6 NYCRR PART 373 – HAZARDOUS WASTE PERMIT TO CONSTRUCT/OPERATE HAZARDOUS WASTE MANAGEMENT FACILITY (HWMF)/MODIFICATION REQUEST TO SITEWIDE PART 373 PERMIT PERMIT ID 9-2934-00022/00097

CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY

August 2013
(Revised November/December 2013)

Prepared By: *CWM Chemical Services, LLC.*
1550 Balmer Road
Model City New York, 14107

SCHEDULE I TO MODULE I

(proposed modified pages are designated with a December 2013 revision date at the bottom of the respective page)

PART 373 PERMIT

SCHEDULE 1 OF MODULE I
FACILITY-SPECIFIC CONDITIONS

DEC Facility Name: CWM Chemical Services, L.L.C.
DER Facility No.: 932045
EPA RCRA ID No.: NYD049836679

Facility Address: 1550 Balmer Road
Model City, New York 14107
Niagara County
Hereinafter referred to as "Facility" or "Site"

A. PERMITTED ACTIVITIES

The following hazardous waste management units, activities and types and quantities of hazardous waste to be managed are authorized by this Permit:

Unit Type[1]	No. of Areas/Units	Activity Type	Waste Type[2]	Quantity[3]
Containers[7] (S01)	38 areas 11,952 units	Storage	Solid & Liquid Wastes	2,154,736 gallons
Tanks (S02)	16 areas 28 units	Storage	Liquid Wastes	988,051 gallons
Tanks (T01)	11 areas 32 units	Treatment	Liquid Wastes	2,336,880 gallons 259,180 gallons/day[4]
Tanks[5] (T04)	1 area 2 units	Stabilization, Immobilization or Encapsulation	Solid & Debris Wastes	40,708 gallons 150 short tons/hour
Surface Impoundments[6] (S04)	4 areas 5 units	Storage	Liquid Wastes	142,349,500 gallons
Landfill[8] (RMU-1 & RMU-2) (D80)	1 area 1 unit	Disposal	Solid & Debris Wastes	4,731 acre-feet

Footnotes:

1. Unit codes are as described in the Part A Application.

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2. Specific waste types and waste codes are presented in Exhibit C (containers) of this Schedule, Exhibit D (tanks) of this Schedule, Exhibit E (surface impoundments) of this Schedule, Exhibit F (landfills) of this Schedule and Attachment C of this Permit.

3. The maximum storage limit for incinerable liquids is 130,636 gallons and the maximum storage limit for incinerable solids is 633,500 lbs. (see **Condition G.1 of Exhibit A**).

4. The indicated treatment capacity of 259,180 gallons/day pertains to the flow rate through the entire treatment system. Certain waste types which can be adequately treated without having to pass through the entire system may be processed at a faster rate.

5. Mixing Pit Tanks 1&2.

6. Includes Facultative Ponds 1 & 2, Facultative Ponds 3 & 8 and proposed New Facultative Pond 5. Total quantity will be revised upon approval of the closure certification for Facultative Ponds 3 and 8.

7. Number of Areas and Units and the Waste Quantity include the total for the Existing Drum Management Building, South Trailer Parking Area, Stabilization Full Trailer Parking Areas I to IV, Tank T-109 (SLF-10) Load / Unload Area, Tank T-158 (SLF 1-11 OWS) Load / Unload Area and the proposed New Drum Management Building, New Full Trailer Parking Area, New Stabilization Trailer Parking Area, Tank T-109 (SLF-10) Load / Unload Area, and Tank T-158 (SLF 1-11 OWS) Load / Unload Area. The Existing Drum Management Building, South Trailer Parking Area, Stabilization Full Trailer Parking Areas I to IV, Tank T-109 (SLF-10) Load / Unload Area, and Tank T-158 (SLF 1-11 OWS) Load / Unload Area will be deleted from the Permit upon approval of the closure certification.

8. Landfill unit type includes Residuals Management Unit No. 1 and proposed Residuals Management Unit No. 2. Waste quantity will be revised upon approval of the closure certification for Residuals Management Unit No. 1.

B. PERMIT DOCUMENTS

The following Modules, Attachments and documents incorporated by reference are considered part of this Permit:

Modules:

- I General Conditions
  Schedule 1 of Module I
- II Corrective Action Requirements
- III Use and Management of Containers
- IV Tank Systems
- V Surface Impoundments
- VI Landfills
- VII RESERVED
- VIII Intermediate Commercial Hazardous Waste Storage and Treatment Facilities and Land Disposal Restrictions (LDRs)
- IX RESERVED

Attachments:

- A Application Section A – Part A Application
- B Application Section F, Subsection 1.0 to 1.3 – Preparedness & Prevention - Security

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C	Application Section C – Waste Analysis Plan
D	Application Appendix D-1 – Containers (Process Description); Application Appendix D-2 – Surface Impoundments (Process Description), Facultative Ponds Response Action Plan; Application Appendix D-3 – Tanks (Process Description); Application Appendix D-3, Section VII – Tank Ancillary Equipment – Tightness Testing Procedures for Underground Hazardous Waste Transfer Lines; Application Appendix D-3, Section IX – Tank System Assessment Table; and Application Appendix D-3, Figures & Capacity Calculations for Tank Systems' Secondary Containment
E	Corrective Action Requirements
F	Application Section F – Preparedness & Prevention
G	Application Section G – Contingency Plan
H	Application Section H – Personnel Training Plan
I	Application Section I – Closure Plan & Post-Closure Plans
J	Application Appendix D-6 – RMU-1 Landfill Drawings; RMU-2 Landfill Drawings; Application Appendix D-7 – RMU-1 Landfill Technical Specifications; RMU-2 Landfill Technical Specifications; and Application Appendix D-8 – RMU-1 Landfill Quality Assurance Manual; RMU-2 Response Action Plan
K	Application Appendix D-9 – RMU-1 Landfill Response Action Plan; and Application Appendix D-11 –Minimum Waste Strength Curves
L	Application Appendix D-10 – Fugitive Dust Control Plan
M	Surface Water Sampling and Analysis Plan
N	Air & Meteorological Monitoring Plan
O	Major / Minor Modifications
P	Permit Cross-Reference Index

<u>Documents Incorporated by Reference</u>:

1. "CWM Meteorological Monitoring Network - Quality Assurance Project Plan" (November 2000; revised November 2013)[1]
2. Department-Approved "Site-Wide and RMU-1 Closure Cost Estimates" (January 24, 2012 with revisions dated June 7, 2012)
3. Department-Approved "Site-Wide and RMU-1 Post-Closure Cost Estimates and Corrective Measures Cost Estimate" (January 24, 2012 with revisions dated June 7, 2012)
4. "Surety Bond #022046594" issued by Liverty Mutual Insurance Company (October 2013)[1,2] [6 NYCRR 373-2.8(d) & (f)]
5. "Surety Bond #K08931884" issued by RLI Insurance Company (April 2001)[1,2] [6 NYCRR 373-2.8(d) & (f)]
6. "JP Morgan Chase Bank Standby Trust Agreement" (October 2013)[1,2]

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7. “Groundwater Extraction Systems Operations and Maintenance Manual” (April 2008, November 2013)[1] [6 NYCRR 373-2.6(l)]

8. Part 373 Permit Application, Drawings Section – “Process & Instrumentation Diagrams (PIDs) for Tank Systems” (December 2001; revised September 2013)[1] [6 NYCRR 373-1.5(c)(4)]

9. Part 373 Permit Application, Appendix D-3, Table entitled – “Aboveground Ancillary Equipment Without Secondary Containment” (April 2001, Revised May 2012)[1] [6 NYCRR 373-2.10(d)(6)]

10. “Aqueous Waste Treatment System Operations and Maintenance (O&M) Manual” (April 2000; revised September 2013)[1] [6 NYCRR 373-2.10(e)]

11. “Operations and Maintenance (O&M) Manual for the Stabilization Facility” (June 1999; revised November 2013)[1] [6 NYCRR 373-2.10(e)]

12. Part 373 Permit Application, Appendix D-5 – “RMU-1 Engineering Report” (June 2003; revised September 2012)[1] [6 NYCRR 373-2.14(c)]

13. “RMU-1 Operations and Maintenance (O&M) Manual” (November 2002 with revisions through November 2013)[1] [6 NYCRR 373-2.14(c) & (e)]

14. “RMU-1 Leachate Level Compliance Plan (LLCP)” (November 2002 with revisions through November 2011)[1] [6 NYCRR 373-2.14(c) & (e)]

15. “Groundwater Sampling and Analysis Plan (GWSAP)” (October 2003; revised November 2013)[1] [6 NYCRR 373-2.6(h)]

16. “Statement of Basis, Selection of Final Corrective Measures, CWM Chemical Services, L.L.C., USEPA ID No. NYD049836679, Model City, NY 14107” (January 31, 2001)[1]

17. “Design Report for Process Area III Groundwater Interceptor Trench” (May 2012)[1] [6 NYCRR 373-2.6(l)]

18. “Design Report for Process Area IV Extraction Wells” (April 2012)[1] [6 NYCRR 373-2.6(l)]

19. “Site Radiological Survey Plan (SRSP)” (November 2006; revised November 2013)[1] [6 NYCRR 373-2.6(l)]

20. “Sitewide Radiological Investigation Soil Sampling Plan (SRISSP)” (May 2006)[1] [6 NYCRR 373-2.6(l)]

21. “Radiation Environmental Monitoring Plan (REMP)” (March 2006; revised November 2013)[1] [6 NYCRR 373-2.6(l)]

22. “Generic Small Project Soil Excavation Monitoring and Management Plan (GSPSEM&MP)” (November 2006; Revised November 2013)[1] [6 NYCRR 373-2.6(l)]

23. “Facultative Pond 8 Water Transfer Procedure” (May 2008)[1] [6 NYCRR 373-2.11(b)(7)]

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24. Dioxin Management Plan (October 18, 1993; updated February 2, 1996, August 29, 1996 and May 25, 1999) [6 NYCRR 373-2.14(m)]

25. "RMU-1 Final Cover Access Road Design Plans" (August 2012; revised September 2012 and October 2012)[1] [6 NYCRR 373-2.14(c)]

26. "RMU-1 Supplemental Primary Leachate Pumping System Design and Operational Plan" (October 2012)[1] [6 NYCRR 373-2.14(c)]

27. "Tank System Design and Assessment Report for AWTS Arsenic Removal Tanks" (May 2013)[1] [6 NYCRR 373-2.10(c)(1)]

28. Department-Approved "RMU-2 Closure Cost Estimate" (August 2013)

29. Department-Approved "RMU-2 Post-Closure Cost Estimate" (August 2013)

30. Part 373 Permit Application, "RMU-2 Engineering Report" (August 2013)[1] [6 NYCRR 373-2.14(c)]

31. "RMU-2 Operations and Maintenance (O&M) Manual" (Date TBD)[1] [6 NYCRR 373-2.14(c) & (e)]

32. "RMU-2 Leachate Level Compliance Plan (LLCP)" (Date TBD)[1] [6 NYCRR 373-2.14(c) & (e)]

33. "RMU-2 Soil Excavation Monitoring and Management Plan" (April 2013)[1]

34. "RMU-1 to RMU-2 Transition Plan" (August 2013)[1]

Footnotes:

1. Each document referenced by this footnote includes the above dated original submission and any subsequent Department approved document revisions.
2. Each document referenced by this footnote includes the referenced document and any subsequent Department approved replacement.

C. COMPLIANCE SCHEDULE

The Permittee must complete the following activities within the scheduled timeframes indicated in the following table:

Item	Requirement	Compliance Date[1]
FAC Pond 8 Closure Extension[2]	Complete radiological characterization of FAC Pond 8, identify all areas requiring remediation and commence remedial activities.	Interim Date: Within 365 days of the effective date of this Permit.
	Complete all remedial activities, conduct final radiological survey	Interim Date: Within 730 days of the effective

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	of FAC Pond 8 and submit final survey report.	date of this Permit.
	Resume, complete and certify the closure of FAC Pond 8 in accordance with the Closure Plan provided in <u>Attachment I</u> of this Permit.	Final Date: Within 1,095 days of the effective date of this Permit.

<u>Footnotes</u>:

1. The Permittee must comply with the reporting requirements of 6 NYCRR 373-1.6(d)(1)(iii) for each interim date and the final compliance date.
2. Additional requirements related to the FAC Pond 8 closure extension are contained in Exhibit E of this Schedule.

D. <u>SCHEDULE OF DELIVERABLES</u>

The Permittee must complete the activities indicated in the following table within the scheduled timeframes from the effective date of the Permit:

Item	Requirement	Compliance Date
Relocation of Exhibits in Schedule 1 of Module I	Relocate the text from the Exhibits (except Conditions A.1 and B of Exhibit A) of **Schedule 1 of Module I** to the Permit Application sections and plans. Permittee must provide the Department with tracked-changes files and final pages of **Schedule 1 of Module I** and all affected Application and plans indicating where the text was relocated.	Provide with Permit renewal application no less than 180 calendar days prior to Permit expiration.
Permit Reference Tables	Submit, in the form of a Permit modification request, a reference table for each unit type (i.e., containers, tanks, surface impoundments, landfill and waste blending) and for corrective action, which lists all Permit citations of Modules, Attachments and Incorporated Documents that pertain to each unit type and corrective action.	Within ninety (90) days of the effective date of this Permit.

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Item	Requirement	Compliance Date
Citation Verification	Submit a review of Permit Attachments and all Documents Incorporated By Reference as listed under Condition B in Schedule 1 of Module I, to verify that any and all references to Permit conditions in these documents correspond properly to the specific conditions in this Permit. If one or more citations do not reference the correct Permit condition, a Permit modification request shall be provided with the review submission to correct each such citation along with the appropriate modified pages for the effected attachment(s) or document(s).	Within ninety (90) days of the effective date of this Permit.
Additional Financial Assurance	Since the total amounts of the Department-approved Facility closure, post-closure and corrective action cost estimates (incorporated by reference into this Permit by Condition B of Schedule 1 of Module I) exceed the amount of the financial assurance instruments currently in place, provide additional financial assurance to cover the amount of these cost estimates in accordance with **Condition O of Module I** of this Permit	Within sixty (60) days of the effective date of this Permit.
Revised Corrective Action Cost Estimate	Submit for Department approval a revised cost estimate, in current dollars, which includes all operational costs for the Corrective Action Process Area III & IV Groundwater Extraction and Treatment systems with appropriate third party justification.	Within thirty (30) days of the effective date of this Permit.

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Item	Requirement	Compliance Date
Additional Financial Assurance	Provide additional financial assurance to cover the total amount of the corrective action cost estimate, as revised to include the operational costs for Process Areas III & IV corrective action, in accordance with **Condition O of Module I** of this Permit.	Within sixty (60) days of the Department's approval of the revised cost estimate.
Draft Site Management Plan (SMP)	Submit a draft SMP for the Model City facility prepared in accordance with Module II and DER-10. The SMP must be a comprehensive document, must consider and include all site management activities for the entire Facility and must describe how the Permittee will manage the Facility to achieve remedial goals and objectives for the entire Facility as a whole. If the Permittee has already prepared a Department-approved plan that fulfills a component of the SMP, the Permittee may incorporate such plan(s) by reference.	Within ninety (90) days of the effective date of this Permit.
Final SMP	Submit a final SMP for the Model City facility acceptable to the Department prepared in accordance with DER-10.	Within 180 days of the effective date of this Permit.
Process Area III Groundwater Extraction System Installation	Complete the installation of the Process Area III groundwater extraction trench and all appurtenances necessary for the operation of this extraction system including Tank T-8010 in accordance with the Department approved "Design Report for Process Area III Groundwater Interceptor Trench" (incorporated by reference into this Permit by Condition B of Schedule 1 of Module I).	Within ninety (90) days of the effective date of this Permit.

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Item	Requirement	Compliance Date
Process Area III Groundwater Extraction System Construction Report	Submit a Construction Report to the Department which documents the system's construction in accordance with the aforementioned Design Report, and including the certification for Tank T-8010 as required by **Condition B of Module IV** of this Permit	Within thirty (30) days of system installation.
Process Area III Groundwater Extraction System Operation	Place the Process Area III groundwater extraction system and any DNAPL recovery system into operation in accordance with the aforementioned Design Report.	Within fifteen (15) days of Department approval of the Construction Report, or the following operational season if the approval occurs during the period from November 1 to April 14.
Process Area III Groundwater Extraction System SMP Inclusion	Include the Process Area III Groundwater Extraction System in the submission of the Draft SMP for Department approval.	Within ninety (90) days of the effective date of this Permit.
Process Area IV Groundwater Extraction System Installation	Complete the installation of the Process Area IV groundwater extraction wells and all appurtenances necessary for the operation of this extraction system including Tank T-8009 in accordance with the Department approved "Design Report for Process Area IV Extraction Wells" (incorporated by reference into this Permit by Condition B of Schedule 1 of Module I).	Within ninety (90) days of the effective date of this Permit.
Process Area IV Groundwater Extraction System Construction Report	Submit a Construction Report to the Department which documents the system's construction in accordance with the aforementioned Design Report, and including the certification for Tank T-8009 as required by **Condition B of Module IV** of this Permit.	Within thirty (30) days of system installation.

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Item	Requirement	Compliance Date
Process Area IV Groundwater Extraction System Operation	Place the Process Area IV groundwater extraction system into operation in accordance with the aforementioned Design Report.	Within fifteen (15) days of Department approval of the Construction Report, or the following operational season if the approval occurs during the period from November 1 to April 14.
Process Area IV Groundwater Extraction System SMP Inclusion	Include the Process Area IV Groundwater Extraction System in the submission of the Draft SMP for Department approval.	Within ninety (90) days of the effective date of this Permit.
FAC Pond 8 Closure	Complete the closure of FAC Pond 8 in accordance with the requirements of this Permit and submit a closure certification report to the Department.	See Condition C (above) and Condition D of Exhibit E.

E. REQUIREMENTS FOR AN ON-SITE ENVIRONMENTAL MONITOR

Number of Environmental Monitors assigned to Facility: Four (4)

1. The account to fund the Environmental Monitor(s) as established under this Permit must continue as follows:

   a. Funds as required to support the monitoring requirements must be provided to the Department for funding of environmental compliance activities related to the Permittee's Facility. This sum is based on annual Environmental Monitor service costs and is subject to annual revision. Subsequent annual payments must be made for the duration of this Permit to maintain an account balance sufficient to meet the next year's anticipated expenses. The Permittee will be billed annually for each fiscal year this Permit is effective. The Permittee must make payment 30 days in advance of April 1 of each fiscal year.

   b. The Department may revise the required payment on an annual basis to include all costs of monitoring to the Department. The annual revision may take into account factors such as inflation, salary increases, changes in operating hours and procedures and the need for additional Environmental Monitors and supervision of such Environmental Monitors by full-time Environmental Monitor supervisors. Upon written request by the Permittee, the Department shall provide that entity with a written explanation of the basis for any modification. If such a revision is

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required, the Department will notify the Permittee of such a revision no later than 60 days in advance of any such revision.

c. Prior to making its annual payment, the Permittee will receive and have an opportunity to review an annual work plan that the Department will undertake during the year.

d. Payments are to be in advance of the period in which they will be expended.

e. Within 30 days of written notice by the Department that a payment is due, payment must be forwarded to the Department. Payment must be sent to New York State Department of Environmental Conservation, Bureau of Revenue Accounting, 625 Broadway 10th Floor, Albany, New York 12233-5012.

f. Failure to make the required payments is a violation of this Permit. The Department reserves all rights to take appropriate action to enforce the above payment provisions.

g. The Environmental Monitor(s) shall, when present at the Permittee's Facility, abide by all of the Permittee's health and safety and operational requirements and policies; provided, however, that this subparagraph shall not be construed as limiting the Environmental Monitors' powers as otherwise provided for by law and shall not result in the Environmental Monitor(s) being less protected than the Environmental Monitor(s) would be if he or she were to abide by State and Federal health and safety requirements.

h. The Department's Environmental Monitor(s) must receive from the Permittee all general safety training which is normally given to new site employees. This training will be a supplement to the mandatory safety training that Environmental Monitors receive from the Department.

i. The Permittee must furnish to the Environmental Monitor(s) a current site policy and procedures manual for health and safety issues. Within fifteen (15) days of any revision to the health and safety plan, the Permittee must notify the Department, in writing, of such modification.

j. The specific daily responsibilities of the Environmental Monitor are dynamic in scope. In general, the Monitor's function is to monitor the Permittee's environmental quality programs, and work with Facility staff to maximize permit and regulatory compliance.

2. The duties of the Environmental Monitor include, but are not necessarily limited to:

   - Inspections;
   - Liaison with the Permittee and the Department's Permit Writer;
   - Meet with the Permittee on an as-needed basis; and,

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– Other duties as assigned by the Department.

F. ROUTINE REPORTING

The Permittee must submit the following routine reports to the Department by the indicated due date in accordance with the requirements of this Permit (Note: the table below is intended to serve as a guide for certain routine reporting required by this Permit. However, the Permittee is still obligated to comply with all applicable regulations cited in this Permit and all conditions and requirements contained in the Modules, Schedule 1 of Module I, Attachments and documents incorporated by reference into this Permit, regardless of whether they are or are not listed in the table below.):

Item	Frequency	Due Date	Requirement
Routine Environmental Monitoring Results	Monthly	90 days after month of event	6 NYCRR 373-1.6(a)(10)(iii), Module VI, Exhibits B and F, and Attachments E and N
Notification of Intention to Import Hazardous Waste	On-going	4 weeks in advance	6 NYCRR 373-2.2(d)
Local Fire Company Inspection Report	Semiannually	7 days of inspection	Condition A.3 of Exhibit A
Copies of Hazardous Waste Manifests to NYSDEC	On-going	10 days of receipt	6 NYCRR 373-2.5(b)(1)(i) and Condition E of Exhibit F
Copies of Hazardous Waste Manifests from foreign locations to USEPA	On-going	30 days of receipt	6 NYCRR 373-2.5(b)(1)(i)(c) and Condition E of Exhibit F
Unmanifested Waste Report	On-going	Within 10 days of waste receipt	6 NYCRR 373-2.5(b)(2&3) and 373-2.5(f)
Annual Report	Annually	March 1	6 NYCRR 373-2.5(e)
Hazardous Waste Reduction Plan Update	Annually	July 1	ECL 27-0908 and Module I, Condition L
Inventory of Waste in Storage Greater Than 6 Months	Monthly	14 days after month's end	Condition C.1 of Exhibit A
Compliance Report for CWM Facilities	Every five years	180 to 365 days prior to Permit expiration	Module I, Condition E.2

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Item	Frequency	Due Date	Requirement
Cost Estimate for Closure, Post-Closure and Corrective Action Adjusted For Inflation	Annually	October 2	6 NYCRR 373-2.8(c)(2), 6 NYCRR 373-2.8(e)(2) and Module I, Condition O.3
Quantity of Leachate and GWES for Previous Year	Annually	March 1	Condition H.1 of Exhibit A
Containers Secondary Containment Assessment Report	Annually	Complete all assessments by August 31; submit report by November 30	Module III, Condition K.1
Tank Assessment Report	Annually	November 30	Module IV, Condition K.3
Tank Secondary Containment Assessment Report	Annually	Complete all assessments by August 31; submit report by November 30	Module IV, Condition K.4
Discharge Pre-qualification Report for FAC Pond	Prior to each discharge	Prior to discharge	Module V, Condition M.3 and Condition D.3.d of Exhibit B
Waste Profiles for RMU-1 to Monitor	On-going	24 hours in advance	Condition E.1.b of Exhibit F
List of Generators with 3 or More Improperly Designated Wastes for Landfill	Annually	March 1	Condition E.1.h.i of Exhibit F
RMU-1 Pipe Flushing	Annually	30 days after flush	Condition F.3.e of Exhibit F
RMU-2 Pipe Flushing	Annually	30 days after flush	Condition ----- of Exhibit G
Upcoming Week Work Schedule to Monitor	On-going	3 p.m. Friday or prior week	Condition F.5.c of Exhibit F
Report of Leachate Level Measurement Verification (RMU-1) and level probes moved	Quarterly	Within 30 days of end of quarter	Condition G.2.d of Exhibit F

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Item	Frequency	Due Date	Requirement
Results of SLCS Monitoring and Flow Rate	Monthly	90 days after month of event	Condition H.1.b.ii of Exhibit F
Quarterly Survey Report	Quarterly	30 days after quarter	Condition I.1.a of Exhibit F
Summary of Total Volume and Weight of Waste Landfilled During Prior Year	Annually	March 1	Condition I.1.b of Exhibit F
Report of Wastes Disposed with 3-D Grid Location and Description	Monthly	Within 6 months after the end of waste placement in cell or monthly through the life of the landfill	Condition I.1.b of Exhibit F
Weekly Construction Reports During Construction (Cell Construction, Landfill Capping, FAC Pond Construction)	Weekly	2 weeks after event	Condition J.2.h of Exhibit F, Condition ____ of Exhibit G, Condition E.1.a & b of Exhibit E
Groundwater Monitoring, Flow Rate and Direction Summary Report	Annually	March 1	Condition L.9.b of Exhibit F
Well Inspection Report	Every 5 years	December 31	Condition L.11 of Exhibit F and Attachment E, I.K and I.J
Analysis of Untreated Leachate Report	Every 4 years	Within 30 days of obtaining results	Waste Analysis Plan, page C-100
Analysis of Treated AWT Effluent Report	Monthly	30 days after month of event	Waste Analysis Plan, page C-100
Corrective Action Detection Monitoring Report	Semiannually	90 days after month of event	Attachment E, Appendix E.1, I.I

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Item	Frequency	Due Date	Requirement
Valve/Pump Leak Not Repaired in Required Timeframe Report	Semiannually, if leak not repaired in required timeframe	Within 30 days of each occurrence	6 NYCRR 373-2.28(p)(1), Attachment D, Appendix D-1, Section N and Attachment D, Appendix D-3, Section VI
GWES Chemical/ Physical Data, NAPL Sump Check and Removal, and Water Levels	Quarterly	Within 30 days of end of quarter	Attachment E, II.H
Evidence that Financial Assurance Instruments have been Maintained and not Lapsed	Annually	Within 30 days of November 30	Module I, Condition O.11

G. FACILITY-SPECIFIC REQUIREMENTS THAT SUPPLEMENT THE STANDARD MODULES

Exhibit A Supplement to Module I - General Provisions

A General Conditions
B Plans, Reports, Specifications, Implementation Schedules and Other Submittals
C Special Storage and Intra-Facility Waste Tracking Conditions
D Special Waste Transportation Conditions
E Special Document Submission Conditions
F Special Surface Water Monitoring Conditions
G Special Cost Estimate & Financial Assurance Conditions
H Special Post-Closure and Corrective Measures Cost Estimate Conditions

Exhibit B Supplement to Module II - Corrective Action

A Corrective Action Requirements
B Additional Corrective Action Activities
C Deed Restrictions
D Supplemental Corrective Action Requirements

Exhibit C Supplement to Module III - Containers

A Authorized Storage Area, Waste Types and Storage Volume
B Special Conditions for Containers (General)
C Special Conditions for Containers (Specific)
D Special Conditions for Container Miscellaneous Units

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Exhibit D Supplement to Module IV - Tanks

Exhibit E Supplement to Module V - Surface Impoundments

Exhibit F Supplement to Module VI – Landfills (RMU-1)

Exhibit G Supplement to Module VI – Landfills (RMU-2)

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EXHIBIT A

SUPPLEMENT TO MODULE I

(proposed modified pages are designated with a revision date at the bottom of the respective page)

EXHIBIT A
SUPPLEMENT TO
MODULE I - GENERAL PROVISIONS

The following conditions supplement those conditions contained within Module I of this Permit:

A. General Conditions

1. The Permittee is authorized to manage only hazardous wastes and non-hazardous wastes waste, from off-site generators and which are generated at the Permittee's Facility as listed in Waste Characteristics Section C-1 (Tables C-1 & C-2) of the Waste Analysis Plan in Attachment C of the Permit, pursuant to the restrictions in Attachment C and the terms of this Permit, unless exempt under 6 NYCRR Part 373-1.1(d), or exempt under 6 NYCRR 371.1(j) and managed in compliance with 6 NYCRR 374-3, or authorized for acceptance under 6 NYCRR 373-4, or collected pursuant to ECL§27-2613 for recycling purposes only. The Permittee is **not** authorized by this Permit to accept garbage (putrescible waste).

2. The Permittee must maintain for the duration of this Permit, signed agreements made/renewed with local emergency response agencies (e.g., fire, EMS, police, etc.), or submit to the Department documentation of the Permittee's attempt to obtain such agreements and the outside agencies lack of response, revocation or refusal to enter into said agreements. If the Permittee is unable to obtain a signed agreement from a particular agency, or agencies, or if an agency, or agencies, decide to terminate a previously signed agreement, the above mentioned submission must indicate what specific additional personnel and/or resources the Permittee will employ to compensate for the deficiency in emergency response.

3. The Permittee must make arrangements for semi-annual inspections of the Facility by local fire companies or departments. During each inspection the Permittee must solicit recommendations from the fire company or department concerning minimum suggested inventories for firefighting and safety equipment to be maintained at the Facility. A report of each inspection, including any and all recommendations made by fire company or department inspectors and the Permittee's plans for addressing these recommendations, must be submitted by the Permittee within seven (7) days of each inspection.

4. The Permittee must provide a copy of the Contingency Plan containing an inventory sheet listing the amount and location of all emergency equipment available on-site, to all employees involved in emergency response and to personnel at each manned gate or guardhouse.

5. In the event of a fire, explosion or a release of hazardous waste to off-site areas, the Permittee must, at a minimum, immediately alert the local fire company or department to respond.

6. Upon notification by the Permittee of any partial closure of a unit or portion thereof, or of final closure of the Facility, in accordance with 6 NYCRR 373-2.7(c)(4), the Department will determine at the time of said closures whether additional samples, sampling points, sampling techniques/methods and/or sample analysis (i.e., in addition to Closure Plan requirements in Attachment I of this Permit) will be necessary to verify the effectiveness of decontamination or removal of components, equipment, structures and contaminated soils. These determinations will be based upon the past history of operating practices and types of wastes handled at the unit/Facility and on the closure regulations and other requirements in effect at the time of closure of the unit/Facility. The operating record, the record of spills, the types of waste released, location of spills and the condition of any secondary containment systems will also provide data to be used in these determinations. Also, at the time of said closures, the Department will determine whether more restrictive and/or additional criteria (i.e., more restrictive than, or in addition to Closure Plan criteria in Attachment I of this Permit) will be necessary to verify the effectiveness of decontamination or removal of components, equipment, structures and contaminated soils, based on the Department's regulatory cleanup standards in effect at the time of said closures.

7. If the Department determines that additional sampling and analysis or more restrictive and/or additional criteria are necessary at the time of unit/Facility closure, the Department shall send the Permittee a notice of intent to modify this Permit in accordance with 6 NYCRR 621 to incorporate these requirements into the Permit. In the event the Department issues such a notice of intent, the Permittee will be restricted from issuing a certification of closure for the unit/Facility in accordance with 6 NYCRR 373-2.7(f), until the associated 6 NYCRR 621 Permit modification process is completed and any associated closure requirement(s) that might result from this modification process are satisfied.

B. Plans, Reports, Specifications, Implementation Schedules and Other Submittals

1. Submittals required by the Permit must be provided to the Department and other identified Agencies as listed below. The list below identifies the Department/Agencies staff by title that must receive submissions and indicates the types of submissions each must receive. At anytime during the life of this Permit, the Department may designate alternate titles or addresses to receive submissions (different than those indicated below), and direct the Permittee to make submissions to the alternate title or address. The list below also indicates whether the submission must be a paper or electronic copy. Where electronic copies are indicated, the submission must be in a form as required by **Condition N of Module I** of this Permit. Submissions of electronic copies may be made by e-mail or other methods acceptable to the Department.

a. One (1) electronic copy of all submittals to:

Regional Hazardous Materials Engineer
New York State Department of Environmental Conservation
Region 9 Office
270 Michigan Avenue
Buffalo, NY 14203-2999

b. One (1) electronic copy of the following:

- any reports on international transport of hazardous waste;
- the "greater than six months drum inventory report";
- any documentation of incoming wastes incorrectly labeled; and,
- only the cover letters of all other submittals.

to:

Chief, RCRA Programs Branch or designee
Division of Environmental Planning and Protection
U.S. Environmental Protection Agency, Region II
290 Broadway, 22nd Floor
New York, NY 10007-1866

c. One (1) electronic copy of all submittals except for those specific only to waste reduction to:

Director, Remedial Bureau E
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7017

d. The original (paper) version of all financial assurance instruments to:

RCRA C Financial Assurance Coordinator
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7251

e. One (1) electronic copy of all waste reduction documents to:

Chief, Bureau of Waste Reduction & Recycling
Division of Materials Management
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7253

f. One (1) paper copy of all modification requests pertaining to this Permit to:

Regional Permit Administrator
Division of Environmental Permits
New York State Department of Environmental Conservation
Region 9 Office
270 Michigan Avenue
Buffalo, NY 14203-2999

g. One (1) electronic copy of all submittals required by **Condition D of Exhibit B** to:

Assistant Director, Bureau of Environmental Radiation Protection
New York State Department of Health
Empire State Plaza, Corning Tower
Albany, NY 12237

An electronic copy of all reports, plans, schedules, correspondence or other documents sent to the Department in accordance with this Permit, must be simultaneously sent to the Niagara County Health Department (NCHD) unless otherwise authorized by this agency. Copies of any enclosures or attachments must be provided to the NCHD at its request.

C. Special Storage and Intra-Facility Waste Tracking Conditions

1. Duration of Waste Storage

a. Within 14 days from the end of each calendar month, the Permittee must submit to the Department a list of all waste which has been stored on-site longer than six months and a plan for the ultimate treatment and/or disposal of this inventory.

2. Intra-Facility Waste Tracking

a. The Permittee must operate and maintain a record management system for waste tracking at the Facility. The system must be capable of recording the date of each off-site generated waste's arrival at the Facility, each waste's fingerprint analyses, all internal waste transfers (e.g., container to tank, container to landfill, etc.), the nature and quantities of waste generated at the Facility, and the method, location, and dates of any treatment, any placement into storage, disposal in the RMU-1 landfill, RMU-2 landfill, or shipment off-site for each waste at the Facility. Each waste must be cross-referenced to waste manifests and waste profile numbers. The data from the waste tracking system must become part of the Facility's operating record required by 6 NYCRR 373-2.5.

b. The Permittee must use codes or other means of identifying the ultimate disposition of each waste, whether the waste is intended for treatment in the Facility's aqueous treatment system, whether the waste is intended to undergo on-site fuels blending, whether the waste requires stabilization, encapsulation or other treatment prior to on-site land disposal, any conditions associated with on-site disposal such as segregation of acid-generating and acid-sensitive wastes or dust suppression activities, and each waste's degree of hazard from reactivity, toxicity and flammability. For wastes disposed in RMU-1 or RMU-2, the disposal location will be documented in accordance with **Condition F.5.e of Exhibit F and Condition ___ of Exhibit G**.

D. Special Waste Transportation Conditions

1. Waste Transport To and From the Facility

a. All trucks transporting, in bulk, blended fuels, PCB contaminated oils, or liquid or solid materials which present a risk of a vapor release or fuming will be scheduled to arrive or depart the Facility between 5:00 a.m. and 7:00 a.m. or between 4:00 p.m. and 9:00 p.m. on the days when the Lewiston-Porter School complex is in session. The Permittee must obtain a copy of the Lew-Port School "event" calendar and attempt to schedule shipments of the aforesaid materials so as to avoid events that are expected to be heavily attended.

b. No trucks carrying waste will be scheduled for arrival or departure between 7:30 a.m. and 9:00 a.m. or between 2:15 p.m. and 3:45 p.m. on days when the Lewiston-Porter School complex is in session. Trucks may be moved from CWM's transportation Facility at 1135 Balmer Road to the TSDF site at 1550 Balmer Road during these hours.

c. Trucks carrying waste to the Facility and arriving via I-190 must use the existing designated route. Trucks carrying wastes to the Facility arriving from the eastern part of Niagara County must use the available state highways to Balmer Road. The Permittee will designate an alternate inbound route for trucks arriving via I-190 if adequate traffic safety devices (signals) are installed at the cloverleaf off ramp left turn onto Rt. 104 East.

d. The Permittee must communicate the above requirements along with all authorizations that are granted to transporters who list the Model City Facility site at 1550 Balmer Road in the Towns of Lewiston and Porter, Niagara County, on their New York State Part 364 waste transporter permits.

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e. It is intended that the above requirements be applied to all waste transporters (including those operating under the control of the Permittee, its parent corporation or any other corporate affiliate of the Permittee) and enforced by the Permittee as provided for in the "CWM Model City Transportation Rules and Regulations", in accordance with the Site Operations Plan (Appendix 1 of the CAC Agreement dated July 21, 1993 or most recent approved edition). The Permittee's failure to communicate the conditions referenced above or its failure to enforce those conditions as provided for in the CWM Model City Transporter Rules and Regulations, shall constitute a violation of this Permit, and hence a violation of the Environmental Conservation Law ("ECL"). It is however, recognized that the CWM Model City Transporter Rules and Regulations allow a measure of discretion to the Permittee in determining the sanctions to be imposed on any transporter.

f. A failure of Permittee owned vehicles to comply with any of the above conditions shall constitute a violation of this Permit and hence a violation of the ECL.

g. It is also recognized that these conditions are almost identical to certain provisions in the CAC Agreement and that the parties to that Agreement intended that the terms of that Agreement may be amended from time to time as the situation warrants and the parties agree. Any changes in the corresponding provisions of the CAC Agreement shall require the Permittee to immediately request a modification of this Permit to incorporate these changes into this Permit. Since the same requirements are contained in the CAC Agreement, it is intended that the parties to the CAC Agreement, particularly the Towns of Lewiston and Porter and the County of Niagara, will be the principal parties responsible for the enforcement of these conditions and the resolution of any disputes concerning the implementation thereof.

2. Waste Transport Within the Facility

a. The Permittee must inspect the vehicles and Waste Transporter Permits of all waste haulers upon their arrival at the Facility. If the Waste Transporter Permit has expired, that discrepancy must be recorded in the Facility's operating record and Department staff must be notified the date of the waste's arrival if staff is present on-site or, if not present on-site, within one (1) business day.

b. The Permittee must maintain in the Facility's operating record, documentation of all leaking vehicles, including dump trailers and roll-off containers, and invalid permits identified during the Waste Transporter Permit review and vehicle inspection as required above. The following information is to be included in the operating record:

- The waste hauler's name;
- The trailer (waste containing section of the vehicle) license number;
- The Permit number;

- Any discrepancies noted in the hauler's Waste Transport Permit or any leakage noted during the vehicle inspection;
- In the event of vehicle leakage, documentation of the actions taken to correct the problem and to cleanup any released waste; and
- In the event of any discrepancies or leakage, note when on-site Department staff were notified.

3. Waste Transport Vehicles and Other Equipment Which Contacts Hazardous Waste

   a. Vehicles or equipment entering the RMU-1 or RMU-2 landfills coming in contact with wastes, waste residues or contaminated media therein, must have all surfaces which may have contacted such material cleaned/decontaminated prior to leaving the landfill. For the RMU-1 or RMU-2 landfills, all vehicles and equipment must be cleaned/decontaminated at the truck wash Facility located within the landfill, in accordance with **Condition F.7 of Exhibit F for RMU-1 and Condition ___of Exhibit G for RMU-2**.

E. <u>Special Document Submission Conditions</u>

1. Standard Division Practices (SDPs)

   a. The Permittee must provide the Department with copies of all new SDPs dealing with management of waste in advance of any new activity involving hazardous waste management practices specified by the new SDPs. The Permittee must also give written notification to the Department in advance of any modification to an SDP activity involving hazardous waste management, and provide copies of all SDP modifications at least five (5) business days in advance of the modified SDP's implementation. All SDPs must be consistent with, and in no way conflict with the conditions, Attachments and referenced documents of this Permit. The Permittee must not implement any SDP or modification to an SDP for which it has received notification from the Department of apparent inconsistencies between the SDP and this Permit.

2. Permittee's Organizational Chart

   a. The Permittee must submit a new organizational chart to the Department within 15 working days of any change to the key management personnel such as Managers or Supervisors.

F. <u>Special Surface Water Monitoring Conditions</u>

1. The Permittee must, at a minimum, perform weekly inspections of control gates at all Surface Water Monitoring Points (SMPs) at the Facility, except for SMP 2. The inspector must verify that each gate is closed and not leaking, unless the surface water at the SMP has been tested and approved for discharge in accordance with the SWSAP in <u>Attachment M</u> of this Permit.

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G. Special Cost Estimate & Financial Assurance Conditions

1. The Department approved Closure Cost Estimate which is incorporated by reference into this Permit by **Schedule 1 of Module I**, makes assumptions regarding tank and container waste inventory at closure to estimate disposal costs. Since disposal by incineration far exceeds the cost of other disposal methods (e.g., aqueous treatment, landfill) on a "per unit" basis (i.e., per gallon or per pound/ton), it is necessary to limit the storage of incinerable wastes at the facility to the quantities assumed in the closure cost estimate so that the estimate represents the cost of final closure that is the most expensive in accordance with 6 NYCRR 373-2.8(c)(1)(i). Therefore, based on the waste inventory quantities assumed in the approved closure cost estimate, the total volumes of liquid and solid incinerable wastes that can be stored at the facility in tanks or containers at any point in time is limited to the following maximums:

   Maximum Stored Quantity of Incinerable Liquids: 130,636 gallons

   Maximum Stored Quantity of Incinerable Solids: 633,500 lbs.

   The Permittee must verify compliance with the above limits on a quarterly basis and record the total quantities of incinerable liquids and solids stored on-site at the end of each quarter in the facility's Operating Record. Copies of the quarterly assessment of incinerable waste in storage must be submitted as part of the Facility's Annual Report required by 6 NYCRR 373-2.5(e).

2. Financial Assurance Standby Trust Fund for Facility Closure, Post-Closure and Corrective Action

   a. The Permittee must maintain the Financial Assurance Instruments and the Standby Trust Fund which are incorporated by reference into this Permit by **Condition B of Schedule 1 of Module I** including any subsequent Department approved revisions, or Department approved replacements. The Standby Trust Fund must be maintained to receive deposits of all payments from the approved financial assurance instruments as referred to in **Condition O of Module I**. The Department shall, in accordance with 6 NYCRR 373-2.8 and the wording of the instruments as required by 6 NYCRR 373-2.8, direct that such payments be deposited in the Standby Trust Fund.

   b. Subsequent to payments being deposited in the Standby Trust Fund, the fund must be managed in accordance with 6 NYCRR 383-2.8 and the wording in the approved Standby Trust Agreement.

H. Special Post-Closure and Corrective Measures Cost Estimate Conditions

1. Leachate Generation & Extracted Groundwater Cost Estimate Increases

   a. The actual annual quantities of leachate and contaminated groundwater removed from each hazardous waste landfill and by on-site contaminated groundwater extraction systems during the previous calendar year, as well as all previous calendar years, must be presented in tables and graphs in the Permittee's annual report in accordance with 6 NYCRR 373-2.5(e). For RMU-1 and RMU-2 and the on-site contaminated groundwater extraction systems, "previous calendar years" includes all calendar years since the removal of leachate and contaminated groundwater was first initiated. For closed landfills, "previous calendar years" includes only those calendar years since the date of each landfill's closure certification. If, upon reviewing this information, the Department determines that there has been a significant change in the annual quantities of leachate and/or contaminated groundwater being removed that would increase the cost of annual post-closure care and/or corrective measures indicated in the approved post-closure and corrective measures cost estimates, the Department will notify the Permittee in writing and require the Permittee to revise the cost estimates to cover the increase. The Permittee must submit, for Department approval, the revised cost estimates within thirty (30) days of the Permittee's receipt of the above indicated written notification by the Department that an increase in the cost estimate is necessary due to a significant increase in leachate and/or contaminated groundwater generation. Subsequent to Department approval of the revised cost estimate, the Permittee must establish additional financial assurance to cover the amount of the increase in the cost estimates in accordance with **Condition O of Module I**.

2. Determination of Long-Term Post-Closure Care and Corrective Action Costs

   a. The total amount of the cost estimate for the entire post-closure care and corrective action period, shall be calculated using the total annual cost estimate for post-closure and corrective action according to the following procedure:

      i. The total amount of the Facility's Annual Post-Closure and Corrective Action Cost Estimate, in current dollars, must be multiplied by a 30-year post-closure care and corrective action period to derive the total 30-year post-closure cost estimate in accordance with 6 NYCRR 373-2.8(e)(1)(ii).

      ii. Using the total amount of the Facility's Annual Post-Closure and Corrective Action Cost Estimate, calculate the present value of the cost over the entire post-closure care and corrective action period by dividing the total annual amount by the most recent Department-approved discount rate.

      iii. The total amount of the cost estimate for the entire post-closure care and corrective action period, shall always be the greater of the two amounts calculated according to **Conditions H.2.a.i and H.2.a.ii** of this Exhibit.

   b. The calculation required by **Condition H.2.a** of this Exhibit must be repeated anytime there is an increase in the Facility's Annual Post-Closure or Corrective Action Cost Estimate, and within fifteen (15) days of any Department-approved revision to the discount rate, with the results submitted to the Department. If this calculation results in an increase in the previously approved Department cost estimate, the Permittee must establish additional financial assurance to cover the

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amount of the increase in the cost estimate in accordance with **Condition O of Module I.**

3. Re-Evaluation of the Present Value Discount Rate

   a. The Permittee must submit an updated evaluation and calculation of the real risk free discount rate from an independent Certified Public Accountant (CPA) for the Post-Closure Care and Corrective Action cost estimates, no later than 180 days before the expiration date of this Permit. The real risk free discount rate must be determined by calculating the arithmetic average Annual Total U.S. Long Return, adjusted by the Consumer Price Index (CPI) for the period 1800 through the year preceding the update. The current Department-approved discount rate of 3.85% shall remain in effect unless and until the Department approves a revised rate. If the Department approves a revised rate, the Permittee must re-calculate post-closure care and corrective action costs according to **Condition H.2** of this Exhibit.

EXHIBIT B

SUPPLEMENT TO MODULE II

(no modifications requested)

EXHIBIT B
SUPPLEMENT TO
MODULE II - CORRECTIVE ACTION

The following conditions supplement those conditions contained within Module II of this Permit:

A. Corrective Action Requirements

1. RCRA Facility Investigation (RFI)

   The Permittee has undertaken eighty-four (84) RFI investigations at solid waste management units (SWMUs) and site-wide areas at the Model City Facility. Detailed descriptions of the investigations can be obtained by referring to the individual/group RFI Reports which are listed in Attachment E of this Permit. A list of the Site Specific Indicators which have been released to the soil and groundwater, and the "groundwater protection standard" for those hazardous waste constituents is included in the following table.

SITE-SPECIFIC INDICATORS CWM MODEL CITY FACILITY		
Analytes	**Units**	**Groundwater Protection Standard**
Benzene	µg/l	1
Bromoform	µg/l	50 GV
Carbon Tetrachloride	µg/l	5
Chlorobenzene	µg/l	5
Chlorodibromomethane	µg/l	50
Chloroethane	µg/l	5
2-Chloroethylvinylether	µg/l	50
Chloroform	µg/l	7
Dichlorobromomethane	µg/l	5
1,1-Dichloroethane	µg/l	5
1,2-Dichloroethane	µg/l	0.6
1,1-Dichloroethene	µg/l	5
1,2-Dichloropropane	µg/l	1
cis-1,3-Dichloropropylene	µg/l	5
trans-1,3-Dichloropropylene	µg/l	5
Methyl Bromide	µg/l	5
Methyl Chloride	µg/l	5

SITE-SPECIFIC INDICATORS CWM MODEL CITY FACILITY		
Analytes	**Units**	**Groundwater Protection Standard**
Methylene Chloride	µg/l	5
Tetrachloroethylene	µg/l	5
1,1,2,2-Tetrachloroethane	µg/l	5
Toluene	µg/l	5
trans-1,2-Dichloroethylene	µg/l	5
1,1,1-Trichloroethane	µg/l	5
1,1,2-Trichloroethane	µg/l	1
Trichloroethylene	µg/l	5
Vinyl Chloride	µg/l	2
Acenaphthene	µg/l	20 GV
Acenaphthylene	µg/l	50
Anthracene	µg/l	50
Benzo(a)pyrene	µg/l	ND
Benzo(g,h,i)perylene	µg/l	50
Benzo(k)fluoranthene	µg/l	0.002 GV
Bis(2-chloroethoxy)methane	µg/l	5 GV
Bis(2-chloroethyl)ether	µg/l	1.0
Bis(2-chloroisopropyl)ether	µg/l	50
Bis(2-ethylhexyl)phthalate	µg/l	5
4-Bromophenylphenylether	µg/l	*see total phenols std.
Butylbenzylphthalate	µg/l	50 GV
2-Chloronaphthalene	µg/l	10 GV
Chrysene	µg/l	0.002 GV
1.2-Dichlorobenzene	µg/l	3
1.3-Dichlorobenzene	µg/l	3
1.4-Dichlorobenzene	µg/l	3
3,3'-Dichlorobenzidene	µg/l	5
Diethylphthalate	µg/l	50 GV
Di-n-butylphthalate	µg/l	50
2,6-Dinitrotoluene	µg/l	5
2,4-Dinitrotoluene	µg/l	5

SITE-SPECIFIC INDICATORS CWM MODEL CITY FACILITY		
Analytes	**Units**	**Groundwater Protection Standard**
Fluoranthene	µg/l	50 GV
Hexachlorobenzene	µg/l	0.04
Hexachlorocyclopentadiene	µg/l	5
Hexachloroethane	µg/l	5
Indeno(1,2,3-cd)pyrene	µg/l	2.0
Isophorone	µg/l	50 GV
Naphthalene	µg/l	10 GV
N-nitrosodi-n-propylamine	µg/l	50
N-nitrosodiphenylamine	µg/l	50 GV
Phenanthrene	µg/l	50 GV
1,2,4-Trichlorobenzene	µg/l	5
2-Chlorophenol	µg/l	*see total phenols std.
2,.4-Dichlorophenol	µg/l	5 *see total phenols std.
4,6-Dinitro-o-cresol	µg/l	*see total phenols std.
2,4-Dinitrophenol	µg/l	10 GV *see total phenols std.
2-Nitrophenol	µg/l	*see total phenols std.
p-Chloro-m-cresol	µg/l	*see total phenols std.
Phenol	µg/l	*when more than one phenol compound is detected, each phenol compound may not exceed a standard of 1
Aroclor 1242	µg/l	total PCBs 0.1
Aroclor 1254	µg/l	total PCBs 0.1
Aroclor 1260	µg/l	total PCBs 0.1
Aroclor 1248	µg/l	total PCBs 0.1
Aroclor 1232	µg/l	total PCBs 0.1
Aroclor 1221	µg/l	total PCBs 0.1
Aroclor 1016	µg/l	total PCBs 0.1

2. Corrective Measures

   The Corrective Measures which have been implemented by the Permittee are described in Attachment E of this Permit.

3. Corrective Measures Study

   The Corrective Measures Study (CMS) for the Model City Facility was performed by the Permittee has two main components, the Site-Wide CMS and the SWMU-Specific CMS. The Statement of Basis dated January 31, 2001, incorporated by reference into this Permit by **Schedule 1 of Module I**, provides a description of the corrective action program implemented at the Facility. The Permittee must monitor and evaluate the SWMUs as specified in the Groundwater Monitoring Program in **Condition L of Exhibit F** and the Department-approved "Groundwater Sampling and Analysis Plan" (GWSAP) which is incorporated by reference into this Permit by **Schedule 1 of Module I**. The Permittee is herein required to operate and maintain the specified remedial systems in perpetuity in accordance with Attachment E of this Permit and the approved "Groundwater Extraction Systems Operation and Maintenance (O&M) Manual" incorporated by reference into this Permit by **Schedule 1 of Module I**. The Permittee must also maintain a corrective measures cost estimate, in current dollars, and provide financial assurance to cover the costs of operation and maintenance of those systems, in accordance with **Condition G of Exhibit A** and **Condition O of Module I** of this Permit.

   a. SWMU Categories

      Many of the SWMUs listed in Attachment E of this Permit have similar waste and design characteristics and requires the same level of effort to address them. As described in the Site-Wide CMS, six functional categories have been used to group SWMUs and Areas of Contamination based on the SWMU type, history, regulatory status, and nature of the contamination. Each category includes SWMUs that will require a similar level of effort to satisfactorily address potential concerns. The following table presents the SWMUs in their appropriate category.

SWMU Categories	
ENGINEERED and/or MONITORED UNITS (no releases identified) CATEGORY 1	
SLF 1	SLF 6
SLF 7	SLF 10
SLF 11	SLF 12
Facultative Pond 1	Facultative Pond 2
Facultative Pond 3	Facultative Pond 8
PREVIOUSLY ADDRESSED AREAS (clean closed, etc.) CATEGORY 2	
Drum Area I	Facultative Pond 9
Fire Pond	Stabilization Area
AREAS REQUIRING NO FURTHER ACTION CATEGORY 3	
Town of Lewiston Salts Area	North Drum Area
Facultative Pond 4	Spent Carbon Piles
MacArthur Street between Main and "J" Streets	Heavy Equipment Maintenance Building Wash Water Sump/Tank
DEFERRED SWMUs CATEGORY 4	
1. **Third Party SWMUs** (U.S. Government is Responsible for Releases)	
Olin Burn Area	Air Force Drum Area I
Air Force Drum Area II	Air Force Drum Area III
Acid and TNT Lines	Low Level Radioactive Contamination
M Street Manhole	Property "G"
Nike Underground Tank	Waterline Construction Area 2
Waterline Construction Area 3	Waterline Construction Area 4
2. **Permitted Units Handled Under Closure**	
Tanks 64 and 65	Drum Storage Warehouse
Leachate Storage Tanks	Truck Wash
A.B.T.U. 58	
LIMITED PROGRAM SWMUs CATEGORY 5	
Swale	Area west of Drum Area II
Site Wide PCB Sampling	Surface Water Swales
SWMUs SUBJECT TO A FULL CMS CATEGORY 6 See table below	

The locations of these SWMUs are depicted on the figures provided in Attachment E, Appendix E-4 of this Permit.

The following table contains a list of the Category 6 SWMUs, a description of the contamination associated with the SWMU, and a brief description of the proposed remedy for the SWMU. A more detailed description of the remedy is included in the Statement of Basis dated January 31, 2001, which is incorporated by reference into this Permit by **Schedule 1 of Module I**.

Unit	Approximate Contamination Levels	Action
SLF 2	Groundwater, Total VOCs - 100 ppb	Continued monitoring w/trigger
SLF 3 (north side)	Groundwater, Total VOCs - 200 ppb	Continued monitoring w/trigger
SLF 4	Groundwater, Total VOCs - 150 ppb	Continued monitoring w/trigger
SLF 5	Groundwater, Total VOCs - <50 ppb	Continued monitoring w/trigger
South of SLF 3	Groundwater, Total VOCs - >100 ppm, DNAPL	Seasonal operation of existing Corrective Measures
Drum Storage west of SLF 1	Soils	Health & Safety awareness program
Wells W0703s and W0705s	Groundwater, Total VOCs W703s - 500 ppb W705s - <20 ppb	Continued monitoring w/trigger
Drum Storage Along H Street and Mac Arthur Street (wells P0701s, P0703s, W1103s, W1104s, W1105s, W1106s)	Groundwater, Total VOCs: W1103s - 50 ppb W1104s - 150 ppb W1105s - 50 ppb W1106s - 50 ppb P701s - 100 ppb P703s - 60 ppb	Continued monitoring w/trigger
Lagoons 1, 2, 5, 6 and 7	Groundwater, Total VOCs - >100 ppm, DNAPL, Full suite of contaminants within impoundments	Seasonal operation of existing Corrective Measures, In-Situ stabilization of sludge + cap
North Salts Area	No GW contamination detected, Full suite of contaminants within impoundment	In-Situ stabilization of sludge + cap
East and West Salts Areas	See TMW-1S for groundwater, Full suite of contaminants within impoundments	In-Situ stabilization of sludge + cap
West Drum Area	Groundwater, Total VOCs - >100 ppm, DNAPL	Seasonal operation of existing Corrective Measures
Group D	Soils - Isolated detection of 50 ppm Groundwater - 3 ppm	Monitoring w/trigger
Tank Farm E, Tank 42	Groundwater, Total VOCs - 100 ppm, DNAPL	Seasonal operation of Process Area III Corrective Measures
F5801s groundwater	Groundwater, Total VOCs - <50 ppb	Continued monitoring w/trigger

Unit	Approximate Contamination Levels	Action
Houghson Lagoon	Groundwater, Total VOCs - 220 ppb	Health & Safety awareness program
Acid Pit	Soils - <1 ppm	DOD responsibility
Oil Pit	Soils - <1 ppm	DOD responsibility
Syms Tank Area	Soils - <1 ppm	DOD responsibility
Chemical Waste Lift Stations	Percent levels within lift stations	DOD responsibility
Process Area	Groundwater, Total VOCs - >100 ppm, DNAPL	Seasonal operation of existing Corrective Measures PAI, PAII and PAIII, and continuous operation of Corrective Measures PAIV
Well 1002s	Groundwater, Total VOCs: W1002s - 1-2 ppm TW24s - 20-30 ppm	Continued monitoring w/trigger
Piezometer P1202s	Groundwater, Total VOCs - >100 ppm	Seasonal operation of existing Corrective Measures
Tanks 50 & 51 Area	Groundwater, Total VOCs - <50 ppb	Health & Safety awareness program
PCB Warehouse	Groundwater, Total VOCs - >100 ppm	Seasonal operation of existing Corrective Measures
Monitoring Well BW02s	Groundwater, Total VOCs - 50 to 100 ppm	Seasonal operation of existing Corrective Measures
RMU-1 Well Investigations	Groundwater, Total VOCs - 100 ppb	Continued monitoring
TW01s, TMW-1s-3n investigations	Groundwater, Total VOCs - 150 ppb	Continued monitoring

The Permittee must continually implement the detection monitoring program for SLF 1-6 in accordance with the Groundwater Monitoring Program in **Condition L of Exhibit F**. The Permittee must continually implement the detection monitoring program for the North Salts and the East/West Salts in accordance with Attachment E, Appendix E-1, Section I of this Permit, and the corrective action monitoring program for the Lagoons in accordance with Attachment E, Appendix E-1, Section II of this Permit.

Also, in the event that future monitoring of surface storm water identifies contaminant concentrations above the limits set forth in the Facility's SPDES Permit, the Department, at its discretion, may require and the Permittee must implement additional corrective measures to control contaminant migration via surface water.

The Department of Defense (DOD) is in the process of investigating and, in some instances, remediating these SWMUs. The Department anticipates that the DOD will assume responsibility for remediation of these areas. If the Department determines that the DOD has failed to accomplish the necessary remediation of these SWMUs, the Department may require the Permittee, as the owner of the property on which the SWMUs are located, to remediate the SWMUs.

(Note: Nothing in this Exhibit is intended, and nothing herein is to be construed, to waive, prejudice or otherwise limit the authority of the Department, in the exercise of their lawful discretion, to order the Permittee to remediate the aforesaid SWMUs under any applicable laws.)

B. Additional Corrective Action Activities

1. Process Area Phase III

Within ninety (90) days of the effective date of this Permit, the Permittee must complete installation of the Process Area III groundwater extraction trench and all appurtenances necessary for the operation of this extraction system in accordance with the Department approved "Design Report for Process Area III Groundwater Interceptor Trench", which is incorporated by reference into this Permit by **Schedule 1 of Module I.** Within thirty (30) days of completing construction of this system, the Permittee must submit a Construction Report to the Department which documents the system's construction in accordance with the aforementioned Design Report, and including the certification for Tank T-8010 as required by **Condition B of Module IV** of this Permit. The Permittee must place the Process Area III groundwater extraction system and any DNAPL recovery system into operation within fifteen (15) days of Department approval of the Construction Report, or the following operational season if the approval occurs during the period from November 1 to April 14. These systems must be operated in accordance with the approved "Design Report for Process Area III Groundwater Interceptor Trench" and the "Groundwater Extraction Systems Operation and Maintenance (O&M) Manual", which are incorporated by reference into this Permit by **Schedule 1 of Module I**.

2. Process Area IV

Within ninety (90) days of the effective date of this Permit, the Permittee must complete installation of the Process Area IV groundwater extraction wells and all appurtenances necessary for the operation of this extraction system in accordance with the Department approved "Design Report for Process Area IV Extraction Wells", which is incorporated by reference into this Permit by **Schedule 1 of Module I**. Within thirty (30) days of completing construction of this system, the Permittee must submit a Construction Report to the Department which documents the system's construction in accordance with the aforementioned Design Report, and including the certification for Tank T-8009 as required by **Condition B of Module IV** of this Permit. The Permittee must place the Process Area IV groundwater extraction system into operation within fifteen (15) days of Department approval of the Construction Report. These systems must be operated in accordance with the approved "Design Report for Process Area IV Extraction Wells" and the

"Groundwater Extraction Systems Operation and Maintenance (O&M) Manual", which are incorporated by reference into this Permit by **Schedule 1 of Module I**.

C. Deed Restrictions

There are known areas of soil and groundwater contamination at the Facility. Therefore, the Permittee has included and must maintain a formal notation on an instrument included with the deed to the Facility property, which is normally examined during title search, that in perpetuity notifies any potential purchaser of the property that:

1. The land has been used to manage hazardous waste. The deed restrictions will include a map and description of the potential areal and vertical presence of hazardous waste constituents which have been detected in the soil and groundwater at the Facility, typical properties of the chemicals and a list of the potential human exposure routes.

2. Use of certain areas of the Facility may be restricted under 6 NYCRR Part 373-2.7, as if they were a "hazardous waste disposal facility."

3. CWM Chemical Services, L.L.C., for itself, and the State of New York, acting through the Department of Environmental Conservation or its designee, retain the right of access to and use of the property, but without the right to interfere with, obstruct, or otherwise physically impact any structures now or hereafter erected thereon for the commercially useful life of any such structure, to the extent necessary to complete the work required to implement corrective measures, and any further work determined to be necessary as a result thereof, including but not limited to any groundwater monitoring or treatment, soil management, cap and cover installation or maintenance. Subsurface alterations, construction or changes in existing building foundations, sewers, utilities, and other subsurface structures, or excavation on the property should be made with appropriate caution.

4. Future use of the Facility property is restricted to industrial or commercial use only; said use must take into account the nature and distribution of hazardous waste constituents in the soil and groundwater at the Facility.

D. Supplemental Corrective Action Requirements

The Supplemental Corrective Action Requirements that are specified by this Permit condition pertain to the investigation and control of historical chemical and radiological contamination that is known or potentially present in the environmental media on the property of the Permitted Facility. All plans, reports and schedules required by this Permit condition and all subsequent amendments to those documents are incorporated by reference into this Permit, upon approval by the Department in accordance with **Condition B of Schedule 1 of Module I**. In addition, the Permittee must submit all such plans, reports and schedules required by this Permit condition, to the New York State Department of Health (NYSDOH) in accordance with **Condition B of Exhibit A**.

All samples of environmental media obtained by the Permittee pursuant to this Permit condition must be analyzed by a laboratory approved for such analysis in accordance with 6 NYCRR 370.1(f). The Permittee must notify the Department at least seventy-two (72) hours in advance of any scheduled sampling or other investigative activities to be implemented by the Permittee, and must allow Department staff and/or its authorized representatives to collect samples or splits of any samples collected by the Permittee pursuant to this Permit condition.

1. Site Radiological Survey Plan

   The Permittee must complete a Gamma Walkover Survey in accordance with the Department-approved "Site Radiological Survey Plan (SRSP)" which is incorporated by reference into this Permit by **Schedule 1 of Module I**, on all areas of the Facility property which have not been previously surveyed by the Permittee. For areas of the Facility where the Permittee indicates, and the Department concurs, are presently inaccessible for conducting the required survey (e.g., operating FAC Ponds, etc.), the Permittee must perform the required survey whenever such areas become accessible (e.g., whenever a FAC Pond is emptied and out of service). Also, any radiological soil sampling conducted in conjunction with this survey or for other purposes, must be performed in accordance with the Department-approved "Sitewide Radiological Investigation Soil Sampling Plan (SRISSP)" which is incorporated by reference into this Permit by **Schedule 1 of Module I**.

   Regarding any and all Department approvals, determinations or requirements pertaining to the SRSP, the Department will act with the concurrence of NYSDOH. Radiological analyses of any samples collected must include isotopic uranium, isotopic thorium, radium-226 and radium-228, gamma spectroscopy, and other radionuclides determined by the Department to be relevant to the media and location. Any locations found to exceed pre-determined screening levels must be further characterized to define the nature and extent of the elevated levels. At any time during or subsequent to SRSP implementation, if locations with elevated levels are identified and defined, the Permittee may take action, or the Department shall, at its discretion and upon concurrence of NYSDOH, require the Permittee to take action, to mark the identified areas, restrict access to these areas and, if necessary, institute measures to control migration of contaminants from these areas, as deemed necessary to protect human health and the environment. Such action, at Permittee's request, shall be subject to the provisions of **Condition A.7 of Module I** of this Permit.

2. Within 60 days of completing all survey activities in each specified area of the Facility, the Permittee must submit a report to the Department and NYSDOH containing all data collected during the survey of that area and corrective action recommendations for any locations identified above screening levels.

3. Site Radiological Monitoring Plan

   The Permittee must perform sampling and radiological analysis of environmental media and wastewater as indicated by this Condition in accordance with the

Department-approved "Radiation Environmental Monitoring Plan (REMP)", which is incorporated by reference into this Permit by Schedule 1 of Module I, at the frequencies specified in the REMP and this Condition. Regarding any and all Department approvals, determinations or requirements pertaining to the REMP, the Department will act with the concurrence of NYSDOH. In accordance with the REMP, the Permittee must provide for routine environmental monitoring of groundwater, air, surface water and wastewater to track the potential for off-site migration of contamination. Radiological analyses of all samples must include isotopic uranium, isotopic thorium, radium-226 and radium-228, gamma spectroscopy, and other radionuclides determined by the Department to be relevant to the media and location. At any time during the monitoring of environmental media, if sampling data suggest the potential for off-site migration of radiological contamination, the Permittee may take action, or the Department may require the Permittee to take action, to control migration of contaminants, as deemed necessary to protect human health and the environment. Such action, at Permittee's request, shall be subject to the provisions of **Condition A.7 of Module I** of this Permit. The analytical data generated in accordance with the approved REMP must be included in the Permittee's Monthly Monitoring Reports and submitted to the Department in accordance with **Condition F of Schedule 1 of Module I**. In addition, the monthly reports must include a narrative summarizing the radiological data. The Permittee may petition the Department to revise the REMP at any time subsequent to completion of one (1) year of monitoring. The REMP revisions shall become effective subsequent to Department approval.

The monitoring must be conducted in accordance with the approved REMP sampling and analytical requirements, at the following minimum frequencies:

a. Groundwater Monitoring

   At least one (1) round of sample collection and radiological analysis per year in accordance with the REMP.

b. Air Monitoring

   Upon request if determined necessary by the Department.

c. Surface Water Monitoring

   At least two (2) rounds of storm water sample collection and radiological analysis per year, during high flow conditions in accordance with the REMP.

d. Wastewater Monitoring

   The Wastewater Monitoring will include the following items:

   - Radiological analysis, in accordance with the REMP, of samples routinely collected to qualify each batch discharge of FAC Pond wastewater to off-site water bodies;

- Submission of radiological data with each FAC Pond Discharge Pre-Qualification Report to facilitate Department review prior to discharge approval in accordance with **Condition M.3 of Module V** of this Permit.

4. Site Soil Monitoring and Management Plans

The Permittee must follow the Department-approved Site Soil Monitoring and Management Plans (SSMMPs), as described below, to ensure control and prevent migration of historical chemical and radiological contamination during soil excavation or soil disturbance activities. Regardless of the size of the area or amount of soil involved, each SSMMP must describe the screening procedures that will be employed during soil excavation/disturbance to detect chemical and/or radiological contamination. Each SSMMP must include procedures to be followed to characterize, and if deemed necessary, remediate the detected chemical and/or radiological contamination in the project area. Prior to soil disturbance or excavation, if screening indicates possible radiological contamination, the Permittee may rely upon the U.S. Department of Defense (DOD) for performance of remedial activity as set forth in the Statement of Basis dated January 31, 2001, which is incorporated by reference into this Permit by **Schedule 1 of Module I**, of this Exhibit if contamination is determined to be from DOD jurisdictional wastes. If contamination is detected during excavation or soil disturbance, any wastes generated by such activities must be managed and disposed of in strict accordance with the Federal and State regulations which are applicable to the waste. Also, if an area of radiological contamination is remediated a final status survey must be performed in that area using procedures consistent with the Multi Agency Radiation Survey and Site Investigation Manual (MARSSIM).

a. Generic Small Project Soil Excavation Monitoring and Management Plan

- The Permittee must follow the requirements of the Department-approved "Generic Small Project Soil Excavation Monitoring and Management Plan (GSPSEM&MP)", which is incorporated by reference into this Permit by **Schedule 1 of Module I**, for all projects where the area of soil excavation/disturbance does not exceed 1,000 m^2 (1,196 yd^2) <u>and</u> the volume of excavated/disturbed soil does not exceed 150 m^3 (196 yd^3). The Permittee may undertake soil excavation/disturbance projects which meet the above criteria for "small projects" without the need for project specific Department approval with respect to potential historical chemical or radiological contamination. However, the Permittee must obtain any other approvals that might be needed for such projects and the implementation of such projects must be in strict accordance with the approved GSPSEM&MP.

b. Project-Specific Site Soil Monitoring and Management Plans

Thirty (30) days prior to the anticipated implementation of any project where the area of soil excavation/disturbance is greater than 1,000 m^2 (1,196 yd^2) <u>or</u> the volume of excavated/disturbed soil is greater than 150 m^3 (196 yd^3), the Permittee must submit a Project-Specific SSMMP for Department approval. In addition to the previously mentioned requirements for all SSMMPs, the Project-Specific SSMMP shall include many of the same components of the Generic SSMMP as well as project specific requirements. The Permittee may not undertake any project involving soil excavation/disturbance which is in excess of the above criteria until the Department has granted approval to the Project-Specific SSMMP applicable to that project. Any and all Department approvals, determinations or requirements pertaining to the generic or project specific SSMP are to be done with the concurrence of NYSDOH. Subsequent to Department approval of the Project-Specific SSMMP, the Permittee may implement project activities in strict accordance with the applicable Project-Specific SSMMP.

EXHIBIT C

SUPPLEMENT TO MODULE III

(proposed modified pages are designated with a revision date at the bottom of the respective page)

EXHIBIT C
SUPPLEMENT TO
MODULE III - CONTAINERS

The following conditions supplement those conditions contained within Module III of this Permit:

A. Authorized Storage Area, Waste Types and Storage Volume

1. The Permittee is authorized to operate the following container storage areas at the Facility and store the following wastes in containers in these areas up to the volumes listed, subject to the terms of this Permit:

Storage Area	Waste Type and Codes	Container Specifications[1,17]	Quantity[2]
1. Drum Management Bldg. (DMB)[3,4,22] – Area I (45' x 60')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 6G, 11G, 11H, 11HZ, 31H, BK3	Total Limit = 688 drums (solid & liquid) Liquid Limit = 688 drums
2. Drum Management Bldg. (DMB)[3,4,22] – Area II (45' x 26')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 6G, 11G, 11H, 11HZ, 31H, BK3	Total Limit = 320 drums (solid & liquid) Liquid Limit = 320 drums
3. Drum Management Bldg. (DMB)[3,4,22] – Area III (22.5' x 8')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 31H	Total Limit = 36 drums (solid & liquid) Liquid Limit = 36 drums
4. Drum Management Bldg. (DMB)[3,4,22] – Area IV (22.5' x 8')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 6G, 11G, 11H, 11HZ, 31H, BK3	Total Limit = 36 drums (solid & liquid) Liquid Limit = 36 drums
5. Drum Management Bldg. (DMB)[4,5,22] – Area V (87.2' x 49.7')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 5L, 5M, 6G, 11G, 11H, 11HZ, 13H, 13L, 31H, BK3	Total Limit = 1,376 drums (solid & liquid) Liquid Limit = 117 drums
6. Drum Management Bldg. (DMB)[4,22] – Area VI Sects. 1,2&3 (Sizes in Att. D, App. D1)	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 5L, 5M, 6G, 11G, 11H, 11HZ, 13H, 13L, 31H, BK3	Total Limit = 956 drums (solids only)

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Storage Area	Waste Type and Codes	Container Specifications[1,17]	Quantity[2]
7. Drum Management Bldg. (DMB) – West Tanker Ramp[22] (66' x 28')	Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tanks (≤ 5,500 gallons)	Total Limit = 2 cargo tanks (liquids only)
8. Drum Management Bldg. (DMB) – Truck Load/Unload Ramp[4,6,7,22] (134.4' x 50')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 5L, 5M, 6G, 11G, 11H, 11HZ, 13H, 13L, 31H, BK3	Total Limit = 1,040 drums (solids only)
9. PCB Warehouse – Area 1[4] (118' x 45')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 5L, 5M, 6G, 11G, 11H, 11HZ, 13H, 13L, 31H, BK3	Total Limit = 1,368 drums (solids only)
10. PCB Warehouse – Area 3/6[4,16] (90' x 84' & 26' x 26')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 5L, 5M, 6G, 11G, 11H, 11HZ, 13H, 13L, 31H, BK3	Total Limit = 1,358 drums (solid & liquid) Liquid Limit = 160 drums
11. South Trailer Parking Area[8,9] (297' x 49.5')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy) or Cargo Tanks (≤ 5,500 gallons)	Total Limit = 58 bulk containers (solid) Liquid Limit = 5 cargo tanks
11a. New Full Trailer Parking Area[8,9,19] (250' x 55')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy) or Cargo Tanks (≤ 5,500 gallons)	Total Limit = 48 bulk containers (solid) Liquid Limit = 5 cargo tanks
12. Stabilization Facility, Trailer Parking Area I[8,9] (70' x 35')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 6 roll-offs (solids only)
13. Stabilization Facility, Trailer Parking Area II[8,9] (150' x 35')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 14 roll-offs (solids only)
14. Stabilization Facility, Trailer Parking Area III[8,9,10] (200' x 35')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy) or Cargo Tanks (≤ 5,500 gallons)	Total Limit = 19 bulk containers (solid) Liquid Limit = 4 cargo tanks

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Storage Area	Waste Type and Codes	Container Specifications[1,17]	Quantity[2]
15. Stabilization Facility, Trailer Parking Area IV[8,9,10] (100' x 35')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy) or Cargo Tanks (≤ 5,500 gallons)	Total Limit = 9 roll-offs (solids) Liquid Limit = 1 cargo tank
15a. New Stabilization Facility, Trailer Parking Area [8,9, ,20] (375' x 35')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy) or Cargo Tanks (≤ 2,500 gallons)	Total Limit = 37 bulk containers (solid) Liquid Limit = 11 cargo tanks
16. Stabilization Facility, Waste Ash Tanker Unload Area[8] (34' x 13')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tank (dry bulk) or Roll-off (≤ 30 cy)	Total Limit = 1 cargo tank/roll-off (solids only)
17. Stabilization Facility, Special Client Treatment Room[8] (49' x 26')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 4 roll-offs (solids only)
18. Stabilization Facility, Macro Room Area I[8,11] (55' x 22.5')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 4 roll-offs (solids only)
19. Stabilization Facility, Macro Room Area II[8,11] (69' x 50')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 8 roll-offs (solids only)
20. Stabilization Facility, Macro Room Area III[8,11] (49' x 30')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 6 roll-offs (solids only)
21. Stabilization Facility, Lower Drum Shredder Area[8,12] (31' x 31')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 2 roll-offs (solids w/liquids)
22. Stabilization Facility, Upper Drum Shredder Area[4] (62' x 27' & 52' x 13')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 5L, 5M, 6G, 11G, 11H, 11HZ, 13H, 13L, 31H, BK3	Total Limit = 300 drums (solids only)
23. Stabilization Facility, North Expansion Bldg [8,13] (80' x 59')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 15 roll-offs (solids only)

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Storage Area	Waste Type and Codes	Container Specifications[1,17]	Quantity[2]
24. Aqueous Treatment Bldg., Drum Dock Area[3,4] (52' x 13')	Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 31H	Total Limit = 128 drums (solid & liquid)
25. Aqueous Treatment Bldg., Tanker Unload Area (50' x 45')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tanks (≤ 6,000 gallons)	Total Limit = 2 cargo tanks (solid or aqueous liquid)[18]
26. Aqueous Treatment Bldg., Filter Press Room[8] (33.5' x 20.5')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-off (≤ 30 cy)	Total Limit = 1 roll-off (solids only)
27. T.O. Bldg., Containment Pan Area[14] (50' x 42')	PCB Transformers & Electrical Devices with Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	PCB Transformers (≤ 386 gallons) or Containers (≤ 55 gallons) 1A, 1H	Total Limit = 11 pans
28. T.O. Bldg., Loading Ramp (82' x 27')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tanks (≤ 6,000 gallons)	Total Limit = 2 cargo tanks (solid & liquid)
29. Truck Wash Bldg.[8] (70' x 16' & 19' x 18')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Roll-offs (≤ 30 cy)	Total Limit = 3 roll-offs (solids only)
30. T-130 Load / Unload Area[8,9] (55' x 13')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tank (≤ 5,500 gallons) or Roll-off (≤ 30 cy)	Total Limit = 1 roll-off/ cargo tank (solid or aqueous liquid)[18]
31. T-108 Load / Unload Area[8,9,15] (55' x 13')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tank (≤ 5,500 gallons) or Roll-off (≤ 30 cy)	Total Limit = 1 roll-off/ cargo tank (solid or aqueous liquid)[18]
32. T-109 Load / Unload Area[8,9,15,21] (55' x 13')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tank (≤ 5,500 gallons) or Roll-off (≤ 30 cy)	Total Limit = 1 roll-off/ cargo tank (solid or aqueous liquid)[18]
33. T-158 Load / Unload Area[8,9,15,21] (55' x 13')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tank (≤ 5,500 gallons) or Roll-off (≤ 30 cy)	Total Limit = 1 roll-off/ cargo tank (solid &liquid)

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Storage Area	Waste Type and Codes	Container Specifications[1,17]	Quantity[2]
34. New Drum Management Bldg. (New DMB)[3,4] – Area 1 (57' x 144')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers 1A, 1G, 1H, 4G, 6G 11G, 11H, 11HZ, 31H, 5L, 5M, 13L, ,13H	Total Limit = 504 drums (solid & liquid) Liquid Limit = 504 drums
35. New Drum Management Bldg. (New DMB)[3,4] – Area 2 (44' x 144')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers 1A, 1G, 1H, 4G, 6G, 11G, 11H, 11HZ, 31H, 5L, 5M, 13L, 13H	Total Limit = 1008 drums (solid & liquid) Liquid Limit =1008 drums
36. New Drum Management Bldg. (New DMB)[3,4] – Area 3 (44' x 149')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers 1A, 1G, 1H, 4G, 6G, 11G, 31H,11H, 11HZ,, 5L, 5M, 13L, 13H	Total Limit = 1008 drums (solid & liquid) Liquid Limit =1008 drums
37. Drum Management Bldg. (DMB)[3,4] – Area 4 (26' x 44')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers 1A, 1G, 1H, 4G, 6G, 11G, 11H, 11HZ, 31H, 5L, 5M, 13L, 13H	Total Limit = 96 drums (solid & liquid) Liquid Limit = 96 drums
38. Drum Management Bldg. (DMB)[4,5] – Area 5 (20' x 38')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers 1A, 1G, 1H, 4G, 6Gm 5L, 5M, 11G, 11H, 11HZ, 13H, 13L, 31H	Total Limit = 96 drums (solid & liquid) Liquid Limit = 96 drums
39. Drum Management Bldg. (DMB)[4] – Area 6 (37' x 139')	Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers 1A, 1G, 1H, 4G, 6G, 5L, 5M, 11G, 11H, 11HZ, 13H, 13L, 31H	Total Limit = 336 drums (solids & liquids) Liquid Limit = 336 drums
40. Drum Management Bldg. (DMB) – Area 7 - Fuels Transfer Ramp (32' x 65')	Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Cargo Tanks (≤ 5,500 gallons)	Total Limit = 2 cargo tanks (liquids only)
41. Drum Management Bldg. (DMB) – Area 8 – Transformer Flush Area (29' x 57')	PCB Transformers & Electrical Devices with Solid & Liquid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	PCB Transformers (≤ 345 gallons) or Containers (≤ 55 gallons) 1A, 1H	Total Limit = 6 Transformers (liquids) or 37 drums (solid & liquid) Liquid Limit = 37 drums
41. Drum Management Bldg. (DMB) – Area 9 - Truck Load/Unload Ramp[4,6,7] (177.9' x 58.20')	Solid Wastes Listed in Attachment C, Section C-1, including Tables C-1 & C-2	Containers (≤ 55 gallons) 1A, 1G, 1H, 4G, 6G, 5L, 5M, 11G, 11H, 11HZ, 13H, 13L, 31H	Total Limit =1,040 drums (solids & liquids) Liquid Limit = 1,040 drums

Revised 12/18/13

Footnotes:

1. The letter/number codes listed under "Container Specifications" are USDOT Packaging Codes for hazardous material container specifications. See **Condition B.1.a** of this Exhibit and Attachment D, Appendix D-1 of this Permit regarding container type and specification requirements.
2. For the purposes of calculating the volume of waste in a storage area under this Permit, all containers in the area shall be considered full. Containers with a capacity of less than 55 gallons may be stored in areas where 55-gallon containers are stored as long as the storage requirements pertaining to 55-gallon drums are met, as specified in **Condition B.1.b** of this Exhibit and **Condition D of Module III** of this Permit. The maximum total volume of liquid waste that may be stored in an area must not exceed the number of containers indicated in the table for each area multiplied by 55 gallons.
3. The Permittee may only store containers of incompatible wastes in DMB Areas I-IV, New DMB Areas 1-6, and in the AT Drum Dock Area. Such storage must be in accordance with the segregation requirements in Attachment D, Appendix D-1 of this Permit.
4. Containers with capacities of greater than 55, but less than or equal to 330 gallons may be stored in DMB Areas I-VI, DMB Truck Load/Unload Ramp, New DMB Areas 1-6, new DMB Truck Load/Unload Ramp (Area 9), PCB Warehouse Areas 1 & 3/6, Stabilization Facility, Upper Drum Shredder Area and AWT Building Drum Dock Area as long as the storage requirements pertaining to 55-gallon containers are met, as specified by **Condition B.1.b** of this Exhibit and **Condition D of Module III** of this Permit.
5. All containers storing free liquids in DMB Area V must be stored at least 2 feet within the perimeter of the DMB Floor Trench containment system. (**Condition B.1.b.i.'c'** of this Exhibit)
6. See **Condition C.1.a** of this Exhibit regarding the limited placement of containers storing free liquids and/or incompatible wastes on the DMB Load/Unload Ramp.
7. All containers on the DMB Load/Unload Ramp must be on flatbed trailers or in box trailers. See **Condition B.1.b.i.'d'** of this Exhibit regarding requirements for containers stored on/in trailers.
8. Roll-offs of 40 cubic yards or less may be stored in the areas identified above by this footnote as long as the storage requirements pertaining to 30-cubic-yard roll-offs are met, as specified by **Condition B.1.c** of this Exhibit.
9. The Permittee may also use the specific CSAs identified above by this footnote for the storage of containers (330-gallons or less) on/in flatbed or box trailers. The number of trailers in each CSA must not exceed the total limit of roll-offs/tankers in each CSA indicated in the table above, and there must be no more than 80 containers per trailer. Storage of containers on/in trailers in these CSAs must be in accordance with **Condition B.1.b.i.'d'** of this Exhibit and Attachment D, Appendix D-1 of this Permit.
10. The entire container (i.e., tank) portion of cargo tanks stored in Stabilization Trailer Parking Areas III & IV must be at least 2 feet within the areas' secondary containment in accordance with **Condition B.1.c** of this Exhibit.
11. See **Condition C.1.b** of this Exhibit regarding management of Macroencapsulation Boxes in the Stabilization Facility, Macro Room Areas I-III.
12. The Permittee may store roll-offs in the Stabilization Facility, Lower Drum Shredder Area that contain solid waste with minor amounts of free liquids within the waste. The Permittee must maintain the secondary containment in this area in accordance with 6 NYCRR 373-2.9(f)(1), **Condition B.1.d** of this Exhibit, **Condition K.1 of Module III** of this Permit and Attachment D, Appendix D-1 of this Permit.
13. See **Condition C.1.c** of this Exhibit regarding management of Roll-offs and Macroencapsulation Boxes in the Stabilization Facility, North Expansion Bldg.
14. See **Condition C.1.d** of this Exhibit regarding management of PCB Transformers, discarded electrical devices and drums in the T.O. Bldg. Containment Pan Area.
15. See **Condition B.1.c.i.'c'** of this Exhibit regarding the storage of cargo tanks containing liquid waste in the CSAs identified by this footnote.
16. See **Condition C.1.e** of this Exhibit regarding the coated steel pans for secondary containment within PCB Warehouse Area 3/6 and the specific storage requirements for this area.
17. Where "Cargo Tank" is listed in the preceding table, the Permittee may also store other bulk liquid containers meeting USDOT specifications for such storage, provided that the capacity of each such

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container does not exceed the indicated capacity limit for Cargo Tanks and the number of such containers does not exceed the indicated quantity limit for each storage area.

18. The containerized aqueous wastes in the noted storage areas may contain small quantities of incinerable liquids within the waste.

19. A New Full Trailer Parking Area to be constructed to replace existing CSA 11 – South Full Trailer Parking Area for Construction of Cell 18 RMU-2 according to the design in Attachment D, Appendix D-1.

20. A New Stabilization Facility Trailer Parking Area to be constructed to replace existing CSAs 12, 13, 14, and 15 – Stabilization Facility Trailer Parking Areas for construction of Cells 15 and 16 of RMU-2 according to the design in Attachment D, Appendix D-1.

21. The Loading/Unloading Ramps at CSA 32 and 33 will be replaced with ramps with the same dimensions for construction of RMU-2 according to the design in Attachment D, Appendix D-1.

22. The existing Drum Management Building (DMB) (CSAs 1 through 8) will be replaced with a New DMB (CSAs 34 through 41) prior to construction of Cell 17 of RMU-2.

B. Special Conditions for Containers (General)

1. The special conditions for containers presented below are applicable to all Container Storage Areas (CSAs) listed in **Condition A** of this Exhibit, unless otherwise specified.

    a. Container Specifications

        i. For all CSAs listed in the table provided in **Condition A** of this Exhibit, the Permittee may only utilize containers conforming to USDOT specifications. The Permittee may utilize other container types as long as they meet the specifications indicated by the USDOT Packaging Codes listed in the table for each CSA or conform to non-listed codes corresponding to containers selected in accordance with the procedure presented in Section B.4.a of Attachment D, Appendix D-1 of this Permit.

        ii. The Permittee must use containers meeting USDOT Packaging Specifications which are compatible with the waste's USDOT Hazard Class in accordance with Section B.4.a of Attachment D, Appendix D-1 of this Permit.

        iii. The Permittee may store containers made of cardboard, fiberboard, textile fabric or other non-metal or non-plastic materials meeting USDOT specifications, in outdoor CSAs within box trailers. They may also be stored outside in these CSAs for up to seven (7) days in accordance with the following:

            'a') Each container, or if containers are stored on flatbeds, each flatbed must be clearly marked with the date of its placement in outdoor storage.

‘b’) The containers must be elevated on pallets or flatbed trailers.

‘c’) The containers must be inspected daily.

‘d’) If any container defects exposing waste or other signs of deterioration are identified during outdoor storage, the Permittee must take immediate action in accordance with **Condition E of Module III**.

b. Storage of ≤ 55-gallon to 330-gallon Containers

i. The Permittee must maintain storage of containers with capacities of ≤55-gallons to 330-gallons, in accordance with **Condition D of Module III** and the following:

‘a’) The minimum aisle space between container rows and between containers and any building walls must be 4 feet for containers storing flammable liquids. Containers with capacities greater than 85 gallons (e.g., overpack drums), up to and including 330-gallon containers must be stored in rows no greater than 1 container wide.

‘b’) Containers greater than 30 gallons storing flammable liquids or solids must not be stacked. Also, containers with capacities greater than 85 gallons (e.g., overpack drums), up to and including 330-gallon containers may only be stacked two high if they have adequate support structures and are specifically designed for stacking (e.g., totes with steel supports). Containers of flammable liquids or solids which are 30 gallons or less may be stacked 2 high to a maximum height of 5 feet.

‘c’) Containers storing free liquid must be stored no closer than 2 feet from the perimeter of their secondary containment (i.e., curb or wall).

‘d’) Flatbed or box trailers storing containers must have a minimum aisle space between trailers of 2 feet. If the containers on these trailers are not unloaded within 7 days of their arrival at the Permittee’s Facility or within 7 days of their initial placement on these trailers by the Permittee, they must be arranged on the trailers in accordance with **Condition B.1.b.i.‘a’** of this Exhibit, to provide aisle space for daily inspections of the containers as required by the Inspection Plan in Attachment F, Section F of this Permit. Also, storage of cardboard, fiberboard, textile fabric or other non-metal or non-plastic containers on flatbeds is limited to 7 days in accordance with **Condition B.1.a.iii** of this Exhibit.

c. Storage of Containers Larger than 330-gallons (e.g., roll-offs, cargo tanks, etc.)

i. The Permittee must maintain storage of containers with capacities of greater than 330 gallons (e.g., roll-offs, cargo tanks, etc.) in accordance with the following:

‘a’) Roll-offs, cargo tanks (or other large containers) must be stored in single rows with a minimum aisle space of 2 feet between container rows and between containers and any building walls.

‘b’) Cargo tanks (or other large containers) containing free liquids must be stored no closer than 2 feet from the perimeter of their secondary containment (i.e., curb or wall).

‘c’) Whenever a cargo tank containing liquid waste is in the T-108 Load/Unload Area or the T-109 Load/Unload Area or the T-158 Load/Unload Area, the valve on the pipe connecting these containment areas and their associated tank containment areas must be open to provide sufficient secondary containment capacity.

d. CSA Secondary Containment Concrete Sealant

i. For CSAs where a sealant has been applied to the concrete secondary containment, the Permittee must re-apply this sealant at least once each calendar year in order to maintain a sufficiently impervious surface as required by 6 NYCRR 373-2.9(f)(1)(i). The sealant to be re-applied must be “CHEMTEC One” manufactured by CHEMTEC INTL as specified in Attachment D, Appendix D-1 of this Permit, or a Department approved equivalent product. The sealant must be re-applied to interior surfaces of the concrete containment (i.e., base, walls, curbs), and these surfaces must be adequately cleaned prior to sealant application to ensure the sealant is able to penetrate the concrete. The Permittee must re-apply the sealant in strict accordance with the product manufacturer’s instructions and/or guidelines.

ii. For CSAs where a sealant/coating has been applied and damage to the sealant/coating (e.g., gouges, chips, obvious wear, etc.) is identified through routine inspections of the applicable CSAs, the Permittee must, at a minimum, re-apply the sealant/coating to repair the damaged area in accordance with the Inspection Plan in Attachment F of this Permit and **Condition E of Module III** of this Permit.

C. Special Conditions for Containers (Specific)

1. The special conditions for containers presented below are applicable only to specific Container Storage Areas (CSAs) listed in **Condition A** of this Exhibit.

a. Drum Management Bldg. (DMB) - Truck Load/Unload Ramp

i. The Permittee may place trailers with containers storing free liquids or incompatible wastes on the DMB Truck Load/Unload Ramp upon the date of their arrival at the DMB. Such containers must be managed in accordance with Attachment D, Appendix D-1 of this Permit, they may not be left unattended (i.e., personnel must be present at the DMB) and they must be inspected as they are off-loaded from the trailers. Prior to the end of the last DMB personnel work shift on the date of the placement of containers storing free liquids or incompatible wastes on trailers in the DMB Truck Load/Unload Ramp, all such containers must be removed from the DMB Truck Load/Unload Ramp and re-located to a CSA which is designated by **Condition A** of this Exhibit for storage of liquid/incompatible waste containers.

ii. For the Truck Load/Unload Ramp at the new DMB, The Permittee may place trailers with containers of incompatible wastes on the Truck Load/Unload Ramp on the date of their arrival at the new DMB. Such containers must be managed in accordance with Attachment D, Appendix D-1 of this Permit, they may not be left unattended (i.e., personnel must be present at the DMB) and they must be inspected as they are off-loaded from the trailers. If incompatibles will be left on flatbeds/box vans at the end of the work shift, they must be segregated as prescribed in Attachment D, Appendix D-1 of this Permit.

b. Stabilization Facility, Macro Room Areas I-III

i. The Permittee may cover, seal and store Macroencapsulation (Macro) Boxes in the Stabilization Facility, Macro Room Areas I-III, in accordance with Attachment D, Appendix D-1 of this Permit. All Macro Boxes must be in roll-offs. Any spills must be cleaned up immediately using dry methods only (e.g., sweeping, shoveling, vacuum, etc.). Subsequent to completing spill cleanups, the Permittee may perform floor wash downs at its discretion.

c. Stabilization Facility, North Expansion Bldg.

i. The Permittee may fill dump trailers, roll-off containers, or Macro Boxes in roll-offs, with solid wastes, debris and filler material, in the Stabilization Facility, North Expansion Bldg., in accordance with Attachment D, Appendix D-1 of this Permit. All Macro Boxes must be placed in roll-offs prior to receiving waste. The storage of containerized solids with no free liquids in this area must be in accordance with **Condition F of Module III** of this Permit. Any spills must be cleaned up immediately using dry methods only (e.g., sweeping, shoveling, vacuum, etc.). Subsequent to completing spill cleanups, the Permittee may perform floor wash downs at its discretion. The Permittee must maintain the concrete floor in this area so that it is free of cracks or joint gaps to provide for effective clean-up of spilled solid wastes that may result from the filling process. Any concrete cracks or gaps identified during inspections conducted in accordance with the Inspection Plan in Attachment F, Section F of this Permit, must be repaired in accordance with **Condition E of Module III** of this Permit. In addition, the concrete floor in this area must be independently inspected for cracks or gaps on an annual basis in accordance with **Condition K.1 of Module III** of this Permit.

d. T.O. Bldg., Containment Pan Area

i. The Permittee may store and decommission PCB transformers and discarded electrical devices, and store drums containing such devices or solid wastes, within the T.O. Bldg. Containment Pan Area in accordance with Attachment D, Appendix D-1 of this Permit and the following requirements:

‘a’) PCB transformers must be in steel containment pan units at all times to provide secondary containment in accordance with 6 NYCRR 373-2.9(f)(1). Discarded electrical devices must be within containment pan units and any such devices with free liquids must be in drums. Containers may only be stored in containment pans with no more than 3 containers in each pan. These containment pans must be no greater than 11 feet in length and 7 feet in width, but must have a minimum capacity of 386 gallons.

‘b’) More than one PCB transformer or container may be placed into a single containment pan provided that no transformer or container is closer than 2 feet from the edges of the pan.

‘c’) Permittee must maintain a minimum aisle space of 2 feet between containment pans and between containment pans and building walls.

‘d’) Liquids in the PCB transformers and discarded electrical devices, and/or liquids used in decommissioning activities, must not be discharged or flushed into the containment pans.

e. PCB Warehouse Area 3/6

i. The Permittee must operate this container storage area in accordance with the following requirements:

‘a’) No containers storing containing liquid waste shall be stored in Area 3/6 outside of the secondary containment pans. Containers stored within these pans must be placed single stacked in rows of no more than two (2) drums per row in each pan. No more than 2,200 gallons may be stored in containers within each pan and a minimum of two (2) feet of space must be provided between the containers and the edges of the pan at all times. Containers less than or equal to 30 gallons may be double stacked as long as they do not contain flammable waste; containers of flammable waste cannot be stacked.

‘b’) At closure, the Permittee must properly dispose or decontaminate and recycle the steel pans.

D. Special Conditions for Container Miscellaneous Units

1. The Permittee may operate the following miscellaneous units used for the management of hazardous waste in containers, in accordance with 6 NYCRR 373-2.24 and the requirements of this special condition.

a. DMB Fuels Drum Pumping Area

i. The Permittee may utilize the pumping equipment in the DMB Fuels Drum Pumping Area depicted on Figure D-1A in Attachment D, Appendix D-1 of the Permit to transfer compatible liquid wastes in drums and oil wastes from electrical equipment in drums, to tankers located on the DMB West Tanker Ramp. Prior to such transfers, the Permittee must determine that all wastes to be transferred into a single tanker are compatible with one another in accordance with the Waste Analysis Plan in Attachment C, Section C of the Permit. This unit must be operated in accordance with Attachment D, Appendix D-1 of the Permit and the following requirements:

‘a’) No more than 8 containers at a time must be in the DMB Fuels Drum Pumping Area.

‘b’) All containers must be removed from the DMB Fuels Drum Pumping Area and relocated to a CSA which is designated by **Condition A** of this Exhibit for the storage of containers storing free liquids, prior to the end of each day’s work shift.

‘c’) No container shall be open in this area unless it is undergoing pumping, sampling or interior inspection. Personnel must be present in the DMB Fuels Drum Pumping Area at all times during pumping.

b. Fuels Drum Pumping Area in new DMB

i. The Permittee may utilize the pumping equipment in the new DMB Fuels Drum Pumping Area depicted on Figure D-1B in Attachment D, Appendix D-1 of the Permit to transfer compatible liquid wastes in drums and oil wastes from electrical equipment, to tankers located in Fuels Transfer Ramp. Prior to such transfers, the Permittee must determine that all wastes to be transferred into a single tanker are compatible with one another in accordance with the Waste Analysis Plan in Attachment C, Section C of the Permit. This unit must be operated in accordance with Attachment D, Appendix D-1 of the Permit.

‘a’) No containers are allowed to be stored in the Fuels Drum Pumping Room. Containers will be staged in Area 1 of the new DMB for transfer of the liquids to tankers in the Fuels Tranfer Ramp.

‘b’) No container shall be open in this area unless it is undergoing pumping, sampling or interior inspection. Personnel must be present in the DMB Fuels Drum Pumping Area at all times during pumping.

EXHIBIT D

SUPPLEMENT TO MODULE IV

(proposed modified pages are designated with a revision date at the bottom of the respective page)

EXHIBIT D
SUPPLEMENT TO
MODULE IV - TANKS

The following conditions supplement those conditions contained within Module IV of this Permit:

A. Authorized Storage Tank, Waste Types and Storage Volume

1. The Permittee is authorized to use the following tank systems for the storage and/or treatment of the following wastes subject to the terms of this Permit:

Tank System I.D.	Capacity (gallons)	Tank Usage & Material of Construction	Waste Origin & Description	EPA Hazardous Waste Code Nos.	Second. Contain. Volume (gallons)
Tanks Located Inside the AWT Building					
T-710[6]	8,000	Storage / Treatment[1,2] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	24,440
T-810[6]	8,000	Storage / Treatment[1,2] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	24,440
T-820[6]	8,000	Storage / Treatment[1,2] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	24,440
T-850	846	Treatment[1,5] FRP[4]	Specific Off-site Commercial Solid & Lab Chemical Wastes[5]	D001, D002, D005, D007 & Lab Chem. Waste Codes Listed in Attachment C[3]	24,440
T-1010[6]	10,000	Treatment[1,7] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	24,440
T-1020[6]	8,000	Treatment[1,7] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	24,440
T-1111[6]	300	Storage Polyethylene	Aqueous Waste Filtrate from Filter Press	Waste Codes Listed in Attachment C[3]	24,440
T-1112[6]	450	Storage FRP[4]	Aqueous Waste Filtrate from Filter Press	Waste Codes Listed in Attachment C[3]	24,440

Tank System I.D.	Capacity (gallons)	Tank Usage & Material of Construction	Waste Origin & Description	EPA Hazardous Waste Code Nos.	Second. Contain. Volume (gallons)
T-1310[6]	580	Treatment[1,8] FRP[4]	Caustic Aqueous Wastes from Process Tank Air Emissions	Waste Codes Listed in Attachment C[3]	24,440
Tanks Located Inside the Solids Separation Building					
T-3011[6]	375	Storage/ Treatment[1,16] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	14,851
T-3012[6]	375	Storage/ Treatment[1,16] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	14,851
Tanks Located Outside, North of AWT Building					
T-100[6,9]	160,545	Storage/ Treatment[1,13] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	571,328
T-125[9]	394,271	Storage/ Treatment[1,23] Steel (lined)	Treated Aqueous Waste[10]	Waste Codes Listed in Attachment C[3]	571,328
T-8008	500	Storage FRP[4]	On-site Generated Groundwater DNAPL	F039	571,328
Tank Located Outside, West of AWT Building					
T-58[9]	488,529	Storage/ Treatment[1,23] Steel (lined)	Treated Aqueous Waste[10]	Waste Codes Listed in Attachment C[3]	Not Required[11]
Tanks Located Outside, East of AWT Building					
T-210[6]	30,000	Treatment[1,12] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	44,350
T-220[6]	30,000	Treatment[1,12] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	44,350
T-230[6]	30,000	Treatment[1,12] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	44,350
T-310[6]	30,457	Treatment[1,13] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	44,350
T-320[6]	30,457	Treatment[1,13] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	44,350

Tank System I.D.	Capacity (gallons)	Tank Usage & Material of Construction	Waste Origin & Description	EPA Hazardous Waste Code Nos.	Second. Contain. Volume (gallons)
Tanks Located Inside the Wastewater Treatment Building					
T-3007[6]	7,600	Treatment[1,15] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	15,317
T-3008[6]	7,600	Treatment[1,15] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	15,317
T-3010A[6,29]	470	Treatment[1,14] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	15,317
T-3010B[6,29]	470	Treatment[1,14] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	15,317
T-3010C[6,29]	470	Treatment[1,14] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	15,317
T-3010D[6,29]	470	Treatment[1,14] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	15,317
Tank Located Outside, South of Wastewater Treatment Building					
T-52	7,600	Storage Steel (coated)	Aqueous Waste Carbon Slurry	Waste Codes Listed in Attachment C[3]	9,546
Tanks Located Outside, East of Wastewater Treatment Building					
T-3001[6]	1,255	Treatment[1,16] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	1,872
T-3002[6]	900	Treatment[1,16] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	1,872
T-3003[6]	1,210	Storage/ Treatment[1,15] FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	1,667
T-3009	6,000	Storage Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	Double-Walled Tank[9]
Tanks Located North of SLF 1-6 Landfills (Tank T-105 Inside, Tank T-130 Outside)					
T-105[6]	3,000	Storage Steel (lined)	SLF 1-6 Leachate	F039	4,143

Tank System I.D.	Capacity (gallons)	Tank Usage & Material of Construction	Waste Origin & Description	EPA Hazardous Waste Code Nos.	Second. Contain. Volume (gallons)
T-130[6]	5,732	Storage Stainless Steel	SLF 1-6 Leachate	F039	8,228
Tanks Located Inside Buildings, Between Landfills SLF 7 & SLF 11					
T-107[6]	350	Storage FRP[4]	SLF 7 Leachate	F039	2,765
T-108[6]	10,000	Storage FRP[4]	SLF 7 & SLF 11 Leachate	F039	15,709
T-111[6]	350	Storage FRP[4]	SLF 11 Leachate	F039	15,709
Tanks Located Inside A Building, Northwest of SLF 10 Landfill					
T-109[6]	3,000	Storage FRP[4]	SLF 10 Leachate	F039	15,709
T-110[6]	350	Storage FRP[4]	SLF 10 Leachate	F039	15,709
Tanks Located Inside A Building, East of the Leachate Tank Farm					
T-158[6]	17,000	Treatment[1,17] Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	24,876
T-159[6]	1,000	Storage FRP[4]	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	24,876
Tank Located Inside A Building, Southeast of SLF 12 Landfill					
T-150	8,000	Storage/ Treatment[1,24] Steel (lined)	Onsite Generated Aqueous Wastes	F039	18,388
Tank Located Inside A Building, On the West Side of the RMU-1 Landfill					
T-160	3,000	Storage/ Treatment[1,24] Steel (lined)	RMU-1 Leachate	F039	7,563
Tank Located Outside, On the South Side of the RMU-1 Landfill					
T-165[26]	876,769	Storage Steel (lined)	RMU-1 or RMU-2 Leachate	F039	913,155

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Tank System I.D.	Capacity (gallons)	Tank Usage & Material of Construction	Waste Origin & Description	EPA Hazardous Waste Code Nos.	Second. Contain. Volume (gallons)
Tanks Located Outside, Within Leachate Tank Farm					
T-101[6]	350,000	Storage/ Treatment[1,13,18] Steel (lined)	SLF 1-11 Leachate, Off-site Commercial & On-site Aqueous Wastes **or** SLF 12 & RMU-1 Leachate[19]	F039 & Waste Codes Listed in Attachment C[3]	500,959
T-102[6]	350,000	Storage/ Treatment[1,13,18] Steel (lined)	SLF 1-11 Leachate, Off-site Commercial & On-site Aqueous Wastes **or** SLF 12 & RMU-1 Leachate[19]	F039 & Waste Codes Listed in Attachment C[3]	500,959
T-103[6]	350,000	Storage/ Treatment[1,13,18] Steel (lined)	SLF 1-11 Leachate, Off-site Commercial & On-site Aqueous Wastes **or** SLF 12 & RMU-1 Leachate[19]	F039 & Waste Codes Listed in Attachment C[3]	500,959
Frac. Tank 3[6]	21,000	Storage Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	500,959
Tanks Located Inside Stabilization Building Northern Expansion					
Mix Pit Tank 1[9]	20,354	Treatment[20] Steel	Off-site Commercial & On-site Solid Wastes[21]	Waste Codes Listed in Attachment C[3]	Steel Vault
Mix Pit Tank 2[9]	20,354	Treatment[20] Steel	Off-site Commercial & On-site Solid Wastes[21]	Waste Codes Listed in Attachment C[3]	Steel Vault
Tanks Located Outside, South of Main Stabilization Building					
TA-1	20,000	Storage Steel (lined)	Off-site Commercial & On-site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	28,174
TA-2	20,000	Storage Steel (lined)	Off-site Commercial & On- site Generated Aqueous Wastes	Waste Codes Listed in Attachment C[3]	28,174
Tank Located Inside Truck Wash Building					
T-120	1,650	Storage FRP[4]	On-site Generated Contaminated Surface Water	Waste Codes Listed in Attachment C[3]	1,659
Tanks Located Inside A Building, West of the AWT Building					
T-8001	5,000	Storage Steel (lined)	On-site Contaminated Groundwater	F039	6,445

Tank System I.D.	Capacity (gallons)	Tank Usage & Material of Construction	Waste Origin & Description	EPA Hazardous Waste Code Nos.	Second. Contain. Volume (gallons)
T-8002	550	Storage FRP[4]	On-site Contaminated Groundwater	F039	6,445
Tank Located Inside A Building, South of SLF 3 Landfill					
T-8004	550	Storage FRP[4]	On-site Contaminated Groundwater	F039	892
Tank Located Inside A Building, South of SLF 10 Landfill					
T-8005	300	Storage Steel	On-site Contaminated Groundwater	F039	356
Tank Located Inside A Building, East of SLF 12 Landfill					
T-8006	300	Storage Steel	On-site Contaminated Groundwater	F039	356
Tank Located Inside A Building, South of PCB Warehouse					
T-8007	500	Storage FRP[4]	On-site Contaminated Groundwater	F039	539
Tank Located Inside T.O. Building CSA					
T-8009[27]	525	Storage HDLPE[25]	On-site Contaminated Groundwater	F039	853
Tank Located South of South Trailer Parking CSA					
T-8010[27]	1,000	Storage HDPE[28]	On-Site Contaminated Groundwater	F039	1,300
Sump Tank Located Inside AWT Building					
Filter Press Sump Tank	175	Storage FRP[4]	On-site Generated AWT Wash Water[22]	Waste Codes Listed in Attachment C[3]	Concrete Vault[9]
Tank Located East of Facultative Pond 5					
T-9001	1,100	Storage HDPE[28]	Liquid from Pond Leak/Leachate Collection System	F039[29]	Double Contained Tank

Footnotes:

1. See **Condition C.1.a** of this Exhibit regarding the overall operation of the aqueous waste treatment process that pertains to the specific Tank Systems identified above by this footnote.
2. See **Condition C.1.a.ii** of this Exhibit regarding the treatment allowed in Tanks T-710, T-810 and T-820.
3. Authorized EPA waste codes are listed in Attachment C, Section C, Tables C-1 & C-2 of this Permit.
4. “FRP” = “Fiberglass Reinforced Plastic.”
5. See **Condition C.1.a.iii** of this Exhibit regarding the treatment allowed in Tank T-850.

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6. See **Condition J of Module IV** and Attachment D, Appendix D-3, Section VI of this Permit regarding air emission controls required by 6 NYCRR 373-2.29 for the specific Tank Systems identified above by this footnote.
7. See **Condition C.1.a.iv** of this Exhibit regarding the treatment allowed in Tanks T-1010 and T-1020.
8. See **Condition C.1.a.v** of this Exhibit regarding the treatment allowed in Tank T-1310.
9. See **Condition C.1.b** of this Exhibit regarding leak detection monitoring requirements for the specific Tank Systems identified above by this footnote.
10. "Treated Aqueous Waste" refers to the effluent from the on-site AWTS that has completed the treatment processes deemed necessary to meet the Land Disposal Restriction wastewater treatment standards as required by 6 NYCRR 376.
11. See **Condition C.1.c** of this Exhibit regarding the variance from secondary containment requirements issued in accordance with 6 NYCRR 373-2.10(d)(7) for Tank T-58.
12. See **Condition C.1.a.vi** of this Exhibit regarding the treatment allowed in Tanks T-210, T-220 and T-230.
13. See **Condition C.1.a.vii** of this Exhibit regarding the treatment allowed in Tanks T-100, T-101, T-102, T-103, T-310 and T-320.
14. See **Condition C.1.a.viii** of this Exhibit regarding the treatment allowed in Tanks T-3010A, T-3010B, T-3010C, T-3010D and Cartridge Filter Units HIF-24-A,B,C&D.
15. See **Condition C.1.a.ix** of this Exhibit regarding the treatment allowed in Tanks T-3003, T-3007 and T-3008.
16. See **Condition C.1.a.x** of this Exhibit regarding the treatment allowed in Tanks T-3001, T-3002, T-3011 and T-3012.
17. See **Condition C.1.a.xi** of this Exhibit regarding the treatment allowed in Tank T-158.
18. See **Condition C.1.d** of this Exhibit regarding requirements to maintain sufficient capacity in Tanks T-101, T-102 and T-103 for the storage of on-site generated leachates and contaminated groundwater.
19. See **Condition C.1.e** of this Exhibit regarding the required separation strategy for the aqueous wastes stored in Tanks T-101, T-102 and T-103.
20. See **Condition C.1.f** of this Exhibit regarding the treatment allowed in Mix Pit Tanks 1 and 2.
21. See **Condition C.1.f** of this Exhibit regarding the use of aqueous wastes in Mix Pit Tanks 1 and 2.
22. See **Condition C.1.a.xii** of this Exhibit regarding the AWT Filter Press wash water.
23. See **Condition C.1.a.xiii** of this Exhibit regarding the treatment allowed in Tanks T-58 and T-125.
24. See **Condition C.1.a.xiv** of this Exhibit regarding the treatment allowed in Tanks T-150 and T-160.
25. "HDLPE" = "High Density Linear Polyethylene."
26. See **Condition C.1.g** of this Exhibit regarding the operational requirements for Tank T-165.
27. See **Condition C.1.h** of this Exhibit regarding the installation and operational requirements for Tanks T-8009 and T-8010.
28. HDPE = High Density Polyethylene.
29. See **Condition C.1.i** of this Exhibit regarding the installation and operational requirements for Tanks T-3010A through D and Cartridge Filter Units HIF-24-A through D.

30. Tank is permitted for hazardous waste storage in case a leak of treated effluent from the fac pond is detected in the leak detection zone. If a leak is detected, all waste codes associated with the fac pond liquid will carry into the leak detection liquid.

B. Special Conditions for Tank Systems (General)

1. The special conditions for tank systems presented below are applicable to all Tank Systems (TSs) listed in **Condition A** of this Exhibit, unless otherwise specified.

a. Tank Systems' Ancillary Equipment Operation and Maintenance

   i. Ancillary Equipment Without Secondary Containment: The Permittee must perform visual daily inspections of the ancillary equipment listed in the table entitled "Aboveground Ancillary Equipment Without Secondary Containment", of the Permit Application which is incorporated by reference into this Permit by **Schedule 1 of Module I**, and maintain records of these inspections in accordance with 6 NYCRR 373-2.2(g)(4) and Attachment F of this Permit. Any replacement of the ancillary equipment listed in this table and any new additional ancillary equipment which is installed without secondary containment, must meet the secondary containment exception requirements specified by **Condition C of Module IV** of this Permit.

   ii. Underground Hazardous Waste Transfer Lines: The Permittee must pressure test all newly installed underground hazardous waste transfer lines prior to burial and placing into service. The Permittee must also pressure test any existing underground hazardous waste transfer line or transfer line section upon repair, replacement or alteration, prior to placing back in service. The Permittee must test both the inner carrier pipe and outer containment pipe of double-walled transfer lines. The Permittee must perform this testing in strict accordance with the procedures contained in Attachment D, Appendix D-3, Section VIII of this Permit. The Permittee must record the results of this testing in the operating record required by 6 NYCRR 373-2.5(c). Any transfer line, or portion thereof, that fails its specified test, must be repaired or replaced in accordance with **Condition E of Module IV** of this Permit and re-tested prior to its use.

b. Tank Systems' Secondary Containment Operation

   i. Spilled or leaked waste and accumulated precipitation must be removed from the secondary containment system within 24 hours, or in as timely a manner as possible to prevent harm to human health and the environment, if the Permittee can demonstrate to the Department that removal of the released waste or accumulated precipitation cannot be accomplished within 24 hours. All removed liquids must be managed in accordance with Attachment D, Appendix D-3, Section II and of this Permit and 6 NYCRR 373-2.10(d)(3)(iv).

c. Tank Systems Independent Assessment: The year of the most recent assessment for each Tank System is indicated in Attachment D, Appendix D-3, Section VIII of this Permit. In addition to the requirements of **Condition K.3 of Module IV** of this Permit, the Permittee must perform the following:

   i. Mix Pit Tanks 1 & 2 and the Filter Press Sump Tank must be independently assessed each calendar year.

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ii. The interiors of Mix Pit Tanks 1 & 2 and the Filter Press Sump Tank must be assessed annually during the independent assessment.

iii. Each calendar year, the engineer/inspector must report to the Permittee on or before August 31, unless the Department approves an extension, any and all Tank System defects identified during that year's assessment along with repair recommendations.

iv. The engineer's/inspector's annual report must be submitted to the Department on/before November 30 of each calendar year, unless the Department approves an extension of no greater than 30 days.

v. Tanks T-3010A, T-3010B, T-3010C & T-3010D must be independently assessed upon each tank change out in accordance with **Condition C.1.i.ii.'b'** of this Exhibit.

C. Special Conditions for Tank Systems (Specific)

1. The special conditions for tank systems presented below are applicable only to specific Tank Systems listed in **Condition A** of this Exhibit.

a. Aqueous Waste Treatment (AWT) Tank Systems

i. The Permittee must operate all treatment tank systems which are identified by Footnote 1 of **Condition A** of this Exhibit and all other components associated with the AWT system, in strict accordance with the July 2012 Revision and any subsequently Department approved revisions of the "Aqueous Waste Treatment System (AWTS) Operations and Maintenance (O&M) Manual", which is incorporated by reference into this Permit by **Schedule 1 of Module I**.

ii. Treatment allowed in Tanks T-710, T-810 and T-820 involves blending of compatible, off-site commercial and/or on-site generated aqueous wastes.

iii. Treatment allowed in Tank T-850 involves dissolving sodium chlorate or chromic acid solids or other Department-approved solids in an aqueous solution, or the dissolving and/or blending of compatible lab chemicals in an aqueous solution. Aqueous solutions from Tank T-850 must undergo additional treatment through the on-site aqueous waste treatment system.

iv. Treatment allowed in Tanks T-1010 and T-1020 involves pH neutralization and metals precipitation.

v. Treatment allowed in Tank T-1310 involves use of caustic solution to adjust the pH of air emissions from various specific treatment process tanks.

vi. Treatment allowed in Tanks T-210, T-220 and T-230 involves blending of compatible, off-site commercial aqueous wastes and/or on-site generated aqueous wastes and the addition of the specific reagents indicated on Figure D-8 "Aqueous Waste Treatment System Flow Diagram" in the Aqueous Waste Treatment System Operations and Maintenance (O&M) Manual listed in **Condition B of Schedule 1 of Module I** of this Permit.

vii. Treatment allowed in Tanks T-100, T-101, T-102, T-103, T-310 and T-320 involves biodegradation and/or reagent addition to remove organic compounds.

viii. Treatment allowed in Tanks T-3010A through D involves the removal of arsenic by media adsorption. Treatment allowed in Cartridge Filter Units HIF-24A through D involves the filtration of aqueous wastes.

ix. Treatment allowed in Tanks T-3003, T-3007 and T-3008 involves reagent addition and carbon adsorption of aqueous wastes.

x. Treatment allowed in Tanks T-3001, T-3002, T-3011 and T-3012 involves pH neutralization and/or biotreatment inoculation.

xi. Treatment allowed in Tank T-158 involves the oil/water phase separation of landfill leachate, off-site commercial and on-site generated aqueous wastes.

xii. AWT Filter Press wash water must be transferred from the Filter Press Room steel container to the Filter Press Sump Tank through aboveground piping within secondary containment. The Filter Press Sump Tank is also part of the AWT secondary containment, and as such, may receive accidental releases and cleanup wash water.

xiii. Treatment allowed in Tanks T-58 and T-125 involves air sparging and/or reagent addition to remove organic compounds.

xiv. Treatment allowed in Tanks T-150 and T-160 involves reagent addition to reduce sulfide odors.

b. Tank Systems' Leak Detection Monitoring

i. For the tank systems identified by Footnote 9 of **Condition A** of this Exhibit (i.e., Tanks T-58, T-100, T-125, T-3009, T-9001, T-9002, Mix Pit Tank 1, Mix Pit Tank 2 & Filter Press Sump Tank), the Permittee must inspect the leak detection monitoring systems of these tanks for the presence of liquid, on a daily basis, in accordance with Attachment F, Section F of this Permit. If liquid is found to be present in sufficient volume for analysis (i.e., 30 ml or greater), the Permittee must perform the tank-specific procedures presented in the following table to determine if such liquid is or is not indicative of tank leakage or, in the case of below grade tanks, indicative of containment vault leakage. This determination must be made based on the tank-specific criteria identified in the following table:

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Tank ID	Liquid Evaluation Procedures	Liquid Evaluation Criteria
T-58	Conductivity Testing	Conductivity Threshold Criteria = 5,000 umhos
T-100	Conductivity Testing	Conductivity Threshold Criteria = 5,000 umhos
T-125	Conductivity Testing	Conductivity Threshold Criteria = 5,000 umhos
T-3009	Conductivity Testing	Conductivity Threshold Criteria = 5,000 umhos
Mix Pit Tank 1	Conductivity Testing, Volume Measurement	Conductivity Threshold Criteria = 14,000 umhos Volume Threshold Criteria = 5.0 gals.
Mix Pit Tank 2	Conductivity Testing, Volume Measurement	Conductivity Threshold Criteria = 14,000 umhos Volume Threshold Criteria = 5.0 gals.
Filter Press Sump Tank	Conductivity Testing, Depth Measurement	Conductivity Threshold Criteria = 5,000 umhos Depth Threshold Criteria = 1.0 inches
T-9001	Conductivity Testing	Conductivity Threshold Criteria = 5,000 umhos

ii. For each tank listed in the table presented in **Condition C.1.b.i** of this Exhibit, if any of the above criteria which are applicable to that tank, are exceeded for two (2) consecutive days, the Permittee must immediately remove that tank from service, unless in the case of Mix Pit Tanks 1 & 2, where only the conductivity threshold criteria has been exceeded and there are no obvious defects in the steel tank. Where Mix Pit Tanks 1 & 2 conductivity leak detection criteria exceedence has occurred and there are no identified tank defects, the Permittee may leave the tank in service and immediately conduct a thorough inspection of the upper perimeter seal between the tank and its secondary containment vault. Any identified defects in this seal must be repaired in accordance with **Condition E of Module IV** of this Permit. For any tanks which must be taken out of service due to exceedence of leak detection criteria, the Permittee must immediately commence transfer of its contents and begin an investigation to determine if the detected liquid is indicative of tank leakage or, in the case of below grade tanks, indicative of containment vault leakage. The tank in question must not be returned to service until the Permittee either: 1) justifies, to the Department's satisfaction, that the detected liquid is not the result of tank or where applicable, containment vault leakage; or 2) locates and repairs the tank/vault leak, and, where required by 6 NYCRR 373-2.10(g)(6), obtains an independent certification.

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c. Tank T-58 Secondary Containment Variance

i. With this Permit, the Department is granting a variance to the Permittee from secondary containment requirements for Tank T-58 in accordance with 6 NYCRR 373-2.10(d)(7). This variance is only applicable under the operational restrictions and requirements for Tank T-58 as listed below:

‘a’) The Permittee may only use Tank T-58 for the storage of treated aqueous hazardous waste discharged from its on-site treatment process in accordance with the “Aqueous Waste Treatment System (AWTS) Operation and Maintenance (O&M) Manual” which is incorporated by reference into this Permit by **Schedule 1 of Module I**.

‘b’) The hazardous wastes contained in Tank T-58 must meet all the Land Disposal Restriction (LDR) treatment standards for wastewater as presented in 6 NYCRR 376.4. The Permittee must analyze the Tank T-58 influent and the contents of Tank T-58 prior to each discharge in accordance with the Waste Analysis Plan in Attachment C, Section C of this Permit, to verify that the hazardous wastes contained in Tank T-58 meet all LDR treatment standards.

‘c’) The Permittee must monitor the groundwater in the area of Tank T-58 in accordance with **Exhibit B** and **Condition L of Exhibit F**.

‘d’) The Permittee must have independent assessments performed on Tank T-58 as required by **Condition K.3 of Module IV** of this Permit.

‘e’) The Permittee must monitor the Tank T-58 leak detection system and take all appropriate actions as required by **Condition C.1.b** of this Exhibit.

‘f’) The Permittee must comply with the requirements of 6 NYCRR 373-2.10(d)(7)(iii) & (iv) in the event of a release of hazardous waste from Tank T-58.

ii. Failure on the part of the Permittee to adhere to the operational restrictions and meet the operational requirements listed in **Condition C.1.c.i** of this Exhibit, shall constitute a violation of this Permit.

d. Leachate Tanks T-101, T-102 & T-103 Storage Capacity

i. In order to ensure adequate storage and treatment capacity for on-site landfill leachates and contaminated groundwater, the Permittee must maintain a minimum of 625,000 gallons of available (empty) tank capacity in Tanks T-101, T-102 & T-103 (cumulative) for the storage of on-site wastewaters that would be generated by a 25-year, 24-hour storm or larger precipitation event. To maintain this storage capacity, the Permittee must take

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the following actions whenever the available capacity in these tanks is less than 625,000 gallons:

‘a’) Immediately notify the Department that the capacity is less than 625,000 gallons. The notification must include a discussion regarding the cause of the capacity shortfall and a proposed plan to restore the required 625,000 gallons of empty volume in Tanks T-101, T-102 & T-103.

‘b’) Treat on-site or ship off-site for treatment no less than 200,000 gallons/day until the empty volume in Tanks T-101, T-102 & T-103 is restored to equal to, or greater than 625,000 gallons. On a case by case basis, the Department may (either verbally or in writing) waive this requirement if the Permittee demonstrates to the Department’s satisfaction that their proposed plan, specified in **Condition C.1.d.i.‘a’** of this Exhibit, will restore the required 625,000 gallons of empty volume in Tanks T-101, T-102 & T-103 within a three (3) day period, as measured from the day when the shortfall first occurs. If this waiver is granted and the Permittee fails to completely eliminate the capacity shortfall within the three (3) day time period, the Permittee must comply with the requirement to treat on-site or ship off-site for treatment no less than 200,000 gallons/day until the empty volume in Tanks T-101, T-102 and T-103 is restored to equal to or greater than 625,000 gallons.

‘c’) Cease on-site treatment of all off-site generated commercial aqueous waste receipts until the empty volume in Tanks T-101, T-102 & T-103 is restored to equal to or greater than 625,000 gallons.

e. Leachate Tanks T-101, T-102 & T-103 Separation of Wastewaters

i. The Permittee must designate specific tanks within the Tank T-101, T-102 & T-103 system for storage of leachate from the RMU-1 and RMU-2 landfills so as to facilitate separate treatment strategies. The Permittee must at no time store leachate from landfills SLF 1 through 11, or off-site commercial aqueous waste in any tank within this system which is designated for the storage of RMU-1 and RMU-2 leachate. The Permittee may store SLF 12 leachate or contaminated groundwater in any tank within this system.

f. Operation of Mix Pit Tanks 1 & 2

i. Treatment allowed in Mix Pit Tanks 1 and 2 involves stabilization of bulk solid wastes to meet waste strength and/or Land Disposal Restriction (LDR) requirements (6 NYCRR 376), and microencapsulation of hazardous debris to meet LDR requirements.

ii. The Permittee must operate Mix Pit Tanks 1 & 2 in strict accordance with <u>Attachment D, Appendix D-3</u> of this Permit and the July 2012 Revision and

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any subsequently Department approved revisions of the "Operations and Maintenance Manual for the Stabilization Facility", which is incorporated by reference into this Permit by **Schedule 1 of Module I**. In addition to these operational requirements, the Permittee must either close all doors leading into the Stabilization Facility North Expansion Building during the addition of dry reagents and during the mixing process or take other actions as necessary to ensure that airborne particles from the waste/reagents are not visible outside of the building. Visible releases of particles from the building as a result of waste stabilization operations are prohibited. There must be no free liquids in or added to the wastes in the Mix Pit Tanks and no reagents added at the end of each work shift.

iii. Aqueous Wastes may also be placed in Mix Pit Tanks 1 and 2 to the extent necessary to facilitate the treatment of the solid wastes in these tanks, provided that such aqueous wastes are compatible with the solid wastes in these tanks, with reagents used in the treatment process, and with the steel tanks.

g. Operation of Tank T-165

i. The Permittee must operate Tank T-165 in strict accordance with Attachment D, Appendix D-3 of this Permit and the following tank specific conditions:

'a') A minimum of two (2) feet of freeboard in Tank T-165 must be maintained at all times to prevent overtopping in order to comply with 6 NYCRR 373-2.10(e)(2)(iii).

'b') In addition to the tank inspection requirements in Attachment F, Section F of this Permit, the Permittee must inspect the Tank T-165 cathodic protection system in accordance with 6 NYCRR 373-2.10(f)(3).

'c') Spilled or leaked waste and accumulated liquids within the secondary containment vault outside of Tank T-165, must be removed in accordance with **Condition B.1.b** of this Exhibit. In addition, any accumulation of snow/ice in the vault which obscures visual inspection of the tank's leak detection system, must be cleared away from the downgradient ends of the leak detection channels within 24 hours or as timely as possible to a level below the leak detection channels to perform inspections.

'd') Tank T-165 must be inspected on a semiannual basis for the presence of accumulated sediment on the bottom of the tank. Any such sediment which is deeper than 3 inches must be removed before resuming the pumping of liquid waste into the tank.

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‘e’) Anytime the level of liquid in Tank T-165 exceeds 12 inches, it must be lowered to 12 inches or less within seven (7) calendar days, to maintain sufficient capacity for the storage of RMU-1 or RMU-2 landfill run-off in accordance with 6 NYCRR 373-2.14(c)(9). The Department, on a case-by-case basis, may grant an extension of this seven (7) day period, provided that the Permittee can demonstrate to the Department’s satisfaction, that the volume of liquid resulting from precipitation and/or snow melt which requires removal, exceeds the run-off volume that would be generated by the 24-hour, 25-year storm event.

h. Installation and Operation of Tanks T-8009 and T-8010

i. Tank T-8009 and its ancillary equipment must be installed and tested for tightness in strict accordance with the tank assessment design and installation requirements contained in the Department-approved “Design Report for Process Area IV Extraction Wells”, which is incorporated by reference into this Permit by **Schedule 1 of Module I**. Prior to placing Tank T-8009 into operation, the Permittee must provide an opportunity for the Department to inspect the installation in accordance with **Condition B.4 of Module IV** of this Permit, and submit the construction certification along with supporting documentation and testing results as required by 6 NYCRR 373-2.10(c) and **Condition B of Module IV** of this Permit. Tank T-8009 must be operated in accordance with the aforementioned Design Report, **Module IV** of this Permit, this Exhibit and <u>Attachment D, Appendix D-3</u> of this Permit.

ii. Tank T-8010 and its ancillary equipment must be installed and tested for tightness in strict accordance with the tank assessment design and installation requirements contained in the Department-approved “Design Report for Process Area III Groundwater Interceptor Trench”, which is incorporated by reference into this Permit by **Schedule 1 of Module I**. Prior to placing Tank T-8010 into operation, the Permittee must provide an opportunity for the Department to inspect the installation in accordance with **Condition B.4 of Module IV** of this Permit, and submit the construction certification along with supporting documentation and testing results as required by 6 NYCRR 373-2.10(c) and **Condition B of Module IV** of this Permit. Tank T-8010 must be operated in accordance with the aforementioned Design Report, **Module IV** of this Permit, this Exhibit and <u>Attachment D, Appendix D-3</u> of this Permit.

i. Installation and Operation of Tanks T-3010A – D and Units HIF-24A – D

i. Installation Requirements: Tanks T-3010A, T-3010B, T-3010C, T-3010D, Cartridge Filter Units (CFUs) HIF-24A, HIF-24B, HIF-24C, HIF-24D and their ancillary equipment must be installed and tested for tightness in strict accordance with 6 NYCRR 373-2.10(c), the tank assessment design and installation requirements contained in the Department-approved “Tank

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System Design and Assessment Report for AWTS Arsenic Removal Tanks T-3010A/B/C/D" which is incorporated by reference into this Permit by **Schedule 1 of Module I**, and the conditions in this Permit. In addition, the Permittee must install an electronic pressure monitoring device within the arsenic or carbon treatment systems that will automatically shut down feed pumps to theses systems and trigger an alarm in the event of system over-pressurization. The device must be set at a pressure above the system's normal operating pressure, but below that which would cause rupture discs in the system to fail.

Prior to placing Tanks T-3010A/B/C/D and CFUs HIF-24A/B/C/D into operation, the Permittee must provide an opportunity for Department staff to inspect the completed installation in accordance with **Condition B.4 in Module IV** of this Permit. Also, prior to operation, the Permittee must submit the construction certifications for the aforementioned Tanks and CFUs, along with supporting documentation and testing results as required by 6 NYCRR 373-2.10(c) and **Condition B in Module IV** of this Permit.

ii. Operation, Inspection and Other Requirements: Tanks T-3010A/B/C/D and CFUs HIF-24A/B/C/D and their ancillary equipment must be operated in strict accordance with 6 NYCRR 373-2.10(e), the operational requirements contained in the the Department-approved "Tank System Design and Assessment Report for AWTS Arsenic Removal Tanks T-3010A/B/C/D" and the "Aqueous Waste Treatment System Operations and Maintenance (O&M) Manual" which are incorporated by reference into this Permit by **Schedule 1 of Module I**, and Attachment D, Appendix D-3 of this Permit. Also, the Permittee must inspect, assess and repair (as necessary) the above tanks, CFUs and ancillary equipment in accordance with 6 NYCRR 373-2.10(f) & (g), **Condition E in Module IV** of this Permit, Attachment D, Appendix D-3 of this Permit including the tank assessment requirements in Section VIII, and Attachment F of this Permit. In addition, the Permittee must comply with the following specific requirements:

"a") Tanks T-3010A, T-3010B, T-3010C and T-3010D must be periodically replaced as a part of normal operations. These regular tank changes shall constitute "in-kind replacements" in accordance with **Condition D.2 in Module I** of this Permit, as long as identical tanks are utilized. Any replacement with non-identical tanks will require modification of this Permit prior to such replacement in accordance with 6 NYCRR 373-1.7 and 621.

"b") During each regular change out installation, the Permittee must inspect all system components prior to operation to insure they have been installed properly, are free of leaks and any identified deficiencies or defects are corrected. In addition, the newly installed tank, or tanks, along with the associated ancillary equipment involved in the installation, shall be re-tested for tightness in accordance with the procedure specified in Section 3.2 of the “Tank System Design and Assessment Report for AWTS Arsenic Removal Tanks T-3010A/B/C/D” which is incorporated by reference into this Permit by **Schedule 1 of Module I**. Prior to placing the newly installed tank(s) into operation, the Permittee must provide an opportunity for Department staff to inspect the completed installation in accordance with **Condition B.4 in Module IV** of this Permit. Also, prior to operation, the Permittee must have the newly installed tank and associated ancillary equipment inspected by an independent, qualified installation inspector or an independent, qualified, professional engineer registered in New York in accordance 6 NYCRR 373-2.10(c)(2), and obtain and keep on file a written certification statement as required by 6 NYCRR 373-2.10(c)(7).

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EXHIBIT E

SUPPLEMENT TO MODULE V

(proposed modified pages are designated with a revision date at the bottom of the respective page)

EXHIBIT E
SUPPLEMENT TO
MODULE V – SURFACE IMPOUNDMENTS

The following conditions supplement those conditions contained within Module V of this Permit:

A. Authorized Surface Impoundments

1. The Permittee is authorized to use the following surface impoundments for the storage and/or treatment of only the following aqueous hazardous wastes subject to the terms of this Permit:

Unit/Activity	Waste Type	Quantity/Capacity (gallons)
FAC[1] Pond 1 / 2	Treated Aqueous Waste[2]	22,880,700
FAC[1] Pond 3[5]	Treated Aqueous Waste[2]	51,355,300
FAC[1] Pond 8[3,5]	Treated Aqueous Waste[2]	43,413,500
FAC[1] Pond 5[4]	Treated Aqueous Waste2	24,700,000

Footnotes:

1. "FAC" = Facultative.
2. "Treated Aqueous Waste" refers to the effluent from the on-site AWTS that has completed the treatment processes deemed necessary to meet the Land Disposal Restriction wastewater treatment standards as required by 6 NYCRR 376.
3. See **Condition D** of this Exhibit regarding the status of FAC Pond 8.
4. New FAC Pond 5 will be constructed in accordance with 6 NYCRR Part 373-2.11(b)(3) for development of landfill RMU-2.
5. FAC Ponds 3 and 8 will be removed from the permit upon acceptance by the Department that closure was performed in accordance with the Sitewide Closure Plan (Attachment I of the Permit).

B. General Conditions

1. The Permittee must operate aerators in the FAC Ponds as necessary to control odors and meet discharge requirements. The Permittee must maintain aerators in operating condition. Non-functioning aerators must be replaced or repaired with functioning units within 5 working days or sooner if odorous emissions are occurring (except in inclement weather, such as ice or snow conditions which could result in unsafe conditions for the repair personnel). A sufficient number of back-up aerators must be stored at the Facility to allow the timely replacement of non-functioning units.

2. Transfers of wastewater and/or accumulated precipitation from FAC Pond 1 / 2 to FAC Pond 3, from FAC Pond 3 to FAC Pond 1 / 2, and from FAC Pond 8 to FAC Pond 1 / 2 may be performed as necessary to maintain minimum freeboard and to

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facilitate accumulation prior to discharge. Upon construction of FAC Pond 5, transfers from FAC Pond Pond 1 / 2 or FAC Pond 3 to FAC Pond 5 and from FAC Pond 5 to Pond 1 / 2 or FAC Pond 3 may be performed as necessary. All transfers of treated wastewater to, from, and between the FAC Ponds must be via rigid piping unless a specific, prior approval is granted by the Department. Transfers from FAC Pond 8 to FAC Pond 1 / 2 must be conducted in accordance with the requirements in **Condition D** of this Exhibit.

3. Between April 1 and November 30 of each calendar year, the Permittee must test the FAC Pond aerators on a monthly basis any time they are not used for a period longer than thirty (30) days, if there is sufficient liquid to support the aerators, and a discharge to the river under the SPDES Permit is not is progress.

4. The Permittee may not manage hazardous waste in surface impoundments that would subject the units to the air control requirements of 6 NYCRR 373-2.29.

C. Special Operating & Monitoring Conditions

1. For the surface impoundments listed in **Condition A** of this Exhibit, the Department made a determination in 1993 to exempt them from the liner system requirements of 6 NYCRR 373-2.11(b)(1), in accordance with the exemption procedures of 6 NYCRR 373-2.11(b)(2). This exemption is continued through the duration of this Permit unless there is a significant change in an impoundment's design or capacity through a Permit modification and as long as the Permittee complies with the following operating and monitoring requirements:

   a. The Permittee may use FAC Ponds 1/2, 3, 8, & 5 for the storage/treatment of treated aqueous hazardous waste discharged from its on-site treatment process in accordance with the "Aqueous Waste Treatment System (AWTS) Operations and Maintenance (O&M) Manual" which is incorporated by reference into this Permit by **Schedule 1 of Module I**. Also, the Permittee must first fully comply with **Condition D** of this Exhibit with regard to FAC Pond 8.

   b. The hazardous wastes contained in FAC Ponds 1/2, 3, 8 & 5 must meet all of the Land Disposal Restriction (LDR) treatment standards for wastewater as presented in 6 NYCRR 376.4 and the air emission exemption requirements in 6 NYCRR 373-2.29(c)(3). The Permittee must analyze the contents of Tanks T-58 and T-125 prior to their discharge to the FAC Ponds in accordance with the Waste Analysis Plan in Attachment C, Section C of this Permit, to verify that the hazardous wastes meet LDR treatment standards.

   c. New FAC Pond 5 are not exempt from the liner system requirements of 6 NYCRR 373-2.11(b)(1).

   d. The Permittee must monitor the groundwater in the area of FAC Ponds 1/2, 3 & 8 in accordance with **Condition L of Exhibit F**.

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2. Failure on the part of the Permittee to adhere to the requirements, as listed above, shall constitute a violation of this Permit.

D. Special Conditions for FAC Pond 8

1. The Permittee must adhere to the Compliance Schedule set forth in **Condition C of Schedule 1 of Module I** with regard to completing the closure of FAC Pond 8, which was previously initiated by the Permittee. This compliance schedule extends the regulatory period for completing closure (i.e., 6 NYCRR 373-2.7(d)(2)) to facilitate radiological investigation and, where necessary, remediation of FAC Pond 8 soil/sediment based on information contained in the Permittee's written request dated March 22, 2012. This extension will remain in effect for the previously indicated period as long as the Permittee complies with the following requirements:

    a. The Permittee must comply with 6 NYCRR 373-2.7(d)(2)(ii).

    b. The Permittee must continue to monitor the groundwater in the area of FAC Pond 8 in accordance with **Condition L of Exhibit F**.

    c. The Permittee must comply with **Condition D of Exhibit B** with regard to any soil or sediment disturbance activities.

    d. The Permittee must remove accumulated precipitation from FAC Pond 8 to maintain a minimum of two (2) feet of freeboard at all times. The accumulated precipitation shall be removed by pumping it to FAC Pond 1 / 2 in accordance with the May 2008 approved "Facultative Pond 8 Water Transfer Procedure" which is incorporated by reference into this Permit by **Schedule 1 of Module I**.

2. The Permittee must initiate and complete radiological investigation and, where necessary, remediation of FAC Pond 8 soil/sediment, including its berm, and complete a final radiological survey within the timeframes specified by the Compliance Schedule in **Condition C of Schedule 1 of Module I**. All such radiological investigations, remediation and the final survey, must be conducted in accordance with work plans approved by the Department and with the concurrence of NYSDOH. Any soil/sediment excavation or disturbance related to FAC Pond 8 remediation or closure activities (e.g., regrading), must be conducted in accordance with Department-approved Site Soil Monitoring and Management Plan(s) as required by **Condition D.3 of Exhibit B**. Any wastes generated by remedial or closure activities must be managed and disposed of in strict accordance with the federal and state regulations which are applicable to the waste. The final status survey for FAC Pond 8 must be performed using procedures consistent with the Multi Agency Radiation Survey and Site Investigation Manual (MARSSIM), and the Permittee must submit a final status survey report for Department approval prior to re-commencing closure activities. Any FAC Pond 8 investigations or remediation initiated or completed to the Department's satisfaction prior to the effective date of this Permit, may be referenced by the Permittee and count towards compliance with this condition.

E. Construction of FAC Pond 5

1. General Unit Construction Conditions

The Permittee is required to comply with the unit construction standards specified in 6NYCRR 373-2.11(b)(3). The conditions in this section shall apply to construction of the unit designated by the Permittee as FAC Pond 5. The Permittee shall not commence upgrade or construction of the unit, or any portion there of until the Permittee has received from the Department all approvals required by the conditions of this Permit necessary for beginning construction, unless otherwise authorized by the Department in writing.

a. General Construction Requirement

FAC Pond 5 shall be constructed in strict conformance with relevant FAC pond sections of the Engineering Report for Residuals Management Unit 2 (Permit Reference Document), the Drawings (Attachment D of this Permit), the Construction Quality Assurance Plan for RMU-2 (Attachment J of this Permit), and the Technical Specifications for RMU-2 (Attachment J of this Permit), and as amended by the conditions contained in this Permit. These conditions maybe modified in accordance with Part 373-1.7 and Part 621 of the regulations.

b. The requirements of Conditions J.1 and J.2 of Exhibit F of Schedule I of Module I must be followed for scheduling and engineer requirements.

F. FAC Pond Secondary Leachate Collection System (SLCS)

1. The Permittee must monitor, report and evaluate the flow from FAC Pond 5 Secondary Leachate Collection System (SLCS) in accordance with 6 NYCRR 373-2.11(d)(4) and 6 NYCRR 373-2.11(j)(2). The Permittee must also implement SLCS Response Actions as necessary in accordance with 6 NYCRR 373-2.11(o)(2)&(3), the FAC Pond 5 Response Action Plan in Attachment D, of this Permit, and the conditions of this Exhibit.

a. FAC Pond SLCS Monitoring

i. The Permittee must monitor the SLCS in FAC Pond 5 and sample and analyze accumulated liquids to obtain accurate and reliable data on the quantity and chemical composition of the liquid in each cell's SLCS. At a minimum, the Permittee must perform the following tasks at the specified frequencies.

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‘a’) On a weekly basis, the Permittee must remove all pumpable liquid from FAC Pond 5’s SLCS sump and record the volume.

‘b’) On a monthly basis, the Permittee must sample the liquid removed from FAC Pond 5’s SLCS sump and analyze each sample for specific conductance.

‘c’) On a yearly basis, the Permittee must sample the liquid removed from FAC Pond 5’s SLCS sump and analyze each sample for chloride and sulfate.

b SLCS Evaluation and Reporting

i. SLCS Flow Rate Evaluation

‘a’) Each time liquid is pumped from FAC Pond 5’s SLCS the volume must be documented in accordance with **Condition F.1.a.i.‘a’** of this Exhibit. The Permittee must take the total weekly volume pumped from FAC Pond 5’s SLCS and divide it by the area of the pond in acres and by the number of days, to derive the ponds average daily SLCS flow rate in gallons per acre per day (gpad). For each weekly calculation, the Permittee must compare the pond’s average daily SLCS flow rate to the Response Rate for the pond as defined by **Condition F.1.c** of this Exhibit. If the pond’s average daily SLCS flow rate exceeds the defined Response Rate for the pond, the Permittee must implement the FAC Pond Response Action Plan (RAP) in Attachment D, of this Permit, as required by **Condition F.1.d** of this Exhibit.

ii. SLCS Reporting

‘a’) The Permittee must report the results of the SLCS monitoring and flow rate evaluation required by **Conditions F.1.a and F.1.b.i** of this Exhibit to the Department. The results of FAC Pond 5’s SLCS monitoring and evaluations that occur during a month must be submitted to the Department within 90 days from the end of that month. The sampling data must be submitted as required by **Condition B of Exhibit A** and **Condition N of Module I** of this Permit.

c. Response Rates (RRs) for FAC Ponds

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i. The Response Rate for FAC Pond 5 from the time it begins operation (i.e., initial receipt of treated wastewater), must be 552 gpad for FAC Pond 5. This Response Rate value was set based on safety margins for discharge over the ponds operational life of water trapped between the primary and secondary liners, as required by 6 NYCRR 373-2.11(j)(1).

d. FAC Pond SLCS Response Actions

i. On any occasion, should the SLCS average daily flow rate for FAC Pond 5 exceed its Response Rate, the Permittee must implement the FAC Pond Response Action Plan (RAP) in Attachment D, of this Permit for the involved pond. In addition, the Permittee must take any and all response actions as deemed necessary by the Department to protect human health and the environment.

EXHIBIT F

SUPPLEMENT TO MODULE VI

(proposed modified pages are designated with a revision date at the bottom of the respective page)

EXHIBIT F
SUPPLEMENT TO
MODULE VI - LANDFILLS

The following conditions supplement those conditions contained within Module VI of this Permit:

A. Authorized Disposal of Waste in Landfill

1. The Permittee may dispose of solid and debris wastes as identified in this Permit in the following landfill at the Facility up to its indicated capacity, subject to the terms of this Permit:

Unit/Activity	Waste Type	Waste Codes	Quantity/Capacity
Residual Management Units No. One (RMU-1)	Hazardous and Nonhazardous, Non-putrescible Solid Waste, including Debris	Listed in Attachment C, Section C-1, including Tables C-1 & C-2[1]	47.1 acres[2] 2,233 acre-feet[3]

Footnotes:

1. Only those Waste Codes listed in the Attachment C Tables with a "L" TSD Option for "Landfill" are authorized for disposal, subject to the restrictions in 6 NYCRR 373-2.14, 6 NYCRR 376 and the conditions of this Permit.
2. The unit size presented in this table represents the approximate size of the total landfill including waste area and perimeter berm. The actual limits of the landfill are presented on the Drawings in Attachment J, Appendix D-6 of this Permit.
3. The unit capacity presented in this table represents the approximate air volume capacity of the landfill. The actual horizontal and vertical limits which govern the amount of waste that may be disposed of in this landfill are presented on "Top of Waste Grade" Drawing No. 11a in Attachment J, Appendix D-6 of this Permit.

B. General Conditions

1. This Permit does **not** authorize the placement or disposal of putrescible-type nonhazardous waste in RMU-1 (e.g., municipal solid waste), nor does it authorize the placement or disposal of electronic waste (e-waste) pursuant to the disposal ban under ECL § 27-2611.

C. RMU-1 Design & Liner/Leachate Collection System Repair Materials

1. If repairs to the RMU-1 liner and/or leachate collection systems are necessary as a result of defects identified during inspections or due to response actions required by **Condition H.1.d** of this Exhibit, the Permittee must use materials in making these repairs which are compatible and consistent with those materials used in the original construction of these systems. All such materials must meet requirements as

specified by 6 NYCRR 373-2.14(c), the documents in Attachment J of this Permit and the RMU-1 Engineering Report which is incorporated by reference into this Permit by **Schedule 1 of Module I**.

a. Geosynthetic Repair Materials

To meet the above requirements, the Permittee may use "newly purchased" geosynthetic materials for RMU-1 liner/leachate collection system component repairs. Alternatively, the Permittee may use geosynthetic materials for such repairs which are "left over" from the original construction of the RMU-1 liner/leachate collection systems, provided that samples of the "left over" geosynthetic materials taken at the time of the repair have passed Conformance Testing in accordance with **Condition C.1.a.iii** of this Exhibit and these geosynthetic materials have been stored since delivery in accordance with the storage requirements in Attachment J, Appendix D-7 of this Permit. For "left over" geosynthetic materials, the Permittee must also produce documentation, upon Department request, which confirms that the specific geosynthetic materials to be used in a repair are remnants from the original construction.

The Permittee must perform leachate compatibility testing and provide material specification test results on "newly purchased" geosynthetic materials used to repair geosynthetic components of the RMU-1 liner/leachate collection systems. The Permittee must perform new material specification testing and provide test results on "left over" geosynthetic materials used to repair geosynthetic components of the RMU-1 liner/leachate collection system under the following circumstances:

For Geomembrane Liner Material:

- when the "left over" geosynthetic liner materials are greater than 5 years old; and
- when the Permittee cannot satisfy the above stated storage provisions for using "left over" geosynthetic liner materials.

For Leachate Collection Geosynthetic Material:

- when the "left over" geosynthetic liner materials are greater than 5 years old and more than 8,000 ft^2 (approximately 1 roll) of "left over" geosynthetic leachate collection material is needed to affect the repair; and
- when the Permittee cannot satisfy the above stated storage provisions for using "left over" geosynthetic liner materials and more than 8,000 ft^2 (approximately 1 roll) of new geosynthetic leachate collection material is needed to affect the repair.

The Permittee must conduct the testing outlined in **Condition C.1.a.i** of this Exhibit on samples of "newly purchased" geosynthetic materials used to repair geosynthetic components of the RMU-1 liner and/or leachate collection systems, and submit all test results for Department approval. The Permittee must obtain manufacturer's quality control documentation if using "newly purchased" geosynthetic materials to affect the repair or when proposing to use "left over" geosynthetic materials under the above listed circumstances, conduct material specification testing on actual material samples of "left over" geosynthetic materials, as outlined in **Condition C.1.a.ii** of this Exhibit.

i. Geosynthetic Material Leachate Compatibility Testing

Utilizing the leachate obtained from the RMU-1 Lift Station, the Permittee must retain an independent laboratory to immerse samples of the geosynthetic materials (geomembrane, geonet, geotextile and geocomposite) in said leachate, in strict accordance with ASTM Method D5322 and perform testing on these materials in strict accordance with ASTM Method D5747. For geocomposite materials, the testing to be performed on control samples and test samples after each immersion period, must be identical to the testing performed on the separate geonet and geotextile materials. The Permittee must submit to the Department a Report from the independent laboratory which includes all immersion test results. The Permittee may complete repairs using these geosynthetic materials and restore the repaired area to its previous operational or closed status at its own risk, prior to the submission to the Department of the above indicated Immersion Testing Report, provided that all other Permit conditions pertaining to the repair involving these materials have been satisfied. Subsequently, if the Report indicates that the geosynthetic materials used in the repair appear incompatible with the RMU-1 leachate, the Department may require that the Permittee repeat the repair of the effected area. In response to this requirement, the Permittee must comply by repeating the repair using geosynthetic materials determined compatible with the RMU-1 leachate.

'a') Geomembrane Sampling/Testing Frequency

The geomembrane material must be sampled at a rate of one sample per resin blend of geomembrane material, but in no case shall the sampling frequency be less than one sample per 180,000 lbs (8.17×10^4 kgs) of the manufactured geomembrane material. The Construction Quality Assurance (CQA) Engineer, as defined by **Condition J.2.a** of this Exhibit, involved in supervising the repair must verify that the sampling frequency which is based on the weight of the geomembrane material was met and that each roll of geomembrane delivered to the Facility was manufactured from resin blends which were tested in accordance with the ASTM Methods stated above based on a comparison of the geomembrane material Resin Blend Nos. Any roll found to have been manufactured from other resin blends, must not be used in the RMU-1 liner system repair. The CQA Engineer must document the above sampling frequency verifications in the repair certification required by **Condition D** of this Exhibit. Geomembrane materials which have been approved by the Department subsequent to compatibility testing and are "left over" after completion of a repair, may be used in future repairs without repeating compatibility testing as long as these materials meet all provisions for "left over" geosynthetic materials as specified above in **Condition C.1.a** of this Exhibit.

'b') Geonet, Geotextile, and Geocomposite Sampling/Testing Frequency

The geonet, geotextile and geocomposite materials must be sampled at a minimum rate of one sample per product per year in which they are to be used in RMU-1 repair. For the purposes of this Permit condition, the term "product" means a group of materials produced by a single manufacturer that are the same material type. Geonet, geotextile and geocomposite materials which have been approved by the Department subsequent to compatibility testing and are "left over" after completion of a repair, may be used in future repairs without repeating compatibility testing as long as these materials meet all provisions for "left over" geosynthetic materials as specified above in **Condition C.1.a** of this Exhibit.

ii. Geosynthetic Material Specification Information/Testing

'a') "Newly Purchased" Geosynthetic Materials

For "newly purchased" geosynthetic materials, the Permittee must obtain from each geosynthetic manufacturer, quality control documentation for smooth/textured geomembrane, geonet, geotextile and/or geocomposite materials to be used in a repair of RMU-1 liner and/or leachate collection system components. For the geosynthetic materials to be used, this quality control documentation must include all information and testing results as required by Sections 02400 (smooth geomembrane), 02401 (textured geomembrane), 02410 (geotextile), 02420 (geonet) and 02430 (geocomposite) of the RMU-1 Technical Specifications in <u>Attachment J, Appendix D-7</u> of this Permit, and Sections 9.3 (geomembrane), 10.3 (geotextile), 11.3 (geonet) and 12.3 (geocomposite) of the RMU-1 Quality Assurance Manual in <u>Attachment J, Appendix D-8</u> of this Permit. The Permittee must provide the above quality control documentation to the Construction Quality Assurance (CQA) Engineer supervising the repair, prior to utilizing the purchased geosynthetic(s) in the repair. The CQA Engineer must review this documentation and certify that each geosynthetic material used in a repair meets all technical specifications for each such geosynthetic as specified in the above listed Sections of the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit. Any geosynthetic material which fails to meet these technical specifications must not be used in RMU-1 liner and/or leachate collection system repairs.

‘b’) “Left Over” Geosynthetic Materials

Under the circumstances listed in **Condition C.1.a** of this Exhibit for “left over” geosynthetic materials, the Permittee must perform geosynthetic material testing on samples of “left over” smooth/textured geomembrane, geonet, geotextile and/or geocomposite materials to be used in a repair of RMU-1 liner and/or leachate collection system components. This testing must be conducted by an independent laboratory. For the geosynthetic materials to be used, samples of the actual material(s) must be tested for all technical specifications which are applicable to the particular geosynthetic material as listed by Sections 02400 (smooth geomembrane), 02401 (textured geomembrane), 02410 (geotextile), 02420 (geonet) and 02430 (geocomposite) of the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit, in strict accordance with the test methods specified by these Sections. The Permittee must provide all test results to the Construction Quality Assurance (CQA) Engineer supervising the repair, and to the Department. The CQA Engineer must review these test results and certify that each geosynthetic material used in a repair meets all technical specifications for each such geosynthetic as specified in the above listed Sections of the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit.

The Permittee may complete repairs using these “left over” geosynthetic materials and restore the repaired area to its previous operational or closed status at its own risk, prior to receiving specification testing results, provided that all other Permit conditions pertaining to the repair involving these materials have been satisfied. Subsequently, if test results indicate that a geosynthetic material, or materials used in the repair fail to meet the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit, the Department may require that the Permittee repeat the repair of the effected area. In response to this requirement, the Permittee must comply by repeating the repair using geosynthetic materials determined to meet the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit, regardless of the fact that the previously repaired area has been restored to operational or closed status.

iii. Geosynthetic Material Conformance Testing

Regardless of whether the Permittee selects "newly purchased" or "left over" geosynthetic materials to make repairs to the RMU-1 liner and/or leachate collection systems, the Construction Quality Assurance (CQA) Engineer supervising the repair must obtain samples of the actual geosynthetic materials to be used in the repair for conformance testing. The CQA Engineer must conduct conformance testing on samples of geomembrane, geonet, geotextile and/or geocomposite materials to be used in a RMU-1 liner/leachate collection system repair in accordance with Sections 9.4 (geomembrane), 10.4 (geotextile), 11.4 (geonet) and 12.4 (geocomposite) of the RMU-1 Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The CQA Engineer must obtain and review all conformance testing results and certify that each geosynthetic material to be used in a repair meets the tested for technical specifications for each such geosynthetic as specified in the applicable Sections 02400 (smooth geomembrane), 02401 (textured geomembrane), 02410 (geotextile), 02420 (geonet) and 02430 (geocomposite) of the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit. Any geosynthetic material which fails to meet the tested for technical specifications must not be used in RMU-1 liner and/or leachate collection system repairs.

b. Granular Repair Materials

For the granular material to be used in repairs of the RMU-1 leachate collection system(s), the Permittee must obtain from the material supplier, quality documentation in accordance with Section 5.2 of the RMU-1 Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The Permittee must provide the above quality control documentation to the Construction Quality Assurance (CQA) Engineer supervising the repair, prior to utilizing the granular material in the repair.

In addition, the CQA Engineer must conduct conformance testing on samples of the actual granular material to be used in a RMU-1 leachate collection system repair in accordance with Section 5.3 of the RMU-1 Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The CQA Engineer must obtain and review the quality control documentation from the material supplier and all conformance testing results, and certify that the granular material to be used in a repair meets the technical specifications for such material as specified in Section 02210 of the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit. Any granular material which fails to meet these technical specifications must not be used in RMU-1 leachate collection system repairs.

c. Other Repair Materials

Other materials which may be needed for RMU-1 liner/leachate collection system repairs (e.g., clay for the soil liner(s), granular material for the operations layer, pipe for the leachate collection system and standpipes, etc.) must meet their respective technical specifications as presented in Sections of the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit. The Department may require testing as deemed appropriate to confirm that such materials meet technical specifications. In addition, any clay needed for soil liner repairs must be obtained from Department approved borrow sources for liner and/or cover soil barrier materials, and must meet all requirements as specified in **Condition J.4** of this Exhibit for final cover clay soil barrier material.

D. RMU-1 Liner/Leachate Collection System Repair

1. The Permittee must implement repairs to the RMU-1 liner and/or leachate collection system when defects are identified during landfill inspections or when such repairs are required as response actions in accordance with **Condition H.1.d** of this Exhibit. The term "leachate collection system" as it is used in this particular condition, refers to components used to collect leachate (e.g., geocomposites, stone drainage layers), and not to components used to remove leachate from the landfill (e.g., pumps, electrical controls). If defects are identified in operational areas of RMU-1, the Permittee must immediately upon identification of such defects, cease all waste placement in the immediate area of the defect(s) and the surrounding area needed to facilitate repairs. Also, if such defects involve breaches of the primary and/or secondary geomembrane liner(s), the Permittee must immediately take any and all actions necessary to prevent leachate and contaminated surface water from entering the area of the defect(s) so as to prevent leakage. The Permittee must submit for Department review and approval, a schedule for completing repairs to all identified defects in cases where it will, or it does take longer than seven (7) days to complete repairs as measured from the date the defect(s) was/were identified, in accordance with 6 NYCRR 373-2.2(g)(3) and the requirements of **Condition E of Module VI** and Attachment F of the Permit.

2. The Permittee must perform repairs on the RMU-1 liner and/or leachate collection system using procedures consistent with their original construction and in strict accordance with the following documents, unless otherwise modified by requirements in this Permit condition:

   - The "RMU-1 Landfill Drawings" in Attachment J, Appendix D-6 of this Permit;
   - The "RMU-1 Landfill Technical Specifications" in Attachment J, Appendix D-7 of this Permit;
   - The "RMU-1 Landfill Quality Assurance Manual" in Attachment J, Appendix D-8 of this Permit; and

- The "RMU-1 Engineering Report" of the Permit Application which is incorporated by reference into this Permit by **Schedule 1 of Module I**.

3. The Permittee must use materials in making these repairs which are compatible and consistent with those materials used in the original construction of the RMU-1 liner/leachate collection systems, and must fulfill all requirements pertaining to such materials as specified by **Condition C.1** of this Exhibit. The Permittee must have all liner/leachate collection system repairs supervised and under the control of a Construction Quality Assurance (CQA) Engineer, as defined by **Condition J.2.a** of this Exhibit, unless such repairs only involve the operations layer component of the system. During such repairs, the CQA Engineer is responsible for fulfilling material qualification requirements as specified by **Condition C.1** of this Exhibit, and the quality control procedures applicable to the particular component(s) being repaired as specified by the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit unless otherwise modified by requirements in this Permit condition. The Permittee must also adhere to the following component specific repair requirements.

   a. Geomembrane Liner(s) Repair Requirements

      i. The Permittee must patch/cap strip all identified geomembrane defects using fusion and/or extrusion welding devices which meet requirements in the RMU-1 Technical Specifications, Attachment J, Appendix D-7 of this Permit. The Permittee must employ only welding personnel who meet the qualification requirements in the RMU-1 Technical Specifications, Attachment J, Appendix D-7 of this Permit and the RMU-1 Landfill Quality Assurance Manual, Attachment J, Appendix D-8 of this Permit. The CQA Engineer supervising the repair must instruct qualified welding personnel to perform test seams on scraps of actual geomembrane and must test all such seams for strength as required by Section 9.7 of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The CQA Engineer must confirm that the test seam results meet the seam strength requirements in Section 02400 (smooth geomembrane) or 02401 (textured geomembrane) of the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit. The CQA Engineer must not allow welding equipment and/or welding personnel to perform actual repairs when a test seam produced by the welder does not meet the above referenced strength requirements. All actual repair seams must be non-destructively tested by the CQA Engineer in accordance with Section 02400 (smooth geomembrane) or 02401 (textured geomembrane) of the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit and Section 9.8 of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. Destructive testing of actual repair seams must only be performed when the total length of all such seams exceeds 500 feet, in accordance with Section 9.9 of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit.

b. Clay Soil Liner(s) Repair Requirements

i. If clay soil liner repairs are needed and the Permittee determines that the area to be repaired is not of sufficient size to facilitate the use of placement and compaction equipment employed during the liner's original construction, the Permittee must submit for Department approval an alternate clay soil placement and compaction plan for the repair area(s) which will produce a clay soil liner that meets moisture/density and permeability requirements of this Permit.

c. Upon completion of RMU-1 liner and/or leachate collection system repairs, the Permittee must submit for Department review and acceptance, the CQA Engineer's certification, along with supporting documentation, that the repair has been completed in accordance with this Permit and that the repaired area is deemed acceptable for hazardous and industrial nonhazardous waste disposal. If not all material testing results required by **Condition C.1** of this Exhibit are available at the time repairs are completed, the CQA Engineer may issue a certification that is conditioned upon the satisfactory outcome of the pending material tests. The Permittee must not re-commence waste placement in the area(s) of the repair and return it to operational or closed status, until the Permittee receives the CQA Engineer's certification or conditional certification. If the Permittee receives a conditional certification due to pending material testing results, the Permittee may re-commence waste placement in the area(s) of the repair at its own risk in accordance with the provisions in **Condition C.1.a** of this Exhibit.

E. RMU-1 Waste Disposal

1. The Permittee may receive for disposal in RMU-l only those solid hazardous and solid nonhazardous wastes identified as being acceptable for land burial in accordance with 6 NYCRR Part 376, 6 NYCRR Part 373-2.14, and the Waste Analysis Plan (WAP) in Attachment C of this Permit, subject to the restrictions and limitations of this Exhibit. The Permittee may not accept for land disposal in RMU-1 any putrescible nonhazardous waste (e.g., municipal waste).

a. Annual Waste Cap

i. The Permittee must not accept for land disposal more than 425,000 tons of waste, applying credits and excluding exemptions, in any calendar year. The determination of the amount of waste land disposed on a tonnage basis will be calculated based upon gate receipt data. The 425,000 ton total must not include any waste generated at a New York State remedial project subject to a federal or state Record of Decision (ROD), order on consent (or any other state or federally approved work plan or enforcement vehicle having the same or similar effect), a Permit condition, or that which is funded in whole or in part by New York State or any governmental subdivision of the State. Characteristic hazardous wastes that are received, de-characterized on-site, and then sent off-site for disposal at a permitted RCRA Subtitle D facility will be entitled to a ton for ton credit up to a maximum of 25,000 tons per year. The credited amount shall be based on the gate receipt weight for each characteristic hazardous waste prior to on-site treatment. In addition, all on-site remedial wastes are exempt from the 425,000 ton total.

ii. For the purposes of determining the annual volumes of hazardous and industrial nonhazardous wastes subject to the volume restrictions contained in this condition, but without altering any of the existing Permit provisions such as the Waste Analysis Plan, "hazardous waste" shall include all wastes meeting the definition of hazardous waste set forth in 6 NYCRR 37l.1(c), (d) and (e) and in 40 CFR 261. Industrial nonhazardous wastes shall include all other wastes generated by industry.

b. Department Waste Stream Review Process

i. Each waste stream to be landfilled in RMU-1 must be reviewed by Department staff prior to placement in the landfill. This review shall not diminish the Permittee's responsibility to fully implement the provisions of the Waste Analysis Plan in <u>Attachment C</u> of this Permit, or other provisions of this Permit. The Permittee may not use a waste review performed by the Department staff in defense of any non-compliance with the requirements of this Permit or any State, federal, or local laws or regulations.

ii. Requests for waste stream review must be submitted to the Department in accordance with the Waste Analysis Plan in <u>Attachment C</u> of this Permit.

iii. The Permittee must submit all waste stream review requests in a form which is acceptable to Department staff performing the review. All information that the waste generators have provided to the Permittee for pre-acceptance review must be made available for review by the Department's waste review staff. The Permittee must allow the Department a minimum of one (1) complete 24-hour business day for review of a waste stream. The Department shall provide the Permittee with notification of any problems associated with the land disposal of a waste stream within 5 working days after all the information needed by Department staff has been supplied.

iv. If a practical alternative method of processing, reclaiming, or destroying a specific waste stream becomes available, the Permittee shall pursue with the Department the feasibility of using such an alternative method. If technologies, as above, become available for a specific waste, the Department may restrict or limit the landfilling of that waste or require treatment of the waste prior to landfilling.

v. Waste stream review requests for New York State remedial wastes defined as "Authorized" in **Condition E.1.a.i** of this Exhibit shall include the designation "NYA" in the comments section.

c. Waste Disposal Restrictions

i. Industrial Nonhazardous Waste Organic Content Restrictions

‘a’) The Permittee must perform a “2 percent organic limit analysis” on each landfill candidate nonhazardous waste stream which is identified as requiring organic analysis in the pre-acceptance review process. The analysis must be a method that quantifies organic priority pollutants and solvent constituents (taken from F001-F005 waste listings). The Permittee must use EPA SW-846 Method 8260 or other Department approved organic analysis method to determine concentration of the organic constituents.

‘b’) Nonhazardous wastes which exceed the “2 percent organic limit” using the “2 percent organic limit analysis” as described above must not be accepted for landfill disposal.

‘c’) The quantitative results for the non-targeted constituents which are obtained through the use of EPA SW-846 Method 8260 or other approved analytical method, must be made available for Department review. The Department may deny land disposal for non-hazardous waste streams containing significant amounts of non-target organic constituents on a case by case basis.

'd') The Permittee shall not place ignitable or reactive wastes in the landfill as restricted by 6NYCRR 373-2.14(h) and shall constituents on a case by case basis.

‘e’) The Department may specify a higher or lower percent by weight limitation than in this **Condition E.1.c.i** of this Exhibit for any particular organic waste constituent or nonhazardous waste stream based upon the toxicity, leachability, and mobility of such waste or constituent. Such determination may be made by the Department on its own initiative or upon the application of the Permittee as provided in 6 NYCRR 621.

‘f’) The Permittee may petition the Department for the continued land disposal of a specific nonhazardous waste stream prohibited by this condition, demonstrating that practical alternative treatment facilities do not exist. Such a demonstration must include a justification for why the waste cannot be otherwise treated and/or incinerated, and written statements from commercial facilities verifying that existing units cannot manage the waste.

ii. On-site Aqueous Waste Treatment (AWT) Filter Cake

‘a’) Filter cake from the Permittee’s on-site wastewater treatment process must be sampled, analyzed, and subjected to the same Permit disposal restrictions as similar off-site generated wastes.

iii. Ignitable, Reactive and/or Incompatible Wastes

‘a’) The Permittee shall not place ignitable or reactive wastes in the landfill as restricted by 6NYCRR 373-2.14(h) and shall document compliance with this condition as required by 6 NYCRR 373-2.2(i)(3).

‘b’) The Permittee shall not place incompatible wastes or incompatible wastes and materials in the same landfill cell as restricted by 6 NYCRR 373-2.14(i), unless such placement is in compliance with 6 NYCRR 373-2.2(i)(2) and documented in accordance with 6 NYCRR 373-2.2(i)(3). Also see Conditions E.1.d.iii and E.1.d.iv with respect to specific incompatible wastes.

iv. Liquid Wastes

‘a’) The Permittee shall not place in the landfill unit, bulk or non-containerized liquid waste or waste containing free liquids (regardless of whether or not absorbents have been added) as restricted by 6 NYCRR 373-2.14(j)(1). The Permittee shall not place containers holding free liquids in the landfill except as allowed by 6NYCRR 373-2.14(j)(2). The Permittee must demonstrate compliance with this condition in accordance with 6NYCRR 373-2.14(j)(3) whenever the Permittee or Department staff consider it to be necessary based on visual observations of the waste and/or waste characterization information. Containers found to have free liquid shall be processed as required by the Waste Analysis Plan in Attachment C of this Permit.

v. Hazardous Waste Codes F020, F021, F022, F023, F026 & F027

‘a’) Hazardous waste gate receipts of F020, F021, F022, F023, F026 and F027 materials must not be placed in the landfill unit, unless otherwise authorized by 6 NYCRR 373-2.14(m) and in accordance with the Permittee’s approved Dioxin Management Plan which is incorporated by reference into this Permit by **Schedule 1 of Module I**. No current production waste or outdated products with these codes can be accepted.

vi. Electronic Waste (e-waste)

‘a’) The Permittee shall not dispose of electronic waste (e-waste) in the landfill, as banned pursuant to ECL § 27-2611.

d. Waste Disposal Limitations

i. Lightweight Wastes

‘a’) Waste that has the potential to become airborne dust or debris must be containerized or otherwise managed in accordance with the Facility Fugitive Dust Control Plan in Attachment L, Appendix D-10 of this Permit.

ii. Soluble Wastes

‘a’) Prior to landfilling, soluble wastes must be pre-treated to the extent feasible using the Permittee’s on-site treatment facilities. Soluble wastes must be placed in the landfill in such a way as to minimize pocketing of soluble material.

iii. Combustible Wastes

‘a’) No material that is combustible shall be placed in the acid generating zones of the landfill, as those zones are defined in **Condition E.1.d.iv** of this Exhibit, unless the material is a part of the actual waste stream or its packaging is approved by the Department.

iv. Acid-Sensitive & Acid-Generating Wastes

‘a’) An acid-sensitive zone must be established throughout the landfill. Only acid-sensitive materials and materials compatible with such wastes, shall be placed into this zone. A 50-foot neutral buffer zone must be established to separate acid-sensitive waste from acid-generating waste. An acid-generating landfill zone must be delineated on the opposite side of the acid-sensitive zone. At locations in Cell 9/10 where acid-sensitive wastes are to be disposed of at elevations above acid-generating wastes, a separation distance of less than 50 feet may be used as long as the vertical neutral buffer zone is at least one lift thick. All acid-sensitive and acid-generating wastes must be identified in accordance with **Condition C.2 of Exhibit A**, to distinguish them for proper disposal. The Permittee must verify the prescribed separation distances for each waste identified as acid-sensitive or acid-generating in accordance with **Condition F.5.e** of this Exhibit.

v. Low Strength Wastes

‘a’) For each non-containerized bulk waste stream to be disposed of in RMU-1, the Permittee must determine that the strength properties of such waste satisfy minimum required bulk waste strength values in terms of the waste's cohesion and friction angle as presented on the "RMU-1 Minimum Waste Strength Curves" in Attachment K, Appendix D-11 of this Permit, whose development is based on the RMU-1 design and stability analyses presented in the "RMU-1 Engineering Report" which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit.

'b') For bulk contaminated soils, and any dry bulk contaminated soil-like materials (e.g., sandblast grit, salts, etc.) as determined by the Department on a case-by-case basis, a soil identification may be performed and, based on the established strength characteristics for the soil type in terms of cohesion and friction angle, the contaminated soil or approved soil-like material may be judged to have sufficient strength using Table 9.1 from "Design Manual - Soil Mechanics, Foundations and Earth Structures", NAVFACDM-7, March 1971.

'c') For non-soil and non-soil-like (hereafter referred to collectively as "non-soil") bulk waste streams, the Permittee must perform a compressive strength analysis using either:

- a remolded sample from the waste generator ("sale sample"), or

- a remolded sample taken prior to placement in RMU-1 ("field mix/as received sample"). The sample must be obtained from the actual field mixing process being utilized or from "as received" wastes not requiring stabilization prior to disposal.

'd') "Non-soil" bulk waste streams which are received at a rate equal to or less than 100 tons per year may be landfilled without compressive strength analysis. The first 20 tons of "non-soil" bulk waste streams that will be landfilled at a rate of greater than 100 tons per year may be landfilled prior to completion of the compressive strength analysis (waste in excess of the 20 tons may not be landfilled until satisfactory compressive strength analysis results are obtained). The Permittee must indicate the use of either exclusion on the waste stream information it submits for Department review in accordance with **Condition E.1.b** of this Exhibit.

'e') Any bulk waste whose "sale sample" fails to meet the required minimum strength values for RMU-1 as depicted by the "Min. Line" on the "RMU-1 Minimum Waste Strength Curves" in Attachment K, Appendix D-11 of this Permit, using 75% cohesion after no more than one week of curing shall not be accepted for disposal in RMU-1.

For any bulk (non-soil) waste load where a "field mix/as received sample" is undergoing testing in accordance with **Condition**

E.1.d.v.'c' of this Exhibit to confirm compliance with "RMU-1 Minimum Waste Strength Curves", but which does not require stabilization and TCLP testing to confirm compliance with Land Disposal Restrictions (LDRs), the load may be placed in Interim Storage in the landfill pending strength testing results under the following conditions:

'1') The load must be placed on a geosynthetic separation material or a stone layer with a minimum thickness of 2 inches, in a distinct interim storage pile, separate from other bulk waste loads and other wastes.

'2') Each such interim storage pile must have a flag or other marker displayed with an identifier(s) that correlates to the waste tracking information which indicates the specific waste in the pile and the date the pile was placed in the landfill.

'3') Daily cover must be applied to all interim storage piles on the date of their placement in the landfill and maintained for the duration of each pile's storage period.

Any bulk waste whose "field mix/as received sample" test result fails to meet the required minimum strength values as depicted by the "Min. Line" on the "RMU-1 Minimum Waste Strength Curves" in Attachment K, Appendix D-11 of this Permit, using 100% cohesion after no more than one week of curing shall not be disposed in RMU-1 and must be immediately removed from landfill interim storage for re-processing or disposition by other than land disposal means. Any bulk waste load whose "field mix/as received sample" test result confirms that it meets required minimum waste strengths, may be disposed of in RMU-1. The Permittee also must not dispose of any below minimum strength bulk waste in RMU-1 by placing it in macroencapsulation boxes or other non-steel containers. Results of all testing performed pursuant to this condition, and documentation on waste quantities necessary to demonstrate compliance with the restrictions contained in this condition, must be included in the Operating Record in accordance with 6 NYCRR 373-2.5(c). The Permittee must report any failed samples to the Department promptly.

'f') Bulk waste that is determined to have cohesion and friction angle values which plot above the "Min. Line" but below the "1.5 Line" on the "RMU-1 Minimum Waste Strength Curves" in Attachment K, Appendix D-11 of this Permit, may be disposed by the Permittee in RMU-1 as "Acceptable Minimum Strength (AMS)" waste under the following limitations and provisions.

- The AMS waste must be spread in thin lifts and blended with other gradable wastes. If the AMS waste is not adequately blended with other wastes, the AMS waste must be placed in maximum one (1) foot thick horizontal layers within a waste lift approximately parallel to the floor of the landfill and with a vertical separation between AMS waste layers of at least nine (9) feet.

- The maximum volume of AMS waste must not exceed ten percent (10%) of the waste placed within the landfill in any given month. The amount of AMS waste landfilled must be reported to the Department on a monthly basis.

- If any AMS waste is received at greater than 200 tons per year, this must be noted on the waste stream information submitted for Department review in accordance with **Condition E.1.b** of this Exhibit, and a strategy for placement of such AMS waste in the landfill must be developed by the Permittee and submitted for Department approval.

'g') The Permittee must promptly notify the Department of any bulk waste stream, which has previously passed the soil identification or compressive strength analysis, for which visual observation and/or testing indicates changed physical or chemical characteristics and is suspected of no longer being of acceptable compressive strength. The Department may select this or any other bulk waste stream it deems appropriate for additional compressive strength analysis by the Permittee, at its discretion. The requirements of this condition do not apply to solid debris and wastes contained in steel drums or other rigid steel containers.

'h') Containerized Wastes - To address void space, the Permittee must fill or crush waste containers as required by 6NYCRR 373-2.14(k).

e. Procedure for Disposal of Package Lab Chemicals in RMU-1

i. Disposal of Package Lab Chemicals (PLCs) in RMU-1 must be as described in Section C-1 of the Waste Analysis Plan (WAP) in Attachment C of this Permit.

ii. The packing lists must be reviewed and a confirmation made that the materials meet the criteria in **Condition E.1.e.i** of this Exhibit. In addition, the materials must be reviewed to confirm that they are acceptable under the terms of this Permit and the above referenced WAP. The packing lists must be submitted to Department staff with the waste stream information submitted for Department review in accordance with **Condition E.1.b** of this Exhibit and they will include sufficient detail to allow the Department to confirm that the wastes meet the requirements of this Permit and the above referenced WAP. Alternately, a list of chemicals will be submitted to Department staff in addition to a database of PLC compounds previously disposed in RMU-1.

iii. The contents of each lab pack must be confirmed by removing the individual items from the lab pack and checking them against the packing lists. The containers may be returned to the original drum/container or re-packed in another drum/container (e.g., a one cubic yard box). Five-gallon pails of solid material may be labeled and disposed of directly in the landfill.

f. Interim Storage of Stabilized Waste in RMU-1

i. The Permittee may place stabilized bulk wastes in interim storage while awaiting results of Toxicity Characteristic Leaching Procedure (TCLP) tests to determine the waste's compliance with land disposal restrictions in 6 NYCRR 376. All such bulk wastes awaiting TCLP test results must be in covered roll-offs or drums which may be stored within the RMU-1 landfill or in other Container Storage Areas at the facility which are allowed by this Permit to store these container types. The placement, storage and ultimate disposition of such waste must be in accordance with the following requirements.

'a') Each such interim storage container must have a flag or other marker displayed with an identifier(s) that correlates to waste tracking information which indicates the specific waste in the container and the date the container was sampled for TCLP testing.

'b') If the TCLP test result on a stabilized bulk waste load in an interim storage container indicates that the waste meets requirements for land disposal, the Permittee may place the waste in a permanent disposal location within RMU-1.

'c') If the TCLP test results on a stabilized bulk waste load in an interim storage container indicates that the waste does <u>not</u> meet requirements for land disposal, the Permittee must either re-stabilize the waste load or have it transported for proper disposal at an appropriate off-site facility in accordance with all applicable regulations. Any such failed stabilized waste load that the Permittee elects to re-stabilize must be stored in an interim storage container subsequent to re-stabilization, and may not be permanently disposed in the landfill until it is re-tested and the test results indicate the waste's compliance with the land disposal restrictions in 6 NYCRR 376.

g. Final Waste Screening Procedures

i. The Permittee must perform final waste screening procedures to identify wastes that do not meet land disposal requirements or are restricted from land disposal by conditions in this Permit.

‘a’) Containerized Wastes

The Permittee must open and visually inspect all drums and other larger containers which were not filled on-site by the Permittee prior to landfill disposal, with the exception of some asbestos containers as noted in Section C-2e(2) of the Waste Analysis Plan (WAP) in Attachment C of this Permit. The Permittee must use a code(s) or other means of identifying the intended method of disposal of each waste stream contained in drums or other containers. The Permittee must also randomly select 10 percent of all such drums/containers for sampling and analysis of their contents in accordance with the WAP in Attachment C of this Permit. Exceptions to this sampling requirement are as noted in Section C-2d(1)(a) of the WAP in Attachment C of this Permit. Should the contents analysis of any randomly selected drum or container indicate waste that is unacceptable for land disposal, the Permittee must analyze all such drums/containers from that waste stream shipment or assume that all such drums/containers from the waste stream shipment contain wastes which are unacceptable for land disposal. Any and all drums/containers that are identified as containing wastes that do not meet the land disposal requirements in 6 NYCRR 376 or are restricted from land disposal by this Permit, must not be disposed of in RMU-1.

‘b’) Non-Containerized (Bulk) Wastes

The Permittee must spread out all bulk waste loads in thin layers within the landfill to facilitate a final inspection. During or subsequent to the spreading of a waste load, but prior to it being covered by other wastes or daily cover, the Permittee must have trained landfill personnel familiar with the waste disposal conditions of this Permit, visually inspect the waste for conformance with waste disposal Permit conditions. This inspection must be conducted in a manner consistent with the Personnel Training Plan in Attachment H of the Permit and the Permittee’s safety policies, using field glasses (i.e., binoculars) where necessary to facilitate a safe and thorough inspection of the waste surface. Any bulk waste load or portion thereof, which is identified by landfill personnel as obviously not meeting the land disposal restrictions/requirements of this Permit, must be placed in an appropriate container(s) and removed from the landfill. In addition, any fire or apparent reaction identified by landfill personnel as occurring within a bulk waste load or on the waste in the landfill, shall require the immediate implementation of the Facility’s Contingency Plan in Attachment G of this Permit.

h. Improper Land Disposal Waste Tracking and Retrieval

i. Waste Tracking

'a') The Permittee must maintain records of all waste containers and bulk waste loads it receives which are designated for land disposal by the waste generator, but which are determined to be unacceptable for land disposal as a result of manifest information, information obtained in accordance with the Waste Analysis Plan (WAP) in Attachment C of this Permit, identification by the screening procedures required by **Condition E.1.g** of this Exhibit, or other waste information obtained by the Permittee or the Department, prior or subsequent the waste's disposal. These records must indicate the name and EPA identification number of the waste generator in each such case, the type of waste involved, the date and reason it was determined to be unacceptable for land disposal, a brief description of how it was identified and the associated circumstances, and the final disposition of the waste.

'b') The Permittee must submit to the Department with the Annual Report required by 6 NYCRR 373-2.5(e) of this Permit, a listing of any and all waste generators (based on EPA ID Number) having three (3) or more occurrences during the previous calendar year of waste improperly designated for land disposal based on the Permittee's records required by this condition. These listings submitted with the Permittee's Annual Report must also include the details of each occurrence based on the Permittee's records. Based on the Department's review of this annual listing and accompanying information, the Department may require the Permittee to implement additional waste analysis and/or screening procedures for wastes it receives in the future from specific generators identified by the Department. If the Department determines that such additional waste analysis and/or screening procedures are warranted, it shall notify the Permittee in writing indicating the generator(s) and the specific analysis and/or procedures it considers necessary for waste accepted by the Permittee from that/those generator(s). Within thirty (30) days of any such notification the Permittee must either:

- Indicate in writing that the Permittee will implement the additional waste analysis and/or screening procedures indicated by the Department for the identified generator(s); or

- Propose in writing for Department approval, alternative additional waste analysis and/or screening procedures for identified generator(s); or

– Indicate in writing to the Department that it will no longer accept waste from the identified generator(s).

ii. Waste Retrieval

'a') Subsequent to land disposal in RMU-1, any containerized or bulk waste identified as not meeting the land disposal requirements in 6 NYCRR 376 or are restricted from land disposal by this Permit, must be located by the Permittee using the waste location system required by **Condition F.5.e** of this Exhibit, and retrieved by the Permittee for appropriate disposition, unless in specific cases the waste in question is under the final cover or two (2) or more lifts below the active landfill surface **and** the Department determines that such retrieval is not necessary based on waste information provided by the Permittee.

F. RMU-1 Operating Requirements

The Permittee must operate RMU-1 in strict accordance with 6 NYCRR 373-2.14(c), the conditions of this Exhibit, and the requirements in the Permit Attachments and other documents listed below:

– The "RMU-1 Landfill Drawings" in Attachment J, Appendix D-6 of this Permit;

– The "Fugitive Dust Control Plan" in Attachment L, Appendix D-10 of this Permit;

– The "RMU-1 Engineering Report" which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit;

– The "RMU-1 Operations and Maintenance (O&M) Manual" which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit; and

– The "RMU-1 Leachate Level Compliance Plan (LLCP)" which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit.

1. RMU-1 Waste Fill Progression

The Permittee must at no time advance the RMU-1 waste fill beyond the horizontal and vertical limits depicted by the topographic contours on the "Top of Waste Grades" Drawing No. 11-a in Attachment J, Appendix D-6 of this Permit.

a. Waste Fill Progression From Operation of Final Cell To Landfill Capacity

The Permittee may advance the RMU-1 waste fill up to the horizontal and vertical limits depicted by the topographic contours on the most recently approved Figure 1 contained in the RMU-1 O&M Manual which is incorporated by reference into this Permit by **Schedule 1 of Module I**. The Permittee may place wastes beyond the topographic contours on the approved Figure 1 but within the topographic contours on the "Top of Waste Grades" Drawing No. 11-a in

Attachment J, Appendix D-6 of this Permit, as long as such placement is in accordance with Section 3.2.7.1 of the RMU-1 O&M Manual and the RMU-1 Leachate Level Compliance Plan (LLCP) which are both incorporated by reference into this Permit by **Schedule 1 of Module I**.

2. RMU-1 Waste Mass Stability

The Permittee must maintain RMU-1 waste mass stability throughout the landfill operation, closure, and post-closure periods. Any and all slope stability analyses required by the conditions of this Permit, must be conducted in accordance with the methods and assumptions used in the RMU-1 Engineering Report which is incorporated by reference into this Permit by **Schedule 1 of Module I**, including, but not limited to the landfill component input parameters presented in the following table:

Landfill Component	Component Weight (pcf)	Component Cohesion (psf)	Component Friction Angle
Protective/Vegetative Cover Soil	125	0	25
Textured Cover System	58.7	0	15[E]
Compacted Clay Cover System	130	1,000	10[E]
GCL Cover System	130	0	26 / 17.8 / 22.4[2]
Waste	111	0	24[E]
Granular Operations Layer	135	0	24[E]
Granular Primary Leachate Collection Layer	135	0	24[E]
Textured Primary Liner	58.7	0	15[E]
Smooth Primary Liner	58.7	0	10.5[E]
Compacted Clay Primary Liner	130	1,000	10[E]
Granular Secondary Leachate Collection Layer	135	0	24[E]
Textured Secondary Liner	58.7	0	15[E]
Smooth Secondary Liner	58.7	0	10.5[E]

Landfill Component	Component Weight (pcf)	Component Cohesion (psf)	Component Friction Angle
Compacted Clay Secondary Liner	130	1,000	10[E]
Structural Fill (berm)	130	2,000	0
Native Upper Till Soils	130	800	10[E]
Native Glacio-Lacustrine Clay	125	320	10[E]
Native Glacio-Lacustrine Sand	130	0	30[E]
Bedrock	140	2,000	40

Footnotes:
1. The values in this table were derived from the RMU-1 Engineering Report. Upon Permittee request, the Department may approve other values for use in the stability analyses required by **Condition F.2.b** of this Exhibit.
2. For GCL final cover stability, the peak and residual friction angles tested at a slow strain rate are 26" and 17.8", respectively, and the residual friction angle tested at a rapid strain rate is 22.4".

In addition, any and all slope stability analyses required by the conditions of this Permit, must evaluate both "circular" and "sliding block" failure modes under both "static" and "seismic" conditions. All such stability analyses must yield a minimum static safety factor of 1.5 to demonstrate adequate bottom liner and final cover static stability. For bottom liner system seismic stability, a pseudo-dynamic analysis must yield a minimum seismic safety factor of 1.0 with zero liner system displacement. For final cover system seismic stability, a displacement analysis must yield a seismic deformation of less than 12 inches to demonstrate adequate final cover seismic stability.

a. Stability of Final RMU-1 Landfill Slopes

The stability analyses of the slopes depicting the final horizontal and vertical extent of the RMU-1 landfill as presented by the topographic contours on the "Top of Vegetative Cover Grades" Drawing No. 12 in Attachment J, Appendix D-6 of this Permit, are contained in the RMU-1 Engineer Report which is incorporated by reference into this Permit by **Schedule 1 of Module I**. Any revisions to, or replacement of these stability analyses must be submitted and approved by the Department.

b. Stability of Waste Fill Progression Slopes

The stability analyses of the most critical slopes depicting the maximum approved waste fill progression as presented by the topographic contours on Figure 1 in the RMU-1 O&M Manual, are contained in the approved RMU-1 O&M Manual which is incorporated by reference into this Permit by **Schedule 1 of Module I**. For waste slopes beyond the topographic contours on the approved Figure 1 in the RMU-1 O&M Manual but within the final topographic contours on the "Top of Waste Grades" Drawing No. 11-a in Attachment J, Appendix D-6 of this Permit, the Permittee must, upon Department request, submit additional slope stability analyses of other specified waste slopes which the Department considers as critical to waste mass stability.

c. Requirements for All Waste Slopes

RMU 1 waste slopes must not exceed a 3 on 1 gradient, except under specific circumstances allowed by this Permit condition. The Permittee may construct waste slopes in RMU-1 with gradients between 3 on 1 and 2 on 1 as long as such slopes do not exceed the maximum vertical height from toe to crest of 45 feet, based on the stability analyses of 2 on 1 waste slopes in the RMU-1 Engineer Report which is incorporated by reference into this Permit by **Schedule 1 of Module I**. Under no circumstances may the Permittee construct any waste slope in RMU-1 exceeding a 2 on 1 gradient. The rate of vertical waste placement in any given location within RMU-1 must be no greater than 23 feet per month, and must not exceed 100 feet per year, so as to allow the development of adequate shear strength in the underlying Glaciolacustrine Clay layer, based on the landfill stability analyses assumptions used in the RMU-1 Engineer Report which is incorporated by reference into this Permit by **Schedule 1 of Module I**. The Permittee must demonstrate compliance with these limits in each Periodic Waste Mass Survey submitted in accordance with **Condition I.1.a** of this Exhibit.

3. Primary Leachate and Contaminated Surface Water Run-Off Management

The Permittee must maintain and operate a primary leachate and contaminated surface water run-off collection and removal systems to collect and remove leachate and contaminated surface water from the landfill. These systems must be maintained and operated in accordance with: 1) 6 NYCRR 373-2.14(c); 2) the "RMU-1 Landfill Drawings" and the "RMU-1 Technical Specifications" in Attachment J of this Permit; 3) the "RMU-1 Engineering Report", the "RMU-1 Operations and Maintenance (O&M) Manual" and the "RMU-1 Leachate Level Compliance Plan (LLCP)" which are incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit; and, 4) the conditions of this Exhibit.

a. Primary Leachate Levels

The primary leachate levels, as monitored in the primary leachate standpipes, must not exceed a depth of one (1) foot directly above the lowest elevation of the primary geomembrane within each cell (excluding each cell's sump area) for a continuous period longer than 24 hours as measured from the time when the level first exceeds the one (1) foot depth. Leachate levels within any sump area must be maintained at the lowest practical levels.

b. Primary Leachate Removal

Primary Leachate in cell standpipes must be monitored and pumped automatically using permanently installed sensors, alarms, and pumping equipment. The pumping equipment must be selected in accordance with the RMU-1 Technical Specifications in Attachment J, Appendix D-7 of this Permit, and as specified in the RMU-1 O&M Manual and the RMU-1 LLCP which are incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit, with added pumping capacity as necessary to ensure compliance at all times with 6 NYCRR 373-2.14(c)(3)(ii) and **Condition F.3.a** of this Exhibit.

In addition, the Permittee shall install and place into operation supplemental leachate pumping systems in Cells 7/8, 9/10, 11/13 & 12/14 in accordance with Drawing Sheet 2 in Attachment J, Appendix D-6 of this Permit and the design and operational details contained in the Permittee's October 4, 2012 submission which is hereby incorporated by reference into this Permit. The pumps in these systems shall be installed at the low point in each cell's leachate collection pipe, and placed into operation on a Department approved schedule. These pumping systems must be operated automatically using level sensors as prescribed by the Permittee's October 4, 2012 submission. Should the Permittee determine that there is little or no leachate being collected in a cell's pipe, the Permittee may submit a written request for Department approval to either curtail the operation of that cell's supplemental pumping system or take it out of service.

Additional pumps and other spare parts must be provided on a standby basis for ready replacement. Inoperable pumps must be replaced within 48 hours of failure. Leachate pumps must be fitted with power failure and high leachate level indicator alarms; leachate level indicator alarms must be routinely monitored during each operating shift. During periods of heavy rains the monitoring frequency must be increased. The Permittee must maintain operation of all primary leachate pumping equipment in a "level sensor" automatic mode at all times, except for short periods of routine maintenance and pumping system repairs. Standpipes must be covered at all times except when sampling, taking level measurements and, performing maintenance.

c. Contaminated Surface Water Run-Off Management

The Permittee must construct Detention Basin(s) of adequate capacity within the operational areas of RMU-1 in accordance with the RMU-1 O&M Manual and the RMU-1 LLCP which are incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit, to collect and control contaminated surface water run-off resulting from a 24-hour, 25-year storm as required by 6 NYCRR 373-2.14(c)(8). The Permittee must remove accumulated surface water run-off from all detention basins and other areas of the landfill. Any time the depth of such water first exceeds 12 inches, as measured from the low point in each detention basin or waste depression, it must be lowered to 12 inches or less in all such basins and depressions within seven (7) calendar days, in accordance with

6 NYCRR 373-2.14(c)(9). The Department, on a case-by-case basis, may grant an extension of this seven (7) day period, provided that the Permittee can demonstrate to the Department's satisfaction, that the volume of liquid resulting from precipitation and/or snow melt which requires removal, exceeds the run-off volume that would be generated by the 24-hour, 25-year storm event. The Permittee must manage the removed liquid as leachate.

d. RMU-1 Leachate Level Compliance Plan (LLCP)

The Permittee must operate the leachate and contaminated surface water run-off collection and removal systems within RMU-1, and the associated on-site liquid transfer, storage and treatment systems, in accordance with the RMU-1 Leachate Level Compliance Plan (LLCP) which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit. In order to maintain proper leachate and contaminated surface water run-off management and control, the Permittee must submit and obtain Department approval of revisions to the RMU-1 LLCP as specified below:

- Prior to any significant increase in size of infiltration drainage areas and/or detention basin(s) drainage areas over their respective sizes as depicted on Figure 1 in the most recently approved RMU-1 O&M Manual and RMU-1 LLCP which are incorporated by reference into this Permit by **Schedule 1 of Module I**;

- Prior to any filling in and/or significant decrease in size or capacity of any detention basin with reference to the size(s)/capacity(s) indicated in the most recently approved RMU-1 O&M Manual and RMU-1 LLCP which are incorporated by reference into this Permit by **Schedule 1 of Module I**; and

- Any time the Permittee or the Department determines that the RMU-1 leachate and/or contaminated surface water character has changed in a way that more extensive treatment is required than presently assumed in the approved RMU-1 LLCP.

Any and all revisions to the approved RMU-1 LLCP submitted by the Permittee must conform to a strategy of minimizing run-off infiltration and leachate heads on the landfill's primary liner by maximizing the amount of run-off directed to detention basin(s) or other depressions within the waste mass. All such revisions must use the same evaluation methods, assumptions and Permit/engineering limitations as are contained in the currently approved RMU-1 LLCP, including, but not limited to the following:

- Precipitation rates and volumes as generated by the 24-hour, 25-year storm event;
- Storage and treatment of both RMU-1 and other on-site wastewaters generated by the storm event;

- No more than 625,000 gallons of available on-site tank capacity at the onset of the storm event;
- A minimum of one (1) foot of liquid in all detention basins or waste mass depressions at the onset of the storm event;
- An RMU-1 waste run-off coefficient of 90 (CN = 90);
- All cells with infiltration zones must have cell primary leachate pumps running at capacity throughout and, if necessary, subsequent to the storm period; however base flow rates for non-infiltrating and covered cells may be considered negligible during the storm management period;
- Pumping and treatment rates based on the on-site Aqueous Wastewater Treatment (AWT) system limitations;
- A minimum of one (1) foot of freeboard in every infiltration channel maintained throughout and subsequent to the storm event;
- A minimum of one (1) foot of freeboard in every detention basin or waste mass depression maintained throughout and subsequent to the storm event;
- Compliance with cell primary leachate level requirements in accordance with **Condition F.3.a** of this Exhibit; and
- Compliance with detention basin liquid removal requirements in accordance with **Condition F.3.c** of this Exhibit.

e. Primary Leachate Collection Pipe Integrity Check & Flush

For those RMU 1 cells with a primary leachate collection pipe (i.e., Cells 7/8, 9/10, 11/13 & 12/14), the Permittee must run a "hydroflush" device on a flexible hose along the entire length of each cell's primary leachate collection pipe at a minimum of once a year, in accordance with the procedure in the RMU-1 O&M Manual which is incorporated by reference into this Permit by **Schedule 1 of Module I**. This frequency may be decreased to once every two (2) years for cells where the final cover has been in place over the entire cell for more than one year. The length of the flexible hose insertion must be measured, recorded and compared against the documented as-built length of each cell's primary leachate collection pipe to verify the pipe's integrity over its entire length. After each hydroflush, a video camera must be advanced down each pipe to provide a visual record of the pipe's condition, help determine the hydroflush's effectiveness in removing any buildup of waste residue in the pipe interior or in its perforations, and help identify any problems encountered during the hydroflush (e.g., failure of the hydroflush hose to reach the end of the pipe). The Permittee must provide on-site Department staff with 24 hours advance notice of the Permittee's performance of the pipe flush and video taping. The Permittee must record the results including any problems encountered and the video tape record, and submit them to the on-site Department staff within thirty (30) days of completing each pipe flush and video taping. Upon review of each such submission, the

Department may require the Permittee to perform additional hydroflushing or take other actions necessary to maintain each pipe's designed collection and flow capability.

f. RMU-1 Detention Basins and Infiltration Channels

The Permittee must construct and maintain detention basins and waste mass depressions within the operational area of RMU-1 in accordance with the RMU-1 O&M Manual to the designed capacities in the RMU-1 LLCP which are incorporated by reference into this Permit by **Schedule 1 of Module I**. Each detention basin must be lined with a temporary geosynthetic liner. An as-built topographic survey must be performed on each completed basin and waste mass depression to confirm that each basin/depression has been constructed to the capacity required by the above referenced RMU-1 LLCP. This survey must be submitted to the Department within thirty (30) days of completing a basin's or depression's construction. Detention basins and waste mass depressions must be operated in accordance with **Condition F.3.c** of this Exhibit and the above referenced RMU-1 O&M Manual and RMU-1 LLCP. Sedimentation controls must be installed and maintained on all basin/depression inlets, and any sediment in a basin/depression which is deeper than six (6) inches must be removed. Upon discontinuing the use of a detention basin, the Permittee must remove or shred the basin's geosynthetic liner to prevent restrictions of leachate flow from subsequent fill layers.

The Permittee must maintain infiltration channels within the operational area of RMU-1 in accordance with the RMU-1 O&M Manual to the designed capacities in the RMU-1 LLCP which are incorporated by reference into this Permit by **Schedule 1 of Module I** until such time as they are filled in and covered in accordance with the aforementioned RMU-1 O&M Manual. The Permittee must implement infiltration channel sedimentation control measures and remove any observed accumulated sediment in accordance with the above referenced RMU-1 O&M Manual to maintain the hydraulic conductivity of the operations stone in these channels until they are filled in and covered.

4. RMU-1 Operational Waste Cover Requirements

a. Daily Cover

i. The Permittee must apply cover material as defined by 6 NYCRR 370.2(b)(39), on all exposed waste, to sufficiently cover the waste, at the end of each day of operation. The daily cover must be placed in accordance with the RMU-1 O&M Manual which is incorporated by reference into this Permit by **Schedule 1 of Module I**, and the conditions of this Exhibit, unless prior written approval is obtained from the Department to defer such placement. The Permittee must also restore at the end of each day of operation, any previously applied cover material on areas of the waste where it is identified as being absent or significantly deteriorated during inspections conducted in accordance with Attachment F of this Permit.

ii. The Permittee must apply daily cover on all lifts of waste using a graded granular material, or an alternative Department approved synthetic fabric or other alternative approved cover material. If the Permittee elects to submit a proposal(s) for Department approval of alternative cover material(s), all such submissions must demonstrate that the proposed cover material will be effective in controlling odors and capable of suppressing airborne dust and light weight debris. No alternative cover material shall be used until it is approved in writing by the Department. If an approved synthetic cover material is used it may be removed from the working face to allow access and then replaced at the end of each day of operation.

iii. The Permittee may leave spaces between drums or other containers unfilled and the adjacent intact drums/containers uncovered until: 1) gradable waste is available to fill the voids; or, 2) potential environmental or safety concerns are identified by the Permittee; or, 3) the Permittee is directed by on-site Department Staff to cover the waste. Cover material must be provided over non-containerized wastes including waste exposed in partially filled voids or voids extending to uncovered waste in a lower lift.

iv. The Permittee must place daily cover as required to maintain the proper slope towards run-off detention basins, waste mass depressions and infiltration channels as required by **Condition F.3** of this Exhibit.

v. Waste material must not be used for cover material unless a specific waste stream is demonstrated as appropriate for such use in accordance with **Condition F.4.a.ii** of this Exhibit and is approved in writing by the Department. In addition, any such "waste cover" material candidate must have relatively low volatile organic concentrations, be odorless, and not be susceptible to dust generation under dry conditions.

b. Intermediate Cover

For a compacted clay Final Cover system, the Permittee may place intermediate cover on waste mass areas that are near, but not above, six (6) inches below the grades depicted on the "Top of Waste Grades" Drawing No. 11 in Attachment J, Appendix D-6 of this Permit. For a GCL Final Cover system, the Permittee may place intermediate cover on waste mass areas that are near, but not above, the grades depicted on the "Top of Waste Grades" Drawing No. 11-a in Attachment J, Appendix D-6 of this Permit; however, such intermediate clay cover must meet the specifications for GCL subbase material contained in Attachment J, Appendix D-7 of this Permit. The Permittee may place intermediate cover when wastes reach final grades. In such cases where the Permittee places intermediate cover on an area of waste, the Permittee must complete placement of final cover during the immediate next calander year, in accordance with **Condition J** of this

Exhibit, unless the Department approves a onetime extension not to exceed one (1) additional calendar year.

i. Construction, Maintenance & Integration Into Final Cover

The Permittee must use only clay that has been approved for use as Final Cover clay soil barrier material in accordance with **Condition J.4** of this Exhibit, for construction of the intermediate cover. Intermediate cover material must be placed in a single loose lift, compacted to a thickness of twelve (12) inches and covered with a temporary geomembrane in accordance with procedures in the RMU-1 O&M Manual which is incorporated by reference into this Permit by **Schedule 1 of Module I**. Once constructed, the Permittee must maintain, inspect and repair the intermediate cover in accordance with the above referenced RMU-1 O&M Manual, including any identified defects in the temporary geomembrane. Immediately prior to the construction of the Final Cover on the area of intermediate cover placement, the Permittee must remove the temporary geomembrane to facilitate Final Cover construction. For intermediate cover areas where a compacted clay Final Cover system is to be constructed, as depicted on the "Top of Waste Grades" Drawing No. 11-a in Attachment J, Appendix D-6 of this Permit, the Permittee must remove the upper six (6) inches of intermediate cover and re-grade, re-compact and test the lower six (6) inches of intermediate cover clay to meet Final Cover construction requirements in **Condition J.5.a** of this Exhibit. For intermediate cover areas where a Geosynthetic Clay Liner (GCL) Final Cover system is to be constructed, as depicted on the "Top of Waste Grades" Drawing No. 11-a in Attachment J, Appendix D-6 of this Permit, the Permittee must remove the upper six (6) inches of intermediate cover and re-grade, proof roll and demonstrate that the lower six (6) inches of intermediate cover clay meets the GCL placement "general fill" Final Cover construction requirements in **Condition J.5.b** of this Exhibit. Any intermediate cover clay that does not meet Final Cover moisture/density and/or permeability requirements for a compacted clay Final Cover or GCL placement "general fill" for a GCL Final Cover system, in accordance with **Condition J.5.a and J.5.b**, respectively, of this Exhibit, must be removed and replaced.

5. RMU-1 Waste Placement Requirements

a. A waste lift must consist of one (1) drum or macroencapsulation box height for containers, or sufficient bulk waste to limit the lift thickness to six (6) feet. On a case-by-case basis, the Permittee may request and the Department may approve waste items which are larger than the above defined waste lift height as part of the waste stream review process described in **Condition E.1.b** of this Exhibit. At no time shall drums, macroencapsulation boxes or roll-offs used for interim waste storage in accordance with **Condition E.1.f** of this Exhibit be placed in the RMU-1 landfill in such a manner as the tops of these containers exceed the final waste grades as depicted on the "Top of Waste Grades" Drawing No. 11-a in Attachment J, Appendix D-6 of this Permit.

b. The Permittee must not allow wastes to be off-loaded outside of the landfill liner perimeter.

c. The Permittee may place drummed and/or stabilized bulk waste in the landfill 24 hours per day, on all days except Sundays and Legal Holidays. Special written approval is required from the Department on a case-by-case basis for waste placement in RMU-1 on Sundays and Legal Holidays. Bulk wastes not requiring stabilization must be placed in the landfill only during the hours of 5:30 a.m. to 8:00 p.m. Monday through Saturday. Artificial lighting must be utilized any time landfill operations are conducted during other than daylight hours. The Permittee must notify on-site Department staff by 3:00 p.m. every Friday of its intended work schedule for the following Saturday through Friday.

d. The Permittee must maintain waste slopes during waste placement in accordance with the requirements in **Condition F.2** of this Exhibit to ensure waste mass stability.

e. The location of each waste load placed in RMU-1 subsequent to the issuance of this Permit must be identified and recorded by the Permittee using a Global Positioning System (GPS) capable of determining the latitude and longitude to an minimum accuracy of 5 feet (1.5 meters), and the elevation to an minimum accuracy of 12 feet (3.5 meters). Using a computerized database, the Permittee must record the GPS reading (latitude, longitude & elevation or northing, easting & elevation), the horizontal grid location identifier and the waste lift number, of each large container/item (e.g., a macroencapsulation box, etc.) and each truck load of drums placed in the same location (if drums from a single truck load are separated and placed in different locations, each such location must be identified and recorded). For each bulk waste load, the Permittee must record the horizontal grid location identifier and the waste lift number, using the GPS device and computerized database. Each waste load disposal location record must also include the date of disposal and the identity of the wastes in each load, in accordance with intra-facility waste tracking requirements in **Condition C.2 of Exhibit A**. The Permittee must use this information to document compliance with waste segregation requirements in **Condition E.1.d.iv** of this Exhibit, and to retrieve improperly landfilled wastes in accordance with **Condition E.1.h.ii** of this Exhibit.

6. RMU-1 Run-On Control Requirements

The Permittee must maintain the surface water diversion berm around the Perimeter of the landfill depicted on the RMU-1 Landfill Drawings in Attachment J, Appendix D-6 of the Permit, to provide run-on control as required by 6 NYCRR 373-2.14(c)(7) until closure.

7. Requirements for Vehicles and Equipment Operating in the Landfill

   Vehicles and equipment operating directly on the operations layer within the landfill must adhere to the special operating requirements in the RMU-1 O&M Manual which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit. Commuter and personal vehicles must be restricted from entering the operational area of the RMU-1 landfill, except for employee or contractor vehicles authorized by the Permittee and State vehicles used by Department staff in monitoring compliance with this Permit.

   All vehicles and equipment entering the RMU-1 operational area must be cleaned at the Department approved Truck Wash facility prior to leaving the landfill. Gross contamination on wheels or other vehicle/equipment exterior surfaces must be physically removed for appropriate disposal in the landfill before washing these surfaces. All visible waste on exterior surfaces must be removed prior to vehicles/equipment leaving RMU-1 to prevent contamination of on-site and off-site roads. The approved RMU-1 Truck Wash facility as depicted on Figure 1 in the RMU-1 O&M Manual which is incorporated by reference into this Permit by **Schedule 1 of Module I**, must be operated in accordance with the referenced RMU-1 O&M Manual. This or any new or replacement Department approved facility must have sloped pavement to direct wash water to a collection point and a sump to retain wash water sediments along with discharge sedimentation controls.

G. <u>RMU-1 Monitoring and Inspection</u>

1. RMU-1 Perimeter Berm Inspection & Repair

   If structural problems are observed on the berms of RMU-1 the Permittee must:

   a. Notify the Department's Region 9 Office in writing within one working day after first observing the problem;

   b. Prepare and submit to the Department the necessary engineering plans and specifications for the repair of the berm(s) for Department approval;

   c. Perform repairs in accordance with the approved plans and specifications; and,

   d. Within one week of completing any necessary repairs, submit a report to the Department describing in detail the completed work and procedures followed.

2. Primary Leachate Monitoring

   The Permittee must monitor the leachate in all primary standpipes in accordance with the following requirements.

   a. The leachate level in each cell must be monitored on a continuous basis using automatic data read-out equipment;

b. The Permittee must sample and analyze the primary leachate on a quarterly basis for pH, specific conductance, PCBs, and Priority Pollutant volatile organics;

c. The Permittee must sample and analyze the primary leachate on a semiannual basis for Priority Pollutant Metals (i.e., antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc); and,

d. On a quarterly basis and every time the leachate level indicator probes are moved, the liquid level must be manually measured and compared to the results of the automatic data read-out to calibrate the leachate level indicators (probes).

The results of the above analyses must be submitted to the Department on a monthly basis contained within the monthly environmental monitoring report for the month in which the samples were collected. The level measurements required by **Condition G.2.a** of this Exhibit must be monitored from the automatic data read-out and the results must be made available to on-site Department staff. Also, the results of the level measurements required by **Condition G.2.d** of this Exhibit must be presented to on-site Department staff. The results of all level measurements required by **Condition G.2.d** must be submitted to the Department on a quarterly basis, within 30 days after the end of the quarter.

Upon Department acceptance of the certification of closure for any cell, or cells, as required by 6 NYCRR 373-2.7(f)(1), the monitoring for that cell, or cells, required by **Conditions G.2.b through G.2.d** of this Exhibit, must be performed semiannually. At anytime after the first semiannual monitoring event during the cell(s)' post-closure period, the Permittee may request Department approval to decrease the frequency or suspend the monitoring activities required by **Conditions G.2.b through G.2.d** of this Exhibit altogether based on a data supported demonstration of consistent leachate character.

3. Monitoring & Inspection of RMU-1 Appurtenances

The Permittee must inspect and monitor the following appurtenant items of RMU-1.

a. Leachate Transfer System Inspection Requirements

The leachate transfer pipelines and the Leachate Pump Station must be inspected in accordance with the Inspection Plan in Attachment F of this Permit and **Condition B.1.a.ii of Exhibit D**. Proper operation of all electronic leak detection systems installed at vaults and piping manholes, must be verified at least quarterly by visually checking for liquids at all locations where a visual check can be performed without entering a confined space. In addition, alarms for leak detection systems will be verified annually by either manually placing the probe in water or by electrical simulation in locations where a manual check would require a confined space entry.

b. Leachate Transfer System Testing Requirements

Subsequent to the repair of any leaks in the leachate transfer line, the Permittee must test the pipe as required by **Condition B.1.a.ii of Exhibit D** in accordance with the procedures in Attachment D, Appendix D-3, Section VIII of this Permit.

4. Detention Basin(s) and Accumulated Surface Water Monitoring

The Permittee must monitor the level of accumulated surface water run-off in detention basins and other waste depression areas in accordance with the Inspection Plan in Attachment F of this Permit. For all run-off detention basins, the Permittee must provide a visible demarcation of each basin's one (1) foot depth, to evaluate compliance with **Condition F.3.c** of this Exhibit. The level measurements must be manually estimated and recorded on the inspection forms for inclusion in the daily operating record.

H. RMU-1 Secondary Leachate Collection System (SLCS)

1. The Permittee must monitor, report and evaluate the flow from each RMU-1 cell's Secondary Leachate Collection System (SLCS) in accordance with 6 NYCRR 373-2.14(e)(3), 6 NYCRR 373-2.14(n)(2), the RMU-1 O&M Manual which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit, and the conditions in this Exhibit. The Permittee must also implement SLCS Response Actions as necessary in accordance with 6 NYCRR 373-2.14(o)(2)&(3), the RMU-1 Response Action Plan in Attachment K, Appendix D-9 of this Permit, and the conditions of this Exhibit.

a. RMU-1 SLCS Monitoring

i. The Permittee must monitor the SLCS in each RMU-1 cell and sample and analyze accumulated liquids to obtain accurate and reliable data on the quantity and chemical composition of the liquid in each cell's SLCS. At a minimum, the Permittee must perform the following tasks at the specified frequencies.

'a') On a weekly basis, the Permittee must remove all pumpable liquid from each cell's SLCS sump and record the volume.

'b') On a monthly basis, the Permittee must sample the liquid removed from each cell's SLCS sump and analyze each sample for pH and specific conductance.

'c') On a quarterly basis, the Permittee must sample the liquid removed from each cell's SLCS sump and analyze each sample for pH, specific conductance, and Priority Pollutant volatile organics.

'd') On a yearly basis, the Permittee must sample the liquid removed from each cell's SLCS sump and analyze each sample for pH, specific conductance, Priority Pollutant organics and Priority Pollutant metals (i.e., antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc).

ii. Upon Department acceptance of the certification of closure for any cell, or cells, as required by 6 NYCRR 373-2.7(f)(1), the monitoring for that cell, or cells, required by **Condition H.1.a.i.'b' and H.1.a.i.'c'** of this Exhibit, must be performed semiannually.

b. RMU-1 SLCS Evaluation and Reporting

i. SLCS Flow Rate Evaluation

'a') Each time liquid is manually removed from a cells' SLCS in accordance with **Condition H.1.a.i.'a'** of this Exhibit, the Permittee must record the volume pumped. If a cell's SLCS pumping system operates automatically in-between manual weekly pumping events due to level sensor activation, the Permittee must add the volume pumped automatically to the recorded weekly volume. The Permittee must take the total weekly volume pumped from each cell's SLCS and divide it by the area of the cell in acres and by the number of days since the cell's last SLCS pumping event, to derive each cell's average daily SLCS flow rate in gallons per acre per day (gpad). For each SLCS manual pumping event, the Permittee must compare each cell's average daily SLCS flow rate to the Response Rate for the cell as defined by **Condition H.1.c** of this Exhibit. If a cell's average daily SLCS flow rate exceeds the defined Response Rate for that cell, the Permittee must implement the RMU-1 Response Action Plan (RAP) in <u>Attachment K, Appendix D-9</u> of this Permit, as required by **Condition H.1.d** of this Exhibit.

ii. SLCS Reporting

'a') The Permittee must report the results of the SLCS monitoring and flow rate evaluation required by **Conditions H.1.a and H.1.b.i** of this Exhibit to the Department. The results of all such RMU-1 SLCS monitoring and evaluations that occur during a month must be submitted to the Department within 90 days from the end of that month. The sampling data must be submitted as required by **Condition B of Exhibit A** and **Condition N of Module I** of this Permit. Along with the above results, the Permittee must submit the results of pH and specific conductance which were obtained at the time SLCS sampling occurred.

c. Response Rates (RRs) for RMU-1 Cells

i. The Response Rate for any RMU-1 cell from the time it begins operation (i.e., initial waste placement) until exactly one (1) year after the Department's acceptance of the certification of closure for the cell, must be 75 gpad. This Response Rate value was set based on safety margins for discharge over the cell's operational life of water trapped between the primary and secondary liners (e.g., primary clay moisture), as required by 6 NYCRR 373-2.14(n)(1). The Response Rate for any RMU-1 cell subsequent to one (1) year after the Department's acceptance of the certification of closure for the cell, must be 20 gpad.

d. RMU-1 SLCS Response Actions

i. On any occasion, should the SLCS average daily flow rate for a cell exceed its Response Rate, the Permittee must implement the RMU-1 Response Action Plan (RAP) in Attachment K, Appendix D-9 of this Permit for the involved cell. In addition, the Permittee must take any and all response actions as deemed necessary by the Department to protect human health and the environment.

I. RMU-1 Surveying, Reporting and Recordkeeping

1. The Permittee must maintain an operating record for RMU-1 as required by 6 NYCRR 373-2.5(c) and 6 NYCRR 373-2.14(f). The Permittee must also make written submissions to the Department concerning RMU-1 as indicated in this Exhibit, in accordance with **Condition B of Exhibit A** and **Condition N of Module I** of this Permit.

a. Periodic Waste Mass Surveys

i. The Permittee must perform topographical surveys of the waste mass that has not received final cover on a quarterly basis and at other times as requested by the Department. From each survey, a topographic map of the waste must be prepared which must depict the actual drainage areas for each infiltration zone and each detention basin, the actual waste slope gradients and slope set back dimensions, and the locations and dimensions of all run-off control channels and culverts. In conjunction with these surveys, the Permittee must perform a thorough inspection of the operational area of the landfill with special attention to identifying any accumulated sediments in channels, basins and culverts, as well as the condition of sediment control features. From the results of each survey/inspection, the Permittee must prepare a report which includes the following:

- The topographic waste map prepared from the survey;
- An evaluation of the surveyed waste mass for compliance with **Condition F.1** of this Exhibit regarding maximum waste mass topographic limitations;
- An evaluation of the actual waste height increases and slope gradients for compliance with **Condition F.2** of this Exhibit regarding the rate

of vertical waste placement and slope gradient limitations pertaining to waste mass stability;

- An evaluation of the actual dimensions and condition of all drainage areas, run-off control channels, culverts and basins for compliance with **Conditions F.3.d and F.3.f** of this Exhibit, and the RMU-1 O&M Manual and RMU-1 LLCP which are incorporated by reference into this Permit by **Schedule 1 of Module I**, regarding flow/volume capacity requirements and sedimentation prevention requirements; and,
- A calculation of the landfill's remaining capacity based on the topographic survey.

ii. The Permittee must submit each survey/inspection report to the Department within thirty (30) days from the end of each quarter, and in the case of a survey performed per a Department request, within thirty (30) days subsequent to such a survey. The Permittee must correct any compliance or other problems identified by a survey/inspection prior to the end of the next consecutive quarter and note any such corrections in that quarter's survey/inspection report, unless the Permittee requests and the Department grants an extension to make certain corrections based on adverse weather conditions or other circumstances beyond the Permittee's control.

b. Waste Disposal Records and Reporting

i. With the submission of the facility's Annual Report required by 6 NYCRR 373-2.5(e), the Permittee must submit a summary of the actual total volume and weight of all waste placed in the landfill. The weight, or volume and density of each waste received must be determined prior to landfilling either from generator supplied information or by measurement at the Permittee's facility, in a manner consistent with required Annual Report forms and instructions.

ii. Within six months after the end of waste placement in a cell of RMU-1, the Permittee must submit to the Department a complete report of all wastes disposed in the cell in accordance with 6 NYCRR 373-2.14(f) including the three-dimensional (3-D) location and a concise description of each waste. Alternately, disposal can be submitted on a monthly basis throughout the life of the landfill. Disposal reports are to be available during inspections. The actual 3-D location and concise description of each waste must be contained in the report using the waste identification and recording system required by **Condition F.5.e** of this Exhibit with appropriate nomenclature, map coordinates, and waste descriptions.

J. RMU-1 Closure Requirements

The Permittee must close RMU-1 in accordance with 6 NYCRR 373-2.7(a) through (f), 6 NYCRR 373-2.14(g), the conditions of this Permit and construct the RMU-1 Final Cover in strict accordance with the following:

- The "RMU-1 & Site Wide Closure Plan" in Attachment I, Section I.1 of this Permit;
- The "RMU-1 Landfill Drawings" in Attachment J, Appendix D-6 of this Permit;
- The "RMU-1 Landfill Technical Specifications" in Attachment J, Appendix D-7 of this Permit;
- The "RMU-1 Landfill Quality Assurance Manual" in Attachment J, Appendix D-8 of this Permit;
- The "RMU-1 Engineering Report" in the Permit application which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit; and
- The conditions of this Exhibit.

1. Final Cover Construction Schedule

   The Permittee must submit a construction schedule for Department review at least 30 days prior to the start of the closure of any portion of RMU-1. Activity scheduling must provide a reasonable opportunity for supplemental inspection by Department staff prior to burying or otherwise obscuring the work. This schedule must be revised as necessary to reflect new tasks, new initiation dates or new completion dates and re-submitted within one week of any such changes, and all revisions should accompany the weekly construction reports. If no revision is received, the Department shall assume that the project is on schedule.

2. Final Cover Construction Quality Assurance (CQA) Engineer & Progress Reports

   a. The CQA Engineer

      In order to ensure that the construction is performed in conformance with the Permit and with sound engineering principles that safeguard life, health, and property, the Permittee must ensure that the RMU-1 Final Cover is constructed under the direct supervision and control of an independent person and firm registered to practice Professional Engineering in the State of New York who will certify construction. This person or firm is referred to in this Exhibit as the Engineer.

   b. Requirements of Engineers, Assisting Personnel, Laboratories, and Other Consultants

      The Permittee and the Engineer must ensure that persons employed or supervised by the Engineer are licensed professional engineers or meet the requirements of exemption from the practice of engineering under Title VIII of the New York State Education Law, Article 145 Section 7208 Paragraph f.

c. Engineer's Personnel Experience Information, Training, and Procedures Report

The following information must be submitted to the Department (for information purposes only) at least two weeks prior to the start of each phase of final cover construction. Also, at least two weeks prior to employing new Engineering Personnel which have not been part of any previous submission, the Permittee must also submit to the Department the following information:

i. Regarding each Professional Engineer involved in the certification of the construction in any capacity:

- the name,
- work address,
- professional engineer license number assigned by the University of the State of New York Education Department,
- the date registration period ends,
- date of first issuance of license, and
- a resume of experience related to the types of construction involved in this Facility.

ii. Regarding all persons that will provide field observations and measurements under the Engineer's direction (such as intern engineers, geologists, soil scientists, liner installers, etc.) and all laboratories, or other consultants that will perform analyses or observations upon which the Engineer will depend:

- the names of firms or individuals,
- their addresses, and
- their qualifications.

iii. The components or steps of construction which will be inspected or observed by each of the following:

- the Engineer,
- subordinate professional engineers and intern engineers,
- others without professional engineer licenses.

iv. The training and instructions that will be given to any field observers who are not registered professional engineers, including instructions to contact the professional engineer on-call (either the Engineer or one of the subordinate professional engineers) when the field observers are aware that the requirements of this Permit are not being met.

v. The instructions that will be given to any subordinate professional engineers to contact the Engineer when the subordinate professional engineers are aware that the requirements of this Permit are not being met.

d. Availability of the Engineer

The Engineer, or one of his/her subordinate professional engineers, must be available continually during any construction of the RMU-1 Final Cover, and must inspect any suspected sub-standard work promptly when notified by the trained field observers.

e. Witnessing of Critical Aspects by the Engineer

The Engineer or his or her subordinate professional engineer must be present and witness initial installation of any significant components, critical aspects of work, and all completed components prior to burying, covering, or otherwise becoming obscured. As required by **Condition J.2.c.iii** of this Exhibit, the Engineer must submit to the Department a list of items that he or she will inspect in the field.

f. Availability of Design Engineer

The person or firm that was the registered professional engineer who certified the final cover design reports and drawings must be available to the Engineer on an as needed basis to answer questions that may arise about the details or intent of the final cover design or to revise the design, if necessary.

g. Field Observer Reports

Written reports from field observers and subordinate professional engineers must be made and submitted to the Engineer on a daily basis.

h. Weekly Construction Reports

The Permittee must ensure that weekly construction reports, prepared and approved by the Engineer, are submitted for review and acceptance to the Department every week that construction occurs. These reports must address the applicable items listed in the bullet for Weekly Construction Reports in **Condition J.8** of this Exhibit, and must be used to track items or issues to resolution. These reports must be submitted to the Department's Central and Region 9 offices within 2 weeks of the end of the construction work week.

3. Final Cover Design Clarification Procedure

For all clarifications and additions to details, the Permittee must implement the following procedure.

a. Make a thorough verbal or written presentation to the Department demonstrating the need for the clarification/addition, the engineering basis for the clarification/addition, and that the clarification/addition will provide equal or better service (the Permittee must have the Design Engineer or the Engineer make supporting portions of the presentation).

b. Obtain the Design Engineer's written approval and submit to the Department. The Department, at its discretion, may accept the verbal concurrence of the Design Engineer prior to receiving the written approval.

c. Obtain the written approval of the Department or, at its discretion, the Department, may give verbal approval to institute the clarification/addition prior to giving its written approval.

d. Record the details of clarification or addition in weekly or special construction reports.

e. Detail clarifications or additions in as-built drawings.

Failure in any of above can be basis for qualification of acceptance of closure certification by the Department.

4. Final Cover Material Requirements

All natural and synthetic materials used to construct the RMU-1 Final Cover must meet all technical specifications for final cover components as presented in the RMU-1 Landfill Technical Specifications in Attachment J, Appendix D-7 of this Permit. The Engineer must certify that all such technical specifications have been met by reviewing material manufacturer's/supplier's test results and performing all testing as indicated by the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. No material which fails to meet these technical specifications shall be used in the construction of the RMU-1 Final Cover. The Engineer must also oversee and certify that the following material specific qualifications have been met.

a. Clay Soil Cover Material Additional Requirements

i. Clay Test Fill

The Permittee must construct a representative test fill for each clay source and construction equipment and methods to demonstrate that the design parameters will be met in the actual construction of the clay barrier layers in RMU-1. The Permittee must notify the Department in writing of the time when each test fill will be conducted. Each test fill must be constructed and evaluated in conformance with the specifications in the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit.

A report including all information specified in the procedures in the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit must be submitted and approved by the Department before placement of any clay barrier layer material in the landfill final cover. The field hydraulic conductivity should be determined using the Sealed Double Ring Infiltrometer Test or the Boutwell Two Stage Borehole Test specified in Attachment J, Appendix D-8 of this Permit and must be observed by, and approved by the Engineer. Construction of clay barrier must be performed using only the methods and parameters of construction quality assurance from a test fill where the above field hydraulic conductivity test results demonstrate a hydraulic conductivity of $1x10^{-7}$ cm/sec, or less was achieved.

ii. Clay Soil Cover Material Qualification

Material removed from a borrow source and intended for use in RMU-1 must be excavated to the full extent of the clay deposits in the borrow source and in a manner that will not exceed the limits of these deposits as identified through testing and field observations of the Engineer (i.e., Test Pits and/or Soil Borings). Test pits and/or soil borings must be conducted in advance of the excavation to the full depth of the borrow source layer to be excavated. The number and location of the test pits and/or soil borings must be determined by the sampling frequency requirements in Section 4.3 of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. Additional test pits and/or soil borings must be performed at any location in the borrow source to further define the extent of any unacceptable material, upon the request of the Engineer. Conformance testing samples must be obtained and subjected to analysis as required by Section 4.3 of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The Engineer must record observations made at each test pit and/or soil boring and specifically note the type and thickness of any obviously unsuitable material, so that it can be segregated during the excavation. The Engineer must determine the suitability of the material in the area represented by each test pit or soil boring based on visual observations and conformance testing results, and grant acceptance, or qualified acceptance of the represented area of the borrow source prior to excavation of that area. The Engineer must present the recorded field observations along with conformance testing results of each area for Department review prior to excavation of the represented area. Material identified from test pit and soil boring observations or observations of the actual borrow source excavation, which obviously does not meet the specifications given in the RMU-1 Landfill Technical Specifications in Attachment J, Appendix D-7 of this Permit, as well as material which conformance testing has shown does not meet these specifications, must be put aside in a separate spoil pile or piles, or avoided during the borrow source excavation. The Department reserves the right to inspect any borrow source to be used in the construction of RMU-1 Final Cover at any time during the normal working hours.

If stockpiles are constructed, suitable clay soil material must be placed in lifts in the stockpile area in a manner that allows control of the material and its moisture content. Stockpiles of material from different borrow sources, or from markedly different sub-areas within one source, must be kept separate from each other. Proctor moisture/density tests must be performed on stockpiled clay material prior to and during placement to establish the acceptable moisture/density zone as required by Appendix C of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit.

b. Textured Geomembrane Cover Material Additional Requirements

The textured geomembrane cover must consist of new, first-quality products designed and manufactured specifically for the purpose of this work, which shall have been satisfactorily demonstrated to be suitable and durable for such purposes. The material provided must meet the requirements of the RMU-1 Landfill Technical Specifications in Attachment J, Appendix D-7 of this Permit and the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The Department may reject outright improperly handled or stored rolls or sheets of textured geomembrane.

c. Additional Testing of Cover Materials' Frictional Properties

The Permittee must test all the cover materials to be used for final cover on RMU-1 to determine the interfacial friction angles between the materials. The Permittee must submit to the Department, at least 30 days prior to the installation of the compacted clay or Geosynthetic Clay Liner (GCL) in any portion of RMU-1 final cover, the results of this test. For the compacted clay Final Cover system, the interfacial friction angles must be a minimum of 25º. For the GCL Final Cover system, friction angles determined from testing conducted in accordance with ASTM D5321 and D6243 over a load range up to 1,000 psf, must be a minimum of 26" peak and 17.8" residual under slow strain rate testing conditions (0.0004 in./min.), and 22.4" residual under rapid strain rate testing conditions.

d. Gradient Ratio Testing of the Geocomposite

The Permittee must perform Gradient Ratio testing on the selected geocomposite, using the selected protective soil cover materials. The Permittee must submit the results to the Department for review and acceptance prior to installation of the geocomposite in the RMU-1 Final Cover. The most current version of the Gradient Ratio Test ASTM 5101 or other Department approved methodology must be used for the testing, and the Gradient Ratio must be less than or equal to 3, as recommended by the U. S. Army Corps of Engineers, or other Department approved criteria. After the initial testing is completed and accepted by the Department, it must be repeated if the geocomposite to be used is different from the one previously tested or if the percentage of fines (i.e., particles passing #200 sieve) in the protective soil is greater than the percentage of fines in the soils previously tested.

5. Final Cover Construction

The Permittee must construct the RMU-1 Final Cover in accordance with the RMU-1 Landfill Drawings in Attachment J, Appendix D-6 of this Permit, the RMU-1 Landfill Technical Specifications in Attachment J, Appendix D-7 of this Permit, the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit, and the conditions in this Exhibit, under the direct supervision of the Engineer as required by **Condition J.2** of this Exhibit.

a. Compacted Clay Soil Cover System Material Placement and Compaction

The natural clay material must be placed and compacted in conformance with, and to the specifications found in the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit, to the lines and grades shown in the RMU-1 Landfill Drawings in Attachment J, Appendix D-6 of this Permit. The Construction Testing (Soil Compaction and Moisture Content, and Lab Hydraulic Conductivity) must be as specified in Section 4.6 of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit, and must meet the pass criteria specified therein.

All laboratory hydraulic conductivity tests on the undisturbed clay samples, must be $1x10^{-7}$ cm/sec, maximum or less and must be performed by a laboratory independent from the Permittee and approved by the Engineer. The test methods and parameters must be appropriate for the sample location or intended material location and must not alter the sample beyond the condition that would be expected to occur in the clay at the actual unit.

b. Geosynthetic Clay Liner (GCL) Cover System Material and Installation

The GCL material provided and the sub-grade on which it is to be placed must: meet the specifications in the RMU-1 Landfill Technical Specifications in Attachment J, Appendix D-7 of this Permit; be installed to the lines and grades shown on the RMU-1 landfill Drawings in Attachment J, Appendix D-6 of this Permit; and be tested and demonstrated as satisfying requirements in accordance with the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The Department's on-site representative and/or the CQA Engineer may reject damaged or improperly handled/stored rolls/sheets of GCL material and/or withhold approval for GCL placement in any area where the sub-grade has been observed to contain items that could damage the GCL.

c. Geomembrane Cover Seaming Procedures

The cover seaming and monitoring must meet the requirements of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. Wherever feasible, the membrane panels must be joined by automatic, self-propelled double weld fusion welding equipment. The surface of the lapped edges of the membrane sheets must be prepared as recommended by the manufacturer. All seam connections must be continuous and must meet the seam requirements of the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The air channel of the double fusion weld must be sealed off by an extrusion weld at its end, at any location where the seam terminates at a T-connection or under a patch or cap strip. At T-connection locations, the hot wedge device must either be removed or the hot wedge device roller pressure must be released, approximately 6 inches from the intersecting seam where the third panel meets the intersection of the first two. The hot wedge device should then be reinserted or roller pressure re-engaged a short distance (approximately 6 inches) beyond the intersection point. This T-connection must be completed by extrusion fillet seaming as is depicted in Figure 7.7 of the document entitled Technical Guidance Document: Inspection Techniques for the Fabrication of Geomembrane Field Seams, USEPA, EPA/530/SW-91/051, May 1991. As depicted in this figure, the un-bonded free overlaps of the sheets are to be cut away to expose the edge of the outside of the hot wedge seam. The surface must be ground to remove the surface oxide and the extrudate bead must be placed in a continuous fashion in accordance with the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The bead must provide complete coverage of areas not completed by the hot wedge device.

d. Geomembrane Cover Test Seams, Visual Inspection, and Non-Destructive Testing

A Passing test seam shall be an indicator of the adequacy of the seaming unit and seamer working under prevailing site conditions, but not necessarily an indicator of seam adequacy.

If the laboratory tests of the test seams fail, they must be taken as an indicator of the possible inadequacy of the entire seamed length of installed cover corresponding to the test seam. Destructive test portions must then be taken by the Geomembrane Cover Installer at locations suggested by the Engineer and the same laboratory tests required of test seams must be performed. Passing tests shall be taken as an indicator of adequate installed cover seams. Failing tests shall be an indicator of non-adequate seams and the seams represented by the destructive test location must be repaired with a cap strip. The cap strip must be non-destructively tested and repaired, as required, until adequacy of the seams is achieved.

Locations where field seams can be seen to be separated or can be pulled or peeled apart by hand must be treated as if they were a location where a laboratory test had failed.

A passing non-destructive test of field seams and repairs and a passing seam inspection shall be taken to indicate the adequacy of field seams and repairs.

e. Geomembrane Cover Destructive Seam Testing

The portion of each seam sample designated in the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit, for laboratory testing should be examined and tested by a laboratory independent from the Permittee and designated by the Engineer. The samples should be examined for holes, grooves, melt through, wavering welds, small welds, and any other unusual characteristics. All occurrences of the aforementioned characteristics must be reported to the Department. The laboratory tests in the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit, to be performed, "Bonded Seam Strength" and "Peel Adhesion," must be performed in accordance with ASTM D4437 as indicated in Attachment J, Appendix D-7 of this Permit. A report, or a series of reports, must be prepared by the laboratory, of the results of examination and testing. This report, or reports, must be submitted to the Engineer and to the Department on a timely basis for review and consideration of further action. No installation of materials above the Geomembrane Cover shall be done until all destructive testing of the Geomembrane Cover section is completed, reported on, accepted by the Engineer, and accepted in writing by the Department.

Failure to meet either of the above testing requirements in any more than one of five of the tests in both peel adhesion and shear strength testing shall indicate a defective seam. A failed seam or other defects must be evaluated and repaired as required by the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit. The Department reserves the right to specify further sampling and testing based on the frequency of defective seams and/or to require the Permittee's Project Manager, in coordination with the Engineer, to call an immediate Problems Resolution Meeting to which all principal parties to the problem are gathered. At the Problems Resolution Meeting corrective actions shall be discussed and a specific course of action to the noted problem(s) shall be chosen. The Engineer must follow up and provide documentation to ensure that corrective actions or procedures are carried out, in a timely fashion in the field. Subsequent to the Resolution Meeting, the Department reserves the right to temporarily halt seaming operations if, for whatever reason, the chosen corrective action cannot be implemented in a timely manner or if the implemented corrective action fails to provide an adequate resolution to the problem based on the frequency of defective seams.

f. Protection of Geosynthetic Cover Components

No equipment shall be allowed to operate on or above geosynthetic cover components until at least one (1) foot of protective soil has been placed above these components. The size of equipment operating on or above the 1-foot of protective soil on the final cover shall be limited to a CAT D8K dozer or smaller.

6. Surface Water Management During Final Cover Construction

   Surface water management during final cover construction shall focus on the restriction of sediment discharge from the work area. Except as described below, no surface water must be allowed to exit the landfill until a minimum of one (1) foot of intermediate cover soil and a temporary geomembrane has been placed. In the case of GCL Final Cover system installation, surface water may exit the landfill after placement of the 6-inch select fill layer, however within seven (7) days of such placement, the Permittee must install either a temporary geomembrane or the GCL and permanent geomembrane above the select fill layer. Construction surface water management measures to be taken by the Permittee must involve sediment control barriers consisting of silt fences, hay bales or other Department approved sediment control measures. The number and location of these shall be determined by the progress of construction in order to cover the perimeter of construction zones.

   Placement procedures for any silt fence used must involve the use of 2-foot wide geotextile either supported by a ¾-inch polypropylene mesh with a nylon top cord and 4-foot wooded posts at 3-foot maximum spacing or by a 6-inch mesh with a 14-gauge wire support fence and a steel top cord, secured by 4-foot wooded posts at a 8-foot spacing. Additional bracing shall be added as required. Anchoring of the geotextile must consist of a 4-inch wide by 6-inch deep trench with backfill compacted over the folded fabric.

   Any erosion prevention hay bales used shall be placed with twine parallel to the ground and must be secured with two 2”x2” stakes per bale each 30 inches in length, driven through the top of the bale.

   Removal of silt fences, hay bales or other Department approved sediment controls shall only be done after vegetation is firmly established on the final cover topsoil areas, and the soil areas of these removed sedimentation controls must be re-vegetated.

   Unless otherwise approved by the Department on a case specific basis, synthetic mesh, jute mesh, cellulose or wood fiber, or other biodegradable meshes must be installed in channels designed to have a vegetative cover to enhance the establishment of such vegetation.

7. Fugitive Dust Control During Final Cover Construction

   The Permittee must reduce impacts on air quality for all construction activities for the final cover through proper operation and maintenance of construction equipment and fugitive dust control techniques, and must comply with the Fugitive Dust Control Plan in Attachment L, Appendix D-10 of this Permit.

8. Final Cover Construction Reporting Requirements

   The Permittee must submit to the Department the following construction reports and certifications as listed in the Permit and the RMU-1 Landfill Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit.

   - Construction Schedules
   - Engineer's Personnel Experience Information, Training, and Procedures Report
   - Design Clarifications or Additions
   - Clay or GCL Protective Soil Test Fill Report (when required)
   - Borrow Area(s) and Stockpile(s) Report(s)
   - GCL Material Properties Report and Quality Control Certificates
   - GCL Conformance Testing Results Report
   - Geomembrane Cover Material Properties Report and Quality Control Certificates
   - Geomembrane Cover Conformance Testing Results Report
   - Geocomposite Properties Report and Quality Control Certificates
   - Geocomposite Conformance Testing Results Report
   - Geomembrane Cover Installer Qualifications
   - Inspection of Waste Surface Report
   - Guarantees on Geomembrane Cover by Installer, unless the Department approves a case specific exemption
   - Engineer's Acceptance of Geomembrane Cover
   - Engineer's and Permittee's Certification
   - Weekly Reports on Construction including inspection of all installation practices and quality assurance and quality control monitoring including:
     - clay placement and compaction
     - prepared surface inspection
     - material shipment and storage
     - GCL installation
     - geomembrane cover
     - geomembrane cover installation and seam testing
     - geocomposite installation
     - miscellaneous installation issues

- tracking of significant Final Cover issues to resolution

Note: Weekly construction reports must be submitted to the Department's Central and Region 9 offices within two (2) weeks of the end of the construction work week.

9. Seasonal or Adverse Weather Requirements

Whenever the construction schedule indicates that placement and compaction of earthen materials and installation of geomembrane cover will be performed after November 30 and before April 1, the Permittee must submit to the Department for review and approval a description of the activities that will be performed to ensure compliance with this Permit. This description must include, but not necessarily be limited to, a description of any special construction procedures and/or materials that may be utilized, and a description of any special quality control/quality assurance procedures that will be performed. No construction or quality assurance or quality control activities shall be conducted in the field during these periods until the Department has approved the submittal.

10. RMU-1 Closure Certifications

Within 60 days of completion of final closure of RMU-1 or within 60 days of any RMU-1 partial closure, the Permittee must submit to the Department certifications by the Permittee and by an independent NYS registered Professional Engineer that RMU-1 (or the applicable portion thereof) has been closed in accordance with: 6 NYCRR 373-2.7(a) through 373-2.7(f); 6 NYCRR 373-2.14(g); **Condition G** of **Module VI** of this Permit; **Conditions A.6 and A.7 of Exhibit A**; the "RMU-1 & Site Wide Closure Plan" in Attachment I, Section I.1 of this Permit; the "RMU-1 Landfill Drawings" in Attachment J, Appendix D-6 of this Permit; the "RMU-1 Landfill Technical Specifications" in Attachment J, Appendix D-7 of this Permit; the "RMU-1 Landfill Quality Assurance Manual" in Attachment J, Appendix D-8 of this Permit; and the conditions in this Exhibit. The Permittee must also submit the following:

a. Guarantees on Geomembrane Cover

Unless the Department approves a case specific exemption, the Engineer and the Permittee must submit to the Department certification by the Geomembrane Cover Installer that the installed Geomembrane Cover and field seams have been constructed in accordance with the specifications and requirements of this Permit, especially the RMU-1 Quality Assurance Manual in Attachment J, Appendix D-8 of this Permit.

b. Acceptance of Geomembrane Cover

Any portion of the Geomembrane Cover shall be accepted by the Department when: that portion of the installation is finished in accordance with the schedule prepared pursuant to the Construction Schedule required by **Condition J.1** of this

Exhibit; the Engineer's acceptance and supporting documentation for that portion is submitted to the Department; and, the Department notifies the Permittee of its acceptance. No burying or otherwise obscuring of the cover shall take place prior to supplemental inspection pursuant to the Construction Schedule required by **Condition J.1** of this Exhibit and documentation by one of the Department's on-site staff of preliminary acceptance by the Department of that portion of the Geomembrane Cover.

K. Perpetual Post-Closure Care Requirements

The Permittee must fully comply with **Condition G of Module VI** of this Permit and the conditions below with regard to the perpetual post-closure care.

Perpetual Post-Closure Care requirements are applicable to the following land disposal units:

- Landfills: Secure Landfills (SLFs) 1-6, 7, 10, 11 & 12, and RMU-1.
- Surface Impoundments: Lagoons 1, 2, 5, 6 & 7, and Salts North, East & West.
- Former Process Area Tank Locations: L-1, L-3, L-6, T-44, FOD-1, FOD-2, T-29, TO-9, TO-10, TO-12, T-64, T-65, FD-1, FD-2, TO-3, TO-6, T-48, T-47 & Carbon Bldg. Sump, as defined on figures in the Corrective Measures Requirements in Attachment E of the Permit.

1. Closed Secure Landfills (SLFs) 1-6, 7, 10, 11 & 12

   a. General Requirements for SLF 1-6, 7, 10, 11 and 12 Leachate Collection and Removal

      i. Primary leachate in all landfill standpipes must be monitored and pumped automatically using permanently installed sensors, alarms, and pumping equipment, with the exception indicated by **Condition K.1.f.ii** of this Exhibit. Additional pumps and other spare parts must be available on-site at all times for ready replacement. Primary leachate pumps must be fitted with power failure and high leachate level indicator alarms which must be electronically monitored on a continuous basis. If a sustained high level alarm is noted, a manual level measurement must be taken within 24 hours of the time that the alarm occurs and a determination made whether an exceedence of the maximum allowable leachate level has occurred. The operation of the pump must then be investigated.

      ii. Inoperable primary pumps and secondary pumps (where applicable) must be replaced within forty-eight (48) hours of failure.

iii. On a quarterly basis and every time the leachate level indicator probes are moved, the liquid level must be manually measured. This manual measurement must be used to confirm compliance with maximum leachate level requirements and to check pump activation and alarm level settings. In addition, such measurements will be compared to the results of the automatic data read-out to calibrate the leachate level indicators (probes) on landfills where such devices are present.

iv. If a statistically significant change in the groundwater quality is noted for SLF 1-6, 7, 10 or 11A and such change indicates that the landfill may be impacting the groundwater, the standpipe(s) nearest to the affected monitoring well(s) must be sampled for the same suite of parameters and at the same frequency indicated in the Groundwater Monitoring Program in **Condition L** of this Exhibit of this Permit until the source of the potential problem is identified and corrected to the satisfaction of the Department.

v. Standpipes must be covered at all times, except when being attended.

vi. Proper operation of all electronic leak detection systems installed at riser vault buildings and piping manholes, must be verified at least quarterly by visually checking for liquids at all locations where a visual check can be performed. On an annual basis, sensor/probes must be manually placed in water, or electronically simulated in locations where a manual check would require confined space entry, to verify that the alarm is electronically triggered.

b. SLF 1-6 Leachate Collection and Removal

i. The maximum leachate level, as measured in the standpipes of SLF 1-6, except standpipes listed in **Condition K.1.b.ii** of this Exhibit, must not exceed a depth of two (2) feet directly above the base of the standpipe, unless such exceedence is clearly attributable to a pump or other obvious leachate removal system malfunction which is corrected within 48 hours of the exceedence.

ii. The maximum leachate levels for the following standpipes must not exceed the listed elevation, unless such exceedence is clearly attributable to a pump or other obvious leachate removal system malfunction which is corrected within 48 hours of the exceedence:

Standpipe No.	Elevation (ft., msl)
1	320.4
2	325.9
3	322.9
5	312.1
7T	324.4
10	318.5
17	321.9

c. SLF-7 Leachate Collection and Removal

i. The maximum leachate level in the standpipes must not exceed 2 feet above the lowest elevation of the floor of the area being drained in the standpipe, unless such exceedence is clearly attributable to a pump or other obvious leachate removal system malfunction which is corrected within 48 hours of the exceedence. The sump in the standpipe has 6 inches of concrete at the bottom which is set on top of the floor and therefore the compliance level is 18 inches above the sump bottom.

d. SLF-10 Leachate Collection and Removal

i. The maximum leachate level in the standpipes must not exceed 2 feet above the lowest elevation of the floor of the area being drained in the standpipe, unless such exceedence is clearly attributable to a pump or other obvious leachate removal system malfunction which is corrected within 48 hours of the exceedence.

e. SLF-11 Leachate Collection and Removal

i. The maximum leachate level in the standpipes must not exceed 1 foot above the primary liner as measured from the liner's lowest elevation at the edge of the sump in each landfill cell, unless such exceedence is clearly attributable to a pump or other obvious leachate removal system malfunction which is corrected within 48 hours of the exceedence.

ii. Secondary leachate in the SLF 11B/C Secondary Leachate Collection System (SLCS) will be sampled biannually for Site Specific Volatile Organic Compounds (27 VOCs) and annually for Organic Priority Pollutants (i.e., semi-volatile organics, PCBs, and pesticides) and Priority Pollutant Metals (i.e., antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc).

iii. If a statistically significant change in the SLF-11B or 11C SLCS water quality is noted and is not clearly attributable to a sampling or analytical error, then response actions will be taken in accordance with **Condition K.1.g** of this Exhibit.

iv. Using either manual or automatic pumping methods, the Permittee must, on a weekly basis, remove all secondary leachate from the SLCS in each SLF 11B & 11C landfill cell to pump's refusal (i.e., when all pumpable liquids have been removed), and measure and record the volume removed (in gallons). At the end of each calendar month, the Permittee must add up the secondary leachate volumes removed from each cell's SLCS for each pumping in the month and record the summed volumes (in gallons). The Permittee must determine the SLCS average daily flow rate (in gallons per acre per day) for each SLF 11B & 11C cell in accordance with 6 NYCRR 373-2.14(n)(2) by dividing the above mentioned summed volume removed from each cell by the respective cell's area (in acres) based on as-built surveys. That resultant value shall be divided by the number of days between the last pumping event in the preceding month and the last pumping event of the current month. The SLCS average daily flow rates must be recorded and reported each month in accordance with **Condition F of Schedule 1 of Module I**.

v. For each calendar month, the Permittee must compare the SLCS average daily flow rate (in gallons per acre per day) for each SLF 11B & 11C cell, determined in accordance with **Condition K.1.e.iv** of this Exhibit, with the Response Rate for SLF 11B & 11C of 20 gallons per acre per day (gpad). If the SLCS average daily flow rate for any given cell exceeds the 20 gpad Response Rate, then response actions will be taken in accordance with **Condition K.1.g** of this Exhibit.

f. SLF-12 Leachate Collection and Removal

i. The maximum leachate level in the standpipes must not exceed a depth of one (1) foot above the primary liner as measured from the liner's lowest elevation at the edge of the sump in each landfill cell, unless such exceedence is clearly attributable to a pump or other obvious leachate removal system malfunction which is corrected within 48 hours of the exceedence.

ii. The leachate in Standpipe No. 54 can be pumped manually, provided the Permittee maintains compliance at all times with **Condition K.1.f.i** of this Exhibit.

iii. Secondary leachate in the SLF 12 Secondary Leachate Collection System (SLCS) will be sampled biannually for Site Specific Volatile Organic Compounds (27 VOCs) and annually for Organic Priority Pollutants (i.e., semi-volatile organics, PCBs, and pesticides) and Priority Pollutant Metals (i.e., antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc).

iv. If a statistically significant change in the SLF-12 SLCS water quality is noted and is not clearly attributable to a sampling or analytical error, then response actions must be taken in accordance with **Condition K.1.g** of this Exhibit.

v. Using either manual or automatic pumping methods, the Permittee must, on a weekly basis, remove all secondary leachate from the SLCS in each SLF 12 landfill cell to pump's refusal (i.e., when all pumpable liquids have been removed), and measure and record the volume removed (in gallons). At the end of each calendar month, the Permittee must add up the secondary leachate volumes removed from each cell's SLCS for each pumping in the month and record the summed volumes (in gallons). The Permittee must determine the SLCS average daily flow rate (in gallons per acre per day) for each SLF 12 cell in accordance with 6 NYCRR 373-2.14(n)(2) by dividing the above mentioned summed volume removed from each cell by the respective cell's area (in acres) based on as-built surveys. That resultant value shall be divided by the number of days between the last pumping event in the preceding month and the last pumping event of the current month. The SLCS average daily flow rates must be recorded and reported each month in accordance with **Condition F of Schedule 1 of Module I**.

vi. For each calendar month, the Permittee must compare the SLCS average daily flow rate (in gallons per acre per day) for each SLF 12 cell, determined in accordance with **Condition K.1.f.v** of this Exhibit, with the Response Rate for SLF 12 of <u>20 gallons per acre per day (gpad)</u>. If the SLCS average daily flow rate for any given cell exceeds the <u>20 gpad</u> Response Rate, then response actions must be taken in accordance with **Condition K.1.g** of this Exhibit.

g. Response Actions for SLF 11B, 11C & 12 SLCSs: If the SLCS average daily flow rate for any given cell exceeds the <u>20 gpad</u> Response Rate, as determined in accordance with **Conditions K.1.e.v or K.1.f.vi** of this Exhibit or if the above re-sampling and analysis confirms a noted change in SLCS water quality for a given landfill cell, the Permittee must:

i. For the landfill cell, or cells involved, immediately implement the response actions required by 6 NYCRR 373-2.14(o)(2&3) and continue implementation of remedial actions and monthly reporting in accordance with 6 NYCRR 373-2.14(o)(2)(vi) until the SLCS flow has been mitigated to the Department's satisfaction.

ii. Immediately increase SLCS liquid removal/pumping frequency for the involved cell, or cells, from weekly to daily, and maintain daily removal/pumping until a level actuated automatic pumping system is installed or the Permittee requests and the Department approves a return to weekly pumping as a result of other measures taken that adequately mitigate the SLCS flow. Measure, record and report the daily SLCS flow rate (in gpad), and the 30-day rolling average daily SLCS flow rate (in gpad).

iii. Immediately increase SLCS liquid sampling and analysis frequency for the involved cell, or cells, from biannual to monthly for the parameters specified in **Conditions K.1.e.ii or K.1.f.iii** of this Exhibit or other Department approved parameters, and maintain this monthly frequency until the Department approves a return to biannual sampling and analysis as a result of other measures taken that adequately mitigate the SLCS flow.

iv. Sample the wells located down-gradient of the involved cell, or cells, within (14) days of an SLCS water quality or volumetric exceedence and increase the groundwater monitoring frequency for these wells to monthly. All such samples must be analyzed for the indicator parameters specified by the Groundwater Protection program in **Condition L** of this Exhibit and any other parameters as deemed necessary by the Department. The monthly frequency must be maintained until the Department approves a reduced frequency as a result of other measures taken that adequately mitigate the SLCS flow.

v. The Permittee must implement other remedial actions as deemed necessary, by the Department, to adequately mitigate the SLCS flow in the involved cell, or cells.

2. Closed Process Area Tank Locations

a. For the currently closed process area tank locations as listed in the beginning of this Condition located south of Lagoons 1, 2, 5, 6 & 7 and north of the East & West Salts Impoundments as defined on figures in the Corrective Measures Requirements in Attachment E of the Permit and any currently operating tank systems within this same area that are closed in accordance with 6 NYCRR 373-2.10(h)(2) (i.e., closure as a landfill) due to remaining soil contamination, the Permittee must perform the following additional perpetual post-closure care activities.

i. Inspect and maintain all final covers for the closed tank systems within the process area. The Permittee must inspect these covers on at least a semi-annual basis for defects (e.g., cracks, gaps, holes, separated joints, areas of differential settlement, etc.) which visually expose the underlying soil and which could allow migration of soil contaminants. The Permittee must record these inspections in the Facility's operating record. The Permittee must repair any and all such defects by application of cover materials or a weather-resistant caulk or sealant. In lieu of making these specific repairs, the Permittee may submit and the Department may approve, an alternative cover design to replace or enhance any existing cover, including a schedule for its construction. Once approved by the Department, the Permittee must construct the alternative cover in accordance with the approved schedule.

ii. If at any time the Department considers that contamination within the Process Area is, or may be causing exceedences of the facility's SPDES storm water discharge limits, the Permittee must, upon written notification from the Department, enhance and/or expand the covers in the area of the suspected source(s), or take other actions as deemed necessary by the Department to lower the levels of these hazardous constituents in process area surface water.

3. Closed Lagoons & Salts Surface Impoundments

a. The Permittee must perform perpetual post-closure care including inspecting and making all necessary repairs to the final cover of Lagoons 1, 2, 5, 6 & 7, and Salts North, East & West, and mow and fertilize these covers in accordance with Section 1.3, Section 1.5 and Table 1 of the Site Wide Post-Closure Plan in Attachment I, Section I.2 of this Permit.

4. RMU-1 Landfill

   a. The Permittee must perform perpetual post-closure care for the RMU-1 landfill in accordance with the RMU-1 Post-Closure Plan in Attachment I, Section I.2 of this Permit, **Conditions F.3.b, F.3.e, F.6, G.1-G.3, H and L** of this Exhibit and **Conditions E.1, E.5-E.7, G, N and O in Module VI** of this Permit.

L. Groundwater Protection

Background

The CWM Model City Facility groundwater monitoring program has continued to evolve since Permit No. 90-87-0476 was issued on July 31, 1989. As required in the Permit, CWM has conducted groundwater investigations in the vicinity of the landfills and surface impoundments and other areas of the site. The Department has used the results of those investigations to develop monitoring programs to detect any future releases from the units that have not released hazardous constituents to the groundwater, and to keep track of the groundwater contamination which has been observed in the vicinity of a number of the landfills and impoundments.

In some locations (Landfills 2, 3, 4/East West Salts), it is not possible to conclusively attribute the presence of groundwater contamination to waste management activities at the regulated units, nor is it possible to rule out those units as potential sources of the contamination. In other locations (Landfills 7, 10, 11, RMU-1), the observed groundwater contamination has resulted from waste management activities that occurred before the units were constructed and, hence, is not attributable to releases from them. The Department will continue to require CWM to keep track of the magnitude and extent of the contamination and to evaluate remedial programs for the groundwater contamination.

In many areas of the site where substantial groundwater contamination has been found, the Department has required CWM to implement an Remedial Measures programs to mitigate the potential threat to the environment posed by the contamination. The details of the Remedial Measures Program are described in **Module II**, **Exhibit B** and Attachment E of this Permit.

This Exhibit contains the groundwater Detection Monitoring Programs which are required under 6 NYCRR Part 373-2. The programs are designed to provide unit-specific detection capabilities at those active or inactive Landfills and Surface impoundments which have not released hazardous waste constituents to the groundwater. The purpose of the detection monitoring programs is to allow for rapid detection of releases should they occur.

Applicability

- The Permittee must comply with all applicable groundwater monitoring requirements set forth in 6 NYCRR 373-2.6.

- The Permittee must modify the groundwater monitoring program, as necessary, to maintain compliance with any future changes in 6 NYCRR 373-2.6 within ninety (90) days after the effective date of such changes.

- Detection Monitoring Program: Groundwater quality data collected during the permit application process support the implementation of a Detection Monitoring Program for the following units:

  Active:

  Residuals Management Unit 1 (RMU-1)
  Facultative Ponds 1, 2, 3, 5, and 8

  Inactive:

  Secure Landfill 1 (SLF 1)
  Secure Landfill 2 (SLF 2)
  Secure Landfill 3 (SLF 3)
  Secure Landfill 4 (SLF 4)
  Secure Landfill 5 (SLF 5)
  Secure Landfill 6 (SLF 6)
  Secure Landfill 7 (SLF 7)
  Secure Landfill 10 (SLF 10)
  Secure Landfill 11 (SLF 11)
  Secure Landfill 12 (SLF 12)
  Aggressive Biological Treatment Unit 58 (A.B.T.U.58)

The Permittee is required to maintain and follow the Detection Monitoring Program as described below:

1. Point of Compliance. The Points of Compliance for the applicable units are as follows:

   a. Residuals Management Unit 2: The Point of Compliance for this landfill is defined as the vertical surface passing through the downgradient monitoring wells R201SR, R204S, R205S, R206S, R207S, R208S, R209S, R210S, R211S, R212S, R213S, R214S, R215S, and R216S.

   b. Residuals Management Unit 1: The Point of Compliance for this landfill is defined as the vertical surface passing through the downgradient monitoring wells R101S, R102SR, R103S, R104S, R105S, R106S, R107S, R1N08S, R109S, R1N10S, R111S, R112S, R113S, R114S, R115S R116S, R118S, R125D, R126D, R127D, R128D, R129D, R130D, R131D, R132D, R133D, R134D and R135D.

   c. Facultative Ponds 1 & 2: The Point of Compliance for this surface impoundment is defined as the vertical surface passing through the downgradient monitoring wells F101S, F102S and F103S.

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d. Facultative Pond 3: The Point of Compliance for this surface impoundment is defined as the vertical surface passing through the downgradient monitoring wells F301S and F302S.

e. Facultative Pond 5: The Point of Compliance for this surface impoundment is defined as the vertical surface passing through the downgradient monitoring wells F501S and F502S.

f. Facultative Pond 8: The Point of Compliance for this surface impoundment is defined as the vertical surface passing through the downgradient monitoring wells F801S and F802S.

g. Secure Landfill 1: The Point of Compliance for this landfill is defined as a vertical surface passing through the downgradient monitoring wells W102S and W101S.

h. Secure Landfills 2, 3 & 4: The Point of Compliance for these landfills is defined as the vertical surface passing through the downgradient monitoring wells W201S, W202S, W301S, W303S, W401S and W402S.

i. Secure Landfill 5: The Point of Compliance for this landfill is defined as a vertical surface passing through the downgradient monitoring wells W501S and W502S.

j. Secure Landfill 6: The Point of Compliance for this landfill is defined as a vertical surface passing through the downgradient monitoring wells W601S, W602S and W603S.

k. Secure Landfill 7: The Point of Compliance for this landfill is defined as a vertical surface passing through the downgradient monitoring wells W701S, W702S, W703S, W704S and W705S.

l. Secure Landfill 10: The Point of Compliance for this landfill is defined as a vertical surface passing through the downgradient monitoring wells W1001S, W1002S, W1003S and W1004S.

m. Secure Landfill 11: The Point of Compliance for this landfill is defined as the vertical surface passing through the downgradient monitoring wells W1101S, W1102S, W1103S, W1104S, W1105S, W1106S, W1107S, W1108S and W1109S.

n. Secure Landfill 12: The Point of Compliance for this landfill is defined as a vertical surface passing through the downgradient monitoring wells W1201S, W1202S, W1203S, W1204S, W1205S, W1206S, W1207S and W1208S.

o. A.B.T.U. 58: The Point of Compliance for this former surface impoundment is defined as the vertical surface passing through the downgradient monitoring wells F5801S and F5802S.

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The Points of Compliance are shown on Figure 1 provided at the end of this Exhibit.

2. Length of Monitoring Requirements. At a minimum, the groundwater monitoring requirements set forth herein shall extend for a period no less than thirty (30) years beyond the closure of the units except for those land disposal units (surface impoundments) where "clean" closure is achieved consistent with the requirements of 6 NYCRR 373-2.11(f)(1). In the event that a compliance monitoring program is needed at the unit, a compliance period equal to the active life of the unit plus thirty (30) years shall be established.

3. Description of Wells. The Detection Monitoring network shall consist of the following wells:

   a. Upgradient. Background monitoring wells BW01S, BW01D, BW03S, BW03D, BW04S, BW04D, BW05S and BW05D.

   b. Downgradient. Monitoring wells R204S, R204D, R205S, R205D, R206S, R206D, R207S, R207D, R208S, R208D, R209S, R209D, R210S, R210D, R211S, R211D, R212S, R212UD, R212LD, R213S, R213D, R214S, R214D, R215S, R215D, R216S, and R216D will be used to monitor Secure Landfill RMU-2.

      Monitoring wells R101S, R101D, R102SR, R102D, R103S, R103D, R104S, R104D, R105S, R105D, R106S, R106D, R107S, R107D, R1N08S, R108D, R109S, R109D, R1N10S, R110D, R111S, R111D, R112S, R113S, R114S, R114D, R115S, R116S, R116D, R118S, R125D, R126D, R127D, R128D, R129D, R130D, R131D, R132D, R133D, R134D and R135D will be used to monitor Secure Landfill RMU-1.

      Monitoring wells F101S, F102S, F102D and F103S will be used to monitor Facultative Pond 1 & 2.

      Monitoring wells F301S, F302S and F302D will be used to monitor Facultative Pond 3.

      Monitoring wells F501S, F501D and F502S will be used to monitor Facultative Pond 5.

      Monitoring wells F801S, F802S, F802UD and F802LD will be used to monitor Facultative Ponds 8.

      Monitoring wells W101S, W101D and W102S will be used to monitor Secure Landfill 1.

      Monitoring wells W201S, W201D, W202S, W202UD, W202LD, W301S, W301D, W303S, W401S, W401D and W402S will be used to monitor Secure Landfills 2, 3 & 4.

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Monitoring wells W501S, W501D and W502S will be used to monitor Secure Landfill 5.

Monitoring wells W601S, W601D, W602S and W603S will be used to monitor Secure Landfill 6.

Monitoring wells W701S, W701D, W702S, W702D, W703S, W703D, W704s, W704D, W705S and W705D will be used to monitor Secure Landfill 7.

Monitoring wells W1001S, W1001D, W1002S, W1003S, W1003D, W1004S and W1004D will be used to monitor Secure Landfill 10.

Monitoring wells W1101S, W1101D, W1102S, W1102D, W1103S, W1103D, W1104S, W1104D, W1105S, W1105D, W1106S, W1106D, W1107S, W1107D, W1108S, W1108D, W1109S and W1109D will be used to monitor Secure Landfill 11.

Monitoring wells W1201S, W121UD, W121LD, W1202S, W122UD, W122LD, W1203S, W123UD, W123LD, W1204S, W1204D, W1205S, W1205D, W1206S, W1206D, W1207S, W1207D, W1208S, W128UD and W128LD will be used to monitor Secure Landfill 12.

Monitoring wells F5801S, F5801D and F5802S will be used to monitor A.B.T.U. 58.

4. Additional Monitoring

   a. Each time the active RMU-2 Detection monitoring wells are sampled during the active life of the Landfill:

      i. Samples of RMU-2 leachate from the primary and secondary leachate collection/detection systems must be collected and analyzed for the same suite of parameters as the monitoring wells.

      ii. Water level measurements will be taken from all RMU-2 piezometers and all inactive RMU-2 Detection Monitoring Wells.

   b. Each time the active RMU-1 Detection monitoring wells are sampled during the active life of the Landfill:

      i. Samples of RMU-1 leachate from the primary and secondary leachate collection/detection systems must be collected and analyzed for the same suite of parameters as the monitoring wells.

      ii. Water level measurements will be taken from all RMU-1 piezometers and all inactive RMU-1 Detection Monitoring Wells.

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c. Each time the SLF 11 Detection monitoring wells are sampled:

   i. Water level measurements will be taken from piezometers P1102S, P1103S, P1104S and P1105S.

d. Each time the SLF 7 Detection monitoring wells are sampled, water level measurements will be taken from piezometers P701S, P702S and P703S.

e. Each time the SLF 10 Detection monitoring wells are sampled, water level measurements will be taken from piezometers P1001S and P1002S.

f. Each time the SLF 12 Detection Monitoring Wells are sampled, water level measurements will be taken from piezometers P1201S, P1202S and monitoring well TW-15S.

5. Sampling Frequency. All monitoring wells in the Detection Monitoring Program, with the exception of monitoring wells F802LD, W202LD, W121LD, W122LD, W123LD and W128LD, must be sampled at least semiannually. Monitoring wells F802LD, W202LD, W121LD, W122LD, W123LD and W128LD must be sampled at least once every two years.

6. Site Specific Indicator Parameters (27 VOCs). As set forth in 6 NYCRR 373-2.6(i)(1), the following parameters must be used as site specific indicator parameters in the Detection Monitoring Program:

Volatile Organic Compounds

Benzene	Ethylbenzene
Bromoform	Methyl Bromide
Carbon Tetrachloride	Methyl Chloride
Chlorobenzene	Methylene Chloride
Chlorodibromomethane	1,1,2,2-Tetrachloroethane
Chloroethane	Tetrachloroethylene
1,2 Dichlorobenzene	Toluene
Chloroform	trans-1,2-Dichloroethylene
Dichlorobromomethane	1,1,1-Trichloroethane
1,1-Dichloroethane	1,1,2-Trichloroethane
1,2-Dichloroethane	Trichloroethylene
1,1-Dichloroethene	Vinyl Chloride
1,2-Dichloropropane	cis-1,3-Dichloropropylene
trans-1,3-Dichloropropylene	

The Permittee must analyze all Detection Monitoring wells for the site specific indicator parameters (27 VOCs) and must statistically compare the values obtained during each sampling event with the background values of the parameters.

7. Background Values for Site Specific Indicator Parameters: To date, no hazardous waste constituents have been detected in groundwater samples obtained from

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background monitoring wells BW01S, BW01D, BW03S, BW03D, BW04S, BW04D, BW05S and BW05D.

8. Statistical Evaluation. Whenever the Permittee determines groundwater quality at the Point of Compliance, the Permittee must determine whether there has been a statistically significant increase in any of the site specific indicator parameters (27 VOCs) when compared against the established trigger values. That determination must be made for each indicator parameter and for every well.

   For the Model City Facility, Poisson Prediction Limits must be used for statistical comparison of monitoring well data. This method is appropriate for data that exhibit truncated distributions with skewed tails, produced by detection limit problems. The Poisson prediction interval includes three data evaluation mechanisms:

   - Statistical Criterion 1 - Poisson Prediction Interval (Concentration)
   - Statistical Criterion 2 - Multiple Detections
   - Statistical Criterion 3 - Persistent Detections

   a. Statistical Criterion 1 - Poisson Prediction Interval (Concentration): A concentration based t-prediction interval has been developed for the Model City site. Based on data obtained from analysis of background groundwater quality, field and trip blanks, the t-prediction interval has been calculated to be a sum total of site specific indicator parameters (27 VOCs) in a single scan. The prediction interval for the specific units covered by this Exhibit is as follows:

      i. RMU-2: For wells, except R204S and R208S, which comprise the Point of Compliance for the landfill, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

         ‘a’) For well R204S, data will be evaluated using a modified PI, namely that the summed total concentration of all indicator parameters, excluding Methylene Chloride and 1,1-Dichloroethane (1,1-DCA), 1,2-Dichloroethane (1,2-DCA), and Trichloroethene (TCE), must not exceed 23 ug/l. Furthermore, the concentration of 1,1-DCA, 1,2-DCA, and TCE will each be compared with a compound with a compound specific PI of 23 ug/l, which was derived from the analytical history of this well. In addition, routine evaluation procedures for Multiple and Persistent Detections will be used, excluding Methylene Chloride and 1,1-DCA, 1,2-DCA, and TCE.

         ‘b’) For well R208S, data will be evaluated using a modified PI, namely that the summed total concentration of all indicator parameters, excluding Methylene Chloride and Benzene, Ethylbenzene, and Toluene, must not exceed 23 ug/l. Furthermore, the concentration of Benzene, Ethylbenzene, and Toluene will each be compared with a compound with a compound specific PI of 23 ug/l, which was derived

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from the analytical history of this well. In addition, routine evaluation procedures for Multiple and Persistent Detections will be used, excluding Methylene Chloride and Benzene, Ethylbenzene, and Toluene.

ii. RMU-1: For wells, except R105S, R106S and R107S, which comprise the Point of Compliance for the landfill, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

‘a’) For well R105S, data will be evaluated using a modified PI, namely that the summed total concentration of all indicator parameters, excluding Methylene Chloride and 1,1-Dichloroethane (1,1-DCA), must not exceed 23 ug/l. Furthermore, the concentration of 1,1-DCA will then be compared with a compound specific PI of 23 ug/l, which was derived from the analytical history of this well. In addition, routine evaluation procedures for Multiple and Persistent Detections will be used, excluding Methylene Chloride and 1,1-DCA.

‘b’) For well R106S, data will be evaluated using a modified PI, namely that the summed total concentration of all indicator parameters, excluding Methylene Chloride, Vinyl Chloride and 1,1-Dichloroethane (1,1-DCA), must not exceed 23 ug/l. Furthermore, the concentrations of Vinyl Chloride and 1,1-DCA will each be compared with a compound specific PI of 23 ug/l, which was derived from the analytical history of this well. In addition, routine evaluation procedures for Multiple and Persistent Detections will be used, excluding Methylene Chloride, Vinyl Chloride and 1,1-DCA.

‘c’) For well R107S, data will be evaluated using a modified PI, namely that the summed total concentration of all indicator parameters, excluding Methylene Chloride, Trichloroethene (TCE), 1,2-Dichloroethane (1,2-DCA) and 1,1-Dichloroethane (1,1-DCA), must not exceed 23 ug/l. Furthermore, the concentrations of TCE, 1,2-DCA and 1,1-DCA will each be compared with a compound specific PI of 23 ug/l, which was derived from the analytical history of this well. In addition, routine evaluation procedures for Multiple and Persistent Detections will be used, excluding Methylene Chloride, TCE, 1,2-DCA and 1,1-DCA.

iii. Facultative Ponds 1, 2, 3 5, & 8: For wells which comprise the Point of Compliance for the Facultative Ponds, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

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iv. SLF 1: For wells which comprise the Point of Compliance for the landfill, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

v. SLFs 2,3 & 4:

‘a’) For wells W201S, W201D, W202UD, W202LD, W301D, W303S, W401D and W402S, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

‘b’) Well W202S: Low level (ppb) contamination has been detected in this well. An investigation of this contamination concluded that SLF 2, SLF 3, SLF 4, the East/West Salts Area and past practices and spills are all potential sources of the VOCs present in the groundwater. The Department has recognized that the close proximity of the above units limits the ability to determine a specific source of the contamination. However, since SLF 2, 3 & 4 cannot be eliminated as a source of contamination, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of all indicator parameters (excluding methylene chloride) compared to a modified prediction interval (PI) of 340 ug/l.

‘c’) Well W301S: Low level (ppb) contamination has been detected in this well. An investigation of this contamination concluded that SLF 2, SLF 3, SLF 4, the East/West Salts Area and past practices and spills are all potential sources of the VOCs present in the groundwater. The Department has recognized that the close proximity of the above units limits the ability to determine a specific source of the contamination. However, since SLF 2, 3 & 4 cannot be eliminated as a source of contamination, its presence requires the use of an alternative statistical approach. The statistical procedure will be the summed total concentration of all indicator parameters, with the exception of methylene chloride, trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE) and trans-1,2-dichloroethene. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The compound specific prediction intervals for trichloroethene, 1,1-DCE and trans-1,2-dichloroethene are as follows:

Trichloroethene	1,200 ug/l
trans-1,2-Dichloroethene	570 ug/l
1,1-Dichloroethene	23 ug/l

‘d’) Well W401S: Low level (ppb) contamination has been detected in this well. An investigation of this contamination concluded that SLF 2, SLF 3, SLF 4, the East/West Salts Area and past practices and spills are all potential sources of the VOCs present in the groundwater. The

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Department has recognized that the close proximity of the above units limits the ability to determine a specific source of the contamination. However, since SLF 2, 3 & 4 cannot be eliminated as a source of the contamination, its presence requires the use of an alternative statistical approach. In addition to the Site Specific Indicator Parameters (27 VOCs) specified in **Condition L.6 of this Exhibit**, the Permittee must also monitor for Acetone, 2-Butanone (MEK), 4-Methyl-2-Pentanone (MIBK), 2-Hexanone, Carbon Disulfide, Styrene, Vinyl Acetate and Xylene. The statistical procedure will be to determine the summed total concentration of Acetone, 2-Butanone, 4-Methyl-2-Pentanone and 2-Hexanone. This total value will then be compared to a modified prediction interval (PI) of 23 ug/l. The summed total concentration of all other indicator parameters (excluding methylene chloride and vinyl chloride) will then be determined and compared to a modified prediction interval of 3 mg/l.

vi. SLF 5:

‘a’) Wells W501D & W502S: The prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

‘b’) Well W501S: Low level (ppb) contamination has been detected in this well. After an investigation, the Department has determined that the contamination is not associated with a release from SLF 5; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to compare the summed total concentration of all indicator parameters, excluding Methylene Chloride, to a modified prediction interval (PI) of 340 ug/l.

The contamination detected in monitoring well W501S has been attributed to past waste handling practices in this area. Evaluation of this release will be performed as outlined in **Module II**, **Exhibit B**, this Condition and Attachment E (corrective action) of this Permit.

vii. SLF 6: For wells which comprise the Point of Compliance for the landfill, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

viii. SLF 7:

‘a’) For wells W701S, W701D, W702S, W702D, W703D, W704D and W705D, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

‘b’) Well W703S: Low levels (ppb) of chloroform and carbon tetrachloride have been detected in this well. After investigation, the

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Department has determined that the contamination is not associated with waste management practices at SLF 7; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of all indicator parameters, with the exception of methylene chloride, chloroform, and carbon tetrachloride. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The concentrations of chloroform and carbon tetrachloride will then be compared to a compound specific prediction interval (PI) for each of these compounds based on the historical data base collected from the well. The prediction intervals for chloroform and carbon tetrachloride are 510 ug/l and 400 ug/l respectively.

The contamination detected in monitoring well W703S has been attributed to past waste handling practices by the Department of Defense. Evaluation of this release will be performed as outlined in **Module II**, **Exhibit B**, this Condition and Attachment E (corrective action) of this Permit.

'c') Well W704S: Low levels of 1,1-dichloroethane (1,1-DCA) have been detected in this well. After investigation, the Department has determined that the contamination is not associated with a release from SLF 7; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of all indicator parameters, excluding methylene chloride and 1,1-DCA. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The concentration of 1,1-DCA will then be compared to a compound specific prediction interval (PI) of 23 ug/l based on the historical data base collected from the well. In addition, routine evaluation procedures for Multiple and Persistent Detections will be used, excluding Methylene Chloride and 1,1-DCA.

'd') Well W705S: Low levels of 1,1,1-Trichloroethane (1,1,1-TCA) and 1,1-Dichloroethane (1,1-DCA) have been detected in this well. After investigation, the Department has determined that the contamination is not associated with a release from SLF 7; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of all indicator parameters, with the exception of methylene chloride, 1,1,1-TCA and 1,1-DCA. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The concentrations of 1,1,1-TCA and 1,1-DCA will each be compared to a compound specific prediction interval (PI) of 23 ug/l based on the historical data base collected from the well.

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ix. SLF 10:

‘a’) For wells W1001S, W1001D, W1003S, W1003D, W1004S and W1004D, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

‘b’) Well W1002S: Low level (ppb) contamination has been detected in this well. After an investigation, the Department has determined that the contamination is not associated with releases from SLF 10; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of 1,1,1-trichloroethane, 1,1-dichloroethane, tetrachloroethane, toluene and vinyl chloride. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The summed total concentration of all other indicator parameters (excluding methylene chloride) will then be determined and compared to a modified prediction interval (PI) of 3 mg/l.

The contamination detected in monitoring well W1002S has been attributed to past waste handling practices and drum storage along MacArthur Street. Evaluation of this release will be performed as outlined in **Module II**, **Exhibit B**, this Condition and Attachment E (corrective action) of this Permit.

x. SLF 11:

‘a’) For monitoring wells W1101S, W1101D, W1102S, W1102D, W1103D, W1104D, W1105D, W1106D, W1107S, W1107D, W1108S, W1108D and W1109D, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

‘b’) Monitoring Wells W1103S, W1104S, W1105S and W1106S: Low levels (ppb) of trichloroethylene (TCE), trans-1,2-dichloroethylene (t-DCE), 1,1-Dichloroethene (1,1-DCE) and Vinyl Chloride (VCl) have been detected in these wells. After investigation, the Department has determined that the contamination is not associated with a release from SLF 11; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of all indicator parameters, with the exception of methylene chloride, TCE, t-DCE, 1,1-DCE and VCl. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The concentrations of TCE and t-DCE will then be compared to a prediction interval (PI) for each of these compounds based on the historical data base collected from these four (4) wells.

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The prediction intervals for TCE and t-DCE in these wells are 260 ug/l and 85 ug/l, respectively.

The concentrations of 1,1-DCA and VCl will each be compared to a prediction interval (PI) of 23 ug/l based on the historical data base collected from these wells. In addition, routine evaluation procedures for Multiple and Persistent Detections will be used, excluding Methylene Chloride, TCE, t-DCE and VC1.

The contamination detected in monitoring wells W1103S, W1104S, W1105S and W1106S has been attributed to past drum storage along "H" Street. Evaluation of this release will be performed as outlined in **Module II**, **Exhibit B**, this Condition and <u>Attachment E</u> (corrective action) of this Permit.

'c') Well W1109S: Low levels of 1,1-dichloroethane (1,1-DCA) have been detected in this well. After an investigation, the Department has determined that the contamination is not associated with a release from SLF 11; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of all indicator parameters excluding methylene chloride and 1,1-DCA. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The concentration of 1,1-DCA will be compared to a compound specific prediction interval (PI) of 23 ug/l based on the historical data base collected from the well. In addition, routine evaluation procedures for Multiple and Persistent Detections will be used, excluding Methylene Chloride and 1,1-DCA.

xi. SLF 12:

'a') For wells which comprise the Point of Compliance for the landfill, except well W1207S, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

'b') Well W1207S: Low levels (ppb) of chloroform and carbon tetrachloride have been detected in this well. After investigation, the Department has determined that the contamination is not associated with a release from SLF 12; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of all indicator parameters, with the exception of methylene chloride, chloroform and carbon tetrachloride. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The concentrations of chloroform and carbon tetrachloride will be compared to compound specific

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prediction intervals (PI) of 50 ug/l and 23 ug/l, respectively, based on the historical data base collected from this well.

xii. A.B.T.U. 58:

‘a’) For wells F5801D and F5802S, the prediction interval (PI) has been calculated to be 23 ug/l as a summed total concentration of all indicator parameters, excluding Methylene Chloride.

‘b’) Well F5801S: Low levels (ppb) of chlorobenzene have been detected in this well. After investigation, the Department has determined that the contamination is not associated with a release from A.B.T.U. 58; however, its presence requires the use of an alternative statistical approach. The statistical procedure will be to determine the summed total concentration of all indicator parameters, excluding Methylene Chloride and Chlorobenzene. This value will then be compared to a modified prediction interval (PI) of 23 ug/l. The concentration of Chlorobenzene will then be compared to a compound specific prediction interval (PI) of 23 ug/l for this compound based on the historical data base collected from the well.

The contamination detected in monitoring well F5801S has been attributed to past waste handling in the Process Area. Evaluation of this release will be performed as outlined in **Module II**, **Exhibit B**, this Condition and Attachment E (corrective action) of this Permit.

b. Statistical Criterion 2 - Multiple Detections: A Prediction Interval, based on the number of compounds detected in a single scan, has been calculated for the Model City site. The number shall be more than 3 site specific indicator parameters (27 VOCs) detected in any well in a single scan, independent of summed total concentration and excluding methylene chloride. Persistent compounds detected in wells evaluated using an “alternative statistical approach” must not be counted when determining the number of detections in a single scan.

c. Statistical Criterion 3 - Persistent Detections: An alternative “trigger” will be if any one site specific indicator parameter is detected in any well in a series of three (3) consecutive scans (independent of concentration) and excluding methylene chloride. Persistent compounds detected in wells evaluated using an “alternative statistical approach” must not be counted when determining persistent detections.

Statistical Based Trigger mechanisms are outlined on Figure 2 provided at the end of this Exhibit.

9. Reporting Requirements

a. Routine Monitoring Reporting: The Permittee must report the results of all groundwater analyses which are obtained from the Detection Monitoring Network.

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The results of all routine environmental monitoring that occurs during a month must be submitted to the Department within 90 days from the end of that month. The sampling data must be submitted to the Department in accordance with the requirements of Condition N of Module I.

Prior to well purging, the depth to the static water surface must be measured to the nearest 0.01 feet each time a well is sampled. As a check, a duplicate water level measurement must be taken and recorded on every fifth well.

The Permittee must evaluate the data using the procedures set forth on Figure 2 provided at the end of this Exhibit and submit the results of the statistical comparison of the indicator parameters as part of the Routine Environmental Monitoring Report. If the analyses reveal a statistically significant increase in the concentration of a indicator parameter at any well in the Detection Monitoring Network, the Permittee must:

i. If the results of analyses fail either Statistical Criteria 1 or 2, the data must have a QA/QC review of the analysis. If the results fail Statistical Criterion 3, the well in question must be resampled within fourteen (14) days.

ii. If the QA/QC data review indicates that the analytical data is erroneous, the evaluation returns to Detection Monitoring with a statement in the annual report that indicates the reasons for the erroneous data. Otherwise, the well in question must be resampled within thirty (30) days of receipt of the original detection monitoring results.

iii. Within seven (7) days of receipt of the results of the resampling, the results must be subjected to the same statistical evaluation criteria (total concentration and multiple detections).

iv. If the resampling results pass Statistical Criteria 1 and 2, then the well in question returns to detection monitoring with a statement in the annual report.

v. If the resampling results fail Statistical Criteria 1 and 2, then, within 7 days of receiving the results, the Permittee must provide written notification of the failure of the evaluation criteria to the Department. Within thirty (30) days of receiving results of the resampling, a plan must be submitted to the Department to determine the source of the detected organic compounds. Within ninety (90) days of receiving the results of the resampling, a Permit modification request must be submitted to the Department.

vi. In addition to **Condition L.9.a.v** of this Exhibit, if the resampling results fail Statistical Criteria 1 or 2, then, within fourteen (14) days of receiving the resampling results (for evaluations under Statistical Criteria 1 and 2), the affected well and adjacent wells that monitor the regulated unit, and for SLF monitoring wells, the leachate from the Landfill Cell upgradient of the well, must all be sampled for Appendix 33 constituents. Adjacent wells will be those wells immediately next to the well(s) with the detected compounds. For

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example, for a shallow (upper tills) monitoring well with detected compounds, the corresponding deep (glaciolacustrine silt/sand) well and the two shallow wells on either side will be considered adjacent wells. For a deep monitoring well, the adjacent wells would be the corresponding shallow well and the deep wells on either side. If compounds are detected in a well at which there is not a well or a well pair on one side monitoring the same regulated unit, then the number of adjacent wells will be reduced by one.

vii. For wells that fail Statistical Criterion 3, within thirty (30) days of receiving the results of the resampling called for in **Condition L.9.a.i** of this Exhibit, the Permittee must meet with the Department to discuss the results. Based on discussions, the Department will determine if further action is required. If further action is not required, then the consecutive count must reset to zero, and the well returns to detection monitoring. If further action is required, a source investigation must be submitted to the Department within thirty (30) days (if required).

viii. Upon approval of the source investigation plans, called for in **Conditions L.9.a.v and L.9.a.vii** of this Exhibit, by the Department; an evaluation must be made to determine the source of the detected compounds.

ix. If the source investigation determines that the regulated unit is not the source of the detected compounds, the Permittee must submit a Permit modification request to continue detection monitoring. In addition, an investigation must be conducted to determine the source, rate and extent of the contamination as well as determine what, if any remedial action is required.

x. If the source investigation determines that the regulated unit is the source of the detected compounds, the Permittee must submit a Permit modification request to determine maximum contaminant levels in order to determine the need for potential remedial action.

The evaluation procedure is outlined on Figure 2 provided at the end of this Exhibit.

b. Annual Reporting: Annually, the Permittee must submit a summary report of all sampling results obtained during the preceding year.

The Annual Report must be due by March 1 of each year and must contain all data and evaluations as required for monthly reporting under **Condition F of Schedule 1 of Module I**. Any data previously submitted to the Department may be referenced.

In addition, the following information must be contained in the Annual Report:

i. The Permittee must determine the groundwater flow rate and direction [6 NYCRR 373-2.6(i)(5)].

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ii. Proposal for any changes to the Groundwater Monitoring Plan.

10. Inability to Obtain Samples. If the Permittee knows that a well or piezometer may not provide representative samples or accurate piezometric values, may be damaged in some way, or is inaccessible, the Permittee must, within fourteen (14) days of such knowledge, attempt to remedy the problem and, when appropriate, sample the well or piezometer. Within thirty (30) days of such knowledge, the Permittee must, through written notification to the Department, provide information which describes the nature of the problem associated with the device, and in the event of a failure to obtain a sample, the reason why a sample was not obtained.

    In addition, the notification must contain:

    a. A description of how the problem was corrected; or

    b. A schedule for the rehabilitation or replacement of the device.

    If a problem with a well prevented obtaining a sample as scheduled, a sample must be obtained within fourteen (14) days after rehabilitation or replacement of the well.

11. Well Rehabilitation. Every five (5) years, the Permittee must inspect the Detection Monitoring Network to determine its integrity. The inspection must be certified by a professional engineer or qualified geologist. The inspection must include the following:

    a. A survey of all groundwater wells and piezometers in the monitoring network (performed by a New York State licensed surveyor) to the top of well casing elevation and to provide an updated site plan. The survey must be accurate to within 0.01 feet of elevation and the site plan must be presented on a scale of 1 inch equals 200 feet.

    b. An establishment of the ability of all wells and piezometers in the monitoring network to yield meaningful groundwater elevations when measured with an instrument accurate to within 0.01 feet. The ability of the wells to yield such information shall be based upon a comparison of the sounding of a well to its historical depth. Wells shall be considered obstructed if 10% or more of the well screen is covered or otherwise inaccessible. At a minimum, these wells will be redeveloped to remove sediments from the bottom of the well.

    c. An establishment of the ability of all groundwater wells to yield representative samples for determining the concentration of hazardous waste constituents that may be present in the groundwater. Physical examination of the well must include removal and inspection of any dedicated sampling device to assure that the device is functioning as designed.

    d. Due to the rusting problems noted during the initial inspection, Well W1108D must be inspected once every three years.

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12. Permit Modification. If the Permittee determines that the monitoring programs required under this Permit no longer satisfy the requirements of the regulations, the Permittee must, within ninety (90) days of such determination, submit an application for a Permit modification which describes the changes that will be necessary to maintain regulatory compliance at the site. The Department may require the Permittee to perform additional sampling and install additional monitoring wells, as necessary, to maintain compliance with 6 NYCRR Part 373-2.6 at the site. If at any time it is determined that the groundwater monitoring network is not in compliance, the Department shall require the Permittee to take whatever actions are necessary to bring the monitoring network into compliance.

13. Additions to the Sampling Program. If hazardous waste constituents are consistently present in the Detection Monitoring Wells below the statistical “trigger” levels, the Department may require the Permittee to perform additional sampling and install additional wells to determine whether the constituents originate from the Regulated Unit.

14. Leak Detection. In the event that the Detection Monitoring Program for the secondary leachate collection/detection systems that is set forth in this Permit indicates the exceedence of volumetric “trigger” values in the secondary system of any landfill or there is a significant change in water quality (as expressed in **Condition K** of this Exhibit for SLF 11 & 12 and **Condition H** of this Exhibit for RMU-1), the Permittee must sample the wells in the Detection Monitoring network downgradient of the cell within fourteen (14) days and perform a statistical comparison of the indicator parameters.

    For the RMU-1 landfill, if hazardous waste constituents are present in the secondary leachate collection/detection system and the results of the statistical analysis of the indicator parameters in monitoring wells downgradient of the landfill cell indicates that the landfill may be impacting the groundwater, the Permittee must discontinue the placement of additional wastes in the landfill cell. Thereafter, future landfilling of wastes may only take place with written approval of the Department.

15. Sampling and Analysis. All Sampling and Analysis must be performed in accordance with the approved Groundwater Monitoring Sampling and Analysis Plan (GWSAP) which is incorporated by reference into this Permit by **Schedule 1 of Module I** of this Permit. Any modification of the approved GWSAP must be approved by the Department prior to its implementation.

16. Collection of Groundwater Samples by NYSDEC. At the request of the Department, the Permittee must allow the Department and/or its authorized representatives to collect samples or splits of any samples collected by the Permittee pursuant to the requirements of this Permit. Similarly, at the request of the Permittee, the Department will allow the Permittee or the Permittee’s authorized representatives to take splits or duplicates of any samples collected by the Department. The Permittee must provide for adequate disposal of purge water whenever samples are collected by the Department.

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ATTACHMENT A

(proposed modified pages are designated with a November 2013 revision date at the bottom of the respective page)

OMB# 2050-0024; Expires 12/31/2014

SEND COMPLETED FORM TO: The Appropriate State or Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**	

1. Reason for Submittal

MARK ALL BOX(ES) THAT APPLY

Reason for Submittal:

- ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location)
- ☐ To provide a Subsequent Notification (to update site identification information for this location)
- ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application
- ☒ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment # 1)
- ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below)
  - ☐ Site was a TSD facility and/or generator of ≥1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)

2. Site EPA ID Number — **EPA ID Number** N Y D 0 4 9 8 3 6 6 7 9

3. Site Name — **Name:** CWM Chemical Services, LLC

4. Site Location Information

Street Address: 1550 Balmer Road		
City, Town, or Village: Porter		**County:** Niagara
State: New York	**Country:** USA	**Zip Code:** 14107

5. Site Land Type — ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

6. NAICS Code(s) for the Site (at least 5-digit codes)

A.	C.
B.	D.

7. Site Mailing Address

Street or P.O. Box: P.O. Box 200		
City, Town, or Village: Model City		
State: New York	**Country:** USA	**Zip Code:** 14107

8. Site Contact Person

First Name: Jill	**MI:** A	**Last:** Banaszak
Title: Technical Manager		
Street or P.O. Box: P.O. Box 200		
City, Town or Village: Model City		
State: New York	**Country:** USA	**Zip Code:** 14107
Email: jbanasz@wm.com		
Phone: 716-286-0246	**Ext.:**	**Fax:** 716-286-0224

9. Legal Owner and Operator of the Site

A. Name of Site's Legal Owner: CWM Chemical Services, LLC		**Date Became Owner:** 08/22/2006
Owner Type: ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other		
Street or P.O. Box: P.O. Box 200		
City, Town, or Village: Model City		**Phone:** 716-286-1550
State: New York	**Country:** USA	**Zip Code:** 14107
B. Name of Site's Operator: CWM Chemical Services, LLC		**Date Became Operator:** 01/30/1998
Operator Type: ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other		

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-10.

Y ☑ N ☐ **1. Generator of Hazardous Waste**
If "Yes", mark only one of the following – a, b, or c.

☑ a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs./mo.) or more of hazardous waste; **or** Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs./mo) of acute hazardous waste; **or** Generates, in any calendar month, **or** accumulates at any time, more than 100 kg/mo (220 lbs./mo) of acute hazardous spill cleanup material.

☐ b. SQG: 100 to 1,000 kg/mo (220 – 2,200 lbs./mo) of non-acute hazardous waste.

☐ c. CESQG: Less than 100 kg/mo (220 lbs./mo) of non-acute hazardous waste.

If "Yes" above, indicate other generator activities in 2-4.

Y ☐ N ☑ **2. Short-Term Generator** (generate from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section.

Y ☑ N ☐ **3. United States Importer of Hazardous Waste**

Y ☐ N ☑ **4. Mixed Waste (hazardous and radioactive) Generator**

Y ☐ N ☑ **5. Transporter of Hazardous Waste**
If "Yes", mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☑ N ☐ **6. Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste Part B permit is required for these activities.

Y ☐ N ☑ **7. Recycler of Hazardous Waste**

Y ☐ N ☑ **8. Exempt Boiler and/or Industrial Furnace**
If "Yes", mark all that apply.

☐ a. Small Quantity On-site Burner Exemption

☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☑ **9. Underground Injection Control**

Y ☑ N ☐ **10. Receives Hazardous Waste from Off-site**

B. Universal Waste Activities; Complete all parts 1-2.

Y ☑ N ☐ **1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes", mark all that apply.**

a. Batteries	☑
b. Pesticides	☐
c. Mercury containing equipment	☑
d. Lamps	☑
e. Other (specify) ______________	☐
f. Other (specify) ______________	☐
g. Other (specify) ______________	☐

Y ☑ N ☐ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities; Complete all parts 1-4.

Y ☐ N ☑ **1. Used Oil Transporter**
If "Yes", mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☐ N ☑ **2. Used Oil Processor and/or Re-refiner**
If "Yes", mark all that apply.

☐ a. Processor

☐ b. Re-refiner

Y ☐ N ☑ **3. Off-Specification Used Oil Burner**

Y ☐ N ☑ **4. Used Oil Fuel Marketer**
If "Yes", mark all that apply.

☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner

☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

❖ You can **ONLY** Opt into Subpart K if:

- you are at least one of the following: a college or university; a teaching hospital that is owned by or has a formal affiliation agreement with a college or university; or a non-profit research institute that is owned by or has a formal affiliation agreement with a college or university; AND
- you have checked with your State to determine if 40 CFR Part 262 Subpart K is effective in your state

Y ☐ N ☑ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories **See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:**

☐ a. College or University

☐ b. Teaching Hospital that is owned by or has a formal written affiliation agreement with a college or university

☐ c. Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university

Y ☐ N ☑ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Waste

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

See	Attached	List				

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

B001	B002	B003	B004	B005	B006	B007

12. Notification of Hazardous Secondary Material (HSM) Activity

Y ☐ N ☑ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes", you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

14. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
Michael D Mahar	Michael D Mahar, District Manager	11/08/2013

United States Environmental Protection Agency

HARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact	**First Name:** Jill	**MI:** A	**Last Name:** Banaszak
	Contact Title: Technical Manager		
	Phone: 716-286-0246	**Ext.:**	**Email:** jbanasz@wm.com
2. Facility Permit Contact Mailing Address	**Street or P.O. Box:** P.O. Box 200		
	City, Town, or Village: Model City		
	State: New York		
	Country: USA	**Zip Code:** 14107	
3. Operator Mailing Address and Telephone Number	**Street or P.O. Box:** P.O. Box 200		
	City, Town, or Village: Model City		
	State: New York	**Phone:** 716-286-1550	
	Country: USA	**Zip Code:** 14107	
4. Facility Existence Date	**Facility Existence Date (mm/dd/yyyy):** 05/01/1971		

5. Other Environmental Permits

A. Facility Type *(Enter code)*	**B. Permit Number**													**C. Description**
N	N	Y	0	0	7	2	0	6	1					SPDES treated waste water and storm water
P	9	-	2	9	3	4	-	0	0	0	2	2		00226 Facility Air Registration
R	9	-	2	9	3	4	-	0	0	0	2	2		0097 Site Wide Part 373 Hazardous Waste Permit
R	9	-	2	9	3	4	-	0	0	0	2	2		00225 Part 373 RMU-2 Permit Modification (pending)
E														USEPA TSCA Authorization
E	2	0	0	0	-	0	1	5	3	4				Section 404 of the Clean Water Act Permit
E	9	-	2	9	3	4	-	0	0	0	2	2		00230 Part 633/Article 24 (State Wetlands) Permit
E	9	-	2	9	3	4	-	0	0	0	2	2		00230 Section 401 of the CWA (Water Quality Cert)

6. Nature of Business: Treatment, storage, disposal, and reclamation of industrial chemical hazardous wastes.

Revised: November 8, 2013

7. Process Codes and Design Capacities – Enter information in the Section on Form Page 3

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item 8.

B. PROCESS DESIGN CAPACITY – For each code entered in Item 7.A; enter the capacity of the process.

1. **AMOUNT – Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.**
2. **UNIT OF MEASURE – For each amount entered in Item 7.B(1), enter the code in Item 7.B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.**

C. PROCESS TOTAL NUMBER OF UNITS – Enter the total number of units for each corresponding process code.

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
Disposal		
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectares-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
Storage		
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
Treatment		
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Metric Tons Per Hour; or Million BTU Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Short Tons Per Day; BTUs Per Hour; Gallons Per Day; Liters Per Hour; or Million BTU Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; or Million BTU Per Hour

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
Treatment (Continued)		**(for T81 – T94)**
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; Liters Per Hour; Kilograms Per Hour; or Million BTU Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used in the Recovery of Sulfur Values from Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR 260.10	
T94	Containment Building Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTU Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million BTU Per Hour
Miscellaneous (Subpart X)		
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; or Million BTU Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

Unit of Measure	Unit of Measure Code
Gallons	**G**
Gallons Per Hour	**E**
Gallons Per Day	**U**
Liters	**L**
Liters Per Hour	**H**
Liters Per Day	**V**
Short Tons Per Hour	**D**
Short Tons Per Day	**N**
Metric Tons Per Hour	**W**
Metric Tons Per Day	**S**
Pounds Per Hour	**J**
Kilograms Per Hour	**X**
Million BTU Per Hour	**X**
Cubic Yards	**Y**
Cubic Meters	**C**
Acres	**B**
Acre-feet	**A**
Hectares	**Q**
Hectare-meter	**F**
BTU Per Hour	**I**

7. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 7 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. PROCESS DESIGN CAPACITY (2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	**1**	**S**	**0**	**2**	**533.788**	**G**	**001**	
	1	D	8	0	4731	A	002	
	2	S	0	2	988051	G	028	
	3	S	0	1	2154736	G	038	
	4	S	0	4	142349500	G	005	
	5	T	0	1	259180	U	032	
	6	T	0	4	150	D	002	
	7							
	8							
	9							
1	**0**							
1	**1**							
1	**2**							
1	**3**							

Note: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the line sequentially, taking into account any lines that will be used for "other" process (i.e., D99, S99, T04, and X99) in Item 8.

8. Other Processes (Follow instructions from Item 7 for D99, S99, T04, and X99 process codes)

Line Number (Enter #s in sequence with Item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. PROCESS DESIGN CAPACITY (2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	**2**	**T**	**0**	**4**	**100.00**	**U**	**001**	
0	6	T	0	4	150	D	002	

9. Description of Hazardous Wastes - Enter Information in the Sections on Form Page 5

A. EPA HAZARDOUS WASTE NUMBER – Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY – For each listed waste entered in Item 9.A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Item 9.A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE – For each quantity entered in Item 9.B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all listed hazardous wastes.

For non-listed waste: For each characteristic or toxic contaminant entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. **Enter the first two as described above.**
2. **Enter “000” in the extreme right box of Item 9.D(1).**
3. **Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 9.E.**

2. PROCESS DESCRIPTION: If code is not listed for a process that will be used, describe the process in Item 9.D(2) or in Item 9.E(2).

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. **Select one of the EPA Hazardous Waste Numbers and enter it in Item 9.A. On the same line complete Items 9.B, 9.C, and 9.D by estimating the total annual quantity of the waste and describing all the processes to be used to store, treat, and/or dispose of the waste.**
2. **In Item 9.A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Item 9.D.2 on that line enter “included with above” and make no other entries on that line.**
3. **Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.**

EXAMPLE FOR COMPLETING Item 9 (shown in line numbers X-1, X-2, X-3, and X-4 below) – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)									D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
X	**1**	K	0	5	4	900	P	T	0	3	D	8	0				
X	**2**	D	0	0	2	400	P	T	0	3	D	8	0				
X	**3**	D	0	0	1	100	P	T	0	3	D	8	0				
X	**4**	D	0	0	2												Included With Above

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
	1	B	0	0	1	4 X 10^{6}	P	S	0	1	S	0	2	T	0	1	T04
	2	B	0	0	2	4 X 10^{6}	P	S	0	1	S	0	2	T	0	1	T04
	3	B	0	0	3	4 X 10^{6}	P	S	0	1	S	0	2	T	0	1	T04
	4	B	0	0	4	4 X 10^{6}	P	S	0	1	D	8	0				
	5	B	0	0	5	4 X 10^{6}	P	S	0	1	D	8	0				
	6	B	0	0	6	4 X 10^{6}	P	S	0	1	D	8	0	S	0	2	T01 T04
	7	B	0	0	7	4 X 10^{6}	P	S	0	1	S	0	2	T	0	1	T04 D80
	8																
	9	D	0	0	1	7.2 X 10^{5}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
1	0	D	0	0	2	3 X 10^{7}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
1	1	D	0	0	3	3 X 10^{5}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
1	2	D	0	0	4	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
1	3	D	0	0	5	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
1	4	D	0	0	6	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
1	5	D	0	0	7	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
1	6	D	0	0	8	3.36 X 10^{7}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
1	7	D	0	0	9	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
1	8	D	0	1	0	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
1	9	D	0	1	1	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
2	0	D	0	1	2	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
2	1	D	0	1	3	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
2	2	D	0	1	4	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
2	3	D	0	1	5	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
2	4	D	0	1	6	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
2	5	D	0	1	7	3.36 X 10^{6}	P	S	0	1	S	0	4	T	0	1	T04 D80 S02
2	6	D	0	1	8	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
2	7	D	0	1	9	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
2	8	D	0	2	0	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
2	9	D	0	2	1	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	0	D	0	2	2	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	1	D	0	2	3	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	2	D	0	2	4	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	3	D	0	2	5	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	4	D	0	2	6	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	5	D	0	2	7	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	6	D	0	2	8	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	7	D	0	2	9	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	8	D	0	3	0	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
3	9	D	0	3	1	3.36 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
4 0	D 0 3 2	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 1	D 0 3 3	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 2	D 0 3 4	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 3	D 0 3 5	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 4	D 0 3 6	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 5	D 0 3 7	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 6	D 0 3 8	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 7	D 0 3 9	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 8	D 0 4 0	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
4 9	D 0 4 1	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
5 0	D 0 4 2	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
5 1	D 0 4 3	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
5 2					
5 3	F 0 0 1	3.84 X 10^6	P	S 0 1 S 0 2 T 0 1	T04 D80 S04
5 4	F 0 0 2	3.84 X 10^6	P	S 0 1 S 0 2 T 0 1	T04 D80 S04
5 5	F 0 0 3	3.0 X 10^6	P	S 0 1 S 0 2 T 0 1	T04 D80 S04
5 6	F 0 0 4	2.04 X 10^6	P	S 0 1 S 0 2 T 0 1	T04 D80 S04
5 7	F 0 0 5	2.04 X 10^6	P	S 0 1 S 0 2 T 0 1	T04 D80 S04
5 8	F 0 0 6	4.42 X 10^6	P	S 0 1 T 0 4 D 8 0	T01 S02 S04
5 9	F 0 0 7	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
6 0	F 0 0 8	4.42 X 10^6	P	S 0 1 T 0 4 D 8 0	T01 S02 S04
6 1	F 0 0 9	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
6 2	F 0 1 0	3.84 X 10^5	P	S 0 1 T 0 4 D 8 0	T01 S02
6 3	F 0 1 1	3.36 X 10^6	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
6 4	F 0 1 2	3.84 X 10^5	P	S 0 1 T 0 4 D 8 0	T01 S02
6 5	F 0 1 9	3.0 X 10^6	P	S 0 1 T 0 4 D 8 0	T01 S02
6 6	F 0 2 0	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
6 7	F 0 2 1	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
6 8	F 0 2 2	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
6 9	F 0 2 3	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
7 0	F 0 2 4	6.62 X 10^6	P	S 0 1 T 0 4 D 8 0	
7 1	F 0 2 5	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
7 2	F 0 2 6	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
7 3	F 0 2 7	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
7 4	F 0 2 8	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
7 5	F 0 3 2	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
7 6	F 0 3 4	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
7 7	F 0 3 5	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80
7 8	F 0 3 7	3.36 X 10^4	P	S 0 1 S 0 2 S 0 4	T01 T04 D80

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
7	9	F	0	3	8	3.36×10^4	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
8	0	F	0	3	9	6.62×10^6	P	T	0	1	S	0	2	D	8	0	T04 S04 S01
8	1																
NOTE: THE WASTE CODES F020 - F023 AND F026 - F028 REFER ONLY TO WASTE THAT MAY BE DEBRIS, CONTAINED IN OR DERIVED FROM F020 - F023 AND F026 - F028. NO CURRENT PRODUCTION WASTE OR OUTDATED PRODUCTS WITH THESE CODES WILL BE ACCEPTED.																	
8	5																
8	6	K	0	0	1	4.42×10^6	P	S	0	1	S	0	2	T	0	1	T04 D80
8	7	K	0	0	2	4.42×10^6	P	S	0	1	S	0	2	T	0	1	T04 D80
8	8	K	0	0	3	4.42×10^6	P	S	0	1	S	0	2	T	0	1	T04 D80
8	9	K	0	0	4	4.42×10^6	P	S	0	1	S	0	2	T	0	1	T04 D80
9	0	K	0	0	5	4.42×10^6	P	S	0	1	S	0	2	T	0	1	T04 D80
9	1	K	0	0	6	4.42×10^6	P	S	0	1	S	0	2	T	0	1	T04 D80
9	2	K	0	0	7	4.42×10^6	P	S	0	1	S	0	2	T	0	1	T04 D80
9	3	K	0	0	8	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
9	4	K	0	0	9	1.68×10^6	P	S	0	1	S	0	2	T	0	1	T04 D80
9	5	K	0	1	0	3.36×10^4	P	S	0	1	S	0	2	T	0	1	T04 D80
9	6	K	0	1	1	3.36×10^4	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
9	7	K	0	1	3	3.36×10^4	P	S	0	1	S	0	2	D	8	0	T01 T04
9	8	K	0	1	4	3.36×10^4	P	S	0	1	S	0	2	D	8	0	T01 T04
9	9	K	0	1	5	3.36×10^4	P	S	0	1	S	0	2	D	8	0	T01 T04
10	0	K	0	1	6	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
10	1	K	0	1	7	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
10	2	K	0	1	8	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
10	3	K	0	1	9	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
10	4	K	0	2	0	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
10	5	K	0	2	1	3.36×10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
10	6	K	0	2	2	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
10	7	K	0	2	3	3.36×10^4	P	S	0	1	S	0	2	D	8	0	T01 T04
10	8	K	0	2	4	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
10	9	K	0	2	5	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
11	0	K	0	2	6	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
11	1	K	0	2	7	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
11	2	K	0	2	8	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
11	3	K	0	2	9	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
11	4	K	0	3	0	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
11	5	K	0	3	1	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
11	6	K	0	3	2	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
11	7	K	0	3	3	3.36×10^4	P	S	0	1	S	0	2	D	8	0	T01 T04

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
11	8	K	0	3	4	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
11	9	K	0	3	5	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
12	0	K	0	3	6	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
12	1	K	0	3	7	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
12	2	K	0	3	8	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
12	3	K	0	3	9	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
12	4	K	0	4	0	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
12	5	K	0	4	1	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
12	6	K	0	4	2	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
12	7	K	0	4	3	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
12	8	K	0	4	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
12	9	K	0	4	5	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
13	0	K	0	4	6	4 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
13	1	K	0	4	7	6.62 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
13	2	K	0	4	8	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
13	3	K	0	4	9	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
13	4	K	0	5	0	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
13	5	K	0	5	1	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
13	6	K	0	5	2	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
13	7	K	0	6	0	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
13	8	K	0	6	1	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
13	9	K	0	6	2	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 S04
14	0	K	0	6	4	4 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
14	1	K	0	6	5	4 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
14	2	K	0	6	6	4 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
14	3	K	0	6	9	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
14	4	K	0	7	1	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
14	5	K	0	7	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
14	6	K	0	8	3	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
14	7	K	0	8	4	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
14	8	K	0	8	5	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
14	9	K	0	8	6	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
15	0	K	0	8	7	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 S04 T04
15	1	K	0	8	8	4 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
15	2	K	0	9	0	4 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
15	3	K	0	9	1	4 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
15	4	K	0	9	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
15	5	K	0	9	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
15	6	K	0	9	5	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
15	7	K	0	9	6	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
15	8	K	0	9	7	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
15	9	K	0	9	8	4.42 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
16	0	K	0	9	9	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
16	1	K	1	0	0	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
16	2	K	1	0	1	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
16	3	K	1	0	2	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
16	4	K	1	0	3	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
16	5	K	1	0	4	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
16	6	K	1	0	5	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
16	7	K	1	0	6	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
16	8	K	1	0	7	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
16	9	K	1	0	8	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	0	K	1	0	9	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	1	K	1	1	0	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	2	K	1	1	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	3	K	1	1	2	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	4	K	1	1	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	5	K	1	1	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	6	K	1	1	5	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	7	K	1	1	6	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	8	K	1	1	7	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
17	9	K	1	1	8	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	0	K	1	2	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	1	K	1	2	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	2	K	1	2	5	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	3	K	1	2	6	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	4	K	1	3	1	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	5	K	1	3	2	3.36 X 10^4	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	6	K	1	3	6	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	7	K	1	4	0	6.62 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	8	K	1	4	1	6.62 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
18	9	K	1	4	2	6.62 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
19	0	K	1	4	3	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
19	1	K	1	4	4	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
19	2	K	1	4	5	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
19	3	K	1	4	7	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
19	4	K	1	4	8	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
19	5	K	1	4	9	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
19	6	K	1	5	0	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
19	7	K	1	5	1	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
19	8	K	1	5	6	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
19	9	K	1	5	7	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	0	K	1	5	8	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	1	K	1	5	9	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	2	K	1	6	1	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	3	K	1	6	9	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	4	K	1	7	0	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	5	K	1	7	1	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	6	K	1	7	2	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	7	K	1	7	4	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	8	K	1	7	5	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
20	9	K	1	7	6	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
21	0	K	1	7	7	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
21	1	K	1	7	8	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
21	2																
21	3	P	0	0	1	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
21	4	P	0	0	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
21	5	P	0	0	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
21	6	P	0	0	4	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
21	7	P	0	0	5	3.36 X 10^4	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
21	8	P	0	0	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
21	9	P	0	0	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
22	0	P	0	0	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
22	1	P	0	0	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
22	2	P	0	1	0	3.36 X 10^4	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
22	3	P	0	1	1	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
22	4	P	0	1	2	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
22	5	P	0	1	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
22	6	P	0	1	4	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
22	7	P	0	1	5	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
22	8	P	0	1	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
22	9	P	0	1	7	4.42 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	0	P	0	1	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	1	P	0	2	0	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	2	P	0	2	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	3	P	0	2	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	4	P	0	2	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
23	5	P	0	2	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	6	P	0	2	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	7	P	0	2	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	8	P	0	2	8	4.42 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
23	9	P	0	2	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	0	P	0	3	0	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	1	P	0	3	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	2	P	0	3	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	3	P	0	3	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	4	P	0	3	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	5	P	0	3	7	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
24	6	P	0	3	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	7	P	0	3	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	8	P	0	4	0	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
24	9	P	0	4	1	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
25	0	P	0	4	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
25	1	P	0	4	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
25	2	P	0	4	4	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
25	3	P	0	4	5	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
25	4	P	0	4	6	4.42 X 10^6	P	S	0	1	T	0	4	D	8	0	S02 T01
25	5	P	0	4	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
25	6	P	0	4	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
25	7	P	0	4	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
25	8	P	0	5	0	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
25	9	P	0	5	1	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
26	0	P	0	5	4	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
26	1	P	0	5	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
26	2	P	0	5	7	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
26	3	P	0	5	8	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
26	4	P	0	5	9	4.42 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
26	5	P	0	6	0	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
26	6	P	0	6	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
26	7	P	0	6	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
26	8	P	0	6	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
26	9	P	0	6	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
27	0	P	0	6	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
27	1	P	0	6	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
27	2	P	0	6	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
27	3	P	0	6	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
27	4	P	0	7	0	5.04 X 10^4	P	S	0	1	T	0	4	D	8	0	
27	5	P	0	7	1	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
27	6	P	0	7	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
27	7	P	0	7	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
27	8	P	0	7	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
27	9	P	0	7	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	0	P	0	7	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	1	P	0	7	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	2	P	0	7	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	3	P	0	8	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	4	P	0	8	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	5	P	0	8	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	6	P	0	8	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	7	P	0	8	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	8	P	0	8	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
28	9	P	0	8	9	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
29	0	P	0	9	2	4.42 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
29	1	P	0	9	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
29	2	P	0	9	4	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
29	3	P	0	9	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
29	4	P	0	9	6	4.42 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
29	5	P	0	9	7	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
29	6	P	0	9	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
29	7	P	0	9	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
29	8	P	1	0	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
29	9	P	1	0	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	0	P	1	0	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	1	P	1	0	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	2	P	1	0	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	3	P	1	0	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	4	P	1	0	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	5	P	1	0	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	6	P	1	1	0	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	7	P	1	1	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	8	P	1	1	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
30	9	P	1	1	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
31	0	P	1	1	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
31	1	P	1	1	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
31	2	P	1	1	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80

EPA ID NO: I_N_I_Y_I_D_I I_0_I_4_I_9_I I_8_I_3_I_6_I I_6_I_7_I_9_I   OMB #: 2050-0024; expires 12/31/2014

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
31	3	P	1	1	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
31	4	P	1	1	9	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
31	5	P	1	2	0	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
31	6	P	1	2	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
31	7	P	1	2	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
31	8	P	1	2	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
31	9	P	1	2	7	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	0	P	1	2	8	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	1	P	1	8	5	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	2	P	1	8	8	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	3	P	1	8	9	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	4	P	1	9	0	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	5	P	1	9	1	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	6	P	1	9	2	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	7	P	1	9	4	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	8	P	1	9	6	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
32	9	P	1	9	7	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
33	0	P	1	9	8	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
33	1	P	1	9	9	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
33	2	P	2	0	1	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
33	3	P	2	0	2	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
33	4	P	2	0	3	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
33	5	P	2	0	4	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
33	6	P	2	0	5	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
33	7																
33	8	U	0	0	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
33	9	U	0	0	2	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
34	0	U	0	0	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
34	1	U	0	0	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
34	2	U	0	0	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
34	3	U	0	0	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
34	4	U	0	0	7	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
34	5	U	0	0	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
34	6	U	0	0	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
34	7	U	0	1	0	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
34	8	U	0	1	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
34	9	U	0	1	2	4.42 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
35	0	U	0	1	4	3.36 X 10^4	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
35	1	U	0	1	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80

Revised: November 8, 2013

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
35	2	U	0	1	6	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
35	3	U	0	1	7	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
35	4	U	0	1	8	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
35	5	U	0	1	9	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
35	6	U	0	2	0	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
35	7	U	0	2	1	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
35	8	U	0	2	2	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
35	9	U	0	2	3	4.42 X 10^4	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
36	0	U	0	2	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
36	1	U	0	2	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
36	2	U	0	2	6	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
36	3	U	0	2	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
36	4	U	0	2	8	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
36	5	U	0	2	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
36	6	U	0	3	0	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
36	7	U	0	3	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
36	8	U	0	3	2	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
36	9	U	0	3	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
37	0	U	0	3	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
37	1	U	0	3	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
37	2	U	0	3	6	4.42 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
37	3	U	0	3	7	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
37	4	U	0	3	8	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
37	5	U	0	3	9	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
37	6	U	0	4	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
37	7	U	0	4	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
37	8	U	0	4	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
37	9	U	0	4	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
38	0	U	0	4	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
38	1	U	0	4	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
38	2	U	0	4	7	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
38	3	U	0	4	8	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
38	4	U	0	4	9	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
38	5	U	0	5	0	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
38	6	U	0	5	1	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
38	7	U	0	5	2	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
38	8	U	0	5	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
38	9	U	0	5	5	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
39	0	U	0	5	6	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
39	1	U	0	5	7	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
39	2	U	0	5	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
39	3	U	0	5	9	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
39	4	U	0	6	0	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
39	5	U	0	6	1	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
39	6	U	0	6	2	4.42 X 10^{6}	P	S	0	1	S	0	2	D	8	0	T01 T04
39	7	U	0	6	3	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
39	8	U	0	6	4	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
39	9	U	0	6	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
40	0	U	0	6	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
40	1	U	0	6	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
40	2	U	0	6	9	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
40	3	U	0	7	0	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
40	4	U	0	7	1	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
40	5	U	0	7	2	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
40	6	U	0	7	3	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
40	7	U	0	7	4	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
40	8	U	0	7	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
40	9	U	0	7	6	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
41	0	U	0	7	7	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
41	1	U	0	7	8	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
41	2	U	0	7	9	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
41	3	U	0	8	0	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
41	4	U	0	8	1	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
41	5	U	0	8	2	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
41	6	U	0	8	3	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
41	7	U	0	8	4	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
41	8	U	0	8	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
41	9	U	0	8	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
42	0	U	0	8	7	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
42	1	U	0	8	8	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
42	2	U	0	8	9	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
42	3	U	0	9	0	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
42	4	U	0	9	1	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
42	5	U	0	9	2	4.42 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
42	6	U	0	9	3	6000	P	S	0	1	S	0	2	S	0	4	D80 T04
42	7	U	0	9	4	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
42	8	U	0	9	5	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
42	9	U	0	9	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)																		
Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)										(2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
43	0	U	0	9	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
43	1	U	0	9	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
43	2	U	0	9	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
43	3	U	1	0	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
43	4	U	1	0	2	4.46 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
43	5	U	1	0	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
43	6	U	1	0	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
43	7	U	1	0	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
43	8	U	1	0	7	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
43	9	U	1	0	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
44	0	U	1	0	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
44	1	U	1	1	0	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
44	2	U	1	1	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
44	3	U	1	1	2	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
44	4	U	1	1	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
44	5	U	1	1	4	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
44	6	U	1	1	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
44	7	U	1	1	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
44	8	U	1	1	7	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
44	9	U	1	1	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
45	0	U	1	1	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
45	1	U	1	2	0	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
45	2	U	1	2	1	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
45	3	U	1	2	2	3.36 X 10^4	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
45	4	U	1	2	3	3.36 X 10^4	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
45	5	U	1	2	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
45	6	U	1	2	5	3.34 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
45	7	U	1	2	6	3.34 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
45	8	U	1	2	7	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
45	9	U	1	2	8	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
46	0	U	1	2	9	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
46	1	U	1	3	0	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
46	2	U	1	3	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
46	3	U	1	3	2	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
46	4	U	1	3	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
46	5	U	1	3	4	3.36 X 10^6	P	S	0	1	T	0	4	D	8	0	T01 S02 S04
46	6	U	1	3	5	6000	P	S	0	1	T	0	4	D	8	0	S02 S04 T01
46	7	U	1	3	6	6.62 X 10^6	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
46	8	U	1	3	7	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
46	9	U	1	3	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
47	0	U	1	4	0	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
47	1	U	1	4	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
47	2	U	1	4	2	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
47	3	U	1	4	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
47	4	U	1	4	4	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
47	5	U	1	4	5	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
47	6	U	1	4	6	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
47	7	U	1	4	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
47	8	U	1	4	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
47	9	U	1	4	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
48	0	U	1	5	0	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
48	1	U	1	5	1	4.42 X 10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
48	2	U	1	5	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
48	3	U	1	5	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
48	4	U	1	5	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
48	5	U	1	5	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
48	6	U	1	5	6	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
48	7	U	1	5	7	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
48	8	U	1	5	8	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
48	9	U	1	5	9	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
49	0	U	1	6	0	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
49	1	U	1	6	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
49	2	U	1	6	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
49	3	U	1	6	3	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
49	4	U	1	6	4	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
49	5	U	1	6	5	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
49	6	U	1	6	6	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
49	7	U	1	6	7	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
49	8	U	1	6	8	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
49	9	U	1	6	9	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
50	0	U	1	7	0	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	
50	1	U	1	7	1	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
50	2	U	1	7	2	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
50	3	U	1	7	3	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
50	4	U	1	7	4	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
50	5	U	1	7	6	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
50	6	U	1	7	7	3.84 X 10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
50	7	U	1	7	8	6.62 X 10^6	P	S	0	1	T	0	4	D	8	0	

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		*A. EPA Hazardous Waste No. (Enter code)*				*B. Estimated Annual Quantity of Waste*	*C. Unit of Measure (Enter code)*	*D. PROCESSES (1) PROCESS CODES (Enter code)*									*(2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)*
50	8	U	1	7	9	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
50	9	U	1	8	0	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
51	0	U	1	8	1	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
51	1	U	1	8	2	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
51	2	U	1	8	3	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
51	3	U	1	8	4	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
51	4	U	1	8	5	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
51	5	U	1	8	6	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
51	6	U	1	8	7	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
51	7	U	1	8	8	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
51	8	U	1	8	9	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
51	9	U	1	9	0	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
52	0	U	1	9	1	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
52	1	U	1	9	2	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
52	2	U	1	9	3	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
52	3	U	1	9	4	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
52	4	U	1	9	6	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
52	5	U	1	9	7	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
52	6	U	2	0	0	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
52	7	U	2	0	1	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
52	8	U	2	0	2	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
52	9	U	2	0	3	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
53	0	U	2	0	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
53	1	U	2	0	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
53	2	U	2	0	6	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
53	3	U	2	0	7	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
53	4	U	2	0	8	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
53	5	U	2	0	9	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
53	6	U	2	1	0	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
53	7	U	2	1	1	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
53	8	U	2	1	3	4.42×10^6	P	S	0	1	S	0	2	D	8	0	T01 T04
53	9	U	2	1	4	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
54	0	U	2	1	5	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
54	1	U	2	1	6	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
54	2	U	2	1	7	6.62×10^6	P	S	0	1	T	0	4	D	8	0	
54	3	U	2	1	8	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
54	4	U	2	1	9	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
54	5	U	2	2	0	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04
54	6	U	2	2	1	3.84×10^5	P	S	0	1	S	0	2	D	8	0	T01 T04

9. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									(2) PROCESS DESCRIPTION (If a code is not entered in 9.D.1)
54	7	U	2	2	2	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
54	8	U	2	2	3	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
54	9	U	2	2	5	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
55	0	U	2	2	6	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
55	1	U	2	2	7	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
55	2	U	2	2	8	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04 S04
55	3	U	2	3	4	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
55	4	U	2	3	5	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
55	5	U	2	3	6	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
55	6	U	2	3	7	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
55	7	U	2	3	8	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
55	8	U	2	3	9	3.84 X 10^{5}	P	S	0	1	S	0	2	D	8	0	T01 T04
55	9	U	2	4	0	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
56	0	U	2	4	3	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
56	1	U	2	4	4	6.62 X 10^{6}	P	S	0	1	T	0	4	D	8	0	
56	2	U	2	4	6	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
56	3	U	2	4	7	6000	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
56	4	U	2	4	8	4.42 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
56	5	U	2	4	9	4.42 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
56	6	U	2	7	1	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
56	7	U	2	7	8	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
56	8	U	2	7	9	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
56	9	U	2	8	0	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	0	U	3	2	8	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	1	U	3	5	3	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	2	U	3	5	9	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	3	U	3	6	4	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	4	U	3	6	7	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	5	U	3	7	2	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	6	U	3	7	3	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	7	U	3	8	7	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	8	U	3	8	9	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
57	9	U	3	9	4	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
58	0	U	3	9	5	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
58	1	U	4	0	4	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
58	2	U	4	0	8	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
58	3	U	4	0	9	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
58	4	U	4	1	0	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80
58	5	U	4	1	1	6.62 X 10^{6}	P	S	0	1	S	0	2	S	0	4	T01 T04 D80

10. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

11. Facility Drawing

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

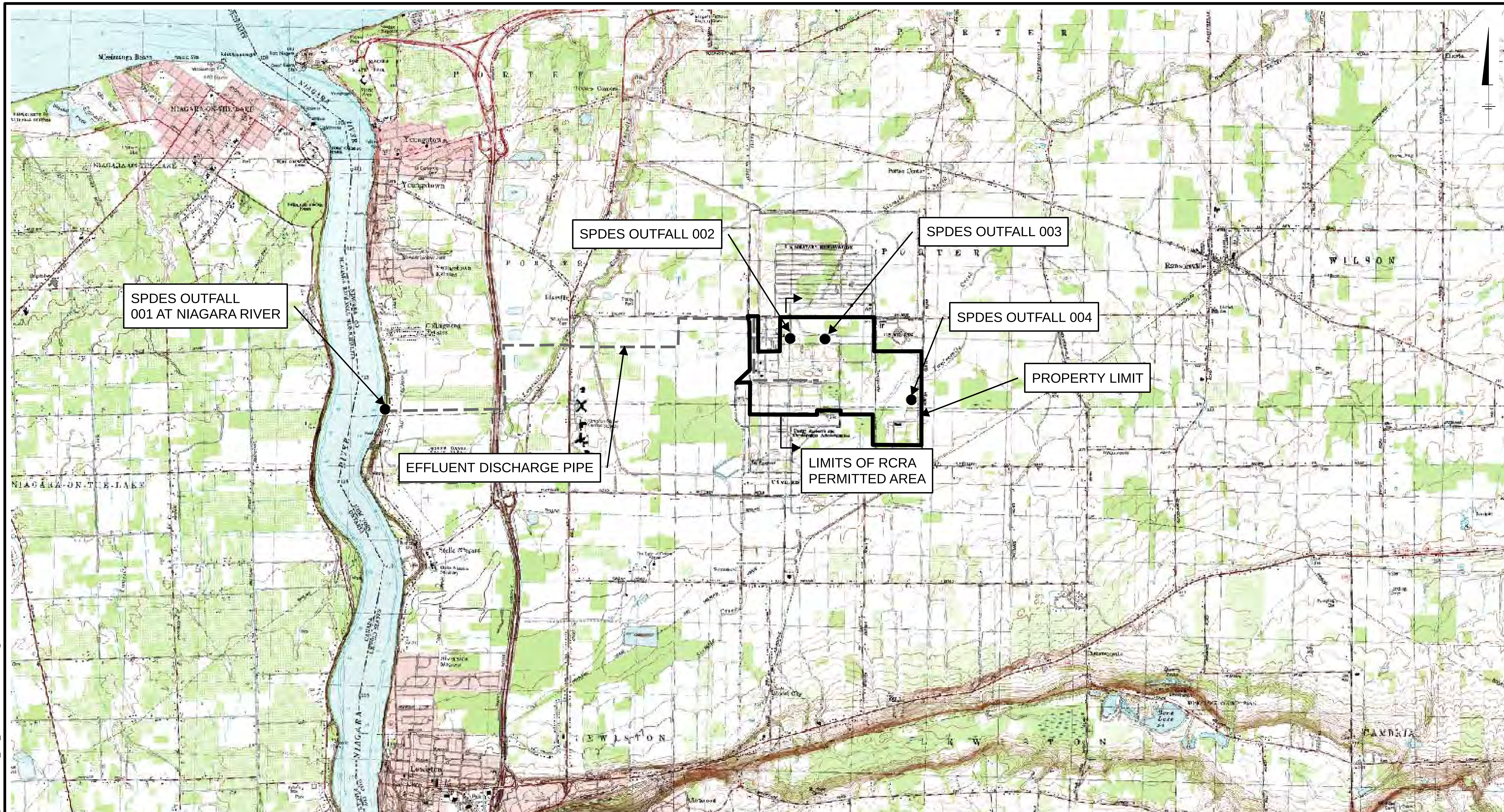
12. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas (see instructions for more detail).

13. Comments

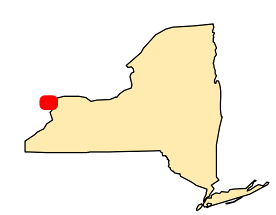
Item 9, Column B, Estimated Annual Quantity of Waste – It is not possible to list each waste stream, its waste codes and the estimated annual quantity by waste code. For example, incinerator ash carries hundreds of waste codes. If the same quantity is provided for each waste code, that quantity of waste would be overstated by a factor of more than one hundred. That would lead to confusion with the permitted annual volume of 425,000 tons. The information for the waste streams managed in a given year (including waste codes and volume) is provided to the NYSDEC in the Annual Report. The maximum quantity of waste that may be landfilled in a year is specified in the facility's permit.

Item 9, Column D, Process Codes – The process codes indicated are an estimate. Actual TSD options will be driven by current permit conditions and current regulations, both State and Federal.



NOTES:

1. PROPERTY LINES ARE APPROXIMATE.
2. NO DRINKING WATER WELLS EXIST WITHIN 1/4 MILE OF THE FACILITY.
3. THE TREATED EFFLUENT DISCHARGE IS LOCATED AT THE NIAGARA RIVER.
4. 710 TOTAL ACRES.
5. 630 RCRA PERMITTED ACRES.



AREA LOCATION

0 1 2

MILES

GRAPHIC SCALE

DATA SOURCE: 24K USGS TOPO QUAD, NRCS Geospatial Data Gateway

CWM CHEMICAL SERIVCES, LLC
MODEL CITY, NEW YORK

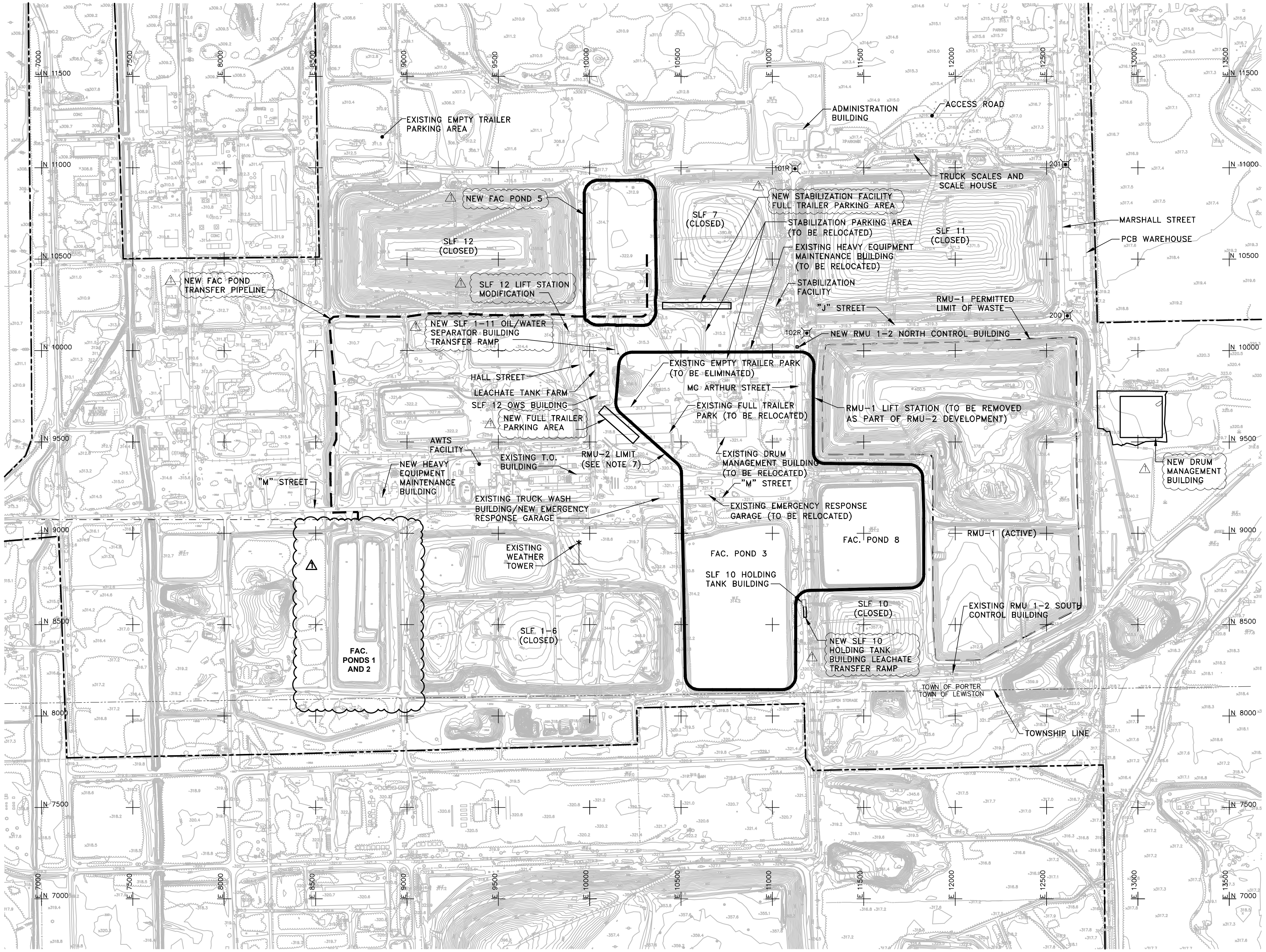
6NYCRR PART 373 PERMIT APPLICATION

REGIONAL TOPOGRAPHIC MAP

ARCADIS

FIGURE
A-1

CITY:CLE DIV/GROUP: AIT 40 DB: L.GREENE EAL LD: EAL PIC: WP PM: TM: GNG TR:
MODEL CITY 23725.003
Q:\CWM\ModelCity\RevisionsToDEIS\mxd\FacilityLocationDetail_B-2_373v2.mxd - 9/18/2009 @ 9:04:22 AM



LEGEND:

	BRUSHLINE		SIGN
	CABLE MARKER		SWAMP
	CATCH BASIN		TRAFFIC LIGHT
	DROP INLET		TREE
	FENCE		TREELINE
	FIRE HYDRANT		UNIDENTIFIED OBJECT
	GUARD RAIL		UTILITY POLE
	LIGHT POLE		VALVE
	MISCELLANEOUS POLE		WATER LINE
	MONUMENT		EXISTING CONTOUR
	POST		EXISTING GRADEBREAK
	RAILROAD TRACKS		PROPERTY LINE
			NEW FAC POND TRANSFER PIPELINE
200	CONTROL MONUMENT (SEE TABLE BELOW)		
E 13500 N 7000	COORDINATE GRID (SEE NOTE 3)		

RMU-1/RMU-2 CONTROL MONUMENTS								
MONUMENTS	ELEVATION	CWM PLANT GRID		RMU-1 GRID		NY STATE PLANE COORDINATES (NAD-27)		NGVD-29 ELEVATION
		NORTHING	EASTING	NORTHING	EASTING	NORTHING	EASTING	
102R	319.72	100+94.55	111+87.56	100+94.65	11+87.56	1,175,430.46	396,380.12	319.66
200	318.33	101+89.56	126+13.77	101+89.56	26+13.77	1,175,488.28	397,808.18	318.27
101R	316.01	109+94.28	111+23.09	---	---	1,176,331.436	396,339.034	315.92
201	316.62	110+17.82	126+3.49	---	---	---	---	---

CONTROL MONUMENTS NOTE:

1. RMU-1 EASTING GRID COORDINATES ARE SIMPLIFIED PLANT GRID COORDINATES. SUBTRACTING 10,000 FROM THE CWM PLANT GRID EASTING COORDINATE WILL CONVERT THE CWM PLANT GRID TO THE RMU-1 GRID. NOTE THAT NO CONVERSION IS REQUIRED FOR NORTHING COORDINATES.

NOTES:

1. TOPOGRAPHIC BASE MAP CONSISTS OF COMBINATION OF DATA COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 5/31/01 BY AIR SURVEY CORP. (PROJECT NO.71010503). AND AN AUGUST 2008 SURVEY BY ENSOL, INC.
2. VERTICAL DATUM BASED ON NGS MEAN SEA LEVEL.
3. GRID COORDINATES SHOWN ARE CWM PLANT GRID.
4. CONTOUR INTERVAL 2 FT.
5. DASHED CONTOURS INDICATE THAT GROUND IS PARTIALLY OBSCURED BY VEGETATION OR SHADOWS. THESE AREAS MAY NOT MEET STANDARD ACCURACY AND REQUIRE FIELD VERIFICATION.
6. PROPERTY LINE IS APPROXIMATE. EASEMENTS AND RIGHT-OF-WAYS NOT SHOWN.
7. RMU-2 LIMIT REPRESENTS TOE OF PERIMETER MSE WALL.

Revised: November 8, 2013

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0023725\2013\00003\DWG\CONTRACT\PART373\23725GA2.dwg LAYOUT: A-2 SAVED: 10/31/2013 3:43 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 11/1/2013 1:30 PM BY: DAVIS, KATHI
XREFS: 23725X02 23725X01 23725X00 IMAGES: PROJECTNAME: ----

300' 0 300' 600'
1"=300'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNG	BMS

Professional Engineer's Name: **JOSEPH MOLINA**
Professional Engineer's No.: 072644
State: NY | Date Signed: | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: LAF | Checked by: BMS

ARCADIS
ARCADIS OF NEW YORK, INC.

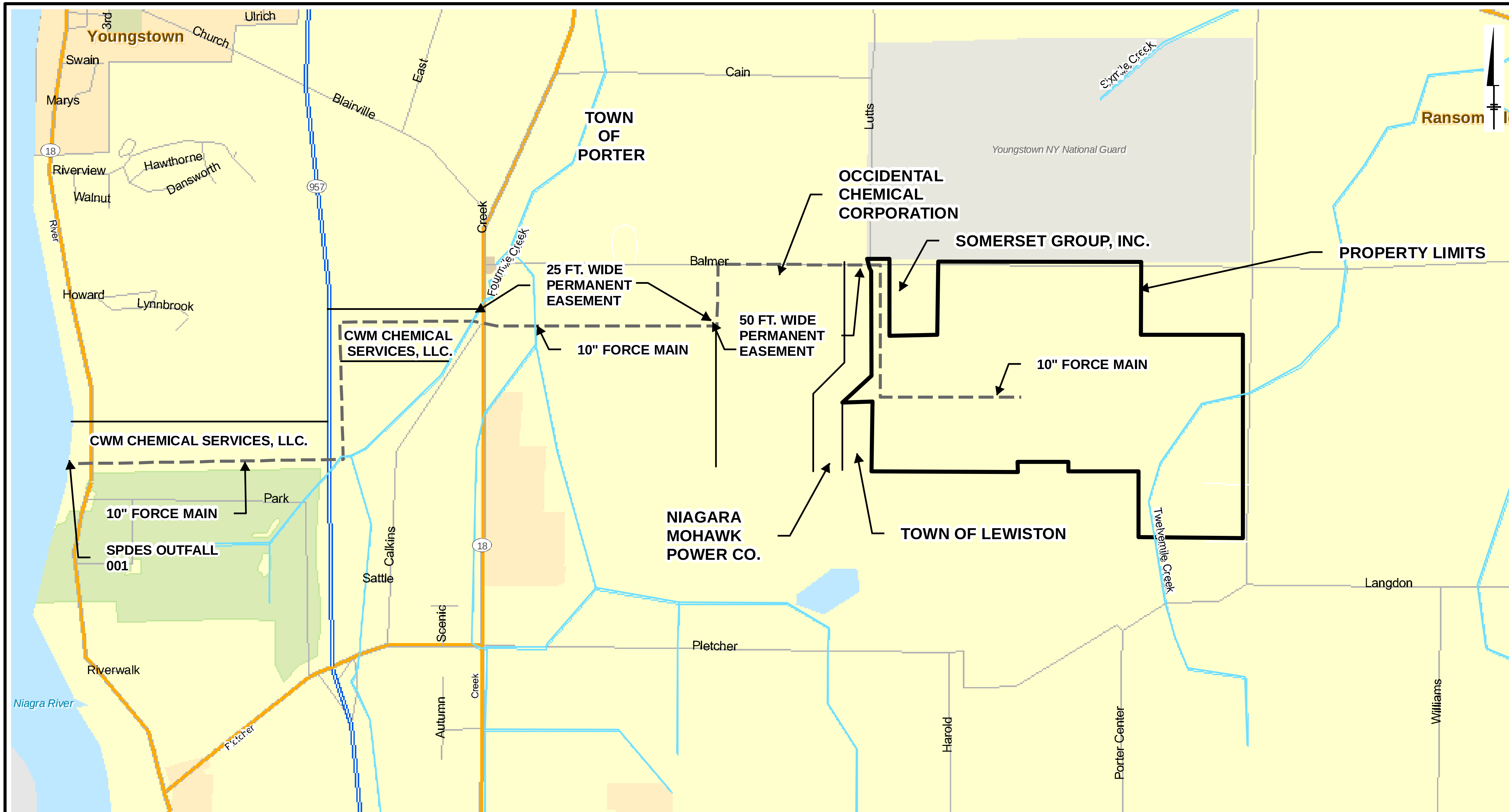
CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
RESIDUALS MANAGEMENT UNIT 2 6NYCRR PART 373 PERMIT APPLICATION

FACILITY LAYOUT

GENERAL

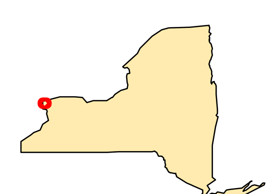
ARCADIS Project No. B0023725.2009.00006
Date: OCTOBER 2009
ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.91220

A-2



NOTES:

1. PROPERTY LINES ARE APPROXIMATE.
2. NO DRINKING WATER WELLS EXIST WITHIN 1/4 MILE OF THE FACILITY.
3. THE TREATED EFFLUENT DISCHARGE IS LOCATED AT THE NIAGARA RIVER.
4. 710 TOTAL ACRES.
5. 630 RCRA PERMITTED ACRES.



AREA LOCATION

0 2,000 4,000

FEET

GRAPHIC SCALE

CWM CHEMICAL SERIVCES, LLC
MODEL CITY, NEW YORK
6NYCRR PART 373 PERMIT APPLICATION

EFFLUENT DISCHARGE PIPELINE

ARCADIS

FIGURE
A-3

CITY: CLE DIV/GROUP: AIT 40 DB: L.GREENE LD: EAL PIC: WP PM: TM: GNG TR:
MODEL CITY 23725.003
Friday, June 19, 2009 1:28:50 PM
G:\enviro\Common\GIS\CWM\ModelCity\Revisions\0373\mxd\FacilityLocationDetail_A-3.mxd

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NEW YORK
PART A APPLICATION

ITEM XVII - PHOTOGRAPHS

PHOTOGRAPHS TAKEN APRIL 18, 2001 (Photographs 1 through 15 only)

PROCESS CODES: D80 LANDFILL
S01 CONTAINER STORAGE
S02 TANK STORAGE
S04 SURFACE IMPOUNDMENT STORAGE
T01 TANK TREATMENT
T04 OTHER TREATMENT

PHOTO 1 – TRAILER PARKING AREA (S01)

Revised: November 8, 2013

PHOTO 2 – SLF 1-11 LEACHATE PRETREATMENT SYSTEM (T01)

PHOTO 3 – FACULTATIVE (FAC) PONDS #1 AND 2 (S04)

PHOTO 4 – FACULTATIVE (FAC) POND #3 (S04)

PHOTO 5 – FACULTATIVE (FAC) POND #8 (S04)

PHOTO 6 – AQUEOUS WASTEWATER TREATMENT FACILITY (T01)

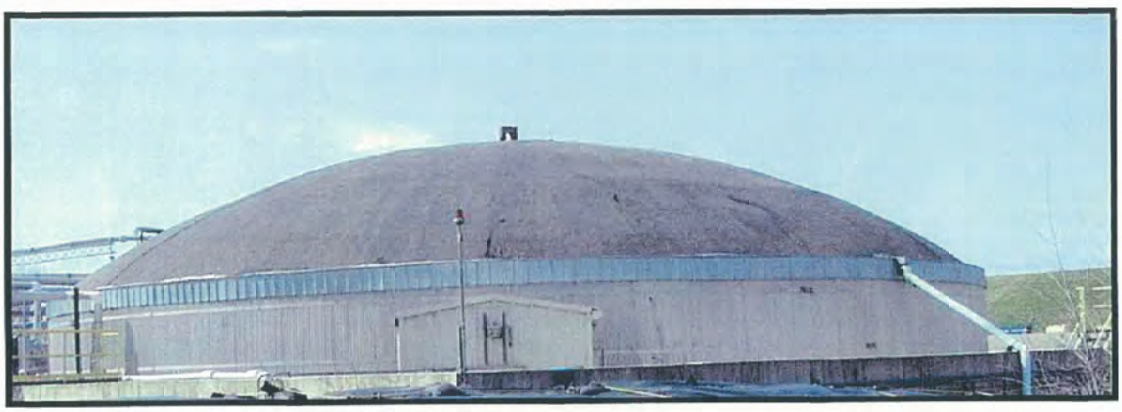


PHOTO 7 – WASTEWATER STORAGE TANK (S02)

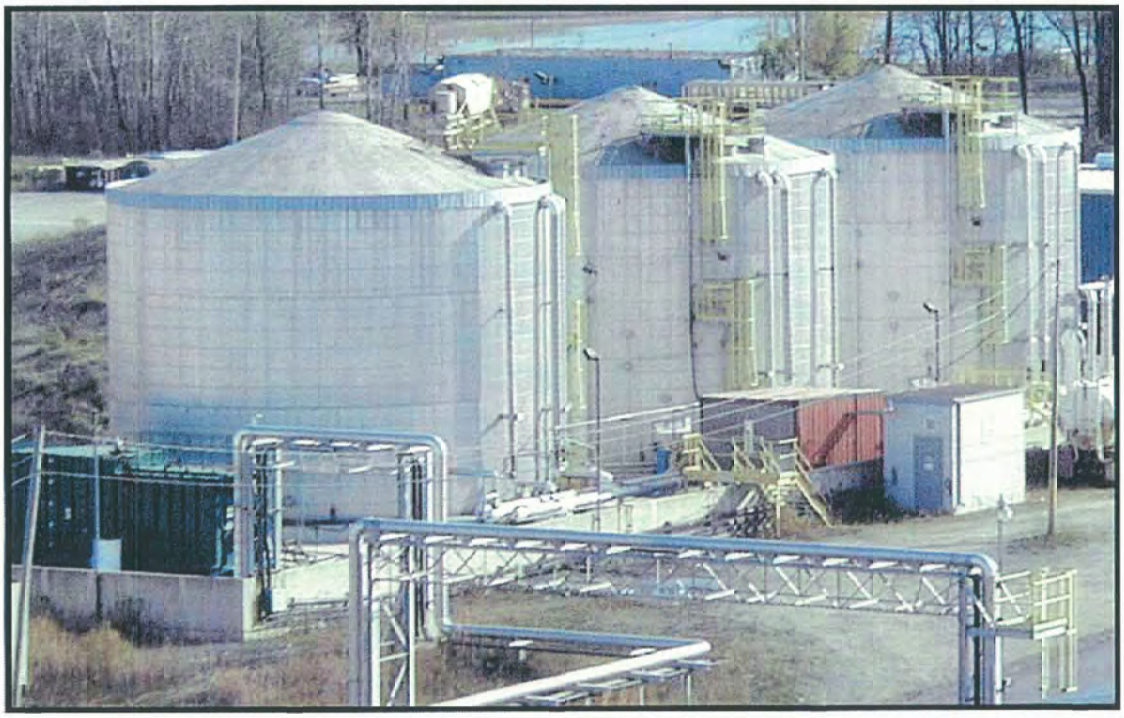


PHOTO 8 – LEACHATE TANK FARM (S02)

PHOTO 9 – PCB DRUM WAREHOUSE (S01)

PHOTO 10 – DRUM MANAGEMENT BUILDING LOADING DOCK (S01)

PHOTO 11 – DRUM MANAGEMENT BUILDING (S01)

PHOTO 12 – WASTE STABILIZATION FACILITY (T04)

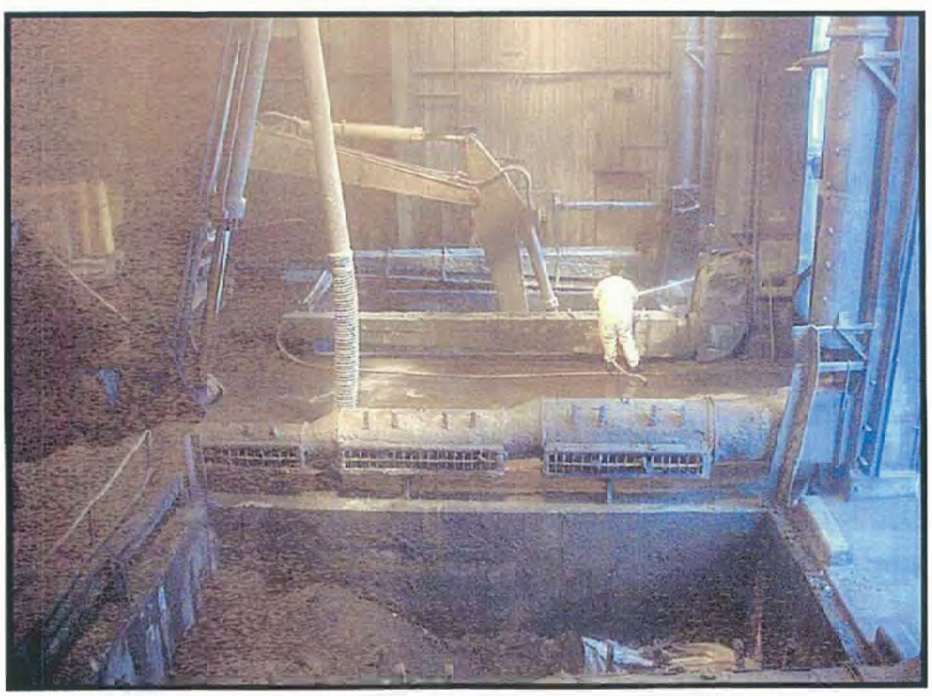


PHOTO 13 – WASTE STABILIZATION FACILITY (T04)

PHOTO 14 – RESIDUALS MANAGEMENT UNIT NO. 1 (RMU-1) (D80)

PHOTO 15 – RESIDUALS MANAGEMENT UNIT NO. 1 (RMU-1) (D80)

PHOTO 16 – LOCATION OF PROPOSED RESIDUALS MANAGEMENT UNIT NO. 2 (D80)

PHOTO 17 – LOCATION OF PROPOSED RESIDUALS MANAGEMENT UNIT NO. 2 (D80)

PHOTO 18 – LOCATION OF PROPOSED RESIDUALS MANAGEMENT UNIT NO. 2 (D80)

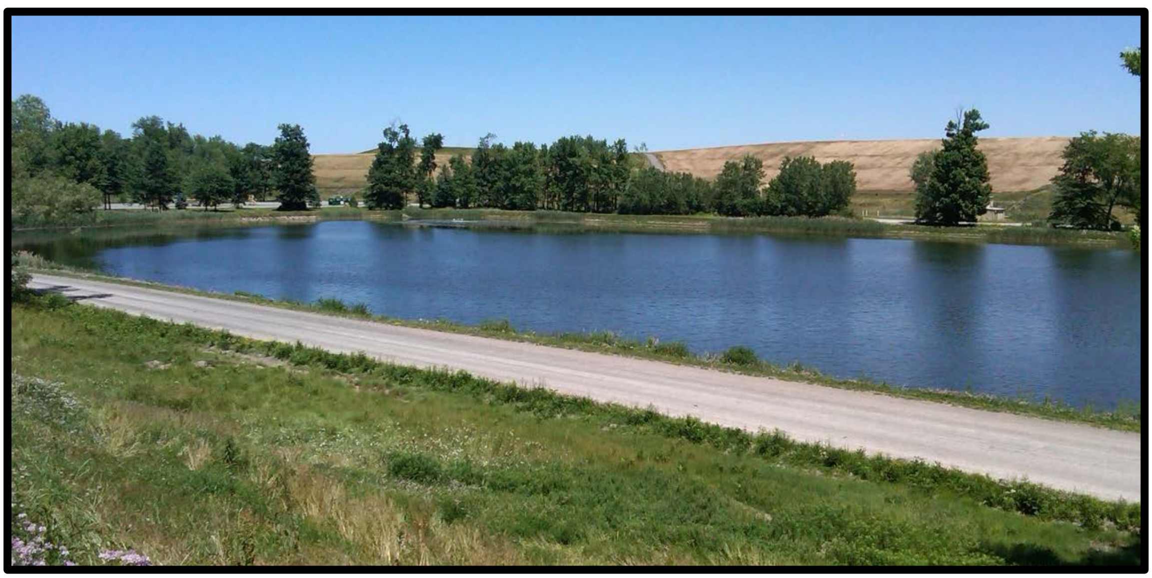


PHOTO 19 – LOCATION OF PROPOSED RESIDUALS MANAGEMENT UNIT NO. 2 (D80)

PHOTO 20 – LOCATION OF PROPOSED FACULTATIVE (FAC) POND #5 (S04)

PHOTO 21 – LOCATION OF PROPOSED NEW DRUM MANAGEMENT BUILDING (S01)

PHOTO 22 – LOCATION OF PROPOSED NEW STABILIZATION TRAILER PARKING AREA (S01)

PHOTO 23 – LOCATION OF PROPOSED NEW FULL TRAILER PARKING AREA (S01)

PHOTO 24 – LOCATION OF PROPOSED NEW SLF-10 HOLD TANK BUILDING LEACHATE TRANSFER RAMP (S01)

PHOTO 25 – LOCATION OF PROPOSED NEW SLF 1-11 OIL/WATER SEPARATOR BUILDING LEACHATE TRANSFER RAMP (S01)

Note:
Photographs 1 through 15 taken April 18, 2001
Photographs 16 through 21 taken June 16, 2012
Photographs 22 through 25 taken October 3, 2013

Revised: November 8, 2013

ATTACHMENT B

No Modifications Proposed

ATTACHMENT C

No Modifications Proposed

WASTE CHARACTERISTICS

AND

ANALYSIS PLAN

FOR

CWM CHEMICAL SERVICES, LLC
1550 BALMER ROAD
MODEL CITY, NEW YORK 14107
EPA ID #NYD049836679

July 2013

WASTE ANALYSIS PLAN

TABLE OF CONTENTS

SECTION C
WASTE CHARACTERISTICS

This section describes the chemical and physical nature of the hazardous wastes received and managed at the facility and provides the facility's Waste Analysis Plan. This information is provided in accordance with 6 NYCRR Subpart 373-2.2(e).

C-1 Chemical and Physical Characteristics

The facility receives and manages virtually every type of hazardous waste identified in 6 NYCRR Subpart 371. The waste received in bulk, drums, or other containers generally fall within the following categories of materials:

o Wastewaters - acidic, basic, or neutral solutions generally containing heavy metals and/or low levels of soluble organics. These materials are usually treated in the aqueous treatment facility, qualified in a facultative pond and then discharged to the Niagara River via the facility SPDES permit.

o Inorganic solids and sludges - frequently contain or are contaminated with heavy metals. They are managed in the secure landfill.

o Solids with organic contamination - generally consists of dirt or debris with organic contamination, suitable for landfill disposal.

o Organic solids and sludges not suitable for landfill disposal in NYS are generally managed off-site.

o Organic liquids such as halogenated and nonhalogenated solvents are generally blended and shipped to incineration facilities. PCB containing liquids are managed separately.

Each hazardous waste received by the facility has been characterized and classified with the proper EPA hazard code(s) by the generator (see Tables C-1 and C-2). A list of the EPA hazard codes, along with an indication of their hazardous characteristics and the basis for listing is presented in Table C-1. Also included in this table is a listing of the typical treatment/disposal options that may be used to process each listed waste. The actual treatment/disposal technique would depend on items such as the concentrations and quantity of the listed compound, its other waste components, physical state and the matrix (water, soil, debris, etc.). Landfill disposal limits, as outlined in the facility's landfill operating permit, includes the following restrictions:

1. The flash point must be greater than 140°F.
2. The pour point must be greater than 75°F.

3. Only Package Lab Chemicals containing non-hazardous wastes or materials that meet the LDR standards will be disposed of in the landfill. "Packaged Lab Chemicals (PLC's) containing hazardous wastes requiring treatment will be processed by decanting for WWT or fuels blending, stabilization or other treatment or they will be stored and transferred off-site for alternate disposal such as incineration. Hazardous waste PLCs with free liquids will be disposed of in the landfill in accordance with 6NYCRR 373-2.14(j) and (l). Non-hazardous PLCs will be managed in general accordance with 6NYCRR 373-2.14(j) and (l) except that the outside container will be DOT-specification in accordance with 49CFR 173.12(b).
4. No wastes containing explosives, shock sensitive, or pyrophoric substances may be disposed of in the landfill[1]. In addition, no compressed gases, compressed liquids or infectious agents may be disposed of in the landfill.
5. Wastes may not contain greater than 2% "Organic Limit", unless otherwise authorized by the Department as prescribed in condition E.1.c.i in Exhibit F of Schedule 1 of Module I of the Sitewide Part 373 Permit. Wastes containing greater than 2% of non-target organic compounds will be submitted on a case-by-case basis to the NYSDEC for land disposal approval.
6. Any wastes containing trace levels of radioactive material that reads slightly above background may not be land disposed without NYSDEC approval. Wastes with higher levels of radioactivity are prohibited from land disposal.
7. Containers containing common contaminant compounds that have a solubility in water at 25°C in excess of 10% by weight of the waste, shall be surrounded by containers with insoluble contents when placed in the landfill. Bulk loads containing >10% solubles shall be spread thin.
8. Cyanide and sulfide containing wastes characterized as reactive (D003) will not be landfilled. Wastes that yield a positive cyanide or sulfide test result, using the screening procedures in Section C-2h(1) will be tested using SW-846 method 9010 or 9030. Wastes that are found to yield values of a 1,000 ppm or greater for either "Cyanide Amenable to Chlorination", or "Total Sulfide" may not be disposed of in the landfill. Total cyanide test results of <1000 ppm may be used to approve waste streams for landfill disposal, as amenable cyanide is a subset of total cyanide.

9. All PCB wastes will be managed in accordance with 40 CFR Part 761 and 6NYCRR 371.4(e).

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[1] Explosive, shock sensitive and pyrophoric substances, as defined by the following references:

- Hawley's Condensed Chemical Dictionary, eleventh edition (or most recent), Sax, N. Irving and Lewis, Richard J., Van Nostrand Reinhold Co., NY, NY, 1987.
- Dangerous Properties of Industrial Materials, sixth edition (or most recent), Sax, N. Irving, Van Nostrand Reinhold Co., NY, NY, 1984.
- Fire Protection Guide on Hazardous Materials, eighth edition (or most recent), National Fire Protection Association, Quincy, MA, 1984.
- Chemistry of Hazardous Materials, Eugene Meyer, Prentice-Hall, Inc., Englewood Cliffs, NY, 1977 (or most recent version).
- Code of Federal Regulations, 49 CFR Part 172.

10. Spent solvents and dioxins: No current production wastes or outdated products with the codes F020-F023, F026-F027 wastes shall be disposed of in the landfill. Only wastes that are derived from these codes such as a water treatment sludge from the treatment of leachate may be land disposed.

11. "All RCRA hazardous solids for which LDR Standard exist, will be managed in compliance with these treatment standards as listed in NYCRR, Part 376 and 40 CFR 268."

12. Suitability for landfill disposal will be dependent upon any future hazardous waste regulations.

13. All wastes for land disposal will be approved by the NYSDEC.

14. No material that is organic/combustible (e.g., grease) shall be designated for disposal in the acid generating/oxidizer area of the landfill. Combustibles that are part of the actual acid generating or oxidizer waste stream or its packaging (e.g., persulfate contaminated paper bags) may be designated for disposal in the acid generating/oxidizer area of the landfill, if approved by NYSDEC.

15. No electronic waste (e-waste) as defined under ECL § 27-2601 shall be disposed of in the landfill pursuant to the ban under ECL § 27-2611.

In general, for treatment, storage or disposal, the facility will not accept (except for trace levels slightly above background, approved by the NYSDEC) radioactive, shock sensitive, pyrophoric or etiologic wastes. The facility also receives and manages industrial waste which are not a hazardous waste as defined in 6 NYCRR 371.2. These waste also generally fall within one of the above-listed categories of materials and are managed in accordance with the procedures outlined in this WAP. Landfill candidate nonhazardous wastes are subject to the same landfill disposal restrictions as are hazardous waste. Analytical procedures for non-hazardous wastes may be modified on a case by case basis with the approval of the profile approval request by the NYSDEC on-site monitor.

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION)**

NYS Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
B001	PCB Oil (concentrated)	Toxic	B
B002	Petroleum Oil or other liquids (50 to 500 ppm)	Toxic	B
B003	Petroleum Oil or other liquids (greater than 500 ppm)	Toxic	B
B004	PCB Articles (50 to 500 ppm)	Toxic	B,L
B005	PCB Articles (greater than 500 ppm)	Toxic	B,L
B006	PCB Transformers	Toxic	B,L
B007	Other PCB Wastes	Toxic	B,L

**All footnotes may be referenced at the end of Table C-2 of the Waste Analysis Plan.

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F AND K DESIGNATION)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
D001	Ignitable waste	Ignitable	L,B,AT
D002	Corrosive waste	Corrosive	L,B,AT
D003	Reactive waste	Reactive	L,T
D004	Arsenic	Toxicity Characteristic	L,AT,B
D005	Barium	Toxicity Characteristic	L,AT,B
D006	Cadmium	Toxicity Characteristic	L,AT,B
D007	Chromium	Toxicity Characteristic	L,AT,B
D008	Lead	Toxicity Characteristic	L,AT,B
D009	Mercury	Toxicity Characteristic	L,AT,B
D010	Selenium	Toxicity Characteristic	L,AT,B
D011	Silver	Toxicity Characteristic	L,AT,B
D012	Endrin	Toxicity Characteristic	T,B,L
D013	Lindane	Toxicity Characteristic	T,B,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY
(B, D, F AND K DESIGNATION)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
D014	Methoxychlor	Toxicity Characteristic	T,B,L
D015	Toxaphene	Toxicity Characteristic	T,B,L
D016	2,4-D	Toxicity Characteristic	T,B,L
D017	2,4,5-TP Silvex	Toxicity Characteristic	T,B,L
D018	Benzene	Toxicity Characteristic	B,T,L,AT
D019	Carbon Tetrachloride	Toxicity Characteristic	B,T,L,AT
D020	Chlordane	Toxicity Characteristic	B,T,L,AT
D021	Chlorobenzene	Toxicity Characteristic	B,T,L,AT
D022	Chloroform	Toxicity Characteristic	B,T,L,AT
D023	o-cresol	Toxicity Characteristic	B,T,L,AT
D024	m-cresol	Toxicity Characteristic	B,T,L,AT
D025	p-cresol	Toxicity Characteristic	B,T,L,AT
D026	Cresol	Toxicity Characteristic	B,T,L,AT

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F AND K DESIGNATION)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
D027	1,4-Dichlorobenzene	Toxicity Characteristic	B,T,L,AT
D028	1,2-Dichloroethylene	Toxicity Characteristic	B,T,L,AT
D029	1,1-Dichloroethylene	Toxicity Characteristic	B,T,L,AT
D030	2,4-Dinitrotoluene	Toxicity Characteristic	B,T,L,AT
D031	Heptachlor	Toxicity Characteristic	B,T,L,AT
D032	Hexachlorobenzene	Toxicity Characteristic	B,T,L,AT
D033	Hexachloro-1,3-butadiene	Toxicity Characteristic	B,T,L,AT
D034	Hexachloroethane	Toxicity Characteristic	B,T,L,AT
D035	Methyl Ethyl Ketone	Toxicity Characteristic	B,T,L,AT
D036	Nitrobenzene	Toxicity Characteristic	B,T,L,AT
D037	Pentachlorophenol	Toxicity Characteristic	B,T,L,AT
D038	Pyridine	Toxicity Characteristic	B,T,L,AT
D039	Tetrachloroethylene	Toxicity Characteristic	B,T,L,AT

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F AND K DESIGNATION)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
D040	Trichloroethylene	Toxicity Characteristic	B,T,L,AT
D041	2,4,5-Trichlorophenol	Toxicity Characteristic	B,T,L,AT
D042	2,4,6-Trichlorophenol	Toxicity Characteristic	B,T,L,AT
D043	Vinyl Chloride	Toxicity Characteristic	B,T,L,AT

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION) (Continued)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
F001	Spent Halogenated Solvents	Toxic	B,T,L,AT
F002	Spent Halogenated	Toxic	B,T,L,AT
F003	Spent non-halogenated solvents	Ignitable	B,T,L,AT
F004	Spent non-halogenated solvents	Toxic	B,T,L,AT
F005	Spent non-halogenated solvents	Ignitable, Toxic	B,T,L,AT
F006	Wastewater treatment sludges from electroplating	Toxic	L,AT
F007	Spent cyanide plating bath; solutions from electroplating	Reactive, Toxic	AT,L
F008	Plating bath sludges	Reactive, Toxic	AT,L
F009	Spent stripping and and cleaning bath solutions from electroplating	Reactive, Toxic	AT,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY
(B, D, F AND K DESIGNATION)**
(Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
F010	Quenching bath sludges from oil baths from metal heat treating	Reactive, Toxic	T,L
F011	Spent cyanide solutions from salt bath cleaning from metal heat treating	Reactive, Toxic	AT,L
F012	Quenching wastewater treatment sludges from metal heat treating	Toxic	L,AT
F019	Wastewater treatment sludges	Toxic	L,AT
F020(4)	Wastes from the production or use of tri- or tetra-chlorophenol	Acute Hazardous	AT,L,T
F021(4)	Wastes from the production or use of pentachlorophenol	Acute Hazardous	AT,L,T
F022(4)	Wastes from the manufacturing of tetra-, penta-, or hexachlorobenzenes	Acute Hazardous	AT,L,T

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F AND K DESIGNATION)**
(Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
F023(4)	Wastes from the production of materials or equipment previously used for the production of use of tri- and tetrachlorophenols	Acute Hazardous	AT,L,T
F024	Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes	Toxic	B,L,T
F025	Condensed light ends and other wastes from the production of certain chlorinated aliphatic hydrocarbons	Toxic	B,L,T
F026(4)	Wastes from the production of materials on equipment previously used for the use of tetra-, penta-, or hexachlorobenzene	Acute Hazardous	AT,L,T
F027(4)	Discarded unused formulations containing tri, tetra-, or pentachlorophenol	Acute Hazardous	AT,L,T

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F AND K DESIGNATION) (Continued)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
F028(4)	Residues from the incineration or thermal treatment of soil with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027	Toxic	AT,L,T
F032	Wastewaters, process residuals, drippage &spent formulations from wood preserving using chlorophenolic formulations	Toxic	B, T, L
F034	Same as above, substitute creosote for chlorophenolic	Toxic	B, T, L
F035	Same as above, substitute preservatives containing arsenic or chromium	Toxic	B, T, L
F037	Petroleum refinery oil/water/ solids separation sludge	Toxic	B, T, L
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge	Toxic	B, T, L
F039	Multisource Leachate	Toxic	AT,B,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY
(B, D, F AND K DESIGNATION)**
(Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K001	Bottom sediment sludge	Toxic	T,L
K002	Wastewater treatment sludge	Toxic	L,AT
K003	Wastewater treatment sludge	Toxic	L,AT
K004	Wastewater treatment sludge	Toxic	L,AT
K005	Wastewater treatment sludge	Toxic	L,AT
K006	Wastewater treatment sludge	Toxic	L,AT
K007	Wastewater treatment sludge	Toxic	L,AT
K008	Oven Residue	Toxic	L,AT
K009	Distillation bottoms	Toxic	B,T,L
K010	Distillation side cuts	Toxic	B,T,L
K011	Bottom stream from wastewater stripper	Reactive, Toxic	T,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F AND K DESIGNATION) (Continued)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K013	Bottom stream from acetonitrile column	Reactive, Toxic	B,T,L
K014	Bottoms from acetoni-trile purification	Toxic	B,T,L
K015	Still bottoms from distillation	Toxic	B,T,L
K016	Heavy ends or distil-lation residue	Toxic	B,T,L
K017	Heavy ends (still bottoms)	Toxic	B,T,L
K018	Heavy ends	Toxic	B,T,L
K019	Heavy ends	Toxic	B,T,L
K020	Heavy ends	Toxic	B,T,L
K021	Aqueous spent antimony catalyst	Toxic	L,T
K022	Distillation bottom tars	Toxic	B,T,L
K023	Distillation light ends	Toxic	B,T,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F AND K DESIGNATION) (Continued)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K024	Distillation bottoms	Toxic	B,T,L
K025	Distillation bottoms	Toxic	B,T,L
K026	Stripping still tails	Toxic	B,T,L
K027	Centrifuge and dis-tillation residues from TDI	Reactive, Toxic	T,L
K028	Spent catalyst	Toxic	T,L
K029	Product steam stripper	Toxic	B,T,L
K030	Column bottoms or heavy ends	Toxic	B,T,L
K031	By-product salts	Toxic	T,L
K032	Wastewater treatment sludge	Toxic	AT,T,L
K033	Wastewater and scrub water	Toxic	AT,B,T,L
K034	Filter solids	Toxic	T,L
K035	Wastewater treatment sludges	Toxic	T,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY
(B, D, F, AND K DESIGNATION)**
(Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K036	Still bottoms	Toxic	B,T,L
K037	Wastewater treatment washing and stripping	Toxic	L,T
K038	Wastewater from washing and stripping	Toxic	AT,B,T,L
K038	Distillation bottoms	Toxic	B,T,L
K039	Filter cake	Toxic	L,T
K040	Wastewater treatment sludge	Toxic	L,T
K041	Wastewater treatment sludge	Toxic	L,T
K042	Heavy ends or dis-tillation residues	Toxic	B,T,L
K043	2,6 dichlorophenol waste	Toxic	B,T,L
K044	Wastewater treatment sludges	Reactive	L (if non-reactive)

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION)[**] (Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K045	Spent Carbon	Reactive	T,L (if non-reactive)
K046	Wastewater treatment sludges	Toxic	L
K047	Pink/redwater	Reactive	AT,B,L (if non-reactive)
K048	DAF/float	Toxic	B,AT,T,L
K049	Slop oil emulsion solids	Toxic	B,AT,T,L
K050	Heat exchanger bundle cleaning sludge	Toxic	B,AT,T,L
K051	API separator sludge	Toxic	B,AT,T,L
K052	Tank bottoms	Toxic	B,AT,T,L
K060	Ammonia still lime sludge	Toxic	L
K061	Emission control dust/sludge	Toxic	L
K062	Spent pickle liquor	Corrosive, toxic	AT,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY
(B, D, F, AND K DESIGNATION)**
(Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K064	Copper Production - Acid Plant blowdown sludge from thickening	Toxic	L,T
K065	Lead Smelting - surface impoundment solids and sludges	Toxic	L,T
K066	Zinc Production - Sludge from treatment of wastewater, acid plant waste	Toxic	L,T
K069	Emission control dust/sludge	Toxic	L
K071	Brine purification muds	Toxic	L,AT
K073	Chlorinated hydro-carbon wastes	Toxic	B,T,L
K083	Aniline wastes	Toxic	B,T,L
K084	Wastewater treatment sludges	Toxic	L,T
K085	Distillation or fraction-ation column bottoms	Toxic	B,T,L
K086	Solvent washes and sludges	Toxic	B,AT,L,T

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION) (Continued)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K087	Decanter tank tar sludge	Toxic	B,T,L
K088	Spent Potliner	Toxic	L,T
K088	Aluminum Reduction - spent potliners from primary aluminum reduction	Toxic	L,T
K090	Ferro-Chromium Silicon Production - emission control dust or sludge	Toxic	L,T
K091	Ferro-Chromium Production-emission control dust or sludge	Toxic	L,T
K093	Distillation light ends	Toxic	B,T,L
K094	Distillation bottoms	Toxic	B,T,L
K095	Distillation bottoms	Toxic	B,T,L
K096	Heavy ends	Toxic	B,T,L
K097	Vacuum stripper discharger	Toxic	B,T,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION)[**] (Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K098	Untreated process wastewater	Toxic	AT,B,T,L
K099	Untreated wastewater	Toxic	AT,B,T,L
K100	Waste leaching solution	Toxic	AT,L
K101	Distillation tar residues	Toxic	B,T,L
K102	Residue from activated carbon	Toxic	L,T
K103	Process residues	Toxic	B,T,L
K104	Combined wastewater	Toxic	B,T,AT,L
K105	Separated aqueous stream from product washing step of chlorobenzenes	Toxic	B,T,L
K105	Separated aqueous stream	Toxic	B,T,AT,L
K106	Wastewater treatment sludge	Toxic	L,AT

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY
(B, D, F, AND K DESIGNATION)**
(Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K107(5)	Column bottoms from 1,1-dimethyl-hydrazine production	Corrosive, Toxic	B,T,AT,L
K108(5)	Condensed column overheads from 1,1-dimethyl-hydrazine production	Ignitable, Toxic	B,T,AT,L
K109(5)	Spent filter cartridges from 1,1-dimethyl-hydrazine production	Toxic	B,T,L
K110(5)	Condensed column overheads from intermediate separation from 1,1-dimethyl-hydrazine production	Toxic	B,T,L
K111	Product washwaters of dinitrotoluene	Toxic	B,T,L
K112	Reaction by-product water of toluenediamine	Toxic	B,T,L
K113	Condensed liquid light ends of toluenediamine	Toxic	B,T,L
K114	Vicinals of toluenediamine	Toxic	B,T,L
K115	Heavy ends of toluenediamine	Toxic	B,T,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION)[**] (Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K116	Organic condensate of TDI	Toxic	B,T,L
K117	Wastewater of ethylene dibromide	Toxic	B,T,L
K118	Spent absorbent solids of ethylene dibromide	Toxic	B,T,L
K123(5)	Process wastewater from the production of Ethylene bisdi-thiocarbamic acid	Toxic	L,T
K124(5)	Reactor Vent Scrubber from ethylenebis-di-thiocarbamic acid	Toxic	L,T
K125(5)	Filter, Evaporation & Centrifuge Solids ethylenebis-dithio-carbamic acid	Toxic	L,T
K126(5)	Baghouse dust and floor sweepings from ethylenebis-dithio-carbamic acid	Toxic	L,T
K131(5)	Wastewater from methyl bromide production	Toxic	L,T

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION)**
(Continued)

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K132(5)	Spent absorbent and wastewater separator solids from methyl bromide production	Toxic	L,T
K136	Still bottoms of ethylene dibromide	Toxic	B,T,L
K140	Floor sweepings, off-specification product and spent filter media from the production of 2,4,6-Tribromophenol	Toxic	B,T,L,AT
K141	Process residues from the recovery of coal tar	Toxic	L, T
K142	Tar storage tank residues from production of coke	Toxic	L,T
K143	Process residues from recovery of light oil	Toxic	L,T
K144	Wastewater sump residues from light oil refining	Toxic	L,T
K145	Residues from naphthalene collection and recovery operations	Toxic	L,T
K147	Tar storage tank residues from coal tar refining	Toxic	L,T

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION) ** **(Continued)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K148	Residues from coal tar distillation	Toxic	L,T
K149	Distillation or fractionation bottoms from alpha or methyl chlorinated toluene, ringed chlorinated toluene, benzoyl chloride	Toxic	B,T,L
K150	Residuals from production of alpha-chlorinated toluenes	Toxic	B,T,L
K151	Wastewater treatment sludges from production of alpha-chlorinated toluenes	Toxic	B,T,L
K156	Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes	Toxic	B,T,AT,L
K157	Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes	Toxic	B,T,AT,L
K158	Bag house dust, and filter/ separation solids from the production of carbamates and carbamoyl oximes	Toxic	B,T,L
K159	Organics from the treatment of thiocarbamate wastes	Toxic	B,T,AT,L

TABLE C-1

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY (B, D, F, AND K DESIGNATION) (Continued)**

EPA Hazardous Waste No.	Waste Common Name	Basis for Listing Hazardous Waste	TSD(1)(2) Option
K161	Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust and floor sweepings from the production of dithiocarbamate acids and their salts (This does not include K125 or K126)	Toxic	B,T,L
K169	Crude oil storage tank sediment from petroleum refining operations	Toxic	B,T,L
K170	Clarified slurry oil storage tank sediment and/or in-line filter/separation solids from petroleum refining operations	Toxic	B,T,L
K171	Spent hydrotreating catalyst from petroleum refining operations, including guard beds used to desulfurize feeds to other catalytic units	Toxic	B,T,L
K172	Spent hydrorefining catalyst from petroleum refining operations, including guard beds used to desulfurize feeds to other catalytic units	Toxic	B,T,L
K174	Wastewater treatment sludges from the production of ethylene dichloride or vinyl chloride monomer unless the sludges are landfilled in a Subtitle C or non-haz landfill permitted by federal or state government	Toxic	B,T,L
K175	Wastewater treatment sludges from the production of vinyl chloride monomer using mercuric chloride catalyst in an acetylene-based process	Toxic	B,T,L
K176	Baghouse filters from the production of antimony oxide, including filters from the production of intermediates (e.g., antimony metal or crude antimony oxide)	Toxic	B,T,L
K177	Slag from the production of antimony oxide that is speculatively accumulated or disposed, including slag from production of intermediates (e.g., antimony metal or crude antimony oxide)	Toxic	B,T,L
K178	Solids from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride-ilmenite process	Toxic	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**

The following list of materials are identified as acute hazardous wastes. The primary hazard has been identified by the following letters: R = reactive; I = ignitable, C = corrosive; T = toxic. If no letter is shown, the compound should be considered as acute hazardous waste for waste numbers beginning with a P.

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P001	Warfarin	T,B,L
P001	3-(alpha-acetonylbenzyl)-4-hydroxycoumarin and salts	T,B,L
P002	Acetamide, N-(aminothioxomethyl)-	T,B,L
P002	1-Acetyl-2-thiourea	T,B,L
P003	2-Propenal	T,B,L
P003	Acrolein	T,B,L
P004	Isocyanic acid, methyl ester	T,L
P004	Aldrin	T,B,L
P004	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-endo, exo-dimethanonaphthalene	T,B,L
P005	Allyl alcohol	T,B,L
P005	2-Propen-1-ol	T,B,L
P006	Aluminumphosphide	T,L (if non-reactive)
P007	3(2H)-Isoxazolone, 5-(aminomethyl)	T,B,L
P007	5-(Aminomethyl)-3-isoxazolol	T,B,L
P008	4-Pyridinamine	T,B,L
P008	4-alpha-Aminopyridine	T,B,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P009	Ammoniumpicrate (R)	L,(not handled if shock sensitive)
P009	Phenol, 2,4,6-trinitro-, ammonium salt (R)	L,(not handled if shock sensitive)
P010	Arsenic acid	L
P011	Pyrophosphoric acid, tetraethyl ester	T,B,L
P011	Arsenic (V) oxide	L
P011	Arsenic pentoxide	L
P012	Arsenic (III) oxide	L
P012	Arsenic trioxide	L
P013	Barium cyanide	L
P014	Benzenethiol	T,B,L
P014	Thiophenol	T,L
P015	Beryllium dust	L
P016	Bis(chloromethyl)ether	T,B,L
P016	Methane, oxybis(chloro-	T,B,L
P017	2-Propanone, 1-bromo-	T,B,L
P018	Brucine	T,B,L
P018	Strychnidin-10-one, 2, 3-dimethoxy-	T,B,L
P020	Phenol, 2,4-dinitro-6(1-methylpropyl)-	T,B,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P020	Dinoseb	T,B,L
P021	Calcium cyanide	T,L
P022	Carbon disulfide	T,L
P022	Carbon bisulfide	T,L
P023	Chloroacetaldehyde	T,B,L
P023	Acetaldehyde, chloro-	B,T,L
P024	p-Chloroaniline	T,B,L
P024	Benzenamine, 4-chloro-	T,B,L
P026	Thiourea, (2-chlorophenyl)-	T,B,L
P026	1-(o-Chlorophenyl)thiourea	T,B,L
P027	Propanenitrile, 3-chloro-	T,B,L
P027	3-Chloropropionitrile	T,B,L
P028	Benzene, (chlormethyl)-	T,B,L
P028	Benzyl chloride	T,B,L
P029	Copper cyanides	L
P030	Cyanides (soluble cyanide salts), not elsewhere specified	L,T
P031 (5)	Cyanogen	L
P033(5)	Chlorine cyanide	L
P034	4,6-Dinitro-o-cyclohexylphenol	T,B,L
P034	Phenol, 2-cyclohexyl-4,6-dinitro-	T,B,L

**All footnotes may be referenced at the end of Table C-2 of the Waste Analysis Plan.

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P036	Dichlorophenylarsine	T,B,L
P036	Phenyl dichloroarsine	T,B,L
P037	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo, exo-1,4:5,8-dimethanonaphthalene	T,B,L
P037	Dieldrin	T,B,L
P038	Diethylarsine	T,B,L
P038	Arsine, diethyl-	T,B,L
P039	O,O-Diethyl S-[2-(ethylthio)ethyl] phosphorodithioate	T,B,L
P039	Disulfoton	T,B,L
P040	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	T,B,L
P040	O,O-Diethyl O-pyrazinyl phosphorothioate	T,B,L
P041	Diethyl-p-nitrophenyl phosphate	T,B,L
P041	Phosphoric acid, diethyl p-nitrophenyl ester	T,B,L
P042	1,2-Benzenediol,4-[1-hydroxy-(methylamino) ethyl]	T,B,L
P042	Epinephrine	T,B,L
P043	Diisopropyl fluorophosphate	T,B,L
P043	Phosphorofluoric acid, bis (1-methlyethyl)-ester	T,B,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P044	Phosphorodithioic acid, O,O-dimethyl S-[2-(methlyamino) -2-oxoethyl]ester	T,B,L
P044	Dimethoate	T,B,L
P045	Thiofanox	T,B,L
P045	3,3-Dimethyl-1-(methylthio)-2-butanone, O-[methylamino)carbonyl]oxime	T,B,L
P046	alpha, alpha-Dimethylphenethylamine	T,B,L
P046	Ethanamine, 1,1-dimethyl-2-phenyl-	T,B,L
P047	Phenol, 2,4-dinitro-6-methyl-	T,B,L
P047	4,6-Dinitro-o-cresol and salts	T,B,L
P048	Phenol, 2,4-dinitro-	T,B,L
P048	2,4-Dinitrophenol	T,B,L
P049	Thiomidodicarbonic diamide	T,B,L
P049	2,4-Dithiobiuret	T,B,L
P050	Endosulfan	T,B,L
P050	5-Norbornane-2,3-dimethanol, 1,4,5,6,7,7-hexachloro, cyclic sulfite	T,B,L
P051	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo, endo-1,4:5,8-dimethanonaphthalene	T,B,L
P051	Endrin	T,B,L
P054	Ethylenamine	T,B,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**

(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P054	Aziridine	T,B,L
P056(5)	Fluorine	L
P057	Fluoroacetamide	T,B,L
P057	Acetamide, 2-fluoro-	T,B,L
P058	Acetic acid, fluoro-, sodium salt	T,B,L
P058	Fluoroacetic acid, sodium salt	T,B,L
P059	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-hep-tachloro-3a, 4,7,7a-tetrahydro	T,B,L
P059	Heptachlor	T,B,L
P060	1,2,3,4,10,10-Hexachloro-1,4,4a,8,8a-hexahydro-1,4:5,8-endo,endo-dimethan-onophthalene	T,B,L
P060	Hexachlorohexahydro-exo, exo-dimethanonaphthalene	T,B,L
P062	Hexaethyl tetraphosphate	T,B,L
P062	Tetraphosphoric acid, hexaethyl ester	T,B,L
P063(5)	Hydrogen Cyanide	L
P064	Methyl isocyanate	T,L
P065(5)	Fulmic Acid, Mercury Salt	L
P066	Acetimidic acid, N-[(methyl-carbamoyl)oxy]thio-, methyl ester	T,B,L
P066	Methomyl	T,B,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P067	1,2-Propylenimine	T,B,L
P067	2-Methylaziridine	T,B,L
P068	Methyl hydrazine	T,B,L
P068	Hydrazine, methyl-	T,B,L
P069	2-Methyllactonitrile	T,B,L
P069	Propanenitrile, 2-hydroxy-2-methyl-	T,B,L
P070	Propanal, 2-methyl-2-(methlythio)-,O-[(methlyamino) carbonyl]oxime	T,B,L
P070	Aldicarb	T,B,L
P071	O,O-Dimethyl O-p-nitrophenyl phosphorothioate	T,B,L
P071	Methyl parathion	T,B,L
P072	Thiourea, 1-napthalenyl-	T,B,L
P072	alpha-Naphthylthiourea	T,B,L
P073	Nickel tetracarbonyl	L,T
P073	Nickel carbonyl	L,T
P074	Nickel(II) cyanide	L,T
P074	Nickel cyanide	L,T
P075	Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl-, and salts	T,B,L
P075	Nicotine and sal	T,B,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P076	Nitric oxide	L,T
P077	p-Nitroaniline	T,B,L
P077	Benzenamine, 4-nitro-	T,B,L
P078(5)	Nitrogen Dioxide	L
P081(5)	Nitroglycerine	L
P082	N-Nitrosodimethylamine	T,B,L
P082	Dimethylnitrosamine	T,B,L
P084	Ethenamine, N-methyl-N-nitroso-	T,B,L
P084	N-Nitrosomethylvinylamine	T,B,L
P085	Octamethylpyrophosphoramide	T,B,L
P085	Diphosphoramide, octamethyl-	T,B,L
P087	Osmium tetroxide	L
P087	Osmium oxide	L
P088	7-Oxabicyclo[2.2.1]heptane-2, 3dicarboxylic acid	T,B,L
P088	Endothall	T,B,L
P089	Phosphorothioic acid, O,O-diethyl O-(p-nitrophenol)ester	T,B,L
P089	Parathion	T,B,L
P092	Mercury, (acetato-O)phenyl-	T,B,L
P092	Phenylmercuric acetate	T,B,L
P093	Thiourea, phenyl-	T,B,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P093	N-Phenylthiourea	T,B,L
P094	Phorate	T,B,L
P094	Phosphorothioic acid, O,O-diethyl S-(ethylthio) methyl ester	T,B,L
P095 (5)	Phosgene	L
P096 (5)	Hydrogen Phosphide	L
P097	Famphur	T,B,L
P097	Phosphorothioic acid, O,O-dimethyl O-[p-dimethylamino)-sulfonyl) phenyl]ester	T,B,L
P098	Potassium cyanide	T,L
P099	Potassium silver cyanide	L
P101	Ethyl cyanide	T,B,L
P101	Propanenitrile	T,B,L
P102	2-Propyn-1-01	T,B,L
P102	Propargyl alcohol	T,B,L
P103	Carbamimidoselenoic acid	T,B,L
P103	Selenourea	T,B,L
P104	Silver cyanide	L
P105	Sodium azide	L,(not handled if shock sensitive)

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY[**]
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P106	Sodium cyanide	T,L
P108	Strychnidin-10-one, and salts	T,B,L
P108	Strychnine and salts	T,B,L
P109	Dithiopyrophosphoric acid, tetraethyl ester	T,B,L
P109	Tetraethyldithiopyrophosphate	T,B,L
P110	Plumbane, tetraethyl-	T,B,L
P110	Tetraethyl lead	T,B,L
P111	Tetraethylpyrophosphate	T,B,L
P112	Tetranitromethane (R)	L,T
P112	Methane, tetranitro-(R)	L,T
P113	Thallium(III) oxide	L
P113	Thallic oxide	L
P114	Thallium(I) selenite	L
P115	Sulfuric acid, thallium (I) salt	L
P115	Thallium(I) sulfate	L
P116	Thiosemicarbazide	T,B,L
P116	Hydrazinecarbothioamide	T,B,L
P118	Methanethiol, trichloro-	T,B,L
P118	Trichloromethanethiol	T,L

[**]All footnotes may be referenced at the end of Table C-2 of the Waste Analysis Plan.

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P119	Vanadic acid, ammonium salt	L
P119	Ammonium vanadate	L
P120	Vanadium pentoxide	L
P120	Vanadium(V) oxide	L
P121	Zinc cyanide	L
P122	Zinc Phosphide (R,T) when present at concentration greater than 10%	T,L
P123	Toxaphene	T,B,L
P123	Camphene, octachloro-	T,B,L
P127	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate (Carbofuran)	AT,T,B,L
P128	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester) (Mexacarbate)	AT,T,B,L
P185	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-,o-[(methylamino)carbonyl]oxime (Tirpate)	AT,T,B,L
P188	Benzoic acid, 2-hydroxy, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a, 8-trimethylpyrrolo[2,3-b]indol-5-yl methlycarbamate ester (1:1) (Physostigmine salicylate)	AT,T,B,L
P189	Carbamic acid, [(dibutylamino)this] methyl-,2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan)	AT,T,B,L
P190	Carbamic acid, methyl-,3-methylphenyl ester (Metolcarb)	AT,T,B,L
P191	Carbamic acid, dimethyl-,1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan)	AT,T,B,L
P192	Carbamic acid, dimethyl-,3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester (Isolan)	AT,T,B,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
P194	Ethanimidothioc acide, 2-(dimethylamino)-N-[[(methylamino) carbonyl]oxy]-2-oxo-,methyl ester (Oxamyl)	AT,T,B,L
P196	Manganese, bis(dimethylcarbamodithioato-S,S')-, (Manganese dimethyldithiocarbamate)	AT,T,B,L
P197	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino)carbonyl] oxy]penyl]-,(Formparanate)	AT,T,B,L
P198	Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride)	AT,T,B,L
P199	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate (Methiocarb)	AT,T,B,L
P201	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb)	AT,T,B,L
P202	Phenol, 3-(1-methylethyl)-, methyl carbamate 3-Isopropylphenyl N-methylcarbamate (m-Cumenyl methylcarbamate)	AT,T,B,L
P203	Propanal, 2-methyl-2-(methysulfonyl)-, o-[(methylamino)carbonyl] oxime (Aldicarb sulfone)	AT,T,B,L
P204	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-,methylcarbamate (ester), 3aS-cis)-(Physostigmine)	AT,T,B,L
P205	Zinc, bis(dimethylcarbamodithioato-S,S')-, (Ziram)	AT,T,B,L

The following list of materials are identified as toxic wastes. The primary hazard has been identified by the following letters: R = reactive; I = ignitable, C = corrosive; T = toxic. If no letter is shown, the compound should be considered as toxic waste for waste numbers beginning with a U.

U001	Acetaldehyde (I)	B,T,L
U001	Ethanal (I)	B,T,L
U002	Acetone (I)	B,T,L
U002	2-Propanone (I)	B,T,L

TABLE C-2
HAZARDOUS MATERIALS MANAGED AT
MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U003	Ethanenitrile (I,T)	B,T,L
U003	Acetonitrile (I,T)	B,T,L
U004	Acetophenone	B,T,L
U004	Ethanone, 1-phenyl-	B,T,L
U005	Acetamide, N-9H-fluoren-2yl-	B,T,L
U005	2-Acetylaminofluorene	B,T,L
U006	Ethanoyl chloride (C.R.T.)	L,T
U006	Acetyl chloride (C,R,T)	L,T
U007	Acrylamide	B,T,L
U007	Benzene, 1,2,4,5-tetrachloro-	B,T,L
U007	2-Propenamide	B,T,L
U008	Acrylic acid (I)	B,T,L
U008	2-Propenoic acid (I)	B,T,L
U009	Acrylonitrile	B,T,L
U009	2-Propenenitrile	B,T,L
U010	Azirino(w',3':3,4)pyrrolo(1,2-a) indole-4,7-dione, 6-amino-8 [((aminocarbonyl)oxy)methyl]- 1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-	B,T,L
U010	Mitomycin C	B,T,L
U011	Amitrole	B,T,L
U011	1H-1,2,4-Triazol-3-amine	B,T,L
U012	Aniline (I,T)	B,T,L
U012	Benzenamine (I,T)	B,T,L
U014	Auramine	B,T,L
U014	Benzenamine, 4,4'-carbonimidoylbis (N,N-di-methyl-	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U015	Azaserine	B,T,L
U015	L-Serine, diazoacetate (ester)	B,T,L
U016	Benz[c]acridine	B,T,L
U016	3,4-Benzacridine	B,T,L
U017	Benzal chloride	B,T,L
U017	Benzene, (dichloromethyl)-	B,T,L
U018	1,2-Benzanthracene	B,T,L
U018	Benz[a]anthracene	B,T,L
U019	Benzene (I,T)	B,T,L
U020	Benzenesulfonyl chloride (C,R)	L,T
U020	Benzenesulfonic acid chloride (C,R)	L,T
U021	Benzidine	B,T,L
U021	(1,1'-Biphenyl)-4,4'-diamine	B,T,L
U022	Benzo[a]pyrene	B,T,L
U022	3,4-Benzopyrene	B,T,L
U023	Benzotrichloride (C,R,T)	T,L
U023	Benzene, (trichloromethyl)- (C,R,T)	T,L
U024	Ethane, 1,1'-[methylenebis(oxy)] bis[2-choro-	B,T,L
U024	Bis(2-chloroethoxy) methane	B,T,L
U025	Ethane, 1,1'-oxybis [2-chloro-	B,T,L
U025	Dichloroethyl ether	B,T,L
U026	Chlornaphazine	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U026	2-Naphthylamine,N,N'-bis (2-chloromethyl)-	B,T,L
U027	Bis(2-chloroisopropyl) ether	B,T,L
U027	Propane, 2,2'oxybis(2-chloro-	B,T,L
U028	1,2-Benzenedicarboxylic acid, [bis(2-ethyl-hexyl)]ester	B,T,L
U028	Bis(2-ethylhexyl)phthalate	B,T,L
U029	Methyl bromide	B,T,L
U029	Methane, bromo-	B,T,L
U030	Benzene, 1-bromo-4-phenoxy-	B,T,L
U030	4-Bromophenyl phenyl ether	B,T,L
U031	1-Butanol (I)	B,T,L
U031	n-Butyl alcohol (I)	B,T,L
U032	Calcium chromate	L
U032	Chromic acid, calcium salt	L
U033 (5)	Carbon Oxyfluoride	L
U034	Acetaldehyde, trichloro-	B,T,L
U034	Chloral	B,T,L
U035	Butanoic acid, 4-[Bis(2-chloro-ethyl)amino]benzene-	B,T,L
U035	Chlorambucil	B,T,L
U036	Chlordane, technical	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U036	4,7-Methanoindan, 1,2,4,5,6, 7,8,8-octa-chloro-3a,4,7,7a-tetrahydro-	B,T,L
U037	Benzene, chloro-	B,T,L
U037	Chlorobenzene	B,T,L
U038	Benzenacetic acid, 4-chloro-alpha-(4-chloro-phenyl)-alpha-hydroxy,ethyl ester	B,T,L
U038	Ethyl 4,4'-dichlorobenzilate	B,T,L
U039	4-Chloro-m-cresol	B,T,L
U039	Phenol, 4-chloro-3-methyl-	B,T,L
U041	1-Chloro-2,3-epoxypropane	B,T,L
U041	Oxirane, 2-(chloromethyl)-	B,T,L
U042	Ethene, 2-chloroethoxy-	B,T,L
U042	2-Cloroethyl vinyl ether	B,T,L
U043(5)	Vinyl Chloride	B,T,L
U044	Chloroform	B,T,L
U044	Methane, trichloro-	B,T,L
U045	Methane, chloro- (I,T)	B,T,L
U046	Chloromethyl methyl ether	B,T,L
U046	Methane, chloromethoxy-	B,T,L
U047	beta-Chloronaphthalene	B,T,L
U047	Naphthalene, 2-chloro-	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY****
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U048	o-Chlorophenol	B,T,L
U048	Phenol, 2-chloro-	B,T,L
U049	Benzenamine, 4-chloro-2-methyl-	B,T,L
U049	4-Chloro-o-toluidine, hydrochloride	B,T,L
U050	1,2-Benzophenanthrene	B,T,L
U050	Chrysene	B,T,L
U051	Creosote	B,T,L
U052	Cresols	B,T,L
U052	Cresylic acid	B,T,L
U053	2-Butenal	B,T,L
U053	Crotonaldehyde	B,T,L
U055	Benzene, (1-methylethyl)-(I)	B,T,L
U055	Cumene (I)	B,T,L
U056	Benzene, hexahydro-(I)	B,T,L
U056	Cyclohexane (I)	B,T,L
U057	Cyclohexanone (I)	B,T,L
U058	Cyclophosphamide	B,T,L
U058	2H-1,3,2-Oxazaphosphorine, [bis(2-chloro-ethyl)amino] tetrahydro-, oxide 2-	B,T,L
U059	Daunomycin	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY[**]
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U059	5,12-Naphthacenedione, (8S-cis) -8-acetyl-10[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl) oxyl]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy	B,T,L
U060	Dichloro diphenyl dichloroethane	B,T,L
U060	DDD	B,T,L
U061	DDT	B,T,L
U061	Dichloro diphenyl trichloroethane	B,T,L
U062	S-(2,3-Dichloroallyl) diisopropyl-thiocarbamate	B,T,L
U062	Diallate	B,T,L
U063	Dibenz[a,h]anthracene	B,T,L
U063	1,2:5,6-Dibenzanthracene	B,T,L
U064	Dibenz[a,i]pyrene	B,T,L
U064	1,2:7,8-Dibenzopyrene	B,T,L
U066	1,2-Dibromo-3-chloropropane	B,T,L
U066	Propane, 1,2-dibromo-3-chloro-	B,T,L
U067	Ethane, 1,2-dibromo-	B,T,L
U067	Ethylene dibromide	B,T,L
U068	Methane, dibromo-	B,T,L
U068	Methylene bromide	B,T,L
U069	Dibutyl phthalate	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U069	1,2-Benzenedicarboxylic acid, dibutyl ester	B,T,L
U070	Benzene, 1,2-dichloro-	B,T,L
U070	o-Dichlorobenzene	B,T,L
U071	Benzene, 1,3-dichloro-	B,T,L
U071	m-Dichlorobenzene	B,T,L
U072	p-Dichlorobenzene	B,T,L
U072	Benzene, 1,4-dichloro-	B,T,L
U073	(1,1'-Biphenyl)-4,4'-diamine, 3,3'dichloro-	B,T,L
U073	3,3'-Dichlorobenzidine	B,T,L
U074	1,4-Dichloro-2-butene (I,T)	B,T,L
U074	2-Butene, 1,4-dichloro-(I,T)	B,T,L
U075	Dichlorodifluoromethane	B,T,L
U075	Methane, dichlorodifluoro-	B,T,L
U076	Ethane, 1,1-dichloro-	B,T,L
U076	Ethylidene dichloride	B,T,L
U077	Ethane, 1,2-dichloro-	B,T,L
U077	Ethylene dichloride	B,T,L
U078	Ethene, 1,1-dichloro-	B,T,L
U078	1,1-Dichloroethylene	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U079	1,2-Dichloroethylene	B,T,L
U079	Ethene, trans-1,2-dichloro-	B,T,L
U080	Methylene chloride	B,T,L
U080	Methane, dichloro-	B,T,L
U081	1,4-Dichlorophenol	B,T,L
U081	Phenol, 2,4-dichloro-	B,T,L
U082	2,6-Dichlorophenol	B,T,L
U082	Phenol, 2,6-dichloro-	B,T,L
U083	1,2-Dichloropropane	B,T,L
U083	Propylene dichloride	B,T,L
U084	1,3-Dichloropropene	B,T,L
U084	Propene, 1,3-dichloro-	B,T,L
U085	2,2'-Bioxirane (I,T)	B,T,L
U085	1,2:3,4-Diepoxybutane (I,T)	B,T,L
U086	N,N-Diethylhydrazine	B,T,L
U086	Hydrazine, 1,2-diethyl-	B,T,L
U087	O,O-Diethyl-S-methyl-dithiophosphate	B,T,L
U087	Phosphorodithioic acid, O, O-diethyl-S-methylester	B,T,L
U088	1,2-Benzenedicarboxylic acid, diethyl ester	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U088	Diethyl phthalate	B,T,L
U089	Diethylstilbestrol	B,T,L
U089	4,4'-Stilbenediol, alpha,alpha' -diethyl-	B,T,L
U090	Benzene, 1,2-methylenedioxy- 4-propyl-	B,T,L
U090	Dihydrosafrole	B,T,L
U091	(1,1'-Biphenyl)-4,4'diamine, 3,3'-dimethyl-	B,T,L
U091	3,3'-Dimethoxybenzidine	B,T,L
U092	Dimethylamine (I)	B,T,L
U092	Methanamine, N-methyl- (I)	B,T,L
U093	Benzenamine, N,N'-dimethyl- 4-phenylazo-	B,T,L
U093	Dimethylaminoazobenzene	B,T,L
U094	7,12-Dimethylbenz[a]anthracene	B,T,L
U094	1,2-Benzanthracene 7,12-dimethyl-	B,T,L
U095	(1,1'-Biphenyl)-4,4'-diamine, 3,3'-dimethyl-	B,T,L
U095	3,3'-Dimethylbenzidine	B,T,L
U096	alpha,alpha-Dimethylbenzyl- hydroperoxide (R)	L,T
U096	Hydroperoxide, 1-methyl-1- phenylethyl- (R)	L,T

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U097	Dimethylcarbamoyl chloride	T,L
U097	Carbamoyl chloride, dimethyl-	T,L
U098	1,1-Dimethylhydrazine	B,T,L
U098	Hydrazine, 1,1-dimethyl-	B,T,L
U099	1,2-Dimethylhydrazine	B,T,L
U099	Hydrazine, 1,2-dimethyl-	B,T,L
U101	2,4-Dimethylphenol	B,T,L
U101	Phenol,2,4-dimethyl-	B,T,L
U102	1,2-Benzenedicarboxylic acid, dimethyl ester	B,T,L
U102	Dimethyl phthalate	B,T,L
U103	Dimethyl sulfate	B,T,L
U103	Sulfuric acid, dimethyl ester	B,T,L
U105	Benzene, 1-methyl-1-2,4-dinitro-	T,L (not handled if explosive)
U105	2,4-Dinitrotoluene	B,T,L
U106	2,6-Dinitrotoluene	B,T,L
U106	Benzene, 1-methyl-2,6-dinitro-	B,T,L
U107	1,2-Benezenedicarboxylic acid, di-n-octyl ester	B,T,L
U107	Di-n-octylphthalate	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY[**]
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U108	1,4-Dioxane	B,T,L
U108	1,4-Diethylene dioxide	B,T,L
U109	1,2-Diphenylhydrazine	B,T,L
U109	Hydrazine, 1,2-diphenyl-	B,T,L
U110	Dipropylamine (I)	B,T,L
U110	1-Propanamine, N-propyl- (I)	B,T,L
U111	Di-N-propylnitrosamine	B,T,L
U111	N-Nitroso-N-propylamine	B,T,L
U112	Ethyl acetate (I)	B,T,L
U112	Acetic acid, ethyl ester (I)	B,T,L
U113	Ethyl acrylate (I)	B,T,L
U113	2-Propenoic acid, ethyl ester (I)	B,T,L
U114	Ethylenebis(dithiocarbamic acid)	B,T,L
U114	1,2-Ethanediylbiscarbamodithioic acid	B,T,L
U115	Ethylene oxide (I,T)	B,T,L
U115	Oxirane (I,T)	B,T,L
U116	Ethylene thiourea	B,T,L
U116	2-Imidazolidinethione	B,T,L
U117	Ethyl ether (I)	B,T,L
U117	Ethane, 1,1'-oxybis- (I)	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U118	Ethylmethacrylate	B,T,L
U118	2-Propenoic acid, 2-methyl-, ethyl ester	B,T,L
U119	Ethyl methanesulfonate	B,T,L
U119	Methanesulforic acid, ethyl ester	B,T,L
U120	Benzo[j,k]fluorene	B,T,L
U120	Fluoranthene	B,T,L
U121	Methane, trichlorofluoro-	B,T,L
U121	Methane, trichlorofluoro-	B,T,L
U121	Trichloromonofluoromethane	B,T,L
U122	Formaldehyde	B,T,L
U122	Methylene oxide	B,T,L
U123	Formic acid (C,T)	T,L,AT
U123	Methanoic acid (C,T)	B,T,L
U124	Furan (I)	B,T,L
U124	Furfuran (I)	B,T,L
U125	2-Furancarboxaldehyde (I)	B,T,L
U125	Furfural (I)	B,T,L
U126	Glycidyladehyde	B,T,L
U126	1-Propanol, 2,3-epoxy-	B,T,L
U127	Benezene, hexachloro-	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U127	Hexachlorobenzene	B,T,L
U128	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	B,T,L
U128	Hexachlorobutadiene	B,T,L
U129	Hexachlorocyclohexane (gamma isomer)	B,T,L
U129	Lindane	B,T,L
U130	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	B,T,L
U130	Hexachlorocyclopentadiene	B,T,L
U131	Ethane 1,1,1,2,2,2-hexachloro-	B,T,L
U131	Hexachloroethane	B,T,L
U132	Hexachlorophene	B,T,L
U132	2,2'-Methylenebis(3,4,6-trichlorophenol)	B,T,L
U133	Diamine (R,T)	T,L
U133	Hydrazine (R,T)	T,L
U134	Hydrofluoric acid (C,T)	T,L
U134	Hydrogen fluoride (C,T)	T,L
U135(5)	Hydrogen Sulfide	T,L
U136	Cacodylic acid	B,T,L
U136	Hydroxydimethylarsine oxide	B,T,L

**All footnotes may be referenced at the end of Table C-2 of the Waste Analysis Plan.

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY[**]
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U137	Inden[1,2,3-cd]pyrene	B,T,L
U137	1,10-(1,2-phenylene)pyrene	B,T,L
U138	Methyl iodide	B,T,L
U138	Methane, iodo-	B,T,L
U140	Isobutyl alcohol (I,T)	B,T,L
U140	1-Propanol, 2-methyl-	B,T,L
U141	Benzene, 1,2-methylenedioxy-4-propenyl-	B,T,L
U141	Isosafrole	B,T,L
U142	Decachlorooctahydro-1,3,4-metheno-2H-cyclobuta[c,d]-pentalen-2-one	B,T,L
U142	Kepone	B,T,L
U143	Lasiocarpine	B,T,L
U144	Acetic acid, lead salt	L
U144	Lead acetate	L
U145	Lead phosphate	L
U145	Phosphoric acid, Lead salt	L
U146	Lead subacetate	L
U147	Maleic anhydride	T,B,L

[**]All footnotes may be referenced at the end of Table C-2 of the Waste Analysis Plan.

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U147	2,5-Furandione	T,B,L
U148	1,2-Dihydor-3,6-pyradizinedione	T,B,L
U148	Maleic hydrazide	T,B,L
U149	Propanedinitrile	B,T,L
U149	Malononitrile	B,T,L
U150	Alanine, 3-[p-bis(2-chlorethyl)amino] phenyl-,L-	B,T,L
U150	Melphalan	B,T,L
U151	Mercury	T,L,
U152	2-Propenenitrile, 2-methyl- (I,T)	B,T,L
U152	Methacrylonitrile (I,T)	B,T,L
U153 (5)	Methanethiol	L
U154	Methanol (I)	B,T,AT,L
U154	Methyl alcohol (I)	B,T,AT,L
U155	Pyridine, 2-[(2-dimethylamino)-2-thenylamino]-	B,T,L
U155	Methapyrilene	B,T,L
U156	Carbonochloridic acid, methyl ester (I,T)	B,T,L
U156	Methyl chlorocarbonate (I,T)	B,T,L
U157	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-,	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U157	3-Methylcholanthrene	B,T,L
U158	Benzenamine, 4,4'-methylenebis (2-chlora	B,T,L
U158	4,4'-Methylenebis (2-chloroaniline)	B,T,L
U159	2-Butanone (I,T)	B,T,L
U159	Methyl ethyl ketone (I,T)	B,T,L
U160	2-Butanone peroxide (R,T)	T,L
U160	Methyl ethyl ketone peroxide (R,T)	T,L
U161	Methyl isobutyl ketone (I)	B,T,L
U161	4-Methyl-2-pentanone (I)	B,T,L
U162	Methyl methacrylate (I,T)	B,T,L
U162	2-Propenoic acid, 2-methyl-methyl ester (I,T)	B,T,L
U163	Guanidine, N-nitroso-N-methyl-N'nitro-	B,T,L
U163	N-Methyl-N'-nitro-N-nitrosoguanidine	B,T,L
U164	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	B,T,L
U164	Methylthiouracil	B,T,L
U165	Naphthalene	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U166	1,4-Naphthalenedione	B,T,L
U166	1,4,Naphthaquinone	B,T,L
U167	1-Naphthylamine	B,T,L
U167	alpha-Naphthylamine	B,T,L
U168	2-Naphthylamine	B,T,L
U168	beta-Naphthylamine	B,T,L
U169	Benzene, nitro- (I,T)	B,T,L
U169	Nitrobenzene (I,T)	B,T,L
U170	Phenol, 4-nitro-	B,T,L
U170	p-Nitrophenol	B,T,L
U171	2-Nitropropane (I)	B,T,L
U171	Propane, 2-nitro- (I)	B,T,L
U172	1-Butanamine, N-butyl-N-nitroso-	B,T,L
U172	N-Nitrosodi-n-butylamine	B,T,L
U173	Ethanol, 2,2'-(nitrosoimino)bis-	B,T,L
U173	N-Nitrosodiethanolamine	B,T,L
U174	Ethanamine, N-ethyl-N-nitroso-	B,T,L
U174	N-Nitrosodiethylamine	B,T,L
U176	Carbamide, N-ethyl-N-nitroso-	B,T,L
U176	N-Nitroso-N-ethylurea	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U177	Carbamide, N-methyl-N-nitroso-	B,T,L
U177	N-Nitroso-N-methylurea	B,T,L
U178	Carbamic acid, methylnitroso-, ethyl ester	B,T,L
U178	N-Nitroso-N-methylurethane	B,T,L
U179	N-Nitrosopiperidine	B,T,L
U179	Pyridine, hexahydro-N-nitroso-	B,T,L
U180	Pyrrole, tetrahydro-N-nitroso-	B,T,L
U180	N-Nitrosopyrrolidine	B,T,L
U181	Benzemamine, 2-methyl-5-nitro	B,T,L
U181	5-Nitro-o-toluidine	B,T,L
U182	Paraldehyde	B,T,L
U182	1,3,5-Trioxane,2,4,5-trimethyl-	B,T,L
U183	Benzene, pentachloro-	B,T,L
U183	Pentachlorobenzene	B,T,L
U184	Ethane, pentachloro-	B,T,L
U184	Pentachloroethane	B,T,L
U185	Benzene, pentachloro-nitro-	B,T,L
U185	Pentachloronitrobenzene	B,T,L
U186	1-Methylbutadiene (I)	B,T,L
U186	2,3-Pentadiene (I)	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY[**]
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U187	Acetamide, N-(4-ethoxyphenyl)-	B,T,L
U187	Phenacetin	B,T,L
U188	Benzene, hydroxy-	B,T,L
U188	Phenol	B,T,L
U189 (5)	Phosphorous sulfide	L
U190	1,2-Benzenedicarboxylic acid anhydride	B,T,L
U190	Phthalic anhydride	B,T,L
U191	2-Picoline	B,T,L
U191	Pyridine, 2-methyl-	B,T,L
U192	3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	B,T,L
U192	Pronamide	B,T,L
U193	1,3-Propane sultone	B,T,L
U193	1,2-Oxathiolane, 2,2-dioxide	B,T,L
U194	1-Propanamine (I,T)	B,T,L
U194	N-Propylamine (I,T)	B,T,L
U196	Pyridine	B,T,L
U197	1,4-Cyclohexadienedione	B,T,L
U197	p-Benzoquinone	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U200	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[3,4,5-trimethoxy-benzoyl)oxy]-, methyl ester	B,T,L
U200	Reserpine	B,T,L
U201	1,3-Benzenediol	B,T,L
U201	Resorcinol	B,T,L
U202	1,2-Benzisothiazolin-3-0ne, 1,1-dioxide	B,T,L
U202	Saccharin and salts	B,T,L
U203	Benzene, 1,2-methylenedioxy-4-allyl-	B,T,L
U203	Safrole	B,T,L
U204	2,4,4-D,salts and esters	B,T,L
U204	Seleniumdioxide	L
U204	Selenious acid	L
U205	Selenium disulfide (R,T)	T,L
U205	Sulfur selenide (R,T)	T,L
U206	D-Glucopyranose, 2-deoxy-2(3-methyl-3-nitro-soureido)-	B,T,L
U206	Streptozotocin	B,T,L
U207	1,2,4,5-Tetrachlorobenzene	B,T,L
U208	Ethane, 1,1,1,2-tetrachloro-	B,T,L
U208	1,1,1,2-Tetrachloroethane	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U209	Ethane, 1,1,2,2-tetrachloro-	B,T,L
U209	1,1,2,2-Tetracloroethane	B,T,L
U210	Ethene, 1,1,2,2-tetrachloro-	B,T,L
U210	Tetrachloroethylene	B,T,L
U211	Carbon tetrachloride	B,T,L
U211	Methane, tetrachloro-	B,T,L
U213	Furan, tetrahydro- (I)	B,T,L
U213	Tetrachydrofuran (I)	B,T,L
U214	Acetic acid, thallium (I) salt	L
U214	Thallium (I) acetate	L
U215	Carbonic acid, dithallium (I) salt	L
U215	Thallium (I) carbonate	L
U216	Thallium (I) chloride	L
U217	Thallium (I) nitrate	L
U218	Ethanethioamide	B,T,L
U218	Thioacetamide	B,T,L
U219	Carbamide, thio-	B,T,L
U219	Thiourea	B,T,L
U220	Benzene, methyl-	B,T,L
U220	Toluene	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U221	Diaminotoluene	B,T,L
U221	Toluenediamine	B,T,L
U222	Benzenamine, 2-methyl-, hydrochloride	B,T,L
U222	O-Toluidine hydrochloride	B,T,L
U223	Benzene, 1,3-diisocyanatomethyl- (R,T)	T,L
U223	Toluene diisocyanate (R,T)	B,T,L
U225	Bromoform	B,T,L
U225	Methane, tribromo-	B,T,L
U226	1,1,1-Trichloroethane	B,T,L
U226	Methylchloroform	B,T,L
U227	Ethane, 1,1,2-trichloro-	B,T,L
U227	1,1,2-Trichloroetane	B,T,L
U228	Trichloroethene	B,T,L
U228	Trichloroethylene	B,T,L
U234	Benzene, 1,3,5-trinitro- (R,T)	T,L (not handled if shock sensitive)
U234	sym-Trinitrobenzene (R,T)	T,L(not handled if shock sensi- tive)
U235	Tris(2,3-dibromopropyl)phosphate	B,T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U235	1-Propanol, 2,3-dibromo-, phosphate (3:1)	B,T,L
U236	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-di-methyl-(1,1'-biphenyl)-4,4'diyl)]-bis (azo) bis(5-amino-4-hydroxy)-,tetra-sodium salt	B,T,L
U236	Trypan blue	B,T,L
U237	Uracil, 5(bis(2-chloromethyl) amino)-	B,T,L
U237	Uracil mustard	B,T,L
U238	Carbamic acid, ethyl ester	B,T,L
U238	Ethyl carbamate (urethan)	B,T,L
U239	Benzene, dimethyl-(I,T)	B,T,L
U239	Xylene (I)	B,T,L
U240	2,4-Dichlorophenoxyacetic acid, salts and esters	B,T,L
U243	Hexachloropropene	B,T,L
U243	1-Propene, 1,1,2,3,3,3-hexachloro-	B,T,L
U244	Bis(dimethylthiocarbamoyl) disulfide	B,T,L
U244	Thiram	B,T,L
U246	Cyanogen bromide	T,L
U246	Bromine cyanide	T,L

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U247	Ethane, 1,1,1-trichloro-2,2-bis (p-methoxyphenyl)	B,T,L
U247	Methoxychlor	B,T,L
U248	3-(alpha-Acetonylbenzyl)-4-hydroxycovmarin and salts, when present at concentrations of 0.3% or less	T,L
U248	Warfann, when present at concentrations of 0.3% or less	T,L
U249	Zinc phosphide, when present at concentrations of 10% or less	T,L (if non-reactive)
U271	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-, methyl ester (Benomyl)	AT,B,L,T
U278	1,3-Benzodioxol-4-ol,2,2-dimethyl-, methyl carbamate (Bendiocarb)	AT,B,L,T
U279	1-Naphthalenol, methylcarbamate (Carbaryl)	AT,B,L,T
U280	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban)	AT,B,L,T
U328	o-Toluidine	B,T,L,AT
U353	p-Toluidine	B,T,L,AT
U359	2-ethoxyethanol	B,T,L,AT
U364	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol)	B,T,L,AT

TABLE C-2

HAZARDOUS MATERIALS MANAGED AT MODEL CITY FACILITY**
(continued)

EPA Hazardous Waste No.	Substance	TSD(1)(2)(3)
U367	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, (Carbofuran phenol)	B,T,L,AT
U372	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim)	B,T,L,AT
U373	Carbamic acid, phenyl-, 1-methylethyl ester (Propham)	B,T,L,AT
U387	Carbamothioic acid, dipropyl-, S-(phenylmethyl)ester (Prosulfocarb)	B,T,L,AT
U389	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester (Triallate)	B,T,L,AT
U394	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester (A2213)	B,T,L,AT
U395	Ethanol, 2,2'-oxybis-, discarbamate (Diethylene glycol, dicarbamate)	B,T,L,AT
U404	Ethanamine, N,N-diethyl-, (Triethylamine)	B,T,L,AT
U408	2,4,6-Tribromophenol	B,T,L,AT
U409	Carbamic acid, [1,2-phenylanabis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl)	B,T,L,AT
U410	Ethanimidothioc acid, N,N'-[thiobis[(methylimimo)carbonyloxy]]bis-, dimethyl ester (Thiodicarb)	B,T,L,AT
U411	Phenol, 2-(1-methylethoxy)-, methylcarbamate (Propoxur)	B,T,L,AT

FOOTNOTES-

(1) The concentration and/or quantity of many of the cited waste constituents which may be accepted for treatment and/or disposal are limited by permit conditions and regulatory framework. The TSD Options selected for the cited materials are an estimate. Actual TSD Options will be driven by current permit conditions and current regulations, both State and Federal. Please refer to the introduction to this table for details (see pages C-1 through C-4).

(2) Disposal and/or Treatment Codes:
T-Transfer. (Transfer is always an option.)
L-Landfill.
B-Blend/Burn.
AT-Aqueous Treatment.

(3) The generator of Non-Bulk and Bulk containers must conform to the packaging requirements of:

49 CFR Subpart B - Table of Hazardous Materials and Special Provisions; specifically Part 172.101(i) Packaging Authorizations.

49 CFR Part 173 - Shippers - General Requirements for Shipments and Packagings.

49 CFR Part 178 - Specifications for Packagings.

Containers that arrive at the facility which do not meet the stated USDOT specifications shall not be shipped out of the facility unless the contents of the container are placed into a container which meets USDOT specifications. Containers that arrive at the facility which appear to have obvious signs of structural damage or deterioration, or which are found to be leaking shall either be repaired so that the containers meet RCRA & USDOT container specifications, overpacked into containers meeting RCRA & USDOT container specifications or shall be emptied and their contents placed into containers meeting RCRA & USDOT container specifications or processed immediately.

(4) These waste codes refer only to waste that may be classified as derived from F020-F023 and F026-F028 (i.e. leachate). No current production waste or out-dated products with these codes will be accepted. See Condition E.1.c.v in Exhibit F of Schedule 1 of Module I for storage and disposal requirements for these wastes.

(5) Due to the hazards posed by concentrated forms of these substances, only treatment residues and contaminated media such as soil, water, debris, etc. will be managed.

* Depends on DOT classification.

C-2 Waste Analysis Plan

In accordance with the regulatory requirements set forth in 6 NYCRR 373-1. CWM Chemical Services, L.L.C. (CWM) has developed this Waste Analysis Plan as an integral part of the 373-2 Permit Application for the Model City treatment, storage and disposal facility located in Niagara County, New York. The procedures set forth in this plan dictate that this facility will be in compliance with all requirements of 6 NYCRR 373-2.2(e). A copy of this plan will be available at the facility at all times.

C-2a Introduction

The purpose of this Waste Analysis Plan (WAP) is to identify and document the necessary sampling methodologies, analytical techniques and overall procedures which are undertaken for all wastes that enter this facility for storage, treatment or disposal. Specifically the plan delineates the following:

- Analytical Parameters, Techniques and Rationale - Section C-2b outlines the parameters and rationale CWM will utilize to determine or identify certain waste properties to ensure proper management of the waste at the site. Section C-2h outlines the analytical techniques.

- Sampling Methodology - Section C-2c outlines the proper sampling method(s) for a given waste type (solid, sludge, liquid) and containment (drum, tank, impoundment pile, etc.). CWM personnel can then obtain waste identification samples to help ensure accurate analytical results when a waste is analyzed.

- Pre-Acceptance Procedures - Section C-2d outlines the procedural steps CWM will take to evaluate the acceptability of a candidate waste stream pursuant to permit conditions and operating capabilities prior to acceptance of the waste for management at the site.

- Incoming Load Procedures - Section C-2e outlines the procedural steps CWM will take to identify the waste shipments delivered to the site.

- Process Operations Procedures - Section C-2f outlines the procedural steps CWM will take in regard to each management unit at the site.

- Quality Control Policy - Section C-2g outlines the quality control policy this site will follow to achieve high quality analytical results.

It is the policy of the Model City facility that all wastes handled by this facility will be subjected to these procedures. This is to help ensure that this facility will be in compliance with applicable permits and regulations.

In addition, the analytical results of incoming waste shipments requiring analysis as part of the incoming waste shipment identification, as well as the analysis and information developed as part of the pre-acceptance procedures, are maintained in the site's operating record.

The forms shown within this WAP are typical forms currently used by the site. These forms may require updating based upon changes in regulations, customer needs, operations or company policy dictate. Any changes in content, rather than format, will be forwarded to the NYSDEC for review.

For the purpose of sampling and testing, "CWM," means any Chemical Waste Management (CWM) laboratory or Approvals Group or CWM subsidiary laboratory or CWM approved contract laboratory.

The Approvals Manager, Laboratory Manager, Technical Manager, General Manager or designee are individually and collectively herein referred to as "site management".

The company strives to maintain, at all times, complete compliance with the hazardous waste regulations. Because new testing requirements, such as those promulgated under the land disposal restrictions, often become effective prior to the time WAP revisions can be formally made and approved by all appropriate agencies, it is impossible to have in place an approved WAP meeting all the conditions of the immediately effective regulatory requirements.

In light of these facts, the facility will have in place a written protocol specifying the new testing and frequency requirements prior to acceptance and/or processing of the regulated waste. The facility may also periodically review the protocol to reflect scientific advances or additional regulatory requirements. A permit modification of the WAP will be submitted as needed after the effective date of a promulgated change to the methods in SW-846. Also, 6NYCRR Part 373-1.7 gives rules to be followed for newly listed or identified wastes.

C-2b <u>Analytical Rationale</u>

A waste characterization is supplied to CWM by the generator (see Section C-2d(1) for discussion regarding the information or data to be supplied by the generator) on a Waste Profile, designed to provide all the information required by 6 NYCRR 373-2-2(e)(1). The analyses performed by CWM ensures that the waste description matches the identity of the waste designated on the accompanying manifest or shipping paper and the Waste Profile. The analysis will also help to ensure that the appropriate treatment, storage, and disposal techniques can be utilized. The parameters utilized by CWM to determine waste identity are classified into two categories:

- o <u>Mandatory Analyses</u> - are performed on incoming load samples, except where noted herein, and when necessary on a pre-acceptance sample.

- o <u>Supplemental Analyses</u> - are performed when necessary to augment existing information on the waste.

This tiered approach provides CWM with sufficient information to properly manage a given waste stream.

The parameters which constitute the "Mandatory Analyses" and "Supplemental Analyses" are identified below. The analytical methods which may be utilized to determine these parameters are described in Section C-2h. Analyses are identified in Section C2-h as either "unique" (developed by CWM and meet CWM performance standards) or "standard" (recognized by the U.S. EPA, ASTM or other recognized sources e.g., AOAC) analytical techniques. The analytical parameters and techniques given in this text (whether standard or developed by CWM through its operating experience) have been chosen for their ability to provide the information required to properly manage a waste.

A summary of the analytical parameters within each category and the rationale behind their usage is provided herein (also see Section C-2f). Analyses are not necessarily repeated for sequential activities or movement of the same waste within the facility unless required by changes in the waste's identity, as determined by site management. The Laboratory Manager may waive specific Mandatory or

Supplemental Analyses if performing the analysis presents a safety hazard in the laboratory (e.g., PCB extraction on an oxidizing waste).

C-2b(1) Mandatory Analyses

The "Mandatory Analyses" include screening procedures that are performed to provide a general identification of the waste, and are used to ensure that the method of management selected is suitable for that particular waste. The Mandatory Analyses are shown on Table C-3. These analyses are performed on all wastes, except on the occasions when a test is inappropriate as described below. These analyses are based on procedures and protocol formulated by CWM and meet CWM performance standards or are based on ASTM, "Standard Methods", or other sources recognized by EPA. The parameters and associated rationale of the "Mandatory Analyses" are as follows (see Section C2-h for the analytical techniques which may be utilized):

- o Physical Description is used to determine the general physical characteristics of the waste. This facilitates subjective comparison of the sampled waste with prior waste descriptions or samples. It is also used to identify the presence or absence of free liquids (includes paint filter test if needed) and notes any dust potential.

- o pH Screening is undertaken to indicate the pH range and the general corrosive nature of the waste. pH screening may not apply to certain waste types, e.g., organic waste, or insoluble solid waste.

- o Water Mix Screening is used to determine whether the waste has a potential to vigorously react with water to form gases or other products, or whether it generates significant heat. This testing does not apply to wastes that are already in contact with excess water, or for which sufficient analytical data exist that indicate no potential reactivity with water.

- <u>Flammability Potential Screening</u> is used to indicate the fire-producing potential of the waste. This testing can be applied to all waste liquids, semi-solids, but need not be applied if other information (e.g., Waste Profile in conjunction with the results of the other screens, MSDS, etc.) indicates the waste is not ignitable.

TABLE C-3

Usage of "Mandatory Analyses"

(applicability of the parameters to each management option)

Parameters	Pre-Acceptance[1]	Incoming Shipment	Wastewater Treatment (Ag. Liq.)	Fuel Blending (Org. Liq.)	Landfill (Solid Sludge)
Physical Description	X	X	O	O	O
pH Screening	X	X	O	O	O
Water Mix Screening	X	X	O	O	O
Flammability Potential Screening	X	X	O	O	O
Cyanide Screening/ Quantification	X	X	O		O
Sulfide Screening/ Quantification	X	X	O		O
Radioactivity Screening	X	X	O	O	O
PCB Screening/ Quantification	X	X		O	
Suitability for Landfill	X				O

[1] The pre-acceptance sample may not always be necessary, see Section C-2d(1).
X - as outlined in text.
O - test provides waste property information which may be useful for these processes.

- o Cyanides Screening is used to determine whether the waste produces hydrogen cyanide upon acidification below pH 2. It is not required if the pH of the aqueous waste is less than 6.0, or if the waste is organic. A positive screen may indicate the need for further quantitative testing to ascertain whether the waste meets the landfill cyanide limit (Section C-1, Item 8).

- o Sulfides Screening is used to determine whether the waste produces hydrogen sulfide upon acidification below pH 2. It is not required if the pH of the aqueous waste is less than 6.0 or if the waste is organic. A positive screen may indicate the need for further quantitative testing to ascertain whether the waste meets the landfill sulfide limit (Section C-1, Item 8).

- o Radioactivity Screening is performed to screen wastes for radioactivity above background levels.

- o PCBs are run on waste targeted for fuels to indicate whether PCBs are present in oil or solvent wastes to be blended and to ascertain their concentration. It is not required on a PCB containing material that will be managed as a PCB waste.

- o Suitability for landfill is a testing program that assesses the acceptability of the waste stream pre-acceptance sample, when necessary, for land disposal. Waste streams that are to be land disposed are classified into general categories. The test requirements and rationale for each of these categories is outlined below. The miscellaneous special wastes are exempt.

1. Inorganic solids and sludges with no RCRA metals (e.g., calcium fluoride, sulfate, and phosphate mixture)
   - o Mandatory analyses.

2. Soil with inorganic contamination, no RCRA metals (e.g., small spill cleanup from a caustic type solution spill)
   - o Mandatory analyses.

3. Inorganic process sludges and solids with metals (e.g., WWT sludges with F and D codes)
   - o Mandatory analyses.
   - o Leachable metals assessment. If the waste exceeds the LDR limits, a stabilization evaluation may be run.
   - o If incomplete organic analysis is provided by the generator, a VOC analysis or other approved organic methods may be performed to confirm LDR for hazardous waste or 2% Organic Limit compliance for non-hazardous waste.

4. Soil or other inorganic solids with metals (e.g., fly ash with lead, D code materials)
   - o Mandatory analyses.
   - o Leachable metals assessment as described for in item number 3, bullet two above.

5. Inorganic solids with cyanide, may include metals (e.g., potliner)
   - o Mandatory analyses.
   - o If cyanide screening is positive, analyze for cyanides amenable to chlorination or total cyanide to determine whether the waste qualifies for land disposal.
   - o Leachable metals assessment may be performed as described in item 3, bullet two above.

6. Nonhazardous non-petroleum organic solids or sludges (e.g., latex sludge, PCBTF waste)
   - o Mandatory analyses.
   - o VOC analysis to confirm the 2% Organic Limit may apply on a case-by-case basis.

7. Soil or other solids contaminated with nonhazardous non-petroleum organics (e.g., soil with dioctyl adipate)
   - o Mandatory analyses.
   - o VOC analysis to confirm the 2% Organic Limit may apply on a case-by-case basis.

8. Soil or other solids contaminated with spent solvents (F codes), HOCs (any code) and for any other RCRA hazardous organic substance (K, U, P or D codes).
   - o Mandatory analyses.
   - o These materials are restricted wastes. A certification backed by analytical data must be provided by the waste generator or treater prior to and/or with the first shipment for many of these wastes. It is therefore expected that the generator will provide the necessary organic analytical data. If the analytical data is not provided by the generator, the analysis may be performed by CWM.

9. Soil or other nonhazardous wastes contaminated with oil or other petroleum products (e.g., oil sludge, soil contaminated with petroleum hydrocarbons)
   - o Mandatory analyses.
   - o Wastes not from a virgin single substance spill will be analyzed for PCBs if the generator does not provide data demonstrating PCBs are not present.

10. Waste materials that do not clearly fall into one of the above-defined categories will be designated as the category that most closely matches the Waste Profile description of that waste or the Waste Profile information will be used to designate a series of tests that are most appropriate for that waste.

Based upon the Waste Profile information, other tests may be necessary. The Additional Review Program, which is used to spot check incoming landfill waste shipments, is described in Section C-2f(5), Landfill Disposal.

C-2b(2) Supplemental Analyses

Supplemental Analyses are performed to further identify wastes as appropriate. The results of these analyses provide the site management with another level of confidence concerning the proper means of treatment, storage and disposal.

These analyses are based on procedures and protocol formulated by CWM and meet CWM performance standards or are based on ASTM, "Standard Methods", or other sources recognized by EPA. The parameters and associated rationale of the "Supplemental Analyses" are as follows (see Section C-2h for the analytical techniques which may be utilized):

- o <u>Ash</u> - the percent ash is determined on a completed fuel blend if the receiving facility requests it.

- o <u>Chromate</u> - by test kit is used to screen for the presence/absence of hexavalent chromium. Waste streams suspected of containing Cr^{+6} may be screened prior to pumping into a tank. A waste batch may be screened to ensure no Cr^{+6} is present prior to alkalization, due to the high solubility of $Cr(OH)_6$.

- <u>Compaction Testing</u> determines liquid loss during compaction of the waste following the structural integrity portion of the EPA toxicity method to ensure that waste meets maximum liquid loss limit of 5% specified in TSCA approval letter for certain PCB wastes.

- o <u>Compressive Strength</u> - determines the compressive strength of wastes and treated wastes.

- o <u>Conductivity</u> - is performed on site surface waters. It is a technique that quickly assesses general contamination. It is run on request.

- o <u>Density</u> - indicates mass per unit volume of waste.

- o <u>Leaching Procedure</u> - (currently called "TCLP") determines if a waste leaches any of the characteristic constituents above the specified regulatory thresholds.

- o <u>Flash Point</u> further characterizes ignitable wastes to establish proper storage mode and conformance with permit conditions. A closed cup is used for liquids, and solids.

- o <u>Fluoride</u> - either soluble (as a screen) or total is used to determine the fluoride concentration of a wastewater stream for species control in WWT plant. Fluoride can also be used to demonstrate compliance with an LDR standard.

- o <u>Ferrous</u> - by test kit is used to monitor the presence of ferrous iron and estimate its concentration. Ferrous sulfate is frequently purchased and used as a reducing agent in the WWT plant.

- o <u>Free Cyanide</u> - a test is used to determine the cyanide concentration on an aqueous waste which had a positive screen using the cyantesmo paper.

- o Free Sulfide - a test is used to determine the sulfide concentration on an aqueous waste which had a positive screen using lead acetate paper.

- o Heating Value - the heating value (BTU/lb) is performed to determine the suitability of a material for a fuel blend. BTU analysis (for wastes to be included in a blend that will be used as a fuel in boilers or industrial furnaces [BIF]) will only be run if the BIF does not have a Certificate of Compliance.

- o Liquid Waste Compatibility - assesses the compatibility of waste shipments received with those currently stored in tanks or process units. This test is required before any material is added to the tank or unit.

- o AWT Metals (e.g., Cu, Cr, Cd, Fe, Mn, Ni, Zn, Pb) is used to determine potential salt precipitation on wastewater treatment streams. When necessary (see Section C-2d(1)), a pre-acceptance wastewater treatment candidate is analyzed for these metals. The efficiency of metals removal (presence of complexing agents) may be further assessed by metals analysis after bench scale lime treatment.

- o Other Metals (e.g., As, Se, Hg, Ag, etc.) may be analyzed as needed. For example, Silver is also analyzed on TCLP extracts of stabilized F006 wastes to ensure compliance with treatment standards.

- o Microwave Digestion for Metals Analysis - is used to obtain a rapid sample preparation for metals analysis.

- o Organic Priority Pollutants - analysis identifies and quantifies organic priority pollutants and other constituents present in a waste.

- o Organics Screening - is performed in order to determine whether or not a waste contains various specific organic compounds (e.g., pesticides, herbicides, PCP, TPH, etc.).

- o Oxidizer Screening - is used to indicate the presence of strong oxidizers. It may be used any time a waste is suspected of being an oxidizer.

- o Liquid Determination is used to indicate if free liquid is present in a solid or semi-solid material if this is not apparent by inspection.

- o PCB Screening is performed in order to determine whether or not PCBs are present in a waste.

- o Percent Halogen/Sulfur - an analyses is used to determine the concentration of fluoride, chloride, bromide, and sulfur on a combusted fuel sample. These anions, as well as nitrate, nitrite, and phosphate may also be determined directly on an aqueous material using the ion chromatograph. Direct injection may be employed whenever the identity of an inorganic salt or acid needs to be confirmed.

- o % Solubility - is determined gravimetrically if a solid waste destined for land disposal is suspected to be greater than 10% water soluble. This test is applied if solubility is not readily apparent from the Waste Profile description.

- o pH - provides a more precise measurement of pH than pH screening. It is used to monitor various steps of the AWT process.

- o Phosphate - by test kit is used to monitor the presence of phosphate in the AWT carbon beds, which is necessary to prevent bridging. It is generally checked daily during operation.

- o Phenols - by test kit is used to monitor the phenols level in the influent and effluent of the WWT carbon beds.
- o Pour Point - to determine whether a material is "pourable" at a specified temperature.

- o Settleable Solids - are determined on the discharge of treated wastewater or on site surface waters in accordance with the facility's SPDES permit.

- o TOC - may be used to determine the soluble organics concentration of a wastewater.

- o Total Cyanides (Distillation with Magnesium Chloride) - quantifies the concentration of all free and most complexed cyanides. It may be used to determine compliance with an LDR standard.

- o Total Sulfides is used to quantify the concentration of total sulfide. It may be used to determine compliance with an LDR standard.

- o 2% Organic Limit Analyses - is used to screen wastes for the presence of unexpected organics or ensure compliance with the NYS 2% organic limit on non-hazardous wastes destined for land disposal.

- o Water Content is performed to determine the amount of free water.

Other parameters not listed here may be performed as required by regulatory change, policy revision, waste matrix, etc.

C-2c Sampling Methodology

Sampling is performed at the Model City facility by CWM and by (or as directed by) the waste generator at the generator's facility. Specific sampling procedures are dependent on both the nature of the material and the type of containment. SW-846 states that, "a less comprehensive sampling approach may be appropriate if information regarding the distribution of waste components is known or assumed." This section presents sampling methodologies to be utilized on-site by CWM personnel.

When a waste arrives at the facility for management, a determination has previously been made by the generator that the waste is either:

1. a listed hazardous waste in 6NYCRR Part 371.4, which meets or requires treatment to the LDR standards in 6 NYCRR Part 376;
2. a characteristic waste as defined in 6NYCRR Part 371.3, which meets or requires treatment to the LDR standards in 6 NYCRR Part 376; or
3. a waste material which is not a hazardous waste as defined in 6NYCRR 371.2.

The generator-supplied characterization provides CWM with information concerning both the distribution and nature of the waste components (see Section C-2d(1) for discussion regarding the information or data to be supplied by the generator). The purpose of the inspection, sampling or analysis when a waste material arrives at the site is to ensure that the shipped waste matches the description of the waste designated on the accompanying manifest or shipping paper and Waste Profile.

Therefore, CWM can often use a less comprehensive sampling approach, as described in Sections C-2c(2)(a) through C-2c(2)(d), (e.g., vertical compositing) to yield a waste identification sample (see EPA documents SW-846 "Test Methods for Evaluating Solid Waste", Third Edition, September 1986, Chapter Nine).

C-2c(1) General Methods and Equipment

As practicable, the sampling techniques used for specific types of waste correspond to those referenced in 40 CFR 261, Appendix I (6NYCRR Part 371, Appendix 19) and presented on Table C-4. Because Appendix I sampling methods have not been formally adopted by the EPA Administrator, CWM may use additional methods or may modify the technique as necessary to obtain a representative sample (see 40 CFR 261.20(c) Comment). Any changes made after final permitting will be forwarded to the NYSDEC for review and acceptance. The sampling equipment and procedures described in this WAP represent the facility's recommended sampling protocol for general types of waste material and containment. Specific waste materials or shipments may require different sampling techniques. Therefore, deviations from the recommended protocol do not constitute an excursion from acceptable sampling practices or the conditions of this WAP. All methodologies will be updated and revised as the references are updated and revised.

C-2c(2) Specific Methods and Equipment

In addition to ASTM and EPA sampling procedures, CWM has instituted specific methodologies for taking samples from various containment sources. The type of container may be transportable (e.g., such as drums), portable transport units (e.g., tanks, roll-off boxes, lugger boxes), and tanker or dump trucks; or stationary, such as tanks, in-process sources, waste piles, and containments. The sampling devices are selected depending on the size and type of containment and on the specific material involved. Detailed sampling procedures can be found in CWM's Standard Division Practices (SDPs). The device to be used in each situation is described below.

TABLE C-4

SAMPLING METHODS AND EQUIPMENT

MATERIAL (or waste type)	METHOD	EQUIPMENT
Extremely viscous liquid	ASTM D140[a]	Tubing, thief or Coliwasa
Crushed or powdered material	ASTM D346[a]	Tubing, trier, scoop, or shovel
Soil-like material	ASTM D1452[a]	Tubing, trier, auger, scoop, or shovel
Fly ash-like material	ASTM D2234[a]	Tubing, trier, auger, scoop, or shovel
Containerized liquids	ASTM-D5495	Coliwasa, tubing, weighted bottle, bomb, or tank sampling port
Additional methods:		
Industrial chemicals	ASTM E-300	
Soil & waste for VOCs	ASTM D4547	
Soil	ASTM D4700	
Liquids in pipes	ASTM D5013	
Pond Sampling	ASTM D5358	
Sampling with a trier	ASTM D5451	
Liquid in drums	ASTM D5743	
Volatile organics in soil and waste samples	Method 5035Ab	
Chapter 9	SW-846b	

[a] American Society for Testing Materials. ASTM International West Conshohocken, PA.

[b] Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, Third Edition, U.S. Environmental Protection Agency, Office of Solid Waste, Washington, DC, September 1986, as amended by Final Update I, July 1992, or more recent update or edition.

Access to any type of container will influence the location within the container from which samples can be taken. Samples will be taken to address vertical variations in the waste because there is a much greater tendency for wastes to be heterogeneous in a vertical rather than a horizontal direction, and horizontal variations are generally easier to detect. If examination indicates strata in the waste, then each layer may be composited in proportion to its estimated volume or sampled individually.

C-2c(2)(a) Containers

A container is a portable or stationary device in which a material is stored, transported, treated, disposed of, or otherwise handled. The sampling of small containers (e.g., drums, cartons, and other small units) varies with the physical nature of the waste material. For flowable materials, the sampling device of choice is either a Coliwasa unit or open tube sampler, which is used to draw a full vertical section. Drums of aqueous and organic liquids are sampled with a four foot glass tube. A composite sample may be obtained by mixing equal portions of each container included in the sampling lot. Solids or sludges or other small containers are sampled with a scoop (disposable plastic or using the bottle itself) or a shovel if a heavy digging tool is required. If the material on top appears non-representative (e.g., "speedi-dry, "oil dry", etc.), a subsurface sample will be obtained. The top portion may be transferred to another container in order to obtain a subsurface sample. Alternately, a metal sample thief, trier or tubing (a piece of conduit or small diameter pipe) may be used to obtain a core sample of the drummed solid. An Easy Draw syringe or similar device may be used to obtain a sample of a solid waste for VOC analysis.

Large containers and tanks for flowable materials may be either stationary or mobile. The sampling device of choice for a bulk aqueous or organic liquid in a tank truck is either a Coliwasa or an open tube sampler. A tank truck is sampled with a coliwasa sampler. If a separate top sample is also desired (e.g., to obtain a sample of a thin oil skim), a sample bottle attached to a string or dipper may be employed.

Tanks containing liquids are generally not amenable to sampling via a tubing or Coliwasa sampler due to their size. If the tank has circulation capability, the contents of the tank are circulated to ensure thorough mixing, and a sample may be obtained in a container either at the pump discharge (an autosampler may be employed) or from the tank sampling port(s), or through a hatch. Tanks without circulation capability are sampled at various levels using a weighted bottle or bomb type sampler if stratification is suspected. In addition, samples may be taken from the tank sampling ports. If a top sample is desired and no sampling port is available, the top hatch is opened and a sample is obtained using a glass sample bottle attached to a dipper. Generally, top, middle, and bottom samples are obtained using a weighted bottle or bomb-type sampler. If layers are present, they may be run separately or composited depending on the information and/or analysis required (e.g., sampling may have taken place solely to identify the location and quantity of a water phase in a full tank).

Bottom sediment samples may be obtained via the bottom discharge valve on the tank.

A bulk solid or sludge in a dump truck is generally sampled using a disposable plastic scoop attached to a scoop extender rod according to the site SDP on sampling bulk solids. For inbound waste loads, a multi-point composite is taken. If a bulk load is to be sampled for VOCs to confirm compliance with the "2% Organic Limit" as part of the Additional Review Program, precaution should be taken to limit the loss of volatiles. If some horizontal stratification is suspected and is of concern (as indicated by the Waste Profile), a larger sampling tool such as a shovel may be used to dig into the waste or a core sample may be taken using a metal thief, trier or tube. If the material is fine and dusty and packaged in a large plastic envelope, a thief (grain sampler) may be used to puncture the envelope and obtain a sample. Landfill personnel are required to report to the laboratory any gross physical discrepancies in waste appearance, when a dump truck type shipment is unloaded in the landfill.

C-2c(2)(b) Process In-Line Sampling

The variability of the waste stream at any point in a treatment process is first determined from knowledge of the process producing the stream, or from the results of a preliminary investigation of the waste stream. Sampling frequency is based upon the waste stream's variability.

Process line samples are obtained via sample taps in the line. An individual sample may be obtained by flushing the tap and directly filling a sample bottle. If desired, a timed (automatic) composite sampler may be used to take samples.

C-2c(2)(c) Waste Piles

Waste accessibility, frequently a function of pile size, is a key factor in the sampling strategy for a waste pile. Piles are sampled by multiple vertical sections using triers, tubing, shovels, or similar devices. Large piles may be sampled with heavy tubing, soil augers, or through the use of excavation equipment such as a backhoe.

In cases where size impedes access to the center or bottom of a waste pile, a set of samples that is generally representative of the entire pile can be obtained by scheduling sampling to coincide with pile emplacement or removal.

C-2c(2)(d) Impoundments

The representativeness of the samples of the waste in a surface impoundment is dependent on the number of samples collected over the volume of the waste. A single sample may be collected for small surface area impoundments. Additionally, for large surface area horizontally displaced sampling may provide additional information. A weighted bottle, bomb sampler or peristaltic pump is generally used for sampling. Samples are composited if necessary. A multi-point composite is used for pond qualification for discharge.

C-2c(2)(e) LDR "Grab" Sampling

The current EPA guidance for RCRA sampling is SW-846, see 40 CFR 260.11, which specifies representative and composite sampling for waste characterization. This type of sampling provides averaged concentration values or properties. The Land Disposal Restrictions, 40 CFR 268, have specified the use of "grab" sampling for most of the compliance demonstrations to the Land Disposal Restrictions treatment standards. For a large container, more than one grab sample may be collected. For LDR compliance, none of the samples may exceed the applicable LDR standard(s).

C-2d Pre-acceptance Procedure

CWM has developed a series of control procedures to determine the acceptability of specific wastes for management at the site, referred to as the "Pre-acceptance Procedures." This acceptability decision is based on the conditions or limitations of existing permits and regulations, and capability to safely manage the waste at the site. The pre-acceptance procedures for this facility may be carried out at this facility, another CWM facility, or upon receipt of the load prior to its acceptance.

The pre-acceptance procedures include the following steps:

- Generator-supplied information is what a customer must provide to enable CWM to make a decision regarding the possible management of a candidate waste stream (see Section C-2d(1) for discussion regarding the information or data to be supplied by the generator).
- Initial review and/or analysis of the generator-supplied material allows CWM to conduct an initial evaluation for management capabilities at the facility.
- Disposal decision process is the process of reviewing all the documentation supplied by the generator and/or CWM and documenting the acceptance or rejection of the candidate waste stream.
- Re-evaluation process determines the frequency a waste stream will be re-evaluated once it has been accepted.

CWM maintains as part of it its pre-acceptance information generator supplied and CWM developed information. This information may be accessed electronically or via hard copy.

C-2d(1) Generator-Supplied Information

The waste generator will supply CWM with the following information and materials for each new candidate waste stream, except where noted herein.

- o Waste Profile, (typical form shown as Figure C-1 in Section C), which will contain pertinent chemical and physical data. At a minimum, the generator supplies all the information required by 6 NYCRR 373-2.2(e)(1) needed to characterize the waste for proper treatment, storage, or disposal.

- o A representative sample may not be required if CWM and NYSDEC determine that the pre-acceptance documentation supplied by the generator gives sufficient information to maintain compliance with the permit and operational constraints and that submittal of a sample would not aid in the disposal decision process (e.g. soil with a limited number of organic contaminates for which the generator has supplied chemical analysis). In addition, a sample may be waived if handling or obtaining a sample poses an unnecessary hazard of acute or chronic exposure of CWM employees to carcinogenic (e.g., asbestos). Also see Sections C-2d(1)(a) and C-2d(1)(b).

- o Land Disposal Restriction Information and/or Data (6NYCRR 376 and 40 CFR Part 268).

- o Other supporting documentation such as additional analytical results or a material safety data sheet (MSDS), as necessary to provide additional waste characterization.

C-2d(1)(a) Exceptions

No representative sample is required for the following:

- o Chemical waste from a laboratory. This is limited to discarded containers of laboratory chemicals (lab packs), lab equipment, lab clothing, debris from lab spills or cleanup, and floor sweepings. Lab pack chemicals are managed in accordance with all applicable NYSDEC regulations.

- o Articles, equipment, and clothing containing or contaminated with polychlorinated biphenyls (PCBs) (e.g., PCB solids, capacitors, transformers, gloves, aprons, etc.).

- o PCB draining and flushing fluids (e.g., PCB articles are flushed with a substance not a hazardous waste and placed directly into transport container).

- o "Empty" containers of waste materials, commercial products, or chemicals. This applies to a portable container which has been emptied, but which may hold residues of the product or chemical (e.g., portable tanks, drums, barrels, cans, bags, liners, etc.). A container shall be determined RCRA "empty" according to the criteria specified in 40 CFR Part 261.7 and 6NYCRR 371.1(f)(2).

- o Asbestos-containing waste from building demolition or cleaning. This applies to asbestos bearing waste insulation material (e.g., wall board, pipe insulation, etc.).

- o <u>Discarded, unused, off-specification, or outdated commercial products</u> (e.g., unused commercial product which has passed its allowed holding time). MSDS to be supplied or made available upon request.

- o <u>Non-hazardous soil</u> where appropriate analytical data has been furnished.

- o <u>RCRA or RCRA/TSCA contaminated soil</u> where analytical data that adequately characterizes the waste has been furnished.

- o <u>Residues and debris</u>. This consists of residue and debris from cleanup of spills or releases of a single chemical substance or commercial product or a single waste which would otherwise qualify as a "miscellaneous special waste" or one or more known substances.

- o <u>Chemical-containing devices removed from service</u>. Examples include cathode ray tubes, batteries, fluorescent light tubes, etc.

- o <u>Demolition wastes</u>. This consists of waste produced from the demolition or dismantling of industrial process equipment or facilities contaminated with chemical from the process. (This does not include wastes drained from such equipment).

- o <u>Cartridge filters</u>.

- o <u>Activated carbon, Ion exchange resin, molecular sieves (as adsorbed constituents cannot be readily desorbed to provide meaningful analysis).</u>

- o <u>Contaminated debris</u> (e.g., wood, building rubble, asphalt, concrete, tools, scrap metal, crushed glass, and plastic. This includes the last three items impregnated or coated with chemical substances).

- o <u>Waste from a remedial project</u> whose sampling and analysis plan was approved by Federal or State agency (e.g., CERCLA, Superfund, or Potentially Responsible Party (PRP) type project).

- o <u>Debris as defined at 40 CFR 268.2 and 6 NYCRR 376.1(b)(1)(vii).</u> These materials will be visually inspected prior to acceptance (see Section C-2e(2)) in order to ensure that the waste meets the definition of debris.

- o <u>Controlled substances regulated by the Federal Government</u> including drugs and/or materials from clandestine labs.

Requests for approvals of wastes defined as "miscellaneous special waste" are to be based only on the waste generator's written description of the waste. A sample is not required. The generator still must supply all the information required by 40 CFR 264.13(a) and 6 NYCRR 373-2.2(e)(1) and necessary to characterize, treat, store, or dispose of the waste. When any of these "miscellaneous special wastes", other than labpacks, are received at the facility for storage or treatment, they will, at a minimum, be visually inspected. In lieu of sampling and analysis, color, texture, or other applicable physical description will be documented. The presence of free liquid or any other physical differences from the profile will be documented. Any incidental odor will also be documented.

The request for approval of a miscellaneous special waste will be initiated by a Waste Profile (typical figure shown in Figure C-1 and/or Figure C-1a). Except for the analysis of a sample, the approval process will proceed as described in Section C-2d.

C-2d(1)(b) Standard Profiles

Standard Profiles may be used for waste streams which are similar in physical and chemical characteristics, generated by a specific industry or process, consistent with the USEPA approach of assigning a listed waste code to process wastes.

An analytical data base will be developed for a specific Standard Profile based on analytical data from waste streams that are representative of wastes from the specific industry, the process or historical data. CWM will review the data base and determine whether the individual waste streams are sufficiently similar in physical and chemical characteristics to an established Standard Profile.

Specific candidate waste streams which upon review are identified as conforming to an existing approved Standard Profile will be managed under the existing disposal decision, specific for that Standard Profile.

C-2d(2) Initial Review and Analysis

Once CWM receives the generator-supplied information, and it is received and reviewed, a determination will be made if further analyses by the generator or CWM are required. All waste samples, when necessary for the pre-acceptance evaluation, will be subjected to the "Mandatory Analyses" (Section C-2b(1) as appropriate. "Supplemental Analyses" (Section C-2b(2) are performed at the direction of the waste approvals personnel. Additional testing may also be requested by the Department pursuant to the waste stream approval condition for land disposal.

If, during the pre-acceptance procedure, CWM determines that the waste information indicated by the "Mandatory Analyses" does not generally conform to the information on the Waste Profile, the generator is notified of the apparent inconsistency. If the inconsistency is resolved, the pre-acceptance procedure continues. The waste may be rejected or accepted during this phase of the procedure.

CWM will not accept, for treatment or disposal, any current production waste or outdated products which are listed as hazardous waste by EPA because it contains, as a hazardous constituent (see 40 CFR Part 261, Appendix VII), a form of polychlorinated-dibenzo-dioxin (PCDD) or polychlorinated-dibenzo-furan (PCDF) (e.g., F020, F021, F022, F023, F026, F027, etc.). Only those waste materials that are classified as derived from F020 to F023 and F026 to F028 (e.g., leachate, filter cake from treatment of leachate, incinerator ash etc.) or media or debris contaminated with these wastes will be accepted at Model City. See Condition E.1.c.v in Exhibit F of Schedule 1 of Module I. Any pre-acceptance screening carefully reviews the Waste Profile for processes generating these wastes, waste names, and those hazard code identifications.

C-2d(3) Disposal Decision Process

The pre-acceptance procedure is concluded when the review of the generator supplied information and any appropriate mandatory analyses is complete. Figure C-2 (see Section C) presents an overview of the pre-acceptance process. At this time, CWM makes a "disposal decision" on the candidate waste.
Disposal decisions are based on:

- o Management methods available.
- o Conditions or limitations of existing permits and regulations.
- o Capability to safely manage the waste.
- o Waste Profile description of the process generating the waste.
- o Knowledge of the waste generating process.
- o Waste Profile description of the chemical and physical properties of the waste.
- o Any additional documentation supplied by the generator.
- o Results of any "Mandatory Analyses."
- o Results of "Supplemental Analyses" as appropriate.
- o Results of any treatability analyses
- o Management's technical experience and judgement.

C-2d(4) Re-evaluation Process

In accordance with NYCRR 373-2.2(e), a waste profile re-evaluation will be conducted when one of the following occurs:

- o A generator notifies CWM that the process generating the waste has changed;

- o The results of inspection or analysis indicate that the waste received at the facility does not match the identity of the waste designated on the accompanying manifest (or shipping paper) or pre-acceptance documentation (See Section C-2e); or

- o Every two years for wastes that are treated and/or disposed of at the site. CWM feels that a biennial waste recharacterization (or recertification by the generator), along with a vigilant incoming load screening program is sufficient to ensure that wastes are managed safely at the site and to ensure the information is accurate and up-to-date; or

- o Every two years. A biennial waste profile re-evaluation along with a vigilant incoming load screening program is sufficient to ensure that wastes that are to be transferred through Model City for disposal at another CWM facility continue to be properly managed.

For bullet items one, three and four above, this re-evaluation process consists of a review of the paperwork to ascertain that the analytical data is accurate and current and that it is sufficient to properly manage the waste as intended. The procedure typically involves comparing the current waste profile to the available results of routine inspection, sampling, and analysis obtained upon receipt of an incoming load of the waste stream. To augment this review, if existing analytical is not sufficient, the generator may be asked to review the current waste profile, to supply a Profile Recertification form, to supply a new profile, and/or to submit a sample for analysis, or CWM may obtain a sample from a shipment of the waste.

C-2e <u>Incoming Load Procedure</u>

The incoming load procedures allow CWM to identify that a waste shipment delivered to the site matches the description on the Waste Profile referenced on the accompanying manifest and secondarily, to ensure the proper management method. This is accomplished through the following procedural steps:

- o <u>Manifest Review</u> outlines the weight and piece count verification, manifest review, and discrepancy resolution.

- o <u>Inspection and sampling</u> outlines the inspection and sampling of incoming waste shipments.

- o <u>Analysis</u> outlines the analyses CWM will perform on each sample.

- o <u>Decision evaluation logic</u> outlines the general logic utilized by CWM personnel in deciding whether to accept or reject a particular waste shipment.

Waste shipments that have arrived at the facility are considered to be in the receiving process until such time that the receiving personnel makes a final decision regarding waste acceptability; at such time the wastes are considered accepted.

In addition, the first shipment of wastes that are subject to the Land Disposal Restrictions (6NYCRR Part 376 & 40 CFR Part 268) and have been treated, exempted, varianced, or meet the appropriate treatment standard or prohibitions without treatment must be accompanied by a form from the treater or generator certifying that the treated, exempted, or varianced waste meets the appropriate treatment standard, prohibition, exemption, or variance (or that the waste naturally meets the appropriate treatment standard prohibition) and includes any applicable analytical data or reference to such data (see Section C-2d(1) third bullet) in accordance with 6NYCRR Part 376 & 40 CFR Part 268. Generators of landfill candidate wastes must be informed that a new LDR form is required if the EPA waste codes for a waste changes.

Furthermore, wastes which are subject to the Land Disposal Restrictions and require treatment must be accompanied by a form from the generator notifying the treater that the waste requires treatment and all applicable prohibitions which must be met and includes any applicable analytical data or reference to such data in accordance with 6NYCRR Part 376 & 40 CFR Part 268. For generators who ship multiple loads of the same LDR waste to the Permittee's facility, providing a notification form with the first load and annually thereafter, is sufficient.

Federal and NYS regulation states that, for containerized waste intended for landfilling where the generator (or treater) has previously identified (see Section C-2d(1)) that sorbents have been added to the waste to sorb free liquids, a determination will be made, prior to disposal that no biodegradable sorbents (as described in 40 CFR Part 264.314(e) and 6 NYCRR 373-2.14(j)) are included in the waste. For landfill candidate wastes, such certification may be provided by the generator's signature on the Waste Profile.

C-2e(1) Manifest Review

Upon arrival at a CWM facility, bulk loads normally will be weighed (gross weight) as a first step to confirm manifest quantity. The empty vehicle will be weighted (tare weight) when exiting the facility. Off-site certified weighing will be accepted. Waste shipments received in drums will be subjected to a piece count during the receiving process.

The manifest is reviewed for completeness and obvious errors (eg. DOT shipping name of "Waste Bricks, NOS"). Any incomplete items discovered or corrections made are noted on the discrepancy section of the manifest.

The generator or transporter (as appropriate) will be contacted concerning any significant manifest discrepancies (defined by 6NYCRR 373-2.5 as a variation of >10% weight for bulk loads or any variation in piece count; discrepancies of waste type are generally discovered later during the acceptance process) and CWM will attempt to resolve the issue. Any significant manifest discrepancy will be noted in the discrepancy identification section on the manifest or will be reported to the DEC via a manifest discrepancy notification letter. If a significant discrepancy can not be resolved, the proper agency notification will be made as required by regulation.

C-2e(2) Inspection and Sampling

Each waste shipment will be inspected at a CWM site and all sampling will be done in accordance with Section C-2c. (Wastes exempted from sampling are noted in Sections C-2d(1)(a) and the last paragraph of this section.) All non-miscellaneous bulk solids will be sampled according to site SDP, unless a reduced frequency for a given profile has been approved by the DEC.

This procedure may be varied, under certain circumstances, for example, to allow CWM personnel to perform generator site inspection/sampling of large remedial actions, lagoons, impoundments, and waste piles, debris or under other circumstances as approved by NYSDEC. This variance will be on a job-specific basis or process specific basis and documentation of the sampling and analysis plan will be detailed and filed with the waste profile.

In the case of drums or portable tanks, all containers will be inspected with at least 10% of each profile solid waste containers randomly selected for sampling. For containerized liquid waste, 100% of the containers will be sampled. Container samples that are related to one generator and one process may be composited prior to analysis, providing the individual samples are similar in physical appearance. Waste stream samples may be further composited for analysis to evaluate suitability for a process or disposal. All containers destined for on-site landfill disposal shall be opened for visual inspection of their contents, with the following exception provided for asbestos containers. Sampling and interior inspection of asbestos containing containers is waived as long as the generator certifies that there is no void space present and the following procedures are performed:

- CWM will tap test all asbestos containers to confirm that there is no void space.
- All containers with debris containing asbestos requiring micro or macro encapsulation and with asbestos waste requiring stabilization, will have their contents inspected in the Mixing Pit Tanks as the material is prepared for processing.
- At least one (1) asbestos container from each generator's shipment which is destined for direct on-site landfill disposal shall be randomly selected and opened for visual inspection of its contents by asbestos qualified personnel under controlled conditions. In addition, for generator shipments greater than eighty (80) containers, one (1) out of every eighty (80) containers shall be opened for visual inspection. If wastes/materials other than those specified on the waste profile are observed in the container, the inspector shall note the waste profile identification, and arrangements shall be made to open and inspect any other asbestos containers associated with that particular waste profile shipment.

See Section C-2d(1)(a) for additional sampling exceptions.

Site management may waive the sampling and analysis of an incoming waste shipment that is only for storage at Model City and will be trans-shipped to another facility for management.

The sampling and analysis of "miscellaneous special waste" is not required, unless specifically requested by the site management. These materials are not sampled because they present extraordinary health and safety hazards, (e.g., asbestos), exhibit unusual or impractical sampling and analytical complication (e.g., lab packs) and/or are of such a nature that their contents are known in sufficient and reliable chemical and physical detail that sampling and analysis is not warranted (e.g., outdated commercial products).

C-2e(3) Analysis

Samples will generally be analyzed in accordance with Section C-2b and C-2f of this text. At a minimum, samples will be subjected to the appropriate "Mandatory Analyses" (wastes exempted from Mandatory Analyses are noted in Sections C-2d(1)(a) and C-2e(2)). "Supplemental Analyses" will be performed as directed by site management and as specified in Section C-2f. Other CWM personnel (or a CWM-approved laboratory) can provide the Mandatory and/or Supplemental Analyses required at incoming prior to or concurrent with the arrival of the shipment.

Under the Additional Review Program (ARP), for wastes to be land disposed, the on-site DEC monitor may identify additional testing to be performed on any non-miscellaneous waste destined for the landfill. This program is further defined in Section C-2f(5). Further testing may be required if the results of the mandatory analyses indicate unexpected information with respect to pre-acceptance analytical results, or if site management has reason to suspect that the waste composition has changed. CWM will conform with the quality control policy described in Section C-2g.

C-2e(4) Decision Evaluation Logic

The general logic utilized by site management in deciding whether to accept or reject a particular waste load is depicted in Figure C-3. The specific major decision points are the need for additional analyses, the actual waste identification, an evaluation of whether a waste is found to be in conformance or non-conformance, and an evaluation of whether wastes found to be in non-conformance can be accepted or should be rejected.

- The need for additional analyses. Site management decides whether additional analyses are required for a particular waste based on the following:

  - Results of "Mandatory Analyses"
  - Knowledge of generator and/or waste-generating process
  - Results of pre-acceptance evaluation
  - Knowledge of the limitations of the targeted waste management units
  - Experience of site management determining the need to know more information

Further testing may be required if the results indicate unexpected characteristics with respect to pre-acceptance analytical results, or if site management has reason to suspect that the waste composition has changed.

- The actual waste identification. The effectiveness of the waste identification step is dependent on some or all of the following components:
  - Inspections
  - Sampling
  - Analytical results
  - Waste profile
  - Waste manifest
  - Restricted waste notification and/or certification form, where appropriate
  - Pre-acceptance information and/or analytical results
  - Site management's judgment
- An evaluation of whether a waste is found to be in conformance or nonconformance. CWM uses four major criteria to determine the existence of an inconsistency among the Waste Profile, the manifest, and the incoming waste load screening analysis. They are:
  - For bulk wastes, variations greater than 10% in weight (6NYCRR 373-2.5)
  - For batch wastes (e.g., drums, bags, etc.) any variation in piece count (6NYCRR 373-2.5)
  - If inspection or analysis of any waste determines obvious differences such as waste solvent substituted for waste acid or toxic constituents not reported on the manifest or shipping paper (6NYCRR 373-2.5)
  - If the inconsistency changes the originally approved method of management.

(Note: The first 3 items are considered to be significant manifest discrepancies as per 6NYCRR Part 373-2.5.)
Non-conformance that do not fall within these criteria are considered to be "minor" and are not subject to a recharacterization review unless CWM has reason to believe that the variation is a continuing deviation and that a particular waste stream indeed is different from its documented values. Significant inconsistencies in waste type, as defined by the last two criteria above, result in recharacterization only if the inconsistency cannot be reconciled with the generator or CWM has reason to believe that the waste composition has changed.

- An evaluation of whether there is a discrepancy of waste type

The results of waste inspection or analysis or a comparison of the information on the Waste Profile with that on the manifest may identify a significant manifest discrepancy of waste type (eg. a waste solvent has been substituted for a waste acid). These types of discrepancies must be handled the same as the other types of significant manifest discrepancies (piece count or weight variation) as described in section C-2e(1).

The results of the inspection/analysis or comparison of the manifest to the Waste Profile may also identify a profile discrepancy in that the waste received does not appear to match the profile and may not be suitable for the intended treatment/disposal method. This type of discrepancy may or may not also be a significant manifest discrepancy. For example, a bulk load of lead contaminated soil is received under a Waste Profile for lead contaminated debris. The manifest information for this waste (eg. DOT shipping name, EPA code, etc.) may be the same for these two wastes, however two different treatment techniques may be required for these LDR restricted wastes. The generator or other appropriate contact is contacted for assistance in the resolution of these types of significant profile discrepancies. Recharacterization of the wastestream may be initiated if the waste appears to be substantially different than represented on the Waste Profile.

The detection of a waste constituent that was not recorded on the Waste Profile or manifest would not necessarily trigger a recharacterization of the waste stream if the inconsistency could be justified by the generator, and was not a continuing variation.

- o Acceptance of waste. If no significant discrepancies of waste type are identified, the waste is accepted.

- o An evaluation of whether discrepant wastes can or should be accepted or rejected. Wastes found to be discrepant as defined above may be rejected; or they may be re-evaluated for possible acceptance at the site despite the discrepancy. A profile modification may be requested from the generator. This procedure is intended to prevent the unnecessary movement of a waste material back and forth between the facility and the generator in cases where the material can be readily handled by the facility. By eliminating this unnecessary movement, CWM is attempting to reduce further possible exposure of this waste to human health or the environment. The re-evaluation procedures are designed to determine whether a waste material, in its form as identified by CWM (i.e., inconsistent with Waste Profile and/or manifest data), can be handled by the facility, and whether the generator concurs with the site's identification. The re-evaluation will be based on the following criteria:

  - Permit authorization
  - Discussions with the generator (as per 6NYCRR 373-2.5)
  - Availability of appropriate treatment/disposal technology
  - Site Management's judgment

If all of the above criteria and results of the "Supplemental Analyses," if any, indicate the waste can be accepted and the generator concurs, the waste disposal decision form is modified by CWM if the discrepancy will be a continuing variation and changes the originally approved method of management. Pursuant to 6NYCRR 373-2.5, CWM will discuss and attempt to resolve with the generator any discrepancy between the received waste and that shown in the manifest. If a discrepancy cannot be resolved within 15 days of shipment receipt, the appropriate regulatory agency will be notified, in writing, of the discrepancy and the attempts to reconcile it, including a copy of the involved manifest.

The final decision to reject all or part of a waste shipment is made by site management. Decisions are made as soon as the facility has considered all of the applicable information listed above. The facility strives to complete these decisions as early as practicable, but circumstances which prevent sampling (e.g.,frozen drums) can cause delays in obtaining the information necessary to make an informed decision on the acceptability of the waste.

Under such circumstances, the facility will take appropriate action to facilitate the decision process. During this time proper staging locations within permitted storage areas will be determined using the information provided by the generator. This information (e.g., Waste Profile, MSDSs, etc.) will provide sufficient information to ensure staging with compatible materials.

A waste may be rejected for one of the following reasons:

- The generator's/transporter's paperwork is not in order.
- A manifest discrepancy or other non-conformance cannot be resolved to the generator's and CWM's satisfaction.
- A bulk liquid shipment is incompatible (<u>fails</u> the liquid waste compatibility test) with wastes stored in bulk liquid storage tanks and no other management method is available.
- Adequate segregated space is not available at the container storage areas for containerized wastes and special handling cannot be used to correct the deficiency.
- No management method for the particular waste is available.

C-2f <u>Process Operations Procedure</u>

Each movement of a waste within the facility, during which any change in its characteristics may occur, may make it subject to additional inspection, sampling and analysis to determine appropriate handling and management of the waste. Many of the analyses needed for the storage, treatment, and disposal functions are performed during incoming load identification. These are not repeated unless it is known or believed that the waste characteristics may have changed during storage or processing and monitoring of the changes is necessary. Existing and anticipated process operations at the facility, for which current and periodic sampling and analyses is important, include the following:

o Storage;
o Treatment: consisting of aqueous waste treatment, fuels blending, stabilization, microencapsulation, macroencapsulation and
o Landfill disposal.

The analytical procedures for each of these processes is described separately below.

C-2f(1) <u>Storage</u>

Stored containerized liquid and solid wastes are segregated with respect to ignitability, reactivity, corrosivity, and compatibility. Liquid wastes which are transferred from drums, portable tanks or tank trucks may be bulked and placed in bulk storage prior to further treatment.

Before any wastes are placed in any storage unit, the site management will determine the compatibility of the waste with the storage unit materials of construction and with wastes already stored therein. This judgement is based upon vendor/engineering handbook data and a knowledge of the waste and its characteristics from the profile. If such data are not available, compatibility testing will be performed.

C-2f(1)(a) Waste in Containers (Drums)

Stored containerized wastes are segregated with respect to ignitability, corrosivity, reactivity, and compatibility. The U.S. DOT Hazardous Precedence List (49 CFR Part 173.2) and the Segregation and Separation Chart of Hazardous Materials (49 CFR Part 177.848) shall be employed for the initial determination of compatibility. The following table lists hazard classes with incompatible hazard classes for wastes in drum storage areas.

TABLE C-5

Incompatible Hazard Classes

Hazard Class	Incompatible Hazard Classes
Flammable Liquid	Oxidizer, Organic Peroxide
Flammable Solid	Corrosive, Oxidizers
Oxidizer or Organic Peroxide	Corrosive, Flammable Liquid, Flammable Solids
Corrosive	Oxidizer, Organic Peroxide Flammable Solids

Based on the initial hazard determination and final identification of the waste, the drummed waste is organized into segregated storage areas. Flammable, corrosive and oxidizing waste materials are kept separate from incompatible materials by storage in separated areas within the drum storage unit.

C-2f(1)(b) Waste in Tanks

All liquid wastes targeted for storage in tanks will undergo the mandatory analyses and the liquid waste compatibility test (density and flash point are performed, if required). Additional testing is based on the targeted treatment or disposal options.

Liquid wastes delivered in bulk form by tank trucks or decanted from drums or portable tanks are placed in bulk storage tanks or directly into reactors prior to further treatment. Prior to transferring any different waste(s) into a storage tank, the compatibility of the waste with the material already in the tank will be determined by the liquid waste compatibility test. Following routine preliminary screening using a chemical compatibility test, specific storage and process compatibility will be determined. The parameters that will be used to determine compatibility are as follows:

Stratification - The general miscibility of the materials will be examined. If stratification would appear to create a problem, the materials will not be combined.

Heat Generation - Materials that upon mixing would generate sufficient amounts of heat or undergo exothermic reactions strong enough to exceed the design capability of the storage unit shall not be combined.

Gas Evolution - Materials that upon mixing liberate flammable, explosive or toxic vapors, fumes or mists in quantities of concern, shall not be combined unless the storage unit is designed with appropriate engineering controls.

Undesirable Reactions - Materials that upon mixing result in the formation of a large amount of precipitate or in the solidification or gelling of the mixture shall not be combined.

C-2f(2) Treatment Operations

The proper and complete treatment of a particular waste depends upon appropriate sampling and analysis during selected phases of operation. The results of this analytical program serve to determine safety constraints, confirm treatment method selections, and identify the process parameters. The treatment sampling/analysis program may be divided into three segments, each with a specific purpose:

- Pre-treatment analysis confirm that the waste falls within the selected process design parameters and allow the fine tuning of the process operational conditions for optimum treatment. These analyses include pre-acceptance, incoming load and any other supplemental analyses as described for each treatment operation;

- o In-process analyses are performed to control the process and to monitor progress; and

- o Post-treatment analyses confirm that treatment was successful and that the characteristics of the process effluent are such that it can be sent to the next step (discharge, disposal, or further treatment) based upon permit or process constraints. Wastes or residue(s) resulting from the treatment of land disposal restricted wastes will be analyzed and/or evaluated, as specified in the following sections against the appropriate treatment standards listed in 6 NYCRR 376.4(j). Wastes or the residues from the treatment of land disposal restricted wastes that are sent off-site for further treatment or disposal will have any appropriate notification or certification form(s).

These segments are discussed below for each of the treatment processes.

C-2f(2)(b) Aqueous Waste Treatment

Wastewater treatment operation consists of a series of modular operations: phase separation (optional), oxidation (optional), reduction (optional), alkalization, filtration for the removal of precipitated sludges, neutralization, aggressive biological treatment, clarification, sand filtration, and activated carbon adsorption. Further biological treatment may occur in the facultative ponds. Effluent is discharged via pipeline to the Niagara River in accordance with the facility's SPDES permit conditions.

The incoming waste shipment is subjected to the applicable mandatory analyses consisting of physical description, pH screen, water mix, cyanide screen and sulfide screen (for alkaline waste), and radiation screen. Compatibility of the incoming waste stream shipment with the intended receiving tank and batch blend is assessed prior to pumping the drums/tanker. Supplemental analyses may include density, pH (meter), WWT metals, hexavalent chromium (Cr^{+6}) screen, oxidizer screen, and metals removal efficiency. Any of the other parameters listed as supplemental may be performed on incoming material if the profile, sample or test results indicate these could be items of concern (i.e., off spec shipments).

In general, greater than 90 percent of the waste water processed in the Aqueous Treatment Plant is on-site generated leachate from the landfills and process areas. The untreated leachate (FO39) was sampled and analyzed for all the constituents on the F039 LDR list. This constituted the initial characterization. The untreated leachate will be sampled and analyzed for the full LDR list of constituents every four (4) years to further ensure that no changes effecting the leachate have occurred. CWM will provide a copy of the results of the characterization to the Department, along with the results of the monthly effluent sampling and analysis. Based on review of the raw leachate characterization and the results for the parameters being routinely monitored, if CWM or NYSDEC has a concern that additional constituents should be tested for on a routine basis, CWM or NYSDEC may initiate a permit modification.

In process analysis for gate receipts includes assessing the receiving tanks for pH, percent acidity (if any excess is suspected based on density), and the presence of Cr^{+6} ,if suspected, (requires reduction). The batches containing gate receipts are sampled and checked for pH/acidity and screened for Cr^{+6} ,if suspected. The pH of the lime slurry tank is monitored to ensure that sufficient lime is being added. The filtrate from the filter press is monitored for pH. In addition, when gate receipts containing high metals concentrations are processed, the metals concentrations may be tested at this intermediate point. The specific metals to be tested would depend on the EPA codes of the materials being processed. For gate receipts, the metals generally analyzed for include those frequently found in industrial waste waters from metal finishing; cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc.

In order to monitor the performance of the organic constituent removal portion of the system, COD, phosphate (by test kit) and pH will be run on a daily basis on the influent and effluent of biotower to evaluate the operating condition of the biotower and the organic removal efficiency. Volatiles, including acetone will be tested on the effluent of the carbon beds to monitor the organic removal by carbon adsorption and to determine when the bed is spent. Acetone has a low affinity for carbon at a part-per-billion concentration. It will break through the carbon bed long before the carbon adsorption capacity is spent. If any of the F039 constituents approaches or exceeds the LDR limits, corrective measures will be employed to ensure that the discharge from the holding tank to the Facultative Pond is in compliance with the LDR restrictions. Such measures will include increased monitoring of the volatiles in the carbon bed effluent and, if necessary, a change from continuous to batch discharge from the holding tank.

In order to demonstrate compliance with the F039 wastewater standards, a composite sample of effluent will be analyzed for the following key control constituents: full volatile scan by GC/MS, metals including chromium, lead and nickel, and total cyanide. As the AWT system can operate in two modes, batch and continuous with up to two effluent qualification tanks, samples may be collected at several different locations. Concentration standards for F039 wastewaters (WW) are based on the analysis of composite samples. The Clean Water Act (CWA) regulations specify that grab samples must be used for pH, cyanide and VOC analysis. A grab sample from the holding tank after the batch is completed and has been mixed/recirculated will satisfy both of these requirements. The following logic will be employed:

Batch qualification and discharge

- A sample representing a composite of the treated effluent in a batch will be obtained from the holding tanks (T-125 and T-58) after completion of the batch and recirculation of the tank contents. As long as the results show that the effluent meets the LDR standards, the water will be discharged.

- If the results are questionable a sample may be taken from the recirculation line on the tank for comparison.

- If a subsequent composite sample must then be taken for confirmation and compliance with LDR standards, an automated sampler or a manual sample on the recirculation line may be used.

- An autosampler will remain available on the discharge side of the effluent tanks in order to provide a split sample when requested by DEC.

Continuous operation

- If two holding tanks are not available to operate in the fill, test and discharge mode, continuous operations (adding and discharging at the same time) may be employed if additional sampling and analysis controls are employed.

- A daily sample of the effluent from the carbon beds is analyzed for volatiles to ensure that the water entering the tank meets the LDR standards for organics monitored and that break through has not occurred.

- A daily sample is obtained from the holding tank and analyzed for volatiles, metals and cyanide to insure that the tank meets LDR standards.

- Compliance with LDR standards will be certified based on the analysis of a daily sample of the effluent as it is discharged from the holding tank. Monitoring the influent and the tank ensures that the discharge composite will also meet the LDR standards.

- An autosampler will remain available on the discharge side of the effluent tanks in order to provide a split sample when requested by DEC.

In addition, if sufficient quantities of gate receipts containing F039 constituents not on the site indicator parameter list for F039 are managed and could cause an exceedance of the standard, these constituents will also be tested to show compliance. Once per month, a sample representing a composite of the treated effluent will also be tested for semi-volatiles, PCBs, additional metals (arsenic, barium, cadmium, mercury and selenium), and sulfide. In order to demonstrate quality assurance of the analytical data being produced, DEC may request on a semi-annual basis that split samples be taken for one or two suites of tests (VOAs, semi-vols, or metals) and sent to an outside DEC and CWM approved laboratory. DEC will select sampling date and time and has the option to be present to witness sampling and transport of samples to the laboratory.

The treated water in the effluent tanks and facultative pond is transferred as volume dictates to one of the other fac ponds.

When a pond contains sufficient liquid to justify a discharge, the pond is sampled, and then analyzed by a wastewater certified laboratory to qualify it for discharge under the CWM Chemical Services Inc. SPDEs permit. No treated wastewater is discharged from the facility unless it meets all the limits specified on the permit and the pond discharge is approved by the NYSDEC. A general flow schematic and list of analytical procedures is shown in Figure C-4.

C-2f(2)(c) Fuels Blending/Incinerables

This operation utilizes tank trucks and pumping systems to produce a fuel product which can be used as a feedstock for thermal units. Carefully controlled decant and mixing of compatible waste streams such as solvent, waste oils, emulsions, and lean water is carried out to produce a product with limited concentrations of specific constituents. Any liquids containing 50 ppm PCB or greater are handled in a dedicated unit and are not blended into a fuel product with non-PCB fuels. PCB feedstocks are transferred to an approved incinerator for destruction.

The incoming waste shipment is subjected to the applicable mandatory analyses consisting of physical description, water mix, flammability potential screen, and radiation screen. BTU analysis will be performed for wastes to be included in a blend that will be used as a fuel in boilers or industrial furnaces [BIF], if it is suspected that the BTUs are <5000 BTU/lb. The waste solvents and oils are analyzed for PCBs. If a large unexpected peak appears in the PCB-ECD Scan for any fuels sample, chlorinated pesticides will be investigated. Incoming shipment analyses also include a mandatory compatibility check with the intended receiving blend. Supplemental analyses may include density, flash point, percent halogens, percent sulfur, and percent ash. A flash point may be run if flammability potential screening indicates the DOT information on the manifest is incorrect. As long as the material is on specification and is compatible, the waste stream may be blended as described on the disposal decision.

If a variance is found in the testing parameters, additional tests may be requested by site management in order to determine the appropriate fuel blend. In-process and post-treatment analyses must verify that the resultant fuel product going to a BIF has a minimum heating value of 5000 BTU/lb and is within the limits specified by the BIF. These parameters will include heating value and may include PCBs, % halogens, heating value, % sulfur, % ash, lead and other heavy metals. Other parameters will be run as needed to meet the receiving facility's specification. Specific parameters and concentrations are identified by the user of the blended fuel and thus, in-process and post-treatment analyses will vary accordingly. Individual feedstocks with pre-treatment or in-process analyses exceeding the specified product limits may be blended with other feedstocks to produce a specification product.

C-2f(2)(d) Transformer Decommissioning

This process drains, and when required, flushes transformers which contain PCBs. The drained liquid and spent flush solvent are incinerated at an approved incinerator. The empty transformer bodies from transformers that contained greater than or equal to 500 ppm PCB oil are disposed in a TSCA approved landfill cell as a state hazardous B006 waste. Empty transformer bodies from units that contained less than 500 ppm PCB oil may be placed in any cell. Empty transformers that are received from a generator will be inspected to ensure that they are "empty".

Incoming and pre-treatment mandatory testing only includes physical description. In process supplemental testing involves analysis of the blended mixture as required by the incineration facility. Post-treatment analyses consist of physical inspection of the emptied transformer body.

C-2f(5) Landfill Disposal

A Sampling/Analysis program is an integral part of this phase of operation. The results of this program serve to evaluate compliance with site permit constraints, confirm disposal method selection, and determine safety constraints. During incoming analyses, wastes to be landfilled will be subject to the mandatory analyses of physical description, water mix, pH screen, cyanide screen, sulfide screen, flammability potential screen and radiation screen (see Figure C-5). In addition, the "suitability for landfill" testing is performed as part of the pre-acceptance process when necessary (see Section C-2b(1)). If a positive screen is obtained on an incoming waste where no cyanide was expected, another cyanide screening method may be run. If it is positive, the off spec waste will be quantitatively analyzed for total and/or amenable cyanide or the waste will be handled as a discrepancy. A similar sequence will be performed for sulfide, first screening the waste, using a second screening method if needed and performing total sulfide analysis if both screens are positive. Supplemental Analyses on incoming shipments include flash point if a positive flammability potential is determined.

For any bulk (non-soil) waste load where a sample is undergoing testing to confirm compliance with “RMU-1 Minimum Waste Strength Curves”, but which does not require stabilization and TCLP testing to confirm compliance with Land Disposal Restrictions (LDRs), the load may be placed in Interim Storage in the landfill pending strength testing results under the following conditions:

- The load must be placed on a geosynthetic separation material or a stone layer with a minimum thickness of 2 inches, in a distinct interim storage pile, separate from other bulk waste loads and other wastes.
- Each such interim storage pile must have a flag or other marker displayed with an identifier(s) that correlates to the waste tracking information which indicates the specific waste in the pile and the date the pile was placed in the landfill.
- Daily cover must be applied to all interim storage piles on the date of their placement in the landfill and maintained for the duration of each pile’s storage period.
- If the completed strength testing indicates compliance with minimum strength requirements, the waste may be disposed of in the landfill. If the results indicate that strength requirements have not been met, the waste will be removed from the landfill for further stabilization or other appropriate management.

An Additional Review Program (ARP) is used to further monitor incoming waste shipments destined for the Model City landfill. Up to 10 non-miscellaneous shipments per month will be selected by the on-site DEC monitor as requiring additional review. In addition the DEC monitors may request additional review using the sampling and analytical protocols from the ARP listed in section C-2f(5) of this permit. Any additional request will be justified by the DEC in writing. For the bulk solids, a composite will be taken as described in Section C-2c(2)(a). The sample will be of sufficient volume to allow a split sample to be supplied to the DEC. If a shipment of containers is selected, a 10% composite of each non-miscellaneous profile destined for the Model City landfill on the load may be identified for additonal review. Further compositing of similar waste streams may be allowed with DEC approval. NOTE: miscellaneous wastes, including single source PCB soils/spill clean ups, as listed in Section C-2d(1)(a) are exempt from this program.

The Additional Review Program (ARP) samples are analyzed as follows:

RCRA HAZARDOUS WASTES WITH NUMERICAL LDR STANDARDS

- o Sample will be analyzed for constituents listed for each EPA code associated with the shipment for which numerical LDR standards have been promulgated. Additional analyses may be requested by site management or NYS DEC, if justified, to address areas of concern. Examples of these analyses include:

  * TCLP metals
  * PCB
  * Volatiles
  * Semivolatiles

- o Wastes that are to be stabilized on-site will have their compliance with LDR standards verified according to the frequency specified in the CWM procedure on demonstrating that stabilized residuals meet land ban standards. The post-treatment analysis procedure specifically addresses processes, frequency of analyses and corrective action, and are therefore, exempt from the ARP.

- o Residues including ash from a commercial hazardous waste incinerator will be subject to reduced analytical testing. Loads destined for stabilization will be managed under site SDP for testing stabilized residuals. Loads not requiring stabilization will be tested for LDR TCLP metals and volatiles (e.g., Method 8240) with routine site detection limits. Other organics of concern will be analyzed for if requested by NYSDEC.

- o Due to the extensive listing of constituents, F039 ARP samples will be tested for routine volatiles, semivolatiles and the characteristic TCLP Metals.

NON-HAZARDOUS WASTE AND WASTE WITHOUT LDR STANDARDS

- o TCLP metals: lead, cadmium and chromium - these are very frequently found industrial metals and a broad random screen is justified. The other five regulated TCLP metals may be requested by site management or NYSDEC if there is a concern about their presence based on information on the waste profile.

- o PCBs - will be tested on oil bearing waste as determined by a review of the waste profile.

- o 2% Organic Limit (OL) – a VOC analysis using EPA SW-846 Method 8260 or other Department approved organic analysis methods, shall be used to determine the concentration of the organic constituents and confirm compliance with the 2% Organic Limit. Organic analysis to verify < 2 % is not required if DEC has authorized a higher percentage on a case-by-case basis as prescribed in condition E.1.c.i in Exhibit F of Schedule 1 of Module I of the Sitewide Part 373 Permit.

If unexpected results are obtained during the ARP testing, the generator will be contacted and we will attempt to resolve the issues. Questions will be raised as to the appropriate hazard code classification and application of LDR standards. An update of the profile and the disposal decision may be considered. If the analysis indicates that LDR standards have been exceeded for wastes that are either stabilized off-site or certified as naturally meeting the treatment standards, it shall be reported to the NYSDEC.

C-2f(6) Stabilization

a. Stabilization of Land Disposal Restricted Waste

In this process, certain Land Disposal Restricted (LDR) waste are treated to meet the appropriate LDR treatment standard or prohibition. For the purpose of this discussion, treatment will include, at a minimum, stabilization of waste, and in some instances, will include a pre-treatment step prior to stabilization. The pre-treatment may include using other reagents such as oxidizing or reducing agents to chemically convert constituents into a form more suitable for stabilization.

The pre-treatment analyses for LDR waste to be treated to meet a particular treatment standard or prohibition consists of the "Mandatory Analyses" for landfill (see Section C-2f(5)) and a bench scale development of a recipe suitable for achievement of these standards. This recipe will be analyzed using the appropriate test method (e.g. TCLP., etc.) to demonstrate that the LDR waste can be treated to meet the appropriate standard of prohibition and to establish the treatment guideline to be used on the waste. In addition, compression strength testing may be performed to demonstrate the strength of the treated waste. The treatment guidelines, established during the procedure, demonstrated to achieve the appropriate treatment standard, will be used to treat that LDR waste. In lieu of bench scale recipe development a previously developed and established recipe may be identified for use (e.g., recipe utilized on a similar waste).

A post-treatment analysis, which includes TCLP, is conducted to assure that the process continues to be effective in meeting the treatment standards. The analysis will be performed on retained material in interim storage in containers such as roll-off boxes (see Condition E.1.f in Exhibit F of Schedule 1 of Module I). The test frequency will be that specified in the CWM procedure on demonstrating that stabilized residuals meet land ban standards. The post-treatment analysis procedure specifically addresses processes, frequency of analyses and corrective action.

Additional "Supplemental Analyses" may be requested by the Laboratory Manager to further identify a waste or confirm that the treatment standards have been met in treated waste.

Stabilization operations may involve combining multiple waste streams or shipments, i.e., to optimize treatment volume. Wastes to be combined will be selected based on their chemical matrices, EPA codes and recipe requirements. For waste tracking purposes, the treatment residue will carry all waste stream identities (profile numbers and shipment identities, i.e., work order number, manifest number, etc.). For batches with multiple EPA codes, the combined most restrictive standards will apply to the treated residue.

b. Stabilization of Other Wastes

In this operation, portland cement and/or other stabilization reagents are mixed with Non-Land Disposal Restricted waste to treat the free liquids and/or increase compression strength of the waste.

The pre-treatment analyses for these wastes include the "Mandatory Analyses" for landfill (see Section C-2f(5) and the development of a suitable recipe for increasing the compression strength. Compression strength testing may be used in order to demonstrate that the recipe works. The recipe established during this procedure will be used to treat that waste. In lieu of bench scale recipe development a previously developed and established recipe may be identified for use (e.g., recipe utilized on a similar waste).

A post-treatment evaluation ensures that the material appears well mixed, that no free liquids are present.

On occasion a non-LDR waste shipment of an ordinarily solid material may arrive containing a minimal amount of free liquids. These types of "off-spec" solid waste shipments may be stabilized or they may be rejected. If the "off-spec" shipment is to be stabilized, the stabilization reagent will be blended into the waste material until a homogeneous mixture is observed.

C-2g Quality Assurance/Quality Control

C-2g(1) Introduction

The following Quality Assurance/Quality Control (QA/QC) information for the CWM Model City Facility is being provided as required by 40 CFR 270.30(e) and 6NYCRR371, Appendix 19, 20 and 21 and in accordance with the following EPA guidance documents.

o Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Section 10, SW-846, Third Edition, November 1986, (or most recent EPA promulgated and approved edition). Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, currently approved version.

QA/QC procedures are applicable to both sampling procedures and analytical techniques. QA/QC information for these two elements of the waste analysis program has been included in this Waste Analysis Plan (WAP) as recommended in the waste analysis plan guide manual.

This section does not provide specific performance standards or quality control procedures for individual sampling and analysis techniques. Such specifics are defined on a corporate-wide basis for all Chemical Waste Management, Inc. (CWM) facilities. The specific performance standards are dynamic and are revised as warranted to reflect technological advances in sampling and analytical techniques. CWM QA/QC policies are found in the corporate Quality Assurance and Control Policies, portions of which have been extracted and included in the following sections. The performance standards will be available for review at the facility.

C-2g(2) Sampling Program

Sampling procedures for specific facility operations are described in Section C-2c of the WAP. The selection of the sample collection device depends on the type of sample, the sample container, and the sampling location. In general, the methodologies used for specific materials correspond to those referenced in 6NYCRR Part 371, Appendix 19. The selection and use of the sampling device is supervised by a person thoroughly familiar with both the sampling and analytical requirements. The type of device to be used in the various sampling situations is specified in Section C-2c(2), Specific Methods and Equipment.

Sampling equipment is constructed of non-reactive materials such as glass, PVC plastic, aluminum, or stainless steel. Care is taken in the selection of the sampler to prevent contamination of the sample and to ensure compatibility of materials. For example, non-fluorocarbon plastic bottles are not used to sample organic wastes and glass bottles are not used to collect hydrofluoric acid wastes. The specific material of construction to be used for each sampling activity is specified in Section C-2c(2).

Sampling is performed for each waste stream in a manner that ensures the samples are as representative as possible under the conditions of the sampling event. Full vertical sections are drawn from tanks and containers, where appropriate and where access allows, as described in Section C-2c(2)(a).

With a few exceptions, all bulk and containerized waste loads will be sampled (see Section C-2d(1)(a). Container samples that are related to one generator and one process may be composited prior to analysis, provided that individual samples are similar in physical appearance. Precautions are taken to minimize loss of volatiles.

All samples must be appropriately labelled. The following information must be included on the label:

Generator	or	Sample Location
Profile		(process or site samples)
Receipt #		
# containers		
container type		
	Date:	
	Time:	
	Sampler:	

An example of a suitable label is shown below:

GENERATOR:____

PROFILE #:____________________W.O. #________________________

CONTAINERS:________________TYPE CONT.____________________

COMPOSITE SAMPLE: Y OR N LOT #____________________________

DATE:________________________TIME:__________________________

SAMPLER:____

COMMENTS:____

No field notebook is used in sampling hazardous waste shipments or process samples. Anything unusual noted during sampling would be noted in the comments area of the label. No chain of custody form is employed within the plant. The samples are turned directly into the lab. A chain-of-custody will accompany any sample being sent to a contract lab, see example on following page. Sampling information is entered into the facilities operating record.

Hazardous waste samples are generally not amenable to preservation. For samples collected at CWM for organic analysis, the preservation and holding times will be in accordance with Chapter 4 of SW-846. Samples for VOC analysis to confirm LDR or 2% Organic Limit compliance will be analyzed within 14 days. For treated wastewater samples from the AWT plant, metals aliquots are preserved by the addition of HNO_3 to pH <2 and cyanide aliquot is preserved by the addition of NaOH to pH >12 . After TCLP extraction for leachable metals an aliquot for metals is fixed by adding HNO_3 to pH <2. Other hazardous waste samples (i.e., preacceptance, incoming, and process) are not preserved. Adding a preservative such as acid can drastically change the matrix (e.g., metals may precipitate, gel, fume, etc.).

CWM CHEMICAL SERVICE, INC.
1550 Balmer Road
Model City, New York 14107

TYPICAL CHAIN OF CUSTODY FORM NO.___________

SAMPLER
SIGNATURES(S):..____

SAMPLE POINT I.D. AND DESCRIPTION	DATE SAMPLED TIME	NO. OF BOTTLES	ANALYSIS REQUIRED

RELINQUISHED BY: (SIGNATURE)	DATE REC'D BY: (SIGNATURE)	DATE

RECEIVED AT LAB BY:____

METHOD OF
SHIPMENT:.____

CONDITION OF SAMPLES REC'D:____ OK:____ NOT OK (EXPLAIN) ________________________________

____

NOTE: APPARENT GAPS OR BREAKS IN THE "INCLUSIVE DATES" SECTION OF THE "CHAIN OF POSSESSION" SECTION ARE COVERED BY THE SITE RECEIVING/SHIPPING LOGS.

C-2g(3) Analytical Program

All analyses performed for determinations under 6NYCRR Parts 370-374 and 376 will be in accordance with 6NYCRR 370.1(f).

C-2g(4) Reserved

C-2g(5) Contract Laboratories

Contract laboratories will only be those which meet the requirements in 6NYCRR 370.1(f).

C-2g(6) Conclusion

The aforementioned sampling and analytical procedures help ensure that the data obtained are precise, accurate, and representative of the waste stream being sampled. The results of these analyses are used by the Site Management to decide whether or not to accept a particular waste and, upon acceptance, to determine the appropriate method of treatment. Proper analytical procedures are particularly important for waste treatment units. They are also important to ensure that restricted wastes are managed properly and that incompatible wastes are not inadvertently combined. For these reasons, the quality of the data and the thoroughness and care with which the sampling and analyses are performed and reported provide an important basis for day-to-day operational decisions.

C-2h Analytical Procedures

The following analytical procedures are designed to identify or screen waste. They are used by CWM, based upon its operating experience, as rapid but effective means for establishing key decision parameters pertinent to proper waste management. Analytical procedures, not listed below, may be added as necessary and will be taken from the references listed at the end of this section or other recognized sources, e.g., Association of Official Analytical Chemists (AOAC), or will be developed by CWM and meet CWM performance standards.

All analytical procedures are subject, at a minimum, to the QA/QC procedures described in Section C-2g.
It should be noted that the information presented in this appendix is generic in character. Therefore, certain test methods are discussed which may pertain to treatment or disposal processes that are excluded from the facility for which the foregoing waste analysis plan is presented.

C-2h(1) Unique Analytical Procedures

The following CWM-developed analytical procedures have been found by CWM to provide important information pertinent to certain processes. They have been developed by CWM, based upon its operating experience, as rapid but effective means for establishing key decision parameters pertinent to proper waste management. In some cases, these tests provide information not available from standard analytical procedures found in Section C-2h(2), which follows. The methods described below are based on ASTM standards or standard procedures recognized by EPA or are based on procedures and protocol formulated by CWM and meet CWM performance standards. These tests provide important operational information.

Ash - The ash content of a sample is determined by placing the sample in a muffle furnace for 2 to 4 hours.

Percent Acidity - One-tenth of the equivalent weight of the acid species to be quantified is weighted out and diluted with DI water. The sample is titrated using a pH meter and NaOH to a pH of 8.3.

Percent Alkalinity - One tenth of the equivalent weight of the basic species to be quantified is weighed out and diluted with DI water. The sample is titrated with HCl and a pH meter to a pH of 4.5.

Bench-Scale Treatment Evaluation - Samples of wastes are combined with samples of other wastes or reagents at predetermined ratios. Further testing may be required in order to confirm that the desired reaction has occurred.

Dissolved Sulfides - An aliquot of waste is mixed with distilled water. The solution/slurry is filtered through filter paper and the resultant filtrate is then analyzed for sulfide. Antimony potassium tartrate and hydrochloric acid are added and the color produced is determined to be a positive screen or is visually compared with standards.

Cyanide Screen by Cyantesmo Paper – A portion of waste is slurried with deionized water and then acidified with sulfuric acid. The sample is capped with the cyantesmo paper just above the solution. The presence of cyanide is indicated by a color change in the cyantesmo paper.

Cyanide Screen by Prussian Blue – A portion of waste is slurried with deionized water. The pH is adjusted to 12-13 with NaOH, then solutions of ferrous sulfate and ferric chloride are added. Sulfuric acid is added and the solution is observed for color. The presence of cyanide is indicated by a blue-green color.

Free Cyanide Screen/Quantification (Aqueous Waste) - NaOH is added to a portion of sampler to bring the pH to about 14. Then p-dimethylaminobenzal-rhodanine indicator solution is added to the sample and the sample is then titrated with a $AgNO_3$ solution to a salmon colored endpoint (as if for a total cyanide determination).

Free Soluble Sulfide Screen/Quantification (Aqueous Waste) - (1) An aliquot of sample is analyzed for free soluble sulfide. The level of sulfide is determined using an iodometric method which includes the addition of a measured portion of a standard iodine solution and back titration with sodium thiosulfate.

Heating Value - The heating value (BTU/lb) is determined in the isoperibol/dynamic mode using an oxygen bomb calorimeter. The combusted sample may then be analyzed for anions.

Load Bearing Strength by Pocket Penetrometer - The load bearing strength of the stabilized waste material is determined by pushing a pocket penetrometer or similar device into the sample. It is grasped by the handle and pushed into the sample at a constant rate up to the calibration mark. The load bearing strength is read from the low side of the indicator ring. This process is repeated two more times and the average of the three results is recorded in tons/square foot.

Microwave-aided Digestion - A portion of sample is weighed into an appropriate microwave digestion vessel and digested using an acid or acid mixture. The vessel is heated in a microwave oven. After cooling, the contents are diluted to volume, filtered and analyzed by appropriate methods.

Peroxide Screen - Peroxide test strips are used to determine the presence of organic peroxides or other oxygen donors (oxidizers) in solvent and aqueous wastes.

Phosphate screen - The phosphate level is monitored to ensure phosphate is present to prevent bridging in the carbon beds.

Chromate screen - the presence of hexavalent chromium (Cr^{+6}) and its concentration may be determined using accepted methods.

Ferrous screen - the presence of ferrous iron (Fe^{+2}) may be determined using a ferrous test kit. Ferrous iron is frequently used as a reducing agent in the aqueous treatment plant.

Phenol screen - the phenol level in the feed and effluent of the carbon beds may be determined using accepted methods.

Quick Leach Extraction - An amount of sample is mixed with the appropriate extraction fluid and stirred for a designated time period. After filtration, the pH and/or metals content are determined using the appropriate methods.

Radioactivity Screen - A sample of the material is passed by a geiger counter or survey meter. Radioactivity levels above background are noted, recorded and investigated.

Reagent Compatibility Screen - Equal portions of stabilization reagent and waste are mixed. The generation of any unacceptable or adverse reactions are evaluated and noted.

Percent Solubility is determined by dissolving a weighed sample aliquot in water, filtering the solution through a tarred filter paper, drying the filtered solids, and then re-weighing the dried sample and filter paper. The
percent solubility is determined by subtracting the filter paper weight from the dried sample, then determining the percent sample remaining. Percent solubility equals 100 minus the percent sample remaining.

Solvent Screen - Uses standard analytical procedures tailored to cover a range of organic compound types for quick screening of common industrial organics.

Stabilization Evaluation - The waste to be stabilized is mixed with at least one combination of cement kiln dust and/or other suitable reagent(s). Heat change (as evidence of curing) which occurs is recorded as the waste/reagent(s) mixture is "setting". The occurrence of any violent reactions of reagent(s) to waste sample is noted.

2% organic Limit - VOC analysis using EPA SW-846 Method 8260 for organic priority pollutants and solvent constituents taken from the F001 through F005 solvent listings will be employed as needed.

C-2h(2) Standard Analytical Procedures

See Appendix A for a list of Standard Analytical Procedures.

SECTION C-2i
FIGURES

Figure C-1 Waste Profile

WASTE MANAGEMENT

EZ Profile™

Requested Facility: ____________ ❑ Unsure Profile Number: ____________
❑ Check if there are multiple generator locations. Attach locations. ❑ Renewal? Original Profile Number: ____________

A. GENERATOR INFORMATION (MATERIAL ORIGIN)

1. Generator Name: ____________
2. Site Address: ____________
   (City, State, ZIP) ____________
3. County: ____________
4. Contact Name: ____________
5. Email: ____________
6. Phone: ____________ 7. Fax: ____________
8. Generator EPA ID: ____________ ❑ N/A
9. State ID: ____________ ❑ N/A

B. BILLING INFORMATION ❑ SAME AS GENERATOR

1. Billing Name: ____________
2. Billing Address: ____________
   (City, State, ZIP) ____________
3. Contact Name: ____________
4. Email: ____________
5. Phone: ____________ 6. Fax: ____________
7. WM Hauled? ❑ Yes ❑ No
8. P.O. Number: ____________

C. MATERIAL INFORMATION

1. Common Name: ____________
   Describe Process Generating Material: ❑ See Attached
2. Material Composition and Contaminants: ❑ See Attached

1.	
2.	
3.	
4.	
	≥100%

3. State Waste Codes: ____________ ❑ N/A
4. Color: ____________
5. Physical State at 70°F: ❑ Solid ❑ Liquid ❑ Other: ____________
6. Free Liquid Range Percentage: ______ to ______ ❑ N/A (Solid)
7. pH: ______ to ______ ❑ N/A (Solid)
8. Strong Odor: ❑ Yes ❑ No Describe: ____________
9. Flash Point: ❑ <140°F ❑ 140°–199°F ❑ ≥200° ❑ N/A (Solid)

D. REGULATORY INFORMATION

1. EPA Hazardous Waste? ❑ Yes* ❑ No
   Code: ____________
2. State Hazardous Waste? ❑ Yes ❑ No
   Code: ____________
3. Excluded waste under 40 CFR 261.4 (a) or (b)? ❑ Yes* ❑ No
4. Contains Underlying Hazardous Constituents? ❑ Yes* ❑ No
5. Contains benzene **and** subject to Benzene NESHAP? ❑ Yes* ❑ No
6. Facility remediation subject to 40 CFR 63 GGGGG? ❑ Yes* ❑ No
7. CERCLA or State-mandated clean-up? ❑ Yes* ❑ No
8. NRC or State-regulated radioactive or NORM waste? ❑ Yes* ❑ No

***If Yes, see Addendum (page 2) for additional questions and space.**

9. Contains PCBs? → If Yes, answer a, b and c. ❑ Yes ❑ No
   a. Regulated by 40 CFR 761? ❑ Yes ❑ No
   b. Remediation under 40 CFR 761.61 (a)? ❑ Yes ❑ No
   c. Were PCB imported into the US? ❑ Yes ❑ No
10. Regulated and/or Untreated Medical/Infectious Waste? ❑ Yes ❑ No
11. Contains Asbestos? ❑ Yes: Friable ❑ Yes: Non-Friable ❑ No

E. ANALYTICAL AND OTHER REPRESENTATIVE INFORMATION

1. Analytical attached ❑ Yes
   Please identify applicable samples and/or lab reports:
2. Other information attached (such as MSDS)? ❑ Yes

F. SHIPPING AND DOT INFORMATION

1. ❑ One-Time Event ❑ Repeat Event/Ongoing Business
2. Estimated Quantity/Unit of Measure: ____________
   ❑ Tons ❑ Yards ❑ Drums ❑ Gallons ❑ Other: ____________
3. Container Type and Size: ____________
4. USDOT Proper Shipping Name: ❑ N/A
   ____

G. GENERATOR CERTIFICATION (PLEASE READ AND CERTIFY BY SIGNATURE)

By signing this EZ Profile™ form, I hereby certify that all information submitted in this and all attached documents contain true and accurate descriptions of this material, and that all relevant information necessary for proper material characterization and to identify known and suspected hazards has been provided. Any analytical data attached was derived from a sample that is representative as defined in 40 CFR 261 - Appendix 1 or by using an equivalent method. All changes occurring in the character of the material (i.e., changes in the process or new analytical) will be identified by the Generator and be disclosed to Waste Management prior to providing the material to Waste Management.

If I am an agent signing on behalf of the Generator, I have confirmed with the Generator that information contained in this Profile is accurate and complete.

Name (Print): ____________ Date: ____________
Title: ____________
Company: ____________

Certification Signature

EZ Profile™ Addendum

WASTE MANAGEMENT

Only complete this Addendum if prompted by responses on EZ Profile™ (page 1) or to provide additional information. Sections and question numbers correspond to EZ Profile™.

Profile Number: ______________

C. MATERIAL INFORMATION

Describe Process Generating Material (Continued from page 1): If more space is needed, please attach additional pages.

Material Composition and Contaminants (Continued from page 1): If more space is needed, please attach additional pages.

5.	
6.	
7.	
8.	
9.	
10.	
	≥100%

D. REGULATORY INFORMATION

Only questions with a "Yes" response in Section D on the EZ Profile™ form (page 1) need to be answered here.

1. EPA Hazardous Waste
   a. Please list all USEPA listed and characteristic waste code numbers:
   b. Is the material subject to the Alternative Debris standards (40 CFR 268.45)? ❑ Yes ❑ No
   c. Is the material subject to the Alternative Soil standards (40 CFR 268.49)? → If Yes, complete question 4. ❑ Yes ❑ No
   d. Is the material exempt from Subpart CC Controls (40 CFR 264.1083 and 265.1084)? ❑ Yes ❑ No
      → If Yes, please select one of the following:
      ❑ Waste has been determined to be LDR exempt [265.1083(c)(4) and 265.1084(c)(4)] based on the fact that it meets all applicable organic treatment standards (including UHCs for D-coded characteristic wastes) or a Specified Technology has been utilized.
      ❑ Waste does not qualify for a LDR exemption, but the average VOC at the point of origination is <500 ppmw and this determination was based on analytical testing (upload copy of analysis) or generator knowledge.
2. State Hazardous Waste → Please list all state waste codes: ______________
3. Excluded Waste → Please select which of the following categories apply to your material:
   ❑ Delisted Hazardous Waste ❑ Excluded Waste under 40 CFR 261.4 → Specify Exclusion: ______________
   ❑ Treated Hazardous Waste Debris ❑ Treated Characteristic Hazardous Waste → If checked, complete question 4.
4. Underlying Hazardous Constituents → Please list all Underlying Hazardous Constituents:
5. Benzene NESHAP → Please include benzene concentration and percent water/moisture in chemical composition.
   a. Are you a TSDF? → If yes, please complete Benzene NESHAP questionnaire. If not, continue.
   b. What is your facility's current total annual benzene quantity in Megagrams? ❑ <1 Mg ❑ 1–9.99 Mg ❑ ≥10 Mg
   c. Is this waste soil from remediation at a closed facility? ❑ Yes ❑ No
   d. Has material been treated to remove 99% of the benzene or to achieve <10 ppmw? ❑ Yes ❑ No
   e. Is material exempt from controls in accordance with 40 CFR 61.342? ❑ Yes ❑ No
      → If yes, specify exemption: ______________
   f. Based on your knowledge of your waste and the BWON regulations, do you believe that this waste stream is subject to treatment and control requirements at an off-site TSDF? ❑ Yes ❑ No
6. 40 CFR 63 GGGGG → Does the material contain <500 ppw VOHAPs at the point of determination? ❑ Yes ❑ No
7. CERCLA or State-Mandated clean up → Please submit the Record of Decision or other documentation to assist others in the evaluation for proper disposal.
8. NRC or state regulated radioactive or NORM Waste → Please identify Isotopes and pCi/g: ______________

WASTE MANAGEMENT

Additional Profile Information

Profile Number: _______________

C. MATERIAL INFORMATION

Material Composition and Contaminants (Continued from page 2): If more space is needed, please attach additional pages.

11.	
12.	
13.	
14.	
15.	
16.	
17.	
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28.	
29.	
30.	
31.	
32.	
33.	
34.	
35.	
36.	
37.	
38.	
39.	
40.	
	≥100%

D. REGULATORY INFORMATION

1. EPA Hazardous Waste
   a. Please list all USEPA listed and characteristic waste code numbers (Continued from page 2):

FIGURE C-2
OVERVIEW OF THE PRE-ACCEPTANCE PROCESS

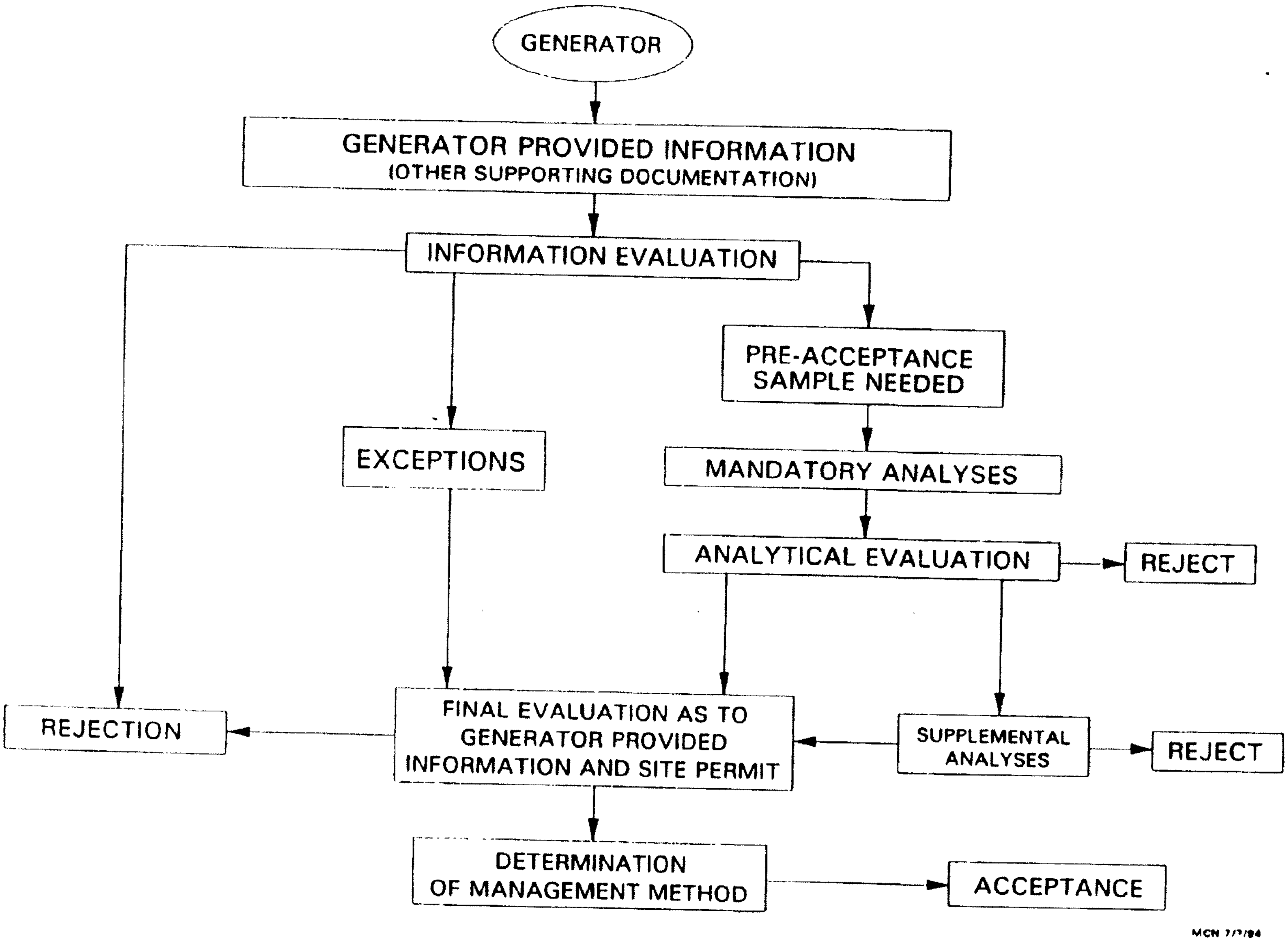
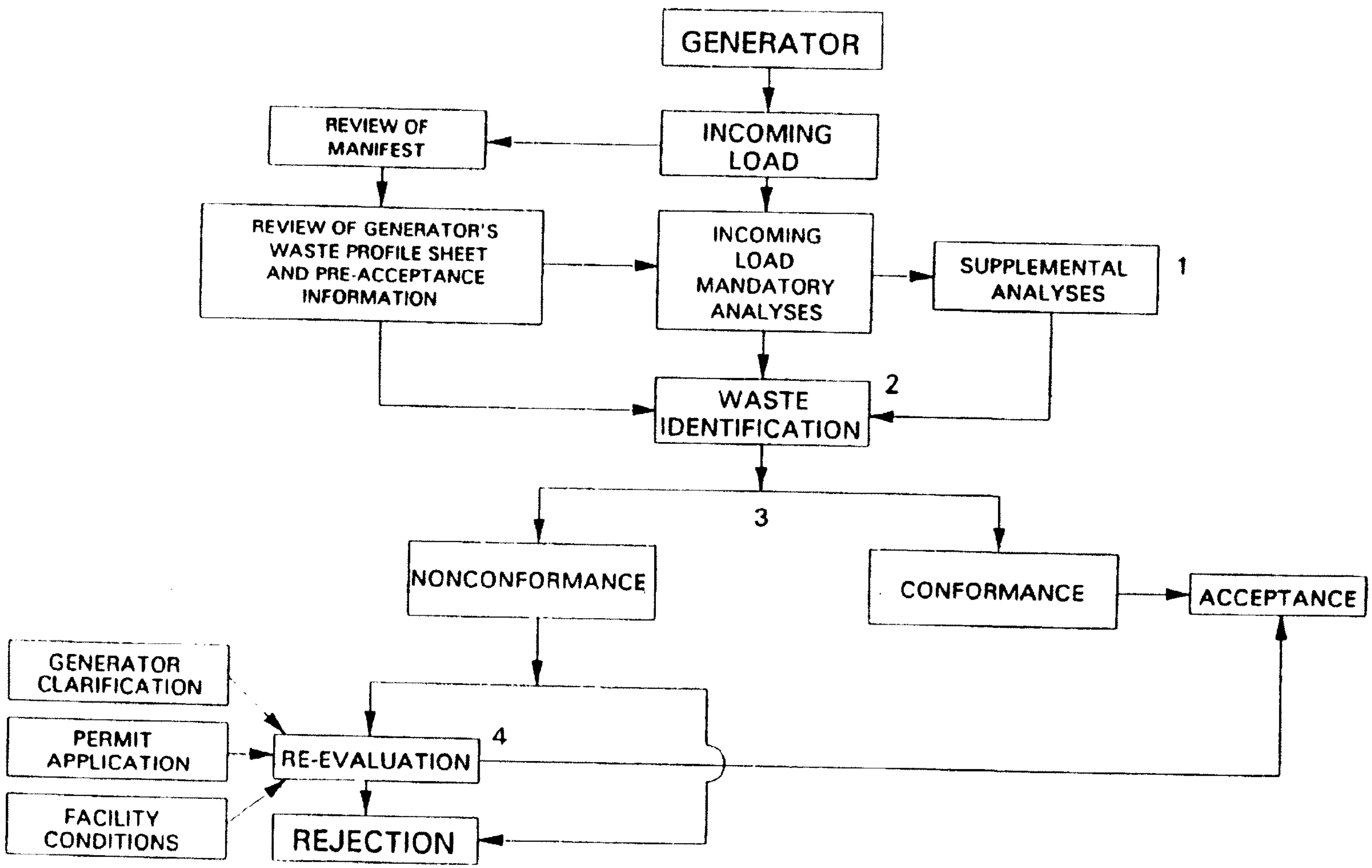


FIGURE C-3
OVERVIEW OF THE INCOMING LOAD IDENTIFICATION PROCESS



July, 2011

Figure C-4
Aqueous Waste Treatment

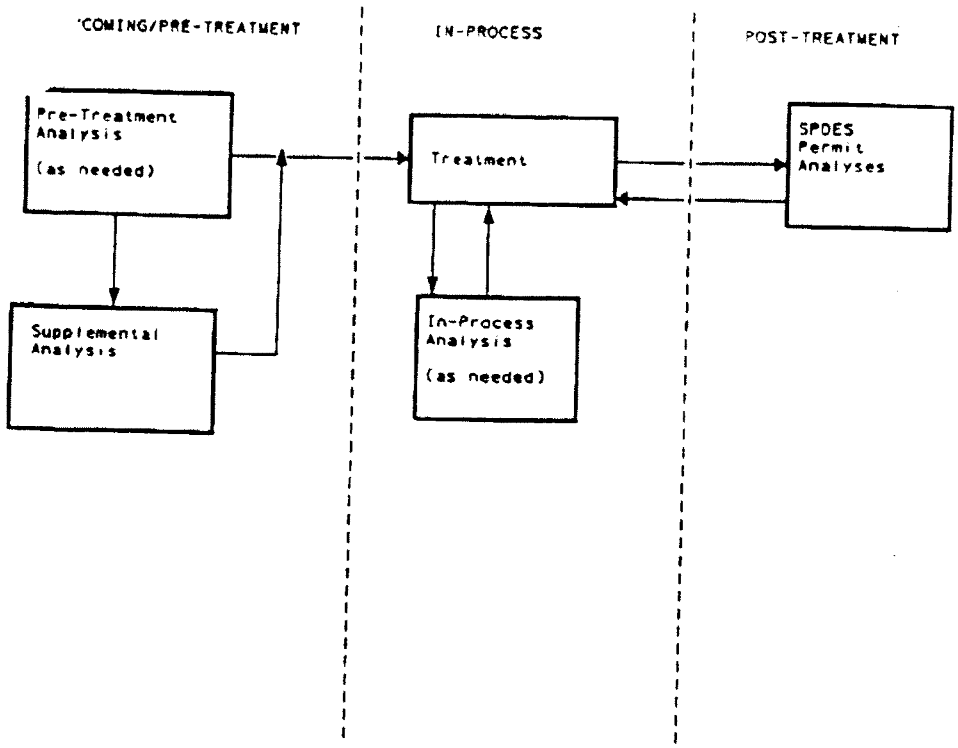
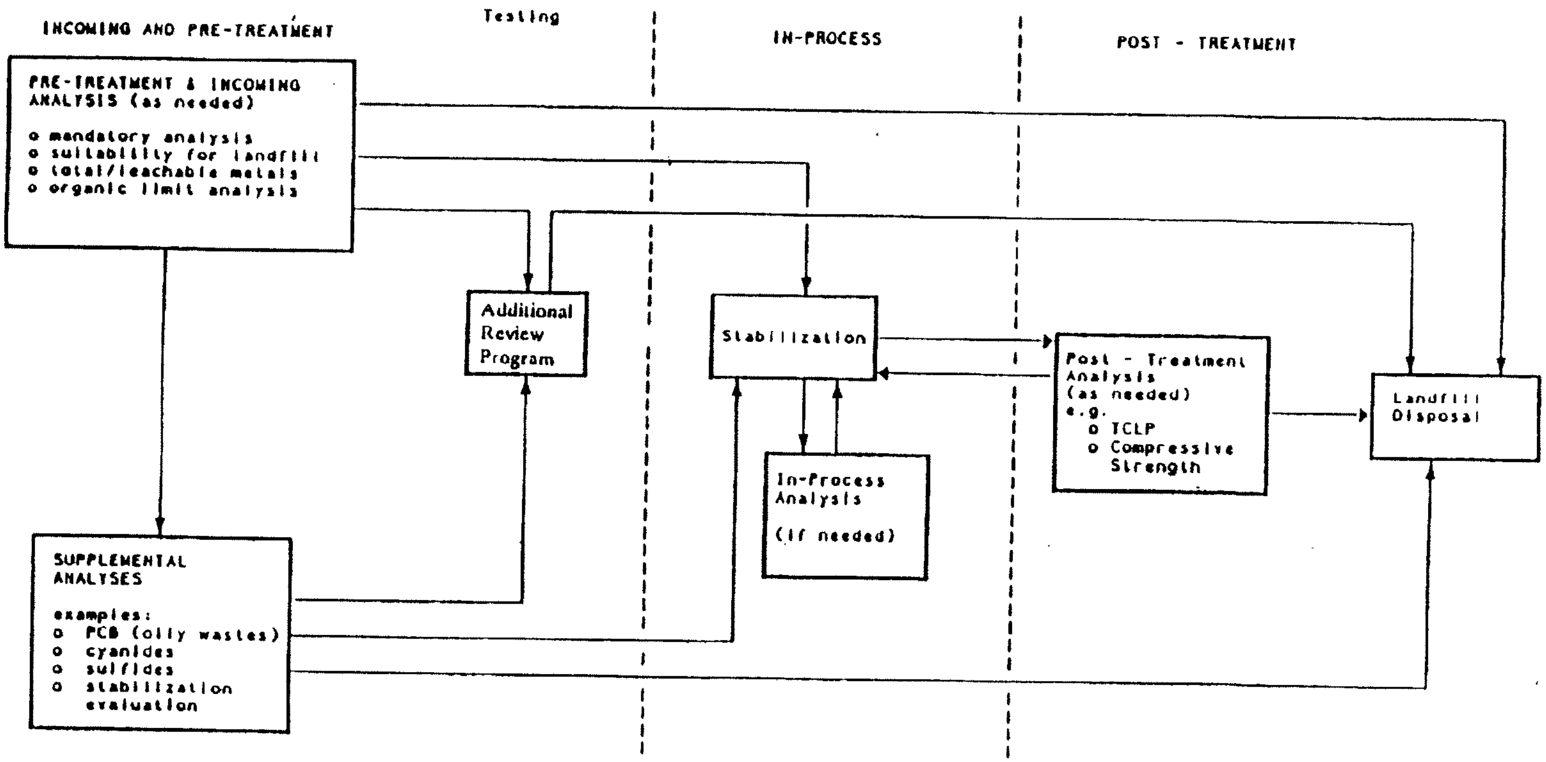


Figure C-5
LANDFILL AND STABILIZATION PROCESS



July, 2011

APPENDIX A

STANDARD ANALYTICAL PROCEDURES

Standard Analytical Procedures

PARAMETER/METHOD	SW-846[1]	EPA[2]	Std Meth[3]	ASTM[4]
Method Selection	Chap 2	Table 1B, 1C		
Extraction Procedure (EP) Toxicity Test	1310B			
Toxicity Chracteristic Leaching Procedure (TCLP)	1311			
Sample Digestion Methods:				
Acid Digestion of Waters for Total Recoverable or Dissolved	3005A			
Metals for Analysis by FLAA or ICP				
Acid Digestion of Aqueous Samples and Extracts for Total	3010A			
Metals for Analysis by FLAA or ICP				
Microwave Assisted Digestion of Aqueous Samples and Extracts	3015A			
Acid Digestions of Aqueous Samples and Extracts for	3020A			
Total Metals for Analysis by GFAA				
Acid Digestion of Oils for Metals Analysis by Atomic	3031			
Absorption or ICP				
Dissolution Procedure for Oils, Greases or Waxes	3040A			
Acid Digestion of Sediments, Sludges and Soils	3050B			
Microwave Assisted Digestion of Siliceous and Organically	3052			
Based Matrices				
Determination of Inorganic Analytes:				
Inductively Coupled Plasma-Atomic Emission Spectrometry	6010C	200.7 rev 4.4	3120B	
Flame Atomic Absorption Spectrophotometry	7000B		3111B,C,D,E	
Graphite Furnace Atomic Absorption Spectrophotometry	7010	200.9 rev 2.2	3113B	
Arsenic (Atomic Absorption Gaseous Hydride)	7061A		3114B	
Antimony and Arsenic (Atomic Absorption, Borohydride	7062			
Reduction)				
Chromium Hexavalent (Coprecipitation)	7195			
Chromium Hexavalent (Colorimetric)	7196A		3500-Cr B,C	
Chromium Hexavalent (Chelation/Extraction)	7197			
Determination of Hexavalent Chromium is Drinking Water,	7199	218.6 rev 3.3		
Groundwater and Industrial Wastewater Effluent by				
Ion Chromatograph				
Mercury in Liquid Waste (ManualCold-Vapor Technique)	7470A	245.1 rev 3.0	3112B	
Mercury in Solid Waste (ManualCold-Vapor Technique)	7471B			
Selenium (Atomic Absorption Gaseous Hydride)	7741A		3114B	
Selenium (Atomic Absorption, Borohydride Reduction)	7742			
Organic Extractions and Preparations:				
Organic Extraction and Sample Preparation	3500C			
Separatory Funnel Liquid-Liquid Extraction	3510C			
Soxhlet Extraction	3540C			
Pressurized Fluid Extraction (PFE)	3545A			
Ultrasonic Extraction	3550C			
Waste Dilution	3580A			
Waste Dilution for Volatile Organics	3585			
Sample Preparation for Volatile Organic Compounds	5000			
Volatile Organic Compounds in Soils and Other Solid	5021			
Matrices Using Equilibrium Headspace Analysis				
Purge-and-trap for Aqueous Samples	5030C			
Closed-System Purge-and-Trap and Extraction for	5035A			
Volatile Organics in Soil and Waste Samples				
Cleanup	3600C			
Florisil Cleanup	3620C			
Sulfur Cleanup	3660B			
Sulfuric Acid/Permanganate Cleanup	3665A			

Standard Analytical Procedures

PARAMETER/METHOD	SW-846[1]	EPA[2]	Std Meth[3]	ASTM[4]

Organic Analytical Methods

Determinative Chromatographic Separations	8000C			
Pesticides	8081B	608	6630B,C	
Polychlorinated Biphenyls	8082A	608	6431B	
Volatile Organic Compounds	8260C	624	6200 B &C	
		1624B		
Semivolatile Organic Compounds	8270D	625	6410B	
		1625B		
Heat of Combustion, Bomb Calorimeter Method				D240
				D2015
Chlorine (Halogen) Content	5050			D808
				D2361
				D4327
Sulfur Content				D129
				D3177
				D4327

Screening Methods

Bulk Density & Apparent Specific Gravity				D5057
Commingled Waste Compatibility				D5058 Method A
Flammability Potential/Ignitability Screen	1030			D4982
Oxidizer Screen				D4981
Paint Filter Liquids Test	9095B			
Physical Description				D4979
pH Screen	9041A			
Polymerization Potential				D5058 Method B
Sulfide Screen by Lead Acetate Paper				D4978 Method A
Water Compatibility Screen				D5058 Method C
Screening of Waste for Radioactivity				D5928

Miscellaneous Analytical Methods

Acidity			2310B	D1067
Alkalinity			2320B	D1067
Ammonia		350.3	4500-NH_3	
Ash Content				D482
				D2974
				D3174
Chemical Oxygen Demand (COD)			5220D	
Chlorine	9075			
	9076			
	9077			
Chlorine, Residual			4500-Cl G	
Compaction Test	1310A			
Conductivity/Specific Conductance	9050A	120.1	2510	D1125
Corrosivity Toward Steel	1110A			
Dermal Corrosion	1120			
Total and Amenable Cyanide	9010C	335.1	4500-CN	
	9012B			
	9013			
	9014			
Free Cyanide			4500-CN	
Flash Point, Cleveland Open Cup				D92

Standard Analytical Procedures

PARAMETER/METHOD	SW-846[1]	EPA[2]	Std Meth[3]	ASTM[4]
Miscellaneous Analytical Methods				
Flash Point, Pensky-Martens Closed-Cup	1010A			D93
Flash Point, Setaflash Closed-Cup	1020B			D3278
Flash Point, Tag Closed-Cup				D56
Fluoride			4500-F^-C	
Oil & Grease		1664A	5520B	
Oxidation/Reduction (Redox) Potential (ORP)				D1498
pH Measurement	9040C	150.1	4500H	
	9041A			E70
	9045D			
Pour Point of Petroleum Oils				D97
Radiation	9310			
	9315			
	9320			
Soil Identification				D2487
				D2488
Solids, Fixed and Volatile (500 C)		160.4	2540E,G	
Solids, Total Dissolved Solids (180 C)		160.1	2540C	
Total Solids (103/105 C)		160.3	2540B	D2974
Total Suspended Solids (103/105 C)		160.2	2540D	
Specific Gravity			2710F	D70
				D891
				D1217
				D1429
Sulfide	9030B		4500-S^{-2}	
	9031			
	9034			
	9215			
Unconsolidated, Undrained Compressive (UUC) Strength				D2850
of Cohesive Soils in Triaxial Compression				

References

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, Third Edition, U.S. Environmental Protection Agency, Office of Solid Waste, Washington, DC September 1986, as amended by Final Updates I, II, III, IIIA, IIIB and IV or most recent edition or revision.
2. Tables 1B, 1C and 1D of EPA Approved Test Procedures listed in 40 CFR 136 (March 12,2007 or most recent). Full text of 600 series methods included in Appendix A. Full text of metals methods in Methods for the Determination of Metals in Environmental Samples, Supplement 1, National Exposure Risk Laboratory-Cincinnati (NERL-CI) EPA/600/R-94/111,May 1994. Full text of inorganic methods in Methods for the Determination of Inorganics in Environmental Samples, National Exposure Risk Laboratory-Cincinnati (NERL-CI) EPA/600/R-93/100,August 1993..
3. Standard Methods for the Examination of Water and Wastewater, 20th Edition (or on-line) Americal Public Health Association (APHA), American Water Works Association, Water Environment Federation, 2000 or more recent.
4. Annual Book of ASTM Standards, American Society for Testing and Materials, 1993 or more recent edition or revision.

ATTACHMENT D

(proposed modified pages are designated with a November or December 2013 revision date at the bottom of the respective page)

Application Appendix D-1 – Containers

(proposed modified pages are designated with a December 2013 revision date at the top of the respective page)

APPENDIX D-1
CONTAINERS

TABLE OF CONTENTS

CONTAINERS

This section contains a description of the container storage areas and operations utilized to store and process solid and liquid hazardous wastes received at the CWM Chemical Services, LLC. (CWM) Model City, New York Facility (site). In addition, CWM utilizes these areas to store and process non-hazardous waste.

A. CONTAINER STORAGE AREAS

The site currently maintains the following areas for the permanent storage and handling of containerized solid and liquid hazardous wastes.

LOCATION	WASTE TYPE	CONTAINER TYPE	STORAGE CAPACITY	AVAILABLE SECONDARY CONTAINMENT (gallons)	REQUIRED SECONDARY CONTAINMENT (gallons)
Drum Management Building					
Area I	Liquid/Solid	drums	688 55-gal drums	4,675	3,784
Area II	Liquid/Solid	drums	320 55-gal drums	1,989	1,760
Area III	Liquid/Solid	drums	36 55-gal drums	251	198
Area IV	Liquid/Solid	drums	36 55-gal drums	251	198
Area V (Floor Trench System)	Liquid	drums	117 55-gal drums	648	644
	Solid	drums	1,376 55-gal drums	NA	NA
Drum Building West Ramp	Liquid	tankers	2-5,500-gal tankers	22,118	10,104
	Solid	drums	160 55-gal drums	22,118	NA
Truck Loading/Unloading Area & Ramp	Solid	drums	1,040 55-gal drums	NA	NA
Area VI, Sections 1, 2 & 3	Solid	drums	956 55-gal drums	NA	NA
PCB Warehouse Building					
Area 1	Solid	drums	1,368 55-gal drums	NA	NA
Area 3/6	Liquid	drums	160 55-gal drums	409 (per pan)	220 (per pan)
	Solid	drums	1,358 55-gal drums	NA	NA
South Trailer Parking Area	Liquid/Solid	tankers/rolloffs	58 rolloffs or 5 tankers & 48 rolloffs	82,481	27,500
Stabilization Facility					
Trailer Parking Area I	Solid	rolloffs	6 rolloffs	NA	NA
Trailer Parking Area II	Solid	rolloffs	14 rolloffs	NA	NA
Trailer Parking Area III	Liquid/Solid	tankers/rolloffs	19 rolloffs or 5 tankers & 9 rolloffs	39,273	27,500
Trailer Parking Area IV	Solid	rolloffs	9 rolloffs	NA	NA
Waste Ash Tanker Unloading Area	Solid	Tanker(dry)/rolloff	1 tanker(dry)/rolloff	NA	NA
Special Client Treatment Room	Solid	rolloffs	4 rolloffs	NA	NA
Macro Room	Solid	rolloffs	18 rolloffs	NA	NA
Lower Drum Shedder Area	Liquid/Solid	rolloffs	2 rolloffs	3,019	NA
Upper Drum Shredder	Solid	drums	300 55-gal drums	NA	NA
North Expansion Building	Solid	rolloffs	15 rolloffs	NA	NA
Aqueous Treatment Building					
AT Drum Dock	Liquid	drums	128 55-gal drums	1,303	704
	Solid	Drums	128 55-gal drums	NA	NA
AT Tanker Unloading Area	Liquid/Solid	Tankers	2-6,000-gal tankers	14,851	9,916
AT Filter Press Room	Solid	Rolloffs	1 rolloff	NA	NA

LOCATION	WASTE TYPE	CONTAINER TYPE	STORAGE CAPACITY	AVAILABLE SECONDARY CONTAINMENT (gallons)	REQUIRED SECONDARY CONTAINMENT (gallons)
T. O. Building					
Transformer Containment Pan	Liquid/Solid	transformer/drums	11 pans	386 (per pan)	386 (per pan)
T.O. Building Loading Ramp	Liquid/Solid	Tanker	2-6,000-gal tankers	18,269	17,515
Truck Wash Facility	Solid	Rolloffs	3 rolloffs	NA	NA
T-130 Loading/Unloading Area	Liquid/Solid	tanker/rolloff	1-5,500-gal tanker, 1 rolloff	9,895	7,281
T-108 Loading/Unloading Area	Liquid/Solid	tanker/rolloff	1-5,500-gal tanker, 1 rolloff	20,481	7,309
T-109 Loading/Unloading Area	Liquid/Solid	tanker/rolloff	1-5,500-gal tanker, 1 rolloff	20,255	7,281
T-158 Loading/Unloading Area	Liquid/Solid	tanker/rolloff	1-5,500-gal tanker, 1 rolloff	29,422	7,281

Container types other than those listed above are also allowed, provided the secondary containment requirements are satisfied. For drum storage areas, 55 gallon drums and other liquid containers not exceeding 330 gallon capacity which meet the United States Department of Transportation (DOT) definitions of "non-bulk packaging" or "intermediate bulk containers (IBCs)" in 49CFR 171.8 are allowed. Also, containers of solid materials, such as 55 gallon drums and other solid containers not exceeding 330 gallon capacity which meet the DOT definitions of "non-bulk" or "IBCs" in 49CFR 171.8 may be stored in these areas. The number of containers allowed in each drum storage area is based on 55-gallon equivalents. For bulk container storage areas, rolloffs, tankers, flat beds and box vans and other containers which meet the DOT definition of "bulk packaging in 49CFR 171.8 are allowed. Flat beds and box vans are only used in conjunction with storage of non-bulk containers and IBCs, and not for direct storage of un-containerized bulk waste. Precautions are taken for containers that are subject to deterioration from weather (e.g., cubic yard boxes) and such containers are subject to the storage restrictions under Condition B.1.a.iii in Exhibit C of Schedule 1 of Module I of the Permit. The containment pans in the T.O. Building may be used to store transformers, drums and other electrical devices. Only DOT containers listed in the table under Section B.4.(a) or selected using the procedure in Section B.4.(a) of this appendix are allowed to be used for waste storage.

The above-referenced areas are permitted for container storage and management incidental to the operations conducted in that area. Satellite and 90 day accumulation practices are also permitted as per 6 NYCRR Part 372.

CWM manages all container storage areas in a manner to prevent the possibility of a leak or spill from the containers.

According to the National Fire Protection Association (NFPA) 30, 2003 edition, entitled Flammable and Combustible Liquids Code, Chapter 6.4.3, for flammable liquids (DOT Class IA, Class IB and Class IC) and combustible liquids (DOT Class II and Class III) solid pile (containers, rows or groupings of containers) and palletized storage (modules) in warehouses shall be arranged so that piles containing these materials are separated from each other by at least 4 ft. (1.2 m).

For all other New York State Department of Environmental Conservation (NYSDEC) regulated waste containers, 6NYCRR 373-2.3(f) maintains that the owner or operator must maintain aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency unless it can be demonstrated to the commissioner that aisle space is not needed for any of these purposes.

For all container storage areas located on the site, maximum storage is based on the following:

- Drums will be staged two wide with at least a 2 foot aisle space (4 foot for flammables) between drum pairs and between drums and building walls;

- Drums will be stacked a maximum of two high (single stacked for flammables, except for small containers, less than or equal to 30 gallons, of flammables which may be stacked two high to a maximum height of 5 feet);

- Drums containing liquids will be managed with a minimum 2 foot distance to the edge of the containment system (i.e., curbing); and

- Bulk containers may be staged end-to-end (maximum of 2) with a separation of 2 feet between rows.

General container management procedures are presented below, followed by a detailed description of each container storage area. Secondary containment calculations and drawings for each container storage area, as indicated by the figure number referenced for each area, are included in figures and calculations.

B. GENERAL CONTAINER MANAGEMENT PROCEDURES

(1). Acceptance Limitations

CWM is permitted by the NYSDEC for the receipt, handling, treatment and disposal of solid and liquid hazardous waste with the following exceptions:

- Shock-Sensitive Waste (for landfill disposal);

- Radioactive waste (slightly above background is acceptable in accordance with the CWM Waste Analysis Plan);

- Explosives; and

- Pyrophoric Waste (for landfill disposal).

All waste received in containers at the facility is subject to the procedures outlined in the CWM Waste Analysis Plan.

(2). Waste Tracking

Containerized waste is received at the site through the continuously monitored (i.e., security guard) front gate and directed to the scale/receiving department. All waste is tracked from receipt to treatment, disposal and/or off-site shipment. All completed waste tracking information becomes part of the Daily Operating Record.

(3). Off-Specification Wastes

Off-Specification designation indicates that the waste does not fall within specified waste parameters. The waste may or may not be acceptable for handling at the site. Details concerning off-specification wastes are presented in CWM's Waste Analysis Plan.

A quality control check is performed on each waste shipment received at the site. If a waste is determined to be off-specification, the laboratory or other technical personnel documents this off-specification. The off-specification information is distributed as necessary. If the waste is not acceptable at the site, the generator is notified and arrangements are made to transport the material to an appropriate facility or back to the generator.

Information for off-specification wastes will include operations and laboratory steps necessary to manage the waste. Wastes received off-specification may result in a re-evaluation of the waste profile and/or management decision according to CWM's Waste Analysis Plan.

(4). General Container Storage Procedures

(a). Packaging Requirements

Under USDOT regulations, it is the shipper's responsibility to ensure that waste which is a DOT hazardous material conforms to the container packaging requirements. All waste stored in containers shall conform to these requirements as follows:

- 49 CFR Subpart B - Table of Hazardous Materials and Special Provisions; specifically Part 172.101(i) Packaging Authorizations;
- 49 CFR Part 173 - Shippers - General Requirements for Shipments and Packagings; and
- 49 CFR Part 178 - Specifications for Packagings.

The following table contains a list of the USDOT specification containers for hazardous material and wastes received, stored and shipped by CWM. This list is not comprehensive and other containers may be selected in accordance with the performance oriented packaging standards in 49 CFR 171-178. Under USDOT, the shipper is responsible for ensuring that the packages are compatible with the hazardous material; Under RCRA, the TSDF becomes the generator when materials are shipped off-site.

USDOT Class/Div.		**Waste Type Example**	**USDOT Packaging Specifications**
2.1	Flammable Gas	Aerosols	1A2 1H2 1G 4G
2.2	Non-Flammable Gas	Aerosols	1A2 1H2 1G 4G
3	Flammable liquids	solvents, paints	1A1 1A2 1H1 1H2 31H Cargo tank combination: outer 4G or 1G, inner metal or plastic
4.1	Flammable Solid	metal powders	1A2 1H2 1G 4G
4.2	Spontaneously Combustible	oily rags	1A2 1H2 1G 4G
4.3	Dangerous when wet	sodium cell sweepings	1A2 1H2 1G 4G 11G
5.1	Oxidizer	liquid - aqueous solution	1A1 1A2 1H1 1H2 31H Cargo tank
		solid - nitrating salts	1A2 1H2 1G 4G
5.2	Organic Peroxides	organic peroxide	1A1 1A2 1H1 1H2
6.1	Toxic	liquid - chlorinated solvent	1A1 1A2 1H1 1H2 31H Cargo Tank combination: outer 4G or 1G, inner metal or glass
		solid - pesticides/soil	1A2 1H2 1G 4G 6HG 11G 11H 11H2 Roll-off box
8	Corrosive	liquid - acid solution	1A1 1A2 1H1 1H2 31H Cargo tank
		solid - caustic solids	1A2 1H2 1G 4G 6HG 11G 11H 11H2 Roll-off box
9	Miscellaneous	liquid - hazardous waste	1A1 1A2 1H1 1H2 6HG 31H Cargo tank combination: outer 4G or 1G, inner metal or plastic
		solid - hazardous waste	1A2 1H2 1G 4G 5L 5M 6HG 11G 11H 11HZ BK3 13H 13L Roll-off box

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When selecting a container not on this table, CWM will follow the procedure described below:

- Refer to the DOT section of the Waste Profile Sheet to identify the proper shipping name.
- Locate the proper shipping name in column 2 of the Hazardous Materials (HazMat) Table (49 CFR 172.101). and identify the associated hazard class/division, identification number and packing group. Note any special provisions in column 7.
- Using this information, identify permissible packings identified in column 8A (exceptions), 8B non-bulk packages (< or = 119 gallons) and 8C for bulk packages (> 119 gallons). The sections referenced in column 8 as Section 173*** refer to the sections of Part 173 where the permissible packagings are identified and described.

Containers of hazardous materials that arrive at the site which do not meet the USDOT specifications will not be shipped off the site unless the contents of the container are placed into a container which meets USDOT specifications. Containers that arrive at the site which appear to have obvious signs of structural damage or deterioration, or which are found to be leaking shall either be repaired so that the containers meet RCRA & USDOT container specifications, overpacked into containers meeting RCRA & USDOT container standards or will be emptied and their contents placed into containers meeting RCRA & USDOT container standards or processed immediately.

Per 49 CFR, all containers that contain hazardous materials and leave the site for transportation by public highway must meet USDOT standards.

(b). Containment

Secondary containment systems as described below are utilized by CWM to store containerized (i.e., drums, rolloffs, etc.) liquid hazardous waste throughout the site. In the areas that only store hazardous waste solids, secondary containment is not required, but outdoor areas will be designed and operated to remove liquid resulting from precipitation or containers will be elevated or otherwise protected from contact with accumulated liquids.

(1). Modular Units

Modular units are currently used by CWM to store drummed liquid hazardous waste within the Aqueous Treatment Building (AT Drum dock). The modular units are constructed of a rectangular steel frame with a corrosion resistant steel grating over the frame which is bonded to the concrete floor using a solid layer of sealant (i.e., urethane caulk). Containers are positioned on these gratings. Containers holding packaged laboratory chemicals may be stored on floors since the packaging requirements listed under 49 CFR provide adequate primary, secondary and tertiary containment.

(2). Concrete Curbing

Concrete curbing is currently being used as secondary containment by CWM to store containerized liquid hazardous waste throughout the site. In several of the areas, CWM currently utilizes a coating (e.g., epoxy) or sealant (e.g., CHEMTEC One manufactured by CHEMTEC INTL) to improve the impervious quality of the concrete. The existing coating and sealant systems are inspected at least weekly and maintained as needed. For all sealant areas, the sealant will be reapplied annually. The following table lists all container storage areas and use of coatings or sealants.

LOCATION	COATING/SEALANT
Drum Management Building	
Building Interior	Sealant
West Ramp	Sealant
Truck Loading/Unloading Area & Ramp	No coatings or sealants required
PCB Warehouse Building	
Area 3/6	No coatings or sealants required (use pans for liquid storage)
All other areas	No coatings or sealants required
South Trailer Parking Area	Sealant
Stabilization Facility	
Trailer Parking Area I & II	No coatings or sealants required
Trailer Parking Area III & IV	Sealant
Waste Ash Tanker Unloading Area	Coating
Special Client Treatment Room	No coatings or sealants required
Macro Room	No coatings or sealants required
Lower Drum Shedder Area	Coating
Upper Drum Shredder	No coatings or sealants required
North Expansion Building	No coatings or sealants required
Aqueous Treatment Building	
AT Drum Dock	Coating
AT Tanker Unloading Area	Sealant
AT Filter Press Room	Coating
T. O. Building	No coatings or sealants required (use pans for liquid storage)
T.O. Building Loading Ramp	Sealant
Truck Wash Facility	No coatings or sealants required
T-130 Loading/Unloading Area	Sealant
T-108 Loading/Unloading Area	Sealant
T-109 Loading/Unloading Area	Sealant
T-158 Loading/Unloading Area	Sealant

Secondary containment for all container storage areas is inspected weekly in accordance with the Facility Inspection Plan. If concrete cracks or gaps are found that exhibit separation or if a defect in the coating system exposes the underlying concrete, an Environmental Work Order (EWO) will be issued to schedule the repair unless it is completed by the end of the next business day. The time period for a repair will vary depending on the type, extent and location of the defect. All repairs will be documented. Hairline cracks will be closely monitored and repaired if separation occurs.

(c). Compatibility

Containers are sealed prior to storage and are normally placed in a double row side by side within the same waste category. Containers can be double stacked, except for drummed flammables. Adequate aisle space is maintained to allow daily inspection of the containers.

In the areas where modular units are used, the modular units are organized by grouping them in sections. Each section stores only compatible materials. Each section may contain both regulated and non-regulated material according to compatibility.

For all containers not being stored on modules (i.e., concrete curbing), the segregation philosophy of 49 CFR Part 177.848 will be followed to avoid co-mingling of incompatible wastes.

Procedures for verifying compatibility of wastes are presented in CWM's Waste Analysis Plan.

(d). Identification

All hazardous waste containers will be labeled with the following information:

1. Generator name
2. Waste profile/identity
3. DOT labels, where applicable
4. Date Received at CWM for Land Disposal Restricted waste

Additional labeling for PCB items, articles and containers will be required by 40CFR Part 761. In addition, every PCB item, article, and container, which is regulated as hazardous under 6NYCRR Part 371, will have the words "Hazardous Waste" affixed to it because PCBs are a New York State listed Hazardous Waste and must be labeled accordingly.

(5). General Methods of Container Processing

Containerized material at the site is processed by one or more of the following general methods:

(a). Liquid wastes may be transferred to or from the Front End Aqueous Treatment System.

Aqueous wastes are stored in areas designated in Section A and treated at the Aqueous Waste Treatment Facility or they may be staged incidental to final treatment at the Aqueous Waste Treatment Facility.

(b). Organic Liquids and other liquids may be consolidated for BIF fuels blending or incineration offsite.

Liquid containerized wastes may be consolidated for BIF fuels blending or incineration. Liquid bulk materials may be transferred to appropriate tanks for storage. Containers of liquid waste may be transshipped to another facility for treatment/disposal.

(c). Solid materials are disposed of in designated landfill areas if and only if land disposal restrictions are met and/or do not apply.

All containers that contain solid wastes are staged temporarily until quality control measures are performed. Prior to landfilling, drums stored in the Drum Management Building are typically loaded onto flatbed trailers staged at the loading dock entrance. Based on information provided by the laboratory, the solid drummed wastes are delivered to the landfill for disposal.

(d). Solid materials may be consolidated for disposal offsite.

Solid containerized wastes may be consolidated for offsite disposal in a landfill or incinerator. Containers of solid waste may also be transshipped to another facility for treatment or disposal.

(e). Other containerized wastes may be stabilized and landfilled and/or transported to an offsite permitted facility.

Incoming materials will be stabilized to meet land disposal restriction standards or to increase strength prior to landfilling, as necessary. Decharacterized waste may be disposed of in an offsite permitted landfill.

(f). Some types of waste can be Macroencapsulated and/or Microencapsulated using permitted debris technology.

CWM may implement debris immobilization techniques by stabilizing debris utilizing microencapsulation and/or macroencapsulation techniques.

Microencapsulation is a specified technology involving the immobilization of contaminants on the surface of debris by a process similar to stabilization.

Debris that may not be physically suitable for the stabilization equipment, or that contains contamination unsuitable for microencapsulation (e.g., a pump contaminated with oily leachate) may be managed by macroencapsulation.

CWM currently utilizes macroencapsulation containers (i.e., vaults) made of high density polyethylene (HDPE) and the minimum thickness of the containers' bottom, sides, and top is 300 mil. having a capacity of approximately 30 cubic yards. The container shall be the "SUPERLINER XL 0370 Black HDPE" brand or NYSDEC approved equivalent. After the void space is filled with stabilized waste or other approved filler material, the containers are sealed by applying glue to the lip of the container and the lid. The lid is placed on the container and screws are installed at approximately 4 inch to 6 inch intervals. A visual inspection is performed after the container is sealed. Other non-degradable containers, such as a polydrum or other approved encapsulation device, may also be used.

In order to help prevent damage to the macroencapsulation container during off-loading operations, the lip of each container shall be modified to reduce the stress on the container. This modification consists of removing as much of the lip as possible while still leaving sufficient width to secure the container lid. Alternatively, the design of the container may be modified by the manufacturer to reduce the stress produced by the lip. CWM will take all necessary precautions to prevent macroencapsulation container damage and monitor each container's integrity from filling through placement in the landfill. Any observed damage and the repairing of such damage, shall be recorded in the facility's operating record.

(g). Repacking and decanting wastes and other hazardous materials.

Container repackaging can occur in the Drum Management Building or the PCB Warehouse Building and, in certain instances, in the T.O. Building. USDOT packaging standards must be followed for hazardous materials that will be shipped offsite.

(h). Empty containers may also be accepted from offsite and landfilled or transported offsite for disposal or recycling.

Empty containers are accepted at the Drum Management Building for visual inspection to ensure that they are empty in accordance with 6NYCRR Part 371.1(h)(2). Drums determined to be empty may be sent off-site for recycling. Empty drums may be crushed in the landfill. They also may be crushed in the stabilization mixing pits and sent offsite to a permitted landfill.

Hazardous waste containers that, upon inspection, do not meet the definition of RCRA empty (as defined in 6NYCRR Part 371.1(h)(2)) after the liquid has been removed will be treated as hazardous waste. A management method for the waste will be selected as dictated by CWM's Waste Analysis Plan.

(i). Transship for recycling or other treatment processes.

Containers of batteries, light bulbs and other wastes may be transshipped for recycling or other applicable management process.

C. DRUM MANAGEMENT BUILDING

(1). History and Design

Construction of the existing Drum Management Building (DMB) commenced in 1981 and was completed in 1982. The building was opened for use in November, 1982 and includes a loading/unloading dock for the shipment and receiving of wastes. The DMB West Ramp was constructed in 1998 and encompasses 1,700 square feet.

(2). Operations

Based on the types/volumes of wastes received by the site, the DMB is the focal point for most incoming containers. Liquid waste containers were previously managed on modular containment units. In 2006, CWM replaced the existing modular units with a concrete curb secondary containment system. This system provides separation of incompatibles. Solid waste containers may be stored throughout the DMB. Figure D-1A presents the DMB layout and the maximum liquid and/or solid storage capacity for the building based on the previously presented spacing requirements (also see Section A). The arrangements of containers may change depending on storage needs, however, compatibility guidelines will be met. Secondary containment calculations accompany attached Figure D-1A. As previously stated, an approved sealant, (e.g., CHEMTEC One) has been applied to all concrete floor areas in this building which are permitted for liquid waste storage.

Loading/unloading areas at the DMB have ramps allowing equipment to move directly onto transport vehicles from the unloading docks. Containers are removed by use of forklifts that are equipped with drum handling attachments. The attachments generally employed are capable of lifting up to two (2) drums at a time. Other container moving practices may be utilized as technologies improve.

(a). Loading/Unloading Areas

The DMB Loading/Unloading Area & Ramp is permitted for solids container storage only. No secondary containment is required. Incoming and outgoing box trailers containing 55-gallon containers or equivalent of liquids and/or solids may be temporarily staged in this areas. Incoming trailers will be unloaded and a quality control check performed. The dock area is covered, providing protection for personnel during inclement weather.

After receipt, containers may be staged on a flatbed incidental to the transfer of these containers to other on-site operations, such as aqueous treatment, stabilization, or the landfill. Liquid and incompatible waste containers may be staged on flatbed trailers according to USDOT compatibility requirements in the dock area up until the end of the last DMB personnel work shift on the date placed in the dock area. Containers with solid wastes may be staged on the dock for longer if needed.

Co-mingling of incompatible wastes staged on the trailers in the dock area is prevented by separating these wastes with a buffer such as non-regulated packages or bags of "speedi-dry" or as required by NYSDOT.

The DMB West Ramp (fuel transfer area) is permitted for liquid storage. This ramp is used to transfer compatible liquids from drums inside the DMB to bulk tankers located on the ramp. It is sized to accommodate two tankers to also allow the transfer from tanker to tanker. CWM has applied an approved sealant (e.g., CHEMTEC One) to the entire ramp area.

(b). Container Waste Characterization

The waste characterization procedures described in CWM's Waste Analysis Plan are used to determine the compatibility grouping for a particular waste material.

In addition, each corrosive is specified as either an acid or base for further segregation. All acutely toxic materials (P codes which are not "derived from" treatment residues) will be handled as poisons if they are not specifically listed by USDOT for other hazardous properties. Any D, F, K or U codes for materials not specifically assigned a hazard class will be recognized as Class 9 for storage purposes. In the fuels storage area, flammables, combustible, Class 9 and non-regulated organic liquids will be staged for bulking into a fuel or incineration blend.

(3). Containment

The maximum 55-gallon equivalent containers (solids/liquids) allowed for this building is presented in Section A and on attached Figure D-1A.

(a). Base Construction

The DMB floor, loading/unloading ramp and West Ramp are constructed of concrete and inspected as defined within the Facility Inspection Plan. The base was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Containment of Leaking Drums

The DMB is inspected at least daily on operating days for leaks or spills. If spills are observed, they will be contained within the building. Spilled materials will generally be absorbed with absorbent and placed into drums for disposal. Upon receipt of a shipment of drums and after unloading, a visual inspection is made for leaking drums.

If a small leak should occur, the contents of a leaking drum are transferred to another appropriate container or the drum is placed in an overpack drum. In the event of major leaks or spills, liquids will be removed by vacuum trucks or absorbed with a compatible absorbent material and placed into containers for disposal.

Spilled material is cleaned up with absorbent materials. Spill control procedures are described in the CWM Contingency Plan.

(c). Control of Run-off and Run-on

Because all container management operations take place within the confines of the existing DMB, no run-off or run-on is expected. However, precipitation may collect in the covered truck unloading area or curbed fuels transfer area ramp. Precipitation may be treated in the Aqueous Treatment System without sampling. If the liquids will be discharged to the surface water drainage system, a water sample will be collected for appropriate characterization prior to the discharge.

(4). Fuels Drum Pumping Station

A separate pumping station is located in a partitioned room at the south end of the DMB. The purpose of this station is to transfer waste organic liquids, such as oils, solvents, lean waters, etc., from drums and oil filled equipment into bulk containers at the DMB West Ramp using a permanently installed pump. This operation provides fuels blending and consolidation for off-site shipments. Containment is provided by the DMB (i.e., concrete floor and trench).

D. <u>PCB WAREHOUSE BUILDING</u>

(1). History and Design

The PCB Warehouse Building was constructed in the 1940's and consists of a single story, brick and frame structure which is approximately 239 feet long by 106 feet wide. There are five major areas within the building which are separated by masonry walls.

The floor consists of a six-inch thick reinforced concrete slab poured on fill material. The floor is smooth and there are no floor drains or other floor openings. A perimeter concrete footing is about four feet above surrounding ground level.

The exterior walls consist of wood frame with aluminum siding on exterior and painted plywood on interior with a frame of 2 x 4's on 16-inch centers. Interior walls consist of brick and mortar construction. The roof is supported by 2" x 8" rafters on 20-inch centers. The rafters are supported by wooden beams on vertical wood columns in Areas 3, 4, and 5 and by longer span wood trusses in Area 1. The roof is covered with tar paper and sealed with roofing tar.

(2). Operations

The PCB Warehouse Building is used for the container storage of solid and liquid materials. Liquid drums must be stored within containment pans. A total of four pans, each 9 feet wide by 50 feet long by 2 inches high, capable of storing up to 40 drums (55 gallons or equivalent) each, are constructed of ¼" thick continuously welded ASTM Grade A36 carbon steel coated with vinyl ester. All containers stored within a pan in the PCB Warehouse pans are compatible with each other and with the pans, as established by the CWM Waste Analysis Plan. Attached Figure D-2 presents the PCB Warehouse Building layout and the maximum liquid and/or solid storage capacity for the building based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-2. No secondary containment will be provided or is required in the areas used for storage of solid waste. Coatings or sealants are not required in the PCB Warehouse Building. Storage of waste within the building will be as follows:

- Areas 1, 3 and 6 are primarily used for container storage of wastes that will be shipped offsite for recycling or disposal and other wastes for onsite management. Area 1 will be used for storage of solids only. Areas 3 and 6 will be used to store compatible liquid and solid waste materials.

- Area 5 will be used to store empty drums and supplies. Areas 2 and 4 will be used to store facility supplies and equipment, including clean overpack drums.

(3). Containment

As previously discussed, no secondary containment will be required in areas 1, 2, 4 and 5 based on only solid storage requirements. Containment within the liquid waste storage area (Areas 3 and 6) is provided by containment pans. In addition, storage areas 3 and 6 are provided with a one-foot high continuous perimeter curb and doors are equipped with elevated ramps to prevent liquids from exiting the building.

(a). Base Construction

The PCB Warehouse Building floor consists of a poured concrete slab and is inspected as defined within the Facility Inspection Plan. The base of the PCB Warehouse Building was designed to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment

The PCB Warehouse Building is inspected daily on operating days for leaks or spills. Spilled materials will generally be absorbed with absorbent and placed into drums for disposal. Upon receipt of a shipment of drums and after offloading, a visual inspection is made for leaking drums.

If a small leak should occur, the contents of a leaking drum are transferred to another appropriate container or the drum is placed in an overpack drum. In the event of major leaks or spills, liquids will be removed by vacuum trucks or absorbed with a compatible absorbent material and placed into containers for disposal.

Spilled material is cleaned up with absorbent materials. Spill control procedures are described in the CWM Contingency Plan.

(c). Control of Run-On and Run-Off

All container management operations will take place within the confines of the existing PCB Warehouse building. Therefore, no run-on and run-off is expected.

E. SOUTH TRAILER PARKING AREA

(1). History and Design

The South Trailer Parking Area encompasses 15,000 square feet, was constructed in 1986, and is used to store full trailers containing solid or liquid materials. The area is 299 feet long and is designed to store liquid and solid materials in containers prior to disposal. The area is constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

(2). Operation

The South Trailer Parking Area may be used for storage of liquid and/or solid hazardous and non-hazardous waste. Containers are typically placed in this area for the following reasons:

- Trailer is delivered to the site after normal operating hours;

- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

The following units may be used to store materials in this area.

- Box trailers holding hazardous and non-hazardous waste in USDOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding liquids;
- Covered roll-off trailers holding solid materials; and
- Flatbed or lowboy trailers holding hazardous and non-hazardous waste in containers or transformers. Cardboard, fiberboard, textile fabric or other non-metal or non-heavy plastic containers meeting USDOT specifications, may be stored on an uncovered flatbed or other open trailer for up to seven (7) days in accordance with Condition B.1.a.iii in Exhibit C of Schedule 1 of Module I in the Permit.

Attached Figure D-3 presents the South Trailer Parking Area layout and the maximum liquid and/or solid storage capacity for the area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-3. As previously stated, an approved sealant, (e.g., CHEMTEC One) has been applied to the entire concrete slab.

(3). Containment

The South Trailer Parking Area is used for the liquid or solid storage of the RCRA regulated, TSCA regulated and non-hazardous full or partially full containers mentioned above.

(a). Base Construction

The South Trailer Parking Area is constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad is sloped toward the rear wall and graded toward the center from both sides. Approximately one foot up slope from the rear curb is an 18” high containment wall that is designed to protect the rear containment curb. Precipitation will collect in the containment area until it is removed via vacuum truck. The South Trailer Parking Area consists of a poured concrete slab which was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The South Trailer Parking Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated in the Aqueous Waste Treatment System, or if appropriate, characterized by sampling and discharged to the surface water drainage system if analysis indicates that it meets surface water standards. It may also be collected and used in lieu of city water in the Stabilization process in accordance with SDP 2124, if analysis indicates compliance with 6 NYCRR Part 376.

F. STABILIZATION FACILITY

(1). History and Design

The Stabilization Facility (CHEM-MATRIX System), a mechanized stabilization process, began operations in 1991. In late 1992, the Main Stabilization Facility was augmented with the Northern and Southern Expansions. The Stabilization Facility also includes the Trailer Parking Area, Waste Ash Tanker Unloading Area, Special Client Treatment Room, Macro Room, Lower Drum Shredder Area and Upper Drum Shredder Area.

The mechanized facility was closed in 1996 and received NYSDEC approval of closure in January 1997. After removal of the CHEM-MATRIX system, the drum shredder was relocated from the Northern Expansion to the Main Stabilization Facility. The drum shredder was removed in May 2009 after receiving NYSDEC approval of the closure certification. The Southern Expansion, originally used as a powdery waste processing system, has not been used for that purpose since 1994 and is now used for reagent and water storage.

The Stabilization Facility is permitted to store solid and liquid containers incidental to the treatment operation. Operational flexibility may require storage or staging of different waste types and quantities. Attached Figure D-4 presents the maximum liquid and/or solid storage capacity for the areas based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-4. As previously stated, an approved sealant, (e.g., CHEMTEC One) has been applied in the areas utilized for liquid storage.

The Stabilization Facility is designed to process hazardous wastes so that the stabilized wastes conform to NYSDEC and Federal Land Disposal Restrictions (LDRs) thereby making wastes amenable to landfill disposal. Hazardous and non-hazardous wastes may be stabilized in order to meet the compressive strength requirements of CWM's Waste Analysis

Plan. In addition, equipment may be used to process hazardous and non-hazardous waste into a state acceptable at an on-site or off-site disposal facility. A detailed description of each area within the Stabilization Facility is presented below.

(a) Trailer Parking Areas

(1). History and Design

The Stabilization Trailer Parking Area encompasses four separate areas (Areas I – IV) and is used to store solid or liquid materials. The dimensions of the areas as well as intended storage are as follows:

- Area I (solid waste or compatible liquid/solid non-waste containers) – 70'x35'
- Area II (solid waste or compatible liquid/solid non-waste containers) – 150'x35'
- Area III (solid/liquid waste containers or compatible liquid/solid non-waste containers) – 200'x35'
- Area IV (solid/liquid waste containers or compatible liquid/solid non-waste containers) – 100'x35'

The areas are constructed of reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from an area will be contained.

(2). Operations

Area III and IV of the Stabilization Trailer Parking Area may be used for storage of liquid and/or solid hazardous and non-hazardous waste. Areas I, II & IV may only be used for storage of solid hazardous and non-hazardous waste and liquid non-waste containers. Containers are typically placed in this area for the following reasons:

- Trailer is delivered to the site after normal operating hours;
- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

Units which may be stored or staged incidental to treatment in this area include:

- Box trailers holding hazardous and non-hazardous waste in USDOT approved containers (liquid waste containers in Areas III & IV only);

- Bulk tanker trailers, vacuum trailers or other bulk containers holding liquids (in Areas III & IV only);

- Covered roll-off trailers holding solid materials; and

- Flatbed or low boy trailers holding hazardous and non-hazardous waste in containers or transformers. Cardboard, fiberboard, textile fabric or other non-metal or non-heavy plastic containers meeting USDOT specifications, may be stored on an uncovered flatbed or other open trailer for up to seven (7) days in accordance with Condition B.1.a.iii in Exhibit C of Schedule 1 of Module I in the Permit.

(3). Containment

(a). Base Construction

All four areas are constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pads are sloped toward the rear wall and graded toward the center from both sides. Approximately one foot up slope from the rear curb is an 18-inch high barrier wall, which is designed to protect the rear curb from trailers backing into the rear containment curb. The base of the Trailer Parking Area was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The Stabilization Trailer Parking Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated in the Aqueous Waste Treatment System, or if appropriate, characterized by sampling and discharged to the surface water drainage system if analysis indicates that it meets surface water standards. It may also be collected and used in lieu of city water in the Stabilization process in accordance with SDP 2124, if analysis indicates compliance with 6 NYCRR Part 376.

(b). North Expansion Building

(1). History and Design

The North Expansion Building was constructed in 1992 and is located adjacent to the north side of the Main Stabilization Building. The south wall of the facility is also the north wall of the Main Stabilization Building. The North Expansion Building has a control room and a mechanical room. The building contains two mixing pits (i.e., double walled subsurface tanks) on the west end and an overhead crane with a five ton hoist. An overturning frame is located on the west side by the overhead doors leading to the mixing pits to hinder trucks from tipping over while emptying their loads. There are three dust collection system baghouses, located east of the Main Stabilization Building. In addition, there is a make-up air unit on the roof to provide make-up air and heat to the buildings when the baghouses are operating.

(2). Operations

The primary purpose of the North Expansion Building is to stabilize waste material by mixing incoming waste streams with pozzolanic materials, other reagents and water. This will typically consist of waste being dumped into the pits, adding reagents and water, mixing with a backhoe and loading the stabilized material into dump trucks to haul to the site's landfill or to be transported off site. The pits may also be used to improve waste strength or prepare waste material for off site shipment.

The floor of the building is constructed with reinforced concrete. The concrete floor is placed over an HDPE liner to form an impervious barrier against waste migration. Except at the west side doorways, a perimeter curb is constructed around the entire building to further contain waste. The mixing pits are double walled steel tanks recessed into the floor of the North Expansion Building. The floor of the outer tank is sloped to a low point where a monitoring pipe installed within the secondary containment of the pit to provide identification of leaks into the leak detection annulus and to remove any liquids that collect between the tank walls.

Containerized solid wastes associated with the stabilization operations may be stored in the North Expansion Building.

(3). Containment

Other than the mixing pits, the North Expansion Building is only used for solid container storage and so no secondary containment is required.

(c). Main Building Stabilization Facility:

(1). History and Design

The Main Building Stabilization Facility consists of the Special Client Treatment Room, Macro Room, and the Upper/Lower Drum Shredder Areas.

(2). Operations

The Special Client Treatment Room (SCTR) is generally utilized for material storage, such as sandblast grit, road salt and stabilization reagents. It may also be used for storage of containers of solid hazardous and non-hazardous waste.

The Upper/Lower Drum Shredder Areas were previously used in conjunction with the drum shredder which has since been removed. After removal of the drum shredder, these areas continue to provide container storage. The Upper Drum Shredder Area is used for solid container storage only. The Lower Drum Shredder Area may be used for the storage of solid or liquid containers. Air emissions ductwork previously used for the Drum Shredder remains in place to provide general building ventilation, which is potentially part of the stabilization hazardous waste management.

The Macro Room is used for the storage of solid containers only. This area is used to store rolloffs containing HDPE boxes (minimum thickness of 300 mils) from the macroencapsulation process, prior to disposing in the landfill or shipping offsite. Macroencapsulation containers are processed in accordance with the procedures presented in Section B.5.f above. Lids for the boxes are typically installed in the Macro Room.

(3). Containment

No secondary containment is required in the SCTR, Macro Room or Upper Drum Shredder Area since these areas are used for solid storage only. The area utilized for liquid storage, i.e., Lower Drum Shredder Area, is constructed of a poured concrete slab and curbed sides which were designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations. The previously installed coating in this area will be maintained.

(d). Waste Ash Tanker Unloading Area:

(1). History and Design

The Waste Ash Tanker Unloading Area was constructed in 1992 with the Southern Expansion and is located south of the Main Stabilization Building. This area consists of a concrete ramp used for unloading waste ash tankers into the stabilization process. CWM will maintain the existing concrete coating system in this area.

(2). Operations

The Waste Ash Tanker Unloading Area is used to store both empty and full waste roll-offs and dry bulk trailers containing solid materials.

(3). Containment

The Waste Ash Unloading Area includes the ramp and sump area. The Waste Ash Unloading Area is constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad is sloped toward the rear wall and graded toward the center from both sides. Approximately one foot up slope from the rear curb is a one-foot high barrier wall, which is designed to protect the rear curb from trailers backing into the rear containment curb. The base of the Waste Ash Unloading Area was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

G. AQUEOUS TREATMENT BUILDING

(1). History and Design

The Aqueous Treatment (AT) Building was designed and constructed in 1985. The AT Building also includes the AT Drum Dock, the AT Tanker Unloading Area, and the AT Filter Press Room.

(2). Operations

The AT Building is permitted for solid and liquid storage and is used in the treatment of leachate and aqueous waste at the site. Attached Figure D-5 presents the current typical storage arrangements for the Building and secondary containment storage volume calculations (also see Section A). Operational flexibility may require moving modular units and/or redesignating modular waste types and drum quantities. As previously stated, an approved sealant, (e.g., CHEMTEC One) or coating has been applied in the areas utilized for liquid storage.

(3). Containment

The AT Drum Dock is permitted for solid and liquid storage with containers stored on modular containment units. The units are designed to manage liquid waste drums. In the event that a drum of liquid should leak or rupture, the modular containment units would provide containment for such an occurrence. Drums are segregated according to compatibility. The beams under the grating are currently bolted to the floor and caulked to provide separation of incompatible spills. The floor and beams under the grating system have been coated with a coating system (i.e., Elasti-Liner). Segregated rows are identified for storage of acids, bases and neutrals. Acids and bases must be separated by a neutral row at least two drums wide.

The AT Filter Press Room is permitted for the storage of solid containers only. However, CWM will maintain the existing floor coating system in this area due to water cleaning of the filter presses and the presence of tanks T-1111 and T-1112.

The AT Tanker Unloading Area is permitted for the storage of solid and liquid containers. CWM will maintain the existing concrete secondary containment system and has applied an approved sealant (e.g., CHEMTEC One) to the entire ramp and sump area.

(a). Base Construction

The AT Building, including the AT Drum Dock, the Filter Press Room and the AT Tanker Unloading Area, floor base is constructed of concrete which was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Containment of Leaking Drums

The AT Building is inspected at least daily on operating days for leaks or spills. If spills are observed, they will be contained within the building. Spilled materials will generally be absorbed with absorbent and placed into drums for disposal. Upon receipt of drums and after unloading, a visual inspection is made for leaking drums.

If a small leak should occur, the contents of a leaking drum are transferred to another appropriate container or the drum is placed in an overpack drum. In the event of major leaks or spills, liquids will be washed down and pumped into a treatment tank from the containment sump or absorbed with a compatible absorbent material and placed into containers for disposal.

Spilled material is cleaned up with absorbent materials. Spill control procedures are described in the CWM Contingency Plan. In the event of major leaks or spills, liquids from the AWT Drum Dock will be contained within the Modular

Containment Units and the AT Building. The liquid will be pumped out via vacuum truck or evacuated and placed directly into the AWT tanks.

(c). Control of Run-off and Run-on

Because all container management operations take place within the confines of the existing AT Building, no run-off or run-on is expected. However, precipitation may collect in the ramp and sumps of the AT Tanker Unloading Area. Precipitation will be collected and removed via vacuum truck or equivalent and treated in the aqueous waste treatment system, or if appropriate, characterized by sampling and discharged to the surface water drainage system if analysis indicates that it meets surface water standards.

H. TRANSFORMER DECOMMISSIONING BUILDING OR "T.O." BUILDING

(1). History and Design

The Transformer Decommissioning Building was in use for over forty years as part of the Lake Ontario Ordinance Works. In the 1970s, this building, which now houses the transformer decommissioning operations at CWM, was formerly used for thermal oxidation (T.O.) processes. The facility name for this building, "T.O. Building", is a result of this former use. The T.O. Building consists of a single-story concrete and sheet metal structure, which is approximately 50 feet long by 41 feet wide. The building has been in use for its present service since 1981. In 1981, the equipment from the defunct T.O. operations was removed and disposed. At that time, the building was cleaned and modified for the transformer decommissioning operation by repair of the roof, construction of concrete berms, addition of a door and sealing of floor joints. The south, east and west walls of the building are constructed of one-foot thick reinforced concrete. The north wall of the building consists of corrugated sheet metal with openings for two roll-up doors. The 13-foot high manual (pull-chain) roll-up was originally included in construction of the building. The second roll-up door (20-foot high) was installed during 1987 building modifications. Movement of the door is controlled by an electrical switch.

The roof of the T.O. Building is constructed of corrugated sheet metal. There is electrical service provided throughout the building. Overhead lights have been installed for lighting the building. Besides being permitted to store waste, the T.O. Building is also used to store equipment which is used for PCB waste management operations.

The T.O. Building Loading Ramp was constructed in 1998 and encompasses 2,100 square feet.

Attached Figure D-6 presents the T.O. Building layout and the maximum liquid storage capacity for the building based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-6.

(2). Operations

The T.O. Building and Loading Ramp are permitted for solid and liquid container storage. The facility receives PCB-contaminated transformers and other electrical equipment for decanting and decommissioning prior to disposal. This equipment is brought to the T.O. Building after completion of the receiving procedures. Regulated activities which may be performed in the T.O. Building include equipment decommissioning, storage, decanting, flushing and miscellaneous activities such as cutting contaminated cable.

Generally, transformers and other electrical devices containing liquids which are delivered to the site are transported in metal drip pans or drums on a flatbed trailer or box van. Pans and drums provide containment for spilled or leaked oil while in route to the site.

PCB contaminated oil and spent flushing solvent from decommissioned transformers, other electrical equipment or tank trucks is removed by vacuum tank truck and placed into tankers located at the T.O. Building Loading Ramp north of the building for bulk shipment and off-site treatment, i.e., incineration or other approved TSCA methods. PCB receiving procedures are outlined in CWM's Waste Analysis Plan. The T.O. Building Loading Ramp is also used as a station for fueling vehicles and unloading fuel oil.

(3). Containment

A concrete berm surrounds the inside of the building, providing containment for spilled or leaked material. However, secondary containment will be provided by the use of steel containment pans within the T.O. Building. All transformers, other electrical equipment and drums will be stored within the containment pans. The floor is a six-inch thick reinforced concrete slab poured on fill material. The floor is smooth, with no floor drains or any other floor openings. Coatings or sealants on the existing concrete floor are not required.

The Loading Ramp is constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad is sloped toward the middle. Precipitation will collect in the containment area until it is removed via vacuum truck. The Loading Ramp was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations. As previously stated, an approved sealant (e.g., CHEMTEC One) has been applied to the entire loading ramp.

(a). Control of Run-On and Run-Off

Since the decommissioning operations are conducted inside the T.O. Building, run-on and run-off is not expected. At the base of each of the two doorways is a ramp, preventing liquids from escaping and precipitation from entering.

The T.O. Building Loading Ramp, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated in the Aqueous Waste Treatment System, or if appropriate, characterized by sampling and discharged to the surface water drainage system if analysis indicates that it meets surface water standards.

I. TRUCK WASH FACILITY

(1). History and Design

The truck wash facility is a heated, drive-through bay on the north end of the old transportation garage, which was renovated in 1994. Dimensions of the bay are 88 feet in length by 15 feet 9 inches wide by 16 feet high. Overhead doors are located at each end of the bay. Walls are constructed of corrugated metal.

(2). Operations

The Truck Wash Building is permitted to stage solid containers only and is used to wash the exterior of trucks which have not come into contact with hazardous waste or have been previously decontaminated at the RMU-1 truck wash station. It also may be used to temporarily store bulk solid hazardous waste containers, such as to provide heat for thawing frozen loads.

Trucks to be cleaned enter the truck wash facility through the east side and exit through the west. A high pressure water wash is used to clean the vehicles. The wash system has an auxiliary heater to raise the water temperature for winter use. Vehicle wash time varies depending upon its size and the amount of cleaning required.

Attached Figure D-7 presents the maximum solid storage capacity for the area based on the previously presented spacing requirements (also see Section A).

(3). Containment

Since the Truck Wash Building is permitted for the storage of solids only, no secondary containment is required.

J. T-130 LOADING/UNLOADING AREA

(1). History and Design

The T-130 Loading/Unloading Area was constructed in 1998 and encompasses 700 square feet. It is used to store full trailers containing liquid materials generated from the SLF 1-6 leachate lift station tank T-105 or surge tank T-130. The area is 56 feet long and 13 feet wide with a curb height at the deepest end of 3'-9". The area is constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

(2). Operations

The T-130 Loading/Unloading Area may be used by CWM for storage of aqueous liquid which may contain small quantities of incinerable liquids and/or solid hazardous and non-hazardous waste. Containers are typically placed in this area for the following reasons:

- Transfer of leachate from tank T-105 or T-130;
- Trailer is delivered to the site after normal operating hours;
- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

The following units may be used to store materials in this area.

- Box trailers holding hazardous and non-hazardous waste in USDOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding aqueous liquids which may contain small quantities of incinerable liquids;
- Covered roll-off trailers holding solid materials; and
- Flatbed or low boy trailers holding hazardous and non-hazardous waste in containers or transformers. Cardboard, fiberboard, textile fabric and other non-metal or non-heavy plastic containers meeting USDOT specifications, may be stored on an uncovered flatbed or other open trailer for up to seven (7) days in accordance with Condition B.1.a.iii in Exhibit C of Schedule 1 of Module I in the Permit.

Attached Figure D-25 presents the T-130 Loading/Unloading Area layout and the maximum liquid storage capacity for the area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-25. As previously stated, an approved sealant, (e.g., CHEMTEC One) has been applied to the entire concrete slab.

(3). Containment

The T-130 Loading/Unloading Area is used for the aqueous liquid which may contain small quantities of incinerable liquids or solid storage of the RCRA regulated, TSCA regulated and non-hazardous full or partially full containers mentioned above.

(a). Base Construction

The T-130 Loading/Unloading Area is constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad is sloped toward the rear wall and graded toward the center from both sides. Precipitation will collect in the containment area until it is removed via vacuum truck.

The T-130 Loading/Unloading Area consists of a poured concrete slab which was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The T-130 Loading/Unloading Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated in the Aqueous Waste Treatment, or if appropriate, characterized by sampling and discharged to the surface water drainage system if analysis indicates that it meets surface water standards.

K. <u>T-108 LOADING/UNLOADING AREA</u>

(1). History and Design

The T-108 Loading/Unloading Area was constructed in 1998 and encompasses 700 square feet. It is used to store full trailers containing liquid materials generated from the SLF-7/11 leachate holding tank T-108 or SLF-7 leachate wet well tank T-107. The area is 55 feet long and 13 feet wide with a curb height at the deepest end of 1’-9”. The area is constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

(2). Operations

The T-108 Loading/Unloading Area may be used by CWM for storage of aqueous liquid and/or solid hazardous and non-hazardous waste. Containers are typically placed in this area for the following reasons:

- Transfer of leachate from tank T-108 or tank T-107;
- Trailer is delivered to the site after normal operating hours;
- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

The following units may be used to store materials in this area.

- Box trailers holding hazardous and non-hazardous USDOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding aqueous liquids;
- Covered roll-off trailers holding solid materials; and
- Flatbed or lowboy trailers holding hazardous and non-hazardous containers or transformers. Cardboard boxes and other fiberboard containers may not be stored on an uncovered flatbed or other open trailer.

Attached Figure D-13 presents the T-108 Loading/Unloading Area layout and the maximum liquid storage capacity for the area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-13. As previously stated, an approved sealant, (e.g., CHEMTEC One) has been applied to the entire concrete slab.

(3). Containment

The T-108 Loading/Unloading Area is used for the aqueous liquid or solid storage of the RCRA regulated, TSCA regulated and non-hazardous full or partially full containers mentioned above.

(a). Base Construction

The T-108 Loading/Unloading Area is constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad is sloped toward the rear wall and graded toward the center from both sides. Precipitation will collect in the containment area until it is removed via vacuum truck.

The T-108 Loading/Unloading Area consists of a poured concrete slab which was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The T-108 Loading/Unloading Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated in the Aqueous Waste Treatment, or if appropriate, characterized by sampling and discharged to the surface water drainage system if analysis indicates that it meets surface water standards.

L. T-109 LOADING/UNLOADING AREA

(1). History and Design

The T-109 Loading/Unloading Area was constructed in 1998 and encompasses 700 square feet. It is used to store full trailers containing liquid materials generated from the SLF-10 leachate holding tank T-109. The area is 55 feet long and 13 feet wide with a curb height at the deepest end of 1’-9”. The area is constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

(2). Operations

The T-109 Loading/Unloading Area may be used by CWM for storage of liquid and/or solid hazardous and non-hazardous waste. Containers are typically placed in this area for the following reasons:

- Transfer of leachate from tank T-109;
- Trailer is delivered to the site after normal operating hours;
- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

The following units may be used to store materials in this area.

- Box trailers holding hazardous and non-hazardous USDOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding aqueous liquids;
- Covered roll-off trailers holding solid materials; and
- Flatbed or lowboy trailers holding hazardous and non-hazardous containers or transformers. Cardboard boxes and other fiberboard containers may not be stored on an uncovered flatbed or other open trailer.

Attached Figure D-12 presents the T-109 Loading/Unloading Area layout and the maximum liquid storage capacity for the area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-12. As previously stated, an approved sealant, (e.g., CHEMTEC One) has been applied to the entire concrete slab.

(3). Containment

The T-109 Loading/Unloading Area is used for the aqueous liquid or solid storage of the RCRA regulated, TSCA regulated and non-hazardous full or partially full containers mentioned above.

(a). Base Construction

The T-109 Loading/Unloading Area is constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad is sloped toward the rear wall and graded toward the center from both sides. Precipitation will collect in the containment area until it is removed via vacuum truck.

The T-109 Loading/Unloading Area consists of a poured concrete slab which was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The T-109 Loading/Unloading Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated in the Aqueous Waste Treatment, or if appropriate, characterized by sampling and discharged to the surface water drainage system if analysis indicates that it meets surface water standards.

M. T-158 LOADING/UNLOADING AREA

(1). History and Design

The T-158 Loading/Unloading Area was constructed in 1998 and encompasses 700 square feet. It is generally used to store full trailers containing leachate from ~~the~~ SLFs 1-11, biphased gate receipts for transfer to the oil/water separator tank T-158 and organic materials transferred from tank T-158 to tankers. The area is 55 feet long and 13 feet wide with a curb height at the deepest end of 1'-8.5". The area is constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

(2). Operations

The T-158 Loading/Unloading Area may be used by CWM for storage of liquid and/or solid hazardous and non-hazardous waste. Containers are typically placed in this area for the following reasons:

- Transfer of leachate to and from tank T-158, Frac Tank #3 and the tanks in the Leachate Tank Farm or organic materials from tank T-158 to tankers;
- Trailer is delivered to the site after normal operating hours;
- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

The following units may be used to store materials in this area.

- Box trailers holding hazardous and non-hazardous waste in USDOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding liquids;
- Covered roll-off trailers holding solid materials; and
- Flatbed or low boy trailers holding hazardous and non-hazardous waste in containers or transformers. Cardboard, fiberboard, textile fabric and other non-metal or non-heavy plastic containers meeting USDOT specifications, may be stored on an uncovered flatbed or other open trailer for up to seven (7) days in accordance with Condition B.1.a.iii in Exhibit C of Schedule 1 of Module I in the Permit.

Attached Figure D-14 presents the T-158 Loading/Unloading Area layout and the maximum liquid storage capacity for the area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-14. As previously stated, an approved sealant, (e.g., CHEMTEC One) has been applied to the entire concrete slab.

(3). Containment

The T-158 Loading/Unloading Area is used for the liquid or solid storage of the RCRA regulated, TSCA regulated and non-hazardous full or partially full containers mentioned above.

(a). Base Construction

The T-158 Loading/Unloading Area is constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad is sloped toward the rear wall and graded toward the center from both sides. Precipitation will collect in the containment area until it is removed via vacuum truck.

The T-158 Loading/Unloading Area consists of a poured concrete slab which was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The T-158 Loading/Unloading Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated in the Aqueous Waste Treatment, or if appropriate, characterized by sampling and discharged to the surface water drainage system if analysis indicates that it meets surface water standards.

N. AIR EMISSION STANDARDS

Air emission standards for containers are specified in 6NYCRR 373-2.29 and 40 CFR 264/265.1080-1091 (Subpart CC), which became effective on December 6, 1996. RCRA Subpart CC is applicable to owners and operators of a TSDF which treats, stores or disposes of hazardous waste containing greater than 500 ppmw volatile organics in tanks, surface impoundments and containers. If Subpart CC wastes are managed in containers, either Level 1, Level 2 or Level 3 controls must be implemented depending on the container size, organic content and activity performed.

Level 1 controls may be used for all containers less than 119 gallons and containers greater than 119 gallons which are not in light material service (i.e., total concentration of pure organic constituents having a vapor pressure greater than 0.3 kPa (0.04 psi) at 20^{o} C is equal to or greater than 20% by weight). Level 1 controls may be satisfied through use of a container that meets USDOT specifications; use of a cover, such as a tarp, with no visible cracks, holes, gaps or other spaces; or use of an organic vapor barrier, such as a foam or tight fitting tarp.

All drums and other containers less than 119 gallons at CWM drum storage locations which are subject to Subpart CC requirements will have level 1 controls. This requirement may be satisfied by use of a USDOT specification container or a container with no cracks, gaps or holes. Most bulk containers in CWM bulk container storage locations will not be in light material service and thus will only require level 1 controls. This requirement will be satisfied by use of a tarp or equivalent with no cracks, gaps or holes.

Level 2 controls are required for containers greater than 119 gallons in light material service. Level 2 controls may be satisfied through use of a container that meets USDOT specifications; use of a container that operates with no detectable emissions as tested using USEPA Method 21; or use of a container that is vapor tight as tested by USEPA Method 27. On-site tankers and vacuum trucks containing Subpart CC wastes are tested annually by USEPA Method 27 to satisfy the Level 2 requirements. If a rolloff containing Subpart CC waste in light material service is accepted, Level 2 controls will be satisfied by covering with a tarp and testing for no detectable emissions using USEPA Method 21 within 24 hours of receipt.

Level 3 controls are required to perform stabilization of Subpart CC wastes in containers. The container must be placed inside an enclosure and vented to a control device. This operation is not performed at CWM.

O. NEW DRUM MANAGEMENT BUILDING

The location of the existing Drum Management Building (DMB) as described in Section C is located in the proposed footprint of a new landfill designated Residuals Management Unit Number Two (RMU-2). A New Drum Management Building will need to be constructed to replace the existing DMB.

(1). Design

The new DMB is designed with nine (9) areas for management of containers with solid or liquid wastes. Each area is segregated by concrete curbing, interior walls, and/or exterior walls. Areas will typically be connected by overhead doors and concrete ramps. The types of wastes and containers, and the container management procedures for the handling of containers in the new DMB are described in Sections A and B. Permit Design Drawings are attached.

The following areas will be included in the new Drum Management Building for the storage and handling of containerized solid and liquid hazardous wastes.

New Drum Management Building

LOCATION	WASTE TYPE	CONTAINER TYPE	STORAGE CAPACITY	AVAILABLE SECONDARY CONTAINMENT (gallons)	REQUIRED SECONDARY CONTAINMENT (gallons)
Area 1 Flammable Storage Area	Liquid/Solid	drums	504 55-gal drums	9,011	2,772
Area 2 Acid Storage Area	Liquid/Solid	drums	1008 55-gal drums	6,667	5,544
Area 3 Caustic Storage Area	Liquid/Solid	drums	1008 55-gal drums	6,914.6	5,544
Area 4 Poisons Storage Area	Liquid/Solid	drums	96 55-gal drums	1,244.7	528
Area 5 Oxidizer Storage Area	Liquid/Solid	drums	96 55-gal drums	765.2	528
Area 6 QA/QC Storage Area	Liquid/Solid	drums	336 55-gal drums	8,459.1	1,848
Area 7 Fuels Transfer Ramp	Liquid	tankers	2-5,500-gal tankers	23,338	10,681
Area 8 Transformer Flush Area	Liquid	Drums/ transformers	6-345-gal transformers of 37 55-gal drums	2,065.2	2,065.2
Area 9 Truck Loading/Unloading Area & Ramp	Liquid/Solid	drums	1,040 55-gal drums	95,681	5,720

(2). Operations

Based on the types/volumes of wastes received by the site, the new DMB will be the focal point for most incoming containers after construction and closure of the existing DMB. Separation of incompatibles will be accomplished by placing these waste in separate rooms within the new DMB. Solid waste containers may be stored throughout the new DMB. The table above and Figure D-1B present the new DMB layout and the maximum liquid and/or solid storage capacity for the building based on the previously presented spacing requirements (also see Section A). The arrangements of containers may change depending on storage needs, however, compatibility guidelines will be met. Secondary containment calculations accompany attached Figure D-1B. As previously stated, an approved sealant, (e.g., CHEMTEC One) will be applied to all concrete floor areas in this building which are permitted for liquid waste storage.

Loading/unloading areas at the DMB will have ramps allowing equipment to move directly onto transport vehicles from the unloading docks. Containers will be removed by use of forklifts that are equipped with drum handling attachments. The attachments generally employed are capable of lifting up to two (2) drums at a time. Other container moving practices may be utilized as technologies improve.

(a). Loading/Unloading Areas

The new DMB Loading/Unloading Area & Ramp will be permitted for solids and liquids container storage, excluding flammable. Secondary containment will be provided by the sloped concrete ramp and the truck dock. An approved sealant, (e.g., CHEMTEC One) will be applied to the concrete area of the ramp. Incoming and outgoing box trailers containing 55-gallon containers or equivalent of liquids and/or solids may be staged in this area. Incoming trailers will be unloaded and a quality control check performed. The dock area will be covered, providing protection for personnel during inclement weather.

After receipt, containers may be stored on a flatbed in the dock area incidental to the transfer of these containers to other on-site operations, such as aqueous treatment, stabilization, or the landfill. If DOT incompatible waste containers remain stored on flatbed trailers in the dock area at the end of the work shift they will be separated from each other as required by 6 NYCRR Part 373-2.9(h)(s).

The new DMB Fuels Transfer Ramp will be permitted for liquid storage. This ramp will be used to transfer compatible liquids from drums inside the new DMB Fuels Pumping Area to bulk tankers located on the ramp. The ramp is sized to accommodate two tankers to also allow the transfer from tanker to tanker. As previously stated, an approved sealant (e.g., CHEMTEC One) will be applied to the entire ramp area.

(b). Container Waste Characterization

The waste characterization procedures described in CWM's Waste Analysis Plan will be used to determine the compatibility grouping for a particular waste material in the new DMB.

In addition, each corrosive is specified as either an acid or base for further segregation. All acutely toxic materials (P codes which are not "derived from" treatment residues) will be handled as poisons if they are not specifically listed by DOT for other hazardous properties and will be stored in Area 4 (Poison Area). Any D, F, K or U codes for materials not specifically assigned a hazard class will be recognized as Class 9 for storage purposes. In the fuels storage area, flammables, combustible, Class 9 and non-regulated organic liquids will be stored for bulking into a fuel or incineration blend.

(3). Containment

Containment is provided by a combination of sloping floors, trenches, and/or concrete curbing around the perimeter of the building and individual rooms. The maximum 55-gallon equivalent containers (solids/liquids) allowed for this building is presented in Section O.1 and on attached Figure D-1B.

(a). Base Construction

The DMB floor, loading/unloading ramp and West Ramp will be constructed of concrete and inspected as defined within the Facility Inspection Plan. The base was designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Containment of Leaking Drums

The new DMB will be inspected daily on operating days for leaks or spills. If spills are observed, they will be contained within the building. Spilled materials will generally be absorbed with absorbent and placed into drums for disposal. Upon receipt of a shipment of drums and after unloading, a visual inspection is made for leaking drums.

If a small leak should occur, the contents of a leaking drum are transferred to another appropriate container or the drum is placed in a salvage drum. In the event of major leaks or spills, liquids will be removed by vacuum trucks or absorbed with a compatible absorbent material and placed into containers for disposal.

Spilled material is cleaned up with absorbent materials. Spill control procedures are described in the CWM Contingency Plan.

(c). Control of Run-off and Run-on

Because all container management operations take place within the confines of the DMB, no run-off or run-on is expected. However, precipitation may collect in the covered truck unloading area or covered fuels transfer area ramp. Precipitation may be treated in the Aqueous Treatment System without sampling. If the liquids will be discharged to the surface water drainage system, a water sample will be collected for appropriate characterization prior to the discharge.

(4). Fuels Pumping Area

A separate pumping station is located in a room at the north end of the new DMB. The purpose of this station is to transfer waste organic liquids, such as oils, solvents, lean waters, etc., from drums and oil filled equipment into bulk containers at the new DMB Fuels Transfer Ramp using permanently installed pumps. This operation provides blending and consolidation of liquids for off-site shipments. Drums will be staged in Area 1 of the new DMB and no drums will be staged or stored in the fuels pumping room. Containment will be provided by the new DMB (i.e., concrete floor 2-inch curb around the perimeter of the room).

(5). Transformer Flush Area

The Transformer Flush Area will be used for permitted solid and liquid container storage. The facility receives PCB-contaminated transformers and other electrical equipment for decanting and decommissioning prior to disposal. This equipment will be brought to the Transformer Flush Area after completion of the receiving procedures. Regulated activities which may be performed in the Transformer Flush Area will include equipment decommissioning, storage, decanting, flushing and miscellaneous activities such as cutting contaminated cable.

PCB contaminated oil and spent flushing solvent from decommissioned transformers, other electrical equipment or tank trucks will be removed by vacuum tank truck and placed into tankers located at the Fuels Loading Ramp north of the building for bulk shipment and off-site treatment, i.e., incineration or other approved TSCA methods. PCB receiving procedures are outlined in CWM's Waste Analysis Plan.

P. NEW FULL TRAILER PARKING AREA

The location of the existing South (Full Trailer Parking Area) as described in Section E is partially located in the proposed footprint of a new landfill designated Residuals Management Unit Number Two (RMU-2). A New Full Trailer Parking Area will need to be constructed to replace the existing South Trailer Parking Area.

New Full Trailer Parking Area

LOCATION	WASTE TYPE	CONTAINER TYPE	STORAGE CAPACITY	AVAILABLE SECONDARY CONTAINMENT (gallons)	REQUIRED SECONDARY CONTAINMENT (gallons)
New Full Trailer Parking Area	Liquid/Solid	tankers/rolloffs	48 rolloffs or 24 tankers	66,583	47,449

(1). Design

A new Full Trailer Parking Area (attached Figure D-3A) will be constructed which encompasses 13,700 square feet, and will be used to store full trailers containing solid or liquid materials. The area is 250 feet long and is designed to store liquid and solid materials in containers prior to disposal or shipment off-site. The area will be constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

(2). Operation

The new Full Trailer Parking Area will be used for storage of liquid and/or solid hazardous and non-hazardous waste. Containers will be typically placed in this area for the following reasons:

- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

The following units may be used to store materials in this area.

- Box trailers holding hazardous and non-hazardous DOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding liquids;

- Covered roll-off trailers or other bulk containers holding solid materials; and

- Flatbed or lowboy trailers holding hazardous and non-hazardous containers or transformers. Storage of cardboard containers with liners (e.g. DOT 11 G) on flatbeds in outdoor CSAs for a maximum of 7 days. Bags of weather resistance fabric such as polypropylene with liners (e.g. DOT 13H) may be stored on flatbeds in outdoor CSAs. A daily inspection will be performed to verify that the containers are not showing signs of deterioration.

Attached Figure D-3A presents the proposed new Full Trailer Parking Area layout and the maximum liquid and/or solid storage capacity for the area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-3A. An approved sealant, (e.g., CHEMTEC One) will be applied to the entire concrete slab.

(3). Containment

The new Trailer Parking Area will be used for the liquid or solid storage of the RCRA regulated, TSCA regulated and non-hazardous full or partially full containers mentioned above.

(a). Base Construction

The new Full Trailer Parking Area will be constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad will be sloped toward the rear wall and graded toward two low points. Precipitation will collect in the containment area until it is removed via vacuum truck. The new Full Trailer Parking Area will consist of a poured concrete slab which has been designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The new Full Trailer Parking Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated, or if appropriate, characterized and discharged to the surface water drainage system.

Q. NEW STABILIZATION TRAILER PARKING AREA

The location of the Stabilization Trailer Parking Area (Areas III and IV) as described in Section F is partially located in the proposed footprint of a new landfill designated Residuals Management Unit Number Two (RMU-2). A New Stabilization Trailer Parking Area will need to be constructed in the location of Areas I and II to replace the existing Stabilization Trailer Parking Areas.

New Stabilization Trailer Parking Area

LOCATION	WASTE TYPE	CONTAINER TYPE	STORAGE CAPACITY	AVAILABLE SECONDARY CONTAINMENT (gallons)	REQUIRED SECONDARY CONTAINMENT (gallons)
New Stabilization Full Trailer Parking Area	Liquid/Solid	tankers/rolloffs	37 rolloffs/tankers	56,106	41,977

(1). Design

The new Stabilization Trailer Parking Area (attached Figure D-4A) will be 13,125 square feet, and will be used to store full trailers containing solid or liquid materials. The area is 375 feet long and is designed to store liquid and solid materials in containers prior to disposal. The area will be constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

The new Stabilization Trailer Parking Area will permitted to store solid and liquid containers incidental to the treatment operation. Operational flexibility may require storage or staging of different waste types and quantities. Attached Figure D-4A presents the maximum liquid and/or solid storage capacity for the new Stabilization Trailer Parking Area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-4A. An approved sealant, (e.g., CHEMTEC One) will be applied to the entire concrete slab.

(2). Operations

The new Stabilization Trailer Parking Area may be used for storage of liquid and/or solid hazardous and non-hazardous waste. Containers may typically be placed in this area for the following reasons:

- The materials delivered are found to be off-specification;

- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

Units which may be stored or staged incidental to treatment in this area include:

- Box trailers holding hazardous and non-hazardous DOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding liquids;
- Covered roll-off trailers or other bulk containers holding solid materials; and
- Flatbed or lowboy trailers holding hazardous and non-hazardous containers or transformers.

(3). Containment

(a). Base Construction

The new Stabilization Trailer Parking Area will be constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad will be sloped toward the rear wall and graded toward two low points. The base of the new Stabilization Trailer Parking Area has been designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The Stabilization Trailer Parking Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated, or if appropriate, characterized and discharged to the surface water drainage system.

R. NEW T-109 LOADING/UNLOADING AREA

The T-109 Loading/Unloading Area as described in Section L is partially located in the proposed footprint of a new landfill designated Residuals Management Unit Number Two (RMU-2). A New T-109 Loading/Unloading Area will need to be constructed to replace the existing T-109 Loading/Unloading Area.

(1). Design

The new T-109 Loading/Unloading Area (attached Figure D-12A) will encompass approximately 700 square feet. It will be used to store full trailers containing liquid materials generated from the SLF-10 leachate holding tank T-109. The area is 55 feet long and 13 feet wide with a curb height at the deepest end of 2'-3". The area will be constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

(2). Operations

The new T-109 Loading/Unloading Area may be used by CWM for storage of liquid and/or solid hazardous and non-hazardous waste. Containers may typically be placed in this area for the following reasons:

- Transfer of leachate from tank T-109;
- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt; or
- General storage while awaiting disposal approval or off-site transportation.

The following units may be used to store materials in this area.

- Box trailers holding hazardous and non-hazardous DOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding liquids;
- Covered roll-off trailers or other bulk containers holding solid materials; and
- Flatbed or lowboy trailers holding hazardous and non-hazardous containers or transformers.

Attached Figure D-12A presents the new T-109 Loading/Unloading Area layout and the maximum liquid storage capacity for the area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached

Figure D-12A. An approved sealant, (e.g., CHEMTEC One) will be applied to the entire concrete slab.

LOCATION	WASTE TYPE	CONTAINER TYPE	STORAGE CAPACITY	AVAILABLE SECONDARY CONTAINMENT (gallons)	REQUIRED SECONDARY CONTAINMENT (gallons)
T-109 Loading/Unloading Area	Liquid/Solid	tanker/rolloff	1-5,500-gal tanker, 1 rolloff	21,762	7,294

(3). Containment

The new T-109 Loading/Unloading Area will be used for the liquid or solid storage of the RCRA regulated, TSCA regulated and non-hazardous full or partially full containers mentioned above.

(a). Base Construction

The new T-109 Loading/Unloading Area will be constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad will be sloped toward the rear wall and graded toward the center from both sides. Precipitation will collect in the containment area until it is removed via vacuum truck.

The new T-109 Loading/Unloading Area will consist of a poured concrete slab which has been designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The new T-109 Loading/Unloading Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated, or if appropriate, characterized and discharged to the surface water drainage system.

S. NEW T-158 LOADING/UNLOADING AREA

The T-158 Loading/Unloading Area as described in Section M is partially located in the proposed footprint of a new landfill designated Residuals Management Unit Number Two (RMU-2). A new T-158 Loading/Unloading Area will need to be constructed to replace the existing T-158 Loading/Unloading Area.

(1). Design

The new T-158 Loading/Unloading Area (attached Figure D-14A) will encompass approximately 700 square feet. It will generally be used to store full trailers containing leachate from SLFs 1-11, biphased gate receipts for transfer to the oil/water separator tank T-158 and organic materials transferred from tank T-158 to tankers. The area will be 55 feet long and 13 feet wide with a curb height at the deepest end of 2'-3". The area will be constructed of a reinforced concrete pad, curbed on three sides and sloped so that all precipitation or potential leakage from any unit will be contained.

(2). Operations

The new T-158 Loading/Unloading Area may be used by CWM for storage of liquid and/or solid hazardous and non-hazardous waste. Containers may typically be placed in this area for the following reasons:

- Transfer of leachate to and from tank T-158, Frac Tank #3 and the closed landfill tank in the Leachate Tank Farm or organic materials from tank T-158 to tankers;
- Trailer is delivered to the site after normal operating hours;
- The materials delivered are found to be off-specification;
- Materials will be processed after the date of receipt;
- Corrective measures are being instituted due to a potential leaking vehicle; or
- General storage while awaiting disposal approval or off-site transportation.

The following units may be used to store materials in this area.

- Box trailers holding hazardous and non-hazardous DOT approved containers;
- Bulk tanker trailers, vacuum trailers or other bulk containers holding liquids;
- Covered roll-off trailers, covered dump trailers or other bulk containers holding solid materials; and

- Flatbed or lowboy trailers holding hazardous and non-hazardous containers or transformers.

Attached Figure D-14A presents the new T-158 Loading/Unloading Area layout and the maximum liquid storage capacity for the area based on the previously presented spacing requirements (also see Section A). Secondary containment calculations accompany attached Figure D-14A attached. An approved sealant, (e.g., CHEMTEC One) has been applied to the entire concrete slab.

LOCATION	WASTE TYPE	CONTAINER TYPE	STORAGE CAPACITY	AVAILABLE SECONDARY CONTAINMENT (gallons)	REQUIRED SECONDARY CONTAINMENT (gallons)
T-158 Loading/Unloading Area	Liquid/Solid	tanker/rolloff	1-5,500-gal tanker, 1 rolloff	30,929	7,294

(3). Containment

The new T-158 Loading/Unloading Area is used for the liquid or solid storage of the RCRA regulated, TSCA regulated and non-hazardous full or partially full containers mentioned above.

(a). Base Construction

The new T-158 Loading/Unloading Area will be constructed of reinforced concrete with a compacted gravel base layer. The concrete containment pad will be sloped toward the rear wall and graded toward the center from both sides. Precipitation will collect in the containment area until it is removed via vacuum truck.

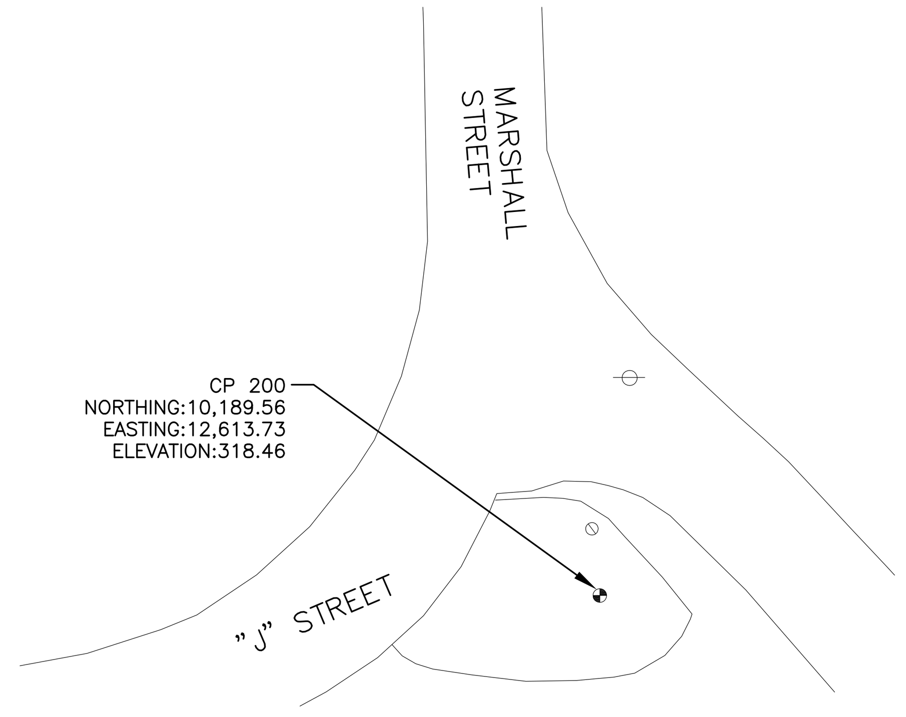
The new T-158 Loading/Unloading Area will consist of a poured concrete slab which has been designed by a certified professional engineer to support loads and structural stresses in excess of those provided by present operations.

(b). A Procedure for the Removal of Liquids from Secondary Containment and Precipitation Management

The new T-158 Loading/Unloading Area, being outdoors, will collect precipitation. Precipitation will be collected and removed via vacuum truck or equivalent and treated, or if appropriate, characterized and discharged to the surface water drainage system.

NEW DRUM MANAGEMENT BUILDING PERMIT DRAWINGS

C-2 - Site Plan
C-5 - Fuels Transfer Ramp Details
E-8 - Drum Storage - Gas Monitoring System
FP-1 - Floor Plans - Fire Protection
FP-2 - Details - Fire Protection
S-0 - Foundation Notes and Required Inspections
S-1 - Foundation Plan
S-2 - Foundation Details
S-3 - Foundation Details
S-4 - Foundation Details
S-5 - Foundation Details



SITE CONTROL POINT 200
SCALE: 1" = 40'

PROJECT INFORMATION

Owner:	Chemical Waste Management 1550 Balmer Road Youngstown, New York 14174 716-286-0325
Tax Account Nos.:	61.00-2-1
Parcel Size:	482.53 acres
Project Area:	5.0 acres
Proposed Development:	45,596 s.f. Drum Management Building

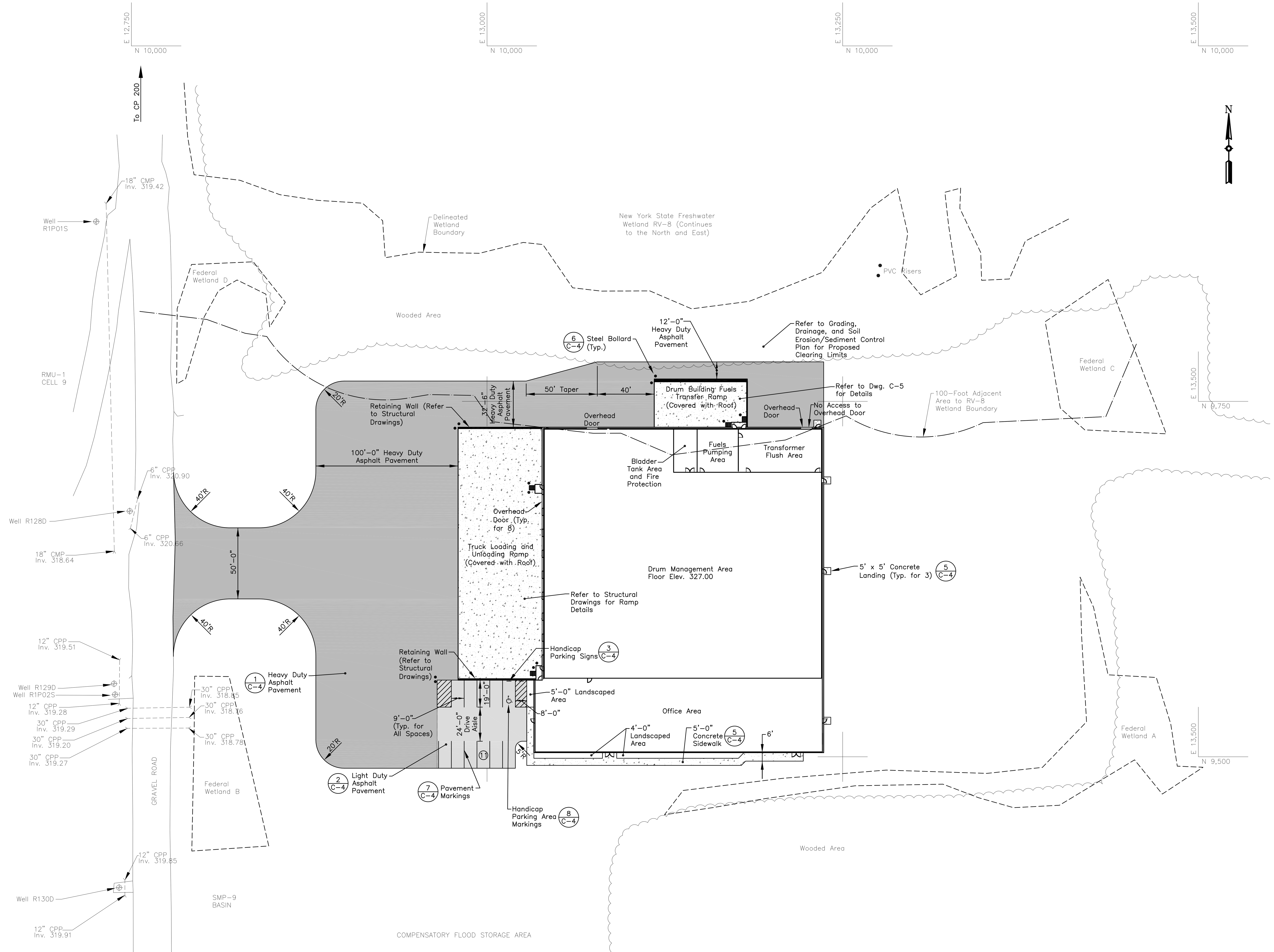
ZONING INFORMATION

District:	M-3 Heavy Industrial		
Zoning Requirements:		Required	Proposed
	Min. Lot Size	2.5 acres	482.53 acres
	Max. Building Height	50 l.f.	?? l.f.

Parking Requirements: 1 space per 100 s.f. net floor area (office, professional, or business)
Must be a minimum of 80% and a maximum of 110% of required spaces

45,596 s.f./100 s.f. = 456 parking spaces
80% x 456 spaces = 365 parking spaces

Proposed Parking: 11 spaces



SITE PLAN
SCALE: 1" = 40'

SCALE (FEET)
0 40 80

NO.	DATE	APPR.	REVISION
1	06/10/12	GFT	REVISIONS TO ADDRESS 04/23/12 NYSDEC REVIEW COMMENTS
2	05/30/13	GFT	REVISIONS TO INCORPORATE WETLAND DELINEATION
3	10/22/13	GFT	REVISIONS TO INCORPORATE RV-8 WETLAND 100-FOOT ADJACENT AREA

GREAT LAKES ENVIRONMENTAL & SAFETY CONSULTANTS, INC.
50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

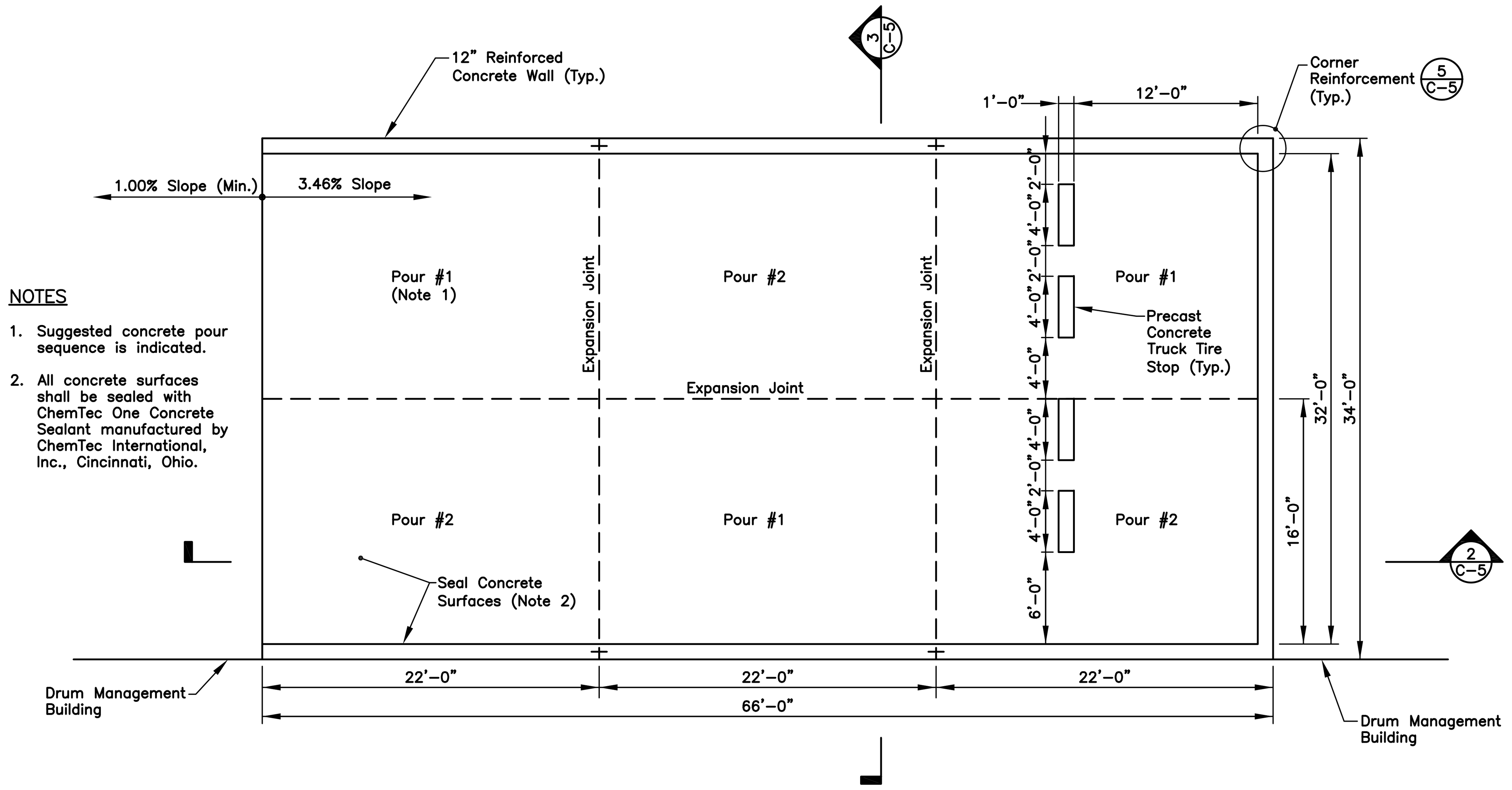
DRUM MANAGEMENT BUILDING RELOCATION PROJECT
CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

STATE OF NEW YORK · ALBERT G. LYONS JR. · 067470 · LICENSED PROFESSIONAL ENGINEER

CHECKED	
DESIGN ENGINEER	GFT
PROJECT ENGINEER	GFT
PROJECT MANAGER	
APPROVED	
APPROVED	

SITE PLAN

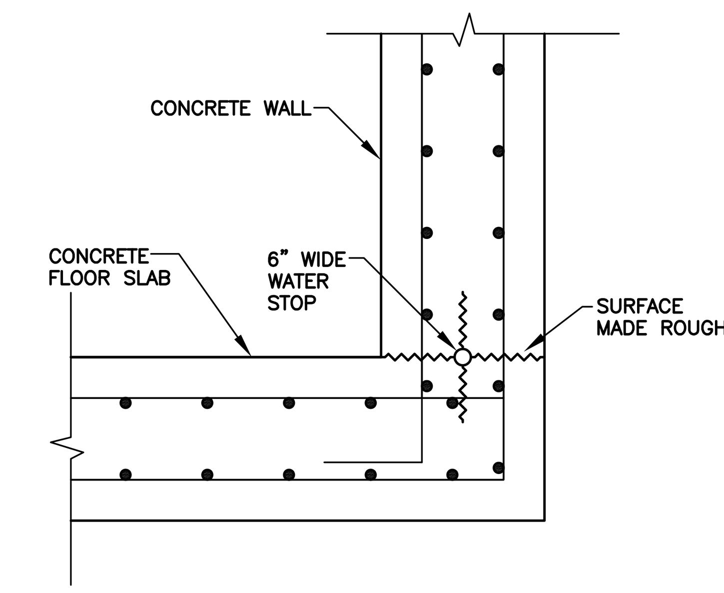
DRAWN	DATE	REVISION DATE	DRAWING NO.
HKT	6-20-12	MAY 30, 2013	C-2
SCALE	JOB NO.	FILE NAME	SHEET OF
1" = 40'	11-406	SITE PLAN.DWG	



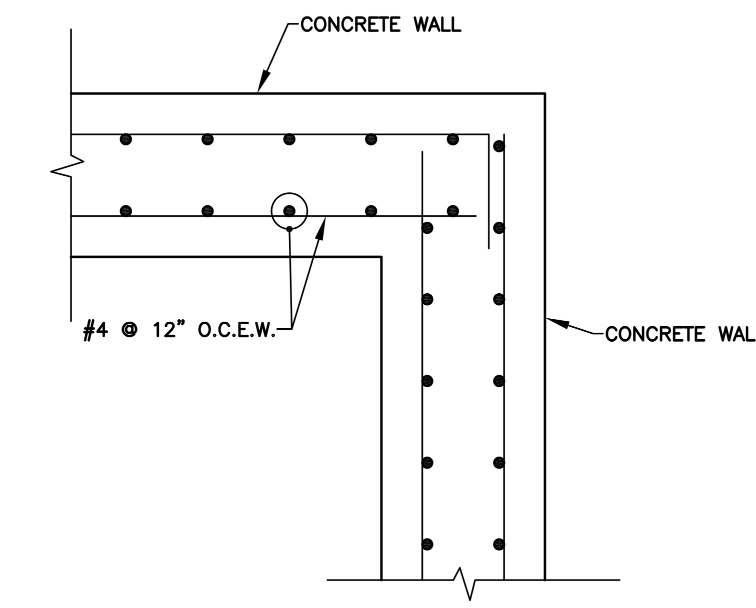
NOTES

1. Suggested concrete pour sequence is indicated.
2. All concrete surfaces shall be sealed with ChemTec One Concrete Sealant manufactured by ChemTec International, Inc., Cincinnati, Ohio.

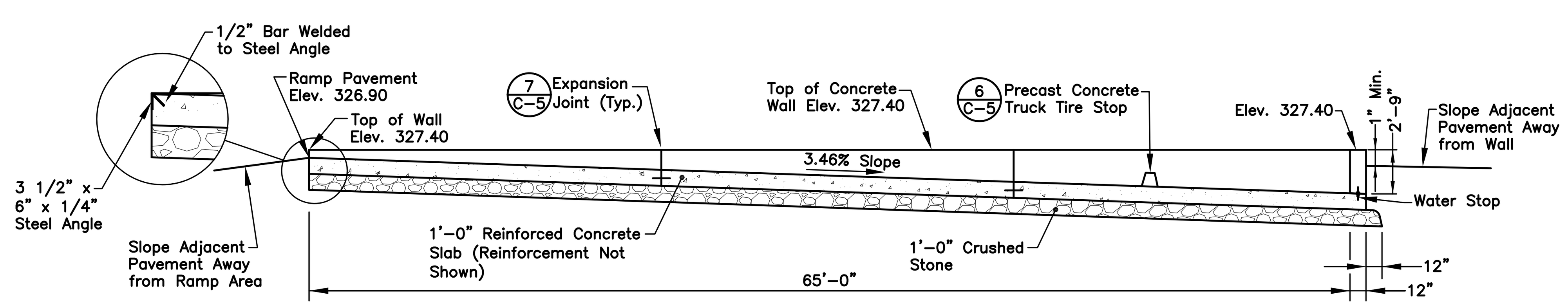
1 C-5 FUELS TRANSFER RAMP
SCALE: 1" = 8'



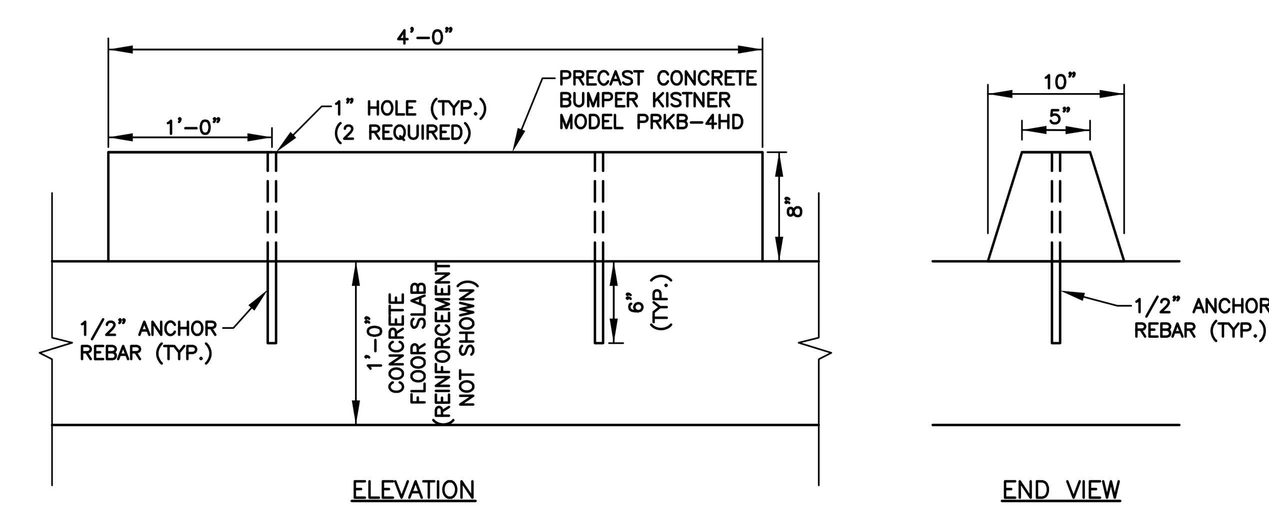
4 C-5 VERTICAL WALL JOINT
NOT TO SCALE



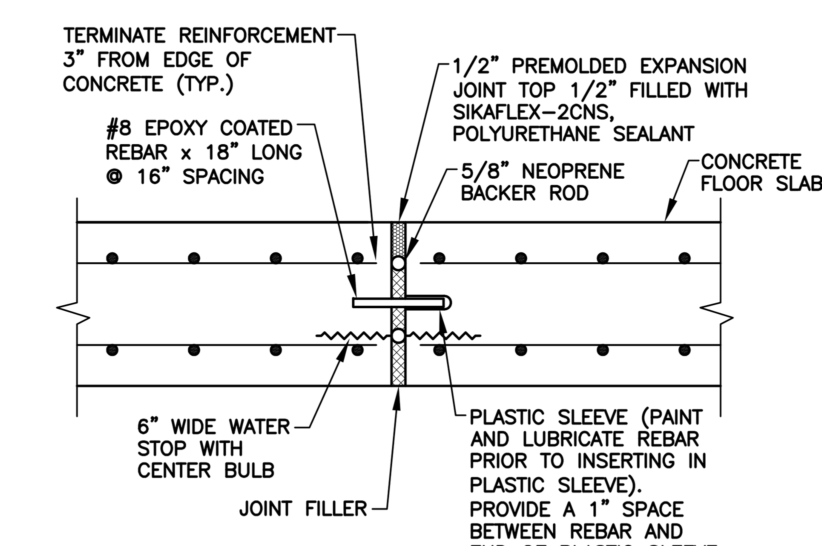
5 C-5 CORNER REINFORCEMENT
NOT TO SCALE



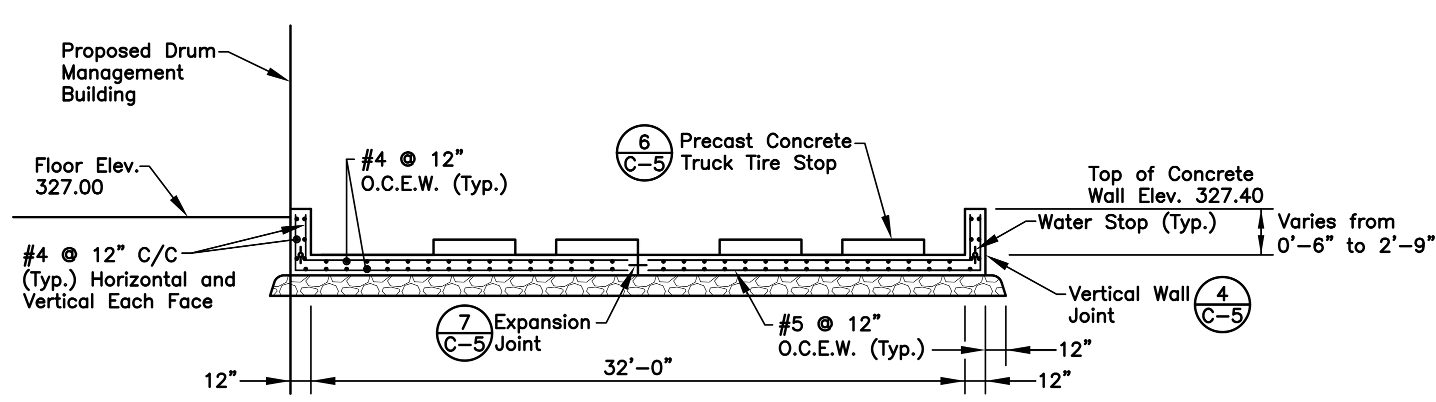
2 C-5 LONGITUDINAL SECTION
SCALE: 1" = 8'



6 C-5 TRUCK TIRE STOP
NOT TO SCALE



7 C-5 TYPICAL EXPANSION JOINT
NOT TO SCALE



3 C-5 TRANSVERSE SECTION
SCALE: 1" = 8'

NO.	DATE	APPR.	REVISION
1	06/10/12	GFT	REVISIONS TO ADDRESS 04/23/12 NYSDEC REVIEW COMMENTS
2	05/30/13	GFT	REVISIONS TO INCORPORATE WETLAND DELINEATION
3	06/11/13	GFT	REVISIONS TO INCORPORATE CWM COMMENTS

GREAT LAKES ENVIRONMENTAL & SAFETY CONSULTANTS, INC.
50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING RELOCATION PROJECT
CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

STATE OF NEW YORK PROFESSIONAL ENGINEER

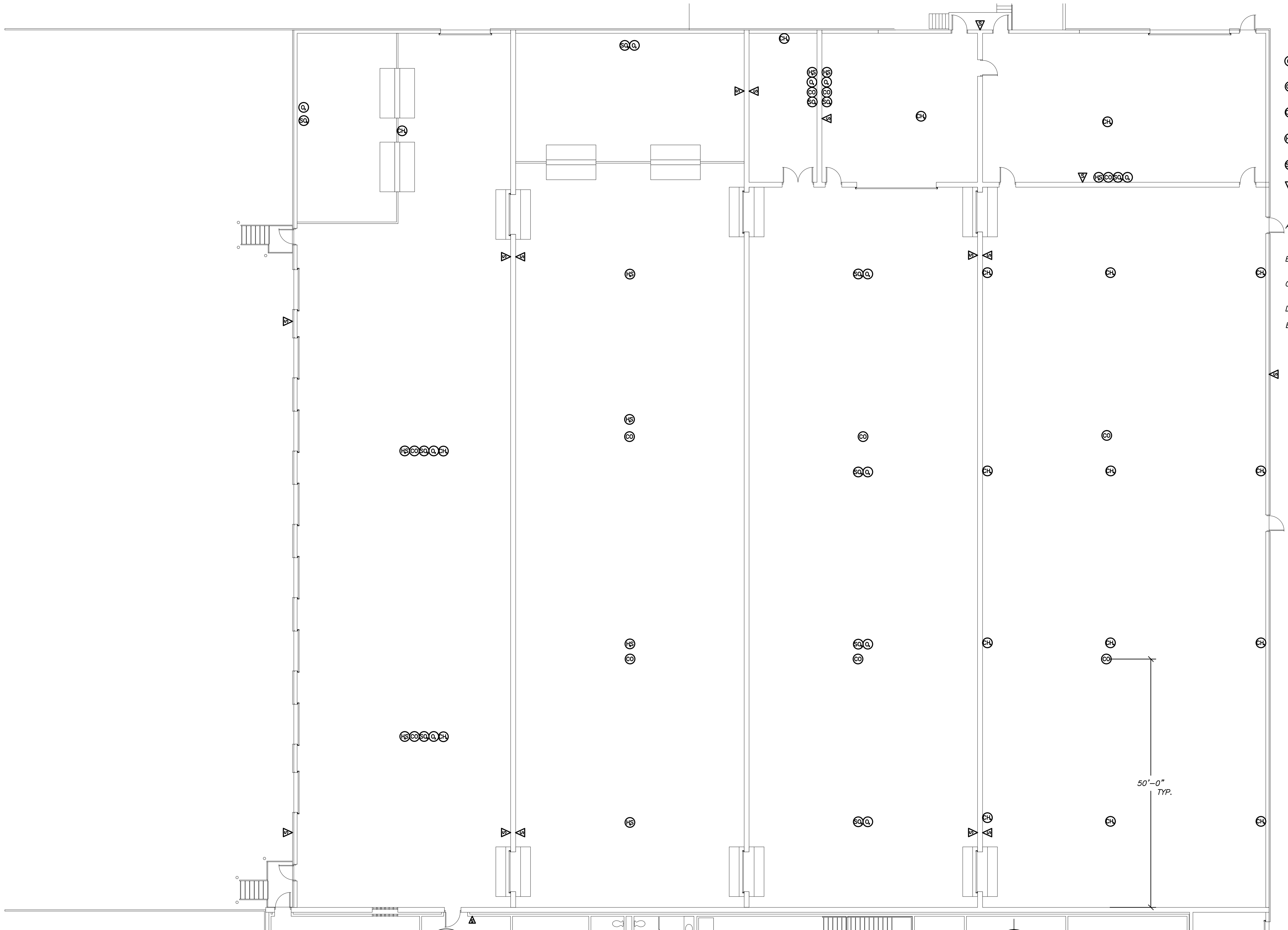
CHECKED	DATE
DESIGN ENGINEER	GFT
PROJECT ENGINEER	GFT
PROJECT MANAGER	
APPROVED	
APPROVED	

FUELS TRANSFER RAMP DETAILS

DRAWING NO. C-5

DRAWN	DATE	REVISION DATE
HKT	6-20-12	JUNE 11, 2013
SCALE	JOB NO.	FILE NAME
NOT TO SCALE	11-406	SITE PLAN.DWG

SHEET OF
REV. NO.



1
E-8

DRUM STORAGE - GAS MONITORING SYSTEM

SCALE: 3/32" = 1'-0"

O_2	OXYGEN SENSOR, MOUNTED 3'A.F.F VULCAIN VA301D202 OR APPROVED EQUAL
CO	CARBON DIOXIDE SENSOR, MOUNTED 3' A.F.F. VULCAIN VA301D260 OR APPROVED EQUAL
CH_4	COMBUSTIBLE GAS SENSOR (METHANE), MOUNTED AT CEILING. VULCAIN VA301D2 OR APPROVED EQUAL
H_2S	HYDROGEN SULFIDE SENSOR, MOUNTED 3' A.F.F. VULCAIN VA301D2H2S OR APPROVED EQUAL.
SO_2	SULFER DIOXIDE SENSOR, MOUNTED 3' A.F.F. VULCAIN 3012D2S02 OR APPROVED EQUAL
S	MULTI-TONE STROBE/HORN VULCAIN MT4 OR APPROVED EQUAL

A. PROVIDE ALL DEVICES, CONDUIT AND FITTINGS AS EXPLOSION PROOF, PER NEC AS CLASS I, DIV. 2. CRITERIA, EXPLOSION PROOF.

B. PROVIDE ALL SENSORS AT LOCATIONS SHOWN BY TYPICAL DIMENSIONS.

C. PROVIDE VULCAIN SPLASH GUARD D2SG FOR ALL SENSORS, OR APPROVED EQUAL.

D. PROVIDE CALIBRATION KITS FOR ALL SENSORS.

E. PROVIDE (1) SPARE CALIBRATED CIRCUIT BOARD W/ SENSOR FOR EACH SENSOR TYPE.

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NO.	DATE	APPR.	REVISION

GREAT LAKES ENVIRONMENTAL & SAFETY CONSULTANTS, INC.

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BUFFALO, NEW YORK 14218
716-827-0700

WM

DRUM MANAGEMENT BUILDING RELOCATION PROJECT
CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

STATE OF NEW YORK ★ ALBERT G. LYONS, JR. ★ 074710 LICENSED PROFESSIONAL ENGINEER

CHECKED	EJS	DATE
DESIGN ENGINEER	RS	
PROJECT ENGINEER		
PROJECT MANAGER		
APPROVED		
APPROVED		

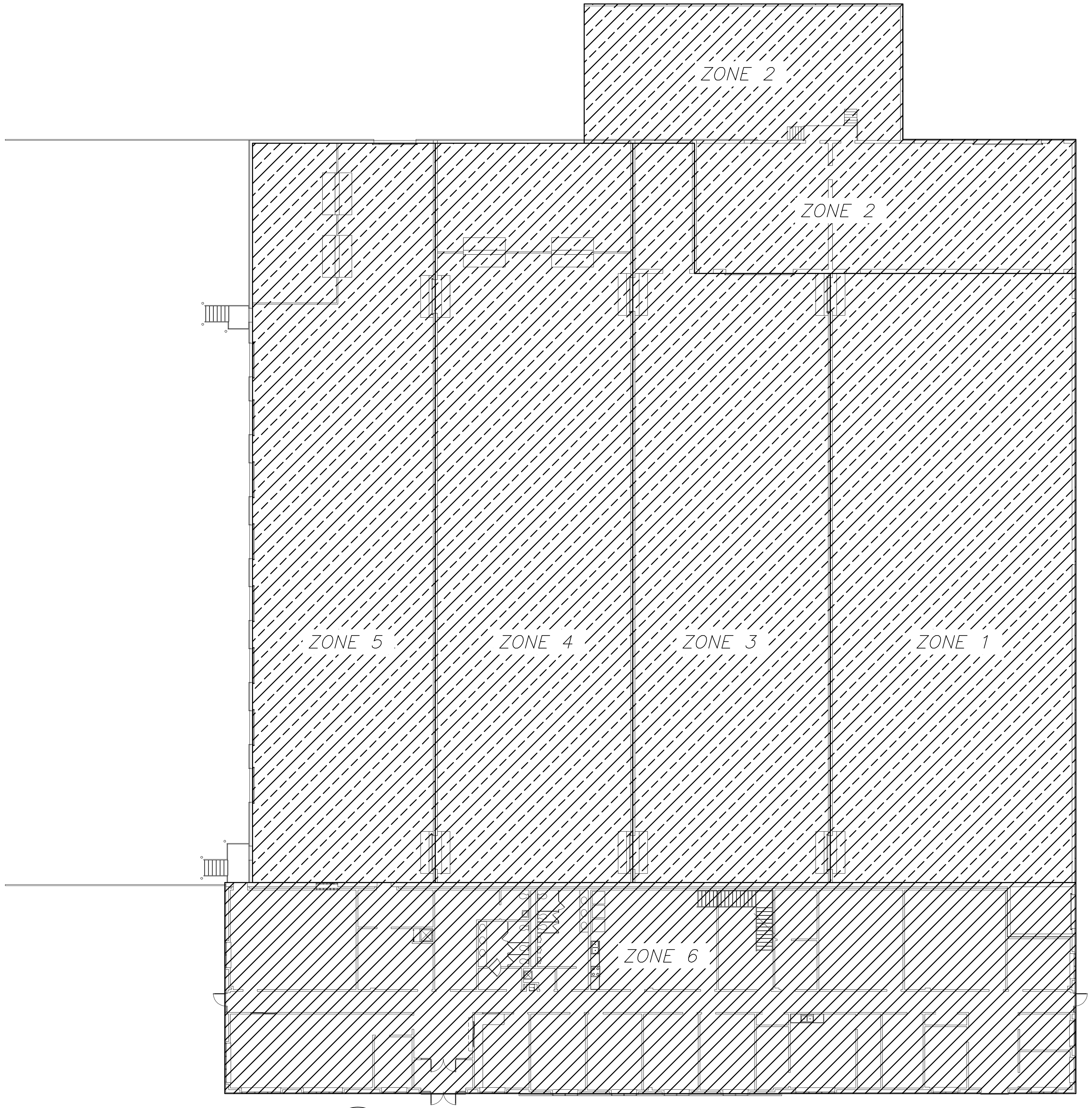
DRUM STORAGE –
GAS MONITORING SYSTEM

DRAWN	DATE 1/19/12	REVISION DATE:
SCALE AS NOTED	JOB NO.	FILE NAME:

DRAWING NO.
DWG. E-8

REV. NO.

SHEET OF



1 FP-1 FIRST FLOOR PLAN – FIRE PROTECTION

SCALE: 1/16 = 1'-0"

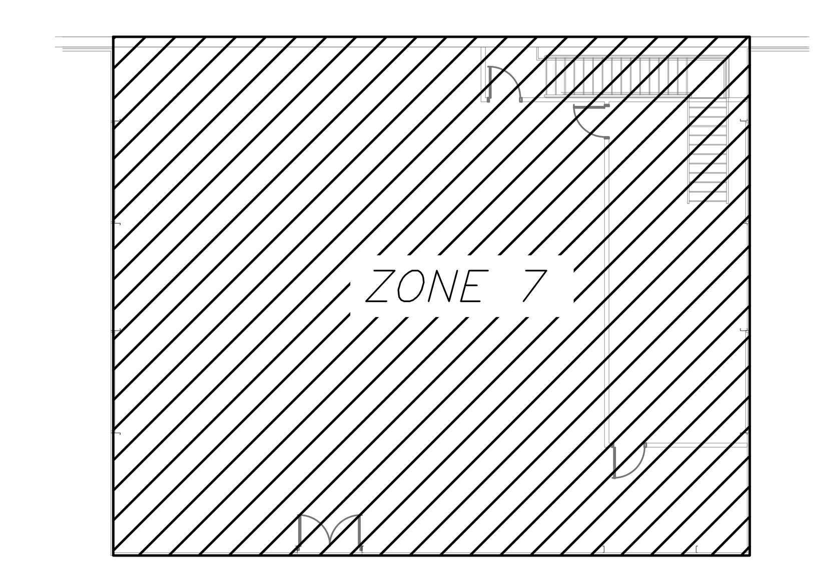
FIRE SUPPRESSION SYSTEM NOTES:

1. REFER TO SPECIFICATIONS FOR GENERAL REQUIREMENTS AND PROCEDURES APPLICABLE TO PERFORMANCE REQUIREMENTS AND MATERIALS OF CONSTRUCTION.
2. CONTRACTOR SHALL HIRE A QUALIFIED PROFESSIONAL ENGINEER SPECIALIZING IN THE PERFORMANCE REQUIREMENTS PER N.F.P.A. AND ALL OTHER GOVERNING AUTHORITIES.
3. CONTRACTOR SHALL COORDINATE INSTALLATION OF FIRE PROTECTION SYSTEM WITH OTHER COMPONENTS AND SYSTEMS INCLUDING, BUT NOT LIMITED TO, BUILDING STRUCTURE, DUCTWORK, DIFFUSERS, DUCTWORK APPARATUS, LIGHT FIXTURES, ELECTRICAL CONDUIT AND FITTINGS, CONTROL AND SIGNAL WIRING, AND SUSPENDED CEILING COMPONENTS.
4. ALL WET PIPE SYSTEM PIPING SHALL BE PREPARED WITH GROOVED ENDS TO ALLOW PIPE TO BE FIELD JOINED WITH GROOVED FITTINGS AND COUPLINGS. PIPE FOR WET PIPE SYSTEMS WILL ALSO BE SHOP PREPARED WITH VICTAULIC MECHANICAL TEES TO CREATE OUTLETS FOR SPRINKLER GRID AND BRANCH LINES.
5. ALL FITTINGS ON 1"– 2" WET SYSTEM PIPE SIZES ARE TO BE BLACK CAST IRON, STANDARD WEIGHT. DRY CHEMICAL SYSTEM FITTINGS SHALL BE MALLEABLE, GALVANIZED FOR ALL SIZES.
6. ALL WET PIPE SYSTEM FITTINGS ON PIPE 2 1/2" AND LARGER ARE TO BE VICTAULIC FIRELOCK, U.N.O.
7. ALL GROOVED COUPLINGS ARE TO VICTAULIC FIRELOCK, U.N.O.
8. ALL HANGERS ARE TO BE BLACK STEEL, U.N.O.
9. ALL BRANCH LINE OUTLETS ON MAINS ARE TO BE VIC. MECHANICAL TEES, U.N.O.
10. ALL PIPE, VALVES, FITTINGS AND HANGERS SHALL BE IN ACCORDANCE WITH THE LATEST NFPA-13 AND NFPA-17. SYSTEM DESIGNS SHALL BE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND LOCAL REGULATIONS.

LEGEND

SPRINKLER SYSTEM

DRY CHEMICAL SUPPRESSION SYSTEM



2 FP-1 SECOND FLOOR PLAN – FIRE PROTECTION

SCALE: 1/16 = 1'-0"

NO.	DATE	APPR.	REVISION

GREAT LAKES ENVIRONMENTAL & SAFETY CONSULTANTS, INC.
50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING RELOCATION PROJECT
CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

STATE OF NEW YORK · ALBERT G. LYONS, JR. · 074710 · LICENSED PROFESSIONAL ENGINEER

CHECKED	AJW	DATE
DESIGN ENGINEER	WAB	
PROJECT ENGINEER		
PROJECT MANAGER		
APPROVED		
APPROVED		

FLOOR PLANS – FIRE PROTECTION

DRAWN	DATE 6/20/12	REVISION DATE:
SCALE AS NOTED	JOB NO.	FILE NAME:

DRAWING NO. DWG. FP-1

REV. NO.

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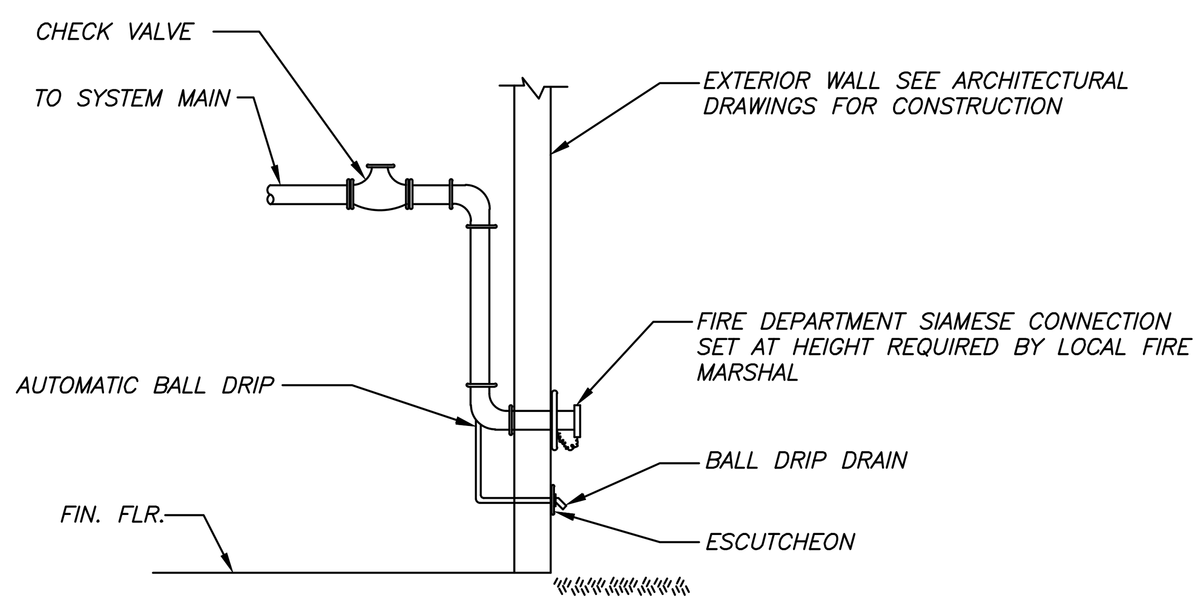
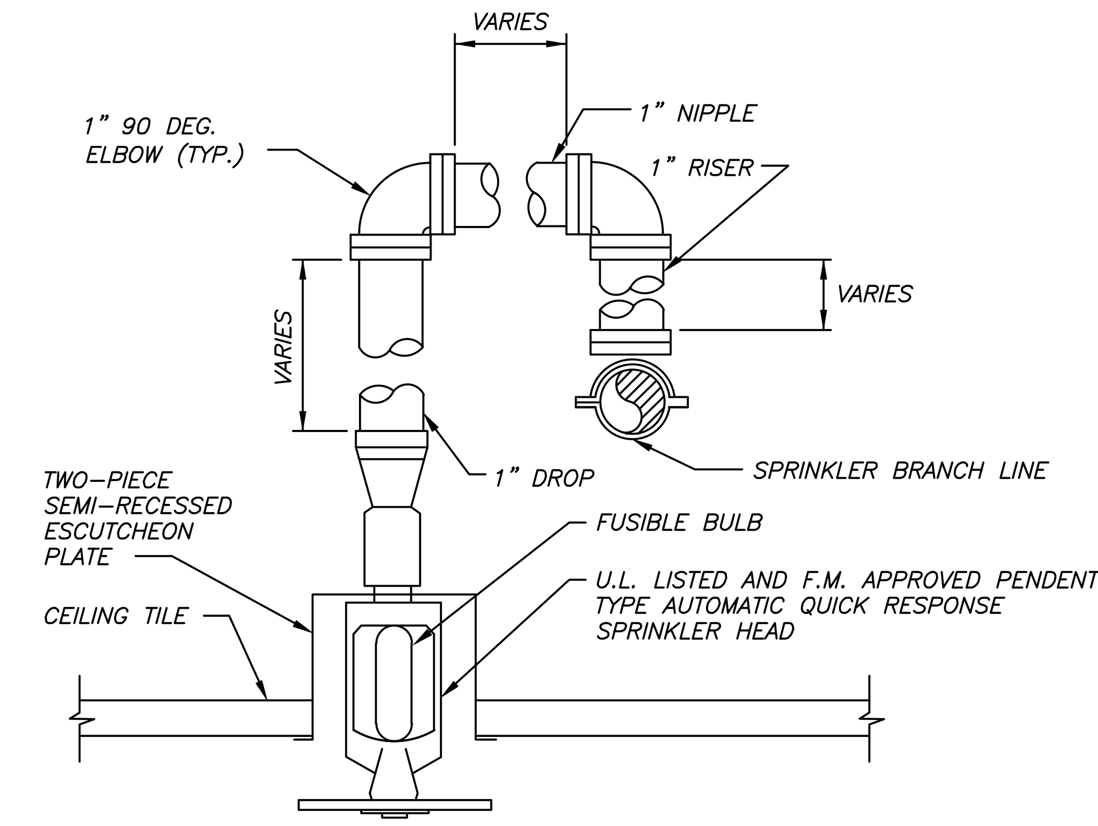
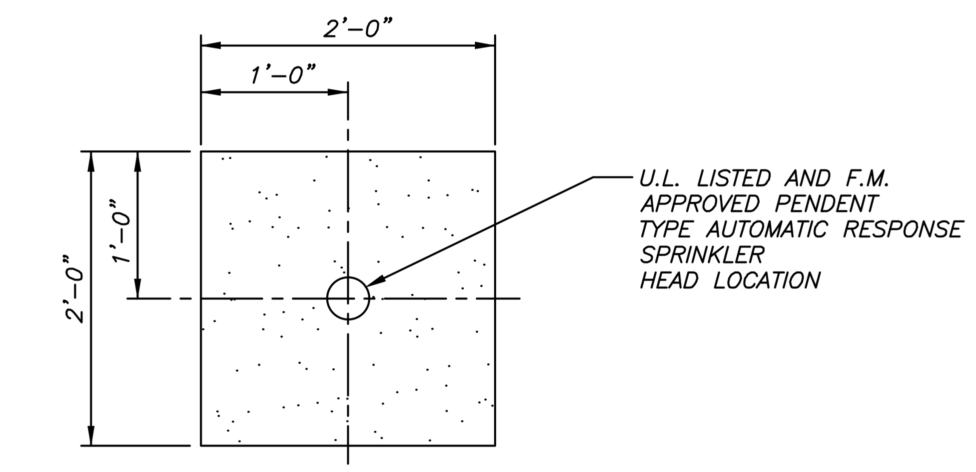


NOTES:
1. REMOVE EXISTING FIRE DEPARTMENT CONNECTION AND REPLACE WITH NEW AT SAME LOCATION.

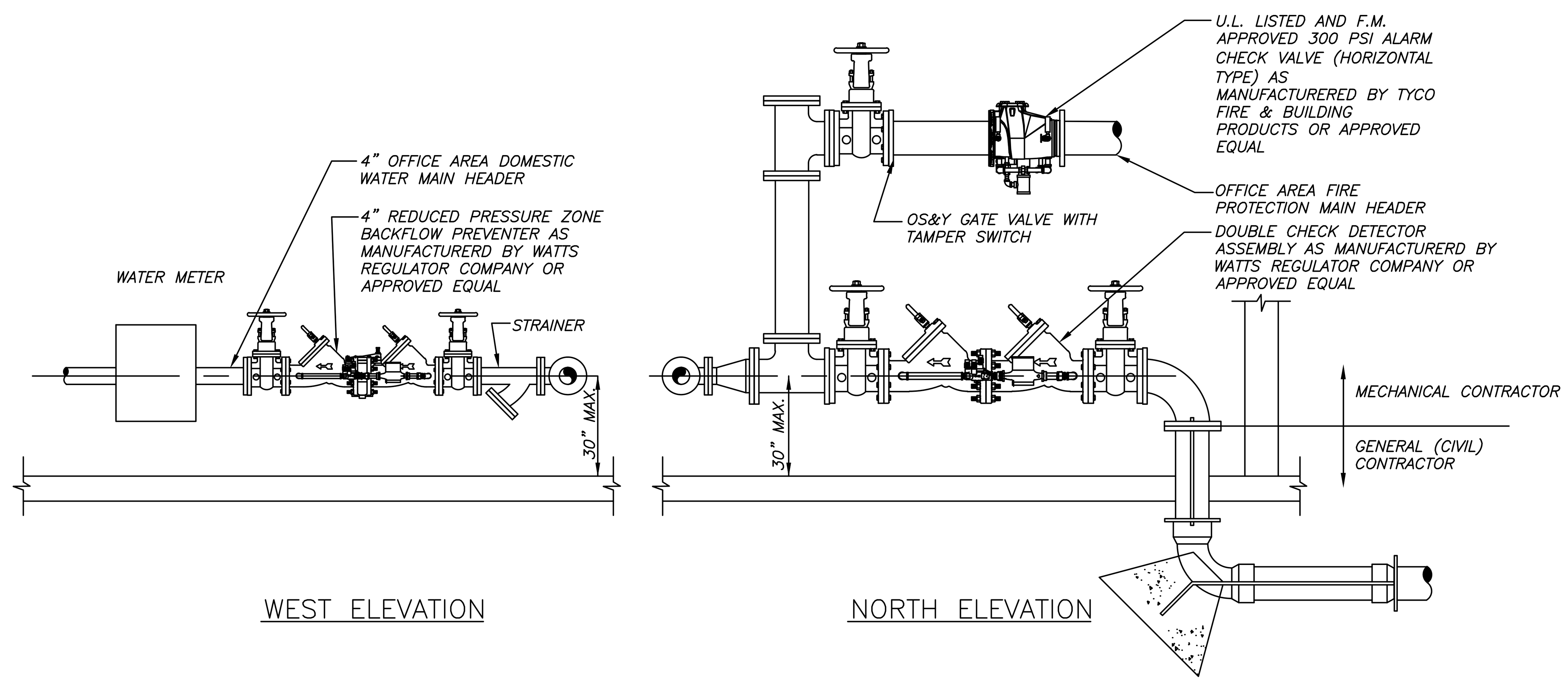
1 FP-2 **TYPICAL FIRE DEPARTMENT CONNECTION DETAIL**
SCALE: NONE



2 FP-2 **TYPICAL SEMI- RECESSED PENDENT SPRINKLER RISER DETAIL**
SCALE: NONE



3 FP-2 **TYPICAL SPRINKLER HEAD LOCATION IN 2' X 2' CEILING TILE**
SCALE: NONE



4 FP-2 **FIRE/DOMESTIC WATER CONNECTION DETAIL**
SCALE: NONE

NO.	DATE	APPR.	REVISION

GREAT LAKES ENVIRONMENTAL & SAFETY CONSULTANTS, INC.
50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING RELOCATION PROJECT
CWM CHEMICAL SERVICES, LLC. MODEL CITY FACILITY MODEL CITY, NEW YORK

STATE OF NEW YORK ALBERT G. LYONS JR. 074710 LICENSED PROFESSIONAL ENGINEER

		DATE
CHECKED	WAB	
DESIGN ENGINEER	AJW	
PROJECT ENGINEER		
PROJECT MANAGER		
APPROVED		
APPROVED		

DETAILS – FIRE PROTECTION

DRAWN | DATE 6/20/12 | REVISION DATE:
SCALE AS NOTED | JOB NO. | FILE NAME:

DRAWING NO. DWG. FP-2
REV. NO.
SHEET OF

EARTHWORK NOTES

1. FOUNDATION DESIGNS ARE BASED ON AN ASSUMED ALLOWABLE SOIL BEARING PRESSURE OF 2000 PSF.
2. ALL FOOTINGS ARE TO BE PLACED ON CLEAN, DRY, LEVEL, COMPACTED NATIVE SOIL OR ON ENGINEERED STRUCTURAL FILL. FOR BIDDING PURPOSES, DEPTH TO EXISTING NATIVE SOIL SHALL BE TAKEN AS 4'-0" BELOW FINISHED FLOOR DATUM ELEVATION (0'-0"). THE CONTRACTOR SHALL FIELD DETERMINE THE EXACT DEPTH TO NATIVE SOIL, AND ADJUST REQUIRED FOUNDATION ELEVATIONS ACCORDINGLY. SUBGRADE SOILS SHALL BE COMPACTED TO DENSITIES IN EXCESS OF 95% OF THE MAXIMUM DRY DENSITY, AS DETERMINED BY ASTM D1557. PLACE 8" LAYERS OF ENGINEERED STRUCTURAL FILL AS REQUIRED TO OBTAIN THE REQUIRED BEARING ELEVATIONS INDICATED ON THE DRAWINGS. ALL ENGINEERED FILL MUST BE COMPACTED TO AT LEAST 95% OF ITS MAXIMUM DRY DENSITY, AS DETERMINED BY ASTM D1557.
3. IMPORTED ENGINEERED STRUCTURAL FILL PLACED AS FILL BENEATH PROPOSED FOUNDATIONS AND AS BACKFILL AGAINST PROPOSED FOUNDATIONS SHALL BE A MATERIAL CONSISTING OF PREDOMINATELY GRANULAR SOILS, FREE FROM ORGANIC MATTER, CLAY, ICE, DEBRIS, OR OTHER DELETERIOUS MATERIAL. STRUCTURAL FILL SHALL CONSIST OF A WELL-GRADED MATERIAL HAVING A MAXIMUM PARTICLE SIZE OF 3 INCHES AND LESS THAN 7% BY WEIGHT PASSING THE NO. 200 SIEVE.
4. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO ADEQUATELY CONTROL SURFACE RUNOFF AND GROUNDWATER SEEPAGE ON A CONTINUOUS BASIS DURING CONSTRUCTION. NO SURFACE RUNOFF OR GROUNDWATER WILL BE PERMITTED TO ENTER CONSTRUCTION EXCAVATIONS. ALL BACKFILL OPERATIONS SHALL BE CONDUCTED IN DRY AREAS ONLY.
5. TAKE ALL NECESSARY PRECAUTIONS WHEN EXCAVATING NEXT TO EXISTING BUILDINGS TO AVOID DAMAGE TO EXISTING FOUNDATIONS. PROVIDE TEMPORARY SHORING IN THESE AREAS AS REQUIRED.
6. ALL EXCAVATIONS SHALL FULLY CONFORM TO ALL LOCAL, STATE AND FEDERAL SAFETY REGULATIONS.
7. ALL FILL MATERIAL PLACED BENEATH FLOOR SLABS AND FOUNDATIONS, AND AGAINST FOUNDATIONS SHALL BE SPREAD IN MAXIMUM 8" THICK LAYERS AND UNIFORMLY COMPACTED TO AT LEAST 95% OF ITS MAXIMUM DRY DENSITY AS DETERMINED BY THE MODIFIED PROCTOR TEST (ASTM D1557). IN OVEREXCAVATED AREAS OR CONFINED AREAS, THE FILL SHALL BE PLACED IN MAXIMUM 6" THICK LIFTS AND COMPACTED TO 95% USING A MANUALLY OPERATED COMPACTOR.
8. BACKFILL BOTH SIDES OF FOUNDATION WALLS IN EQUAL, ALTERNATE LIFTS IN ORDER TO AVOID IMPOSING EXCESSIVE UNBALANCED LATERAL PRESSURE ON THE WALLS.
9. BACKFILL MATERIALS REQUIRED AS A RESULT OF OVER-EXCAVATION BY THE CONTRACTOR WITHOUT PRIOR APPROVAL SHALL BE PROVIDED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
10. ALLOW TESTING AGENCY TO INSPECT AND APPROVE ALL COMPACTED SUBGRADE AND FILL LAYERS PRIOR TO FURTHER BACKFILL AND/OR PLACEMENT OF CONCRETE. TEST RESULTS SHALL BE TO THE COMPLETE SATISFACTION OF THE OWNER AND ALL GOVERNING AUTHORITIES. REFER TO PROJECT SPECIFICATIONS FOR BALANCE OF REQUIREMENTS REGARDING SUBMITTALS, STORAGE AND HANDLING, JOB CONDITIONS, MANNER OF EXECUTION AND METHODS OF CONTROL FOR EXCAVATIONS

FOUNDATION NOTES

1. TOP OF FOOTING ELEVATIONS ARE REFERENCED FROM FINISHED FLOOR SLAB DATUM ELEV. 0'-0", AND ARE NOTED THUS: [ ] ON PLAN OR NOTED IN THE TYPICAL FOOTING DESIGNATIONS.
2. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIRED CONCRETE PROPERTIES.
3. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60.
4. PROVIDE 2 - #5 BARS x 4 FT. LONG DIAGONALLY AT CORNERS OF ALL OPENINGS IN CONCRETE SLABS.
5. PROVIDE #4 DOWELS @ 16" O.C. FROM EXTERIOR SLABS, SIDEWALKS, ETC. INTO FOUNDATION WALLS AT ALL EXTERIOR DOORS.
6. PROVIDE CONCRETE COVER OVER REINFORCING IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318.
7. ALL REINFORCING SHALL BE DETAILED, FABRICATED, AND PLACED IN ACCORDANCE WITH THE LATEST REQUIREMENTS OF ACI 315.
8. SECTIONS INDICATED ON PLAN ARE TYPICAL FOR SIMILAR CONDITIONS.

MASONRY NOTES

1. ALL MASONRY ASSEMBLIES SHALL HAVE f'm = 1500 PSI
2. DESIGN AND PROVIDE TEMPORARY BRACING OF MASONRY WALLS DURING CONSTRUCTION. BRACING SHALL REMAIN IN PLACE UNTIL PERMANENT SUPPORTING ELEMENTS OF THE STRUCTURE HAVE BEEN CONSTRUCTED. BRACING SHALL FULLY CONFORM TO ALL OSHA REQUIREMENTS.
3. ALL BLOCK SHALL CONFORM TO ASTM C90.
4. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIRED MORTAR AND GROUT PROPERTIES.

SCHEDULE OF STRUCTURAL SPECIAL INSPECTIONS

THE FOLLOWING TABLES DENOTE THE STRUCTURAL SPECIAL INSPECTION REQUIREMENTS FOR THIS PROJECT IN ACCORDANCE WITH CHAPTER 17 OF THE BUILDING CODE OF NEW YORK STATE. REFER TO THE PROJECT SPECIFICATIONS FOR REQUIRED QUALIFICATIONS OF ALL PERSONNEL PERFORMING SPECIAL INSPECTION ACTIVITIES.

EARTHWORK OPERATIONS - REQUIREMENTS FOR SPECIAL INSPECTION & TESTING

AREAS OF INSPECTION & TESTING	FREQUENCY OF INSPECTION OR TESTING		REFERENCE STANDARD	BCNYS REFERENCE
	CONTINUOUS	PERIODIC		
1. PRIOR TO PLACEMENT OF ENGINEERED OR ON-SITE FILL MATERIAL, CONFIRM THAT SUBGRADE HAS BEEN PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROJECT DOCUMENTS.		X		1704.7.1
2. DURING PLACEMENT AND COMPACTION OF FILL MATERIAL, VERIFY THAT THE MATERIAL AND ITS METHOD OF PLACEMENT AND COMPACTION CONFORM TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.		X		1704.7.2
3. CONFIRM THAT THE FINAL IN-PLACE DENSITY OF THE FILL MATERIAL MEETS THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.		X		1704.7.3
4. INSPECT FOUNDATION BEARING STRATA PRIOR TO PLACING CONCRETE FOR CONFORMANCE TO REQUIREMENTS OF THE CONTRACT DOCUMENTS.	X			
5. VERIFY THAT UNDERSLAB GRANULAR FILL AND ITS METHOD OF PLACEMENT CONFORM TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.		X		

MASONRY CONSTRUCTION - REQUIREMENTS FOR LEVEL 1 SPECIAL INSPECTION & TESTING

AREAS OF INSPECTION & TESTING	FREQUENCY OF INSPECTION OR TESTING		REFERENCE STANDARD	BCNYS REFERENCE
	CONTINUOUS	PERIODIC		
1. AS MASONRY CONSTRUCTION BEGINS, VERIFY THAT THE FOLLOWING ITEMS ARE IN COMPLIANCE:				1903.5, 1907.1, 1907.7, 1914.4
A. PROPORTIONS OF SITE-PREPARED MORTAR.		X	ACI 530.1: ART. 2.6A	
B. CONSTRUCTION OF MORTAR JOINTS.		X	ACI 530.1: ART. 3.3B	
C. SIZE, LOCATION AND SPACING OF REINFORCEMENT.		X	ACI 530.1: ART. 3.4 & 3.6A	
2. VERIFY THE FOLLOWING DURING CONSTRUCTION:				
A. SIZE AND LOCATION OF STRUCTURAL ELEMENTS.		X	ACI 530.1: ART. 3.3G	
B. TYPE, SIZE AND LOCATION OF ANCHORS, INCLUDING DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES OR OTHER CONSTRUCTION.		X	ACI 530: SEC. 1.15.4 & 2.1.2	
C. SPECIFIED SIZE, GRADE AND TYPE OF REINFORCEMENT.		X	ACI 530: SEC. 1.12, ACI 530.1: ART. 2.4 & 3.4	
D. PROPER WELDING OF REINFORCING BARS.			ACI 530: SEC. 2.1.8.6, 2.1.8.6.2	2108.9.2.11, ITEM 2
E. PROPER PROTECTION OF MASONRY DURING COLD WEATHER (TEMPERATURE BELOW 40° F) OR HOT WEATHER (TEMPERATURE ABOVE 90° F).		X	ACI 530.1: ART. 1.8	2104.3, 2104.4
3. VERIFY THE FOLLOWING PRIOR TO GROUTING:				
A. GROUT SPACE IS CLEAN.		X	ACI 530.1: ART. 3.2D	
B. PLACEMENT OF REINFORCEMENT AND ANCHORS IS IN ACCORDANCE WITH CONTRACT DOCUMENTS.	X		ACI 530: SEC. 1.12, ACI 530.1, ART. 3.4	
C. PROPER PROPORTIONS OF SITE-PREPARED GROUT.		X	ACI 530.1: ART. 2.6B	
D. PROPER CONSTRUCTION OF MORTAR JOINTS.		X	ACI 530.1: ART. 3.3B	
4. VERIFY THE FOLLOWING DURING GROUTING:				
A. GROUT PLACEMENT IS IN COMPLIANCE WITH ALL CODE AND CONTRACT DOCUMENT REQUIREMENTS.	X		ACI 530.1: ART. 3.5	
5. OBSERVE THE PREPARATION OF ALL REQUIRED GROUT AND MORTAR SPECIMENS.	X		ACI 530.1: ART. 1.4	2105.3, 2105.4, 2105.5
6. COMPLY WITH ALL REQUIRED INSPECTION PROVISIONS OF THE CONTRACT DOCUMENTS AND APPROVED SUBMITTALS.		X	ACI 530.1: ART. 1.5	

CAST-IN-PLACE CONCRETE - REQUIREMENTS FOR SPECIAL INSPECTION & TESTING

AREAS OF INSPECTION & TESTING	FREQUENCY OF INSPECTION OR TESTING		REFERENCE STANDARD	BCNYS REFERENCE
	CONTINUOUS	PERIODIC		
1. INSPECT REINFORCING STEEL FOR CORRECT MATERIAL, SIZE, CONDITION AND PLACEMENT.		X	ACI 318: 3.5, ACI 318: 7.1-7.7	1903.5, 1907.1, 1907.7, 1914.4
2. INSPECT REINFORCING STEEL WELDING IN ACCORDANCE WITH BCNYS TABLE 1704.3, ITEM 5B.		X	AWS D1.4, ACI 318: 3.5.2	1903.5.2
3. PRIOR TO AND DURING PLACEMENT OF CONCRETE, INSPECT BOLTS AND ANCHOR RODS INSTALLED IN CONCRETE FOR PROPER LOCATION AND DEPTH OF EMBEDMENT.	X			1912.5
4. VERIFY THAT REQUIRED CONCRETE DESIGN MIX IS USED IN CORRECT LOCATIONS.		X	ACI 318: CH. 4, ACI 318: 5.2-5.4	1904, 1905.2, 1905.3, 1905.4, 1914.2, 1914.3
5. TAKE SAMPLES OF FRESH CONCRETE TO PERFORM SLUMP TESTS AND MEASURE AIR CONTENT AND TEMPERATURE OF THE CONCRETE BEING PLACED. MAKE TEST CYLINDERS FOR STRENGTH TESTS.	X		ASTM C172, ASTM C31, ACI 318: 5.6, 5.8	1905.6, 1914.10
6. VERIFY THAT PROPER INSTALLATION TECHNIQUES ARE BEING USED TO PLACE CONCRETE.	X		ACI 318: 5.9, 5.10	1905.9, 1905.10, 1914.6, 1914.7, 1914.8
7. INSPECT FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.		X	ACI 318: 5.11-5.13	1905.11, 1905.13, 1914.9
8. VERIFY CONCRETE STRENGTH BY TESTING CYLINDERS CONSTRUCTED OF FRESHLY PLACED CONCRETE.		X		

STEEL CONSTRUCTION - REQUIREMENTS FOR SPECIAL INSPECTION & TESTING
(SUBJECT TO CONSTRUCTION DETAILS OF PRE-ENGINEERED BUILDING)

AREAS OF INSPECTION & TESTING	FREQUENCY OF INSPECTION OR TESTING		REFERENCE STANDARD	BCNYS REFERENCE
	CONTINUOUS	PERIODIC		
1. FABRICATOR'S SHOP TESTING AND QUALITY CONTROL PROGRAM:				
A. VERIFY FABRICATOR'S CERTIFICATION AND QUALITY CONTROL PROGRAM.		X		
B. SPECIAL INSPECTIONS REQUIRED IN FABRICATOR'S SHOP FOR ELEMENTS IDENTIFIED BELOW.	NOT REQ'D. IF FABRICATOR IS AISC CERTIFIED		AISC PLANT CERTIFICATION PROGRAM	1704.2
2. REVIEW MATERIAL CERTIFICATIONS FOR HIGH-STRENGTH BOLTS, NUTS AND WASHERS:		X	APPLICABLE ASTM MATERIAL SPECIFICATIONS, AISC SECT. A3.3	
A. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN CONSTRUCTION DOCUMENTS.				
B. MANUFACTURER'S CERTIFICATES OF COMPLIANCE REQUIRED.				
3. INSPECT HIGH-STRENGTH BOLTED CONNECTIONS:				
A. BEARING-TYPE CONNECTIONS.	X		AISC SECT. M2.5	1704.3.3
B. SLIP-CRITICAL CONNECTIONS.	X	X		
4. VERIFY STRUCTURAL STEEL MATERIAL CERTIFICATIONS:				
A. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN CONSTRUCTION DOCUMENTS.			ASTM A6	1708.4
B. MANUFACTURER'S CERTIFIED MILL TEST REPORTS REQUIRED.			ASTM A6	
5. VERIFY WELD FILLER MATERIAL CERTIFICATIONS:				
A. IDENTIFICATION MARKINGS TO CONFORM TO AWS REQUIREMENTS SPECIFIED IN THE CONSTRUCTION DOCUMENTS.			AISC SECT. A3.5	
B. MANUFACTURER'S CERTIFICATES OF COMPLIANCE REQUIRED.				
6. CONDUCT WELD INSPECTIONS AS FOLLOWS:			AWS D1.1	1704.3.1
A. COMPLETE AND PARTIAL PENETRATION GROOVE WELDS.	X			
B. MULTI-PASS FILLET WELDS.	X			
C. SINGLE-PASS FILLET WELDS > 5/16 "	X			
D. SINGLE-PASS FILLET WELDS <= 5/16 "		X		
E. FLOOR DECK AND ROOF DECK WELDS.		X	AWS D1.3	
7. INSPECT STEEL FRAME JOINT DETAILS FOR COMPLIANCE WITH CONSTRUCTION DOCUMENTS:		X		1704.3.2
A. DETAILS SUCH AS BRACING AND STIFFENERS.				
B. MEMBER LOCATIONS.				
C. APPLICATION OF JOINT DETAILS AT EACH CONNECTION.				

NO.	DATE	APPR.	REVISION

GREAT LAKES ENVIRONMENTAL & SAFETY CONSULTANTS, INC.
50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING RELOCATION PROJECT
CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

STATE OF NEW YORK · ALBERT G. LYONS, JR. · 074710 · LICENSED PROFESSIONAL ENGINEER

CHECKED | DATE
DESIGN ENGINEER
PROJECT ENGINEER
PROJECT MANAGER
APPROVED
APPROVED

FOUNDATION NOTES AND REQUIRED INSPECTIONS

DRAWN: FMF | DATE: 6/20/12 | REVISION DATE:
SCALE: AS NOTED | JOB NO. | FILE NAME:

DRAWING NO. S-0
REV. NO.
SHEET 1 OF 6

FOUNDATION PLAN

1/16" = 1'-0"

TRUE PROJECT

1. TOP OF FOOTING ELEVATIONS ARE REFERENCED FROM FINISHED FLOOR DATUM ELEVATION 0'-0", AND ARE NOTED THUS: [ ] ON PLAN.
2. FLOOR SLABS SHALL BE CONCRETE SLABS-ON-GRADE, REINFORCED WITH ONE LAYER OF WELDED-WIRE-FABRIC (W.W.F.), OVER A MINIMUM 6" LAYER OF COMPACTED GRANULAR FILL. SEE PLAN FOR SLAB THICKNESSES. ALL EXPOSED SURFCAES OF INTERIOR AND EXTERIOR CONCRETE AT NEW DRUM BUILDING WAREHOUSE SLABS, CURBS, RAMPS, TRENCHES, WALLS AND PIERS SHALL BE COATED WITH CHEMTEC ONE CHEMICAL TREATMENT IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN APPLICATION INSTRUCTIONS.
3. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL FLOOR PLANS FOR DIMENSIONS NOT INDICATED ON STRUCTURAL DRAWINGS.
4. SECTIONS INDICATED ON PLAN ARE TYPICAL FOR SIMILAR CONDITIONS.
5. "CJ" = SUGGESTED WALL & SLAB CONTROL JOINT LOCATIONS.
6. TOP OF CONCRETE FOUNDATION WALL ELEVATION @ DOORWAYS = (-8") BELOW ADJACENT FINISHED FLOOR ELEVATION.

FOOTING SIZE

TOP OF FOOTING ELEVATION (RELATIVE TO FIN. FLOOR DATUM ELEV. 0'-0")

F5.0	-3'-0"
P1	-1'-0"

PIER DETAIL (SEE DWG. S-3)

TOP OF PIER ELEVATION (RELATIVE TO FIN. FLOOR DATUM ELEV. 0'-0")

FOOTING LEGEND

FOOTING SCHEDULE

MARK	SIZE	THK.	BOT. REINFORCING	TOP REINFORCING
F3.0	3'-0" x 3'-0"	12"	3 - #5 EACH WAY	NONE
F3.5	3'-6" x 3'-6"	12"	3 - #6 EACH WAY	NONE
F4.0	4'-0" x 4'-0"	12"	5 - #5 EACH WAY	NONE
F4.5	4'-6" x 4'-6"	12"	5 - #6 EACH WAY	NONE
F5.0	5'-0" x 5'-0"	12"	6 - #6 EACH WAY	6 - #6 EACH WAY
F5.5	5'-6" x 5'-6"	12"	7 - #6 EACH WAY	NONE
F5.5A	5'-6" x 5'-6"	16"	7 - #6 EACH WAY	7 - #6 EACH WAY
F6.0	6'-0" x 6'-0"	16"	7 - #7 EACH WAY	NONE
F6.5	6'-6" x 6'-6"	16"	8 - #7 EACH WAY	8 - #6 EACH WAY
F7.0	7'-0" x 7'-0"	18"	7 - #8 EACH WAY	7 - #6 EACH WAY

GENERAL CONTRACTOR NOTE:

FOUNDATION DESIGNS FOR THE PRE-ENGINEERED BUILDINGS ARE PRELIMINARY. FINAL PIER DETAILS & FOOTING SIZES WILL BE DETERMINED AFTER FRAME REACTIONS ARE SUPPLIED BY THE BUILDING MANUFACTURER.

FOUNDATION CONTRACTOR NOTE:

COORDINATE LOCATION OF ALL FOOTING STEPS AND PIPE SLEEVES WITH PLUMBING LINE & TRENCH LOCATIONS PRIOR TO PLACING FOOTING CONCRETE

FOUNDATION PLAN

1/16" = 1'-0"

NO.	DATE	APPR.	REVISION

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50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING RELOCATION PROJECT

CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

STATE OF NEW YORK · ALBERT G. LYONS, JR. · 067410 · LICENSED PROFESSIONAL ENGINEER

CHECKED	DATE
DESIGN ENGINEER	
PROJECT ENGINEER	
PROJECT MANAGER	
APPROVED	
APPROVED	

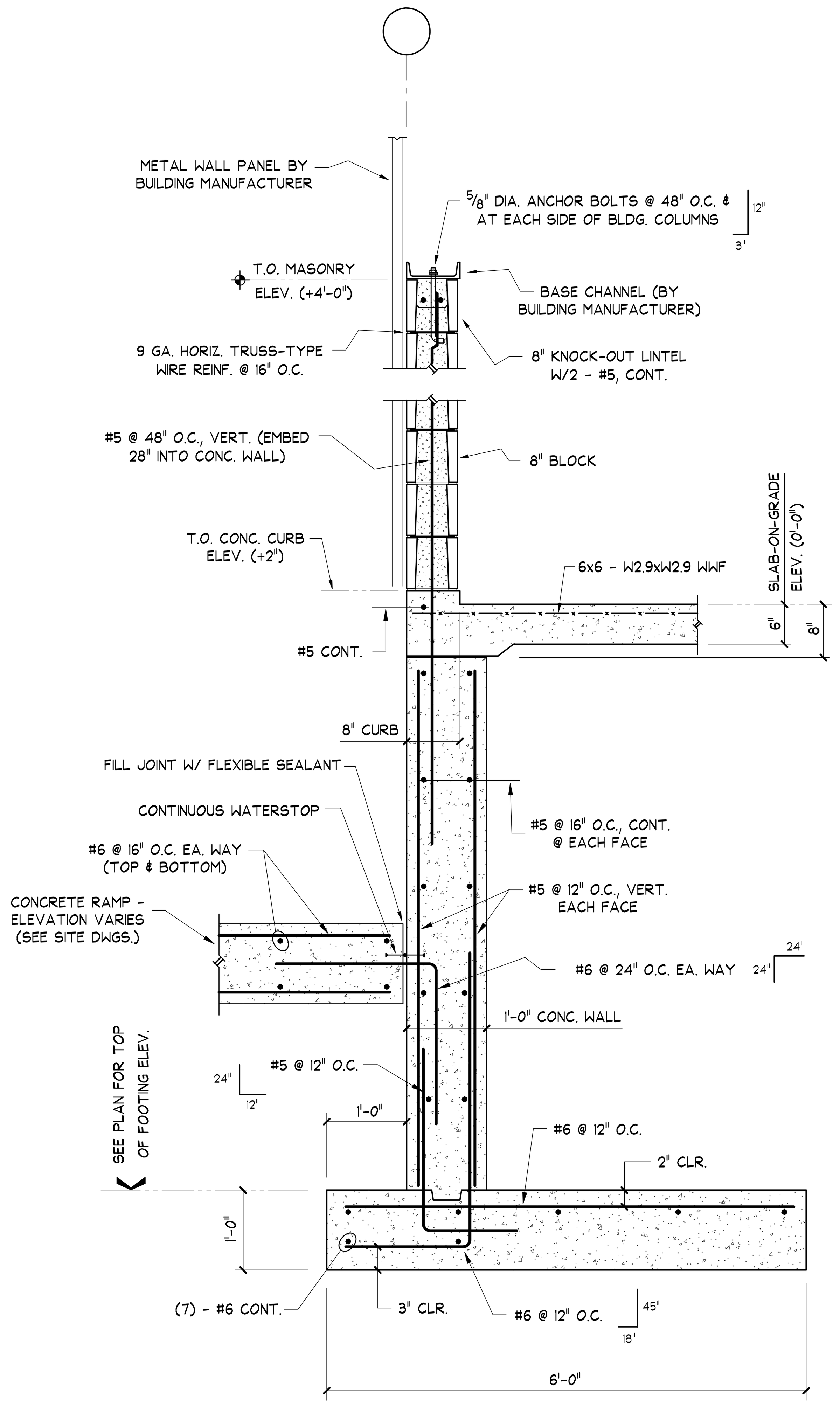
FOUNDATION PLAN

DRAWN	FMF	DATE	6/20/12
SCALE	AS NOTED	JOB NO.	
REVISION DATE:		FILE NAME:	

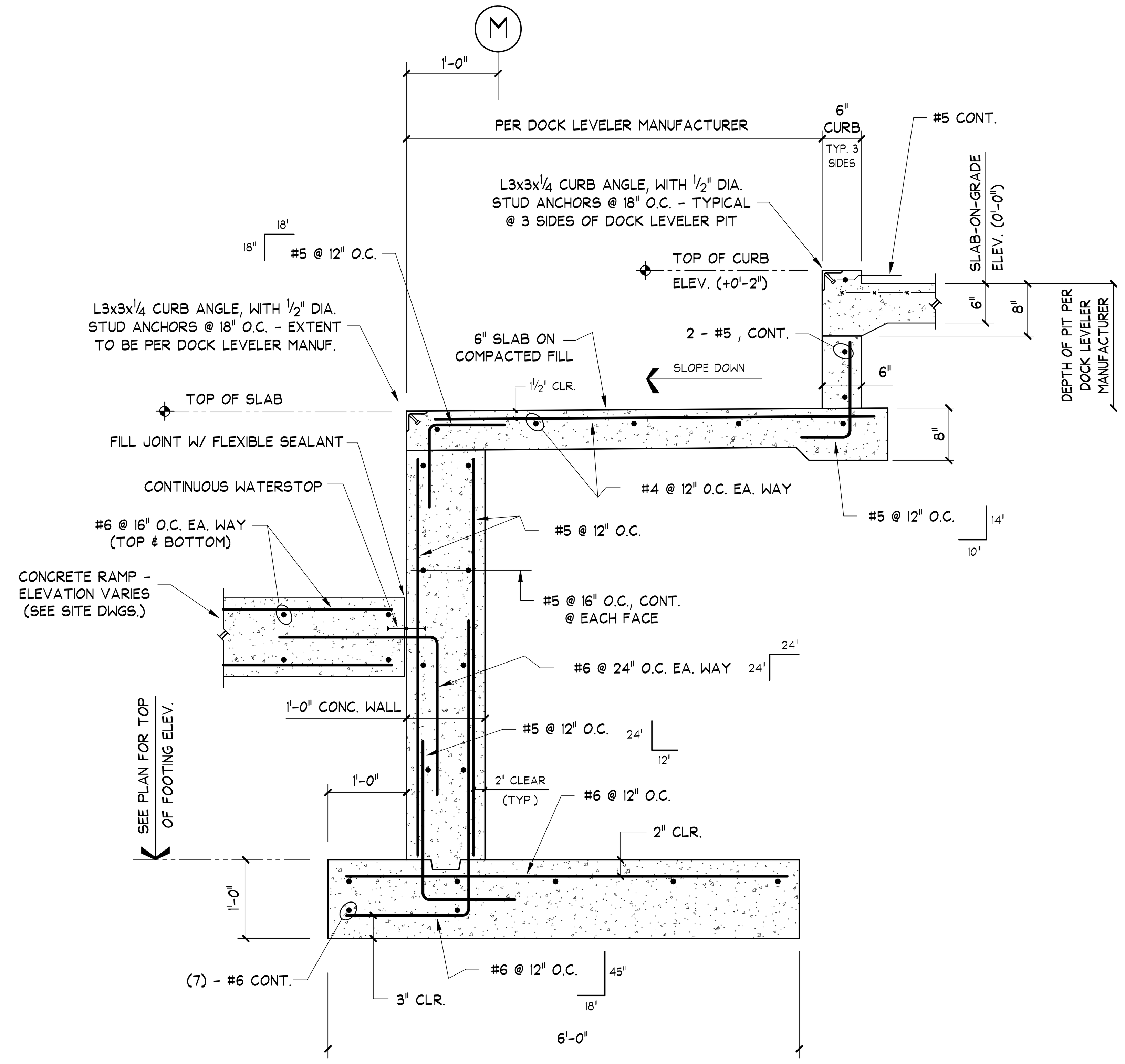
DRAWING NO. S-1

REV. NO.

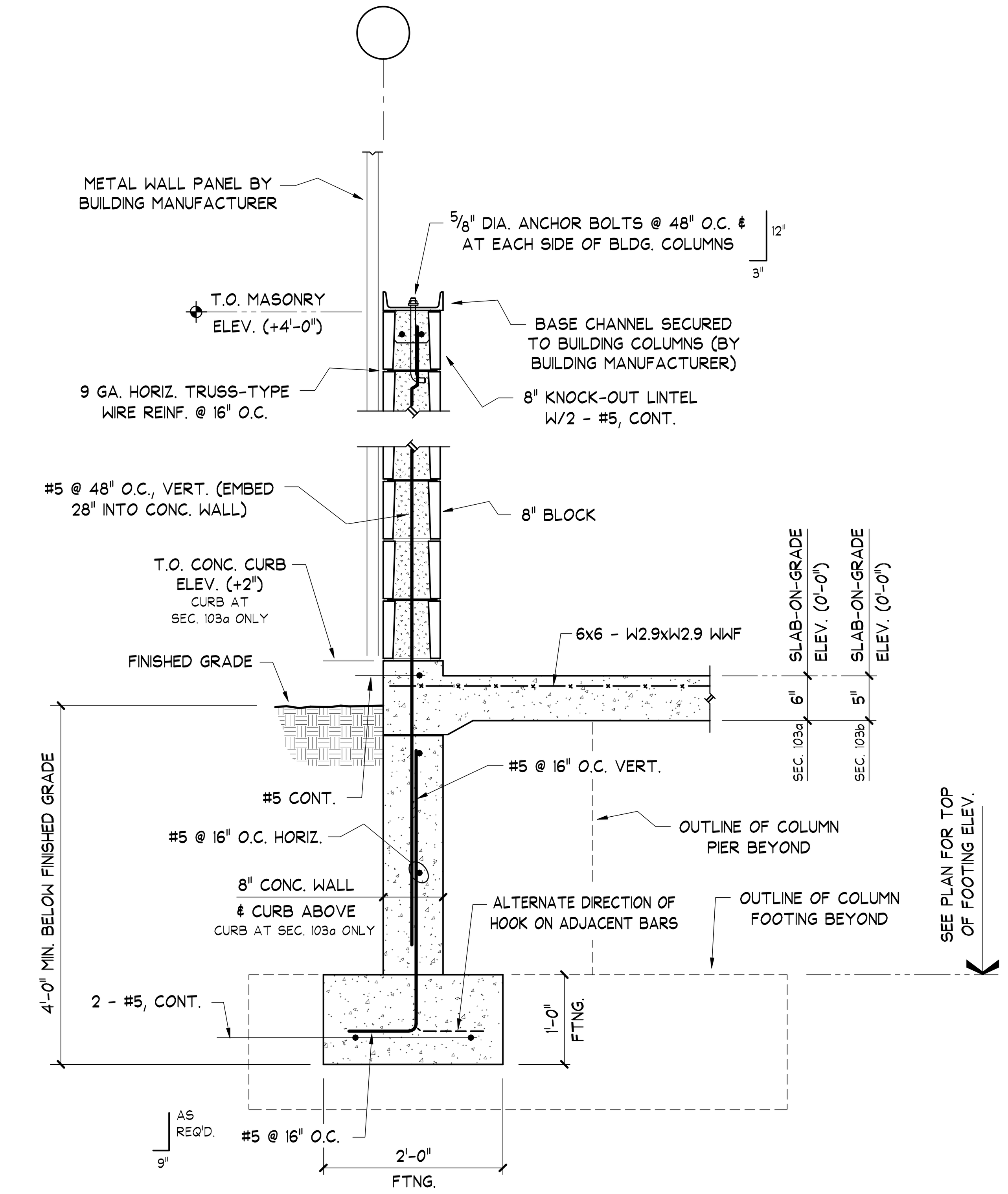
SHEET 2 OF 6



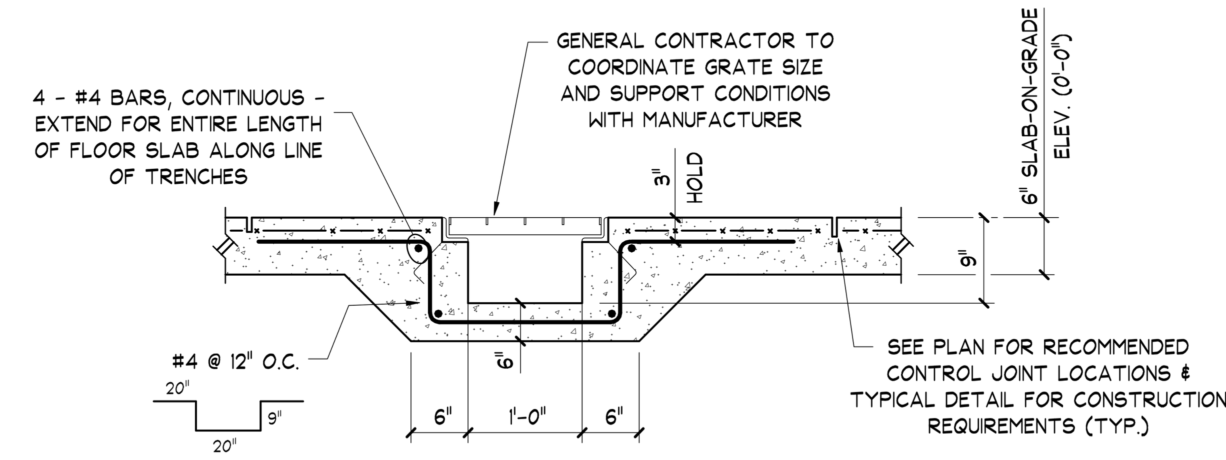
SECTION 101
3/4" = 1'-0"



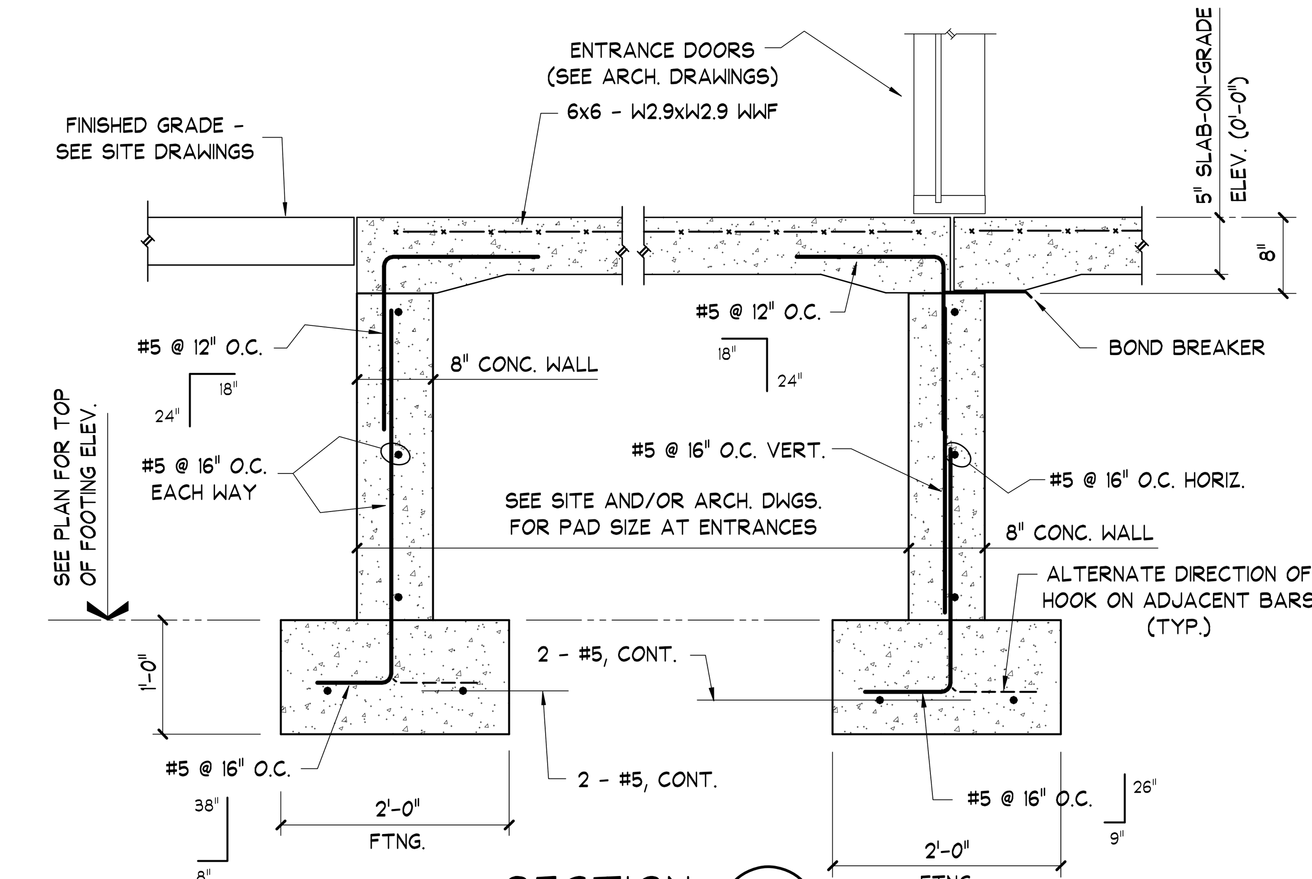
SECTION 102
3/4" = 1'-0"



SECTION 103a 103b
3/4" = 1'-0"



TRENCH REINFORCING DETAIL AT DRUM STORAGE CONTAINMENT
NO SCALE



SECTION 104
3/4" = 1'-0"

NO.	DATE	APPR.	REVISION

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50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING RELOCATION PROJECT
CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

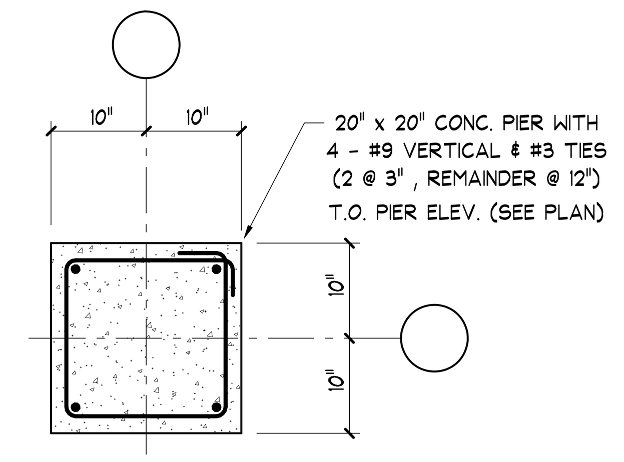
STATE OF NEW YORK
ALBERT G. LYONS, JR.
LICENSED PROFESSIONAL ENGINEER
074710

CHECKED	DATE
DESIGN ENGINEER	
PROJECT ENGINEER	
PROJECT MANAGER	
APPROVED	
APPROVED	

FOUNDATION DETAILS

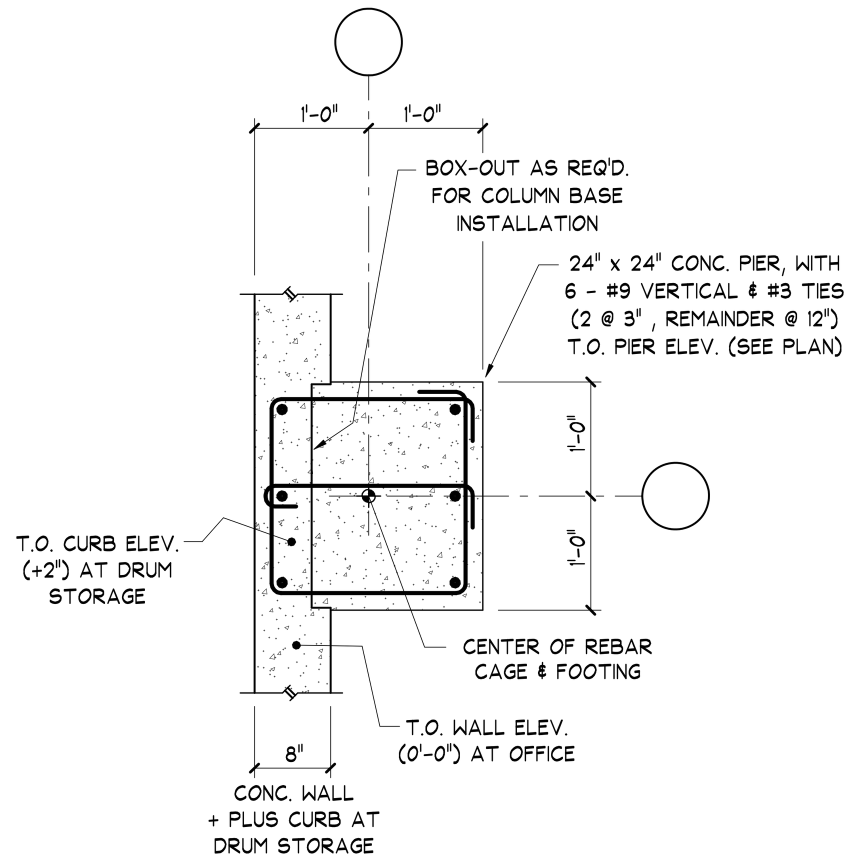
DRAWN	FMF	DATE	6/20/12	REVISION DATE:
SCALE	AS NOTED	JOB NO.		FILE NAME:

DRAWING NO. S-2
REV. NO.
SHEET 3 OF 6



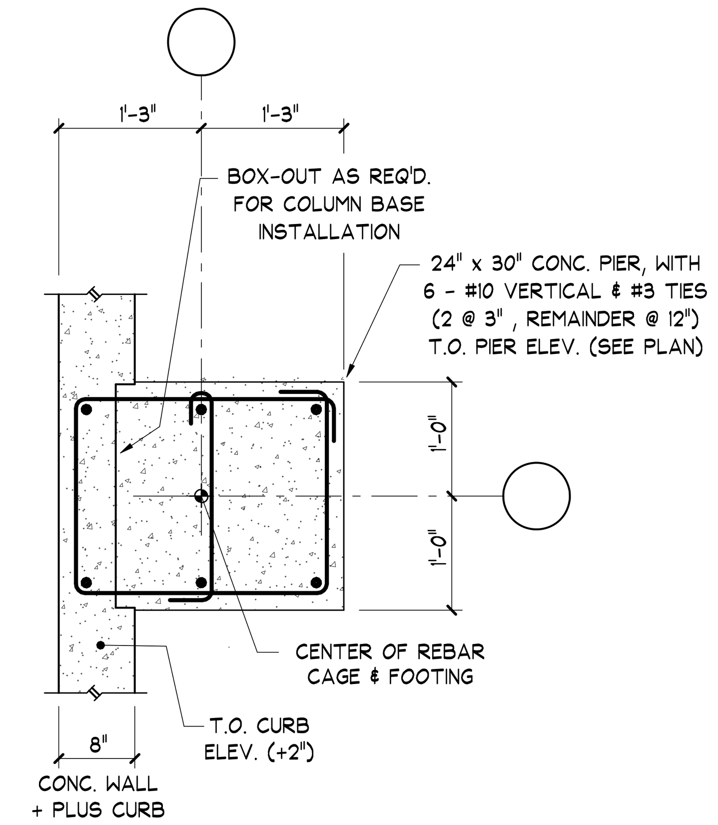
PIER DETAIL "P1"

3/4" = 1'-0"



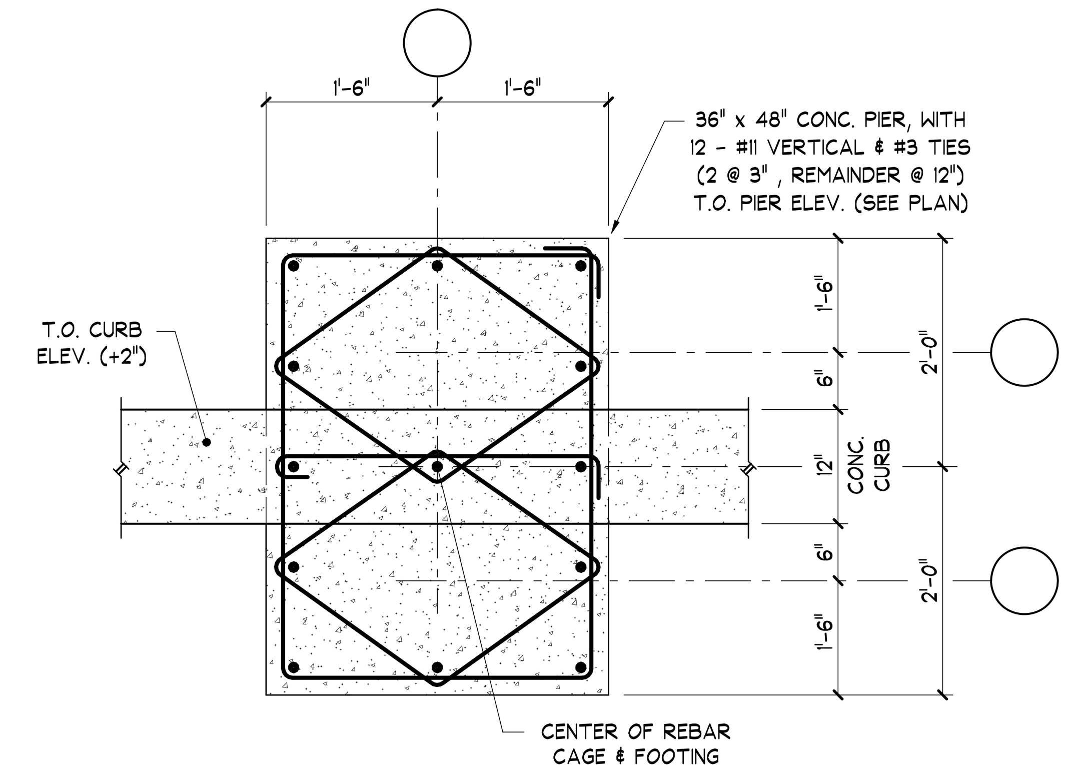
PIER DETAIL "P2"

3/4" = 1'-0"



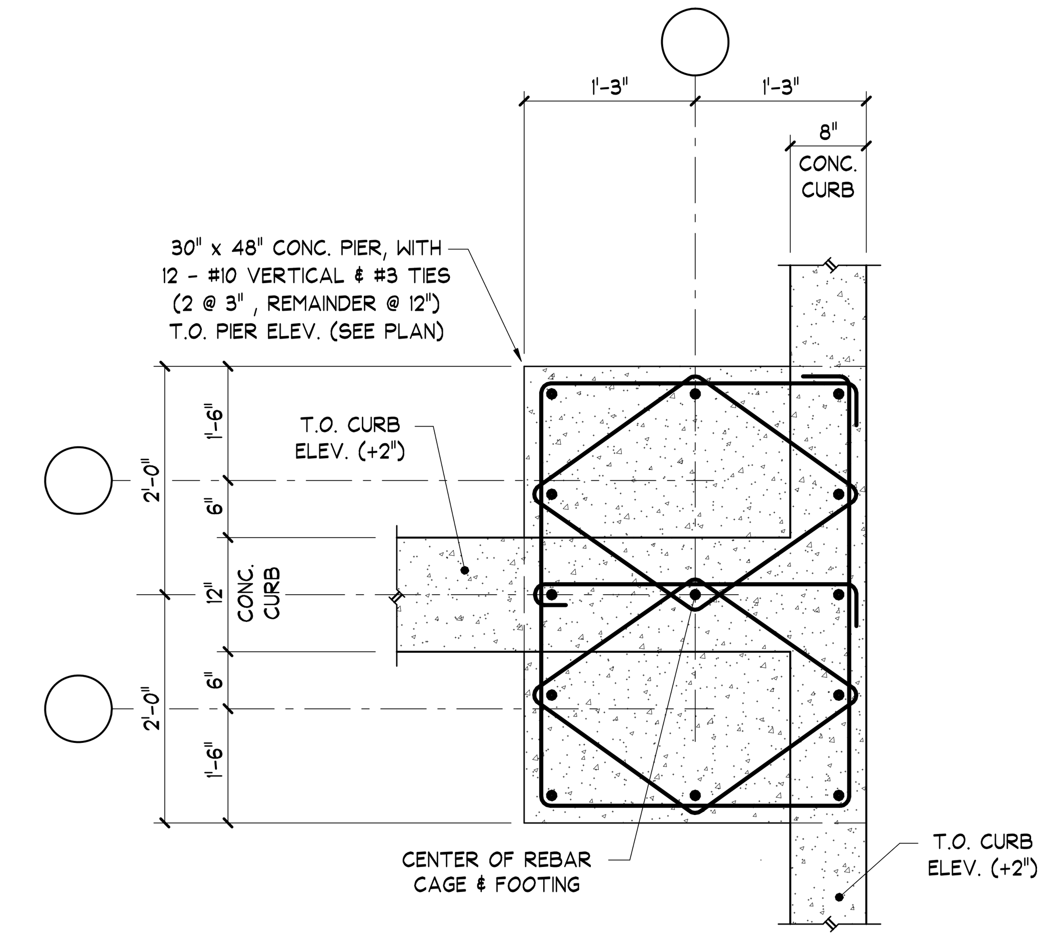
PIER DETAIL "P3"

3/4" = 1'-0"



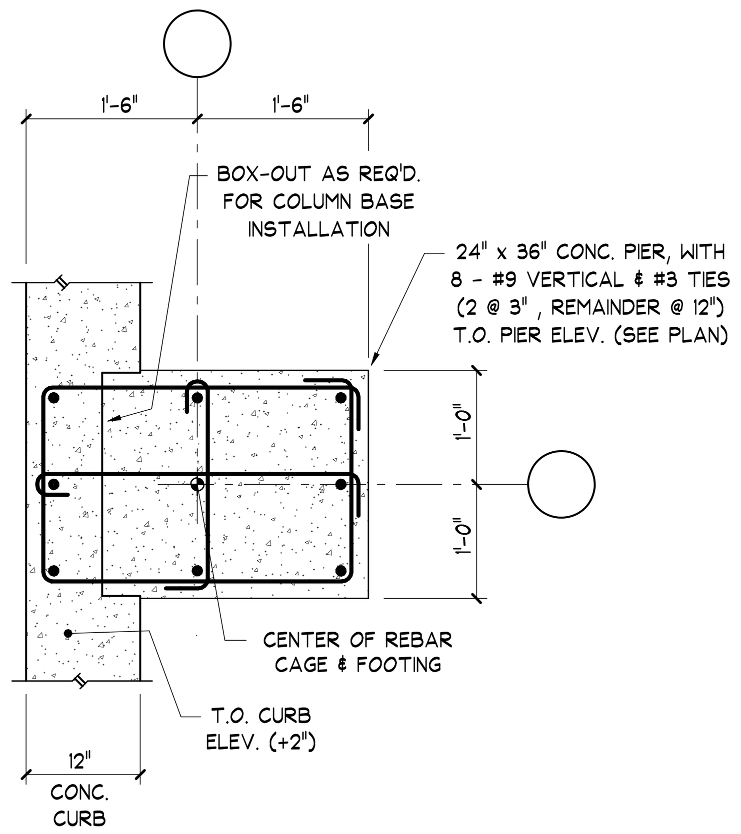
PIER DETAIL "P4"

3/4" = 1'-0"



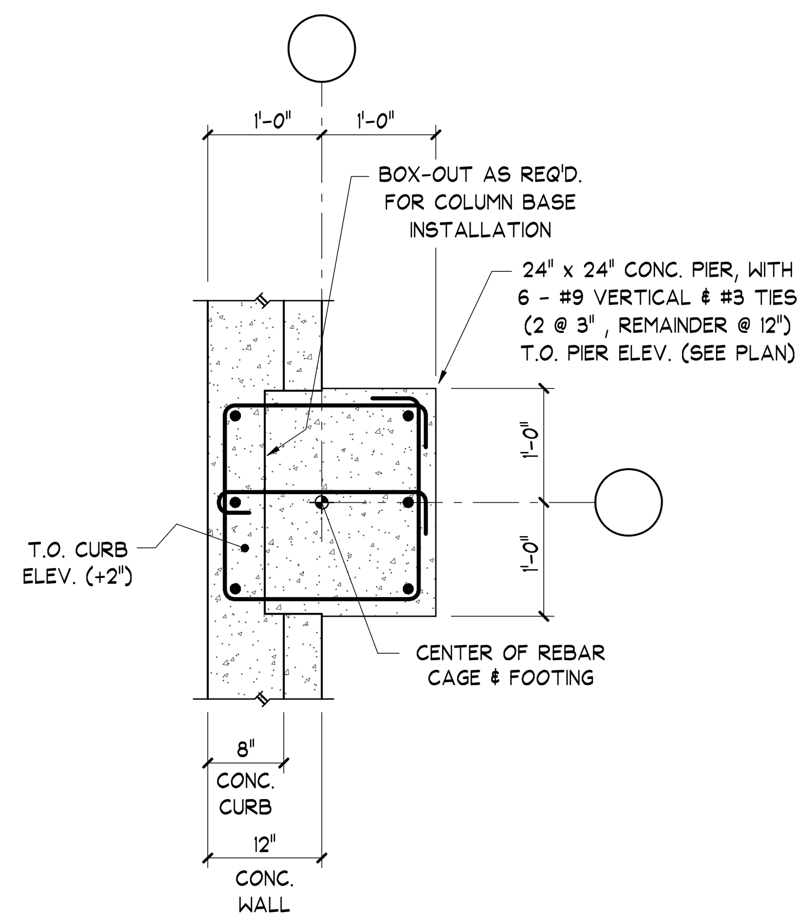
PIER DETAIL "P5"

3/4" = 1'-0"



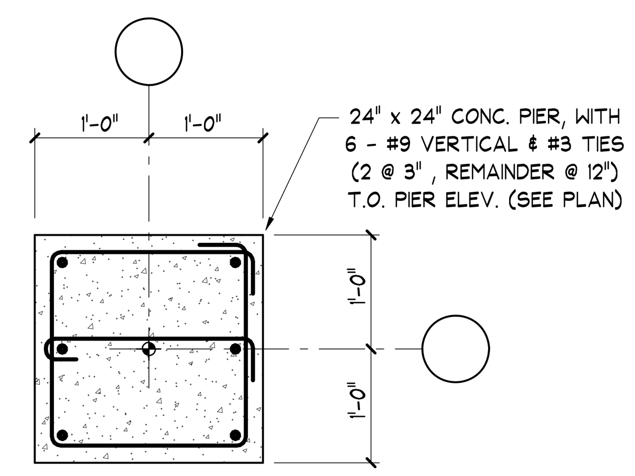
PIER DETAIL "P6"

3/4" = 1'-0"



PIER DETAIL "P7"

3/4" = 1'-0"



PIER DETAIL "P8"

3/4" = 1'-0"

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50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING
RELOCATION PROJECT

CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

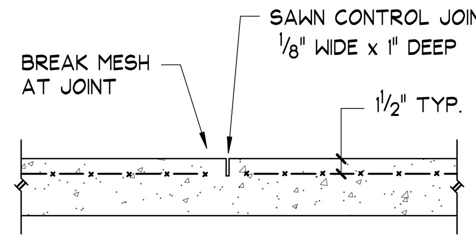
STATE OF NEW YORK
ALBERT G. LYONS, JR.
074710
LICENSED PROFESSIONAL ENGINEER

CHECKED | DATE
DESIGN ENGINEER
PROJECT ENGINEER
PROJECT MANAGER
APPROVED
APPROVED

FOUNDATION DETAILS

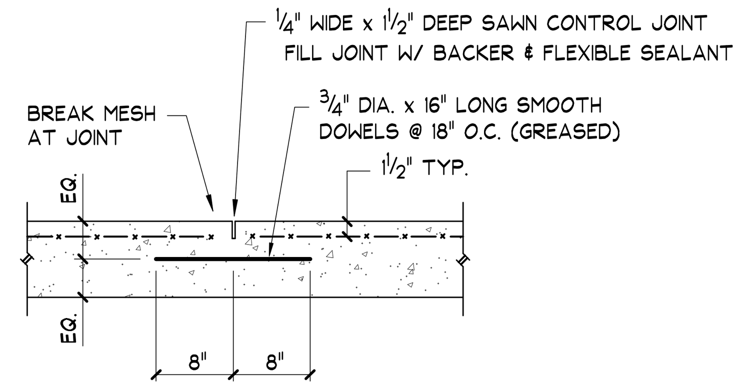
DRAWN: FMF
DATE: 6/20/12
REVISION DATE:
SCALE: AS NOTED
JOB NO.:
FILE NAME:

DRAWING NO.: S-3
REV. NO.:
SHEET 4 OF 6



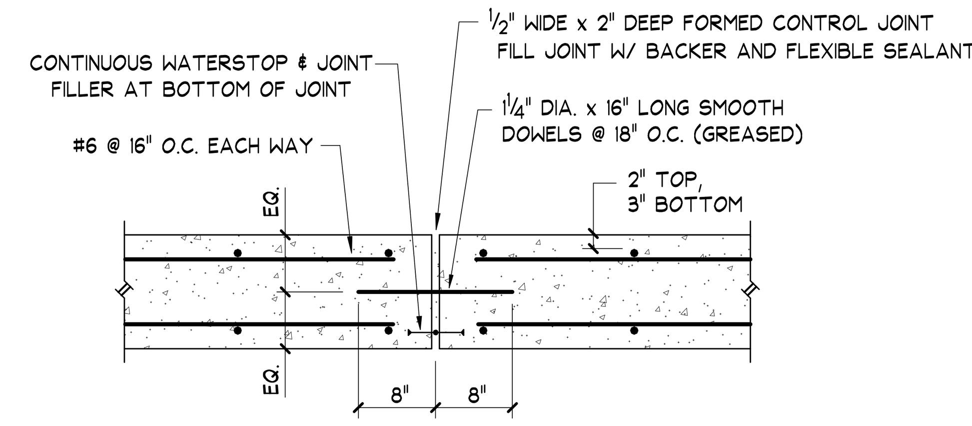
TYPICAL SAW-CUT CONTROL JOINT DETAIL FOR 5" SLABS-ON-GRADE

(NO SCALE)
SEE PLAN FOR SUGGESTED LOCATIONS.
MAXIMUM JOINT SPACING = 15'-0".



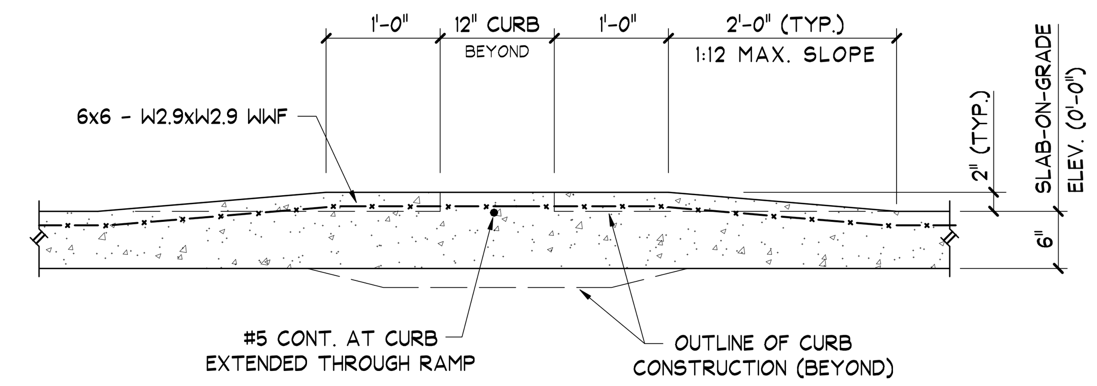
TYPICAL SAW-CUT CONTROL JOINT DETAIL FOR 6" SLABS-ON-GRADE

(NO SCALE)
SEE PLAN FOR SUGGESTED LOCATIONS.
MAXIMUM JOINT SPACING = 18'-0".



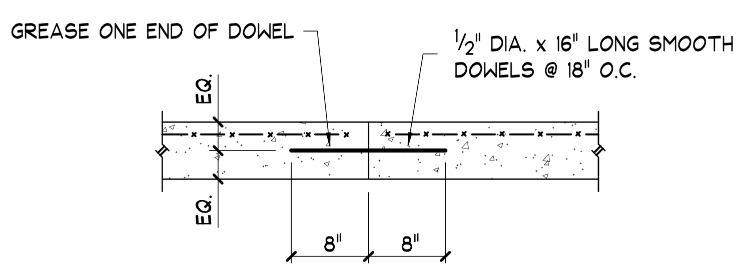
TYPICAL EXPANSION JOINT DETAIL FOR 12" SLABS-ON-GRADE

(NO SCALE)
SEE PLAN FOR SUGGESTED LOCATIONS.
MAXIMUM JOINT SPACING = 30'-0".



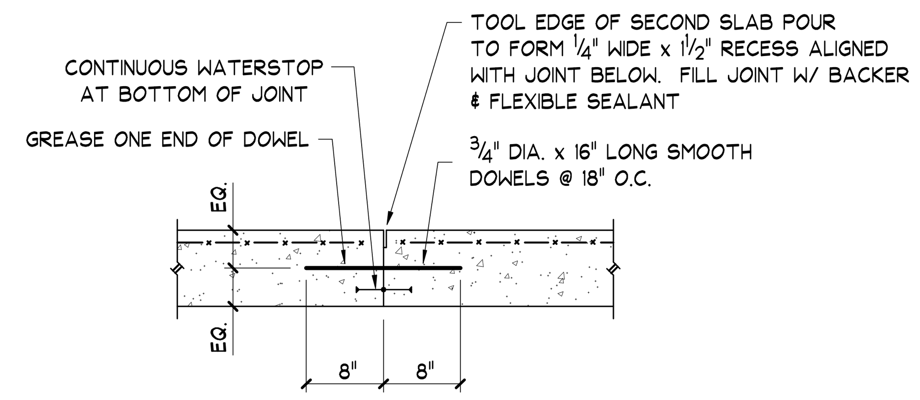
TYPICAL INTERIOR RAMP DETAIL BETWEEN CONTAINMENT AREAS

NO SCALE
SEE PLAN FOR LOCATIONS



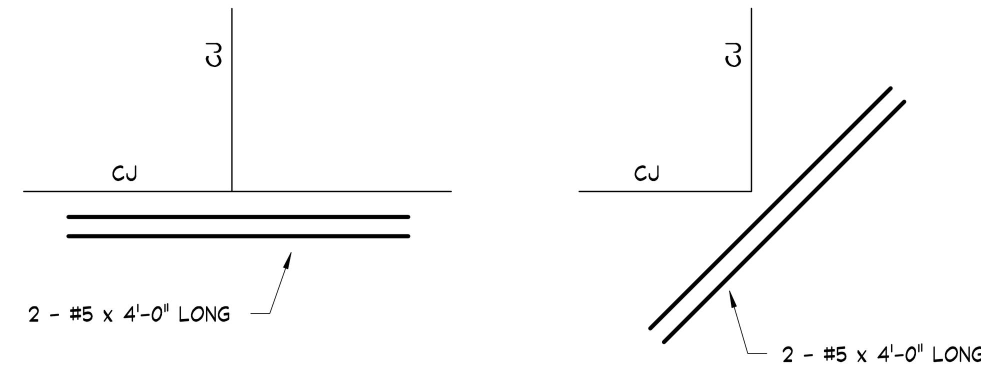
TYPICAL CONSTRUCTION JOINT DETAIL FOR 5" SLABS-ON-GRADE

(NO SCALE)
PLACE DOWELS PARALLEL TO SURFACE AND PERPENDICULAR TO EDGE OF SLAB.



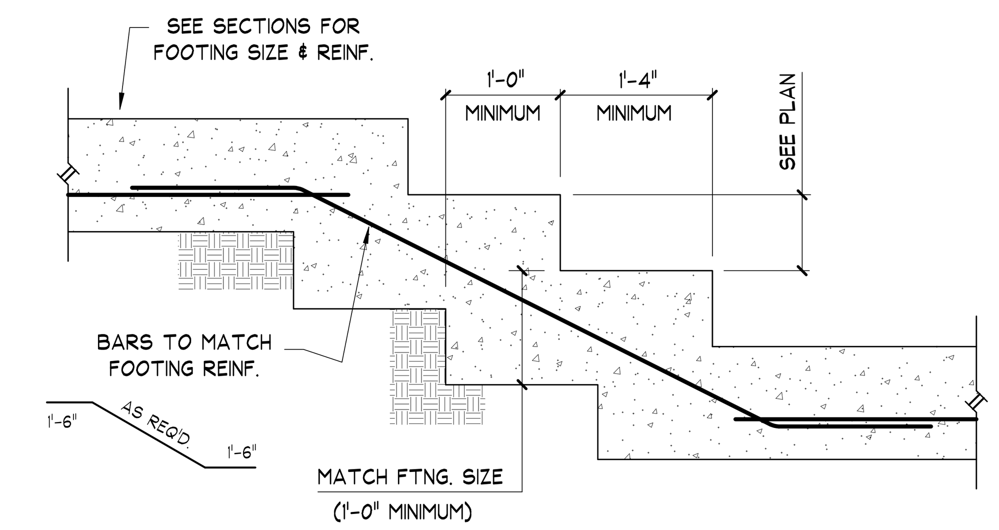
TYPICAL CONSTRUCTION JOINT DETAIL FOR 6" SLABS-ON-GRADE

(NO SCALE)
PLACE DOWELS PARALLEL TO SURFACE AND PERPENDICULAR TO EDGE OF SLAB.



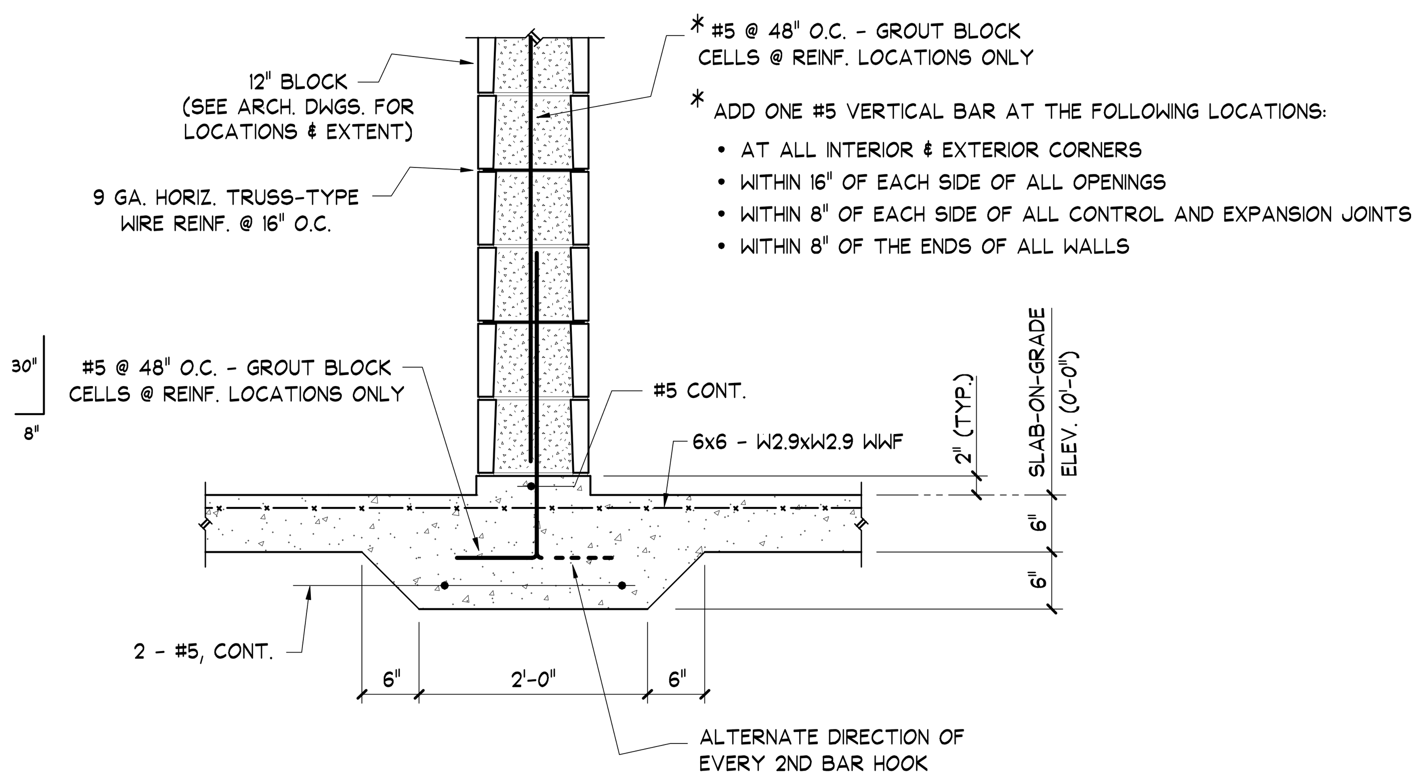
TYPICAL REINFORCEMENT FOR SLABS-ON-GRADE AT DISCONTINUOUS CONTROL JOINTS AND SLAB EDGES

NO SCALE



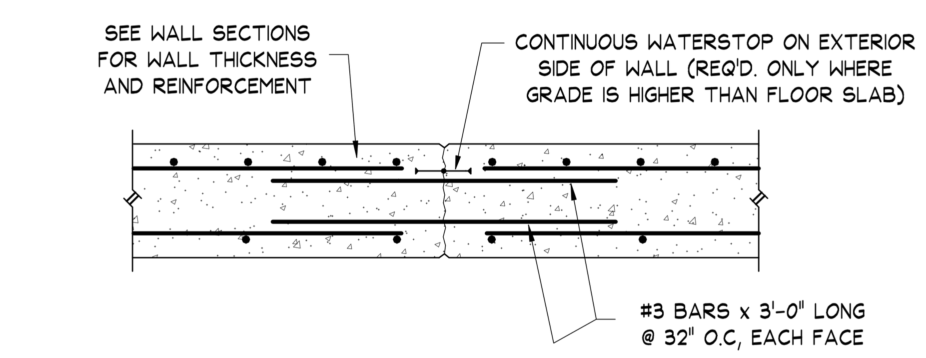
TYPICAL STEPPED FOOTING DETAIL

NO SCALE



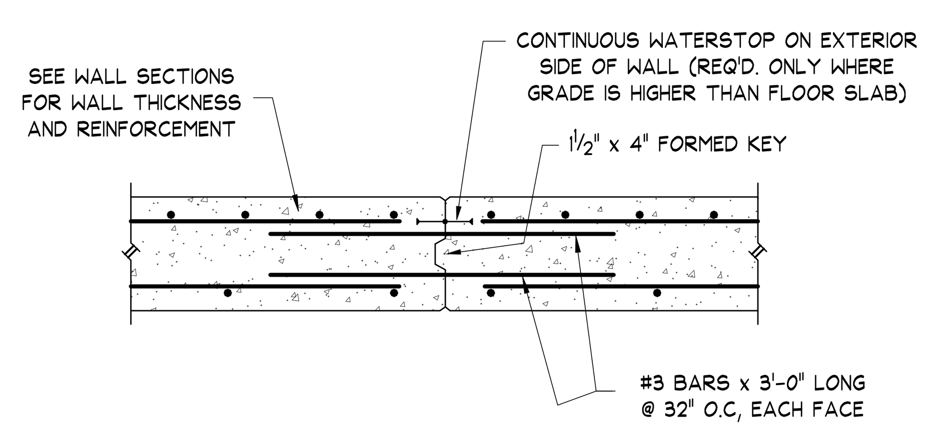
TYPICAL 12" WIDE INTERIOR CURB DETAIL

NO SCALE
SEE PLAN FOR LOCATIONS



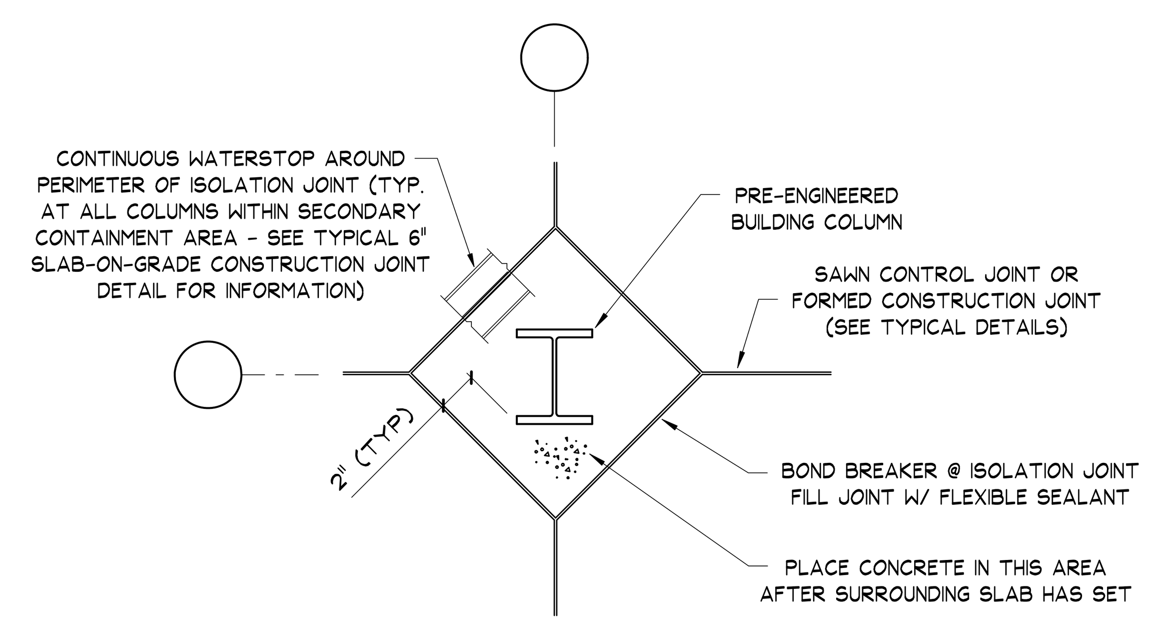
TYPICAL CONTROL JOINT DETAIL FOR CONCRETE WALLS

(SEE PLAN FOR SUGGESTED LOCATIONS)



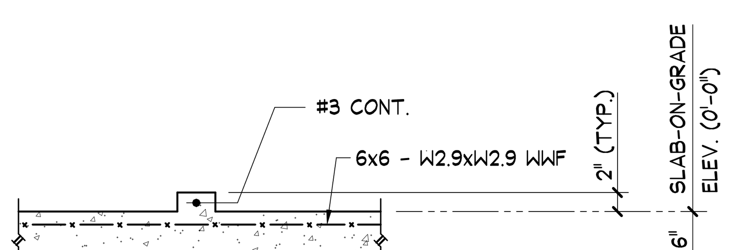
TYPICAL CONSTRUCTION JOINT DETAIL FOR CONCRETE WALLS

(TO BE USED IN PLACE OF CONTROL JOINT, AT CONTRACTOR'S OPTION)



TYPICAL INTERIOR COLUMN ISOLATION JOINT

NO SCALE



TYPICAL 4" WIDE INTERIOR CURB DETAIL

NO SCALE
SEE PLAN FOR LOCATIONS

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GREAT LAKES ENVIRONMENTAL & SAFETY CONSULTANTS, INC.
50 RIDGE ROAD
BUFFALO, NEW YORK 14218
716-827-0700

WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING RELOCATION PROJECT
CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

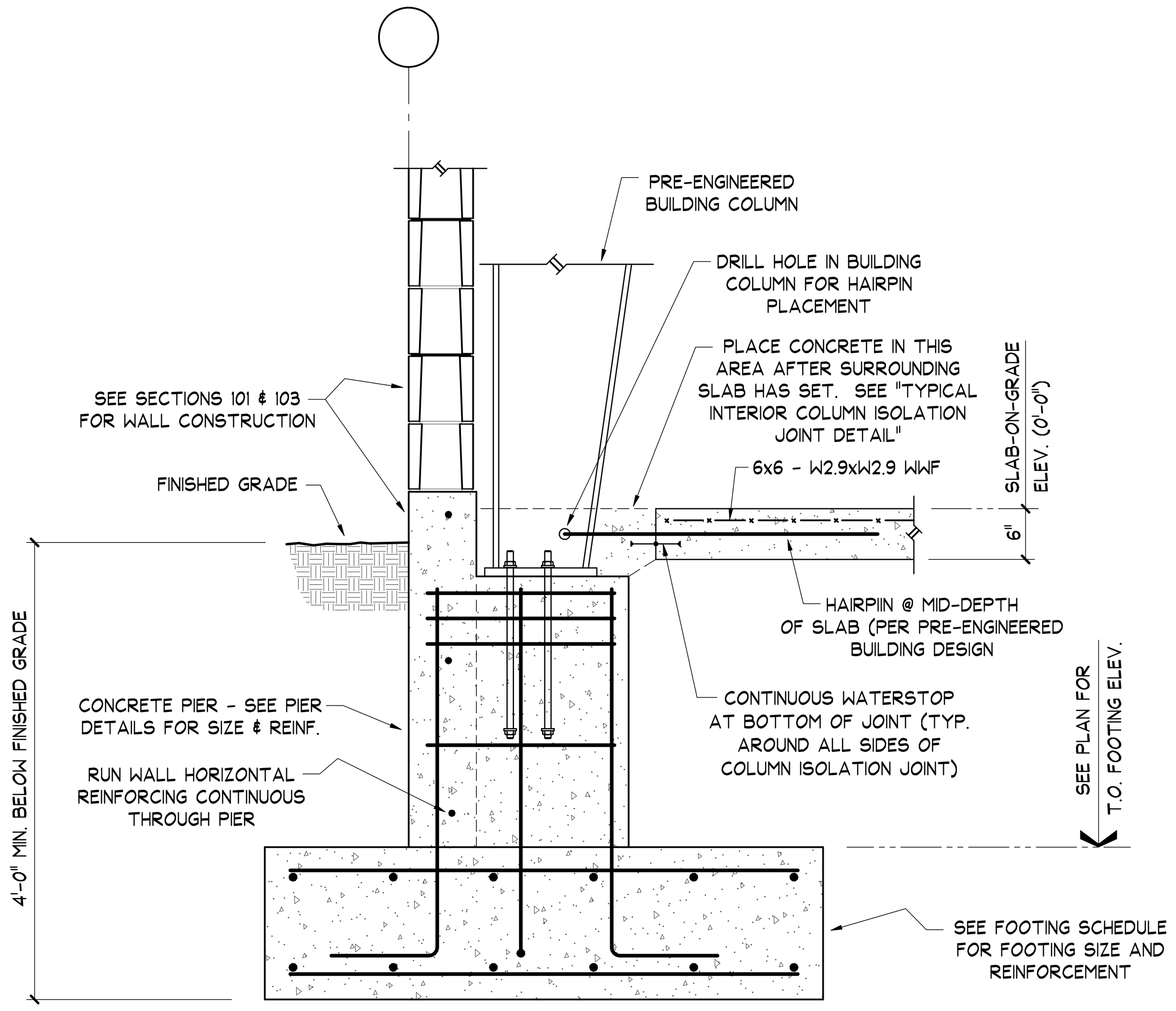
STATE OF NEW YORK · ALBERT G. LYONS, JR. · 074710 · LICENSED PROFESSIONAL ENGINEER

CHECKED | DATE
DESIGN ENGINEER
PROJECT ENGINEER
PROJECT MANAGER
APPROVED
APPROVED

FOUNDATION DETAILS

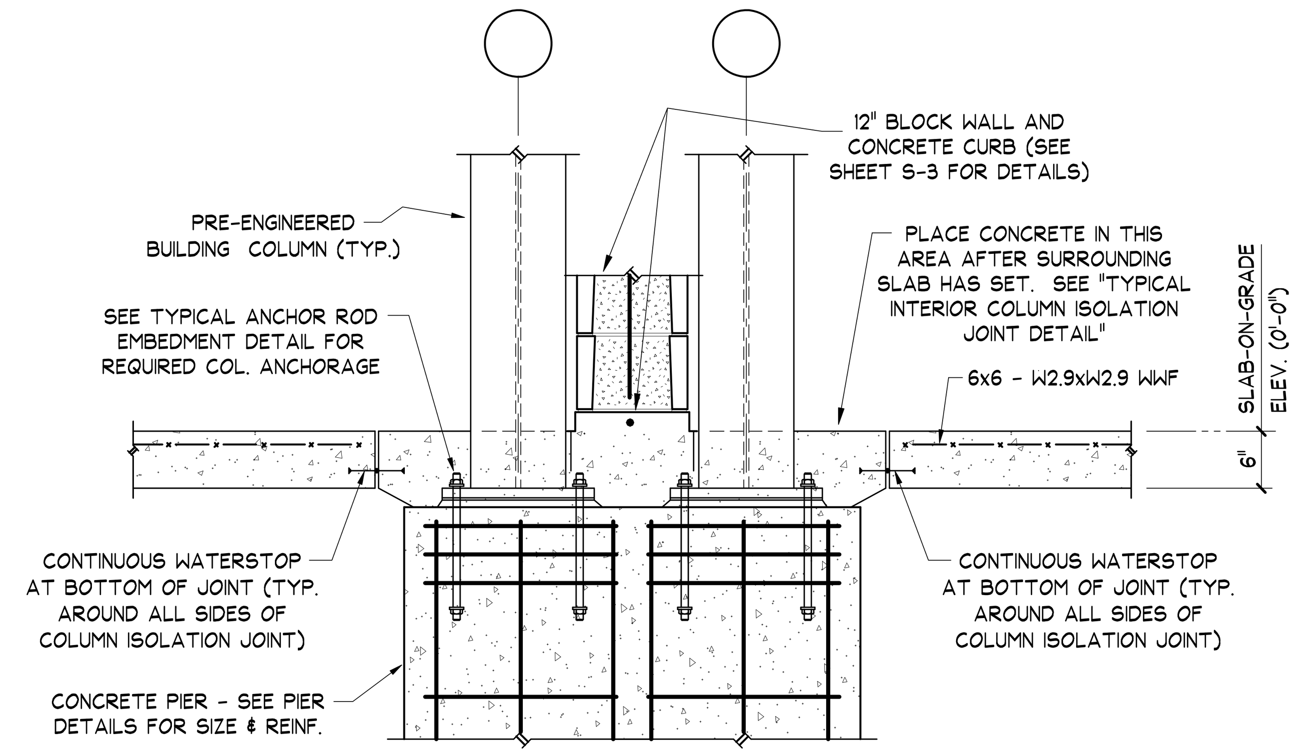
DRAWN: FMF | DATE: 8/13/13 | REVISION DATE:
SCALE: AS NOTED | JOB NO. | FILE NAME:

DRAWING NO. S-4
REV. NO.
SHEET 5 OF 6



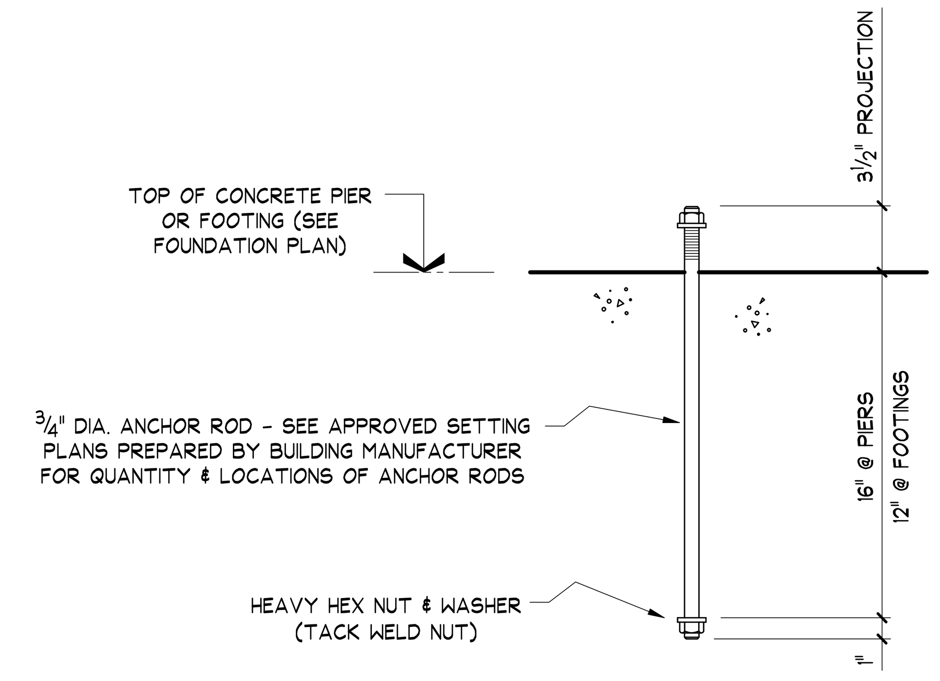
TYPICAL EXTERIOR COLUMN FOUNDATION DETAIL

3/4" = 1'-0"



TYPICAL INTERIOR COLUMN FOUNDATION AND CURB DETAIL

3/4" = 1'-0"



TYPICAL ANCHOR ROD EMBEDMENT DETAIL

NO SCALE

NOTE:

ALL ANCHOR BOLTS TO CONFORM TO ASTM F1554, GRADE 36.

NO.	DATE	APPR.	REVISION

GREAT LAKES ENVIRONMENTAL & SAFETY CONSULTANTS, INC.

50 RIDGE ROAD
BUFFALO, NEW YORK 14218
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WASTE MANAGEMENT

DRUM MANAGEMENT BUILDING RELOCATION PROJECT

CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
MODEL CITY, NEW YORK

STATE OF NEW YORK
ALBERT G. LYONS, JR.
074710
LICENSED PROFESSIONAL ENGINEER

CHECKED		DATE
DESIGN ENGINEER		
PROJECT ENGINEER		
PROJECT MANAGER		
APPROVED		
APPROVED		

FOUNDATION DETAILS

DRAWN FMF	DATE 8/13/13	REVISION DATE:	
SCALE AS NOTED	JOB NO.	FILE NAME:	

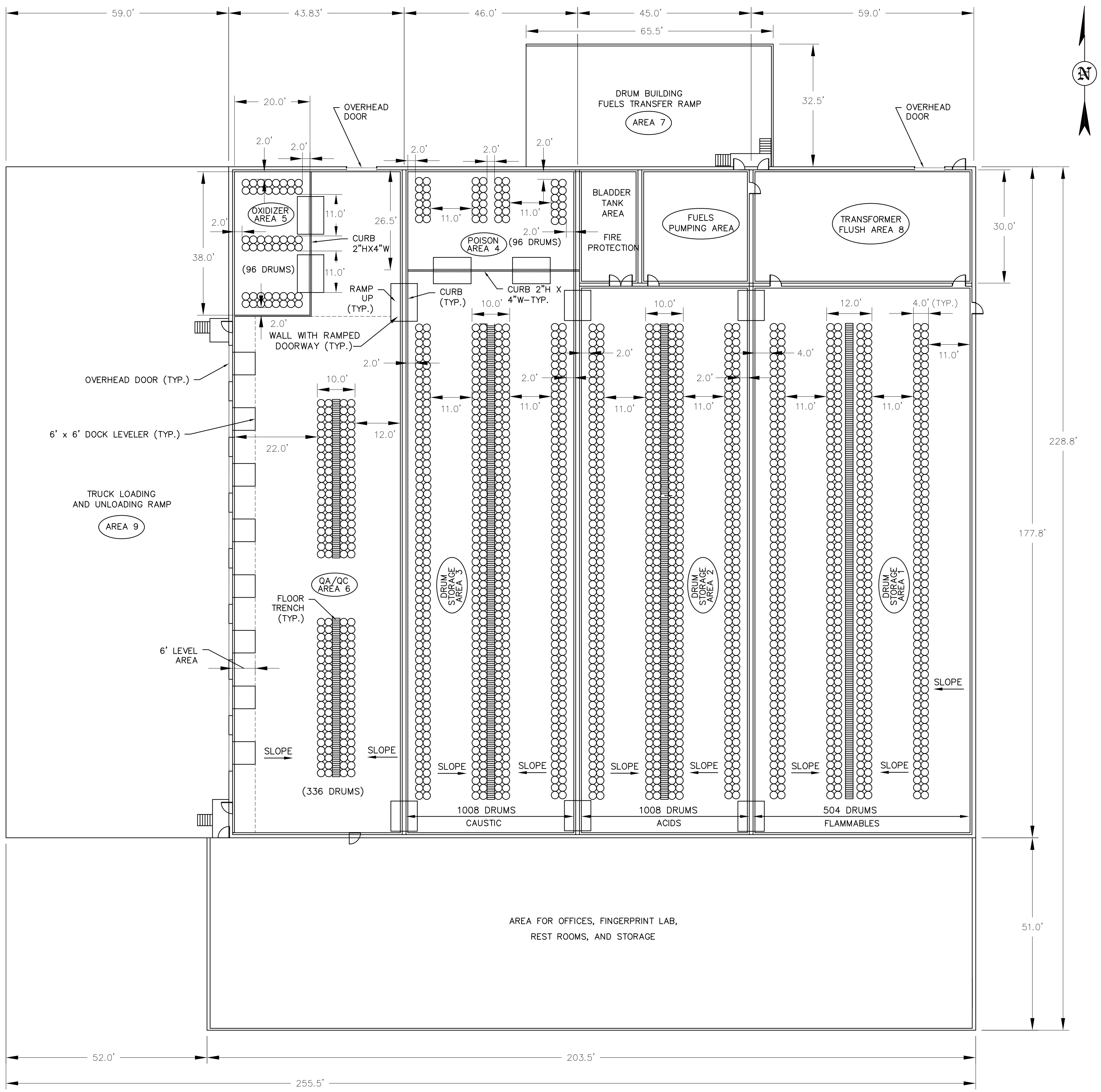
DRAWING NO. S-5

REV. NO.

SHEET 6 OF 6

FIGURE D-1B

NEW DRUM MANAGEMENT BUILDING LAYOUT



NOTES:

1. THE ARRANGEMENT SHOWN MAY BE MODIFIED TO SUIT THE NEEDS OF SPECIFIC STORAGE REQUIREMENTS.
2. A MINIMUM OF TWO FEET BETWEEN ROWS OF DRUM PAIRS (FOUR FEET FOR FLAMMABLES) WILL BE USED AS GUIDANCE FOR AISLE SPACING THROUGHOUT THE FACILITY.
3. DRUMS WILL BE STORED A MINIMUM OF TWO FEET FROM CURBING OR EDGE OF WALLS IF NO CURBING EXISTS (FOUR FEET FOR FLAMMABLES), AND MAY BE STACKED TWO HIGH (ONE HIGH FOR FLAMMABLES).
4. INCOMPATIBLES WILL NOT BE STORED WITHIN THE SAME STORAGE AREA.
5. MAXIMUM STORAGE CAPACITY: CALCULATED AS 55-GALLON DRUMS
   AREA 1: FLAMMABLES – 504 (LIQUID OR SOLID)
   AREA 2: ACIDS – 1008 (LIQUID OR SOLID)
   AREA 3: CAUSTIC – 1008 (LIQUID OR SOLID)
   AREA 4: POISONS – 96 (LIQUID OR SOLID)
   AREA 5: OXIDIZER – 96 (LIQUID OR SOLID)
   AREA 6: QA/QC – 336 (LIQUID OR SOLID)
6. MAXIMUM TOTAL BUILDING STORAGE (55-GALLON DRUMS) – 3,044

   AREAS MAY STORE LIQUIDS, SOLIDS, OR A COMBINATION OF LIQUID AND SOLID DRUMS. OTHER COMPATIBLE LIQUIDS AND SOLIDS MAY ALSO BE STORED IN THESE AREAS.
7. THE TRUCK LOADING/UNLOADING RAMP IS PERMITTED FOR SOLIDS OR LIQUIDS CONTAINER STORAGE EXCLUDING FLAMMABLES. MAXIMUM CAPACITY FOR UNLOADING/LOADING AREA IS 13 FLATBEDS OR 13 TRAILERS CONTAINING APPROXIMATELY 80 DRUMS EACH (i.e., 1040 DRUMS MAXIMUM).
8. MAXIMUM CAPACITY FOR FUELS TRANSFER RAMP IS TWO TANKERS CONTAINING UP TO 5,500 GALLONS EACH.
9. MAXIMUM CAPACITY FOR TRANSFORMER FLUSH AREA IS 2,065 GALLONS.
10. FLOOR PLAN SHOWS TYPICAL MAXIMUM LAYOUT USING 55-GALLON DRUMS. OTHER TYPES, SIZES, AND ARRANGEMENT OF CONTAINERS ARE POSSIBLE PROVIDED THE SECONDARY CONTAINMENT CAPACITY IS NOT EXCEEDED.
11. THE DRUM MANAGEMENT BUILDING CONTAINMENT STORAGE AREA LAYOUT CONFORMS TO ALL APPLICABLE PROVISIONS IN THE NFPA CODES.
12. CORROSIVES IN AREAS 2 AND 3 MAY BE EITHER ACIDS OR CAUSTICS, BUT NOT BOTH IN THE SAME AREA AT ANY TIME.

REVISION	BY	DATE
CHANGED SHEET NO. TO FIGURE D-1B	TAS	1/21/13
REVISED NOTE 7 TO EXCLUDE FLAMMABLES. ADDED AREA 9.	JCD	5/10/12
REVISED PER GLE FOUNDATION PLAN S-1 DATED 1/19/12	JCD	2/6/12

IT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW, ARTICLE 145 SECTION 7209, FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY.

STATE OF NEW YORK — BRIAN DOUGLAS SHIAH — No. 079072 — LICENSED PROFESSIONAL ENGINEER

BRIAN D. SHIAH, P.E.
NYSPE LICENCE NO. 079072

EnSol, Inc.
Environmental Solutions
661 MAIN STREET
NIAGARA FALLS, NY 14301
PHONE (716) 285-3920 FAX (716) 285-3928

PROJECT NO: 09-7011
SCALE: 20' 0' 20' 40'
DWG: 09-7011-D01-Drum Bldg Design Rev 3.dwg
DES. BY: MJM | DRW. BY: AMW | CHK. BY: BDS
DATE: SEPTEMBER 2009

TITLE: PROPOSED DRUM MANAGEMENT BUILDING LAYOUT
PROJECT: DRUM MANAGEMENT BUILDING RELOCATION
PREPARED FOR: CWM CHEMICAL SERVICES, LLC.
TOWN OF LEWISTON | COUNTY OF NIAGARA | STATE OF NEW YORK

FIGURE D-1B

X:\AAApj\CWM\09-2009 Projects\09-7011 Drum Mgnt. Bldg Relocation Dwgs. & Design (Task 4 & 5)\ACAD\09-7011-D01-Drum Bldg Design Rev 3.dwg, 1/21/2013 1:05:17 PM

EnSol, Inc.
Environmental Solutions

PROJECT NO.: 09-7011

CLIENT: CWM Chem. Svcs. PROJECT: New Drum Building Warehouse Prepared By: JCD Date: 6/22/2012
SUBJECT: Secondary Containment Calculations Reviewed By: BDS Date: 6/22/2012

NEW DRUM BUILDING WAREHOUSE

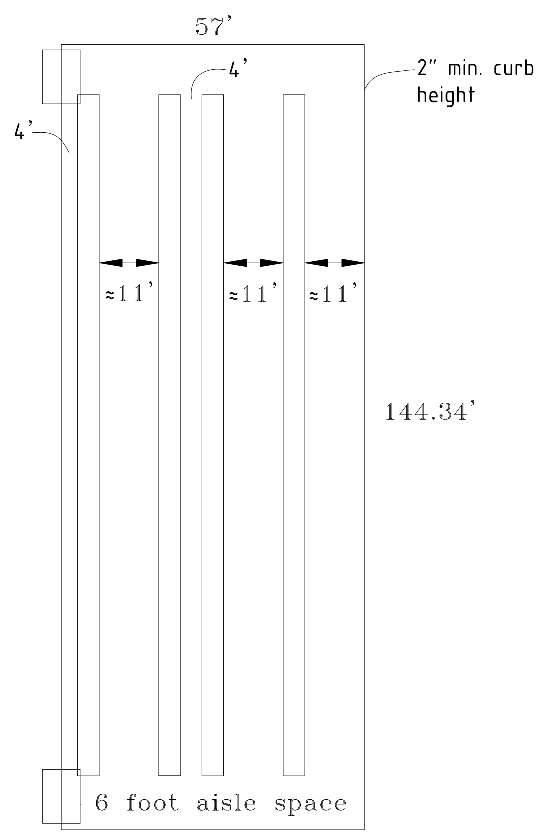
TASK:

Calculate the total available and required volumes within the secondary containment areas. All dimensions are interior.

CALCULATIONS:

AREA 1 – FLAMMABLE LIQUID STORAGE AREA:

Dimensions:



There are 4 *sections in Area 1*.
A *section* is defined as 2 *drums* side by side (4.0 feet total) with approximately 11-foot aisle space, and minimum 4-foot from wall; 63 *drums* each row x 2 rows of *drums* (126 *drums total,* Single-Stacked).

4 *sections* x 126 *drums/section* = 504 *drums*

Required Secondary Containment per *Area 1*:

504 *drums* x 55 *gallons/drum* = 27,720 *gallons* x 10% = 2,772 *gallons*

Available Secondary Containment per *Area 1*:

Gross Dimensions and Volume (less floor trench volume):

57' x 144.34' x 0.167' (2-inches curb height)

57' x 144.34' x 0.167' = 1374 ft^3

7.48 $gallons / ft^3$

7.48 $gallons/ft^3$ x 1374 ft^3 $\cong$ 10,277.5 $gallons$

Floor Trench System Volume:

126'L x 1.0'W x 0.75'D = 94.5 ft^3

7.48 $gallons/ft^3$ x 94.5 ft^3 $\cong$ 706.9 $gallons$

Total Secondary Containment Volume:

10,277.5 $gallons$ + 706.9 $gallons$ = 10,984.4 $gallons$

Reduction in Gross Available Volume Due to Presence of Drums (assume 1 drum leaks):

503 $drums$ x [3.14 x (2')^2/4 x 0.167'] = 263.8 ft^3

7.48 $gallons / ft^3$

7.48 $gallons/ft^3$ x 263.8 ft^3 $\cong$ 1973.2 $gallons$

Net Available Secondary Containment Volume:

10,984.4 $gallons$ – 1973.2 $gallons$ = 9,011.2 $gallons$

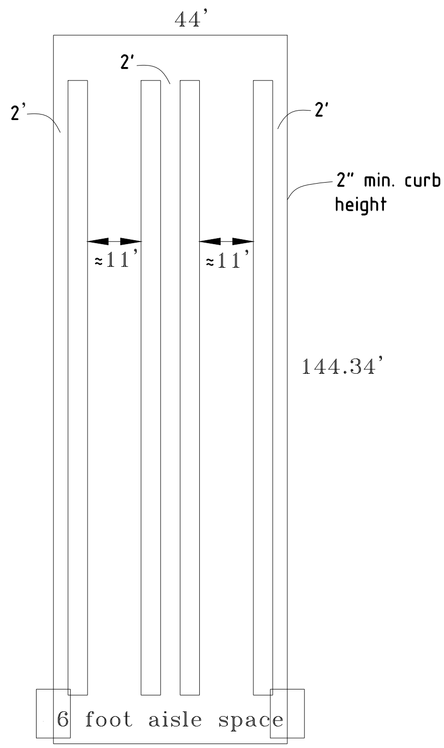
CONCLUSIONS:

Area 1 has sufficient secondary containment for the flammable liquid storage capacity of 504 55-gallon drums.

NEW DRUM BUILDING WAREHOUSE (continued)

AREA 2 – ACIDS LIQUID STORAGE AREA:

Dimensions:



There are 4 *sections in Area 2*.
A *section* is defined as 2 *drums* side by side (4.0 feet total) with approximately 11-foot aisle space and 2-foot minimum from wall; 63 *drums* each row x 2 rows of *drums* (126 *drums total,* Single-Stacked; 252 *drums total*, Double-Stacked).

4 *sections* x 126 *drums/section* x 2 *drums/stack* = 1,008 *drums*

Required Secondary Containment per *Area 2*:

1,008 *drums* x 55 *gallons/drum* = 55,440 *gallons* x 10% = 5,544 *gallons*

Available Secondary Containment per *Area 2* :

Gross Dimensions and Volume (less floor trench volume):

44' x 144.34' x 0.167' (2-inches curb height)

44' x 144.34' x 0.167' = 1,060.6 *ft*³

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 1,060.6 ft^3 ≅ 7,933.3 *gallons*

Floor Trench System Volume:

126'L x 1.0'W x 0.75'D = 94.5 ft^3

7.48 *gallons*/ft^3 x 94.5 ft^3 ≅ 706.9 *gallons*

Total Secondary Containment Volume:

7,933.3 *gallons* + 706.9 *gallons* = <u>8,640.2 *gallons*</u>

<u>Reduction in Gross Available Volume Due to Presence of Drums (assume 1 drum leaks):</u>

503 *drums* x [3.14 x (2')^2/4 x 0.167'] = 263.8 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 263.8 ft^3 ≅ <u>1973.2 *gallons*</u>

<u>Net Available Secondary Containment Volume:</u>

8,640.2 *gallons* – 1973.2 *gallons* = <u>6,667 *gallons*</u>

<u>CONCLUSIONS:</u>

<u>Area 2 has sufficient secondary containment for the acids liquid storage capacity of 1,008 55-gallon drums.</u>

EnSol, Inc.
Environmental Solutions

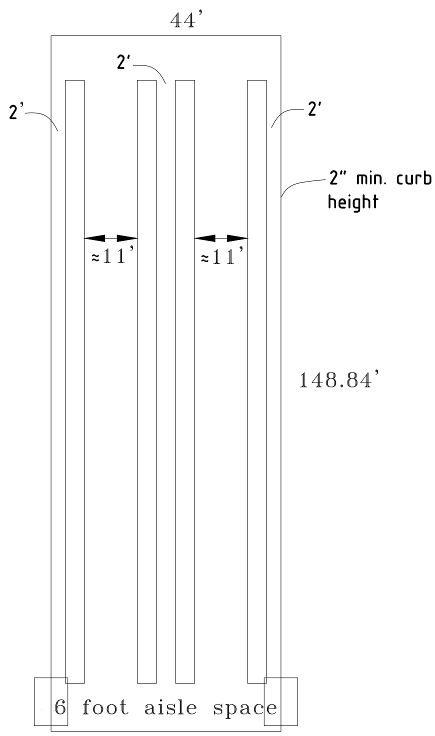
PROJECT NO.: 09-7011

CLIENT: CWM Chem. Svcs. PROJECT: New Drum Building Warehouse Prepared By: JCD Date: 6/22/2012
SUBJECT: Secondary Containment Calculations Reviewed By: BDS Date: 6/22/2012

NEW DRUM BUILDING WAREHOUSE (continued)

AREA 3 – CAUSTICS STORAGE AREA:

Dimensions:



There are 4 *sections in Area 3*.
A *section* is defined as 2 *drums* side by side (4.0 feet total) with approximately 11-foot aisle space and 2-foot minimum from wall; 63 *drums* each row x 2 rows of *drums* (126 *drums total,* Single-Stacked; 252 *drums total*, Double-Stacked).

4 *sections* x 126 *drums/section* x 2 *drums/stack* = 1,008 *drums*

Required Secondary Containment per *Area 3*:

1,008 *drums* x 55 *gallons/drum* = 55,440 *gallons* x 10% = 5,544 *gallons*

Available Secondary Containment per *Area 3*:

Gross Dimensions and Volume (less floor trench volume):

44' x 148.84' x 0.167' (2-inches curb height)

44' x 148.84' x 0.167' = 1,093.7 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 1,093.7 ft^3 $\cong$ 8,180.9 *gallons*

Floor Trench System Volume:

126'L x 1.0'W x 0.75'D = 94.5 ft^3

7.48 *gallons*/ft^3 x 94.5 ft^3 $\cong$ 706.9 *gallons*

Total Secondary Containment Volume:

8,180.9 *gallons* + 706.9 *gallons* = <u>8,887.8 *gallons*</u>

<u>Reduction in Gross Available Volume Due to Presence of Drums (assume 1 drum leaks):</u>

503 *drums* x [3.14 x $(2')^2/4$ x 0.167'] = 263.8 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 263.8 ft^3 $\cong$ <u>1973.2 *gallons*</u>

<u>Net Available Secondary Containment Volume:</u>

8,887.8 *gallons* – 1973.2 *gallons* = <u>6,914.6 *gallons*</u>

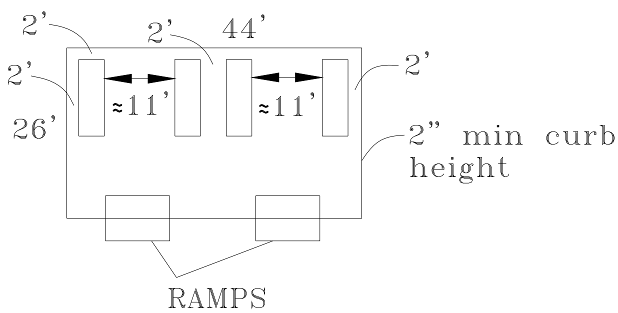
CONCLUSIONS:

<u>Area 3 has sufficient secondary containment for the caustics storage capacity of 1,008 55-gallon drums.</u>

NEW DRUM BUILDING WAREHOUSE (continued)

AREA 4 – POISONS STORAGE AREA:

Dimensions:



There are 4 *sections in Area 4*.
A *section* is defined as 2 *drums* side by side (4.0 feet total) with approximately 11-foot aisle space and 2-foot minimum from wall or curb; 6 *drums* each row x 2 rows of *drums* (12 *drums total,* Single-Stacked, 24 *drums total* Double Stacked).

4 *sections* x 12 *drums/section* x 2 *drums/stack* = 96 *drums*

Required Secondary Containment per *Area 4*:

96 *Drums* x 55 *gallons/Drum* = 5,280 *gallons* x 10% = 528 *gallons*

Available Secondary Containment per *Area 4*:

Gross Dimensions and Volume:

44' x 26' x 0.167' (2-inches curb height)

44' x 26' x 0.167' = 191 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 191 ft^3 ≅ 1,428.7 *gallons*

Reduction in Gross Available Volume Due to Presence of Drums (assume 1 drum leaks):

47 drums x [3.14 x $(2')^2$/4 x 0.167'] = 24.6 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 24.6 ft^3 ≅ 184 *gallons*

EnSol, Inc.
Environmental Solutions

PROJECT NO.: 09-7011

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SUBJECT: Secondary Containment Calculations Reviewed By: BDS Date: 6/22/2012

Net Available Secondary Containment Volume:

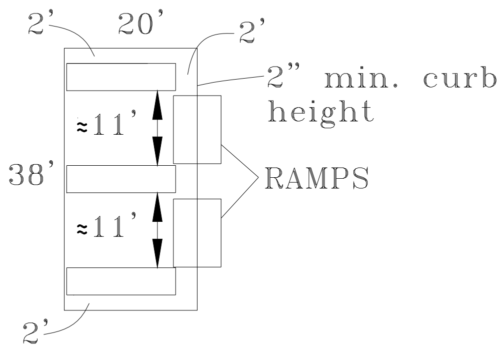
1,428.7 *gallons* – 184 *gallons* = 1,244.7 *gallons*

CONCLUSIONS:

Area 4 has sufficient secondary containment for the poisons storage capacity of 96 55-gallon drums.

AREA 5 - OXIDIZER STORAGE AREA:

Dimensions:



There are 3 *sections in Area 5*.
A *section* is defined as 2 *drums* side by side (4.0 feet total) with approximately 11-foot aisle space and 2-foot minimum from wall or curb; 8 *drums* each row x 2 rows of *drums* (16 *drums total,* Single-Stacked, 32 *drums total* Double Stacked).

3 *sections* x 16 *drums/section* x 2 *drums/stack* = 96 *drums*

Required Secondary Containment per *Area 5*:

96 *Drums* x 55 *gallons/Drum* = 5,280 *gallons* x 10% = 528 *gallons*

Available Secondary Containment per *Area 5*:

Gross Dimensions and Volume:

20' x 38' x 0.167' (2-inches curb height)

20' x 38' x 0.167' = 126.9 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 126.9 ft^3 ≅ 949.2 *gallons*

Reduction in Gross Available Volume Due to Presence of Drums (assume 1 drum leaks):

47 drums x [3.14 x $(2')^2/4$ x 0.167'] = 24.6 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 24.6 ft^3 ≅ 184 *gallons*

Net Available Secondary Containment Volume:

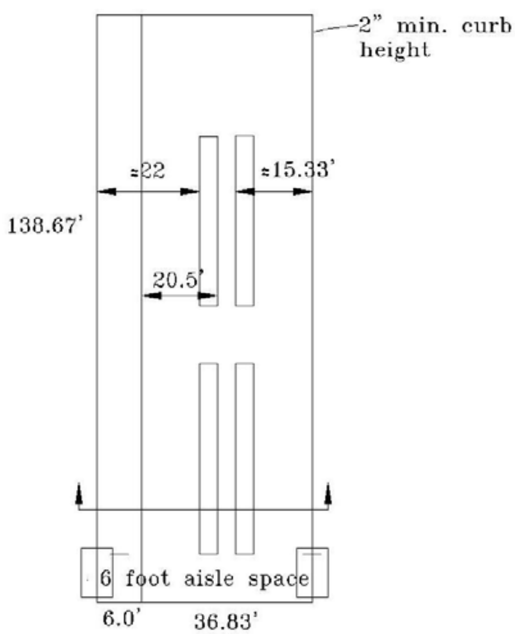
949.2 *gallons* – 184 *gallons* = 765.2 *gallons*

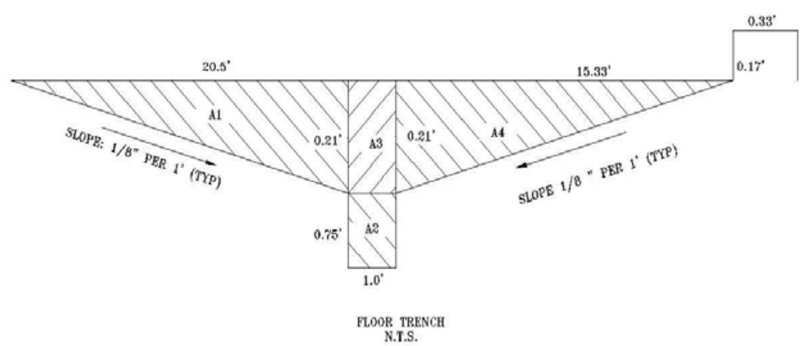
CONCLUSIONS:

Area 5 has sufficient secondary containment for the oxidizer storage capacity of 96 55-gallon drums.

AREA 6 – QA/QC STORAGE AREA:

Dimensions:





There are 4 *sections in Area 6*.
A *section* is defined as 2 *drums* side by side (4.0 feet total) with a minimum of 11-foot aisle space and 12-foot from closest wall; 21 *drums* each row x 2 rows of *drums* (42 *drums total*, Single-Stacked, 84 *drums total*, Double Stacked).

4 *sections* x 42 *drums/section* x 2 *drums/stack* = 336 *drums*

Required Secondary Containment per *Area 6*:

336 *drums* x 55 *gallons/drum* = 18,480 *gallons* x 10% = 1,848 *gallons*

Available Secondary Containment per *Area 6*:

Gross Dimensions and Volume (less floor trench volumes):

A1 + A4 + A3:

(0.5 x 20.5' x 138.67' x 0.21') + (0.5 x 15.33' x 138.67' x 0.21') + (0.21' x 1' x 138.67')

(298.49 ft^3) + (223.21 ft^3) + (29.12 ft^3)= 550.82 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 550.86 ft^3 ≅ 4,120.1 *gallons*

Floor Trench System Volume:

A2: 2 x 42'*L* x 1.0'*W* x 0.75'*D* = 63 ft^3

7.48 *gallons*/ft^3 x 63 ft^3 ≅ 471.2 *gallons*

Total Secondary Containment Volume:

4120.1 *gallons* + 471.2 *gallons* =4,591.3 *gallons*

Reduction in Gross Available Volume Due to Presence of Drums (assume 1 drum leaks):

167 drums x [3.14 x $(2')^2$/4 x 0.21'] = 110.1 ft^3

7.48 *gallons* / ft^3

7.48 *gallons*/ft^3 x 110.1 ft^3 ≅ 823.7 *gallons*

Net Available Secondary Containment Volume:

4591.3 *gallons* – 823.7 *gallons* = 3,768 *gallons*

CONCLUSIONS:

Area 6 has sufficient secondary containment for the QA/QC storage capacity of 336 55-gallon drums.

EnSol, Inc.
Environmental Solutions

PROJECT NO.: 09-7011

CLIENT: CWM Chem. Svcs. **PROJECT:** New Drum Building Warehouse **Prepared By:** JCD **Date:** 6/22/2012
SUBJECT: Secondary Containment Calculations **Reviewed By:** BDS **Date:** 6/22/2012

AREA 7 - DRUM BUILDING FUELS TRANSFER RAMP:

Dimensions:

32' x 65' x 2'-9"' (*Deep End*)

Available Secondary Containment:

0.50 x (32' x 65' x 2.75') = 2,860ft^3 ≅ 21,392 *gallons*

Required Secondary Containment:

2 tankers; 5,500 gallons each:
Largest single container equals 5,500 gallons.

25 Year, 24 Hour Precipitation Event:

32' x 65' x 0.333' = 692.6 ft^3 ≅ 5,181 *gallons*
0.333 feet is equivalent to 4.0 inches of precipitation (i.e., rain).

Required Secondary Containment Including Precipitation Event:

5,500 *gallons* + 5,181 *gallons* = 10,681 *gallons*

CONCLUSIONS:

Area 7, the Fuels Transfer Ramp/Drum Building North Ramp, has sufficient secondary containment capacity for (2) 5,500-gallon tankers.

EnSol, Inc.
Environmental Solutions

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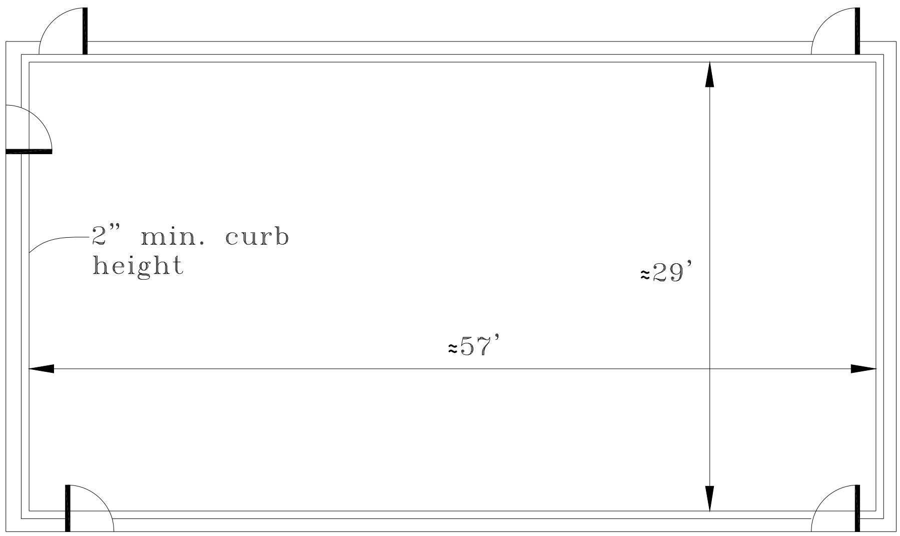
SUBJECT: Secondary Containment Calculations Reviewed By: BDS Date: 6/22/2012

NEW DRUM BUILDING WAREHOUSE (continued)

AREA 8 – TRANSFORMER FLUSH AREA:

Dimensions:



29'*W* x 57'*L* x 0.167'*D*

Available Secondary Containment:

(29' x 57' x 0.167') = 276.1 *ft³* ≅ 2,065.2 *gallons*

CONCLUSIONS:

The Transformer Flush Area has secondary containment capacity of 2,065.2 *gallons*.

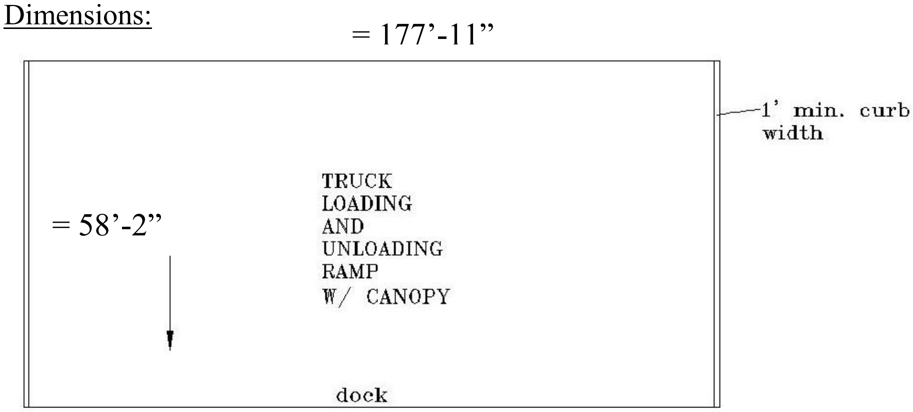
EnSol, Inc.
Environmental Solutions

PROJECT NO.: 09-7011

CLIENT: CWM Chem. Svcs. PROJECT: New Drum Building Warehouse Prepared By: JCD Date: 6/22/2012
SUBJECT: Secondary Containment Calculations Reviewed By: BDS Date: 6/22/2012

AREA 9 – TRUCK LOADING AND UNLOADING RAMP:

Dimensions:



58'-2" x 175'-11" x 2'-6" (*Deep End*)

Available Secondary Containment:

0.50 x (58.17' x 175.92' x 2.5') = 12,792 $ft^3 \cong$ 95,681 *gallons*

Required Secondary Containment:

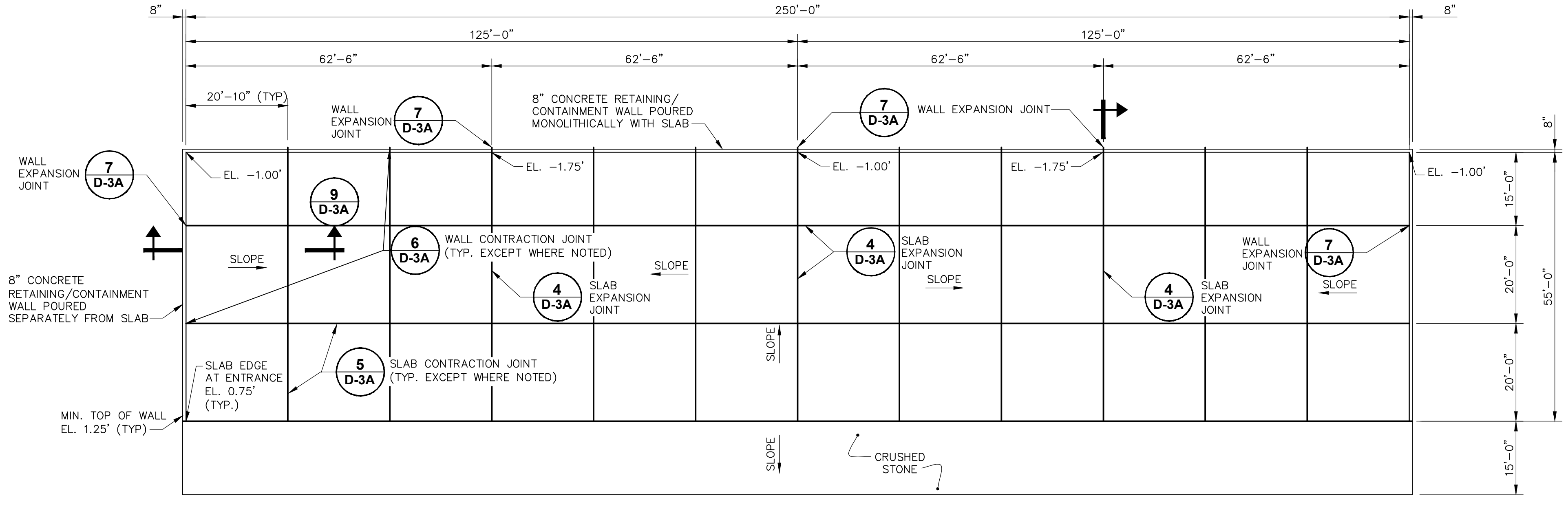
13 flatbeds or trailers x 80 drums per trailer = 1,040 drums
1,040 drums x 55 gallons = 57,200 gallons x 10% = 5,720 *gallons*

CONCLUSIONS:

The Truck Loading and Unloading Ramp, has sufficient secondary containment capacity of a minimum of 10% of the total volume of all containers.

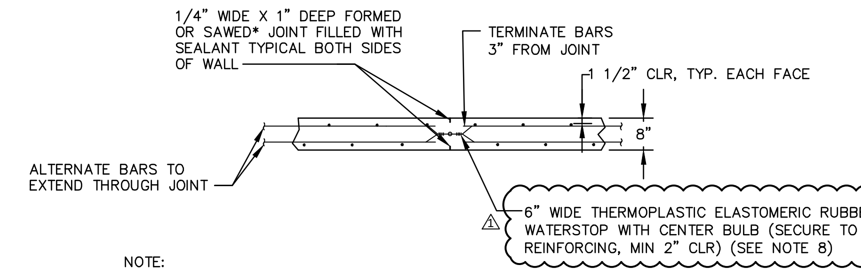
FIGURE D-3A

NEW FULL TRAILER PARKING AREA



FULL TRAILER PARKING AREA 1

SCALE: 1/16"=1'-0"

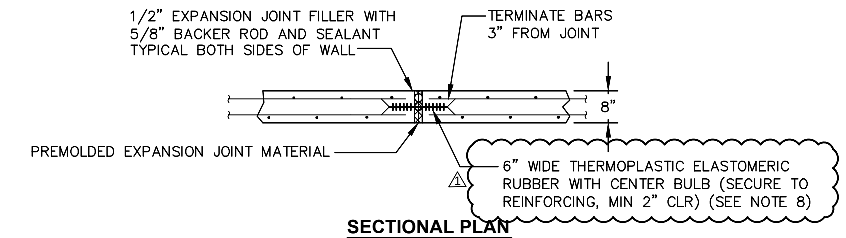


NOTE:
* SAWED JOINTS SHALL BE MADE NO LATER THAN 18 HOURS AFTER CONCRETE IS PLACED.

SECTION PLAN

WALL CONTRACTION JOINT DETAIL 6

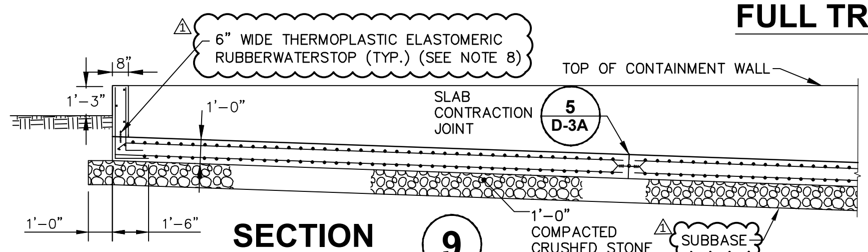
SCALE: 1/2"=1'-0"



SECTIONAL PLAN

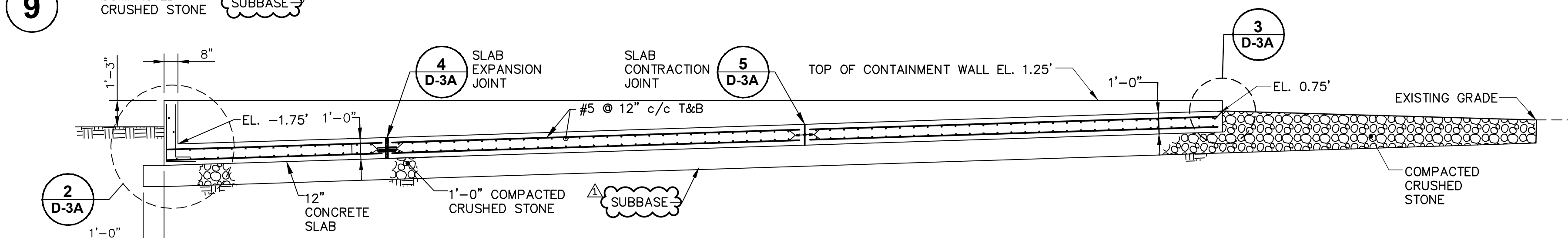
WALL EXPANSION JOINT 7

SCALE: 1/2"=1'-0"



SECTION 9

SCALE: 1/4"=1'-0"

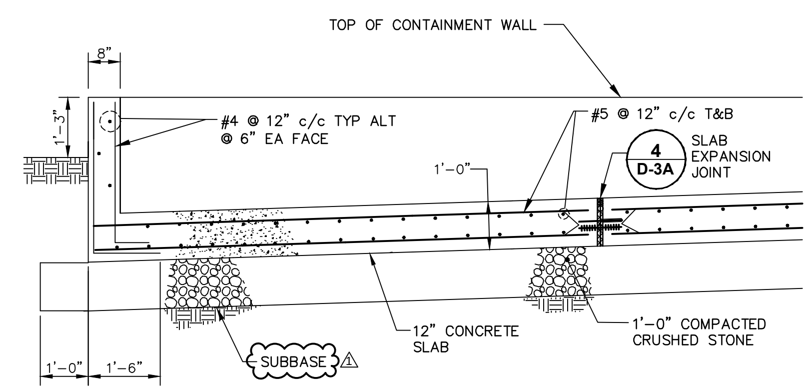


SECTION 8

SCALE: 1/4"=1'-0"

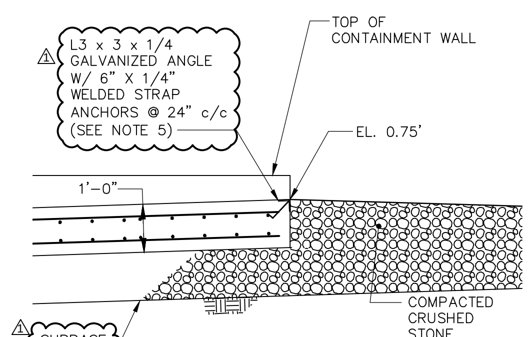
NOTES:

1. CONCRETE MIX SHALL BE 4000 PSI AT 28 DAYS WITH AIR ENTRAINING ADMIXTURE 6±1%. STEEL FIBER REINFORCEMENT SHALL BE ADDED TO MIX AS MANUFACTURED BY MITCHELL FIBERCON, INC.,MEETING ASTM A820 TYPE II SPECIFICATIONS.
2. ALL EXPOSED CONCRETE SURFACES TO RECEIVE CHEMTEC ONE CONCRETE PROTECTION SEALANT, OR APPROVED EQUAL.
3. REINFORCED CONCRETE BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. LAP REINFORCING BARS MINIMUM 36 BAR DIAMETERS.
4. DESIGN ELEVATIONS ARE RELATIVE. EXISTING GROUND SURFACE IS ASSUMED TO BE ELEVATION 0.0 FOR REFERENCE PURPOSES.
5. STEEL ANGLE SHALL BE FABRICATED IN LENGTHS CORRESPONDING TO JOINT LOCATIONS. STEEL ANGLE SHALL NOT SPAN ANY SLAB JOINT. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM AI23. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1.
6. SUBBASE SHALL BE PROOF-ROLLED AND INSPECTED BY ENGINEER PRIOR TO PLACING CRUSHED STONE. IF SOFT SOILS OR AREAS OF PUMPING ARE OBSERVED, SOILS WITHIN THESE AREAS SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE OR STRUCTURAL FILL AND PROOF ROLLED.
7. CRUSHED STONE SHALL BE COMPACTED TO A MINIMUM 95% OF MAXIMUM DRY DENSITY BASED ON MODIFIED PROCTOR.
8. WATERSTOP SHALL BE WESTEC'S ENVIROSTOP™ TPE-R (THERMOPLASTIC ELASTOMERIC RUBBER) 600 SERIES OR APPROVED EQUAL.



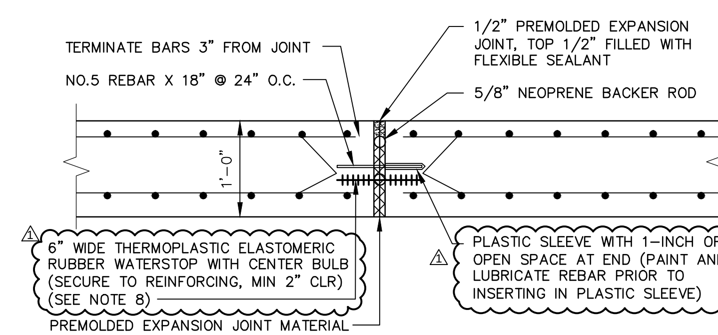
SECTION 2

SCALE: 1/2"=1'-0"



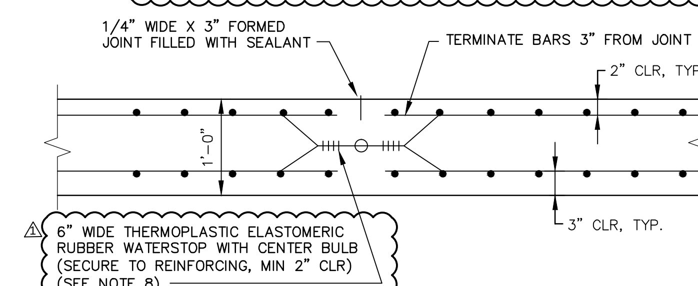
SECTION 3

SCALE: 1/2"=1'-0"



SLAB EXPANSION JOINT 4

SCALE: 1"=1'-0"



SLAB CONTRACTION JOINT 5

SCALE: 1"=1'-0"

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\FULL_TRAILER_PARKING\23725D03A.dwg LAYOUT: D-3A SAVED: 7/8/2013 12:40 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 7/8/2013 12:40 PM BY: SARTORI, KATHERINE

XREFS: 23725X00 IMAGES: PROJECTNAME: ----

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	7/2013	GENERAL REVISIONS	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: | Project Mgr.: WAR
Designed by: LAB | Drawn by: LAF | Checked by: BMS

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CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
FULL TRAILER PARKING AREA AND LEACHATE TRANSFER RAMP PERMIT DRAWINGS

FULL TRAILER PARKING AREA

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date FEBRUARY 2013
ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

D-3A

ARCADIS
Infrastructure, environment, buildings

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Calculation Sheet

Client: CWM Chemical Services, LLC

Project Location: Model City, New York

Project: RMU-2 Design Calculations **Project No.: B0023725.2011**

Subject: New Full Trailer Parking Area – Secondary Containment Calculations

Prepared By: GNG **Date: August 2013**

Reviewed By: BMS **Date: August 2013**

Checked By: BMS **Date: August 2013**

OBJECTIVE:

Determine the capacity of the new Full Trailer Parking Area (new Parking Area) for solids and liquid storage containers. Demonstrate that adequate secondary containment volume exists for management of free liquids anticipated within the new Parking Area including precipitation.

REFERENCES:

1. Permit Drawing No. D-3A entitled "Full Trailer Parking Area," contained in Attachment D-1 of the Overall Site/RMU-1 Part 373 Permit, ARCADIS, August 2013.

2. New York State Department of Environmental Conservation Regulations, Subpart 373.2.9 (f).

ASSUMPTIONS:

1. The new Parking Area is wide enough (55 ft from the entrance to the back wall) to contain roll-offs (for solids), semi tanker trailers (for liquids), or some combination of these containers. Because roll-offs sit much closer to the pavement, they consume secondary containment volume, whereas semi tanker trailers consume only negligible volume. Thus, when calculating the available secondary containment volume, this analysis assumes that the new Parking Area is filled to capacity with roll-offs. When calculating the required secondary containment volume, this analysis assumes that the new Parking Area is filled to capacity with semi tanker trailers. Although this combination cannot physically occur, it provides the most extreme case in terms of assessing secondary containment volume. Any physically possible combination of roll-offs and semi tanker trailers can therefore be accommodated with adequate secondary containment volume.

2. The secondary containment system must have sufficient capacity to contain 10 percent of the total volume of liquid storage containers or the volume of the largest liquid container, whichever is greater.

3. The precipitation volume considered in this calculation is based on the 25-year, 24-hour storm event which contributes 4-inches or 0.333 feet of runoff.

4. The liquid storage container volume is 5,500 gallons (gal) per container.

5. Roll-offs are assumed to rest on approximately 6-inch-diameter rollers and thus sit 6 inches off the pavement.

Calculation Sheet

CALLCULATIONS:

1. Capacity for Solids and Liquid Storage Containers

The capacity of the new Parking Area for solids and liquid storage containers is based on the geometry of the parking area and the typical size of individual storage containers and is calculated as follows:

Solids Storage Container Dimensions

- Width of a typical container = 8 ft
- Aisle space requirement between containers = 2 ft
- Adjusted width of a typical container = 10 ft (8 ft + 2 ft)
- Length of a typical solids container = 22 ft

Maximum Number of Solids Storage Containers

- Adjusted row length taking into account a required 2 ft distance between the last container in the end row to the edge of the containment area = 250 ft – 2 ft = 248 ft
- Maximum number of rows = 248 ft ÷ 10 ft = 24.8 ≈ 24 rows
- Maximum number of solids storage containers end-to-end in each row = 50 ft ÷ 22 ft (solids storage container length) = 2.3 ≈ 2 containers
- Maximum number of solids storage containers = 24 rows x 2 containers per row = 48 containers

Liquid Storage Container Dimensions

- Width of a typical container = 8 ft
- Aisle space requirement between containers = 2 ft
- Adjusted width of a typical container = 10 ft (8 ft + 2 ft)
- Length of a typical liquid container = 50 ft

Maximum Number of Liquid Storage Containers

- Adjusted row length taking into account a required 2 ft distance between the last container in the end row to the edge of the containment area = 250 ft – 2 ft = 248 ft
- Maximum number of rows = 248 ft ÷ 10 ft = 24.8 ≈ 24 rows
- Maximum number of liquid storage containers end-to-end in each row = 50 ft ÷ 50 ft (liquid storage container length) = 1 container
- Maximum number of liquid storage containers = 24 rows x 1 containers per row = 24 containers

2. Secondary Containment Analysis

Total Available Secondary Containment Volume

The new Parking Area consists of a sloped, reinforced concrete pad that measures 55ft wide by 250 ft long. Access to the new Parking Area is from the full length of the southern edge (250 ft) where the concrete pad is approximately flush with surrounding grade. The reinforced concrete pad is sloped toward the center and back of the two drain areas within the new Parking Area. Reinforced concrete curbing and the slope of the reinforced concrete pad provide the secondary containment for the new Parking Area. Due to its complex dimensions, the total available secondary containment volume of the new Parking Area was determined based on 3-dimensional surface computations performed using computer aided design software (Terramodel).

Calculation Sheet

As discussed in Assumption 1, the new Parking Area is assumed to be filled to capacity with roll-offs for the purposes of determining available secondary containment volume. Because the roll-offs sit approximately 6 inches off the pavement, liquid can spread across the pavement for the first 6 inches within the entire footprint of the new Parking Area, except near the entrance edge where the liquid cannot have an elevation greater than the entrance elevation. This volume was modeled with Terramodel and determined to be 47,380 gal. As confirmation, one can multiply 6 inches by the plan dimensions of the new Parking Area (55 ft by 250 ft) to yield 51429 gal. This slightly larger volume is attributable to the loss at the entrance where liquid cannot be 6 inches above the entrance elevation.

The volume available between rows of containers and above the aforementioned 6-inch-thick layer of storage is calculated manually based on an average depth of 1.63 ft at the back wall, an aisle width of 2 ft, a length of 43 ft, and 25 aisles. Using the area formula for a triangle multiplied by the aisle width and the number of aisles, this volume is estimated to be 13,107 gal. Similarly, the volume available along the back wall and above the 6-inch-thick layer of storage is calculated manually based on an average depth of 1.63 ft at the back wall, an aisle width of 2 ft, and a length of 250 ft. Using the area formula for a rectangle multiplied by the aisle width, this volume is estimated to be 6,096 gal.

Summing the above components, a worst-case available secondary containment volume of 66,583 gal is calculated.

Required Secondary Containment Volume

As discussed in Assumption 1, the new Parking Area is assumed to be filled to capacity with semi tanker trailers for the purposes of determining required secondary containment volume. The required secondary containment volume for liquid storage containers is based on one of two possible conditions. The first condition (Condition 1) provides storage for 10 percent of the total liquid volume of containers stored within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event. The second condition (Condition 2) provides storage for the entire volume of the single largest liquid container stored within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event. Calculations for both conditions are presented below.

<u>Condition 1</u>

Total Container Volume (assuming all containers store liquid)

- Total Container Volume: Maximum number of containers x volume per container (Assumption 4) x 0.10 (10 percent) = 24 containers x 5,500 gal/container x 0.10 = 13,200 gal

Precipitation Runoff Volume

- Runoff Volume: 55 ft x 250 ft x 0.333 ft = 4,579 cf or 34,249 gal

Required Secondary Containment Volume

- Total Container Volume + Precipitation Runoff Volume = 13,200 gal + 34,249gal = 47,449gal

Calculation Sheet

<u>Condition 2</u>

Single Largest Liquid Storage Container Volume

- The volume of the largest liquid storage container stored within the secondary containment area = 5,500 gal

Required Secondary Containment Volume

- Largest Liquid Storage Container Volume + Precipitation Runoff Volume (from Condition 1 above) = 5,500 gal + 34,249gal = 39,749 gal

Based on a comparison of the required secondary containment volumes calculated for Conditions 1 and 2 above, the greatest required secondary containment volume is 47,449 gal (Condition 1).

Excess Secondary Containment Volume

The excess secondary containment volume condition is based on the total secondary volume available within the new Parking Area compared with the greatest required secondary containment volume. The resultant volume condition is as follows:

Total Secondary Containment Volume: 66,583 gal
Required Secondary Containment Volume: 47,449 gal
Excess Volume: 66,583 gal – 47,449 gal = 19,134 gal

It is noted that this is a worst-case scenario because it is based on extremes of all roll-offs for available volume and all semi tanker trailers for required volume. Any physically possible combination of roll-offs and semi tanker trailers will yield additional reserve capacity beyond this calculated minimum.

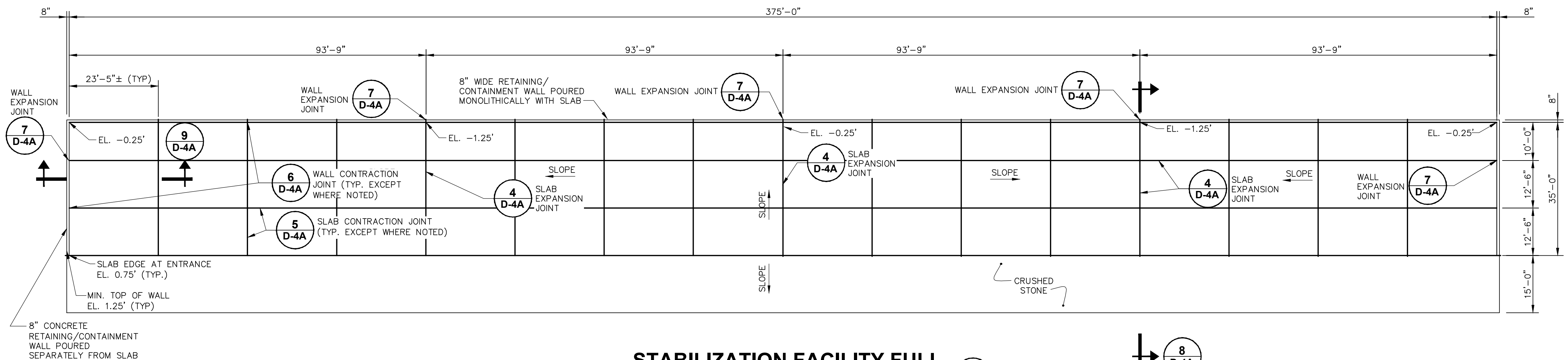
<u>SUMMARY:</u>

The new Parking Area has a worst-case secondary containment volume of 66,583 gal. Based on the required secondary containment volume of 47,449 gal, which accounts for 10 percent of the maximum volume in all liquid storage containers within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event, the new Parking Area provides adequate secondary containment. A maximum of 48 solids storage containers or 24 liquid containers or any combination of the two container types may be stored in the new Parking Area assuming the required aisle spaces considered herein are maintained.

FIGURE D-4A

NEW STABILIZATION FACILITY FULL TRAILER PARKING AREA

NOTES:
1. CONCRETE MIX SHALL BE 4000 PSI AT 28 DAYS WITH AIR ENTRAINING ADMIXTURE 6±1%. STEEL FIBER REINFORCEMENT SHALL BE ADDED TO MIX AS MANUFACTURED BY MITCHELL FIBERCON, INC., MEETING ASTM A820 TYPE II SPECIFICATIONS.
2. ALL EXPOSED CONCRETE SURFACES TO RECEIVE CHEMTEC ONE CONCRETE PROTECTION SEALANT, OR APPROVED EQUAL.
3. REINFORCED CONCRETE BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. LAP REINFORCING BARS MINIMUM 44 BAR DIAMETERS.
4. DESIGN ELEVATIONS ARE RELATIVE. EXISTING GROUND SURFACE IS ASSUMED TO BE ELEVATION 0.0 FOR REFERENCE PURPOSES.
5. STEEL ANGLE SHALL BE FABRICATED IN LENGTHS CORRESPONDING TO JOINT LOCATIONS. STEEL ANGLE SHALL NOT SPAN ANY SLAB JOINT. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1.
6. SUBBASE SHALL BE PROOF-ROLLED AND INSPECTED BY ENGINEER PRIOR TO PLACING CRUSHED STONE. IF SOFT SOILS OR AREAS OF PUMPING ARE OBSERVED, SOIL WITHIN THESE AREAS SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE OR STRUCTURAL FILL AND PROOF ROLLED.
7. CRUSHED STONE SHALL BE COMPACTED TO A MINIMUM 95% OF MAXIMUM DRY DENSITY BASED ON MODIFIED PROCTOR.
8. WATERSTOP SHALL BE WESTEC'S ENVIROSTOP™ TPE-R (THERMOPLASTIC ELASTOMERIC RUBBER) 600 SERIES OR APPROVED EQUAL.



STABILIZATION FACILITY FULL TRAILER PARKING AREA (1)

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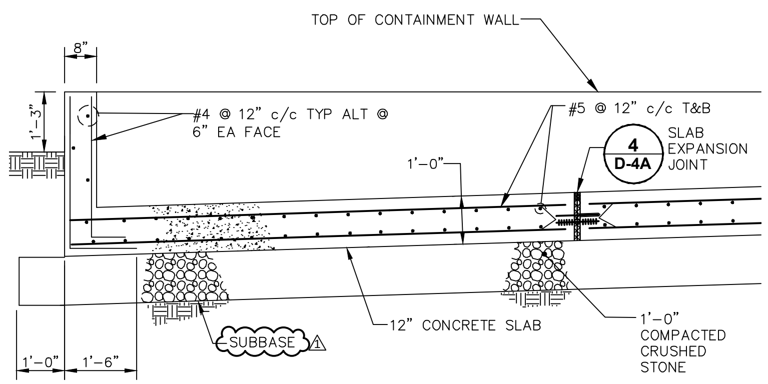

SECTION (2)

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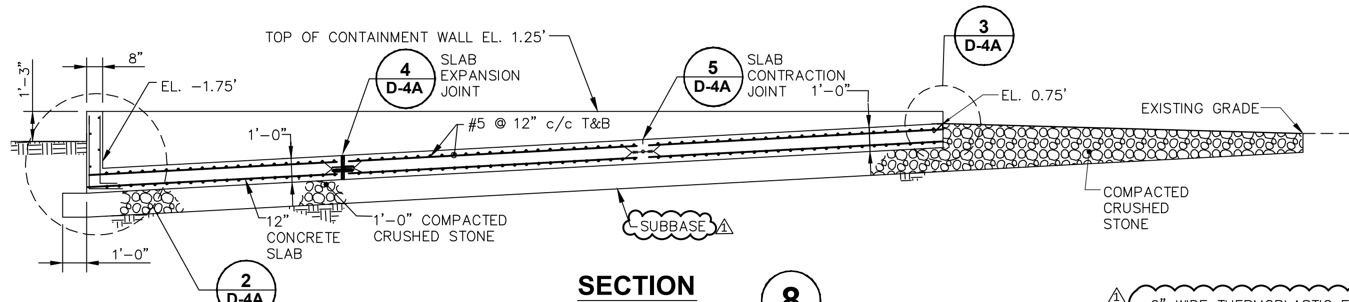

SECTION (8)

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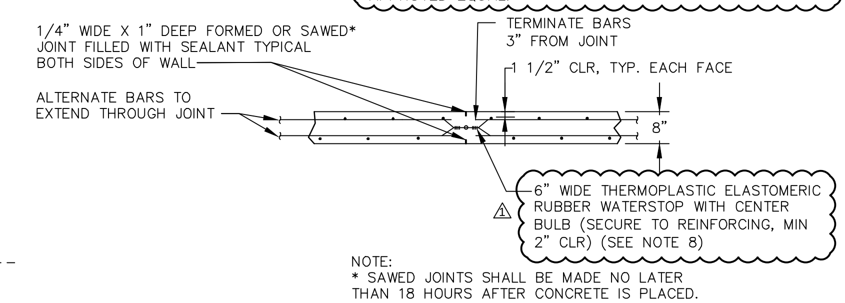
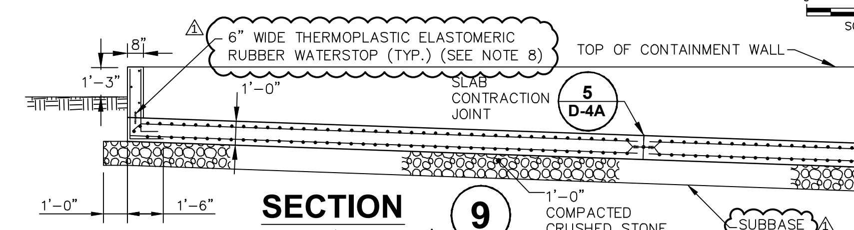


NOTE:
* SAWED JOINTS SHALL BE MADE NO LATER THAN 18 HOURS AFTER CONCRETE IS PLACED.

SECTION PLAN

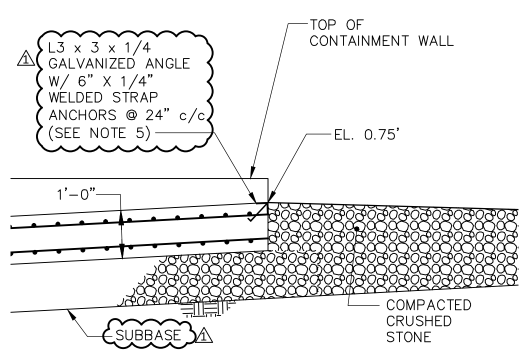
WALL CONTRACTION JOINT DETAIL (6)

SCALE: 1/2"=1'-0"



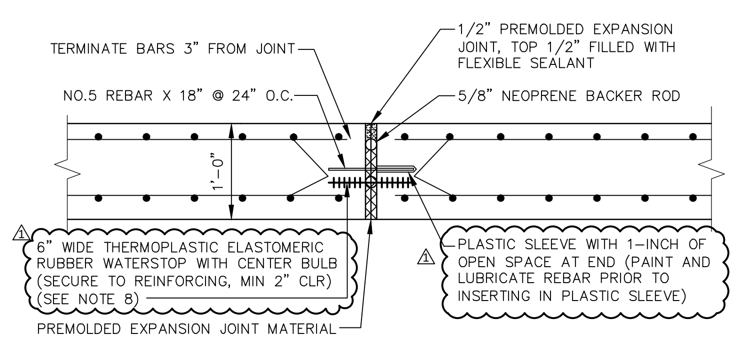
SECTION (9)

SCALE: 1/4"=1'-0"



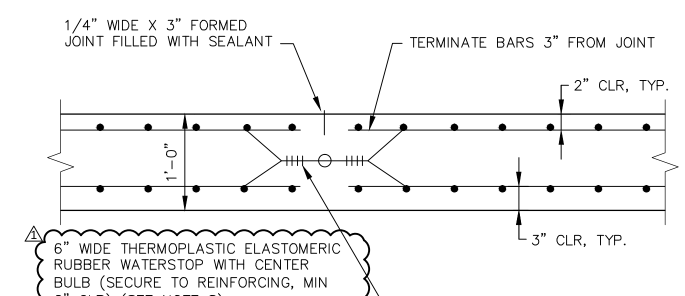
SECTION (3)

SCALE: 1/2"=1'-0"



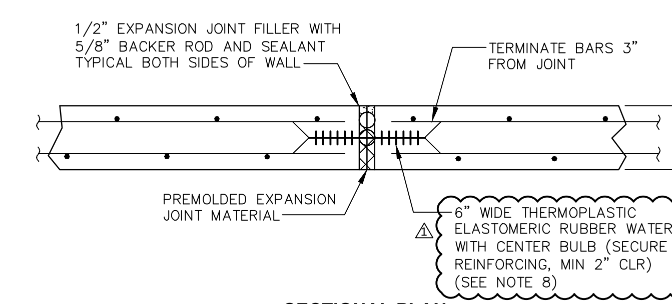
SLAB EXPANSION JOINT (4)

SCALE: 1"=1'-0"



SLAB CONTRACTION JOINT (5)

SCALE: 1"=1'-0"



SECTIONAL PLAN

WALL EXPANSION JOINT (7)

SCALE: 1"=1'-0"

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	7/2013	GENERAL REVISIONS	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: | Project Mgr.: WAR
Designed by: LAB | Drawn by: SJK | Checked by: BMS

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CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
FULL TRAILER PARKING AREA AND LEACHATE TRANSFER RAMP PERMIT DRAWINGS

STABILIZATION FACILITY FULL TRAILER PARKING AREA

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date FEBRUARY 2013

ARCADIS of New York, Inc.
6723 Towpath Road
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D-4A

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Calculation Sheet

Client: **CWM Chemical Services, LLC**

Project Location: **Model City, New York**

Project: **RMU-2 Design Calculations** **Project No.:** **B0023725.2011**

Subject: **New Stabilization Full Trailer Parking Area – Secondary Containment Calculations**

Prepared By: **NWF** **Date:** **August 2013**

Reviewed By: **BMS** **Date:** **August 2013**

Checked By: **BMS** **Date:** **August 2013**

OBJECTIVE:

Determine the capacity of the new Stabilization Full Trailer Parking Area (new Parking Area) for solids and liquid storage containers. Demonstrate that adequate secondary containment volume exists for management of precipitation within the new Parking Area.

REFERENCES:

1. RMU-2 Permit Drawing No. D-4A entitled “Stabilization Facility Full Trailer Parking Area,” contained in Attachment D-1 of the Overall Site/RMU-1 Part 373 Permit, ARCADIS, August 2013.

2. New York State Department of Environmental Conservation Regulations, Subpart 373.2.9 (f).

ASSUMPTIONS:

1. The new Parking Area may contain roll-offs (for solids), tanker trucks (for liquid), or some combination of these containers. Because roll-offs sit much closer to the pavement, they consume secondary containment volume, whereas tankers consume only negligible volume. Thus, when calculating the available secondary containment volume, this analysis assumes that the new Parking Area is filled to capacity with roll-offs. When calculating the required secondary containment volume, this analysis assumes that the new Parking Area is filled to capacity with tankers. Although this scenario cannot physically occur, it provides the most extreme case in terms of assessing secondary containment volume. Any physically possible combination of roll-offs and tankers can therefore be accommodated with adequate secondary containment volume.

2. The secondary containment system must have sufficient capacity to contain 10 percent of the total volume of liquid storage containers or the volume of the largest liquid container, whichever is greater.

3. The precipitation volume considered in this calculation is based on the 25-year, 24-hour storm event which contributes 4-inches or 0.333 feet of runoff.

4. The liquid storage container volume is 2,500 gallons (gal) per container.

5. Roll-offs are assumed to rest on approximately 6-inch-diameter rollers and thus sit 6 inches off the pavement.

Calculation Sheet

CALCULATIONS:

1. Capacity for Solids and Liquid Storage Containers

The capacity of the new Parking Area for solids and liquid storage containers is based on the geometry of the parking area and the typical size of individual storage containers and is calculated as follows:

Solids Storage Container Dimensions

- Width of a typical container = 8 ft
- Aisle space requirement between containers = 2 ft
- Adjusted width of a typical container = 10 ft (8 ft + 2 ft)
- Length of a typical liquid container = 22 ft

Maximum Number of Solids Storage Containers

- Adjusted row length taking into account a required 2 ft distance between the last container in the end row to the edge of the containment area = 375 ft – 2 ft = 373 ft
- Maximum number of rows = 373 ft ÷ 10 ft = 37.3 ≈ 37 rows
- Maximum number of solids storage containers end-to-end in each row = 35 ft ÷ 22 ft (solids storage container length) = 1.6 ≈ 1 container
- Maximum number of solids storage containers = 37 rows x 1 container per row = 37 containers

Liquid Storage Container Dimensions

- Width of a typical container = 8 ft
- Aisle space requirement between containers = 2 ft
- Adjusted width of a typical container = 10 ft (8 ft + 2 ft)
- Length of a typical liquid container = variable (less than 35 ft), thus only one liquid container per row is assumed

Maximum Number of Liquid Storage Containers

- Adjusted row length taking into account a required 2 ft distance between the last container in the end row to the edge of the containment area = 375 ft – 2 ft = 373 ft
- Maximum number of rows = 373 ft ÷ 10 ft = 37.3 ≈ 37 rows
- Maximum number of liquid storage containers end-to-end in each row = 1 container
- Maximum number of liquid storage containers = 37 rows x 1 container per row = 37 containers

2. Secondary Containment Analysis

Total Available Secondary Containment Volume

The new Parking Area consists of a sloped, reinforced concrete pad that measures 35 feet (ft) wide by 375 ft long. Access to the new Parking Area is from the full length of the southern edge (375 ft) where the concrete pad is approximately flush with surrounding grade. The reinforced concrete pad is sloped toward the center and back of the two drain areas within the new Parking Area. Reinforced concrete curbing and the slope of the reinforced concrete pad provide the secondary containment for the new Parking Area. Due to its complex dimensions, the total available secondary containment volume of the new Parking Area was determined based on 3-dimensional surface computations performed using computer aided design software (Terramodel).

Calculation Sheet

As discussed in Assumption 1, the new Parking Area is assumed to be filled to capacity with roll-offs for the purposes of determining available secondary containment volume. Because the roll-offs sit approximately 6 inches off the pavement, liquid can spread across the pavement for the first 6 inches within the entire footprint of the new Parking Area, except near the entrance edge where the liquid cannot have an elevation greater than the entrance elevation. This volume was modeled with Terramodel and determined to be 43,020 gal. As confirmation, one can multiply 6 inches by the plan dimensions of the new Parking Area (35 ft by 375 ft) to yield 49,091 gal. This slightly larger volume is attributable to the loss at the entrance where liquid cannot be 6 inches above the entrance elevation.

The volume available between rows of containers and above the aforementioned 6-inch-thick layer of storage is calculated manually based on an average depth of 1.00 ft at the back wall, an aisle width of 2 ft, a length of 26.3 ft, and 38 aisles. Using the area formula for a triangle multiplied by the aisle width and the number of aisles, this volume is estimated to be 7,476 gal. Similarly, the volume available along the back wall and above the 6-inch-thick layer of storage is calculated manually based on an average depth of 1.00 ft at the back wall, an aisle width of 2 ft, and a length of 375 ft. Using the area formula for a rectangle multiplied by the aisle width, this volume is estimated to be 5,610 gal.

Summing the above components, a worst-case available secondary containment volume of 56,106 gal is calculated.

Required Secondary Containment Volume

As discussed in Assumption 1, the new Parking Area is assumed to be filled to capacity with tankers for the purposes of determining required secondary containment volume. The required secondary containment volume for liquid storage containers is based on one of two possible conditions. The first condition (Condition 1) provides storage for 10 percent of the total liquid volume of containers stored within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event. The second condition (Condition 2) provides storage for the entire volume of the single largest liquid container stored within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event. Calculations for both conditions are presented below.

<u>Condition 1</u>

Total Container Volume (assuming all containers store liquid)

- Total Container Volume: Maximum number of containers x volume per container (Assumption 4) x 0.10 (10 percent) = 37 containers x 2,500 gal/container x 0.10 = 9,250 gal

Precipitation Runoff Volume

- Runoff Volume: 35 ft x 375 ft x 0.333 ft = 4,375 cf or 32,727 gal

Required Secondary Containment Volume

- Total Container Volume + Precipitation Runoff Volume = 9,250 gal + 32,727 gal = 41,977 gal

Calculation Sheet

<u>Condition 2</u>

Single Largest Liquid Storage Container Volume

- The volume of the largest liquid storage container stored within the secondary containment area = 2,500 gal

Required Secondary Containment Volume

- Largest Liquid Storage Container Volume + Precipitation Runoff Volume (from Condition 1 above) = 2,500 gal + 32,727 gal = 35,227 gal

Based on a comparison of the required secondary containment volumes calculated for Conditions 1 and 2 above, the greatest required secondary containment volume is 41,977 gal (Condition 1).

Excess Secondary Containment Volume

The excess secondary containment volume condition is based on the worst-case total secondary volume available within the new Parking Area compared with the required secondary containment volume. The resultant volume condition is as follows:

Total Secondary Containment Volume: 56,106 gal
Required Secondary Containment Volume: 41,977 gal
Excess Volume: 56,106 gal – 41,977 gal = 14,129 gal

It is noted that this is a worst-case scenario because it is based on extremes of all roll-offs for available volume and all tankers for required volume. Any physically possible combination of roll-offs and tankers will yield additional reserve capacity beyond this calculated minimum.

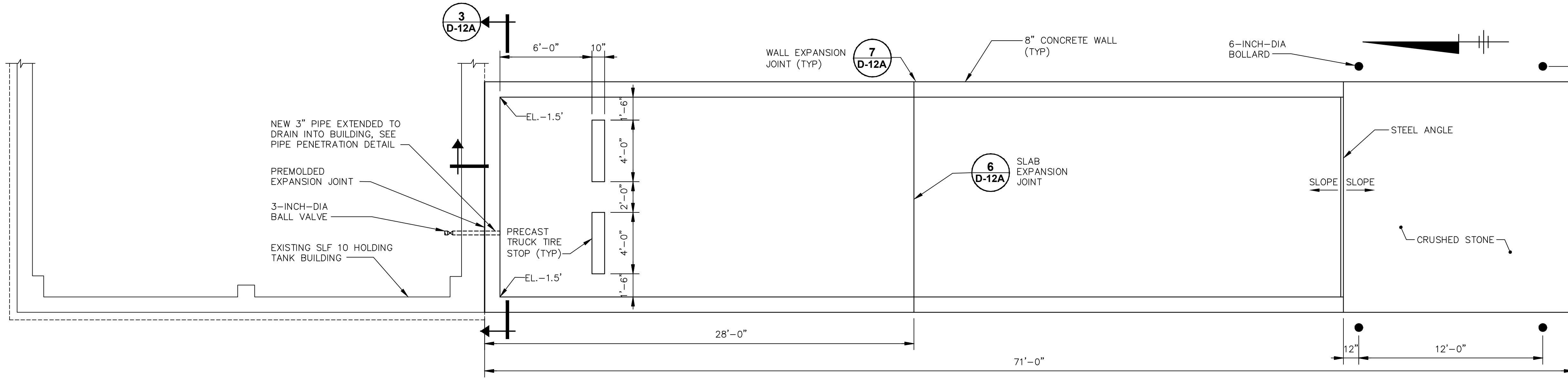
<u>SUMMARY:</u>

The new Parking Area has a worst-case secondary containment volume of 56,106 gal. Based on the required secondary containment volume of 41,977 gal, which accounts for 10 percent of the maximum volume in all liquid storage containers within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event, the new Parking Area provides adequate secondary containment. A maximum of 37 solids storage containers or 37 liquid storage containers or any combination of the two container types may be stored in the new Parking Area assuming the required aisle spaces considered herein are maintained.

FIGURE D-12A

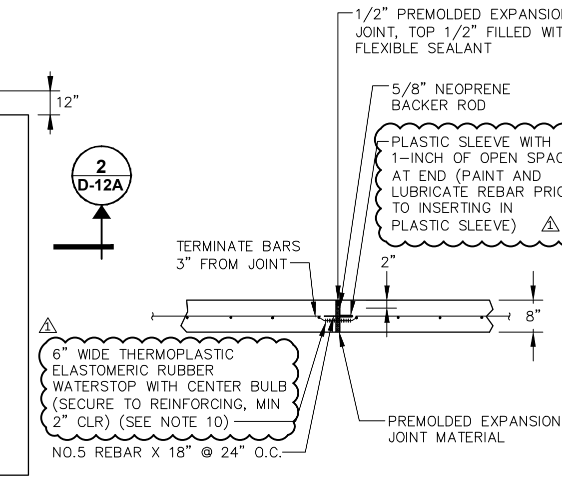
NEW TANK T-109 (SLF 10)

LEACHATE LOADING/UNLOADING PAD



RAMP PLAN 1

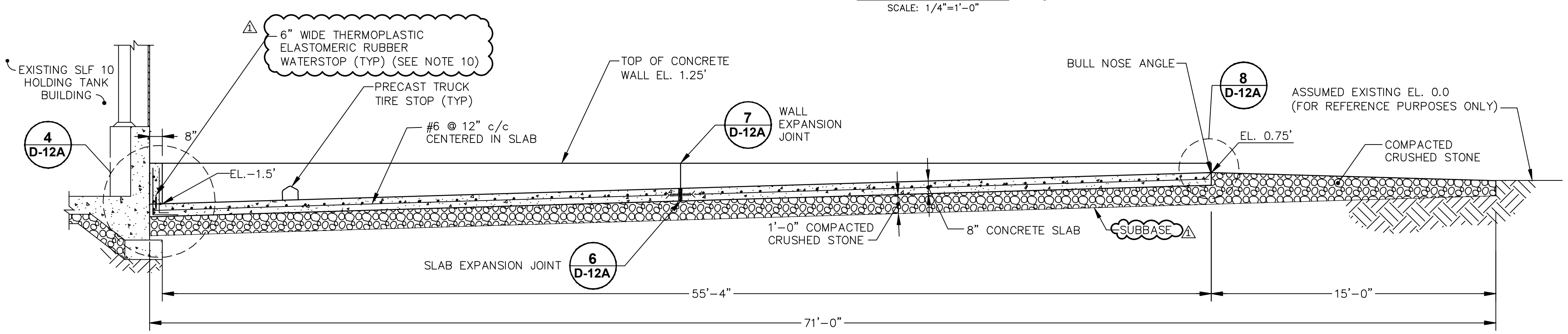
SCALE: 1/4"=1'-0"



SECTION

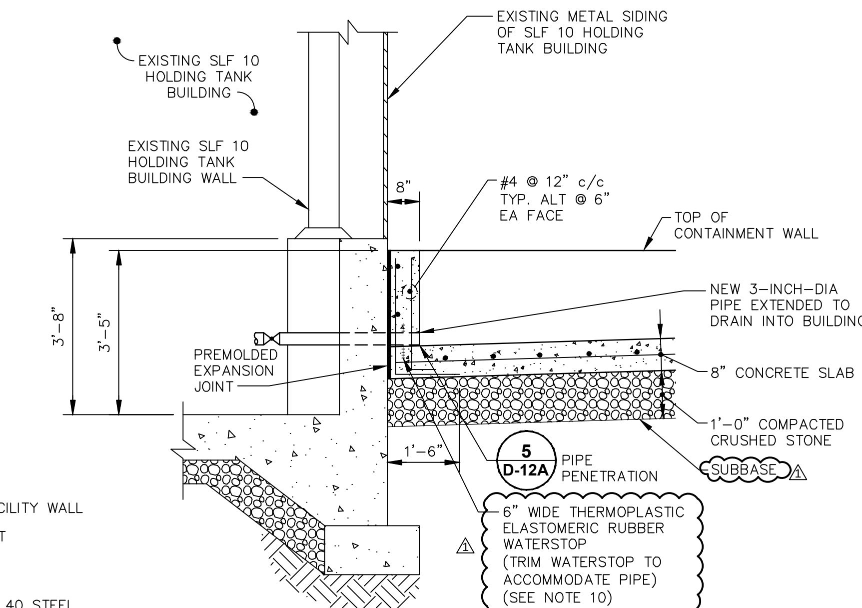
SLAB EXPANSION JOINT DETAIL 6

SCALE: 1/2"=1'-0"



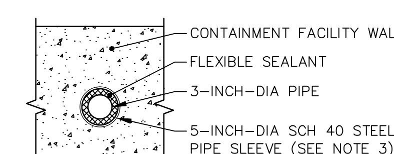
SECTION 2

SCALE: 1/4"=1'-0"



BUILDING WALL/RAMP DETAIL 4

SCALE: 1/2"=1'-0"

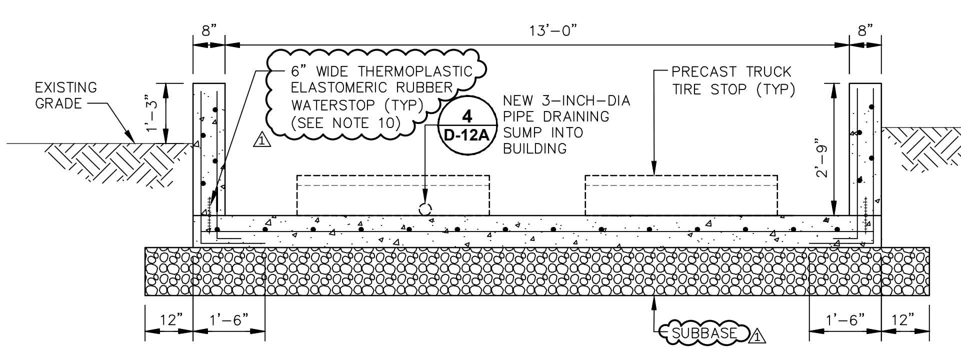


PIPE PENETRATION DETAIL 5

SCALE: 1"=1'-0"

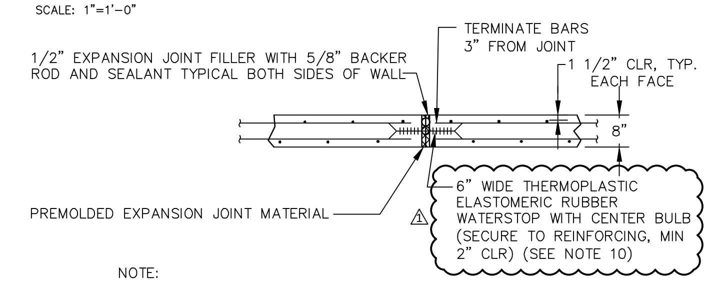
GENERAL NOTES:

1. CONCRETE MIX SHALL BE 4000 PSI AT 28 DAYS WITH AIR ENTRAINING ADMIXTURE 6±1%. STEEL REINFORCEMENT SHALL BE ADDED TO MIX AS MANUFACTURED BY MITCHELL FIBERCON, INC., MEETING ASTM A820 TYPE II SPECIFICATIONS.
2. ALL EXPOSED CONCRETE CONTAINMENT SURFACES TO RECEIVE CHEMTEC ONE CONCRETE PROTECTION SEALANT, OR APPROVED EQUAL.
3. 5" SCHEDULE 40 STEEL SLEEVE SHALL BE INSTALLED AS SHOWN THROUGH CONTAINMENT RAMP WALL. CORRESPONDING 5" CORE DRILLED OPENING SHALL BE PROVIDED IN FOUNDATION WALL OF EXISTING SLF 10 HOLDING TANK BUILDING
4. 3" PIPE TO EXTEND INTO EXISTING SLF 10 HOLDING TANK BUILDING AND BE EQUIPPED WITH VALVE ACCESSIBLE FROM INTERIOR.
5. REINFORCED CONCRETE BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. LAP REINFORCING BARS MINIMUM 36 BAR DIAMETERS.
6. DESIGN ELEVATIONS ARE RELATIVE. EXISTING GROUND SURFACE IS ASSUMED TO BE AT ELEVATION 0.0 FOR REFERENCE PURPOSES.
7. STEEL ANGLE SHALL BE FABRICATED IN LENGTHS CORRESPONDING TO JOINT LOCATIONS. STEEL ANGLE SHALL NOT SPAN ANY SLAB JOINT. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1.
8. SUBBASE SHALL BE PROOF-ROLLED AND INSPECTED BY ENGINEER PRIOR TO PLACING CRUSHED STONE. IF SOFT SOILS OR AREAS OF PUMPING ARE OBSERVED, SOIL WITHIN THESE AREAS SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE OR STRUCTURAL FILL AND PROOF ROLLED.
9. CRUSHED STONE SHALL BE COMPACTED TO A MINIMUM 95% OF MAXIMUM DRY DENSITY BASED ON MODIFIED PROCTOR.
10. WATERSTOP SHALL BE WESTEC'S ENVIROSTOP™ TPE-R (THERMOPLASTIC ELASTOMERIC RUBBER) 600 SERIES OR APPROVED EQUAL.



SECTION 3

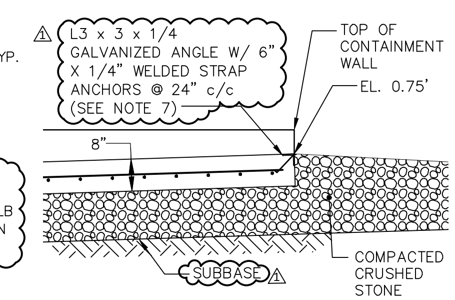
SCALE: 1/2"=1'-0"



NOTE:
* SAWED JOINTS SHALL BE MADE NO LATER THAN 18 HOURS AFTER CONCRETE IS PLACED.

WALL EXPANSION JOINT DETAIL 7

SCALE: 1/2"=1'-0"



SECTION 8

SCALE: 1/2"=1'-0"

SCALE AS NOTED

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JOSEPH MOLINA		
Professional Engineer's No. 072644		
State: NY	Date Signed	Project Mgr.: WAR
Designed by: LAB	Drawn by: SJK	Checked by: BMS

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FULL TRAILER PARKING AREA AND LEACHATE TRANSFER RAMP PERMIT DRAWINGS

SLF 10 HOLDING TANK BUILDING LEACHATE TRANSFER RAMP

GENERAL

ARCADIS Project No. B0023725.2009.00006

Date FEBRUARY 2013

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6723 Towpath Road
P.O. Box 66
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TEL. 315.446.9120

D-12A

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K.DAVIS L.FORAKER K.DAVIS LD: PIC: W.POPHAM PM: W.RANKIN TM: B.STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\0000\DWG\FULL_TRAILER_PARKING\23725D12A.dwg LAYOUT: D-12A SAVED: 7/8/2013 12:43 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 7/8/2013 12:43 PM BY: SARTORI, KATHERINE

XREFS: 23725X00 IMAGES: PROJECTNAME: ----

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Calculation Sheet

Client: CWM Chemical Services, LLC

Project Location: Model City, New York

Project: RMU-2 Design Calculations | **Project No.: B0023725.2011**

Subject: New SLF 10 Leachate Loading/Unloading Ramp – Secondary Containment Calculations

Prepared By: NWF | **Date: August 2013**

Reviewed By: BMS | **Date: August 2013**

Checked By: BMS | **Date: August 2013**

OBJECTIVE:

Calculate the total secondary containment volume for the new SLF 10 Leachate Loading/Unloading Ramp and demonstrate that adequate capacity exists for the anticipated storage quantities.

REFERENCES:

1. Permit Drawing No. D-12A entitled "SLF 10 Holding Tank Building Leachate Transfer Ramp," contained in Attachment D-1 of the Overall Site/RMU-1 Part 373 Permit, ARCADIS, August 2013.

2. SLF 10 Leachate Building Secondary Containment Calculations, Sitewide 6 NYCRR Part 373 Permit, February 2001.

3. New York State Department of Environmental Conservation Regulations, Subpart 373.2.9 (f).

ASSUMPTIONS:

1. The secondary storage volume consumed by the semi tanker trailer tires and landing gear is assumed to be negligible and is not considered in this analysis.

2. The secondary containment must have sufficient capacity to contain the entire volume of the largest liquid container that will be stored on the ramp (Reference 3).

3. The precipitation volume considered in this calculation is based on the 25-year, 24-hour design storm, which contributes 4 inches of 0.333 feet (ft) of runoff.

4. One tanker truck can be located on the ramp at any one time. The largest liquid storage container volume that will be stored on the ramp is 5,500 gallons (gal).

CALCULATIONS:

The new ramp has interior dimensions of 13-feet-wide by 55.33-feet-long. Access to the ramp is from one end where the concrete is approximately flush with surrounding grade. The ramp slopes downward into the ground, such that the ramp is 2.25 feet lower at the deep end.

The available secondary containment volume within the ramp can be calculated manually using the area of a triangle multiplied by the ramp width as follows:

Calculation Sheet

[½ (13 ft x 55.33 ft x 2.25 ft)] = 809 cubic feet = 6,053 gal

The new ramp is connected to the SLF 10 Holding Tank Building by a 3 inch pipe. A valve on this pipe is opened whenever liquid containers are on the ramp. As such, an additional 15,709 gallons of secondary containment volume within the SLF 10 Holding Tank Building (Reference 2) is also available. A total secondary containment volume of 21,762 gal is thus provided by the ramp itself and the building.

The required secondary containment volume for the new ramp is equal to the sum of the largest liquid storage container volume (5,500 gal) and the runoff from the design storm. The stormwater runoff volume is calculated as follows:

13 ft x 55.33 ft x 0.333 ft = 240 cubic feet = 1,794 gal

Thus, the required secondary containment volume is 7,294 gal

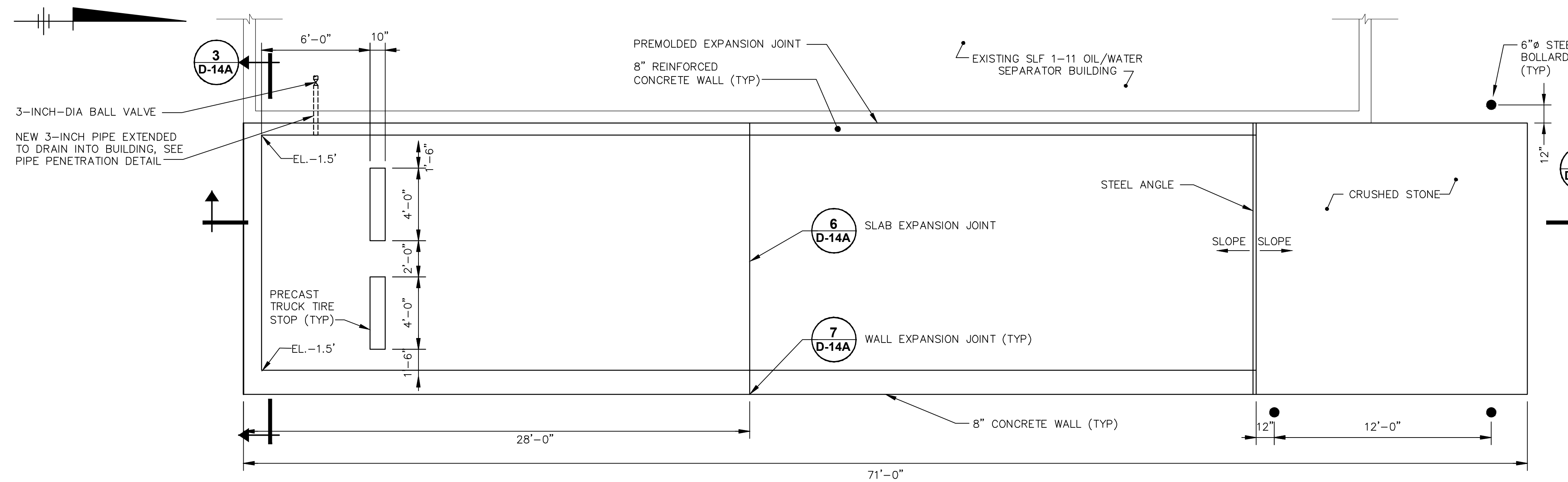
SUMMARY:

The available secondary containment volume for the new SLF 10 Leachate Loading/Unloading Ramp (including the volume provided both by the ramp itself and the SLF 10 Holding Tank Building) exceeds the required secondary containment volume and is therefore acceptable.

FIGURE D-14A

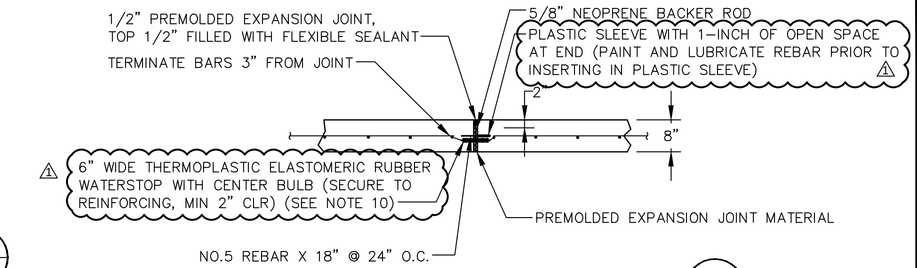
NEW TANK T-158 (SLF 1-11 OWS)

BUILDING LOADING/UNLOADING PAD



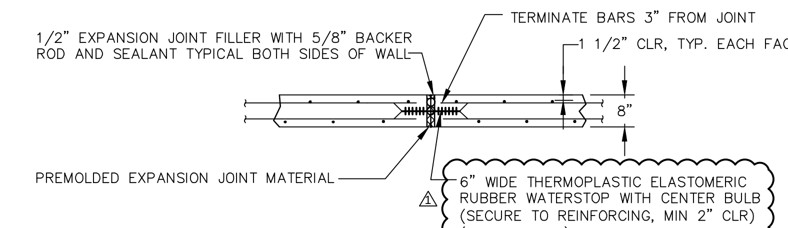
RAMP PLAN (1)

SCALE: 1/4"=1'-0"



SLAB EXPANSION JOINT DETAIL (6)

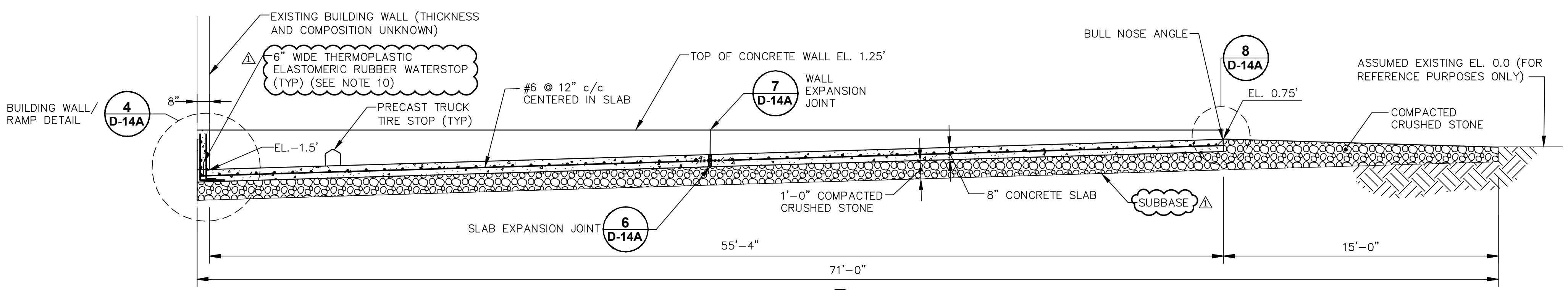
SCALE: 1/2"=1'-0"



NOTE:
* SAWED JOINTS SHALL BE MADE NO LATER THAN 18 HOURS AFTER CONCRETE IS PLACED.

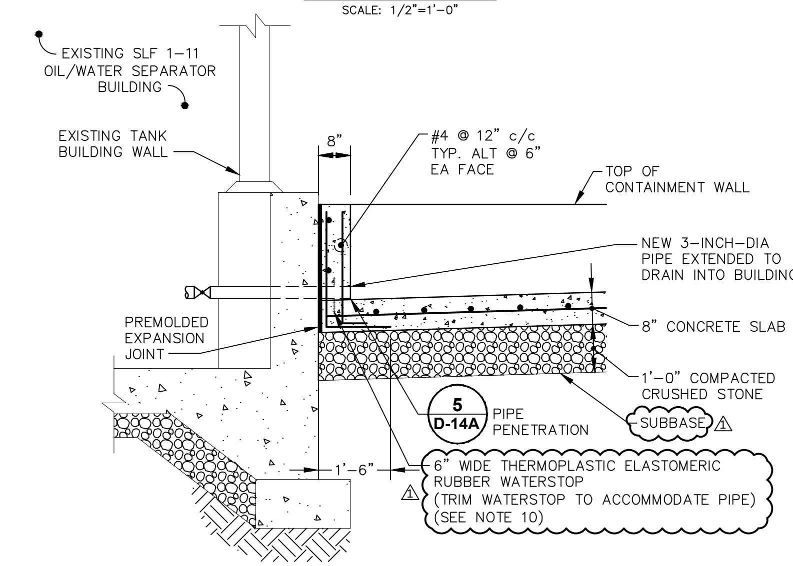
WALL EXPANSION JOINT DETAIL (7)

SCALE: 1/2"=1'-0"



SECTION (2)

SCALE: 1/4"=1'-0"

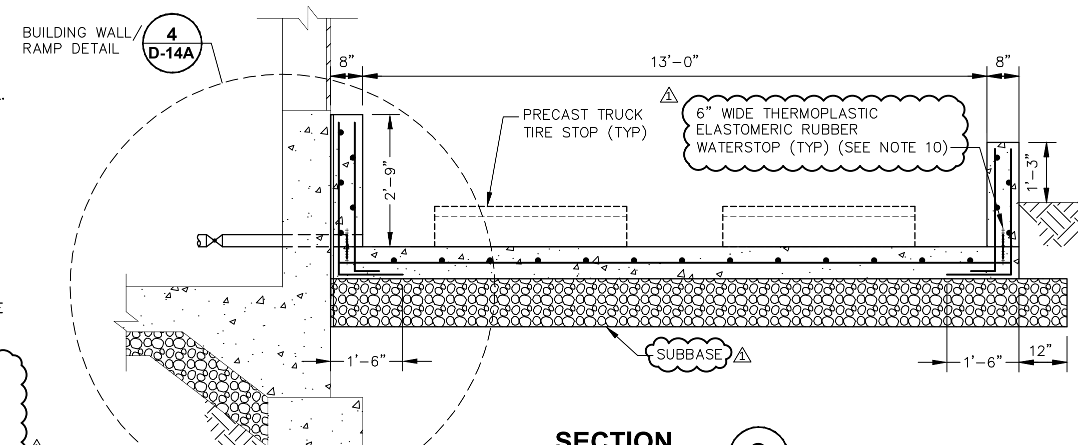


BUILDING WALL/RAMP DETAIL (4)

SCALE: 1/2"=1'-0"

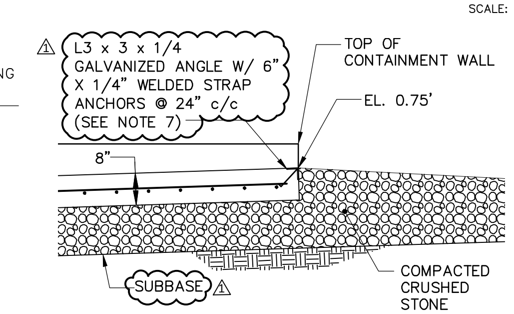
GENERAL NOTES:

1. CONCRETE MIX SHALL BE 4000 PSI AT 28 DAYS WITH AIR ENTRAINING ADMIXTURE 6±1%. STEEL REINFORCEMENT SHALL BE ADDED TO MIX AS MANUFACTURED BY MITCHELL FIBERCON, INC., MEETING ASTM A820 TYPE II SPECIFICATIONS.
2. ALL EXPOSED CONCRETE CONTAINMENT SURFACES TO RECEIVE CHEMTEC ONE CONCRETE PROTECTION SEALANT, OR APPROVED EQUAL.
3. 5" SCHEDULE 40 STEEL SLEEVE SHALL BE INSTALLED AS SHOWN THROUGH CONTAINMENT RAMP WALL. CORRESPONDING 5" CORE DRILLED OPENING SHALL BE PROVIDED IN FOUNDATION WALL OF EXISTING SLF 1-11 OIL/WATER SEPARATOR BUILDING.
4. 3" PIPE TO EXTEND INTO EXISTING SLF 1-11 OIL/WATER SEPARATOR BUILDING AND BE EQUIPPED WITH VALVE ACCESSIBLE FROM INTERIOR.
5. REINFORCED CONCRETE BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. LAP REINFORCING BARS MINIMUM 36 BAR DIAMETERS.
6. DESIGN ELEVATIONS ARE RELATIVE. EXISTING GROUND SURFACE IS ASSUMED TO BE ELEVATION 0.0 FOR REFERENCE PURPOSES.
7. STEEL ANGLE SHALL BE FABRICATED IN LENGTHS CORRESPONDING TO JOINT LOCATIONS. STEEL ANGLE SHALL NOT SPAN ANY SLAB JOINT. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1.
8. SUBBASE SHALL BE PROOF-ROLLED AND INSPECTED BY ENGINEER PRIOR TO PLACING CRUSHED STONE. IF SOFT SOILS OR AREAS OF PUMPING ARE OBSERVED, SOIL WITHIN THESE AREAS SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE OR STRUCTURAL FILL AND PROOF ROLLED.
9. CRUSHED STONE SHALL BE COMPACTED TO A MINIMUM 95% OF MAXIMUM DRY DENSITY BASED ON MODIFIED PROCTOR.
10. WATERSTOP SHALL BE WESTEC'S ENVIROSTOP™ TPE-R (THERMOPLASTIC ELASTOMERIC RUBBER) 600 SERIES OR APPROVED EQUAL.



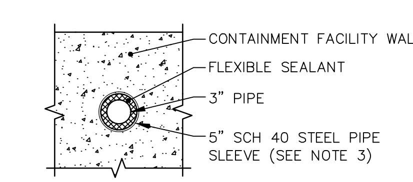
SECTION (3)

SCALE: 1/2"=1'-0"



SECTION (8)

SCALE: 1/2"=1'-0"



PIPE PENETRATION DETAIL (5)

SCALE: 1"=1'-0"

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\0003\DWG\FULL_TRAILER_PARKING\23725D14A.dwg LAYOUT: D-14A SAVED: 7/8/2013 12:44 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 7/8/2013 12:44 PM BY: SARTORI, KATHERINE
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No.	Date	Revisions	By	Ckd
1	7/2013	GENERAL REVISIONS	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA		
Professional Engineer's No.: 072644		
State: NY	Date Signed	Project Mgr.: WAR
Designed by: LAB	Drawn by: SJK	Checked by: BMS

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CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
FULL TRAILER PARKING AREA AND LEACHATE TRANSFER RAMP PERMIT DRAWINGS

SLF 1-11 OIL/WATER SEPARATOR BUILDING LEACHATE TRANSFER RAMP

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date FEBRUARY 2013

ARCADIS of New York, Inc.
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TEL. 315.446.9120

D-14A

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Calculation Sheet

Client: **CWM Chemical Services, LLC**

Project Location: **Model City, New York**

Project: **RMU-2 Design Calculations** **Project No.:** **B0023725.2011**

Subject: **New SLF 1-11 OWS Loading/Unloading Ramp – Secondary Containment Calculations**

Prepared By: **NWF** **Date:** **August 2013**

Reviewed By: **BMS** **Date:** **August 2013**

Checked By: **BMS** **Date:** **August 2013**

OBJECTIVE:

Calculate the total secondary containment volume for the new SLF 1-11 Oil/Water Separator (OWS) Loading/Unloading Ramp (ramp) and demonstrate that adequate capacity exists for the anticipated storage quantities.

REFERENCES:

1. Permit Drawing No. D-14A entitled “SLF 1-11 Oil/Water Separator Building Leachate Transfer Ramp,” contained in Attachment D-1 of the Overall Site/RMU-1 Part 373 Permit, ARCADIS, August 2013.

2. SLF 1-11 OWS Building Secondary Containment Calculations, Sitewide 6 NYCRR Part 373 Permit, February 2001.

3. New York State Department of Environmental Conservation Regulations, Subpart 373.2.9 (f).

ASSUMPTIONS:

1. The secondary storage volume consumed by the semi tanker trailer tires and landing gear is assumed to be negligible and is not considered in this analysis.

2. The secondary containment must have sufficient capacity to contain the entire volume of the largest liquid container that will be stored on the ramp (Reference 3).

3. The precipitation volume considered in this calculation is based on the 25-year, 24-hour design storm, which contributes 4 inches of 0.333 feet (ft) of runoff.

4. One tanker truck can be located on the ramp at any one time. The largest liquid storage container volume that will be stored on the ramp is 5,500 gallons (gal).

CALCULATIONS:

The new ramp has interior dimensions of 13-feet-wide by 55.33-feet-long. Access to the ramp is from one end where the concrete is approximately flush with surrounding grade. The ramp slopes downward into the ground, such that the ramp is 2.25 feet lower at the deep end.

Calculation Sheet

The available secondary containment volume within the ramp can be calculated manually using the area of a triangle multiplied by the ramp width as follows:

[½ (13 ft x 55.33 ft x 2.25 ft)] = 809 cubic feet = 6,053 gal

The new ramp is connected to the SLF 1-11 OWS Building by a 3 inch pipe. A valve on this pipe is opened whenever liquid containers are on the ramp. As such, an additional 24,876 gallons of secondary containment volume within the SLF 1-11 OWS Building (Reference 2) is also available. A total secondary containment volume of 30,929 gal is thus provided by the ramp itself and the building.

The required secondary containment volume for the new ramp is equal to the sum of the largest liquid storage container volume (5,500 gal) and the runoff from the design storm. The stormwater runoff volume is calculated as follows:

13 ft x 55.33 ft x 0.333 ft = 240 cubic feet = 1,794 gal

Thus, the required secondary containment volume is 7,294 gal

SUMMARY:

The available secondary containment volume for the new SLF 1-11 OWS Loading/Unloading Ramp (including the volume provided both by the ramp itself and the SLF 1-11 OWS Building) exceeds the required secondary containment volume and is therefore acceptable.

Application Appendix D-2 – Surface Impoundments

(proposed modified pages are designated with a November 2013 revision date at the top of the respective page)

APPENDIX D-2
SURFACE IMPOUNDMENTS

TABLE OF CONTENTS

SURFACE IMPOUNDMENTS

I. Introduction

The active surface impoundments, i.e., facultative ponds (FAC Ponds), are comprised of FAC Ponds 1, 2, 3 and 8. These surface impoundments are utilized for biological treatment using aeration and storage of treated wastewater prior to discharge into the Niagara River in accordance with the Model City Facility SPDES Permit.

The FAC ponds receive treated effluent from the Aqueous Wastewater Treatment System only. There are no other inputs to these impoundments with the exception of direct precipitation into the impoundments. Precipitation that accumulates in FAC Pond 8 may be transferred to FAC Pond 1 / 2.

Fac Ponds 3 and 8 will be eliminated as part of site preparation for the construction of the proposed landfill Residuals Management Unit No. 2 (RMU-2). Fac Ponds 3 and 8 will be closed in accordance with the Sitewide Closure Plan. Fac Ponds 3 and 8 lie within the footprint of RMU-2 and upon closure will be filled with structural (as required) and general soil fill to the RMU-2 excavation grades. It is anticipated that Fac Pond 8 will be closed prior to permitting for RMU-2 (it is currently in progress). Fac Pond 3 will be eliminated only after the construction of Fac Pond 5 because of the need to continuously provide storage of treated wastewater prior to discharge.

New Fac Pond 5 will be constructed to compensate for the storage capacity lost due to closure of Fac Ponds 3 and 8. Fac Pond 5 will be constructed to the north of proposed RMU-2 between SLF 12 and SLF 7. The new Fac pond will provide storage lost due to the removal of Fac Ponds 3 and 8. Fac Pond 5 will include a Part 373-compliant liner system.

II. Background

The RCRA Hazardous and Solid Waste Amendments of 1984 (HSWA) specify that surface impoundments which treat or store hazardous waste must have two or more liners, a leachate collection system between these liners, and appropriate groundwater monitoring.

Owners and operators of facilities with interim status surface impoundments were given four years to retrofit impoundments to meet these minimum technology requirements (November 8, 1988). Chemical Waste Management, Inc. applied to the USEPA Region II for a variance to the HSWA double liner requirements for Facultative Ponds No. 1, 2, 3, 8, 9, Fire Pond and the Aggressive Biological Treatment Unit (ABTU) No. 58. On February 17, 1989 CWM was notified by the USEPA of the approval of its request for a variance. In the approval, the

USEPA stated that CWM still qualifies for the exemption should the composition of waste streams handled by CWM change or in the event that a new SPDES Permit was issued.

Moreover, during August of 1993, CWM requested verification from the NYSDEC that its exemption was still valid even though the AWTS had been upgraded and CWM's SPDES Permit had been renewed. In its 1993 request for verification, CWM demonstrated that the conditions upon which the exemption was based had not changed. In December of 1993, the NYSDEC informed CWM that its exemption from minimum technology requirements for the facultative pond system was still valid.[1]

Consequently, the active surface impoundments described herein (FAC Ponds 1, 2, 3 and 8) do not meet the minimum technology requirements and are not double lined impoundments.

The Fire Pond was removed from service, clean closed and certified on March 1, 1990. Fac Pond 9 was removed from service, clean closed and certified on August 7, 1992. These two Fac Ponds no longer exist. ABTU 58 was converted to a RCRA tank in 1993.

III. Description of Active Facultative Ponds 1, 2, 3 and 8

Active Fac Ponds 1, 2, 3 and 8 are clay lined surface impoundments of the following approximate sizes:

Fac Pond	Capacity (gallons)	Area in Acres
1 and 2	22,880,700	7.1
3	51,355,300	13.2
8	43,413,500	6.6

New Fac Pond 5 will be Part 373-compliant surface impoundments of the following approximate size:

Fac Pond	Capacity (gallons)	Area in Acres
5 (new)	24,700,000	7.5

[1] Paul R. Counterman, P.E. to Ms. Jill Knickerbocker, "Aggressive Biological Treatment Exemption", New York State Department of Environmental Conservation letter dated December 21, 1993.

Fac Ponds 1 and 2 were originally two separate adjacent ponds separated by a berm. In recent years, however, the internal berm was encroached. Now Fac Pond 1 and 2 are considered a single surface impoundment with common exterior berms.

The historical purpose of the Fac Ponds was to provide the final step for treated wastewater prior to discharge. This was accomplished by mechanical aeration allowing the continued reduction in TOC, BOD and COD, plus an increase in dissolved oxygen content. Since the inception of Land Disposal Regulations (LDRs), however, the levels of organic and other contaminants in the treated wastewater entering the Fac Ponds are greatly reduced. Aeration is currently used mainly for odor control.

IV. Facultative Pond Construction

A. Construction of Facultative Pond 5

Material that is excavated from the floor area of Fac Pond 5 will be used to initiate construction of the eastern perimeter berm. This will allow a channel to be built between Fac Pond 5 and SLF 7 to divert runoff from SLF 7 around the Fac Pond 5 footprint. Additional fill material will be obtained from on-site stockpiles or be imported from pre-screened off-site sources.

A new liner system will be installed in Fac Pond 5, as described in Section 3.5.2 of the Engineering Report for RMU-2/Fac Ponds. A sideslope riser pipe will allow for monitoring of liquid levels in the sump of the leak detection system and for removal of accumulated liquids. A pre-fabricated weather proof riser house will be installed near the top of the perimeter berm at the sideslope riser pipe location. The sideslope riser pipe will penetrate the wall of the riser house so that transfer piping from the ponds leak detection system submersible pump may discharge into a tank. The riser house will contain a double-walled tank for storage of liquids pumped from the leak detection system. Access to the riser house will be provided by a ramp from an access road on the adjacent SLF 7.

A new at grade transfer line will be installed between Fac Ponds 1 and 2 and Fac Pond 5. The transfer line will include two parallel 6-inch-diameter in 10-inch diameter double-wall HDPE pipes at grade with soil protection cover. Each forcemain (two, in total) will be constructed of double-contained HDPE pipe. The inner carrier pipe will be 6-inches and the outer containment pipe will be 10-inches. The outer, secondary containment pipe will terminate at the penetration into HDPE manholes to allow for leak detection. The treated wastewater forcemains will be sloped so that any liquid in the secondary containment pipe will gravity drain back to a junction or transfer manhole.

As indicated on attached Drawing Nos. 5, 6 and 7, the pipeline will be sloped towards leak detection manholes. At Fac Pond 5, the pipeline will terminate above ground at the riser house. Connective piping will be installed to allow either of the two parallel lines to be used to fill or drain the pond. At Fac Ponds 1 and 2, the pipeline will terminate in a valve house as indicated on attached Drawing Nos. 3, 5, and 13 . Piping from the valve house will lead to Fac Ponds 1 and 2, Fac Pond 5, and the existing discharge manhole to the north of the Fac pond perimeter berm that discharges to the Niagara River. Piping will be installed in the new valve house to allow either of the two parallel lines to be used to transfer liquid from Fac Ponds 1 and 2 to Fac Pond 5 or vice versa, fill Fac Pond 5 with effluent from the site's treatment plant and to discharge liquid from Fac Pond 5 to the existing discharge piping leading to the Niagara River. The existing discharge filter system will be relocated from its current location at Fac Pond 3 to an area north of Fac Ponds 1 and 2.

The Action Leakage Rate (ALR) for Fac Pond 5 was calculated and a Response Action Plan (RAP) was prepared and is attached.

V. Land Disposal Regulations

LDRs have established treatment standards for wastewater discharged to surface impoundments. In November 1998, NYSDEC updated the 6NYCRR Part 376 regulations to adopt recently promulgated USEPA LDRs. The CWM Waste Analysis Plan describes the test procedures and frequency employed to assure that the treated effluent meets established LDRs under the multi-source leachate Waste Code F039.

IV. Operation

After treatment in the carbon adsorption system of the AWTS, the wastewater effluent is discharged into an effluent holding tank. Following qualification, the effluent is transferred to FAC Pond 1 and 2.

Periodically, this volume of treated effluent is pumped from Fac Pond 1 and 2 into Fac Pond 3 to accumulate sufficient quantities for discharge. The final step of the qualification process occurs in Fac Pond 3 where samples are collected and analyzed for comparison to the SPDES Permit limits. Once the effluent qualifies under the SPDES Permit, the wastewater is discharged via the facility's pipeline to the Niagara River. Generally, one batch is qualified and discharged per year. A typical volume is 15-25 million gallons per year.

Fac Ponds 1, 2 and 3 are equipped with mechanical aerators whose main purpose is to minimize odorous emissions from the pond by maintaining a high dissolved oxygen content. Aerators are operated on an as needed basis. The liquid level in each Fac Pond is visually inspected to maintain a freeboard of at least two feet.

Fac Pond 8 was taken out of service in 2004 and emptied in anticipation of closure. Prior to that time, Fac Pond 8 was used as the final qualification pond. Closure of Fac Pond 8 is currently in progress.

Development of the first phase (Cell 20) of RMU-2 will be at the location of current Fac Pond 8. During the development of the first phase of RMU-2 Fac Ponds 1 / 2 and 3 will operate as described above and Fac Pond 5 will be constructed. Fac Pond 3 will be closed in accordance with the Sitewide Closure Plan prior to the development of the second phase of RMU-2 after the final discharge from the pond.

The existing influent and effluent piping will be modified, as necessary, to accommodate the Fac pond construction and reconstruction. Piping will be installed in a new valve house to allow either of the two parallel lines to be used to transfer liquid from Fac Ponds 1 and 2 to Fac Pond 5 or vice versa, fill Fac Pond 5 with effluent from the site's treatment plant and to discharge liquid from Fac Pond 5 to the existing discharge piping leading to the Niagara River.

Periodically, a volume of treated effluent will be pumped from Fac Pond 1 and 2 into Fac Pond 5 to accumulate sufficient quantities for discharge. The final step of the qualification process will occur in Fac Pond 5 where samples will be collected and analyzed for comparison to the SPDES Permit limits. Once the effluent qualifies under the SPDES Permit, the wastewater will be discharged via the facility's pipeline to the Niagara River. Generally, one batch is qualified and discharged per year, however additional batches may be discharged within a calendar year. A typical volume will be 15-20 million gallons per year.

Fac Ponds 1, 2 and 5 will be equipped with mechanical aerators whose main purpose is to minimize odorous emissions from the pond by maintaining a high dissolved oxygen content. Aerators will be operated on an as needed basis. The liquid level in each Fac Pond will be visually inspected to maintain a freeboard of at least two feet.

Liquids will be pumped from the leak detection system of of Fac Pond 5 to the riser house constructed on the berm. The amount of liquids removed from the leak detection system sump will be recorded at least once each week during the active life and will compared to the Response Rate in the RAP and the ALR.

VII. Maintenance

Erosion protection is predominately provided for the exterior surfaces of all above grade impoundments in the form of a vegetative growth. Inspections of all active surface impoundment embankments are performed at least once each operating day.

A. Control of Overtopping and Maintenance of Dikes

1. Inspections

Specific inspection criteria are described in the facility's Inspection Plan for the following criteria:

1) measurement devices;
2) liquid level in the impoundment (indication whether two feet of freeboard is present);
3) no sudden drop in level of contents not associated with pumping;
4) no signs of severe erosion, deterioration, or instability of dikes;
5) aerators are operable when in use.

The inspections are designed to detect any evidence of deterioration, malfunction or improper operation which would compromise the efficiency of the overtopping control. Level control is accomplished by visual inspections of the measuring device affixed near each impoundment. This will assure that sudden changes in liquid level will be quickly detected.

Liquid losses, due to berm failure, from the FAC Ponds would be contained in the facility surface water drainage collection system until contingency measures were implemented.

Moreover, most of the Fac Ponds are below ground level, with the exception of new Fac Pond 5, making losses very minimal in the event of berm failure.

2. Erosion Protection

The exterior of the containment berms for the surface impoundments are vegetated to reduce the potential for erosion due to precipitation and runoff.

Inspections which indicate a problem with erosion will be handled by initiating the Environmental Work Order System. Restorative construction will consist of removal or reshaping the eroded soils, reseeding and adding additional material with compaction. The area will be monitored during subsequent inspections to ensure its viability.

VIII. Air Emission Standards

Air emission standards for surface impoundments are specified in 6NYCRR 373-2.29 and 40 CFR 264/265.1080-1091 (Subpart CC), which became effective on December 6, 1996. RCRA Subpart CC is applicable to owners and operators of a TSDF which treats, stores or disposes of hazardous waste containing greater than 500 ppmw volatile organics in tanks, surface impoundments and containers. If Subpart CC wastes are managed in a surface impoundment, a floating membrane continuous barrier or a cover vented through a closed vent system to a control device must be installed, unless specified exemptions apply. All surface impoundments at the CWM Model City Facility are exempt from these requirements as described below.

Fac Ponds 1, 2, 3, 8, and new Fac Pond 5 are exempt since the treated wastewater placed in these impoundments meets the applicable numerical organic limits for F039, as specified by the LDR regulations. In addition, all wastewaters are exempt after being treated at the AWTS, and so the effluent from AWTS is exempt.

FACULTATIVE PONDS 1 / 2 AND 5 PERMIT DRAWINGS

PERMIT DRAWINGS

FAC POND 5 PERMIT DRAWINGS

⚠

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NIAGARA COUNTY
NEW YORK

FEBRUARY 2013

WASTE MANAGEMENT

INDEX TO DRAWINGS

NOT TO SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING. USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
⚠	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNG	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr: TJF
Designed by: BMS/PTO | Drawn by: | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL ENGINEER · 072644

ARCADIS

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FAC POND 5 PERMIT DRAWINGS

TITLE AND INDEX

GENERAL

ARCADIS Project No. B0023725.2013.00003

Date: FEBRUARY 2013

ARCADIS of New York, Inc.
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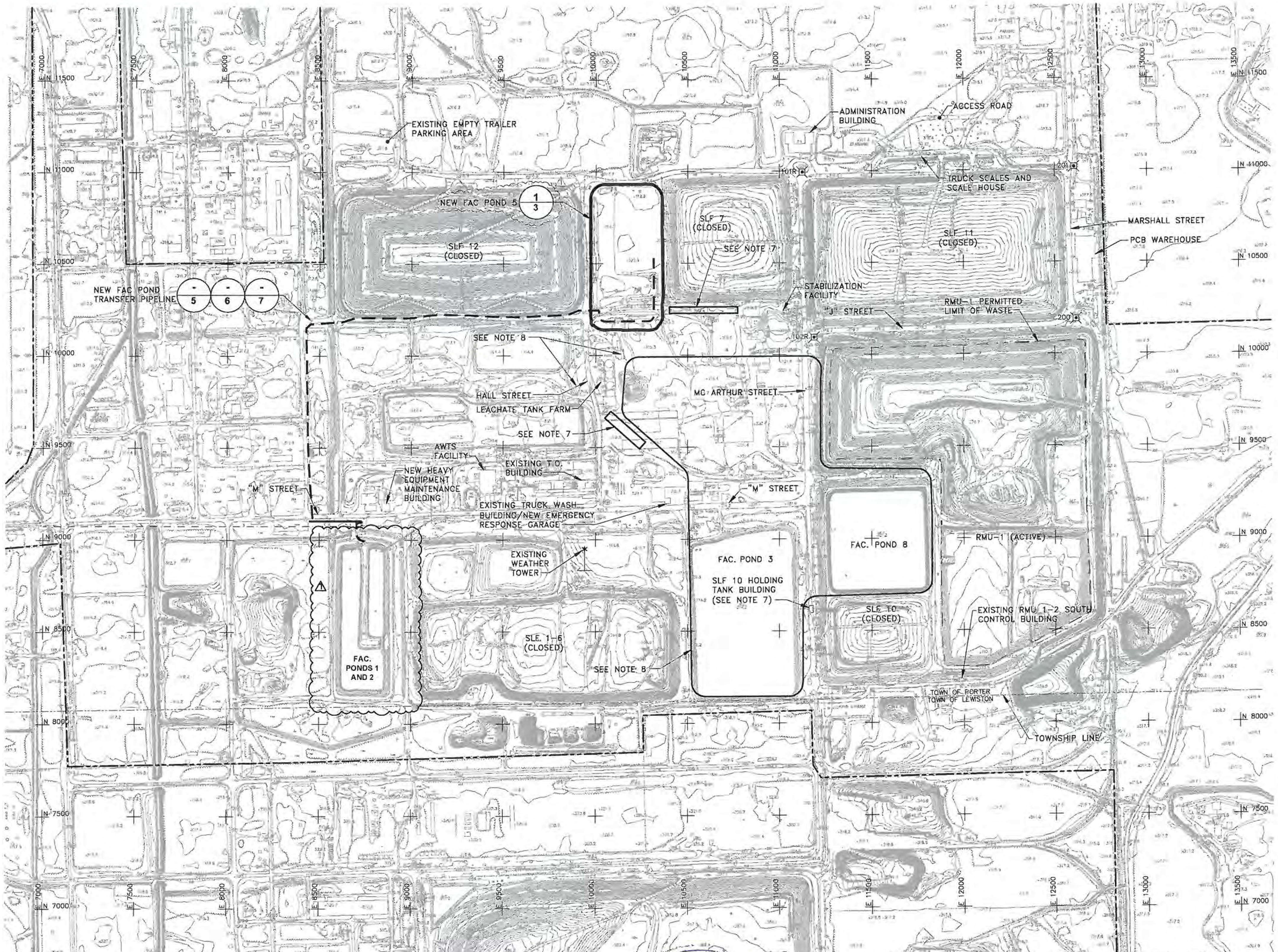

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- BRUSHLINE
- CABLE MARKER
- CATCH BASIN
- DROP INLET
- FENCE
- FIRE HYDRANT
- GUARD RAIL
- LIGHT POLE
- MISCELLANEOUS POLE
- MONUMENT
- POST
- RAILROAD TRACKS
- SIGN
- SWAMP
- TRAFFIC LIGHT
- TREE
- TREELINE
- UNIDENTIFIED OBJECT
- UTILITY POLE
- VALVE
- WATER LINE
- EXISTING CONTOUR
- EXISTING GRADEBREAK
- PROPERTY LINE

200 CONTROL MONUMENT (SEE TABLE BELOW)

1 DETAIL REFERENCE NUMBER
3 DRAWING REFERENCE NUMBER

E 13500 N 7000 COORDINATE GRID (SEE NOTE 3)

RMU-1/RMU-2 CONTROL MONUMENTS

MONUMENTS	ELEVATION	CWM PLANT GRID		RMU-1 GRID		NY STATE PLANE COORDINATES (NAD-27)		NGVD-29 ELEVATION
		NORTHING	EASTING	NORTHING	EASTING	NORTHING	EASTING	
102R	319.72	100+94.55	111+87.56	100+94.65	11+87.56	1,175,430.46	396,380.12	319.66
200	318.33	101+89.56	126+13.77	101+89.56	26+13.77	1,175,488.28	397,808.18	318.27
101R	316.01	109+94.28	111+23.09	---	---	1,176,331.436	396,339.034	315.92
201	316.62	110+17.82	126+3.49	---	---	---	---	---

CONTROL MONUMENTS NOTE:

1. RMU-1 EASTING GRID COORDINATES ARE SIMPLIFIED PLANT GRID COORDINATES. SUBTRACTING 10,000 FROM THE CWM PLANT GRID EASTING COORDINATE WILL CONVERT THE CWM PLANT GRID TO THE RMU-1 GRID. NOTE THAT NO CONVERSION IS REQUIRED FOR NORTHING COORDINATES.

NOTES:

1. TOPOGRAPHIC BASE MAP CONSISTS OF COMBINATION OF DATA COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 5/31/01 BY AIR SURVEY CORP. (PROJECT NO.71010503). AND AN AUGUST 2008 SURVEY BY ENSOL, INC.
2. VERTICAL DATUM BASED ON NGS MEAN SEA LEVEL.
3. GRID COORDINATES SHOWN ARE CWM PLANT GRID.
4. CONTOUR INTERVAL 2 FT.
5. DASHED CONTOURS INDICATE THAT GROUND IS PARTIALLY OBSCURED BY VEGETATION OR SHADOWS. THESE AREAS MAY NOT MEET STANDARD ACCURACY AND REQUIRE FIELD VERIFICATION.
6. PROPERTY LINE IS APPROXIMATE. EASEMENTS AND RIGHT-OF-WAYS NOT SHOWN.
7. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
8. REFER TO DRAWINGS IN ATTACHMENT J FOR FURTHER DETAIL.

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G:\ENVCAD\SYRACUSE\ACT\B0023725\2013\00003\DWG\CONTRACT\FACSPOND\23725G02.dwg LAYOUT: 2 SAVED: 11/1/2013 11:20 AM ACADVER: 18.1S (LMS TECH)
XREFS: 23725X02 23725X01 23725X00 IMAGES: PROJECTNAME: ----

300' 0 300' 600'
1"=300'

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr: TJF
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

Joseph Molina

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SITE PLAN

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2

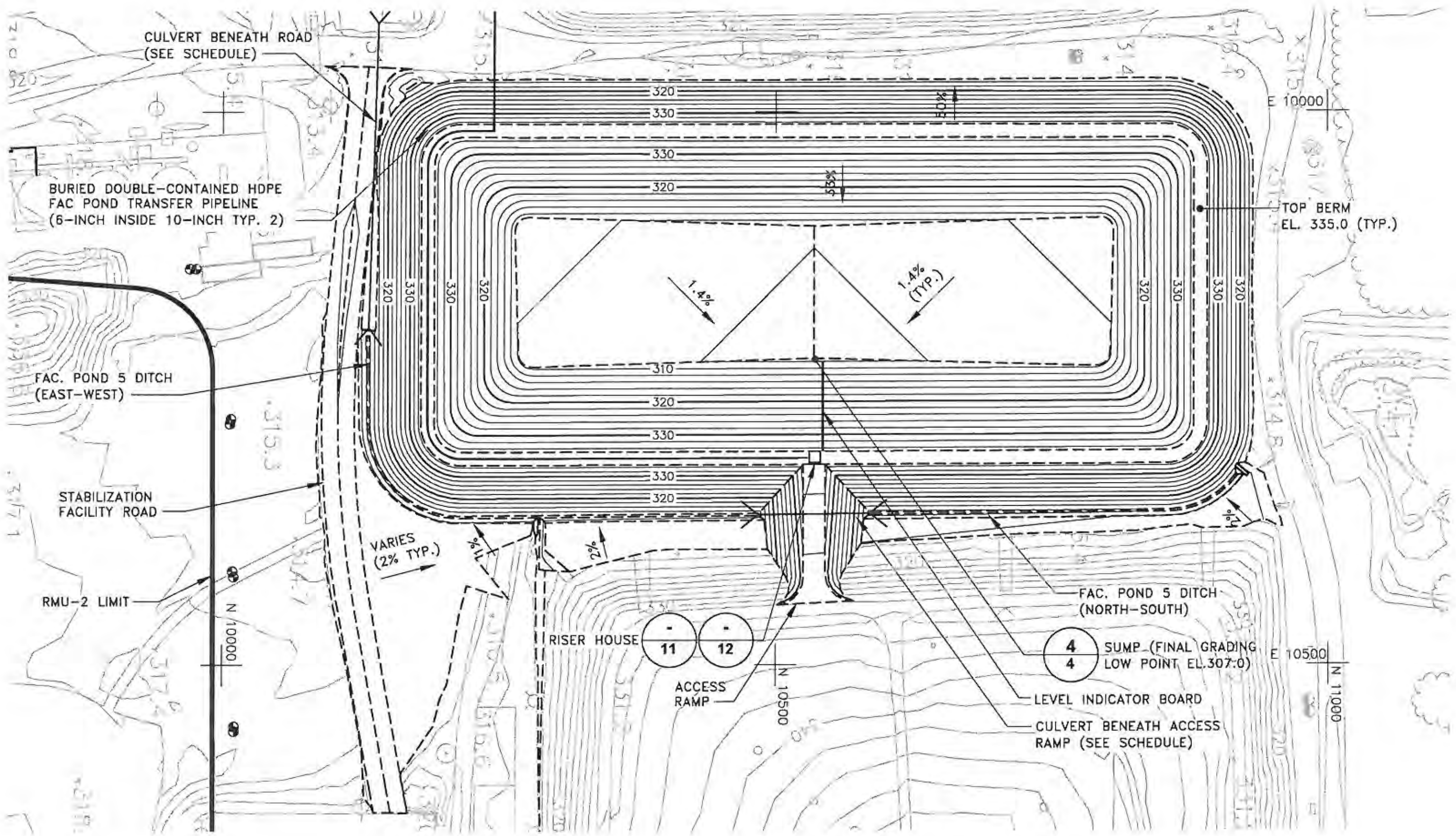
LEGEND:

WATER LINE
EXISTING CONTOUR
EXISTING GRADE BREAK
PROPERTY LINE
320 PROPOSED INDEX ELEVATION CONTOUR
PROPOSED INTERMEDIATE ELEVATION CONTOUR
PROPOSED GRADE BREAK
31 DETAIL REFERENCE NUMBER
3 DRAWING REFERENCE NUMBER
N 8000 E 8500 COORDINATE GRID

NOTES:

1. SEE DRAWING 2 FOR BASEMAP INFORMATION.
2. PROPOSED GRADES REPRESENT FINAL GRADING (TOP OF BALLAST LAYER ON FLOOR AND TOP OF PRIMARY LINER ON INTERIOR SIDESLOPES).

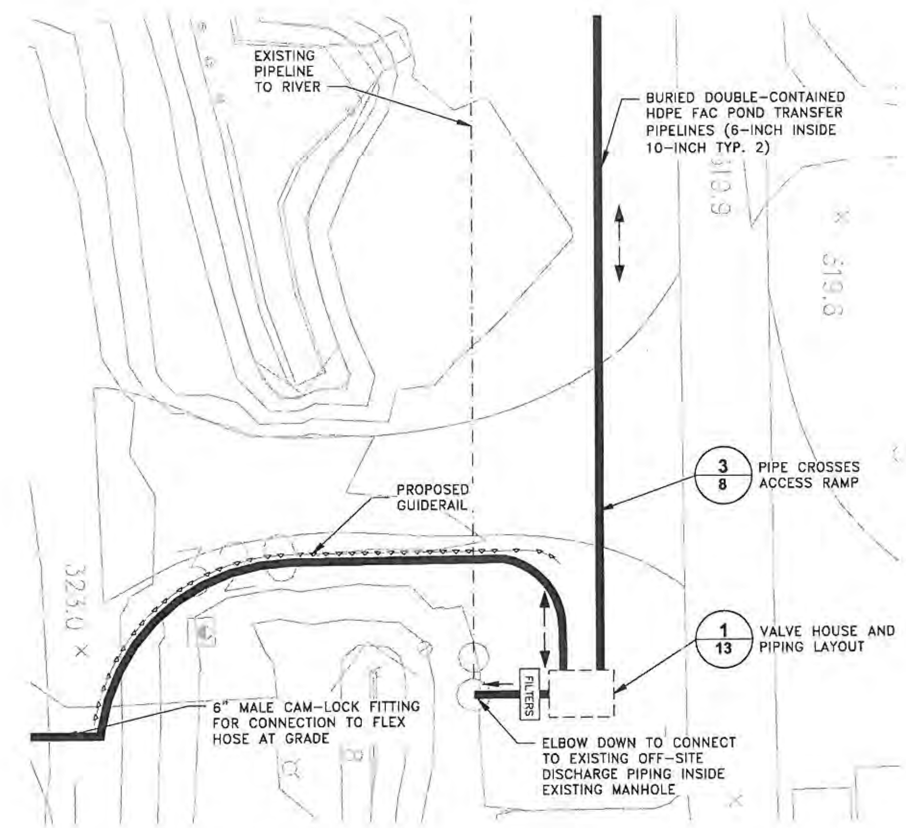
CULVERT ID	SIZE	SLOPE %
BENEATH ACCESS RAMP	24"	0.3%
BENEATH ROAD	36"	0.3%



FAC POND 5 PLAN

1

SCALE: 1"=80'



FAC POND 1 TRANSFER PIPELINE CONNECTION TO FILTER AND OFF-SITE DISCHARGE PIPING

2

SCALE: 1"=20'

SCALE(S) AS INDICATED

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State: NY
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Project Mgr.: TJR
Designed by: BMS/PTO
Drawn by: SJK
Checked by: BMS

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FAC POND GRADING PLAN

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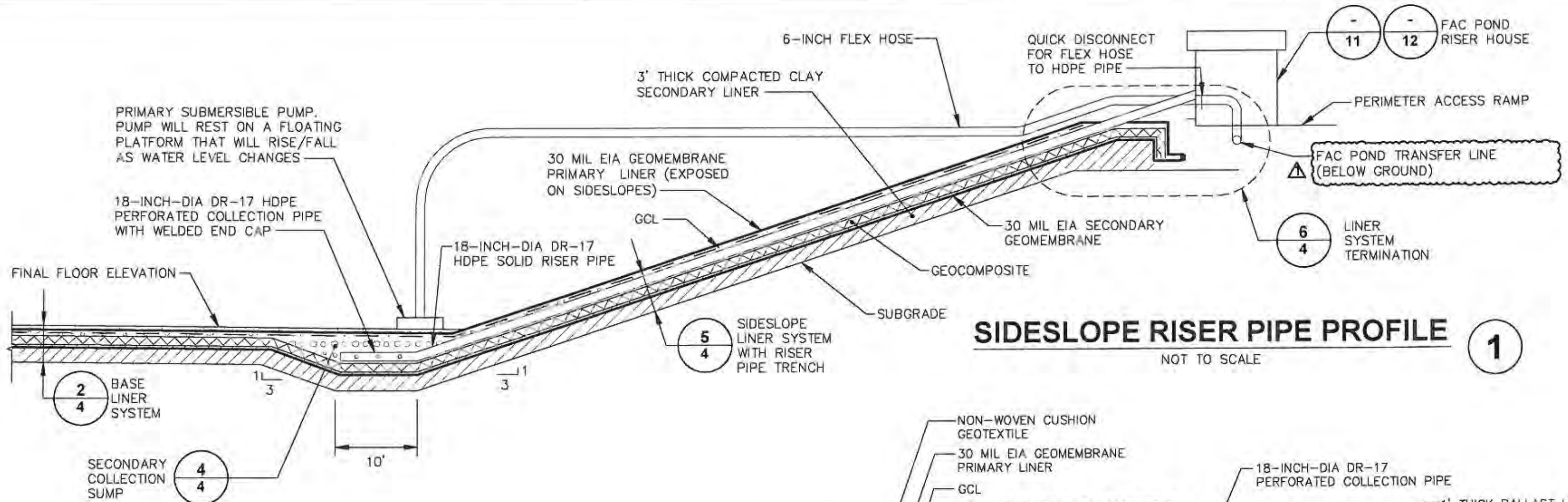
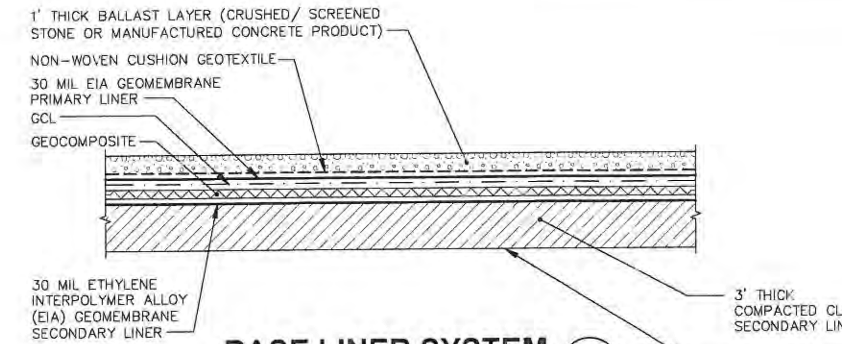


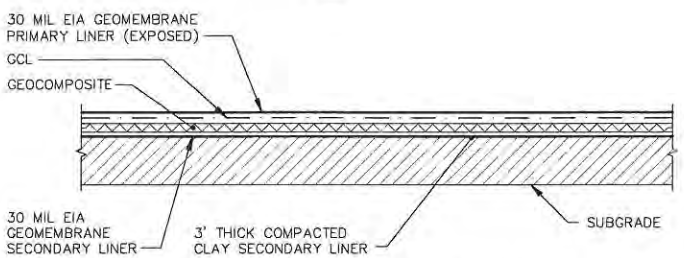
SIDESLOPE RISER PIPE PROFILE (1)

NOT TO SCALE



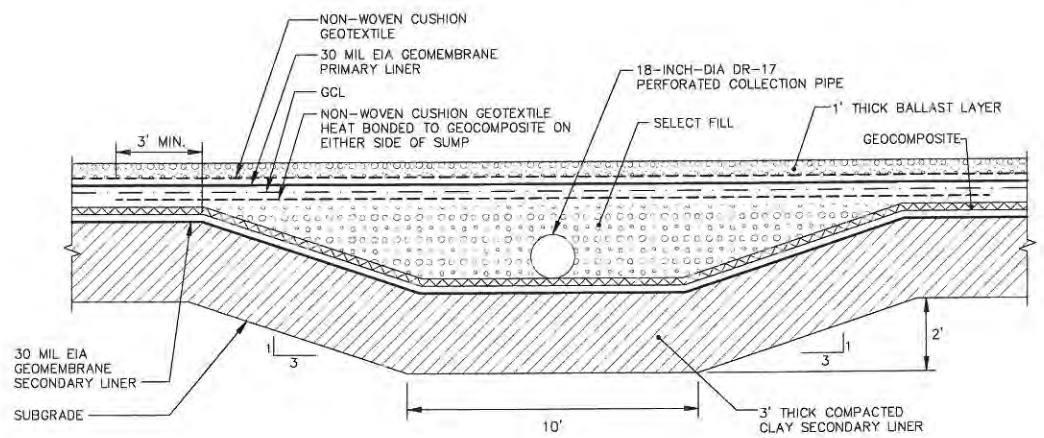
BASE LINER SYSTEM (2)

NOT TO SCALE



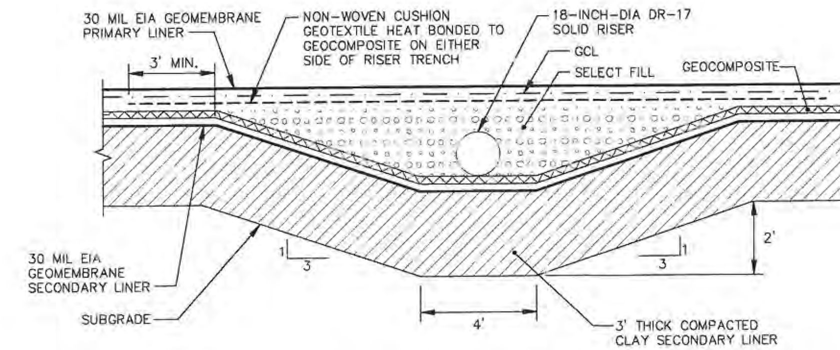
SIDESLOPE LINER SYSTEM (3)

NOT TO SCALE



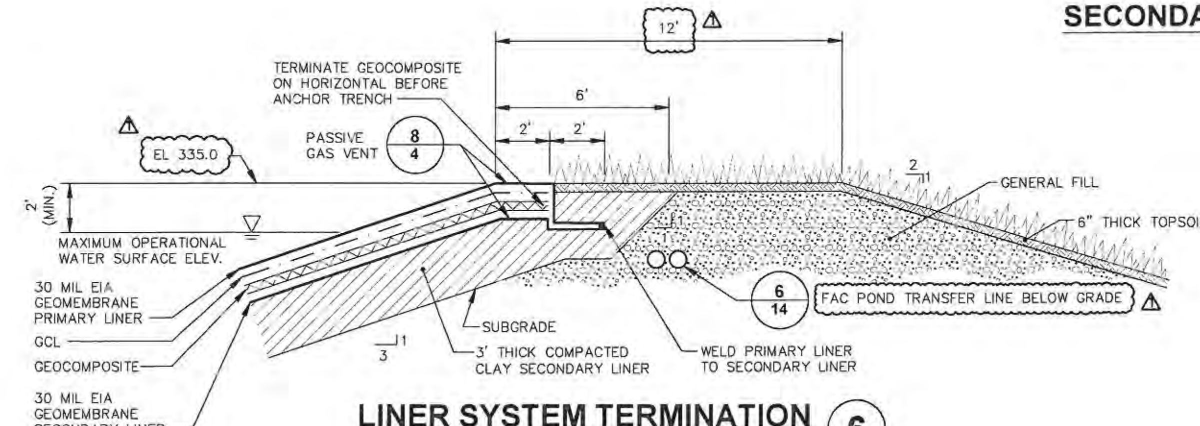
SECONDARY COLLECTION SUMP SECTION (4)

NOT TO SCALE



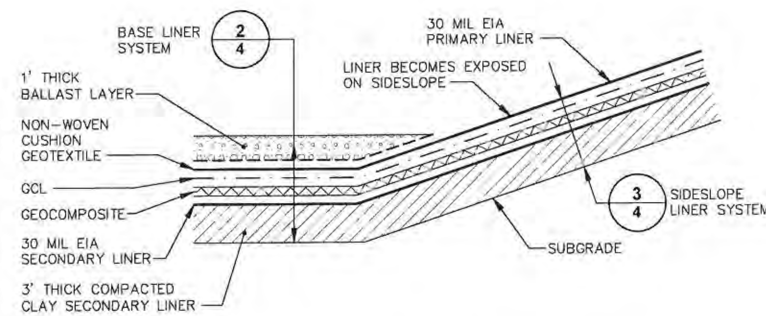
SIDESLOPE LINER SYSTEM WITH RISER PIPE TRENCH (5)

NOT TO SCALE



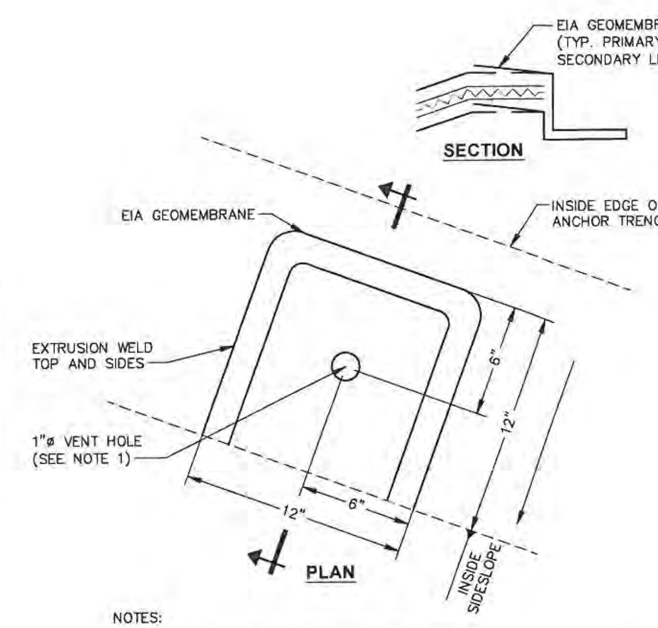
LINER SYSTEM TERMINATION (6)

NOT TO SCALE



FLOOR TO SIDESLOPE TRANSITION (7)

NOT TO SCALE



NOTES:

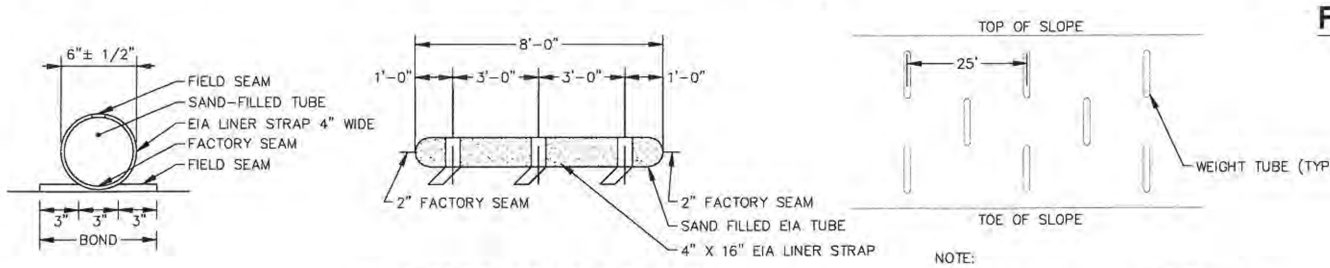
1. VENT POCKETS SHALL BE INSTALLED EVERY 200 FEET ALONG TOP OF SLOPE OF LINER SYSTEM.
2. AT EACH VENT POCKET LOCATION BOTH UPPER AND LOWER GEOMEMBRANES SHALL BE VENTED.

VENT POCKET DETAIL (8)

NOT TO SCALE

GENERAL NOTE:

1. GEOSYNTHETICS ARE SHOWN AT AN EXAGGERATED SCALE IN CERTAIN DETAILS FOR CLARITY.



NOTE:

1. WEIGHT TUBE SHALL BE PLACED EVERY 25' ALONG FAC POND SIDESLOPE.

WEIGHT TUBE DETAIL (9)

NOT TO SCALE

NOT TO SCALE

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Professional Engineer's No.: 072644
State: NY
Date Signed: 11/5/13
Project Mgr.: TJF
Designed by: GNG
Drawn by: LAF
Checked by: BMS

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FAC POND SECTIONS AND DETAILS

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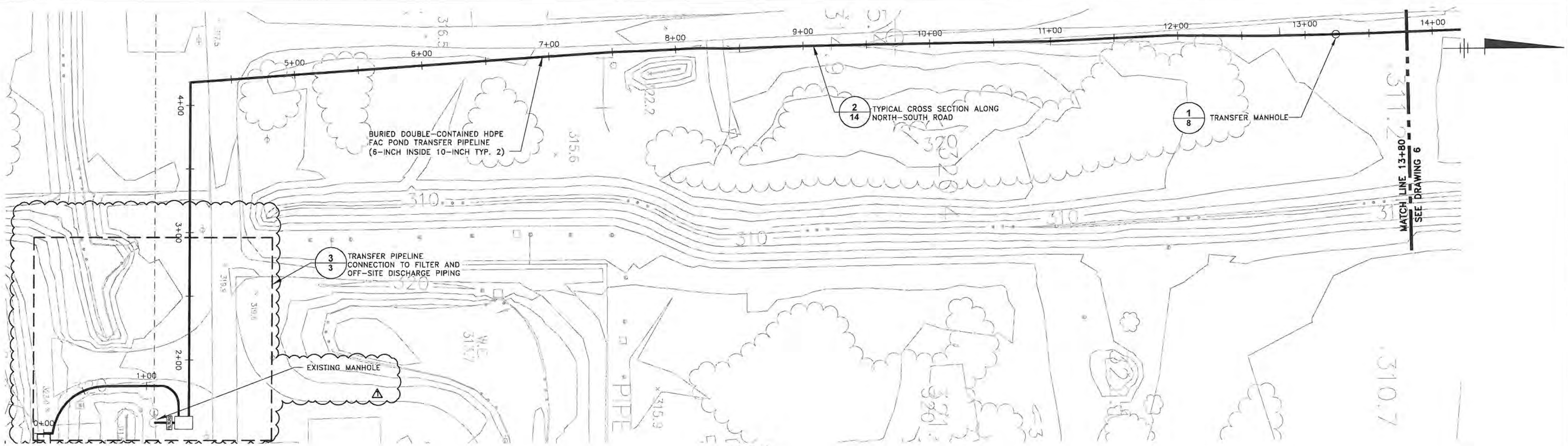
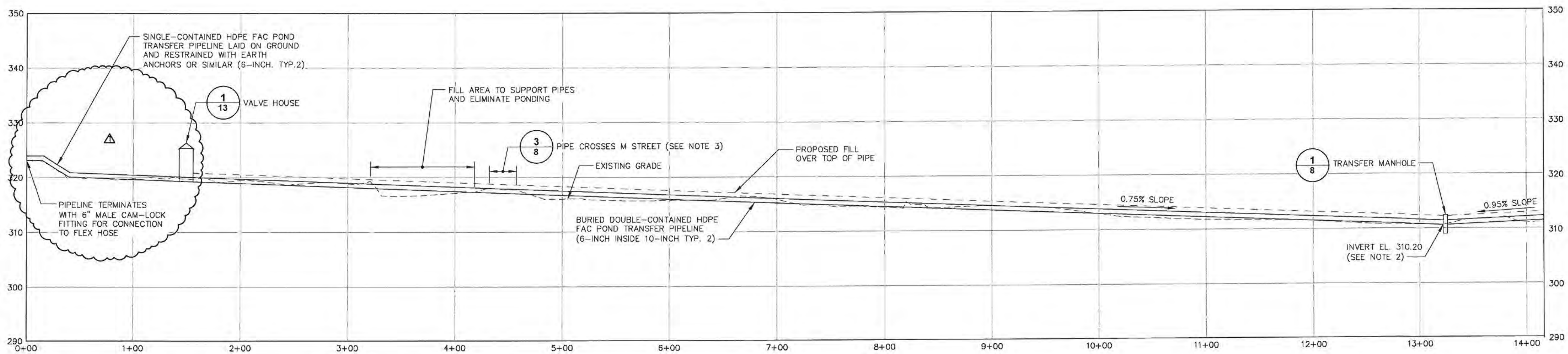


PLAN



PROFILE

NOTES:

1. ADDITIONAL PIPING (NOT SHOWN) WILL BE INSTALLED WITHIN EXISTING MANHOLE TO CONNECT NEW TRANSFER PIPELINES TO EXISTING OFF-SITE DISCHARGE PIPING.
2. ELEVATIONS REFERENCED REPRESENT INVERT OF THE CONTAINMENT PIPE (OUTER), EXCEPT WHERE SINGLE-CONTAINED PIPE IS INDICATED.
3. DUCTILE IRON SLEEVE PIPE SHALL BE USED TO PROTECT HDPE PIPE AT ALL ROAD CROSSINGS.

SCALE(S) AS INDICATED

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Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by | Drawn by: SJK | Checked by: BMS

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FAC POND TRANSFER PIPELINE

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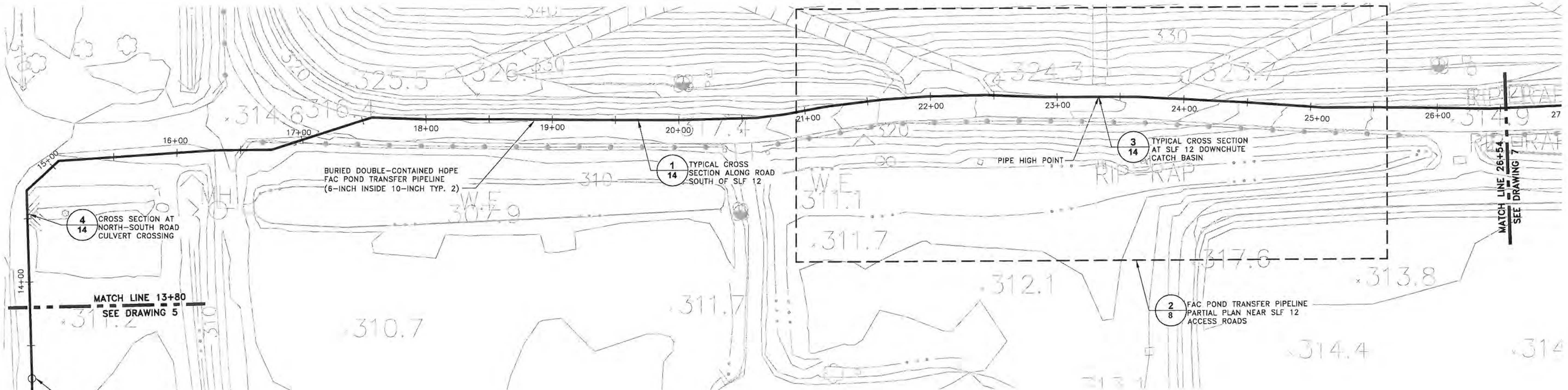
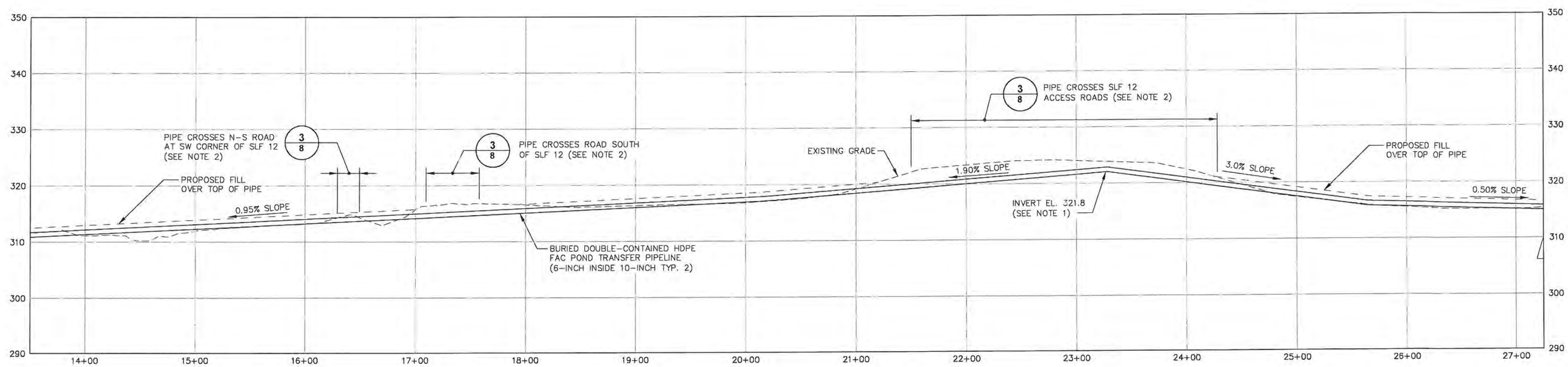


PLAN

0 40' 80'
SCALE: 1"=40'



PROFILE

0 50' 100'
HORIZONTAL SCALE: 1"=50'
0 10' 20'
VERTICAL SCALE: 1"=10'

NOTES:

1. ELEVATIONS REFERENCED REPRESENT INVERT OF THE CONTAINMENT PIPE (OUTER).
2. DUCTILE IRON SLEEVE PIPE SHALL BE USED TO PROTECT HDPE PIPE AT ALL ROAD CROSSINGS.

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Professional Engineer's No.: 072644
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Designed by: | Drawn by: SJK | Checked by: BMS

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FAC POND TRANSFER PIPELINE

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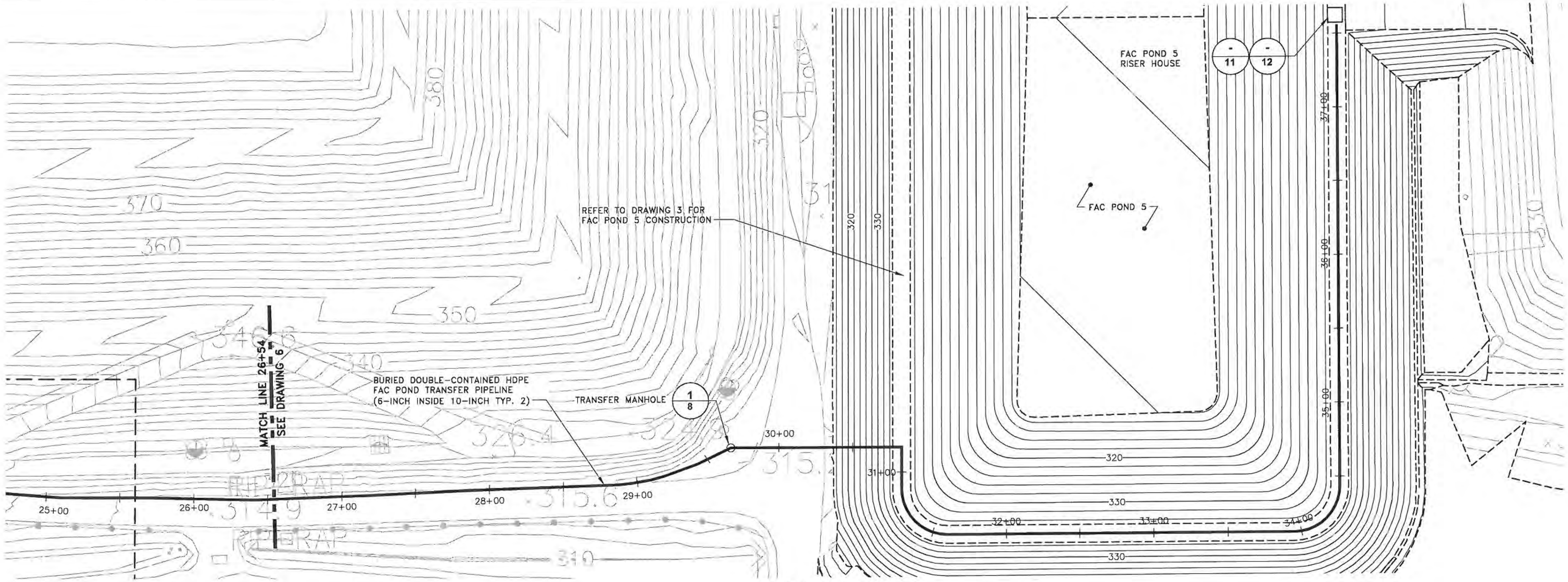
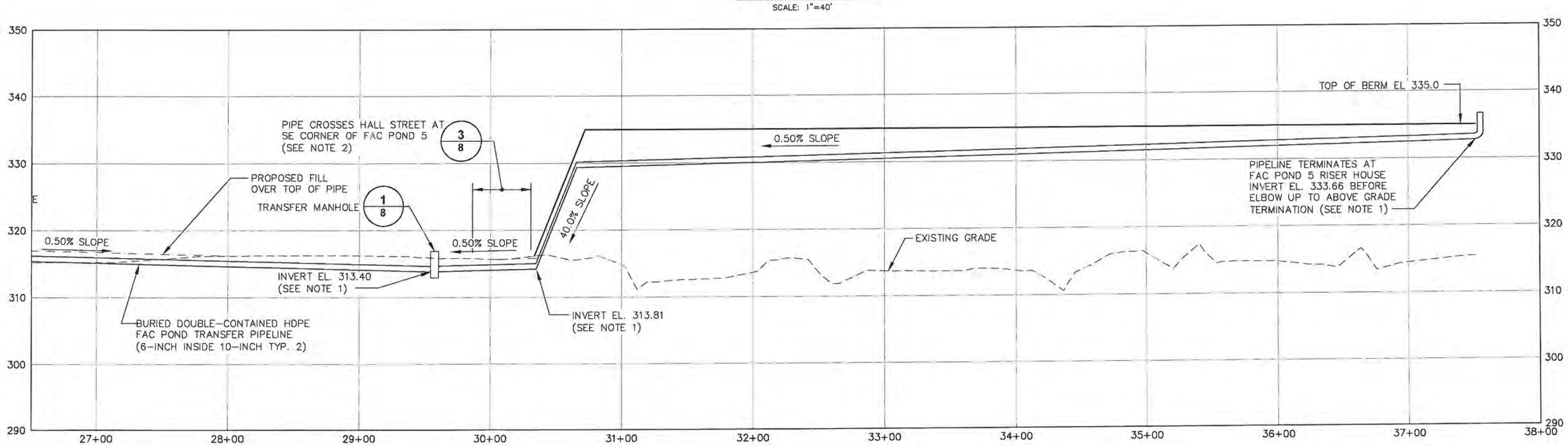


PLAN

SCALE: 1"=40'



PROFILE

HORIZONTAL SCALE: 1"=50'   VERTICAL SCALE: 1"=10'

NOTES:

1. ELEVATIONS REFERENCED REPRESENT INVERT OF THE CONTAINMENT PIPE (OUTER).
2. DUCTILE IRON SLEEVE PIPE SHALL BE USED TO PROTECT HDPE PIPE AT ALL ROAD CROSSINGS.

SCALE(S) AS INDICATED

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State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by | Drawn by: SJK | Checked by: BMS

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FAC POND TRANSFER PIPELINE

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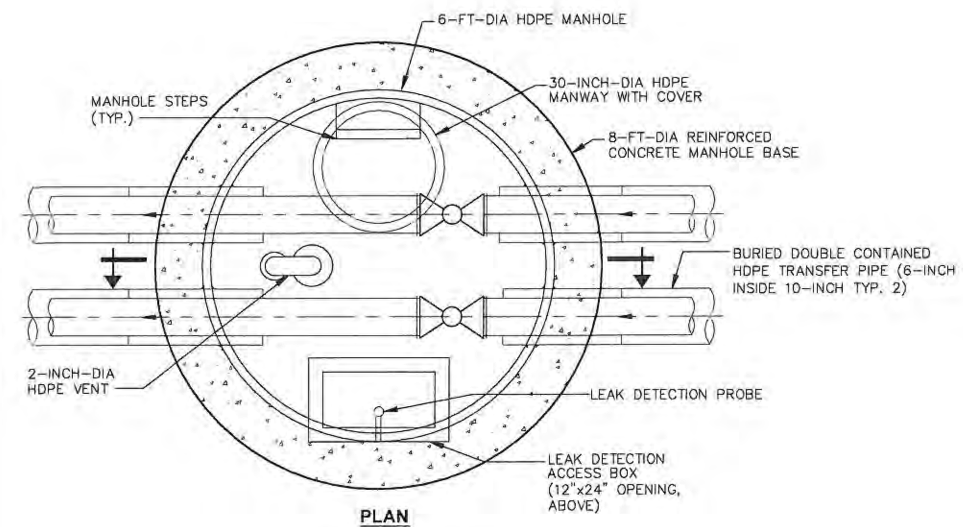

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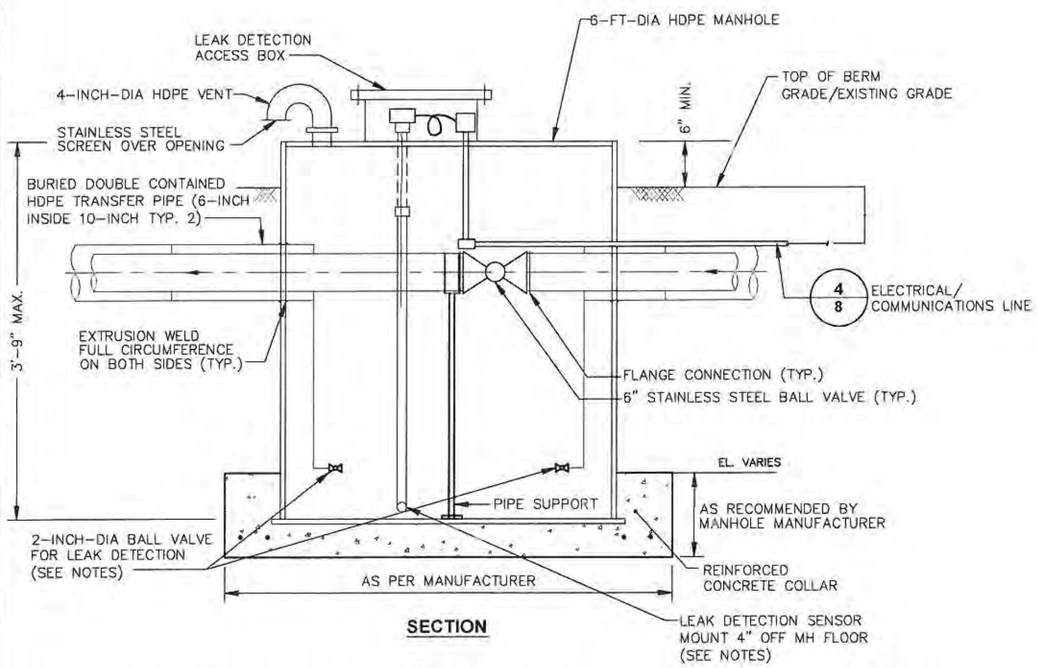


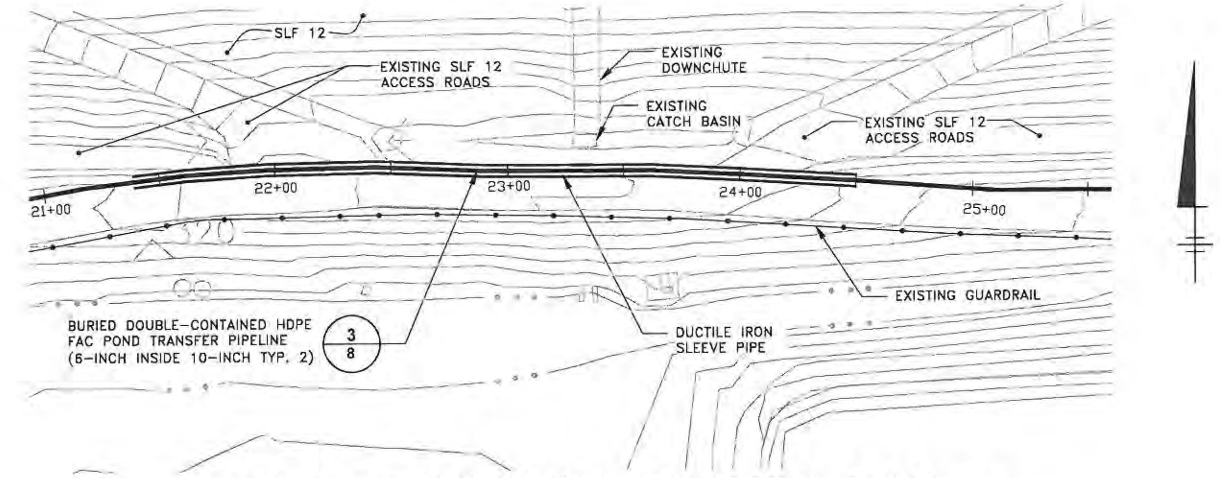
SECTION

NOTES:

1. INSTALL LEAK DETECTION VALVES AT LOW POINTS ONLY.
2. SEAL END OF SECONDARY TRANSFER HDPE PIPE FOR TESTING PURPOSES. 1" THICK FLATSTOCK RING TO BE EXTRUSION WELDED TO BOTH PRIMARY AND SECONDARY PIPES.
3. ELECTRONIC LEAK DETECT SENSORS WIRED TO FAC POND TRANSFER PUMPS TO AUTOMATICALLY SHUT OFF PUMPS WHEN ACTIVATED.

TYPICAL TRANSER MANHOLE (1)

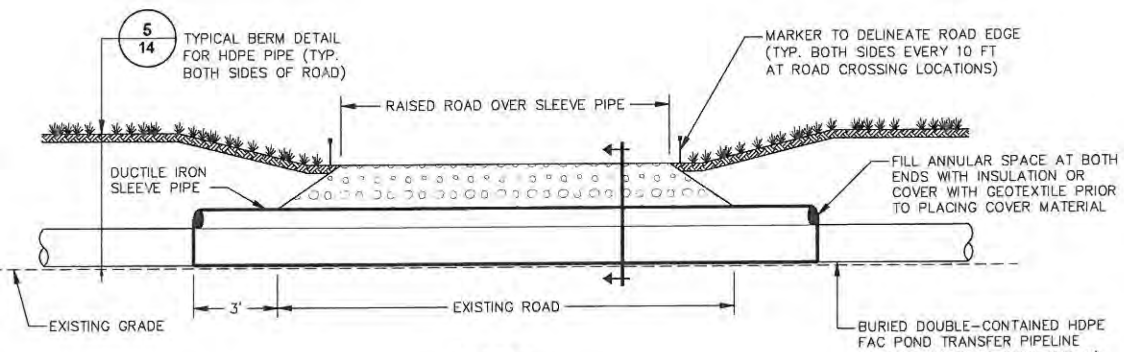
NOT TO SCALE



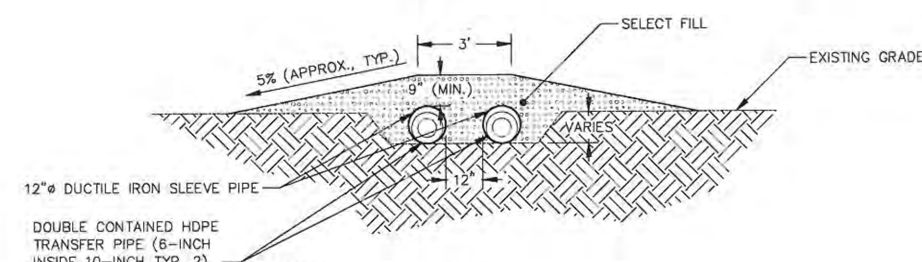
FAC POND TRANSFER PIPELINE PARTIAL PLAN NEAR SLF 12 ACCESS ROADS (2)

0 40' 80'

SCALE: 1"=40'



PROFILE



NOTES:

1. DUCTILE IRON SLEEVE PIPE SHALL BE USED TO PROTECT HDPE PIPE AT ALL ROAD CROSSINGS.
2. DUCTILE IRON PIPE SHALL HAVE MINIMUM WALL THICKNESS OF 0.50 INCHES.
3. PIPE DEPTH BELOW GROUND VARIES DEPENDING ON LOCATION.

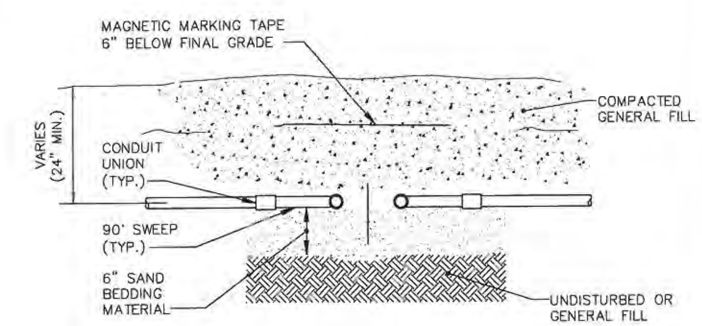
SECTION

FAC POND TRANSFER PIPELINE ROAD CROSSING (3)

NOT TO SCALE

GENERAL NOTE:

1. ALL HDPE PIPING SHALL BE DR-11.



NOTES:

1. NUMBER AND SIZE OF CONDUITS MAY VARY.
2. CONDUITS TO BE SPACED 6" APART MINIMUM.
3. POWER CONDUITS: RIGID STEEL PVC COATED (PLASTI-BOND), SIZE MAY VARY.
4. I/O COMM CONDUIT: 1" RIGID STEEL PVC COATED (PLASTI-BOND).

TYPICAL UNDERGROUND CONDUIT INSTALLATION DETAIL (4)

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Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by | Drawn by: BKD | Checked by: BMS

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FAC POND TRANSFER PIPELINE DETAILS

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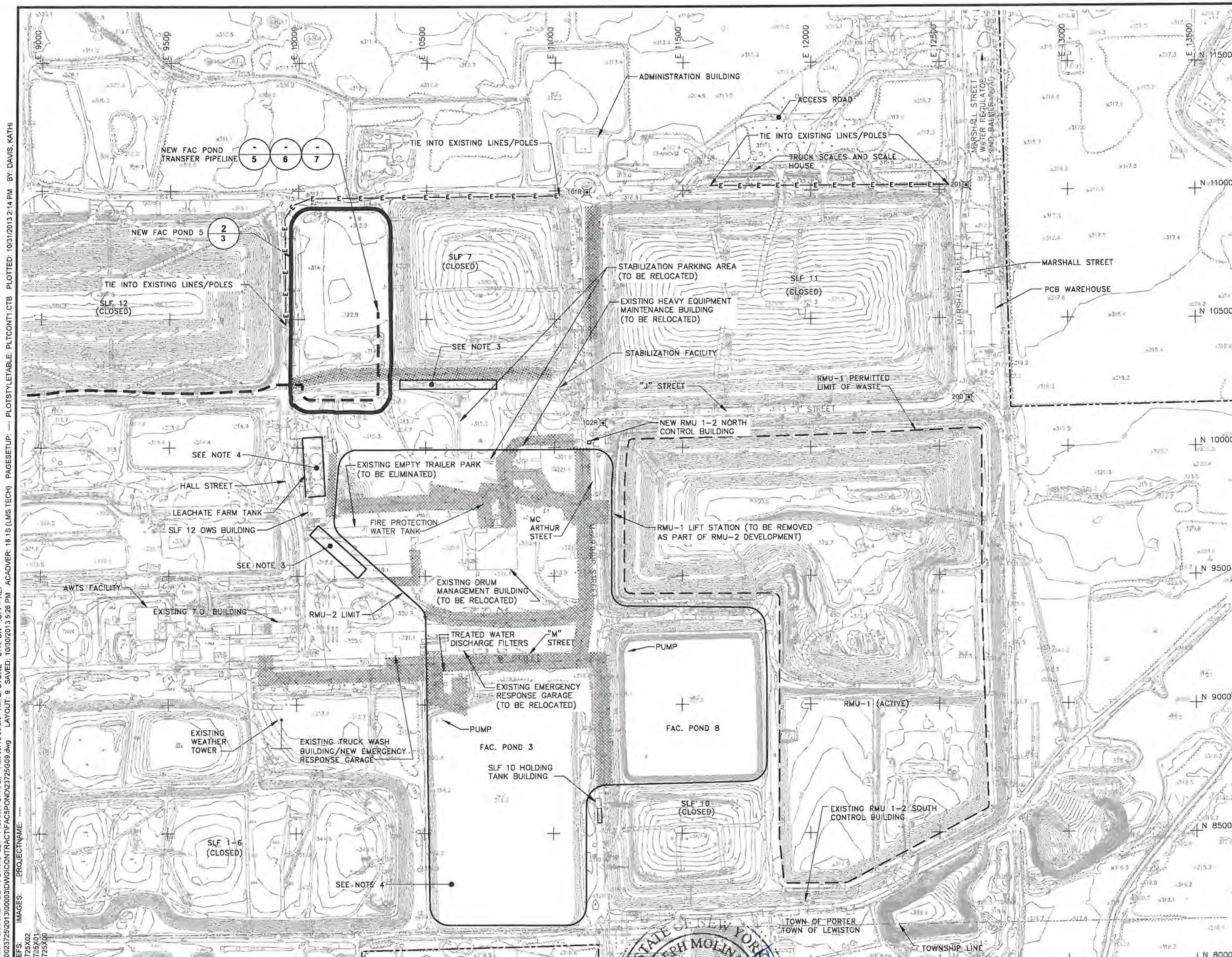

LEGEND:

- BRUSHLINE
- CABLE MARKER
- CATCH BASIN
- DROP INLET
- FENCE
- FIRE HYDRANT
- GUARD RAIL
- LIGHT POLE
- MISCELLANEOUS
- POLE
- MONUMENT POST
- RAILROAD TRACKS
- SIGN
- SWAMP
- TRAFFIC LIGHT
- TREE
- TREELINE
- UNIDENTIFIED OBJECT
- UTILITY POLE
- VALVE
- WATER LINE
- EXISTING CONTOUR
- EXISTING GRADEBREAK
- PROPERTY LINE
- ELECTRICAL UTILITIES TO BE REMOVED
- ABOVE-GROUND ELECTRICAL UTILITIES
- UNDERGROUND ELECTRICAL UTILITIES
- PROPOSED ABOVE-GROUND ELECTRICAL UTILITIES
- 200 CONTROL MONUMENT (SEE TABLE BELOW)
- 2 / 33 DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER
- E 13500 N 7000 COORDINATE GRID (SEE NOTE 3)

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASEMAP INFORMATION.
2. ELECTRICAL UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED ON SITE OBSERVATIONS MADE IN 2003 BY BLASLAND, BOUCK & LEE, INC. (NOW KNOWN AS ARCADIS) AND INPUT FROM CWM. POINT OF CONNECTION BETWEEN EXISTING AND PROPOSED UTILITIES ARE APPROXIMATE.
3. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
4. REFER TO DRAWINGS IN ATTACHMENT J FOR FURTHER DETAIL.

200' 0 200' 400'
1"=200'

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Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by: BMS/NWF | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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SITE ELECTRICAL FEED RELOCATION PLAN

GENERAL

ARCADIS Project No. B0023725.2013.00003
Date: FEBRUARY 2013

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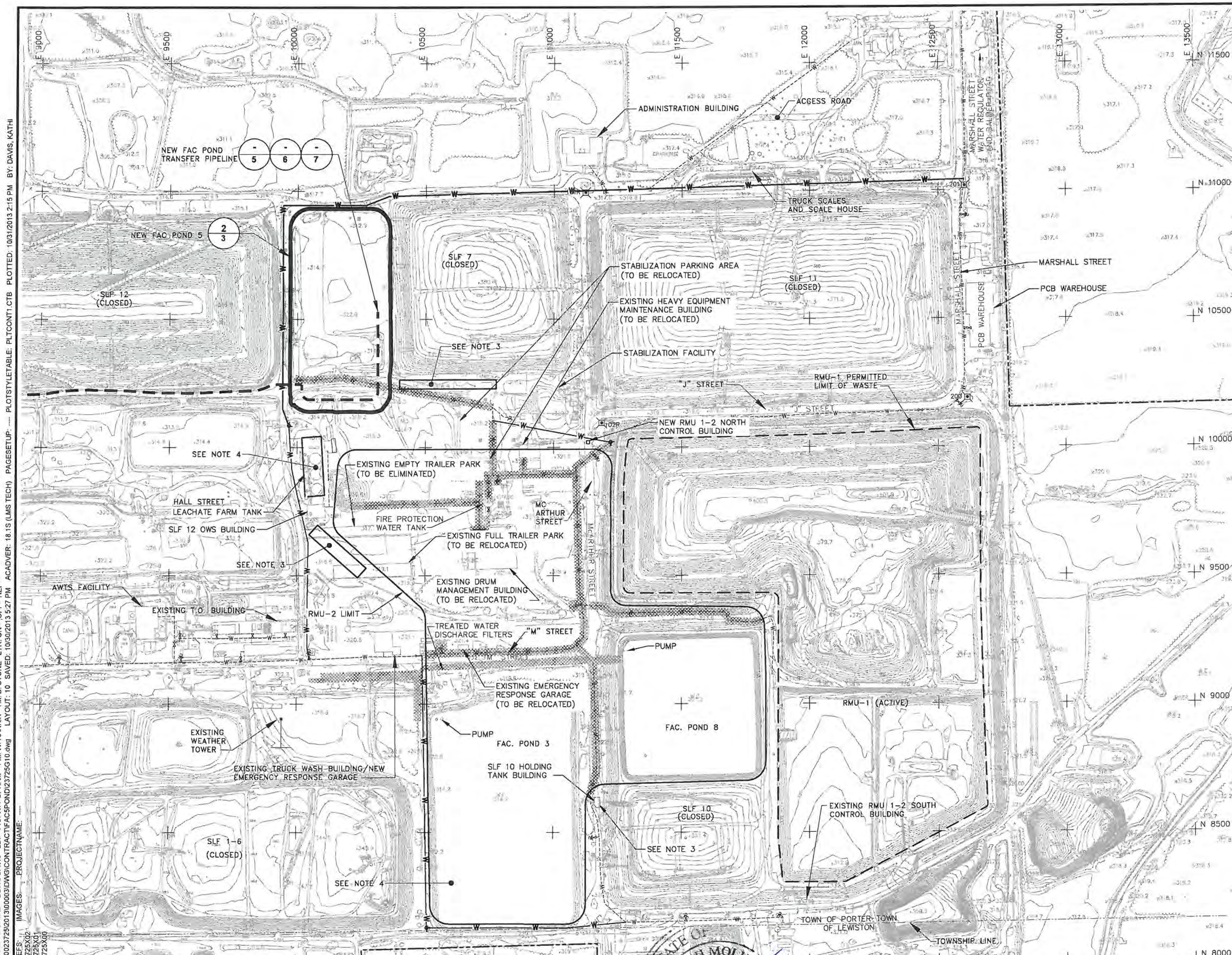

LEGEND:

- BRUSHLINE
- CABLE MARKER
- CATCH BASIN
- DROP INLET
- FENCE
- FIRE HYDRANT
- GUARD RAIL
- LIGHT POLE
- MISCELLANEOUS
- POLE
- MONUMENT POST
- RAILROAD TRACKS
- SIGN
- SWAMP
- TRAFFIC LIGHT
- TREE
- TREELINE
- UNIDENTIFIED OBJECT
- UTILITY POLE
- VALVE
- POTABLE WATER
- REROUTE OF WATER SUPPLY
- NEW WATERLINE
- EXISTING CONTOUR
- EXISTING GRADEBREAK
- PROPERTY LINE
- ACTIVE WATER SUPPLY LINES TO BE DISCONNECTED AND ABANDONED IN PLACE AND/OR REMOVED
- 200 CONTROL MONUMENT
- 2 — DETAIL REFERENCE NUMBER; 33 — DRAWING REFERENCE NUMBER
- E 13500, N 7000 COORDINATE GRID

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASEMAP INFORMATION.
2. WATER SUPPLY LINES SHOWN ARE APPROXIMATE AND ARE BASED ON SITE OBSERVATIONS MADE IN 2003 BY BLASLAND, BOUCK & LEE, INC. (NOW KNOWN AS ARCADIS) AND INPUT FROM CWM. POINT OF CONNECTION BETWEEN EXISTING AND PROPOSED WATER SUPPLY LINES ARE APPROXIMATE.
3. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
4. REFER TO DRAWINGS IN ATTACHMENT J FOR FURTHER DETAIL.

200' 0 200' 400'
1"=200'

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Designed by: BMS/NWF | Drawn by: LAF | Checked by: BMS

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SITE WATER SUPPLY RELOCATION PLAN

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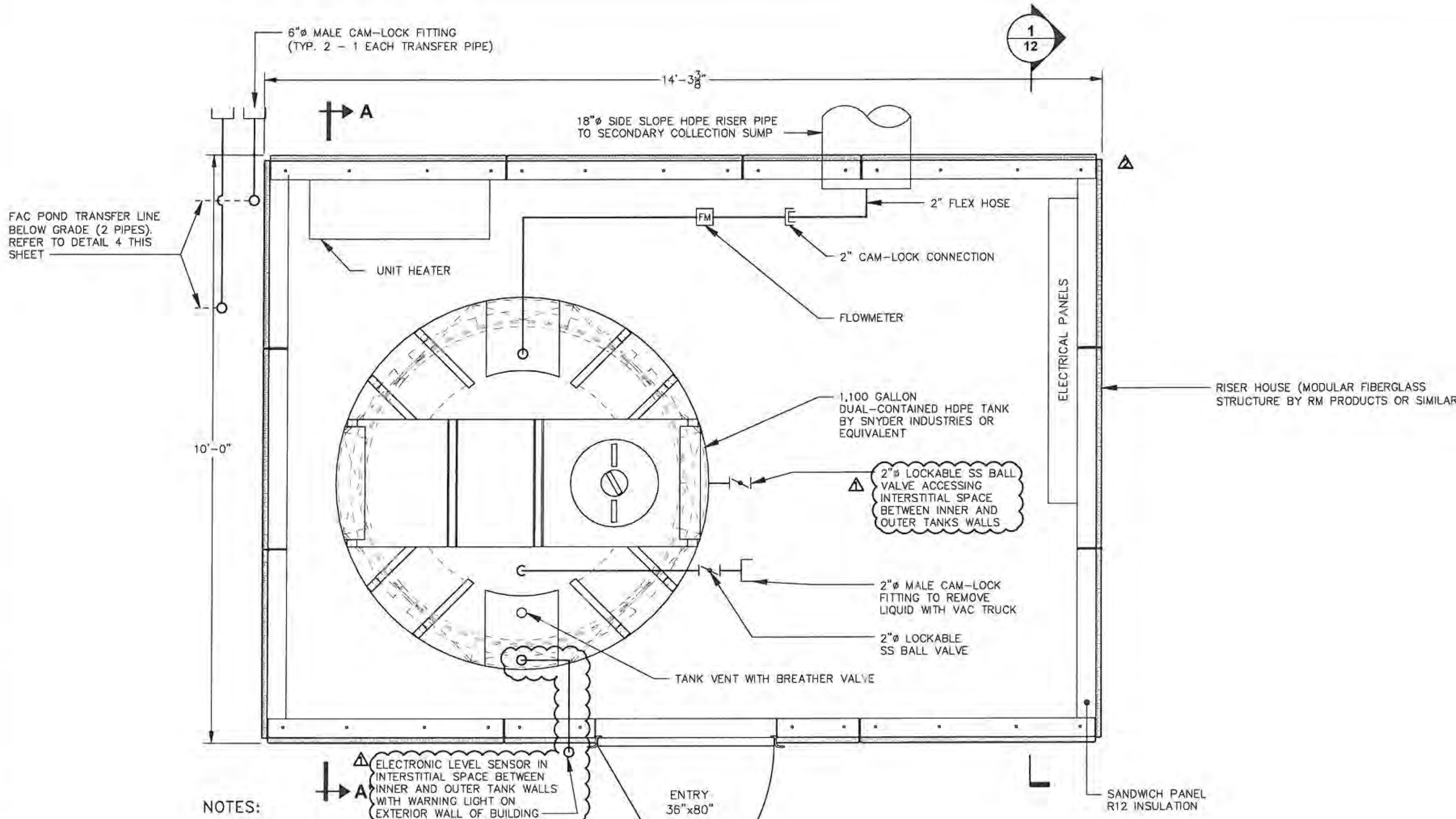
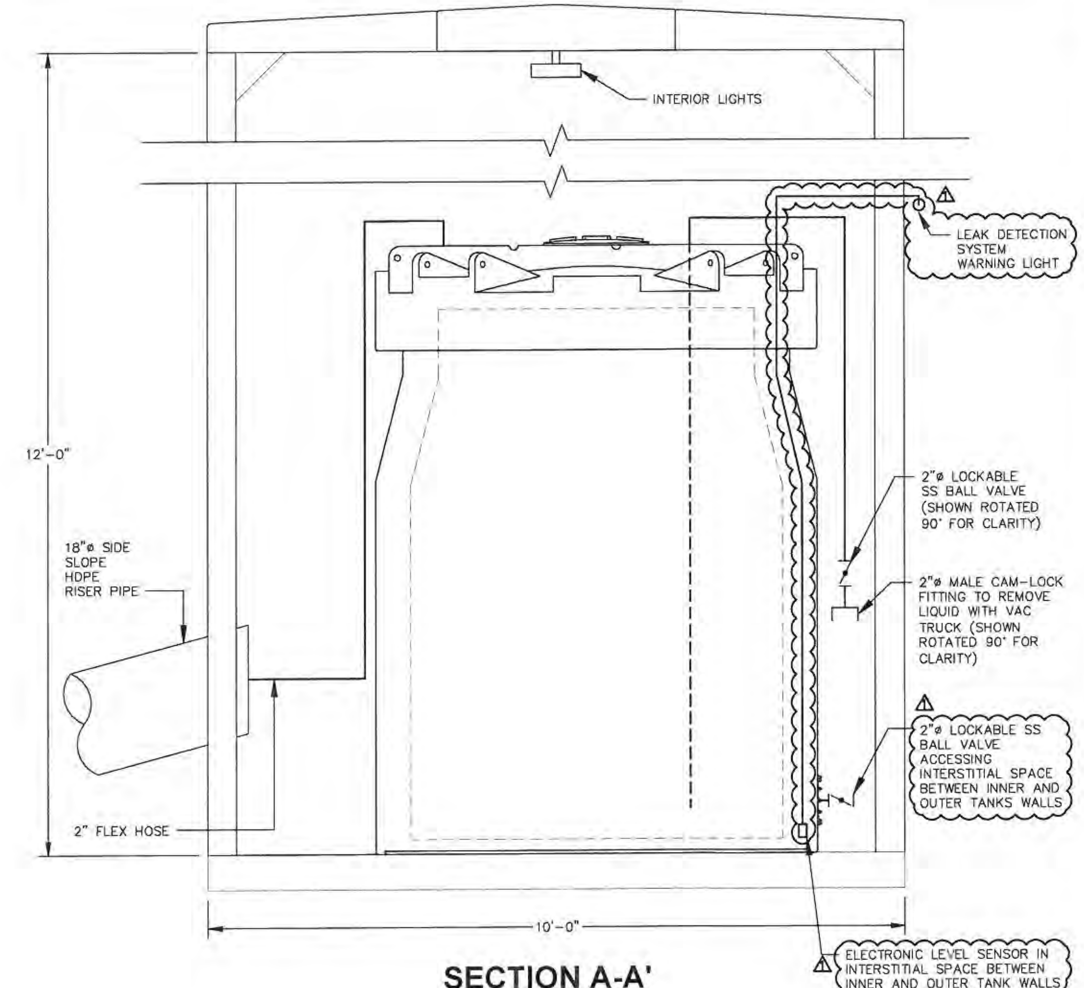


NOTES:

1. ALL PIPE PENETRATIONS OF EXTERIOR WALL SHALL BE SEALED.
2. SEE DRAWING 12 FOR ELECTRICAL AND INSTRUMENTATION DETAILS.
3. SEE DETAIL 3 ON THIS SHEET FOR FOUNDATION AND ANCHORAGE DETAILS.
4. END OF SIDESLOPE RISER TO REMAIN OPEN.

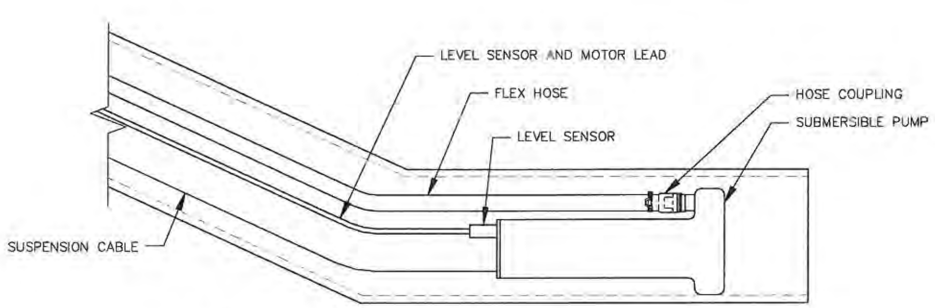
PLAN (1)

0 1' 2'
SCALE: 3/4"=1'-0"



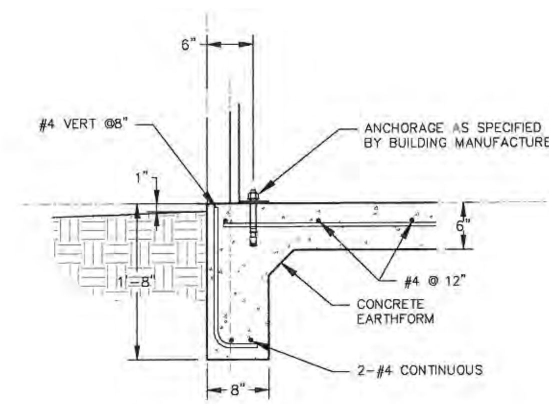
SECTION A-A'

0 1' 2'
SCALE: 3/4"=1'-0"



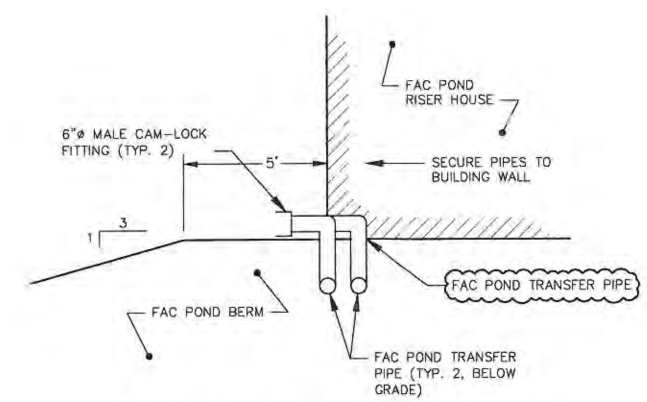
SECONDARY COLLECTION SUMP PUMP INSTALLATION DETAIL (2)

NOT TO SCALE



PROPOSED RISER HOUSE FOUNDATION (3)

0 1' 2'
SCALE: 1"=1'-0"



FAC POND TRANSFER PIPELINE TERMINATION (4)

NOT TO SCALE

NOT TO SCALE

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No.	Date	Revisions	By	Ckd
2	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNG	BMS
1	10/2013	ADDED ELECTRONIC LEAK DETECTION AND WARNING LIGHT	PTO	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by: CDL | Drawn by: SJK | Checked by: BMS

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FAC POND RISER HOUSE MECHANICAL INSTALLATION DETAILS

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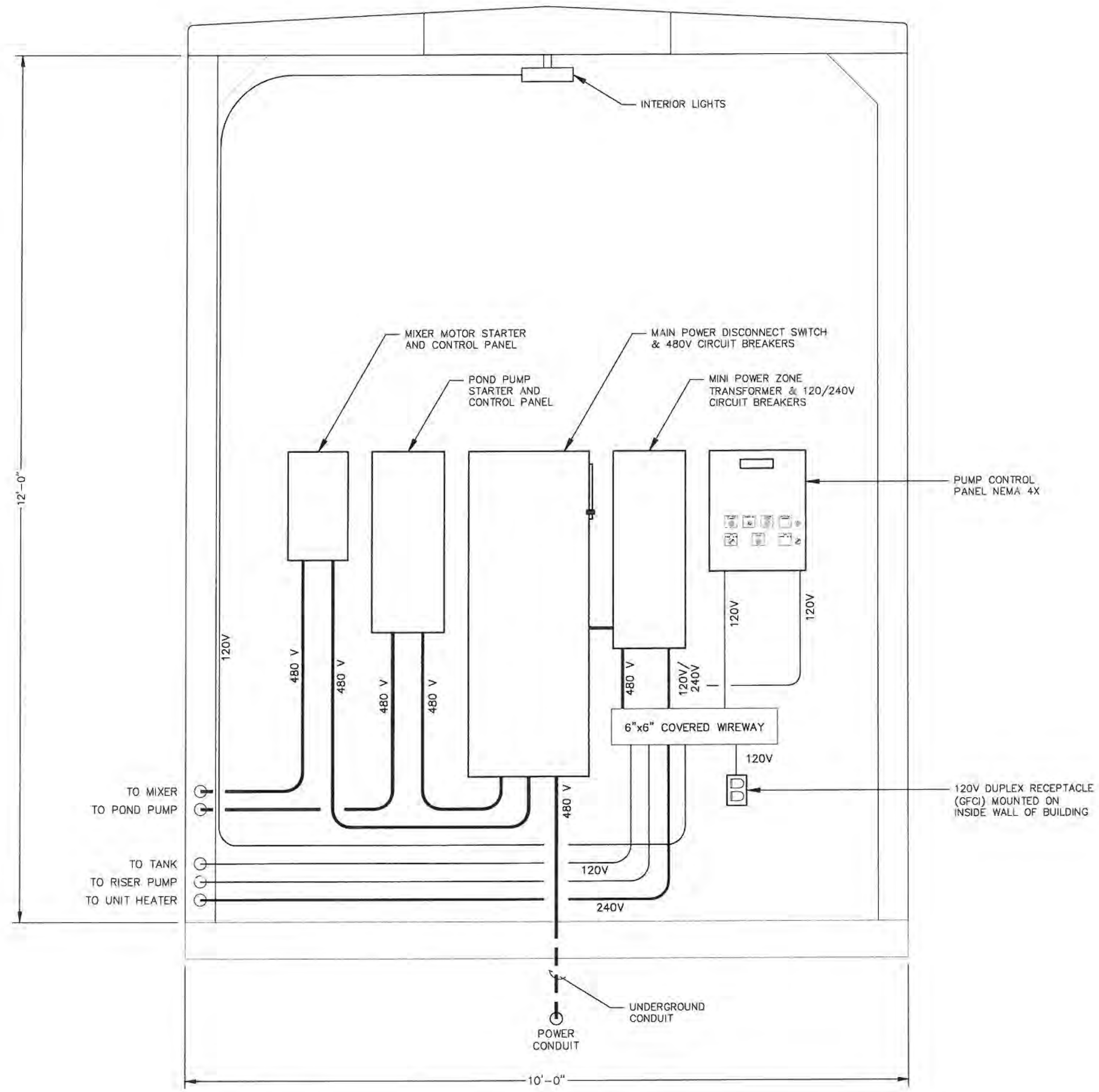

ELECTRICAL SECTION (1)

0 1' 2'
SCALE: 1"=1'-0"

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JOSEPH MOLINA		
Professional Engineer's No. 072644		
State: NY	Date Signed: 11/5/13	Project Mgr: TJF
Designed by: CDL	Drawn by: SJK	Checked by: BMS

STATE OF NEW YORK JOSEPH MOLINA III LICENSED PROFESSIONAL ENGINEER 072644

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FAC POND RISER HOUSE ELECTRICAL INSTALLATION DETAILS

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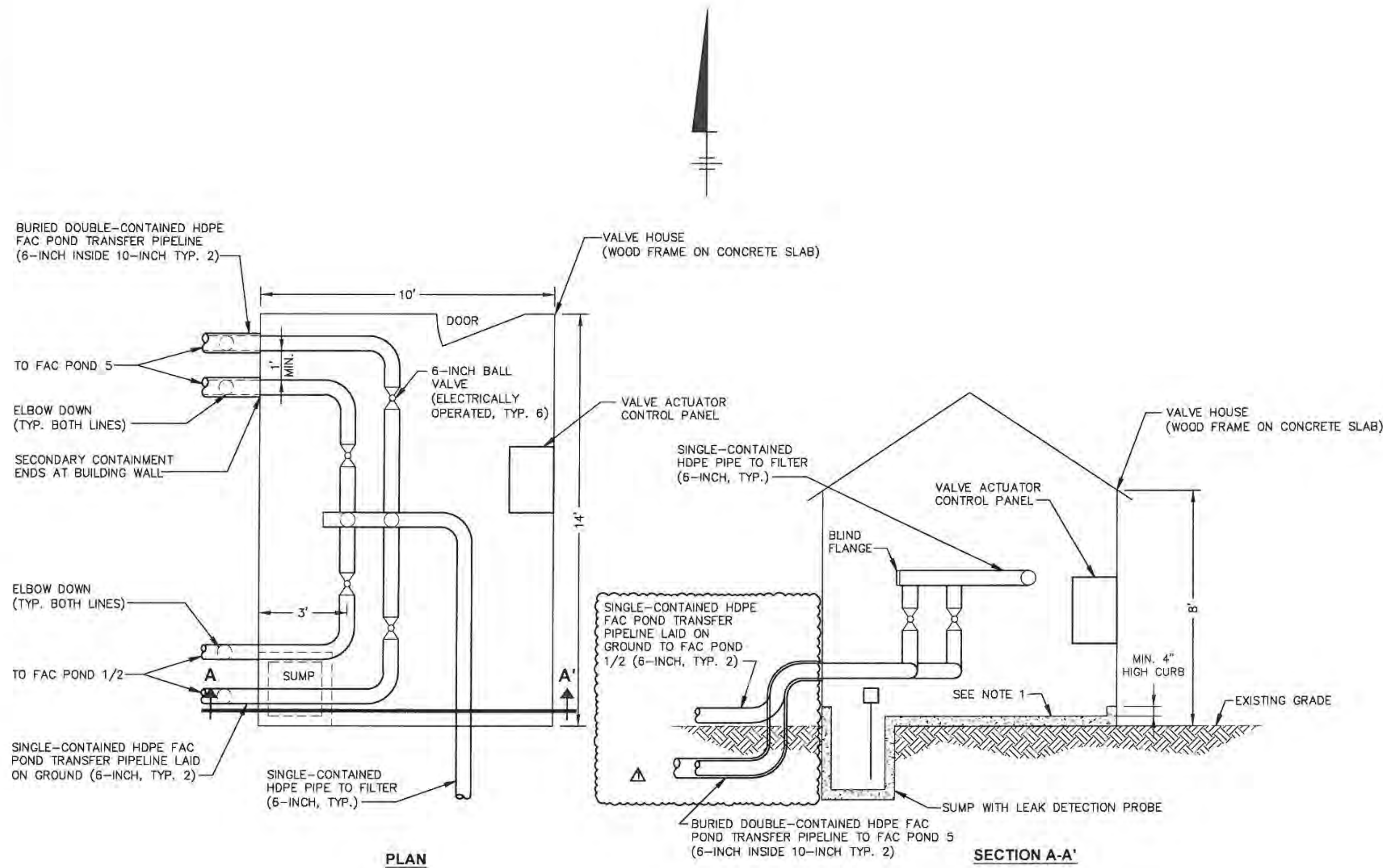
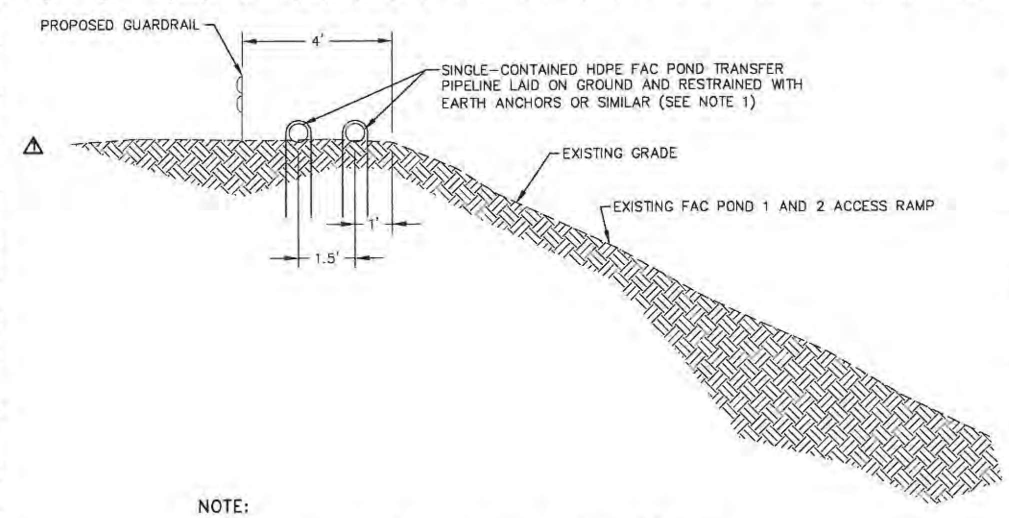


NOTE:

1. CONCRETE FLOOR, SUMP, AND CURB TO BE A MONOLITHIC POUR TO ELIMINATE JOINTS.

VALVE HOUSE AND PIPING LAYOUT (1)

0 2' 5'
SCALE: 3/8"=1'-0"



NOTE:

1. ANCHORS TO BE 1/2" DIAMETER REBAR BENT IN A "U" SHAPE AND DRIVEN INTO GROUND TO A DEPTH OF 24 INCHES.

ABOVE GROUND PIPING DETAIL (2)

NOT TO SCALE

SCALE(S) AS INDICATED

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1	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	CNG	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr: TJF
Designed by | Drawn by: SJK | Checked by: BMS

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VALVE HOUSE DETAILS

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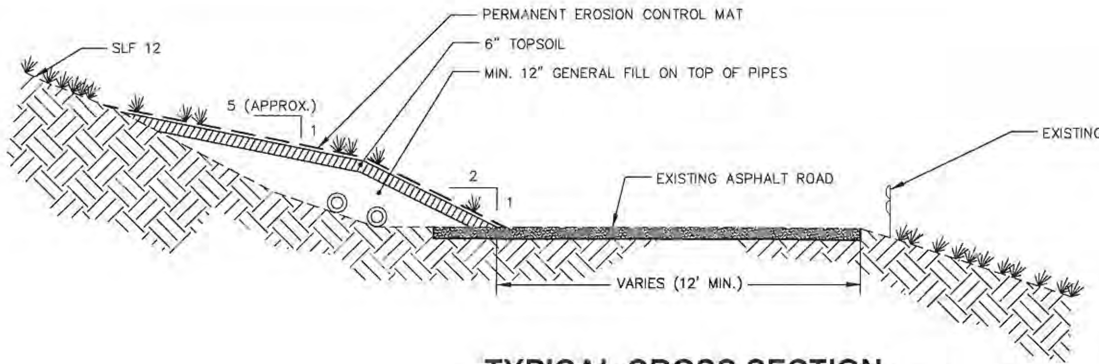
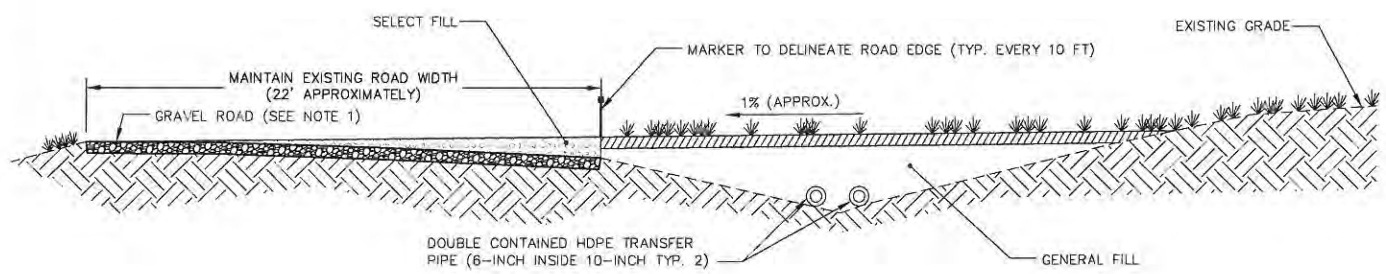


TYPICAL CROSS SECTION ALONG ROAD SOUTH OF SLF 12 (1)

NOT TO SCALE

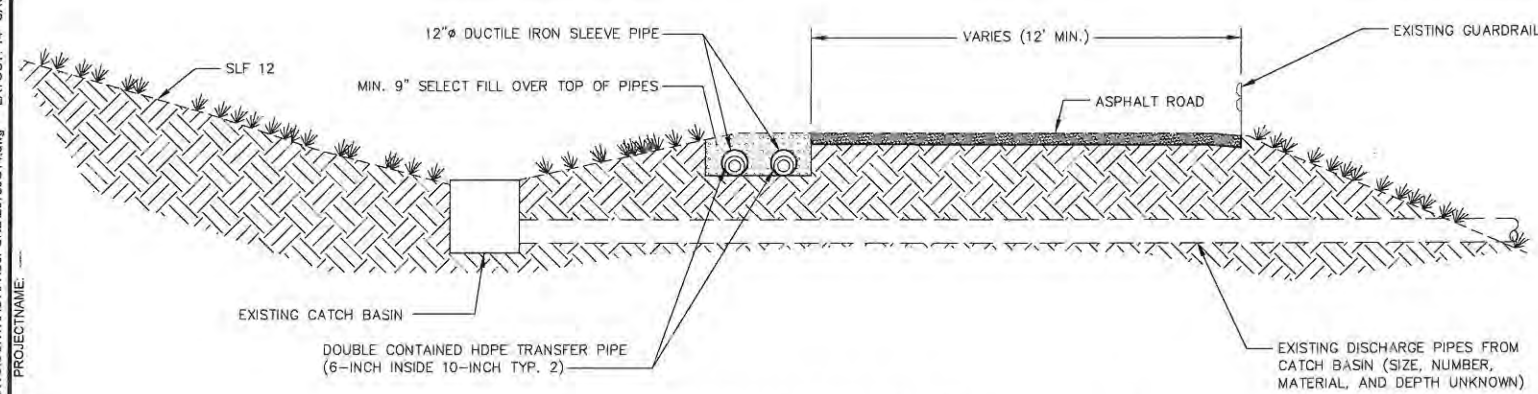


NOTE:

1. EXISTING ROAD SURFACE TO BE REGRADED AS NEEDED TO DRAIN TOWARDS THE WEST.

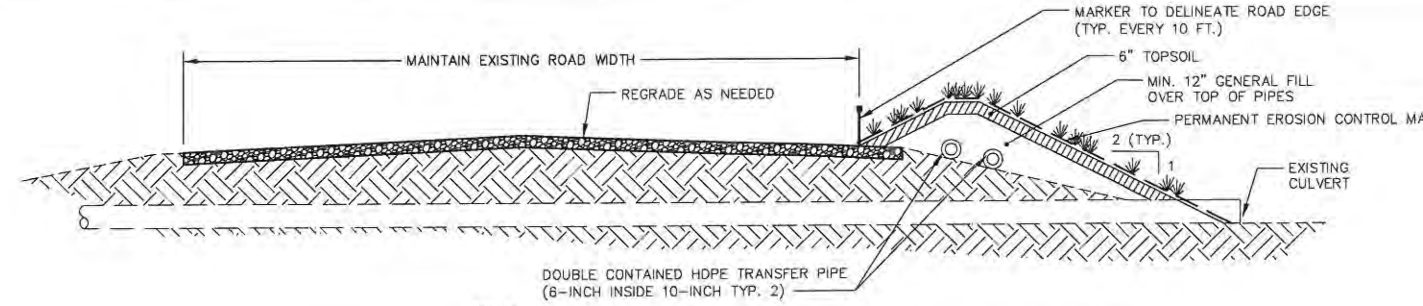
TYPICAL CROSS SECTION ALONG NORTH-SOUTH ROAD (2)

NOT TO SCALE



CROSS SECTION AT SLF 12 DOWNCHUTE CATCH BASIN (3)

NOT TO SCALE

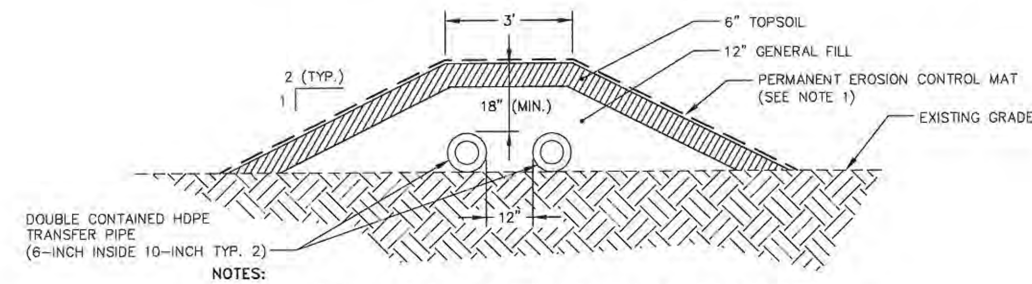


NOTE:

1. EXISTING ROAD SURFACE TO BE REGRADED AS NEEDED TO DRAIN TOWARDS THE WEST.

CROSS SECTION AT NORTH-SOUTH ROAD CULVERT CROSSING (4)

NOT TO SCALE

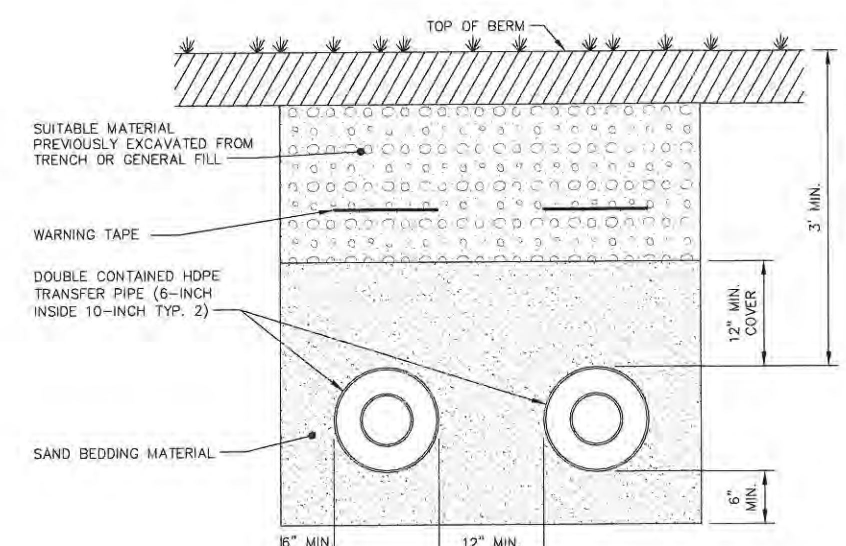


NOTES:

1. PERMANENT EROSION CONTROL MAT SHALL BE INSTALLED IN LOCATIONS WHERE PROPOSED BERM IS SUBJECT TO RUNOFF FROM UPGRADIENT AREAS (SUCH AS SLF 12) OR IS ADJACENT TO CONCENTRATED FLOWS (SUCH AS CULVERTS, CATCH BASINS, OR DITCHES). PERMANENT EROSION CONTROL MAT SHALL NOT BE REQUIRED IN OTHER BERM LOCATIONS.
2. DETAIL SHOWN IS FOR PIPES LAID ON GRADE. OVERALL BERM HEIGHT AND WIDTH MAY DEVIATE IN LOCATIONS WHERE PIPELINE IS PARTIALLY ENTRENCHED OR WHERE FILLING IS NEEDED. MINIMUM COVER AND MAXIMUM SIDESLOPE GRADIENT SHALL BE ADHERED TO IN ALL CONDITIONS.

TYPICAL BERM DETAIL FOR HDPE PIPE (5)

NOT TO SCALE



TYPICAL TRENCH DETAIL FOR HDPE PIPE ALONG FAC POND 5 BERM (6)

NOT TO SCALE

GENERAL NOTE:

1. ALL HDPE PIPING SHALL BE DR-11.

SCALE(S) AS INDICATED

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Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by: SJK | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL ENGINEER · 072644

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FAC POND TRANSFER PIPELINE DETAILS

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XREFS: 23725X00 IMAGES: PROJECTNAME: ---

FACULTATIVE PONDS 1 / 2 AND 5 RESPONSE ACTION PLAN

RESPONSE ACTION PLAN

Facultative Pond 5

Model City Treatment, Storage, and Disposal Facility

Model City, Niagara County, New York

Submitted To: CWM Chemical Services, LLC
Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

Submitted By: Golder Associates Inc.
10 Canal Street, Suite 217
Bristol, PA 19007 USA

Paul A. Whitty, P.E.
NY PE 083843

Distribution:

1 Copy – CWM Chemical Services, LLC
1 Copy – Golder Associates Inc.

Revised November 2013

123-89494

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Table of Contents

List of Tables

List of Appendices

1.0 INTRODUCTION

1.1 General

CWM Chemical Services, LLC (CWM) owns and operates the Model City Treatment Storage, and Disposal (TSD) Facility (Model City Facility or "Site"), in Niagara County, New York. The Model City Facility is regulated at the federal level under the Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act. Since the United States Environmental Protection Agency (USEPA) has delegated the implementation of the RCRA regulations in New York to the New York State Department of Environmental Conservation (NYSDEC), the Model City Facility operates under an NYSDEC-issued Permit pursuant to Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Part 373. The general site layout, shown on Permit Drawing No. 2 of the permit drawing set, comprises waste receiving areas, storage and mixing tanks, chemical treatment facilities, biological treatment impoundments, and secure landfills. Current operations include treatment, recovery, stabilization, disposal, and transfer of hazardous and industrial non-hazardous waste.

As part of the revised permit application for Residuals Management Unit 2 (RMU-2) Facultative (Fac) Pond 5 will be added. New Fac Pond 5 will be a double-composite-lined surface impoundment for the storage of treated wastewater from CWM's Aqueous Wastewater Treatment System (AWTS).

As required by 6 NYCRR Part 373-2.11(k), a Response Action Plan (RAP) must be approved for surface impoundments prior to receipt of any treated wastewater and this requirement applies to Fac Pond 5. The RAP is a site-specific plan that the owner develops to address leakage through the primary liner and into the leak detection system (LDS) to minimize the potential migration of treated wastewater out of the Fac ponds. This RAP, which is part of CWM's overall leachate management program, describes the criteria used to establish key inflow rates to the LDS that require the implementation of certain response actions as described herein. Fac Pond 5 consists of an open-air facultative pond with primary and secondary liner systems. The layout of Fac Pond 5 is shown on Fac Pond Permit Drawing No. 3.

This RAP addresses the potential sources of inflows to the LDS in Fac Pond 5 and discusses the development of site-specific performance characteristics for the pond. It should be noted that liquids encountered in the LDS of the facultative ponds are not necessarily derived from the treated wastewater. Depending on the rate, responses to inflows of liquids into the LDS of the Fac ponds include no action, modifying operating procedures, and, where appropriate, notifying the USEPA and the NYSDEC. The various response actions are described in Section 4.

1.2 Action Leakage Rate and Response Rate

In accordance with 6 NYCRR Parts 373-2.11(j) and (k), this RAP presents the Action Leakage Rate (ALR), which is the primary trigger to implement a response action, for the Fac ponds. The ALR is based on the maximum flow rate that the LDS can remove without the fluid head on the secondary liner exceeding 1 foot. Consistent with the Residuals Management Unit 1 (RMU-1) RAP, and the RMU-2 RAP, this RAP also presents a secondary trigger level known as the Response Rate (RR). The RR is based on the anticipated maximum inflow to the LDS that could be expected under normal operating conditions. The RR could be used in identifying potential problems with the primary liner by alerting CWM personnel to unanticipated inflows to the LDS. The trigger levels are presented both as "unit-specific" and "pond-specific." The term "unit-specific" relates to a unit area (e.g., 1 acre), whereas "pond-specific" is a function of each Fac pond area. Unit-specific rates are presented in terms of gallons per acre per day [gpad]; pond-specific rates are presented in terms of gallons per day (gpd). The development of the ALR and RR values is discussed in greater detail in Sections 2 and 3, respectively.

1.3 RMU-2 Overview

The Site has been a hazardous waste TSD facility since 1972. RMU-2 encompasses approximately 43.5 acres (as measured to the outside toe of the perimeter mechanically stabilized earth wall). Fac Pond 5 are constructed above the existing ground surface and are surrounded by containment berms. Fac Pond 5 is approximately 4.7 acres, as measured planimetrically along the centerline of the top of slope for the side slope liner system.

1.3.1 Facultative Pond Liner System Description

The Fac Pond 5, which ispart of RMU-2 development, has been designed to meet or exceed the requirements for hazardous waste landfills as specified in 6 NYCRR Part 373-2.11. As shown on Fac Pond Permit Drawing No. 4, the facultative pond liner system consists of the following components (in descending order):

- Primary Liner System
  - 1 foot of ballast layer stone on the pond floors;
  - A layer of nonwoven geotextile on the pond floors;
  - A 30-mil ethylene interpolymer alloy (EIA) geomembrane on the pond floors and side slopes; and,
  - A layer of geosynthetic clay liner (GCL) on the pond floors and side slopes.
- Leak Detection System (LDS)
  - A layer of geocomposite on the pond floors and side slopes;
  - A layer of non-woven cushion geotextile heat bonded to the geocomposite on either side of the sump and riser trench; and,
  - A select fill sump with an 18-inch diameter perforated collection pipe and an 18-inch diameter solid riser pipe.
- Secondary Liner System
  - A 30-mil EIA geomembrane on the pond floor and side slopes; and
  - 3 feet of compacted glacial till or other suitable clay soil having a maximum hydraulic conductivity of 1×10^{-7} cm/s on the pond floor and side slopes.

On the perimeter side slopes, the 1 foot of ballast stone has been omitted and replaced with weight tubes to provide ballast against uplift forces on the geomembranes. In addition, vent pockets will be installed in the primary and secondary liners at the edge of the anchor trench. These vent pockets will allow any gas below the liners to escape without allowing liquid within the LDS to pass through the liner system.

1.3.2 Liquid Collection and Removal from the Leak Detection System

The LDS is designed and managed to control and remove liquids in a manner consistent with the requirements of 6 NYCRR Part 373-2.11(b)(3)(ii) and (iii). A sumps located at the low point of the Fac pond collect liquids that enter the LDS. Liquids that collect in the LDS are removed by pumping through the 18-inch diameter high density polyethylene (HDPE) side slope riser pipes. Liquids are removed from the LDS at regular intervals with dedicated automatic pumps to provide effective leachate management and to minimize the hydrostatic head on the secondary liner. The performance of the LDS of the Fac pond will be monitored based on regular documentation of the liquid volume encountered in and removed from the LDS.

1.3.3 Geologic and Hydrogeologic Setting

Numerous past investigations have been conducted throughout the Model City Facility. Geologic and hydrogeologic investigations for the entire Model City Facility have been performed and were submitted to the NYSDEC and the USEPA in March 1985 (*Hydrogeologic Characterization*, Golder Associates, Inc. [Golder], March 1985). Two updates to the 1985 hydrogeologic report were prepared and submitted in 1988 (*Hydrogeologic Characterization Update*, Golder, February 1988) and in 1993 (*Hydrogeologic Characterization Update*, Golder, June 1993). These studies detail the physiography, drainage, regional geology, site stratigraphy, hydrogeology and site hydrologic parameters. In terms of hydrogeology, these studies focused on defining the uppermost aquifer underlying the Model City Facility, groundwater flow direction and rates. A supplemental geologic investigation within the footprint of RMU-2 was also performed and presented in a letter report entitled *Geotechnical Investigation for Proposed Residuals Management Unit Number 2 Western Expansion Area* (Golder, December 2002). In general, the 2002 geotechnical investigation confirmed the geologic findings presented in the 1985, 1988 and 1993 site-wide investigations. Additional hydrogeologic investigations were performed by Golder in 2004 and again in 2009 to obtain geological and subsurface site stratigraphy data specific to the proposed RMU-2 location. The 2009 investigation was summarized in a report entitled *Landfill Footprint Analytical Data Study and Western Boundary Relocation Investigation, Residuals Management Unit Number 2* (Golder, August 2009). Additionally, groundwater elevation measurements were performed in 2008 in the area of the proposed RMU-2. Copies of the 2002 and 2009 Golder reports are presented in Appendices A-2 and A-4, respectively, of the *RMU-2 Engineering Report* (ARCADIS, April 2003, revised August 2009 and February 2013).

The Site is situated on the Ontario Plain that is an area of low topographic relief between the Niagara Escarpment and Lake Ontario. The upper portion of the stratigraphy at the Model City Facility generally includes low-permeability silt and clay tills over Glaciolacustrine Clay, underlain by a Glaciolacustrine Silt/Sand unit. Beneath these units is a lodgment of till (Basal Red Till) above shale bedrock. Over the northwestern portion of the Model City Facility, the Glaciolacustrine Clay is separated into an upper and lower member by a silt till (Middle Silt Till). Because of variations in topography, the thickness of the prevailing materials and the subbase depth of the cells, RMU-2 penetrates either one or both of the Upper Tills and the Glaciolacustrine Clay units.

In general, a varying thickness of in-situ glacial till will be left in place above the in-situ Glaciolacustrine Clay formation to withstand hydrostatic pressures and provide a suitable surface for construction equipment. The thickness of glacial till varies because of the irregularity of the surface of the Glaciolacustrine Clay. However, in particular areas, the entire in-situ glacial till may be removed in order to accommodate excavation grades in certain sump elevations. Natural surface elevations in the vicinity of RMU-2 are approximately 320 feet above mean sea level.

The typical hydraulic conductivity values of the geologic formations indicate that the Glaciolacustrine Silt/Sand stratum is the most permeable geologic unit and forms the uppermost aquifer underlying the Model City Facility. The Silt Till, Clay Till and Glaciolacustrine Clay above this aquifer are very low-permeability materials and restrict aquifer recharge from infiltration. The Basal Red Till and bedrock beneath the aquifer are also low-permeability units, although the shallow, weathered bedrock is more permeable than the deeper bedrock.

Water-level data collected on May 15, 2001 and in October 2004 from wells screened in the Glaciolacustrine Silt/Sand unit appear to represent the period of greatest piezometric heads for the confined aquifer since regular recording of Site-wide groundwater elevation data began in the early 1980s. Of these two monitoring events, the May 2001 levels were found to be more critical (i.e., higher) and, thus, governed the establishment of design elevations for the RMU-2 cells. Additional groundwater elevation data from “Figure 4 – Upper Tills Unit Potentiometric Surface Contours October 2011” prepared by Golder was also used to estimate the inflow rate of groundwater through the Fac pond secondary liner (see Section 3).

2.0 ACTION LEAKAGE RATE

2.1 General

The purpose of this section is to quantify the ALR for the Fac pond. The NYSDEC defines the ALR as the maximum design flow rate that the LDS can remove without the fluid head on the bottom liner exceeding 1 foot. As such, the ALR is dependent on the hydraulic capacities of the various components of the LDS. The ALR for the Fac ponds is established by evaluating each component of the LDS to determine the limiting component (i.e., the component having the least hydraulic capacity that would cause the fluid head on the bottom liner to exceed 1 foot). A factor of safety is typically applied to the hydraulic capacity of the limiting component to arrive at the actual ALR. The individual flow rate components that are used to determine the ALR are discussed in the following section. The ALR calculation is presented in Appendix A and summarized in Section 2.3.

2.2 ALR Flow Rate Components

The following hydraulic capacities for the various LDS components are calculated to determine the ALR for each pond:

- Flow rate through the geocomposite that drains directly to the LDS sump;
- Flow rate through the drainage stone surrounding the perforated section of the 18-inch diameter side slope riser pipe within the LDS sump; and,
- Flow rate through the perforations in the horizontal portion of the 18-inch diameter side slope riser pipe.

The analysis of each of these components is discussed in greater detail below.

2.2.1 Flow Rate through the Geocomposite Draining Directly into the LDS Sump

The LDS of each Fac pond includes a geocomposite that covers the side slopes and floor and discharges into the sump. The capacity of the geocomposite is designed to exceed the contributing maximum flow rate into the geocomposite, with a minimum transmissivity of 3 x 10^{-4} meters squared per second (m^2/s). The maximum flow rate conveyed into the sump via this mechanism is estimated by multiplying the flow per unit width through the geocomposite by the perimeter of the LDS sump.

2.2.2 Flow Rate through the Drainage Stone Surrounding the Perforated Section of the Side Slope Riser Pipe within the LDS Sump

Liquids that drain into the LDS sump from the surrounding geocomposite must permeate through the stone surrounding the perforated section of the side slope riser pipe and pass through the perforations. The maximum flow rate through the drainage stone is computed using Darcy's law and a flow net for the drainage stone surrounding the perforated portion of the side slope riser pipe.

2.2.3 Flow Rate through the Perforations in the Horizontal Portion of the Side Slope Riser Pipe

Liquids that flow through the drainage stone surrounding the perforated portion of the side slope riser pipe must ultimately pass through the perforations themselves. The flow rate through the perforations is determined from calculations presented in Appendix A, which are based on the orifice equation and the effective head on each perforation in the side slope riser pipe.

2.3 ALR Values

For the Fac pond, the limiting flow rate is determined to be the flow rate through the geocomposite that drains directly into the sump (discussed in Section 2.2.1). Because this flow rate is dependent on the slope of the pond floor, the ALRs are pond-specific (i.e., the ALR per unit area differs from one pond to the next). The calculation for the Fac Pond 5 ALR is summarized in Table 1. As discussed above, the ALR is calculated by multiplying the limiting flow rate by a factor of safety. To maintain consistency with the RMU-1 and RMU-2 RAPs and USEPA recommendations, a factor of safety of two is applied to the calculated ALR.

Table 1: Calculated ALR Values

Fac Pond	Pond-Specific ALR [gpd]	Pond Area[1] [acres]	Unit-Specific ALR [gpad]
5	7,982	4.7	1,698

Notes:
1. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.

The unit-specific ALR of 1,698 gpad is used to calculate the Pond-Specific ALR for Fac Pond 5. This unit-specific ALR value is multiplied by the pond area to calculate a pond-specific ALR, as summarized in the following table.

Table 2: Final ALR Values

Fac Pond	Unit-Specific ALR[1] [gpad]	Pond Area[2] [acres]	Pond-Specific ALR [gpd]
5	1,698	4.7	7,982

Notes:
1. Unit-specific ALR is based on the minimum calculated value from Table 1.
2. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.

3.0 RESPONSE RATE

3.1 General

The purpose of this section is to quantify the RR Fac Pond 5. As described earlier in this RAP, the RR is the anticipated maximum inflow to the LDS that could be expected under normal operating conditions. An RR value is calculated to represent the Fac pond at their maximum design capacity. The Fac pond RR value is discussed below in Section 3.2. The RR calculation is presented in Appendix B and summarized in Section 3.3.

3.2 Facultative Pond RR

The maximum design capacity RR has been established to account for the increased flow rates experienced in the LDS when the liquid level in the Fac ponds is at the maximum design level. The higher flow rates are primarily attributable to increased flows in the LDS due to leakage and permeation through the primary and secondary liner systems into the LDS.

In order to calculate the Fac pond RRs, it is necessary to identify potential inflow sources to the LDS and estimate the peak anticipated inflow to the LDS from each source. The following potential inflow sources to the LDS are considered in the estimation of the Fac pond RR:

- Leakage and permeation of liquids through the primary liner system due to hydrostatic head on the primary liner;
- Leakage and permeation of groundwater through the secondary liner system; and
- Leakage and permeation of consolidation water from the compacted clay layer in the secondary liner system.

Construction liquids (i.e., liquids that have entered the pond during the LDS construction period) are not considered in the Fac pond RR because these liquids will have been collected by the LDS during the initial stages of pond operation. Furthermore, because the liner system of the RMU-2 Fac ponds utilizes a GCL in the composite primary liner system, the Fac pond RR calculation does not consider the generation of liquids from the consolidation of a primary clay layer. The potential inflow sources to the LDS are discussed in greater detail below and in Appendix B.

3.2.1 Inflow through the Primary Liner System

Leakage and permeation through the primary liner system is considered one of the three main long-term sources for liquids entering the LDS. Higher heads on the primary liner will cause a corresponding increase in flow to the LDS due to leakage and permeation through the primary geomembrane and GCL. The computation of leakage and permeation rates through the primary liner system is discussed separately in the following sections.

3.2.1.1 Leakage through the Primary Liner System

Good construction practices and thorough construction quality control/quality assurance procedures can be employed in the installation of pond liners to minimize or eliminate defects in the geomembrane that typically occur during the course of installation. Defects in the form of pinholes are also known to occur during the manufacturing process. The frequency and size of these installation and manufacturing defects are estimated from the *Hydrologic Evaluation of Landfill Performance (HELP) Model User's Guide for Version 3* (USEPA, September 1994).

Leakage through defects in the primary liner geomembrane will occur whenever a hydrostatic head exists on the primary liner geomembrane and is a function of the frequency of defects, their size, head on the geomembrane and the hydraulic conductivity of the material beneath the geomembrane (i.e., the GCL). For the purposes of determining the RR, the leakage rate is estimated assuming the maximum operational level on the primary liner geomembrane. Using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), leakage rate through the assumed geomembrane defects isestimated to be approximately 712.4 gpd for Fac Pond 5. The calculations for the leakage rate through the primary liner system is presented in Appendix B and summarized in Table 1 of Appendix B.

3.2.1.2 Permeation of Liquids through the Primary Liner System

Permeation of liquids through the primary liner system will occur whenever a hydrostatic head exists on the primary geomembrane. The permeation rate estimate assumes the pond is filled to its maximum operational level of 26 feet. In order for liquids to permeate completely through the primary liner and into the LDS, they must pass through a geomembrane layer and a GCL. The presence of both these low-permeability layers is accounted for in the permeation rate estimate by combining their individual thicknesses and using an effective hydraulic conductivity, as recommended in the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994). The resulting permeation rate through the primary liner system is estimated to be approximately 879.3 gpd for Fac Pond 5. The calculations for the permeation rates through the primary liner system are presented in Appendix B and summarized in Table 2 of Appendix B.

3.2.2 Groundwater Inflow through Secondary Liner System

In general, the elevations of the components in the secondary liner system (geomembrane and compacted clay layer) on the pond floors are below the historical high piezometric head in the confined aquifer (i.e., those recorded in October 2011). The historical high groundwater elevation beneath Fac Pond 5 is 308 feet. Using the Fac Pond elevations provided on Permit Drawing No. 3 and the liner system details on Permit Drawing No. 4, the low point of the compacted clay layer of the secondary liner system is at elevation 301 feet for Fac Pond 5. The resulting hydrostatic head exerted on the compacted clay layer and geomembrane in the secondary liner system of 7 ft. will cause groundwater to enter the LDS by permeation and leakage through the geomembrane, similar to the mechanisms discussed in Section 3.2.1. Although the rate of groundwater inflow to the LDS is expected to fluctuate due to seasonal variations in groundwater elevations, the presence of this external hydrostatic head is expected continuously throughout the life of the Fac pond. The computation of leakage and permeation rate of groundwater through the secondary liner is discussed separately in the following sections.

3.2.2.1 Leakage of Groundwater through the Secondary Liner System

Leakage of groundwater into the LDS through assumed defects in the secondary liner geomembrane will occur whenever the confined aquifer piezometric head beneath a given pond exceeds the lowest LDS elevation. For the purposes of determining the RR, the leakage rate of groundwater through the secondary liner is estimated using the bottom of the liner system design grade (i.e., subgrade) depicted on Fac Pond Permit Drawings 3 and 4 prepared by Arcadis of New York, Inc. as well as the groundwater elevation contours on Figure 4 – Upper Tills Unit Potentiometric Surface Contours October 2011 prepared by Golder Associates Inc. Using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), leakage of groundwater though the assumed defects in the secondary liner geomembrane is estimated at 22.7 gpd for Fac Pond 5. The calculations for the leakage of groundwater through the secondary liner system are presented in Appendix B and summarized in Table 3 of Appendix B.

3.2.2.2 Permeation of Groundwater through the Secondary Liner System

Permeation of groundwater into the LDS through the secondary liner will occur whenever the confined aquifer piezometric head beneath a given pond exceeds the lowest LDS elevation. As with the leakage rate calculation in the preceding section, the permeation rate estimate is based on the design grades for the bottom of the compacted clay layer in the secondary liner and the average piezometric heads from the

October 2011 monitoring event. In order for groundwater to permeate completely through the secondary liner and into the LDS, it must pass through the compacted clay layer and the geomembrane. As for the composite primary liner system discussed in Section 3.2.1.1, the presence of both of these low-permeability layers in the secondary liner system is accounted for in the permeation rate estimate by combining their individual thicknesses and using an average effective hydraulic conductivity. The flow rate of groundwater into the LDS through the secondary liner system due to permeation is estimated at 195.9 gpd for Fac Pond 5. The calculations for the permeation of groundwater through the secondary liner system are presented in Appendix B and summarized in Table 3 of Appendix 2.

3.2.3 Consolidation Water Inflow from the Secondary Liner Compacted Clay Layer

Construction of the pond system and subsequent filling activities result in applied stresses to the compacted clay layer in the secondary liner system. The applied stress will vary as the liquid level in the pond varies under operational conditions.

The resulting consolidation of the compacted clay layer produces excess pore pressures within the clay, which drive water from the clay layer. The resulting flow rate depends on, and is expected to temporarily lag slightly behind, the filling rate. The inflow of consolidation water to the LDS is expected to continue for some period after the pond is initially filled and gradually diminish over time. As with the other potential inflow sources discussed thus far, this consolidation water will enter the LDS via leakage and permeation through the secondary liner system. The computation of leakage and permeation rates of consolidation water through the secondary liner system is discussed separately in the following sections.

3.2.3.1 Leakage of Consolidation Water through the Secondary Liner Geomembrane

The leakage rate of consolidation water through assumed defects in the secondary liner geomembrane is calculated using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), as discussed in previous sections. The hydrostatic head used to calculate leakage is equal to the excess pore pressure produced within the compacted clay layer during consolidation divided by the unit weight of water. The resulting leakage rate through geomembrane defects is estimated at 54.1 gpd for Fac Pond 5. The calculations for the leakage of consolidation water through the secondary liner system are presented in Appendix B and summarized in Table 3 of Appendix B.

3.2.3.2 Permeation of Consolidation Water through the Secondary Liner System

The permeation rate of consolidation water through the secondary liner geomembrane is estimated using Darcy's law. The flow rate of consolidation water through the pond floors is estimated at 727.4 gpd for Fac Pond 5. The calculations for the permeation of consolidation water through the secondary liner system are presented in Appendix B and summarized in Table 2 of Appendix B.

3.3 RR Values

Unit-specific RR values were calculated based on the conditions in the Fac pond. For the Fac pond RR, the individual flow rates into the LDS from the sources described in Section 3.2 are combined to generate a single unit-specific RR for the pond. The following table summarizes the estimated flow rates into the LDS from each potential inflow source for the pond.

Table 3: Calculated Fac Pond Unit-Specific RR Inflow Components (From Appendix B)

Fac Pond	Leachate Inflow through Primary Liner System		Groundwater Inflow through Secondary Liner System		Consolidation Water Inflow through Secondary Liner System		Combined [gpad]
	Leakage Rate [gpad]	Permeation Rate [gpad]	Leakage Rate [gpad]	Permeation Rate [gpad]	Leakage Rate [gpad]	Permeation Rate [gpad]	
5	151.6	187.1	4.8	41.7	11.5	154.8	551.5

Pond-specific RR values have been calculated using the unit-specific RR values summarized in Table 3. The unit-specific RR value was multiplied by the pond area to calculate the Fac pond RR that is pond-specific, and is summarized in Table 4.

Table 4: Final Fac Pond RR Values

Fac Pond	Unit-Specific RR[1] [gpad]	Pond Area[2] [acres]	Pond-Specific RR [gpd]
5	552	4.7	2,595

Notes:
1. Unit-specific RR values have been rounded up for conservatism.
2. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.

4.0 RESPONSE ACTIONS

4.1 General

The purpose of this section is to outline the required response actions corresponding to various flow rates in the LDS sumps of the Fac pond, including the ALR and RR calculated in Sections 2 and 3, respectively. For all flow rates, the following procedure is required for monitoring of the LDS:

- The LDS sump will be monitored at least once every seven (7) days for the presence of liquids. Pumpable amounts of liquids contained in the sump will be removed automatically or manually, and the liquid quantity will be measured and recorded. The inflow value will be determined by taking the liquid volumes removed each week divided by seven (7) days to establish an average daily inflow for the week.

4.2 Flow Rate at or Below the RR

Routine monitoring should continue. No action is required.

4.3 Flow Rate Between the RR and the ALR

1. If the average daily flow rate is between the RR and ALR, verbally notify the NYSDEC within three (3) working days of an apparent exceedance of the RR. Complete one or more of the following activities to determine whether the apparent exceedance is actually due to an electronic or mechanical equipment malfunction:

   a. Evaluate the LDS volume data transferred from Fac pond sump to the storage tank by checking recent level trends and alarm summary logs.

   b. Verify proper operation of the LDS pump via computer control and by manually switching it on and off.

   c. Inspect the LDS flow meter and verify its proper operation using timed pumping and comparing the estimated volume with the meter flow readings.

   d. Remove the LDS pump and level probe and inspect for any obvious defects. Verify proper operation of level probe by either electrical simulation or by manually placing the probe in water.

2. If the average daily flow to the LDS sump for a week exceeds the RR and is not conclusively determined within two (2) weeks of an apparent RR exceedance to be clearly attributable to an operational failure (e.g., equipment or power failures based on the investigation specified in Item 1 above), the following will be performed:

   a. Conduct a review of the most recent LDS analytical data available from the sampling programs required by the site permit.

   b. Immediately perform the following tests and observations on samples of the LDS liquids:

      1) color;

      2) turbidity;

      3) specific-conductance; and

      4) pH.

   c. Make a preliminary comparison of these values with the previous results and record the information.

d. Perform, within one (1) week after verifying that the RR exceedance is not attributed to operational failure, the sampling and analysis of the LDS liquid that would normally occur on a yearly basis (chloride and sulfate). Test results are to be available within 45 days of the exceedance. Results will be reviewed with the NYSDEC to determine what, if any, additional response actions are necessary based on the results. This sampling will satisfy the next yearly sampling requirements for that sump and pond.

e. Increase monitoring and calculation of the flow rate from the LDS sump of the pond involved, if pumpable quantities are present, to every day until flow decreases below the RR. Also, verify that the automatic removal of liquid from the LDS sumps is occurring as designed. If the automatic pumping of the LDS is unable to maintain a level of 12 inches or less in the LDS, evaluate whether it is necessary to increase the pumping rate.

f. Review all analytical data and if liquid characteristics do not match the pond contents investigate alternative sources of liquid.

3. If the flow is between the RR and the ALR for seven (7) consecutive additional days, provide written notification to the NYSDEC within 14 days from the date of determination and implement the following steps:

   a. Determine the need to temporarily stop placing treated wastewater into the affected pond during the pond's normal operation.

   b. Assess the potential cause or causes of the RR exceedance. In the affected pond, examine any exposed portions of the pond liner.

   c. Repair any observed damage.

   d. If no obvious defects are detected, propose mitigative actions to return the leakage rate to below the RR. Upon approval, sequentially inspect side slope liner and likely locations of base liner, if necessary, removing water and ballast stone as needed. Repair any observed damage.

   e. Document location, type and extent of liner damage, if any.

4. If the liquid in the LDS appears to be stormwater, investigate possible pathways and repair, as necessary. After all necessary mitigative measures have been taken, the pond may be returned to service upon authorization by the NYSDEC.

5. Return to routine monitoring as indicated in Section 4.1

4.4 Flow Rates Greater than the ALR

1. Notify, in writing, the USEPA and NYSDEC within seven (7) working days from the date of determination if the average daily flow from the LDS sump exceeds the ALR, if this is not clearly attributable to an operational disturbance. Determine the need to temporarily stop placing treated wastewater into the affected pond during the pond's normal operation. Prepare a written preliminary assessment report describing the amount of liquids; likely source of liquids; possible location, size and cause of any leaks and short-term actions taken and planned. Submit this report to the USEPA and NYSDEC within 14 days from the date of determination of exceedance. Use of the pond may not resume until written notification is given by the NYSDEC.

2. Increase monitoring and calculation of the flow rate from the LDS sump of the pond involved, if pumpable quantities are present, to every day until flow decreases below the ALR. Also, verify that the automatic removal of liquid from the LDS sumps is occurring as designed.

3. Immediately perform the following tests and observations on samples of the LDS liquids:

   1) color;

2) turbidity;
3) specific-conductance; and
4) pH.

Make a preliminary comparison of these values with the previous results and record the information.

4. Determine, to the extent practicable, the location, size and cause of any leak.
5. Determine other short-term and longer-term actions necessary to mitigate or stop any leaks.
6. Within 30 days after the notification that the ALR has been exceeded, submit to the USEPA and the NYSDEC the results of the analyses from Responses 1 through 5 above, as well as the results of actions taken and actions planned.
7. If the average daily flow exceeds the ALR for two weeks, implement the following steps:
   a. Test a sample of the liquid obtained from the LDS for chloride and sulfate and compare to pond contents;
   b. If the liquid characteristics match the pond contents, stop placing treated wastewater into the affected pond during the pond's normal operation;
   c. Assess the seriousness of the leak and the potential for release to the environment;
   d. Examine any exposed portion of the pond liner;
   e. Determine if material should be removed from the pond for repair or control; and
   f. Repair any observed damage. If damage cannot be repaired, determine whether the pond should be closed.
8. If the liquid in the LDS appears to be stormwater or groundwater, investigate possible pathways and repair as necessary. Provide third-party inspection by a registered professional engineer who will investigate alternative sources of liquid, review available analytical and pumping event data for the pond to identify any trends and prepare a written report to the USEPA and the NYSDEC on the findings and recommended actions to protect human health and the environment.
9. As long as the flow rate in the LDS exceeds the ALR, submit monthly reports to the USEPA and the NYSDEC summarizing actions taken and planned.
10. If the ALR value continues to be exceeded after taking all reasonable corrective measures, implement the following steps:
    a. Remove all standing water inside the Fac pond;
    b. Sequentially inspect side slope liner and likely locations of base liner, if necessary, removing ballast stone as needed;
    c. Repair any observed damage;
11. Prepare third-party certification that observed damage has been repaired and return the pond to service upon NYSDEC approval; and
12. Return to routine monitoring as indicated in Section 4.1.

APPENDIX A

Action Leakage Rate (ALR) Calculation

Golder Associates

CALCULATIONS

Date:	**April 16, 2013** **Revised November 4, 2013**	**Made by:**	**JPG**
		Checked by:	**BJG**
Project No.:	**123-89494**	**Revised by:**	**MTW**
		Checked by:	**JB**
Subject:	**Action Leakage Rate Calculation**	**Reviewed by:**	PAM 11/4/13

Project Short Title: **FACULTATIVE POND RESPONSE ACTION PLAN FOR RMU-2 EXPANSION**

In accordance with 6 NYCRR Part 373.2-11 regulations, the action leakage rate (ALR) must be calculated for Facultative (Fac) Pond 5 as part of the RMU-2 expansion. *This revision of the ALR calculation includes only Fac Pond 5.*

1.0 OBJECTIVE

Determine the ALR for the Facultative Pond 5 leak detection system (LDS). The ALR is defined as the maximum design flow rate that the LDS can remove without the fluid head on the bottom liner exceeding one (1) foot.

2.0 METHOD

The ALR is the maximum design flow rate that the LDS can remove without the fluid head on the bottom liner exceeding 1 foot. In order for liquid to flow through the LDS, it must be collected and conveyed to the sump and then flow into the perforated section of the side slope riser pipe and be pumped out. This calculation will determine the limiting flow rate, ie. the ALR.

3.0 REFERENCES

1. "Response Action Plan Residuals Management Unit 1 Model City TSDR Facility" prepared by Rust Environment and Infrastructure, February 1993.
2. "Response Action Plan Residuals Management Unit 2" prepared by Arcadis, April 2003. Revised August 2013.
3. RMU-2 Technical Specifications, Section 02210, Earthworks, Article 2.09.
4. Fac Pond Permit Drawing No. 3 "Fac Pond Grading Plans" prepared by Arcadis of New York, Inc., August 2009. Revised November 2013.
5. Fac Pond Permit Drawing No. 4 "Fac Pond Sections and Details" prepared by Arcadis of New York, Inc., August 2009. Revised November 2013.
6. 6 NYCRR Subpart 373.2-11 Surface Impoundments, effective September 6, 2006.

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4.0 ASSUMPTIONS

1. The liner system has been designed to meet the minimum requirements outlined in Reference 5.
2. The LDS has been designed to meet the minimum requirements outlined in Reference 5 for permeability/transmissivity, bottom slope, clogging, and sump size.
3. Liquids collected in the LDS sump will be pumped to minimize head on the bottom liner.

5.0 CALCULATION

Three potentially limiting flow rates will be evaluated to determine the ALR. These flow rates are:

- Flow rate from the geocomposite that drains directly into the sump.
- Flow rate through the stone in the vicinity of the perforated section of the side slope riser pipe.
- Flow rate through the perforations in the horizontal portion of the side slope riser.

5.1 Flow Rate Through Geocomposite

The daily flow rate from the geocomposite draining directly into the sump can be calculated as:

$$Q_{GEO} = L\Phi i$$

Where,

Φ	=	Geocomposite transmissivity (per Reference 5) Minimum design value = 3.0 x 10^{-4} m^2/sec = 0.003 ft^2/sec
L	=	Length of geocomposite draining directly into the sump
i	=	Hydraulic gradient perpendicular to the rim of the sump From Figure 34 (Reference 3), both Fac ponds have floor slopes of 1.4% and side slopes of 33%.

Sumps are square in plan view with a trapezoidal cross-section. The bottom dimensions are 10 feet by 10 feet, the side slopes are 3H:1V, and the sump is two (2) feet deep. The rim dimensions at the top of the sump are each 22 feet in length.

Sides parallel to the centerline of the pond are assumed to have hydraulic gradient of 0.014. Sides perpendicular to the center line of the pond have hydraulic gradients as follows:

i = 0.33 (pond side slope) and *i* = 0.016 (along pond centerline)

$$Q_{GEO} = L\Phi i$$

$$Q_{GEO} = 22\ (0.003)\ (0.33) + 22(0.003)(0.014) + 22(0.003)(0.014) + 22(0.003)(0.016)$$

$$Q_{GEO} = 0.0218\ cfs + 0.000924\ cfs + 0.000924\ cfs + 0.00106\ cfs$$

$$Q_{GEO} = 0.0247\ cfs = 15{,}964\ gpd$$

5.2 Flow Rate Through Sump Drainage Stone

Since sump design is the same for both basins, this calculation is applicable to both basins.

Using the flownet created for the sump, the flow through the stone is calculated:

$$Q_{FLOWNET} = k\,H\,\frac{N_f}{N_D}L$$

Where,

k	=	Hydraulic conductivity of drainage stone; 0.4 cm/s = 1,134 ft/day (Reference 3).
H	=	Head difference between free surface at top of drainage stone (equal to 1 foot above the top of the secondary liner at the sump fringe) and average centroid of perforations (ie. center of pipe).
	=	2.25 ft.
N_f	=	Number of flow paths from flow net = 8
N_d	=	Number of equipotential drops from flow net = 3
L	=	Length of perforated pipe = 10 ft.

$$Q_{FLOWNET} = (1{,}134\,ft/day)\,(2.25\,ft)\,\frac{8}{3}(10\,ft)$$

$$Q_{FLOWNET} = 68{,}040\frac{ft^3}{day} = 508{,}939\,gpd$$

5.3 Flow Rate Through Perforation in Side Slope Pipe

For an 18-inch diameter perforated pipe in the sump, using an orifice equation, the flow through the perforations calculated:

$$Q_{ORIFICE} = CA\sqrt{2gh}$$

Where,

C	=	Orifice coefficient (assume 0.61 for sharp edged orifice).
A	=	Area of orifice (ft^2)
g	=	Acceleration due to gravity (32.2 ft/sec^2)
h	=	Head above side slope riser pipe (ft) (assume middle of pipe)

From Advanced Drainage Systems, Inc. manufacturer data for perforated high density polyethylene pipe (HDPE), standard AASHTO class II perforated 18-inch dia. pipe has minimum water inlet area of 1.42 in^2/ft = 0.00986 ft^2/ft.

$$Q_{ORIFICE} = 0.61(0.00986)\sqrt{2*32.2*2.25}$$

$$Q_{ORIFICE} = 0.072\frac{cfs}{linear\ foot}$$

$$Q_{PERF} = (Length\ of\ perforated\ pipe)(Q_{ORIFICE})$$

$$Q_{PERF} = 10ft\ \times 0.072\frac{cfs}{linear\ foot}$$

$$Q_{PERF} = 0.72\,cfs = 465{,}348\,gpd$$

6.0 CONCLUSIONS

The daily flow rate from the drainage geocomposite at the edge of the sump is the limiting factor.

A factor of safety of 2.0 is applied to the limit flow rate for the pond to determine the pond-specific ALRs.

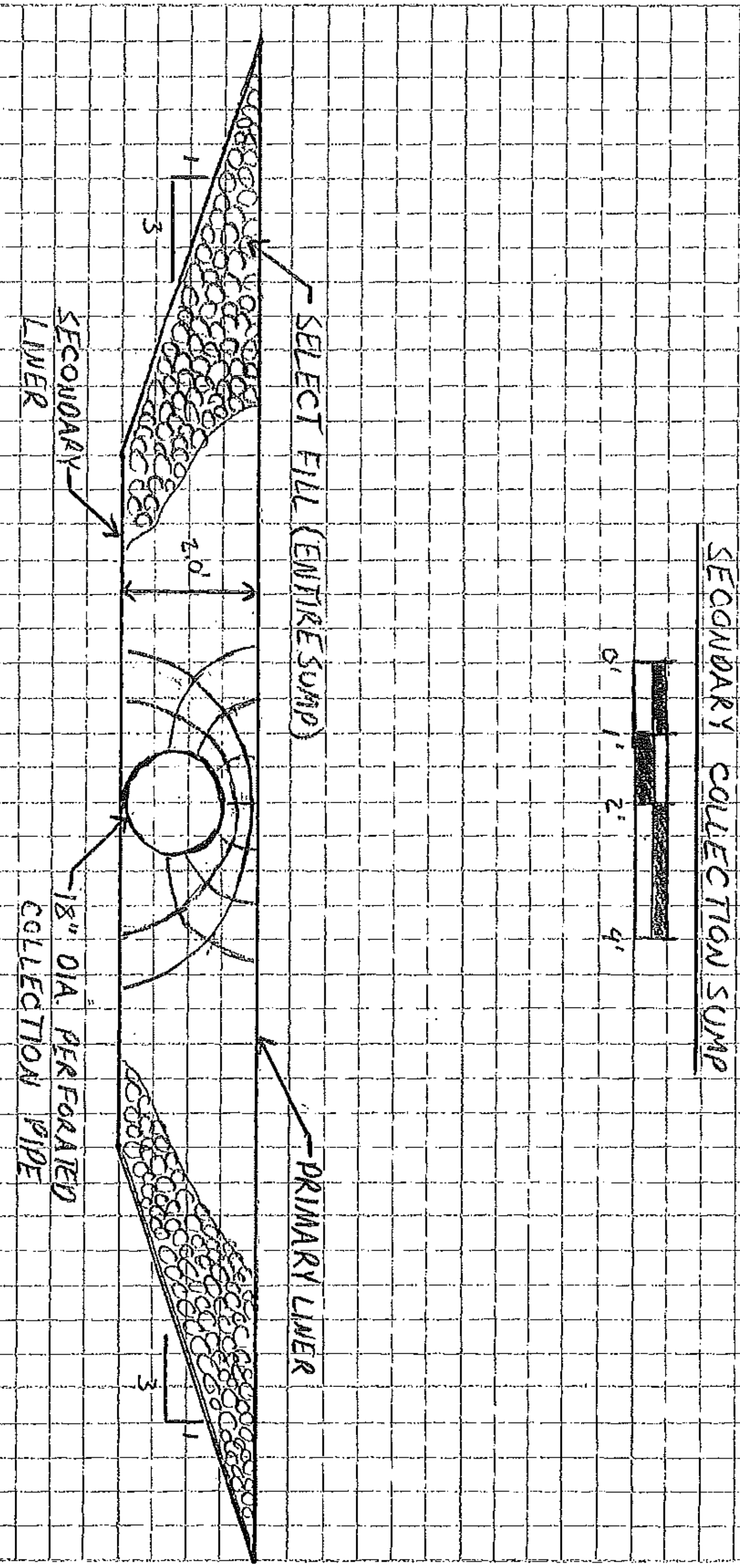
Fac Pond 5
ALR = 0.5 x 15,964 gpd
ALR = 7,982 gpd

Table 1: Calculated ALR Values

Fac Pond	Pond-Specific ALR [gpd]	Pond Area[1] [acres]	Unit-Specific ALR [gpad]
5	7,982	4.7	1,698

Notes:
1. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.

Golder Associates	SUBJECT Model City Fac Ponds ALR		
	Job No. 123-89494	Made by JPG	Date 2/13/13
	Ref.	Checked	Sheet 5 of 5
		Reviewed	



APPENDIX B

Response Rate (RR) Calculation

CALCULATIONS

Date:	April 16, 2013 Revised November 4, 2013	**Made by:**	BJG
		Checked by:	JPG
Project No.:	123-89494	**Revised by:**	MTW
		Checked by:	JB
Subject:	Response Rate Calculation	**Reviewed by:**	MAW 11/4/13
Project Short Title:	**FACULTATIVE POND RESPONSE ACTION PLAN FOR RMU-2 EXPANSION**		

In accordance with 6 NYCRR Part 373.2-11 regulations, the computed action leakage rate (ALR) must include a Response Rate (RR) calculation. The RR calculation includes the likelihood and amounts of other sources of liquids in the leak detection system (LDS) calculated for Facultative (FAC) Pond 5 as part of the RMU-2 expansion. *This revision of the calculation includes only Fac Pond 5.*

1.0 OBJECTIVE

Quantify the leakage Response Rate in FAC Pond 5 at the Model City Landfill.

2.0 METHOD

The Response Rate is equal to the maximum anticipated inflow to the LDS from all likely sources. Permeation through the primary and secondary geomembrane layers and leakage through the secondary geomembrane will be combined to calculate the maximum anticipated inflow.

3.0 REFERENCES

1. "Soil Mechanics and Foundations," 2nd Edition, Budhu, 2007.
2. "Response Action Plan Residuals Management Unit 2," prepared by Arcadis, April 2003. Revised August 2013.
3. "Response Action Plan Residuals Management Unit 1 Model City TSDR Facility," prepared by RUST Environment and Infrastructure, February 1993.
4. "Hydrologic Evaluation of Landfill Performance (HELP) Model Engineering Documentation: Version 3," U.S. Environmental Protection Agency, August 1994.
5. "Hydrologic Evaluation of Landfill Performance (HELP) Model User's Guide: Version 3," U.S. Environmental Protection Agency, September 1994.
6. Fac Pond Permit Drawing No. 3 "Fac Pond Grading Plans" prepared by Arcadis of New York, Inc., August 2009. Revised November 2013.
7. Fac Pond Permit Drawing No. 4 "Fac Pond Sections and Details" prepared by Arcadis of New York, Inc., August 2009. Revised November 2013.
8. 6 NYCRR Subpart 373.2-11 Surface Impoundments, effective September 6, 2006.
9. "Upper Tills Unit Potentiometric Surface Contours October 2011" drawing prepared by Golder Associates Inc. dated January 2012.

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4.0 ASSUMPTIONS

1) Manufacturing defects in the primary geomembrane occur at a rate of 1 per acre and are approximately 1 mm in diameter (Reference 4).

2) Installation defects in the primary geomembrane occur at a rate of 5 per acre and are assumed to be 1 cm^2 in area (Reference 4).

3) Manufacturing defects in the secondary geomembrane occur at a rate of 1 per acre and are approximately 1 mm in diameter (Reference 4).

4) Installation defects in the secondary geomembrane occur at a rate of 5 per acre and are assumed to be 1 cm^2 in area (Reference 4).

5) The liner system cross section is composed (working from top to bottom) of a primary 30-mil Ethylene Interpolymer Alloy (EIA) geomembrane, a 200-mil Geosynthetic Clay Liner (GCL), a geocomposite drainage layer, a secondary 30-mil EIA geomembrane, and a 3-foot thick layer of compacted clay. The hydraulic conductivity of the EIA liner is assumed to be 2×10^{-11} cm/s, which is one of the highest hydraulic conductivities for geomembrane materials listed in the HELP Engineering Document (Reference 4). The hydraulic conductivity of the GCL is assumed to be 5×10^{-9} cm/s (Reference 2), and the hydraulic conductivity of the compacted clay is assumed to be 1×10^{-7} cm/s (Reference 2).

6) The combined effective hydraulic conductivity through two or more layers is calculated using the procedure described in Reference 5.

5.0 CALCULATION

5.1 Leakage Through the Primary Liner System

The leakage of liquid stored in the pond through the primary liner system is influenced by the number and size of small defects in the geomembrane and the transmissivity of the GCL layer directly below. Assumptions 1 and 2 outline the estimated defects due to manufacturing and installation per the EPA's HELP Model Engineering Documents (Reference 4). Leakage through these geomembrane defects is estimated using equation 149 from Reference 4 outlined below:

$$q_h = k_s i_{ave} n \pi R^2 (0.87719)$$

Where,

q_h	=	flow per unit area of geomembrane (m/s)
k_s	=	hydraulic conductivity of controlling soil layer = 1×10^{-9} m/s
i_{ave}	=	average hydraulic gradient from HELP equ. 150
n	=	number of defects per unit area (#/m^2)
R	=	radius of wetted area around flaw from HELP equ. 162 (m)

The average hydraulic gradient is calculated using equation 150 from Reference 4 outlined below:

$$i_{ave} = 1 + [h_g \div (2T_s * \ln(R \div r_o)]$$

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Where,

h_g	=	hydraulic head on secondary layer (m)
T_s	=	thickness of controlling soil layer (m)
r_o	=	radius of defect (m)

The radius of wetted area around each defect is calculated using equation 162 from Reference 4 outlined below:

$$R = 0.26a_o^{0.05}h_g^{0.45}k_s^{-0.13}$$

Where,

a_o	=	area of defect (m^2)

Leakage Through Manufacturing Defects in Primary Geomembrane for FAC Pond 5

$$R = 0.26a_o^{0.05}h_g^{0.45}k_s^{-0.13}$$

Where,

a_o	=	area of defect (m^2) = $7.85x10^{-7}$ m^2
h_g	=	hydraulic head on secondary layer (m) = 16.2 ft = 4.94 m
k_s	=	hydraulic conductivity of controlling layer = $5x10^{-9}$ m/s

$$R = 0.26(7.85x10^{-7})^{0.05}(4.94)^{0.45}(5.00x10^{-9})^{-0.13}$$

$$\boldsymbol{R = 5.77\ m;}$$

$$i_{ave} = 1 + [h_g \div (2T_s * \ln(R/r_o)]$$

Where,

h_g	=	hydraulic head on secondary layer (m) = 16.2 ft = 4.94 m
T_s	=	thickness of controlling soil layer (m) = .0167 ft = 0.0051 m
r_o	=	radius of defect (m) = $5.0x10^{-4}$ m

$$i_{ave} = 1 + [4.94 \div (2(0.005) * \ln(5.77/5.0x10^{-4})]$$

$$\mathbf{i_{ave} = 52.86;}$$

$$q_h = k_s i_{ave} n \pi R^2 (0.87719)$$

$$q_h = (5x10^{-9} cm/s)(52.86)(1 flaw \div 4046m^2)\pi(5.77m)^2(0.87719)$$

$$\boldsymbol{q_h = ((5.99 \times 10^{-11}\ m/s)(86,400\ s/day)(1.0\ acres)) \div (9.35 \times 10^{-7}\ gallons/[meter \cdot acres])}$$
$$\boldsymbol{q_h = 5.53\ gallons/acre/day}$$

This calculated flow rate is 5.53 gallons/acre/day of liquid from the pond leaking through manufacturing defects in the primary geomembrane of FAC Pond 5. A summary of leakage through the primary liner for the pond can be found in Table 1.

5.2 Permeation Through the Primary Liner System

Permeation through the primary geomembrane occurs regardless of the presence of material or installation defects. The flow rate through the primary liner is estimated using Darcy's Law (Reference 1):

$$Q = k_e i A$$

Where,

k_e = effective hydraulic conductivity (ft/day)
i = hydraulic gradient across the geomembrane = H/t
H = hydraulic head (ft) = Max. Operating Level of Pond
t = geomembrane thickness (ft)
A = Area of Liner (ft^2)

The effective hydraulic conductivity combines the hydraulic conductivities of the geomembrane and the GCL layer directly below it. The effective hydraulic conductivity is calculated using the following equation (Reference 5):

$$k_e = (t_1+t_2)\div[(t_1\div k_1)+(t_2\div k_2)]$$

Where,

k_e = Effective hydraulic conductivity (ft/day)
k_1 = Hydraulic conductivity of layer 1 (ft/day)
t_2 = Thickness of layer 1 (ft)
k_1 = Hydraulic conductivity of layer 2 (ft/day)
t_2 = Thickness of layer 2 (ft)

<u>Permeation Through Primary Geomembrane for FAC Pond 5</u>

$$k_e = (t_1+t_2)\div[(t_1\div k_1)+(t_2\div k_2)]$$

Where,

k_e = Effective hydraulic conductivity (ft/day)
k_1 = Hydraulic conductivity of geomembrane (ft/day) = $5.67x10^{-8}$ ft/day
t_2 = Thickness of layer 1 (ft) = 0.0025 ft
k_1 = Hydraulic conductivity of layer 2 (ft/day) = $1.42x10^{-5}$ ft/day
t_2 = Thickness of layer 2 (ft) = 0.0167 ft

$$k_e = (.0025+.0167)\div[(.0025\div 5.67x10^{-8})+(.0167\div 1.42x10^{-5})]$$

$$\mathbf{k_e = 4.24x10^{-7}\ ft/day;}$$

$$Q = k_e i A$$

Where,

k_e = effective hydraulic conductivity (ft/day)
i = hydraulic gradient across the geomembrane = H/t = 16.2/0.0192 = 843.8
H = hydraulic head (ft) = Max. Operating Level of Pond = 16.2 ft
t = layer thickness (ft) = 0.0025 ft + 0.0167 = 0.0192
A = Area of Liner (ft^2) = 1.0 acres = 43,560 ft^2

$$Q = (4.24x10^{-7}\ ft/day)(843.8)(\ 43{,}560\ ft^2)$$

$$Q = 15.58\,ft^3(7.48\,gal/ft^3) = \mathbf{116.57\ gallons\,/acre/day}$$

The calculations for the permeation rates through the primary liner are presented in Scenario 3 of the attachments to this calculation. The calculated permeation rate through the primary geomembrane for the pond is summarized in Table 2.

5.3 Permeation Through the Secondary Liner System

Permeation through the secondary geomembrane occurs due to pressure exerted by a groundwater table that is higher than the bottom of the secondary liner system and excess pore water pressure in the compacted clay layer below the geomembrane. Permeation of groundwater and clay consolidation water through the secondary geomembrane is calculated using the same method used to find the volumes permeated through the primary geomembrane. For groundwater permeation, the hydraulic head (h) used will be equal to the difference between the elevations of the bottom of the compacted clay layer at the lowest point, 301 feet for Fac Pond 5, compared to the highest piezometric head from the confined aquifer in the Upper Tills Unit below the footprint of 308 feet for Fac Pond 5, and the effective hydraulic conductivity (k) through the secondary geomembrane will be a combination of the 30-mil EIA geomembrane and the 3-foot layer of compacted clay.

Initially, the compacted clay layer below the secondary geomembrane will have excess pore pressure due to the initial loading of the pond. As the layer settles due to the extra loading from the full pond, water will be expelled from the clay. To be conservative, these calculations will be done assuming the clay layer is saturated and the pond is full (at maximum operating level). Under these conditions, the initial pore pressure will equal the initial load applied by the pond being filled to the maximum operating level. Assuming that the water can be forced either up through the geomembrane or down into the native soil, the hydraulic head (h) acting on the geomembrane used will be one-half of the pore pressure. The layer thickness (t) used in this calculation to find the permeability of the compacted clay will also be equal to one-half of the actual layer thickness in order to model the two drainage paths. The consolidation water has been included in this analysis, however it is recognized that over time the liquid contributed by this mechanism will become negligible.

The permeation through the secondary liner system was calculated using the same methodology presented in Section 5.2. The calculations for the permeation rates through the secondary liner in the pond are presented in Scenario 3 of the attachments to this calculation. The permeation rates through the secondary geomembrane for the pond are summarized in Table 2.

5.4 Leakage of Groundwater Through the Secondary Liner System

The leakage of groundwater through the secondary geomembrane is influenced by the number and size of small defects in the geomembrane and the transmissivity of the compacted clay layer directly below. The hydraulic head on secondary layer was determined as described above in Section 5.3. Assumptions 3 and 4 outline the estimated defects due to manufacturing and installation per the EPA's HELP Model Engineering Documents (Reference 4). Leakage through these geomembrane defects is estimated using equation 149 from Reference 4 outlined below:

$$q_h = k_s i_{ave} n \pi R^2 (0.87719)$$

Where,

q_h	=	flow per unit area of geomembrane (m/s)
k_s	=	hydraulic conductivity of controlling soil layer = $1\text{x}10^{-9}$ m/s
i_{ave}	=	average hydraulic gradient from HELP equ. 150
n	=	number of defects per unit area (#/m^2)
R	=	radius of wetted area around flaw from HELP equ. 162 (m)

The average hydraulic gradient is calculated using equation 150 from Reference 4 outlined below:

$$i_{ave} = 1 + [h_g \div (2T_s * \ln(R \div r_o)]$$

Where,

h_g	=	hydraulic head on secondary layer (m)
T_s	=	thickness of controlling soil layer (m)
r_o	=	radius of defect (m)

The radius of wetted area around each defect is calculated using equation 162 from Reference 4 outlined below:

$$R = 0.26 a_o^{0.05} h_g^{0.45} k_s^{-0.13}$$

Where,

a_o	=	area of defect (m^2)

Groundwater Leakage Through Manufacturing Defects in
Secondary Geomembrane for FAC Pond 5

$$R = 0.26 a_o^{0.05} h_g^{0.45} k_s^{-0.13}$$

Where,

a_o	=	area of defect (m^2) = $7.85\text{x}10^{-7}$ m^2
h_g	=	hydraulic head on secondary layer (m) = 8.2 ft = 2.5 m
k_s	=	hydraulic conductivity of controlling soil layer = $1\text{x}10^{-9}$ m/s

$$R = 0.26(7.85x10^{-7})^{0.05}(2.5)^{0.45}(1.00x10^{-9})^{-0.13}$$

$$\boldsymbol{R = 2.88\ m;}$$

$$i_{ave} = 1 + [h_g \div (2T_s * \ln(R/r_o)]$$

Where,

h_g	=	hydraulic head on secondary layer (m) = 8.2 ft = 2.5 m
T_s	=	thickness of controlling soil layer (m) = 3 ft = 0.9144 m
r_o	=	radius of defect (m) = $5.0x10^{-4}$ m

$$i_{ave} = 1 + [2.5 \div (2(0.9144) * \ln(2.88/5.0x10^{-4})]$$

$$i_{ave} = 1.16;$$

$$q_h = k_s i_{ave} n \pi R^2 (0.87719)$$

$$q_h = (1x10^{-9})(1.16)(1 \div 4046)\pi(2.88)^2(0.87719)$$

$$\boldsymbol{q_h = ((6.52x10^{-12}\, m/s)(86{,}400\, s/day)(1.0\, acres)) \div (9.35x10^{-7}\, gallons/[meter \cdot acres])}$$

$$\boldsymbol{q_h = 0.60 gallons/acre/day}$$

This flow rate equates to 0.60 gallons/acre/day of groundwater leaking through manufacturing defects in the secondary geomembrane of FAC Pond 5. The same methodology presented above for leakage through manufacturing defects was used in determining the leakage rate due to installation defects. Installation defects are assumed to be 1 cm^2 and occur at a frequency of five (5) per acre. The groundwater leakage in the pond due to manufacturing defects and installation damage are presented in Scenarios 4 and 5 of the attachments to this calculation. A summary of calculated groundwater leakage rates through defects for the pond can be found in Table 3.

5.5 Compacted Clay Layer Consolidation Water Leakage Through the Secondary Geomembrane

The leakage volume of clay consolidation water through the secondary geomembrane is calculated using the same method used to find the groundwater leakage volume through the secondary geomembrane. In calculating the leakage of clay consolidation water, it is assumed that the clay layer is doubled drained. Therefore, the clay layer thickness (t) will be cut in half to model the two drainage paths. The head (h) is assumed to be the average depth of liquid in the pond. This value relates to the increase in pore pressure generated from the liquid within the pond. This increased pressure is the driving force of the clay consolidation. The consolidation water has been included in this analysis, however it is recognized that over time the liquid contributed by this mechanism will become negligible.

The calculated leakage rate for the compacted clay consolidation water was determined by the same methodology used for the leakage of groundwater through the secondary liner system and can be found in Scenarios 6 and 7 of the attachments to this calculation. A summary of calculated compacted clay layer consolidation water leakage rate through defects in the secondary geomembrane for the pond can be found in Table 3.

6.0 CONCLUSIONS

Combining all sources of liquids entering the leak detection system will yield the Response Rate for the FAC Pond. Tables 1 to 4 below summarize liquid quantities per day from each source. Table 5 summarizes the Response Rates for the pond.

Table 1: Leakage Through Defects in Primary Geomembrane in FAC Pond 5

	Pond 5
Manufacturing Defects (gallons/acre/day)	13.2
Installation Defects (gallons/acre/day)	138.4
Total (gallons/acre/day)	**151.6**

Table 2: Permeation Through Geomembranes in FAC Pond 5

	Pond 5
Leachate Liquid through Primary Liner System (gallons/acre/day)	187.1
Groundwater through Secondary Liner System (gallons/acre/day)	41.7
Clay Consolidation Water through Secondary Geomembrane (gallons/acre/day)	154.8
Total (gallons/acre/day)	**383.6**

Table 3: Leakage Through Defects in Secondary Geomembrane in FAC Pond 5

		Pond 5
Manufacturing Defects (gallons/acre/day)	Groundwater	0.5
	Clay Consolidation	1.0
Installation Defects (gallons/acre/day)	Groundwater	4.3
	Clay Consolidation	10.5
Total (gallons/acre/day)		**16.3**

Table 4: Response Rates for FAC Pond 5

	Pond 5
Total Permeation (gallons/acre/day)	383.6
Total Leakage (gallons/acre/day)	167.9
Total (gallons/acre/day)	**551.5**

Table 5: Final Response Rate Values

Fac Pond	Unit-Specific RR[2] [gpad]	Pond Area[1] [acres]	Pond-Specific RR [gpd]
5	552	4.7	2,595

Notes:
1. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.
2. Unit-specific RR values have been rounded up for conservatism

Scenario 1: Leakage Through Primary Liner Due to Manufacturing Defects

Assumption 1: One (1) defect per acre, with an approximate diameter of 1 mm

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Liner (ft)	26	7.9248
k_s = Permeability of Controlling Soil Layer (cm/s)	5.00E-09	5.00E-11
T_s = Thickness of Controlling Soil Layer (ft)	1.67E-02	5.09E-03
r_0 = Radius of Flaw (mm)	0.5	5.00E-04
a_0 = Flaw Area (m^2)		7.8540E-07
R = Radius of Wetted Area Around Flaw(1) (m)		7.1352
n = Density of Flaws (number per acre)	1	2.47E-04
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} (2)	82.38
Leakage Rate Through Flaws, q_h (m/s) (3)	1.43E-10
Daily Leakage Volume (gallons/acre/day)	13.19

Notes:

(1) From HELP Model Engineering Documentation Equ. 162

(2) From HELP Model Engineering Documentation Equ. 150

(3) From HELP Model Engineering Documentation Equ. 149

Scenario 2: Leakage Through Primary Liner Due to Installation Defects

Assumption 1: Five (5) defects per acre, with an approximate diameter of 5.65 mm

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Liner (ft)	26	7.9248
k_s = Permeability of Controlling Soil Layer (cm/s)	5.00E-09	5.00E-11
T_s = Thickness of Controlling Soil Layer (ft)	1.67E-02	5.09E-03
r_0 = Radius of Flaw (mm)	5.65	5.65E-03
a_0 = Flaw Area (m^2)		1.0029E-04
R = Radius of Wetted Area Around Flaw[1] (m)		9.0931
n = Density of Flaws (number per acre)	5	1.24E-03
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} [2]	106.43
Leakage Rate Through Flaws, q_h (m/s) [3]	1.50E-09
Daily Leakage Volume (gallons/acre/day)	138.38

Notes:

(1) From HELP Model Engineering Documentation Equ. 162

(2) From HELP Model Engineering Documentation Equ. 150

(3) From HELP Model Engineering Documentation Equ. 149

Scenario 3: Permeation through the primary and secondary layers

Assumed hydraulic conductivity of 30-mil liner, k= 2x10^{-11} cm/s

Q=kiA

Pond 5

For primary layer (permeation from pond through liner)

k = Effective Hydraulic Conductivity	4.24E-07
i = Hydraulic Gradient = H/t	1354.2
H = Hydraulic Head (ft)	26
t = layer thickness (ft)	0.019
A = Area (acres)	1
Daily Leakage Volume (gallons/acre/day)	187.08

For secondary layer (groundwater permeation)

k = Effective Hydraulic Conductivity	5.49E-05
i = Hydraulic Gradient = H/t	2.3314
H = Hydraulic Head (ft)	7
t = layer thickness (ft)	3.0025
A = Area (acres)	1
Daily Leakage Volume (gallons/acre/day)	41.70

For secondary layer (clay consolidation water permeation)

k = Effective Hydraulic Conductivity	5.49E-05
i = Hydraulic Gradient = H/t	8.6522
H = Hydraulic Head (ft)	13
t = layer thickness (ft)	1.5025
A = Area (acres)	1
Daily Leakage Volume (gallons/acre/day)	154.77

Total Permeation (gallons/day):	**383.56**

Scenario 4: Groundwater Leakage Due to Manufacturing Defects

Assumption 1: One (1) defect per acre, with an approximate diameter of 1 mm

Assumption 2: Hydraulic head is acting on the bottom of the clay layer

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Secondary Layer (ft)	7	2.1336
k_s = Permeability of Controlling Soil Layer (cm/s)	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer (ft)	3	0.9144
r_0 = Radius of Flaw (mm)	0.5	5.00E-04
a_0 = Flaw Area (m^2)		7.8540E-07
R = Radius of Wetted Area Around Flaw[(1)] (m)		2.6781
n = Density of Flaws (number per acre)	1	2.47E-04
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} [(2)]	1.14
Leakage Rate Through Flaws, q_h (m/s) [(3)]	5.55E-12
Daily Leakage Volume (gallons/acre/day)	0.51

Notes:

(1) From HELP Model Engineering Documentation Equ. 162

(2) From HELP Model Engineering Documentation Equ. 150

(3) From HELP Model Engineering Documentation Equ. 149

Scenario 5: Groundwater Leakage Due to Installation Defects

Assumption 1: Five (5) defects per acre, with an approximate diameter of 5.65 mm

Assumption 2: Hydraulic head is acting on the bottom of the clay layer

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Secondary Layer (ft)	7	2.1336
k_s = Permeability of Controlling Soil Layer (cm/s)	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer (ft)	3	0.9144
r_0 = Radius of Flaw (mm)	5.65	5.65E-03
a_0 = Flaw Area (m^2)		1.0029E-04
R = Radius of Wetted Area Around Flaw[1] (m)		3.4130
n = Density of Flaws (number per acre)	5	1.24E-03
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} [2]	1.18
Leakage Rate Through Flaws, q_h (m/s) [3]	4.69E-11
Daily Leakage Volume (gallons/acre/day)	4.33

Notes:

(1) From HELP Model Engineering Documentation Equ. 162

(2) From HELP Model Engineering Documentation Equ. 150

(3) From HELP Model Engineering Documentation Equ. 149

Scenario 6: Secondary Clay Layer Consolidation Water Leakage Due to Manufacturing De
Assumption 1: One (1) defect per acre, with an approximate diameter of 1 mm

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Liner (ft)	13	3.9624
k_s = Permeability of Controlling Soil Layer (cm/s)	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer (ft)	3	0.9144
r_0 = Radius of Flaw (mm)	0.5	5.00E-04
a_0 = Flaw Area (m^2)		7.8540E-07
R = Radius of Wetted Area Around Flaw[1] (cm^2/s)		3.5384
n = Density of Flaws (number per acre)	1	2.47E-04
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} [2]	1.24
Leakage Rate Through Flaws, q_h (m/s) [3]	1.06E-11
Daily Leakage Volume (gallons/acre/day)	0.98

Notes:
(1) From HELP Model Engineering Documentation Equ. 162
(2) From HELP Model Engineering Documentation Equ. 150
(3) From HELP Model Engineering Documentation Equ. 149

Scenario 7: Secondary Clay Layer Consolidation Water Leakage Due to Installation Defect
Assumption 1: Five (5) defects per acre, with an approximate diameter of 5.65 mm

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Liner (ft)	13	3.9624
k_s = Permeability of Controlling Soil Layer (cm/s)	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer (ft)	1.5	0.4572
r_0 = Radius of Flaw (mm)	5.65	5.65E-03
a_0 = Flaw Area (m^2)		1.0029E-04
R = Radius of Wetted Area Around Flaw(1) (cm^2/s)		4.5094
n = Density of Flaws (number per acre)	5	1.24E-03
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} (2)	1.65
Leakage Rate Through Flaws, q_h (m/s) (3)	1.14E-10
Daily Leakage Volume (gallons/acre/day)	10.54

Notes:
(1) From HELP Model Engineering Documentation Equ. 162
(2) From HELP Model Engineering Documentation Equ. 150
(3) From HELP Model Engineering Documentation Equ. 149

Application Appendix D-3 – Tanks

(proposed modified pages are designated with a November 2013 revision date at the top of the respective page)

APPENDIX D-3
TANKS

TABLE OF CONTENTS

TANKS

I. INTRODUCTION

The CWM Model City Facility utilizes tanks for storing, treating and transferring many different materials including leachate, PCB liquids, organic liquids, products, aqueous waste, acids, caustics, sludges, recycle water, ground water, waste solids and lab waste.

All of the permitted tanks at the Model City Facility are listed in this Appendix.

II. TANKS AND THEIR SECONDARY CONTAINMENT SYSTEMS

The Permittee has constructed tankage specified in this Appendix with the required secondary containment and leak detection systems as specified in 6 NYCRR Part 373-2.10, except for Tank T-58 which was granted a variance from secondary containment requirements in CWM's 2005 Part 373 Permit No. 9-2934-00022/00097. Drawings and secondary containment volume calculations for each tank area are provided in the attached System schematics. Process and Instrumentation Drawings (P&IDs) are also provided.

The secondary containment for tanks located inside buildings is provided by the building itself and designed to contain, at a minimum, 100% of the volume of the largest tank. Tanks located outside of buildings are provided with secondary containment designed to contain a minimum of 100% of the largest tank plus a 25 year, 24 hour storm event.

Precipitation that falls into outdoor secondary containment areas is typically collected and removed via pump, vacuum truck or equivalent and treated in the Aqueous Waste Treatment System, or if appropriate, tested and discharged to the surface water drainage system if analysis indicates that it meets surface water standards. Under normal circumstances, the secondary containment will be pumped free of liquid no later than the end of the next business day after the end of a rainfall event or thaw.

All ancillary equipment for the permitted tank systems is provided with secondary containment, except for that ancillary equipment meeting the exemption specified in 6NYCRR 373-2.10(d)(6). All exempted ancillary equipment, e.g., welded piping, which is located outside of secondary containment, is visually inspected on a daily basis (except for groundwater extraction systems during the winter shut down period).

All hazardous waste tank systems have been evaluated to determine if any such systems meet the definition of being interconnected, in accordance with 6NYCRR 370.2(b)(105). Criteria has been used to identify all areas where equipment failure at any point in the tank system or operator error could result in the release from more than one tank for tank systems interconnected in the same, or separate, secondary containments. As specified by 6NYCRR 373-2.10(d)(5)(i)(a), secondary containment systems must be designed or operated to contain 100% of the largest tank or the volume of all interconnected tanks, whichever is greater.

CWM has installed valving and electronic safeguards for all interconnected tanks at the Model City Facility whose combined volume exceeds the volume of secondary containment provided for these tanks to prevent potential secondary containment volume exceedences which could be caused by operator error.

III. GENERAL PROCESS SYSTEMS

A. The Aqueous Waste Treatment Facility

CWM has engineered and constructed an Aqueous Wastewater Treatment System (AWTS) designed to treat on-site waters, landfill leachate and gate receipts from customers. The system occupies an area of approximately two acres, and is located at the western edge of the existing operating facility. The facility features enclosed tanks for receipt of waste materials, reaction vessels, filter presses for the removal of solids, biotowers for the removal of biodegradable organics (alcohols and ketones), carbon adsorbers for the capture of residual organics, cartridge filter units for removal of residual solids, adsorption media for removal of arsenic and storage tanks for the treated waste. The alkalization/precipitation, lime slurry, filter press and gate receipts receiving operations are housed in the 10,000 square foot Aqueous Treatment (A/T) Building along with the control room, laboratory and offices. The 1,500 square foot Water Treatment (W/T) Building houses the filtration, arsenic adsorption and carbon adsorption processes.

The system features a Programmable Logic Controller (PLC) to monitor operations and transfers of materials within the facility. The PLC is also used to insure system safety by interlocking with various control equipment.

The Aqueous Treatment and Water Treatment Buildings were designed to provide an environmentally safe water treatment operation. Environmental control was one of the primary objectives in the design and operation of the facility. The system features concrete containment surrounding all tanks, reaction vessels, and other process equipment. In addition, where needed, process piping is lined with special corrosion resistant plastic (polypropylene) or is constructed of High Density Polyethylene (HDPE) in order to prevent corrosion on the interior surface of the piping and prolong the process life of the piping. Finally, process tanks within the A/T Building are tied into a vent collection system. This system controls acid vapors associated with receipt and treatment of the waste materials. In addition, carbon canisters are installed on the process tanks which contain Subpart CC wastes to control organic emissions.

The system is designed to be flexible in the treatment of waste streams. Flexibility is provided by the capability to by-pass or recirculate the process flow through major components of the treatment system. This allows for enhanced treatment and additional process capacity.

The incoming leachate, which is pretreated by oil/water separation when necessary, is pumped into the reaction/blending tanks where sulfuric acid and ferrous sulfate are added to lower the pH prior to metals precipitation, as needed and directed by the laboratory. Aqueous gate receipts can be mixed in the special treatment tanks and then transferred to the reaction/blending tanks. Each batch of blended waste is carefully prepared and analyzed by facility chemists.

The aqueous wastes then go through an alkalization step and filtration unit to remove metal contaminants. The filter cake from the process is incinerated or transported to the site's secure landfill depending on the F039 analysis and achievement of land ban treatment standards. The treated effluent is then pumped into the biological treatment system (biotowers), where the wastewater undergoes biodegradation to remove organics. Flow is then processed through the cartridge filter and arsenic adsorption units (for aqueous wastes requiring arsenic removal) and carbon adsorption unit and on to the effluent holding tanks for testing prior to discharge to the facultative ponds. The biotowers can also be bypassed if organic constituent concentrations are low and the carbon treatment system can handle the organic load. The final treated effluent undergoes extensive laboratory testing and is discharged to the lower Niagara River under a state SPDES permit.

While some AWTS tanks are used for storage only, various treatment options may be used in other tanks to facilitate the most efficient overall treatment, as listed in the following tank tables. For example, anti-foaming agents, nutrients and inoculum are typically added to lift station tanks T-3011 and T-3012 or tank T-3002 to improve organic reduction efficiency in the biotowers. Various agents may be added to filtrate storage tank T-100 and leachate tank farm tanks T-101, T-102 and T-103 to reduce the concentration of organics. Air sparging may be performed and various agents may be added to final effluent tanks T-58 and T-125 to reduce the concentration of organics. Hexametaphosphate is typically added to carbon adsorber feed tank T-3003 to prevent bridging of the carbon adsorbers. An oxidizer may be added to RMU-1 lift station tank T-160 to control the generation of hydrogen sulfide gas. A wide variety of other chemicals may also be used in any treatment tank depending on the type of treatment needed.

Aqueous Wastewater Treatment Building Tanks.

TANK #	OVERFILL CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-710 SPECIAL TREATMENT TANK	level indicator with high and high/high level alarms (PLC controlled)	FRP	8,000 storage/ treatment	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-810 SPECIAL TREATMENT TANK	level indicator with high and high/high level alarms (PLC controlled)	FRP	8,000 storage/ treatment	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-820 SPECIAL TREATMENT TANK	level indicator with high and high/high level alarms (PLC controlled)	FRP	8,000 storage/ treatment	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-850 SOLIDS DISSOLVING TANK	visual observation with inspection hatch	FRP	846 treatment	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1010 METALS PRECIPITATION TANK	level indicator with high and high/high level alarms (PLC controlled)	Carbon steel	10,000 treatment	lime slurry/ aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1020 METALS PRECIPITATION TANK	level indicator with high and high/high level alarms (PLC controlled)	Carbon steel	8,000 treatment	lime slurry/ aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1111 FILTRATE TANK	level indicator with high and high/high level alarms (PLC controlled)	Polyethylene	300 storage	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1112 FILTRATE TANK	overflow pipe and level indicator with high and high/high level alarms (PLC controlled)	FRP	450 storage	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1310 CAUSTIC SCRUBBER	level indicator with high level alarm (PLC controlled)	FRP	580 treatment	caustic solution / aqueous wastewater	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual

Solids Separation Building Tanks.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-3011 LIFT TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	375 storage/ treatment	aqueous waste	Solids Separator Building (South of AWTS Building)	above ground	14,851 gallons	4,291 gallons	visual
T-3012 LIFT TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	375 storage/ treatment	aqueous waste	Solids Separator Building (South of AWTS Building)	above ground	14,851 gallons	4,291 gallons	visual

Tanks North of AWTS Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-100 FILTRATE STORAGE	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	160,545 storage/ treatment	aqueous waste	North of AWTS Building	above ground	571,328 gallons	424,410 gallons	visual/leak detection valve
T-125 EFFLUENT STORAGE	overflow pipe and level indicator with high level alarm (PLC controlled)	carbon steel	394,271 storage/ treatment	aqueous waste	North of AWTS Building	above ground	571,328 gallons	424,410 gallons	visual/leak detection valve

Tanks West of AWTS Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-58 EFFLUENT STORAGE	level indicator with high level alarm (PLC controlled)	Glass fused carbon steel	488,529 storage/ treatment	aqueous waste	East of AWTS Building	above ground	see note	see note	leak detection pipe and valve

Note: A request for variance from secondary containment for Tank T-58 has been approved by NYSDEC.

Tanks East of AWTS Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-210 REACTION BLEND TANK	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	30,000 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350 gallons	36,903 gallons	visual
T-220 REACTION BLEND TANK	level indicator with high and high/high level alarms (PLC controlled)	FRP	30,000 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350gallons	36,903 gallons	visual
T-230 REACTION BLEND TANK	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	30,000 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350gallons	36,903 gallons	visual
T-310 BIOTOWER	automatic shut off and overflow pipe to clarifier tanks, equipped with pressure relief vent	FRP	30,457 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350gallons	36,903 gallons	visual
T-320 BIOTOWER	automatic shut off and overflow pipe to clarifier tanks, equipped with pressure relief vent	FRP	30,457 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350gallons	36,903 gallons	visual

Waste Water Treatment Building Tanks.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-3007 CARBON ADSORBER	flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	7,600 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual
T-3008 CARBON ADSORBER	flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	7,600 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual
T-3010A ARSENIC ADSORBER	Flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	470 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual

T-3010B ARSENIC ADSORBER	Flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	470 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual
T-3010C ARSENIC ADSORBER	Flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	470 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual
T-3010D ARSENIC ADSORBER	Flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	470 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual

Tanks South of Waste Water Treatment Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-52 CARBON TRANSFER TANK	overflow pipe to carbon adsorbers, equipped with pressure rupture disk	carbon steel	7,600 storage	aqueous waste	South of WWT Building	above ground	9,546 gallons	8,400 gallons	Visual

Tanks East of Waste Water Treatment Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-3001 pH ADJUST TANK	automatic shut off and overflow pipe to T-3002	FRP	1,255 treatment	aqueous waste	Tank farm east of WWT Building	above ground	1,872 gallons	1,549 gallons	Visual
T-3002 BIOTOWER FEED TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	900 treatment	aqueous waste	Tank farm east of WWT Building	above ground	1,872 gallons	1,549 gallons	Visual
T-3003 ADSORBER FEED TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	1,210 storage/ treatment	aqueous waste	Tank farm east of WWT Building	above ground	1,667 gallons	1,491 gallons	Visual
T-3009 BACKWASH TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	carbon steel	6,000 storage	aqueous waste	East of WWT Building	above ground	Double walled tank	N/A	visual/leak detection valve

B. SLF 1-6 Leachate System

Oily leachate from SLF 1-6 can be pumped or transferred from the SLF 1-6 landfill leachate pumps into the SLF 1-6 lift station (T-105). The leachate received by the lift station is transferred by a pump into a surge tank (T-130). Oil and aqueous phases can be decanted and separately removed from T-130. Otherwise, mixed leachate is transferred to the SLF 1-11 Oil/Water Separator (T-158) by vacuum truck.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-105 LIFT STATION	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	carbon steel	3,000 storage	Leachate	SLF 1-6	above ground	4,143 gallons	3,000 gallons	visual
T-130 SURGE TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	stainless steel	5,732 storage	Leachate	SLF 1-6	above ground	8,228 gallons	6,819 gallons	visual

C. SLF 7, 10 and 11 Leachate Systems

Leachate generated by SLF 7, 10 and 11 is pumped from the SLF 7, 10 and 11 landfill leachate pumps into the associated lift station tank (T-107, T-110 and T-111). The leachate received by the lift station is pumped to holding tanks (T-108 and T-109) from which it is removed by vacuum truck and transferred to the T-200 series tanks or the SLF 1-11 Oil/Water Separator (T-158), which may also be used for various offsite commercial and onsite generated aqueous wastes. Oil from T-158 is transferred to vacuum trucks for offsite disposal. The aqueous phase from T-158 is transferred to tank T-159 and pumped to the Leachate Tank Farm. SLF 7 leachate may also be removed from T-107 by vacuum truck and transferred to AWT for treatment and/or transferred to an outbound tanker for treatment or disposal.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-107 SLF 7 WET WELL TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	350 storage	leachate	SLF 7	aboveground	2,765 gallons	350 gallons	visual
T-110 SLF 10 WET WELL TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	350 storage	leachate	SLF 10	aboveground	15,709 gallons	3,000 gallons	visual
T-111 SLF 11 WET WELL TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	350 storage	leachate	SLF 11	aboveground	15,709 gallons	10,000 gallons	visual
T-108 SLF 7/11 HOLD TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	10,000 storage	leachate	SLF 11	aboveground	15,709 gallons	10,000 gallons	visual
T-109 SLF 10 HOLD TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	3,000 storage	leachate	SLF 10	aboveground	15,709 gallons	3,000 gallons	visual

SLF 1-11 Oil/Water Separator Building

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-158 OIL/WATER SEPARATOR TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	steel	17,000 treatment	leachate, offsite and onsite aqueous wastes	East of Leachate Tank Farm	aboveground	24,876 gallons	17,000 gallons	visual
T-159 AQUEOUS TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	1,000 storage	leachate, aqueous wastes	East of Leachate Tank Farm	aboveground	24,876 gallons	17,000 gallons	visual

D. SLF 12 Leachate System

Leachate generated by SLF 12 is pumped from the SLF 12 landfill leachate pumps into the SLF 12 lift station tank (T-150). Nonhazardous onsite generated aqueous wastes (i.e., site waters) may also be added to tank T-150. The aqueous wastes received by the lift station are transferred by a pump to the Leachate Tank Farm through above ground piping.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-150 LIFT STATION	control level indicator and controller	carbon steel	8,000 storage /treatment	leachate, onsite generated aqueous wastes	SLF 12 Lift Station	above ground	18,388 gallons	8,000 gallons	visual

Tank T-160 and Lift Station for RMU-1 are located within the northern footprint of proposed new landfill Residuals Management Unit No. 2 (RMU-2). Tank T-160 and Lift Station will be closed in accordance with the Sitewide Closure Plan and will be demolished for the construction of the later northern phases of RMU-2. Therefore, new underground piping from RMU-1 will be installed to transfer leachate to tank T-150. Additionally, RMU-2 leachate will be pumped to T-150 through new underground piping. T-150 will be upgraded with new pumps to management the leachate from SLF-12 and RMU-1 and proposed RMU-2. The existing above ground piping used for transferring aqueous wastes from T-150 to the Leachate Tank Farm will be replaced with underground piping.

E. RMU - 1 Leachate System

Leachate generated by RMU-1 is pumped from the RMU-1 landfill leachate pumps and tank T-165 into the RMU-1 lift station tank (T-160). The leachate received by the lift station is transferred by pump through double walled underground piping and aboveground piping, then to the Leachate Tank Farm through aboveground piping.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-160 LIFT STATION	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	carbon steel	3,000 storage/ treatment	leachate	RMU-1 Landfill	above ground	7,563 gallons	3,000 gallons	visual
T-165	automatic shut off and level indicator with high and high/high level alarms	Glass fused carbon steel	876,769 storage	leachate	RMU-1 Landfill	above ground	913,155 gallons	889,529 gallons	visual

Tank T-160 and Lift Station are located within the footprint of proposed new landfill Residuals Management Unit No. 2 (RMU-2). Tank T-160 and Lift Station will be closed in accordance with the Sitewide Closure Plan and will be demolished for the construction of later phases of RMU-2. Tank T-165 will be retained for future management of leachate from RMU-2.

F. Leachate Storage Tanks T-101, T-102, T-103 and Frac Tank #3

The Leachate Tank Farm contains three (3) leachate storage tanks which are used to collect the aqueous phase leachate from active and closed landfills as well as other site waters. The leachate is held in the tanks and transferred to the AWTS on a demand basis. Also, located within this secondary containment area is Frac Tank # 3 which is used for storage of aqueous waste prior to treatment at the AWTS or SLF 7 leachate prior to offsite shipment for treatment or incineration.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-101 STORAGE (southern)	level indicator and controller and overflow pipe to sump	carbon steel	350,000 storage/ treatment	aqueous waste	East of North Salts	above ground	500,959 gallons	392,765 gallons	visual
T-102 STORAGE (middle)	level indicator and controller and overflow pipe to sump	carbon steel	350,000 storage/ treatment	aqueous waste	East of North Salts	above ground	500,959 gallons	392,765 gallons	visual
T-103 STORAGE (northern)	level indicator and controller and overflow pipe to sump	carbon steel	350,000 storage/ treatment	aqueous waste	East of North Salts	above ground	500,959 gallons	392,765 gallons	visual
FRAC TANK #3	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	21,000 storage	aqueous waste	East of North Salts	above ground	500,959 gallons	392,765 gallons	visual

G. Waste Stabilization Facility

Stabilization is a process that results in the reduction in the mobility (or leachability) of hazardous components within a hazardous waste matrix. This stabilization is accomplished by inducing a chemical reaction between the hazardous components and one or more reagents, such as cement, cement kiln dust, lime, flyash or other pozzolanic materials.

Typical materials to be stabilized are inorganic waste water treatment sludges, media with metals, contaminated soils, sand blast grit, incinerator ash, incinerator slag, emissions control dust and debris. These waste streams are chemically compatible and have no reactive properties, therefore, compatibility concerns are minimal.

Waste Profiles are carefully reviewed for EPA codes, components, types of metals present and stabilization recipe (type and quantity of reagents). Generally, bulk loads are processed as individual batches. Drum or other small quantities of waste and bulk loads that have similar characteristics, non-conflicting EPA waste codes and the same stabilization recipe may be combined to increase the batch size for processing.

Waste water from equipment wash down or compatible hazardous and non-hazardous gate receipts may be used as the water source in the recipe. The EPA codes will be tracked through the process tankage and the impact on the treatment standards will be assessed for each batch prior to processing. Alternatively, city water or non-hazardous site waters may be used to avoid code conflict.

The bulk waste material to be stabilized arrives at the site in dump trailers, rolloff boxes, drums, pneumatic trailers, and other types of containers. The waste can be wet, sticky, cohesive, dusty and contain rock, pipe sections, metal, concrete, rags, wire and other debris.

The majority of the waste that requires stabilization is deposited in a mixing basin. Reagents are metered into the basin in accordance with a predetermined recipe. Water is added to the mixture, and the waste with reagent and water is mixed to a homogeneous mixture. The stabilized waste mixture is then removed from the pit with a backhoe, loaded into a dump truck or container, and transported to the landfill or an off-site disposal facility. Waste in drums can be emptied into the pit using a forklift and drum handler or placed full into the pit and broken apart with the mixing backhoe.

Microencapsulation is a specified technology involving the immobilization of contaminants on debris by stabilization. Stabilization treatment is performed in the mixing basin (pit) system. As it is not possible to develop a waste stream specific recipe, the requirement is to utilize sufficient stabilization media to treat all surfaces. For material or debris that is not easily manageable in the mixing pits, a slurry of stabilization media can be mixed in the pit and transferred into the waste container where the material will be encapsulated.

Debris that may not be physically suitable for the stabilization equipment, or that contains organic contamination (e.g. pump contaminated with leachate) may be managed by macroencapsulation. This type of debris is placed in a non-degradable container such as a poly drum or HDPE box. The void space is then eliminated by the addition of stabilization material that does not need to be held and tested or other non-degradable absorbent/space filler. The container is then permanently sealed and disposed of in the landfill.

Stabilization-Northern Expansion Tanks

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
MIXING PIT 1	visual observation during operation	carbon steel	20,354 treatment	RCRA/TSCA wastes	Stab. Northern Expansion	underground	Double walled underground tank	Double walled underground tank	sensor probe
MIXING PIT 2	visual observation during operation	carbon steel	20,354 treatment	RCRA/TSCA wastes	Stab. Northern Expansion	underground	Double walled underground tank	Double walled underground tank	sensor probe

Stabilization-Southern Expansion Tanks

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
TA-1 PROCESS WATER	high level indicator	rubber lined carbon steel	20,000 storage	aqueous waste, miscellaneous site waters	Stab. Southern Expansion	above ground	28,174 gallons	24,739 gallons	visual
TA-2 PROCESS WATER	high level indicator	rubber lined carbon steel	20,000 storage	aqueous waste, miscellaneous site waters	Stab. Southern Expansion	above ground	28,174 gallons	24,739 gallons	visual

H. Truck Wash Facility

The Truck Wash Facility is comprised of the Truck Wash Building and the Truck Wash Bay. A collection tank (T-120) is contained in the Truck Wash Building for holding wash water accumulated as a result of washings from the Truck Wash Bay. Tank T-120 is permitted for hazardous waste in case collected wash waters are determined to be hazardous.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-120 WASH WATER STORAGE	electronic level control	FRP	1,650 storage	wash water	Truck Wash Building	aboveground	1,659 gallons	1,650 gallons	visual

I. Groundwater Pumping Systems

The groundwater pumping system tanks were constructed as part of the Corrective Measures Program at Model City. Originally installed as Interim Corrective Measures to check the spread of groundwater contamination and, ultimately, to improve groundwater quality in the affected areas, these systems were determined to be capable of achieving the goals of the Corrective Action Program and were made Final Corrective Measures by the NYSDEC on February 13, 2001.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	TANK CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-8001	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	5,000 storage	groundwater	West Drum Area	above ground	6,445 gallons	5,000 gallons	visual
T-8002	level indicator with high and high/high level alarms (PLC controlled)	FRP	550 storage	groundwater	West Drum Area	above ground	6,445 gallons	5,000 gallons	visual
T-8004	level indicator (PLC controlled)	FRP	550 storage	groundwater	South of SLF 3	above ground	892 gallons	550 gallons	visual
T-8005	automatic shut off and high level alarm	carbon steel	300 storage	groundwater	South of SLF 10	above ground	356 gallons	300 gallons	visual
T-8006	automatic shut off and high level alarm	carbon steel	300 storage	groundwater	East of SLF 12	above ground	356 gallons	300 gallons	visual
T-8007	automatic shut off and high level alarm	FRP	500 storage	groundwater	South of PCB Warehouse	above ground	539 gallons	500 gallons	visual
T-8008	automatic shut off and high level alarm	FRP	500 storage	DNAPL	Tank T-125/T-100 Area	above ground	571,328 gallons	424,410 gallons	visual
T-8009	automatic shut off and high level alarm	HDLPE	525 storage	groundwater	Inside T.O. Building CSA	above ground	853 gallons	525 gallons	visual
T-8010	automatic shut off and high level alarm	HDPE	1,000 storage	groundwater	South of South Trailer Parking CSA	above ground	1,300 gallons	1,000 gallons	visual

J. Process and Secondary Containment Sump Systems

SUMP	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
FILTER PRESS SUMP SYSTEM	daily visual inspection and pumped as needed	concrete with FRP insert	175 storage	aqueous waste/floor washdowns	Filter Press Room AWTS Building	underground	Sump provided with FRP box insert and leak detection.	N/A- double walled sump	leak detection view pipe
AWTS BLDG. UNLOADING PAD SYSTEM	daily visual inspection and pumped as needed	concrete	14,851	aqueous waste/floor washdowns	South side of AWTS Building	underground	N/A - part of containment for unloading pad	N/A - part of containment for unloading pad	not required
AWTS BLDG. FLOOR SUMP SYSTEM	daily visual inspection and pumped as needed	concrete	230	aqueous waste/floor washdowns	Floor in AWTS Building	underground	N/A - part of containment for building	N/A - part of containment for building	not required

K. Fuels Tanks

The fuels tanks in the Process Area were previously used for bulking, storage and transfer of fuel and incinerable wastes such as PCB liquids, sludges and organic wastes. These tanks provided for the separation of solvent, oil and incinerable material, disposal of wastewater and sludge, and the blending and storage of fuels and incinerables for off-site shipment. All fuels tanks have been emptied, cleaned, removed and certified closed. Final closure of the secondary containment and underlying soils for all fuels tank areas is being addressed as part of the facility Corrective Measures.

K. Fac Pond 5 Tank

The facultative pond tank will be located on the berms of the surface impoundment. The tank will store waters pumped from the secondary collection sump of the impoundment. The surface impoundment (facultative pond) are used for storage of treated effluent from the AWTS.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-9001	automatic shut off and level indicator with high level alarm	HDPE	1,100 storage	Secondary Leachate/Leak detection waters	East Berm of Fac Pond 5	above ground	Double walled tank	N/A	visual/leak detection valve

IV. PROCEDURES TO PREVENT HAZARDS

A. Inspections

Tanks will be inspected and evaluated according to the procedures and schedules provided in the CWM Inspection Plan.

B. Tank Inspection Criteria

Environmental Compliance Tank Inspection Criteria will generally include inspection items such as:

- above ground tank exterior free of signs of leakage, including discoloration that may be a residue of a prior release.
- above ground tank exterior free of signs of deterioration that could lead to potential leakage, including cracks, corrosion, defects, and obvious deformation.
- above ground tank ancillary equipment free of signs of leakage
- secondary containment shows no visible evidence of spills
- secondary containment intact and free of cracks which exhibit separation and coating is free of chips which expose the underlying concrete
- secondary containment not holding liquids for more than is allowable under the Inspection Plan
- overfill controls (where present) do not indicate overflow condition; overfill controls (where present) are operable
- liquids (not including condensate) not present in leak detection systems (visual or electronic indication); electronic leak detection systems (where present) are operable

C. Tank Assessments

All permitted hazardous waste tank systems must undergo a periodic assessment performed by an independent professional engineer who must certify that the tank is fit for continued use. Generally, all above ground tanks with secondary containment and leak detection are assessed once every five years. For certain tanks, an internal inspection is also required. The double walled, underground stabilization mixing pits and the AWTS floor sump are subjected to an annual, internal assessment. The assessment frequency and whether the tank will be internally inspected are specified in the attached Tank Assessment Schedule. In addition, all secondary containments and sumps associated with permitted tank systems are inspected by a qualified inspector every year. Tank assessment and secondary containment inspection reports are submitted to the NYSDEC each year.

Tanks T-3010A, T-3010B, T-3010C, and T-3010D are part of the arsenic treatment system and will be periodically changed out as part of normal operations. During regular tank change out installations, CWM personnel will inspect the system components prior to start up to insure they are installed properly. In addition, the tanks, along with the associated flexible hoses and their connections, involved in the change out will be re-tested for tightness in accordance with the procedure specified in Section 3.2 of the “Tank System Design and Assessment Report for AWTS Arsenic Removal Tanks T-3010A/B/C/D”. Also, prior to start up, CWM will comply with the requirements in Condition C.1.i.ii.”b” of Exhibit D in Schedule 1 of Module I of the Permit. During start up after tank change out, CWM will visually inspect the system components to insure they are free of leaks and that any deficiencies are addressed immediately. Documentation of each tank change out, and associated tightness testing and installation inspections will be maintained on-site for Department review.

D. Overflow Protection

Generally, most tanks within the AWT system are connected to a programmable logic controller (PLC). This unit is programmed to continuously monitor tank level, pump status and valve positions for the process vessels. The logic in the PLC is arranged so that pumps are shut down should levels become too low or reach a pre-determined high or high-high level.

Tanks that are not equipped with mechanical or electronic overflow protection generally contain an overflow pipe which is directed into the tank's secondary containment. As part of normal operations, the process operators and department supervisors make visual checks of the status of the operation. Overflow conditions would be identified at that time. In addition, the Site Inspector inspects each permitted tank on a daily basis.

E. Repairs

When a system deficiency is identified by any of the above inspection programs, it will generally be repaired immediately, if possible. Otherwise, action will be initiated with an environmental or maintenance work order by the end of the next business day. The time period to complete a repair varies depending on the type and extent of the deficit. Some repairs, such as outdoor concrete work or coating applications cannot be efficiently completed during winter conditions. Major defects affecting human health or the environment such as a tank leak, require immediate action by taking the unit out of service. After repairs have been completed, the area will be re-inspected and the repairs will be documented on the work order or by a subsequent tank assessment or secondary containment inspection report.

V. REQUIREMENTS FOR IGNITABLE, REACTIVE AND INCOMPATIBLE WASTE STREAMS

The facility Waste Analysis Plan addresses the special hazards and compatibility concerns for tank storage. Ignitable or reactive wastes will only be placed in tanks which are designed for storage of ignitable or reactive wastes unless the tank is used for an emergency. The aqueous waste treatment system is equipped with treatment tanks designed to react and mix wastewaters requiring special treatment or handling techniques. These tanks are closed top tanks meeting the buffer zone requirements of NFPA Combustible Liquids Code (1984). All tanks must be at least 50 feet internal to property lines or public roadways. NFPA 30 sets minimum buffer distances required for Class I, II and IIIB materials at 5 feet from a building. The distance increases depending on capacity.

Process wastewater, other site water or city water may be added prior to the addition of concentrated incoming wastewaters to control the generation of significant heat during mixing. All reaction vessels and tanks which could be subject to significant chemical reactions are equipped with the appropriate level, pH and/or temperature monitoring devices.

Mixing of incompatible wastes, which could produce an uncontrolled reaction is avoided by adhering to a prescribed process for purging and flushing of all process lines and tanks following transfer operations.

Incompatible wastes which could produce an uncontrolled reaction will not be mixed in storage tanks. Control of waste mixtures in storage tanks will be accomplished by actual laboratory bench tests if the material to be stored in a tank is different than the existing stored material.

Procedures to prevent incompatible mixtures in tanks are detailed in the Waste Analysis Plan. Materials that indicate signs of reaction which may exceed the design specifications of the vessel will not be stored in the same tank. Hazardous wastes will not be placed into an unwashed tank which previously held an incompatible waste or material.

VI. AIR EMISSION STANDARDS

Air emission standards for tanks are specified in 6NYCRR 373-2.29 and 40CFR 264/265.1080-1091 (Subpart CC), which became effective on December 6, 1996. RCRA Subpart CC is applicable to owners and operators of a TSDF which treats, stores or disposes of hazardous waste containing greater than 500 ppmw volatile organics in tanks, surface impoundments and containers. If Subpart CC wastes are managed in tanks, either Level 1 or Level 2 controls must be implemented.

Level 1 controls are based on the size of the tank, vapor pressure of the waste contained in the tank and the use of the tank. As long as the tank and its contents meet the specifications below, Level 1 controls consisting of a fixed roof with no cracks, gaps or leaks (conservation vents and relief devices are allowed) are sufficient. All closure devices must be maintained in the closed position except when necessary to access the waste or equipment under the cover.

Tank size (gallons)	Maximum vapor pressure
≥ 40,000	< 5.2 kPa (< 0.75 psi)
≥ 20,000 but < 40,000	< 27.6 kPa (< 4.5 psi)
< 20,000	< 76.6 kPa (< 11.1 psi)

Level 2 controls are required for tanks that do not meet the Level 1 criteria and for tanks in which stabilization of wastes with greater than 500 ppmw volatile organics is performed. Level 2 tanks must be vented to a control device. Stabilization (any physical or chemical process used to reduce the mobility of hazardous constituents or eliminate free liquids, except for the addition of absorbent to the surface of a waste without mixing) must be performed in an enclosure vented to a control device.

Based on volatile organic content of the leachate from SLF 1-6, SLF 7, SLF 10 and SLF 11, the lift stations and collection tanks associated with these landfills, as well as the SLF 1-11 oil/water separator system and the leachate storage tanks in the Leachate Tank Farm, are subject to Subpart CC requirements. Based on vapor pressure, Level 1 controls are sufficient for these tanks. Tanks associated with SLF 12 and RMU-1 contain leachate with less than 500 ppmw volatile organics at the point of origin and are exempt from Subpart CC requirements.

AWTS tanks associated with the treatment of leachate from SLF 1-6, SLF 7, SLF 10 and SLF 11 are also subject to Subject CC requirements. These tanks must also meet Level 1 controls based on the vapor pressure of the waste. All AWTS tanks downstream of the carbon adsorbers contain treated wastewater meeting the exit concentration and are exempt from Subpart CC requirements. Other AWTS tanks, e.g., the special treatment tanks, may be used for wastes containing greater than 500 ppmw volatile organics and would then be subject to Subpart CC requirements.

CWM limits the types of waste processed through the stabilization facility to those containing less than 500 ppmw volatile organics. Therefore, the stabilization mixing pits are exempt from Subpart CC requirements. Liquids contained in tanks TA-1 and TA-2 contain less than 500 ppmw volatile organics and are exempt from Subpart CC requirements.

Tanks associated with the groundwater pumping systems are part of the facility corrective measures and are exempt from Subpart CC requirements.

APPENDIX D-3, SECTION VII

TANK ANCILLARY EQUIPMENT TIGHTNESS TESTING PROCEDURES FOR UNDERGROUND HAZARDOUS WASTE TRANSFER LINES

VII. Procedures for Pressure Testing of Underground Hazardous Waste Transfer Lines

The procedures in this section are not required for leachate piping under waste within the boundaries of a landfill liner and piping associated with the river discharge of treated wastewater.

1. **Procedures for Hydrostatic Testing the Inner Carrier Pipe of Double-Walled Underground Transfer Lines:**

   The Permittee shall perform either of the two (2) hydrostatic test procedures specified below, as derived from the "Plastic Pipe Institute=s (PPI=s) Technical Report 31 (TR-31)". The Permittee, at its discretion, may use a "tracer" (e.g., dye, etc.) in the water used in these tests to differentiate it from other liquids that may be present. The pressure measurement device used in either of these procedures must be incremented at, and sensitive to pressure fluctuations of 1 psi or less. Also, regardless of which test is used, the Permittee shall, throughout the test=s duration, periodically inspect the down-gradient end of the outer containment pipe associated with the section of inner carrier pipe being tested, for signs of liquid discharge. If liquid discharge is observed, or if a tracer is used and it is detected in the liquid, it shall be assumed to be leakage.

   a. <u>Pressure Drop Procedure</u> -

      1. Pipe to be tested shall be filled with fresh water or Department approved alternate, and have all air bled off from its highest point.
      2. Pipe shall be pressurized to not less than 1.5 times the system operating pressure with a minimum of 11 psi.
      3. Maintain this test pressure for four (4) hours by adding sufficient liquid at hourly intervals as necessary, to each time re-establish the test pressure.
      4. Drop the pressure by 10 psi, and measure and record the pressure one (1) hour thereafter. If the final pressure is within 5% of this reduced pressure, the pipe has passed the test.

      If any pipe fails to pas the above test, prior to initiating any leak location and repair activities, the Permittee, at its discretion, may perform the Volume Loss Procedure specified in Sub-section Ab@ below to verify that the pressure loss is not due to pipe expansion.

   b. <u>Volume Loss Procedure</u> -

      1. Pipe to be tested shall be filled with fresh water or Department approved alternate, and have all air bled off from its highest point.

2. Pipe shall be pressurized to not less than 1.5 times the system operating pressure with a minimum of 11 psi.
3. Maintain this test pressure to compensate for pipe expansion for four (4) hours by adding sufficient liquid at hourly intervals as necessary, to each time re-establish the test pressure.
4. After the four (4) hour expansion period, the test period shall begin lasting a maximum of three (3) hours. At hourly intervals, liquid shall be added as necessary, to each time re-establish the test pressure. The amount of liquid which is added, if any, shall be measured and recorded each hour.
5. The amount of liquid added after the first hour of the test period and, if necessary, the cumulative amounts added after hours two (2) and three (3), shall be compared to the Expansion Allowance Criteria presented in Table VIII-1 at the end of this Section.
6. If the cumulative quantity of liquid added each hour is equal to, or less than the applicable quantity presented in Table VIII-1, the pipe has passed the test.

2. **Procedure for Testing the Outer Containment Pipe of Double-Walled Underground Transfer Lines:**

The test procedure which follows must be performed prior to burying or otherwise obscuring from view, the installed, or repaired/altered section of the outer containment pipe.

a. Air Pressure Procedure -

1. Pipe to be tested shall be pressurized with air at ambient temperature to not less than 1.5 times the system operating pressure with a minimum of 10 psi.
2. After a minimum of one (1) hour of stabilization, the pipe shall be re-pressurized, if necessary, to re-establish the test pressure.
3. At one-quarter (1/4) hour intervals (i.e., every 15 minutes) after the end of the stabilization period, the pressure will be measured using a pressure measure device which is incremented at, and sensitive to pressure fluctuations of 1 psi or less. These pressure measurements shall be recorded. Also, each time a pressure measurement is taken, at a minimum, the entire length of the newly installed pipe, or the length of the repaired/altered section, shall be inspected for any visible or audible signs of escaping air.

4. The test period shall be a minimum of one (1) hour and shall terminate with a final check of the pressure and inspection of the pipe. The test shall be considered passed if there are no visible or audible signs of escaping air along the pipe and there is no detectable pressure drop.

Table VII 1
Allowances for Plastic Pipe Expansion Under Test Pressure
(Gallons per 100 feet of pipe)

Nominal Pipe Size (inches)	1-Hour Test Duration (gals. / 1 hr.)	2-Hour Test Duration (gals. / 2 hrs.)	3-Hour Test Duration (gals. / 3 hrs.)
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.5
10	0.75	1.3	2.1
11	1.0	2.0	3.0
12	1.1	2.3	3.4

APPENDIX D-3, SECTION VIII

TANK SYSTEM ASSESSMENT TABLE

Tank ID	Most Recent Assessment prior to January 2004 (year)	Internal Tank Inspection Required (yes/no)	Tank ID	Most Recent Assessment Prior to January 2004 (year)	Internal Tank Inspection Required (yes/no)
T-710	2002	no	T-810	2002	no
T-820	2002	no	T-850	1997	yes
T-1010	1999	yes	T-1020	1999	yes
T-1111	2003	no	T-1112	1999	no
T-1310	2003	no	T-3011	2003	no
T-3012	2002	no	T-100	1999	yes
T-125	1999	no	T-8008	2002	no
T-58	2003	yes	T-210	2001	yes
T-220	2010[3]	no	T-230	2003	yes
T-310	2001	no	T-320	2001	no
T-3010A	2013[5]	no	T-3010B	2013[5]	no
T-3010C	2013[5]	no	T-3010D	2013[5]	no
T-3007	1999	yes	T-3008	1999	yes
T-52	2003	no	T-3001	1999	no
T-3002	1999	no	T-3003	1999	no
T-3009	2000	yes	T-105	2003	yes
T-130	1999	yes	T-107	2001	no
T-108	2001	no	T-109	2001	no
T-110	2001	no	T-111	2001	no
T-158	2001	no	T-159	2001	no
T-150	2003	yes	T-160	2002	no
T-165	2010[3]	yes	T-101	1999	yes
T-102	1999	yes	T-103	1999	yes
Frac Tank 3	1999	no	Mix Pit Tank 1	2003[1]	yes
Mix Pit Tank 2	2003[1]	yes	TA-1	2003	no

Modified: Nov. 2013

Tank ID	Most Recent Assessment prior to January 2004 (year)	Internal Tank Inspection Required (yes/no)	Tank ID	Most Recent Assessment Prior to January 2004 (year)	Internal Tank Inspection Required (yes/no)
TA-2	2003	no	T-120	1999	no
T-8001	1999	no	T-8002	1999	no
T-8004	1999	no	T-8005	1999	no
T-8006	1999	no	T-8007	2001	no
T-8009	2012[4]	no	T-8010	2012[4]	no
Filter Press Sump Tank	2003[2]	yes	T-9001	2014[5]	no

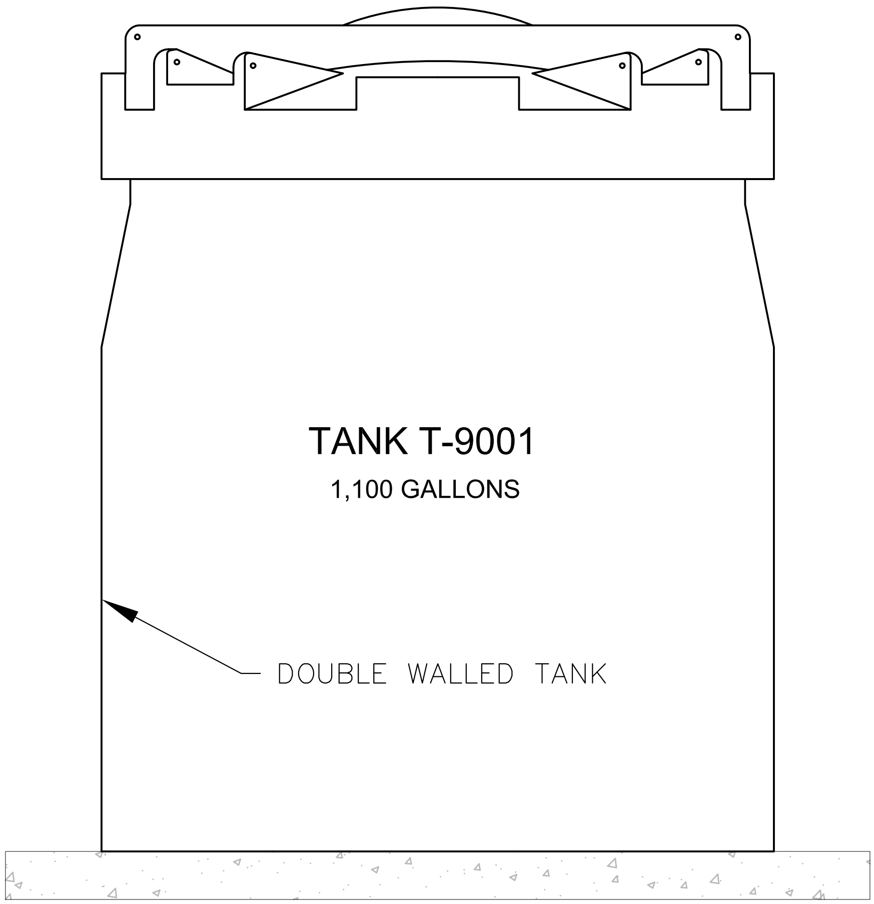
<u>FOOTNOTES</u>:

1. Mix Pit Tanks 1 & 2 shall be assessed annually instead of every five years in accordance with Condition B.1.c.i in Exhibit D of Schedule 1 of Module I of the Permit.
2. The Filter Press Tank Sump shall be assessed annually instead of every five years since it is part of the AWT secondary containment system, in accordance with Condition B.1.c.i in Exhibit D of Schedule 1 of Module I of the Permit.
3. Year of Tank T-165 & T-220 installation assessment.
4. Year of Tank T-8009 & T-8010 installation assessment.
5. Year of Tank T-3010A, T-3010B, T-3010C & T-3010D initial assessment. These tanks shall be re-assessed upon each operational change out in accordance with Condition C.1.i.ii."b" of Exhibit D in Schedule 1 of Module I of the Permit.
6. Year of Tank T-9001 installation assessment.

Application Appendix D-3, Figures & Capacity Calculations for Tank Systems' Secondary Containment

FIGURE D-36

TANK T-9001



PROFILE

SCALE: 1' 0' 1' 2'

FAC POND 5 TANK T-9001 6NYCRR PART 373 PERMIT		
CWM CHEMICAL SERVICES LLC TOWN OF PORTER, STATE OF NEW YORK		
EnSol, Inc. **Environmental Solutions**	661 MAIN STREET NIAGARA FALLS, NY 14301 PHONE (716) 285-3920 FAX (716) 285-3928	FIGURE D-36
10/28/13	PN: 13-7028	

X:\AAAp]\CWM\13-7028 Sitewide Permit Sec Cont Calcs Updates (Task 9) \Fac Ponds 1-2 & 5 (Figs D-36 & D-37) \ACAD\13-7028-D-36-37 - FAC POND 1-2 & 5 TANKS.dwg, 10/29/2013 8:38:31 AM, awellington

DOUBLE WALLED ABOVEGROUND STORAGE TANK

ATTACHMENT E

No Modifications Proposed

ATTACHMENT F

Application Section F – Preparedness & Prevention

No modifications to the text of the plan are proposed with the exception of the Inspection Forms

PREPAREDNESS AND PREVENTION

This section is presented in fulfillment of the requirements of 6 NYCRR 373-1.5(a)(2)(iv) and (v), 373-2.2(f),(g), and (h), 373-2.3, and 373-2.4(b)(1). It addresses information concerning security systems and procedures, facility inspection plans and procedures, and the equipment, structures, and procedures utilized to minimize hazards at the CWM Chemical Services, LLC, Treatment, Storage, and Disposal Facility in Model City, New York.

1.0 SECURITY [6 NYCRR 373-1.5(a)(2)(iv) and (v)], [6 NYCRR 373-2.2(f)]

1.1 24-hour Surveillance System

The primary access to the facility is via the main entrance off Balmer Road. This entrance is used by plant employees, contractors, waste haulers, suppliers, salesmen, and visitors. The main entrance gate is monitored 24 hours a day by one or more security guards who stops all trucks or other vehicles entering and leaving the facility. The guardhouse is equipped with telephone and radio communications. All hazardous waste shipments are stopped at this checkpoint.

Prior to admittance to the facility, all visitors or drivers must provide information including name, business affiliation, reason for visit, person whom visiting, and date and time of entry and exit. All plant visitors, contractors, vendors, and other nonfacility personnel are recorded by the guard in the visitor logbook prior to entry. Unauthorized access to the facility is prevented by the security guard. In addition, the entrance/exit gates may be closed and locked, if necessary.

1.2 Barrier and Means to Control Entry [6 NYCRR 373-2.2(f)(2)(ii)(a) and (b)]

In addition to the 24-hour security surveillance at the main entrance to the facility, the entire Model City Facility is enclosed with wire chain link fencing to prevent accidental or unauthorized access to active portions of the facility. The Balmer Road gate is controlled by the security guard, as described above. The alternate plant entrance is located on Balmer Road across from Lutts Road. All gates in the perimeter fence with roadway access from public thoroughfares to the active portion of the facility, except the main gate, are kept securely locked at all times when not in use. Whenever any of these gates is opened, a CWM employee or a security officer is stationed at these gates to record the name, date, and time of persons entering or leaving the facility.

Upon entry to and exit from the facility, all vehicles are required to show identification (for facility personnel) or sign in/out with the security guard. Consequently, the security guard maintains a complete and accurate record of who is on-site at any particular point in time.

1.3 Warning Signs [6 NYCRR 373-2.2(f)(3)]

Warning signs bearing the legend "DANGER - Unauthorized Personnel Keep Out" are posted at the entrance to the facility and at intervals on the fencing surrounding the facility. Warning signs are clearly legible from a distance of 25 feet and can be seen from any approach to the facility. A large sign is present at the Balmer Road entrance to the facility which describes the minimum safety precautions which must be followed at all times on-site. Facility buildings are posted with "DANGER -- Unauthorized Personnel Keep Out" signs. Required signs are posted on all appropriate tankage. Other warning signs such as "No Smoking" signs and personal protective equipment requirements are posted throughout the facility in appropriate locations. Traffic control signs are also posted throughout the facility.

2.0 INSPECTION PLAN [6 NYCRR 373-1.5(a)(2)(v)], [6 NYCRR 373-2.2(g)]

2.1 Introduction

This inspection plan has been developed in accordance with the regulatory requirements set forth under 6 NYCRR 373-2.2(g) and is an integral part of the Part 373-2 Permit for the Model City facility. Implementation of the procedures set forth in this plan will ensure facility compliance with all requirements of 6 NYCRR 373-2.2(g). A copy of this plan will be maintained and be available at the facility at all times.

This inspection plan is intended to provide a mechanism to identify and prevent system malfunctions, equipment deterioration, and human errors which, if allowed to continue without correction or preventive action, may lead to a release of hazardous waste constituents to the environment or create a threat to human health. The performance of periodic and effective inspections is essential if such events are to be prevented. To this end, CWM has developed the following procedure for performing inspections so that substandard conditions and practices are identified, and appropriate actions are taken in a timely manner.

The inspection program is implemented by qualified individuals assigned the responsibility to detect any unsafe conditions at the facility and prevent adverse consequences. The designated individuals have the training and authority to: (1) implement the required inspections, (2) perform necessary evaluations and hazard assessments, and (3) recommend appropriate response actions. Inspections are performed according to pre-determined schedules based on engineering knowledge and operational experience with the systems and processes involved. Each inspection item has the content and frequency necessary to alert facility personnel prior to development of a serious problem. A trained inspector assesses each item noting any potential malfunction/deterioration of equipment or operator error through regular observation of the processes and procedures. The level of response and its timing is determined by the nature and seriousness of the problem identified -- with protection of personnel and the prevention of adverse environmental impact being of paramount concern.

2.2 Administration

The facility District Manager is responsible for the administration and implementation of this plan. The District Manager has the responsibility for ensuring that:

- Inspections are conducted per the schedule included on the inspection forms which are included as part of this plan.
- Inspection reports are properly documented and problem conditions are addressed and corrected.
- The program is updated as necessary to reflect changes in Federal and State regulations as well as changes in facility operations.

2.3 Inspection Schedule and Criteria

The inspection program for the facility includes the following types of inspections which are described in detail below.

- Environmental Compliance Inspections (ECI). (Daily/Weekly/Monthly)
- Environmental Monitoring Systems Inspections (EMSI). (Frequency Varies)
- Security Inspection (SI). (Quarterly)
- Surface Water Control Inspection (SWCI). (Monthly)
- Emergency Equipment Inspection (EEI). (Monthly)

2.3.1 Environmental Compliance Inspection (ECI)

The Environmental Compliance Inspection (ECI) is performed to meet the requirements of the applicable federal regulations and the analogous New York State regulations:

Federal regulations

- General Facility Inspection Requirements (40 CFR 264.15)
- Container Management Inspections (40 CFR 264.174)
- Tank System Inspections (40 CFR 264.195)
- Surface Impoundment Inspections (40 CFR 264.226)
- Landfill Inspections (40 CFR 264.303)

Analogous New York State regulations

- General Facility Inspection Requirements (6 NYCRR 373-2.2(g))
- Containers Management Inspections (6 NYCRR 373-2.9)
- Tank System Inspections (6 NYCRR 373-2.10)
- Surface Impoundment Inspections (6 NYCRR 373-2.11)

- Secure Landburial Facility Inspections (6 NYCRR 373-2.14)

The facility is broken up into the following areas for the purposes of performing routine inspections:

- Aqueous Wastewater Treatment Operations
- Drum Warehouse
- Transformer Decommissioning Area
- General Facility
- Landfill Leachate Systems
- Active Landfills
- PCB Warehouse
- Laboratories
- Stabilization
- Trailer Parking
- Closed Landfills
- Petroleum Tanks

The schedule for inspecting the individual components of each of these areas is indicated on the inspection forms. Some inspections are conducted daily, i.e., 365 days per year. Other inspections are required only on operating days, defined as days on which a given operation is processing (e.g., aqueous wastewater treatment, stabilization) or managing gate receipt wastes (e.g., landfill, trailer park, warehouses). In addition, inspections with weekly and monthly frequencies are also included in the program. Many of the areas listed above have common components for which standard inspection criteria apply, i.e., tanks, container management areas, and satellite accumulation areas. In these cases, they are included on the back of the form to avoid repetition. The inspection forms for the ECI are attached.

Inspections are performed by trained site personnel that may include site supervision, and/or the Environmental Compliance Inspector (Site Inspector), and/or a trained alternate Site Inspector.

2.3.2 Environmental Monitoring Systems Inspections

The EMSIs are performed to ensure proper operation of the environmental monitoring systems in use at the facility. The Environmental Monitoring Personnel perform regular inspections of environmental monitoring equipment as outlined below:

2.3.2.1 Meteorological Monitoring System (per QAPP)

Meteorological System components are inspected per the Quality Assurance Project Plan (QAPP) for the CWM Meteorological Monitoring Network. Typical inspection items include the following instrumentation: wind speed, wind direction, sigma theta, temperature, dewpoint temperature, barometric pressure, precipitation gauge, chart recorder, and data logger.

2.3.2.2 Groundwater Monitoring Wells and Equipment (per sampling event)

Groundwater monitoring equipment is in good condition, including the following inspection items for all active groundwater monitoring wells: Well Wizard samplers, bailers, well casings, protective casings, protective barriers, concrete pads, and drainage.

2.3.2.3 Air Monitoring Equipment (per sampling event)

The air monitoring equipment is in good condition, including the following inspection items: air sampler, selective size inlet, filter holder housing, flow recorder, and timer.

2.3.2.4 Storm Water Flow Monitoring Equipment (Monthly)

The storm water flow monitoring flumes are operable, including the following inspection items: power supply, recorder, chart paper supply, flume condition.

2.3.3 Security Inspections (SI)

The Site Inspector performs a quarterly general facility security inspection. This inspection assesses the overall integrity and maintenance of the facility's security devices: perimeter fence, gates, locks, and warning signs.

2.3.4 Surface Water Control Inspection (SWCI)

The Site Inspector inspects the facility surface water control mechanisms monthly. The SWCI ensures that the run-off control systems for the facility are operating properly. Inspection criteria are as follows:

a. Discharge drainage ditches and culverts are free from major obstruction and blockage.
b. Adequate volume for containment of surface water prior to gates (visual observation).
c. Surface water retention area berms show no signs of instability, erosion, or integrity problems.
d. Concrete gates free of signs of deterioration or damage.
e. Gratings not buckling, corroding, deteriorating, or damaged.

f. Butterfly valves appear to seal properly.
g. Butterfly valves free from damage, deterioration, or corrosion.

2.3.5 Emergency Equipment Inspection (EEI)

The Emergency Coordinator (or his designee) will perform a monthly inspection of emergency response equipment maintained at the facility. These following items will be inspected to ensure that the equipment is available, accessible, and maintained:

a. Emergency Response Garage
    - Emergency Equipment Inventory per Contingency Plan
b. Emergency Response Van
    - Emergency Equipment Inventory per Contingency Plan
    - Response Van engine turned over to insure operation
c. Emergency Response Vehicle
    - Extinguishing system check for operability
    - Turn out gear accessible
    - SCBAs

2.4 Assess, Correct, Train (A.C.T.) Procedures

When an inspection indicates equipment malfunction or deterioration, or any other condition of concern, the following actions are taken as appropriate:

- Assess the situation.
- Determine the action needed in response to the situation, including immediate responses, if necessary.
- Establish the time frame within which the responses must occur. For minor discrepancies, the area supervisor is notified and the situation remedied as soon as possible. For remedies that require more time, an Environmental Work Order (EWO) is prepared. For emergency or near-emergency situations, prompt verbal reports shall be made to the Environmental or Safety Manager, to be followed later with written reports.
- Determine if training is required to prevent future reoccurrence and schedule any appropriate training.
- Follow up to verify that the situation has been resolved.

2.5 Environmental Work Order System

Environmental Work Orders (EWOs) are used to correct deficiencies that cannot be addressed by the end of the next business day (business days exclude weekends and holidays). The following is a description of how the EWO process works. An EWO can be initiated by any employee at the

Model City Facility using the EWO form. Part A of the form is usually completed by the Site Inspector who assigns a number to the EWO and enters it into the EWO tracking system. EWOs are typically issued by the end of the second business day after the deficiency is first noted. A copy of the EWO is then forwarded to the Operations Manager or other CWM employee with responsibility for the resources needed to respond to the EWO. This person completes Part B and C of the EWO form. When the work is completed, the Site Inspector is contacted to reinspect the area. If the deficiency has been resolved, the Site Inspector completes Part D. The completed EWO is filed in the Facility Operating Record.

The EWO tracking system maintained by the Site Inspector includes information regarding each current EWO, the responsible party, and the scheduled completion date. The Site Inspector periodically reviews the status of EWOs to ensure closure of each issue.

2.6 Recordkeeping Requirements

An inspection form is completed to document each required inspection. All substandard conditions identified during each inspection are noted on the inspection form, with a brief description of the item (if necessary) and a notation as to how the item has been resolved is included in the "Comments" column. For items which cannot be resolved by the end of the next business day, an Environmental Work Order (EWO) will be initiated.

Completed forms for all inspection areas are compiled and reviewed by the Site Inspector who ensures that all outstanding issues are addressed by an EWO or otherwise flagged for management review. The Site Inspector then attaches a Document Review Form to the completed package. The inspection package is then reviewed by the Technical Manager or designee and the Operations Manager or designee. Copies of all inspection packages as well as copies of completed EWOs and periodic EWO status reports, will be maintained with the facility operating record for a minimum period of 3 years.

2.7 Inspection Plan Updates

When significant changes in either the facility, operations, or equipment occur, the Operations Manager or designee will revise the inspection schedules and/or criteria contained in this plan. Any such revisions will require submission to NYSDEC as a modification to the site permit.

3.0 PREVENTIVE PROCEDURES, STRUCTURES AND EQUIPMENT [6 NYCRR 373-1.5(a)(2)(viii)]

The purpose of this section is to describe the procedures, equipment and facility structures to prevent hazards in loading/unloading areas; to prevent contaminated run-off from processing areas to enter the environment; to prevent the contamination of surface and groundwater; to mitigate the potential effects of equipment failure and power outages; and prevent undue exposure of personnel working within the facility from exposure to hazardous wastes.

3.1 Loading and Unloading Operations [6 NYCRR 373-1.5(a)(2)(viii)(a)]

The procedures for loading and unloading hazardous wastes in RMU-1 are described in the RMU-1 Engineering Report. Facilities have been designed to prevent hazards associated with the loading and unloading of hazardous wastes in connection with operation of RMU-1.

3.2 Run-on/Run-Off Control and Protection of Water Supplies [6 NYCRR 373-1.5(a)(2)(viii)(b) and (c)]

In accordance with Section 6 NYCRR 373-1.5(a)(2)(viii)(b), a unit run-off collection system must be capable of controlling and collecting run-off to prevent it from reaching other areas of the facility or the environment and to prevent flooding. This will be achieved through a combination of impounding and pumping.

During construction of RMU-1 and before placement of wastes in the cell, surface water will be handled within the cell. The purpose of surface water control will be to manage flow from precipitation and to direct such water away from, or out of, the cell. Measures to achieve this purpose will involve sediment controls, such as silt fences and hay bales. The number and location of these will be determined by the progress of construction operations, in order to affect control at the perimeters of construction zones.

During operation of RMU-1, precipitation entering the cells will be collected in the leachate collection system and be handled and treated as leachate.

Water from the final cover system will be managed as surface water. Run-off will be collected in the site surface water drainage channel system. The existing site surface water drainage system consists of a series of drainage channels and basins controlled by ~~five~~ gate valves where samples of the collected run-off are taken. The quality of the storm water run-off is monitored according to the site Surface Water Monitoring Plan contained in the site Part 373 Permit.

The requirements of 6 NYCRR 373-2.9(f)(1)(iv) state that run-on be controlled, collected, and managed expeditiously after storms to maintain the design capacity of the system. In accordance with this requirement, RMU-1 is surrounded by a perimeter embankment of sufficient height (approximately 5 to 10 feet above the existing ground surface) to prevent run-on from reaching the unit. The run-on, thus diverted, will be collected with other site drainage in the site surface drainage channel system where it will be collected and managed as described above.

All run-on/run-off collected by the drainage and collection system is monitored, as required by the facility's SPDES Permit. As previously stated, run-off collected from active portions of the unit will be transferred to and handled in the aqueous treatment process and run-off (and run-on) collected from other areas of the facility will be handled in accordance with site-wide drainage discharge procedures. Those procedures, summarized below, are defined in the Model City Surface Water Monitoring Plan.

Currently, the Surface Water Monitoring Plan covers most of the Model City site, discounting only a small portion of the southeastern most property that presently contains no hazardous waste management operations. This unmonitored area comprises that portion of the site drainage to Twelve Mile Creek. The monitored section of the site is part of the Six Mile Swale drainage basin.

In order to choose sampling locations (and sampling methods), which will yield samples representative of surface water run-off, it is important to consider the topography and drainage characteristics (as determined by soil types, cover, land use, and drainage control systems) of the site. In general, the Model City Facility site is extremely flat, sloping northward at less that 1 percent. Natural ground surface elevations range between approximately 310 and 320 feet above sea level.

Surface water on the Model City Facility property ultimately drains to one of two creeks which flow through the site. The major part of the property (western portion) drains to the north and west, discharging to Six Mile Swale. According to the New York State Stream Classifications, Six Mile Swale is a Class C stream. The best use of Class C waters is secondary contact recreation. Class C waters are suitable for the survival of fish, but due to the natural conditions, may not support their propagation. Six Mile Swale empties into Four Mile Creek approximately two miles from the northwestern boundary of the facility. Four Mile Creek flows north to Lake Ontario. A small part of the eastern portion of the site drains to Twelve Mile Creek. Twelve Mile Creek is Class C in the area of the Model City Facility property.

Twelve-Mile Creek and Six-Mile Swale are part of the Eighteen-Mile Creek Drainage Subbasin. This subbasin is a portion of the Lake Ontario Drainage Basin which includes the Eighteen-Mile Creek Subbasin and other tributaries of Lake Ontario entering the lake between the hamlet of Olcott and the mouth of the Niagara River. The basin drains an area of 233 square miles.

3.3 Air Monitoring Program

The Model City Facility has established an air monitoring program to assess the potential effects of the facility's emissions on the ambient air surrounding the site, particularly at locations where receptors may be exposed to this air. The air monitoring program is designed to establish average long-term emissions and trends.

The parameters of the Model City program have been selected to detect, identify and quantify matter which might be emitted into the atmosphere by the process and activities on-site. These parameters cover potential emissions from all site activities, and have historically included volatile organic compound vapors, PM-10, semi-volatile organic vapors, including PCBs. The Ambient Air Monitoring Program is detailed in the Part 373 Permit.

3.4 Equipment Failure at Power Outages [6 NYCRR 373-1.5(a)(2)(viii)(d)]

In all operating areas of the site, the facility equipment is inspected and maintained routinely to minimize equipment failure. In addition, all operators are trained with respect to the appropriate response and corrective actions in the event of an equipment or power failure.

In the event of a power failure, emergency exit lighting will automatically be activated. All feed pumps will be shut-off and remain shut down until reactivated by the operators. As an added precaution in Class I, Division II, Group D Hazard Areas, all electrical equipment is explosion-proof. Water for fire fighting purposes is available and duplicate equipment capable of pumping this water is maintained at the site.

In the event of equipment failures, potentially hazardous situations will be prevented or controlled via the following mitigation measures:

- Waste handling areas are provided with secondary containment structures.
- Movement of containers is performed by forklifts and if necessary by hand truck.
- Manual shut-off valves and controls are provided for all processes and tanks.
- Pumps which fail can be taken out of service and replaced with another pump.

If there has been an equipment failure or power outage which has resulted in a fire, explosion, spill or release of hazardous waste or produces conditions which could result in such events, the procedures described for each type of event in the Contingency Plan will be implemented.

The following procedures have been developed for, and are to be implemented if power loss does result in an imminent release, spill, fire, or explosion:

- Immediately notify the Department Supervisor of the failure or outage;
- Summon the Emergency Coordinator;
- Either the Department Supervisor or the Emergency Coordinator will contact the Maintenance Manager. The Maintenance Manager will assess the cause of the failure or outage and initiate efforts to correct situation;
- If necessary, battery operated lights and two-way radios are available to personnel.

3.5 Required Equipment [6 NYCRR 373-2.3(d)]

3.5.1 Internal Communications and Alarms [6 NYCRR 373-2.3(c)(1) and 373-2.3(c)(2)]

Internal communications are provided to each building and process area in the facility by centrally located telephones. Key management personnel are equipped with individual cell phones to notify them of an emergency situation. In addition, two-way radios are available to personnel to maintain contact in the event of an emergency. Outside emergency services (police, fire, etc.) may be contacted by telephone.

The primary alarm notification of an emergency is the electric siren located on the 350,000-gallon water tank adjacent to the container storage building. This siren can be activated by the Security Officer at the main entrance to the facility. This siren, when activated, alerts facility personnel that an emergency situation exists.

3.5.2 Emergency Response Equipment [6 NYCRR 373-2.3(c)(3)]

Portable fire extinguishers are located in various marked locations within the facility. Emergency response equipment is detailed in the site Contingency Plan.

3.5.3 Water for Firefighting [6 NYCRR 373-2.3(c)(4)]

Water for firefighting within the facility is provided by:

- a series of fire hydrants located throughout the facility
- a 350,000 gallon fire water tank adjacent to the drum handling building

3.5.4 Testing and Maintenance of Emergency Equipment

All facility communications and alarm systems, fire protection equipment, spill control equipment, and decontamination equipment will be tested and maintained in accordance with the facility Inspection Plan to assure its proper operation in time of emergency.

3.6 Preventing Undue Exposure of Personnel to Hazardous Waste

Employees complete general training courses which ensure that they have the basic skills to protect themselves and their fellow employees, as well as instructions which address the specific needs of their jobs. This includes a personal protection course, which takes employees through the care, use, limitations, and decontamination of the respirators and protective clothing that are required for their job duties in order to supplement general training about basic personal protection techniques and clothing. If appropriate to their duties, employees also learn how to use eye-wash/chemical-safety showers and hearing protection.

4.0 PRECAUTIONS TO PREVENT IGNITION OR REACTION OF IGNITABLE, REACTIVE OR INCOMPATIBLE WASTES [6 NYCRR 373-1.5(a)(2)(ix) and 373-2.2(i)(1) and (3)]

4.1 Applicable Waste Streams and Storage Locations

CWM has instituted operating procedures and facility construction to prevent accidental, uncontrolled reactions which might result in:

- Generation of extreme pressure, fire, explosion or violent reaction;
- Production of uncontrolled toxic mists, fumes, dusts or gases which may impact human health or the environment;
- Production of uncontrolled flammable fumes or gases which may result in a fire or explosion; or
- Damages to the structural integrity of the facility; or
- Through other like means threaten human health or the environment.

Mandatory laboratory analyses (as defined in the facility Waste Analysis Plan) are used to determine the properties of waste materials so that ignitable, reactive or incompatible wastes are not improperly placed in the unit, preventing reaction.

RCRA regulated reactive and ignitable wastes are restricted from landfill disposal unless they are deactivated. These wastes will be managed by properly processing, stabilizing, or otherwise rendering nonreactive, before placement into the landfill so that the material no longer meets the definition of reactive under 6 NYCRR Part 371.3(d) and 40 CFR 261.21 and 261.23. In addition, incompatible waste materials will not be placed in the same landfill cell unless they have been treated so that they are compatible prior to placement. The analyses described in the Waste Analysis Plan are implemented to ensure compliance with these requirements. In general, potentially incompatible materials are placed in separate areas in the unit and separated by a buffer zone, preventing reaction.

4.2 General Procedures to Prevent Ignition of Ignitable/Reactive Wastes

To prevent the ignition of wastes from sources of ignition or reaction, such as open flames, smoking, cutting, welding, hot surfaces, and sparks (static, electrical, or mechanical), operating procedures are strictly enforced for proper hot work and tool safety. Training in these procedures is provided for all employees who may be involved in such work.

"No Smoking" signs are conspicuously posted throughout the facility. These rules are strictly enforced. Any employee violating this rule is subject to termination.

As discussed in the facility Waste Analysis Plan, the wastes are characterized upon receipt, as well as through various handling processes to insure proper segregation and handling. The design of all hazardous waste units at the site provide for both physical barriers and area separation of the wastes based upon their characteristics. Ignitables are stored in separate areas from other wastes, such as cyanides and acids. Bulk waste storage tanks are also segregated and contained according to waste types.

Through the analysis, testing, and identification protocols identified in the Waste Analysis Plan, the mixing of wastes which would produce adverse chemical reactions is avoided. In the event that incompatibles are mixed during a spill condition, the Laboratory Manager or other site technical personnel shall provide assistance to operations personnel, as appropriate, to mitigate the potential adverse effects which may result from such an incident. A wide range of responses is possible based on the types of materials involved. Thus, response to such an incident will be consistent with activation of the Contingency Plan.

The following precautions are used for handling ignitable or reactive waste at the Model City Facility for:

- Prevention of sparking
- Separation and protection from sources of ignition
- Separation and protection from sources of reaction
- Prevention of spontaneous ignition

4.2.1 Prevention of Sparking

The use of drum handlers on forklifts minimizes the chances of ignition from friction, spark, puncture of a container, or frictional heat. Drums are opened with nonsparking tools and stored in designated storage areas.

4.2.2 Separation and Protection from Sources of Ignition

Drums will be stored in designated container storage areas with passive secondary containment systems. Ignitable wastes will be stored in designated areas which are clearly marked. Containers are protected from extreme heat, sunlight, and cold by an enclosed building. All electrical wiring, lighting, and motors in the waste management Class I areas are of industrial explosion-proof-grade, reducing the potential for sparking.

4.2.3 Separation and Protection from Sources of Reaction

Secondary containment is provided for all liquid hazardous waste management units. Any release of waste would, therefore, be fully contained and prevented from contacting incompatible waste.

4.2.4 Prevention of Spontaneous Ignition

All materials are handled and appropriately segregated to preclude entering into heat producing reactions with other materials. Additionally, ignitable wastes are stored away from sources of heat or sparks to prevent "spontaneous ignition."

4.3 Management of Ignitable, Reactive or Incompatible Wastes

Ignitable wastes are not accepted for direct land disposal at the Model City Facility. Incompatible wastes are not placed in the same cell unless they are first treated to eliminate the basis of their incompatibility or separated by a buffer zone.

RCRA regulated reactive and ignitable wastes are restricted from landfill disposal unless they are deactivated. These wastes will be managed by properly processing, stabilizing, or otherwise rendering nonreactive, before placement into the landfill so that the material no longer meets the definition of reactive under 6 NYCRR Part 371.3(d) and 40 CFR 261.21 and 261.23.

4.4 Other Measures Employed to Minimize Hazards Associated with Ignitable, Reactive, and Incompatible Wastes

4.4.1 Waste Analysis Plan

Waste analysis procedures include: (1) a pre-receipt requirement that the generator clearly defines the waste to be shipped to the facility, (2) a receipt inspection analysis to confirm that the material is as specified by the generator, and (3) laboratory analyses to determine the significant parameters of wastes to be bulked, or in any way combined, to assure that only similar and totally compatible wastes are combined.

4.4.2 Inspections

A rigid inspection schedule is followed to assure that the security, emergency, and operating equipment are in good order.

4.4.3 Training

Great care is taken to select only employees who are capable of performing the required tasks and properly training these employees. The importance of properly handling ignitable wastes is stressed in the training process.

4.4.4 Contingency Plan

The Contingency Plan specifically discusses the possibility of fire, reactions, and mixing of incompatible wastes. The Emergency Coordinator has been made aware of the importance of these factors in any emergency situation. Methods of prevention, as well as action to be taken in the event of an emergency, are detailed in the Contingency Plan. Possible alternative actions which minimize the possibility and/or occurrence or such events have been discussed and considered.

ATTACHMENT F

Inspection Forms

(proposed modified pages are designated with a December 2013 revision date at the bottom of the respective page)

NOTE: Operating days are days on which a given operation is processing (e.g., aqueous treatment, stabilization) or managing gate receipt waste (e.g., landfill, trailer park, warehouses).

AQUEOUS TREATMENT OPERATIONS (Page 1 of 2)

Inspector Name/Title:______________________________

Signature:______________________________

Date:____________**Time:**__________**am/pm**

I.	**AT Tanks (DAILY for Tank Criteria)**	**Accept.**	**/Unacc.**	**Comments**
A)	T-58 (Note Volume and conductivity of liquid in leak detector, if any)	[ ]	[ ]	______
B)	T-210, T-220, T-230	[ ]	[ ]	______
	T-310	[ ]	[ ]	______
	T-320	[ ]	[ ]	______
C)	T-1111, T-1112	[ ]	[ ]	______
D)	T-100 **(Note volume and conductivity of liquid in leak detector, if any)**	[ ]	[ ]	______
	T-125 **(Note volume and conductivity of liquid in leak detector, if any)**	[ ]	[ ]	______
E)	T-3001, T-3002, T-3003	[ ]	[ ]	______
	T-3009 **(Note volume and conductivity of liquid in leak detector, if any)**	[ ]	[ ]	______
F)	T-1010, T-1020, Floor Sump.	[ ]	[ ]	______
	Area outside Filter Press Building free of spills.	[ ]	[ ]	______
	AT Building satellite accumulation criteria met.	[ ]	[ ]	______
G)	T-710, T-810, T-820, T-830, T-840, T-850, T-1310	[ ]	[ ]	______
H)	T-3010A, T-3010B, T-3010C, T-3010D (including Cartridge Filter Units)	[ ]	[ ]	______
	T-3007, T-3008 (Carbon Adsorbers)	[ ]	[ ]	______
	WT Building satellite accumulation criteria met.	[ ]	[ ]	______
I)	T-3011, T-3012	[ ]	[ ]	______
J)	T-52	[ ]	[ ]	______

Modified: Dec. 2013

AQUEOUS TREATMENT OPERATIONS (Page 2 of 2)

Inspector Name/Title:______________________________

Signature:______________________________

Date:____________**Time:**__________**am/pm**

II. AT Loading Dock	**Accept./Unacc.**	**Comments**
A) Container Management Criteria No.1-8 met **(WEEKLY)** (Note any container remediation activities).	[ ] [ ]	____________________
B) Loading/Unloading areas free of spills. **(DAILY on operating days)**	[ ] [ ]	____________________

III. Other Aqueous Treatment Facility compliance-related issues as appropriate. ____________________

AQUEOUS TREATMENT INSPECTION CRITERIA

TANKS

1. Above ground tank exterior and containment area free of signs of leakage, including discoloration that may be a residue of a prior release. Tank hatches are closed, except when adding or removing waste.

2. Above ground tank exterior free of signs of deterioration that could lead to potential leakage, including cracks, corrosion, weld defects, unsatisfactory condition of rivets, and obvious deformation.

3. Above ground tank ancillary equipment (i.e. pumps, piping, valves, and flanges) free of signs of leakage.

4. Secondary containment and surrounding area shows no visible signs of leakage from containment.

5. Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.

6. Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or a thaw.

7. No evidence of overflow. Overfill controls, e.g., level indicators, high level alarms, are operable. Pressure and temperature being monitored where applicable.

8. Liquids not present in leak detection systems (visual or electronic indication); electronic leak detection systems operable. If liquid is found in the leak detection systems under tanks, it will be sampled and analyzed for conductivity. A conductivity value less than 5000 umhos will be considered to be condensation. Results greater than this value will trigger an evaluation to determine if the tank is leaking.

CONTAINER MANAGEMENT

1. No signs of spillage or leakage from containers and no signs of swelling/bulging or excessive deterioration.

2. Waste containers are securely closed except when adding or removing waste.

3. Secondary containment and surrounding area shows no visible evidence of leakage from containment.

4. Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.

5. Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or a thaw.

6. Containers marked with all required labels and dates.

7. Containers properly stored with respect to compatibility.

8. Aisle space maintained as appropriate to allow unobstructed movement of personnel and emergency equipment.

SATELLITE ACCUMULATION AREAS

1. Not more than one 55 gallon drum in each operating area for greater than three days.

2. Containers not leaking and covers are secured.

3. Containers marked with all required labels/dates.

DRUM WAREHOUSE

Inspector Name/Title:______________________

Signature:______________________

Date:__________**Time:**__________**am/pm**

		Accept./Unacc.		Comments
I.	**Drum Warehouse and Dock (DAILY on operating days, except as noted)**			
A)	Sampling areas free of spills.	[ ]	[ ]	______
B)	Fuels transfer area:			
1.	Pumps, piping, valves & flanges free of signs of leakage.	[ ]	[ ]	______
2.	Loading/unloading areas free of spills.	[ ]	[ ]	______
3.	Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or thaw.	[ ]	[ ]	______
C)	Container Management criteria:			
1.	No signs of spillage or leakage from containers and no signs of swelling/ bulging or excessive deterioration. (Note any container remediation activities, i.e., response to leaks, overpacked drums, etc.)	[ ]	[ ]	______
2.	Waste containers securely closed except when adding or removing waste.	[ ]	[ ]	______
3.	Containers properly stored according to compatibility.	[ ]	[ ]	______
4.	Aisle space maintained as appropriate to allow unobstructed movement of personnel and emergency equipment.	[ ]	[ ]	______
4.	Truck dock not holding pumpable liquids at the end of the next business day after a rainfall event or thaw.	[ ]	[ ]	______
6.	Secondary containment and surrounding area (including loading/unloading area) shows no evidence of leakage from containment. **(WEEKLY)**	[ ]	[ ]	______
7.	Secondary containment (including loading/unloading area) intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete. **(WEEKLY)** [ ]	[ ]		______
8.	Drum inventory properly marked (labels and dates). **(WEEKLY)**	[ ]	[ ]	______
II.	**Other Drum Warehouse compliance-related issues as appropriate.**			______

TRANSFORMER DECOMMISSIONING AREA

Inspector Name/Title:____

Signature:____

Date:__________________**Time:**______________**am/pm**

I.	**PCB TRANSFORMER DECOMMISSIONING BUILDING**	**Accept/Unacc.**		**Comments**
A)	Loading/Unloading Area **(DAILY on operating days)**			
1.	Loading/unloading areas free of spills.	[ ]	[ ]	________________
2.	Fuels pumps, piping, valves and flanges free of signs of leakage.	[ ]	[ ]	________________
B)	Container Management **(WEEKLY)**			
1.	No signs of spillage or leakage from containers and no signs of swelling/bulging or excessive deterioration. (Note any container remediation activities, i.e. response to leaks, overpacked drums, etc.)	[ ]	[ ]	________________
2.	Waste containers and transformers are securely closed except when adding or removing waste.	[ ]	[ ]	________________
3.	Secondary containment and surrounding area (including loading/unloading area) shows no visible evidence of leakage from containment.	[ ]	[ ]	________________
4.	Secondary containment (including loading/unloading area) intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.	[ ]	[ ]	________________
5.	Satellite accumulation criteria met.	[ ]	[ ]	________________
6.	Containers marked with all required labels and dates.	[ ]	[ ]	________________
7.	Containers properly stored with respect to compatibility.	[ ]	[ ]	________________
8.	Aisle space maintained as appropriate to allow unobstructed movement of personnel and emergency equipment.	[ ]	[ ]	________________
II.	**Other Area compliance-related issues as appropriate.**			________________

Note: Refer to GENERAL FACILITY Section VI - Groundwater Extraction Systems Inspection Form for T-8009

TRANSFORMER DECOMMISSIONING AREA INSPECTION CRITERIA

SATELLITE ACCUMULATION

1. Not more than one 55 gallon drum in each operating area for greater than three days.

2. Containers not leaking and covers are secured.

3. Containers marked with all required labels/dates.

GENERAL FACILITY (Page 1 of 2)

Inspector Name/Title:____

Signature:____

Date:____

		Accept./Unacc.		Comments
I.	**Active Surface Impoundments (DAILY for Active Criteria)**			**Time:__________am/pm**
A)	Fac Pond #1/2	[ ]	[ ]	__________
B)	Fac Pond #3	[ ]	[ ]	__________
C)	Fac Pond #8	[ ]	[ ]	__________
D)	Fac Pond #5 (upon construction) Note: Refer to Fac Ponds Transfer Systems	[ ]	[ ]	__________
II.	**Inactive Surface Impoundments (DAILY for Inactive Criteria)**			
	None			
III.	**Bulk Sampling Stations (DAILY on operating days)**			**Time:__________am/pm**
A)	Sampling areas free of spills.	[ ]	[ ]	__________
IV.	**Retarp Area (DAILY on operating days)**			**Time:__________am/pm**
A)	Area free of spills.	[ ]	[ ]	__________
B)	"30 day Accumulation" container:			
1.	Container not leaking and cover is closed except when adding waste.	[ ]	[ ]	__________
2.	Container marked with all required labels/dates.	[ ]	[ ]	__________

GENERAL FACILITY (Page 2 of 2)

Inspector Name/Title:______________________________

Signature:______________________________

Date:______________________________

		Accept.	Unacc.	Comments
V.	**Truck Wash (DAILY on operating days)**			**Time:__________am/pm**
A)	Truck wash containment building (Tank Criteria Nos. 4 & 5)	[ ]	[ ]	__________
B)	Truck wash water collection:			
	1. T-120 meets Tank criteria	[ ]	[ ]	__________
	2. Truck Wash sump meets Tank criteria	[ ]	[ ]	__________
VI.	**Groundwater Extraction Systems (DAILY for Tank Criteria on operating days from April 16 to October 31: Year round for T-8009)**			**Time:__________am/pm**
A)	West Drum Area T-8001 & T-8002	[ ]	[ ]	__________
B)	Area south of SLF 3 T-8004	[ ]	[ ]	__________
C)	BW02S system T-8005	[ ]	[ ]	__________
D)	P1202S system T-8006	[ ]	[ ]	__________
E)	PCB Warehouse T-8007	[ ]	[ ]	__________
F)	Process Area DNAPL T-8008	[ ]	[ ]	__________
G)	Process Area (IV) T-8009	[ ]	[ ]	__________
H)	Process Area (III) T-8010	[ ]	[ ]	__________
VII.	**Other General Facility compliance-related issues as appropriate.**			__________

GENERAL FACILITY INSPECTION CRITERIA

TANKS

1. Above ground tank exterior and containment area free of signs of leakage, including discoloration that may be a residue of a prior release.

2. Above ground tank exterior free of signs of deterioration that could lead to potential leakage, including cracks, corrosion, weld defects, unsatisfactory condition of rivets, and obvious deformation.

3. Above ground tank ancillary equipment (i.e. pumps, piping, valves, and flanges) free of signs of leakage.

4. Secondary containment and surrounding area shows no visible signs of leakage from containment.

5. Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.

6. Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or thaw.

7. No evidence of overflow. Overfill controls, e.g., level indicators, high level alarms, are operable. Pressure and temperature being monitored where applicable.

8. Liquids not present in leak detection systems (visual or electronic indication); electronic leak detection systems operable.

ACTIVE SURFACE IMPOUNDMENTS

1. Measurement device is present and operable.

2. Outage in the impoundment, indication whether or not two feet of freeboard is present, and time recorded on the Surface Impoundment Level Form.

3. No sudden drop in level of contents not associated with pumping.

4. No signs of severe erosion, deterioration, or instability of dikes.

INACTIVE SURFACE IMPOUNDMENTS

1. Liquid levels in covered impoundments not greater than one foot for more than 3 days; or 3 weeks after the spring thaw.

2. Visual inspection of security of cover, where present.

LANDFILL LEACHATE SYSTEMS (DAILY on operating days except as noted)
(page 1 of 3)

Inspector Name/Title:______________________

Signature:______________________

Date:______________________

I.	**Leachate Collection Systems**	**Accept./Unacc.**		**Comments**
A)	SLF 1-6			**Time:**__________**am/pm**
1.	T-105 and T-130, including loading/unloading area **(DAILY for Tank Criteria)**	[ ]	[ ]	______________________
2.	Leachate Collection System Criteria **(DAILY)**	[ ]	[ ]	______________________
3.	Loading/Unloading areas free of spills.	[ ]	[ ]	______________________
4.	Satellite Accumulation criteria met.	[ ]	[ ]	______________________
B)	SLF 7			**Time:**__________**am/pm**
1.	T-107 **(DAILY for Tank Criteria)**	[ ]	[ ]	______________________
2.	Leachate Collection System Criteria **(DAILY)**	[ ]	[ ]	______________________
3.	Satellite Accumulation criteria met.	[ ]	[ ]	______________________
C)	SLF 10			**Time:**__________**am/pm**
1.	T-109 and T-110, including loading/unloading area **(DAILY for Tank Criteria)**	[ ]	[ ]	______________________
2.	Leachate Collection System Criteria **(DAILY)**	[ ]	[ ]	______________________
3.	Loading/Unloading areas free of spills.	[ ]	[ ]	______________________
4.	Satellite Accumulation criteria met.	[ ]	[ ]	______________________

Inspector Name/Title:________________________

Signature:________________________

Date:________________________

I. Leachate Collection Systems (continued)

		Accept.	Unacc.	Comments
D)	SLF 11			**Time:________am/pm**
1.	T-108 and T-111, including loading/unloading area **(DAILY for Tank Criteria)**	[ ]	[ ]	________________________
2.	Leachate Collection System Criteria **(DAILY)**	[ ]	[ ]	________________________
3.	Loading/Unloading areas free of spills.	[ ]	[ ]	________________________
4.	Satellite Accumulation criteria met.	[ ]	[ ]	________________________
E)	SLF 12 Lift Station/Leachate Collection			**Time:________am/pm**
1.	T-150 **(DAILY for Tank Criteria)**	[ ]	[ ]	________________________
2.	Overhead Transfer Piping **(DAILY for Tank Criteria, as applicable)**	[ ]	[ ]	________________________
3.	No leak detection alarms for SLF-12 Leachate lines **(DAILY)**	[ ]	[ ]	________________________
4.	Leachate Collection System Criteria **(DAILY)**	[ ]	[ ]	________________________
5.	Loading/Unloading area free of spills.	[ ]	[ ]	________________________
F)	RMU-1 Lift Station			**Time:________am/pm**
1.	T-160 & T-165 **(DAILY for Tank Criteria)**	[ ]	[ ]	________________________
2.	No leak detection alarms for RMU-1 Leachate lines. **(DAILY)**	[ ]	[ ]	________________________
3.	Leachate Collection System Criteria **(DAILY)**	[ ]	[ ]	________________________

LANDFILL LEACHATE SYSTEMS (Page 3 of 3)

Inspector Name/Title:______________________________

Signature:______________________________

Date:______________________________

		Accept.	Unacc.	Comments
II.	**Oil/Water Separators**			
A)	SLF 1-11 oil/water separator			**Time:________am/pm**
1.	T-158 and T-159, including loading/unloading area (Tank Criteria)	[ ]	[ ]	________________
2.	Loading/unloading areas free of spills	[ ]	[ ]	________________
B)	RMU-1 oil/water separator			**Time:________am/pm**
1.	Above Ground Transfer Piping **(DAILY for Tank Criteria, as applicable)**	[ ]	[ ]	________________
2.	Loading/unloading areas free of spills	[ ]	[ ]	________________
III.	**Leachate Tank Farm**			**Time:________am/pm**
A.	T-101, 102, 103, Frac Tank (Tank Criteria) **(DAILY)**	[ ]	[ ]	________________
B)	No leak detection alarms for Leachate Transfer Lines from Leachate Tank Farm to A/T.	[ ]	[ ]	________________
C)	Portable Filtration Vessel(s) (if present) (Container Management Criteria **WEEKLY**)	[ ]	[ ]	________________
D)	Satellite Accumulation Criteria Met.	[ ]	[ ]	________________
IV.	**Other Landfill Leachate Systems compliance related issues as appropriate.**			________________

FAC POND TRANSFER SYSTEMS (Page 1 of 1) **Inspector Name/Title:**______________________________

Signature:______________________________

Date:______________________________

		Accept./Unacc.		Comments
I.	**Fac Pond 5**			**Time:**_________**am/pm**
1.	T-9001 **(DAILY for Tank Criteria)** (Note Volume and conductivity of liquid in leak detector, if any)	[ ]	[ ]	______________________________
2.	No leak detection alarms for Fac Ponds Transfer lines. **(DAILY)**	[ ]	[ ]	______________________________
3.	No high level alarms on leak detection sumps **(DAILY)**	[ ]	[ ]	______________________________

LANDFILL LEACHATE SYSTEMS INSPECTION CRITERIA

LANDFILL LEACHATE COLLECTION SYSTEMS

1. No high level alarms on leachate sumps.
2. No primary leachate pumps out of service for more than 24 hours.

TANKS

1. Above ground tank exterior and containment area free of signs of leakage, including discoloration that may be a residue of a prior release.
2. Above ground tank exterior free of signs of deterioration that could lead to potential leakage, including cracks, corrosion, weld defects, unsatisfactory condition of rivets, and obvious deformation.
3. Above ground tank ancillary equipment (i.e. pumps, piping, valves, and flanges) free of signs of leakage.
4. Secondary containment and surrounding area shows no visible signs of leakage from containment.
5. Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.
6. Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or a thaw.
7. No evidence of overflow. Overfill controls, e.g., level indicators, high level alarms, are operable. Pressure and temperature being monitored where applicable.
8. Liquids not present in leak detection systems (visual or electronic indication); electronic leak detection systems operable.

CONTAINER MANAGEMENT

1. No signs of spillage or leakage from containers and no signs of swelling/bulging or excessive deterioration.
2. Waste containers are securely closed except when adding or removing waste.
3. Secondary containment and surrounding area shows no visible evidence of leakage from containment.
4. Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.
5. Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or a thaw.
6. Containers marked with all required labels and dates.
7. Containers properly stored with respect to compatibility.
8. Aisle space maintained as appropriate to allow unobstructed movement of personnel and emergency equipment.

SATELLITE ACCUMULATION AREAS

1. Not more than one 55 gallon drum in each operating area for greater than three days.
2. Containers not leaking and covers are secured.
3. Containers marked with all required labels/dates.

LANDFILL - RMU 1

Inspector Name/Title:____

Signature:____

Date:__________________**Time:**______________**am/pm**

I.	**RMU 1 (DAILY on operating days except as noted)**	**Accept.**	**Unacc.**	**Comments**
A)	No ponded water greater than 12" deep for more than 7 days. **(DAILY) (If >12", note number of days since below 12")**	[ ]	[ ]	__________
B)	No rainwater contacting waste exiting the landfill.	[ ]	[ ]	__________
C)	No fugitive emissions of waste materials from landfill.	[ ]	[ ]	__________
D)	No fugitive dust evident on RMU berms.	[ ]	[ ]	__________
E)	Cover material provided on lift and face.	[ ]	[ ]	__________
F)	No spills or tracked waste on access roads or ramps.	[ ]	[ ]	__________
G)	No waste material evident through cover.	[ ]	[ ]	__________
H)	Each lift is one drum high, or a maximum of six feet in height.	[ ]	[ ]	__________
I)	All off loading occurs within perimeter run-off berm.	[ ]	[ ]	__________
J)	Equipment in contact with PCB material is properly labeled.	[ ]	[ ]	__________
K)	Vehicles in contact with PCB's/waste are decontaminated prior to exiting landfill.	[ ]	[ ]	__________
L)	Landfill perimeter fence is in good condition and all required signs are posted.	[ ]	[ ]	__________
M)	No visual evidence of acid sensitive and acid generating materials placed in same area within the landfill.	[ ]	[ ]	__________
N)	All leachate standpipes covered except when performing maintenance, sampling, and level measurements.	[ ]	[ ]	__________
O)	Satellite Accumulation Criteria met.	[ ]	[ ]	__________
P)	Stormwater run-off controls operating properly **(WEEKLY and after rainfall events >0.75" in 24 hours)**	[ ]	[ ]	__________

Note: Off loaded Macro Boxes shall be inspected for cracks and other defects after each box is offloaded. Any identified defects and repairs or box replacement shall be recorded in the facility's operating record.

II. Other Landfill/RMU-1 compliance related issues as appropriate. __________

LANDFILL - RMU 1

Inspector Name/Title:________________________________

Signature:________________________________

Date:______________**Time:**___________**am/pm**

I.	**RMU 2 (DAILY on operating days except as noted)**	**Accept.**	**Unacc.**	**Comments**
A)	No ponded water greater than 12" deep for more than 7 days. **(DAILY) (If >12", note number of days since below 12")**	[ ]	[ ]	__________
B)	No rainwater contacting waste exiting the landfill.	[ ]	[ ]	__________
C)	No fugitive emissions of waste materials from landfill.	[ ]	[ ]	__________
D)	No fugitive dust evident on RMU berms.	[ ]	[ ]	__________
E)	Cover material provided on lift and face.	[ ]	[ ]	__________
F)	No spills or tracked waste on access roads or ramps.	[ ]	[ ]	__________
G)	No waste material evident through cover.	[ ]	[ ]	__________
H)	Each lift is one drum high, or a maximum of six feet in height.	[ ]	[ ]	__________
I)	All off loading occurs within perimeter run-off berm.	[ ]	[ ]	__________
J)	Equipment in contact with PCB material is properly labeled.	[ ]	[ ]	__________
K)	Vehicles in contact with PCB's/waste are decontaminated prior to exiting landfill.	[ ]	[ ]	__________
L)	Landfill perimeter fence is in good condition and all required signs are posted.	[ ]	[ ]	__________
M)	No visual evidence of acid sensitive and acid generating materials placed in same area within the landfill.	[ ]	[ ]	__________
N)	All leachate standpipes covered except when performing maintenance, sampling, and level measurements.	[ ]	[ ]	__________
O)	Satellite Accumulation Criteria met.	[ ]	[ ]	__________
P)	Stormwater run-off controls operating properly **(WEEKLY and after rainfall events >0.75" in 24 hours)**	[ ]	[ ]	__________

Note: Off loaded Macro Boxes shall be inspected for cracks and other defects after each box is offloaded. Any identified defects and repairs or box replacement shall be recorded in the facility's operating record.

II. Other Landfill/RMU-2 compliance related issues as appropriate. __________

Inspector Name/Title:________________________________

Signature:________________________________

Date:________________ **Time:**______________ **am/pm**

I.	**RMU 2 (YEARLY during operation)** (by Qualified Geotechnical Engineer)	**Accept./Unacc.**		**Comments**

MSE Berm Field Inspection Checklist

A)	No visible evidence of Movement.	[ ]	[ ]	________
B)	No visible evidence of erosion	[ ]	[ ]	________
C)	Condition of Facing	[ ]	[ ]	________
D)	Condition of overall batter (or slope inclination) of the berm face	[ ]	[ ]	________
E)	No Seepage of Facing	[ ]	[ ]	________
F)	Condition of Stormwater Structures	[ ]	[ ]	________
G)	Condition of Access Road	[ ]	[ ]	________
H)	Condition of Guide Rail/Fence	[ ]	[ ]	________
F)	Evidence of Wildlife or Borrowing	[ ]	[ ]	________
G)	Other	[ ]	[ ]	________

LANDFILL MSE WALL INSPECTION CRITERIA

EVIDENCE OF MOVEMENT

1. No Visible defects in overall alignment
2. No Visible movement at top or the toe of slope
3. No evidence of Ponded water in ditches
4. No evidence of Vertical or horizontal movement on face
5. No Localized movement on face
6. No evidence of longitudinal cracking
7. No evidenced of transversal cracking
8. No evidence of wall profiles/ tilting or bulging

EROSION

1. No Significant erosion on face
2. No Significant erosion at top
3. No Significant erosion at toe
4. No Undermining due to erosion
5. No Appearance of wet or soft soils at toe

CONDITION OF FACING

1. No Deformed welded wire forms
2. No Exposed geosynthetics/ reinforcement
3. No Degradation of exposed geosynthetics
4. No Damaged, displaced, missing block facing
5. No Woody vegetation over 1-inch diameter
6. No Dead vegetation
7. No Signs of vandalism
8. No Signs of adjustments to stepbacks

CONDITION OF BATTER

1. No Bulging
2. No Evidence of overturning
3. No Evidence of shear deformation along reinforcement layers

SEEPAGE

1. No Seeps on facing
2. No Washed-out material at toe or facing
3. No Discoloration due to previous seepage
4. No Algae/ spots of vegetation on face

STORMWATER STRUCTURES

1. No Standing water in perimeter channel
2. Channel lined
3. No Sediment or debris in channel
4. No Evidence of channel overtopping
5. No Damage/ debris at stormwater pipes/ inlets
6. No Signs of erosion along channel

OTHER FEATURES (IF APPLICABLE)

1. Road conditions at top of berm
2. Condition of Poles on or adjacent to berm
3. Condition of Electrical conduits in berm
4. Condition of Guide rails on berm
5. Condition of Leachate vaults on berm
6. Condition of Downchutes
7. Condition of Stormwater outlets
8. No Invasive wildlife or burrowing
9. No Evidence of water overtopping berm

PCB WAREHOUSE

Inspector Name/Title:________________________________

Signature:________________________________

Date:________________**Time:**____________**am/pm**

I.	**PCB Warehouse (WEEKLY, except as noted)**	**Accept./Unacc.**		**Comments**
A)	Container Management criteria:			
1.	No signs of spillage or leakage from containers and no signs of swelling/bulging or deterioration. (Note any container remediation activities, i.e., response to leaks, overpacked drums, etc.) **(DAILY on operating days)**	[ ]	[ ]	__________
2.	Waste containers securely closed except when adding or removing waste.	[ ]	[ ]	__________
3.	Containers properly stored according to compatibility.	[ ]	[ ]	__________
4.	Aisle space maintained as appropriate to allow unobstructed movement of personnel and emergency equipment.	[ ]	[ ]	__________
5.	Secondary containment and surrounding area shows no evidence of leakage from containment.	[ ]	[ ]	__________
6.	Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.	[ ]	[ ]	__________
7.	Drum inventory properly marked (labels and dates).	[ ]	[ ]	__________

II. Other PCB Warehouse compliance-related issues as appropriate. ____________________

SITE LABORATORIES (DAILY on operating days)

Inspector Name/Title:____

Signature:____

Date:____

		Accept./Unacc.	Comments
			Time:________**am/pm**
I.	**Main Laboratory**	[ ] [ ]	____________________
			Time:________**am/pm**
II.	**AWT Laboratory**	[ ] [ ]	____________________
			Time:________**am/pm**
III.	**Drum Building Laboratory**	[ ] [ ]	____________________
IV.	**Other Laboratory compliance-related issues as appropriate.**		____________________

SITE LABORATORIES INSPECTION CRITERIA

SATELLITE ACCUMULATION AREA

1. Not more than one full 55 gallon drum in each operating area for greater than three days.
2. Containers not leaking and covers are secured.
3. Containers marked with all required labels/dates.
4. Daily use containers emptied at end of day.

STABILIZATION (Page 1 of 2)
(DAILY on operating days, except as noted)

Inspector Name/Title:______________________________

Signature:______________________________

Date:____________**Time:**__________**am/pm**

I.	**Reagent Silos and Process Water Tanks**	**Accept./Unacc.**		**Comments**
A)	Truck unloading area free of spills.	[ ]	[ ]	______
B)	TA-01, TA-02 (Tank Criteria)	[ ]	[ ]	______
C)	Bin Vent Filters TA-04 (silo), TA-05 (silo) TA-06 (Day Bin) no visible releases to the air.	[ ]	[ ]	______
II.	**Shredder Area**			
A)	Loading/unloading area free of spills.	[ ]	[ ]	______
B)	Drum Shredder area meets Container Management Criteria. (**WEEKLY**)	[ ]	[ ]	______
III.	**Waste Ash Unloading Area**			
A)	Loading/unloading area free of spills.	[ ]	[ ]	______
B)	Container Management Criteria met. (**WEEKLY**)	[ ]	[ ]	______
IV.	**Baghouses (BH-01, BH-02, BH-03)**			
A)	Containment Criteria:			
	1. No evidence of spills.	[ ]	[ ]	______
	2. Containment is intact and free of cracks. (**WEEKLY**)	[ ]	[ ]	______
B)	No visible releases to the air.	[ ]	[ ]	______

STABILIZATION (Page 2 of 2)
(DAILY on operating days, except as noted)

Inspector Name/Title:____________________

Signature:____________________

Date:__________**Time:**________**am/pm**

		Accept.	Unacc.	Comments
V.	**Northern Expansion**			
A)	Loading/unloading areas free of spills.	[ ]	[ ]	
B)	Mixing Pits (Pit Criteria)	[ ]	[ ]	
C)	Satellite Accumulation Criteria met	[ ]	[ ]	
VI.	**Special Client Room**			
A)	Container Management Criteria No. 1, 2, 6-8 met	[ ]	[ ]	
B)	Loading/unloading area free of spills	[ ]	[ ]	
VII.	**Roll-off box storage areas**			
A)	Container Management Criteria No. 1, 2 & 5-8 met (Note any container remediation activities, i.e., spill cleanup) **(DAILY when hazardous waste is being stored)**	[ ]	[ ]	
B)	Container management criteria 3 & 4 met (**WEEKLY**)	[ ]	[ ]	
C)	Containers properly tarped.	[ ]	[ ]	
D)	Not more than 48 Roll-offs. **(existing area)**	[ ]	[ ]	
E)	Not more than 37 Roll-offs (new area) (upon development of RMU-2)	[ ]	[ ]	
F.	4-ft Aisle space maintained between trailers of Flammable and combustible wastes .	[ ]	[ ]	
VIII.	**Macro Room**			
A)	Container Management Criteria No. 1, 2, 6-8 met	[ ]	[ ]	

Note: Loaded Macro Boxes shall be inspected for cracks a proper seal or other defects after each box is filled and covered. Any identified defects and repairs or box replacement shall be recorded in the facility's operating record.

IX. Other Stabilization compliance-related issues as appropriate. ____________________

Modified: Dec. 2013

STABILIZATION INSPECTION CRITERIA

TANKS

1. Above ground tank exterior and containment area free of signs of leakage, including discoloration that may be a residue of a prior release.
2. Above ground tank exterior free of signs of deterioration that could lead to potential leakage, including cracks, corrosion, weld defects, unsatisfactory condition of rivets, and obvious deformation.
3. Above ground tank ancillary equipment (i.e. pumps, piping, valves, and flanges) free of signs of leakage.
4. Secondary containment and surrounding area shows no visible signs of leakage from containment.
5. Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.
6. Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or a thaw.
7. No evidence of overflow. Overfill controls, e.g., level indicators, high level alarms, are operable. Pressure and temperature being monitored where applicable.
8. Liquids not present in leak detection systems (visual or electronic indication); electronic leak detection systems operable.

CONTAINER MANAGEMENT

1. No signs of spillage or leakage from containers and no signs of swelling/bulging or excessive deterioration.
2. Waste containers are securely closed except when adding or removing waste.
3. Secondary containment and surrounding area shows no visible evidence of leakage from containment.
4. Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.
5. Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or a thaw.
6. Containers marked with all required labels and dates.
7. Containers properly stored with respect to compatibility.
8. Aisle space maintained as appropriate to allow unobstructed movement of personnel and emergency equipment.

SATELLITE ACCUMULATION AREAS

1. Not more than one 55 gallon drum in each operating area for greater than three days.
2. Containers not leaking and covers are secured.
3. Containers marked with all required labels/dates.

PITS

1. Liquids not present in leak detection system. If liquid is found, it will be sampled and analyzed for conductivity and pH. It will be considered to be condensation if conductivity is less than 14,000 umhos, or volume is less than 5 gallons per day. Results greater than any of these values will trigger an evaluation to determine if the pit is leaking.
2. No signs of spillage in the area around the pit at the end of the operating day.

TRAILER PARKING AREA

Inspector Name/Title:____

Signature:____

Date:____

		Accept.	Unacc.	Comments
I.	**Trailer Park (DAILY on operating days, except as noted)**			
A)	Container Management:			
1.	No signs of spillage or leakage from containers and no signs of swelling/bulging or deterioration. Note any container remediation activities. **(DAILY)**	[ ]	[ ]	__________
2.	Secondary containment and surrounding areas shows no visible sign of leakage from containment. (**WEEKLY**)	[ ]	[ ]	__________
3.	Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete. (**WEEKLY**)	[ ]	[ ]	__________
4.	Secondary containment not holding pumpable liquids at the end of the next business day after a rainfall event or a thaw. **(DAILY)**	[ ]	[ ]	__________
5.	Containers marked with all required labels and dates and stored with compatible materials.	[ ]	[ ]	__________
6.	Aisle space maintained as appropriate to allow unobstructed movement of personnel and emergency equipment.	[ ]	[ ]	__________
7.	4-ft Aisle space maintained between trailers of Flammable and combustible wastes .	[ ]	[ ]	__________
B)	Containers properly tarped.	[ ]	[ ]	__________
C)	Less than or equal to 58 rolloffs or 48 rolloffs & 5 full trailers (existing area)	[ ]	[ ]	__________
D)	Less than or equal to 48 rolloffs or 38 rolloffs &5 full trailers (upon development of RMU-2)	[ ]	[ ]	__________
II.	**Other Trailer Park compliance related issues as appropriate.**			__________

CLOSED LANDFILLS AND SURFACE IMPOUNDMENTS

Inspector Name/Title:______________________________

Signature:______________________________

Date:______________________________

I. Closed Landfills (QUARTERLY for Closed Criteria 1-4)
(only criteria No. 4 after rainfall >0.75" in 24 hours) **Quarterly [ ]** **After rainfall >0.75" in 24 hours [ ]** **Time:**________________**am/pm**

		Accept.	Unacc.	Comments
A)	SLF 1-6	[ ]	[ ]	
B)	SLF 7	[ ]	[ ]	
C)	SLF 10	[ ]	[ ]	
D)	SLF 11	[ ]	[ ]	
E)	SLF 12	[ ]	[ ]	
F)	RMU-1	[ ]	[ ]	

II. Closed Surface Impoundments (ANNUALLY for Closed Criteria 1 and 4)
(only criteria No. 4 after rainfall >0.75" in 24 hours) **Annual [ ]** **After rainfall >0.75" in 24 hours [ ]** **Time:**________________**am/pm**

		Accept.	Unacc.	Comments
A)	Lagoons 1, 2, 5, 6 and 7	[ ]	[ ]	
B)	North Salts	[ ]	[ ]	
C)	East/West Salts	[ ]	[ ]	

CLOSED LANDFILLS AND SURFACE IMPOUNDMENTS CRITERIA

1. Cap has no apparent settling, subsidence, or erosion, which might endanger the integrity and effectiveness of the final cover.
2. No broken vent pipes.
3. All standpipes properly closed.
4. Stormwater run-off controls operating properly.

PETROLEUM TANKS
CWM Chemical Services, Inc.
1550 Balmer Road, Model City, NY 14107
Facility ID No. 9-073814

Inspector Name/Title:______________________________

Signature:______________________________

Date:____________**Time:**__________**am/pm**

I. Bulk Petroleum Storage Tanks (MONTHLY for Petroleum Tank Criteria)

		Accept./Unacc.		Comments
A)	T-20	[ ]	[ ]	______________________________
B)	E03, E04, E05	[ ]	[ ]	______________________________
C)	DF-1, LG-2, UG-1, G04	[ ]	[ ]	______________________________
D)	T-27	[ ]	[ ]	______________________________
E)	DF-3	[ ]	[ ]	______________________________

PETROLEUM STORAGE TANKS CRITERIA

1. Above ground tank exterior and containment area free of signs of leakage, including discoloration that may be a residue of a prior release. Tank hatches are closed, except when adding or removing waste.

2. Above ground tank exterior free of signs of deterioration that could lead to potential leakage, including cracks, corrosion, weld defects, unsatisfactory condition of rivets, and obvious deformation.

3. Above ground tank ancillary equipment (i.e. pumps, piping, valves, and flanges) free of signs of leakage.

4. Secondary containment and surrounding area shows no visible signs of leakage from containment.

5. Secondary containment intact and free of cracks exhibiting separation and coating (if present) is free of chips which expose the underlying concrete.

6. Precipitation removed from secondary containment in a timely manner.

7. No evidence of overflow. Overfill controls, e.g., level indicators, high level alarms, are operable. Pressure and temperature being monitored where applicable.

8. Loading/unloading areas free of spills. All petroleum spills are reportable to NYSDEC unless they are less than 5 gallons, contained on or within an impervious structure, under control, cleaned up within 2 hours of occurrence and have not entered onto or into soil, grass, groundwater or surface water.

9. This inspection has been performed in a manner consistent with the requirements of 6NYCRR 613.6.

ATTACHMENT G

Application Section G – Contingency Plan

(proposed modified pages are designated with a December 2013 revision date at the bottom of the respective page)

CONTINGENCY PLAN

FOR

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NEW YORK

November 2013
Revised: December 2013

CERTIFICATE

RESOLVED that CWM Chemical Services, LLC (CWM), hereby grants to the individual(s) designated as "Emergency Coordinator" in the approved Contingency Plan for the CWM Model City Facility authority to commit such of the Corporation's resources as are needed to carry out such Contingency Plan.

Such individual(s) designated as "Emergency Coordinator" in such approved Contingency Plan is (are) hereby authorized, directed and empowered to execute and deliver for and on behalf of the Corporation any and all such contracts, agreements, documents and memoranda deemed to be necessary and appropriate to execute the herein authorized resolution.

Authorized Facility
Representative: Michael Mahar

Signature: Michael D Mahar

Title: District Manager
CWM Chemical Services, LLC

Date: 11/8/13

TABLE OF CONTENTS

PART I - INFORMATION AT A GLANCE

CONTINGENCY PLAN DETAILS [6NYCRR 373-1.5 (a)(2)(vii)]

SPECIFIC FACILITY INFORMATION

CWM Chemical Services, LLC, is located in Model City, Niagara County, New York. Current facility operations include hazardous waste secure landfilling, container handling and storage, bulk storage, PCB handling, storage, and disposal, fuels bulking, aqueous waste treatment, and waste stabilization. This Contingency Plan applies to all active hazardous waste management areas at the site. Additionally, this Contingency Plan provides details of the Contingency Plan aspects affected by the development of Proposed Residuals Management Unit No. 2 (RMU-2). Facility information is summarized below.

Name:

CWM Chemical Services, LLC, a wholly-owned subsidiary of Waste Management, Inc.

Location:

Near Model City, New York, approximately 1.9 miles east of NYS Route 18 (Creek Road) at 1550 Balmer Road. The facility occupies land in the towns of Porter and Lewiston, New York.

All hazardous waste operations are located in the Town of Porter.

Size:

total area size is approximately: 710 acres
permitted hazardous waste area is about: 630 acres

Facility Operator Name and Mailing Address:

CWM Chemical Services, LLC
1550 Balmer Road
Model City, NY 14107
(716) 286-1550

Property Owner:

CWM Chemical Services, LLC
1550 Balmer Road
Model City, NY 14107
(716) 286-1550

District Manager (General Manager):

Mr. Michael Mahar
(716) 286-1550

IN CASE OF IMMINENT EMERGENCY SITUATION THAT MAY THREATEN HUMAN HEALTH OR ENVIRONMENT[6NYCRR PART 373-2.4 (C)]

If you think that an emergency is about to occur or has occurred which may threaten human health or the environment then:

- For fires, explosions or off-site releases of hazardous waste, the person observing the incident will immediately take action to activate the on-site emergency alert (two-minute siren) and notify the local fire company or department to respond, as well as notifying the Emergency Coordinator (or available Alternate) and personnel in the immediate area who may be in danger. The person reporting the incident shall give his or her name and location, and the nature and extent of the incident.

- For incidents involving on-site releases of greater than one (1) pound of hazardous waste from tank systems either beyond a secondary containment or within a secondary containment for tank systems with air emission controls, the person observing the incident will immediately notify the site security office (Ext. 0200 from a facility phone or (716) 286-0221 from offsite or a mobile device) as well as personnel in the immediate area who may be in danger, reporting his or her name and location, and the nature and extent of the release. The site security office will immediately notify the Emergency Coordinator (or Alternate) who will determine the appropriate response (see Section 3.0 for details on this determination). If directed by the Emergency Coordinator (or Alternate), the emergency alert (two- minute siren) will be activated to notify facility personnel of the incident.

- The Contingency Plan will be implemented for all fires, explosions, releases of hazardous waste to air, water or other media, as indicated by the above bullets, or any incident that threatens human health or the environment. Verbal notification will be provided to authorities as required (see Notification Action Summary Off-Site Notification Section). A written report must be submitted to the NYSDEC within 15 days.

- The appropriate procedures in this Contingency Plan will be used to address leaks and spills of one pound or less at any on-site location, or of greater than one pound within a secondary containment of a tank system without air emission controls. However, these leaks/spills will not entail full implementation of the Contingency Plan. The level of response appropriate for such incidents will be determined by the Emergency Coordinator (or Alternate). Examples of such minor leaks and spills include:

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- A drip coming from a container in a containment area whose capacity is 55 gallons or less
- A spill of 1 pound or less of waste from a container into a containment area which occurs during sampling or transfer
- Wastewater dripping from a pump, valve or transfer line into a containment area
- A spill/leak of 1 pound or less from a tank system
- A spill/leak of greater than 1 pound within a secondary containment of a tank system which is not required to have air emission controls

Each spill must be evaluated for reporting to appropriate authorities as indicated in this Plan.

RESPONSE TO GENERAL EMERGENCIES THAT WILL THREATEN HUMAN HEALTH OR THE ENVIRONMENT [6NYCRR PART 373-2.4 (C)]

Anyone discovering an emergency shall immediately notify site security at EXT. 0200 from a facility phone or (716) 286-0221 from offsite of mobile device as well as personnel in the immediate area who may be in danger. The site security office will immediately activate the emergency alert alarm and notify the Emergency Coordinator who will, if necessary, announce an evacuation of the area. The following general rules apply IN CASE OF EMERGENCY:

- Dial Extension 0200
- Identify yourself
- Give the area where the emergency is occurring
- Describe the nature of the emergency and what or who is needed
- Notify occupants in the building for help or evacuation
- Have someone stand by to direct emergency equipment to the scene
- Always call for help before extinguishing a fire
- Remember locations of nearest: Telephone, Exits, Emergency Showers and Fire Extinguishers
- Never endanger yourself while responding to an emergency

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RESPONSE TO FIRE, EXPLOSION AND RELEASE EMERGENCIES [6NYCRR PART 373-2.4 (C)]

Follow these general emergency procedures:

1. **Notify Security Guard (Ext. 0200 from a facility phone or (716) 286-0221 from offsite or mobile device), alert other personnel** in adjacent areas to hazards and inform the Supervisor by the quickest available means, e.g., by radio. (Note: Individuals should only attempt to handle fires or other emergencies in their beginning stages. Under no circumstances, however, should an individual attempt to handle it alone.)

2. **Render assistance**, if safe to do so, to persons that may be involved in the emergency and remove them from further exposure or injury.

3. **Don't enter oxygen deficient areas** or those with potential toxic vapors unless you have the proper respiratory protection.

4. The **Security Guard will contact the EC** and notify him of the emergency situation and initiate the alarm siren.

5. **Upon hearing the first alert emergency alarm**, plant personnel will remain at their work stations unless they are within the immediate emergency area. **Emergency Response personnel will immediately report to the Emergency Response Garage.**

6. **Upon hearing the second emergency alert alarm**, plant operations will stop (shutdown operations will be instituted as prescribed later in this Section). All personnel will exit the workplace by primary exit routes and assemble in the emergency assembly areas. Primary exit route signs are located in each building. The building evacuation routes are provided in Appendix A-2.

7. If necessary, the Emergency Coordinator will notify all personnel to **evacuate by prescribed routes**. (This notification will be by verbal command, or radio.)

8. **The Emergency Coordinator will assess the emergency situation** and initiate the return to the workplace when appropriate. NYSDEC approval is required to re-start operations after the full Contingency Plan is enacted - 6NYCRR 373-2.4(g)9.

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NOTIFICATION ACTION SUMMARY ON-SITE NOTIFICATION [6NYCRR PART 373-2.4(G)(4)]

Report all emergencies to the Emergency Coordinator or specified alternate:

Emergency phone extension: 0200

Emergency Coordinator (EC)	Home Phone No.	Home Address
Timothy Fogarty Office (716) 286-0331	(716) 693-2826	351 Woodlin Avenue North Tonawanda, NY 14120
Jim Lis (First Alternate) Office (716) 286-0270	(716) 434-9492	4431 Lower Mountain Road Lockport, NY 14094
Steve Rydzyk (Second Alternate) Office (716) 286-0325	(716) 439-8911	3911 Coomer Road Newfane, NY 14108

The EC or designee will immediately notify the following facility managers:

	Home Phone No.	Home Address
Laboratory Manager Ami Lis Office (716) 286-0295	(716) 434-9492	4431 Lower Mountain Road Lockport, NY 14094
Technical Manager Jill Banaszak Office (716) 286-0246	(716) 773-1699	3474 East River Road Grand Island, NY 14072
District Manager Michael Mahar Office (716) 286-0241	(716) 751-3615	4220 East Lake Road Wilson, NY 14172

The EC or designee will notify other appropriate facility personnel as necessary, e.g., maintenance superintendent, operating supervisors, etc.

Emergency Response Team (ERT)

Charles Aube	(716) 791-8105	2573 New Road Ransomville, NY 14131
Angela Cadwalader	(716) 405-5020	5852 North Kline Road Lewiston, NY 14092
Edward Cassick	(716) 751-6771	3166 Randall Road Ransomville, NY 14131
Jeff Clark	(716) 791-8259	3546 Dickersonville Road Ransomville, NY 14131
Timothy Fogarty	(716) 693-2826	351 Woodlin Avenue North Tonawanda, NY 14120
Bruce Geschwender	(716) 731-4212	3022 Saunders Settlement Sanborn, NY 14132
Richard Harden	(716) 754-7645	4410 Creek Road Lewiston, NY 14092
Mark LaRue	(716) 745-7266	344 3rd Street Youngstown, NY 14174
Jim Lis	(716) 434-9492	4431 Lower Mountain Road Lockport, NY 14094
Howard Lyon	(716) 834-5206	622 Cornwall Avenue Tonawanda, NY 14150
Mark Mariani	(716) 751-0502	3761Youngstown-Wilson Wilson, NY 14172
Tim Morgan	(716) 751-9450	2579 Wilson-Cambria Road Wilson, NY 14172
Tim Napier	(716) 754-8825	4706 Porter Center Road Lewiston, NY 14092
Geoffrey Naughton	(716) 807-7384	4274 Sunset Drive Lockport, NY 14094
Chris Nicastro	(716) 564-3453	3314 Sweethome Road Amherst, NY 14228

Randy Printup	(716) 297-4540	4940 Indian Hill Road Lewiston, NY 14092
Steve Rydzyk	(716) 439-8911	3911 Coomer Road Newfane, NY 14108
Lori Sullivan	(716) 283-1353	147 60th Street Niagara Falls, NY 14304
Mark Zappy	(716) 751-3988	3862 Wilson-Cambria Road Ransomville, NY 14131

Casualty Control Officer (CCO)	Home Phone No.	Home Address
Timothy Fogarty (EMT D, Level 1)	(716) 693-2826	351 Woodlin Ave. N. Tonawanda, NY

CCOs are certified Emergency Medical Technicians/Defibrilation.

If casualties are involved, the CCO immediately notifies outside emergency help. These contacts include the appropriate local hospital/ambulance services and response groups indicated in the Contingency Plan.

Communication Coordinator (CC)	Home Phone No.	Home Address
To Be Designated by the EC		

Personnel Coordinators (PC)	Home Phone No.	Home Address
Andy Argona	(716) 284-1160	3603 Ferry Ave. Niagara Falls, NY
Lori Sullivan	(716) 283-1353	147 60th Street Niagara Falls, NY

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NOTIFICATION ACTION SUMMARY OFF-SITE NOTIFICATION

When the incident has the potential to affect health or the environment off-site or release of a hazardous substance exceeds the CERCLA, SARA or NYS reportable quantity, the following Agencies will be called IMMEDIATELY :

1. National Response Center	**(800) 424-8802 (24 hrs.)**
2. NYSDEC Oil and Hazardous Materials Spill Hotline	**(800) 457-7362 (24 hrs.)**
3. NYSDEC On-Site Monitor	**(716) 286-0302**
4. Niagara County Health Dept.	**(716) 439-7444 or** **(716) 439-7430 After Work Hrs.**
5. Niagara County Local Emergency Planning Committee (LEPC) (S.A.R.A. Title III releases only)	**(716) 438-3171 or** **(716) 433-4482 After Work Hrs.**

When the incident has the potential to affect health or the environment off-site the following Agencies will be called IMMEDIATELY :

6. Lewiston Porter School R. Christopher Roser (Superintendent)	**(716)-754-8281**
7. Lew-Port Hotline	**(716)-754-7387**
8. Town of Porter - Town Hall Merton Wiepert (Supervisor) or Gail Zachary (Clerk) Merton Wiepert	 **(716)-745-3730 (daytime)** **(716)-791-4759 (nighttime)**
9. Town of Lewiston - Town Hall Steven L. Reiter (Supervisor) or Dennis Brochey (Supervisor after 12/31/13) Carol Brandon (Clerk) Lewiston Police	 **(716)-754-8213 (daytime)** **(716)-754-8477 or 911**

Note 1: Any release of hazardous waste to the environment from a tank system, including releases within a secondary containment from a tank system requiring air controls, must be reported to the DEC within 24 hours unless the spill or leak is less than or

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equal to 1 pound (total) and was immediately cleaned up. A written report containing the items in 6 NYCRR 373-2.10 (g)(4)(iii) must be submitted within 30 days.

Note 2: If RQ spill occurs in secondary containment, #1, 2 and 4 above **DO NOT** need to be notified. For spills of >1 lb within a secondary containment of a tank system which does not require air controls, notify DEC no later than the next business day.

Note 3: If a spill of 10 lbs. of PCBs by weight or greater occurs, the EPA Regional Office, Pesticides and Toxic Substances Branch (908/906-6817) must also be notified.

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ARRANGEMENTS WITH LOCAL AUTHORITIES AND OTHER RESOURCES
[6 NYCRR 373-2.3(G), 373-2.4(C)(3) AND (D)(2)]

COORDINATION AGREEMENTS

AUTHORITY	RESPONSE	PHONE NUMBERS
Youngstown Volunteer Fire Department (primary responder)	All fires	911 or (716) 745-3324
Lewiston Fire Company No. 1	All fires	911 or (716) 754-2180
Upper Mountain Fire Company	All fires	911 or (716) 297-0330
Ransomville Fire Dept.	All fires	911 or (716) 791-4411
Mt. St. Mary's Hospital	Emergencies, injuries	(716) 297-4800
NY State Police (per their request)	Emergency traffic control	(716) 297-0755
Niagara County Fire Coordinator	All fires	(716) 438-3171
Niagara County Emergency Management Office	Emergency evacuation assistance	(716) 438-3176 or (716) 433-4482 After Work Hrs.
Sevenson Environmental Services, Inc.	Contract service	(716) 284-0431
Niagara Falls Memorial Medical Center	Emergencies, injuries	(716) 278-4000
Lewiston HazMat Group	Emergencies, Spills	(716) 754-8213

OTHER SOURCES OF ASSISTANCE ALSO AVAILABLE TO THE EMERGENCY COORDINATOR (OR HIS ALTERNATE)

LOCAL

Youngstown Ambulance Serv.	911 or (716) 745-3324
Lewiston Fire Company	911 or (716) 754-2180
Local Weather Information	(716) 540-1234
Poison Control Center	(800) 888-7655

COUNTY

Erie County Medical Center - Emergency Room	(716) 898-3161
Niagara County Sheriff's Dept.	(716)438-3393

STATE

New York State Police	
Lewiston	(716) 297-0755
Lockport, 6424 Ridge Rd.	(716) 434-5588
Region 9 Office of New York State Dept. of Environmental Conservation	(716) 851-7220

FEDERAL

National Response Center	(800) 424-8802
CHEMTREC Center Non-Emergency Services (operated by the Chemical Manufacturers Association-Health & Safety)	(800) 262-8200
US Coast Guard	(716) 843-9504
Federal Emergency Management Agency (FEMA)	(202) 566-1600

Local Cleanup Contractors

Sevenson Environmental Services	(716) 284-0431
Tri-C	(716)731-3400
Shaw Environmental	(716) 879-2537

Emergency Chemical Information

Chemtrec	(800) 424-9300
Niagara Falls Memorial Medical Center	(716) 278-4000

EVALUATION CRITERIA BY EMERGENCY COORDINATOR FOR IMPLEMENTATION OF CONTINGENCY PLAN

FIRE AND/OR EXPLOSION

- Fire will or has caused the release of toxic fumes or vapors.
- The fire has or could spread thereby possibly igniting materials in other locations on-site or off-site or could cause heat-induced leaks or explosions.
- The use of fire suppressants has or could result in contaminated runoff.
- Explosion has or could:
  - result in danger from flying fragments or shock waves;
  - ignite other hazardous waste at the facility;
  - release toxic materials.
- Fire does or will endanger human health or the environment for any other reason.

SPILLS OR MATERIAL RELEASE

- A spill has or could release toxic or flammable liquids or vapors, thus causing a fire or explosion hazard or health hazard.
- The spill has or could result in off-site or on-site soil contamination and/or ground or surface water contamination.
- A spill has occurred which constitutes a release of a "reportable quantity" of a hazardous substance under CERCLA, SARA or NYS regulations.
- A spill does or could endanger human health or the environment for any other reason.
  - A spill which could warrant evacuation from the site or for which off-site assistance is required for containment and control.
  - If the spill is minor and can quickly be brought under control, the full-scale Contingency Plan will not be implemented.

<u>FOR ADDITIONAL EC RESPONSIBILITIES SEE SECTION 3</u>

IMPLEMENTATION OF RESPONSE PROCEDURES BY EMERGENCY COORDINATOR [6NYCRR PART 373-2.4(G)]

The EC has been granted full corporate authority to expend all pertinent resources necessary to implement the Contingency Plan.

A. IN THE EVENT OF AN EMERGENCY, RESPONSE ACTIVITIES ARE INITIATED BY ACTIVATING INTERNAL FACILITY ALARMS OR COMMUNICATION SYSTEMS, as appropriate. The Emergency Coordinator (EC) will perform an assessment immediately.

B. THE FOLLOWING SITE PERSONNEL WILL BE NOTIFIED:
Technical Manager,
Laboratory Manager,
District Manager.

C. RESPONSE ACTIVITIES ARE DIRECTED AS APPROPRIATE and a decision is made whether or not to implement the Full Contingency Plan.

D. IF THE FULL CONTINGENCY PLAN IS IMPLEMENTED, THE EMERGENCY COORDINATOR WILL SET UP A COMMAND POST and take control of the affected area including any resources necessary until the emergency has been eliminated and necessary clean up or restoration is completed. The EC has been granted full corporate authority to expend all pertinent resources necessary to implement the Contingency Plan.

1.0 INTRODUCTION

Pursuant to New York State, RCRA, and TSCA requirements, CWM Chemical Services, LLC (CWM), maintains a Contingency Plan. According to 6NYCRR Part 373-2.4(b)(1) and (2), **"Each owner or operator must have a contingency plan for his facility. The contingency plan must be designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or nonsudden release of hazardous waste or hazardous waste constituents to air, soil or surface water. The provisions of the plan must be carried out immediately whenever there is a fire, explosion or release of hazardous waste or hazardous waste constituents WHICH COULD THREATEN HUMAN HEALTH OR THE ENVIRONMENT."** (emphasis added) Similar federal regulation exists.

Practically, the provisions of the CWM Chemical Services, LLC Contingency Plan will be carried out whenever the facility's Emergency Coordinator, or an alternate, determines that an event could threaten human health or the environment.

According to 6NYCRR Part 373-2.4(d), "A copy of the contingency plan and all revisions to the plan must be:

(1) maintained at the facility; and

(2) submitted to all local police departments, fire departments, hospitals, and State and local emergency response teams that may be called upon to provide emergency services." **(see Attachment 1)**

A copy of the currently approved Contingency Plan is maintained by the Environmental Management Department at the Administrative Office, located at 1550 Balmer Road.

According to 6NYCRR Part 373-2.4(c), the contingency plan must describe the actions facility personnel must take to protect human health and environment. This Contingency Plan provides possible response procedures to be implemented in an emergency situations, which are intended to protect the public, personnel at the facility, and the environment. **(See Section 4.4)**

The facility will operate under this plan upon approval from the appropriate Agencies. After approval, the Contingency Plan will be amended as it becomes necessary due to plan revisions, facility changes, regulatory updates, or other reasons. If amendment is required, approval of all revisions will be obtained from the Agency. It is imperative that, due to the nature of this Plan, the Agency provide a timely approval of this Document when updates are needed. Certain Plan revisions, such as personnel changes or provisions that need to be immediately implemented in order to protect human health and the environment, may need to be put into effect prior to official approval of the revision to the Plan.

This plan provides the procedures to be followed based on the current conditions at the facility. Additionally, this Contingency Plan contains details for the procedures to be followed during and after the development of Proposed RMU-2.

2.0 GENERAL INFORMATION

2.1 FACILITY LOCATION AND SITE PLAN (NOTE:SEE ATTACHMENTS 4 AND 4A)

The location of the CWM Model City Facility within the Region and local Facility Site location are illustrated in the map section of this Plan **(Attachment 4)**. Attachment 4A illustrates the layout of the facility including proposed RMU-2 and proposed new Drum Management Building.

The CWM Model City Facility lies on a broad, relatively flat lowland known as the Ontario Plain, which ends abruptly at the Niagara escarpment to the south and at Lake Ontario on the north. The plain is bisected to the west by the Niagara River which flows across the Ontario Plain from the mouth of the Niagara Gorge to Lake Ontario. A number of northward-flowing streams, drain the lake plain, two of which also cross the facility. These are Six-Mile Swale (Ontario 156-1C) and Twelve-Mile Creek (Ontario 152-A), both of which are typically dry for several months during the year.

The CWM Model City Facility encompasses approximately 710 acres of rural land, with existing permitted hazardous waste treatment, storage, and disposal units occupying approximately 630 acres.

The site was previously part of a United States Government Department of Defense installation, formerly known as the Lake Ontario Ordnance Works. General use of surrounding land includes farmland, government-related industrial and research activities and undeveloped land owned by CWM.

2.2 FACILITY OPERATIONS

Current facility operations include hazardous waste secure landfilling, container handling and storage, bulk storage, PCB handling, storage, and disposal, fuels blending, aqueous waste treatment, and waste stabilization. The entire facility is under the responsibility of the District Manager. Reporting directly to the District Manager are Managers and Supervisors who are responsible for all plant functions. Most operations and support personnel maintain contact by hand held and mobile radios.

2.3 PLANT ENTRANCE

The Plant and Administrative entrance to the CWM Model City Facility is located at 1550 Balmer Road. This entrance is used by waste haulers, CWM employees, sales representatives, contractors and visitors. Other entrances are periodically utilized by suppliers and other personnel working on large construction projects. These entrances are open only during construction operations at which time the gates are manned by security officers.

2.4 SECURITY

A Security Officer is on duty at the main plant entrance 24 hours a day, seven days a week, including holidays. The Security Officer records logistical information either manually or by an electric system as necessary for persons entering or exiting the facility.

2.5 EMERGENCY NUMBER

The emergency telephone, **extension 0200 or ((716) 286-0221 from an external or mobile phone)**, is located in the Guard House at the main plant entrance. This telephone can only accept incoming calls. The Security Office maintains contact with the Area Supervisors and Sentrex Security Systems, Inc., by telephone and two-way radio. During the day shifts from Monday through Friday, the Security Office also maintains contact with the Emergency Coordinator by hand held radio.

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2.6 HAZARDOUS WASTES HANDLED AT FACILITY

The facility receives and manages various types of hazardous waste identified in 6 NYCRR Subpart 371 and 40 CFR Part 261. Waste received in bulk, drums, or other containers generally fall within the following categories of materials:

- Wastewaters - acidic, basic, or neutral solutions generally containing metals and/or soluble organics. These materials are usually treated in the aqueous treatment facility, qualified in a facultative pond, and then discharged to the Niagara River via the facility SPDES permit.

- Inorganic solids and sludges - frequently contain metals. They are frequently stabilized and then managed in the secure landfill.

- Solids with organic contamination - generally consists of dirt or debris with organic contamination, suitable for landfill disposal.

- Organic solids and sludges not suitable for landfill disposal are generally managed off-site.

- Organic liquids such as halogenated and nonhalogenated solvents are generally bulked and shipped to burning or incineration facilities. PCB containing liquids are managed separately.

Each hazardous waste received by the facility has been characterized and classified with the proper EPA hazard code(s) by the generator. (see the Waste Analysis Plan) A list of the EPA hazard codes, along with an indication of their hazardous characteristics and the basis for listing is also presented in the Waste Analysis Plan. Also included in the WAP is a listing of the typical treatment/disposal options that may be used to process each listed waste. The actual treatment/disposal technique would depend on items such as the concentrations and quantity of the listed compound, its other waste components, physical state and the matrix (water, soil, debris, etc.). Wastes can also be transferred to other appropriately permitted facilities for treatment or disposal.

The main locations where wastes can be or are presently treated, stored and disposed of are the:

(a) Drum Management Building

(b) PCB Warehouse

(c) Trailer Parking Area

(d) Stabilization Trailer Parking Area

(e) Aqueous Waste Treatment Facility and all associated tankage

(f) Transformer Decommissioning Building

(g) Waste Stabilization Building

(h) Landfills and all associated tankage

(i) SLF 1-11 Oil/Water Separator Facility

Satellite accumulation areas are used throughout the facility.

For development of proposed RMU-2 the various types of hazardous waste the facility receives and manages will not change with the exception of the varying quantities received during the phases of development. Current locations where wastes are permitted for storage will be modified during development of RMU-2. The development of RMU-2 will require the following modifications to existing permitted units at the facility:

a) Demolition of the existing Drum Management Building and construction of a new Drum Management Building
b) Demolition of the existing South Trailer Parking Area and construction of a new area
c) Demolition of the existing Stabilization Trailer Parking Area and construction of the new area
d) Closure of Facultative Pond 8 upon radiological clearance
e) Closure of Facultative Pond 3, Construction of Facultative Pond 5
f) Removal and replacement of underground leachate transfer lines
g) Removal and replacement of the SLF 1-11 OWS Loading/Unloading Ramp
h) Removal and replacement of the SLF-10 Loading/Unloading Ramp

The new Drum Management Building will be constructed prior to demolition of the existing Drum Management Building. Therefore, waste management operations performed at the Drum Management Building and emergency procedures will not be affected during the construction of the new Drum Management Building. Upon completion and certification of the new Drum Management Building, waste management operations will be shifted from the existing Drum Management Building to the new building. The nature of wastes stored and the operations at the new Drum Management Building will be same as the old Drum Management Building with the exception of the storage and management capacities of various waste streams and shifting the transformer flushing operations from the TO Building to the new drum building. Final modifications to this Contingency Plan will be initiated upon operation of the new Drum Management Building.

During construction of the new Stabilization Trailer Parking Area and the new Full Trailer Parking Area, the facilities maximum storage capacity will be temporarily reduced. Waste storage operations during construction of the new trailer parking areas and demolition of the old trailer parking will be shifted to other waste storage areas at the facility or offsite. Final modifications to this Contingency Plan will be initiated upon operation of the new trailer parking areas.

It is anticipated that Fac Pond 5 will be constructed in the first year of site development for RMU-2. Fac Pond 3 will be utilized during the construction of Fac Pond 5. Upon construction and construction certification of Fac Pond 5and prior to construction of the second phase of RMU-2, Fac Pond 3 will be closed in accordance with the procedures in the Site-Wide Closure Plan with the exception that the pond area will not be backfilled to grade.

2.7 TYPES OF POTENTIAL EMERGENCIES

The potential for an emergency exists at this facility due to it's activities and the type of materials it handles. Additionally, natural events (e.g., hurricanes) could create an emergency situation at the facility that must be appropriately and effectively managed. These are addressed below as events which could potentially trigger implementation of some or all of the procedures detailed in the Contingency Plan.

2.7.1 Emergencies Inherent at Industrial Facility

Fires which:

- Could cause the release of toxic fumes;
- Could spread and possibly ignite materials at other locations on site, or cause heat-induced explosions;
- Could spread to off-site areas; or
- May produce contaminated runoff from controlling fire with water or chemical fire suppressants (would be contained at SMP's).
- Cause personnel injury

Explosions which:

- Could cause a safety hazard from flying fragments or shock waves;
- Could ignite other hazardous wastes stored at the facility; or
- Could result in release of toxic material.
- Cause personnel injury

Spills or Material Releases which:

- Could result in release of flammable liquids or vapors capable of causing a fire or gas explosion hazard;
- Could result in release of a reportable quantity of hazardous waste;
- Could result in on-site contamination;
- Could cause the release of toxic liquids, fumes or vapors; or
- Could result in contamination of surface water or ground water.
- Cause personnel injury

Accidents (vehicle or equipment) which:

- Could cause fire, explosion or spill described above;
- Could result in mixing of incompatible chemicals; or
- Could cause release of toxic materials to surface water, ground water, soil, or air.
- Cause personnel injury

Structural Failures

Treatment or storage tank and/or building failure or collapse could disrupt activities at facility and could endanger the health and safety of personnel onsite.

2.7.2 Natural Events

Every facility has the potential for emergencies caused by natural events, including major climatological, geophysical or other terrestrial events, such as:

- Heavy Rains and Surface Runoff;
- Floods (Facility lies outside of 100-year flood plain);
- Earthquakes (Facility is not located in a jurisdiction listed in 40 CFR 264 Appendix VI);
- Heavy Winds; or

Severe Weather.

ADDITIONAL EMERGENCY COORDINATOR RESPONSIBILITIES

3.0 IMPLEMENTATION OF RESPONSE PROCEDURES [6 NYCRR 2.4(C)(4), (F), AND (G)] (SEE ALSO PART I OF THIS PLAN)

In the event of fire, explosion or accidental materials release, response activities are initiated, as appropriate, following evaluation of the event. **An assessment of the situation is performed immediately by the Emergency Coordinator (EC). Response activities are directed as appropriate and a decision is made whether or not to implement the Full Contingency Plan.**

Should a spill be of a minor or controllable nature which presents no potential hazard to human health or the environment, the Emergency Coordinator, based upon his assessment of the situation, may decide not to implement the Full Contingency Plan, but rather to direct containment, control and notification procedures.

The Facility will not respond to off-site, non-CWM emergency response events. A summary of the emergency response procedures is posted on appropriate bulletin boards at the facility.

3.1 EMERGENCY ALERT - INCIDENT ASSESSMENT AND DECISION PROCESS BY EMERGENCY COORDINATOR

Steps to take, which would initiate response activities leading to implementation of the Contingency Plan are shown in this Section.

Following an Emergency Alert, the Emergency Coordinator will set up a command post and take control of the affected area including any resources necessary until the emergency has been eliminated and necessary clean up or restoration is completed.

3.2 IMPLEMENTATION OF CONTINGENCY PLAN BY EMERGENCY COORDINATOR

When the decision has been made to implement the Full Contingency Plan the Emergency Coordinator will direct:

- Coordination of emergency response measures conducted by the CWM Emergency Response Team.
- Implementation of internal notification;
- Where applicable, to confirm that processes and/or operations are stopped and that any released waste is contained and collected and to ensure fires or explosions do not spread;
- Determine the source and extent of the spilled materials. Evaluation criteria used by the Emergency Coordinator to determine if the Full Contingency Plan is to be implemented are presented in the front of this Plan;
- Ensure that any materials spilled in the incident area are isolated from other incompatible materials;
- Notification of authorities and requesting assistance, as necessary;
- Coordination of first aid activities, if casualties are involved, and activation of the casualty control procedures described in Section 5.0; and
- Record the time and type of incident (e.g., spill, fire, etc.);
- Record/assess the extent of injuries, if any; and
- Activation of the Evacuation Plan described in Section 6.0, if required.
- An accounting of all facility personnel/visitors by head count.
- Assess possible hazards to the environment and human health outside the facility.

3.2.1 Internal Notification and Responsibilities (See Part I Pages 5 Through 10)

The personnel to be notified are identified in the "Notification Action Summary", presented in the front section of this Plan.

3.2.2 Additional Contacts (See Part I Pages 5 Through 10)

A comprehensive list of response agencies and technical resources that may be required during an emergency are also listed in this Plan (see Table of Contents). Technical information resources are not committed to respond to emergencies.

3.2.3 General Responsibilities for Emergency Coordinator

The Emergency Coordinator (EC), or the alternate EC in his absence, is responsible for coordinating all response measures during any emergency. He acts as the director of the emergency response team during each operating shift, with complete and total control of all activities during the incident. The EC has the authority to designate other employees to assist him in the event of an emergency. The EC has also been granted full corporate authority to expend all pertinent resources to deal with the situation.

The EC's comprehensive training in emergency response includes:

- Emergency preparedness and incident command;
- Knowledge of site evacuation plan;
- Effective utilization of emergency response equipment and communication devices;
- Fire extinguisher training;
- First Aid and CPR; and
- Fundamentals of toxicology and chemistry.

In addition, the EC is familiar with all aspects of the facility's Contingency Plan, all operations at the facility, the location and characteristics of waste handled, and the location of facility operating record documents.

The EC or his alternate is always "on-call", and can be reached via telephone or mobile phone. The EC and the Alternate ECs arrange their schedules such that one of them can be reached any day of the year, 24 hours per day.

During an emergency, the EC shall maintain lines of communication with key community emergency services including fire and police agencies, medical facilities, and emergency response units. The facility's management personnel are capable of emergency communication via telephone.

Arrangements have been made with emergency service organizations to assure their availability and assistance in emergency situations. All site emergency equipment is available to the EC for use.

In general, the persons making notifications should give the following information:

- Name and telephone number;
- Name and address of facility;
- Time and type of incident (e.g., discharge, fire);
- Name and quantity of material(s) involved, to the extent known;
- Extent of injuries, if any; and
- Possible hazards to the environment and human health outside the facility.

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3.2.4 Identification of Waste Material and Hazard Assessment by Emergency Coordinator

As soon as possible, the Emergency Coordinator (EC) shall assess the character, source, and extent of any released materials by visual inspection, reference to manifests, and other available sources of information.

After the materials have been identified to the fullest extent possible, the EC shall assess possible hazards, both direct and indirect, to human health or the environment, and subsequently notify the appropriate site personnel and outside authorities.

The EC's hazard assessment may include information from other site personnel. The EC may obtain reports from individuals as to the status of all on-site personnel. Attendance information taken from the electronic personnel list located at the guard house and main office will be reviewed. The Casualty Control Officer (CCO) will relay information concerning injuries or casualties.

Based on his knowledge of the existing conditions, the EC must determine the following:

- Can facility personnel control the emergency? If so, activate Emergency Personnel Response Activities Plan (Section 4.2). If not, he will direct the Communications Coordinator or his designee to immediately notify the appropriate federal, state, and local agencies and summon additional off-site resources;
- Is Casualty Control required? If so, activate the Casualty Control Plan (Section 5.0). The following locations are designated as the on-site aid stations (Regular First Aid Station: Emergency Response Garage; Alternate First Aid Stations; Facility Training Room and Administration Building);
- Is site evacuation necessary? If so, activate Evacuation Plan (Section 6.0); and
- Is evacuation of local area advisable? If so, communicate necessary information, via the Communications Coordinator or designee to the Niagara County Sheriff.

4.0 CONTAINMENT AND EMERGENCY RESPONSE ACTIVITIES [6 NYCRR 373-2.4(C)(1)]

The facility's operations are designed to minimize the potential hazards to facility personnel, to contain spilled materials and to prevent such movement off-site. Operational features of the CWM facility and response activities of key individuals are presented below.

4.1 FACILITY PROVISIONS

All processing and storage areas with the potential for hazardous waste or PCB spills are constructed with secondary containment features to contain spilled materials and prevent their movement offsite. Processing equipment is designed to minimize hazardous material spills through use of appropriate materials of construction, high level alarms and operating procedures.

The facility has prepared an SPCC plan to address the specifics of spill control for bulk petroleum product.

Severe weather conditions such as high winds, heavy precipitation, or severe electrical storms may require shutdown for employee safety until the weather episode abates. If any damage were to occur because of severe weather conditions, the specific operation would be immediately shut down until repairs could be completed. If an earthquake were to cause damage to an operation, immediate shutdown of all operations would occur until the extent of the damage is known.

4.2 EMERGENCY PERSONNEL RESPONSE ACTIVITIES

The CWM Emergency Response Team receives training in order to respond effectively to incidents such as fires, minor first-aid cases or materials spills discussed in Section 2.7.1, at the facility which could cause potential emergencies. Containment and control activities are directed by the Emergency Coordinator. The EC and the Emergency Response Team personnel will respond to the emergency as prescribed by the EC. The Emergency Response Team Organizational Chart is shown in **Attachment 5**.

4.3 TRAINING

Everyone who occupies a position that is identified in the Contingency Plan will receive appropriate training. This applies to all persons at all facility levels who have responsibilities under this Plan.

Emergency responders are trained to the OSHA Hazmat Technician or Specialist level dependent upon individual position responsibilities. Training, based upon responsibilities, include the following: (1) hazard assessment; (2) search and rescue procedures; (3) methods of mitigation; (4) contamination control; (5) basic toxicology; (6) hazardous waste characteristics/class; (7) TLVs/PELs; (8) heat stress; (9) injury evaluation/first aid (10) decontamination procedures; (11) evacuation procedures; (12) communications with outside emergency response organizations.

Emergency Exercises

Emergency exercises involving the total facility and the CWM Emergency Response Team will be scheduled and will be coordinated by the Emergency Coordinator. The type of exercise may be a functional or full-scale exercise. Full-scale exercise will be scheduled at least once per year.

- Functional Exercise
  - Involves testing or evaluating the capability of individuals or multiple functions, or activities within a function.

- Full-Scale Exercise
  - A mock emergency will be staged in which CWM's emergency response personnel that would be involved in an actual emergency perform the actions they would take in an emergency. These simulations may focus on limited objectives of testing the capabilities of the Emergency Response Team and/or involvement of outside response organizations.

Critique of Response and Follow-up

Upon completion of the emergency exercise, the Emergency Coordinator will obtain comments and suggestions from emergency respondents, identify response deficiencies. Based on this review, suggestions for revisions to the emergency response activities will be made to facility management.

4.4 EMERGENCY PROCEDURE SCENARIOS [6 NYCRR 373-2.4(G), 373-2.9(B), AND 373-2.10(G)

Each storage, processing, treatment, and disposal unit at the facility will have built-in control features, containment structures, and equipment to facilitate emergency response procedures. The general procedures described in Section 3.2 apply to all areas of the facility. Additional procedures are described below.

Typical Container Spills and Leakage Scenarios

In the event a non-PCB spill or leak occurs in the drum warehouse, process storage areas or satellite accumulation areas, it will be cleaned up immediately with absorbent materials. The remaining contents of any leaking containers will be transferred or placed in an overpack container. The containment module or area will then be inspected to ascertain whether it contains any spilled waste. Any waste in the containment will be cleaned-up immediately, generally by the use of absorbent materials and, depending on location, rinsed to remove any residues. Ultimate disposal will depend on the exact substance spilled.

If a spill of PCB liquid in the PCB Warehouse or other PCB storage areas is observed, the cleanup procedures contained in the TSCA Approval Letter, 40 CFR Part 761 or other appropriate on-site policy will be followed. A typical cleanup scenario for PCB cleanup includes: immediate removal of the PCB oil with an absorbent; transfer of the absorbent to a container; cleaning of the spill area with an appropriate wash solution; removal of the cleanser solution with absorbents; and placement of all cleanup residues, materials, disposable equipment, and protective clothing in storage containers for disposal. Once these areas and surfaces have been decontaminated following those procedures, PCB decontamination will be evaluated. A PCB wipe sample may be taken to determine if PCB concentrations achieved are consistent with the provisions in 40 CFR 761.125(c)(3)(iii). All rinse waters, used-solvent rinses, and other residues from PCB decontamination procedures will be managed as TSCA wastes at an approved treatment facility. Non-disposable cleanup equipment will be decontaminated in accordance with 40 CFR 761.79 for reuse. Areas of unachievable decontamination may be painted over with a sealant.

Typical Tank Spills and Leakage Scenarios

Wastes from any tank (or tank system) leak will be removed from the containment area and the tank will be scheduled for repair. If the leak is not repairable, or the leak cannot be repaired without removing the contained waste, then the waste will be transferred as soon as possible from the leaking tank to another tank or to tanker trucks. Waste compatibility issues will be addressed prior to transferring. The leaking tank will not be reused until the leak is repaired.

Typical Spill Scenarios Occurring Outside of Containment Areas

In the unlikely event a spill occurs outside of a containment area, it will be cleaned up using absorbent materials, by pumping into containers, by pumping via vacuum truck or other appropriate methods. Neutralizing chemicals may be used to reduce the hazard or toxicity of the spilled waste, if appropriate. Spilled liquids and solid materials will be analyzed and treated and/or disposed of as permitted by regulations. All contaminated soil will be removed, treated and/or disposed of as permitted by regulations. Generally, as per 6NYCRR Part 373-2.10, a leak or spill of hazardous waste of greater than one pound from a tank system to the environment must be reported to the DEC within 24 hours. A written report must follow within 30 days and must address the likely route of migration, characteristics of surrounding soil, results of any monitoring or sampling, proximity to downgradient drinking water, surface water and populated areas and description of response actions taken or planned.

Surface Impoundments

A surface impoundment must be removed from service upon identification of a leak in the containment berm or when the liquid level drops suddenly and is not known to be caused by changes in flow into and out of the impoundment. Removal from service includes immediately shutting off flow into impoundment (if applicable), containing any surface leakage, stopping the leak or emptying the impoundment below the level of the leak if it cannot be repaired. For the Fac Ponds, detection of a leak would prompt repair of the clay berms. If it was necessary to lower the liquid level, the material could be transferred to another impoundment with a compatible disposition. The impoundments may not be returned to service until the repair has been recertified.

Landfill - RMU-1 and Proposed RMU-2

In the event of a fire in the active landfill(s), soil may be used to smother the fire. Elimination of oxygen would generally be the most effective means of controlling a landfill fire. Several other methods are also currently available including fire hydrants, the on-site water tank and the on-site Ansul unit. The Youngstown Fire Department or other Fire Departments in the area could also be called upon to help in an emergency associated with a major fire that could not be handled with the site methods indicated above.

RCRA regulated reactive and ignitable wastes are restricted from landfill disposal by the Land Disposal Restriction (LDR) regulations unless they are deactivated. These wastes will be managed by properly processing, stabilizing, or otherwise rendering nonreactive, before placement into the landfill so that the material no longer meets the definition of reactive under 6 NYCRR Part 371.3(d) and 40 CFR 261.21 and 261.23. In addition, incompatible waste materials will not be placed in the same landfill cell unless they have been treated so that they are compatible prior to placement or they have been properly segregated. The analyses described in the Waste Analysis Plan are implemented to ensure compliance with these requirements.

5.0 AVAILABLE EMERGENCY EQUIPMENT [6 NYCRR 373-2.4(C)(5)]

The facility maintains an alarm system, communications system, and emergency response equipment. On-site equipment will enable facility personnel to react and respond to most minor emergency incidents which might arise. However, if needed, supplemental emergency equipment and supplies will be obtained from outside sources.

5.1 ALARM AND COMMUNICATION SYSTEMS

The off-site communication network consists of the local telephone system. Telephones connected to areas outside the facility are located in operational buildings. The off-site communication network is supplemented by cellular phones. The internal network consists of telephones, cellular phones, two-way portable and stationary radios, and the alarm system. CB's could be used if telephones are out of service. The current primary alarm for notification of an emergency are the electric sirens/horn located in the Administration Building, on the roof of the Fire System Water Storage Tank and on the Boiler House. The sirens/horns can be activated by the Security Officer at the Main Plant Entrance. When activated, the sirens/horns will alert the facility. The sirens sound for two minutes. During development of RMU-2, the Fire System Water Storage Tank will be demolished and not replaced. The siren located on top of tank will be relocated to the top of the Stabilization Building.

The Current Drum Management Building sprinkler system alarm is a water-activated bell and an electronic horn located on the north outside wall of the building. This bell, and a horn located at the main gate security office, rings automatically when the sprinkler system is activated. Alarms located in the proposed new Drum Management Building when activated will activate alarms in the main security office.

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5.2 ON-SITE EQUIPMENT (SEE NEXT PAGE)

The emergency response equipment available at the site includes items indicated on the following page. These lists are considered typical of the equipment at the CWM Model City Facility. Types, quantities and locations of individual pieces of equipment may vary depending upon changes in operations and the levels of minimum equipment required to respond to an emergency.

FACILITY SAFETY AND EMERGENCY EQUIPMENT 6NYCRR Part 373-2.4(c)(5)

EQUIPMENT	LOCATION
Ansul Twin-Agent Model 450/100 Fire Truck which contains: Dry Chemical and Forming Foam; description: mobile unit, 450 lbs. dry chemical and 100 gallons AFFF capability: for B/C type fires, non-structural	Emergency Response Garage
Dry Chemical Fire Extinguishers; **Dry Powder Fire Extinguishers;** description: either ABC - dry chemical or BC - halon, CO2 or D - dry powder capability: ABC can be used for ordinary combustibles, flammable liquids and gases and electrical equipment; BC is used for flammable liquids and gases and electrical equipment; D is used for metal bearing chemical fires such as sodium metal	

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	LOCATION
SCBA Air Packs; **SCBA Air Packs Spare Bottles;** description: portable air tank within a unit that is strapped to the back capability: provides about 0.5 hours of breathing air	
Honda Gasoline Generator description: gas powered, portable, 5,000 Watt capability: provides power for emergency lighting, ventilation	

Portable Fire Extinguishers which are either dry chemical or dry powder are located in these areas:

Administration Building

Ansul Twin Agent Fire Truck

Aqueous Treatment

Boiler Room

Existing Drum Management Bldg.

New Drum Management Bldg. (upon development of RMU-2)

Existing Emergency Response Garage

New Emergency Response Garage (upon development of RMU-2)

Emergency Response Van

Environmental Monitoring Building/DEC Office

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	LOCATION
Portable Fire Extinguishers (continued)	Fuel Area
	Groundwater Extraction Buildings
	Existing Heavy Equipment Maintenance
	New Heavy Equipment Maintenance (upon development of RMU-2)
	Laboratory
	Laboratory Office Trailer
	Lunch Room Locker Room for Employees
	Miscellaneous Equipment
	Old Administration Bldg.
	PCB Area
	PCB Warehouse
	Pump Room
	Records/Scales
	RMU-1 Lift Station (to be removed upon development of RMU-2)
	Safety Supply Store

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	LOCATION
Portable Fire Extinguishers (continued)	Security Bldg., Main Gate
	SLF 1-6 Lift Station
	SLF 1-11 OWS Building
	SLF 7 Lift Station
	SLF 7/11 Leachate Bldg.
	SLF 10 Leachate Building
	SLF 12 Lift Station
	SLF 12 OWS Building
	Stabilization Facility
	TO Building
	Vehicles for Plant
	Water Treatment
Dry Powder for Ansul recharge description: dry powder chemical capability: provides recharge source for Ansul unit	Emergency Response Garage
AFFF Foam for Ansul recharge description: AFFF Foam chemical capability: provides recharge source for Ansul unit	Emergency Response Garage
Nitrogen Bottles for Ansul recharge description: nitrogen containing bottles capability: provides pressure source for Ansul unit to disperse reagents	Emergency Response Garage

Note: the Emergency Response Garage will be relocated to the existing Truck Wash Building during development of the RMU-2. The facility safety and emergency equipment will not change from the existing to the new Emergency Response Garage.

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT **LOCATION**

Fire Hydrants

description: fixed sources of piped water
capability: provides pressurized water
source for fire fighting

1-west of Employee Locker Room
1-north of Employee Locker Room
1-southeast of Employee Locker Room on Marshall Street
1-north of Environmental Trailer on Marshall Street
1-southeast of "H" Street on Marshall Street
1-intersection of "J" and Marshall Street
1-south of "J" Street on MacArthur Street
1-north of "M" Street on MacArthur Street
1-intersection of Hall Street and "M" Street
1-south of Lunch/Training Room on "M" Street
1-southwest of Stabilization Building
1-on Marshall Street at Main Entrance Gate
1-east of Arc Pyrolysis Building on "M" Street
1-east of Campbell Street on "M" Street
1-southwest of Administration Building
1-southeast of SLF-10
1-southwest of RMU-1
1-southeast of Emergency Response Garage on "M" Street
1-north of Stabilization truck road on Hall Street
1-east of SLF-12 Lift Station on Hall Street (upon development of RMU-2)
1-souteast of SLF 1-6 (upon development of RMU-2)
1-northwest of RMU-1 at intersection of "J" and MacArthur Street (upon development of RMU-2)

350,000-gallon Fire Water Tank — Next to Drum Management Building

description: fixed above ground
tank containing water
capability: provides pressurized water
source for sprinkler system & fire fighting,
primarily for Drum Management Building

The existing 350,000-gallon Fire Water Tank will be demolished during the development of RMU-2. The existing Drum Management Building will also be demolished during the development of RMU-2 and will be replaced with the new Drum Management Building. The new Drum Management Building will be equipped with a dry chemical fire suppression system. Therefore, the Fire Water Tank will not be necessary and will not be replaced during the development of RMU-2. The existing Drum Management Building and Fire Water Tank will not be demolished until the new Drum Management Building is operational.

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	LOCATION
Hand Held Radios	General Plant Areas
description: 2-way portable units capability: limited to on-site usage	
Air Compressors	Plant
description: portable gas units capability: pressure supply for tools	
Generators	Plant
description: portable units capability: electrical supply for tools and equipment	
Pumps	Operating Areas
description: fixed and portable units capability: provides vacuum source for pumping liquids, leachate and sludges	
Supersucker	Operating Areas
description: mobile gas unit capability: provides mobile vacuum source for pumping liquids, leachate and sludges from standpipes, tanks, containment, etc.	

FACILITY SAFETY AND EMERGENCY EQUIPMENT
(continued)

EQUIPMENT	LOCATION
Dump Trucks	Landfill/Grounds
description: mobile gas unit capability: provides mobile transportation source for solids	
Pumps	Maintenance
description: mobile units capability: provides mobile vacuum source for pumping liquids	
Bulldozers	Landfill/Grounds
description: mobile diesel unit capability: provides earth moving source	
Loader	Landfill/Grounds
description: mobile diesel unit capability: provides earth moving/loading source	
Excavator description: mobile diesel unit capability: provides earth digging/moving source	Landfill/Grounds/Stab.
Water Trucks description: mobile unit capability: provides water source for wetting in landfills roads and operations	Grounds

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	LOCATION
Self Contained Breathing Apparatus (SCBA) description: portable unit strapped to back capability: provides supplied air breathing source for about one-half hour	Aqueous Treatment Existing Drum Management Building New Drum Management Bldg. (upon development of RMU-2) Emergency Response Van Existing Emergency Response Garage Existing Facility Maintenance Shop Stabilization Facility (Office/Clean/Dirty Bldg.)
Absorbent description: absorbent material capability: used for spills	PCB Warehouse, Existing Drum Management Building New Drum Management Bldg. (upon development of RMU-2)

FACILITY SAFETY AND EMERGENCY EQUIPMENT
(continued)

EQUIPMENT	LOCATION
Vacuum trucks description: mobile units capability: provides vacuum source to remediate spills or water	Various Locations in Operations Area
Personal Protective Equipment description: gloves, boots, Tyvek, hard-hats, respirators, air cartridges, etc. capability: personal protection	PPE Safety Supply Room at Emergency Response Garage
Emergency Lights description: portable lighting capability: provides emergency light source	Heavy Equipment Garage
First Aid Kits description: stationary kits capability: provides minor first-aid	Administration Building Aqueous Treatment Bldg. Existing Drum Management Building New Drum Management Bldg. (upon development of RMU-2) Existing Emergency Response Garage New Emergency Response Garage (upon development of RMU-2) Emergency Response Van Env. Monitors Office Facility Maintenance Shop

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	**LOCATION**
First Aid Kits(continued)	Existing Heavy Equipment Maintenance Building
	New Heavy Equipment Maintenance (upon development of RMU-2)
	Laboratory - West Wall
	Main Gate Security Office
	Safety Supply Store
	Scale/Receiving Area
	Stabilization/ Existing Landfill
	New Landfill (upon development of RMU-2)

Emergency Showers/Eye Wash Stations

description: stationary units
capability: provides body wash and eye wash emergency water source

Aqueous Treatment Facility	Drum Storage Dock
	East Tank Farm
	Filter Press Room - upstairs next to press
	Filter Press Room - downstairs next to roll-off container
	Next to Tank T-810
	Next to Tank T-910
	Next to Tank T-1010

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	**LOCATION**
Emergency Showers/Eye Wash Stations (continued)	
Waste Water Treatment Facility	West side next to overhead door
PCB Warehouse	Center area of building
Equipment Maintenance	Southwest corner
Laboratory	East side of building
	West side of building
Facility Maintenance	Compressor room
Environmental Monitoring Bldg.	Laboratory
Existing Drum Management Building	North side of building
	South side of building
	Laboratory
New Drum Management Building	Area 1
	Area 2 Area 3
	Area 6
	Laboratory
Roll-off Garage	North side next to wash bay

Note: to be converted to new Emergency Response Garage upon development of RMU-2

Stabilization (Center Section)	East end of building, 1st floor Southwest end of building, 1st floor

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	LOCATION
Emergency Showers/Eye Wash Stations (continued)	
	East end of building, 2nd floor
	Southeast end of building, 1st floor
	Near TA-5 silo
Stabilization (Northern Expansion)	Southeast wall
	Northeast wall
Truck Wash Facility	Northeast Wall
SLF 7/11 Leachate Building	Next to Tank T-108
SLF 10 Leachate Building	Next to Tank T-109
SLF 1-11 OWS Building	Next to Tank T-158
Stretcher Locations	
description: stretcher capability: provides means to carry victim	
	Aqueous Treatment Facility, Control Room
	Stabilization Facility, Office/Clean/Dirty Bldg.

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT	**LOCATION**
Fire Hose	
description: fire-fighting water hose capability: provides means to extinguish certain fires such as wood burning, paper, structural fires, etc.	
<u>Existing Drum Management Building</u>	North wall
	South wall
New Drum Management Building (dry chemical fire suppression system)	Not necessary
<u>Stabilization (Center Section)</u>	Southwest wall, ground floor
	Northeast wall, ground floor
	Northeast wall, 1st floor
<u>Stabilization (Northern Expansion)</u>	East end, south wall
	West end, south wall

EMERGENCY RESPONSE VAN EQUIPMENT (not all inclusive)

Neck Collars
Backboard
Stretcher
First aid kit
Blankets
Set splints
Rope
Safety harnesses with Life line

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT **LOCATION**

EMERGENCY RESPONSE VAN EQUIPMENT (continued)

Electrical extension cords
Speedi-dry
Absorbent socks
soda ash
Empty pails
plastic bags
Brooms
Shovels
Sledge hammer
Bar
Plastic
Vinyl tarp
duct tape
barrier tape
Traffic safety cones
Self contained breathing apparatus (scba)
Saranex suits
Leak patch tool kit
HF kit
Cyanide kit
EMT bags with oxygen
Flash lights

EXISTING EMERGENCY RESPONSE GARAGE
(to be relocated to new Emergency Response Garage upon development of RMU-2)

Drum roll
pH kit
Nu-dough (box)
Flashlights
tools
PPE

FACILITY SAFETY AND EMERGENCY EQUIPMENT (continued)

EQUIPMENT **LOCATION**

EXISTING EMERGENCY RESPONSE GARAGE (continued)

Blood pathogens spill clean up kit
LEL/oxygen meter
Honda gas generator
One ton cable hoist
Cable with hooks
Portable electric lights
Miscellaneous decon equipment
cribbing
dolly
Binoculars
Bull horn

An Emergency Response Van is accessible to response personnel at all times. The principal function of this unit is to make personal protective and spill response equipment readily available at any location where personnel may require it. All response team members are instructed in the use and maintenance of the protective equipment.

The Ansul Fire Unit is a truck mounted unit which holds about 450 pounds of dry chemical and about 100 gallons of AFFF solution. The unit is normally located in the existing Emergency Response Garage. Emergency Response Team personnel are trained in the movement, operation, and maintenance of the unit. The Ansul Fire Unit will be located in the new Emergency Response Garage upon development of RMU-2.

Approximately 180 portable fire extinguishers are located in various marked locations within the CWM Model City Facility.

Fire extinguishers and first aid kits are checked and serviced as required. In addition, most on-site vehicles and equipment carry ABC-type extinguishers and first aid kits. Many employees are trained and qualified to administer first aid/CPR.

<u>Water for Fire Control</u>

Water for firefighting within the facility is provided by fire hydrants located throughout the facility.

A Dry-pipe sprinkler system delivering roughly 0.15 gpm/ft^2 to zoned areas is installed in the existing Drum Management Building.

A 350,000-gallon fire water tank is located north of the Existing Drum Management Building and provides the source of sprinkler water. Water from the fire water tank is channeled to a below ground fire service main using a fire pump. This fire service main distributes water to the Existing Drum Management Building and hydrant service located at the Fire Pump House.

The existing 350,000-gallon Fire Water Tank will be demolished during the development of RMU-2. The existing Drum Management Building will also be demolished during the development of RMU-2 and will be replaced with the new Drum Management Building. The new Drum Management Building will be equipped with a dry chemical fire suppression system. Therefore, the Fire Water Tank and Fire Pump House will not be necessary and will not be replaced during the development of RMU-2. The existing Drum Management Building and Fire Water Tank will not be demolished until the new Drum Management Building is operational.

5.3 OFF-SITE RESOURCES

Supplemental emergency equipment will be available if needed from off-site resources. The nearby fire departments (Youngstown, Ransomville, Upper Mountain, and Lewiston #1) have self-contained breathing apparatus, diking materials, and containment equipment. The available fire trucks are equipped with foam concentrate. The ambulances from the local emergency services have 24-hour capability and are equipped to treat traumatic injuries.

6.0 CASUALTY CONTROL OFFICER RESPONSIBILITIES

During the course of an emergency, injured individuals will be given first aid, as necessary. For more serious injuries outside medical assistance will be sought. The Casualty Control officer (CCO) will have primary responsibility for medical assistance but will keep the EC informed throughout the emergency. During an emergency situation, the CCO will accomplish the following:

- Designate, organize, and direct available first-aid personnel. The first-aid stations are located in the existing Emergency Response Garage, Training Room and SPEC Center. Additionally, first aid stations will be located in the new Emergency Response Garage to be relocated to the Truck Wash/Roll Off Building upon development of RMU-2
- Access on-site information regarding injury-causing agents, including toxicity and decontamination requirements.
- Assess the situation and summon emergency medical assistance from the Youngstown Fire Department Ambulance Service (911), Mt. St. Mary's Hospital (911) and/or the Niagara Falls Medical Center (716-278-4000) as necessary. Meet incoming emergency/medical services personnel and guide them to the first-aid station or location of the injured individual(s);
- Injured personnel will be placed in the care of qualified medical personnel. The CCO will provide casualty control resources to the medical service person in charge; and
- Assist the medical service person in charge by providing notification to the appropriate hospital or emergency room of the arrival of casualties, nature of injury, information on toxicity and decontamination, and any other pertinent information. Such information shall be promptly transmitted to those with a need-to-know.

6.1 EVACUATION PLAN [6 NYCRR 373-2.4(C)(6)] (SEE ATTACHMENT 2)

The Emergency Coordinator, or his alternate, is the only person authorized to call for complete evacuation of the site in response to an emergency situation which threatens the health and safety of facility personnel. He may take this action based upon his analysis of the situation or at the request of the On Scene Incident Commander or a outside Fire Department or other public emergency service.

6.2 SITE ACCESS AND EGRESS

The facility is located at 1550 Balmer Road. This site can be reached from NY State Route 18, via Balmer Road. The primary evacuation route (Attachment 2) from the facility's current operations area is east on " M" Street, north on McArthur Street, east on "J" Street, north on Marshall Street, through the main gate on Balmer Road. The alternate route is west on "M" Street and through the Lutts Road entrance. A new evacuation route will be necessary due to construction of RMU-2. The primary evacuation route (Attachment 2) from the facility's proposed operations area after development of RMU-2 is east or west on "M" Street to Hall Street, north on Hall Street, east on the street located in front of the administration building, north on Marshall Street, through the main gate on Balmer Road. The alternate route is west on "M" Street and through the Lutts Road entrance. The site is designed and operated to facilitate access to all internal points for inspection and emergency response.

Access to the facility is always restricted. During an emergency the security guard will allow immediate access only to emergency response professionals. Other state and federal personnel will be allowed access by the EC or CC as necessary.

6.3 EVACUATION PROCEDURES

The following actions will be taken when the EC orders a site evacuation:

1. The EC or his designate will immediately notify local emergency services by calling 911 for assistance, reporting any casualties and arranging for their emergency care. The EC will coordinate activities with police, fire department, or other public emergency services;

2. The EC or a designee will determine which exit routes will be used depending upon the location of the incident, wind direction, and personnel location. Prior to evacuation, the Area Supervisors shall account for all personnel in their respective areas.

3. The EC will broadcast evacuation instructions via voice, telephone communication or two-way radio;

4. Security personnel or designee will unlock the required emergency exit gates immediately. The evacuation route through the main gate is always open and staffed by security personnel 24 hrs. per day. The emergency gates are designed to provide security from unauthorized entry without obstructing exit during an emergency;

5. All personnel, visitors, and contractors will immediately leave through the designated exit gate(s) as instructed. These evacuation routes are shown in the **Attachment 2** section;

6. Evacuation should proceed as follows:

   If downwind of incident, evacuate perpendicularly to wind direction over the most accessible route; and

   If upwind of incident, evacuate in the upwind direction.

7. Personnel will regroup at one of the following areas as designated by the EC:

   - The intersection of Balmer Road and Marshall Street; and
   - The OLD Administration Building parking lot at the far northwest corner of the facility.

8. The Personnel Coordinator (PC) will initiate a head count and check it against the sign in/sign out sheets located in the guard house and main office. The PC will account for all personnel at regrouping area(s). This information will be communicated to the EC.

Evacuation Procedures during and following development of proposed RMU-2 will not change other than the site access and egress described in Section 6.2.

6.5 COMMUNITY IMPACT CONSIDERATIONS

In anticipation of the remote possibility that areas adjacent to or near the site may be endangered, CWM representatives have discussed procedures for evacuating the surrounding areas with local authorities. The following items will be discussed with local authorities:

- The Emergency Coordinator (EC) assisted by the Communications Coordinator (CC) will notify local authorities of the possible need to evacuate off-site areas. The EC will indicate the nature, extent, and rate of spread (including direction) of potential hazards to the community;
- Prior to local response, facility personnel will, under the ECs direction, request the Niagara County Sheriff's Department and/or New York State Police to initiate roadblocks (if necessary) and evacuation procedures for areas adjacent to the site;
- Assisted by the Communications Coordinator, the EC will maintain communications with local authorities and assist in the coordination of the community evacuation, emergency response, and casualty control activities; and
- The Niagara County Sheriff's Department and/or New York State Police will implement these procedures for the evacuation of the endangered areas.

6.6 RE-OCCUPANCY OF FACILITY

The determination of when the facility may be safely re-occupied will be made by the Emergency Coordinator (EC) in consultation with responding emergency services agencies. Site activities will only resume after the EC has announced an "all clear" notification.

7.0 POST-EMERGENCY PROCEDURES

Post-emergency procedures are designed to prevent recurrence, clean-up and dispose of residuals, decontaminate equipment, and provide for personnel debriefing.

7.1 PREVENTION OF RECURRENCE [6 NYCRR 373-2.4(G)(5)]

The Emergency Coordinator will take all necessary steps to ensure that a secondary release, fire or explosion does not occur after an initial incident. Procedures that will be carried out in the affected area include:

- Inspection for any leaks or cracks in pipes, valves, tanks, and drums;
- Inspection for gas generation or leakage;
- Separation of potentially incompatible residues;
- Monitoring all pressure valves; and
- Isolation of residual wastes.

All operations that were initially shut down in response to the incident will not be reactivated until the EC announces an "all clear" signal.

7.2 TREATMENT AND DISPOSAL OF RELEASED MATERIALS AND CLEAN-UP RESIDUES [6 NYCRR 373-2.4(G)(7)]

Once the emergency situation has ended, the EC will initiate clean-up and disposal of the residues. This will occur as soon as possible in order to avoid further contamination.

Liquid spills occurring within a containment area will be analyzed, removed, and stored securely. Spilled liquids cleaned up with spill control materials will be placed in drums and sealed. Leaking containers will be immediately segregated and repackaged or drained. Clean-up materials and residuals will be collected and containerized for disposal or incineration in accordance with applicable regulations.

All waters collected during an emergency will be handled as hazardous waste, and managed appropriately.

7.3 EQUIPMENT DECONTAMINATION AND MAINTENANCE [6 NYCRR 373-2.4(G)(8)(II)]

All equipment used during the cleanup will be decontaminated and readied for future use. All response personnel will remove any contaminated clothing and shower as necessary. Fire extinguishers will be recharged, personnel protective equipment replaced, and spill control materials restocked. Before operations are resumed, an inspection of all safety equipment will be conducted to verify readiness. All residue and debris from decontamination will be collected and containerized for disposal.

7.4 PERSONNEL DEBRIEFING AND RETRAINING

The Emergency Coordinator will conduct debriefings of the incident with site supervisors, operating personnel, and local authorities to assess preparedness, emergency response activities, casualty control, and evacuation procedures to determine future preventative measures and activities. Based on this review, a written critique will be prepared and suggestions for revisions to the Contingency Plan will be made to facility management.

7.5 NOTIFICATION PRIOR TO RESUMING OPERATIONS IN THE AFFECTED AREAS

According to 6NYCRR Part 373-2.4(g)(9), before operations are resumed in the affected area(s) of the facility, the owner or operator must notify the commissioner, and appropriate State and local authorities, that:

1. no waste that may be incompatible with the released material is treated, stored or disposed of until cleanup procedures are completed; and
2. all emergency equipment listed in the contingency plan is cleaned and fit for its intended use before operations are resumed.

8.0 ARRANGEMENTS WITH LOCAL AUTHORITIES AND OTHER RESOURCES [6 NYCRR 373-2.3(G), 373-2.4(C)(3) AND (D)(2)]

CWM Chemical Services, LLC (CWM) has made contact with local authorities which may be involved in an emergency situation. Each of these authorities has been provided a copy of the facility's current Contingency Plan (see **Attachment 1**). Specific involvements have been discussed and are determined by the local mutual aid agreements.

The authorities in **Attachment 1** have been advised of materials handled at the facility, the likely hazards involved, and the storage, treatment, and processes used. Material Safety Data Sheets and other technical references pertaining to hazardous materials are available at the site for use by hospital personnel. Helicopter evacuation of injured personnel is possible, if warranted.

CWM periodically conducts training sessions with the response team members and representatives of local fire departments to provide information concerning:

- Facility layout;
- Location of possible hazards;
- Emergency equipment location and operation;
- Evacuation plan and route;
- Power cutoff;
- Communications equipment;
- Phone numbers of all required contacts; and
- Other critical information and procedures.

9.0 INCIDENT REPORTING [6 NYCRR 373-2.4(G)(10)]

All incident reporting from the facility, if requested by the Emergency Coordinator (EC), will be conducted by the Communications Coordinator (CC) or Alternate. The National Response Center and the New York State DEC will be notified if there has been a spill or release of a hazardous waste/substance in excess of reportable quantity or if it is determined that the spill may cause environmental damage or a human health hazard. 6 NYCRR 373-2.4(g)(4) and 40 CFR 264.56(d)(2) require immediate verbal notification of the National Response Center **[1-800-424-8802]** or the On-Scene Coordinator for the area, and the New York State DEC [24 hour oil and hazardous material spill notification number: **(518) 457-7362**] specifically, if the EC determines that "the facility has had a release, fire or explosion which could threaten human health, or the environment, outside the facility."

6 NYCRR 373-2.4(g)(10) further states that any emergency event requiring the implementation of the Contingency Plan will be reported in writing within 15 days to the NYSDEC Commissioner.

All required information will be provided in a written report which may reference the incident reporting forms used by the facility.

Modified: Dec. 2013

9.1 REPORTING INCIDENTS MITIGATED ON-SITE

(Full Contingency Plan not implemented)

The following procedures are to be followed as required depending on the type of incident:

- Report incident to WMI Corporate offices verbally at the time of the incident and submit a complete incident report form after the incident is controlled. A copy of the incident report will be provided to the Technical Manager who will maintain the copy of the incident reports in a central file at the facility.

9.2 REPORTING INCIDENTS IMPLEMENTING FULL CONTINGENCY PLAN

The following procedures are to be followed:

- Report incident to local authorities and request emergency support, if needed;
- **Immediately** report the incident verbally to National Response Center **(800-424-8802)** and to the New York State Department of Environmental Conservation **(716-851-7220)** or the NYSDEC Hotline **(800-457-7362)** if off-site human health or environment are threatened or if there is a release of a hazardous substance that exceeds the CERCLA, SARA or NYS reportable quantity (RQ) in any 24-hour period.
- Report the incident to WMI corporate offices verbally at the time of the incident and submit a completed incident report form after the situation is controlled.
- In case of a RQ PCB spill, report the incident to the Regional Administrator of Region II; and
- Within 15 days, as required, a report of the incident will be made to the NYSDEC and to the EPA Regional office.
- Removal of surface impoundment from service for emergency repairs requires a written notification to the DEC within 7 days.
- Any release of hazardous waste to the environment from a tank system must be reported to the DEC within 24 hours unless the spill or leak is less than 1 pound (total) and was immediately cleaned up. A written report containing the items in 373-2.10 (g)(4)(iii) must be submitted within 30 days.

Modified: Dec. 2013

9.3 REPORTING REQUIREMENTS FOR OTHER RELEASES

Not all releases may require the implementation of the full contingency plan, however, each release must be assessed and the reporting requirements determined. Attachment 3 summarizes the reporting thresholds, who to report to and the required time frame under the various hazardous substance programs.

The following are the hazardous substances maintained in inventory at Model City which are controlled under SARA:

substance	Reportable Quantity under SARA III
Calcium Oxide	10,000 lbs.
Cement	10,000 lbs.
Ferrous Sulfate	1000 lbs.
Fuel Oil #2	10,000 lbs.
Gasoline	10,000 lbs.
Hydrochloric acid	5000 lbs.
Propane	10,000 lbs.
Sodium Hydroxide	1000 lbs.
Sulfuric acid	1000 lbs.

The RQ levels for some of these substances is listed in 40 CFR Part 302. For all other chemicals (based on OSHA), the minimum reporting threshold is 10,000 lbs. If a release of one of these materials exceeds the RQ and the material is released off-site, the Niagara County Local Emergency Planning Committee (LEPC), for S.A.R.A. Title III, must also be notified at (716) 438-3471.

10.0 AMENDMENTS TO CONTINGENCY PLAN

This Contingency Plan is subject to review and amendment, if:

1. The plan fails in an emergency;

2. The facility's permit is revised;

3. The facility changes in design, construction, operation, maintenance, or if other circumstances develop that materially increase the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or change the response necessary in any emergency;

4. The list of Emergency Coordinators changes; and

5. The list of emergency equipment changes substantially.

ATTACHMENT 1

LOCAL EMERGENCY AGENCIES GIVEN CONTINGENCY PLAN

According to 6NYCRR Part 373-2.4(d), "A copy of the contingency plan and all revisions to the plan must be: (1) maintained at the facility; and (2) submitted to all local police departments, fire departments, hospitals, and State and local emergency response teams that may be called upon to provide emergency services."

CWM has made arrangements with emergency providers to supply emergency services as required by 6NYCRR Part 373-2.3(g). Documentation is provided in this attachment, including written responses where received. No emergency provider has declined to enter such an agreement.

The Contingency Plan has been submitted to the following agencies:

<u>Local Emergency Agencies Given Contingency Plan</u>

1. Hockenberry, Sharon - Director Niagara Falls Memorial Medical Center 621 10th Street Niagara Falls, New York 14301 phone: 716-278-4000	10. Maness, Judith - President Mount St. Mary's Hospital 5300 Military Road Lewiston, New York 14092 716-297-4800
2. Cecula, John - CEO HazMat Group Lewiston Town Hall Lewiston, New York 14092 phone: 716-754-8213	11. Chief Lewiston Fire Company No. 1 145 N. 6th Street Lewiston, New York 14092 phone: 716-754-2180
3. Schultz, Jon - Chief Upper Mountain Fire Company - Escarpment Area 839 Moyer Road Lewiston, New York 14092 phone: 716-297-0330	12. On-Site Monitor CWM Chemical Services 1550 Balmer Road Model City, New York 14107 ext: 302
4. Schick, Robert New York State Department of Environmental Conservation 625 Broadway Albany, New York 12233-7011 phone: 518-402-9706	13. Orsi, Paul Sentrex Security Systems 1925 Pine Avenue Niagara Falls, New York 14301 phone: 716-285-5999
5. DeVald, James Niagara County Health Department 5467 Upper Mountain Road Lockport, NY 14094 phone: 716-439-7444	14. Niagara County Fire Coordinator and Director of Emergency Services P.O. Box 496, 5574 Niagara Street Extension Lockport, New York 14095 phone: 716-438-3171
6. Elia, Laurence Sevenson Environmental Services, Inc. 2749 Lockport Road, NF, NY 14305 716-284-0431	15. Rougeux, Peter - Station Commander New York State Police 4525 Witmer Road Niagara Falls, New York 14305 phone: 716-297-0755
7. Tower, Jeff - Chief Youngstown Volunteer Fire Company 625 Third Street Youngstown, New York 14174 phone: 716-745-3324	16. Weiss, Dennis New York State Department of Environmental Conservation Region 9 270 Michigan Avenue Buffalo, New York 14203-2999 phone: 716-851-7220
8.	17. Lockhart, Tim Chairman, Niagara County Emergency Management Office PO Box 496, 5526 Niagara Street Ext. Lockport, New York 14095 phone: 716-438-3176 or 716-278-4413
9. Hillman, Steve - Chief Ransomville Fire Company No. 1 2521 Youngstown-Lockport Road Ransomville, New York 14131 716-791-4411	18. Whitenight, David Sentrex Security Systems On-Site Main Gate Guardhouse ext: 0221

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. Harold Suitor, Chief
Youngstown Volunteer Fire Company
625 Third Street
Youngstown, New York 14174

Mr. Peter Rougeux, Station Commander
New York State Police
4525 Witmer Road
Niagara Falls, New York 14305

Re: Agreement to Provide Emergency Response Services

Dear Sirs:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to be a primary provider of emergency services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B Hino

John B. Hino
Permitting Manager
Model City Facility

__X__ Yes, I agree to provide emergency services to CWM Model City Facility.
______ No, I am unable to provide emergency services to CWM Model City Facility.

Signature: David J Truesdale

Name: DAVID J. TRUESDALE Title: PRES

Organization: YOUNGSTOWN VOL FIRE COMP Date: 3-6-2000

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. Harold Suitor, Chief
Youngstown Volunteer Fire Company
625 Third Street
Youngstown, New York 14174

Mr. Peter Rougeux, Station Commander
New York State Police
4525 Witmer Road
Niagara Falls, New York 14305

Re: Agreement to Provide Emergency Response Services

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Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B. Hino

John B. Hino
Permitting Manager
Model City Facility

__✓__ Yes, I agree to provide emergency services to CWM Model City Facility.
______ No, I am unable to provide emergency services to CWM Model City Facility.

Signature: Sgt/SC Philip J. Bourque

Name: PHILIP J. BOURQUE Title: SGT. STATION COMMANDER

Organization: NY STATE POLICE Date: 3/6/00

WASTE MANAGEMENT

CWM CHEMICAL SERVICES, LLC
1550 Balmer Road
PO Box 200
Model City, NY 14107
(716) 754-8231
(716) 754-0211 Fax

October 10, 2005

Ms. Sharon Hockenberry, Director
Niagara Falls Memorial Medical Center
621 10th Street
Niagara Falls, New York 14301

Re: Agreement to Provide Emergency Response Services

Dear Ms. Hockenberry:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response and/or clean up services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by October 24, 2005. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Jill A. Banaszak at (716) 754-0246 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B Hino

John B. Hino
Permitting Manager
Model City Facility

__X__ Yes, I agree to provide emergency services to CWM Model City Facility.
______ No, I am unable to provide emergency services to CWM Model City Facility.

Signature: Sharon Hockenberry

Name: SHARON HOCKENBERRY Title: DIR OF OPERATIONS

Organization: NF OCC HEALTH Date: 10-11-05

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. James Volkosh
Niagara County Fire Coordinator
P.O. Box 496
Lockport, NY 14095

Re: Agreement to Provide Emergency Response Services

Dear Mr. Volkosh:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response and/or clean up services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B. Hino
Permitting Manager
Model City Facility

__✓__Yes, I agree to provide emergency services to CWM Model City Facility.
______No, I am unable to provide emergency services to CWM Model City Facility.

Signature: James C Volkosh

Name: JAMES C VOLKOSH Title: FIRE COORDINATOR

Organization: NIAG. CO. FIRE SERVICE Date: 4-18-00

APPROVED
NIAGARA COUNTY ATTORNEY
BY

WM

ADMINISTRATION
RECEIVED
MAR 06 2000
REF. TO: ______ INITIAL: ______
RET. TO: ______ INITIAL: ______

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Angelo G. Calbone, President & CEO
Mr. ~~Henry Lobl, Administrator~~---
Mount St. Mary's Hospital
5300 Military Road
Lewiston, NY 14092

Re: Agreement to Provide Emergency Response Services

Dear Mr. Lobl:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response and/or clean up services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B. Hino

John B. Hino
Permitting Manager
Model City Facility

__XX__ Yes, I agree to provide emergency services to CWM Model City Facility.
______ No, I am unable to provide emergency services to CWM Model City Facility.

Signature: ______________________

Name: Angelo G. Calbone Title: President & CEO

Organization: Mount St. Mary's Hospital and Health Center Date: 03/07/00

1-31-84

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. Les Meyers
Lewiston Fire Company No. 1
145 N. 6th Street
Lewiston, NY 14092

Re: Agreement to Provide Emergency Response Services

Dear Mr. Meyers:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response and/or clean up services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B. Hino

John B. Hino
Permitting Manager
Model City Facility

X Yes, I agree to provide emergency services to CWM Model City Facility. upon request of Youngstown Fire Co

~~No, I am unable to provide emergency services to CWM Model City Facility.~~

Signature: Les Myers

Name: Les Myers Title: Chief

Organization: Lewiston Fire Co #1 Date: 3-6-00

RECEIVED MAR - 6 2000

WASTE MANAGEMENT, INC.

CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. Alan Elia
Sevenson Environmental
2749 Lockport Road
Niagara Falls, NY 14305

Re: Agreement to Provide Emergency Response Services

Dear Mr. Elia:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response and/or clean up services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B. Hino

John B. Hino
Permitting Manager
Model City Facility

___✓___Yes, I agree to provide emergency services to CWM Model City Facility.
______No, I am unable to provide emergency services to CWM Model City Facility.

Signature: Laurence Elia

Name: LAURENCE A. ELIA Title: V.P.

Organization: Sevenson Industrial Services, Inc. Date: 3/6/00

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. John Mellenchuck
HazMat Group
Lewiston Town Hall
Ridge Road
Lewiston, NY 14094

Re: Agreement to Provide Emergency Response Services

Dear Mr. Mellencheck:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response and/or clean up services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B Hino

John B. Hino
Permitting Manager
Model City Facility

______Yes, I agree to provide emergency services to CWM Model City Facility.
______No, I am unable to provide emergency services to CWM Model City Facility.

Signature:____________________________

Name:______________________________ Title:______________

Organization:_________________________ Date:______________

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. Joe Passanese, Chief
Upper Mountain Fire Company
839 Moyer Road
Lewiston, NY 14092

Re: Agreement to Provide Emergency Response Services

Dear Mr. Passanese:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response and/or clean up services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B. Hino

John B. Hino
Permitting Manager
Model City Facility

X Yes, I agree to provide emergency services to CWM Model City Facility. At the Request of Youngstown Fire Co.
___ ~~No, I am unable to provide emergency services to CWM Model City Facility.~~

Signature: Joseph Passanese

Name: Joseph D. Passanese Title: Chief

Organization: Upper Mountain Fire Co. Date: 7 Mar 02

WM

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. Todd Moltrup, Chief
Ransomville Fire Company No. 1
2521 Youngstown-Lockport Road
Ransomville, NY 14131

Re: Agreement to Provide Emergency Response Services

Dear Mr. Moltrup:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response ~~and/or clean up services~~ for this facility. *

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

* as determined by the Niagara County Mutual Aid Agreement

John B Hino

John B. Hino
Permitting Manager
Model City Facility

______Yes, I agree to provide emergency services to CWM Model City Facility.
______No, I am unable to provide emergency services to CWM Model City Facility.

Signature:__________________________

Name:__________________________Title:__________

Organization:____________________Date:__________

WASTE MANAGEMENT, INC.
CWM Chemical Services, L.L.C.
1550 Balmer Rd.
P.O. Box 200
Model City, N.Y. 14107
716/754-8231

March 3, 2000

Mr. Norm Pearson
Niagara County Emergency Management Office
P.O. Box 496
5526 Niagara Street Ext.
Lockport, NY 14095

Re: Agreement to Provide Emergency Response Services

Dear Mr. Pearson:

It has come time to update and renew our agreements with local emergency response providers, as required by 6NYCRR 373-2.3(g), for the CWM Chemical Services, LLC, Model City Facility (CWM). CWM is requesting confirmation that your organization will continue to support the primary providers with emergency response and/or clean up services for this facility.

Your organization will continue to be supplied with information regarding the facility layout, properties of hazardous wastes handled and associated hazards as required by the above regulation and contained within the CWM Contingency Plan which has been distributed to you. Please contact the undersigned if additional information is needed or a site tour is desired.

Please complete the information below, sign, date and return to my attention by March 17, 2000. If for any reason you decline to participate in this agreement, please indicate such and return this letter by that date. Please call Ms. Rebecca Park Zayatz at (716) 754-0279 or myself at (716) 754-0278 if you have any questions or comments.

Sincerely,
CWM CHEMICAL SERVICES, LLC

John B. Hino
Permitting Manager
Model City Facility

______Yes, I agree to provide emergency services to CWM Model City Facility.
______No, I am unable to provide emergency services to CWM Model City Facility.

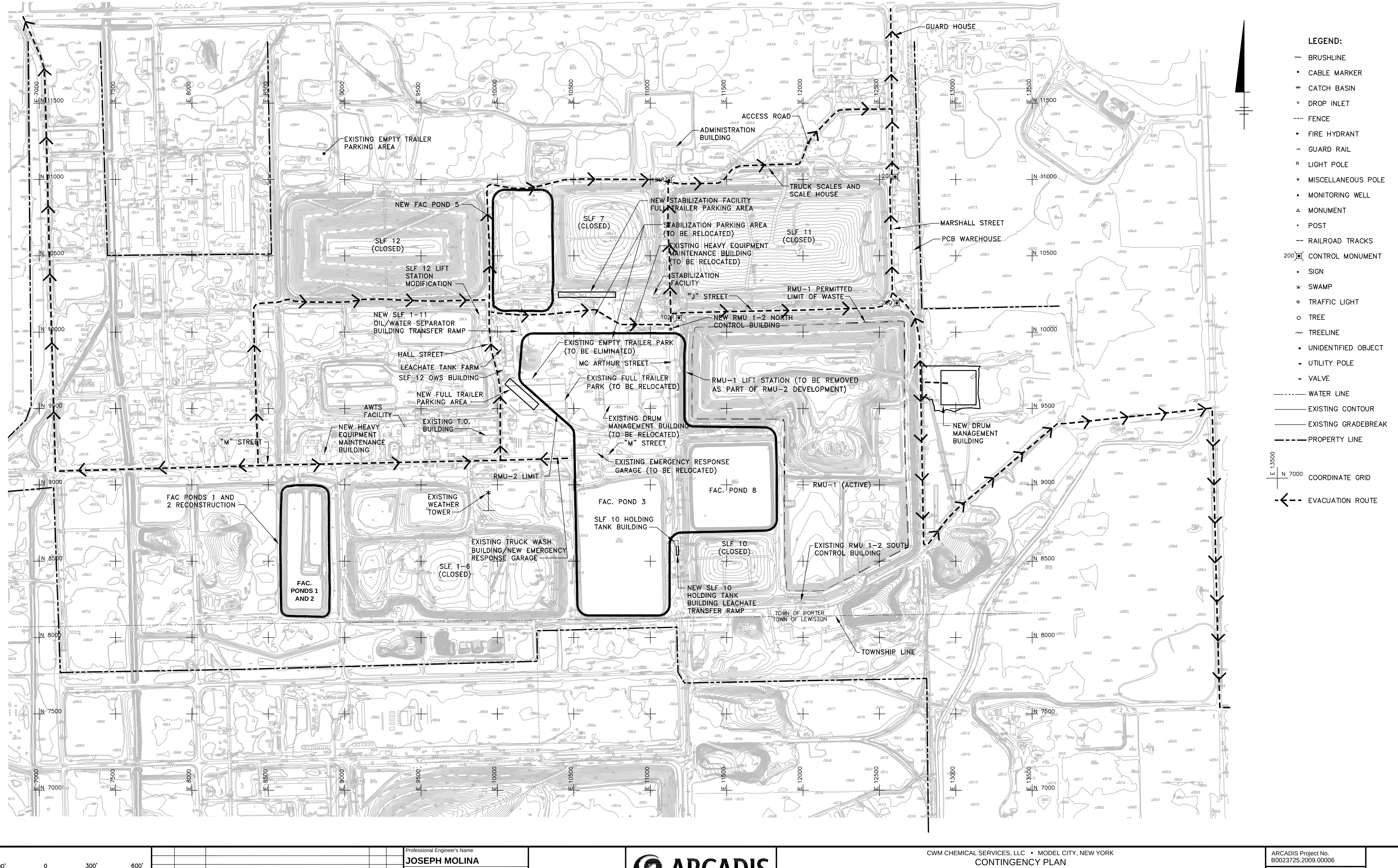
Signature:____________________________

Name:______________________________Title:______________

Organization:________________________Date:______________

ATTACHMENT 2

EVACUATION ROUTES



CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS K. DAVIS K. WOOD N.SMITHGALL LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PAGESETUP: ---- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 9/13/2011 4:31 PM BY: STEINBERGER, GEORGE
G:\ENVCAD\SYRACUSE\ACT\B0023729\2011\00001\DWG\CONTINGENCY-UPDATE\23729G52.DWG LAYOUT: 2-1 SAVED: 9/13/2011 4:31 PM ACADVER: 18.1S (LMS TECH)
XREFS: 23725X02 23725X01 23729X00 IMAGES: PROJECTNAME: ----

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

THIS DRAWING IS THE PROPERTY OF THE ARCADIS ENTITY IDENTIFIED IN THE TITLE BLOCK AND MAY NOT BE REPRODUCED OR ALTERED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF SAME.

Professional Engineer's Name		
JOSEPH MOLINA		
Professional Engineer's No. 072644		
State: NY	Date Signed	Project Mgr.: WAR
Designed by: BMS/NWF	Drawn by: LAF	Checked by: BMS

ARCADIS

ARCADIS OF NEW YORK, INC.

CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK

CONTINGENCY PLAN

EVACUATION ROUTES

GENERAL

ARCADIS Project No. B0023725.2009.00006

Date SEPTEMBER 2011

ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.91220

2-1

ATTACHMENT 3*

FEDERAL AND STATE RELEASE REPORTING REQUIREMENTS

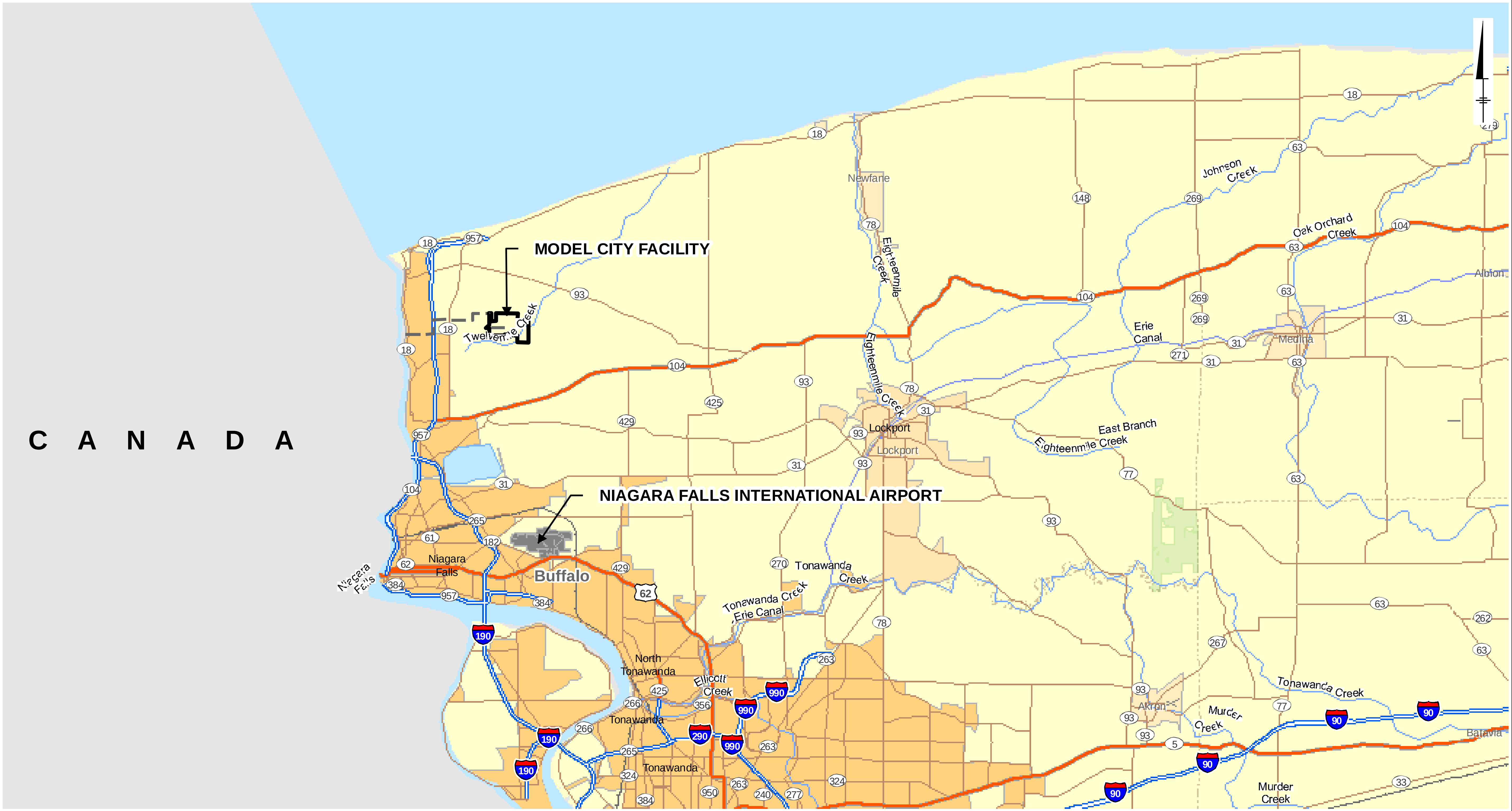
* see CWM Environmental Manual, Appendix: Spill Manual, Attachment A

Reporting Requirements	SPDES	Clean Water Act Section 311	CERCLA Section 103	SARA Title III	RCRA Subtitle I, UST's	RCRA Subtitle J, Tanks; 6NYCRR 373-2.10	TSCA	DOT	Title 6 Chemical Bulk Storage 6NYCRR Part 595	Title 6 NYS, 6NYCRR Part 613.8
Substance	Any SPDES Discharge Parameter	Oil & Hazardous Substances listed in 40 CFR 116.4	Hazardous Substances listed in 40 CFR 302.4	EH's listed in 40 CFR 355.20 and CERCLA hazardous substances	Petroleum and CERCLA hazardous substances (Excludes RCRA hazardous wastes)	All RCRA Wastes	PCB containing material (greater than or equal to 50 ppm)	Hazardous Substances in Appendix A of 49 CFR 172	Phosphoric acid, sulfuric acid, ferrous sulfate and all substances listed in 6NYCRR 597.2	Petroleum bulk storage excluding RCRA haz. waste and non-reprocessed waste oil
Subjected Facilities	Model City	All facilities and vessels	All facilities and vessels, except consumer products in consumer use	All facilities that produce, use, or store OSHA hazardous chemicals	Facilities with an UST (Volume 10% or more beneath ground surface)	All TSDF's	All	During the Course of Transportation (includes loading, unloading, and storage incidental to transportation)	All facilities	Facilities with total storage of petroleum products > 1100 gal.
Subjected Releases	Release to Niagara River	Surface Water Discharge (see 40 CFR 110.1 - 110.10)	Release to Environment	Environmental release with the potential to expose off-site personnel	Groundwater, surface water, or subsurface soils	All releases into the environment which are not < 1 lb. and immediately contained and cleaned up	All PCB releases which directly contaminates surface waters, sewers, drinking water supplies, grazing lands, vegetable gardens, and PCB spills in excess of 10 lbs. of PCB not mentioned above.	See 49 CFR 171.15 and 171.16 or see RQ Guidance for complete list of circumstances	All releases to land or water or air outside secondary containment	Spill, leak or discharge to environment

Reporting Thresholds	Any discharge parameter which is exceeded.	All oil discharges that form a sheen and all discharges > = the CERCLA RQ	Release > = the CERCLA RQ list	Release > = the CERCLA RQ listing or 1 lb. of an EHS not on the CERCLA list	All suspected or confirmed releases, spills > = CERCLA RQ, spills > 25 gallons or that result in a sheen	All environmental releases > = one pound	All PCB spills resulting in direct contamination of areas mentioned above	Two thresholds exist under DOT; first - the events occurring in items 1-9 of 171.15; second - the criteria in 171.16.	All suspected or confirmed releases, spills; spills greater > = RQ listed in 6NYCRR Part 597	All oil discharges (no diminimis amount)
WHO REPORTS	Person in charge	Person in charge	Person in charge	Owner or Operator	Owner or Operator	Responsible Person	Responsible Person	Carrier	Person Responsible	Any person
REPORT WHEN	orally within 24 hrs.	Immediately	Immediately	Immediately	Within 24 hours	Within 24 hours	Immediately upon discovery	As soon as possible if one of the 9 events in 171.15 occurs; within 30 days if one of the events in 171.16 occurs.	Within 2 hours of discovery	Within 2 hours
PHONE REPORT	Div. of Water, (518)-457-3790	DEC Monitors; DEC Htlne: 800-457-7362; DEC R9: 716-851-7220; Nat. Response Ctr: 800-424-8802; NCHD: 716-439-7444 (wkdy), 716-439-7430 (other)	DEC Monitors; DEC Htlne: 800-457-7362; DEC R9: 716-851 -7220; Nat. Response Ctr: 800-424-8802; NCHD: 716-439-7444 (wkdy), 716-439-7430 (other)	SERC or LEPC	Implementing Agency	DEC Monitors; DEC Htlne: 800-457-7362; DEC R9: 716-851-7220; Nat. Response Ctr: 800-424-8802; NCHD: 716-439-7444 (wkdy), 716-439-7430 (other)	EPA Regional Office (David Greenlaw, EPA Region II at 731-906-6817) of Pesticides and Toxic Substances Branch	NRC: 800-424-8802, LEPC or SEPC or 911	DEC Monitors; DEC Htlne: 800-457-7362; DEC R9: 716-851-7220; Nat. Response Ctr: 800-424-8802 (if federal RQ); NCHD: 716-439-7444 (wkdy), 716-439-7430 (other)	DEC Hotline: 800-457-7362
Written Report	YES	NO	NO	Yes: to LEPC and SEPC	NO	YES: Regional Adm. or Authorized Agency	NO	YES: USDOT	YES: DEC, NRC, NCHD	NO
Written Report Due	**within 5 days**	**N/A**	**N/A**	**As soon as practical**	**N/A**	**Within 30 days**	**N/A**	**Within 30 days**	**Within 14 days**	**N/A**

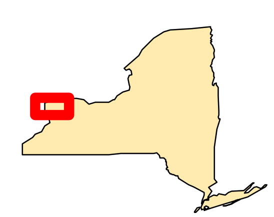
ATTACHMENT 4

REGIONAL AND SITE LOCATION MAPS



NOTES:

1. PROPERTY LINES ARE APPROXIMATE.
2. NO DRINKING WATER WELLS EXIST WITHIN 1/4 MILE OF THE FACILITY.
3. THE TREATED EFFLUENT DISCHARGE IS LOCATED AT THE NIAGARA RIVER.
4. 710 TOTAL ACRES.
5. 630 RCRA PERMITTED ACRES.



AREA LOCATION

0 5 10
MILES
GRAPHIC SCALE

CWM CHEMICAL SERIVCES, LLC
MODEL CITY, NEW YORK
6NYCRR PART 373 PERMIT APPLICATION

REGIONAL LOCATION OF MODEL CITY

ARCADIS

FIGURE
1

CITY: CLE DIV/GROUP: AIT 40 DB: L.GREENE LD: EAL PIC: WP PM: TM: GNG TR:
MODEL CITY 23725.003
Friday, June 19, 2009 1:37:16 PM
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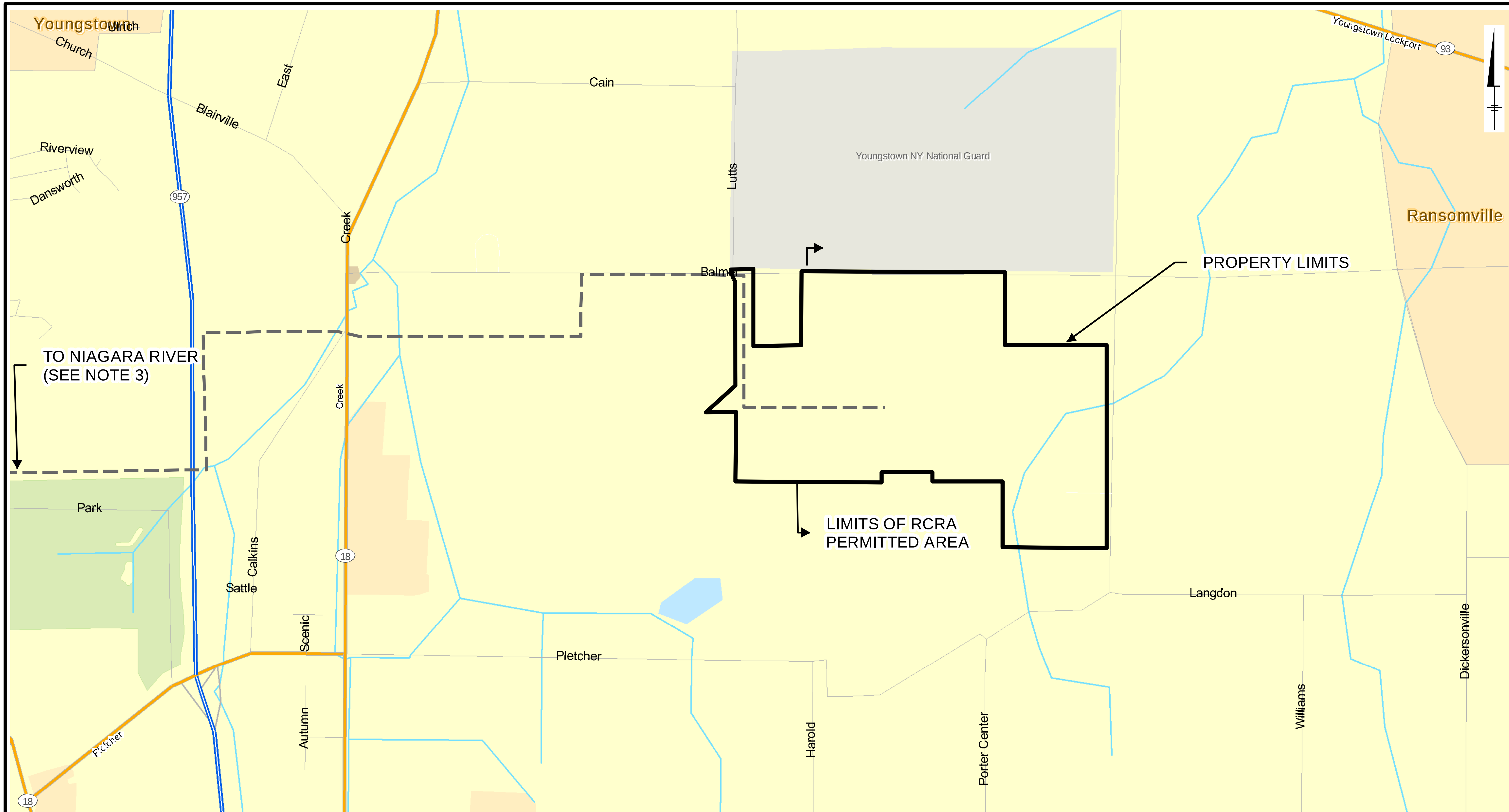

NOTES:

1. PROPERTY LINES ARE APPROXIMATE.
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3. THE TREATED EFFLUENT DISCHARGE IS LOCATED AT THE NIAGARA RIVER.
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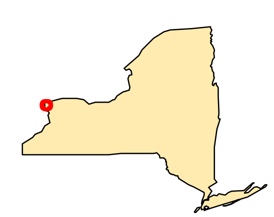


AREA LOCATION

0 2,000 4,000
FEET
GRAPHIC SCALE

CWM CHEMICAL SERIVCES, LLC
MODEL CITY, NEW YORK
6NYCRR PART 373 PERMIT APPLICATION

FACILITY LOCATION DETAIL

ARCADIS

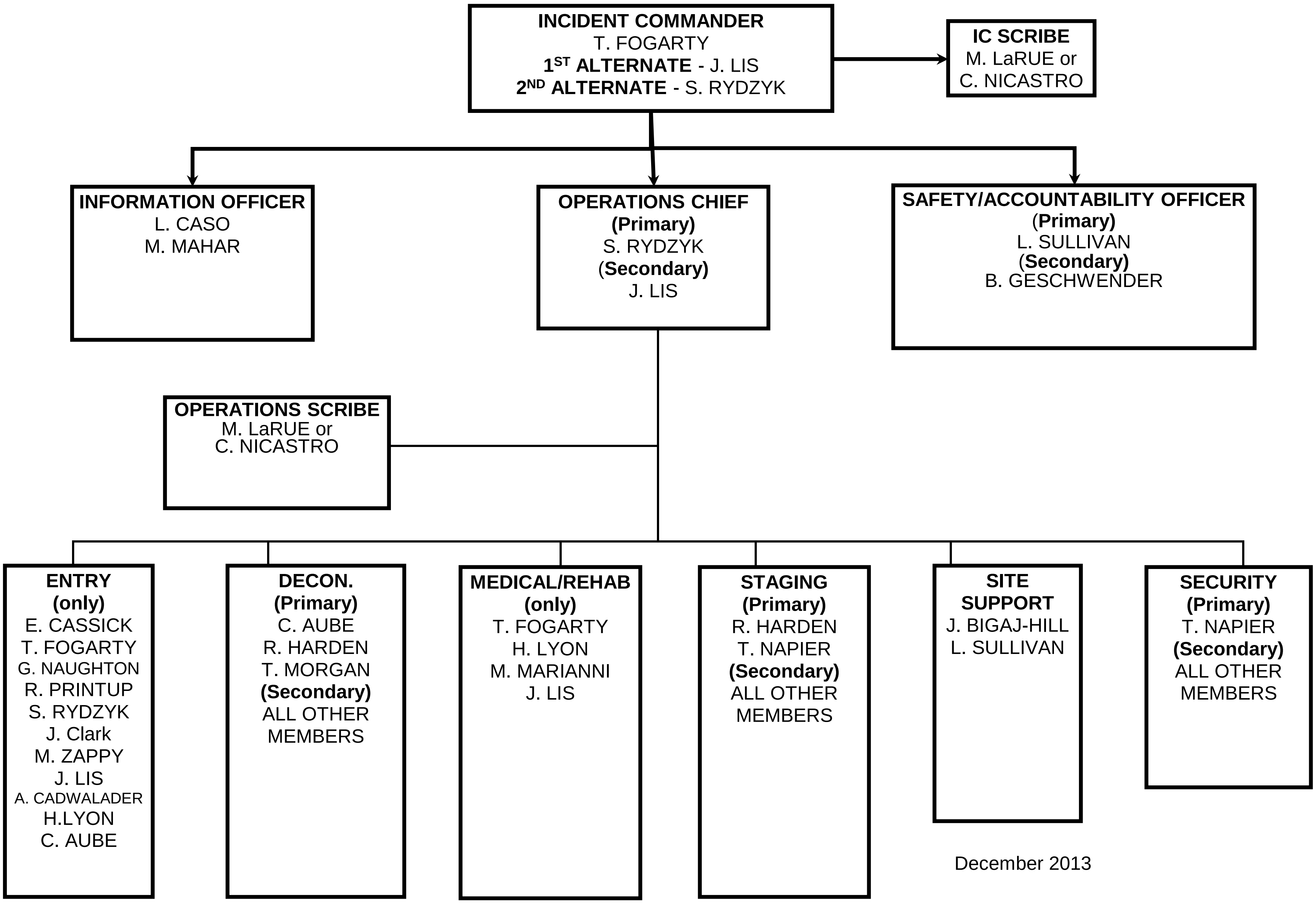
FIGURE
2

CITY: CLE DIV/GROUP: AIT 40 DB: L.GREENE LD: EAL PIC: WP PM: TM: GNG TR:
MODEL CITY 23725.003
Friday, June 19, 2009 1:33:29 PM
G:\enviro\Common\GIS\CWM\ModelCity\RevisionsToDEIS\mxd\FacilityLocationDetail_B-2.mxd

ATTACHMENT 5

EMERGENCY RESPONSE TEAM ORGANIZATIONAL CHART

EMERGENCY RESPONSE TEAM
ORGANIZATIONAL CHART



December 2013

ATTACHMENT H

No Modifications Proposed

TRAINING PLAN

CWM CHEMICAL SERVICES, LLC

MODEL CITY FACILITY

MODEL CITY, NEW YORK

March 1998

Revised: July 2013

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDIXES

1.0 INTRODUCTION

In accordance with the State of New York and Federal regulatory requirements found in 6NYCRR 373-2.2(h) and 40 CFR 264.16 respectively, CWM Chemical Services, LLC, (CWM) has developed this Training Plan as an integral part of the Part 373 Permit for the Model City Facility, which is located in Niagara County, New York. A copy of this plan is available at the Facility at all times and will be reviewed annually.

This program will be directed by the Technical Manager who is trained in hazardous waste management procedures. The Technical Manager may use other site staff (e.g. Emergency Coordinator, Safety Specialist) and outside contractors to assist in the training and administration of this program.

Training is essential for the efficient and safe operation of all facility processes, and to ensure effective responses to emergency conditions. It is CWM's policy that all employees be trained to perform in a manner which emphasizes accident prevention to safeguard human health and protection of the environment.

1.1 GENERAL TRAINING CONCEPT

Each new employee is trained in the general orientation and operation of the Facility. A training program related to the specific duties of each job function is tailored specifically for the position.

No employee is permitted to work under reduced supervision until it has been determined that the employee has successfully completed all elements of the initial training requirements and has been trained to perform such task(s). This orientation training will be completed within 6 months of the new employee's entry into a specific job. In addition, every employee will participate in continuing training to maintain proficiency and to learn new techniques and procedures.

1.2 PROGRAM IMPLEMENTATION

Implementation of the training program encompasses:

* Identification of training requirements
* Identification of qualified instructors
* Delivery of training
* Employee testing / performance evaluation
* Documentation of training sessions

Qualified instructors participate in development of the training program's content and format.

2.0 POSITION (JOB) DESCRIPTIONS

Training is tailored to prepare the employee to safely and effectively perform the functions of the position and to ensure that the employee will be able to respond effectively to emergency situations at the facility. Job descriptions are the foundation for designing specific training programs because they identify the responsibilities and duties of each position.

2.1 FACILITY ORGANIZATION

The primary function of the CWM Model City Facility is hazardous waste management (i.e., treatment, storage, and disposal). In addition, associated business activities include general management functions performed by technical support personnel (e.g., laboratory chemists, engineers, etc.), and administrative staff (e.g., financial, clerical, etc.).

2.2 STAFF POSITIONS

A position description, including basic function, duties, responsibilities and required qualifications, is maintained at the facility's main office for each position as required by 40 CFR Part 264 and 6NYCRR Subpart 373-2. An example of a position description is displayed in Appendix A. A current list of job titles relevant to hazardous waste management and the name of the employee filling each respective position is also maintained at the main office.

The Facility organization and position descriptions may be changed from time to time, based on business demands and opportunities. Updated organization charts are submitted in accordance with Model City's Part 373 Site Permit.

3.0 TRAINING PROGRAM

All personnel employed at the Model City Facility undergo continuing training pursuant to the Training Plan. All new operations employees are introduced to the full training and qualifications process illustrated in Figure 3-1 and discussed herein.

3.1 SCOPE OF TRAINING FOR NEW PERSONNEL

New employees will undergo introductory training composed of general training and job-specific training to varying degrees. The amount of training an employee receives depends on his / her job duties, responsibilities, and the employee's competence based on prior experience. The scope of the introductory training program is defined in this section. Moreover, the method for determining the amount of training that a specific new employee will receive is explained in Section 3.2.4 herein.

3.1.1 General Training

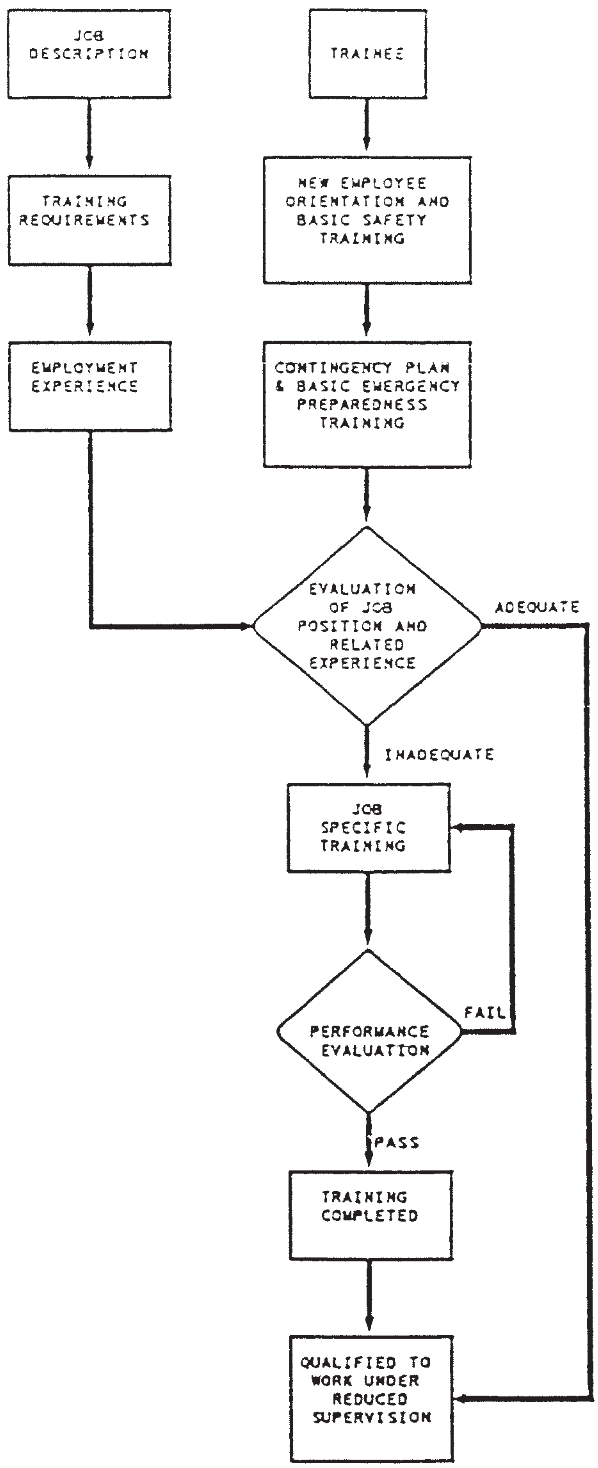
All trainees complete training on a series of topics to familiarize them with the facility, the contingency plan, and basic emergency response skills. These courses ensure that trainees have basic skills to protect themselves and perform their duties in a way that ensures the facility's compliance.

3.1.1.1 New Employee Orientation and Basic Safety Training

All new employees undergo an orientation and basic safety training session within six months after their date of employment or assignment to the facility to introduce them to the company, the management and operations of the facility, the contingency plan appropriate for their work area, and basic health and safety skills.

FIGURE 3-1

TRAINING PROGRAM FLOW DIAGRAM



3.1.1.2 Contingency Plan Training

As required by 6NYCRR 373-2.2(h)(1)(iii), all facility personnel having personal involvement with any hazardous waste management activities are trained to respond effectively to emergencies. Each trainee is familiarized with the facility's Contingency Plan during his or her orientation and basic safety training session. Training in emergency procedures is provided by the facility's Emergency Coordinator or other qualified trainers. The extent of the training is determined by the employee's position. Refer to Appendix C for an example list of potential training topics. A listing of job titles and job descriptions with corresponding training requirements is maintained at the facility. Training may include:

* Possible emergency situations and response techniques
* Duties of the Emergency Coordinator and others
* Emergency communication and alarm systems
* Evacuation procedures and routes
* Locations of emergency equipment such as telephones, radios, alarms, first aid stations, eye wash stations, safety showers, fire fighting equipment, etc.
* Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment.
* Incident/action reporting mechanism(s) and use of emergency extension 0200
* Operational shut down

3.1.1.3 Basic Emergency Response and Preparedness Training

The facility holds at least one emergency evacuation exercise per year to practice evacuation of the facility. This exercise gives management and any new employees an opportunity to check the new employee's recall of the alarm system and the evacuation routes. The emergency evacuation procedures will be covered as part of the employee's orientation.

CWM Model City also has an emergency response team. The team is trained on response to hazards inherent to the facility. The Emergency Coordinator and Safety Specialist maintain the team professionally through continuous training including simulated emergencies.

3.1.2 Job-Specific Training

After completing general training, new employees are instructed in the specific needs of their job functions to ensure work is performed safely and in accordance with applicable regulations. For employees who directly handle or supervise hazardous waste activities, a list of job specific training tasks is prepared for each job position by the appropriate supervisor. The Training Coordinator assist supervisors in preparing the departmental job task list by position by using the job description and knowledge of the operations.

A typical departmental Job Specific Training Task List by job position is presented in Appendix C. These documents will be maintained at the facility.

The job specific task lists are prepared by the supervisors. These lists are used to train employees filling the positions. This system is designed to be updated as new equipment and activities are introduced. An employee may not perform a task under reduced supervision unless he or she passes an evaluation by a qualified individual.

3.2 TRAINING PROGRAM ADMINISTRATION

The selection of qualified instructors, the use of effective training formats and the evaluation of an employee's learning are critical. These considerations, as addressed at the Model City Facility, are described below.

3.2.1 Training Personnel Qualifications

Designated individuals will conduct specific portions of the training program. The trainers are recognized consultants or in-house specialists in the specific fields being taught and have extensive experience in hazardous waste management, safety and environmental requirements. Training may be conducted by an immediate supervisor, department manager, training coordinator, skilled employee, or any other qualified person.

3.2.2 Training Formats

Training may be conducted in classroom meetings, small discussion groups, in-field exercises, emergency drills, at an employee's work station (i.e., on-the-job), in on-line computer courses or webinars. These activities may be supplemented by reading, problem sets, and other teaching aids. For some training, courses and teaching materials developed by an outside vendor are used, either by arranging for the course to be presented on-site or by sending employees to the vendor's training sessions. Safety and environmental training topics and materials may be provided by Waste Management (WM). Courses may be assigned through the WM University computer system. Field demonstrations and practice sessions reinforce skills and promote safety awareness.

The employee's supervisor is responsible for job specific (on-the-job) training to assure that the employee learns correct procedures and can perform them accurately, reliably, efficiently and in compliance.

3.2.3 Training Effectiveness Evaluation

Training effectiveness may be measured by written or oral examinations, or by performance evaluations. The training coordinator and the trainee's immediate supervisor must maintain the training records to document that an employee has successfully completed the necessary training.

3.2.4 Qualification of Trainees for Work Under Reduced Supervision

No employee will perform work under reduced supervision at the facility until he or she has been qualified. Qualification is earned through successful completion of the general training and job specific training, based on the training requirements for the position and the trainee's prior education, experience and skills.

The trainee's supervisor evaluates the amount of job-specific training a new employee needs in addition to the general training requirements. This determination is made by comparing the employee's records of employment with the job description and its training lists. Based on this comparison, the necessary job-specific and special skills courses for an employee are scheduled.

The employee's Training History Record or Job Specific Training Record are updated as the employee completes the required training. Periodically, this record is reviewed to evaluate the employee's training completion status. This periodic evaluation continues until all of the required training has been successfully completed.

Some of the training requirements may be waived by the Program Administrator or designee, if an employee can demonstrate prior competence. Proof of competence may consist of transcripts from academic institutions, certificates of course completion, demonstrated job experience or skill or the passage of a performance evaluation test such as a written examination.

3.2.5 Trainee Feedback

Trainee comments and constructive criticism of the training program are encouraged throughout the entire training process. Such comments are used by the trainers to modify/improve training program scope, content and/or format as appropriate.

3.3 CONTINUING TRAINING

An employee's training does not end with his/her initial qualification. Periodic "refresher" training is required and provided, as discussed herein.

3.3.1 Continuing Training

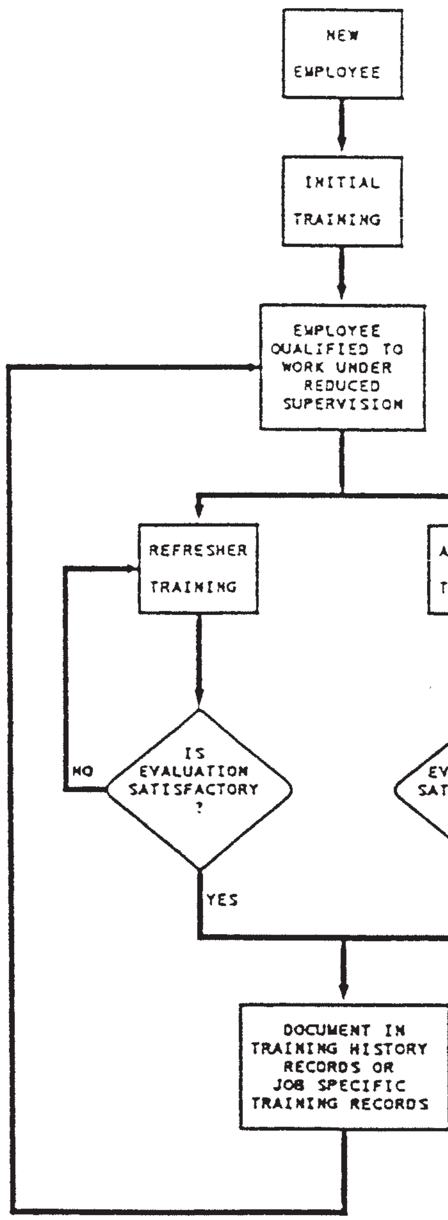
As required by 6NYCRR 373-2.2(h)(3), annual refresher training is performed on responding to emergencies (see Section 3.1.1.2). Continuing training is also provided to maintain proficiency in job skills, increase safety, ensure compliance, and teach new skills. Such topics may consist of:

* Health and Safety
* Environmental
* Emergency Preparedness
* Regulatory
* Job Specific
* Operational

This continuing training program is depicted in the flow diagram in Figure 3-3.

FIGURE 3-3

CONTINUING TRAINING FLOW DIAGRAM



3.4 DOCUMENTATION OF TRAINING

Training records are maintained at the facility. They include a written description of the content of training sessions, identify attendee(s) and trainer(s), and record of the signatures of trainer(s) and attendee(s), thus certifying that the training was accomplished.

Each employee has a Training History Record file and Job Specific Training Record file (for employees who directly handle or supervise hazardous waste activities) on-site that contains appropriate documentation that the training has been completed satisfactorily. Training documentation for current employees will be maintained at the facility until closure. An employee's training history record files will be sent to the general manager of any other facility owned/operated by WM to which the employee may be transferred. Training files of employees who leave the employment of WM will be retained for 3 years at the last facility where they worked.

4.0 TRAINING FOR OUTSIDE CONTRACTORS

CWM is dedicated to ensuring the safety and well being of the outside contractors that work at the facility as well as its employees. All outside contractors performing work on-site must review the facility's "Safety Procedures and Requirements for Outside Contractors". An authorized representative of the contractor is required to sign the safety declaration that they will comply with these policies and requirements, and with all local, state and federal laws and regulations while performing work at CWM.

CWM CHEMICAL SERVICES, L.L.C.

POSITION DESCRIPTION

POSITION TITLE: Heavy Equipment Operator DATE PREPARED: 02/98

REPORTS TO: Landfill Supervisor DIV./DEPT: 658/380

INCUMBENT: REGION: WMI New York
CWM Chemical Services
Model City, NY

BASIC POSITION FUNCTION:

a) Responsible for operating heavy equipment including excavator, backhoe, pay loader, fork truck and/or other company owned or leased equipment.

b) Operate material handling and processing equipment as required to achieve the safe, cost-effective and environmentally compliance operation of the Facility.

c) Maintain all material handling and process equipment in a clean and mechanically ready condition.

PRINCIPAL RESPONSIBILITIES: (This list is not intended to be all encompassing and other duties may be assigned.

a) Operate equipment in accordance with all safety rules, manufacturer's instructions, and CWM Operating Procedures.

b) Direct trucks to proper unloading, loading, and staging locations.

c) Other related duties as assigned by the Supervisor.

POSITION DIMENSIONS:

Education/Experience: (The following requirements are typical but may be obtained through on-the-job training, etc.)

a) High school graduate.

b) 3-5 years heavy equipment/chemical processing operator experience.

c) Previous related experience in handling and stabilization of hazardous/non-hazardous waste.

CWM POSITION DESCRIPTION

POSITION TITLE: Heavy Equipment Operator - Grounds

Education/Experience (cont):

d) Should be familiar with RCRA and OSHA safety regulations.

e) Must be able to operate heavy construction equipment including pay loader, backhoe, excavator, fork truck and other company owned or leased equipment.

f) Must have physical and mental ability to carry out written and verbal instructions.

g) Qualifications of any employee with be determined by the Company/

Internal/External Contacts:

CWM employees, Supervisors, Managers

Budgetary/Financial Responsibility:

N/A

Organizational Relationships:

Reports to the Landfill Supervisor who reports to the Plant Operations Manager who reports to the Division President.

FOR HUMAN RESOURCES USE ONLY:

POSITION CODE: EEO CODE: SALARY GRADE:

APPROVED BY: DATE:

APPROVED BY: DATE:

CWM Chemical Services, L.L.C.

New York Region
1550 Balmer Road
P. O. Box 200
Model City, New York 14107-0200
716/754-8231

MASTER COURSE LISTING

COURSE TITLE

Asbestos/Employee Information & Training

Bloodborne Pathogens/Information & Training

Cadmium/Employee Information & Training

Cardiopulmonary Resuscitation (CPR)

Contingency/SPCC Plan

Contracts Compliance

Evacuation Drill

First Aid

Hazardous Communication (Right to Know)/Employee Overview

Hazardous Materials Transportation Act/Training

Hazwoper/Emergency Response Program - Training

Hazwoper/TSD Facilities

Lead/Training Program

Occupational Exposure to Hazardous Chemicals in Laboratories

Occupational Noise Exposure/Training Program

Permit-Required Confined Space/Attendants & Entrants

Permit-Required Confined Space/Entry Supervisor

COURSE TITLE

Permit-Required Confined Space/Rescue & Emergency Services

Portable Fire Extinguishers/Training and Education

RCRA/.Hazardous Waste Personnel Training

Respiratory Fit Test

Site Orientation

The Control of Hazardous Energy (Lockout/Tagout)/All Employees

APPENDIX B

Formerly Appendix C

JOB SPECIFIC TRAINING TRACKING FORM

POSITION: Landfill/Grounds - Heavy Equipment Operator

NAME:___________________________ Employee SS#________________

PRIMARY FUNCTION: ___YES ___NO CROSS TRAINING: ___YES ___NO

TASK LIST	P.M. DATE	SUPERVISOR'S INITIALS
Compactor-roller		
Payloader		
Bulldozer		
Integrated tool carrier		
Excavator/backhoe		
Utility/backhoe (466)		
Gradall excavator		
Rigging		
Excavator crane use		
Excavator trailer/box digout		
Interim storage		
Decon of equipment		
Landfill orientation		
Special Handling (red/green flagged loads)		
RMU-1 operations manual		
Vehicle log inspection		
Asbestos handling		
Prevention of truck overturn		
Haz Comm/Profile		

Appendix C

TRAINING TOPICS

Subject	Agency	Training required for:
Contingency Plan	EPA/DEC	All operations personnel
Emergency Response Plan	OSHA	All operations personnel
Hazard Communication	OSHA	All operations personnel
Medical Surveillance Program	OSHA	All operations personnel
Hearing Conservation	OSHA	All operations personnel
Carcinogens	OSHA	All operations personnel
Portable Fire Extinguishers	OSHA	All operations personnel
Respiratory Protection Program	OSHA	All operations personnel
		Additional training for employees required to Wear a respirator
Confined Space	OSHA	All operations – awareness
		Additional training for employees performing Confined space activities
Lock out/Tag out	OSHA	All operations – awareness
		Additional training for employees performing LOTO activities
Personal Protective Equipment	OSHA	All operations – awareness
		Additional training for employees required to wear PPE

Training Requirements by Job Title

August 13, 1997

JOB TITLE: Heavy Equipment Operator

COURSES TO TAKE	AGENCY	RETRAINING REQUIRED-Y/N	FREQUENCY (months)
Cadmium / Employee Information & Training	OSHA	Y	12
Contingency/SPCC plan	EPA	Y	12
DOT Emergency Response Guidebook	General	Y	12
Evacuation Drill	OSHA	Y	12
HAZWOPER / TSD Facilities	OSHA	Y	12
Lead / Training Program	OSHA	N	0
Medical Exam C	OSHA	Y	24
Occupational Noise Exposure / Training Program	OSHA	N	0
Portable Fire Extinguishers / Training and Education	OSHA	Y	12
RCRA / Hazardous Waste Personnel Training	EPA	Y	12
Respiratory Fit Test	OSHA	Y	12
Site Orientation	General	N	0

ATTACHMENT I

Application Section I – Closure Plans & Post-Closure Plans

(proposed modified pages are designated with a November 2013 revision date at the bottom of the respective page)

(no changes proposed to RMU-1 Closure Plan, RMU-1 Post-Closure Plan, or the Sitewide Post-Closure Plan)

SECTION I.1

RMU-2 Closure Plan

Infrastructure, environment, buildings

Imagine the result

WASTE MANAGEMENT, INC.

CWM Chemical Services, LLC

Closure Plan

Residuals Management Unit 2

Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

April 2003
Revised August 2009
Revised February 2013

1. Closure Procedures and Activities

1.1 Introduction

This Closure Plan for Residuals Management Unit 2 (RMU-2) is divided into a partial closure plan for one, two, three, four and five cells and one final closure plan for the entire unit, consisting of six cells. Each closure plan depicts the closure of RMU-2 at certain successive stages of its development. Partial closure plans and associated cost estimates have been developed depicting closure after one, two, three, four and five cells, and a final closure plan and cost estimate has been developed that depicts closure after the construction of six cells.

This Closure Plan for RMU-2 has been developed in accordance with the requirements of 6 New York Codes, Rules and Regulations (NYCRR) Subpart 373-2, Sections 373-2.7, 373-2.8 and 373-2.14(g). Written cost estimates for each partial closure plan and the overall closure of the unit are being submitted separately.

Furthermore, each closure plan presented herein depicts the closure of the landfill cells at the point when those cells are at their maximum waste capacity, in accordance with 6 NYCRR 373-2.8(c)(1)(i). The partial closure plan will serve to illustrate how RMU-2 would be closed if landfill cell development were to be halted at various points prior to the construction of all six cells.

1.2 Closure Performance Standard

In accordance with 6 NYCRR 373-2.7(b), this Closure Plan is designed to provide that the facility will require minimal maintenance and controls, will minimize or eliminate threats to human health and the environment and will prevent the escape of hazardous wastes or hazardous waste constituents, leachate, contaminated rainfall or waste decomposition products to the ground, surface water or to the atmosphere.

The following sections discuss in detail the procedures and actions that will be taken in order to satisfy the closure performance standard.

CWM Chemical Services, LLC (CWM) will achieve this standard of closure by the removal or disposal of all unprocessed hazardous wastes and hazardous waste residues from waste management areas other than land disposal units, by the decontamination and removal of all process and associated equipment and by regrading all hazardous waste process areas subsequent to closure. These areas will be covered with clay-rich soils and vegetated following the completion of all other closure activities.

During the unit's operational lifetime, conditions or operations may be modified such that this Closure Plan will require changes. The general manager, or his designated representative, will be responsible for maintaining and updating this Closure Plan. The general manager may be contacted at the following address and telephone number:

Mr. Michael Mahar
District Manager
CWM Chemical Services, LLC
1550 Balmer Road
Model City, New York 14107
(716) 286-0241

At least one copy of the approved Closure Plan and all revisions to the plan will be maintained on site until closure is completed and certified. CWM will amend or revise the Closure Plan whenever there are significant changes in the operating plans or facility design that will affect the plan, or whenever there is a change in the expected year of facility closure. The closure cost estimate will be updated annually.

1.2.1 Closure Policies

This Closure Plan for RMU-2 is based on the closure performance standards for the entire Model City Facility. A summary of the overall site closure scenario is presented, as well as the specific closure scenario for RMU-2. Basic closure policies for these scenarios are as follows:

- All untreated hazardous wastes remaining on site will be treated on site using available treatment operations, disposed on site in the secure unit, if possible, or shipped off site to an approved hazardous waste management facility. In the case of polychlorinated biphenyl (PCB) wastes, any wastes that must be shipped off site will go to a facility approved by the United States Environmental Protection Agency (USEPA) for the incineration, treatment or disposal of such wastes.

- All heavy equipment directly related to operation of the unit (e.g., trucks, draglines, front-end loaders, bulldozers, backhoes) will be cleaned and moved for use at another site, sold or returned to the supplier.

- The main road and parking areas serving the landfill will be thoroughly swept, and the sweepings will be landfilled on site, if possible, or sent off site for disposal.

- All buildings and equipment to be decontaminated will be cleaned by thorough washing with a high-pressure stream of water. Detergents or solvents may be added, as necessary, to enhance decontamination. The washdown will be followed by a rinse using a high-pressure stream of water and/or steam cleaning. Rented mobile equipment will be taken to the Truck Wash Facility for cleaning and decontamination. Moveable equipment that will be removed from PCB operations areas for salvage, resale or relocation to another site will be decontaminated in accordance with 40 Code of Federal Regulations 761.79(b) or as alternatively approved by the USEPA.

- Decontamination will be deemed complete after sampling and analysis of rinsewaters or PCB wipe samples, as required, to confirm that hazardous constituents are no longer present above regulated levels.

- All contaminated stormwater in the secondary containment areas will be removed and processed in the on-site aqueous waste treatment system or sent off site.

- All hazardous waste disposal sites will be contoured and revegetated, as necessary, to prevent wind erosion and ponding of precipitation and runoff.

- As required by 6 NYCRR 373-2.7(b) and 6 NYCRR 373-2.14(g), CWM will take all necessary steps to prevent the occurrence of threats to human health and the environment during the time between the last receipt of wastes and approval of the closure certification.

1.3 Partial and Final Closure of the Model City Facility

The Closure Plan for RMU-2 is presented in the subsequent sections of this document. The closure schedule for RMU-2 is provided in Section 1.8. In accordance with 6 NYCRR 373-2.7(d)(1), treatment, removal and disposal of all hazardous wastes must occur within 90 days after receipt of the final volume of hazardous wastes. Total estimated time for closing RMU-2 based on the worst-case scenario is 180 days. If weather conditions make closure within 180 days difficult, CWM will petition the

Commissioner of the New York Department of Environmental Conservation (NYSDEC) for an extension.

The year 2041 is projected as the final closure date for the entire Model City Facility, except for essential processes, such as a portion of the aqueous waste treatment system, which will be retained for post-closure leachate management and treatment, unless suitable off-site treatment is located. Partial closure of existing hazardous waste management units during normal operational periods at the Model City Facility will utilize on-site and off-site treatment and/or disposal operations. CWM will notify the Commissioner of the NYSDEC at least 60 days prior to initiating any landfill closure activities or final closure of the facility.

1.4 RMU-2 Waste Inventory

The total gross waste volume capacity of RMU-2 is estimated to be approximately 4,030,700 cubic yards, and the net waste volume capacity of RMU-2 is estimated to be approximately 3,934,000 cubic yards after adjusting for cell separation berms, daily and intermediate cover, structural fill and access roads (see Section 5).

1.5 Inventory Removal, Disposal or Decontamination of Equipment

All buildings and equipment to be decontaminated will be cleaned by thorough washing with a high-pressure stream of water, or steam cleaning. Detergents or other cleaning additives may be added to the water, as necessary, to enhance decontamination. Washwaters determined to be hazardous by laboratory analysis will be collected and treated on site in the aqueous treatment system or shipped off site for treatment.

Outside contractors will provide their own personnel protective gear. All Model City Facility personnel involved in the decontamination of the process facilities will be provided with protective equipment, such as acid/solvent-resistant splash suits and hoods, steel-toe shoes and rubber boots rubber gloves and self-contained breathing apparatus or full-face respirator, as determined by the Site Safety Manager. In addition, wrists and ankles will be taped to protect against splashes. Facilities also will be provided for personnel decontamination at the completion of each work interval.

1.6 Closure and Partial Closure of RMU-2

This section provides the closure procedures for RMU-2 and was prepared using the following closure scenarios:

- This Closure Plan depicts final closure after the completion and filling of six cells. As individual cells are filled to capacity, a final cap may be installed on those cells and progressed forward as additional cells are filled.

- Because construction of RMU-2 will be completed over several years, it is possible that landfill development could be stopped and closure of the unit could occur prior to the six cells being constructed. Partial closure plans have been developed depicting closure after one, two, three, four and five cells.

- Assuming that the remaining cells will not be constructed, partial closure of RMU-2 will require the implementation of similar activities regardless of whether one, two, three, four, five or six cells are to be included. Most notably, the cell separation berm located between constructed cells and unused cell locations would need to be converted to a perimeter berm, including the installation of the cutoff wall. Final cover placement providing adequate surface-water controls would be similar to full closure.

- All motorized equipment will be decontaminated and moved for use at another location or returned to the supplier.

- At the time of closure, RMU-2 will be at or above existing grade elevations and not completely capped.

1.6.1 Final Cover Design

Regardless of when closure of RMU-2 will be initiated, the final cover of RMU-2 will consist of a Geosynthetic Clay Liner (GCL), a synthetic flexible membrane liner, a geocomposite drainage layer and vegetative cover. The perimeter of the cap will be secured into the perimeter berm so as to totally encapsulate and isolate the waste placed in the unit.

The unit is designed to shed water, and is, therefore, sloped downward from the center toward the perimeter. The final cover materials and thickness have been selected to limit infiltration into the placed wastes and thereby reduce leachate generation. Additionally, a general fill layer has been included above the waste surface to reduce the possibility that waste containers or debris will come into close proximity to the impermeable materials. The final cover design, which accomplishes the aforementioned objectives, consists of the following in ascending order:

- Six inches of an unclassified fill grading layer;
- A GCL;
- A synthetic flexible membrane liner consisting of 40-mil thick textured high-density polyethylene (HDPE);
- A geocomposite drainage layer;
- Eighteen inches of unclassified fill; and
- Six inches of topsoil suitable for promoting a vegetative cover.

The Final Cover System shall be constructed in accordance with applicable plans and details contained in the *RMU-2 Engineering Report* (ARCADIS, 2003, Revised 2009 and 2013).

Installation of the final cover for RMU-2 will be in accordance with the following sections of the Technical Specifications for RMU-2, as applicable:

- Section 15064 High-Density Polyethylene Pipe
- Section 02100 Site Preparation and Maintenance
- Section 02210 Earthworks
- Section 02401 Textured Polyethylene Geomembrane
- Section 02410 Geotextile
- Section 02413 Geosynthetic Clay Liner
- Section 02430 Geotextile/Geonet Composite
- Section 03400 Manholes, Risers, and Handholes
- Section 02960 Surface-Water Drainage Ditches

The Quality Assurance Plan for the installation of the final cover system for RMU-2 will be in accordance with the following sections of the Construction Quality Assurance Plan for RMU-2 (CQA Plan), as applicable:

- Section 1 General
- Section 2 Documentation
- Section 3 Lining System Acceptance
- Section 4 Soil Liner Material
- Section 5 Granular Drainage Media
- Section 6 Operations Layer
- Section 7 Vegetative Cover
- Section 8 General Earthfill
- Section 9 Mechanically Stabilized Earth (MSE) Wall
- Section 10 Geomembranes
- Section 11 Geotextiles
- Section 12 Geocomposites
- Section 13 Geosynthetic Clay Liner
- Appendices A through G

Clarifications and minor design changes or additions to the plans and details in the Engineering Report or the Technical Specifications or the CQA Plan shall be conducted in accordance with procedures specified in the approved RMU-2 Permit.

The quality assurance criteria for soils and synthetic liners are the same regardless of whether they are used for initial liner installation or final cap.

To limit the quantity of stormwater that contacts hazardous waste and requires special treatment, portions of the landfill surface may be covered with an "intermediate cover." Intermediate cover refers to a minimum of 12 inches of compacted clay that has been placed over cover material and the final waste grades. If intermediate cover is used, the minimum 12 inches of compacted clay will be installed over the design top of waste grades. Also, a temporary geomembrane will be placed to protect the intermediate cover from erosion until placement of the final cover. Prior to placement of the final cover, the temporary geomembrane will be removed. The top 6 inches of the intermediate cover will be removed and the remaining clay surface will be proof-rolled and used as the subbase for the GCL. The lower 6 inches of clay will replace the lower 6 inches of unclassified fill grading layer in the final cover system.

When final or intermediate cover is placed, the final waste grades shall be at or below design top of waste shown on the permit drawings. The design grade and slope of the final cover must be adhered to within specified survey tolerance limits. Any alteration of these grades or slopes must be made in the form of a permit modification request to change the design of the final cover.

The recommended final cover design has several advantages. First, it limits infiltration such that leachate generation will be strictly minimized. Second, by placing the 6 inches of grading layer and GCL under the synthetic membrane liner, the 40-mil textured HDPE will have a good supporting base, thus helping to maintain its integrity. Third, by placing the 6 inches of grading layer and GCL under the membrane liner, the HDPE is more accessible should any future repair be necessary, and any such remedial effort would not be hampered by the difficulties encountered in performing remedial actions immediately on top of the waste. Fourth, by having the membrane liner above the GCL, no additional moisture will be added to the GCL by means of infiltration, thus minimizing the potential for premature hydration of the GCL. Above the synthetic membrane, the soil (unclassified fill and topsoil) provides adequate room for root growth without long-term saturation of the soil or significant buildup of excess water and also provides freeze-thaw protection.

Less than 1 inch per year of percolation will be generated (based on water balance analyses completed for prior secure landfill areas by Wehran Engineering). This represents the maximum percolation value of water through the topsoil. Such percolation will not provide sufficient driving head to drive moisture through the top liner system, and, in turn, to cause rainwater to enter the unit. This percolation is not expected to cause any problems with slope stability of the soils on top of the synthetic liner, as drainage net above the synthetic liner is included in the cap design.

Furthermore, once a mature growth of vegetation is established, the moisture storage capacity is expected to increase, resulting in lower values of percolation.

After the final topsoil cover is completed and in place, vegetative cover will be established. If proper weather conditions do not exist for the establishment of permanent vegetation, all completed topsoil areas shall be seeded with temporary vegetative cover. The seedbed shall be prepared, including liming and fertilizing, as needed. The areas shall be seeded with species selected on their ability to minimize erosion.

Seeded areas may be mulched in order to conserve soil moisture and retard erosion. Mulch may be clean hay or straw or cellulose wood fiber material, depending on whether the seeding was accomplished by broadcasting or hydroseeding.

The planting can be made in spring, summer and fall. The seedings of perennial grasses may then be over-seeded in the spring. Alternate seeding mixtures suitable to local soil conservation district guidelines may be substituted, as appropriate, for the actual topsoil used.

1.6.2 Conversion of Soil Separation Berm to Perimeter Berm

In the event partial closure activities are instituted, several activities would be performed to convert the cell separation berm, at the leading edge of landfill development, to a perimeter berm. The anticipated typical methodology by which this will be performed is explained below.

Constructed components of the cell separation berm, primary base liner system and secondary base liner will be removed. The horizontal extent of excavation will be sufficient for the installation of the perimeter berm cutoff wall. The vertical limit of excavation will be the compacted clay secondary soil liner. The excavation of material will proceed in a manner that would prevent disturbance of the geocomposite, and the 80-mil HDPE liner outside the limit of excavation. On the cell side of the excavation, the various layers of the baseliner system (operations layer, geotextile, primary leachate collection system, composite primary liner and secondary leachate collection system) will be stepped back so that proper connections can be made upon construction of the perimeter berm. Based on the condition of the excavated material, it will be stockpiled and reused, used as perimeter berm fills or salvaged for other on-site uses.

The cutoff wall will be located and installed per the Engineering Report in the Permit, and the appropriate Permit Drawings.

The exposed secondary compacted clay liner will be scarified prior to the construction of the perimeter berm. Liner systems, leachate collection systems, and the perimeter berm will be constructed in accordance with the *RMU-2 Engineering Report* and Permit Drawings.

1.6.3 Maintenance Needs

Maintenance activities will be required to protect the integrity of the cover, containment structures and monitoring equipment for RMU-2. The seeding operation outlined in Section 1.6.1, above, is designed to provide rapid initial cover succeeded by long-term, low maintenance vegetative cover.

The function and integrity of the final cover for RMU-2, as specified in the Closure Plan for the facility, will be maintained, as necessary. The following corrective measures will be implemented, as necessary: 1) localized repair or replacement of any synthetic cover material that may have been breached; 2) filling, grading, compacting and revegetating any breach in the natural cover soil that may have occurred; and/or 3) minor backfilling of any small ponded areas.

The vegetative cover will be maintained during the growing season and reseeded and mulched, as needed, in areas subject to erosion. In general, such covers need little mowing. Woody plants appearing above the vegetative layer will be removed, as needed.

Fertilization and watering will be completed, as required, during the growing season; routine inspections during the post-closure care period will address vector control, with extermination scheduled, if required.

1.6.4 Drainage and Erosion

Drainage from RMU-2 will be collected in the site ditches and channels. Calculations for drainage control (24-hour, 25-year storm event) can be found in the *RMU-2 Engineering Report*.

Most surface-water runon and runoff is controlled by drainage channels on the Model City Facility. Each of the primary drainage channels has a spill control gate, which is normally closed and locked so that surface water can be sampled prior to being released from the Model City Facility. The location of these channels, gates and monitoring points is discussed in the site Surface-Water Sampling and Analysis Plan (SWSAP).

During the operational life of RMU-2, surface water is monitored in accordance with the SWSAP. This monitoring will continue during closure until the landfill is closed. Then, the post-closure monitoring will be performed. The referenced SWSAP accounts for the surface-water drainage from all areas containing waste management units at the Model City Facility.

In the event that RMU-2 is closed prior to the construction of six cells, drainage will be collected in the site ditches, as outlined above. Details of the surface-water control features for partial closure are consistent with the *RMU-2 Engineering Report* and associated drawings showing the top of vegetative cover grades.

Additional details on drainage and erosion control plans can be found in the *RMU-2 Engineering Report*.

1.6.5 Settlement and Subsidence

The cell subbase grades are designed to provide a minimum slope of 1% toward the sumps (as measured both parallel and perpendicular to the cell centerline) following compression of the underlying Glaciolacustrine Clay layer. Consolidation of the Glaciolacustrine Clay is computed at several points in each cell to maintain the minimum slope of 1% following clay consolidation. Because the magnitude of clay consolidation is proportional to both clay thickness and applied pressure, clay consolidation is computed at several points in each cell based on reported clay thickness (Golder Associates, 2002) and waste depth. The post-consolidation elevation of each point is used to calculate the post-consolidation slope to achieve the minimum required slope of 1%. As a result, the performance of the leachate collection systems will not be affected by slope changes due to consolidation.

The cover will not be subjected to stress loadings, such as building foundations or heavy equipment traffic. Cover maintenance will also be performed to reduce stress associated with ponding liquids. Therefore, compressive forces will not induce either primary or secondary consolidation. Furthermore, liquefaction of the soil in the cover is not a threat, as liquefaction typically occurs only in relatively loose, saturated, cohesionless soils, which are not to be used as cover material. The yield point of the

HDPE material is much greater than the expected maximum geomembrane elongation, thereby keeping the liner intact in the event that some settlement does occur.

Geotechnical calculations, including those for consolidation of Glaciolacustrine Clay, waste settlement, excavation heave, hydrostatic uplift, slope stability and liquefaction are included in Appendix C of the *RMU-2 Engineering Report*.

1.6.6 Cover Permeability

The GCL component of the composite final cover will have a maximum permeability of 1×10^{-7} centimeters per seconds (cm/sec) (as is required for compacted clay layers), and the 40-mil HDPE geomembrane will have a 1×10^{-12} cm/sec permeability rating.

1.6.7 Leachate Collection and Pumping

Based on a “cap-as-you-go” approach, at the point a cell or cells are covered with the GCL and geomembrane portion of the final cover system, or 12 inches of intermediate cover, and precipitation is managed as clean runoff, leachate monitoring will be reduced from monthly to biannually for those cells. The leachate collection system for the RMU-2 facility will be maintained and will continue to be updated after closure as part of the aqueous treatment system.

1.6.8 Groundwater

The groundwater monitoring program adhered to during the operational life of RMU-2 will be followed during closure activities.

1.7 Continuance of Operations

RMU-2 is anticipated to close prior to closure of the entire Model City Facility. The site aqueous waste treatment system is projected to continue operating after closure for post-closure leachate management, unless suitable off-site treatment is located. Closure of other treatment, storage and disposal recovery units are addressed in the CWM Model City Facility Site-Wide Part 373 Permit.

1.8 Schedule for Closure

Final closure activities will commence within 30 days after receipt of final volume of wastes. Closure will be completed within 180 days unless an extension is requested of the Commissioner of the NYSDEC. This procedure does not apply to "cap-as-you-go" activities, during which cover is placed as sections of RMU-2 are completed, but only to final closure following receipt of the final volume of waste.

CWM will notify the Commissioner of the NYSDEC at least 60 days prior to initiating any final closure activities. When final closure is completed, CWM will submit to the Commissioner of the NYSDEC certification both by CWM and an independent, registered New York State Professional Engineer that RMU-2 has been closed in accordance with the approved Closure Plan.

1.9 Extensions for Closure Time

CWM does not anticipate requiring an extension for closure time for RMU-2 unless one is needed due to weather or time of year constraints. Severe weather conditions at the Model City Facility may make completion of closure within 180 days difficult, and an extension of the closure time may then be necessary. In the event such an extension becomes necessary for these reasons, or due to some other unforeseen circumstances, CWM will petition the Commissioner of the NYSDEC for an extension.

2. Notice to Land Authority

CWM, the owner of the property where the Model City Facility is located, shall make a notation in the deed to the facility property stating in perpetuity that:

1. The land has been used to manage hazardous wastes; and

2. The use of the land is restricted in accordance with 6 NYCRR 373-2.7(g)(3).

No later than the submission of the certification of closure, CWM will submit to the local zoning authority, the Niagara County Clerk and the Commissioner of the NYSDEC a survey plot indicating the location and dimensions of the RMU-2 cells or other disposal areas with respect to permanently surveyed benchmarks. This plot will be prepared and certified by a Professional Land Surveyor licensed to practice in New York State. The plot, which is filed, will contain a note, prominently displayed, that states CWM's obligations to restrict the disturbance of the site. This includes eliminating inadvertent site access by the general public and livestock, to be accomplished by maintaining the integrity of the existing fence around the Model City Facility and by placing secondary fences around the closed facilities proper. In addition, this notice will indicate that post-closure use of the property on or in which hazardous waste remains after closure must never be allowed to disturb the integrity of the final cover, liner or any containment component, or the function of the facilities monitoring system.

Further, within 60 days after certification of closure, CWM will submit to the local zoning authority, Niagara County Clerk and the Commissioner of the NYSDEC a record of the type, location and quantity of hazardous wastes disposed within each cell or area of the facility.

3. Closure Cost Estimate [6 NYCRR 373-2.8(c)]

A closure cost estimate has been developed that represents the cost of closure of RMU-2. Operations included in this cost estimate include RMU-2 and associated equipment for the successive stages of one, two, three, four and five cells of RMU-2 and the total closure of six cells.

These costs represent detailed cost estimates based upon the closure performance standards detailed herein. Costs associated with appropriate waste handling techniques for inventoried hazardous wastes have been calculated into all of the estimated closure costs.

4. Financial Assurance for Closure

CWM currently uses a surety bond and a letter of credit as the selected financial assurance mechanisms for closure of the Model City Facility's units. Additional or revised mechanisms will be selected as the financial instrument for providing closure of each successive stage of RMU-2. An original signature financial assurance instrument for RMU-2 will be sent to the Commissioner of the NYSDEC at least 60 days prior to the placement of wastes in each stage of the development of the unit. This financial assurance instrument will have the NYSDEC as its beneficiary. CWM reserves the right to change financial assurance mechanisms as outlined in 6 NYCRR Part 373-2.8(d)(3) and (4). These will be updated annually, as required, to coincide with annual updates of the facility closure and post-closure cost estimates.

5. Waste Capacity and Final Cap Areas

The approximate waste volume capacity of the successive options for closure of RMU-2 after adjusting for cell separation berms, soil cover, and structural fill is as follows and the approximate final cover area:

Scenario	Cells Built	Approximate Waste Volume Capacity (cy)	Approximate Final Cover Area (surface area, acres)
1 cell	20	460,000	6.9
2 cells	20-18	797,000	13.1
3 cells	20-18-19	1,459,000	19.5
4 cells	20-18-19-17	2,385,000	25.4
5 cells	20-18-19-17-16	2,991,000	31.9
6 cells	20-18-19-17-16-15	4,030,700	38.5

Notes:

1. Waste volumes and final cover areas are approximate based on limited computer modeling of maximum waste grades within the footprint made available by having the indicated cells constructed and open. Where possible, the design waste grading equals the top of waste for the landfill under final buildout. In other areas, maximum 3H:1V slopes are used and benches are assumed to be constructed at the approximate intervals used for final buildout.

2. Waste volumes are gross and are based on volume comparison from modeled top of waste for each configuration to top of operations layer. No allowance is made for loss of waste volume due to use of select fill or for volume consumed by stabilizing agents or interim cover.

3. Final cover areas are based on the surface area of the design waste grading.

Revised Sitewide Closure Plan

(proposed modified pages are designated with a revision date at the bottom of the respective page)

OVERALL SITE-WIDE CLOSURE PLAN
CWM CHEMICAL SERVICES, LLC
1550 BALMER ROAD
MODEL CITY, NEW YORK 14107

DATED: SEPTEMBER 1998

REVISED: November 2013

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1.0 CLOSURE PROCEDURES AND ACTIVITIES

1.1 INTRODUCTION

This revised Closure Plan for CWM Chemical Services, LLC's Model City facility ("CWM") has been developed in compliance with the requirements of 6NYCRR Subpart 373-2, Sections 373-2.7, 373-2.8, 373-2.9(i), 373-2.10(h), 373-2.11(f), 373-2.14(g) and the requirements of 40 CFR 761.65(e). A written Cost Estimate for closure activities has also been developed and is submitted under separate cover.

The Plan details facility closure whether performed by CWM or by a third party. First, Closure Performance Standards that CWM intends to apply are described in Section 1.2. Partial closure is discussed in Section 1.3. Section 1.4 details the maximum waste inventory at closure. Section 1.5 presents a synopsis of partially closed tanks and their secondary containment systems. The closure schedule is outlined in Section 1.6 and the certification of closure, survey plat and deed notation requirements are found in Section 1.7. General closure activities are described in Section 1.8. This section includes general decontamination procedures for buildings, tanks, and containment structures. Health & Safety provisions for closure are found in Section 1.9. Section 1.10 gives general sampling and analytical procedures for closure. The Plan details the closure activities related to each major waste management unit currently on site in Section 1.11. Finally, sections 2.0 and 3.0 of the Plan include a discussion of the Closure Cost Estimate and financial mechanism chosen by CWM to secure funds for closure activities.

During the facility's operational lifetime, conditions or operations may be modified such that the Closure Plan will require changes. The general manager, or his designate, will be responsible for maintaining and updating the plan both prior to and after closure of the site. The CWM facility General Manager may be contacted at the following address and telephone:

Mr. Michael Mahar
District Manager
CWM Chemical Services, LLC
1550 Balmer Road
Model City, NY 14107
(716) 286-1550

At least one copy of the approved Plan and all revisions to the Closure Plan will be maintained on site until closure is completed and certified. CWM will amend or revise the Closure Plan at least annually whenever changes in the operating plans or facility design affect the Plan or whenever the expected year of facility closure changes. The Closure Cost Estimate will be updated annually.

1.2 CLOSURE PERFORMANCE STANDARDS

In accordance with 6NYCRR 373-2.7(b) and 40 CFR 761.65(e)(1), the Closure Plan is designed to ensure that the facility will require minimal maintenance and controls, to minimize or eliminate threats to human health and the environment, and to prevent the escape of hazardous wastes or hazardous waste constituents, PCB's, leachate, contaminated rainfall, or waste decomposition products to the groundwater, surface waters, or atmosphere.

Closure will be achieved by the removal of all unprocessed and hazardous waste residues. This will include decontamination and removal of all process and associated equipment, except buildings and other specified structures which will be decontaminated and left in place. If possible, salvageable equipment may be decontaminated and moved for use at another site. Where appropriate, hazardous waste process areas will be regraded and covered with clay-rich soils and vegetated following the completion of all other closure activities.

Closure cost estimates in this Plan are based on the following standards as outlined in 6NYCRR Part 373-2.7(c) and 6NYCRR Part 373-2.8(c):

- the closure cost estimate presumes the maximum inventory of hazardous wastes ever on-site over the active life of the facility;

- the closure cost estimate must equal the cost of final closure at the point in the facility's active life when the extent and manner of its operation would make closure the most expensive;

- the closure cost estimate must be based on the costs to the owner or operator of hiring a third party to close the facility;

- wastes remaining at this site during closure will be disposed of on-site if the owner or operator can demonstrate that on-site disposal capacity will exist at all times over the life of the facility. If such landfill capacity exists at the time of closure, CWM will utilize this capacity for wastes and other contaminated closure materials. Alternatively, these closure wastes/materials will be disposed of off-site at an appropriate facility.

Other assumptions include the following:

- it is presumed that the facility will operate until the year 2021; and

- the Aqueous Waste Treatment System ("AWTS") will continue to operate for post-closure leachate management.

1.3 PARTIAL CLOSURE

Closure of individual existing hazardous waste management units during normal operational periods at Model City will utilize on-site and off-site treatment and/or disposal options. Partial closure activities will adhere to the requirements of this Closure Plan, unless a unit-specific closure plan is approved. According to 6NYCRR Part 373-2.7(c)(4)(i), the owner or operator must notify the commissioner in writing at least 60 days prior to the date on which the owner or operator expects to begin closure of a surface impoundment, waste pile, land treatment unit or landfill unit, or final closure of a facility with such a unit.

1.4 WASTE INVENTORY AT CLOSURE

All untreated hazardous wastes remaining on site at closure will either be treated on site using available treatment operations, disposed of on site in the hazardous waste landfill, or shipped off-site to an approved hazardous waste management facility. PCB wastes which must be shipped off site will go to a facility approved by USEPA for PCB waste incineration, treatment or disposal.

Assuming all process equipment and storage areas are full of waste at the time of closure, the facility would have the maximum permitted volume of waste on site at closure. Tanks will be assumed to be full of the type of waste managed in those tanks as permitted. Below is a list of each storage area and its permitted maximum contents. All drum quantities are listed in 55-gallon equivalents. Rolloffs are estimated to be 30 cubic yards. Tankers may be 2,500, 5,500 or 6,000 gallons.

A. Container storage areas:

PCB Warehouse				
Area 1 storage		1,368 drums	75,240 gal.	Solid waste
Area 3/6 storage		1,358 drums	74,690 gal.	Solid waste
	or	1,198 drums	65,890 gal.	Solid waste
	and	160 drums	8,800 gal.	Liquid waste
Existing Drum Management Building				
Building storage		1,197 drums	65,835 gal.	Liquid waste
	and	2,215 drums	121,825 gal.	Solid waste
	or	3,412 drums	187,660 gal.	Solid waste
Loading dock		1,040 drums	57,200 gal.	Solid waste
West ramp		2 rolloffs/tankers	11,000 gal.	Solid/liquid waste
New Drum Management Building				
Building storage		3,048 drums	167,640 gal.	Solid/liquid waste
Truck Load/Unload Ramp		1,040 drums	57,200 gal.	Solid/liquid waste
Fuels ramp		2 rolloffs/tankers	11,000 gal.	Liquid waste
Transformer Flush Area		6 transformers or equivalent		
	or	37 drums	2,065 gal.	Solid/liquid waste

PCB Transformer Decommissioning Building ("T.O. Building")

T.O. Building	11 pans with 50 small transformers or equivalent		
	or 33 drums	1,815 gal.	Solid/liquid waste
Loading ramp	2 rolloffs/tankers	12,000 gal.	Solid/liquid waste

Aqueous Waste~~r~~ Treatment Facility

Drum storage	128 drums	7,040 gal.	Solid/liquid waste
Unloading ramp	2 rolloffs/tankers	12,000 gal.	Solid/liquid waste
Filter Press room	1 rolloff	30 cu. yds.	Solid waste

Exiting South Trailer Parking Area

Trailer parking area	58 rolloffs	1,740 cu. yds.	Solid waste
	or 48 rolloffs	1,440 cu. yds.	Solid waste
	and 5 tankers	27,500 gal.	Liquid waste

New Full Trailer Parking Area

Trailer parking area	48 rolloffs	1,440 cu. yds.	Solid waste
	or 38 rolloffs	1,140 cu. yds	Solid waste
	and 5 tankers	27,500 gal.	Liquid waste

Stabilization Facility

Trailer parking areas (I-IV)	48 rolloffs	1,440 cu. yds.	Solid waste
(existing)	or 38 rolloffs	1,140 cu. yds.	Solid waste
	and 5 tankers	27,500 gal.	Liquid waste
New Trailer Parking Area	37 rolloffs	1,110 cu. yds.	Solid waste
	or 26 rolloffs	780 cu. yds.	Solid waste
	and 11 tankers	27,500 gal.	Liquid waste
Waste ash unloading area	1 ash tanker	2,500 gal.	Solid waste
Special Client Treat. Rm.	4 rolloffs	120 cu. yds.	Solid waste
Macro room	18 rolloffs	540 cu. yds.	Solid waste
North expansion	15 rolloffs	450 cu. yds.	Solid waste
Upper drum shredder	300 drums	16,500 gal.	Solid waste
Lower drum shredder	2 rolloffs	60 cu. yds.	Solid~~/liquid~~ waste

Truck Wash Facility

Wash bay	3 rolloffs	90 cu. yds.	Solid waste

Tank T-130 Loading Ramp

Loading ramp	1 rolloff/tanker	5,500 gal.	Solid/liquid waste

Tank T-108 Loading Ramp

Loading ramp	1 rolloff/tanker	5,500 gal.	Solid/liquid waste

Modified: Nov. 2013

Tank T-109 Loading Ramp			
Loading ramp	1 rolloff/tanker	5,500 gal.	Solid/liquid waste
Tank T-158 Unloading Ramp			
Loading ramp	1 rolloff/tanker	5,500 gal.	Solid/liquid waste

B. Facultative Ponds:

Facultative ponds are the last portion of the on-site wastewater treatment system.

Pond#	Maximum Capacity	Contents
1-2	22,880,700 gallons	Treated Effluent from AWTS
3	51,355,300 gallons	Treated Effluent from AWTS
5	24,700,000 gallons	Treated Effluent from AWTS
8	43,413,500 gallons	Treated Effluent from AWTS

C. Tank storage areas:

The following Table 1 provides a list of all tanks on site, their location, and the type and quantity of waste or product in each tank.

TABLE 1 - MAXIMUM TANK INVENTORY

TANK #	CAPACITY IN GALLONS	CONSTRUCTION MATERIAL	LOCATION SUB-AREA	CONTENT
T-105 LIFT STATION	3,000	CARBON STEEL	SLF 1-6	LEACHATE
T-130	5,732	STAINLESS STEEL	SLF 1-6	LEACHATE
T-107 WET WELL	350	FRP	SLF 7	LEACHATE
T-108 HOLD TANK	10,000	FRP	SLF 7/11	LEACHATE
T-109 HOLD TANK	3,000	FRP	SLF 10	LEACHATE
T-110 WET WELL	350	FRP	SLF 10	LEACHATE
T-111 WET WELL	350	FRP	SLF 11	LEACHATE
T-150 LIFT STATION	8,000	CARBON STEEL	SLF 12	LEACHATE
T-160 LIFT STATION	3,000	CARBON STEEL	RMU 1	LEACHATE
T-165 STORAGE TANK	876,769	GLASS FUSED CARBON STEEL	RMU 1	LEACHATE
T-158 OIL/WATER SEPARATOR	17,000	CARBON STEEL	E. OF N. SALTS	LEACHATE
T-159 LIFT STATION	1,000	FRP	E. OF N. SALTS	LEACHATE
T-3007 CARBON ADSORBER	7,600	CARBON STEEL	WWT BLDG.	CARBON & WASTEWATER
T-3008 CARBON ADSORBER	7,600	CARBON STEEL	WWT BLDG.	CARBON & WASTEWATER
T-3010A ARSENIC ADSORBER	470	CARBON STEEL	WWT BLDG.	RESIN & WASTEWATER
T-3010B ARSENIC ADSORBER	470	CARBON STEEL	WWT BLDG.	RESIN & WASTEWATER
T-3010C ARSENIC ADSORBER	470	CARBON STEEL	WWT BLDG.	RESIN & WASTEWATER
T-3010D ARSENIC ADSORBER	470	CARBON STEEL	WWT BLDG.	RESIN & WASTEWATER

TANK #	CAPACITY IN GALLONS	CONSTRUCTION MATERIAL	LOCATION SUB-AREA	CONTENT
T-52 STORAGE	7,600	CARBON STEEL	SOUTH OF WWT BLDG.	SPENT CARBON
T-58 EFFLUENT STORAGE	488,529	GLASS FUSED CARBON STEEL	WEST OF AWTS BLDG.	AWTS EFFLUENT
T-100 STORAGE	160,545	CARBON STEEL	NORTH OF AWTS BLDG.	AQUEOUS WASTE
T-101 STORAGE	350,000	CARBON STEEL	EAST OF N. SALTS	LANDFILL LEACHATE
T-102 STORAGE	350,000	CARBON STEEL	EAST OF N. SALTS	LANDFILL LEACHATE
T-103 STORAGE	350,000	CARBON STEEL	EAST OF N. SALTS	LEACHATE
FRAC TANK #3	21,000	CARBON STEEL	EAST OF N. SALTS	LEACHATE
T-125 EQUALIZATION	394,271	CARBON STEEL	NORTH OF AWTS BLDG.	AQUEOUS WASTES
T-210 INFLUENT WASTE MGMT.	30,000	PLACITE 4310 LINED CARBON STEEL	Tank Farm East of AWTS Bldg.	AQUEOUS WASTES
T-220 INFLUENT WASTE MGMT.	30,000	FIBER GLASS	Tank Farm East of AWTS Bldg.	AQUEOUS WASTE
T-230 INFLUENT WASTE MGMT.	30,000	PLACITE 4310 LINED CARBON STEEL	Tank Farm East of AWTS Bldg.	AQUEOUS WASTE
T-310 BIOTOWER	30,457	FIBER GLASS	Tank Farm East of AWTS Bldg.	AQUEOUS WASTE
T-320 BIOTOWER	30,457	FIBER GLASS	Tank Farm East of AWTS Bldg.	AQUEOUS WASTE
T-710 PROCESS TANK	8,000	PLACITE 4310 LINED CARBON STEEL	AWTS BUILDING	AQUEOUS WASTE
T-810 PROCESS TANK	8,000	PLACITE 4310 LINED CARBON STEEL	AWTS BUILDING	AQUEOUS WASTE
T-820 PROCESS TANK	8,000	FIBER GLASS	AWTS BUILDING	AQUEOUS WASTE
T-1010	10,000	CARBON STEEL	AWTS BLDG.	LIME/AQUEOUS WASTE
T-1020	8,000	CARBON STEEL	AWTS BLDG.	LIME/AQUEOUS WASTE
T-1111 HOLDING	300	POLYETHYLENE	FILTER PRESS AWTS BLDG.	PRESS WATER (EFFLUENT)

TANK #	CAPACITY IN GALLONS	CONSTRUCTION MATERIAL	LOCATION SUB-AREA	CONTENT
T-1112 HOLDING	450	FIBER GLASS	FILTER PRESS AWTS BLDG.	PRESS WATER (EFFLUENT)
T-1310 CAUSTIC SCRUBBER	580	FIBER GLASS	AWTS BUILDING	CAUSTIC
T-3001	1,255	FIBER GLASS	Tank Farm East of WWT Bldg.	AQUEOUS WASTE
T-3002	900	FIBER GLASS	Tank Farm East of WWT Bldg.	AQUEOUS WASTE
T-3003	1,210	FIBER GLASS	Tank Farm East of WWT Bldg.	AQUEOUS WASTE
T-3009	6,000	CARBON STEEL	Tank Farm East of WWT Bldg.	AQUEOUS WASTE
T-3011	375	FIBER GLASS	CLARIFIER BLDG.	AQUEOUS WASTE
T-3012	375	FIBER GLASS	CLARIFIER BLDG.	AQUEOUS WASTE
MIXING PIT 1	20,354	CARBON STEEL	STAB. NORTH EXPANSION	WASTE SOLIDS
MIXING PIT 2	20,354	CARBON STEEL	STAB. NORTH EXPANSION	WASTE SOLIDS
T-120	1,650	FIBER GLASS	TRUCK WASH BLDG.	WASH WATER
FILTER PRESS SUMP SYSTEM	141	CONCRETE WITH FIBERGLASS INSERT	FILTER PRESS AWTS BLDG.	AQUEOUS WASTE
T-8001	5,000	CARBON STEEL	WEST DRUM AREA	GROUND WATER
T-8002	550	FIBERGLASS	WEST DRUM AREA	GROUND WATER
T-8004	550	FIBERGLASS	NORTH OF LAGOONS	GROUND WATER
T-9001	1,100	HDPE	FAC POND 5	FAC POND LEAK DETECTION LIQUID

TANK #	CAPACITY IN GALLONS	CONSTRUCTION MATERIAL	LOCATION SUB-AREA	CONTENT
T-8005	300	CARBON STEEL	SOUTH OF SLF 10	GROUND WATER
T-8006	300	CARBON STEEL	EAST OF SLF 12	GROUND WATER
T-8007	500	FIBERGLASS	SOUTH OF PCB WAREHOUSE	GROUND WATER
T-8008	500	FIBERGLASS	NORTH OF AWTS BLDG.	DNAPL
T-8009	525	HDPLE	INSIDE T.O. BUILDING CSA	GROUND WATER
T-8010	1,000	HDPE	SOUTH OF SOUTH TRAILER PARKING CSA	GROUND WATER
T-850	846	FIBERGLASS	AWTS BLDG.	AQUEOUS WASTE
TA-1	20,000	RUBBER LINED CARBON STEEL	STABILIZATION	AQUEOUS WASTE
TA-2	20,000	RUBBER LINED CARBON STEEL	STABILIZATION	AQUEOUS WASTE

D. Operating Landfills:

RMU-1 A separate closure and post closure plan has been prepared for RMU-1.

1.5 PARTIALLY CLOSED TANKS (out of service)

This section shows former tanks and their associated secondary containment areas on-site which are partially closed. All tanks listed have been removed. Partial closure documentation for all tanks was submitted to NYSDEC. The tables below give a summary of the closure status of the partially closed tanks on-site.

Partially Closed Fuels L-Series Tank System (secondary containment located west of TO Building)

TANK #	TANK REMOVED	SECONDARY CONTAINMENT DECONTAMINATED	CONTENTS	GENERAL LOCATION OF TANK OR CONTAINMENT	VERTICAL LOCATION OF TANK	SECONDARY CONTAINMENT VOLUME	SECONDARY CONTAINMENT REMOVED*	UNDER-LYING SOILS TESTED*	UNDER-LYING SOILS REMOVED*
L-1	Y	N	tank disposed of	FUELS - L SERIES TANK FARM	n/a	28 143 GAL.	N/A	N/A	N/A
L-3	Y	N	tank disposed of	FUELS - L SERIES TANK FARM	n/a	28 143 GAL.	N/A	N/A	N/A
L-6	Y	N	tank disposed of	FUELS - L SERIES TANK FARM	n/a	28 143 GAL.	N/A	N/A	N/A

*Secondary containment for the L-series tanks will remain intact. Potential contamination underneath the secondary containment structure will be contained/extracted by the PA IM GWES.

Partially Closed Fuels Tank System (T-44 Tank Farm) (secondary containment located west of TO Building)

TANK #	TANK REMOVED	SECONDARY CONTAINMENT DECONTAMINATED	CONTENTS	GENERAL LOCATION OF TANK OR CONTAINMENT	VERTICAL LOCATION OF TANK	SECONDARY CONTAINMENT VOLUME	SECONDARY CONTAINMENT REMOVED*	UNDER-LYING SOILS TESTED*	UNDER-LYING SOILS REMOVED*
T-44	Y	Y	tank disposed of	FUELS - T-44 TANK FARM	n/a	10 892 GAL.	N/A	N/A	N/A

*Secondary containment for the T-44 Tank Farm will remain intact. Potential contamination underneath the secondary containment structure will be contained/extracted by the PA IM GWES.

Partially Closed FOD Fuels Tank System (secondary containment located west of TO Building)

TANK #	TANK REMOVED	SECONDARY CONTAINMENT DECONTAMINATED	CONTENTS	GENERAL LOCATION OF TANK OR CONTAINMENT	VERTICAL LOCATION OF TANK	SECONDARY CONTAINMENT VOLUME	SECONDARY CONTAINMENT REMOVED*	UNDER-LYING SOILS TESTED*	UNDER-LYING SOILS REMOVED*
FOD-1 FUELS STORAGE	Y	Y	tank disposed of	FUELS - FOD TANK FARM	n/a	8 626 GAL.	N/A	N/A	N/A
FOD-2 FUELS STORAGE	Y	Y	tank disposed of	FUELS - FOD TANK FARM	n/a	8 626 GAL.	N/A	N/A	N/A
T-29	Y	Y	tank disposed of	FUELS - FOD TANK FARM	n/a	8 626 GAL.	N/A	N/A	N/A

*Secondary containment for the FOD Fuels System Tank Farm will remain intact. Potential contamination underneath the secondary containment structure will be contained/extracted by the PA IM GWES.

Partially Closed PCB Tank System (secondary containment located north of TO Building)

TANK #	TANK REMOVED	SECONDARY CONTAINMENT DECONTAMINATED	CONTENTS	GENERAL LOCATION OF TANK OR CONTAINMENT	VERTICAL LOCATION OF TANK	SECONDARY CONTAINMENT VOLUME	SECONDARY CONTAINMENT REMOVED*	UNDER-LYING SOILS TESTED*	UNDER-LYING SOILS REMOVED*
TO-9 - PCB STORAGE	Y	N	tank disposed of	TO-9, TO-10, TO-12 TANK FARM	n/a	8 626 GAL.	N/A	N/A	N/A
TO-10 PCB STORAGE	Y	N	tank disposed of	TO-9, TO-10, TO-12 TANK FARM	n/a	8 626 GAL.	N/A	N/A	N/A
TO-12	Y	N	tank disposed of	TO-9, TO-10, TO-12 TANK FARM	n/a	8 626 GAL.	N/A	N/A	N/A

*Secondary containment for the PCB Tank System Tank Farm will remain intact. Potential contamination underneath the secondary containment structure will be contained/extracted by the PA IM GWES.

Partially Closed PCB Storage Tank System (secondary containment located west of AWT Drum unloading dock)

TANK #	TANK REMOVED	SECONDARY CONTAINMENT DECONTAMINATED	CONTENTS	GENERAL LOCATION OF TANK OR CONTAINMENT	VERTICAL LOCATION OF TANK	SECONDARY CONTAINMENT VOLUME	SECONDARY CONTAINMENT REMOVED*	UNDER-LYING SOILS TESTED*	UNDER-LYING SOILS REMOVED*
T-64	Y	in progress	tank disposed of	WEST OF AWT BUILDING	n/a	n/a	N/A	began 6/95	N/A
T-65	Y	in progress	tank disposed of	WEST OF AWT BUILDING	n/a	n/a	N/A	began 6/95	N/A

*Secondary containment for the PCB Tank System Tank Farm will remain intact. Potential contamination underneath the secondary containment structure will be contained/extracted by the PA IM GWES.

Partially Closed Fuels Tank System (secondary containment located east of TO Building)

TANK #	TANK REMOVED	SECONDARY CONTAINMENT DECONTAMINATED	CONTENTS	GENERAL LOCATION OF TANK OR CONTAINMENT	VERTICAL LOCATION OF TANK	SECONDARY CONTAINMENT VOLUME	SECONDARY CONTAINMENT REMOVED*	UNDER-LYING SOILS TESTED*	UNDER-LYING SOILS REMOVED*
FD-1 STORAGE	Y	Y	tank disposed of	FUELS - DECHLOR TANK FARM	n/a	14 114 GAL.	N/A	N/A	N/A
FD-2 STORAGE	Y	Y	tank disposed of	FUELS - DECHLOR TANK FARM	n/a	14 114 GAL.	N/A	N/A	N/A
TO-3 STORAGE	Y	Y	tank disposed of	FUELS - DECHLOR TANK FARM	n/a	14 114 GAL.	N/A	N/A	N/A
TO-6 STORAGE	Y	Y	tank disposed of	FUELS - DECHLOR TANK FARM	n/a	14 114 GAL.	N/A	N/A	N/A
T-48 STORAGE	Y	Y	tank disposed of	FUELS - DECHLOR TANK FARM	n/a	14 114 GAL.	N/A	N/A	N/A

*Secondary containment for the Fuels Tank System Tank Farm will remain intact. Potential contamination underneath the secondary containment structure will be contained/extracted by the PA IM GWES.

T-47 Fuels Tank System (secondary containment located north-west of TO Building)

TANK #	TANK REMOVED	SECONDARY CONTAINMENT DECONTAMINATED	CONTENTS	GENERAL LOCATION OF TANK OR CONTAINMENT	VERTICAL LOCATION OF TANK	SECONDARY CONTAINMENT VOLUME	SECONDARY CONTAINMENT REMOVED*	UNDER-LYING SOILS TESTED*	UNDER-LYING SOILS REMOVED*
T-47 STORAGE	Y	Y	tank disposed of	Fuels - T-47 TANK FARM	n/a	4 959 GAL.	N/A	N/A	N/A

*Secondary containment for the Fuels Tank System Tank Farm will remain intact. Potential contamination underneath the secondary containment structure will be contained/extracted by the PA IM GWES.

1.6 CLOSURE SCHEDULE

According to 6NYCRR Part 373-2.7(c)(4)(i), the owner or operator must notify the commissioner in writing at least 60 days prior to the date on which the owner or operator expects to begin closure of a surface impoundment, waste pile, land treatment unit or landfill unit, or final closure of a facility with such a unit. According to 6NYCRR Part 373-2.7(d)(1) within 90 days after receiving the final volume of hazardous wastes, the owner or operator must treat, remove from the unit or facility, or dispose of on-site, all hazardous wastes in accordance with the approved closure plan. The commissioner may approve a longer period if the owner or operator complies with all applicable requirements for requesting a modification to the permit and provides further regulatory demonstrations. The US EPA Regional Administrator will be contacted in the case of a closure of the entire facility or a PCB storage unit and also if any time extension were sought on either a PCB unit or site-wide closure.

Closure will be completed within 180 days unless an extension is approved by the Commissioner of the NYSDEC and the USEPA Regional Administrator. It is important to note that this procedure does not apply to intermediate cover of landfills on site, but only to final closure following receipt of the final volume of waste.

1.7 CERTIFICATION OF CLOSURE, SURVEY PLAT, AND DEED NOTATION

Pursuant to 6 NYCRR 373-2.7(f) and 40 CFR 761.65(e)(8), CWM will submit to the Commissioner and/or the Regional Administrator, by registered mail, a certification that the hazardous and/or PCB waste management unit or the facility has been closed in accordance with the specifications in the approved Closure Plan within 60 days of final closure of the unit or facility. The certification will be signed by CWM and by an independent professional engineer registered in New York.

In addition, a survey plat indicating the location and dimensions of landfill cells and other hazardous waste disposal units with respect to permanently surveyed benchmarks, plus a record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility, will be submitted prior to the submittal of the Certification of Closure. Copies will be submitted to the Commissioner of the NYSDEC, the local zoning authority and to the Niagara County Clerk.

Finally, pursuant to 6 NYCRR 373-2.7(i)(2)(i), CWM recorded with the Niagara County Clerk, within 60 days of Certification of Closure of the first hazardous waste disposal unit, a notation on the deed (notation for SLF 1-6 dated 8/10/83) to the facility property that will in perpetuity notify any potential purchaser that:

1) the land has been used to manage hazardous waste;

2) the facility property use is restricted under 6 NYCRR 373-2.7; and

3) the survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility has been filed with the local zoning authority, the Niagara County Clerk, and the Commissioner of the NYSDEC.

CWM also submitted to the NYSDEC Commissioner a copy of the document in which the deed notation was placed and a certification stating that the notation was placed on the deed as required.

Within 60 days of Certification of Closure of the last hazardous waste disposal unit, CWM will record another similar notation on the deed. And CWM will again submit a copy of the document in which the notation has been placed and the required certification.

1.8 GENERAL CLOSURE ACTIVITIES

Many of the tasks that will be performed during closure of the Model City Facility are common to different waste management units on site. This section of the Plan will summarize general activities and requirements. Unit-specific details are discussed in Section 1.11.

1.8.1 INVENTORY

Prior to initiating any closure activities, an inventory of all waste at the facility will be conducted. The inventory will be performed in order to:

1) verify that the actual inventory is consistent with the records of reported waste identity and quantities;

2) confirm the integrity of all containers in preparation for inventory removal; and

3) identify, by visual observation, any potentially contaminated areas.

Any potentially contaminated areas will be noted so that additional sampling can be done in those areas.

1.8.2 DECONTAMINATION OF BUILDINGS

All buildings used for solid, hazardous or TSCA waste storage or management will be thoroughly decontaminated and left standing at closure.

As a general rule for all buildings, once they have been cleared of all material, the floors will be swept or vacuumed clean of all dust and debris, washed and then visibly inspected to a clean debris surface. Clean debris surface means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area. (40 CFR 268.45, Table 1).

Wastewaters generated from decontamination procedures used during the closure process will be collected and treated by the on-site Aqueous Wastewater Treatment System. Section 1.10.3 describes further decontamination guidance.

Refer to the following decontamination procedures to be used on a building specific basis:

A. All non-PCB waste management buildings (Buildings where wastes containing PCBs were never managed)

Once these buildings have been cleared of all material, the floors will be swept or vacuumed clean of all dust and debris, washed and then visibly inspected to a clean debris-type surface that is, to the best degree possible, free of soil and hazardous waste except for residual staining (light shadows, streaks or minor discolorations). Any wastewater generated during the decontamination process will be treated in the on-site AWT system.

Mobile equipment may be used to wash the floors. The wash water will be collected for treatment/disposal on-site. In order to determine if the building has been adequately decontaminated for potential reuse, a small quantity of final rinse water will be analyzed as indicated in Section 1.10.3 below. If the wash waters are not treated on site, they will be shipped to an appropriate approved facility.

If a location fails to meet the clean up criteria, it will be re-cleaned and re-tested until clean.

Rinse water analysis for a porous surface such as concrete with known contamination will be supplemented by a destructive analysis that demonstrates that the surface concentrations represent the most highly contaminated material. Concrete which has been sealed or coated to effectively prevent the penetration of contaminants may be cleaned and tested, by using rinse water testing, as a non-porous surface.

B. PCB Management Buildings (Buildings where wastes containing PCBs were managed)

The clean closure of the PCB Storage Areas includes three major components: (1) removal of inventory, (2) decontamination, and (3) sampling.

Storage areas will be PCB wipe sampled after all TSCA wastes have been removed for disposal. The areas will be swept or vacuumed clean of all dust and debris and washed in accordance with section 1.8.2.A.

The effectiveness of the initial cleaning with regard to PCBs will be measured by standard wipe tests. Building areas may be decontaminated to 10 micrograms/100 cm^2 or less for the possibility of future reuse or to 100 micrograms/100 cm^2 for disposal as a solid waste (refer to the TSCA Approval Letter, dated December, 1994).

PCB wipe samples will be taken by using a random grid based sampling strategy (refer to section 1.10). If the grid area includes a location where PCBs would be suspected (e.g. sumps, trenches, low spots, etc.) the grid sample(s) will be strategically taken in these location(s).

If PCB wipe samples indicate greater levels than those listed above, washing or steam cleaning may be performed on those floor areas which are contaminated. Detergents may be used, if necessary.

If there is visual evidence indicating potential contamination (e.g. stains), the area will be decontaminated by washing or steam cleaning. Again, as above, a grid based sampling strategy will be applied. If the grid area includes previously stained location(s), or a location where PCBs would be suspected, the grid sample(s) will be taken in these location(s). In addition, a small quantity of final rinse water will be analyzed as indicated in Section 1.10.3 below to help determine if the effectiveness of the decontamination with respect to non-PCB contaminants.

If a location fails to meet the clean up criteria, it will be re-cleaned and re-tested until clean.

PCB wipe tests and rinse water analysis for a porous surface such as concrete with known contamination will be supplemented by a destructive analysis that demonstrates that the surface concentrations represent the most highly contaminated material. Concrete which has been sealed or coated to effectively prevent the penetration of PCBs may be cleaned and tested, by using PCB wipe tests, as a non-porous surface.

Any spent cleaning solvents and pads needed for decontamination will be landfilled on-site or shipped off site for treatment or disposal. Any rinse or wash water generated from cleaning of buildings will be treated in the on-site AWTS or shipped off site for appropriate disposal.

C. Office and non-waste management areas of buildings (Laboratories, SPEC Center, Office Trailers, Locker Room, Training Room, Fire Hall, etc.)

Buildings and rooms not used for management of waste materials include, but may not be limited to, offices, lavatories, employee lunch rooms or meeting rooms and records storage areas. As these areas should not be waste contaminated, the floors will be mopped with soapy water and the walls will be wiped down if dirty. No additional decontamination activities will be performed in these areas.

1.8.3 DECONTAMINATION AND REMOVAL AND/OR POTENTIAL REUSE OF TANKS

At closure, all possible/practicable material will be removed from on-site tanks. All pumpable free liquid will be transferred onto bulk liquid transporters or into drums or other suitable transport vehicles (i.e. "super suckers" or vac trucks) for disposal on-site or shipment to off-site hazardous waste management facilities. Residual semi-solid or solid materials will also be removed from tanks. These solids or semi-solids will be loaded into containers and managed on-site, if possible, or shipped to an appropriate off-site waste management facility.

According to the intended disposition of the closed tank, one the following three options will be followed:

- Disposal as a Hazardous Waste - Disposal in a Subtitle C hazardous waste landfill (TSCA landfill for PCB tanks), in accordance with the immobilization technologies in EPA's Hazardous Debris Rule. This entails cutting the empty tank into pieces, micro and/or macroencapsulation or sealing of the pieces, and disposal in an on-site or off-site hazardous waste landfill;

- Disposal as a Solid Waste - For RCRA tanks, disposal in a Subtitle D solid waste landfill after treatment in accordance with the extraction technologies in EPA's Hazardous Debris Rule. This entails use of one of the chemical or physical extraction technologies specified in the rule and achievement of a visibly clean surface (i.e. no greater than 5% of the total surface area remaining stained), prior to disposal in an off-site solid waste landfill. For tanks that are also PCB contaminated, decontamination in accordance with the procedures specified in the USEPA TSCA Approval Letter, utilizing the 100 ug/100 cm^2 wipe sample criteria; or

- Potential Reuse of the Tank on-site or off-site - (For a RCRA tank, treat as cited above for Disposal as a Solid Waste.) For tanks that are also PCB contaminated, decontamination in accordance with the procedures approved by the USEPA TSCA Approval Letter, to 100 micrograms/100 cm^2 for reuse as a non-PCB tank or to 10 micrograms/100 cm^2 for any use.

Any wastewater generated from washing will be collected and treated by the on-site Aqueous Wastewater Treatment System.

(**NOTE:** If the tank is to be reused as an on-site hazardous waste storage tank, CWM must first obtain a Permit modification in accordance with Condition B in Module IV of the Permit.)

1.8.4 ROADWAYS

All paved main roads and parking areas serving the facility, especially landfill areas, will be thoroughly swept. The sweepings will be landfilled on site or shipped off-site to an appropriate facility.

1.8.5 CONTAINMENT STRUCTURES AND UNDERLYING SOILS

1.8.5.1 Areas to be Demolished

The steps to closure include: **1)** removal and disposal of any materials inside the containment structures; **2)** inspection for cracks and staining; **3)** cleaning; and **4)** PCB wipe tests, if applicable. Once the concrete containment structures are removed, the underlying soil will be inspected, sampled and analyzed.

A. PCB areas (Areas where wastes containing PCBs were managed)

Random wipe tests will be done to determine if concrete meets "clean" parameters listed in Section 1.8.2.B If the containment area is "clean", the containment structure will not be considered TSCA regulated and will be landfilled in a secure landfill, on or off-site. If it does not meet the definition of "clean", the concrete will be removed and managed as PCB debris. If the storage area was also used to store other types of waste, the building/area will be cleaned also as outlined in Section 1.8.5.1.B below.

B. RCRA areas (Areas where wastes containing PCBs were never managed)

Containment areas will be cleaned using the same procedures as in Section 1.8.2.A (Non-PCB Building Decontamination). Due to the fact that any spills to a containment area are promptly cleaned up, internal contamination of the concrete is not expected in areas such as the parking containment area. A clean, debris-type surface will be verified. Several containment areas will be broken up and removed for disposal. The containment demolition debris will be landfilled on site if possible, or shipped to an appropriate waste management facility.

C. **Underlying soils**

Once the concrete is removed, the soil will be inspected for signs of contamination. Any soil showing contamination will be sampled as in Section 1.10.5. Depending on the characterization results, the soils will either be removed and disposed of in a RCRA and/or TSCA permitted landfill on-site or off-site, disposed of in a solid waste permitted landfill off-site or managed as a SWMU.

Characterization of underlying soils at any location where visual evidence of contamination exists (i.e. stained or discolored soils) will be sampled by using area-specific sampling grids as described in section 1.10.5 of this Plan.

Cracks or open seams in containment structures are unlikely, given the fact that, by law, all observable cracks and open seams must be documented and repaired under our current operating permit. However, any soils under identified cracks or open seams will be targeted for sampling using methodology described in section 1.10.5 of this Plan.

1.8.5.2 Areas to be Cleaned and to Remain in Place

Containment areas will be cleaned using the same procedures as described above in sections 1.8.2.A and/or B (depending on whether PCBs were managed in the area), tested as per 1.10.5.C and left in place. These containment areas either have a downgradient Groundwater Extraction System (GWES) in place which will address any potential contamination in the soils underneath or they are new, well managed containment areas with no major release history.

1.8.6 EQUIPMENT

All heavy equipment and equipment ancillary to storage tanks or waste management processes will be removed upon closure. The equipment will be either decontaminated and moved off site, or dismantled and landfilled.

A. **PCB contaminated equipment**

In keeping with 40 CFR 761.79(b), "Movable equipment used in storage areas shall be decontaminated by swabbing surfaces that have contacted PCBs with a[n appropriate] solvent." The equipment can also be cleaned according to an alternate decontamination procedure written in the TSCA Approval Letter. This procedure will be followed for equipment such as backhoes used in the landfill, where PCBs are managed, and forklifts used in drum storage areas.

Piping and pumps that conveyed PCB material will be drained or blown free of waste material and will be managed as TSCA debris.

B. RCRA waste contaminated equipment

Heavy equipment will be cleaned in the RMU-1 truck wash or an area established with containment, and washed using detergents as necessary. Ancillary equipment, such as piping and pumps, will be water flushed and managed as RCRA debris. After decontamination, salvageable equipment may be removed to another facility for use.

C. Virgin Product contaminated equipment

Ancillary process equipment on site that was not used to manage hazardous or PCB wastes will be water flushed for safety purposes and sent off site for reclamation or for disposal.

1.8.7 EMPTY DRUM MANAGEMENT

During the initial pre-closure inspection and inventory, inspectors should take special note of empty drums throughout the facility.

All drums which are to be considered "empty" must first undergo waste removal practices which are normally employed so that no drum has greater than one (1) inch of waste residue remaining in it. This will ensure that no empty drums or drums containing residual contaminants will remain on site without plans for ultimate disposal. Any drum containing solid residues of less than one inch will be sent off site to a drum reclamation facility or cut in half or shredded, in a contained area, and disposed of on site, or shipped off site to a secure landfill.

Any container that held an acute hazardous waste listed in 40 CFR Part 261.31, 261.32 or 261.33(e) will be considered empty if the procedures listed in 40 CFR Part 261.7(3) are followed.

Any drums located in process areas from which hazardous wastes have been removed for processing, but which remain partially filled will be collected and stored temporarily in the Drum Warehouse.

Drums with residual liquid waste will be bulked according to chemical composition based on their waste profile(s) and determined through compatibility analysis performed according to the procedure described in Section C-2h(2) of the Model City Facility Waste Analysis Plan. The empty drums will be managed as described above. Any drums that do not meet the definition of RCRA empty will be managed as containers of waste.

1.8.8 RINSE WATER/WASH WATER MANAGEMENT

Other than cleaning solvents, for example those used to remove PCBs, all wash/rinse waters are expected to be processed through Aqueous Waste Treatment System ("AWTS") during closure. AWTS is designed to treat multi-source leachate (waste code F039) to Federal Land Disposal Restriction (LDR) treatment standards. In addition, wash water for containment areas is not expected to be different from the rainwater that is collected in them and treated through AWTS currently. Therefore, AWTS should not have difficulty treating wash or rinse waters from site decontamination and no pretreatment analysis will be necessary. CWM plans to continue operating AWTS until the landfills cease to generate significant volumes of leachate or until a suitable off site disposal location is identified.

1.8.9 SITE MONITORING DURING CLOSURE ACTIVITIES

Closure is anticipated to take 6 months. During this time, groundwater wells, leachate collection systems and surface water discharges will continue to be monitored in compliance with all plans, permits and approvals associated with the facility during normal operations. After the facility is closed, post-closure monitoring will commence.

1.8.10 CONTINGENT CLOSURE FOR TANKS AND SURFACE IMPOUNDMENTS

During closure, tank systems and specific surface impoundments (i.e. Facultative Ponds 1, 2, 3, 5, and 8) will be emptied of all waste materials and any underlying contaminated soils will be remediated at that time. However, should it be necessary to leave any contaminated soils in place, pursuant to 6NYCRR 373-2.10(h)(2) and 373-2.11(f)(2), the affected units will be closed as landfills. Landfill closure of these units will require the full implementation of landfill closure requirements including capping and vegetating and will require the implementation of the applicable provisions of the Post-Closure Plans for secure landfills. Residual soil contamination may also be addressed as part of the ongoing facility RCRA Corrective Measures Study and Implementation, as described in Section 1.8.5.2.

1.9 HEALTH & SAFETY

Appropriate precautions must be taken to ensure that the closure activities are performed safely and using good industrial hygiene practices. As a result, personnel performing closure will need to have the appropriate OSHA 1910.120 training.

Task appropriate personal protective equipment (PPE) will need to be provided. If closure activities are performed by CWM personnel, the level of personal protective equipment required will be determined by the Site Safety Manager. Otherwise, contractors will need to determine activity specific PPE requirements.

PPE for most activities will most likely include hard hats, safety glasses or goggles, chemical resistant coveralls, gloves, steel-toed boots, and air purifying respirators. A positive-pressure self-contained breathing apparatus with full-face masks will probably be necessary for initial tank and vessel entry. OSHA Confined Space Entry procedures will be followed at all times for vessel entry. Organic vapor-acid gas respirators with hard hat and appropriate eye protection may be used for later stages of the decontamination or when workers are performing moderate hazard activities.

Also, appropriate personnel decontamination procedures must be followed. Facilities will be provided for personnel decontamination at the completion of each work interval. PPE cleaning solutions associated with closure activities related to specific waste management units will be disposed of appropriately with the building or equipment cleaning rinse waters generated from the decontamination of the same unit.

1.10 ANALYTICAL VERIFICATION OF CLEAN CLOSURE

1.10.1 QUALITY ASSURANCE

The following paragraphs describe the sampling methods that will be employed to ensure that representative samples are taken. The sampling locations and/or frequency are specified in section 1.11 - Unit-Specific Closure Activities, with additional information in the unit-specific sections of the Site-Wide Closure Cost Estimate. The average grid size is 22,500 sq. ft. (150 x 150) for soil composite samples and 625 sq. ft. for PCB wipe samples (see also unit specific sections, grid size varies depending on unit configuration). One field duplicate will be collected for every 20 samples. One tap water "blank" will be taken and analyzed for background information on the water washing samples. For the soil samples, one equipment "blank" will be prepared by rinsing one of the disposal plastic scoops into a sample bottle.

The samples will be preserved as follows: volatiles, semivolatiles and PCBs, store at 4 C; aqueous samples for metals, pH < 2 with nitric acid. The samples will be analyzed by a NYS certified lab in order to ensure that high quality analytical data is obtained. The analytical methods to be employed are listed below:

analyte(s)	method
PCBs	8082
Volatile Organics (VOC)	8260
Semivolatile Organics	8270
Priority Pollutant Metals (metals)	6010 or other individual SW-846 methods

The exact reference and edition to be followed for each method is listed in the Waste Analysis Plan, Attachment C of the 373 Permit. The analytical data will be reviewed and a determination made whether a unit meets the closure specifications as part of the preparation of the closure certification.

1.10.2 PCB MANAGEMENT AREAS (Areas where wastes containing PCBs were managed)

A. TSCA Requirements for Clean Closure

As provided in CWM's TSCA Approval Letter (December, 1994), building and storage areas will be decontaminated to 10 micrograms/100 cm^2 or less for reuse or to 100 micrograms/100 cm^2 or less for disposal as solid waste. Tanks may be decontaminated to 100 micrograms/100 cm^2 for reuse as a non-PCB waste tank or to 10 micrograms/100 cm^2 for any use, or properly disposed in a RCRA/TSCA landfill (see Section 1.8.3).

B. PCB sampling procedures

Procedures for closure sampling are outlined in this section. The procedures for sampling done prior to decontamination are identical to those that will be used for sampling after decontamination.

All sampling will be in accordance with US EPA-approved methods. The analysis of the wipe samples will conform to US EPA SW-846 method 8082. CWM may use either the on-site lab or a local contract laboratory, or another CWM laboratory to perform this analytical work as long as any such laboratories are certified for the subject parameters in accordance with the NYSDOH's Environmental Laboratory Approval Program (ELAP). Regardless of the laboratory chosen, the Quality Assurance Plan of the selected laboratory will be used as a basis of ensuring that all analytical data is valid.

Grid-based sampling will strategically encompass low areas on the floor of each storage area (i.e. sumps, collection trenches, etc.) and stained/discolored areas since these are the most likely places where any released PCBs may have become concentrated. A representative number of low areas will be sampled, e.g., one per grid section, if present.

Sampling may be performed on the inside and top surfaces of curbing, ramps, railings, floors, sumps and trenches, if contamination is suspected.

If initial wipe tests indicate that PCBs are present above the PCB clean up levels, the surface areas will be decontaminated and re-sampled. If decontamination is necessary, areas where visual signs of contamination existed or that previously failed wipe tests will be re-sampled after decontamination.

For a tank, at least two samples will be taken; one at the bottom and one at the high liquid level. Up to three additional samples may be taken if areas of corrosion or damage is noted.

Once the sampling locations are chosen, the basic steps in the sampling program are shown below:

1. The designated sampling areas/points will be marked, using a template or ruler, into sections that are 10 centimeters by 10 centimeters.

2. A cotton swab pre-moistened with hexane will be removed from the previously-prepared sampling vial. Wiping of the marked area will begin immediately. Gloves will be worn by the sampler at all times to prevent cross-contamination.

3. The surface to be sampled will be wiped with uniform pressure, in a manner such that the entire area is wiped two times, thoroughly and consistently, each time being from a different direction and orientation.

4. The swab will then be returned to the sampling vial.

5. The vial will be capped, labeled, and prepared for shipping. A chain-of-custody form will be prepared.

1.10.3 RINSE WATER ANALYSIS FOR DECONTAMINATION VERIFICATION

Due to the intended closure in place, in addition to achieving a clean debris-type surface, a rinse with a minimal amount of water will be performed and a sample will be collected and analyzed. The samples will be analyzed for VOC contamination. The results of the sampling will be used to determine the effectiveness of the decontamination.

The criteria that will be used to determine cleanliness is 300 ppb or less for methylene chloride and 100 ppb or less for all other volatile organic constituents. If a sample does not meet the cleanup criteria, the washing process will have to be repeated and another sample collected.

1.10.4 WASTE RESIDUE ANALYSIS

Analytical results and/or generator knowledge of the waste will be used to characterize any residues removed from RCRA empty containers prior to on-site or off-site disposal.

1.10.5 SITE SAMPLING AND ANALYSIS

A. Standard soil sampling and analytical

All soil sampling will be conducted using area-specific sampling grids collecting samples from one or more subsurface lifts.

A 150 ft. x 150 ft. average grid size will be used for sampling purposes, each containing 4 random samples (1 in each quadrant). The most likely area of contamination within each quadrant, if present, will be targeted for sampling. Grid sizes may fluctuate depending on location.

Soil will be tested to determine if contamination is present above documented background levels. Characterization of underlying soils at any location where no visual evidence of contamination exists (i.e. stained or discolored soils) will be randomly sampled by using area-specific sampling grids.

Cracks or open seams in containment structures are unlikely, given the fact that, by law, all observable cracks and open seams must be documented and repaired under our current operating permit. However, any soils under identified cracks or open seams will be targeted for sampling.

The samples removed from each grid square will be representative of the horizontal composition of the soil mixture. The number of samples and grid size will vary, however the sample collection will follow the procedure below:

1. New disposable scoops will be used to collect all soil samples.

2. For the uppermost sample, the soil from an area approximately one square foot will be loosened and placed into a new, unused "compositing bottle" prior to placement in the sample bottles. Surface samples from the other grids in the area would be similarly collected and composited.

3. The lower soil samples will be collected by removing additional soil with a sturdy trowel from the same one foot square area to the specified level (e.g. 6 inches). The lower soil samples will be similarly composited and bottled.

4. Assuming the trowel will not be decontaminated between sample locations, any portion of the sample which may have contacted the trowel will be discarded.

5. Each individual sample will be thoroughly mixed prior to compositing. Composite samples will then be mixed to produce a sample that is representative of the horizontal component of the grid section.

6. Each sample will be recorded, preserved if necessary, and packaged for analysis following appropriate handling and chain-of-custody procedures.

Unless otherwise mentioned, soil will be analyzed using a two tiered approach. First it will be typically analyzed for parameters like Priority Pollutant Metals and Organics. A minimum of one "grab" sample will be taken within each grid square for VOC analysis. The criteria used for determining whether or not clean closure has been obtained are those presented in Table 375-6.8(b) for industrial facilities in accordance with NYSDEC Commissioner Policy – 51 (CR-51).

Results from soil analyses will be compared to the above indicated criteria to determine whether or not clean closure has been achieved. If clean closure has not been established for a given area, then a determination can be made as to what type of management method will be needed. Options may involve invoking the Contingent Closure Plans or removing contaminated soil or treating contamination by immobilization technologies, direct landfilling, incineration, etc. Another option would be to follow Corrective Measures guidance, with options of possibly leaving low levels of contamination in place with institutional controls.

B. Fac Pond bottoms sampling and analytical

Following discharge of the treated effluent, the bottom soils and sediment will be sampled and analyzed to determine their characteristics. A grid system which divides the ponds into approximate 200 ft. x 200 ft. areas will be set up in each emptied facultative pond and core samples will be taken inside each grid and composited. An approximate 100 ft. x 100 ft. grid squares will be used for closing Fac ponds 1 & 2.

Samples will be collected and composited in the following manner:

1) Five sample locations from each grid will be randomly selected;

2) From four (4) of the five locations within each grid, a core will be taken from which:

   A) the top one inch (1") from each core will be composited to represent the upper stratigraphy, and;
   B) at a point six inches (6") below the upper layer, a composite will be made from each core to represent the lower stratigraphy.

   Both the upper and lower composites from these four (4) locations will be tested for priority pollutant metals.

3) From the fifth location in two of the grids, a grab sample will be taken at a depth of six inches (6"), and analyzed for 6 NYCRR Part 373 Appendix 33 constituents; and

4) From the fifth location in the remaining grids, a grab sample will be taken at a depth of six inches (6") and analyzed for priority pollutant organics.

C. Concrete containment sampling

Containment areas will be cleaned using the same procedures as in Section 1.8.2.A (Non-PCB Building Decontamination). If PCBs were stored in the containment area, PCB wipe tests will be taken as described in 1.10.2.B.

For areas with no apparent contamination, the concrete will be broken up as indicated in Section 1.8.5.1 and disposed of.

If concrete containment is to be left in place, a small amount of rinse water will be collected and analyzed for VOCs to ensure that stormwater runoff is not impacted.

1.11 UNIT-SPECIFIC CLOSURE ACTIVITIES

1.11.1 FACULTATIVE PONDS (1, 2, 3, 5, and 8)

Facultative (fac) ponds 1, 2, and 5 will be retained to serve as part of the post-closure wastewater treatment system for leachate management and treatment and will not be closed until the AWTS ceases operation. Fac Pond 8 is currently in the process of being closed. Fac Pond 3 will be closed when the proposed RMU-2 landfill is expanded beyond the first stage of development. The following assumptions were made in developing this closure plan:

All fac ponds will contain treated aqueous treatment plant effluent at the time of closure;

- Treated effluent will be discharged to the Niagara River under the conditions set forth in the SPDES permit for the facility in effect at the time of closure;

- Soils will be sampled and analyzed as described in Section 1.10.5 to verify no contamination is present (as previously demonstrated during other on-site pond closures);

- Clean fill will be used to regrade the facultative pond areas to prevent wind erosion and ponding of precipitation and runoff. This fill will supplement the use of the existing earth berms for regrading;

- Tankage and associated piping, valves, aerators and appurtenances will be disposed of off site, or on site if possible.

Treated effluent from AWTS will be pumped out of each fac pond and discharged via the SPDES permitted outfall to the Niagara River. This effluent will meet the concentration limitations specified in the SPDES discharge permit. In light of the large volume of effluent which may need to be discharged during closure, it may be necessary to discharge the maximum expected inventory over a two-year period. This will allow the closure of the fac ponds to be scheduled so that periods of low flow (winter) can be avoided during the discharge of the effluent to the Niagara River.

Closure of the fac ponds will begin after all effluent is removed. Once the discharge is completed, the bottom soils and sediments will be sampled and analyzed to determine their characteristics as specified in Section 1.10. Removal of soil/sediment from the bottom of a fac pond will be based on the results of the initial sampling and analysis program. If concentrations of hazardous constituents do not exceed the criteria indicated in Section 1.10.5.A, no removal will be performed prior to regrading. In this event, the results of the initial sampling and analysis program will be used to demonstrate clean closure.

If concentrations of hazardous constituents exceed the criteria indicated in Section 1.10.5.A in the surface samples, but not in the samples taken at six inches below the surface, a minimum of six inches of material will be removed from the bottom of the facultative pond and disposed of properly. In the event that materials are removed, post-removal sampling will be conducted to confirm that the indicated criteria have been achieved. The sampling and analysis program described in Section 1.10 will be repeated (including sampling locations and analytical parameters) except that only the one inch surface samples will be collected. The results of the post-removal sampling will be used to demonstrate clean closure.

If concentrations of hazardous constituents exceed the criteria indicated in Section 1.10.5.A in the subsurface samples, but not in the surface samples, the upper twelve inches of material will be removed from the bottom of the facultative pond and disposed of properly. In the event that materials are removed, post-removal sampling will be conducted to confirm that the indicated criteria above have been achieved. The sampling and analysis program described in Section 1.10 will be repeated (including sampling locations and analytical parameters) except that only the one inch surface samples will be collected. The results of the post-removal sampling will be used to demonstrate clean closure.

Facultative Pond 8 has been dewatered and the results of sampling and analysis of bottom soils conducted in August 2005 have indicated that the concentration of chemical constituents meet the criteria used for determining whether or not clean closure has been obtained as presented in Table 375-6.8(b) for industrial facilities in accordance with NYSDEC Commissioner Policy – 51 (CR-51). Results of the RCRA chemical closure of Fac Pond 8 were provided to the NYSDEC in November 2009. Consequently, it is assumed that clean closure of this impoundment, can be completed without the removal of bottom soils.

Unless a modified closure is approved by NYSDEC, the Facultative Pond area will be regraded and filled by leveling the existing perimeter berms, and if necessary, utilizing clean backfill from on-site borrow areas. This earthwork will be accomplished using bulldozers and graders, and the closed Facultative Pond areas will be filled and re-graded to promote drainage and conform with the surrounding ground elevations. The backfill soil and collapsed berms will not be compacted. No clay cover or other type of final cover will be required because the closed and regraded pond areas will then be seeded and fertilized to re-vegetate the bare soil and promote drainage which will conform to the overall site drainage patterns. . Fac Ponds 3 and 8 will not be backfilled due to their location within the proposed footprint of Residuals Management Unit No. 2 (RMU-2). Fac Ponds 3 and 8 will however, still be subject to all required chemical testing and disposal requirements in accordance to this closure plan.

Fac Ponds 3 and 8 are located within the proposed footprint of RMU-2 and will be closed for development of the landfill. To partially replace the storage volume reduction from closure of Fac Ponds 3 and 8, a new Fac Pond 5 will be constructed. New Fac Pond 5 will be constructed with a liner system to comply with 6 NYCRR Part 373-2.11. Fac Pond 5 will be designed with a double composite liner system and ballast material above a three (3) foot compacted clay layer. This new double composite liner system includes a three (3) foot compacted clay layer, a 30-mil secondary geomembrane layer, a geocomposite layer, a geosynthetic clay liner, a 30 mil primary geomembrane layer, a non-woven geotextile layer, and a one (1) foot thick ballast layer (crushed/screened stone). The closure of Fac Pond 5 will include the removal of ballast materials and double composite liner system components, excluding the 3-foot secondary clay liner. The clay liner will remain in place and is subject to required chemical sampling as indicated in Section 1.10.5(b).

1.11.2 PCB WAREHOUSE

The PCB Warehouse will be decontaminated as indicated in Section 1.8.2.B. As both TSCA and RCRA materials are stored in this building, sampling will be conducted using the procedures in Section 1.10.2 and 1.10.3. In addition to grid sampling in the storage areas, the loading/ unloading area and the direct pathway from the loading/unloading area to the storage area will be sampled. CWM will use a path that generally follows the route of movement of wastes once received at the facility. If any signs of spillage are observed outside the warehouse, those areas will be sampled, analyzed and decontaminated if necessary. This building and the adjacent driveway will remain after closure.

Based on past CMS investigations of the area to the south of the warehouse, soils contamination has been indicated. The Draft Addendum to the Site Wide and SWMU Specific CMS (Golder Associates Inc., July 1996) was submitted to the agencies on July 2, 1996. Installation of a Groundwater Extraction System (GWES) in this area was completed in 1997 and is now operational. Financial assurance for the operation of this system has been included with the other GWES.

1.11.3 DRUM STORAGE BUILDING

The Drum Storage Building will be decontaminated as indicated in Section 1.8.2.B. As both TSCA and RCRA materials are stored in this building, sampling will be conducted using the procedures in Section 1.10.2 and 1.10.3. In addition to grid sampling in the storage areas, the loading/ unloading area and the direct pathway from the loading/unloading area to the storage area will be sampled. CWM will use a path that generally follows the route of movement of wastes once received at the facility. If any signs of spillage are observed outside the warehouse, those areas will be sampled, analyzed and decontaminated if necessary. This building and the adjacent driveway will remain after closure.

1.11.4 PROCESS AREA

The Process Area was previously used for various solvent recovery and fuels blending operations which are no longer present. Previous fuels tanks in this area have been removed (see Section 1.5). Secondary containment for the tanks has been decontaminated and the run-off from the concrete has been demonstrated to be suitable for management as surface water. At closure, the "T.O." Building, where transformers are emptied and PCB oils are stored, will be decontaminated as indicated in Section 1.8.2.B.

During the RFI investigation in 1991, more than 400 soil samples were taken in the area identified as Groups G & H (Process Area, including Tank Farms A, B, C, D, E, Distillation and Thermal Oxidation Areas) in the Corrective Action Module of the Sitewide Permit (see Schedule 1, Exhibit B and Attachment E). Based upon the volatiles and PCB contamination found throughout this area, it was determined that a release has occurred from the tanks formerly located in this area, and that the area must be managed as a SWMU and in accordance with 6 NYCRR 373-2.14(g)(2)(i) and (v).

To prevent the migration of the contamination within the soil, two Interim Measures Ground Water Extraction Systems (Process Area I and II) were installed down gradient of the Process Area. In January, 1995, as required by 6 NYCRR 373-2.6 and the Corrective Action Module, CWM submitted a report titled SITE-WIDE CORRECTIVE MEASURES STUDY. The contamination found in the Process Area was described in Sections 6.1, 6.2, and Table 6-14. The risk assessment for various exposure pathways (present and future) is discussed in Section 6.3. Section 10.3 includes the recommendation for Corrective Measures for this area. It includes continued groundwater sampling, continued operation of PA I&II GWES and a Facility Awareness program to communicate the potential for exposure if excavation is performed in the future. Construction of a DNAPL collection system for EW10 and EW13 was completed in 1997 and is now operational.

Since the RFI has determined that there is contamination throughout the Process Area, there is no need to sample the soil beneath this area. The site-wide CMS submitted in January, 1995 included a risk assessment of this contamination and proposed appropriate corrective measures. Based on the “Statement of Basis” issued by the NYSDEC on January 31, 2001.

Additional soil sampling and analysis have been included for the Process Area. The Draft Addendum to the Site Wide and SWMU Specific CMS (Golder Associates Inc., July 1996) was submitted on July 2, 1996. This addendum included a provision for an additional groundwater extraction trench to be constructed north of the Lagoons Area which was completed in 1997 and is now operational.

Continued operation of the GWES is addressed in the Financial Assurance Plan for Interim Measures Systems.

1.11.5 AQUEOUS WASTE TREATMENT SYSTEM (AWTS) AND CALGON BUILDING

AWTS is the only unit likely to remain operational during the landfill post-closure period. The unit will continue to process leachate from the on-site landfills until it is decided to ship the leachate off site for treatment or disposal. At that time, AWTS will undergo closure. All buildings used for solid, hazardous or TSCA waste storage or management will be thoroughly decontaminated and left standing at closure. All waste storage, process, and reagent tanks will be managed as indicated in Section 1.8. AWTS storage tanks that manage waste prior to it being filtered through the carbon absorption unit are assumed to have contacted PCBs at greater than (>) 50 ppm by contact PCBs and therefore must be managed as TSCA/RCRA wastes. Tanks will be emptied and managed as indicated in Section 1.8.3. Ancillary piping and pumps will be managed in accordance with Section 1.8.6.

The filter presses will be pressure washed and then wipe tested for PCB contamination. If PCB contamination is present, the presses will be dismantled and managed as TSCA waste.

The carbon absorption unit will be emptied and its contents will be shipped off-site for regeneration or incineration. The tank itself will be decontaminated and disposed of on site or at an off-site landfill.

Process and holding tanks in line after the carbon unit will be rinsed, dismantled and disposed of in compliance with Federal Land Disposal Restrictions.

Tank containment areas external to the buildings will be managed as described in Section 1.8.5.2. The containment areas surrounding the AWT facility are considered part of the process area and will be addressed as described in section 1.11.5. The tank containment for the leachate storage tanks T-101, 102, 103 will also be cleaned as per 1.8.5.2 and left in place.

1.11.6 STABILIZATION

The Closure Plan scenario is based upon the following:

- Treatment of remaining inventory through the Stabilization Unit or removal for treatment off site;

- On or off-site disposal of remaining waste residuals and raw materials;

- Sampling for PCB contamination;

- Decontamination of treatment units, equipment and building;

- Dismantling or removal of equipment for reuse or disposal;

All buildings and equipment to be decontaminated will be cleaned as specified in Section 1.8.2 and 1.8.6. Both the pits and the drum shredder area manage PCB wastes. The pits will be subject to PCB wipe sampling to confirm decontamination as provided for tanks. Further, the air pollution control equipment (i.e. duct work, baghouses) is also PCB contaminated equipment and will be dismantled and disposed of as RCRA and/or PCB debris. All tanks will be managed according to Section 1.8.3. Wash waters will be collected and analyzed as indicated in Section 1.10.3. Collected decontamination rinsate will be treated in the on-site AWTS, as well as the process water contained in the two (2) 20,000 gallon storage tanks. Solid treatment residuals will be disposed of on-site or at an appropriate off-site facility.

The trailer staging area, as a concrete and paved area, will be managed as per 1.8.5.2 and left in place. The area will be decontaminated in the same manner as the building and must be subject to PCB sampling and decontamination as per 1.8.5.1.A. The entire Stabilization process, including the roll-off storage area, is contained. Therefore, soil sampling and analysis will be unnecessary. Roll-off boxes will be decontaminated and sold for reuse or reused at Model City or another CWM facility. Unused reagents will be transported to another site for use or will be used at Model City. Reagent containers will be managed as specified in Section 1.8.3.

1.11.7 RMU-1

The Closure Plan for Residuals Management Unit No. 1 (RMU-1) is part of the RMU-1 Part 373 Permit.

1.11.8 RMU-2

The Closure Plan for Residuals Management Unit No. 2 (RMU-2) is part of the RMU-2 Part 373 Permit.

1.11.9 LABORATORY

The main laboratory at Model City will remain standing at closure, but will be emptied of all chemicals, samples and waste materials and decontaminated as specified by Section 1.8.2. All other laboratories on site will be emptied and cleaned in a similar fashion.

1.11.10 TRUCK WASH AREA AND BUILDING

The truck wash building will be one of the last units to be closed. It will be decontaminated in keeping with Section 1.8.2.

1.11.11 TRUCK SAMPLING AREA

The truck untarping and sampling area is unpaved and will be subject to random soil sampling. The approximately 2,500 square foot area (50' x 50') will be divided up into a grid of 10 ft. x 10 ft. squares. Each square will have one (1) randomly selected sample taken at a depth of 1 inch. Sampling in this area will be primarily to verify that no contamination is present and will be conducted as specified in Section 1.10.5.A. Samples will be composited according to quadrant into four (4) composite samples that will be analyzed for PCBs, VOC, and metals. In addition, the sampling platforms will be removed and scrapped or landfilled.

1.11.12 TRAILER PARKING AREA

The Full Trailer Park will be managed as a concrete containment structure in accordance with Sections 1.8.5.1.A & 1.10.2.B since this area may be used for storage of PCB wastes.

The Trailer Staging Area is permitted for the storage of full and empty roll-offs or cargo tanks. All full containers will be managed on site, if possible, or shipped for appropriate disposal off site. The "full" side is concrete and will be swept as indicated in Section 1.8.4 and then washed, with the rinse water analyzed as spelled out in Section 1.10.3. The criteria in 1.10.5.C will be used to determine if the concrete is clean. Due to the long history of use for this unit, the concrete will be removed and disposed of on site or at an appropriate off-site facility. The underlying soil will be sampled in similar fashion to the unpaved portion of the parking area as indicated below.

The "empty" side is unpaved and will be sampled to verify that no contamination exists. The lot will be divided up into fifty foot grid sections (50' x 50') and two random surface soil samples will be taken per grid section. The samples will be composited and analyzed in keeping with Section 1.10.5.A.

If any staining or visible contamination is present on either side, additional analysis and decontamination will be performed in keeping with this plan.

2.0 CLOSURE COST ESTIMATE

A Closure Cost Estimate has been developed which represents the cost of closure of the entire Model City facility. A copy of the Closure Cost Estimate will be kept on file at the facility and will be updated annually to reflect changes in costs brought about by inflation or deflation and by changes to facility units or operations. The Department of Commerce's Annual Implicit Price Deflator for Gross National Product (published by the U.S. Department of Commerce in the publication "Survey of Current Business") will be used to make adjustments.

3.0 FINANCIAL ASSURANCE FOR CLOSURE CARE

CWM Chemical Services, LLC, has established surety bonds as the selected financial assurance mechanisms for closure of the Model City facility. These financial assurance instruments have the New York State Department of Environmental Conservation as beneficiary.

SECTION I.2

RMU-2 Post Closure Plan

Imagine the result

WASTE MANAGEMENT, INC.

CWM Chemical Services, LLC

Post-Closure Plan

Residuals Management Unit 2

Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

April 2003
Revised August 2009
Revised February 2013

Tables

1. Post-Closure Procedures and Activities

1.1 Introduction

This Post-Closure Plan for the Residuals Management Unit 2 (RMU-2) at the CWM Chemical Services, LLC (CWM) Model City Facility has been developed in accordance with the requirements of 6 New York Codes, Rules and Regulations (NYCRR) Subpart 373-2, Sections 373-2.7, 373-2.8 and 373-2.14(g). A cost estimate for the post-closure care for RMU-2 has been submitted under separate cover.

All hazardous waste disposal units are required to have a Post-Closure Plan that identifies the activities that must be carried on after the facility is closed. The regulations require that post-closure care of the facility be continued for 30 years after the date of completion of closure, unless the Commissioner of the New York State Department of Environmental Conservation (NYSDEC) has determined that a reduced period is sufficient to protect human health and the environment. However, in the case of RMU-2, CWM will provide post-closure care in perpetuity, unless this permit condition is changed or deleted by a modification granted by the Commissioner.

This Post-Closure Plan provides: 1) that the need for further maintenance is minimized and 2) that the post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall or waste decomposition products to groundwater or surface waters or to the atmosphere is controlled, minimized or eliminated so as to protect human health and the environment.

This Post-Closure Plan for RMU-2 at the Model City Facility identifies post-closure care activities that will be carried out after closure and certification of closure. This Post-Closure Plan presents the requirements for periodic groundwater and leachate monitoring, site inspections and maintenance activities, as well as measures to restrict site access. The Post-Closure Plan provides that potential pollutant migration from the facility via groundwater, surface water and air is controlled. This is discussed in the Model City Post-Closure Groundwater Monitoring Plan (Section 1.4.1) and the Model City Leachate Monitoring Plan (Section 1.4.2). There will be no potential for migration via surface-water pathways because all disposal units will be closed.

A copy of the approved Post-Closure Plan and any subsequent revisions will be kept at the Model City Facility until the facility post-closure period begins. At that time, an updated copy of the approved plan will be kept at the corporate offices of Waste Management, Inc., presently located in Houston, Texas.

During the unit's operational lifetime, conditions or operations may be modified such that the Post-Closure Plan will require changes. The general manager, or his designate, will be responsible for maintaining and updating this Post-Closure Plan. The general manager may be contacted at the following address and telephone number:

Mr. Michael Mahar
District Manager
CWM Chemical Services, LLC
1550 Balmer Road
Model City, New York 14107
(716) 286-0241

According to 6 NYCRR Part 373-2.7(h)(4), the owner or operator may request a permit modification to authorize a change in the approved Post-Closure Plan in accordance with the applicable requirements of Subpart 373-1 and Part 621 of Title 6. For a proposed change in facility design or operation, the owner or operator must submit a written request for a permit modification at least 60 days prior to the proposed change, or no later than 60 days after an unexpected event has occurred that has affected the Post-Closure Plan.

1.2 Post-Closure Activities

This Post-Closure Plan addresses post-closure facility care of RMU-2 at the Model City Facility. The post-closure care period will begin when the unit is closed. During the post-closure care period, it is assumed that the on-site permitted aqueous waste treatment operations will continue for leachate treatment. However, this operation may be carried out at an off-site plant. The year 2041 is projected as the final closure date for the Model City Facility, except for essential processes, such as the aqueous waste treatment operations. RMU-2 final closure is projected for 2025, assuming initiating operations in 2014 and a maximum disposal rate of 500,000 tons per year. Disposal at a lower rate will extend the landfill life.

1.3 Post-Closure Inspection Plan

The closed unit (RMU-2) listed above will be inspected at the frequencies listed in Table 1 and/or after storm events resulting in 4 or more inches of liquid precipitation per 24 hours. The purpose is to provide for the continued operation of the final closure measures taken to prevent migration of hazardous constituents. Inspection of the general site will focus on access barriers and security control devices (e.g., fences, locks, gates) to see that they are visible and functioning properly. The components of RMU-2 that will be inspected include: 1) the cover, 2) the stormwater control system, 3) the leachate collection system, 4) the leachate detection system, if applicable, 5) the groundwater monitoring system and 6) mechanically stabilized earth (MSE) wall. Inspection procedures for each of these items are described in more detail below. Criteria for the post-closure inspection are included in Sections 1.3, 1.4 and 1.5.

The cover will be inspected for: 1) the condition of the vegetation, 2) signs of erosion and 3) subsidence. Inspections will include visual observations to determine any gross movement of the slopes and settlement of the structure. Cap settlement will be monitored by this inspection activity. When an inspection shows that sections of the cover have subsided, those sections will be repaired in a manner consistent with the nature of the subsidence; that is, by appropriate backfilling, regrading and/or reseeding.

The protection provided by the cover vegetation should be complete; repairs to bare spots will include reseeding, fertilizer application and soil conditioning. As part of the visual inspection, the inspector will look for erosion rivulets or slides on the slopes; for signs of settling and unevenness along the top edge and for signs of accumulated liquids (puddles, dampness) on the sloping sides of the berms. The facility manager (or his designee) will review the inspector's comments and determine what maintenance work is needed to correct the problem. Mitigating actions that may be implemented include improving the vegetation and altering contours to prevent stormwater runoff from reaching scour velocities.

Additionally, inspections will be conducted in the event of specific regional seismic events of at least a Richter Scale magnitude of 6.5, within a 100-mile radius of the Model City Facility. Visual inspections of all units will be conducted with the objective of noting any surface cracking and/or signs of geotechnical instability (e.g., twisting, cracking or rotating of tanks, containment areas, manholes, sideslope risers, vaults or other objects) and noting of tension cracks in any structures within the affected areas.

Stormwater runoff is controlled by a series of drainage ditches. The drainage ditches will be inspected for surface deterioration (i.e., erosion), and following 24-hour, 25-year frequency storm events resulting in 4 or more inches of liquid precipitation per 24 hours. Such surface deterioration will be repaired as weather conditions permit. Diversion ditches and culverts will be inspected at the same monthly intervals to see that silt, weeds or debris do not accumulate and interrupt flow. The drainage ditches, diversion ditches and culverts will be kept cleared and functional.

The leachate collection and transmission systems will be inspected to determine that they are operational. The inspection will cover the physical condition and operational status of the manholes, sumps, pumps, valves, piping and electrical system. Any operational problems identified will be remedied.

If leachate is being treated through the on-site aqueous waste treatment system (AWTS), the leachate collection system, as an operating waste management unit, will be monitored and inspected by using the inspection schedule as required under the Part 373 Facility Inspection Plan. However, once the AWTS ceases to treat the leachate, the leachate-level alarm systems will continue to be inspected at the frequency specified in Table 1. In addition, leachate inventory will also be checked. This inventory may be performed less frequently, as leachate production drops off.

If a primary leachate pipe is determined to be leaking, that line shall immediately be removed from service. It shall be repaired or replaced and tested prior to being returned to service. During this period, alternate leachate pumping shall be conducted.

The groundwater monitoring system will be inspected during each sampling event to determine that it is functioning properly. Monitoring wells and casings will be inspected for defects and to determine that covers are secured. Groundwater sampling pumps will be replaced or repaired whenever a sufficient sample cannot be obtained.

The MSE wall will be visually inspected annually by a Qualified Geotechnical Engineer. The inspections will specifically target observations of horizontal movement along the top and the toe of the berm, signs of vertical movement (settlement) along the slope, significant change in the slope of the berm facing, significant erosion and the condition of vegetation.

1.4 Post-Closure Monitoring Plan

1.4.1 Groundwater Monitoring Plan

1.4.1.1 Introduction

Upon completion of the useful life of RMU-2, the unit will be capped. However, given that wastes will remain within the unit, the potential for leachate migration and subsequent contamination of groundwater will exist. In accordance with 6 NYCRR 373-2 Regulations, a Groundwater Sampling and Analysis Plan (GWSAP) has been developed for the Model City Facility.

The pre-closure GWSAP will be followed during the post-closure period in order to provide a means to detect the presence of hazardous constituents and to prevent their migration from the Model City Facility. The plan will utilize the monitoring wells installed for the active facility groundwater monitoring program.

1.4.1.2 Sampling Locations

The facility groundwater monitoring well locations discussed in the pre-closure plan will also be used for monitoring the groundwater in Zones 1 and 3 during the post-closure period. Information on monitoring well locations can be found in the GWSAP.

1.4.1.3 Monitoring Parameters

Sampling parameters required during the post-closure period by the NYSDEC and United States Environmental Protection Agency (USEPA) are listed in the GWSAP and the Toxic Substance Control Act Approval Letter issued by the USEPA.

The sampling parameters anticipated for the post-closure period for RMU-2 are summarized as follows:

Unit No.	Parameters
RMU-2	pH
	Specific Conductivity
	Site-specific Volatile Organic Compounds (VOC)

1.4.1.4 Sampling Methods

The sampling methodology for RMU-2 discussed in the GWSAP will be followed in the post-closure period. In addition, CWM will keep records of sampling and the associated groundwater elevations throughout the period of post-closure. The sampling devices installed in the wells will be used during post-closure sampling. The operation of these devices is described in the GWSAP.

The monitoring wells will be checked periodically when sampled to determine that they are functioning properly over the post-closure period. Inoperable wells will be appropriately decommissioned, as required by the NYSDEC-approved well abandonment procedures (see B. Senefelder to P. Counterman 6/5/89).

1.4.1.5 Analytical Methods

The organic constituents selected for the Detection Monitoring Program will be analyzed according to USEPA SW-846 procedures. As the samples are taken, specific conductivity and pH will be measured using field meters. The methodologies that will be used for sample analysis are contained in the GWSAP.

1.4.1.6 Monitoring Frequency

The monitoring schedule utilized during the post-closure period will be to sample the wells that were installed as part of the facility GWSAP for RMU-2. All wells for RMU-2 will be sampled as indicated in Table 1. Sampling parameters are listed in Section 1.4.1.3.

1.4.2 Leachate Monitoring Plan

1.4.2.1 Introduction

The liquid in the secondary leak detection systems will be pumped weekly, and the calculated gallons per acre per day will be used for comparison to the volumes contained in the RMU-2 Response Action Plan. Secondary leachate will be sampled and analyzed as specified in this section.

1.4.2.2 Sampling Locations for Secondary Leachate

Required sampling will occur at the secondary sideslope riser of each cell.

1.4.2.3 Monitoring Parameters and Frequencies

Leachate will be sampled and analyzed for the following:

- Primary standpipes will be sampled biannually for Priority Pollutant (PP) Metals, polychlorinated biphenyls and VOCs.

- Secondary standpipes will be sampled biannually for VOCs and annually for Organic Priority Pollutants and PP Metals.

1.4.2.4 Sampling Methods

The sampling methodology will be consistent with USEPA-recognized methods. When samples must be collected from sideslope risers, the pump located in each collection sump will be used to draw samples. If no pump is present or if the pump is non-operational, an alternate method, such as a dipper bottle will be used. Records of the sampling and analysis will be maintained throughout the post-closure care period.

1.4.2.5 Analytical Methods

VOCs will be analyzed according to USEPA SW-846 procedures. Some of the methods that will be used for sample analysis are contained in the documents entitled *Methods for Chemical Analysis of Water and Wastes* (USEPA 600/4-82-55) and the current edition of *Standard Methods for the Examination of Water and Wastewater*.

1.4.2.6 Monitoring Time Period

Primary leachate sampling will be suspended following the closure of RMU-2. Secondary leachate sampling will continue in perpetuity.

1.4.3 Surface Water Monitoring

There is no surface-water monitoring associated with RMU-2. Each year during post-closure care, the effluent surface-water monitoring points will be monitored as specified in CWM's State Pollutant Discharge Elimination System Permit.

1.5 Post-Closure Maintenance Plan

Maintenance activities will be required to maintain the integrity of the cover, containment structures, MSE wall, leachate system and monitoring equipment for the closed secure landfill. Inspection and other maintenance activities will be carried out as specified in Section 1.3.

The function and integrity of the final cover for the unit will be maintained as specified in the closure plan for the facility. In the event deficiencies are discovered, the following corrective measures may be implemented: 1) repair or replacement of any synthetic cover material that may have been breached and/or 2) filling, grading, compacting and revegetating any breach in the natural cover soil that may have occurred.

The vegetative cover will be preserved during the growing season. The topsoil will be reseeded and mulched, as needed, in areas subject to excessive erosion.

Fertilizer will be added, as needed. No irrigation will take place because meteorological conditions in the area are conducive to plant growth. Spraying for vector control will be conducted, as necessary.

The permanent benchmarks will be inspected to verify their presence and to ascertain that damage-prevention measures are being observed in compliance with 6 NYCRR Part 373-2.14(g)(2)(vi). This item will be noted as part of the inspection criteria for closed landfills. Inspection and maintenance of the security fence, locks and security devices will be conducted.

Specific repairs or maintenance may be the result of a visual inspection of the MSE wall, as discussed in Section 1.3. Common repairs may include trimming of woody vegetation along the face of the berm, filling in of animal burrows, cleanup of vandalism, restoration of eroded areas, drainage improvements, repair of erosion or other surficial damage or repairs to the welded wire forms, facing or reinforcement.

1.6 Post-Closure Certification

Within 60 days after completion of the established post-closure period for each hazardous waste disposal unit, CWM must submit to the Commissioner of the NYSDEC, by registered mail, certification that the post-closure care period for the hazardous waste disposal unit was performed in accordance with the specifications in the approved Post-Closure Plan. A similar certification is required to be submitted to the Commissioner of the NYSDEC within 60 days after completion of the post-closure care period for the entire facility. These certifications must be signed by CWM and an independent professional engineer registered in New York State.

For RMU-2, no post-closure certification costs are included because CWM is providing funds for perpetual post-closure care. No post-closure care end date will be set.

2. Post-Closure Cost Estimate

Post-closure cost estimates have been prepared under separate cover. This estimate represents the costs of post-closure care for RMU-2 and reflects the costs of monitoring and maintenance activities required in perpetuity.

This post-closure cost estimate will be kept on file at the CWM site. Following closure of the Model City Facility, the estimate will be retained at the Houston, Texas offices of Waste Management, Inc. It will be revised whenever a change in the Post-Closure Plan affects the cost of post-closure and will be adjusted annually to reflect changes in post-closure costs brought about by inflation or deflation. The Department of Commerce's Annual Implicit Price Deflator for Gross National Product (published by the United States Department of Commerce in the publication "Survey of Current Business") is a typical source that may be used to make this adjustment.

2.1 Perpetual Care Costs

The present value of the cost of perpetual care shall be defined according to the following Present Value Formula:

$$A \times \left[\sum_{t=1}^{\infty} \frac{MMC_t}{(1+K)^t} \right] \times \left[\frac{1}{1+K} \right]^n$$

MMC_t is the anticipated cost of annual monitoring, maintenance and care during the year numbered “t” from the applicable starting date. The applicable starting date is the first year after closure. The factor “n” equals 0 plus the number of years from present until estimated closure. Annual anticipated MMC_t will be the anticipated cost of reimbursing a third party to complete all monitoring, maintenance, and care activities in that year. “A” represents a factor adjusting for contingencies (equal to 5% of MMC_t) and administrative costs (equal to 5 percent of MMC_t) (i.e., A = 1.10). The applicable discount rate is represented by the letter “k” and is 0.0396 (representing a 3.96 percent rate of discount).

As t approaches ∞ (infinity), the expression can be simplified to:

$$A \times \left[\frac{MMC_t}{K} \right] \times \left[\frac{1}{1+K} \right]^n$$

where:

$\left[\frac{MMC_t}{K}\right]$ = perpetuity value and $\left[\frac{1}{1+K}\right]^n$ factor adjusts the perpetuity value to present dollars.

CWM proposes to provide financial assurance, which, at all times, is equal to the greater of the amount required by either: 1) 373-2.8 (post-closure cost estimate equal to the number of years remaining in the 30-year post-closure period times annual operation and maintenance cost) or 2) the amount calculated as the present value for perpetual care commencing in the first year after closure. Separate annual operation and maintenance cost estimates for years 1 through 30 and year 31 and beyond of the post-closure period have been prepared for these periods and are provided under separate cover.

3. Financial Assurance for Post-Closure Care

CWM currently uses a surety bond and a letter of credit as the selected financial assurance mechanism for post-closure care of the Model City Facility. Additional or revised mechanisms will be selected as the financial instrument for providing post-closure of RMU-2. These financial assurance instruments identify the NYSDEC as the beneficiary. CWM reserves the right to change financial assurance mechanisms as outlined in 6 NYCRR Part 373-2.8(f)(3). These financial assurance mechanisms will be updated annually to coincide with annual updates of the facility post-closure and perpetual care costs.

TABLE 1
POST-CLOSURE/PERPETUAL CARE SITE-WIDE AND LANDFILL MONITORING/MAINTENANCE FREQUENCIES

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NEW YORK FACILITY

Component Description	FREQUENCIES
Landfill Inspections	Yr 1, 12/yr
	Yr 2, 4/yr
	Yr 3-10, 2/yr
	>11yr, 1/yr
MSE Wall Inspection	1/yr
Stormwater Management System Inspection	Yr 1, 12/yr
	Yr 2, 4/yr
One additional inspection over the 25-yr period for a 25 yr storm event.	Yr 3-10, 2/yr
	>11yr, 1/yr
Landfill Leachate System Inspection	Yr 1, 12/yr
	Yr 2, 4/yr
	Yr 3-10, 2/yr
	>11yr, 1/yr
Perimeter Fence-line Inspection	Yr 1-30, 2/yr
	>30yr, 1/yr
Mowing	Yr 1-30, 1/yr
	>30yr, 1/yr
MSE Wall Maintenance	1/yr
Fertilizing	as needed
Groundwater Monitoring	Yr 1-30, 2/yr
	>30yr, 1/5yr

ATTACHMENT J

Application Appendix D-6 – RMU-2 Landfill Drawings

PERMIT DRAWINGS

RESIDUALS MANAGEMENT UNIT 2

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NIAGARA COUNTY
NEW YORK

AUGUST 2009

WASTE MANAGEMENT

△3 DRAWINGS REMOVED AND INCLUDED UNDER SEPARATE COVER

34	FAC POND GRADING PLANS
35	FAC POND SECTIONS AND DETAILS
36	FULL TRAILER PARKING AREA
37	SLF 10 HOLDING TANK BUILDING LEACHATE TRANSFER RAMP
38	SLF 1-11 OIL/WATER SEPARATOR BUILDING LEACHATE TRANSFER RAMP
40	STABILIZATION FACILITY FULL TRAILER PARKING AREA
41	FAC POND TRANSFER PIPELINE
42	FAC POND TRANSFER PIPELINE
43	FAC POND TRANSFER PIPELINE
45	FAC POND TRANSFER PIPELINE DETAILS
48	FAC POND RISER HOUSE MECHANICAL INSTALLATION DETAILS
49	FAC POND RISER HOUSE ELECTRICAL INSTALLATION DETAILS
50	VALVE HOUSE DETAILS
51	FAC POND TRANSFER PIPELINE DETAILS

INDEX TO DRAWINGS

NOT TO SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
△3	2/2013	REVISED AND RENUMBERED DRAWINGS	GNG	BMS
△2	1/2012	NEW DRAWINGS	NWF	BMS
△1	1/2012	REVISED DRAWINGS	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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TITLE AND INDEX

GENERAL

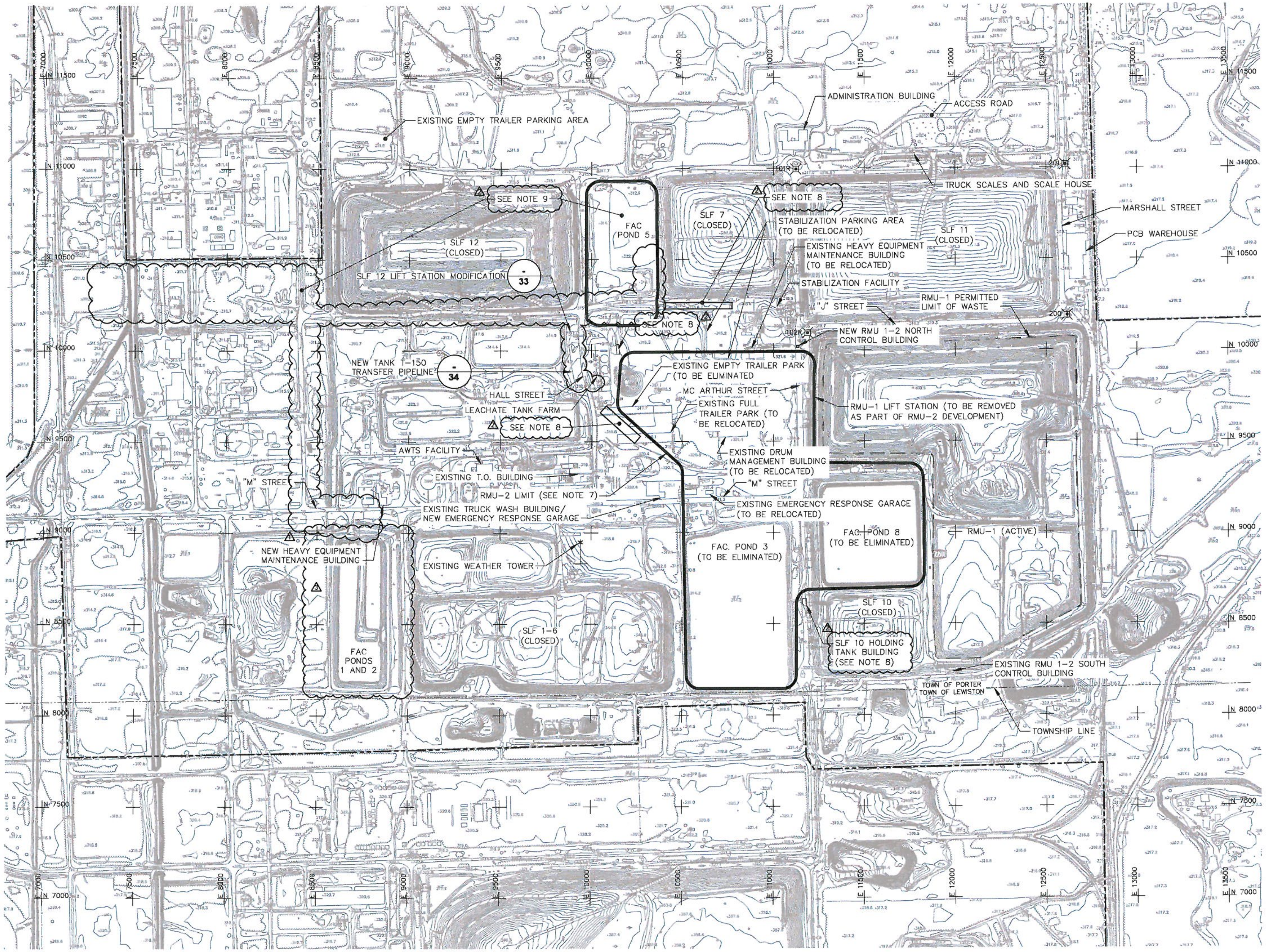
ARCADIS Project No. B0023725.2009.00006

Date AUGUST 2009

ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

1

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: L. FORAKER K. WOOD LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\RMU_2\23725G01.dwg LAYOUT: 1 SAVED: 2/22/2013 2:53 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: M-LD2B-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:11 PM BY: SARTORI, KATHERINE
XREFS: 23725X00 IMAGES: 23725X01.TIF PROJECTNAME: ---



LEGEND:

BRUSHLINE	SIGN
CABLE MARKER	SWAMP
CATCH BASIN	TRAFFIC LIGHT
DROP INLET	TREE
FENCE	TREELINE
FIRE HYDRANT	UNIDENTIFIED OBJECT
GUARD RAIL	UTILITY POLE
LIGHT POLE	VALVE
MISCELLANEOUS POLE	WATER LINE
MONUMENT	EXISTING CONTOUR
POST	EXISTING GRADEBREAK
RAILROAD TRACKS	PROPERTY LINE

200 CONTROL MONUMENT (SEE TABLE BELOW)

2 / 33 — DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER

E 13500 N 7000 COORDINATE GRID (SEE NOTE 3)

RMU-1/RMU-2 CONTROL MONUMENTS								
MONUMENTS	ELEVATION	CWM PLANT GRID		RMU-1 GRID		NY STATE PLANE COORDINATES (NAD-27)		NGVD-29 ELEVATION
		NORTHING	EASTING	NORTHING	EASTING	NORTHING	EASTING	
102R	319.72	100+94.55	111+87.56	100+94.65	11+87.56	1,175,430.46	396,380.12	319.66
200	318.33	101+89.56	126+13.77	101+89.56	26+13.77	1,175,488.28	397,808.18	318.27
101R	316.01	109+94.28	111+23.09	---	---	1,176,331.436	396,339.034	315.92
201	316.62	110+17.82	126+3.49	---	---	---	---	---

CONTROL MONUMENTS NOTE:

1. RMU-1 EASTING GRID COORDINATES ARE SIMPLIFIED PLANT GRID COORDINATES. SUBTRACTING 10,000 FROM THE CWM PLANT GRID EASTING COORDINATE WILL CONVERT THE CWM PLANT GRID TO THE RMU-1 GRID. NOTE THAT NO CONVERSION IS REQUIRED FOR NORTHING COORDINATES.

NOTES:

1. TOPOGRAPHIC BASE MAP CONSISTS OF COMBINATION OF DATA COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 5/31/01 BY AIR SURVEY CORP. (PROJECT NO.71010503). AND AN AUGUST 2008 SURVEY BY ENSOL, INC.
2. VERTICAL DATUM BASED ON NGS MEAN SEA LEVEL.
3. GRID COORDINATES SHOWN ARE CWM PLANT GRID.
4. CONTOUR INTERVAL 2 FT.
5. DASHED CONTOURS INDICATE THAT GROUND IS PARTIALLY OBSCURED BY VEGETATION OR SHADOWS. THESE AREAS MAY NOT MEET STANDARD ACCURACY AND REQUIRE FIELD VERIFICATION.
6. PROPERTY LINE IS APPROXIMATE. EASEMENTS AND RIGHT-OF-WAYS NOT SHOWN.
7. RMU-2 LIMIT REPRESENTS TOE OF PERIMETER MSE WALL.
8. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
9. REFER TO DRAWINGS IN ATTACHMENT D-2 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K. DAVIS PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0023725\2013\00003\DWG\CONTRACT\RMU_2\23725G02.dwg LAYOUT: 2 SAVED: 11/1/2013 1:40 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 11/1/2013 1:40 PM BY: DAVIS, KATHI
XREFS: 23725X02 23725X01 23725X00 IMAGES: PROJECTNAME: ----

300' 0 300' 600'
1"=300'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
3	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNG	BMS
2	2/2013	REVISED CALLOUTS AND NOTES	GNG	BMS
1	1/2012	REDESIGNED FAC POND TRANSFER PIPELINE	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA III · LICENSED PROFESSIONAL ENGINEER · 072644

ARCADIS
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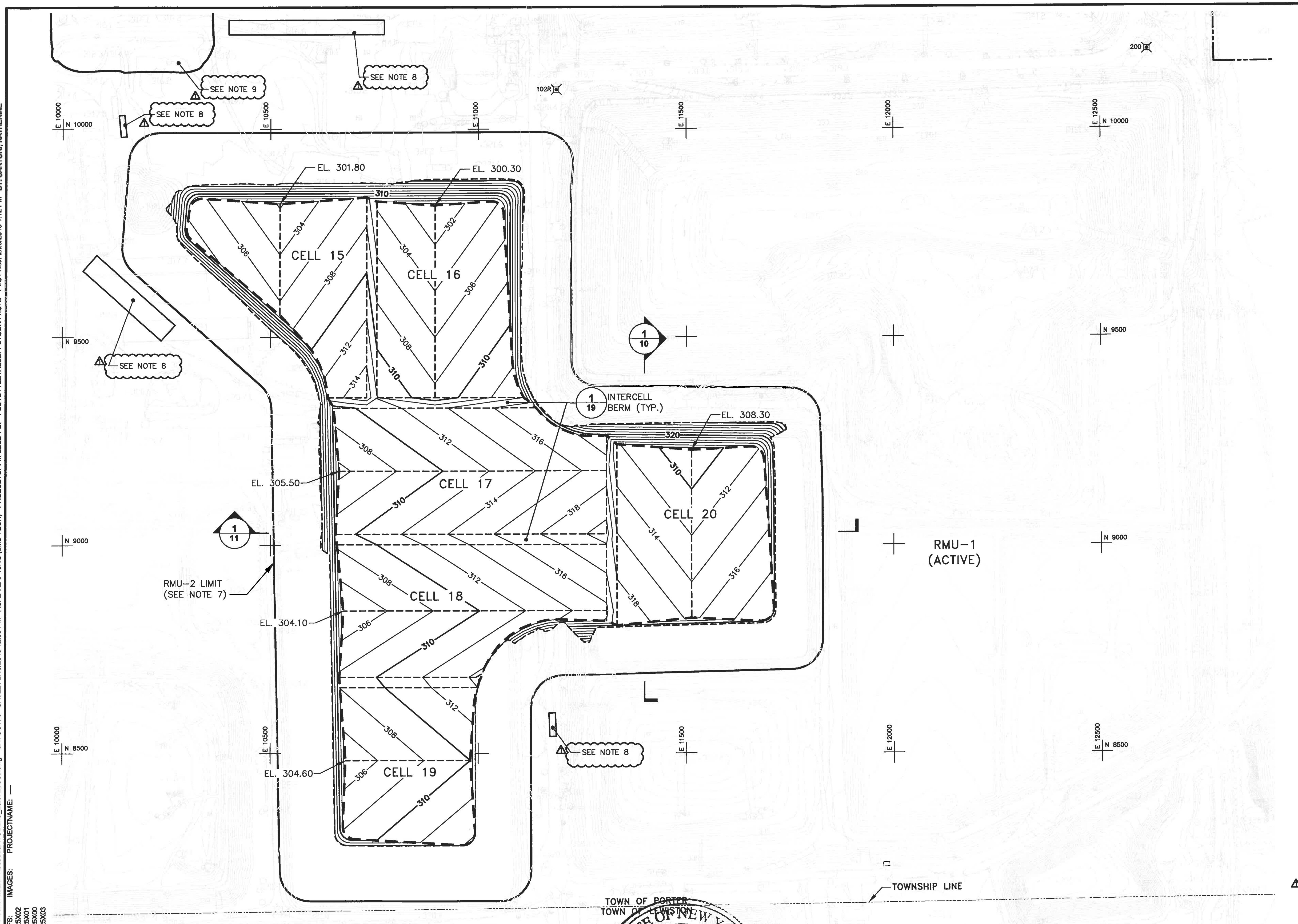
RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

RMU-2 SITE

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL 315.446.9120

2



LEGEND:

- APPROXIMATE PROPERTY LINE
- 310 — PROPOSED INDEX ELEVATION CONTOUR
- 308 — PROPOSED INTERMEDIATE ELEVATION CONTOUR
- PROPOSED GRADE BREAK
- PROPOSED LOW PERMEABILITY CUT-OFF WALL (4/15)
- 200 PERMANENT CONTROL MONUMENT
- EXISTING GROUNDWATER MONITORING WELLS
- E 12500 / N 10000 COORDINATE GRID
- 4 — DETAIL REFERENCE NUMBER; 15 — DRAWING REFERENCE NUMBER
- 1/10 SECTION REFERENCE

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASE MAP INFORMATION.
2. PROPOSED GRADES SHOWN ARE APPROXIMATE LIMITS OF EXCAVATION. TOPSOIL, GENERAL FILL AND CLAY WITHIN THE EXCAVATION AREA WILL BE STRIPPED AND STOCKPILED IN AREAS DESIGNATED BY THE OWNER.
3. SURFACE DRAINAGE SHALL BE DIRECTED AROUND EXCAVATIONS. SURFACE WATER SHALL BE PUMPED TO ADJACENT DRAINAGE DITCHES AND ROUTED TO EXISTING STORMWATER RETENTION BASINS DURING CONSTRUCTION.
4. PROPOSED SPOT ELEVATIONS AT CELL LOW POINTS REPRESENT GENERAL FLOOR SUBGRADE ELEVATION AND DO NOT REPRESENT SUMP EXCAVATING GRADES. ADDITIONAL EXCAVATION IS REQUIRED BELOW GRADES SHOWN ON THIS DRAWING AT EACH CELL SUMP LOCATION. SEE DRAWING NOS. 12, 13, AND 14 FOR ADDITIONAL INFORMATION. PRIOR TO SUMP EXCAVATION, THE POTENTIAL FOR UPLIFT SHALL BE IDENTIFIED BY THE PROTOCOL OUTLINED IN THE RMU-2 CONSTRUCTION QUALITY ASSURANCE MANUAL. APPROPRIATE CONDITIONS SHALL EXIST PRIOR TO SUMP EXCAVATIONS.
5. RELOCATE OR ABANDON EXISTING UTILITIES PER PROJECT SPECIFICATIONS AND WITH AUTHORIZATION OF OWNER.
6. DEMOLISH EXISTING FACILITIES (e.g., BUILDING STRUCTURES, FOUNDATIONS) WITHIN LIMITS OF LANDFILL PER PROJECT SPECIFICATIONS AND WITH AUTHORIZATION OF OWNER.
7. RMU-2 LIMIT REPRESENTS TOE OF PERIMETER MSE WALL.
8. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
9. REFER TO DRAWINGS IN ATTACHMENT D-2 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.

XREFS: 23725X02 23725X01 23725X00 23725X03 IMAGES: PROJECTNAME: ---

1"=120' — 120' 0 120' 240'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	2/2013	REVISED CALLOUTS AND NOTES	GNG	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK — JOSEPH MOLINA — 072644 — LICENSED PROFESSIONAL ENGINEER

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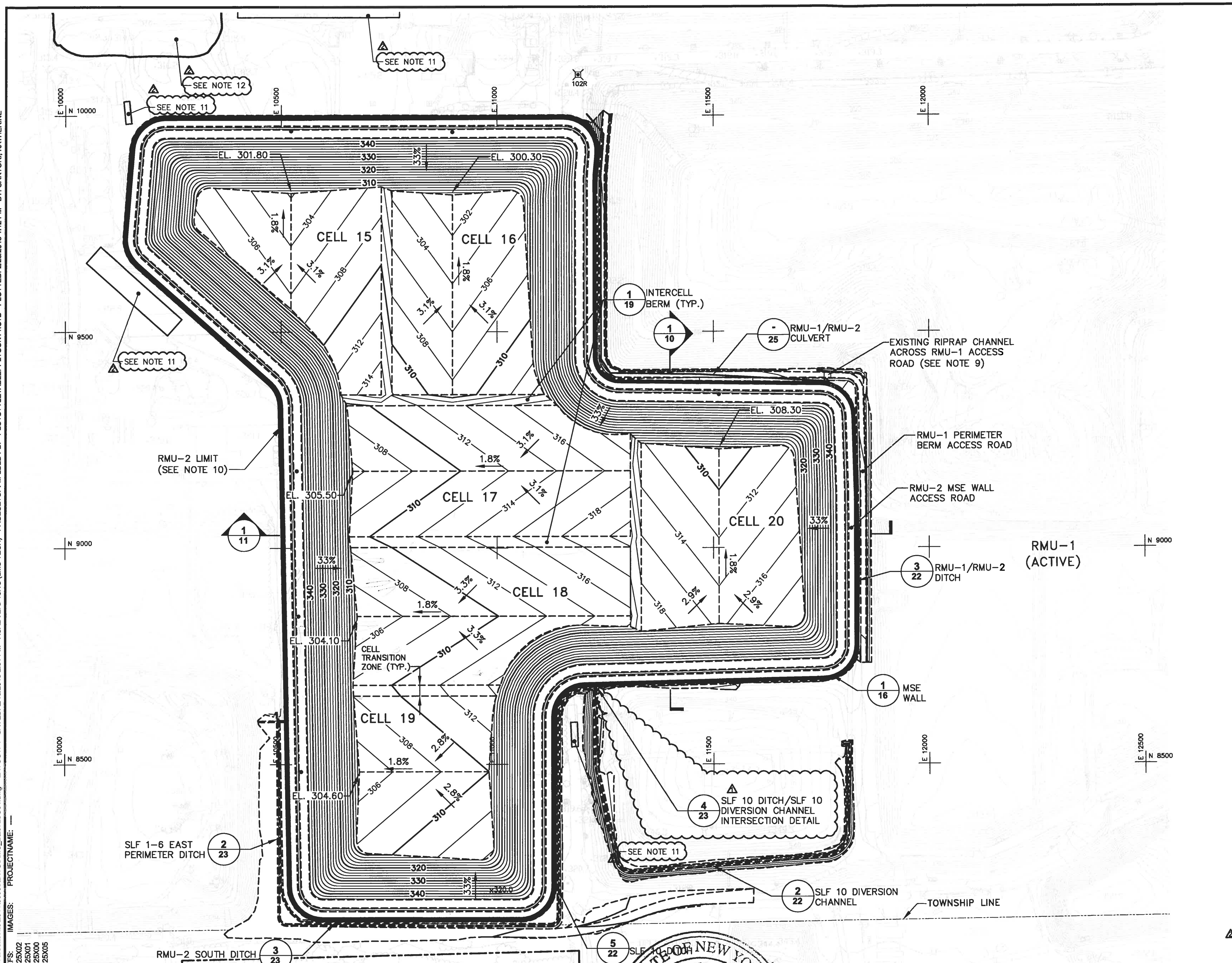
RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

EXCAVATION GRADES

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date: AUGUST 2009
ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

3



LEGEND:

——— ———	APPROXIMATE PROPERTY LINE
——310——	PROPOSED INDEX ELEVATION CONTOUR
——308——	PROPOSED INTERMEDIATE ELEVATION CONTOUR
— — — — —	PROPOSED GRADE BREAK
•	PROPOSED LEACHATE RISER VAULT
×320.0	PROPOSED SPOT ELEVATION
LP	PROPOSED LOW POINT
200	PERMANENT CONTROL MONUMENT
E 12500 / N 10000	COORDINATE GRID
4 / 13	DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER
1 / 10	SECTION REFERENCE

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASE MAP INFORMATION.
2. PROPOSED GRADES INSIDE PERIMETER MSE WALL ARE TOP OF FINISHED SUBGRADE (BOTTOM OF LINER SYSTEM) AFTER PROOF ROLLING. PROPOSED GRADES SHOWN FOR MSE WALL AND AREA BEYOND WALL ARE FINAL GRADES.
3. TOPSOIL, GENERAL FILL AND CLAY WITHIN THE CONSTRUCTION AREA WILL BE STRIPPED AND STOCKPILED IN AREAS DETERMINED BY CWM.
4. SURFACE DRAINAGE SHALL BE DIRECTED AROUND EXCAVATIONS. SURFACE WATER SHALL BE PUMPED TO ADJACENT DRAINAGE DITCHES AND ROUTED TO EXISTING STORMWATER RETENTION BASINS DURING CONSTRUCTION.
5. CELL TRANSITION ZONES ALLOW FOR GRADE TRANSITIONS BETWEEN INDICATED CELLS.
6. PROPOSED SPOT ELEVATIONS AT CELL LOW POINTS REPRESENT GENERAL FLOOR SUBGRADE ELEVATIONS AND DO NOT REPRESENT SUMP SUBGRADES. ADDITIONAL EXCAVATION IS REQUIRED BELOW GRADES SHOWN ON THIS DRAWING AT EACH CELL SUMP LOCATION. SEE DRAWING NOS. 12, 13, AND 14 FOR ADDITIONAL INFORMATION. PRIOR TO SUMP EXCAVATION, THE POTENTIAL FOR UPLIFT WILL BE IDENTIFIED BY THE PROTOCOL OUTLINED IN THE RMU–2 CONSTRUCTION QUALITY ASSURANCE MANUAL. APPROPRIATE CONDITIONS WILL EXIST PRIOR TO SUMP EXCAVATIONS.
7. RELOCATE OR ABANDON UTILITIES PER PROJECT SPECIFICATIONS AND WITH AUTHORIZATION OF OWNER.
8. DEMOLISH EXISTING FACILITIES (e.g., BUILDING STRUCTURES, FOUNDATIONS) WITHIN LIMITS OF LANDFILL PER PROJECT SPECIFICATIONS AND WITH AUTHORIZATION OF OWNER.
9. EXISTING RIPRAP CHANNEL ACROSS ACCESS ROAD CONVEYS RUNOFF FROM RMU–1 PERIMETER CHANNEL TO NEW RMU–1/RMU–2 PERIMETER CHANNEL.
10. RMU–2 LIMIT REPRESENTS TOE OF PERIMETER MSE WALL.
11. REFER TO DRAWINGS IN ATTACHMENT D–1 OF THE OVERALL SITE/RMU–1 PERMIT FOR FURTHER DETAIL.
12. REFER TO DRAWINGS IN ATTACHMENT D–2 OF THE OVERALL SITE/RMU–1 PERMIT FOR FURTHER DETAIL.
13. REFER TO SPECIFICATION SECTION 02402 FOR REQUIREMENTS FOR LEAK LOCATION SURVEYING.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\RMU_2\23725G04.dwg LAYOUT: 4 SAVED: 2/15/2013 2:51 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: M-LD28-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:12 PM BY: SARTORI, KATHERINE

XREFS: 23725X02 23725X01 23725X00 23725X05 IMAGES: PROJECTNAME: —

120' 0 120' 240'

1"=120'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
2	2/2013	REVISED CALLOUTS AND NOTES	GNG	BMS
1	1/2012	ADDITIONAL CALLOUT	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA II · LICENSED PROFESSIONAL ENGINEER · 072644

ARCADIS

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RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

SUBGRADE GRADES

GENERAL

ARCADIS Project No. B0023725.2009.00006

Date AUGUST 2009

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6723 Towpath Road
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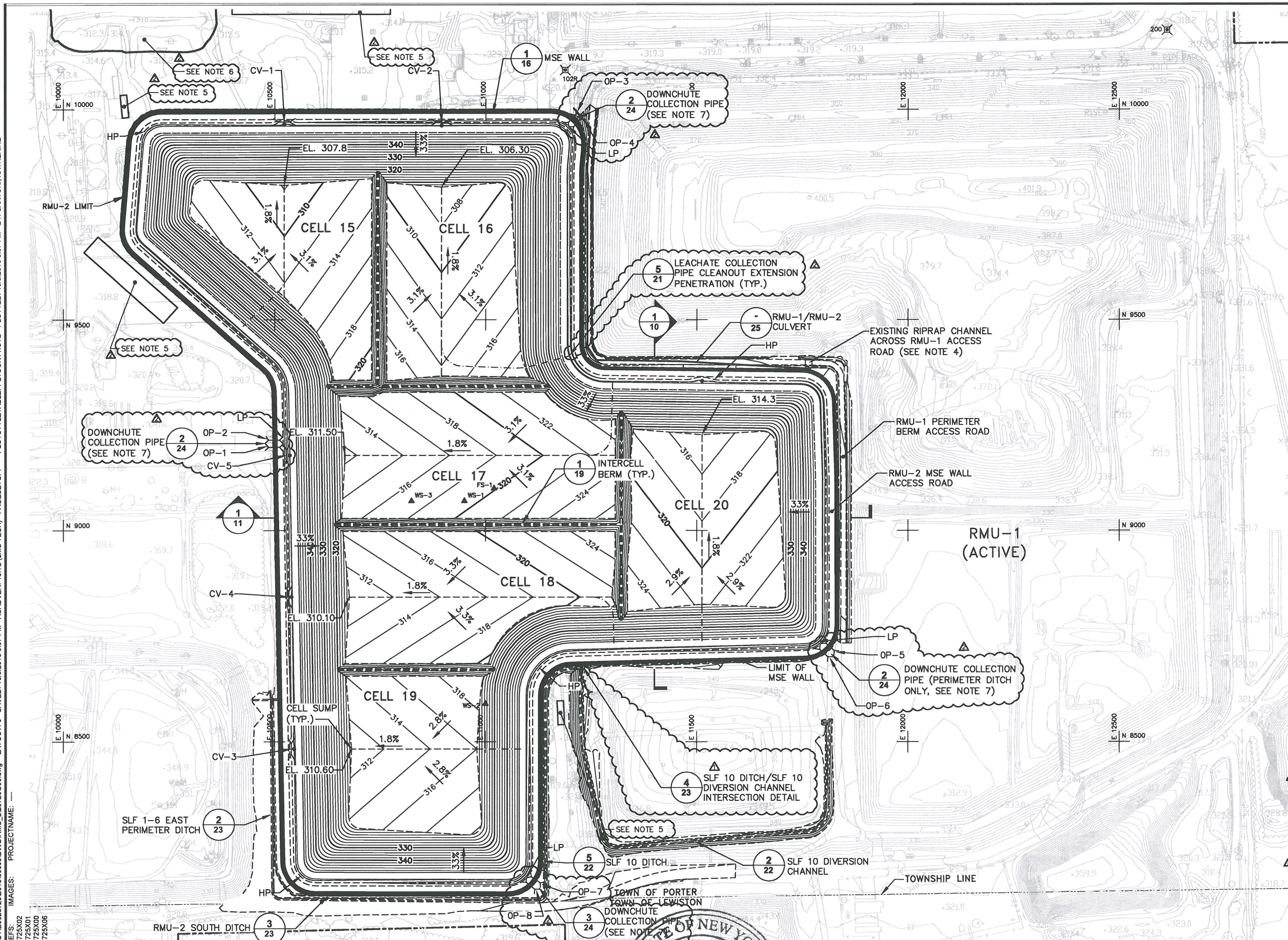
Syracuse, New York
TEL. 315.446.9120

4



LEGEND:

- APPROXIMATE PROPERTY LINE
- 310 — PROPOSEDINDEX ELEVATION CONTOUR
- 308 — PROPOSED INTERMEDIATE ELEVATION CONTOUR
- PROPOSED GRADE BREAK
- LEACHATE COLLECTION PIPE CLEANOUT
- PROPOSED LEACHATE RISER VAULT
- CV-1 PROPOSED PERIMETER DITCH CULVERT AND ID (1/23)
- OP-3 PROPOSED PERIMETER DITCH CULVERT AND ID (1/24)
- ×320.0 PROPOSED SPOT ELEVATION
- LP PROPOSED PERIMETER DITCH LOW POINT
- HP PROPOSED PERIMETER DITCH HIGH POINT
- FS-1 EXAMPLE FLOOR SETTLEMENT CALCULATION POINT
- WS-1 EXAMPLE WASTE SETTLEMENT CALCULATION POINT
- 200 PERMANENT CONTROL MONUMENT
- E 12500 / N 10000 COORDINATE GRID
- 2/14 DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER
- 1/10 SECTION REFERENCE

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASE MAP INFORMATION.
2. PROPOSED GRADES INSIDE OF PERIMETER DITCH REPRESENT TOP OF OPERATIONS LAYER. PROPOSED GRADES WITHIN AND OUTSIDE OF PERIMETER DITCH REPRESENT FINAL GRADE.
3. ACCESS ROADS TO BE CONSTRUCTED UP TO TOP OF MSE WALL AND OVER CELL SEPARATION BERM LOCATIONS AS NEEDED.
4. EXISTING RIPRAP CHANNEL ACROSS RMU-1 PERIMETER BERM ACCESS ROAD CONVEYS RUNOFF FROM RMU-1 PERIMETER CHANNEL TO NEW RMU-1/RMU-2 PERIMETER CHANNEL.
5. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
6. REFER TO DRAWINGS IN ATTACHMENT D-2 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
7. PERIMETER DITCH OUTLET PIPES AND PORTION OF CENTRAL DOWNCHUTE PIPE THAT IS WITHIN MSE WALL TO BE INSTALLED CONCURRENT WITH MSE WALL CONSTRUCTION.
8. LEACHATE COLLECTION PIPE CLEANOUT EXTENSION BEGINS AT UPSTREAM END OF LEACHATE COLLECTION PIPE. CHANGES IN HORIZONTAL ALIGNMENT ARE MADE USING 11.25-DEGREE ELBOWS AS NECESSARY. IF MORE THAN ONE ELBOW IS NEEDED, SUCCESSIVE ELBOWS ARE SPACED A MINIMUM OF 10-FT APART. AT THE INTERSECTION OF THE CELL SIDESLOPE AND FLOOR, A SINGLE 18.4-DEGREE ELBOW IS USED TO ACCOMMODATE CHANGE IN VERTICAL ALIGNMENT.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K.DAVIS L.FORAKER K.DAVIS LD: PIC: W.POPHAM PM: W.RANKIN TM: B.STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2013\0003\DWG\RMU_2\23725G05.dwg LAYOUT: 5 SAVED: 10/9/2013 3:07 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 10/9/2013 3:07 PM BY: SARTORI, KATHERINE

XREFS: 23725X02 23725X01 23725X00 23725X06 IMAGES: PROJECTNAME: —

120' 0 120' 240'
1"=120'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
3	10/2013	REVISED LEACHATE COLLECTION PIPE CLEANOUTS, ADDED NOTE 8	PTO	BMS
2	2/2013	REVISED CALLOUTS AND NOTES	GNG	BMS
1	1/2012	ADDITIONAL CALLOUT	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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TOP OF OPERATIONS LAYER GRADES

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc.
6723 Towpath Road
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Syracuse, New York
TEL. 315.446.9120

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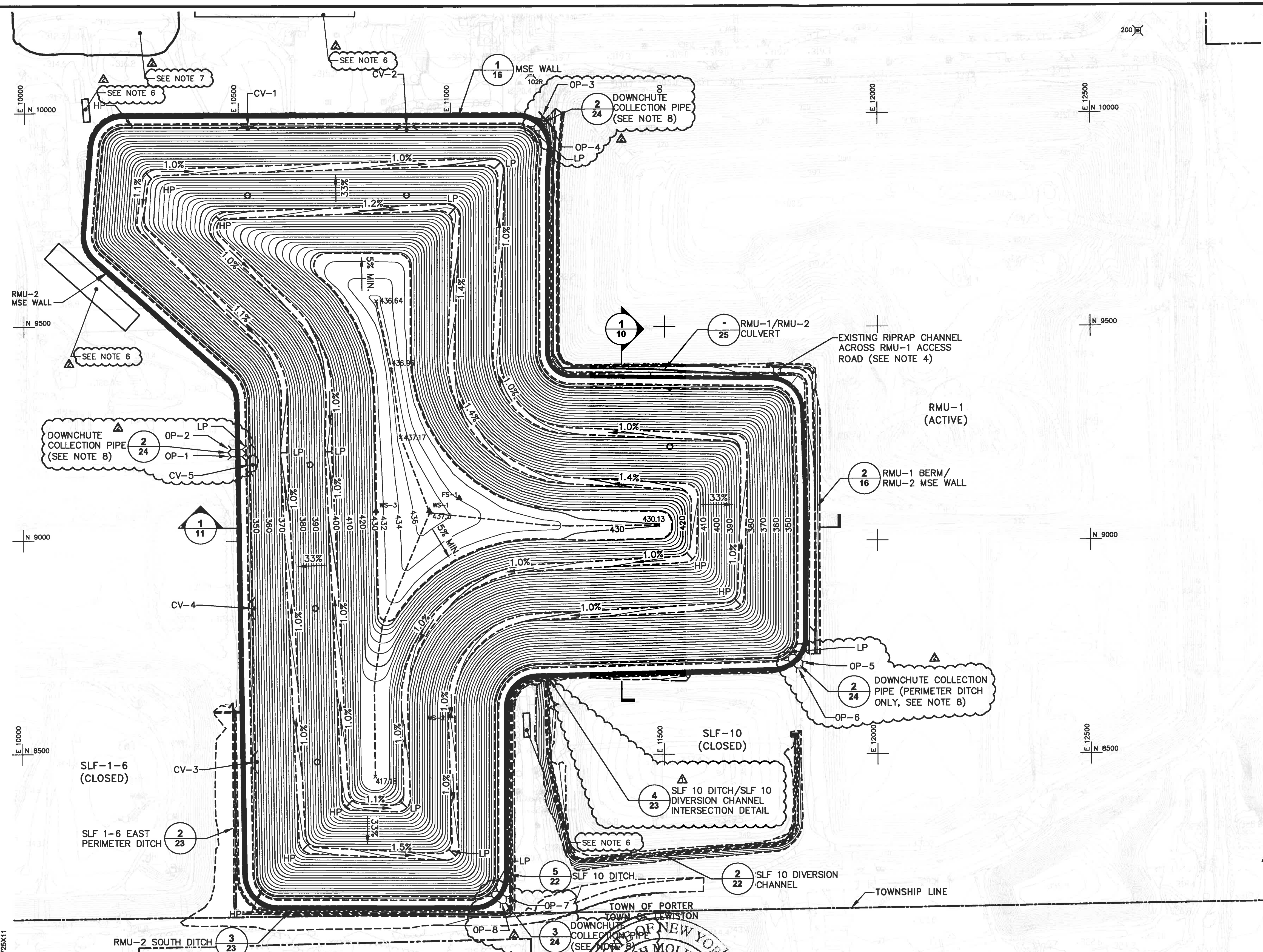

LEGEND:

- APPROXIMATE PROPERTY LINE
- 310 — PROPOSED INDEX ELEVATION CONTOUR
- 428 — PROPOSED INTERMEDIATE ELEVATION CONTOUR
- PROPOSED GRADE BREAK
- PROPOSED RISER MANHOLE (2/13)
- PROPOSED LEACHATE RISER VAULT
- CV-1 PROPOSED CULVERT AND ID (1/23)
- OP-3 PROPOSED PERIMETER DITCH CULVERT AND ID (1/24)
- ×320.0 PROPOSED SPOT ELEVATION
- LP PROPOSED PERIMETER DITCH LOW POINT
- HP PROPOSED PERIMETER DITCH HIGH POINT
- FS-1 EXAMPLE FLOOR SETTLEMENT CALCULATION POINT
- 200 PERMANENT CONTROL MONUMENT
- E 12500 / N 10000 COORDINATE GRID
- 2 DETAIL REFERENCE NUMBER / 14 DRAWING REFERENCE NUMBER
- 1/10 SECTION REFERENCE

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASE MAP INFORMATION.
2. PROPOSED GRADES SHOWN INSIDE OF PERIMETER DITCH ARE TOP OF WASTE GRADES. PROPOSED GRADES WITHIN AND OUTSIDE PERIMETER DITCH ARE FINAL GRADES.
3. MSE WALL ACCESS RAMPS TO BE DESIGNED/CONSTRUCTED AS NEEDED DURING LANDFILL OPERATION.
4. EXISTING RIPRAP CHANNEL ACROSS RMU-1 PERIMETER BERM ACCESS ROAD CONVEYS RUNOFF FROM RMU-1 PERIMETER CHANNEL TO NEW RMU-1/RMU-2 PERIMETER CHANNEL.
5. PROPOSED TOP OF WASTE GRADES DO NOT REFLECT LOCAL GRADING PROXIMATE TO PIPE DOWNCHUTES. PROPOSED TOP OF WASTE GRADES DO NOT REFLECT EXISTENCE OF INFILTRATION CHANNEL AT LANDFILL PERIMETER.
6. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
7. REFER TO DRAWINGS IN ATTACHMENT D-2 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
8. PERIMETER DITCH OUTLET PIPES AND PORTION OF CENTRAL DOWNCHUTE PIPE THAT IS WITHIN MSE WALL TO BE INSTALLED CONCURRENT WITH MSE WALL CONSTRUCTION.

1"=120' 120' 0 120' 240'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
2	2/2013	REVISED CALLOUTS AND NOTES	GNG	BMS
1	1/2012	ADDITIONAL CALLOUT	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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TOP OF WASTE GRADES

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date: AUGUST 2009
ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

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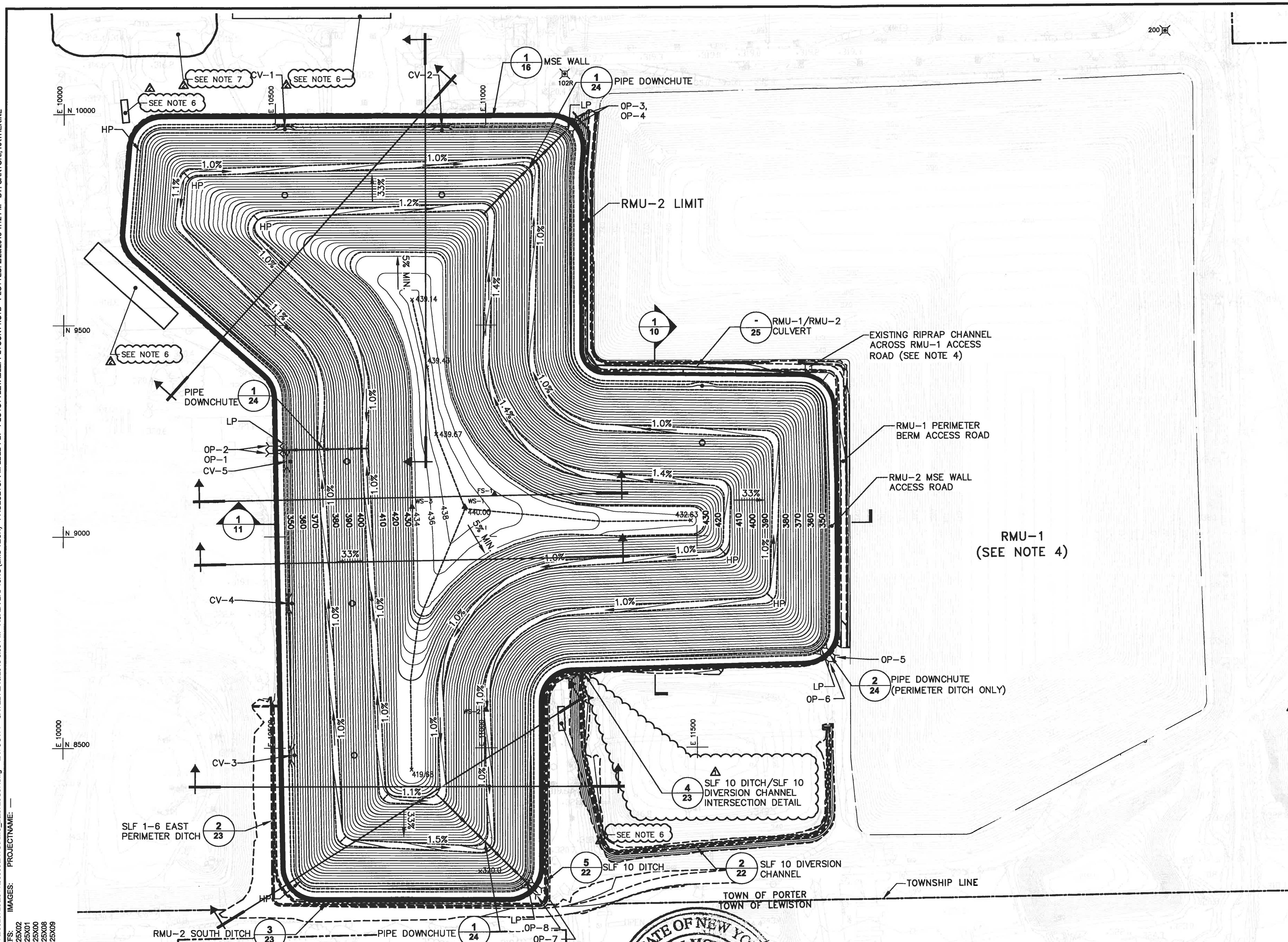
CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PLOTTED: 2/25/2013 1:12 PM BY: SARTORI, KATHERINE
XREFS: 23725X02 23725X01 23725X00 23725X11 IMAGES: PROJECTNAME: —



LEGEND:

- APPROXIMATE PROPERTY LINE
- 310 — PROPOSED INDEX ELEVATION CONTOUR
- 428 — PROPOSED INTERMEDIATE ELEVATION CONTOUR
- PROPOSED GRADE BREAK
- PROPOSED RISER MANHOLE (3/20)
- PROPOSED LEACHATE RISER VAULT
- SLOPE STABILITY SECTION
- CV-1 — PROPOSED PERIMETER DITCH CULVERT AND ID (1/23)
- OP-3 — PROPOSED PERIMETER DITCH CULVERT AND ID (1/24)
- ×320.0 — PROPOSED SPOT ELEVATION
- LP — PROPOSED PERIMETER DITCH LOW POINT
- HP — PROPOSED PERIMETER DITCH HIGH POINT
- FS-1 — SETTLEMENT CALCULATION POINT
- 200 — PERMANENT CONTROL MONUMENT
- E 12500 / N 10000 — COORDINATE GRID
- 2/14 — DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER
- 1/10 — SECTION REFERENCE

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASE MAP INFORMATION.
2. PROPOSED GRADES SHOWN INSIDE OF PERIMETER DITCH ARE TOP OF WASTE GRADES. PROPOSED GRADES WITHIN AND OUTSIDE PERIMETER DICTH ARE FINAL GRADES.
3. MSE WALL ACCESS RAMPS TO BE DESIGNED/CONSTRUCTED AS NEEDED DURING LANDFILL OPERATION..
4. EXISTING RIPRAP CHANNEL ACROSS RMU-1 PERIMETER BERM ACCESS ROAD CONVEYS RUNOFF FROM RMU-1 PERIMETER CHANNEL TO NEW RMU-1/RMU-2 PERIMETER CHANNEL.
5. PROPOSED TOP OF WASTE GRADES DO NOT REFLECT LOCAL GRADING PROXIMATE TO PIPE DOWNCHUTES. PROPOSED TOP OF WASTE GRADES DO NOT REFLECT EXISTENCE OF INFILTRATION CHANNEL AT LANDFILL PERIMETER.
6. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
7. REFER TO DRAWINGS IN ATTACHMENT D-2 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\RMU_2\23725G07.dwg LAYOUT: 7 SAVED: 2/19/2013 3:50 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: M-LD28-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:12 PM BY: SARTORI, KATHERINE

XREFS: 23725X02 23725X01 23725X00 23725X08 23725X09 IMAGES: PROJECTNAME: —

1"=120' — 120' 0 120' 240'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
2	2/2013	REVISED CALLOUTS AND NOTES	GNG	BMS
1	1/2012	ADDITIONAL CALLOUT	NWF	BMS

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Professional Engineer's Name		
JOSEPH MOLINA		
Professional Engineer's No. 072644		
State: NY	Date Signed: 2/27/13	Project Mgr.: WAR
Designed by: BMS/PTO	Drawn by: SJK	Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

ARCADIS

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RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

TOP OF VEGETATIVE COVER GRADES

GENERAL

ARCADIS Project No. B0023725.2009.00006

Date AUGUST 2009

ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

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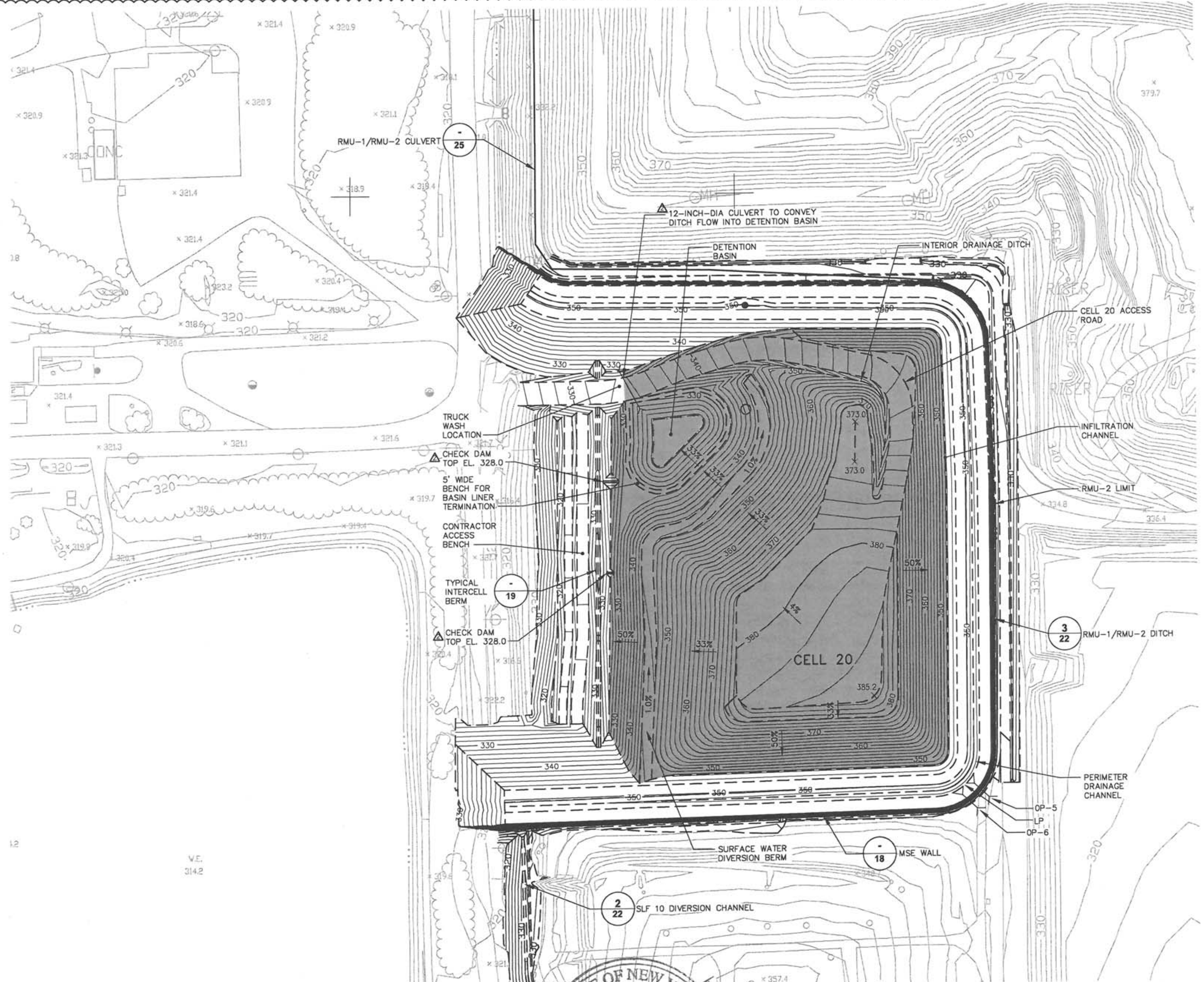

LEGEND:

- APPROXIMATE PROPERTY LINE
- 310 PROPOSED INDEX ELEVATION CONTOUR
- 308 PROPOSED INTERMEDIATE ELEVATION CONTOUR
- PROPOSED GRADE BREAK
- PROPOSED RISER MANHOLE (2/13)
- PROPOSED LEACHATE RISER VAULT
- CV-1 PROPOSED PERIMETER DITCH CULVERT AND ID (1/23)
- OP-3 PROPOSED PERIMETER DITCH CULVERT AND ID (1/24)
- ×320.0 PROPOSED SPOT ELEVATION
- LP PROPOSED PERIMETER DITCH LOW POINT
- HP PROPOSED PERIMETER DITCH HIGH POINT
- 200 PERMANENT CONTROL MONUMENT
- E 12500 N 10000 COORDINATE GRID
- (2/14) DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER
- WASTE PLACEMENT AREA

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASE MAP INFORMATION.
2. PROPOSED GRADES SHOWN REPRESENT A COMBINATION OF FINAL AND INTERIM MSE WALL GRADES, OPERATIONS LAYER GRADES, AND INTERIM WASTE GRADES.
3. ACCESS ROAD TO BE CONSTRUCTED OVER CELL SEPARATION BERM.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 5/30/2013 3:07 PM BY: SAMIOS, ALEX
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XREFS: 23725X02 23725X01 23725X00 23725X16 IMAGES: PROJECTNAME: ----

1"=70' — 70' 0 70' 140'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
2	5/2013	REVISED ACCESS ROAD GRADING AND ADDED CULVERT SIZE AND CHECK DAMS	PTO	BMS
1	2/2013	CHANGED INITIAL OPERATING CELL FROM 15 TO 20 AND MISCELLANEOUS REVISIONS	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 6/3/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK — JOSEPH MOLINA — 072644 — LICENSED PROFESSIONAL ENGINEER

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CELL 20 INITIAL FILL PROGRESSION

GENERAL

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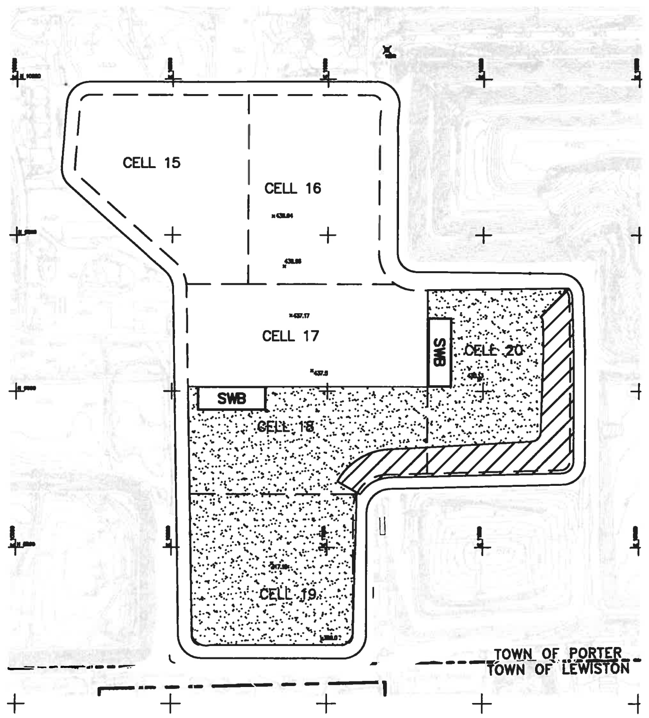
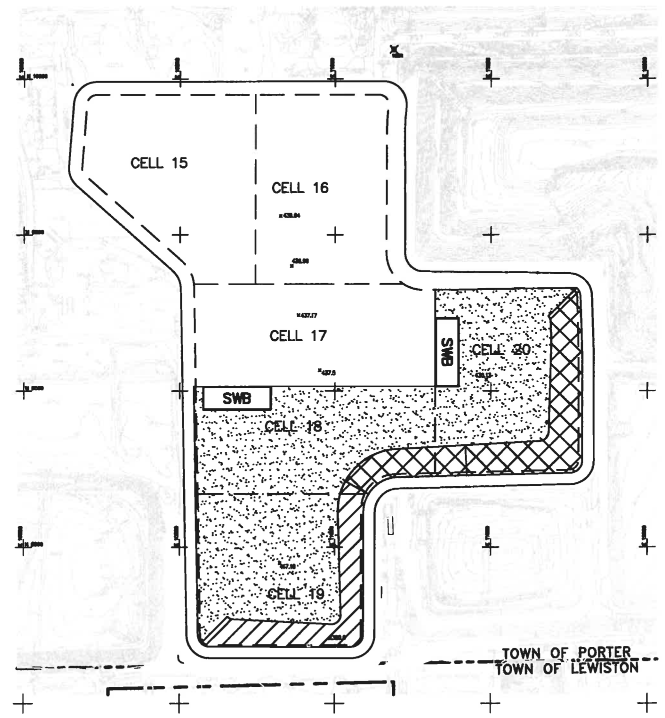


NOTE:

1. CELLS 18, 19, AND 20 ASSUMED TO BE CONSTRUCTED AND ACTIVE IN THIS PHASE.

PHASE 1

SCALE: 1" = 300'

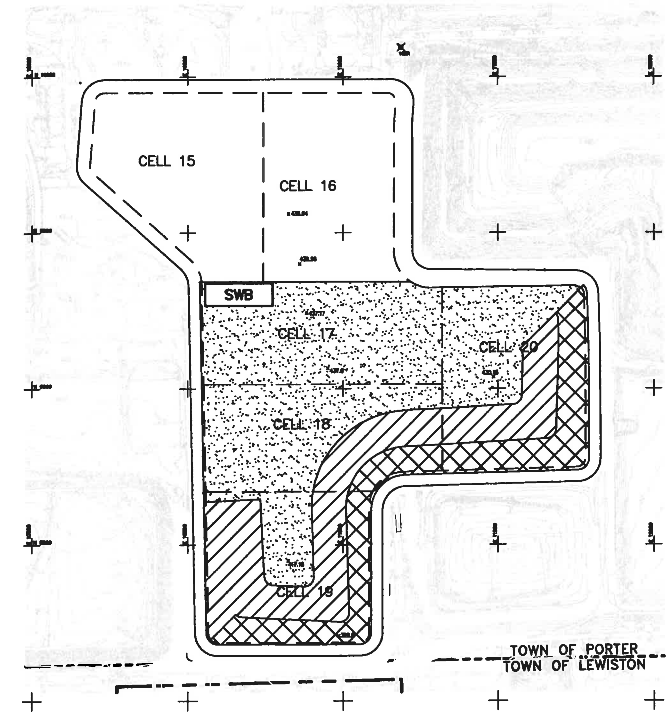


NOTE:

1. CELLS 18, 19, AND 20 ASSUMED TO BE CONSTRUCTED AND ACTIVE IN THIS PHASE.

PHASE 2

SCALE: 1" = 300'



NOTE:

1. CELLS 17, 18, 19 AND 20 ASSUMED TO BE CONSTRUCTED AND ACTIVE IN THIS PHASE.

PHASE 3

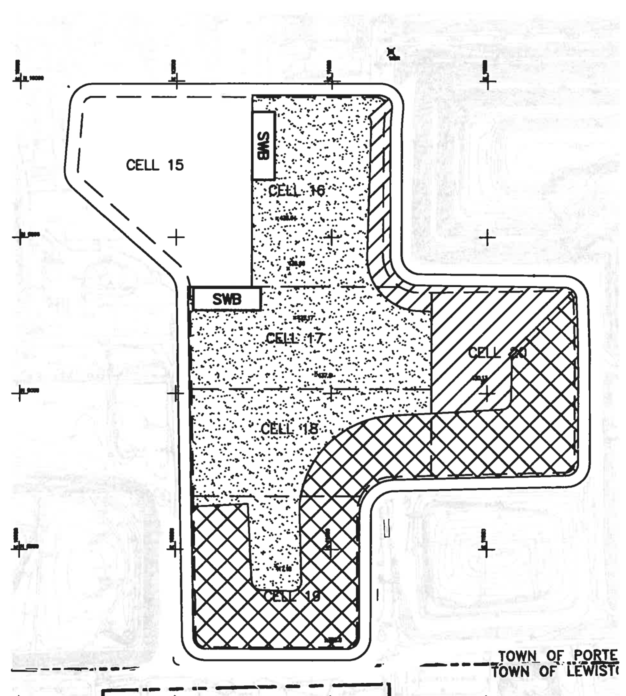
SCALE: 1" = 300'

LEGEND:

- APPROXIMATE PROPERTY LINE
- PROPOSED CELL DIVIDE
- NEWLY INSTALLED FINAL COVER
- FINAL COVER INSTALLED DURING PRIOR PHASES
- WASTE FILLING
- SWB — STORMWATER BASIN (SEE NOTE 2)
- E 12500 / N 10000 — COORDINATE GRID

GENERAL NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASE MAP INFORMATION.
2. STORMWATER BASINS ARE DEPICTED TO ILLUSTRATE POSSIBLE LOCATIONS AND ARE NOT INTENDED TO REPRESENT REQUIRED SIZES. LOCATIONS ARE BASED ON ALLOWANCE FOR CONSTRUCTION OF FINAL COVER IN EACH PHASE.
3. THIS DRAWING DEPICTS POSSIBLE WASTE FILLING AND FINAL COVER SEQUENCING. OTHER WASTE FILLING AND FINAL COVER SEQUENCING POSSIBILITIES EXIST AND MAY BE EMPLOYED.
4. DUE TO THE CONCEPTUAL NATURE OF THIS DRAWING, DIFFERENCES IN ACTUAL WASTE FILLING AND FINAL COVER SEQUENCING SHOULD BE EXPECTED AND WILL NOT REQUIRE PERMIT MODIFICATION IN ORDER TO IMPLEMENT.

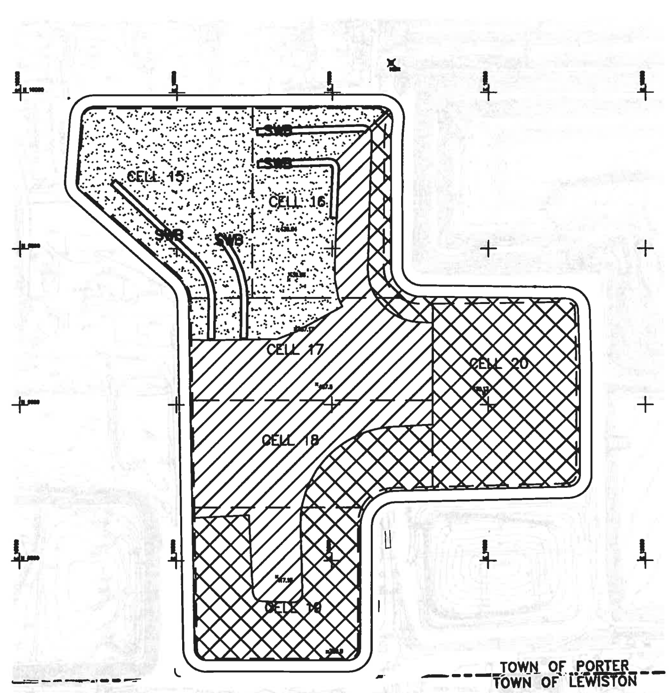


NOTE:

1. CELLS 16, 17, 18, 19 AND 20 ASSUMED TO BE CONSTRUCTED IN THIS PHASE. CELLS 16, 17, 18, AND 19 ASSUMED TO BE ACTIVE AT THE END OF THIS PHASE.

PHASE 4

SCALE: 1" = 300'

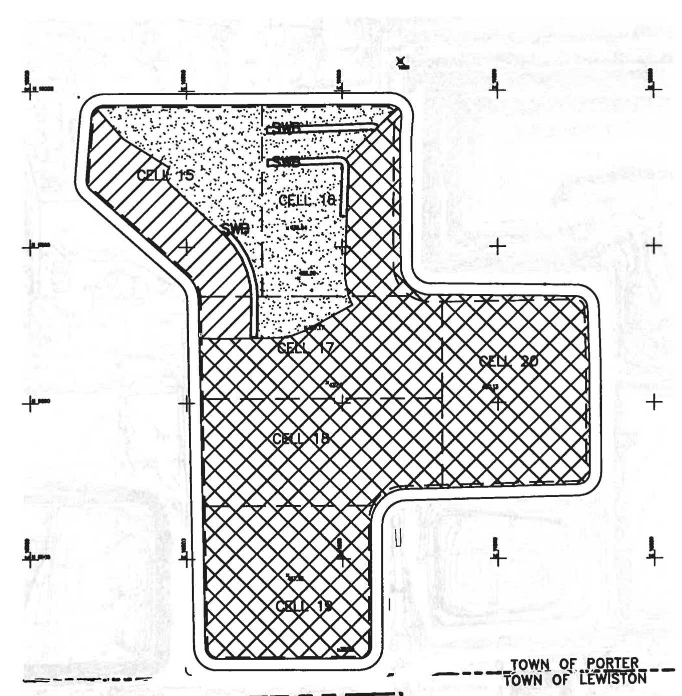


NOTE:

1. ALL CELLS ASSUMED TO BE CONSTRUCTED IN THIS PHASE. CELLS 15, 16, AND 17 ASSUMED TO BE ACTIVE AT THE END OF THIS PHASE.

PHASE 5

SCALE: 1" = 300'

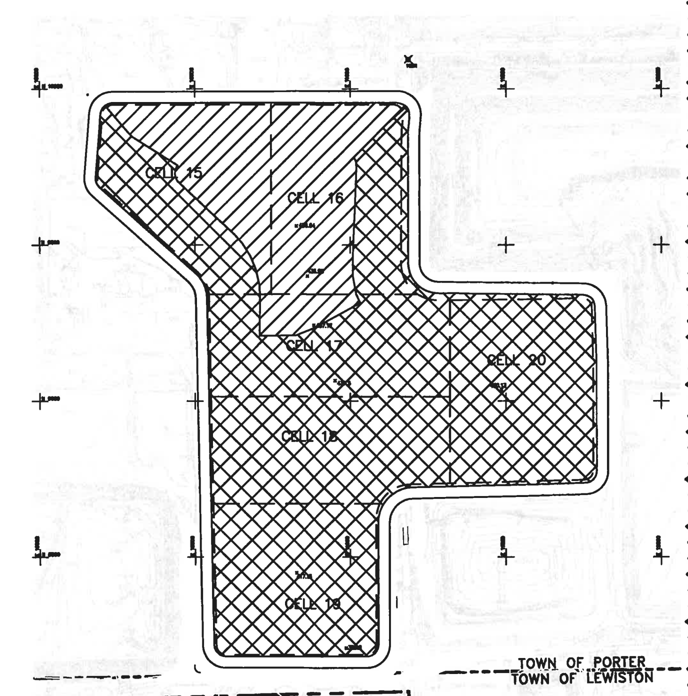


NOTE:

1. ALL CELLS ASSUMED TO BE CONSTRUCTED IN THIS PHASE. CELLS 15, 16, AND 17 ASSUMED TO BE ACTIVE AT THE END OF THIS PHASE.

PHASE 6

SCALE: 1" = 300'



NOTE:

1. ALL CELLS ASSUMED TO BE CONSTRUCTED IN THIS PHASE. LANDFILL IS COMPLETELY CAPPED AT THE END OF THIS PHASE.

PHASE 7

SCALE: 1" = 300'

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\RMU_2\23725G09.dwg LAYOUT: 9 SAVED: 2/19/2013 10:19 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: M-D2B-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:13 PM BY: SARTORI, KATHERINE

XREFS: 23725X02 23725X01 23725X00 23725X11 IMAGES: PROJECTNAME:

300' 0 300' 600'
1"=300'

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No.	Date	Revisions	By	Ckd
1	2/20/12	REVISED PHASING	PTO	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: TJF
Designed by: BMS/PTO | Drawn by: LAF | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL ENGINEER · 072644

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CONCEPTUAL WASTE FILLING AND FINAL COVER SEQUENCING

GENERAL

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Date: AUGUST 2009

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TEL. 315.446.9120

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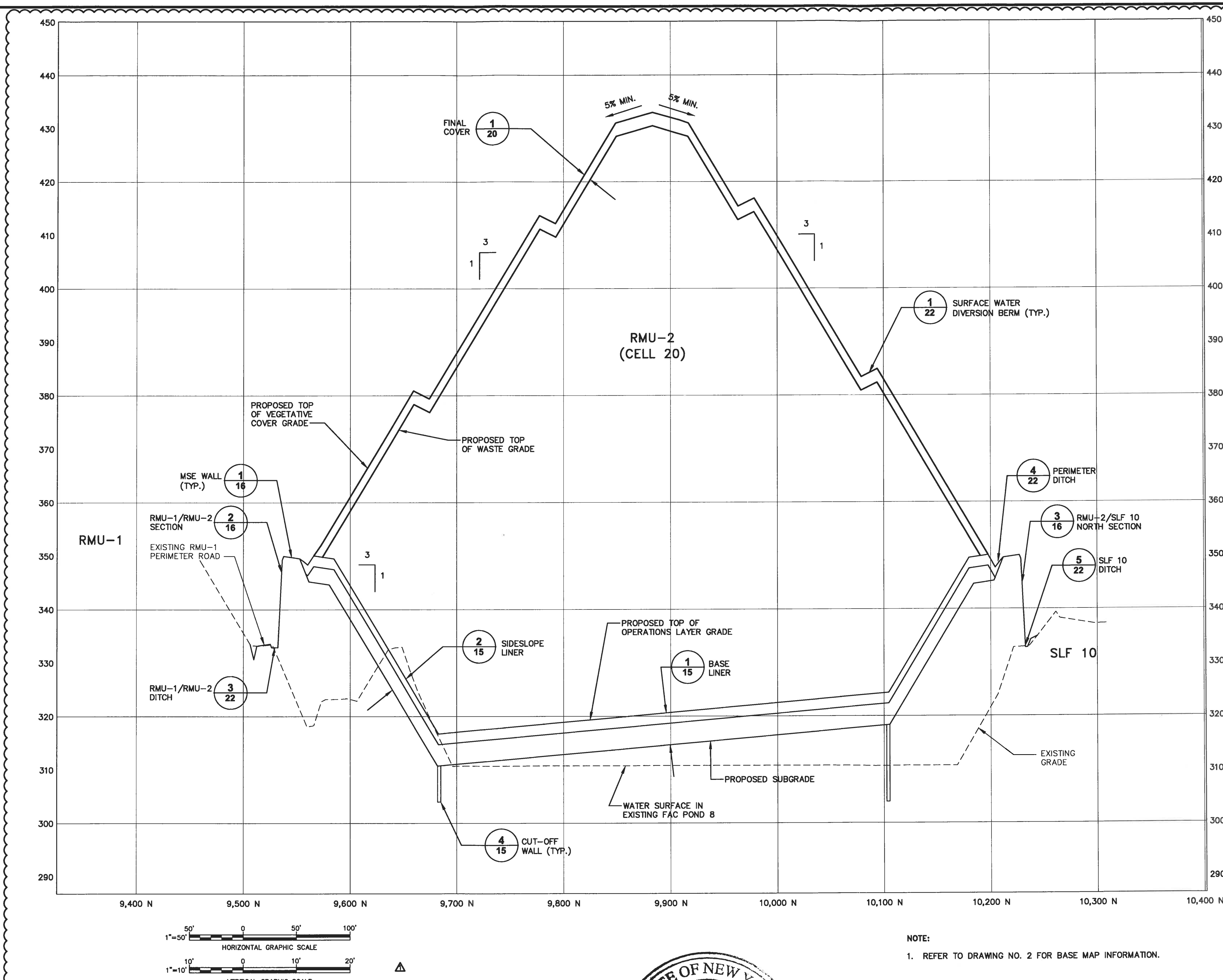
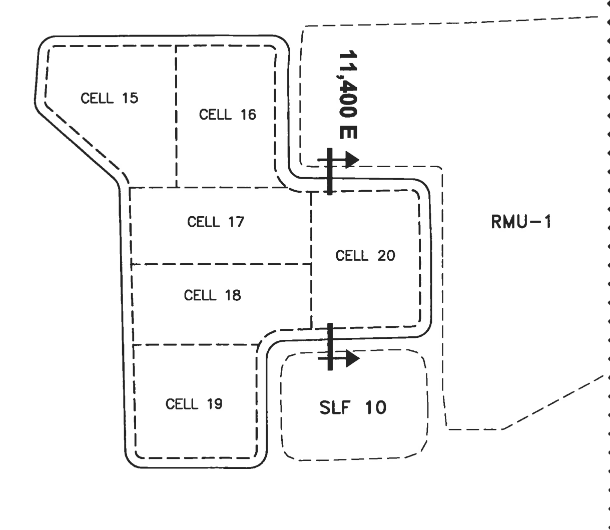


NOTE:

1. REFER TO DRAWING NO. 2 FOR BASE MAP INFORMATION.



CROSS SECTION LOCATION PLAN

SCALE: 1"=400'

SCALE(S) AS INDICATED

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No.	Date	Revisions	By	Ckd
1	2/2013	CORRECTED CROSS SECTION STATION & DWG. TITLE	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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CROSS SECTION 11,400 E

GENERAL

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Syracuse, New York
TEL. 315.446.9120

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CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PAGESETUP: M-LD28-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:13 PM BY: SARTORI, KATHERINE
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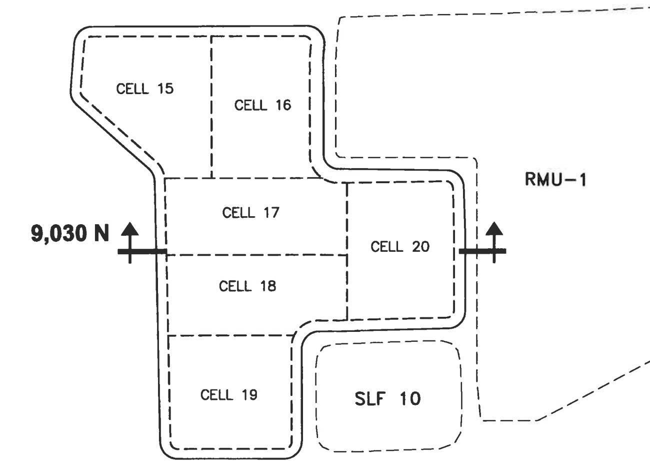
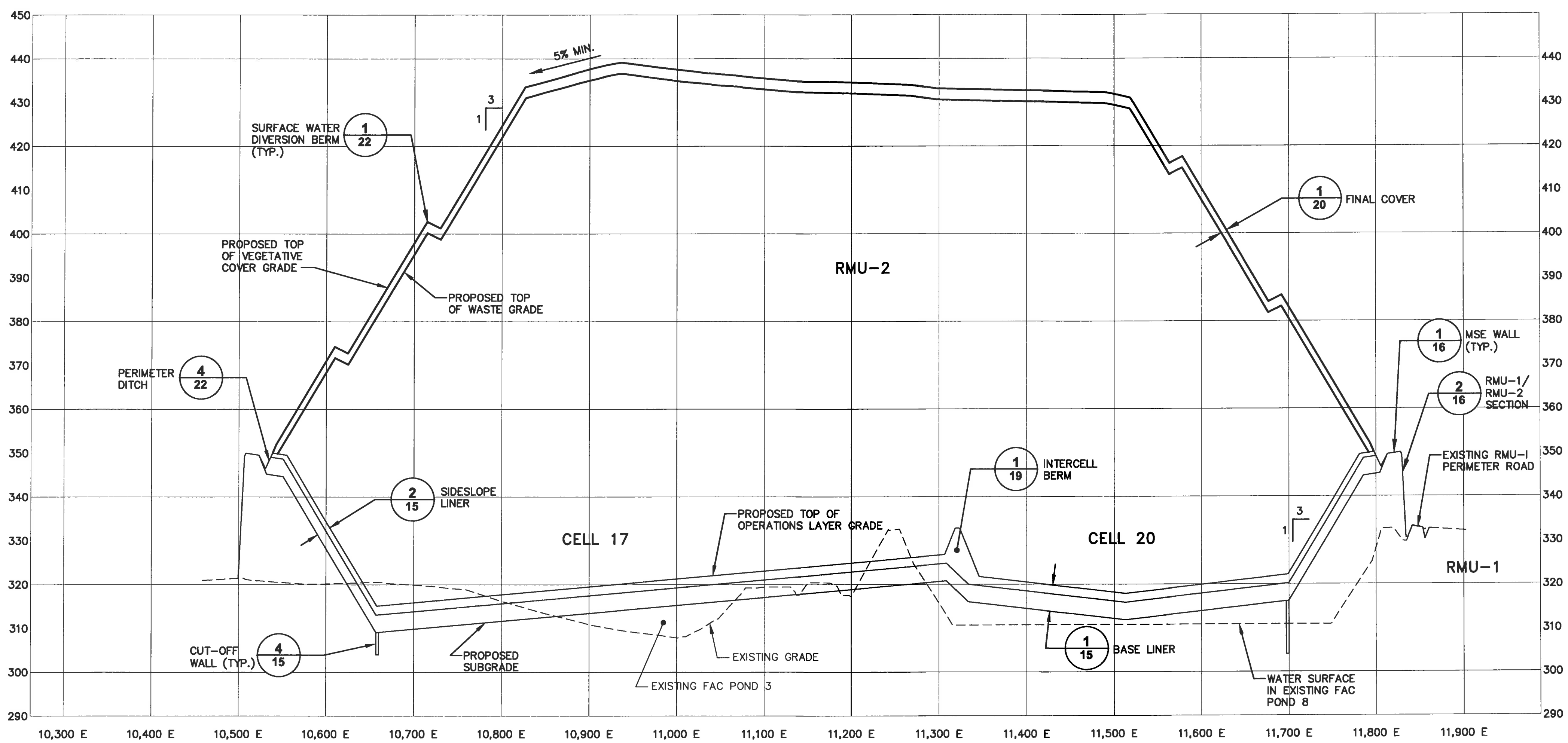


CROSS SECTION LOCATION PLAN

SCALE: 1"=400'



1"=80' HORIZONTAL GRAPHIC SCALE

1"=16' VERTICAL GRAPHIC SCALE

SECTION 1

NOTE:

1. REFER TO DRAWING NO. 2 FOR BASE MAP INFORMATION.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K.DAVIS L.FORAKER K.DAVIS LD: PIC: W.POPHAM PM: W.RANKIN TM: B.STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\RMU_2\23725G11.dwg LAYOUT: 11 SAVED: 2/8/2013 3:30 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: M-LD2B-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:13 PM BY: SARTORI, KATHERINE

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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CROSS SECTION 9,030 N

GENERAL

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Date AUGUST 2009
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120

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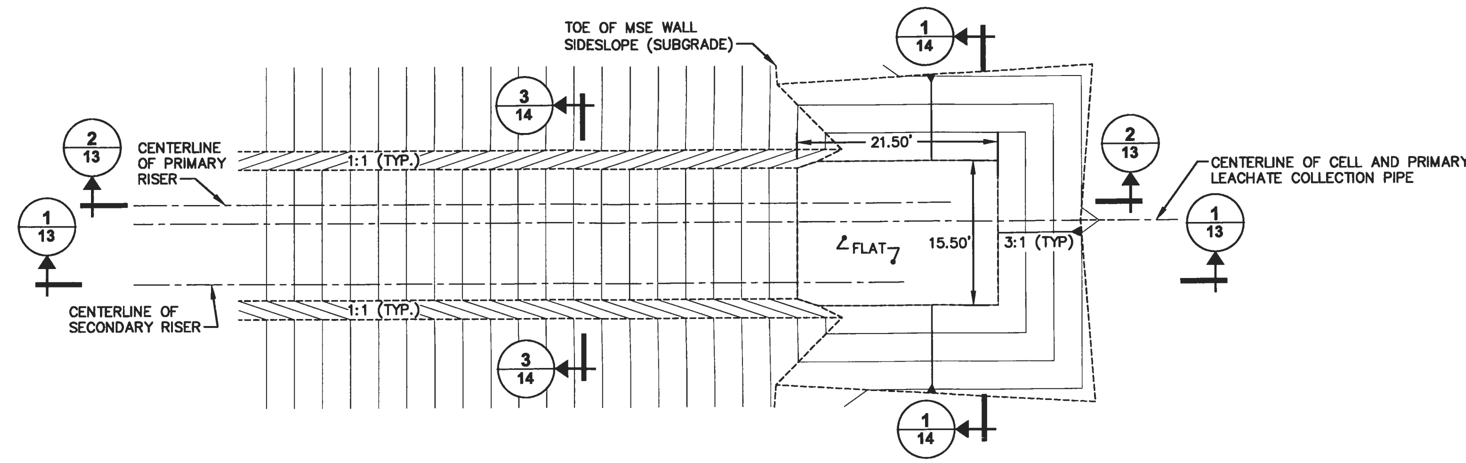
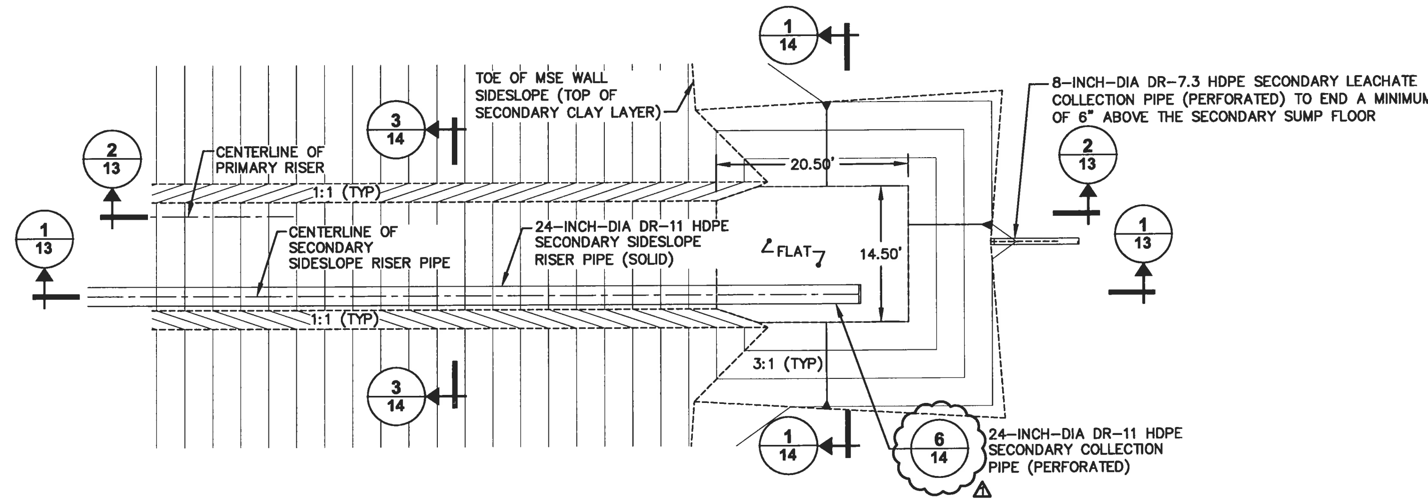
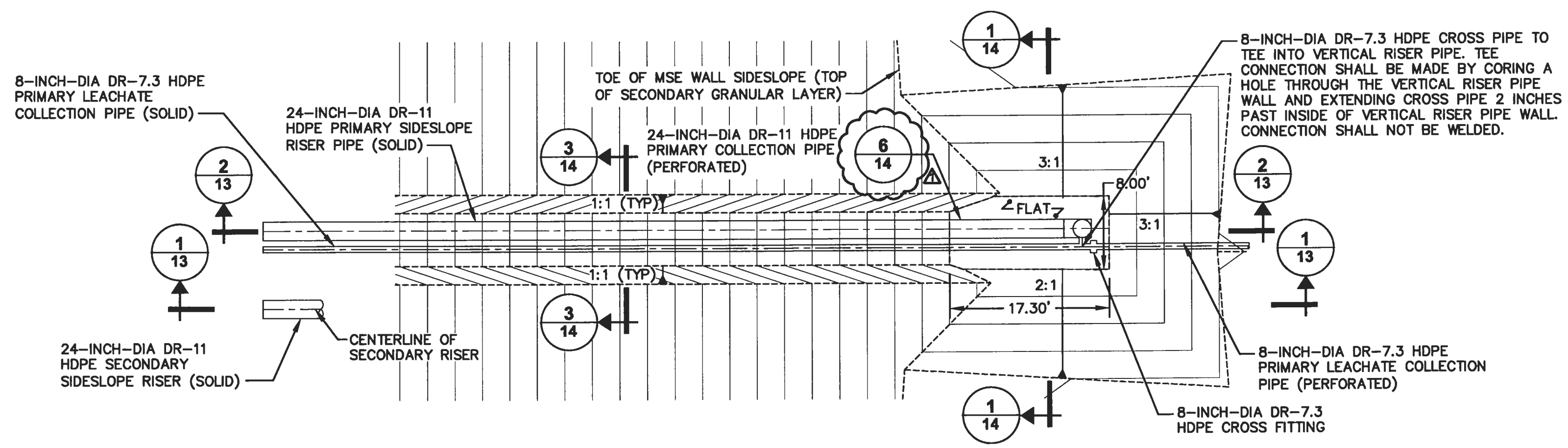


LEACHATE COLLECTION SUMP SUBGRADE PLAN (1)



SECONDARY LEACHATE COLLECTION SUMP AND SIDESLOPE RISER PIPE (TOP OF SECONDARY LINER) (2)



PRIMARY LEACHATE COLLECTION SUMP AND SIDESLOPE RISER PIPE (TOP OF PRIMARY LINER) (3)

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PLOTTED: 2/25/2013 1:13 PM BY: SARTORI, KATHERINE
XREFS: 23725X00 IMAGES: PROJECTNAME: ---

1"=10' — 10' 0 10' 20'

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No.	Date	Revisions	By	Ckd
1	2/2013	REVISED CALLOUT	GNG	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

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TYPICAL SUMP PLANS

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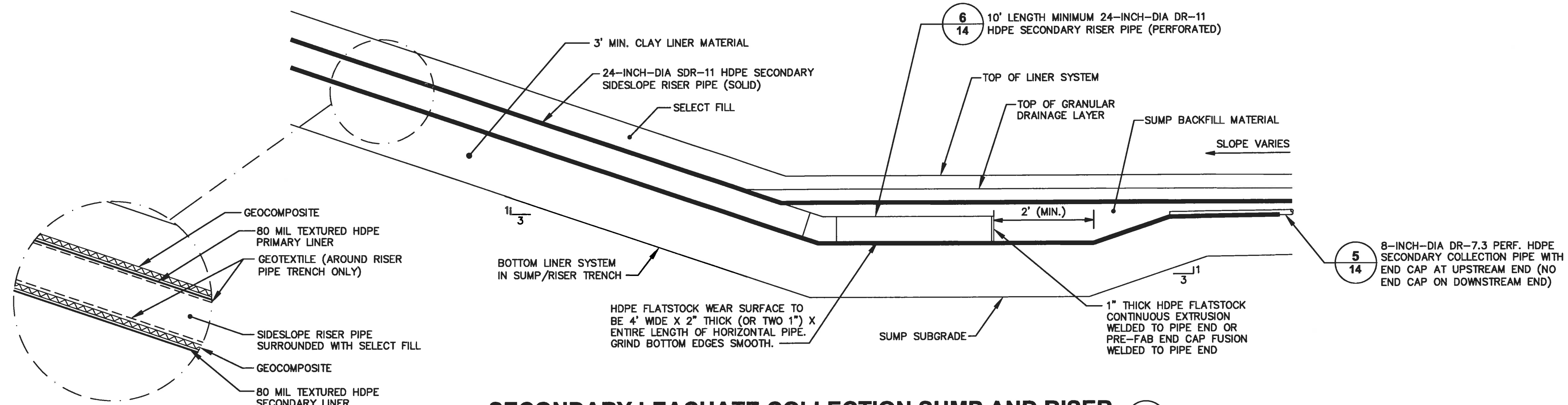
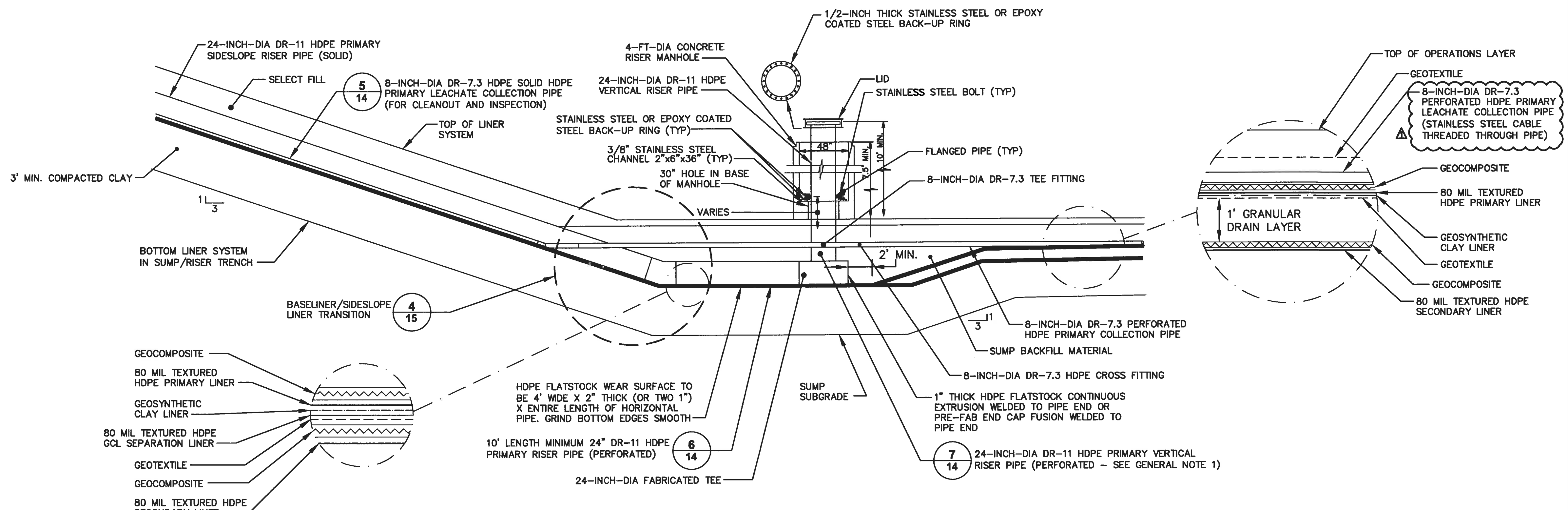


SECONDARY LEACHATE COLLECTION SUMP AND RISER (1)

0 5' 10'
SCALE: 1"=5'



PRIMARY LEACHATE COLLECTION SUMP AND RISER (2)

0 5' 10'
SCALE: 1"=5'

GENERAL NOTES:

1. HDPE VERTICAL RISER BETWEEN HORIZONTAL SECTION OF FABRICATED TEE AND BOTTOM OF MANHOLE SHALL BE PERFORATED WITH A MINIMUM OF 20 EVENLY SPACED 5/8" DIAMETER HOLES.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\RMU_2\23725G13.dwg LAYOUT: 13 SAVED: 2/19/2013 2:39 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: M-LD2B-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:13 PM BY: SARTORI, KATHERINE
XREFS: 23725X00 IMAGES: PROJECTNAME: —

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No.	Date	Revisions	By	Ckd
1	2/2013	REVISED CALLOUT	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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TYPICAL SUMP PROFILES

GENERAL

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Date AUGUST 2009

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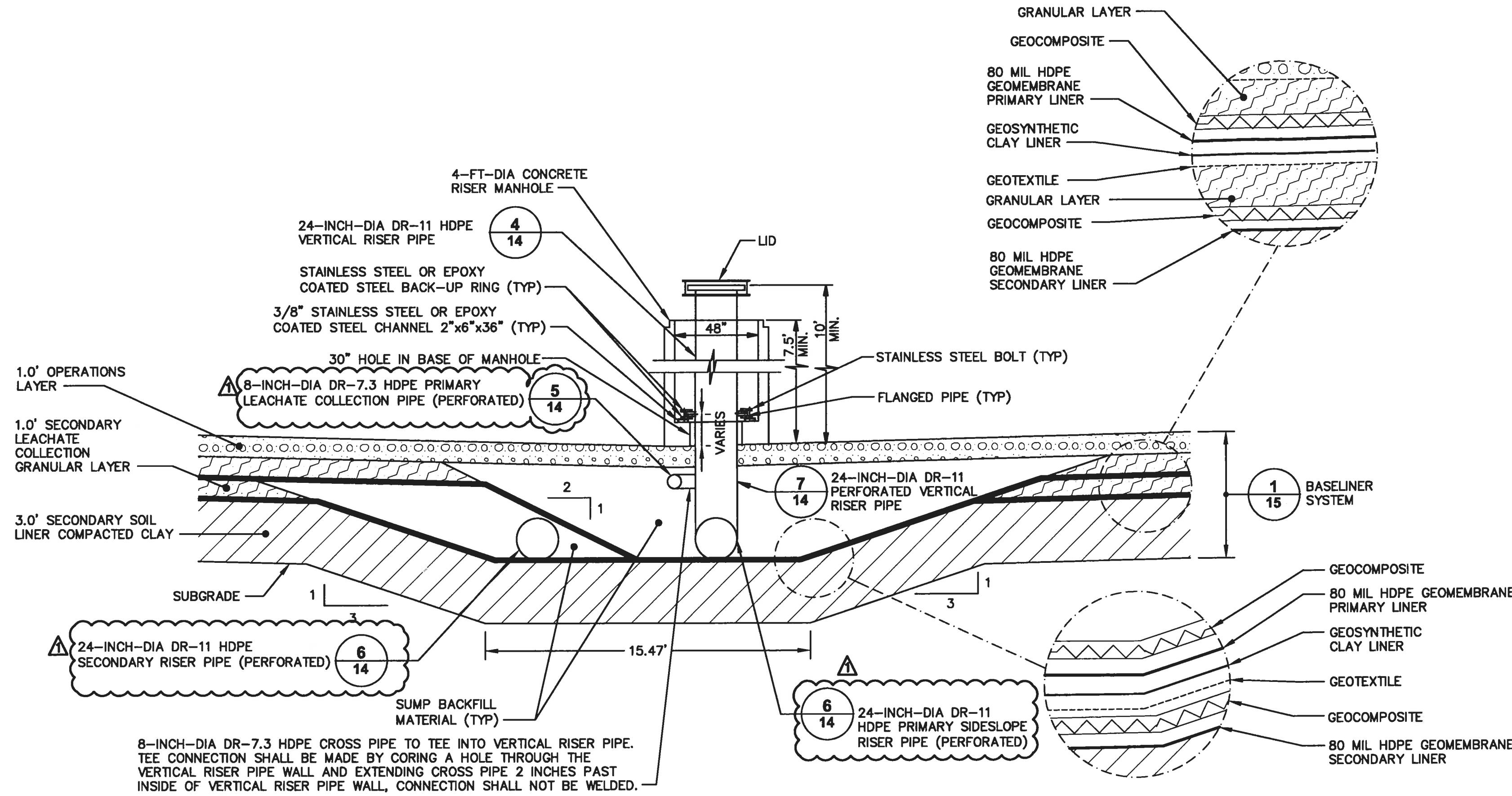
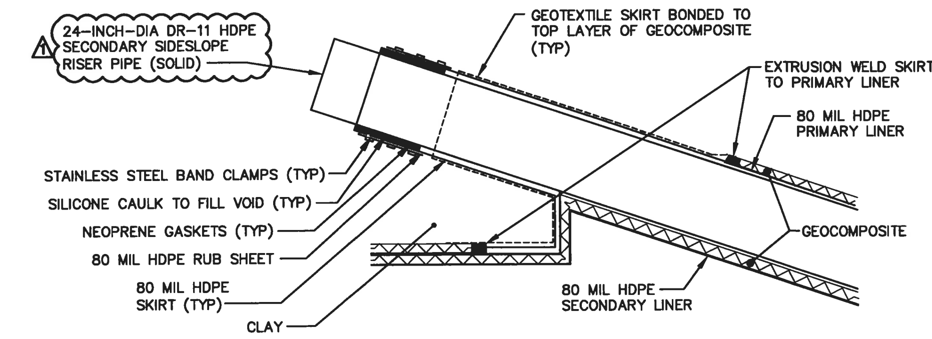
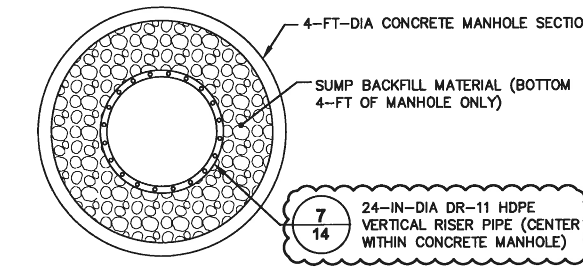


PRIMARY/SECONDARY LEACHATE COLLECTION SUMP SECTION (1)

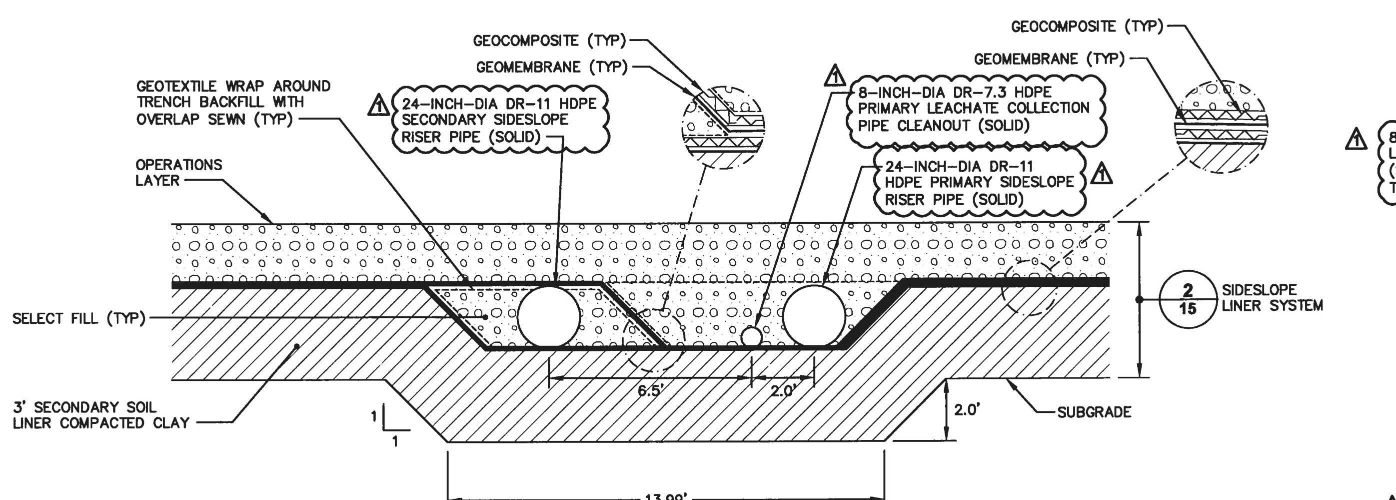
0 4' 8'
GRAPHIC SCALE



SECONDARY RISER PIPE PENETRATION (2)
NOT TO SCALE

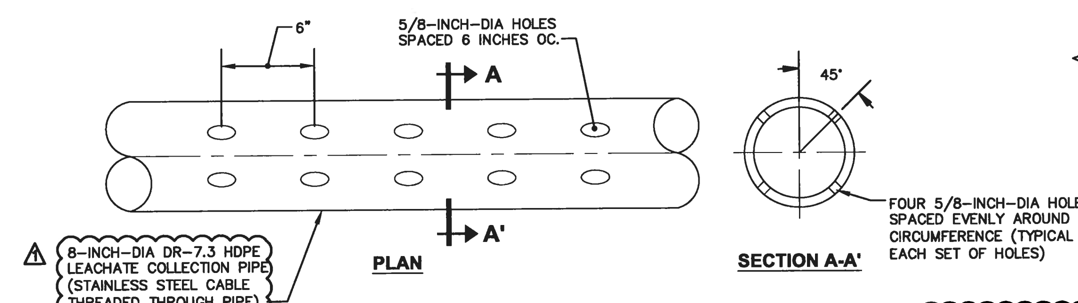


VERTICAL RISER (4)
NOT TO SCALE

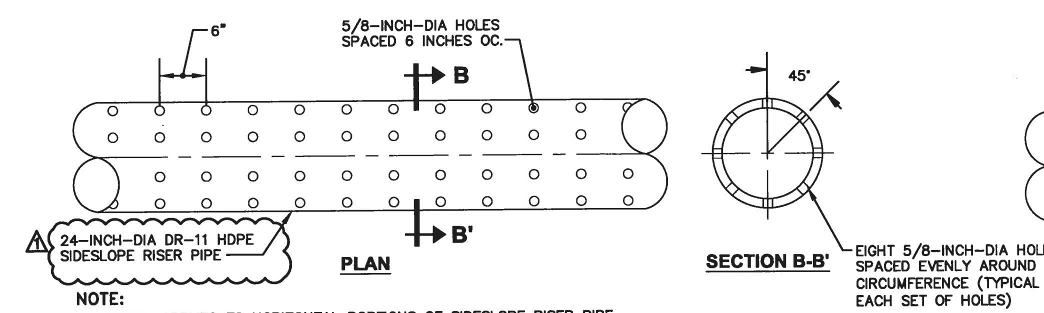


PRIMARY/SECONDARY RISER PIPE TRENCH (3)

0 3' 6'
GRAPHIC SCALE

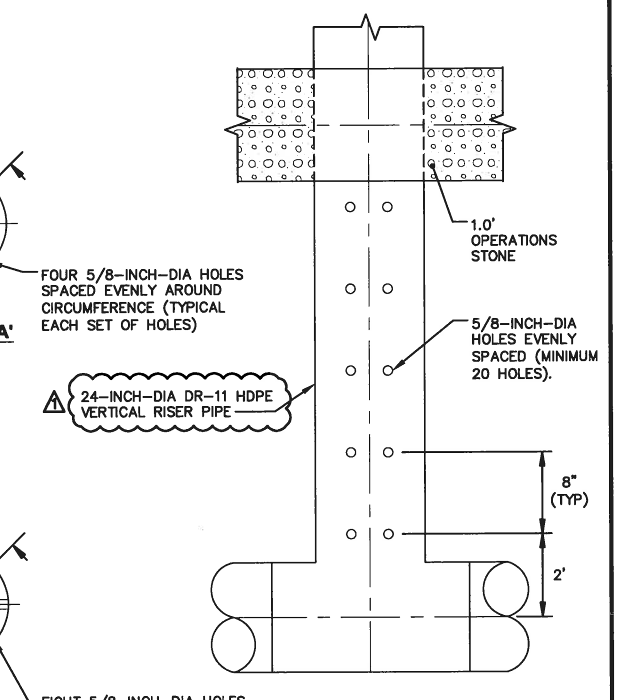


PRIMARY LEACHATE COLLECTION PIPE (5)
NOT TO SCALE



NOTE:
1. DETAIL APPLIES TO HORIZONTAL PORTIONS OF SIDESLOPE RISER PIPE.

SIDESLOPE RISER PIPE (6)
NOT TO SCALE



VERTICAL RISER PIPE (7)
NOT TO SCALE

SCALE(S) AS INDICATED				
THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE				

No.	Date	Revisions	By	Ckd
1	2/2013	ADDED REVISED PIPE CALLOUTS	GNG	PMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL ENGINEER · 072644

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TYPICAL SUMP SECTIONS AND DETAILS

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
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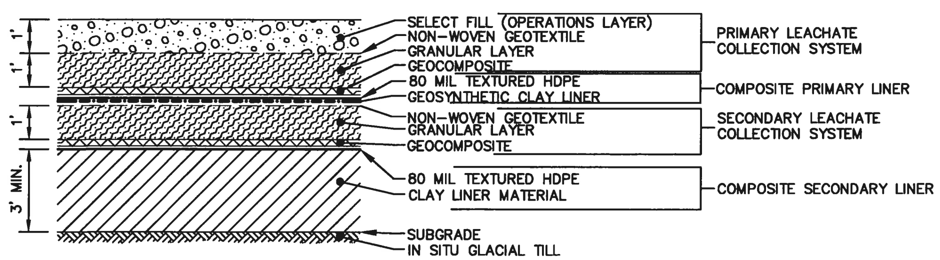
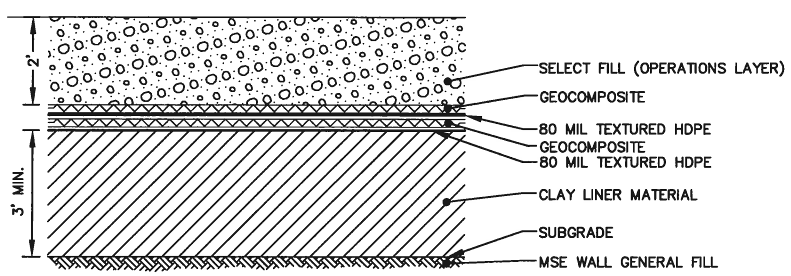
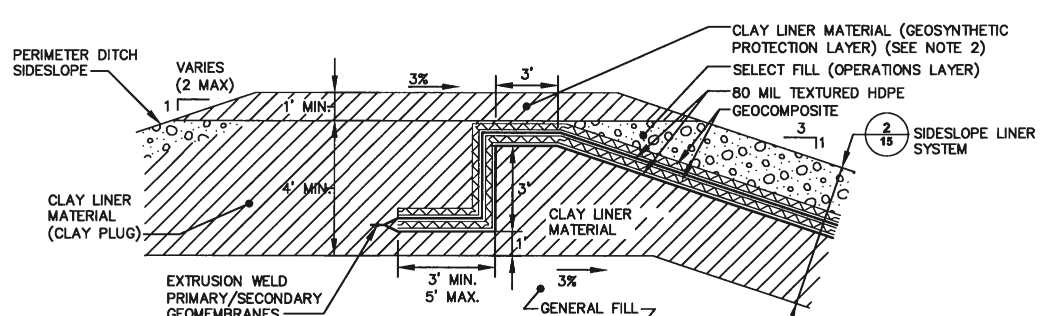


BASE LINER SYSTEM (1)



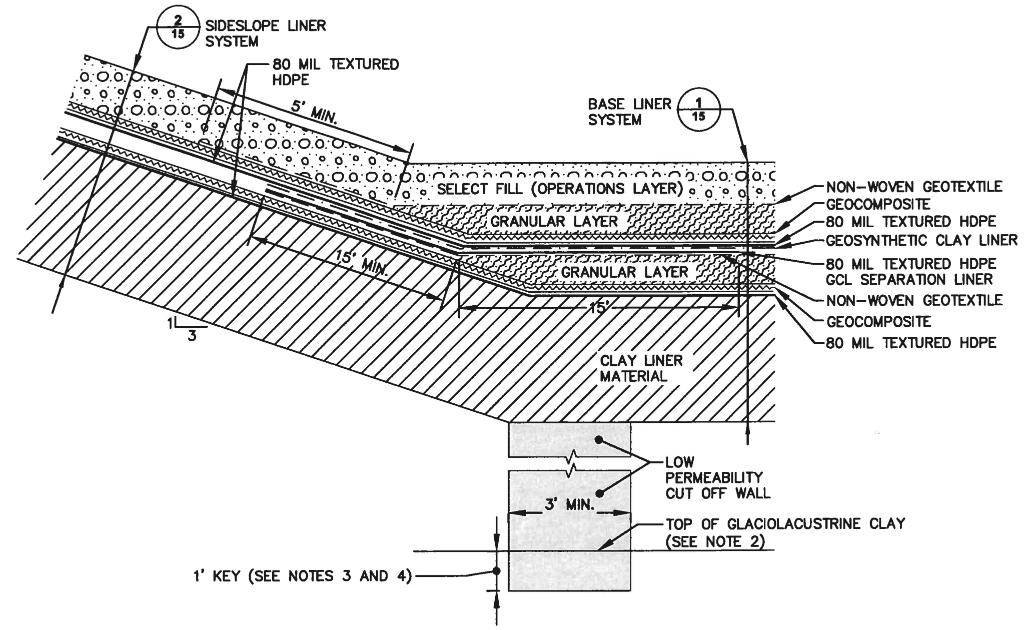
SIDESLOPE LINER SYSTEM (2)



NOTES:

1. SYNTHETIC COMPONENTS OF SIDESLOPE LINER SYSTEM SHALL BE PROPERLY ANCHORED UNTIL FINAL BACKFILLING OF ANCHOR TRENCH.
2. GEOSYNTHETIC PROTECTION LAYER SHALL BE CONSTRUCTED AFTER COMPLETION OF LINER INSTALLATION AND BACKFILLING OF ANCHOR TRENCH. GEOSYNTHETIC PROTECTION LAYER WILL BE REMOVED (AS NECESSARY) DURING CONSTRUCTION OF FINAL COVER SYSTEM.

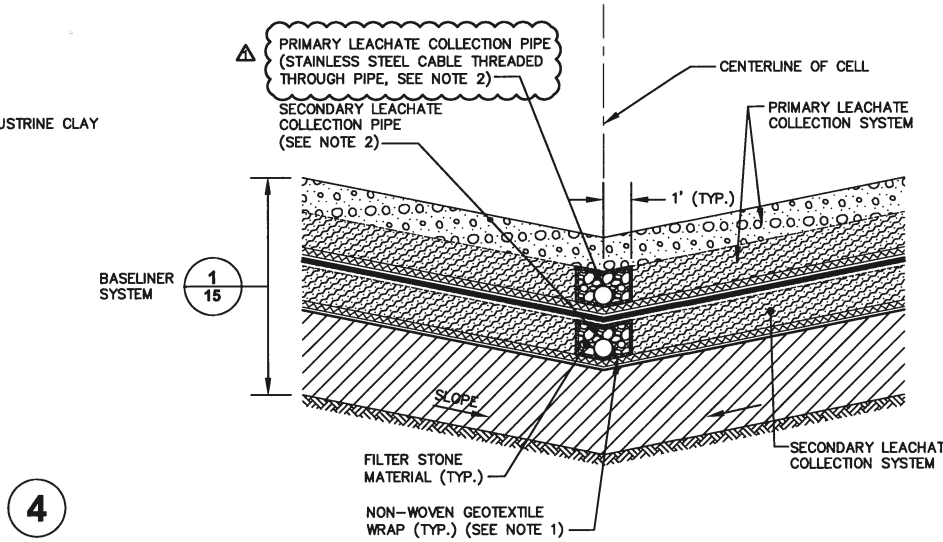
SIDESLOPE LINER SYSTEM ANCHOR TRENCH (3)



NOTES:

1. LOW PERMEABILITY CUT OFF WALL SHALL BE CONSTRUCTED OF MATERIAL HAVING A MAXIMUM HYDRAULIC CONDUCTIVITY OF $1X10^{-7}$ CM/S.
2. TOP ELEVATION OF GLACIOLACUSTRINE CLAY SHALL BE VERIFIED AND DOCUMENTED DURING CONSTRUCTION.
3. BOTTOM ELEVATION OF LOW PERMEABILITY CUTOFF WALL SHALL EXTEND BELOW TOP ELEVATION OF GLACIOLACUSTRINE CLAY A MINIMUM OF 1 FOOT.
4. REQUIRED WIDTH OF LOW PERMEABILITY CUTOFF WALL AT TIE-IN WITH GLACIOLACUSTRINE CLAY IS 3 FEET.

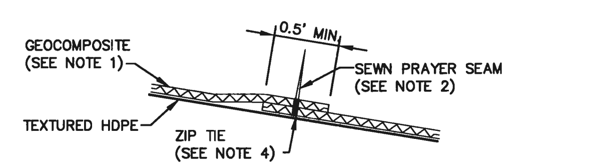
BASELINER/SIDESLOPE LINER TRANSITION (4)



NOTES:

1. SEAM ON GEOTEXTILE WRAP TO BE SEWN.
2. LEACHATE COLLECTION PIPES TO BE 8-INCH-DIA PERFORATED DR-7.3 HDPE WITH END CAP TO DAYLIGHT AT UPSTREAM AND DOWNSTREAM END OF PIPE.

LEACHATE COLLECTION PIPE SECTION (6)



NOTES:

1. ALL GEOCOMPOSITE SHALL SHINGLE DOWNSLOPE AS SHOWN.
2. THE TOP GEOTEXTILE LAYER OF THE GEOCOMPOSITE IS TO BE PEELED BACK SO THAT A PRAYER SEAM MAY BE SEWN ABOVE THE GEOCOMPOSITE OVERLAP.
3. IF GEOTEXTILE IS UNABLE TO BE PEELED BACK WITHOUT CAUSING DAMAGE, A PATCH OF GEOTEXTILE SHALL BE HEAT BONDED TO THE TOP GEOTEXTILE LAYER OF THE GEOCOMPOSITES OVER THE SEAM.
4. ZIP TIES SHALL BE PLACED EVERY 5' ALONG ADJACENT PANELS AND EVERY 6" ALONG BUTT SEAMS AND IN ANCHOR TRENCHES.

TYPICAL GEOCOMPOSITE SEAM (5)

GENERAL NOTES:

GEOSYNTHETICS ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY.

NOT TO SCALE

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No.	Date	Revisions	By	Ckd
△	2/2013	REVISED CALLOUT	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · PROFESSIONAL ENGINEER

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LINER SYSTEM SECTIONS AND DETAILS

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

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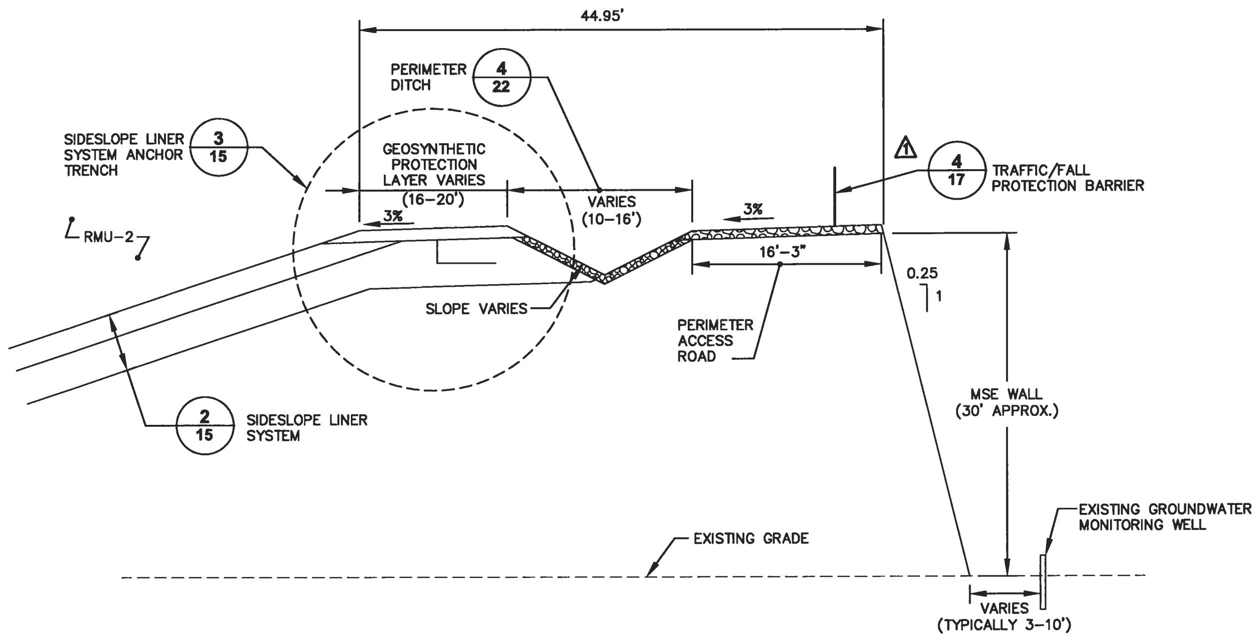
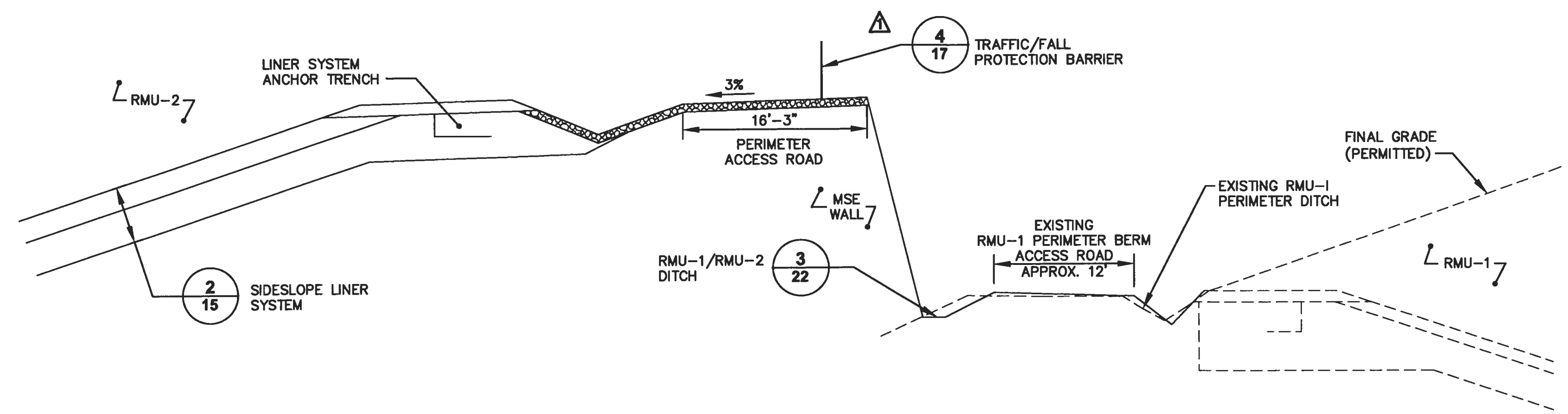
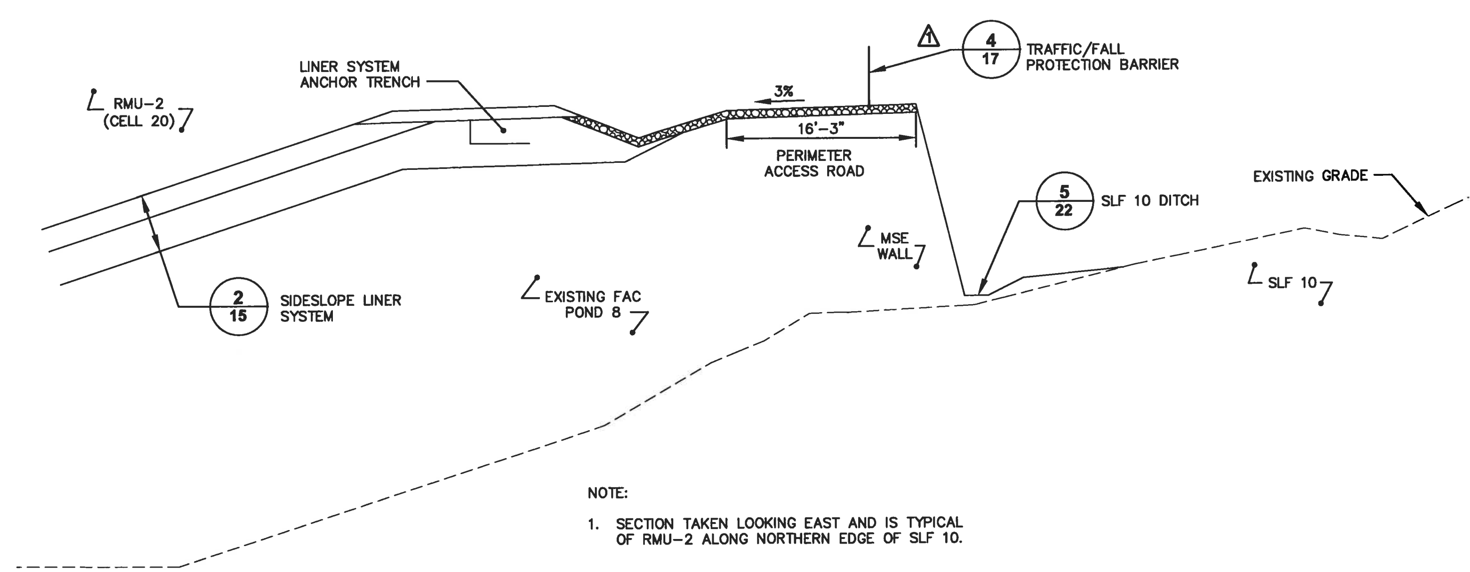


TYPICAL MSE WALL SECTION (1)



RMU-1/RMU-2 SECTION (2)



NOTE:

1. SECTION TAKEN LOOKING EAST AND IS TYPICAL OF RMU–2 ALONG NORTHERN EDGE OF SLF 10.

RMU-2/SLF 10 NORTH SECTION (3)

1"=8'-0" 8' 0 8' 16'

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No.	Date	Revisions	By	Ckd
1	02/2013	REVISED TOP EDGE OF MSE WALL AND REVISED CALLOUTS	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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MSE WALL SECTIONS

GENERAL

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CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
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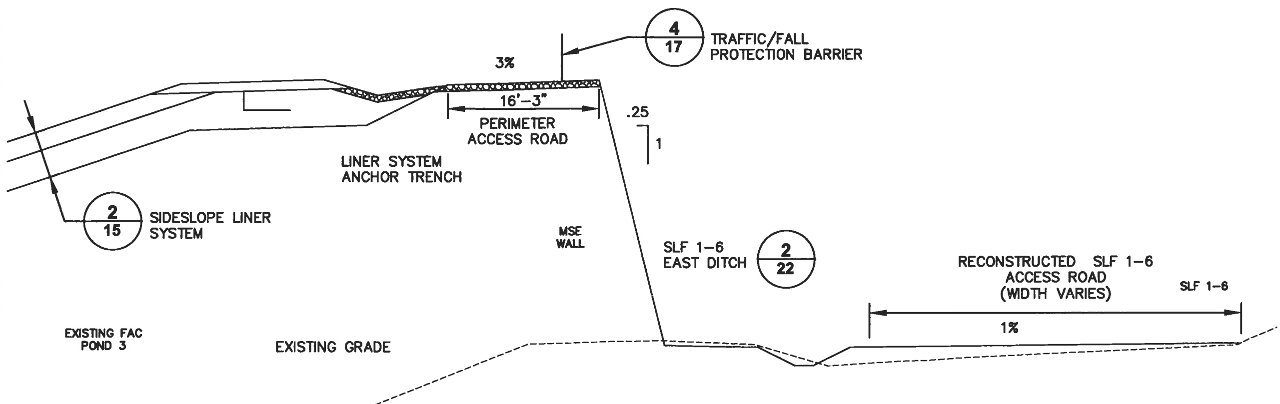
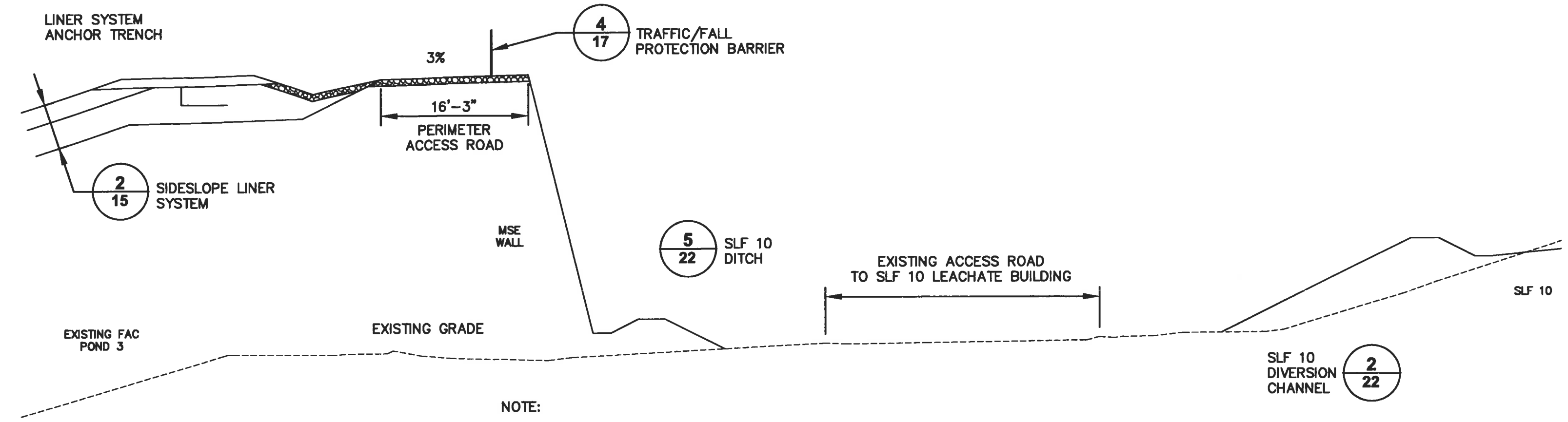
XREFS: 23725X00 IMAGES: PROJECTNAME: ---



NOTE:

1. SECTION TAKEN LOOKING SOUTH AND IS TYPICAL OF RMU-2 ON THE EASTERN EDGE NEAR SLF 1-6.

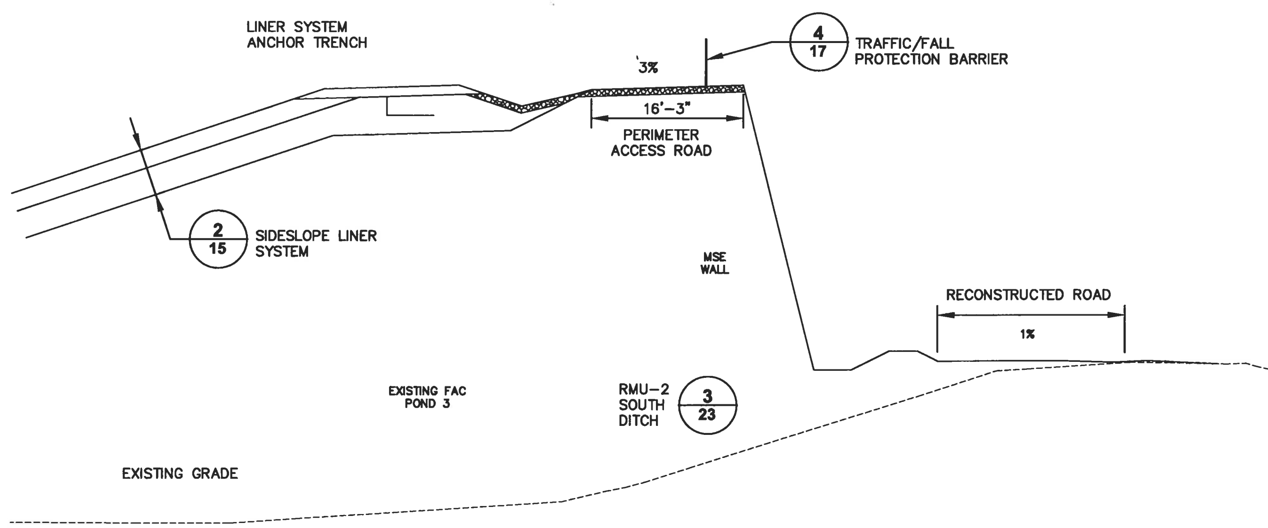
RMU-2/SLF 1-6 SECTION 1



NOTE:

1. SECTION IS TAKEN LOOKING NORTH AND IS TYPICAL OF RMU-2 ALONG THE WESTERN EDGE OF SLF 10.

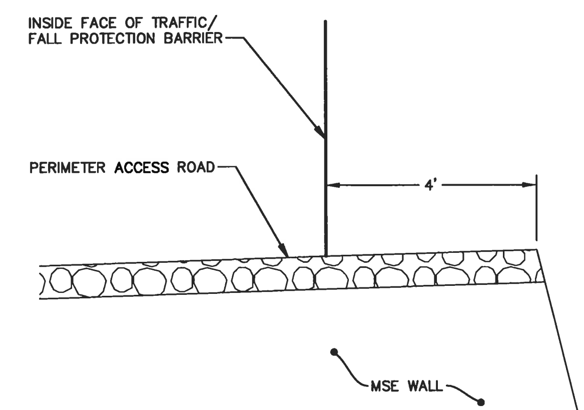
RMU-2/SLF 10 WEST SECTION 2



NOTE:

1. SECTION IS TAKEN LOOKING EAST AND IS TYPICAL OF RMU-2 ON THE SOUTHERN EDGE.

RMU-2 SOUTH SECTION 3



NOTES:

1. TRAFFIC/FALL PROTECTION BARRIER WILL BE DESIGNED TO ARREST TYPICAL VEHICLES ANTICIPATED TO BE OPERATED ON THE PERIMETER ACCESS ROAD AND TRAVELING AT THE POSTED SPEED AND WILL COMPLY WITH OSHA FALL PROTECTION REQUIREMENTS CONTAINED IN 29 CFR 1910.23.
2. TRAFFIC/FALL PROTECTION BARRIER WILL ALSO INCLUDE A PROVISION FOR ATTACHING A TEMPORARY LITTER FENCE TO MINIMIZE THE POTENTIAL FOR WIND-BLOWN DEBRIS TO LEAVE THE LANDFILL WHILE THE LANDFILL IS IN OPERATION. TEMPORARY LITTER FENCE MAY BE REMOVED FOLLOWING FINAL CLOSURE OF LANDFILL.
3. EXACT CONFIGURATION OF TRAFFIC/FALL PROTECTION BARRIER WILL BE DETERMINED AT TIME OF CONSTRUCTION. ONE POSSIBLE CONFIGURATION INCLUDES PRECAST CONCRETE HIGHWAY BARRIERS INSTALLED END-TO-END AND OF SUFFICENT HEIGHT TO MEET OSHA FALL PROTECTION REQUIREMENTS OR ALTERNATIVELY EQUIPPED WITH AN ADDITIONAL RAILING SECURED TO THE TOP TO MEET OSHA FALL PROTECTION REQUIREMENTS.
4. THE INDICATED LOCATION OF THE BARRIER IS BASED ON THE ASSUMED SETBACK DISTANCE FOR VEHICLE LOADING USED IN THE MSE WALL DESIGN CALCULATIONS. THE BARRIER WILL BE DESIGNED SO AS TO NOT COMPROMISE THE FUNCTIONALITY OF THE MSE WALL GEOGRID LAYERS

TRAFFIC/FALL PROTECTION BARRIER 4

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XREFS: 23725X00 IMAGES: PROJECTNAME: ----

1"=10' 10' 0 10' 20'

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No.	Date	Revisions	By	Ckd
1	2/2013	REVISED TOP EDGE OF MSE WALL, REVISED CALLOUTS, AND ADDED DETAIL 4	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK JOSEPH MOLINA 072644 LICENSED PROFESSIONAL ENGINEER

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MSE WALL SECTIONS

GENERAL

ARCADIS Project No. B0023725.2009.00006

Date AUGUST 2009

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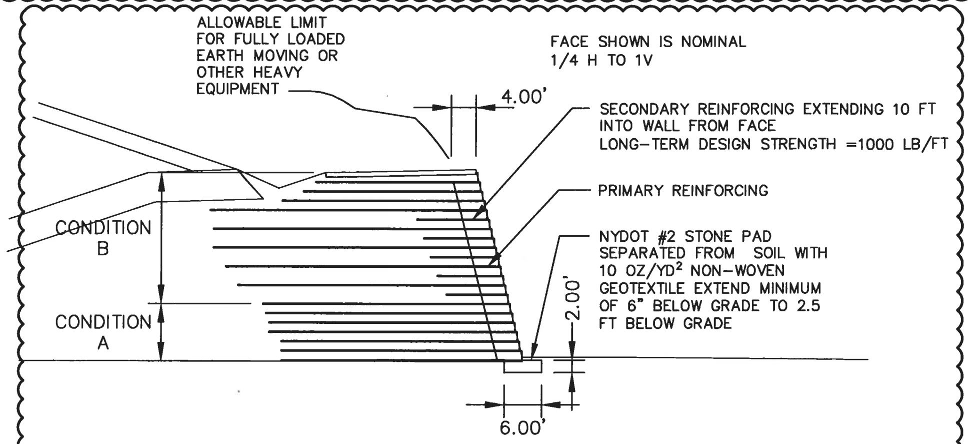
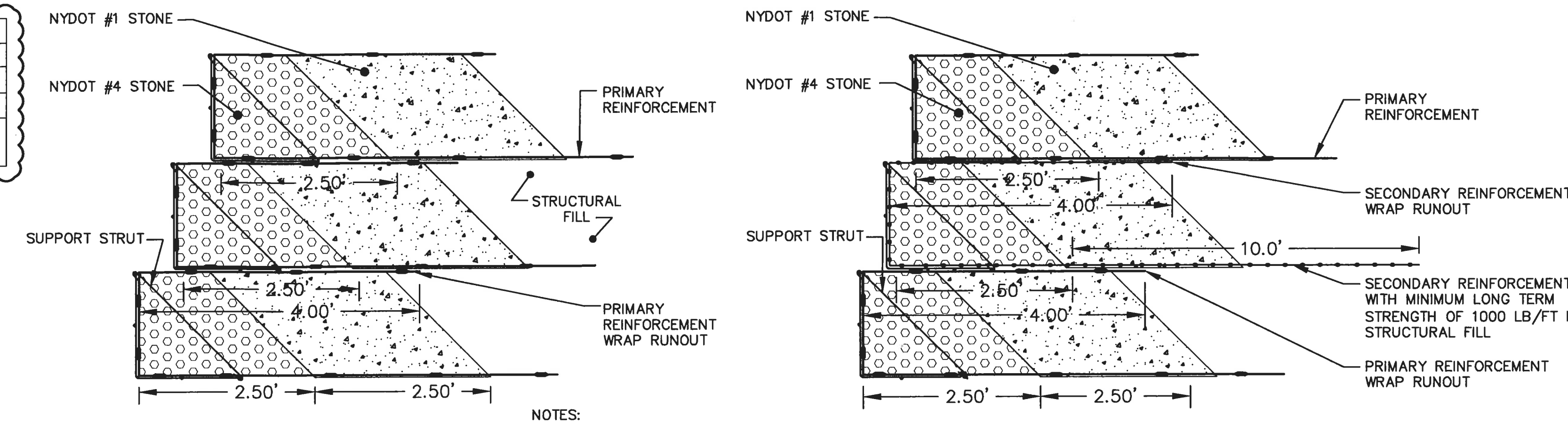
PRIMARY REINFORCEMENT															
LAYER NUMBER	1	2	3	4	5	6	7	9	11	13	15	17	18	19	20
ELEVATION	319.5	321.0	322.5	324.0	325.5	327.0	328.5	331.5	334.5	337.5	340.5	343.5	345.0	346.5	348.0
LENGTH (FROM FACE) FT	31.5	30.5	30.1	31.8	31.4	31.50	31.5	34.9	36.1	37.4	36.6	36.4	24.0	20.6	18.3
LONG TERM DESIGN STRENGTH (LBS/FT)	6800	6800	5900	5900	5900	4900	4900	4900	4900	4900	3000	2300	2300	3000	3000



NOTE:

1. REINFORCING AT A GIVEN ELEVATION CAN BE ELIMINATED WHEN FINAL GRADE OUTSIDE THE LIMITS OF MSE WALL EXCEEDS 3 FOOT ABOVE THE LAYER OF REINFORCING FOR A DISTANCE OF AT LEAST 25 FEET BEYOND THE WALL.

MECHANICALLY STABILIZED EARTH (MSE) WALL SECTION (1)



CONDITION A

(WHERE PRIMARY REINFORCEMENT IS 1.5' APART)

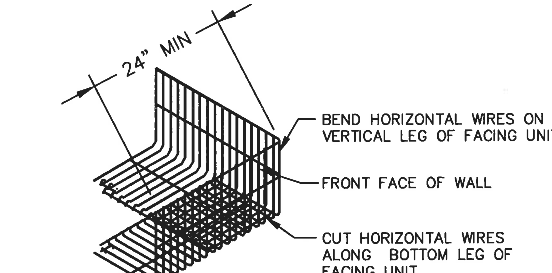
CONDITION B

(WHERE PRIMARY REINFORCEMENT IS 3.0' APART)

NOTES:

1. ALL NYDOT STONE SHALL MEET NYDOT 703 COARSE AGGREGATE PHYSICAL REQUIREMENTS.
2. PRIMARY REINFORCEMENT PER DESIGN.
3. SECONDARY REINFORCEMENT IN CONDITION B WILL HAVE A MINIMUM LONG TERM STRENGTH OF 1000 LB/FT IN STRUCTURAL FILL.

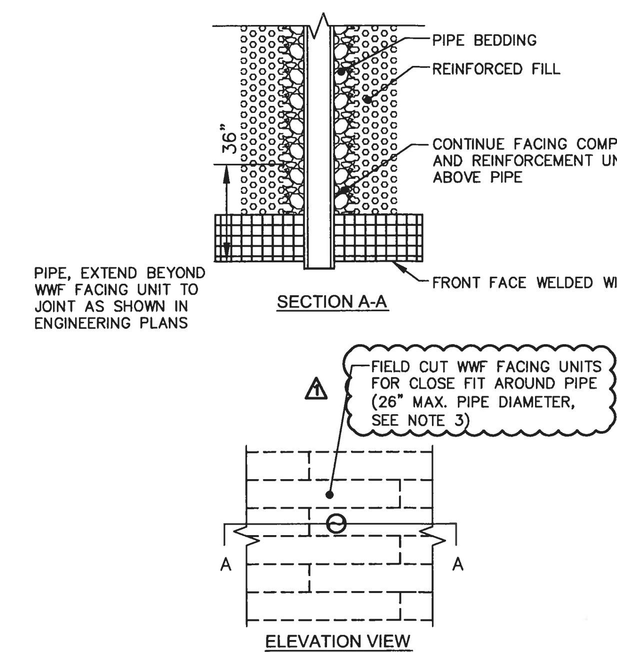
FACING DETAIL (2)



NOTES:

1. FACING UNIT SHALL BE USED TO FABRICATE CONTINUOUS CORNER. A MINIMUM OF 24" OF FACING UNIT MUST BE PROVIDED IN BOTH DIRECTIONS AS MEASURED FROM THE CORNER BEND.

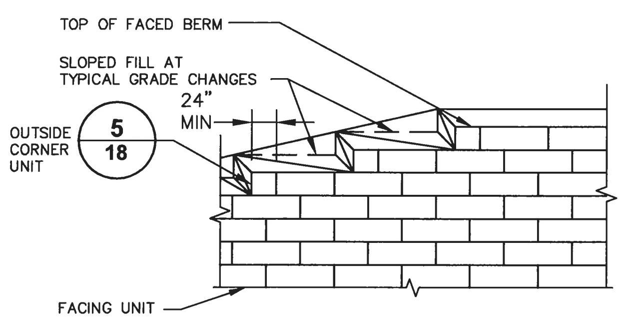
OUTSIDE CORNER UNIT (5)



NOTES:

1. SEE WELDED WIRE FORM (WWF) FACING UNIT DETAIL FOR FACING MATERIALS AND DIMENSIONS.
2. SEE ELEVATION VIEW FOR GEOGRID TYPE, LOCATION, AND DIMENSIONS.
3. AT PIPE PENETRATIONS, A REINFORCED CONCRETE HEADWALL WILL REPLACE THE AFFECTED MSE WALL BASKETS. THE GEOGRID LAYERS WILL BE STRUCTURALLY TIED TO THE HEADWALL BASED ON DETAILS TO BE DEVELOPED AS PART OF CONSTRUCTION. THE STRUCTURAL CONNECTION MAY CONSIST OF CASTING THE CONCRETE AROUND THE GEOGRID END OR PROVIDING A BAR ON THE BACK OF THE HEADWALL AROUND WHICH THE GEOGRID CAN BE WRAPPED AND RUN BACK AWAY FROM THE HEADWALL A MINIMUM OF 4 FEET.
4. WHERE PIPES INTERFERE WITH GEOGRID LAYERS, GEOGRID LAYERS WILL BE CUT ALONG THE PIPE AND THE REMOVED GEOGRID WILL BE REPLACED WITH ADDITIONAL GEOGRID LAYERS TO EITHER SIDE OF THE PIPES.
5. PIPE SHALL BE FUSED HDPE.

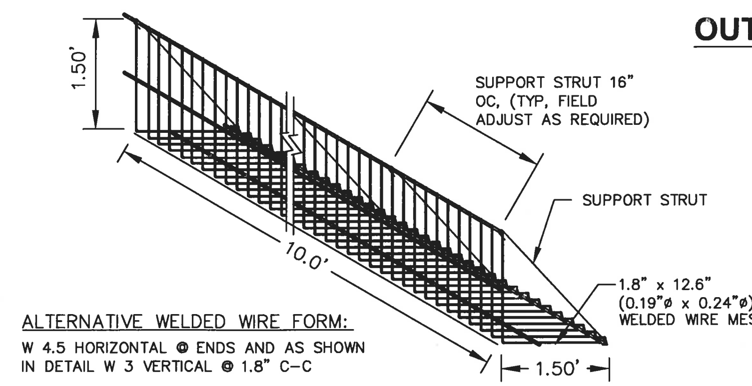
PIPE PENETRATION DETAIL AT WELDED WIRE FACE (7)



NOTES:

1. SEE FACING UNIT DETAIL FOR FACING MATERIALS AND DIMENSIONS.
2. ADJACENT FACING UNITS SHALL BE INSTALLED TO PROVIDE 4" OVERLAP OF HORIZONTAL WIRES.

TEMPORARY TERMINATION DETAIL (3)

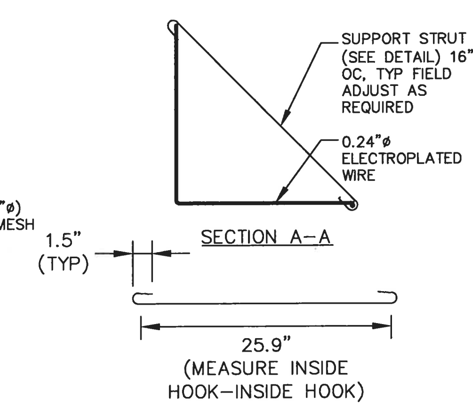


ALTERNATIVE WELDED WIRE FORM:
W 4.5 HORIZONTAL @ ENDS AND AS SHOWN IN DETAIL W 3 VERTICAL @ 1.8" C-C

NOTES:

1. ALL FACING UNITS SHALL BE GALVANIZED PER ASTM A123 AFTER BENDING, UNLESS OTHERWISE SPECIFIED.
2. ALL FORMS AND STRUTS WILL BE FABRICATED WITH BLACK STEEL WIRE.
3. OVERALL LENGTH OF WIRE FORMS IS 10'-0". EFFECTIVE CONSTRUCTED WIDTH IS 9-8" WITH 4" OVERLAPPING AT ENDS.
4. USE HOG RINGS TO TIE THE WIRE FORMS TOGETHER AT OVERLAPPING ENDS.

WELDED WIRE FORM FACING DETAIL (4)



SUPPORT STRUT DETAIL (6)

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No.	Date	Revisions	By	Ckd
1	02/2013	REVISED NOTE CALLOUT, MSE WALL GRID, AND TABLE	NWF	BMS

Professional Engineer's Name
Professional Engineer's No.
State | Date Signed 2/27/13 | Project Mgr.
Designed by PJC | Drawn by | Checked by PJC

STATE OF NEW YORK · JOSEPH MOLINARI · 072644 · LICENSED PROFESSIONAL ENGINEER

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MSE WALL DETAILS

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
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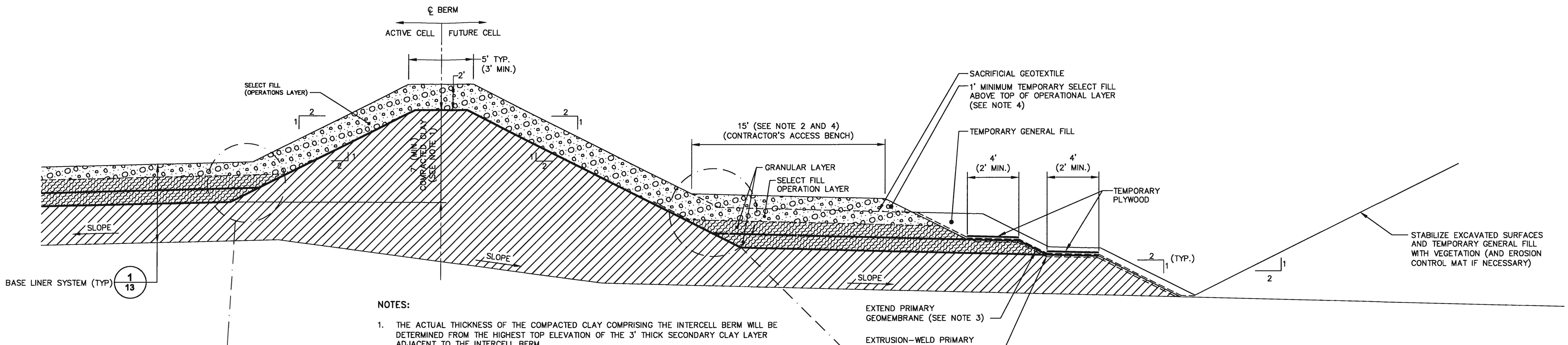
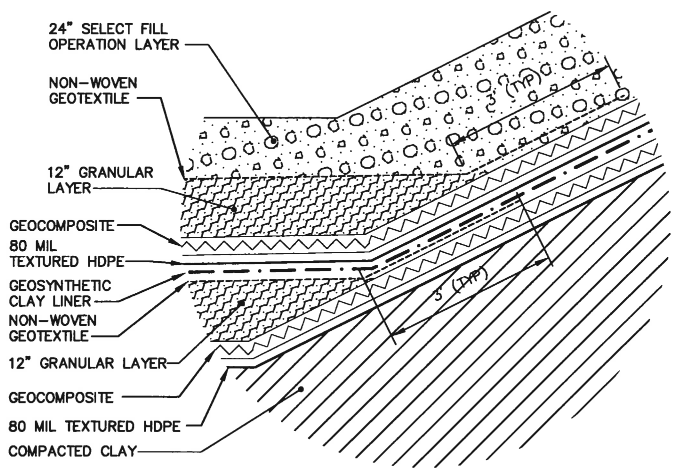
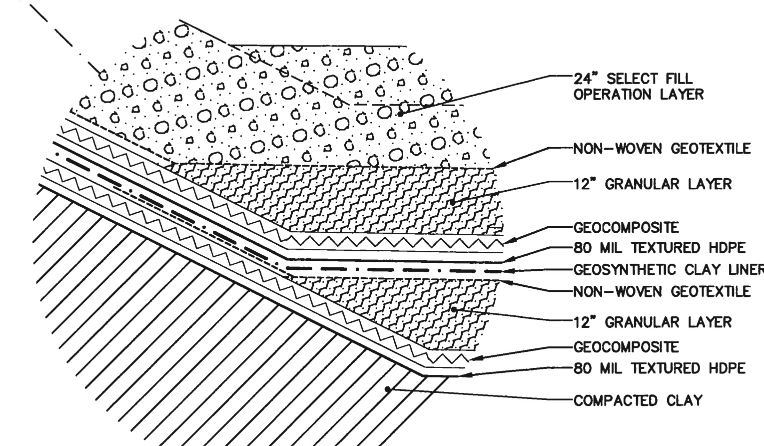


NOTES:

1. THE ACTUAL THICKNESS OF THE COMPACTED CLAY COMPRISING THE INTERCELL BERM WILL BE DETERMINED FROM THE HIGHEST TOP ELEVATION OF THE 3' THICK SECONDARY CLAY LAYER ADJACENT TO THE INTERCELL BERM.
2. CONTRACTOR'S ACCESS BENCH IS FOR REMOVAL OF TEMPORARY COVER MATERIAL AS PART OF FUTURE CONSTRUCTION OF CELLS.
3. EXTEND PRIMARY GEOMEMBRANE TO RUNOUT FOR SECONDARY GEOMEMBRANE AND EXTRUSION WELD LINERS TO SEAL OFF SECONDARY LEACHATE COLLECTION SYSTEM.
4. A MINIMUM OF 1' OF SELECT FILL SHALL BE PLACED ABOVE COMPACTED OPERATIONS LAYER TO PROVIDE PROTECTION OVER CONSTRUCTED LINER SYSTEM RUNOUT. SELECT FILL ON CONTRACTOR'S ACCESS BENCH SHALL BE REMOVED DURING CONSTRUCTION OF FUTURE CELL.



TYPICAL INTERCELL BERM (1)



GENERAL NOTES:

1. GEOSYNTHETICS ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY.
2. DETAIL SHOWS TEMPORARY TERMINATION OF LINER SYSTEM LAYERS ON UNCONSTRUCTED SIDE OF INTERCELL BERM. TEMPORARY FEATURES TO BE REMOVED DURING CONSTRUCTION OF FUTURE CELL.

NOT TO SCALE

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No.	Date	Revisions	By	Ckd
1	2/2013	DELETED GENERAL FILL, COLLECTION PIPE, AND DETAIL 2	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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TYPICAL INTERCELL BERM

GENERAL

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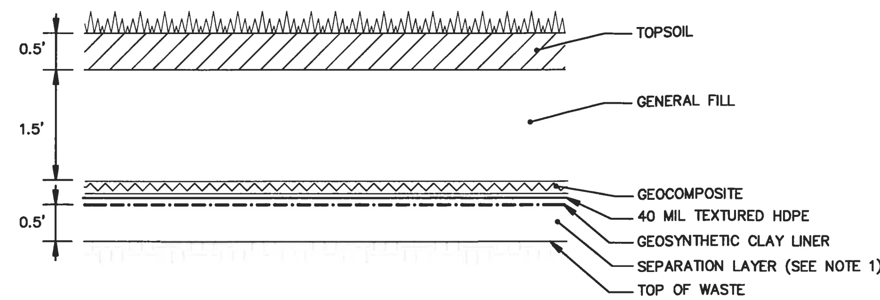
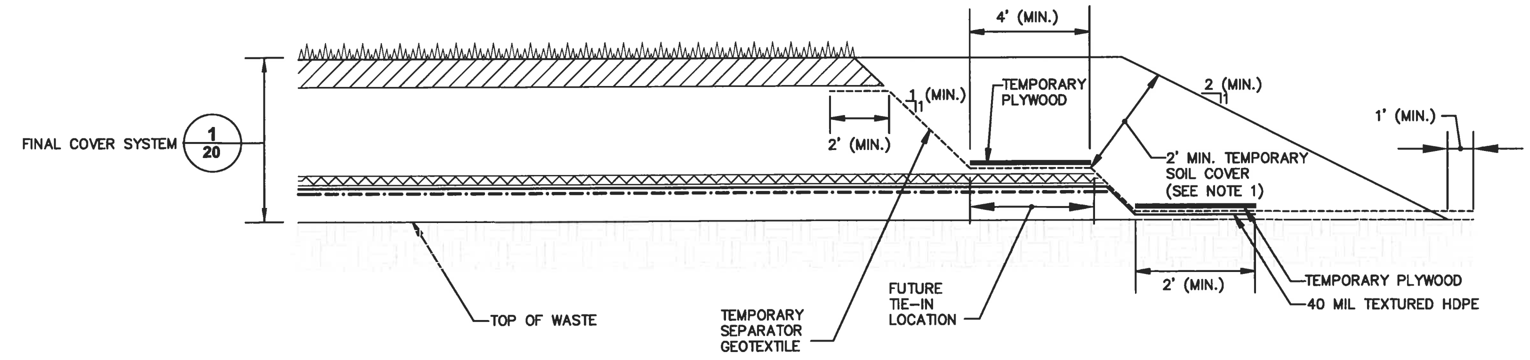


NOTE:

1. SEPARATION LAYER SHALL CONSIST OF GENERAL FILL MATERIAL HAVING A MAXIMUM PARTICLE SIZE OF 2-INCHES.

FINAL COVER SYSTEM (1)

NOT TO SCALE

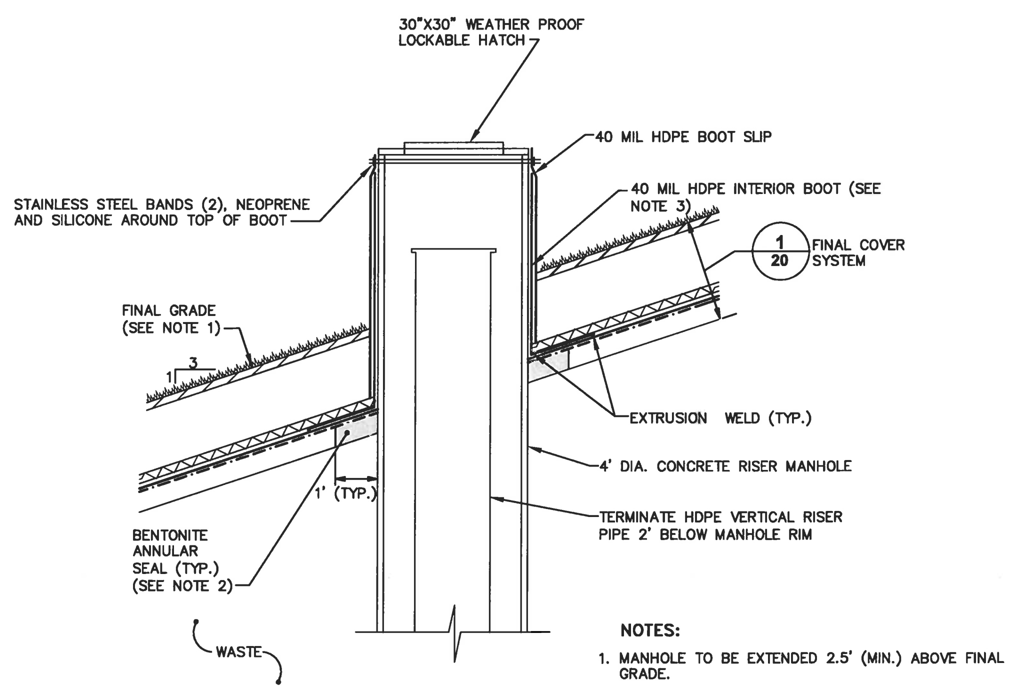


NOTE:

1. TEMPORARY SOIL COVER REPRESENTS EARTHEN MATERIAL TO BE REMOVED DURING FUTURE TIE-IN CONSTRUCTION TO ACHIEVE PERMIT GRADES. GEOSYNTHETICS TO BE PROTECTED DURING REMOVAL.

TEMPORARY FINAL COVER SYSTEM TERMINATION AT SIDESLOPE OR TOP PLATEAU (2)

NOT TO SCALE

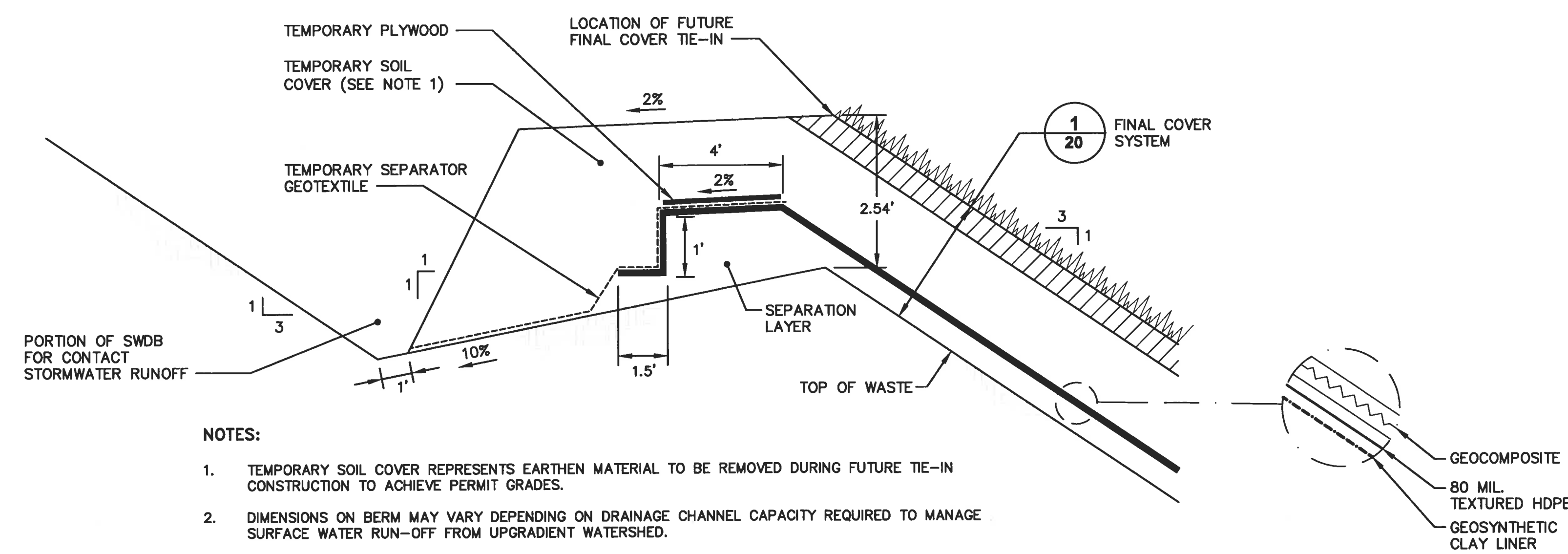


NOTES:

1. MANHOLE TO BE EXTENDED 2.5' (MIN.) ABOVE FINAL GRADE.
2. SEAL ANNULAR SPACE AROUND RISER PIPE WITH BENTONITE PRIOR TO FINAL COVER PLACEMENT.
3. 40 MIL HDPE INTERIOR BOOT TO BE LEFT UNATTACHED TO MANHOLE AND EXTERIOR BOOT SLIP TO ALLOW FOR MOVEMENT.

FINAL COVER VERTICAL RISER PENETRATION (3)

NOT TO SCALE



NOTES:

1. TEMPORARY SOIL COVER REPRESENTS EARTHEN MATERIAL TO BE REMOVED DURING FUTURE TIE-IN CONSTRUCTION TO ACHIEVE PERMIT GRADES.
2. DIMENSIONS ON BERM MAY VARY DEPENDING ON DRAINAGE CHANNEL CAPACITY REQUIRED TO MANAGE SURFACE WATER RUN-OFF FROM UPGRADIENT WATERSHED.
3. FUTURE GEOSYNTHETICS TIE-IN EXTRUSION SEAM TO BE MADE ON SURFACE WATER DIVERSION BERM.

TEMPORARY FINAL COVER SYSTEM TERMINATION AT SURFACE WATER DIVERSION BERM (4)

0 3' 6' HORIZONTAL SCALE

0 1.5' 3' VERTICAL SCALE

GENERAL NOTE:

1. GEOSYNTHETICS ARE SHOWN AT AN EXAGGERATED SCALE IN CERTAIN DETAILS FOR CLARITY.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
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Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

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FINAL COVER DETAILS

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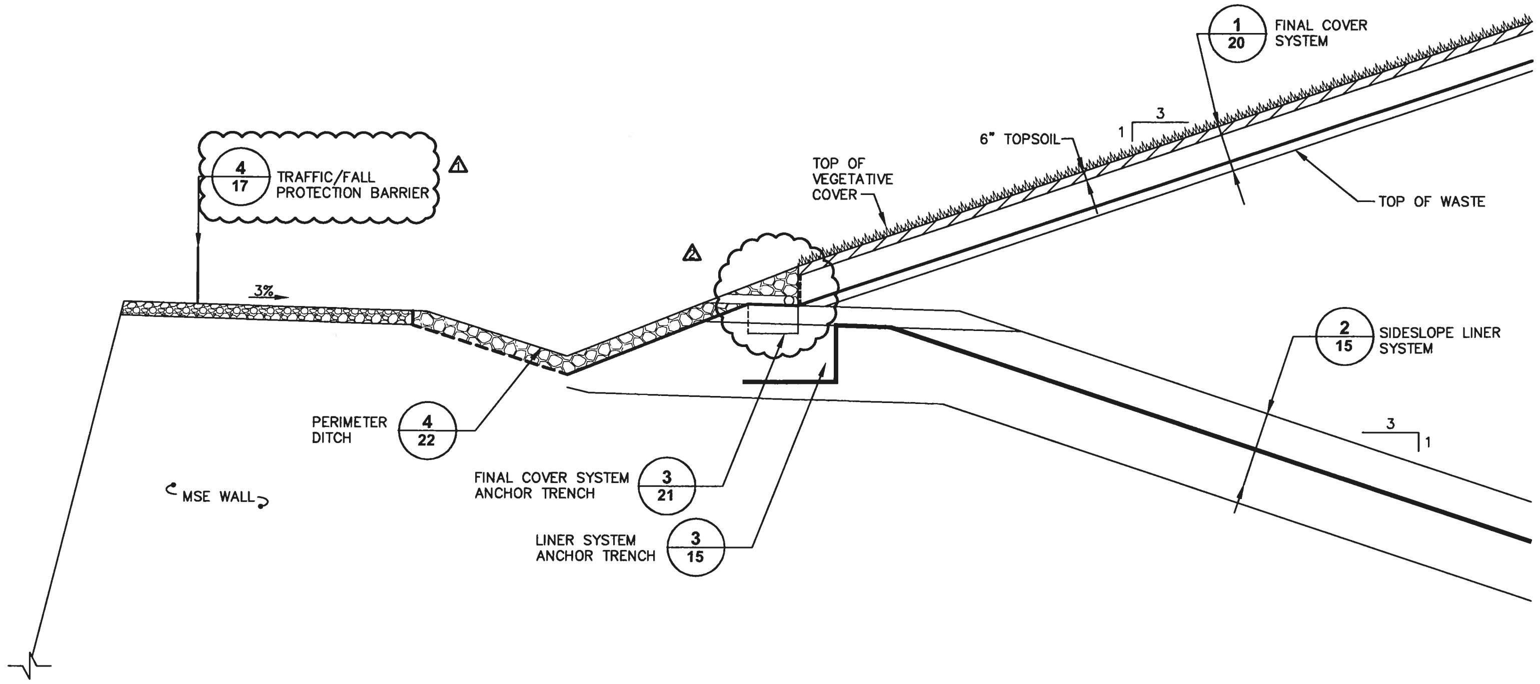
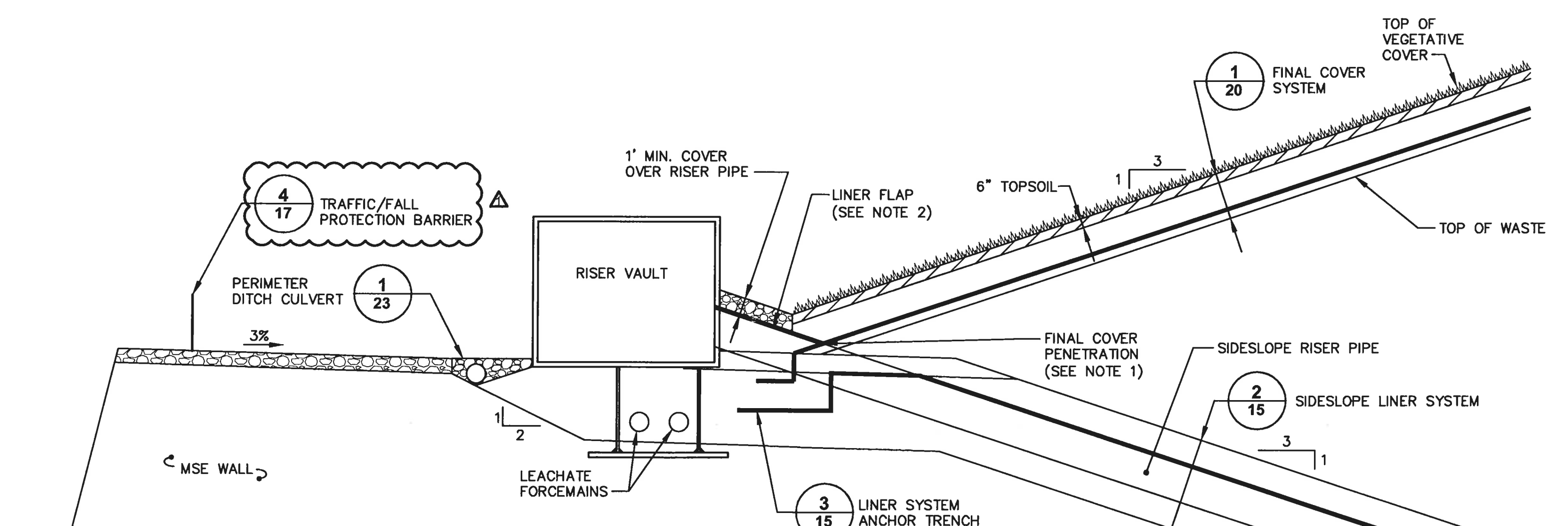


TYPICAL FINAL COVER TERMINATION (1)

0 5' 10'
GRAPHIC SCALE

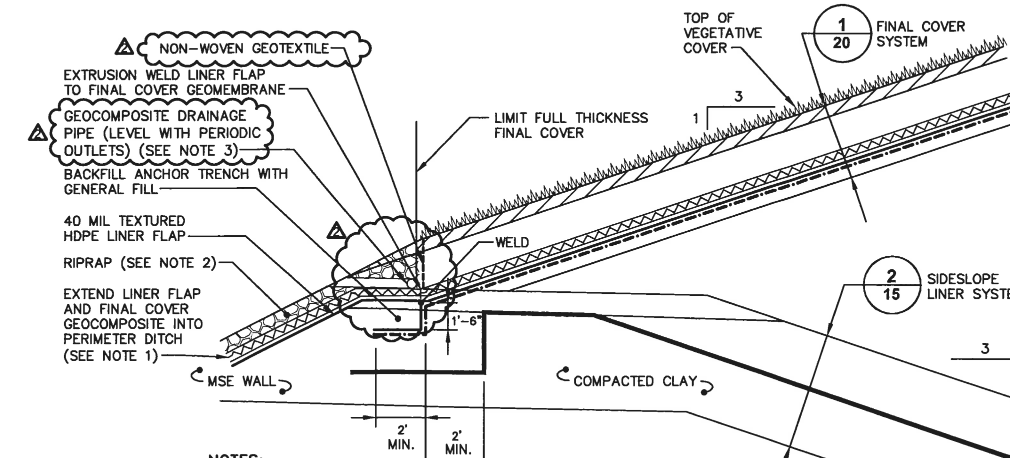


NOTE:

1. EXTRUSION WELD 40 MIL HDPE MEMBRANE TO SIDESLOPE RISER PIPES MINIMUM 180° AROUND PIPE CENTERED ON TOP OF PIPE.
2. AT VAULT LOCATIONS, LINER FLAP EXTENDING FROM FINAL COVER SYSTEM ANCHOR TRENCH SHALL BE INSTALLED ABOVE RISER PIPE AND SECURED TO RISER VAULT.

FINAL COVER TERMINATION AT RISER VAULT (2)

0 5' 10'
GRAPHIC SCALE

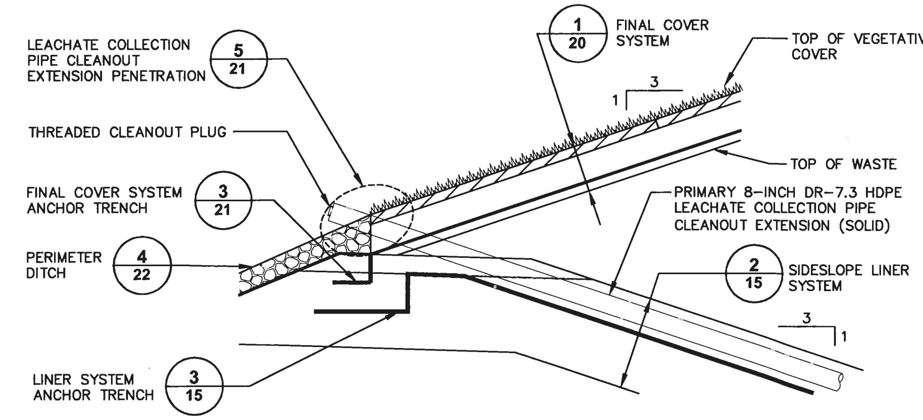


NOTES:

1. LINER FLAP AND FINAL COVER GEOCOMPOSITE SHALL EXTEND TO INVERT OF PERIMETER DITCH.
2. REFER TO DETAIL 4 ON SHEET 22 FOR INSTALLATION SEQUENCING OF RIPRAP DITCH LINING.
3. GEOCOMPOSITE DRAINAGE PIPE SHALL BE 6"ø PERFORATED SMOOTH-BORE CORRUGATED HDPE. OUTLET PIPES SHALL BE PROVIDED EVERY 300 FT ALONG THE PERIMETER OF FINAL COVER.

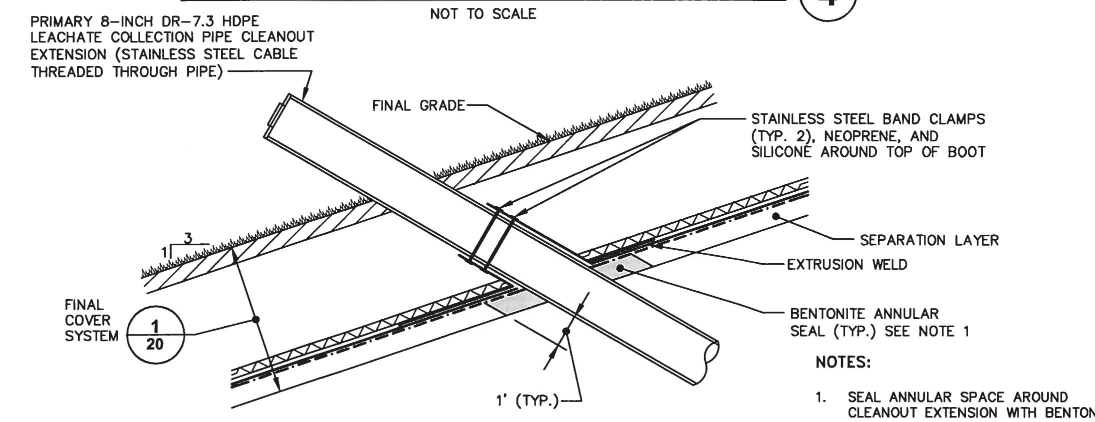
FINAL COVER SYSTEM ANCHOR TRENCH (3)

NOT TO SCALE



TYPICAL LEACHATE COLLECTION PIPE CLEANOUT TERMINATION (UPSTREAM) (4)

NOT TO SCALE



NOTES:

1. SEAL ANNULAR SPACE AROUND CLEANOUT EXTENSION WITH BENTONITE PRIOR TO FINAL COVER PLACEMENT.

LEACHATE COLLECTION PIPE CLEANOUT EXTENSION PENETRATION (5)

NOT TO SCALE

GENERAL NOTE:

GEOSYNTHETICS ARE SHOWN AT AN EXAGGERATED SCALE IN CERTAIN DETAILS FOR CLARITY.

SCALE(S) AS INDICATED

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No.	Date	Revisions	By	Ckd
2	2/2013	REVISED GEOCOMPOSITE DRAINAGE FEATURES	GNG	BMS
1	2/2013	REVISED CALLOUTS AND ADDED NEW DETAILS 4 AND 5	GNG	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

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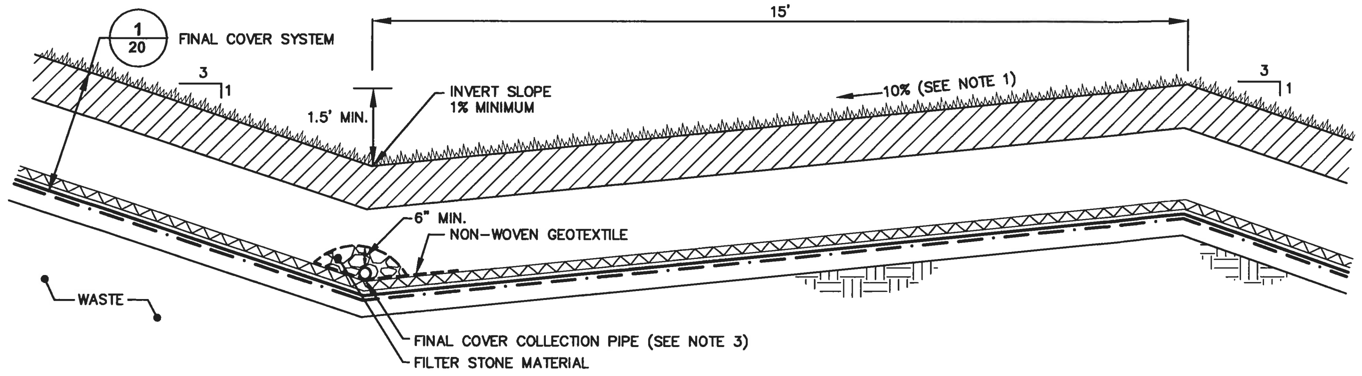
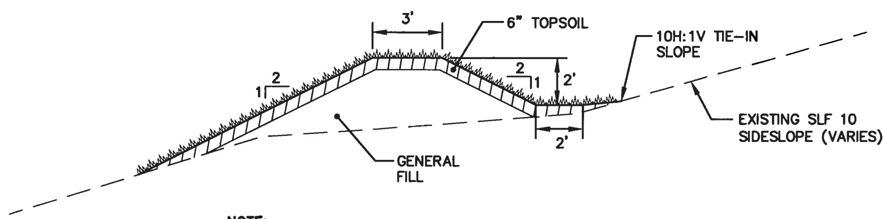


NOTES:

1. MINIMUM OUTBOARD CHANNEL SIDESLOPE FOR UNCAPPED AREAS IS 10%.
2. INTERIOR SIDESLOPES OF SURFACE WATER DIVERSION BERMS SHALL BE LINED WITH TEMPORARY EROSION CONTROL MAT.
3. FINAL COVER COLLECTION PIPE SHALL BE 6"ø. PIPES SHALL BE PERFORATED SMOOTH-BORE CORRUGATED HDPE.

SURFACE WATER DIVERSION BERM (1)

NOT TO SCALE

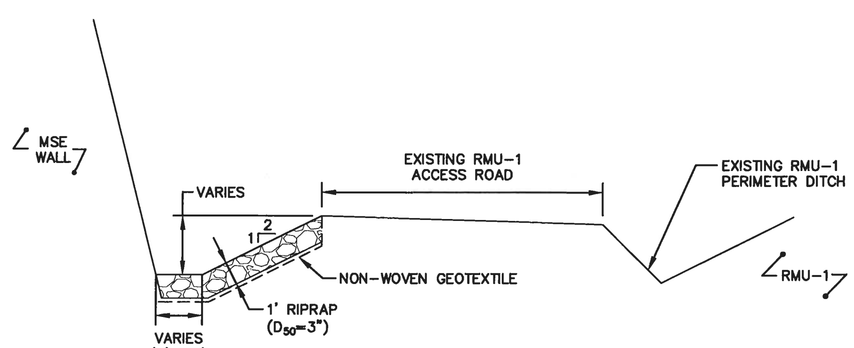


NOTE:

1. INTERIOR SIDESLOPES OF SLF 10 DIVERSION CHANNEL SHALL BE LINED WITH TEMPORARY EROSION CONTROL MAT.

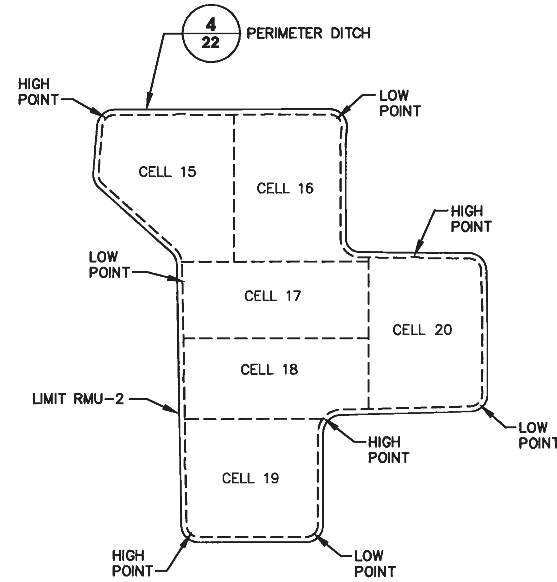
SLF 10 DIVERSION CHANNEL (2)

0 4' 8'
SCALE: 1"=4'



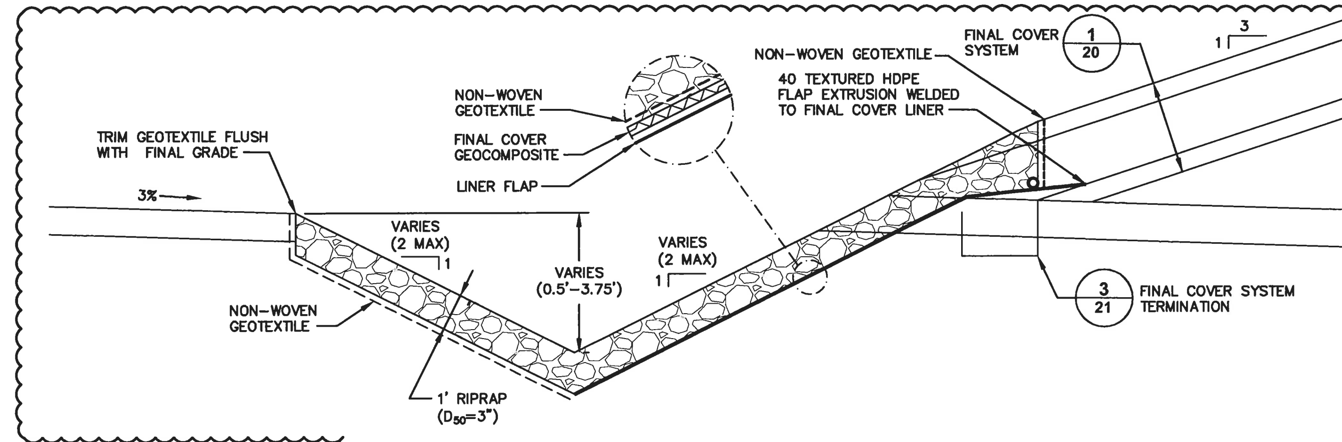
RMU-1/RMU-2 DITCH (3)

0 4' 8'
SCALE: 1"=4'



PERIMETER DITCH LOCATION PLAN (6)

0 400' 800'
SCALE: 1"=400'

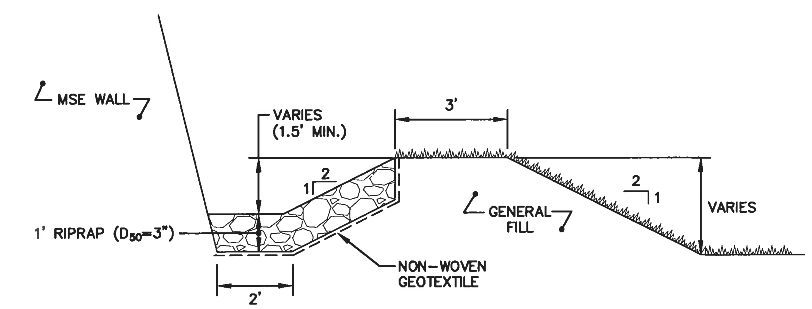


NOTES:

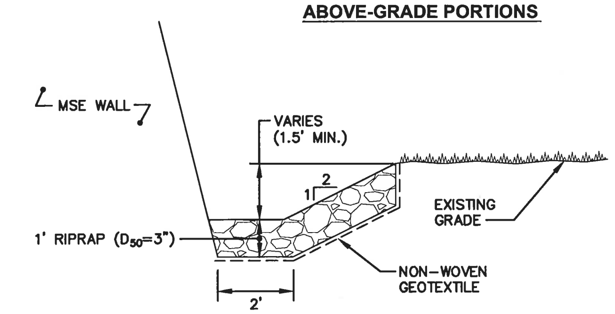
1. RIPRAP LINING MAY BE INSTALLED IMMEDIATELY FOLLOWING CONSTRUCTION OF DITCH OR DELAYED UNTIL CONSTRUCTION OF ADJACENT FINAL COVER AREAS. IF RIPRAP IS INSTALLED IMMEDIATELY FOLLOWING DITCH CONSTRUCTION, LINER FLAP SHALL BE OMITTED UNTIL ADJACENT FINAL COVER AREAS ARE CONSTRUCTED.

PERIMETER DITCH (4) ⚠

0 2.5' 5'
SCALE: 1"=2.5'



ABOVE-GRADE PORTIONS



BELOW-GRADE PORTIONS

SLF 10 DITCH (5)

0 2.5' 5'
SCALE: 1"=2.5'

GENERAL NOTE:

1. GEOSYNTHETICS IN SELECT DETAILS ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY.

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No.	Date	Revisions	By	Ckd
⚠	2/2013	REVISED DETAIL 4	GNG	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

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SURFACE WATER MANAGEMENT DETAILS

GENERAL

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ARCADIS of New York, Inc.
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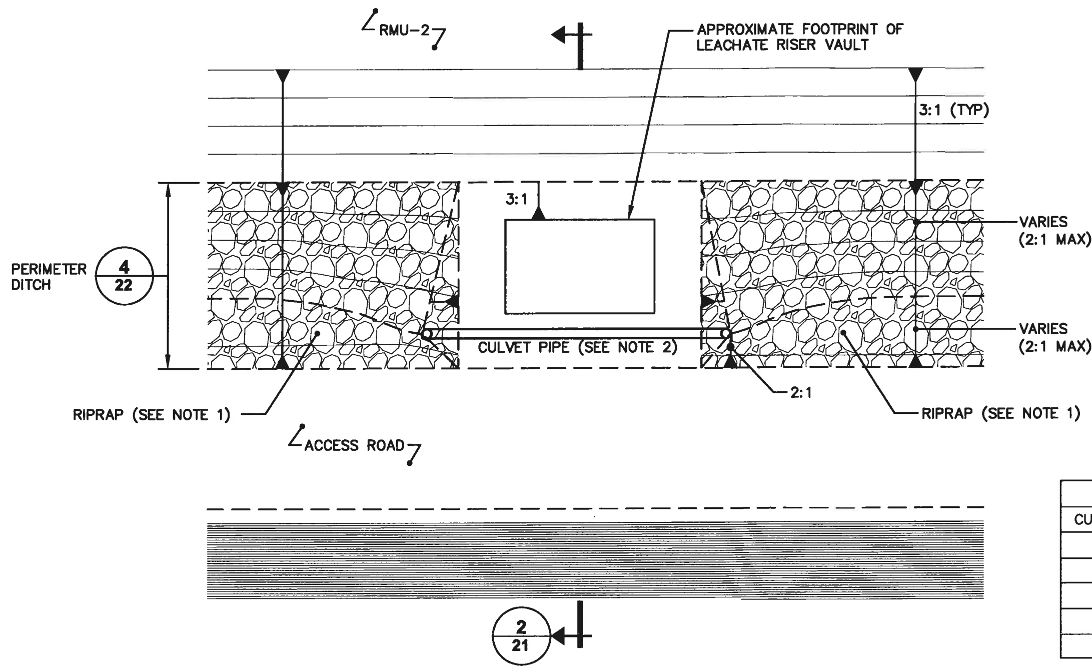


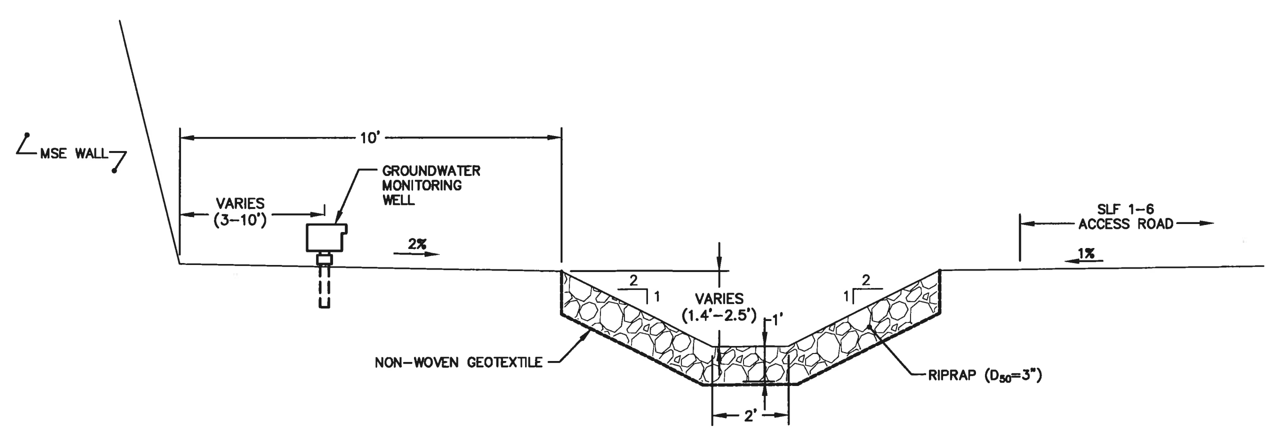
CULVERT SCHEDULE	
CULVERT ID	DESCRIPTION
CV-1	1-18-IN-DIA HDPE @ 0.3%
CV-2	1-24-IN-DIA HDPE @ 0.3%
CV-3	1-15-IN-DIA HDPE @ 0.3%
CV-4	1-24-IN-DIA HDPE @ 0.3%
CV-5	1-24-IN-DIA HDPE @ 0.3%

NOTES:

1. RIPRAP SHALL HAVE D_{50}=3 INCHES AND D_{MAX}=5 INCHES. RIPRAP SHALL BE PLACED IN A 12-INCH-THICK LAYER.
2. CULVERT PIPES SHALL BE SMOOTH-BORE CORRUGATED HDPE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. REFER TO CULVERT SCHEDULE FOR PIPE DIAMETERS.

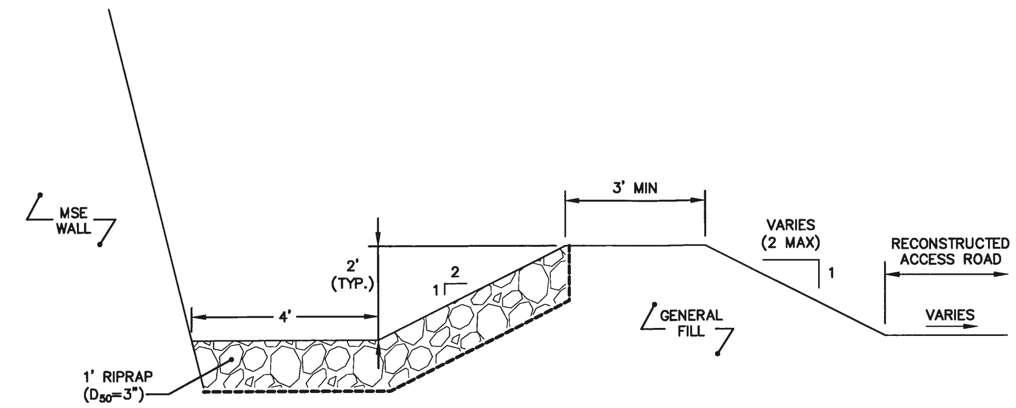
PERIMETER DITCH CULVERT DETAIL 1

0 10' 20'
SCALE: 1"=10'



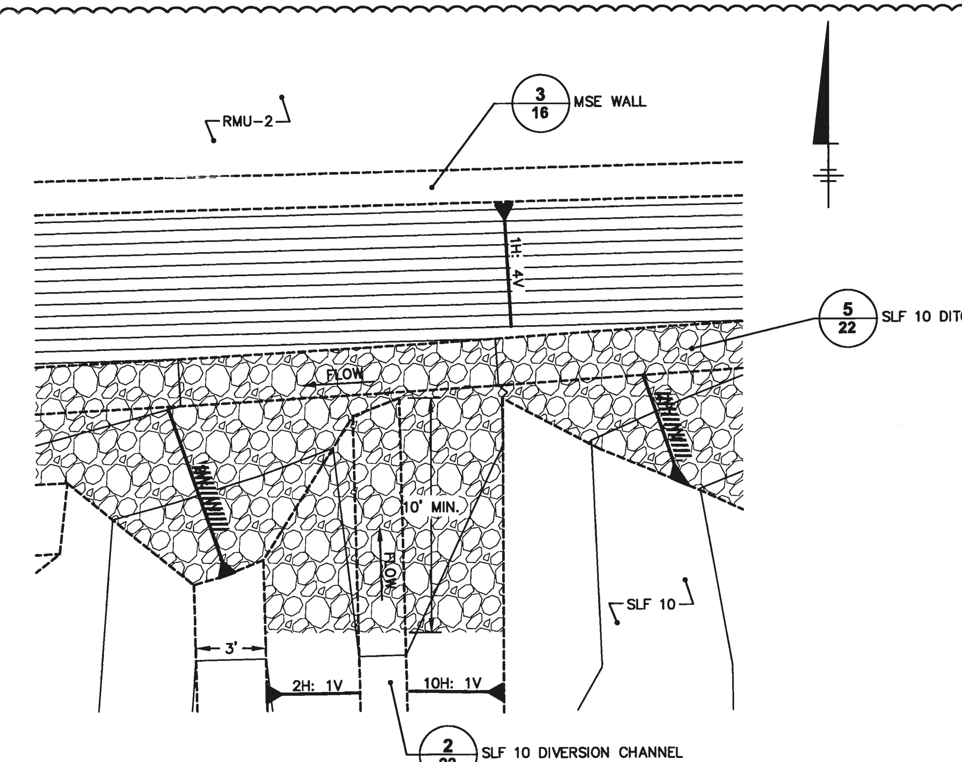
SLF 1-6 EAST PERIMETER DITCH 2

0 2' 5'
SCALE: 3/8"=1'-0"



RMU-2 SOUTH DITCH 3

0 2' 4'
SCALE: 1/2"=1'-0"



SLF 10 DITCH / SLF 10 DIVERSION CHANNEL INTERSECTION DETAIL 4

0 4' 8'
SCALE: 1/4"=1'-0"

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No.	Date	Revisions	By	Ckd
1	1/2012	ADDED DETAIL 4	PTO	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
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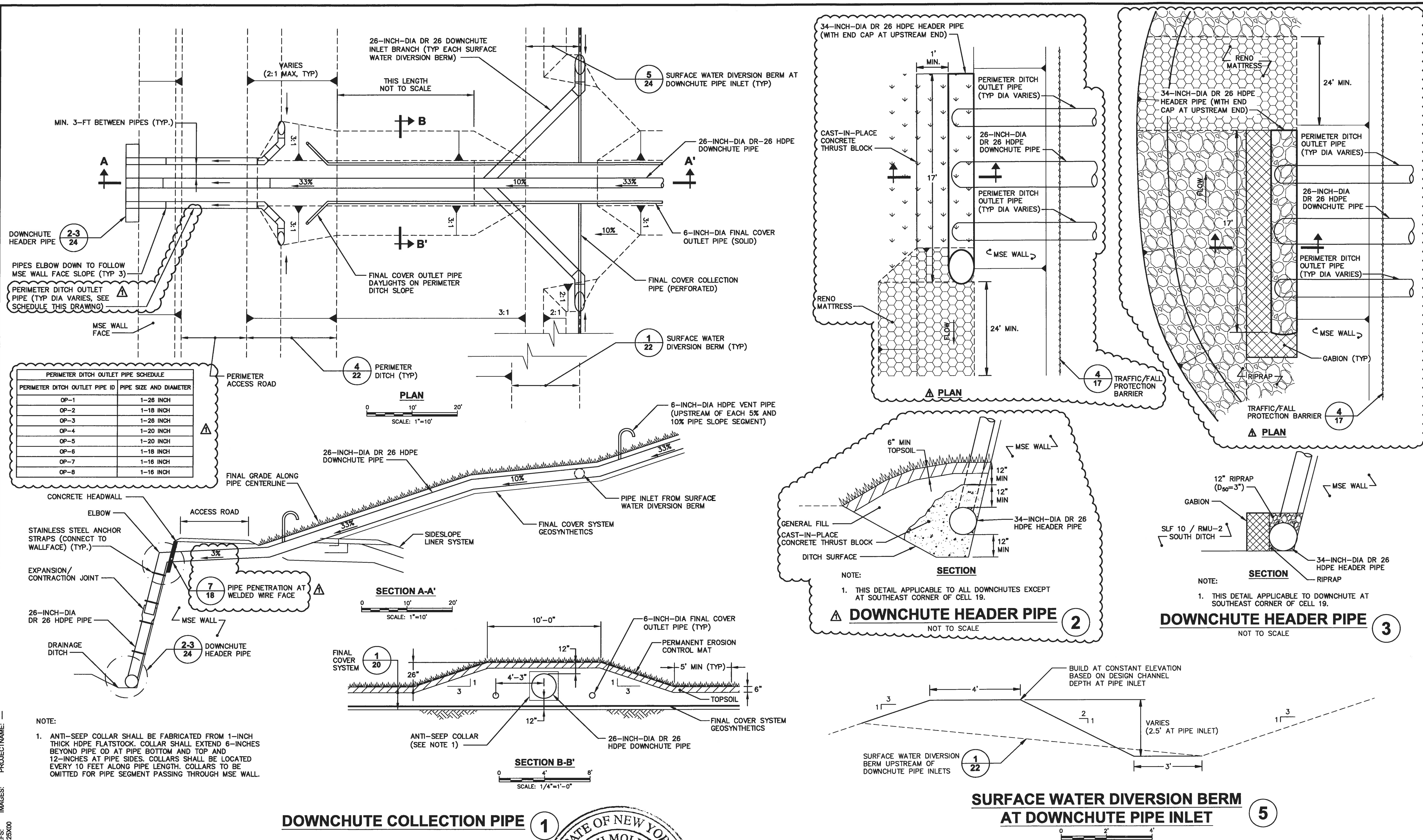

PERIMETER DITCH OUTLET PIPE SCHEDULE	
PERIMETER DITCH OUTLET PIPE ID	PIPE SIZE AND DIAMETER
OP-1	1-26 INCH
OP-2	1-18 INCH
OP-3	1-26 INCH
OP-4	1-20 INCH
OP-5	1-20 INCH
OP-6	1-18 INCH
OP-7	1-16 INCH
OP-8	1-16 INCH

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: N. SMITHGALL K.SARTORI K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PAGESETUP: M-LD2B-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:15 PM BY: SARTORI, KATHERINE
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XREFS: 23725X00 IMAGES: PROJECTNAME: ---

1	2/2013	REVISED THRUST BLOCK DETAIL AND ADDED OUTLET PIPE SCHEDULE	NWF	BMS
No.	Date	Revisions	By	Ckd

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SURFACE WATER MANAGEMENT DETAILS

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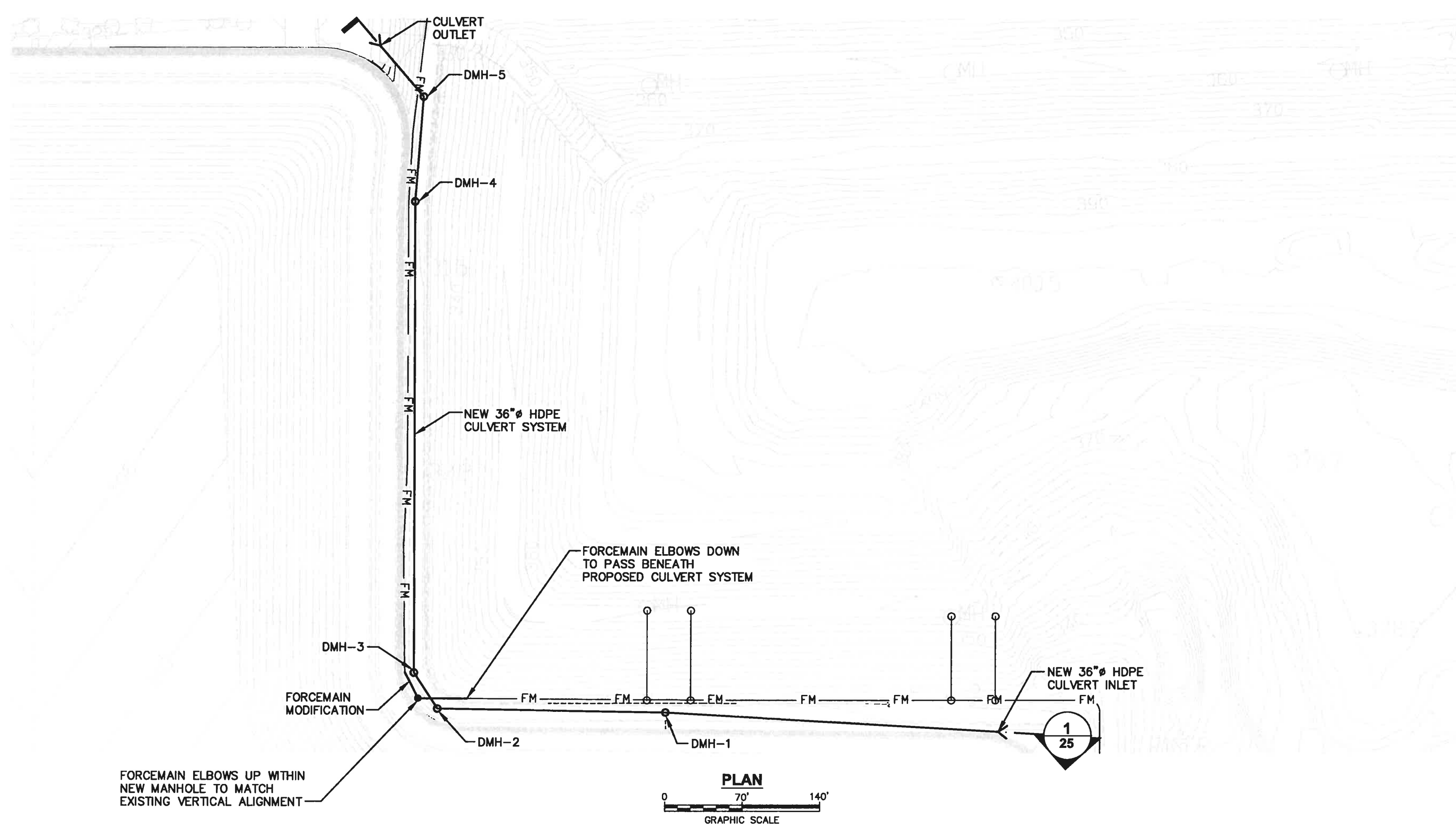
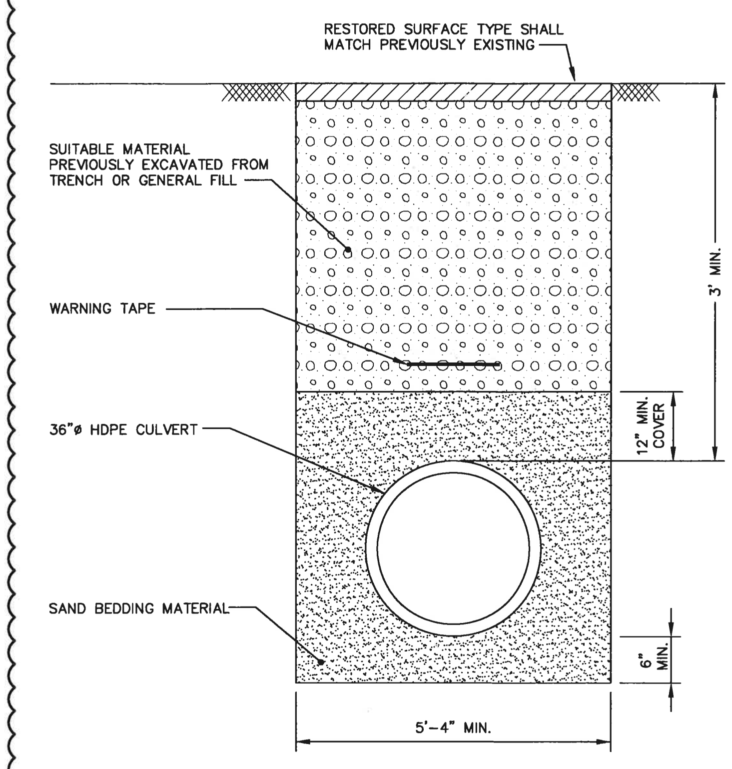


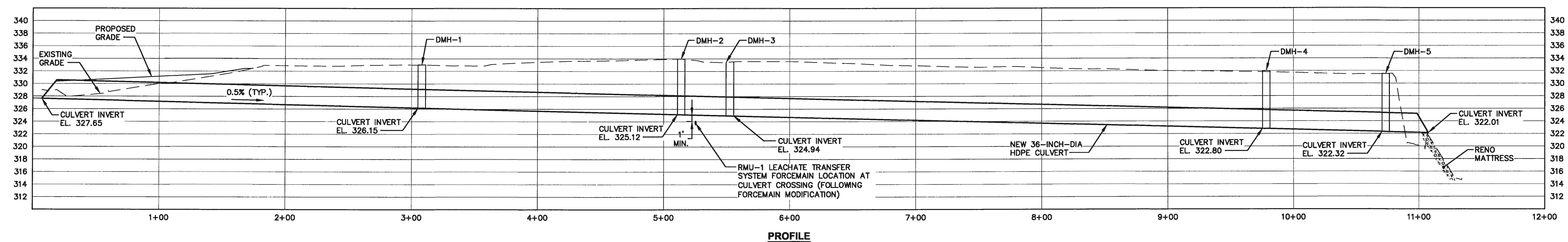


NOTE:

1. COVER THICKNESS INDICATED IS TYPICAL EXCEPT AT CULVER INLET AND OUTLET.

TYPICAL RMU-1/RMU-2 CULVERT SYSTEM TRENCH DETAIL (2)

NOT TO SCALE



RMU-1/RMU-2 CULVERT SYSTEM (1)

40' 0 40' 80'
HORIZONTAL SCALE
8' 0 8' 16'
VERTICAL SCALE

GENERAL NOTE:

1. NEW CULVERT SHALL BE CORRUGATED, SMOOTH-BORE HDPE PIPE.

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1	1/2012	TYPICAL TRENCH DETAIL ADDED	NWF	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 2/21/13 | Project Mgr.: WAR
Designed by: PDB | Drawn by: SJK | Checked by: BMS

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RMU-1/RMU-2 CULVERT SYSTEM PLAN AND PROFILE

GENERAL

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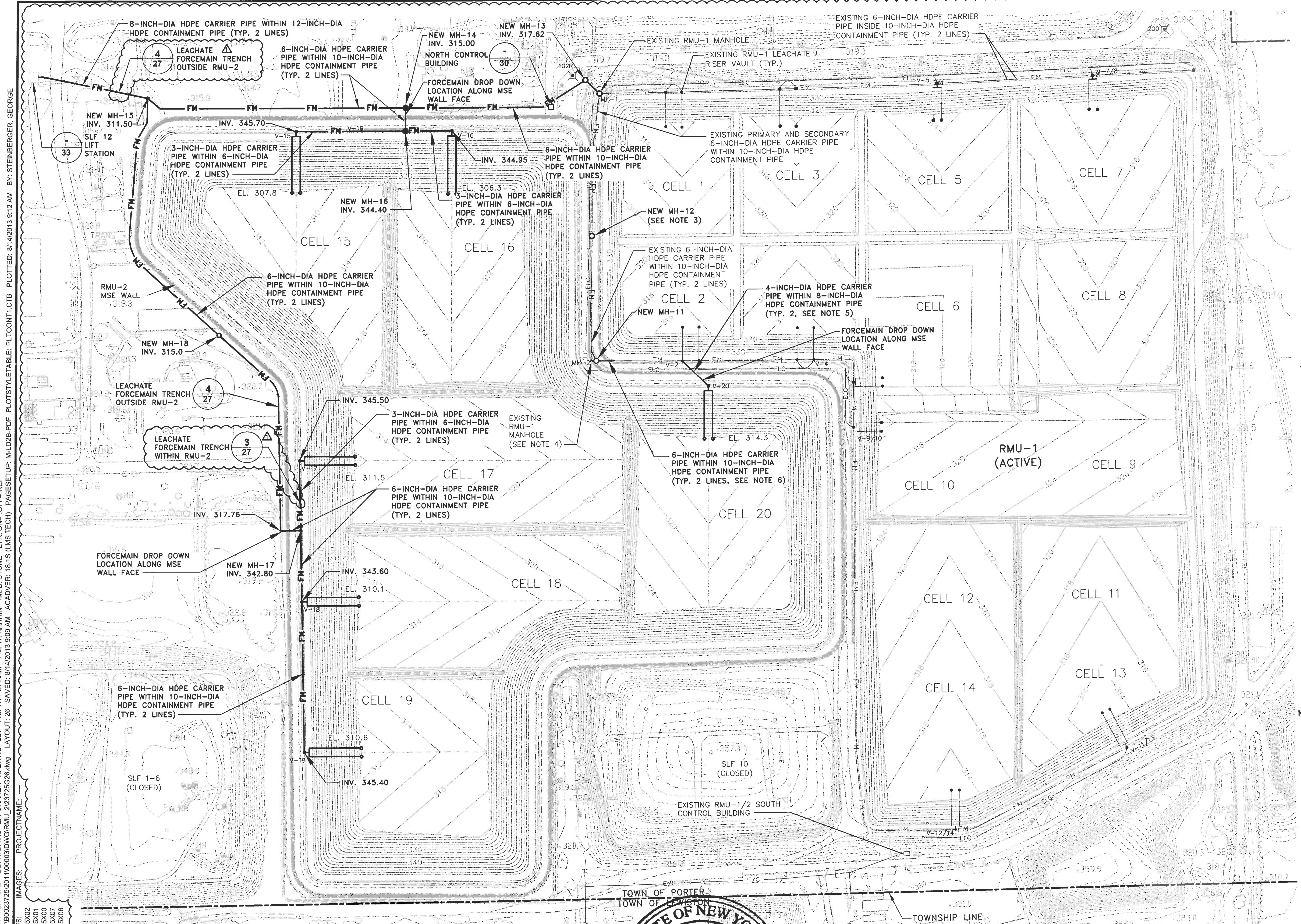

LEGEND:

- APPROXIMATE PROPERTY LINE
- TOWNSHIP LINE
- ELEVATION CONTOUR
- GRADE BREAK
- FM — EXISTING FORCEMAIN
- FM — PROPOSED FORCEMAIN
- EXISTING CELL LEACHATE COLLECTION SUMP AND RISER PIPE
- PROPOSED CELL LEACHATE COLLECTION SUMP AND RISER5 PIPE
- ELC — EXISTING RMU-1 ELECTRICAL/COMMUNICATION CONDUIT
- V-16 — LEACHATE RISER VAULT AND ID NO.
- LEACHATE JUNCTION MANHOLE (TYP. MH-14, MH-15, MH-16 AND MH-17) 1/27
- LEACHATE TRANSFER MANHOLE (TYP. MH-11, MH-12, MH-13 AND MH-18) 2/27
- EL 311.02 — TOP OF OPERATIONS LAYER ELEVATION AT CELL LOW POINT
- 200 — PERMANENT CONTROL MONUMENT
- E 12500 / N 10000 — COORDINATE GRID
- 2/14 — DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASE MAP INFORMATION.
2. PROPOSED RMU-2 GRADES SHOWN ARE TOP OF OPERATIONS LAYER GRADES (REFER TO DRAWING NO. 5). RMU-1 GRADES ARE PERMIT TOP OF OPERATIONS LAYER GRADES.
3. EXISTING RMU-1 LIFT STATION TO BE REMOVED. EXISTING FORCEMAIN TO TIE INTO NEW MH-12 NEAR FORMER LIFT STATION LOCATION.
4. EXISTING MH-2 TO BE REMOVED AND REPLACED WITH NEW MH-11 AND TIE IN WITH EXISTING FORCEMAIN.
5. RMU-2 CELL 20 LEACHATE TRANSFER SYSTEM TO TIE INTO EXISTING RMU-1 FORCEMAIN AT CELL 2 VAULT.
6. EXISTING FORCEMAINS IN RMU-1 PERIMETER BERM TO BE MODIFIED AT SOUTHWEST CORNER OF CELL 2 AS NECESSARY TO ACCOMMODATE PROPOSED RMU-1/RMU-2 CULVERT SYSTEM. REFER TO DRAWING 25 FOR ADDITIONAL INFORMATION.
7. PIPE INVERTS REPRESENT INVERT ELEVATION OF INNER CARRIER PIPE.

120' 0 120' 240'
1"=120'

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No.	Date	Revisions	By	Ckd
3	8/2013	REVISED MANHOLE SYMBOL AND CALLOUTS	PTO	PHB
2	2/2013	REVISED FORCEMAIN LAYOUT AND SIZES	GNG	BMS
1	1/2012	ADDITIONAL CALLOUT	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 8/15/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

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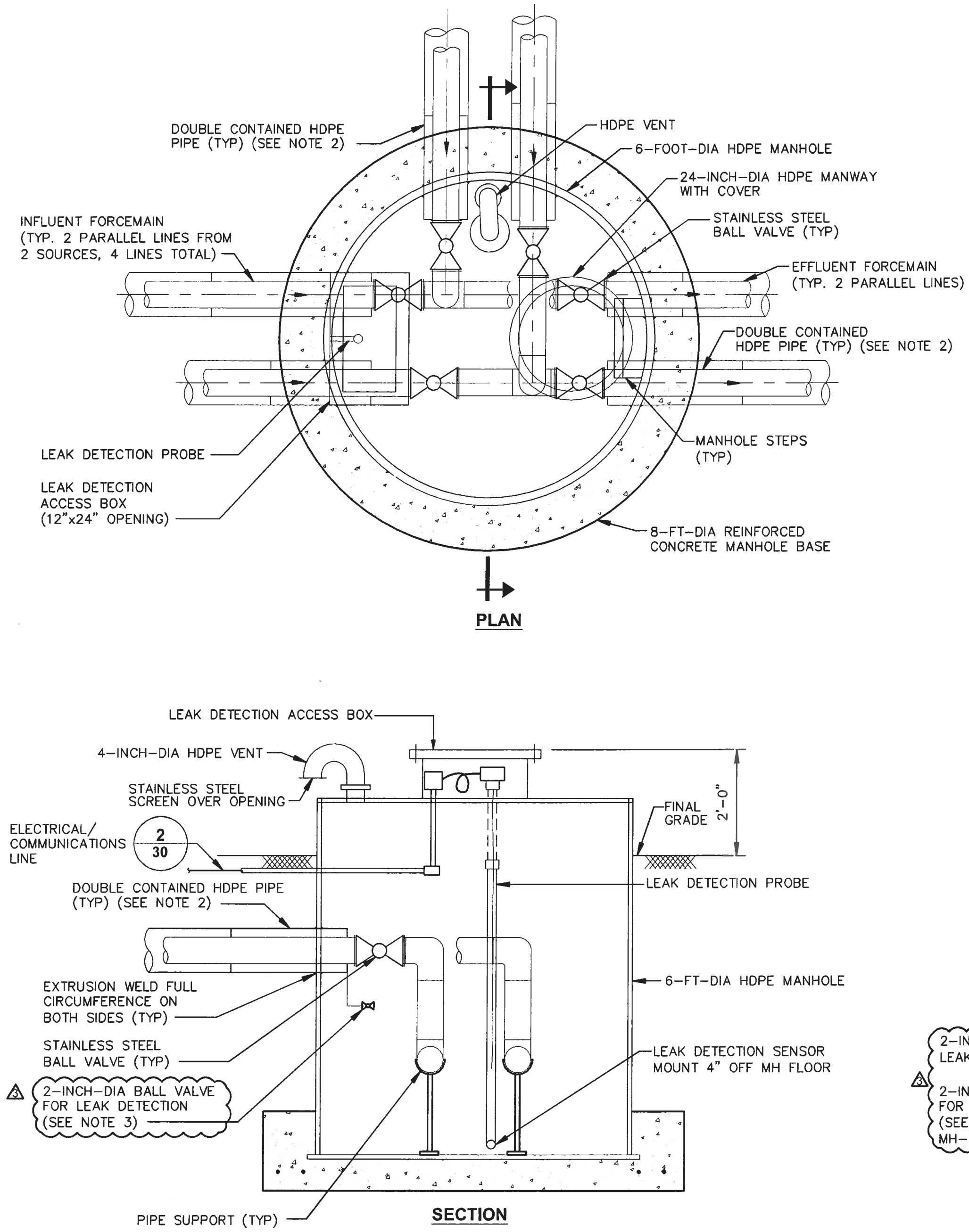
RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

LEACHATE TRANSFER SYSTEM PLAN

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date: AUGUST 2009
ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

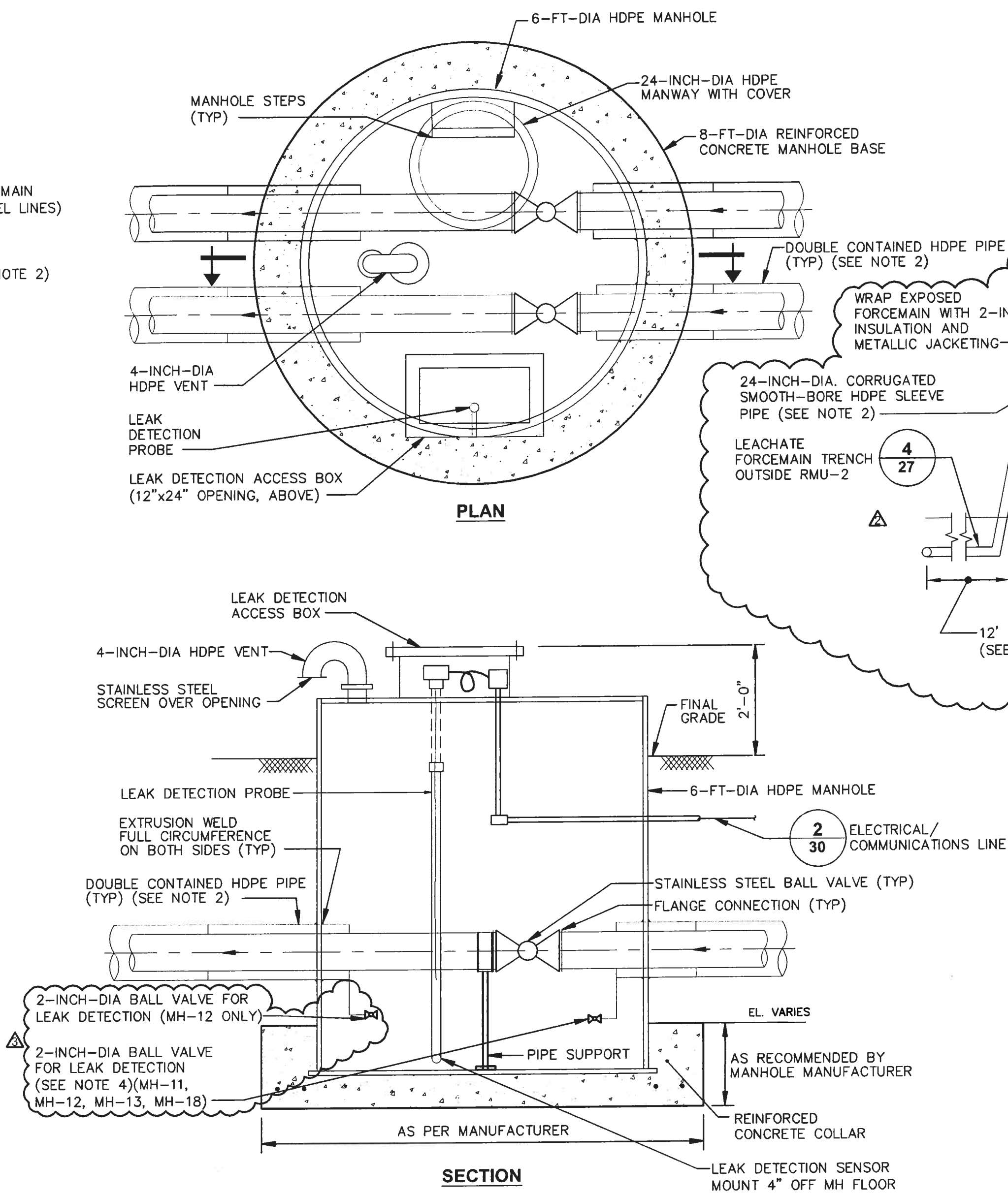
26



NOTES:

1. TYPICAL DETAIL FOR MANHOLES MH-14, MH-15, MH-16, AND MH-17. SEE DRAWING 26 FOR MANHOLE LOCATION.
2. PIPE SIZES VARY DEPENDING ON MANHOLE LOCATION. SEE DRAWING 26 FOR PIPE SIZES.
3. LEAK DETECTION PIPE AND VALVES INSTALLED AT LOW POINTS OF DOUBLE CONTAINED HDPE PIPE ONLY.
4. SEAL END OF SECONDARY TRANSFER HDPE PIPE FOR TESTING PURPOSES. 1" THICK FLATSTOCK RING TO BE EXTRUSION WELDED TO BOTH PRIMARY AND SECONDARY PIPES.

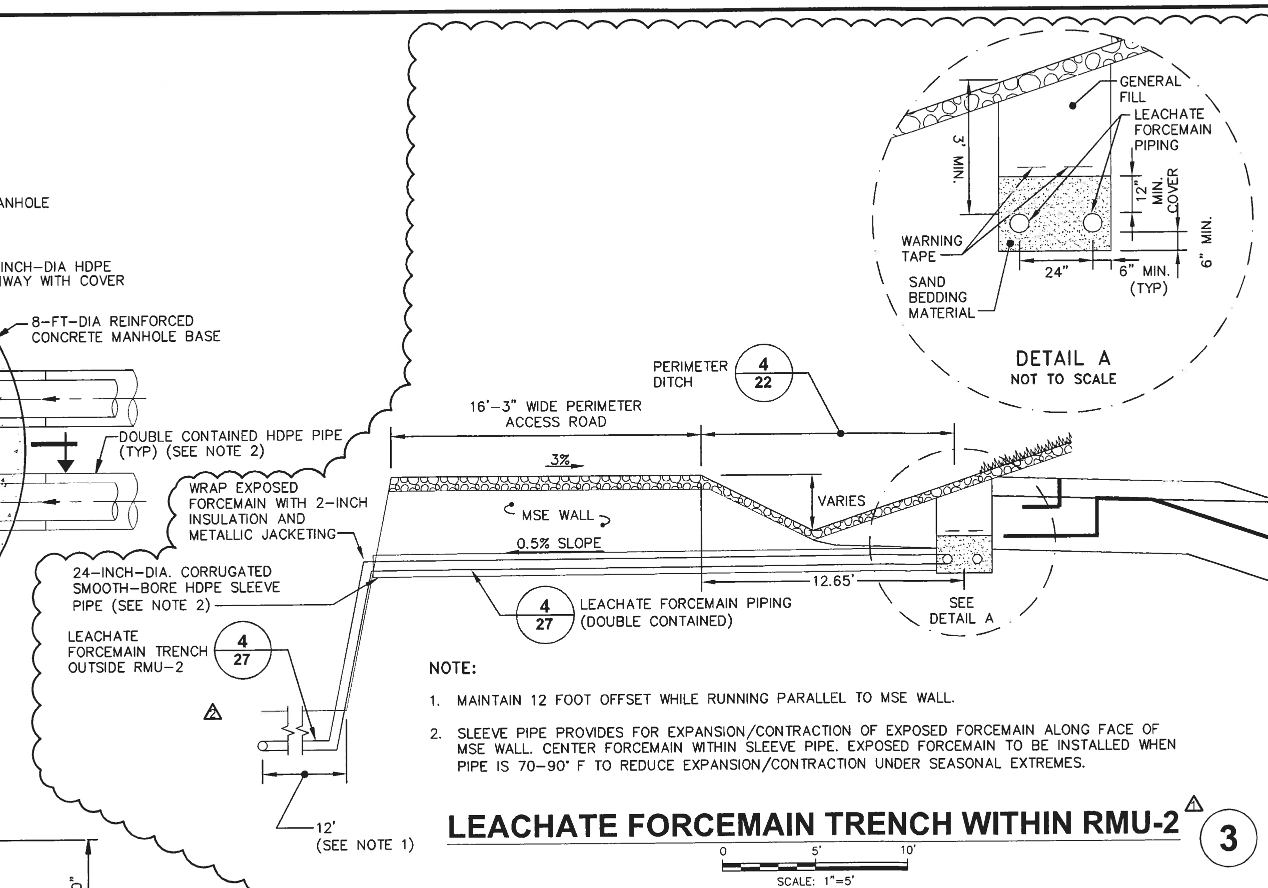
TYPICAL LEACHATE JUNCTION MANHOLE (1)



NOTES:

1. TYPICAL DETAIL FOR MANHOLES MH-11, MH-12, MH-13, AND MH-18. SEE DRAWING 26 FOR MANHOLE LOCATION.
2. PIPE SIZES VARY DEPENDING ON MANHOLE LOCATION. SEE DRAWING 26 FOR PIPE SIZES.
3. PIPE PENETRATION AND CONFIGURATION INSIDE MANHOLES MAY VARY DEPENDING ON MANHOLE LOCATION.
4. LEAK DETECTION PIPE AND VALVES INSTALLED AT LOW POINTS OF DOUBLE CONTAINED HDPE PIPE ONLY.
5. SEAL END OF SECONDARY TRANSFER HDPE PIPE FOR TESTING PURPOSES. 1" THICK FLATSTOCK RING TO BE EXTRUSION WELDED TO BOTH PRIMARY AND SECONDARY PIPES.

TYPICAL LEACHATE TRANSER MANHOLE (2)

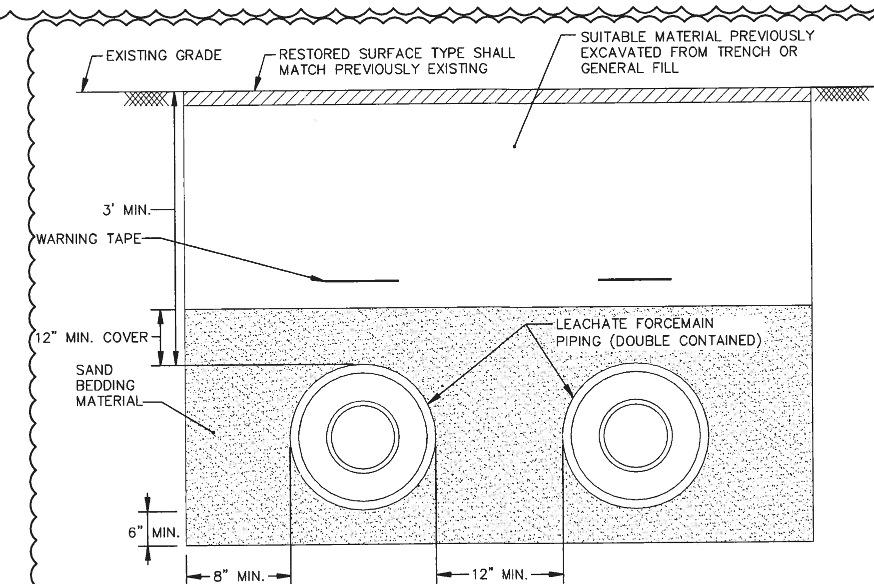


NOTE:

1. MAINTAIN 12 FOOT OFFSET WHILE RUNNING PARALLEL TO MSE WALL.
2. SLEEVE PIPE PROVIDES FOR EXPANSION/CONTRACTION OF EXPOSED FORCEMAIN ALONG FACE OF MSE WALL. CENTER FORCEMAIN WITHIN SLEEVE PIPE. EXPOSED FORCEMAIN TO BE INSTALLED WHEN PIPE IS 70-90° F TO REDUCE EXPANSION/CONTRACTION UNDER SEASONAL EXTREMES.

LEACHATE FORCEMAIN TRENCH WITHIN RMU-2 (3)

0 5' 10'
SCALE: 1"=5'



LEACHATE FORCEMAIN TRENCH OUTSIDE RMU-2 (4)

GENERAL NOTE:

1. ALL PIPING EXCEPT MSE WALL SLEEVE PIPE TO BE HDPE DR-11

NOT TO SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
3	8/2013	REVISED DETAIL 1 AND 2 AND GENERAL NOTES	GNG	BMS
2	2/2013	REVISED DETAILS 1-3	GNG	BMS
1	1/2012	ADDED DETAIL 4 AND GENERAL NOTE 3	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 9/15/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK — JOSEPH MOLINA — 072644 — LICENSED PROFESSIONAL ENGINEER

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RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

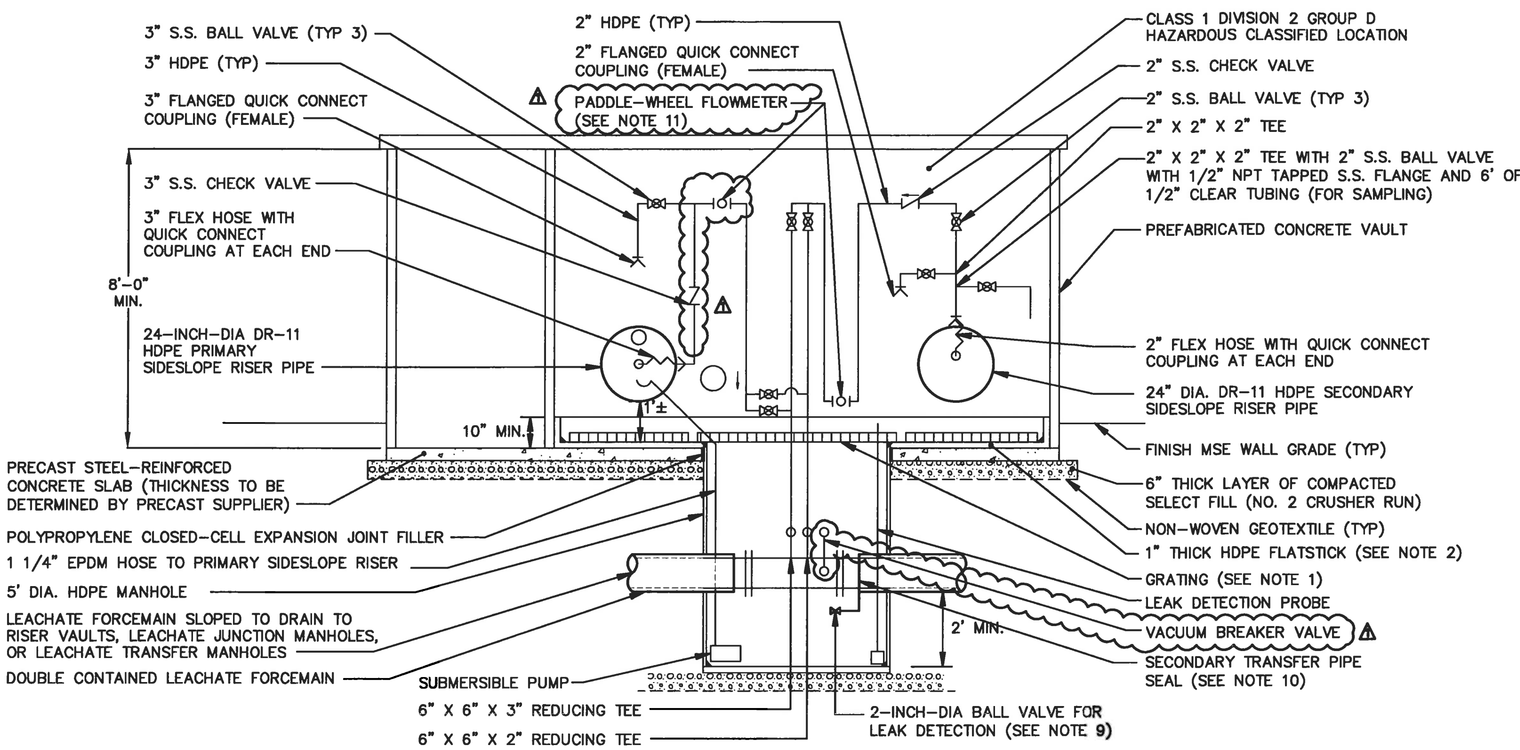
LEACHATE COLLECTION AND TRANSFER SYSTEM DETAILS

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date: AUGUST 2009
ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

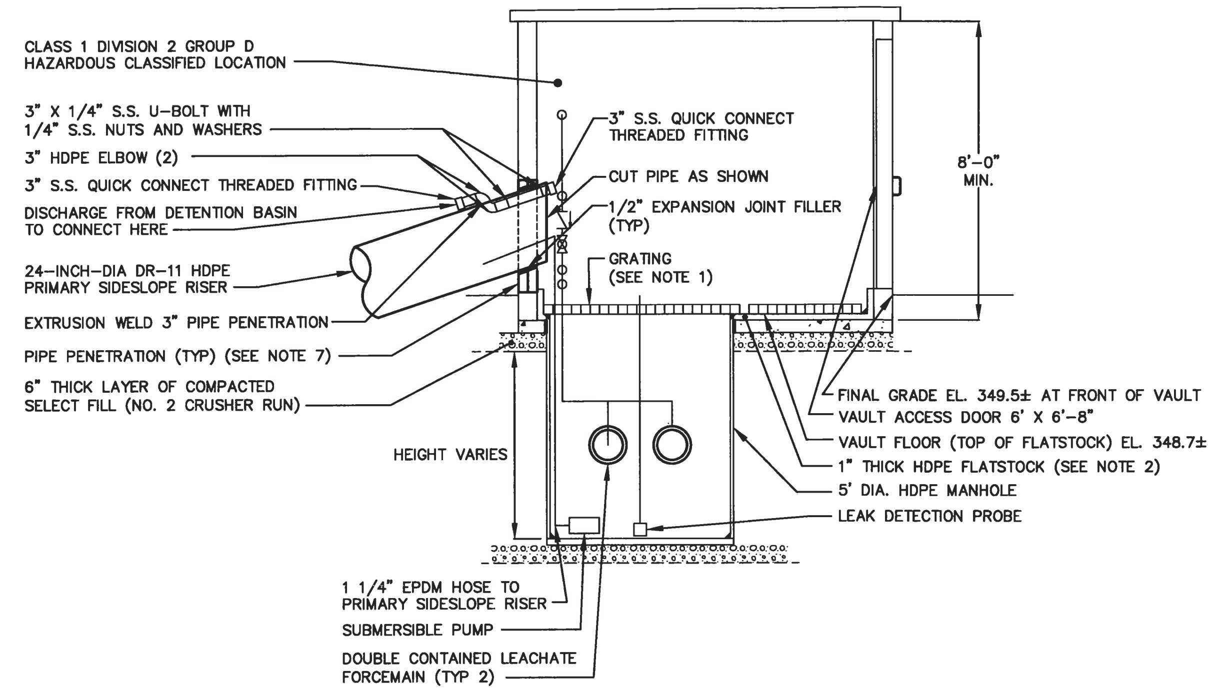
27

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: G. STOWELL L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\0003\DWG\RMU_2\23725G27.dwg LAYOUT: 27 SAVED: 8/14/2013 9:09 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: M-LD2B-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 8/14/2013 9:12 AM BY: STEINBERGER, GEORGE
XREFS: 23725X00 IMAGES: PROJECTNAME: ---



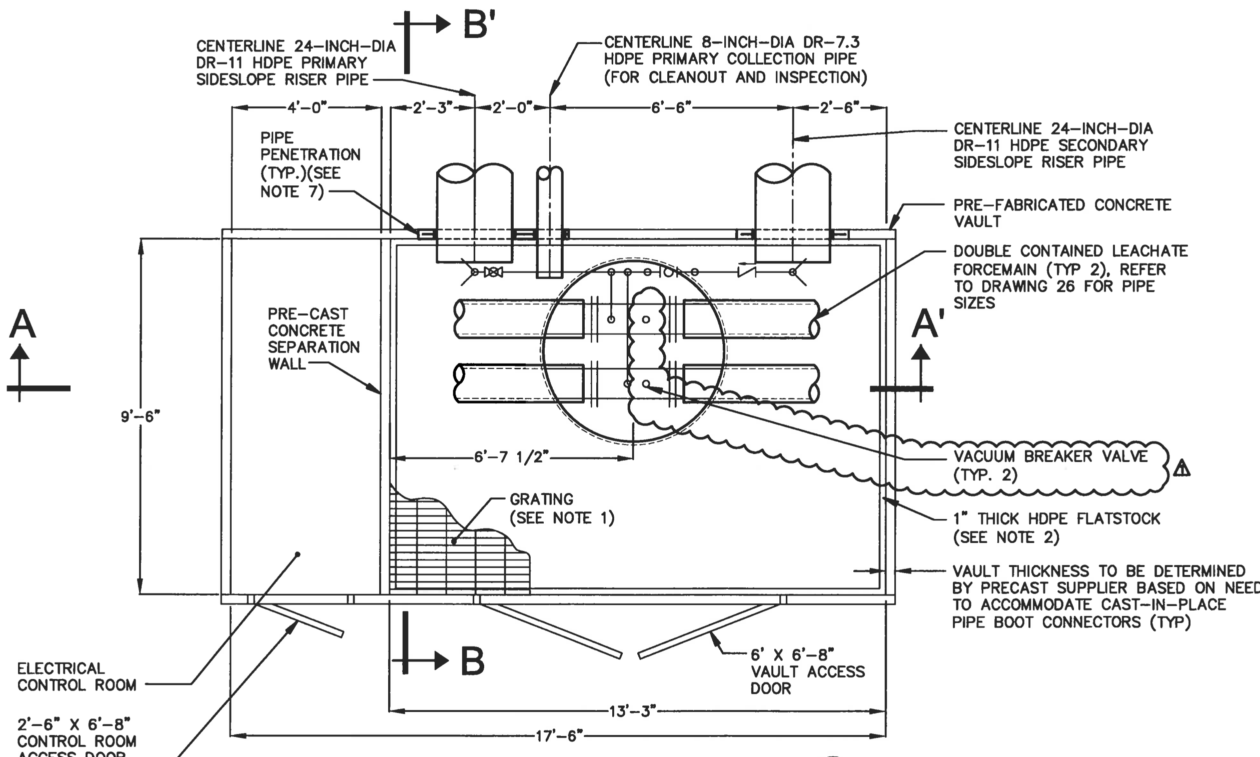
SECTION A-A'

1"=2.5' 2.5' 0 2.5' 5'



SECTION B-B'

1"=2.5' 2.5' 0 2.5' 5'



PLAN

1

1"=2.5' 2.5' 0 2.5' 5'

GENERAL NOTES:

1. GRATING TO BE FIBERGLASS CONSTRUCTION, PLACED LOOSE, WITH REMOVABLE SECTION OVER MANHOLE TO FACILITATE ACCESS.
2. 1" THICK HDPE FLATSTOCK WITHIN VAULT TO BE CONTINUOUS, HEAT FUSED AT ALL SEAMS, AND TO TOP EDGE OF HDPE MANHOLE.
3. LOCATE VAULT LEAK DETECTION PROBE ON INLET SIDE OF LEACHATE COLLECTION/TRANSFER PIPING.
4. ALL PIPING TO BE HDPE DR-11.
5. RISER VAULT PIPING CONFIGURATIONS MAY VARY WITH FIELD CONDITIONS.
6. SEE DRAWING NO. 31 FOR ELECTRICAL DETAILS.
7. PIPE PENETRATIONS SHALL BE ACHIEVED USING CAST-IN-PLACE BOOT CONNECTORS.
8. ANY PROPOSED ALTERNATE BUILDING DESIGNS TO BE APPROVED BY ENGINEER.
9. INSTALL LEAK DETECTION VALVES AT LOW POINTS ONLY.
10. SEAL END OF SECONDARY TRANSFER HDPE PIPE FOR TESTING PURPOSES. 1" THICK FLATSTOCK RING TO BE EXTRUSION WELDED TO BOTH PRIMARY AND SECONDARY PIPES.
11. PIPE LAYOUTS SHOWN WITHIN RISER VAULTS ARE PRELIMINARY AND MAY BE MODIFIED BASED ON AS-BUILT CONDITIONS WITHIN THE VAULTS AND/OR TO ACCOMMODATE SPECIFIC RECOMMENDATIONS FROM EQUIPMENT MANUFACTURERS.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS LD: L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
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XREFS: 23725X00 IMAGES: 23725X01.TIF PROJECTNAME: ---

SCALE(S) AS INDICATED

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No.	Date	Revisions	By	Ckd
1	2/2013	ADDED VACUUM BREAKER VALVE & PADDLE WHEEL FLOWMETER	NWF	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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RISER VAULT PLAN AND SECTIONS

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120

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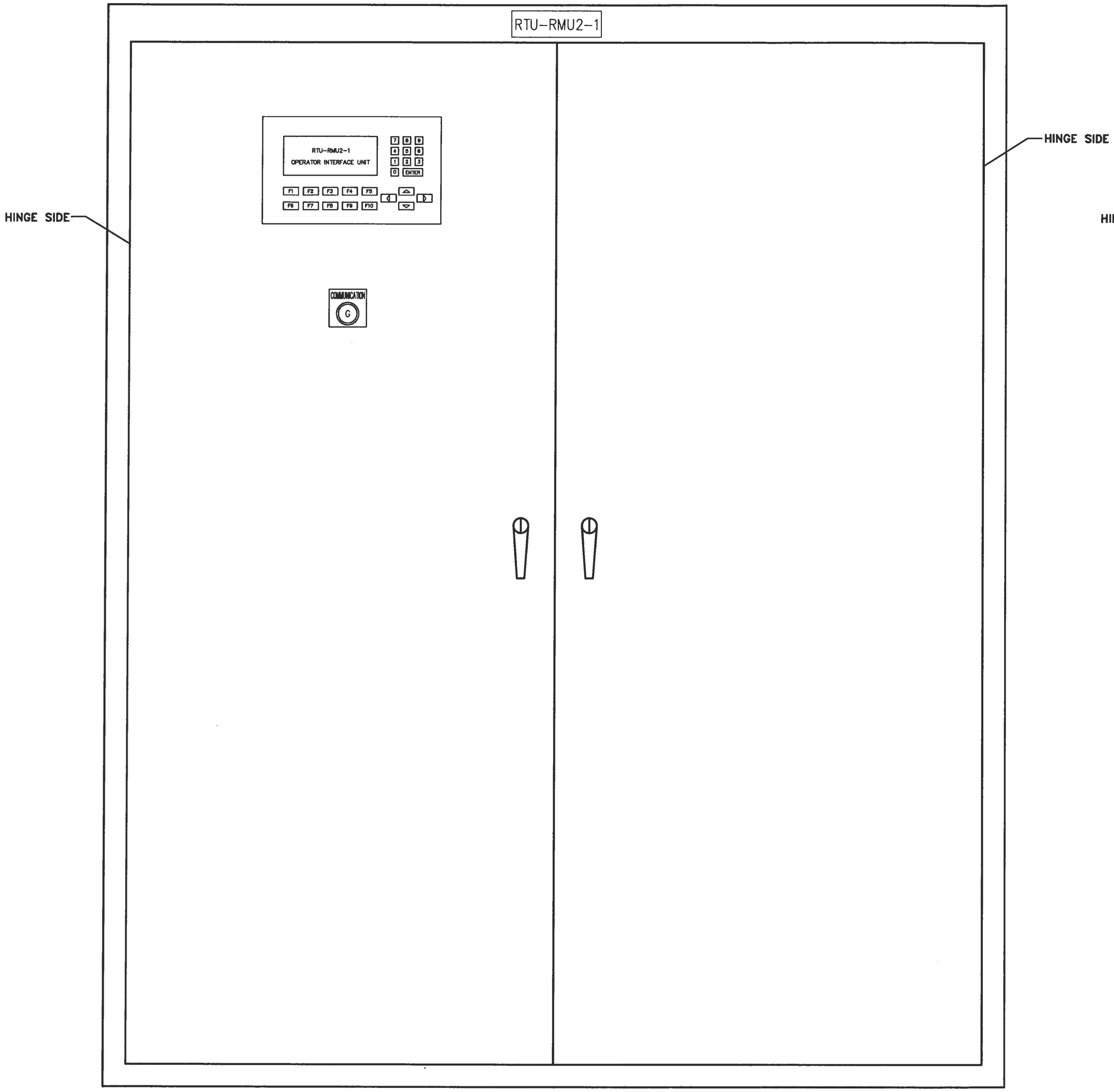
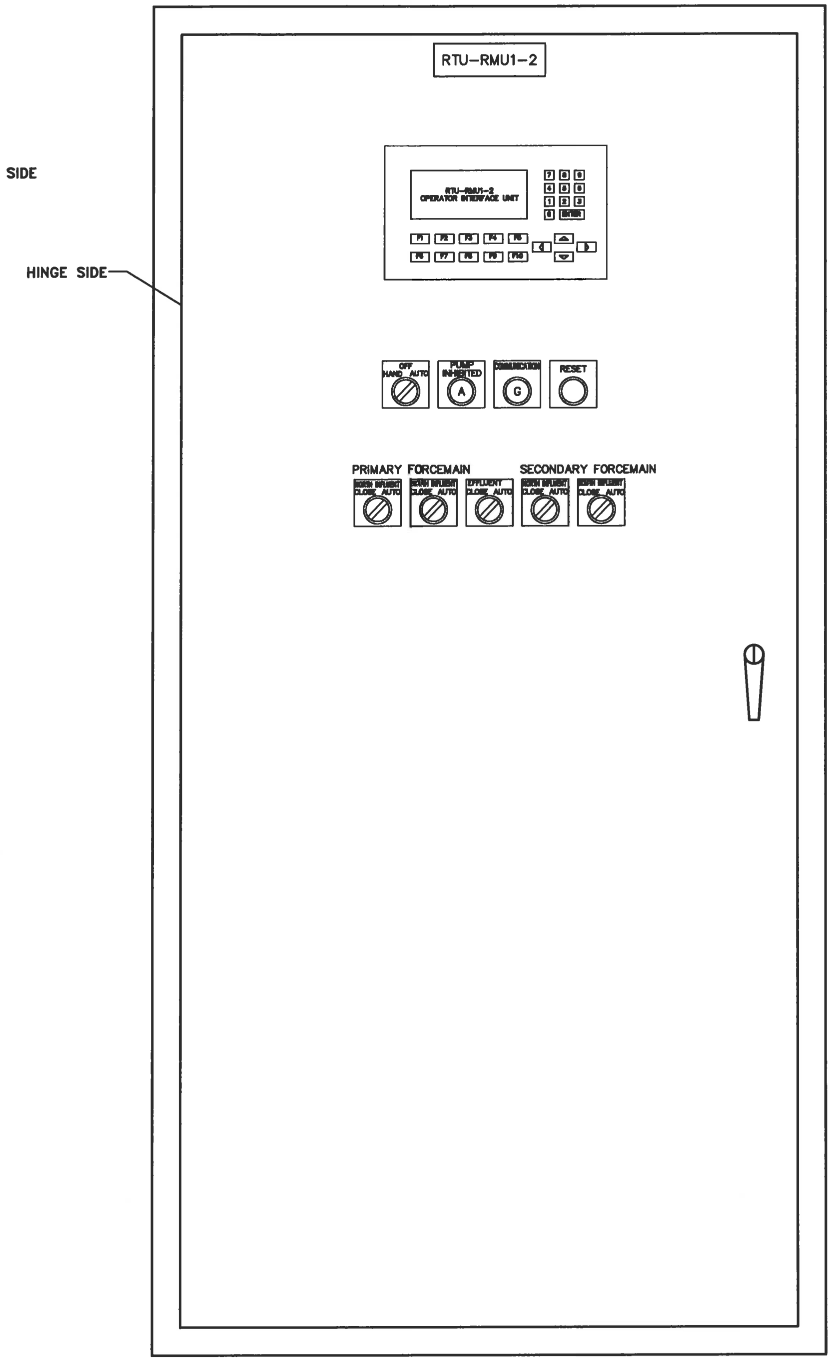
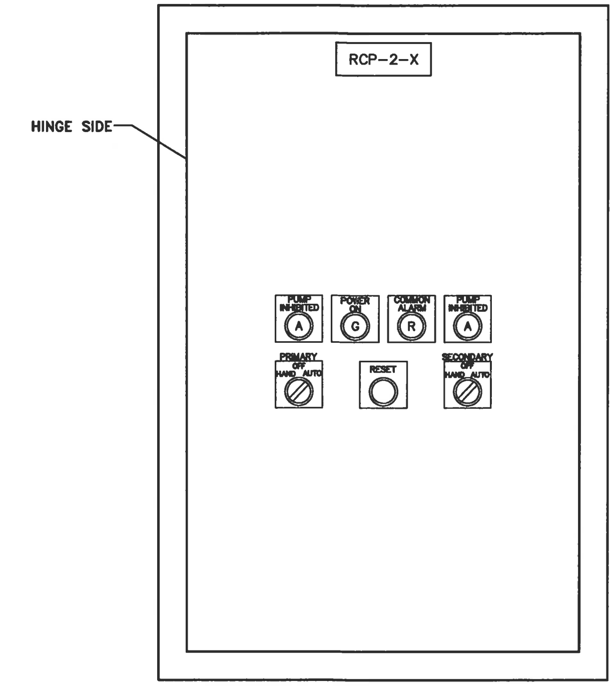


RTU-RMU2-1 NORTH
REMOTE TERMINAL UNIT
FRONT OF PANEL LAYOUT (1)



RTU-RMU1-2
REMOTE TERMINAL UNIT
FRONT OF PANEL LAYOUT (EXISTING) (2)



RCP-2-X PRIMARY/SECONDARY
REMOTE CONTROL PANEL
FRONT OF PANEL LAYOUT (3)

NOTES:

1. LINEWORK FROM AUTOMATED CONTROL SOLUTIONS, INC. 1000 YOUNG STREET, SUITE 450 TONAWANDA, NY 14150, 7/29/02 "REMOTE TRANSMITTING UNIT PANEL AND PRIMARY & SECONDARY PANEL LAYOUTS" DWG26.DWG.
2. RMU-2 CELLS 17, 18, AND 19 TO BE CONNECTED TO EXISTING RTU-RMU1-2.
3. THE PRIMARY/SECONDARY REMOTE CONTROL PANEL TO BE INSTALLED WITHIN EACH RMU-2 CELL RISER VAULT. "X" DESIGNATION IDENTIFIES SPECIFIC CELL THAT PANEL CONTROLS.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* BY: SARTORI, KATHERINE

NOT TO SCALE

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: ACS, INC. | Drawn by: SJK | Checked by: TPA

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

REMOTE TERMINAL UNIT PANEL AND PRIMARY & SECONDARY CONTROL PANEL LAYOUTS

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc.
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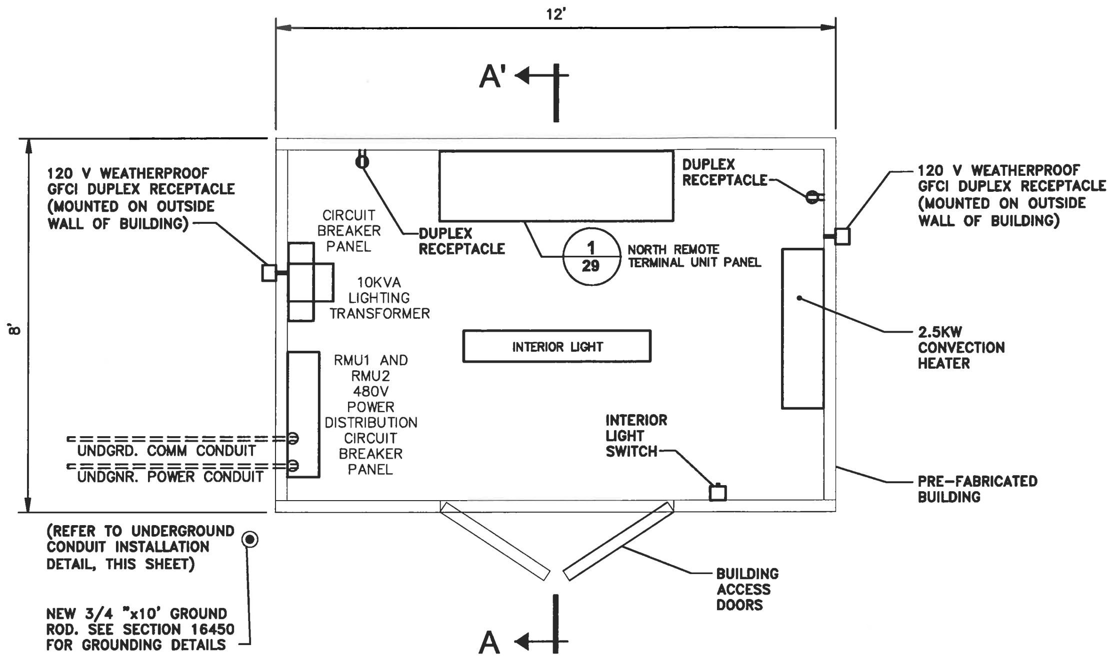
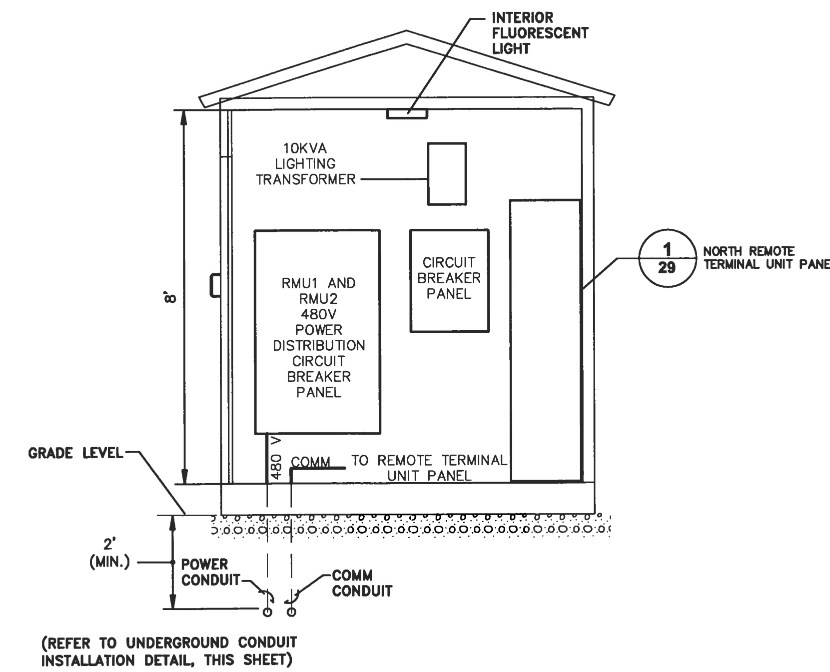


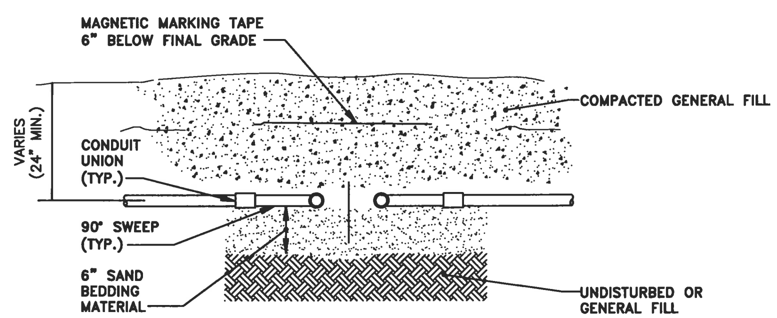
NORTH REMOTE CONTROL BUILDING PLAN (1)



NOTES:

1. BUILDING DIMENSIONS AND PANEL LAYOUT ARE APPROXIMATE.
2. FINAL BUILDING AND PANEL LAYOUT MAY VARY.

SECTION A-A'



NOTES:

1. NUMBER AND SIZE OF CONDUITS MAY VARY.
2. CONDUITS TO BE SPACED 6" APART MINIMUM.
3. POWER CONDUITS: RIGID STEEL PVC COATED (PLASTI-BOND), SIZE MAY VARY.
4. I/O COMM CONDUIT: 1" RIGID STEEL PVC COATED (PLASTI-BOND).

TYPICAL UNDERGROUND CONDUIT INSTALLATION DETAIL (2)

NOT TO SCALE

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Professional Engineer's Name: JOSEPH MOLINA
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STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

NORTH REMOTE CONTROL BUILDING LAYOUT

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc.
6723 Towpath Road
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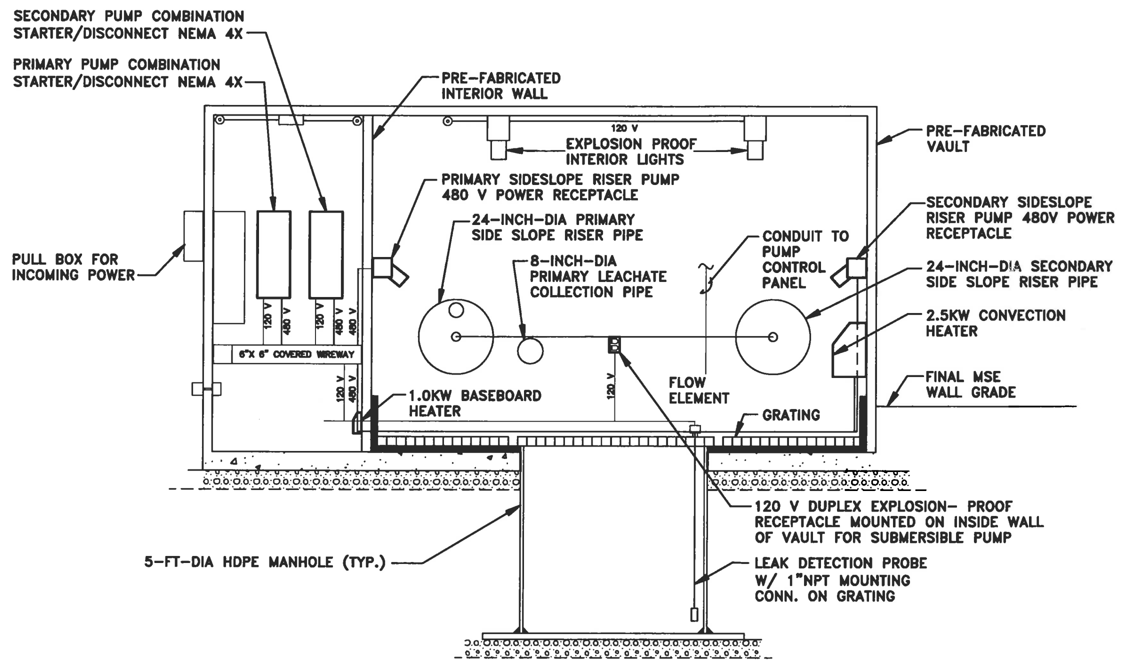
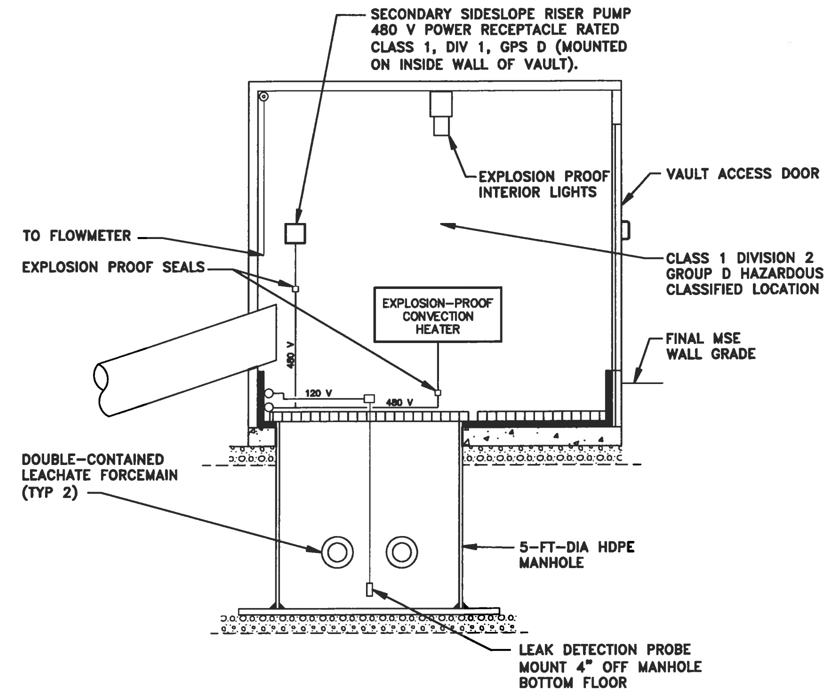
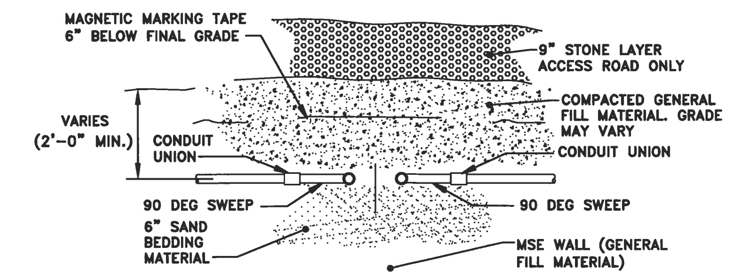


SECTION A-A'



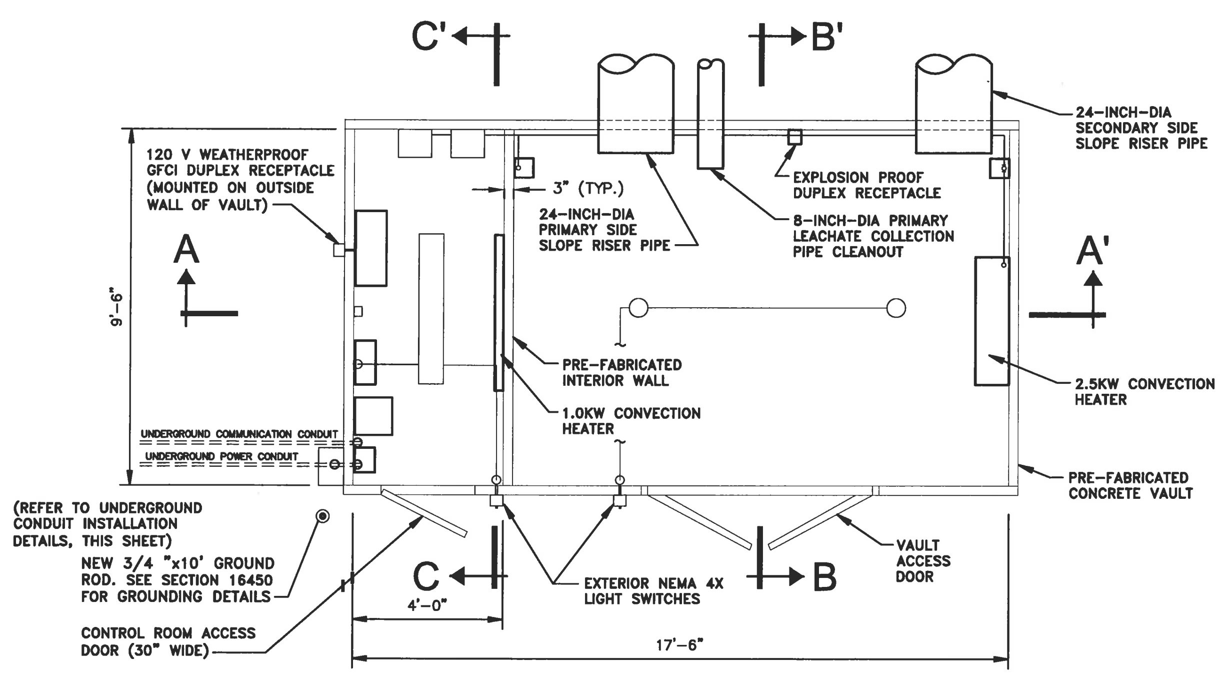
SECTION B-B'



NOTES:

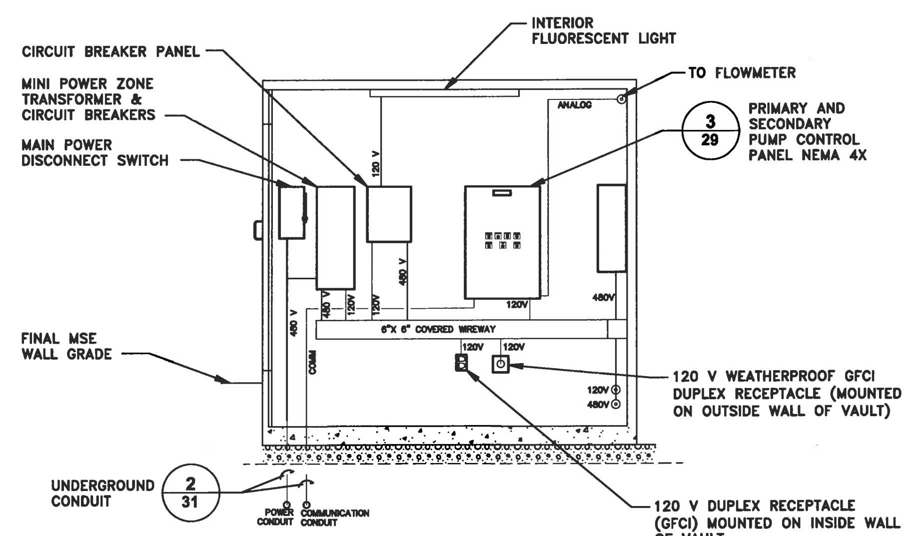
1. NUMBER AND SIZE OF CONDUITS MAY VARY.
2. CONDUITS TO BE SPACED 6" APART MINIMUM.
3. POWER CONDUITS: RIGID STEEL PVC COATED (PLASTI-BOND). SIZE MAY VARY.
4. I/O COMMUNICATION CONDUIT: 1" RIGID STEEL PVC COATED (PLASTI-BOND).

MSE WALL UNDERGROUND CONDUIT INSTALLATION DETAILS (2)

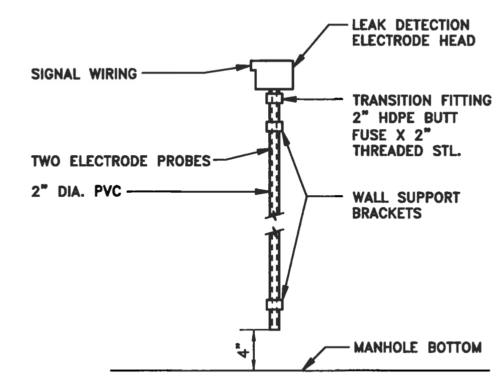


PLAN (1)

2.5' 0 2.5' 5'
1"=2.5'



SECTION C-C'



NOTES:

1. MOUNT PROBE FITTING 6" ABOVE GRATING IN RISER VAULTS.
2. EXTEND ELECTRODES TO 1/2" ABOVE BOTTOM OF 2" HDPE PIPE.

RISER VAULT LEAK DETECTION DETAIL (3)

GENERAL NOTES:

1. LINEWORK FROM AUTOMATED CONTROL SOLUTIONS, INC. 1000 YOUNG STREET, SUITE 450 TONAWANDA, NY 14150, 4/2/02 "RMU-2 RISER VAULT ELECTRICAL DIAGRAM AND DETAILS" DWG27.DWG.
2. LOCATE VAULT LEAK DETECTION PROBE ON INLET SIDE OF LEACHATE COLLECTION HDPE MANHOLE. MOUNT PROBE 4" FROM FLOOR.
3. ALL CONDUIT TO BE RUN AGAINST WALLS NEAR GRATING OR HIGH NEAR CEILING CORNERS, AS APPROPRIATE. USE CONDUIT SEALS PER N.E.C. ARTICLE 500 FOR ALL CONDUITS IN THE MAIN PUMPING AREA OF THE RISER VAULT.
4. REFER TO ELECTRICAL SPECIFICATIONS FOR CONDUIT AND CABLE INFORMATION.
5. REFER TO DRAWING 28 FOR RISER VAULT MECHANICAL DETAILS.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PLOTTED: 2/25/2013 1:15 PM BY: SARTORI, KATHERINE
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XREFS: 23725X00 IMAGES: PROJECTNAME: ---

SCALE AS NOTED

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: ACS, INC. | Drawn by: LAF | Checked by: TPA

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL · 072644

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RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

RMU-2 RISER VAULT ELECTRICAL DIAGRAM AND DETAILS

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120

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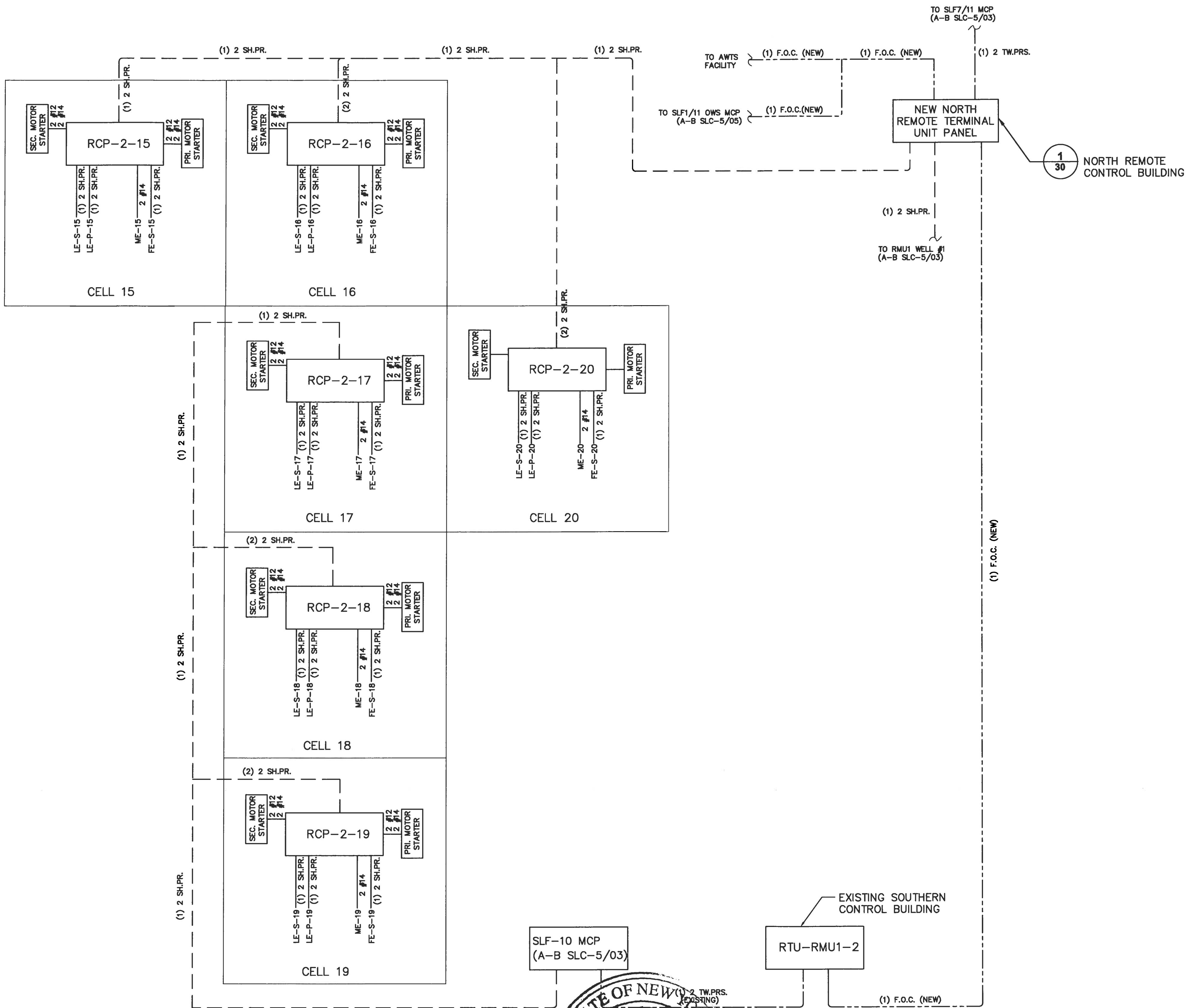

GENERAL NOTES:

1. LINEWORK FROM AUTOMATED CONTROL SOLUTIONS, INC. 1000 YOUNG STREET, SUITE 450 TONAWANDA, NY 14150, 6/10/02 "RMU2 INSTRUMENT RISER DIAGRAM" DWG28.DWG.
2. THIS DRAWING SHOWS PROCESS INSTRUMENTATION AND CONTROL WIRING REQUIREMENTS. ASSOCIATED AC POWER AND GROUNDING CONDUCTORS ARE NOT SHOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WIRING, WHETHER SHOWN OR NOT, NECESSARY FOR A COMPLETE AND OPERABLE SYSTEM.
3. ALL SHIELDED AND UNSHIELDED CONDUCTORS SHALL BE RUN IN CONDUIT. SHIELDED CONDUCTORS SHALL NOT BE COMBINED WITH UNSHIELDED CONDUCTORS IN ANY CONDUIT. NEITHER SHIELDED NOR UNSHIELDED CONDUCTORS SHALL BE INCLUDED IN THE SAME CONDUIT AS THREE PHASE POWER.
4. THIS DRAWING DOES NOT SHOW CONDUIT SYSTEMS. PROVIDE, AS A MINIMUM, PULL BOXES AS RECOMMENDED BY CONDUCTOR MANUFACTURER. CONDUIT SHALL NOT BE USED AS PULL BOX.
5. CONDUIT SHALL BE SIZED FOR CONDUCTORS SHOWN PLUS REQUIRED SPARES.
6. CONDUCTORS SHALL NOT BE SPLICED EXCEPT AT TERMINALS.

LIST OF ABBREVIATIONS:

FE - FLOW ELEMENT
FV - FLOW VALVE
LE - LEVEL ELEMENT
ME - MOISTURE ELEMENT
PRI - PRIMARY (RISER)
SEC - SECONDARY (RISER)

LEGEND:

( ) #12	(QUANTITY) #12 THWN CONDUCTORS
( ) #14	(QUANTITY) #14 THWN CONDUCTORS
( ) SH. PR.	(QUANTITY) SHIELDED PAIR (DUPLINE DATA HIGHWAY)
( ) 2 TW PRS	(QUANTITY) 2 TWISTED PAIRS CABLE (RS-485 DATA HIGHWAY)
( ) F.O.C.	(QUANTITY) FIBER OPTIC CABLE (FULL DUPLEX, MULTI-MODE)

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PAGESETUP: M-LD2B-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:18 PM BY: SARTORI, KATHERINE
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XREFS: 23725X00 IMAGES: PROJECTNAME: ---

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Designed by: ACS, INC. | Drawn by: LAF | Checked by: TPA

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

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RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

RMU-2 RISER VAULT INSTRUMENTATION DIAGRAM

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120

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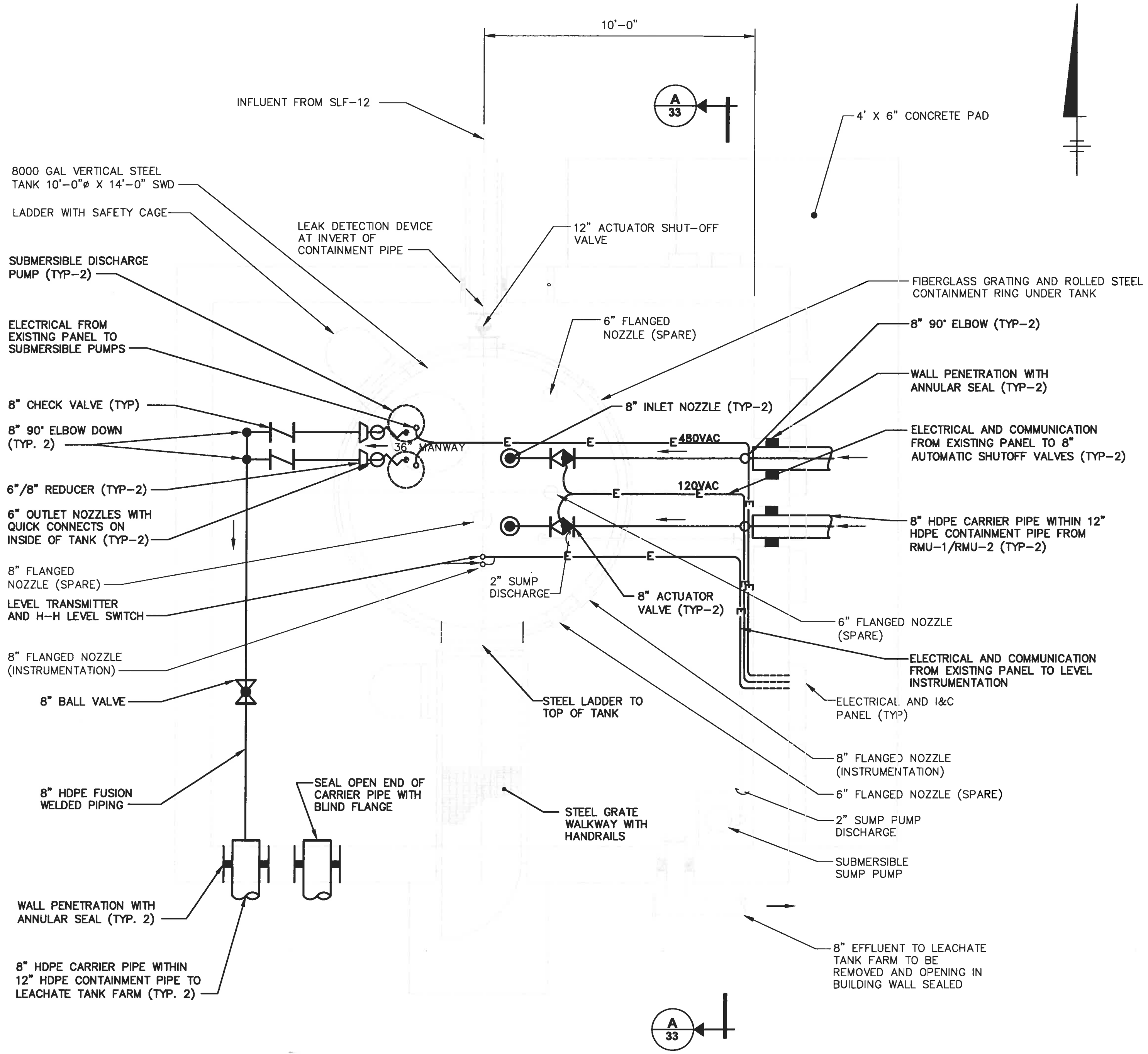
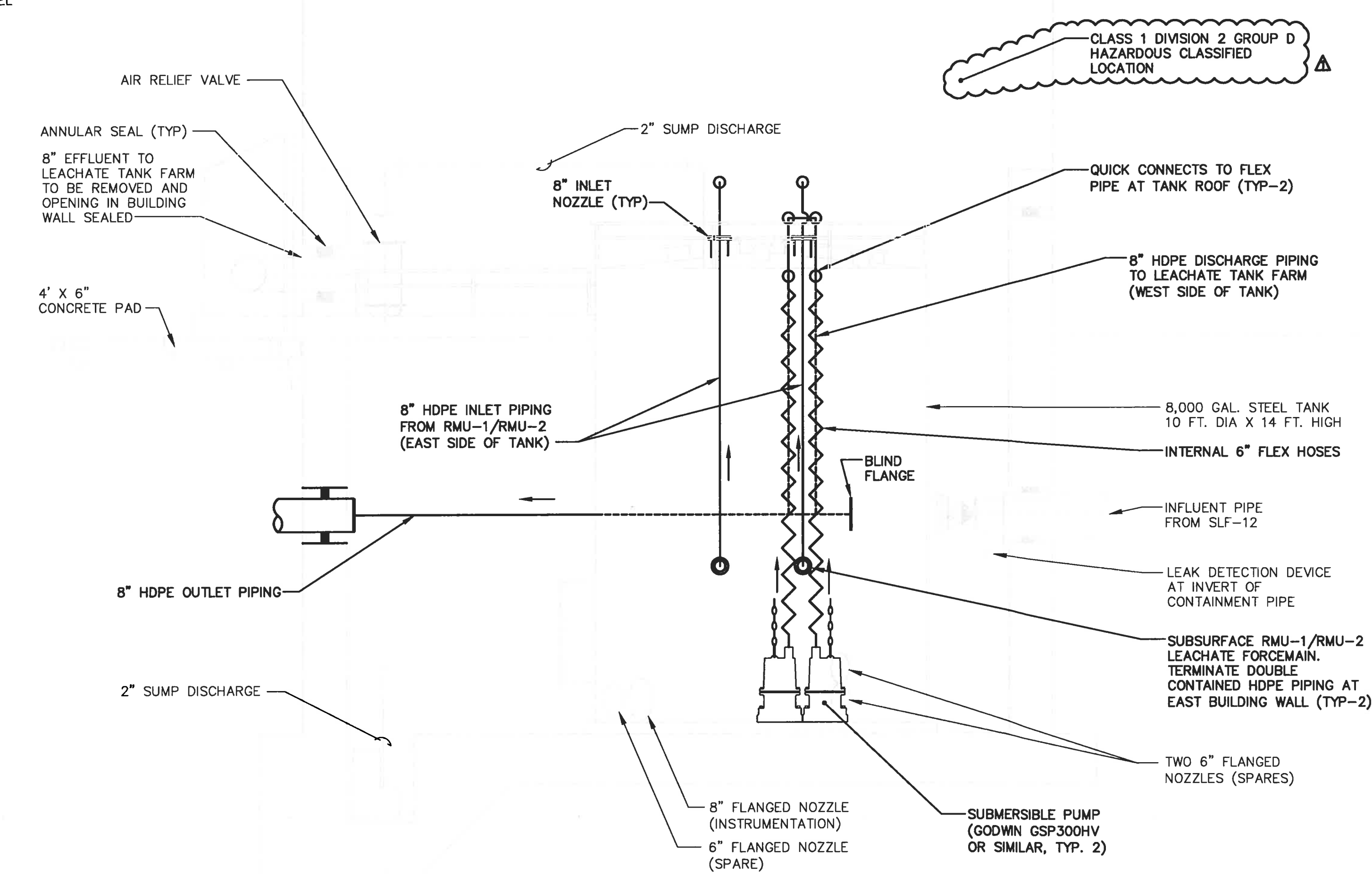


PROCESS PLAN



SECTION A-A

NOTES:

1. BASEMAP INFORMATION ON THIS DRAWING WAS DIGITIZED FROM A PHOTOCOPY PROVIDED BY CWM.
2. EXISTING TANK DISCHARGE LINES NOT SHOWN FOR CLARITY.
3. EXISTING TANK DISCHARGE LINES (INCLUDING PIPES, VALVES, PUMPS, ETC.) TO BE REMOVED AND REPLACED AS REQUIRED.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS G. STOWELL L. FORAKER LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PAGESETUP: M-LD28-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:16 PM BY: SARTORI, KATHERINE
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XREFS: 23725X00 IMAGES: PROJECTNAME: ---

NOT TO SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	2/2013	ADDED CLASS 1 DIVISION 2 LOCATION	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/PTO | Drawn by: LAF | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

ARCADIS

ARCADIS OF NEW YORK, INC.

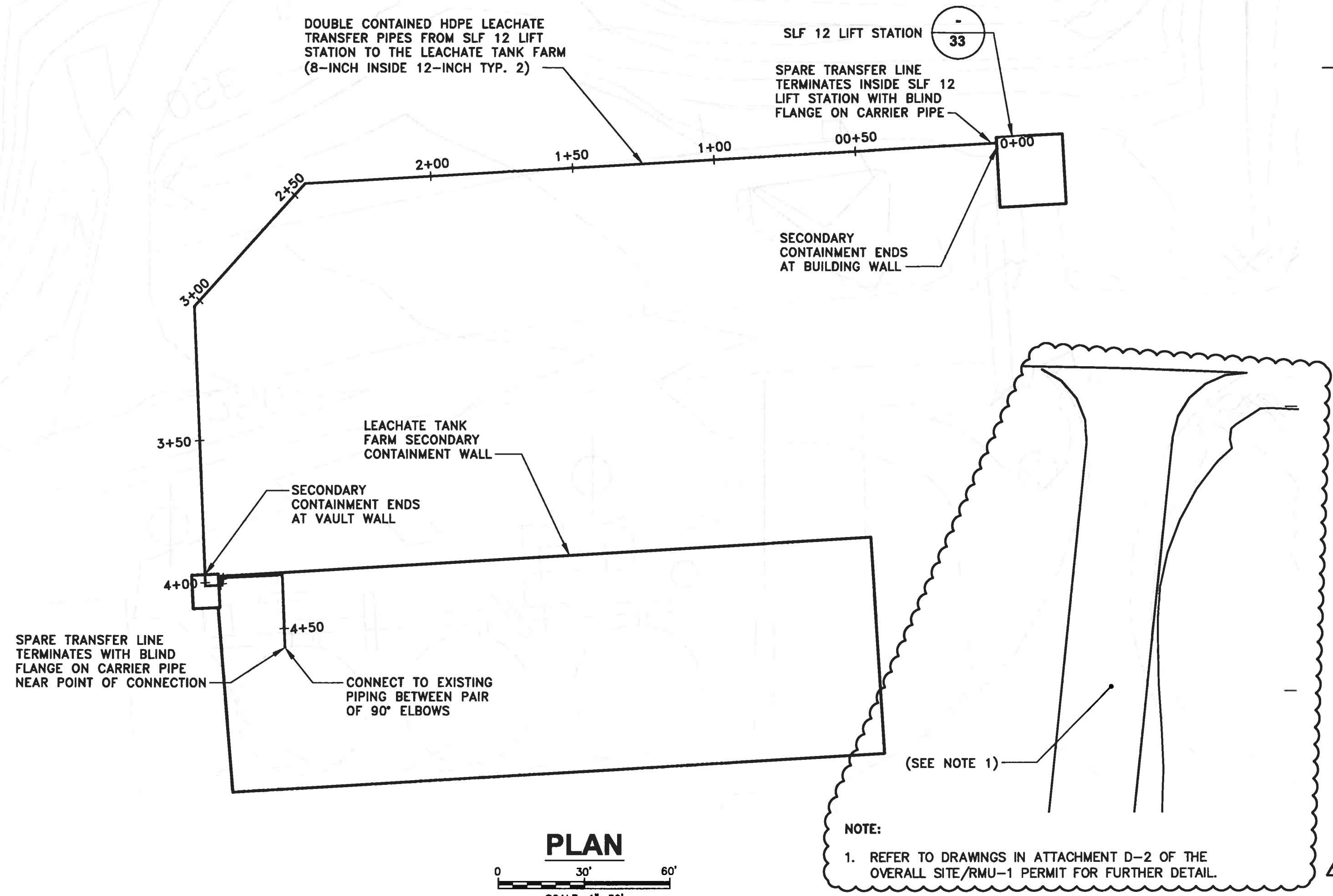
CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

SLF 12 LIFT STATION MODIFICATIONS

GENERAL

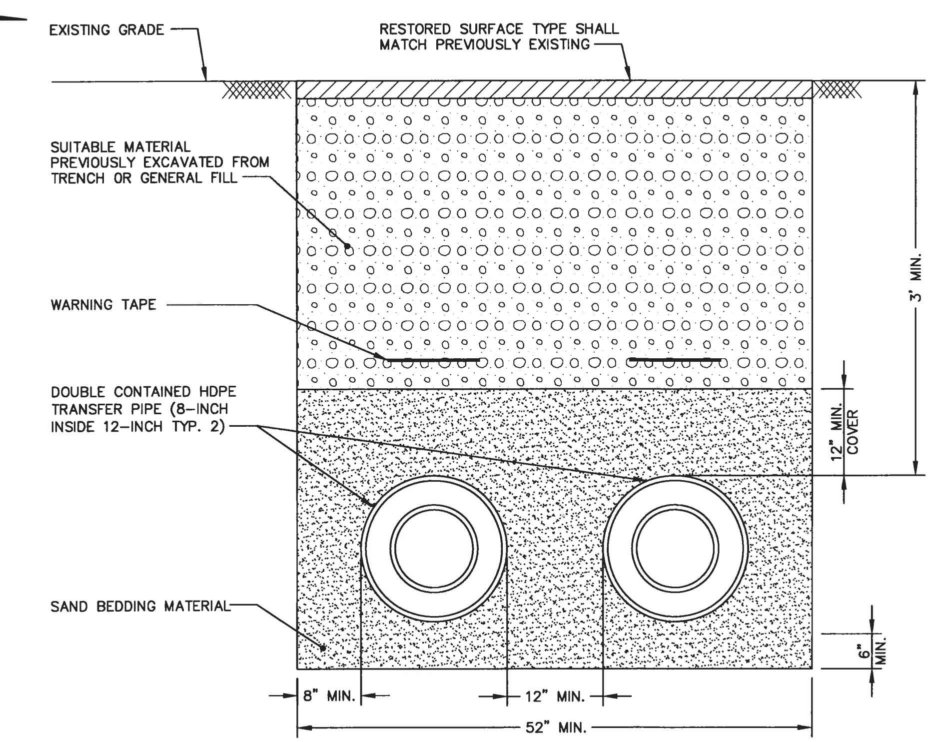
ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120

33



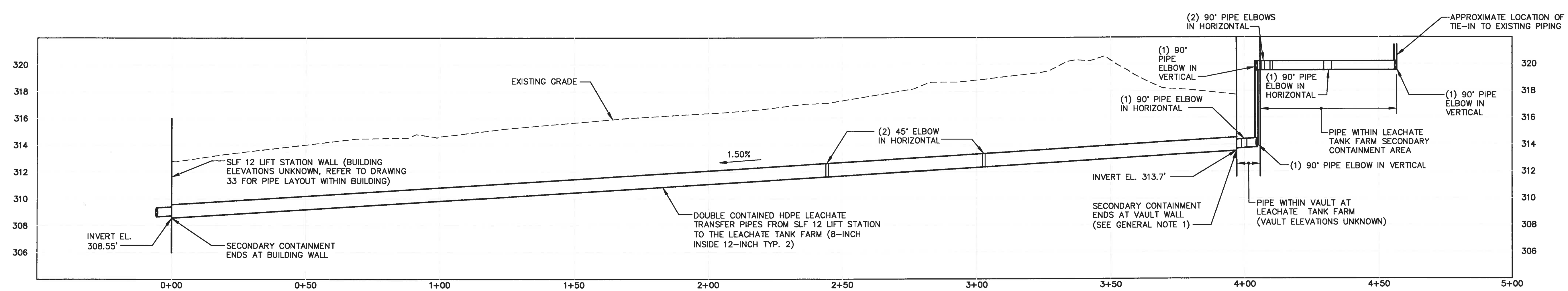
PLAN

0 30' 60'
SCALE: 1"=30'



TANK T-150 TRANSFER LINE TRENCH DETAIL (1)

NOT TO SCALE



PROFILE

0 20' 40'
HORIZONTAL SCALE: 1"=20'
0 4' 8'
VERTICAL SCALE: 1"=4'

GENERAL NOTES:

1. SEAL END OF SECONDARY TRANSFER HDPE PIPE FOR TESTING PURPOSES. 1" THICK FLATSTOCK RING TO BE EXTRUSION WELDED TO BOTH PRIMARY AND SECONDARY PIPES.
2. ELEVATIONS REFERENCED REPRESENT INVERT OF THE CONTAINMENT PIPE (OUTER).
3. SECOND TRANSFER PIPELINE INSTALLED AS SPARE. SPARE TRANSFER LINE TO BE CAPPED AT EACH END FOR FUTURE USE.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
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XREFS: 23725X02 23725X01 23725X00 IMAGES: PROJECTNAME: ---

SCALE(S) AS INDICATED

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No.	Date	Revisions	By	Ckd
△	1/2013	REMOVED FAC POND 5 GRADING AND RENUMBERED DWG	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA		
Professional Engineer's No.: 072644		
State: NY	Date Signed: 2/27/13	Project Mgr.: WAR
Designed by: NWF	Drawn by: SJK	Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL ENGINEER · 072644

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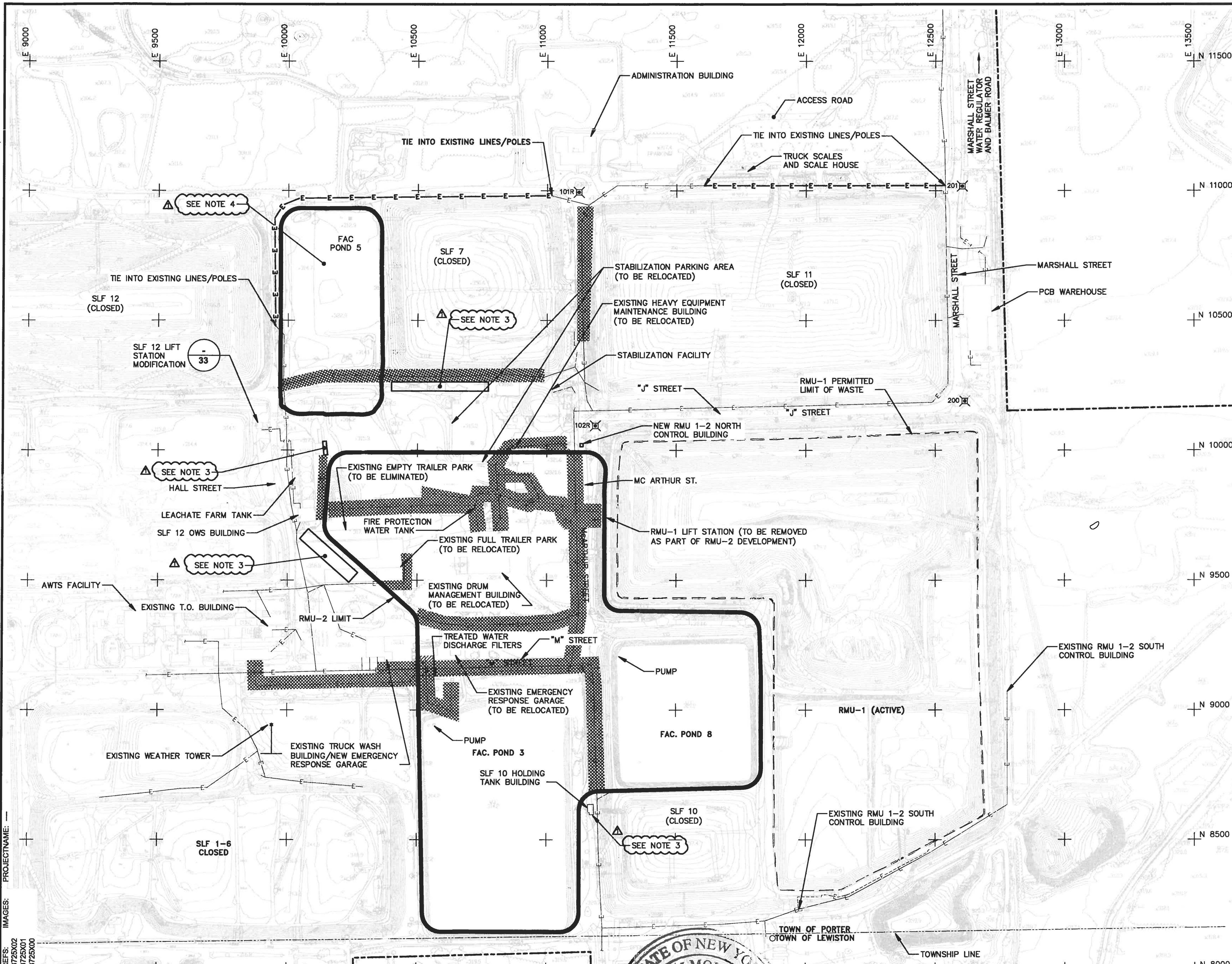
ARCADIS OF NEW YORK, INC.

CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

TANK T-150 TRANSFER PIPELINES

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date JANUARY 2012
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120



LEGEND:

	BRUSHLINE
	CABLE MARKER
	CATCH BASIN
	DROP INLET
	FENCE
	FIRE HYDRANT
	GUARD RAIL
	LIGHT POLE
	MISCELLANEOUS
	POLE
	MONUMENT POST
	RAILROAD TRACKS
	SIGN
	SWAMP
	TRAFFIC LIGHT
	TREE
	TREELINE
	UNIDENTIFIED OBJECT
	UTILITY POLE
	VALVE
	WATER LINE
	EXISTING CONTOUR
	EXISTING GRADEBREAK
	PROPERTY LINE
	ELECTRICAL UTILITIES TO BE REMOVED
	ABOVE-GROUND ELECTRICAL UTILITIES
	UNDERGROUND ELECTRICAL UTILITIES
	PROPOSED ABOVE-GROUND ELECTRICAL UTILITIES
200	CONTROL MONUMENT (SEE TABLE BELOW)
2 / 33	DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER
E 13500 N 7000	COORDINATE GRID (SEE NOTE 3)

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASEMAP INFORMATION.
2. ELECTRICAL UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED ON SITE OBSERVATIONS MADE IN 2003 BY BLASLAND, BOUCK & LEE, INC. (NOW KNOWN AS ARCADIS) AND INPUT FROM CWM. POINT OF CONNECTION BETWEEN EXISTING AND PROPOSED UTILITIES ARE APPROXIMATE.
3. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
4. REFER TO DRAWINGS IN ATTACHMENT D-2 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
5. ALL UTLITILTY MODIFICATIONS MAY NOT BE NECESSARY FOR THE CONTRUCTION OF INDIVIDUAL ELEMENTS.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS K. DAVIS K. WOOD LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\RMU_2\23725G35.dwg LAYOUT: 35 SAVED: 2/21/2013 10:43 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: M-LD2B-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:16 PM BY: SARTORI, KATHERINE

XREFS: 23725X02 23725X01 23725X00 IMAGES: PROJECTNAME: ---

200' 0 200' 400'
1"=200'

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No.	Date	Revisions	By	Ckd
2	2/2013	RENUMBERED DWG., REVISED CALLOUTS & NOTES	GNG	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/NWF | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · 072644 · LICENSED PROFESSIONAL ENGINEER

ARCADIS

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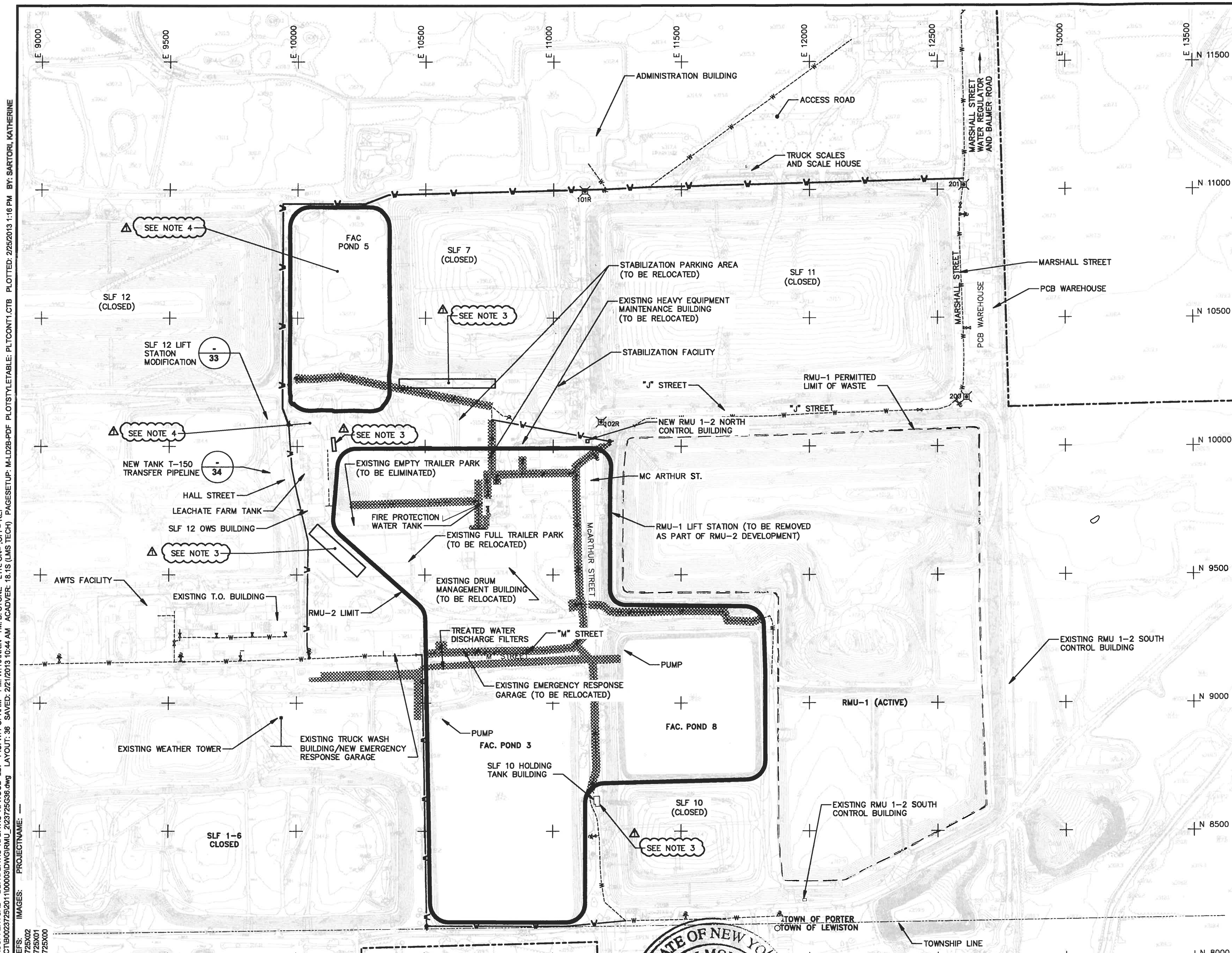
RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

SITE ELECTRICAL FEED RELOCATION PLAN

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date AUGUST 2009
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120

35



LEGEND:

- BRUSHLINE
- CABLE MARKER
- CATCH BASIN
- DROP INLET
- FENCE
- FIRE HYDRANT
- GUARD RAIL
- LIGHT POLE
- MISCELLANEOUS
- POLE
- MONUMENT POST
- RAILROAD TRACKS
- SIGN
- SWAMP
- TRAFFIC LIGHT
- TREE
- TREELINE
- UNIDENTIFIED OBJECT
- UTILITY POLE
- VALVE
- PROPOSED FIRE HYDRANT
- POTABLE WATER
- REROUTE OF WATER SUPPLY
- NEW WATERLINE
- EXISTING CONTOUR
- EXISTING GRADEBREAK
- PROPERTY LINE
- ACTIVE WATER SUPPLY LINES TO BE DISCONNECTED AND ABANDONED IN PLACE AND/OR REMOVED
- 200 CONTROL MONUMENT
- 2 DETAIL REFERENCE NUMBER
- 33 DRAWING REFERENCE NUMBER
- E 13500 N 7000 COORDINATE GRID

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASEMAP INFORMATION.
2. WATER SUPPLY LINES SHOWN ARE APPROXIMATE AND ARE BASED ON SITE OBSERVATIONS MADE IN 2003 BY BLASLAND, BOUCK & LEE, INC. (NOW KNOWN AS ARCADIS) AND INPUT FROM CWM. POINT OF CONNECTION BETWEEN EXISTING AND PROPOSED WATER SUPPLY LINES ARE APPROXIMATE.
3. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
4. REFER TO DRAWINGS IN ATTACHMENT D-2 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
5. ALL UTLITILTY MODIFICATIONS MAY NOT BE NECESSARY FOR THE CONTRUCTION OF INDIVIDUAL ELEMENTS.

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS K. DAVIS K. WOOD LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PAGESETUP: M-LD28-PDF PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 2/25/2013 1:16 PM BY: SARTORI, KATHERINE
G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\RMU_2\23725G36.dwg LAYOUT: 36 SAVED: 2/21/2013 10:44 AM ACADVER: 18.1S (LMS TECH)
XREFS: 23725X02 23725X01 23725X00 IMAGES: PROJECTNAME: --

1"=200' — 200' 0 200' 400'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	2/2013	RENUMBERED DWG., REVISED CALLOUTS AND NOTES	GNG	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 2/27/13 | Project Mgr.: WAR
Designed by: BMS/NWF | Drawn by: LAF | Checked by: BMS

STATE OF NEW YORK — JOSEPH MOLINA — 072644 — LICENSED PROFESSIONAL ENGINEER

ARCADIS
ARCADIS OF NEW YORK, INC.

CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
RESIDUALS MANAGEMENT UNIT 2 PERMIT DRAWING

SITE WATER SUPPLY RELOCATION PLAN

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date JANUARY 2012
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120

36

ATTACHMENT J

Application Appendix D-7 – RMU-2 Landfill Technical Specifications

Imagine the result

CWM Chemical Services, LLC.

Technical Specifications

Residuals Management Unit 2

Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

April 2003
Revised August 2009
Revised March 2011
Revised February 2013
Revised August 2013

TECHNICAL SPECIFICATIONS
FOR
MODEL CITY FACILITY
RESIDUALS MANAGEMENT UNIT 2
CWM CHEMICAL SERVICES, LLC
MODEL CITY, NEW YORK

GENERAL TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

SECTION 01000
GENERAL PROVISIONS

PART 1 GENERAL

1.01 PROJECT DESCRIPTION

A. Work included in construction of Residuals Management Unit 2 (RMU-2) entails construction of the baseliner system, installation of piping and electrical work for the landfill's leachate collection system, and the installation of the final cover system and stormwater management system. The Landfill is located in Model City, Niagara County, New York.

B. OWNER - CWM Chemical Services, LLC has overall authority of the facility and is responsible for selecting the CONTRACTOR, ENGINEER, and QUALITY ASSURANCE CONSULTANT. They are also responsible for the operation and maintenance of the facility, including areas directly and indirectly affected by the work.

C. ENGINEER - is responsible for technical review of the CONTRACTOR'S submittals for conformance with the project requirements, and is responsible for approving all design and specification changes and making design clarifications necessitated during construction. Alternative testing methods to those listed in the specifications may be substituted upon approval by the ENGINEER. The ENGINEER will approve design changes in writing.

D. QUALITY ASSURANCE CONSULTANT (QAC) – is under contract with the OWNER, and is responsible for ensuring the work is performed in accordance with the requirements of the RMU-2 Construction Quality Assurance Manual (CQAM). The QAC performs all conformance testing, survey documentation of work, and observes all major construction activities. The QAC duties may be spilt among more than one consultant.

E. CONTRACTOR – is responsible for completing all work in accordance with the contract, including the project specifications, project drawings, CQAM, and relevant RMU-2 permit conditions.

F. NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION – is the permitting agency for the construction and operation of the facility. As such, they must approve of various elements of the work during construction, as well as any changes or modifications to the permit (including the drawings and specifications).

1.02 IDENTIFICATION OF DRAWINGS

A. Work included in this Contract is presented on RMU-2 drawings; Nos. 1 through 39.

1.03 FORM OF SPECIFICATIONS

A. These Specifications are written in imperative and abbreviated form. This imperative language of technical sections is directed at the CONTRACTOR, unless specifically noted otherwise. Incomplete sentences in specifications shall be completed by inserting "shall", "CONTRACTOR shall”, "shall be", and similar mandatory phrases by inference in the same manner as they are applied to notes on drawings. Words "shall be" shall be supplied by inference where a colon (:) is used within sentences or phrases. Except as worded to contrary, fulfill (perform) indicates requirements whether stated imperatively or otherwise.

B. Items of Work are specified by section. Specifications or requirements of one or more sections may apply or be referenced in other sections.

C. Provide Work stated and comply with requirements stated in each section unless specifically assigned to other Contractors or the OWNER.

D. Term “provide” or “provided” shall mean "furnished and installed by CONTRACTOR".

1.04 WORK BY OTHERS

A. Work at the site may be performed concurrently by other contractors, or the OWNER. Work by others will be identified during the pre-construction conference.

B. Coordinate Work to minimize interference with other work at the facility.

1.05 WORK SEQUENCE

A. Construct Work in stages to accommodate OWNER's use of premises during construction period; coordinate construction schedule and operations with OWNER's representative.

1.06 CONTRACTOR'S USE OF PREMISES

A. Limit use of premises for Work and storage to allow for:

1. Work by other Contractors.

2. OWNER occupancy.

B. Coordinate use of premises with OWNER.

C. Assume full responsibility for protection and safekeeping of products under this Contract.

D. Obtain and pay for use of additional storage or Work areas needed for operations at no additional cost to OWNER.

E. Conduct operations to ensure the least inconvenience to site operations and vehicle access.

1.07 OWNER OCCUPANCY

A. Schedule operations for completion of portions of Work, in accordance with construction schedule, for OWNER occupancy prior to substantial completion of entire Work.

1.08 OWNER-FURNISHED PRODUCTS

A. OWNER may obtain specific products, for the purpose of expediting delivery, and other purposes in OWNER's interest. These items, if any, will be discussed at pre-construction conference.

1.09 REFERENCE STANDARDS

A. Standards and standard specifications referenced in theses specifications shall be the latest published versions, unless otherwise noted.

B. Reference to NYSDOT, or DOT specifications shall mean the "Standard Specifications for Construction and Materials," published by State of New York Department of Transportation, latest edition.

C. Performance criteria for Work shall be in accordance with the RMU-2 Construction Quality Assurance Manual.

* * * END OF SECTION * * *

SECTION 01200
PROJECT MEETINGS

PART 1 GENERAL

1.01 GENERAL MEETING REQUIREMENTS

A. The OWNER or his/her representative shall schedule and administer the pre-construction conference, the pre-work conference, periodic progress meetings, and specially called meetings throughout progress of Work. This shall include at a minimum the following:

1. Prepare agenda for meetings.

2. Distribute written notice of each meeting 4 days in advance of meeting date.

3. Make physical arrangements for meetings.

4. Preside at meetings.

5. Assign individual to record minutes; include significant proceedings and decisions.

6. Reproduce and distribute copies of minutes within 3 days after each meeting to the following at a minimum.

    a. To attendees of the meeting.

    b. To parties affected by decisions made at meeting.

    c. Furnish 1 copy of minutes to OWNER, 2 copies to OWNER’s site representative, and 2 copies to ENGINEER.

B. Representatives of Contractors, Subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of entity each represents.

1.02 PRECONSTRUCTION CONFERENCE

A. Before the OWNER issues the Notice to Proceed, CONTRACTOR shall meet with the OWNER for a pre-construction conference.

B. Purpose of Conference:

1. Status of Contract.

2. Review submittals.

3. Safety programs.

4. Environmental protection.

5. Progress schedules.

6. Requests for payment.

7. Retainage.

8. Staffing.

9. Payment and procurement of materials.

10. Review principal features of Work.

11. Address CONTRACTOR’s questions regarding Contract and Work site.

1.03 PRE-WORK CONFERENCE

A. As soon as possible after the Notice to Proceed is issued to the CONTRACTOR and prior to starting on-site Work, a pre-work conference will be held between CONTRACTOR, Quality Assurance Consultant(s) and OWNER or his representative.

B. Attendance:

1. CONTRACTOR's superintendent.

2. Quality control supervisor.

3. Safety personnel.

4. Major subcontractors' job superintendents.

5. Quality Assurance Consultant.

C. Purpose of Conference:

1. Further define quality control system.

2. Review RMU-2 Construction Quality Assurance Manual (CQAM).

3. Develop mutual understanding of specific requirements established by Contract.

D. Specifics of CONTRACTOR's health, safety, and emergency plan will be discussed so emergency procedures and safety requirements are understood by those directly related to site Work.

E. CONTRACTOR's schedule, particularly for initial startup period, will be discussed.

F. Questions concerning administrative requirements outlined during pre-construction conference or other aspects of the Project shall be addressed.

1.04 PROGRESS MEETINGS

A. Schedule and administer progress meetings at a minimum of once per week and such additional meetings as required, or as requested by OWNER.

B. Attendance:

1. OWNER or OWNER's representative.

2. CONTRACTOR's superintendent.

3. Subcontractors as appropriate to agenda.

4. Quality Assurance Consultant.

5. ENGINEER (as needed).

C. Suggested Agenda:

1. Review and approval of record of previous meeting.

2. Review work schedule.

3. Discuss progress of previous week.

4. Discuss work to be performed in upcoming week.

5. Review long term schedule.

6. Discuss applicable quality assurance test results.

7. Discuss technical issues associated with work and assign responsible parties.

8. Review need for specification and/or permit modification and/or clarification.

9. Review health and safety requirements and issues.

10. Miscellaneous issues.

* * * END OF SECTION * * *

SECTION 01340
SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. This section specifies procedural requirements for Work-related (non-administrative) submittals including Shop Drawings, proposed substitutions, product data, samples, and other miscellaneous Work-related submittals.

B. Administrative Submittals: Procedures concerning items such as listing of manufacturers, suppliers, Subcontractors, construction progress schedule, schedule of Shop Drawing submissions, bonds, payment applications, insurance certificates, and schedule of values are specified elsewhere.

C. Types of Work-Related Submittals:

1. Proposed Substitutes or "Or Equal" Items:

   a. Includes material or equipment that CONTRACTOR requests ENGINEER to accept, after Bids are received, as a substitute for items specified or described in the specifications or by the ENGINEER that are a name of a proprietary item or the name of a particular supplier.

2. Shop Drawings:

   a. Includes technical data and drawings specially prepared for the Project, including; fabrication and installation drawings, diagrams, actual performance curves, data sheets, schedules, templates, patterns, reports, instructions, design mix formulas, measurements, and similar information that is not in standard printed form.

3. Product Data:

   a. Includes standard printed information on manufactured products and systems not specially prepared for this Project, including manufacturer's product specifications and installation instructions, catalog cuts, standard wiring diagrams, printed performance curves, mill reports, and standard color charts.

4. Samples:

   a. Includes fabricated and manufactured physical examples of materials, products, and units of Work, includes complete units, partial cuts of manufactured or fabricated work, swatches showing color, texture, and pattern, and units of Work to be used for independent inspection and testing.

b. Mock-ups are special forms of samples too large or otherwise inconvenient for handling in a manner specified for transmittal of sample submittals.

5. Miscellaneous Submittals:

a. Work-related submittals that do not fit in one of the four previous categories: including guarantees, warranties, certifications, experience records, maintenance agreements, operating and maintenance data, workmanship bonds, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, overrun stock, keys, and similar information, devices, and materials applicable to Work.

1.02 SUBMITTAL PROCEDURES

A. Specific submittal requirements for individual units of Work are specified in applicable Specification sections. Except as otherwise indicated, comply with requirements specified herein for each indicated type of submittal.

B. Scheduling:

1. Provide a submittal schedule for submittals that are required by Specifications indicating principal Work-related submittals and time requirements for coordination of submittal activity with related Work.

2. Adjust submittal schedule to reflect revisions to construction progress schedule and submit to OWNER and/or OWNER’s Representative.

3. Prepare and transmit each submittal sufficiently in advance of scheduled performance of related Work and other applicable activities.

C. Coordination:

1. Coordinate preparation and processing of submittals with performance of Work. Coordinate each submittal with other submittals and related activities such as substitution requests, testing, purchasing, fabrication, delivery, and similar activities that require sequential activity.

2. Coordinate submission of different units of interrelated Work so one submittal is not delayed by ENGINEER's need to review related submittal. ENGINEER may withhold action on any submittal requiring coordination with other submittals until related submittals are submitted.

D. Submittal Preparation:

1. Stamp and sign each submittal certifying to review of submittal, verification of products, field measurement, field construction criteria, and coordination of information within submittal with requirements of Work and Contract Documents.

2. Transmittal Form: Provide transmittal identifying:
   a. Date of submittal.
   b. Project title and number.
   c. Submittal and transmittal number.
   d. Contract identification.
   e. Names of:
      1) CONTRACTOR.
      2) Supplier.
      3) Manufacturer.
   f. If submittal is for substitute item of material or equipment identified as "substitute" on transmittal.
   g. Identification of equipment and material with equipment identification numbers, motor numbers, and Specification section number.
   h. Variations from Contract Documents.

E. Resubmittal Preparation:

1. Comply with requirements described in Submittal Preparation above, and in addition:
   a. Identify on transmittal form that submittal is resubmission and include dates of previous submittals.
   b. Make corrections or changes in submittals required by ENGINEER's notations on returned submittal.
   c. Respond to ENGINEER's notations.
      1) On transmittal or on separate page attached to CONTRACTOR's resubmission transmittal, answer or acknowledge in writing notations or questions indicated by ENGINEER on ENGINEER's transmittal form returning reviewed submission to CONTRACTOR.
      2) Identify each response by question or notation number established by ENGINEER.
      3) If CONTRACTOR does not respond to each notation or question, resubmission will be returned without action by ENGINEER until CONTRACTOR provides written response to ENGINEER's notations or questions.

d. CONTRACTOR-initiated revisions or variations.
   1) On transmittal form, identify variations or revisions from previously reviewed submittal, other than those called for by ENGINEER.

1.03 SPECIFIC SUBMITTAL REQUIREMENTS

A. Requests for Substitutes or "Or Equal":

1. Collect data for items to be submitted for review as substitutes into one submittal for each item of material or equipment.

2. Submit with other scheduled submittals for material or equipment allowing time for OWNER to evaluate additional information required to be submitted.

3. If CONTRACTOR requests to substitute for material or equipment specified but not identified in Specifications as requiring submittals, CONTRACTOR shall schedule substitution submittal request in Submittal Schedule and submit as scheduled.

B. Shop Drawings:

1. Submit newly prepared 1nformation, with graphic information at accurate scale and name of preparer indicated (firm name). Show dimensions and clearly note which are based on field measurement, identify materials and products, which are included in Work, and revisions on resubmittals. Indicate compliance with standards and notation of coordination requirements with other Work. Highlight, encircle or otherwise indicate variations from Contract Documents or previous submittals.

2. Provide 8 in. by 3 in. blank space for CONTRACTOR and OWNER stamps.

3. Submittals:

   a. Submit 7 blue line or black line prints, or; 1 reverse sepia reproducible and 1 blue line or black line print when required in Specification section; reproducible will be returned.

C. Product Data:

1. Preparation:

   a. Collect required data into single submittal for each unit of Work or system. Where product data has been printed to include information on several similar products, some of which are not required for use on Project or not included in submittal, mark copies to clearly show such information is not applicable.
   b. Where product data must be specially prepared for required products, materials or systems, because standard printed data is not suitable for use, submit data as Shop Drawing and not as product data.

2. Submittals:

   a. Submittal is for information and record, and to determine that products, materials, and systems comply with Contract Documents.

   b. Submit 7 copies.

3. Distribution:

   a. Do not proceed with installation of materials, products or systems until final copy of applicable product data is in possession of installer.

   b. Maintain one set of product data (for each submittal) at Project site, available for reference by OWNER and others.

D. Samples:

1. Preparation:

   a. Where possible, provide samples physically identical with proposed materials or products to be incorporated into Work. Where variations in color, pattern or texture are inherent in material or product represented by sample, submit multiple units (not less than 3 units) showing approximate limits of variations.

   b. Provide full set of optional samples where OWNER's selection is required. Prepare samples to match OWNER's sample where so indicated.

   c. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards.

   d. Submit samples for OWNER's visual review of general generic kind, color, pattern, texture, and for final check of coordination of these characteristics with other related elements of Work.

2. Submittals:

   a. At CONTRACTOR's option, and depending upon nature of anticipated response from OWNER, initial submittal samples may be preliminary or final submittals.

   b. Preliminary submittal, of single set of samples, required where ENGINEER's selection of color, pattern, texture or similar characteristics from manufacturer's range of standard choices is necessary. Preliminary submittals will be reviewed and returned with ENGINEER's "Action" marking.

   c. Final Submittals: Submit 3 sets of samples in final submittal, 1 set will be returned.

3. Distribution:

   a. Maintain returned final set of samples at Project site, in suitable condition and available for quality control comparisons throughout course of performing Work.

   b. Returned samples intended or permitted to be incorporated in Work are indicated in Specification sections, and shall be in undamaged condition at time of use.

E. Mock-Ups:

1. Mock-ups and similar samples specified in Specification sections are recognized as special type of samples. Comply with samples submittal requirements to greatest extent possible. Process transmittal forms to provide record of activity.

F. Miscellaneous Submittals:

1. Inspection and Test Reports:

   a. Classify each inspection and test report as "Shop Drawings" or "product data," depending on whether report is specially prepared for Project or standard publication of workmanship control testing at point of production. Process inspection and test reports accordingly.

2. Guarantees, Warranties, Maintenance Bonds, Agreements, and Workmanship:

   a. Refer to Specification sections for specific requirements.

   b. In addition to copies desired for CONTRACTOR's use, furnish 2 executed copies. Provide 2 additional copies where required for maintenance data.

3. Survey Data:

   a. Refer to Specification sections for specific requirements on property surveys, building or structure condition surveys, field measurements, quantitative records of actual Work, damage surveys, photographs and similar data required by Specification sections. Copies will not be returned.

      1) Survey Copies: Furnish 2 copies of final property survey (if any).

      2) Condition Surveys: Furnish 2 copies.

4. Certifications:

   a. Refer to Specification sections for specific requirement on submittal of certifications. Submit 7 copies. Certifications are submitted for review of conformance with specified requirements and information. Submittal final when returned by OWNER marked "Approved".

5. Closeout Submittals:

   a. Refer to Specification sections for specific requirements on submittal of closeout information, materials, tools, and similar items.

      1) Material and Equipment: Section 01600.

      2) Operating and Maintenance (O&M) Data: Section 01730.

G. Operating and Maintenance (O&M) Data:

1. Organize O&M information into suitable sets of manageable size, and bind into individual binders properly identified and indexed (thumb-tabbed). Include emergency instructions, spare parts listing, copies of warranties, wiring diagrams, recommended "turn-around" cycles, inspection procedures, Shop Drawings, product data, and similar applicable information.

2. Bind each manual of each set in heavy duty 2-inch, 3-ring vinyl covered binder, and include pocket folders for folded sheet information. Mark identification on front and spine of each binder.

H. General Distribution:

1. Unless required elsewhere, provide distribution of submittals to Subcontractors, suppliers, governing authorities, and others as necessary for proper performance of the Work.

2. Provide copies of submittals bearing ENGINEER’s action stamp to:

   a. Job site file.

   b. Record documents file.

I. Electronic Submittals:

1. In general, submittals may be made electronically (PDF or similar format) in lieu of hard copy unless the ENGINEER indicates otherwise.

2. Survey-related electronic submittals shall be made in both PDF and AutoCAD (DWG) file formats.

1.04 ACTION ON SUBMITTALS

A. ENGINEER's Action:

1. General:

   a. Except for submittals for record and similar purposes, ENGINEER will review each submittal, mark with appropriate action, and return. Where submittal must be held for coordination, ENGINEER will so advise CONTRACTOR without delay.

b. ENGINEER will stamp each submittal with uniform, self-explanatory action stamp, appropriately marked with submittal action.

B. Action Stamp:

1. Marking: Approved.

a. Final Unrestricted Release: Where submittals are marked as "Approved", Work covered by submittal may proceed provided it complies with Contract Documents. Acceptance of Work depends on that compliance.

2. Marking: Approved With Noted Exceptions.

a. Final-But-Restricted Release: When submittals are marked as "Approved" With Noted Exceptions," Work covered by submittal may proceed provided it complies with ENGINEER's notations or corrections on submittal and Contract Documents. Acceptance of Work depends on that compliance. Resubmittal not required unless required by ENGINEER on returned submittal.

3. Marking: Not Approved.

a. Submittal Not Accepted: When submittals are marked "Not Approved", do not proceed with Work covered by submittal. Work covered by submittal does not comply with Contract Documents.

b. Prepare new submittal for either different material or equipment supplier or different product line or material of same supplier complying with Contract Documents.

4. Marking: Revise and Resubmit.

a. Returned for Re-submittal: When submittals are marked as "Revise and Resubmit", do not proceed with Work covered by submittal.

b. Revise submittal or prepare new submittal in accordance with ENGINEER's notations in accordance with Paragraph 1.02.D of this section. Resubmit submittal without delay. Repeat if required to obtain different action marking.

* * * END OF SECTION * * *

SECTION 01400
GENERAL PROVISIONS FOR GEOSYNTHETICS

PART 1 GENERAL

1.01 SUMMARY

A. Furnish and install geosynthetics including necessary labor, materials and equipment incorporated or to be incorporated into work.

1.02 RELATED SECTIONS

A. Section 02401 - Polyethylene Geomembranes.

B. Section 02410 - Geotexti1e.

C. Section 02430 - Geotextile/Geonet Composite.

D. Section 02413 - Geosynthetic Clay Liner.

1.03 DEFINITIONS

A. OWNER: Individual or firm owning or operating facility.

B. Geosynthetic Installer: Firm responsible for installation of geosynthetics. Firm may be affiliated with manufacturer.

C. Geosynthetic Quality Assurance Consultant (Geosynthetic QAC): Firm independent from OWNER, manufacturer(s) and Geosynthetic Contractor responsible for observing and documenting activities related to quality assurance of production and installation of geosynthetic systems on behalf of OWNER.

D. Lead Geosynthetic Quality Assurance Monitor (LGM): Lead Monitor representing the Geosynthetic QAC responsible for quality assurance work associated with geosynthetics.

E. Additional terms defined in RMU-2 Construction Quality Assurance Manual.

1.04 RESPONSIBILITIES

A. Procurement, transportation to site, and storage of geosynthetic materials if specified in Contract Documents.

B. Field handling, deploying, seaming, temporary restraining and all other aspects of geosynthetic installation.

1.05 QUALIFICATIONS

A. Manufacturer approved/qualified installer.

B. Provide sufficient qualified personnel to meet Project demands.

C. Provide materials from geosynthetic manufacturers having internal product quality control programs meeting OWNER's requirements.

D. Provide Superintendent and Master Seamer.

1. Superintendent:

   a. Previously demonstrated experience, management ability and authority.

   b. Managed, at a minimum, 2 installation projects entailing installation of at least 1,000,000 square feet: (100,000 square meters) of polyethylene geomembrane unless otherwise approved in writing by OWNER.

2. Master Seamer:

   a. Experience seaming minimum of 1,000,000 square feet (100,000 square meters) of polyethylene geomembrane using same type of seaming apparatus as type to be used during Project.

E. Provide personnel qualified to perform geomembrane seaming operations by experience or by successfully passing seaming tests (see Section 02401, Article 3.04.).

1.06 QUALITY ASSURANCE PROGRAM

A. Agree to participate in and conform to items and requirements of OWNER's quality assurance program as described in RMU-2 Construction Quality Assurance Manual.

B. Attend pre-construction meeting.

1.07 FIELD MEASUREMENTS

A. Units:

1. In Specifications, properties and dimensions shall be expressed in U.S. units, with approximate equivalent SI units in parentheses. Conversion is typically only accurate within 10%. In cases of conflict or clarification, U.S. units shall govern.

1.08 WARRANTY

A. Provide written warranty upon Project completion as required in Contract Documents. Warranty shall address quality of material and workmanship.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.01 LINING SYSTEM ACCEPTANCE

A. Geosynthetic Contractor shall retain ownership and responsibility for geosynthetic lining system until accepted by OWNER. At the OWNER's discretion, geosynthetic lining system may be accepted in sections or at points of substantial completion.

B. OWNER will accept geosynthetic lining system based on the following:

1. Installation of lining system, or section thereof.

2. Documentation of installation.

3. Verification of adequacy of field seams and repairs including associated testing.

4. Recommended acceptance by action of Geosynthetic QAC.

C. Progress payments made by OWNER to CONTRACTOR for installed and approved elements of the work do not constitute acceptance.

* * * END OF SECTION * * *

SECTION 01500
TEMPORARY CONSTRUCTION, FACILITIES AND UTILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Provide and maintain temporary facilities and utilities required for construction; remove at completion of Work.

1.02 QUALITY ASSURANCE

A. Comply with federal, state, and local codes and regulations, and utility company requirements.

B. Coordinate all temporary utilities with the OWNER to minimize interruption of OWNER's operations.

PART 2 PRODUCTS

2.01 TEMPORARY ELECTRICITY AND LIGHTING

A. General:

1. Provide temporary electric service as specified herein.

2. Temporary lighting shall be sufficient to enable CONTRACTOR to complete Work and enable OWNER to check Work as it is being performed. Illumination shall meet or exceed OSHA requirements.

3. After Substantial Completion of permanent electrical system and building wiring, permanent receptacles may be used during finishing Work.

4. Use ground fault interrupters on all temporary circuits during construction.

B. Responsibilities:

1. Provide, maintain, and remove temporary electric service facilities.

2. Provide lamps, wiring, switches, sockets, and similar equipment required for temporary lighting and small power tools.

3. Facilities exposed to weather shall be weatherproof and electrical equipment enclosures locked to prevent access by unauthorized personnel.

4. Pay for installation of temporary services including poles, transformer charges, and metering.

5. Patch affected surfaces and structures after temporary services are removed.

6. Arrange with local electric utility for temporary electric service subject to their requirements and approval.

2.02 TEMPORARY HEAT

A. General:

1. Cold Weather Protection: Heating required before building is enclosed.

2. Temporary Heat: Heating required after enclosure of building. Building shall be considered as enclosed when it is roofed and has such protection at doorways, windows, and other openings as will provide reasonable heat retention.

3. See requirements of Specification for minimum temperature to be maintained for various trades and Work. Except as otherwise called for, temperature in all parts of building shall be kept above freezing.

4. Heat shall be warm air heat from oil- or gas-fired portable unit heaters suitably vented to outside as required for protection of health and property.

5. Open salamander type heaters are not permitted for interior use.

6. Site electricity shall not be used for construction-related heating.

B. Responsibilities:

1. Provide temporary heat. Make arrangements and pay fuel costs, supervise, and maintain heating units. Provide adequate heat to all parts of the work.

2. Pay for repairing or replacing any portion of the work that becomes damaged because of lack of heat.

3. Provide temporary throwaway filters if, at any time, permanent system is used for temporary ventilation. Upon acceptance or occupancy of building(s) by OWNER, CONTRACTOR's responsibility for temporary heating as specified shall be in accordance with OWNER'S USE Article, this section.

2.03 TEMPORARY TELEPHONE SERVICE

A. Provide temporary telephone service in job construction office. Locate for CONTRACTOR's use for local and long distance calls.

B. CONTRACTOR shall pay for telephone service directly or be billed by OWNER.

2.04 WATER FOR CONSTRUCTION

A. Water for construction may be available on-site. Provide water of quality and quantity suitable for construction if on-site source is not adequate.

2.05 WATER FOR TESTING

A. Water is available on-site.

2.06 SANITARY FACILITIES

A. Provide temporary sanitary toilet facilities conforming to state and local health and sanitation regulations, in sufficient number for use of CONTRACTOR's employees.

B. Maintain in sanitary condition and properly supply with toilet paper.

C. Remove from site before final acceptance of Work.

D. Do not use existing sanitary facilities.

2.07 TEMPORARY FIRE PROTECTION

A. Provide and maintain in working order a minimum of one fire extinguisher on each floor of each building, and such other fire protective equipment and devices as would be reasonably effective and approved by site Health and Safety Manager.

2.08 TEMPORARY ACCESS ROADS

A. Provide and maintain temporary roadways necessary to carry out construction operations in clean, dust free, snow free, ice free, driveable condition.

B. Provide a gravel surface for temporary access roads subject to vehicle traffic to minimize dust generation.

2.09 DAMAGE TO EXISTING PROPERTY

A. Repair or replace damage to existing facilities, including but not limited to buildings, sidewalks, roads, landscaping, parking lot surfacing, and other existing assets.

B. OWNER will have option of contracting for such Work and deducting cost from Contract amount.

2.10 SECURITY

A. Security not provided by OWNER.

B. CONTRACTOR is responsible for loss or injury to persons or property where his Work is involved, and shall provide such security and take such precautionary measures as deemed necessary to protect CONTRACTOR’s and OWNER’s interests.

2.11 TEMPORARY PARKING

A. Parking on construction site is not allowed, unless designated or approved by OWNER.

B. Make arrangements for parking area for employee's vehicles, in locale designated by OWNER.

C. Costs involved in obtaining parking area shall be borne by CONTRACTOR.

2.12 TEMPORARY FENCING

A. Provide temporary fencing sufficient to control traffic into construction site.

B. Materials shall be sufficiently durable to be effective for duration of construction period.

C. Temporary fencing shall be 4 ft. high, high visibility polyethylene fencing with steel stakes at 8 ft. centers.

2.13 FIELD OFFICES AND BUILDINGS

A. Provide where directed by OWNER, and maintain in good condition, temporary field office and tool storage building(s) for CONTRACTOR's use.

1. Tool storage building(s) shall be of ample size to provide space for tools and equipment. Building(s) shall be neat and well constructed, surfaced with plywood, drop siding, masonite or other similar material, well painted, and void of advertisements.

B. Provide lunch area acceptable to OWNER for CONTRACTOR's personnel and Subcontractors.

2.14 TEMPORARY CONTAINMENT STRUCTURES

A. Provide impervious, lined containment structures where CONTRACTOR handles volatile or hazardous chemicals and agents and where directed by OWNER.

1. Size to contain 110% of liquid volume being handled, plus 6 in. for rainfall.

2. Maintain 1 ft. freeboard at design conditions.

3. Remove upon completion of Work.

4. Clean up and dispose of spillage.

2.15 TEMPORARY EROSION AND SEDIMENT CONTROLS

A. Comply with the OWNER’s Storm Water Pollution Prevention Plan (SWPPP) for the site. Exercise caution to minimize increase in suspended solids and turbidity in surface waters within and adjacent to construction area. Do not deposit soils in surface waters. Control and minimize sediment runoff and excavation erosion to surface waters.

B. Provide temporary controls as necessary to minimize the potential migration of sediments from CONTRCTOR’s work areas. Maintain controls in proper working condition.

C. Temporary controls may include; grading, temporary vegetation, hay bales, silt fencing, or rock check dams. Hay bales shall not be used to control sediments in drainage channels or ditch lines.

D. Maintain temporary controls to limit erosion of completed work until permanent controls are installed, or vegetation is established.

PART 3 EXECUTION

3.01 GENERAL

A. Comply with applicable requirements specified in Divisions 15 and 16.

B. Maintain and operate systems to ensure continuous service.

C. Modify and extend systems, as Work progress requires.

3.02 REMOVAL

A. Completely remove temporary materials and equipment when no longer required.

B. In unfinished areas, clean and repair damage caused by temporary installations or use of temporary facilities, restore drainage, and evenly grade, seed or plant as necessary to provide appearance equal to or better than original.

C. In finished areas, restore existing or permanent facilities used for temporary services to specified or to original condition.

* * * END OF SECTION * **

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Material and Equipment Incorporated into Work:

1. Conform to applicable specifications and standards. Comply with size, make, type, and quality specified or as specifically approved, in writing, by OWNER.

B. Manufactured and Fabricated Materials and Equipment:

1. Design, fabricate, and assemble in accordance with engineering and shop practices standard with industry.

2. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.

3. Two or more items of same kind shall be identical by the same manufacturer.

4. Material and equipment shall be suitable for service conditions.

5. Equipment capabilities, sizes, arid dimensions shown or specified shall be adhered to, unless variations are specifically approved, in writing.

6. Equipment shall be adapted to best economy in power consumption and maintenance. Parts and components shall be proportioned for stresses occurring during continuous or intermittent operation, and for any additional stresses occurring during fabrication or installation.

7. Design, so working parts are readily accessible for inspection and repair, easily duplicated and replaced.

C. Do not use material or equipment for any purpose other than for which it is designed or specified.

1.02 SUBSTITUTIONS

A. Substitutions:

1. CONTRACTOR's requests for changes in equipment and materials from those required by Contract Documents are considered "requests for substitutions" and subject to CONTRACTOR's representations and review provisions of Contract Documents when one of the following conditions are satisfied.

   a. Where request directly related to "or equal" clause or other language of same effect in Specifications.

b. Where required equipment or material cannot be provided within Contract Time, but not as a result of CONTRACTOR's failure to pursue Work promptly or coordinate various activities properly.

c. Where required equipment or material cannot be provided in a manner compatible with other materials of Work, or cannot be properly coordinated therewith.

2. CONTRACTOR'S Options:

a. Compatibility of Options: Where more than one choice is available as options for CONTRACTOR's selection of equipment or material, select option compatible with other equipment and materials already selected.

b. Standards, Codes, and Regulations: Where compliance with imposed standard, code or regulation is required, select from among products which comply with requirements of those standards, codes, and regulations.

c. "Or Equal": For material or equipment specified by naming one or more equipment manufacturer and "or equal", CONTRACTOR shall submit request for substitution for equipment or manufacturer not specifically named. Submit in accordance with these general requirements.

d. Two or More Manufacturers: For equipment or material specified by naming several manufacturers, select one of the manufacturers named. Do not provide or offer to provide unnamed manufacturer or equipment.

e. Single Manufacturer or Material: For equipment or material specified by naming only one manufacturer or material and followed by words indicating no substitution, there is no option.

B. Conditions which are not substitutions:

1. Requirements for substitutions do not apply to CONTRACTOR options on materials and equipment provided for in Specifications.

2. Revisions to Contract Documents, where requested by OWNER or ENGINEER, are "changes" not "substitutions."

3. CONTRACTOR's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute substitutions or basis for Change Orders, except as provided for in Contract Documents.

1.03 MANUFACTURER'S INSTRUCTIONS

A. Contract Documents require installation of equipment and materials to comply with manufacturer's instructions. Obtain and distribute printed copies of such instructions to parties involved in the installation, including 2 copies to OWNER.

1. Maintain one set of complete instructions at the job site during installation and until completion of Work.

B. Handle, install, connect, clean, condition, and adjust materials and equipment in accordance with manufacturer's written instructions and in conformity with Specifications.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult OWNER for further instructions.

2. Do not proceed with Work without written instructions.

1.04 TRANSPORTATION AND HANDLING

A. Arrange deliveries of materials and equipment in accordance with Construction Progress Schedule; coordinate deliveries to avoid conflict with other Work and conditions at the site.

1. Deliver materials and equipment in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Protect machined surfaces, such as shafts and valve faces, with a heavy coat of grease prior to shipment.

3. Immediately upon delivery, inspect shipments to ensure compliance with Contract Documents and approved submittals and that products have been protected and are undamaged.

B. Provide equipment and personnel to handle materials and equipment by methods recommended by manufacturer to prevent soiling or damage to materials, equipment or packaging.

1.05 STORAGE, PROTECTION, AND MAINTENANCE

A. On-site storage areas and buildings shall conform to requirements of Section 01500.

B. OWNER assumes no responsibility for materials and equipment stored in buildings or on-site. CONTRACTOR assumes full responsibility for damage due to storage of materials and equipment.

C. Interior Storage:

1. Store materials and equipment in accordance with manufacturer's instructions, with seals and labels intact and legible.

2. Store materials and equipment subject to damage by elements in weather tight enclosures.

3. Maintain temperature and humidity within ranges required by manufacturer's instructions.

D. Exterior Storage:

1. Exterior storage of all materials shall in be accordance with manufacturer's recommendations. Exterior storage shall not compromise any aspect of the manufacturer's or CONTRACTOR'S warranties.

2. Store fabricated materials and equipment above ground, on blocking or skids, to prevent soiling or staining. Cover materials and equipment subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

3. Store loose granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter. Materials such as pipe, reinforcing and structural steel, and equipment shall be stored on pallets or racks, off ground.

E. Inspection and Maintenance:

1. Arrange storage in manner providing easy access for inspection, maintenance, and inventory.

2. Make periodic inspections of stored materials and equipment to ensure materials and equipment are maintained under specified conditions and free from damage or deterioration, and coverings in-place and in condition to provide required protection.

3. Perform maintenance on stored material and equipment in accordance with manufacturer's written instructions and in presence of the OWNER.

   a. Notify OWNER 24 hours before performance of maintenance.

   b. Submit report of completed maintenance and condition of coverings to OWNER with each Application for Payment.

   c. Failure to perform maintenance, to notify ENGINEER of intent to perform maintenance or to submit maintenance report may result in rejection of material or equipment.

F. Assume responsibilities for protection of completed construction and repair and restore damage to completed Work equal to original condition.

G. Wheeling of loads over finished floors, with or without plank protection is not permitted in anything except rubber-tired wheelbarrows, buggies, trucks or dollies. This applies to finished floors and exposed concrete floors, as well as those covered with composition tile or other applied surfacing.

H. Where structural concrete has a finished surface, avoid marking or damaging surface.

1.06 INSTALLATION, INSTRUCTIONAL, AND POST STARTUP SERVICES

A. General:

1. This article covers on-site services of supplier's or manufacturer's representatives provided by CONTRACTOR during construction, equipment startup, and training of OWNER's personnel for equipment or plant operation as specifically required in Specification section for equipment or system.

2. Include and pay costs for supplier's or manufacturer's services, including, but not limited to, those specified.

B. Installation Services:

1. Where installation services are called for in the Specifications, provide competent and experienced technical representatives of manufacturers of equipment and systems to resolve assembly or installation procedures attributable to, or associated with, equipment furnished.

2. After equipment is installed, representatives shall perform initial equipment and system adjustment and calibration to conform to Specifications and manufacturer's requirements and instructions.

3. Provide "Certificate of Installation Services" stating proper adjustments have been made to equipment or system and equipment or system is ready for startup and operation. Use form attached to this Section and furnish 2 copies to OWNER.

C. Instructional Services:

1. Where training is called for in the Specifications, provide competent and experienced technical representative of supplier to provide detailed instructions to OWNER's personnel for operation of equipment. Training services shall include pre-startup and equipment startup, classroom, and on-site equipment instruction, as stated in Specifications.

2. Coordinate pre-startup training periods with OWNER and supplier's representatives.

   a. Notify OWNER at least 2 weeks before training sessions are to begin so OWNER can make arrangements with operating personnel.

   b. Reschedule cancelled training sessions 48 hours in advance.

3. Similar types of equipment differing in model, size or manufacturer shall require equal service time as stated in "Supplier's or Manufacturer's Services" in Part One of specific Specification section.

4. Complete pre-startup training 14 days prior to actual system startup.

5. O&M data shall constitute basis of instruction.

    a. Review data contents with personnel in full detail to explain aspects of operations and maintenance.

6. Provide "Certificate of Instructional Services," co-signed by OWNER and supplier's representative, verifying training accomplished to satisfaction of all parties. Use form attached to this Section and furnish 2 copies to OWNER.

D. Post Startup Services:

1. After equipment/system has been in operation for at least 6 months, but no longer than 11 months, each equipment manufacturer or authorized equipment representative shall make final inspection where so required in Specifications. Final inspection will provide assistance to OWNER's operating personnel in making adjustments or calibrations required to ensure equipment or system is operating in conformance with design, manufacturer, and Specifications.

2. Provide "Certificate of Post Startup Services," co-signed by OWNER and equipment representative, verifying this service has been performed. Use form attached to this Section and furnish 2 copies to ENGINEER.

1.07 SPECIAL TOOLS AND LUBRICATING EQUIPMENT

A. Furnish, in accordance with manufacturer's recommendations, special tools required for checking, testing, parts replacement, and maintenance. Special tools are those specially designed or adapted for use on parts of equipment and are not customarily or routinely carried by maintenance mechanics.

B. Deliver to OWNER when unit is placed into operation and after operating personnel has been properly instructed in operation, repair, and maintenance of equipment.

C. Tools and lubricating equipment shall be of quality compatible to equipment that the manufacturer has furnished.

1.08 LUBRICATION

A. Where lubrication is required for proper operation of equipment, incorporate necessary and proper provisions in equipment in accordance with manufacturer's requirements. Where possible, lubrication shall be automated and positive.

B. Where oil is used, reservoir shall be of sufficient capacity to supply unit for a 24 hour period.

1.09 GUARDS

A. Provide necessary guards to meet federal, state, and local requirements. Construct guards of expanded metal where possible.

CERTIFICATE OF INSTALLATION SERVICES
(REFERENCE SECTION 01600)

Project ____

Equipment ____

Specification Section ____

Contract ____

I hereby certify the equipment supplier/manufacturer has inspected this equipment and that it has been properly installed, adjusted, and calibrated. I further certify this equipment may now be operated for test purposes and/or normal use.

MANUFACTURER'S REPRESENTATIVE

Signature ____ Date ________________________

Name (print) ____

Title ____

Representing ____

CONTRACTOR

Signature ____ Date ________________________

Name (print) ____

Title ____

This form shall be completed and submitted to ENGINEER prior to training of OWNER'S personnel.

CERTIFICATE OF INSTRUCTIONAL SERVICES
(REFERENCE SECTION 01600)

Project ____

Equipment ____

Specification Section ____

Contract ____

I hereby certify that the equipment supplier/manufacturer has instructed OWNER'S personnel in the startup operation and maintenance of this equipment as required in the specifications.

CONTRACTOR

Signature ______________________________________ Date ____________________

Name (print) ____

Title ____

OWNER

I hereby certify that my operating personnel received _____ days instruction from __________________ for startup, operation, and maintenance of this equipment.

WARRANTY PERIOD COMMENCES ON ____
(Date)

Signature ______________________________________ Date ____________________

Name (print) ____

Title ____

Representing ____

COMMENTS:

CERTIFICATE OF POST STARTUP SERVICES
(REFERENCE SECTION 01600)

Project ____

Equipment ____

Specification Section ____

Contract ____

I hereby certify that the equipment supplier/manufacturer has inspected this equipment, made adjustments and calibrations, and that it is operating in conformance with the design, specification, and manufacturer's requirements. Notation of improper operation shall be detailed and recommendations made and attached to this form.

MANUFACTURER’S REPRESENTATIVE

Signature ______________________________ Date ______________

Name (print) ____

Title ____

Representing ____

CONTRACTOR

Signature ______________________________ Date ______________

Name (print) ____

Title ____

OWNER

I hereby certify that the equipment supplier/manufacturer has inspected this equipment and made adjustments and calibrations.

Signature ______________________________ Date ______________

Name (print) ____

Title ____

COMMENTS

This form shall be submitted to as required by the specifications OWNER upon completion of l-year re-inspection.

* * * END OF SECTION * * *

SECTION 01669
TESTING HDPE PIPING SYSTEMS

PART 1 GENERAL

1.01 PROJECT/SITE CONDITIONS

A. Pipelines shall be pressure tested in the presence of the Quality Assurance Consultant (QAC).

B. Furnish water, air supply, or other OWNER approved test medium required for testing and provide necessary piping connections between section of line being tested and nearest available source of water or air supply, together with test pressure equipment, meters, pressure gauge, and other equipment, materials, and facilities necessary to make specified tests.

C. Provide bulkheads, flanges, valves, bracing, blocking or temporary sectionalizing devices that may be required.

D. Remove temporary sectionalizing device after tests are complete.

PART 2 PRODUCTS

(Not: Applicable)

PART 3 EXECTION

3.01 GENERAL

A. Testing:

1. Perform low air pressure testing on Secondary Containment piping prior to installation of welded HDPE pipe sections.

2. Perform hydraulic testing on all HDPE force main and Primary Carrier pipe sections after installation.

B. Commence test procedures when the following conditions are met.

1. Pipe section to be tested shall be clean and free of dirt, sand or other foreign material.

   a. CONTRACTOR is responsible for collection, containment, and disposal of flushing water and debris.

2. Plug pipe outlets with test plugs. Brace each plug securely to prevent blowouts.

3. Add water or air slowly.

4. Pressurizing equipment shall include a regulator that is set to avoid over-pressurizing and damaging an otherwise acceptable line.

C. Pressure testing shall be in accordance with ASTM F2164 and/or manufacturer recommended procedures.

D. Cost of testing procedure including water, personnel, equipment, and materials shall be CONTRACTOR's responsibility.

E. Correct and re-test leaks or defects at no additional cost to the OWNER.

3.02 LOW PRESSURE AIR TESTING

A. General:

1. Perform air testing on all Secondary Containment piping after piping is butt fused together. Testing may be performed before placement in trench or after placement in trench, but before backfilling.

B. Preparation:

1. Isolate pipe section to be tested by plugging each end with airtight plugs. Plug ends of branches, laterals, and wyes, which are to be included in test section.

2. Brace plugs to prevent slippage and blowout due to internal pressure.

3. One plug shall have inlet tap or other provision for connecting supply air hose.

4. Connect one end of air hose to plug used for air inlet; other end to portable air control equipment.

5. Air control equipment shall consist of valves to control rate at which air flows into test section and gauges to monitor air pressure inside pipe. Air pressure gauges shall be capable of measuring air pressure to the nearest 1 psi or less.

6. Connect air hose between source of compressed air and control equipment.

C. Testing:

1. Pressurize test section to 10 psig.

2. Allow pressure to stabilize for 1 hour.

3. After 1 hour, re-pressurize test section to 10.

4. Record pressure at 15-minute intervals for 1 hour. Test section is acceptable for installation if less than 1 psig pressure drop is recorded over the entire hour, and there are no visible or audible signs of air leakage.

3.03 HYDROSTATIC PRESSURE TESTING

A. General:

1. Perform hydrostatic testing on all force main and primary carrier piping after piping is butt fused together and installed in place. Testing to be performed after placement in trench, but before backfilling.

B. Preparation:

1. Isolate pipe section to be tested by plugging each end with water tight plugs or blind flanges. Plug ends of branches, laterals, and wyes, which are to be included in test section.

2. Brace plugs to prevent slippage and blowout due to internal pressure.

3. One plug shall have inlet tap or other provision for connecting to water supply.

4. Connect one end of water supply pump to plug used for water inlet; other end to water supply.

5. Water supply pump shall consist of valves to control rate at which water flows into test section and gauges to monitor water pressure inside pipe. Water pressure gauges shall be capable of measuring pressure to the nearest 1 psi or less.

6. Connect water hose between source of clean water and water supply pump equipment.

C. Primary Testing Method (Pressure Drop Procedure):

1. Completely fill pipe line to be tested with fresh water or OWNER approved alternate, bleeding off all air from highest point.

2. Pressurize test section to 1.5 times the system operating pressure, or a minimum of 10-psi, and allow pressure to stabilize for 1 hour. During this stabilization period, sufficient liquid shall be added to maintain the test pressure.

3. Following stabilization period, monitor the test pressure for a minimum of 2 hours, checking and recording the pressure at each hourly interval. The test shall be considered complete after the second hourly interval. The test shall be considered successful if there is no visual evidence of leakage and there is no pressure loss during the second hourly interval.

4. At 1 hour intervals, the pressure will be checked and recorded by the Quality Assurance Consultant. If the pressure drops below the test pressure, the line shall be re-pressurized and the test re-started.

D. Alternate Testing Method (Volume Loss Procedure):

1. Completely fill pipe line to be tested with fresh water or OWNER approved alternate, bleeding off all air from highest point.

2. Pressurize test section to 1.5 times the system operating pressure, or a minimum of 10-psi, and allow pressure to stabilize for 1 hour. During this stabilization period, sufficient liquid shall be added to maintain the test pressure.

3. Following the stabilization period, maintain the test pressure by adding additional liquid at hourly intervals for 4 hours. The amount of liquid which is added, in any shall be measured and recorded each hour.

4. The amount of liquid added after the first hour of the test period, and if necessary, the cumulative amounts added after hours 2 and 3, shall be compared to the Expansion Allowance Criteria presented in Table 01669-1.

TABLE 01669-1
Allowances for Pipe Expansion Under Test Pressure
(Gallons per 100 feet of pipe)
Reference: Engineering & Technical Data S-26 – Recommended Testing Procedures for HDPE Pipe

Nominal Pipe Size (in.)	1-Hour Test Duration (gal/1 hour)	2-Hour Test Duration (gal/2 hour)	3-Hour Test Duration (gal/3 hour)
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.5
10	0.75	1.3	2.1
12	1.1	2.3	3.4

3.04 TEST REPORT

A. Prepare and submit a test report for each piping system tested. Include the following information in the test report.

1. Date of test.

2. Description and identification of piping system tested.

3. Type of test performed.

4. Test fluid.

5. Test pressure.

6. Type and location of leaks detected.

7. Corrective action taken to repair leaks.

8. Results of re-testing.

* * * END OF SECTION * * *

SECTION 01730
OPERATION AND MAINTENANCE (O&M) DATA

PART 1 GENERAL

1.01 DESCRIPTION

A. Compile equipment and product data and related information appropriate for OWNER's operation and maintenance for each item of equipment or product as specified in other sections of Specifications.

1.02 QUALITY ASSURANCE

A. Preparation of data shall be performed by personnel:

1. Trained and experienced in O&M of described products.
2. Familiar with requirements of this section.
3. Skilled as technical writer to extent required to communicate essential data.
4. Skilled as drafter competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

A. Prepare data in a form for use by the OWNER's personnel.

B. Format:

1. Size: 8-1/2 in. by 11 in., or 11 in. by 17 in. folded, with standard 3-hole punching.
2. Paper: 20-lb minimum, white, for typed pages.
3. Text: Manufacturer's printed data, or neatly typewritten.
4. Drawings:
    a. Bind in with text.
    b. Fold larger drawings and place in text page size envelopes bound into binder. Place identification on outside of each envelope.
5. Provide tabbed section dividers between each major section.
    a. Provide title of section on each divider.
    b. Provide tab index in Table of Contents.
6. Cover Label: Label each submittal cover with typed or printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and the following:

a. Project title.

b. Name(s) of applicable building(s) or structure(s) as shown on Drawings in which equipment located.

c. Name of equipment as set forth in Contract Documents.

d. Specification section number for equipment as set forth in Contract Documents.

7. Binders:

a. Bind each submittal into commercial quality binder with durable and cleanable plastic covers. Paperboard, laminated paperboard, and canvas covers not acceptable.

b. When multiple binders are used, contents shall be organized into related groupings and each binder cover shall bear identification of specific content.

1.04 GENERAL CONTENTS OF DATA

A. Each submittal shall contain equipment data pertaining to not more than one Specification section number indicated in Contract Documents.

B. Title Sheet: First page in data listing the following:

1. Title: "OPERATION AND MAINTENANCE INSTRUCTIONS.”

2. Title of Project: "RESIDUALS MANAGEMENT UNIT 2".

3. Name(s) of applicable building(s) or structure(s) as shown on Drawings in which equipment located.

4. Name of equipment as set forth in Contract Documents.

5. Specification section number for equipment as indicated in Contract Documents.

6. CONTRACTOR's name, address, and telephone number. Subcontractor's name, address, and telephone number if the equipment is provided by Subcontractor.

7. CONTRACTOR's or Subcontractor's purchase order number, manufacturer's shop order number or any other such numbers required for parts and service ordering.

8. Manufacturer's name, address, and telephone number.

9. Name, address, and telephone number for local source of supply for parts and service.

C. Product List: Immediately after title-sheet containing:

1. List of each product and major components, indexed to content of submittal, and identified by product name and model number as set forth by manufacturer and specification section and article number.

D. Table of Contents: Immediately following product list. Arrange in logical, systematic order and shall be a tab index at minimum. Provide each tabbed section with table of contents for section, arranged in systematic order.

E. Text:

1. Include only those sheets pertinent to specific project.

2. Annotate each sheet to:

a. Clearly identify specific product or part installed.

b. Clearly identify text applicable to product or part installed.

c. Delete inapplicable information.

F. Drawings:

1. Supplement text with drawings to clearly illustrate:

a. Product and components.

b. Relations of component parts of equipment and systems.

c. Control and flow diagrams.

2. Drawings to be actual drawings of equipment from manufacturer. "Typical" drawings are not acceptable, unless they accurately illustrate actual installation.

G. Specially written information, as required to supplement text for a particular installation:

1. Provide explanation of interrelationships of equipment and components, and effects one component has on another and/or entire system.

2. Provide overall instructions and procedures for equipment tying in instructions and procedures for separate components into unified instructional package.

3. Provide glossary of special terms used by manufacturer.

4. Organize in consistent format under separate headings for different procedures.

5. Provide logical sequence of instructions for each procedure.

H. Copy of each warranty, bond, or service contract issued:

1. Provide information sheet for OWNER's personnel to explain:

   a. Proper procedures in event of failure or malfunction to prevent voiding warranty.

   b. Instances affecting validity of warranties or bonds.

1.05 SPECIFIC CONTENT OF DATA FOR EQUIPMENT AND SYSTEMS

A. Specific content, for each unit of equipment and system, shall include:

1. Description of Unit and Component Parts:

   a. Function, normal operating characteristics, and limiting conditions.

   b. Performance curves, engineering data, and tests as applicable. Complete nomenclature and commercial number of replaceable parts. Complete nameplate data. P&ID numbers for equipment as set forth in Drawings.

2. Operating Procedures:

   a. Startup, break-in, and normal operating instructions.

   b. Regulation, control, stopping, shutdown, and emergency instructions.

   c. Summer and winter operating instructions, as applicable.

   d. Special operating instructions.

3. Maintenance Procedures:

   a. Routine maintenance operations.

   b. Guide to troubleshooting.

   c. Disassembly, repair, and re-assembly instructions.

   d. Alignment, adjusting, and checking instructions.

4. Servicing and Lubrication Schedule:

   a. List of lubricants required and quantity to be applied.

   b. Schedule of lubrication.

   c. Schedule for other routine maintenance.

5. Manufacturer's printed instructions regarding safety precautions and features.

6. Description of sequence of operation of controls.

7. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

    a. Predicted life of parts subject to wear.

    b. Items recommended to be stocked as spare parts and quantities of same.

8. As-approved control diagrams. These shall be ladder diagrams, instrumentation loop diagrams and electrical schematics as, appropriate.

9. Bill of material.

10. Completed Equipment Data Form typewritten on copy of Form 1 of this section.

11. Other data as required under pertinent sections of Specifications.

B. Specific content for each electric and electronic system, as applicable to equipment such as switch gear, motor control centers, panelboards, switchboards, starters, breakers, relays, shall include:

1. Description of System and Component Parts:

    a. Function, normal operating characteristics, and limiting conditions.

    b. Performance curves, engineering data, rating tables, and tests as applicable.

    c. Complete nomenclature and commercial number of replaceable parts.

    d. Complete nameplate data.

    e. P&ID numbers for equipment as set forth in Drawings.

2. Circuit Directories of Panelboards:

    a. Electrical service.

    b. Controls.

    c. Communications.

3. Complete instrumentation loop diagrams with tabulated listing of components in each control circuit or loop.

4. Operating Procedures:

    a. Routine and normal operating instructions.

    b. Sequences required.

    c. Special operating instructions.

5. Maintenance Procedures:

   a. Routine maintenance operations.

   b. Guide to troubleshooting.

   c. Disassembly, repair, and re-assembly instructions.

   d. Adjustment and checking instructions.

6. Manufacturer's printed safety instructions.

7. List of original manufacturer's spare parts and recommended quantities maintained in storage.

8. Other data as required under pertinent sections of Specifications.

C. Prepare and include additional data when needed for such data that becomes apparent during instruction of OWNER's personnel as requested by OWNER.

1.06 SUBMITTAL SCHEDULE

A. Submit four copies of complete operation and maintenance data, bound in covers bearing suitable identification, for review within 90 days after time CONTRACTOR receives approved Shop Drawings for equipment.

B. ENGINEER's review and acceptance of O&M data will be only for conformance with requirements of this section, for form of submittal and organization of data and completeness of information provided, but not for technical content or coordination between individual suppliers of equipment or system(s).

C. Review O&M submittal and complete Form 2, Contractor Submittal Form, attached to this section in its entirety indicating requirements of this section have been met before submitting to OWNER. OWNER will reject submittals without completed Form 2. Pages for all submittals shall be numbered.

D. OWNER will be sole judge of completeness of data.

E. Payments:

1. An amount equal to 5% of value of equipment item as shown on Schedule of Values will be retained from Progress Payments until copies of O&M data meeting Contract Documents have been received by OWNER for each item of equipment with approved Shop Drawings.

1.07 INSTRUCTION OF OWNER’S PERSONNEL

A. Comply with requirements of Section 01600.

FORM 1 TO SECTION 01730

EQUIPMENT DATA FORM

PROJECT NAME ____________________
CONTRACT NO. ____________________
CONTRACTOR ____________________
EQUIPMENT NO. ____________________ASSET NO.*____________________
DESCRIPTION ____________________MAINT. NO.*____________________
LOCATION ____________________
MANUFACTURER ____________________
PURCHASED FROM ____________________
VENDOR ORDER NO. ____________________PURCHASE $ ____________________
DATE OF PURCHASE ____________________
LOCAL SUPPLIER____________________
ADDRESS ____________________
PHONE NO. ____________________
MODEL NO. ____________________
NO. OF UNITS ____________SERIAL NOS.____________________

NAMEPLATE DATA

ELECTRIC MOTOR

MANUFACTURER____________________
TYPE [ ] AC [ ] DC
HORSEPOWER____________________
RPM ____________________
VOLTAGE ____________________
AMPERAGE ____________________
PHASE ____________________
FRAME ____________________

PUMP /HVAC UNIT

MANUFACTURER____________________
TYPE ____________________
SIZE ____________________
CAPACITY ____________________
PRESSURE ____________________
ROTATION ____________________
IMPELLER
SIZE ____________________
MATERIAL ____________________

DRIVE/REDUCER

MANUFACTURER____________________
TYPE ____ GEAR ____ V-BELT ____ CHAIN
____ VARIDRIVE
SERVICE FACTOR ____________________
RATIO ____________________

OTHER (I & C)

MANUFACTURER ____________________
TYPE ____________________
SIZE ____________________
CAPACITY ____________________
RANGE ____________________

*By Owner

EQUIPMENT DATA FORM
Maintenance Summary

EQUIPMENT NO. ______________________

ASSET NO.* __________________________

DESCRIPTION ________________________

MAINT NO.* __________________________

MAINTENANCE OPERATION:

List briefly each maintenance operation required and refer to specific information in Manufacturer's Manual, if applicable. Refer by symbol to Lubricant List" for Lubrication Operation.

FREQUENCY:

List required frequency of each maintenance operation.

*By Owner

EQUIPMENT DATA FORM
Lubricant/Recommended Spare Parts List

EQUIPMENT NO. ______________________________________ ASSET NO.*___________________
DESCRIPTION ____ MAINT. NO.*___________________

LUBRICANT LIST

REFERENCE SYMBOL	LUBRICANT TYPE (MILITARY STANDARD)	RECOMMENDED LUB. AND MANUFACTURER
List symbols in "maintenance operation" (Page 2).	List general lubricant type.	List specific lubricant name, viscosity, and manufacturer.

RECOMMENDED SPARE PARTS LIST

PART NO.**	DESCRIPTION	UNIT	QUANTITY	UNIT COST

ADDITIONAL DATA AND REMARKS
____
____

*By Owner
**Identify parts provided by this contract with two asterisks.
Note:
Attach additional sheets, if necessary, identify each sheet at top with equipment number and description.

FORM 2 TO SECTION 01730

CONTRACTOR SUBMITTAL FORM

TO:	______________________________ (ENGINEER)	DATE:	______________________________
	______________________________ (ADDRESS)		SPECIFICATION SECTION TITLE:
	______________________________ (CITY, STATE, ZIP)		SECTION NO. ___________________
	ATTN: ______________________		MANUFACTURER / VENDOR
FROM:	______________________________ (CONTRACTOR)		______________________________
	______________________________ (ADDRESS)		NO. OF COPIES SUBMITTED: _____ (TO ENGINEER)
	______________________________ (CITY, STATE, ZIP)		______________________________ (SIGNATURE OF CONTRACTOR)

GENTLEMEN:

We have checked the O&M manual submittal dated ____________________________, and have found it to be in accordance with the requirements of Specification Section 01730 as noted below.

<u>FORMAT</u>

Size: 8-1/2 x 11 or 11 x 17
Paper: 20-lb minimum
Text: Printed data/neatly typed
Drawings: Standard size bound in text; in text-size labeled envelopes
Tabbed Section Dividers
Cover Label:
- Title
- Project name
- Building/structure ID
- Equipment name
- Specification section

Binders: Plastic Cover

CONTRACTOR SUBMITTAL FORM

GENERAL CONTENTS

Provided	Not Applicable	Page No.	
______	______	______	One specification only
______	______	______	Title Page:
______	______	______	Title
______	______	______	Project title
______	______	______	Building/structure ID
______	______	______	Equipment name
______	______	______	Specification section number
______	______	______	Contract or ID
______	______	______	Subcontractor ID
______	______	______	Purchase order data
______	______	______	Manufacturer ID
______	______	______	Service/parts supplier ID
______	______	______	Product List
______	______	______	Table of Contents
______	______	______	Tabbed Sections:
______	______	______	Pertinent data sheets
______	______	______	Annotated as needed
______	______	______	Text
______	______	______	Pertinent to project
______	______	______	Annotated
______	______	______	Drawings:
______	______	______	Illustrate product and components
______	______	______	Control and flow diagrams
______	______	______	Special Information:
______	______	______	Interrelationships of equipment and components
______	______	______	Instructions and procedures provided
______	______	______	Instructions organized in consistent format
______	______	______	Instructions in logical sequence
______	______	______	Glossary
______	______	______	Warranty, Bond, Service Contract

SPECIFIC CONTENT (EQUIPMENT / SYSTEMS ONLY)

______	______	______	Description of Unit and Components:
______	______	______	Equipment functions
______	______	______	Normal operating characteristics
______	______	______	Limiting conditions

CONTRACTOR SUBMITTAL FORM

Provided	Not Applicable	Page No.	
______	______	______	Performance curves
______	______	______	Engineering data
______	______	______	Test data
______	______	______	Replaceable parts list (with numbers)
______	______	______	Nameplate data
______	______	______	P & ID numbers
______	______	______	Operating Procedures:
______	______	______	Startup
______	______	______	Routine / normal operation
______	______	______	Regulation and control
______	______	______	Stopping and shutdown
______	______	______	Emergency
______	______	______	Seasonal operation
______	______	______	Special instructions
______	______	______	Maintenance Procedures:
______	______	______	Routine/normal instructions
______	______	______	Troubleshooting guide
______	______	______	Disassembly / re-assembly / repair
______	______	______	Servicing and Lubrication:
______	______	______	List of lubricants
______	______	______	Lubrication schedule
______	______	______	Maintenance schedule
______	______	______	Safety Precautions / Features
______	______	______	Sequence of Operation of Controls
______	______	______	Assembly Drawings
______	______	______	Parts List and Illustrations:
______	______	______	Predicted life
______	______	______	Spare parts list
______	______	______	Control Diagrams / Schematics
______	______	______	Bill of Materials
______	______	______	Completed Equipment Data form per Specification
______	______	______	Other Data as Required

SPECIFIC CONTENT (ELECTRICAL AND ELECTRONIC EQUIPMENT ONLY)

Provided	Not Applicable	Page No.	
______	______	______	Description:
______	______	______	Equipment functions
______	______	______	Normal operating characteristics
______	______	______	Performance curves
______	______	______	Engineering data
______	______	______	Test data

CONTRACTOR SUBMITTAL FORM

Provided	Not Applicable	Page No.	
_______	_______	_______	Replaceable parts list (with numbers)
_______	_______	_______	Nameplate data
_______	_______	_______	P & ID numbers
_______	_______	_______	Panelboard Directories:
_______	_______	_______	Electrical
_______	_______	_______	Controls
_______	_______	_______	Communications
_______	_______	_______	Instrumentation Loops:
_______	_______	_______	Diagrams
_______	_______	_______	Components list each circuit / loop
_______	_______	_______	Maintenance Procedures:
_______	_______	_______	Routine/normal instructions
_______	_______	_______	Troubleshooting guide
_______	_______	_______	Disassembly / re-assembly
_______	_______	_______	Adjusting and checking
_______	_______	_______	Safety Precautions / Features
_______	_______	_______	Spare Parts List
_______	_______	_______	Additional Data

* * * END OF SECTION * * *

SECTION 01737
ELECTRICAL SYSTEM DEMONSTRATIONS

PART 1 GENERAL

1.01 DESCRIPTION

A. Demonstrate proper operation of electrical systems and equipment in presence of OWNER.

1.02 SUBMITTALS

A. Demonstration log.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.01 PERFORMANCE

A. Demonstrations:

1. Each piece of equipment.
2. Each integrated system.

B. Demonstration Log:

1. Keep log of individual demonstrations.
2. Data:
    a. Date and time of demonstration.
    b. OWNER's representative.
    c. Equipment or system demonstrated.
    d. Result of demonstration.
        1) Success or fail.
        2) If failure, description of failure.

3) Corrective action taken.

4) Redemonstration result.

* * * END OF SECTION * * *

SECTION 02100
SITE PREPARATION AND MAINTENANCE

PART 1 GENERAL

1.01 PROJECT/SITE CONDITIONS

A. Protect and maintain on-site and off-site roads against damage from equipment and vehicular traffic. Repair damage at no added cost to OWNER.

B. CONTRACTOR shall be responsible for the location and protection of existing utilities. CONTRACTOR shall repair any damage to existing utilities at no added cost to OWNER.

C. Conduct operations and maintain Project site so as to minimize creation and dispersion of dust.

D. Restore existing utilities, surface features, and structures to condition equal to or exceeding condition which existed prior to construction.

E. Remove obstructions such as mounds of dirt, stone or debris located within working limits at no extra cost to OWNER.

F. OWNER will provide on-site stockpile area for excavated soil.

G. CONTRACTOR shall review, understand, and agree to adhere to all requirements of OWNER'S Stormwater Pollution Prevention Plan (SWPPP) prior to commencing any site work.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Plan and construct erosion control measures as required for completion of work or as specified by OWNER.

B. Access and On-Site Roads:

1. Obtain necessary permission and prepare access and on-site roads as shown on Drawings and as follows.

    a. Grade, compact, prepare for specified working areas, and to accommodate equipment to be used on roads.

b. Gravel Surfacing: For access roads, crushed gravel or rock with adequate gradation and fines for compaction. Thickness shall be adequate for CONTRACTOR's operations.

c. Maintain access and on-site roads to provide positive drainage, dust control, mud control, and vehicle access. Repair damage such as washouts and excessive rutting promptly, at no additional cost to OWNER.

C. Material Staging Areas

1. Obtain permission and prepare material staging areas as follows.

a. Material staging areas shall be approved by OWNER prior to installation.

b. Material staging areas shall be built and operated in a manner that does not interfere with normal site operations , including maintenance of existing facilities

c. Upon completion of all activities that necessitated the material staging areas, all staging area materials shall be removed by CONTRACTOR for offsite disposal and the area shall be restored to its original condition or a condition deemed appropriate by OWNER.

3.02 SALVAGED TOPSOIL

A. Excavate and temporarily stockpile salvaged topsoil at on-site areas designated by OWNER.

B. Provide transportation of material and prepare site for stockpiles.

3.03 PROJECT CLOSEOUT

A. Repair access and on-site roads if damaged during work activities to condition equal to that at completion of site preparation. CONTRACTOR shall clean up debris and other site damage resulting from CONTRACTOR's activities.

B. Disconnect and remove temporary utilities and structures when no longer required.

C. Submit to OWNER, last utility meter readings or other information necessary relating to point where CONTRACTOR has been released of responsibility for payment of these services.

D. Complete recordkeeping and documentation and transmit to OWNER.

* * * END OF SECTION * * *

SECTION 02110
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for clearing, grubbing, and disposal of trees, stumps, brush, and other vegetation.

1.02 DEFINITIONS

A. Standard Specifications: "Standard Specifications for Construction and Materials," State of New York Department of Transportation.

1.03 REGULATORY REQUIREMENTS

A. Conform to all applicable codes for disposal of debris. No burning debris on-site.

B. Coordinate clearing work with identification of utilities.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.01 PERFORMANCE

A. No clearing, grubbing or stripping of surficial soil shall commence until the CONTRACTOR has staked out the proposed work, except for the work that may be required to complete the stakeout survey.

B. Except as otherwise directed, the CONTRACTOR shall cut, grub, and remove all objectionable material such as trees, stumps, stones, brush, shrubs, roots, rubbish and debris within the limits of the clearing as defined in the Drawings and as directed by the OWNER. All such materials shall be removed from areas to be occupied by structures, roads and pipelines and from areas designated for stripping. No stumps, trees, limbs or brush shall be buried in any areas not designated to receive such material.

C. Following removal, trees shall be chipped as appropriate and managed as determined by the OWNER. Logs too thick to chip or grind will either be removed from site by the CONTRACTOR or managed on-site as directed by the OWNER.

D. When so designated by the OWNER, the CONTRACTOR shall protect trees or groups of trees, monitoring wells or other site features from damage by any construction operation by erecting suitable barriers, or by other approved means. The CONTRACTOR shall make every effort not to damage common native trees or shrubs, other than those he is permitted to cut, within or adjacent to the limits of work. Areas outside the limits of clearing shall be protected. No equipment or materials shall be stored in or allowed to damage these areas.

* * * END OF SECTION * * *

SECTION 02210
EARTHWORKS

PART 1 GENERAL

1.01 DEFINITIONS

A. Standard Specifications: "Standard Specifications for Construction and Materials," New York State Department of Transportation (NYSDOT).

B. Liner Material: Clay liner material shall be used to construct secondary clay liner. Lines and grades of liner material are designated on Drawings.

C. Unsuitable Material: Topsoil, peat, organic soils, organic debris or soil with less than required bearing capacity as determined by the ENGINEER and/or SOIL QUALITY ASSURANCE CONSULTANT (Soil QAC).

D. Topsoil: Refer to Section 02910 for topsoil definition.

E. Granular Material: Stone used to construct primary and secondary leachate collection systems.

F. Operations Layer: Select fill used to protect liner system during cell operations.

G. General Fill: Soil fill, other than clay liner material and topsoil, used for remainder of site earth work, including final cover, facultative pond berm construction, and replacement of unsuitable material in subgrade preparation.

H. Structural Fill: General Fill to be used in the construction of MSE wall.

I. Underdrain Filter Type Stone: Stone used to bed final cover drainage tile.

J. Influence Zone Around Leachate Force Main or Electrical Conduits: Area below limits bounded by line 12 inches above pipe or duct and by one horizontal to two vertical slope extending outward from that line one foot beyond outer edge of pipe or duct.

K. Influence Zone Under Foundations, Pavements or Sidewalks: Area below foundation, pavement or sidewalk base bounded by one horizontal to two vertical slope extending outward from one foot beyond outer edges of foundation, pavement or sidewalk.

1.02 REFERENCES

A. ASTM D422 - Standard Method for Particle-Size Analysis of Soils.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.

C. ASTM D1140 – Standard Test Method for Amount of Material in Soils Finer Than No. 200 Sieve.

D. ASTM D1556 – Standard Test Method for Density of Soil In Place by the Sand Cone Method.

E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

F. ASTM D1587 - Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes.

G. ASTM D2166 - Standard Test Method for Unconfined Compressive Strength of Cohesive Soils.

H. ASTM D2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

I. ASTM D2434 - Test Method for Permeability of Granular Soils (Constant Head).

J. ASTM D2435 - Test Method for One-Dimensional Consolidation Properties of Soils Using Incremental Loading.

K. ASTM D2487 - Standard Test Method for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

L. ASTM D2850 - Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils.

M. ASTM D2974 - Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Materials.

N. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil Soil-Aggregate by Nuclear Methods (Shallow Depth).

O. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

P. ASTM D4643 - Standard Test Method for Determination of Water (Moisture Content of Soil by Microwave Oven Heating.

Q. ASTM D5084 - Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

R. ASTM D4767 - Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils.

1.03 SUBMITTALS

A. Fill Materials: Name and location of source, stockpile number, and latest test results and DOT approval (if any). Analytical data shall also be submitted for non-aggregate materials (to demonstrate material does not contain chemical constituents exceeding concentrations established by the NYSDEC).

B. Samples: Assist the Soils QAC in taking samples of materials for conformance testing in accordance with the QAM. The OWNER will perform conformance testing.

1.04 QUALITY ASSURANCE

A. Soils QAC will perform quality assurance testing in accordance with the QAM.

B. Grading Tolerances

1. Topsoil:

a. Grade to 4 to 6 in. below finished grade in areas to receive topsoil and seed. Areas to receive topsoil and seed are the RMU-2 final cover and other previously vegetated areas requiring restoration following construction.

2. Access Road:

a. Grade to 12 in. below finished grade under crushed stone access road. Maximum allowable variation from correct elevation is 1 in. in 10 ft. After crushed stone is placed and compacted, maximum allowable variation in cross-slope shall be 0.005 ft/ft. Maximum allowable variation from correct elevation longitudinally along road is 1 in. in 20 ft.

3. Landfill Base:

a. Soil and aggregate components of landfill base, including intercell berms and MSE wall, shall be maintained at correct elevations to prevent ponding on liners. Refer to Drawings for elevations and construction grades. Secondary clay liner shall be a minimum of three feet thick at surveyed locations.

4. Primary Sumps:

a. Maximum allowable variation from correct sump elevation at any location shall be ½ in.

C. Trenching Tolerances

1. Excavate so pipes, ducts, and conduits can be laid straight at uniform grade without sags or humps, between elevations shown on drawings.

2. Maximum width of bottom of trench shall be outside diameter of pipe plus 24 inches. Minimum width shall be outside diameter of pipe plus 12 inches.

3. Where trench width for that portion of trench depth between trench bottom and outside top of pipe, for any reason within CONTRACTOR'S control, exceeds specified limits, CONTRACTOR shall, at his expense, furnish pipe with strength adequate for actual trench width.

4. Maximum width at surface of ground shall not exceed width at top of Leachate transfer pipe or electrical conduit by more than two feet, unless approved by ENGINEER.

5. Excavate electrical conduit trenches as required so center of conduit shall be minimum of 24 inches below final grade.

6. Excavate sidewall riser trenches to tolerances and dimensions shown on drawings.

1.05 PROJECT/SITE CONDITIONS

A. Schedule rough grading with work of other Contractors.

B. Notify corporations, companies, individuals or authorities owning above or below ground conduits, wires, pipes or other utilities running to property or encountered during grading operations. Cap or remove and relocate services in accordance with instructions by owners of said services. Protect, support, and maintain conduits, wires, pipes or other utilities that are to remain in accordance with requirements of owners of said services.

C. Do not block or obstruct roads, streets or pavements with excavation materials, except as authorized by OWNER.

D. Whenever necessary to prevent caving during excavation and to protect adjacent structures, property, workers, and public: excavations shall be adequately sheeted, braced, and shored. Sheeting, shoring, and bracing shall conform to safety requirements of federal, state or local public agency having jurisdiction over such matters. Type, design, detail, and installation of shoring, sheeting, and bracing shall be determined by and the sole responsibility of the CONTRACTOR.

E. Install and maintain erosion and sedimentation controls as prescribed in the RMU-2 Stormwater Pollution Prevention Plan (SWPPP; to be prepared by OWNER and provided to CONTRACTOR).

PART 2 PRODUCTS

2.01 CLAY LINER MATERIAL

A. OWNER may direct use of clay borrow from a designated off-site source or existing on-site borrow source(s). OWNER will make information available to CONTRACTOR for the indicated borrow sources.

B. For CONTRACTOR provided borrow sources, material must be pre-qualified by Quality Assurance Consultant and approved by the OWNER.

C. Clay liner material shall be free of roots, woody vegetation, other deleterious material, and rocks greater than 1-in. diameter at surface grade.

D. Material used for liner shall meet following requirements.

1. Classified as ML, MH, CL, or CH by ASTM D2487.

2. Minimum plasticity index of 10 or greater.

3. Re-compacted permeability less than 1 x 10^{-7} cm/sec.

4. Organic Content: less than 3%.

5. Maximum Particle Size: 1/3 the depth of a loose lift, except for final 4 in. adjacent to HDPE geomembrane. The final 4 in. of prepared clay liner (i.e., adjacent to HDPE membrane) shall have a maximum particle size no greater than 1 in.

6. Material shall have a minimum internal friction angle of 25º. The OWNER shall perform the direct shear test on proposed materials sources in accordance with ASTM D3080. The test specimen shall be molded at 90% of maximum density with normal stresses of 5, 10, and 15 psi.

E. Material testing will be performed continuously by the OWNER throughout Project and used to control placement.

2.02 GRANULAR LAYER MATERIAL

A. Granular layer material for leachate collection systems shall be Type 1A coarse aggregate in accordance with Section 703-02 of the NYSDOT "Standard Specifications", with the following modified gradation:

SCREEN SIZE	PERCENT PASSING (by weight)
0.5 in.	100
0.25 in.	90 - 100
0.125 in	0 - 15
No. 200	0 - 1

B. Permeability: 8.0 x 10^{-2} cm/sec or greater.

C. The OWNER will pre-qualify granular materials in accordance with QAM.

2.03 SELECT FILL (OPERATIONS LAYER)

A. Select fill for operations layer shall be Type 2 subbase material in accordance with Section 733-04 of the NYSDOT “Standard Specifications.”

B. Gradation for select fill for operations layer shall be as follows, unless otherwise approved by OWNER:

SIEVE SIZE	PERCENT PASSING (by weight)
2 in.	100
0.25 in.	25 - 60
No.40	5 - 40
No.200	0 - 10

C. Select fill shall be laboratory tested for shear strength to demonstrate equivalency to a minimum internal friction angle of 34 degrees. Acceptable material shall exhibit the following minimum shear strengths (inclusive of both cohesion and friction) at the indicated normal stresses:

NORMAL STRESS (psf)	MIN. REQ. SHEAR STRENGTH (psf)
100	67
250	169
500	337
1,000	675

2.04 GENERAL FILL

A. General fill shall consist of material taken from approved on-site or off-site excavations or stockpiles.

B. General fill material shall be well-graded granular or cohesive material and free of organics, topsoil, waste, frozen material or other deleterious matter. General fill to be used to replace unsuitable material in the subbase below clay liner shall not be granular.

C. General fill to be used in final cover construction (including above and below final cover geosynthetics) may be either granular or cohesive. If cohesive, general fill shall have a plastic limit of 5 or greater (ASTM D4318). One test shall be performed on each general fill source during each construction season. Material that does not meet these requirements shall be evaluated by the ENGINEER for other possible uses.

D. General fill material to be used for final cover construction (including above and below final cover geosynthetics) shall be laboratory tested for shear strength. Acceptable material shall exhibit the following minimum shear strengths (inclusive of both cohesion and friction) at the indicated normal stresses:

NORMAL STRESS (psf)	MIN. REQ. SHEAR STRENGTH (psf)
100	50
250	125
500	250
1,000	492

E. Acceptable permeability for general fill material to be used for final cover construction and placed above final cover geosynthetics is $1x10^{-5}$ cm/s or lower.

2.05 FILTER STONE

A. Filter Stone shall be granular material meeting the requirements of Section 733-20 of the NYSDOT "Standard Specifications" for Underdrain Filter Type I with the following gradation:

SIEVE SIZE	PERCENT PASSING (by weight)
1 in.	100
½ in.	30 - 100
¼ in.	0 - 30
No. 10	0 - 10
No. 20	0 - 5

2.06 SAND BEDDING MATERIAL

A. Sand bedding to be used under leachate forcemains and electrical conduits to be 6 in. minimum. Backfill with sand above forcemains and conduits to be 12 in. minimum.

B. Sand bedding material shall be Cushion Sand meeting requirements of Section 703-06 of the NYSDOT "Standard Specifications" with the follow graduation:

SIEVE SIZE	PERCENT PASSING (by weight)
1/4 in.	100
No. 50	0 - 35
No. 100	0 - 10

C. As directed by the ENGINEER, a minimum of 5% by weight sodium powdered bentonite, American Colloid or equal, may be added, with the following requirements:

1. Uniform gradation: 200-mesh diameter.

2. Pure bentonite with no additives: 90% sodium-montmorillonite.

3. Free Swell: High-swelling with minimum 16 cubic centimeters per 2 grams.

2.07 STRUCTURAL FILL (GENERAL FILL FOR MSE WALL CONSTRUCTION)

A. Structural fill shall consist of general fill material taken from approved on-site or off-site excavations or stockpiles and meeting the additional strength requirements presented below.

B. Structural fill material shall be well-graded granular or cohesive material and free of organics, topsoil, waste, frozen material, or other deleterious matter, and be free of particles greater in size and angularity that formed the basis of selecting the geogrid long-term design tensile strength.

C. Structural fill material shall be laboratory tested for shear strength (ASTM D4767) under both drained and undrained conditions. Acceptable material shall exhibit the minimum shear strengths (inclusive of both cohesion and friction) summarized below:

1. Consolidated-drained shear strength testing shall demonstrate the equivalent of a failure envelop defined by a cohesion of 195 psf and a friction angle of 28.7 degrees by achieving the following values:

NORMAL STRESS (psf)	MIN. REQ. SHEAR STRENGTH (psf)
500	469
1,000	742
2,000	1,290
4,000	2,385

2. Consolidated-undrained shear strength testing shall demonstrate the equivalent of a failure envelop defined by a cohesion of 2,000 psf and a friction angle of 0 degrees by achieving the following values:

NORMAL STRESS (psf)	MIN. REQ. SHEAR STRENGTH (psf)
500	2,000
1,000	2,000
2,000	2,000
4,000	2,000

3. In the event that non-cohesive soils are used for structural fill, the requirement for undrained shear strength testing is waived.

2.08 COMPACTED CLAY BACKFILL (FOR TRENCHES)

A. Soils classified as CL or CH in the Unified Soil Classification System.

2.09 SUMP BACKFILL MATERIAL

A. Sump Backfill Material shall be granular material meeting the requirements of Section 703-02 of the NYSDOT “Standard Specifications” for Type 3A Course Aggregate with the following gradation:

SIEVE SIZE	PERCENT PASSING (by weight)
2 in.	100
1.5 in.	90 - 100
1 in.	0 - 15

B. Permeability: 4.0×10^{-1} cm/sec or greater.

PART 3 EXECUTION

3.01 DEWATERING:

A. CONTRACTOR is responsible for choosing methods of groundwater and surface water control.

B. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

C. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

D. Remove soil disturbed by pressure or flow of groundwater and repair as approved by ENGINEER.

E. Protect adjacent utilities, structures, and properties from damage resulting from dewatering operations.

3.02 PREPARATION

A. CONTRACTOR shall notify corporations, companies, individuals or authorities owning above or below ground conduits, wires, pipes or other utilities running to property or encountered during excavation activities.

B. Cap or remove and relocate services in accordance with instructions by owners of all services.

C. Protect, support and maintain conduits, wires, pipes or other utilities that are to remain in accordance with requirements of owners of said services.

D. Prior to and during all excavation and soil disturbance activities, CONTRACTOR shall comply with all requirements of the Project Specific Site Soil Monitoring and Management Plan, as directed by OWNER.

3.03 EXCAVATION

A. The possibility exists during excavation to encounter localized sand lenses. Sand lenses may be under confined water pressure and cause localized heaving or water intrusion. CONTRACTOR shall be responsible for water intrusion control and excavation of water saturated sand lenses, or other unsuitable materials to provide a firm subgrade.

B. Excavate to lines and grades as shown on the drawings, and as necessary to complete the work. Do not excavate within influence zone of existing utilities, footings or foundations, without prior approval of OWNER.

C. Do not excavate for other structures until scheduled for construction.

D. Protect excavated areas from freezing and water damage.

E. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).

   1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

F. Footings and Foundations: Trim bottoms to required lines and elevations. Excavate to final elevations by hand just prior to concrete placement when concrete is to bear on undisturbed soil.

   1. Stepping Footings: Cut sloping surfaces under footings, foundations, steps, and where required for other Work as indicated.

2. Pile Foundations: Stop excavations 6 to 12 in. above the bottom of pile cap elevation before the piles are placed. After pile installation, remove loose and displaced material and excavate to final grade, leaving a solid base to receive concrete pile caps.

3. Where footings and other Work requiring similar soil support will rest entirely on rock, remove loose soil and loose rock and place concrete to the required elevations. Where footings and other Work requiring similar soil support will rest partially on rock and partially on soil, immediately notify the ENGINEER before any backfilling or concrete placement occurs; the ENGINEER will determine the correct foundation treatment for the Work.

G. Pipe Trenches: Open only enough trench length to facilitate laying pipe sections. Unless otherwise indicated on the Drawings, excavate trenches approximately 24 in. wide plus the outside pipe diameter, equally divided on each side of pipe centerline. Cut trenches to cross section, elevation, profile, line, and grade indicated. Accurately grade and shape trench bottom for uniform bearing of pipe in undisturbed earth. Excavate at bell and coupling joints to allow ample room for proper pipe connections. Excavate so pipes and/or conduits can be laid straight at uniform grade without sags or humps.

H. Open Ditches: Cut ditches to cross sections and grades indicated.

I. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the ENGINEER.

1. Unauthorized excavations under structural Work such as footings, foundation bases, and retaining walls shall be reported immediately to the ENGINEER before any concrete or backfilling Work commences.

J. Notify the ENGINEER upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Upon completion of excavation, the Soils QAC will document grades before CONTRACTOR proceeds with further work.

K. Removal of Unsuitable Material beneath Structures and Other Improvements: Excavate encountered unsuitable materials, which extend below required elevations, to additional depth as directed by the ENGINEER. The Soils QAC will survey cross sections to determine the quantity of such excavation. Do not backfill this excavation prior to quantity measurement. Proof-rolling may be used to augment inspection/verification of suspect areas.

L. Excavate electrical conduit trenches as required so center of conduit shall be a minimum of 24 inches below final grade.

3.04 SUBGRADE PREPARATION

A. Fill settled areas where excavations or trenches were backfilled and holes made by demolition, tree removal, and site preparation work.

B. Natural soils or compacted fill softened by frost, flooding or weather shall be removed and replaced or compacted as required by the Soils QAC.

C. Subgrade preparation:

1. If CONTRACTOR and Soil QAC do not agree on qualitatively defined excessive pumping or displacement, scarify top 6 to 8 in. of natural subgrade and compact to 90% of Modified Proctor density.

2. Remove and replace soft or loose zones with sufficient thickness of compacted general fill. Thickness of replacement layer shall be as required to support heavy equipment and trucks without excessive pumping or displacement. If thickness of replacement layer is not sufficient to prevent pumping of base, material shall be removed and replaced with thicker layer at no additional cost to OWNER.

3. Replacement layer shall not be granular general fill.

4. Non-woven, heat-bonded geotextile or a geogrid may be used concurrent with removal and replacement efforts to stabilize soft or loose zones of the subgrade. ENGINEER will identify specific material and/or minimum performance criteria.

5. Provided the cutoff wall along the entire length of the cell boundary and the adjoining 25 feet of the adjacent cell(s), as measured from the centerline of the cell separation berm, is keyed into the Glaciolacustrine Clay layer (refer to Article 3.04.D of this section), only final proof rolling of the cell subgrade and approval from the NYSDEC and QAC are required to demonstrate that the cell subgrade has met the required 1×10^{-5} cm/sec permeability.

6. If the cutoff wall cannot be keyed into the Glaciolacustrine Clay (refer to Article 3.04.D of this section), areas of the cell subgrade suspected of having a permeability greater than 1×10^{-5} cm/sec shall be removed to a depth of 2 ft below original cell subgrade design elevation and replaced with general fill having a maximum permeability of 1×10^{-5} cm/sec.

7. The final cell subgrade shall be as described in Article 3.05.C of this section.

D. Cutoff Wall

1. The cutoff wall shall be keyed (vertical depth) into the Glaciolacustrine Clay a minimum of 1 ft. The minimum width of the cutoff wall key shall be 3 ft.

E. Sump Protection:

1. Prior to construction, safety factor against uplift failure (blowout) of sumps shall be verified in field.

2. Safety factor can be measured in one of the following ways.

   a. Excavate test pits outside landfill limits, but close to each proposed sump. Excavate to elevation below proposed sump elevation and inspect integrity of bottom of test pit. Submit results to ENGINEER for approval to proceed.

b. Utilize existing wells and piezometers, or install new piezometers to measure potentiometric surface of uppermost aquifer and calculate safety factor. Submit results to ENGINEER for approval to proceed.

c. Other methods may be submitted to ENGINEER for consideration and may be acceptable.

3. Sumps shall be backfilled with re-compacted clay as soon as sump excavation is complete and grades documented to prevent sump blowout due to changes in potentiometric surface. CONTRACTOR responsible for additional costs resulting from blowout of sump left open for more than 8 hrs.

3.05 PLACING FILL

A. Test plots will be performed for clay liner and final cover general fill materials to determine construction techniques and soil properties necessary to achieve the specified in-place performance requirements.

B. Place fill in accordance with conditions of QAM.

C. Subgrade Preparation for Clay Liner Placement

1. Initial lift of secondary clay liner shall be placed on subgrade that has been prepared to repair desiccation cracking and allow a 1 to 2 in. intermixing of the clay liner material with the subgrade soils.

2. The Soils QAC shall survey subgrade areas following excavation and prior to subgrade desiccation crack repairs.

3. When desiccation cracks are less than 2 in. deep, as measured by a blunt wood No. 2 pencil, the surface of the subgrade shall be wetted sufficiently to soften the subgrade soil for a depth of 1 in.; or, the surface shall be roughened by dozer tracking and blading to create a 1 to 2 in. loose soil layer. The clay liner will be placed on this softened or loosened layer.

4. When desiccation cracks are 2 to 6 in. deep, as measured by a blunt wood No. 2 pencil, the surface of the subgrade shall be wetted sufficiently to create a thin paste-like layer. This paste-like layer shall be back-bladed to smear the paste-like soil across the cracks to partially fill them. Where desiccation cracks measuring 2 to 6 in. deep exist in discrete areas, cracks may be filled in with granular bentonite to the discretion of the Soils QAC. Visual surface inspection after back-blading will approve the effort. The Soils QAC will document the activities, no measurements or tests are required.

5. When desiccation cracks exceed 6 in. deep, as measured by a blunt wood No. 2 pencil, the procedure described for cracks 2 to 6 in. deep may be attempted. The Soils QAC will investigate an area after back-blading by shallow hand excavation to

verify the cracks are substantially filled. Visual inspection with NYSDEC present is all that is needed for approval to place initial lift of secondary clay liner.

D. Clay Liner

1. Lift thickness shall not exceed 9 in. prior to compaction for all lifts, unless otherwise modified by the clay liner test plot results. The acceptability of greater pre-compaction lift thicknesses shall be determined by the ability of compaction equipment to achieve minimum 90% Modified Proctor density or greater throughout entire lift to meet permeability requirements with maximum of 20 passes. Compaction equipment shall be equivalent to equipment used for test pad construction.

2. Remove boulders, rocks, and cobbles exceeding maximum allowable size for respective lift. All removed material will be discarded away from working area.

3. Maintain clay liner surface in condition suitable for geomembrane installation until surface is covered. Clay liner surface shall be free of angular rocks.

4. CONTRACTOR to provide minimum of 3 ft. of secondary clay in all locations, however, maximum variation in remaining liner layer is 0.1 ft. per layer. CONTRACTOR responsible for meeting these requirements at his expense.

5. Scarify sealed lifts prior to next lift placement.

6. Placement of clay liner may occur below 32°F with the Soil QAC's approval, provided frozen soil is not placed. Frozen clay material shall be removed before additional clay lifts are placed. Additional requirements for desiccation due to warm weather construction are included in Quality Assurance Manual. Placement under these conditions does not relieve CONTRACTOR from achieving Specification requirements.

7. First lift testing of the secondary clay liner is modified as follows:

   a. Compaction testing shall be performed with a 4 in. probe depth to limit the influence of the subgrade soils.

   b. Undisturbed samples taken from the first lift shall be field marked by Soil QAC, based on recover length, to prevent permeability testing of clay liner material that has intermixed with subgrade material.

   c. If initial permeability test fails and subsequent re-testing fails, and it can be shown that the subgrade material is the cause of the failures; the NYSDEC will not require the lift to be removed.

E. Granular Layer Material

1. Place granular layer material in a manner that will not create folds in underlying geosynthetics. Walk out bumps and/or wrinkles in geosynthetics that could potentially fold over as granular material is placed.

2. Folds or creases in geosynthetics that cannot be walked out shall be cut out, patched, and tested in accordance with the appropriate specification.

3. A minimum of 36 in. of material shall be used to cover and protect underlying geosynthetics within the travel footprint of temporary haul routes for rubber-tire equipment (e.g., dump trucks, loader).

4. A minimum of 12 in. of material shall be used to cover and protect underlying geosynthetics where operation of low-ground pressure equipment will occur.

F. Select Fill

1. Operations Layer: Place material carefully to avoid damage to the primary leachate collection system and primary liner.

2. A minimum of 36 in. of material shall be used to cover and protect underlying geosynthetics within the travel footprint of temporary haul routes for rubber-tire equipment (e.g., dump trucks, loader). Where underlain by 12 in. of granular layer material, the minimum thickness of select fill shall be reduced to 24 in. to allow for similar equipment use.

3. Operations layer placement shall be performed under constant supervision of the Soil QAC.

G. General Fill

1. Shall not be placed above topsoil.

2. Lift thickness shall generally not exceed 12 in. prior to compaction. General fill compaction shall be specified by the ENGINEER on a case-by-case basis depending on application.

3. General fill material to be placed beneath final cover geosynthetics shall be placed in a 6-inch-thick lift (post compaction). Compaction assessment shall be performed via proof rolling.

4. General fill material to be placed above final cover geosynthetics shall be installed in a single 18-in.-thick minimum lift (post compaction) to protect the underlying geosynthetics.

5. Compaction requirement for the general fill layer above final cover geosynthetics shall be determined based on laboratory remolded permeability testing and test plot results. Required compaction is that which is determined necessary to achieve maximum allowable permeability. Compaction equipment shall be equivalent to equipment used for test plot construction.

6. Achievement of maximum allowable permeability for the general fill layer above final cover geoysnthetics shall be assessed as follows:

   a. In-place density measurements performed at a frequency of nine tests per acre. The measured dry density must equal or exceed the minimum required compaction determined from the test pad.

   b. Undisturbed samples collected from the constructed layer at a frequency of 4 tests per acre and submitted for laboratory permeability testing (ASTM D5084). The tests shall be performed with a confining pressure of 1 psi, which is approximately equal to the soil pressure experienced mid-depth in the general fill layer.

H. Structural Fill

1. Refer to Section 02450 – Mechanically Stabilized Earth (MSE) Wall of the Technical Specifications for placement, compaction, and testing requirements pertaining to structural fill.

I. Additional requirements for placing fill to support structures

1. Place fill within the entire area enclosed by a line 10 ft. outside the perimeter of the structure to be constructed as follows:

   a. Strip the area in accordance with the requirements for Surface Preparation of Fill Areas.

   b. Compact the stripped surface and verify subgrade compaction by proof-rolling.

   c. Place fill in horizontal layers not exceeding 8 in. prior to compaction and compact layers as specified.

2. Obtain written approval of fill area compaction before excavating for footing.

3. Excavate for footing width plus 1 ft. on each side.

4. Excavate 1 ft. below footing elevations where bottom of footings are 2 ft. or less above or 4 ft. or less below original ground surface.

   a. Compact footing bottom and place a 1 ft. bed of select fill. Compact in 6 in. layers to 95% Modified Proctor.

   b. Omit excavation and select fill below bottom of footings where footing elevations are more than 2 ft. above or more than 4 ft. below original ground surface.

J. BACKFILLING TRENCHES

1. Notify ENGINEER before placing backfill material.

2. Do not use frozen material or place fill on frozen subgrade. It is acceptable to place fill on frozen subgrade in the anchor trench where removal of frozen surface may damage the geomembrane liner system. For temporary stormwater diversion berms during construction, fill can be placed when temperatures are below 25 degrees Fahrenheit.

3. Compact each lift of sand bedding with hand held vibratory compactor in maximum lift thicknesses of 6 inches. If powdered bentonite is added to the sand, compact using hand tamping equipment instead of vibratory equipment.

4. Where pipes or electrical ducts must cross, ducts shall be a higher elevation and shall be separated from underlying pipes or ducts by a minimum of 6 inches.

5. Where pipes or electrical ducts leave structures, protect by backfilling pipe or duct influence zone down to undisturbed soil with compacted clay backfill.

6. Do not backfill until new concrete has properly cured.

7. Place warning tape, if required, in accordance with Section 15060.

K. BACKFILLING FOUNDATIONS

1. Do not use frozen material or place on frozen subgrade.

2. Fill excavations below foundations within influence zone with structural fill.

3. To minimize lateral forces against structures due to wedging action of soil, begin compaction of each lift at structure wall.

4. Thickness and Compaction: Place and compact fill materials in maximum lift thickness and to minimum densities as follows:

Location	Lift Thickness (inches)	Modified Proctor (%)
Footing, Foundation Slab or Floor Slab Influence Zone	8	95
Sidewalk, Paving, Piping or Electrical Ducts Influence Zones	12	90
Lawn and Landscape Areas	12	80

3.06 FIELD QUALITY CONTROL

A. The Soils QAC shall perform testing in accordance with QAM.

B. Moisture content of clay liner material and final cover general fill layer: Control the moisture of fill materials in order to achieve the desired compaction results. Moisture content is subject to modification by the ENGINEER after review of soils results.

C. Operations on earthwork shall be suspended at any time satisfactory results cannot be obtained due to field conditions.

D. Wetting or drying of clay liner and general fill material to meet compaction requirements shall be CONTRACTOR'S responsibility. Achieve acceptable moisture contents by blading, discing, harrowing, or other methods to dry material.

E. Assist OWNER in obtaining soil samples and soil testing. Fill placement shall be scheduled to facilitate testing. No additional fill material shall be placed until the Soils QAC approves in-place fill.

1. Maintain control of loose lift thickness with grade stakes or comparable method. When grade stakes are used, they shall be removed prior to subsequent lift placement, excluding the secondary clay layer. For the secondary clay layer, the Soils QAC will visually ensure that there will be no contamination of any secondary soil lift by the grade stakes. Grade stakes must be removed from loose soil lift prior to compaction.

3.07 ADJUSTMENT AND CLEANING

A. Place excavated material not suitable for backfilling or site grading and unsuitable materials in designated spoil areas and grade to drain.

B. Stockpile excavated material suitable for backfill in OWNER designated areas. CONTRACTOR shall not stockpile materials where trenches for sewers, water lines or other utilities will be located.

3.08 EROSION AND SEDIMENT CONTROLS

A. OWNER will prepare the RMU-2 SWPPP. The RMU-2 SWPPP will generally direct the location and type of various erosion and sediment controls necessary to minimize the potential for damage to constructed soil surfaces by water erosion and associated loss of soil. The RMU-2 SWPPP will identify controls to be used for both cell and final cover system construction.

B. CONTRACTOR shall review, understand, and agree to abide by all requirements contained in the RMU-2 SWPPP.

C. CONTRACTOR shall furnish, install, and maintain all erosion and sediment controls prescribed in the RMU-2 SWPPP, to be prepared by the OWNER and provided to the CONTRACTOR.

D. CONTRACTOR may be required to furnish, install, and maintain additional erosion and sediment controls in the event those specified in the RMU-2 SWPPP do not adequately achieve the erosion and sediment control objectives. This determination may be made by either OWNER, ENGINEER, or CONTRACTOR. Any changes to the controls specified in the RMU-2 SWPPP must be approved by OWNER and ENGINEER prior to implementation.

* * * END OF SECTION * * *

SECTION 02401
POLYETHYLENE GEOMEMBRANE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide 40 mil textured high-density polyethylene geomembrane for the landfill final cover system and 80 mil textured high-density polyethylene geomembrane for the base liner systems.

1.02 REFERENCES

A. ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

B. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.

C. ASTM D1238 - Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastomer.

D. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.

E. ASTM D1603 - Standard Test Method for Carbon Black Content in Olefin Plastics.

F. ASTM D3895 - Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry.

G. ASTM D4437 - Standard Practice for Non-Destructive Testing (NDT) for Determining the Integrity of Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

H. ASTM D4833 - Standard Test Method of Index Puncture Resistance of Geomembranes and Related Products.

I. ASTM D5321 - Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.

Modifications:

1. Perform interface shear testing of geomembrane with materials which will be installed above and below the geomembrane (i.e., geocomposite/80 mil textured geomembrane, 80-mil textured geomembrane/geosynthetic clay liner, 80-mil textured geomembrane/compacted clay liner, geocomposite/40-mil textured geomembrane, and 40-mil textured geomembrane/geosynthetic clay liner).

2. Normal loads: 100, 250, 500 and 1,000 psf for geomembrane in the cover system and 100, 250, 500, 1,000, 2,500, 5,000, 10,000 and 15,000 psf for geomembrane in the liner system.

J. ASTM D5397 - Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.

K. ASTM D5596 - Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.

L. ASTM D5641 - Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.

M. ASTM D5820 - Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.

N. ASTM D5721 - Standard Practice for Air-Oven Aging of Polyolefin Geomembranes.

O. ASTM D5885 - Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry.

P. ASTM D5994 - Standard Test Method for Measuring Core Thickness of Textured Geomembrane.

Modifications:

1. Measure thickness at 1 ft. intervals across roll width.

2. Report individual measurements, average, and standard deviation.

Q. ASTM D6392 - Standard Test Method for Determining the Integrity of Non-reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

Modifications:

1. For peel adhesion, seam separation shall not extend more than 25% of seam width into seam.

R. ASTM D6693 (Type IV) - Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.

S. ASTM D7466 - Standard Test Method for Measuring the Asperity Height of Textured Geomembrane.

T. GRI GM10 - Specification for the Stress Crack Resistance of Geomembrane Sheet.

U. GRI GM11 - Accelerated Weathering of Geomembranes Using a Fluorescent UVA-Condensation Exposure Device.

V. GRI GM13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.

W. GRI GM19 - Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

Note: The most current version of the specified test methods indicated above should be followed by the GEOSYNTHETICS MANUFACTURER, GEOSYNTHETICS INSTALLER, or authorized testing laboratory. In the event that a new test method becomes available and is deemed by the ENGINEER to be appropriate for use, either in addition to those methods indicated above or as a replacement to one or more of the methods indicated above, the new method will be used.

1.03 QUALITY CONTROL SUBMITTALS

A. Pre-installation: The GEOSYNTHETICS MANUFACTURER shall submit the following to the OWNER for approval prior to geomembrane delivery.

1. Origin (supplier's name and production plant) and identification (brand name and number) of resin.

2. Copies of dated quality control certificates issued by resin supplier.

3. Results of tests conducted by the GEOSYNTHETICS MANUFACTURER to verify that resin used to manufacture geomembrane meets specifications listed in Article 2.01.

4. Statement that amount of reclaimed polymer added to resin during manufacturing was done with appropriate cleanliness and did not exceed 2% by weight.

5. List of materials, which comprise geomembrane, expressed in the following categories as percent by weight: polyethylene, carbon black, and other additives. Geomembrane shall not contain more than 1.0% by weight of other additives (fillers or extenders).

6. Manufacturer's specification, which includes properties, listed in Article 2.01 as measured using appropriate test methods.

7. Written certification that the minimum values given in GEOSYNTHETICS MANUFACTURER's specification are guaranteed by the GEOSYNTHETICS MANUFACTURER.

8. Quality control certificates, signed by responsible entity employed by geomembrane manufacturer. Each quality control certificate shall include applicable roll identification numbers, testing procedures, and results of quality control tests required by Article 2.03 A.

9. Submit a field panel layout diagram indicating the proposed layout of field seams and panel orientation. A field panel is defined as unit of geomembrane, which is to be seamed in field, (i.e., field panel roll or portion of roll cut in field).

B. Installation: The GEOSYNTHETICS INSTALLER shall submit the following to the OWNER and ENGINEER as installation proceeds:

1. Quality control documentation recorded during installation.

2. Submit prior to geomembrane deployment subgrade surface acceptance certificates signed by GEOSYNTHETICS INSTALLER for each area that will be covered directly by geomembrane.

C. Completion: The GEOSYNTHETICS INSTALLER shall submit the following to the OWNER and ENGINEER upon completion of the installation of the geomembrane:

1. The warranty obtained from the manufacturer of the flexible membrane liner (FML) to warranty material for a period no less than 10 years.

2. An installation warranty shall be submitted to cover the installation for a period of 1 year.

1.04 FIELD SAMPLES

A. Geomembrane sampling shall be conducted by the GEOSYNTHETICS QAC for the following, in accordance with Quality Assurance Manual (QAM).

1. Conformance Testing (Article 3.01 A of this section).

2. Destructive Seam Testing (Article 3.04 D of this section).

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:

1. The GEOSYNTHETICS MANUFACTURER shall provide the following information on labels attached to each roll of geomembrane delivered to the site:

a. Manufacturer's name.

b. Product identification.

c. Thickness.

d. Roll number.

e. Roll dimensions.

2. The GEOSYNTHETICS MANUFACTURER shall ensure that geomembrane rolls are properly loaded and secured to prevent damage during shipping.

3. The GEOSYNTHETICS INSTALLER shall protect geomembrane from excessive heat, cold, puncture, cutting, or other damaging or deleterious conditions while stored on-site.

B. Acceptance at Site:

1. The GEOSYNTHETICS QAC and the GEOSYNTHETICS INSTALLER, together, shall perform inventory and outer surface inspection for defects and damage, of all geomembrane rolls upon delivery.

2. The GEOSYNTHETICS QAC may require the GEOSYNTHETICS INSTALLER to unroll and inspect any geomembrane roll that shows signs of damage.

3. Damage resulting from handling and transport of geomembranes shall be repaired at no cost to OWNER. If irreparable, in opinion of the ENGINEER, damaged materials shall be replaced at no cost of OWNER.

C. Storage and Protection:

1. The GEOSYNTHETICS INSTALLER and/or EARHWORK CONTRACTOR shall provide on-site storage in the area indicated by OWNER for geomembrane rolls from time of delivery until installed.

2. The GEOSYNTHETICS INSTALLER and/or EARTHWORK CONTRACTOR shall store and protect the geomembrane from dirt, water, and other sources of damage.

3. The GEOSYNTHETICS INSTALLER and/or EARTHWORK CONTRACTOR shall preserve integrity and readability of geomembrane roll labels.

PART 2 PRODUCTS

2.01 MATERIALS

A. FINAL COVER GEOMEMBRANE MATERIAL - The GEOSYNTHETICS QAC shall obtain random samples of the proposed textured geomembrane to be used in the Final Cover System and materials that will be installed above and below the geomembrane. These samples will be tested for shear strength for each interface (i.e., geocomposite/40-mil textured geomembrane and 40-mil textured geomembrane/geosynthetic clay liner). A minimum of one round of interface shear strength testing (including testing at all indicated normal stresses, under all conditions, and for each interface) shall be completed prior to any construction season involving final cover construction. The interface shear strength testing shall be repeated if, in the opinion of the ENGINEER, the manufacturer, product, or material characteristics of the associated products (geomembrane, geocomposite, or GCL) change following acceptance of the initial testing. Testing must be conducted prior to the approval of the materials and performed with components that will be used in construction. Testing may be performed prior to or following delivery of the geomembrane material to the site. In either case, testing must be conducted on the actual material that will be used in construction of the final cover. Testing shall be conducted according to the most recent version of ASTM D5321, and the reported results shall meet the requirements of Paragraph A.1 of this Part.

1. Tests shall be performed at a normal load of 100, 250, 500 and 1,000 psf with a strain rate of 0.04 in./min. and a minimum displacement of 6 in. The minimum

required peak and residual interface shear strengths are provided in the following table.

GEOMEMBRANE INTERFACE SHEAR STRENGTH (ASTM D5321) Frequency of 1 test per product type.		
Normal Stresses (psf)	Required Peak Shear Strength (psf)*	Required Residual Shear Strength (psf)*
100	50	33
250	125	83
500	250	167
1,000	492	329

* The required shear strengths above include both internal friction and cohesion (adhesion) components.

Additionally, testing for interface residual shear strength shall be performed at normal loads of 100, 250 and 500 psf at high strain rate (minimum of 0.5 in./min.) and large strains to simulate strength conditions during a seismic event. The required residual shear strengths are provided in the table below.

GEOMEMBRANE INTERFACE SHEAR STRENGTH DURING SEISMIC EVENT (ASTM D5321) Frequency of 1 test per product type.	
Normal Stresses (psf)	Required Residual Shear Strength (psf)*
100	38
250	95
500	191

* The required shear strengths above include both internal friction and cohesion (adhesion) components.

B. BASELINER GEOMEMBRANE MATERIAL - The GEOSYNTHETICS QAC shall obtain random samples of the proposed textured geomembrane and materials that will be installed above and below the geomembrane for the Baseliner System. These samples will undergo interface shear strength testing for each interface (i.e., geocomposite/80 mil textured geomembrane, 80-mil textured geomembrane/geosynthetic clay liner, and 80-mil textured geomembrane/compacted clay liner). A minimum of one round of interface shear strength testing (including testing at all indicated normal stresses, under all conditions, and for each interface) shall be completed prior to any construction season involving Baseliner construction. The interface shear strength testing shall be repeated if, in the opinion of the ENGINEER, the manufacturer, product, or material characteristics of the associated products (geomembrane, geocomposite, GCL, or clay liner) change following acceptance of the initial testing. Testing must be conducted prior to the approval of the materials and performed with components that will be used in the construction. Testing may be performed prior to or following delivery of the geomembrane material to the site. In either case, testing must be conducted on the actual material that will be used in construction of the final cover. Testing shall be conducted according to the most recent version of ASTM D5321, and the reported results shall meet the requirements of Paragraph B.1 and B.2 of this Part.

1. Tests shall be performed at a normal load of 100, 250, 500, and 1,000 psf with a strain rate of 0.04 in./min. and a minimum displacement of 1 in. The minimum required peak interface shear strengths are provided in the following table.

GEOMEMBRANE INTERFACE SHEAR STRENGTH (ASTM D5321) Frequency of 1 test per product type.	
Normal Stresses (psf)	Required Peak Shear Strength (psf)*
100	41
250	103
500	206
1,000	412

* The required shear strengths above include both internal friction and cohesion (adhesion) components.

2. Tests shall be performed at a normal load of 100, 250, 500, 1,000, 2,500, 5,000, 10,000 and 15,000 psf with a strain rate of 0.04 in./min. and a minimum displacement of 6 in. The minimum required residual interface shear strengths are provided in the following table.

GEOMEMBRANE INTERFACE SHEAR STRENGTH (ASTM D5321) Frequency of 1 test per product type.	
Normal Stresses (psf)	Required Residual Shear Strength (psf)*
100	31
250	78
500	156
1,000	311
2,500	1,200
5,000	2,100
10,000	3,500
15,000	4,400

* The required shear strengths above include both internal friction and cohesion (adhesion) components.

C. Supply geomembranes and resins which meet the following specifications:

POLYETHYLENE GEOMEMBRANE PRODUCTS

PROPERTY	**METHOD***	**REQUIRED VALUE (min ave unless otherwise noted)**	
		40 mil	**80 mil**
Thickness	ASTM D5994	38 mil (min ave) 36 mil (lowest individual for 8 of 10 values) 34 mil (lowest individual for any of 10 values)	76 mil (min ave) 72 mil (lowest individual for 8 of 10 values) 68 mil (lowest individual for any of 10 values)
Asperity Height	ASTM D7466	10 mil (min ave) 7 mil (min for 8 of 10 values) 5 mil (lowest individual)	
Density	ASTM D1505/D792	0.94 g/cm^3	
Tensile Properties (5 replicates each direction)	ASTM D6693 Type IV	84 lb/in (yield strength) 60 lb/in (break strength) 12% (yield elongation)	168 lb/in (yield strength) 120 lb/in (break strength) 12% (yield elongation)

PROPERTY	METHOD*	REQUIRED VALUE (min ave unless otherwise noted)	
		40 mil	**80 mil**
		100% (break elongation)	100% (break elongation)
Tear Resistance	ASTM D1004	28 lb	56 lb
Puncture Resistance	ASTM D4883	60 lb	120 lb
Stress Crack Resistance	ASTM D5397	300 hr	
Carbon Black Content	ASTM D1603	2-3%	
Carbon Black Dispersion	ASTM D5596	9 in categories 1 or 2, 1 in category 3	
Oxidative Induction Time (OIT)	ASTM D3895 (Standard OIT) or ASTM D5885 (High Pressure OIT)	100 minutes or 400 minutes	
Oven Aging at 85^{o} C	ASTM D5721 Standard OIT, % retained after 90 days (ASTM D3895) or High Pressure OIT, % retained after 90 days (ASTM D5885)	55% or 80%	
UV Resistance	High Pressure OIT, % retained after 1,600 hours (ASTM D5885)	50%	

* Test Methods as modified in Article 1.02

D. Geomembrane shall be manufactured from new polyethylene resin. A maximum of 2% by weight of factory regrind resin recycled during the manufacturing process may be used if the manufacturer provides resin documentation of reclaimed material.

E. Geomembrane manufactured from non-complying resin shall be rejected.

F. Resin shall be designed and manufactured specifically for use in geomembranes.

G. Geomembrane shall be free of pinholes and non-dispersed raw materials or other signs of contamination by foreign matter.

2.02 SEAMING AND TESTING EQUIPMENT

A. Welding:

1. Use extrusion welding apparatus equipped with gauges giving temperature of extrudate at nozzle of apparatus, or utilize hand-held gauges to measure extrudate temperatures.

2. Use fusion-welding apparatus that are self-propelled devices equipped with a gauge indicating temperature of heating element, and a method of monitoring relative pressure applied to geomembrane.

3. Maintain on-site a minimum of 2 spare operable seaming apparatus, unless otherwise agreed upon at pre-construction meeting.

4. Seaming equipment shall not damage geomembrane.

B. Vacuum Testing: Equipment shall consist of following:

1. Vacuum box assembly consisting of: rigid housing, transparent viewing window, soft neoprene gasket attached to bottom of housing, porthole or valve assembly, and vacuum gauge.

2. Pump assembly equipped with pressure controller and pipe connections.

3. Pressure/vacuum rubber hose with fittings and connections.

4. Bucket of soapy solution and a wide paint brush or other means of applying the soapy solution.

C. Air Pressure Testing: Equipment shall consist of following:

1. Air pump equipped with a pressure gauge, capable of generating, sustaining, and measuring pressure between 24 and 35 psi (160 and 240 kPa), and mounted on cushion to protect geomembrane.

2. Rubber hose with fittings and connections.

3. Sharp hollow needle or other approved pressure feed device equipped with a pressure gauge.

2.03 MANUFACTURER QUALITY CONTROL

A. Tests, Inspections:

1. Geomembranes shall be tested by geomembrane manufacturer for quality control to demonstrate that resin meets these specifications. Testing frequency shall be in accordance with GRI GM13.

2. GEOSYNTHETICS MANUFACTURER shall continuously monitor during manufacturing process for inclusions, bubbles, or other defects. Geomembranes that exhibit defects shall not be acceptable for installation.

3. GEOSYNTHETICS MANUFACTURER shall monitor thickness continuously during manufacturing process.

4. No geomembrane shall be acceptable for installation, which fails to meet specified values. Samples not satisfying specifications shall result in rejection of rolls represented by tests. At GEOSYNTHETICS MANUFACTURER's discretion and expense, additional testing of individual rolls may be performed to more closely identify non-complying rolls and to qualify individual rolls.

PART 3 EXECUTION

3.01 EXAMINATION

A. Conformance Testing:

1. Samples of the geomembrane shall be collected for conformance testing. As outlined in Section 10.4 of QAM, conformance samples shall be collected in one of the following manners:

   a. The GEOSYNTHETICS QAC shall collect samples of geomembrane for conformance testing at the time of delivery to the site; or

   b. The GEOSYNTHETICS QAC shall direct representatives of the GEOSYNTHETICS QAL to collect samples of the geomembrane for conformance testing from the material at the manufacturer's facility.

2. GEOSYNTHETICS MANUFACTURER may request retesting of failed conformance tests, as outlined in QAM. GEOSYNTHETICS MANUFACTURER shall bear cost of retesting if results lead to material rejection. GEOSYNTHETICS QAC shall bear cost of retesting if original conformance tests found to be in error. Material that does not meet the requirements specified in Article 2.01 C of this section shall be immediately removed from the site.

3.02 PREPARATION

A. Surface Preparation:

1. GEOSYNTHETICS INSTALLER shall verify that supporting soil or geosynthetic surface has been properly prepared for geomembrane deployment.

2. Geomembrane shall not be deployed until all necessary testing of underlying layer(s) has been completed and the associated results have been reviewed and approved by applicable parties.

3. After prepared surface has been accepted in accordance with QAM, report to OWNER any change in supporting soil condition that may require work. Take special care to maintain prepared soil surface.

4. Do not place geomembrane onto any area that has become softened by precipitation or cracked due to desiccation. Observe soil surface daily to evaluate softening and to check for desiccation cracking.

5. Repair, at GEOSYNTHETICS INSTALLER's expense, damage to subgrade caused by installation activities.

3.03 INSTALLATION

A. Panel Nomenclature:

1. The GEOSYNTHETICS INSTALLER shall mark each field panel with identification code (number or letter-number) consistent with approved layout plan. OWNER, GEOSYNTHETICS INSTALLER, and GEOSYNTHETICS QAC shall agree upon this identification code.

B. The following presents requirements to be followed by the GEOSYNTHETICS INSTALLER to protect geomembrane material during installation:

1. Do not use equipment, which damages geomembrane by handling, trafficking, excessive heat, leakage of hydrocarbons, or other means. Provide a protective layer under equipment (e.g., generators, welding apparatus) to prevent damage.

2. Ensure prepared surface underlying geomembrane has not deteriorated since previous acceptance and remains acceptable immediately prior to geomembrane deployment.

3. Keep geosynthetic elements immediately underlying geomembrane clean and free of debris.

4. Do not permit personnel to smoke or wear shoes that can damage geomembrane while working on geomembrane. Personnel shall not bring glass bottles onto the geomembrane.

5. Unroll panels in manner, which does not cause excessive scratches or crimps in geomembrane and does not damage supporting soil.

6. Place panels in manner, which minimizes wrinkles (especially differential wrinkles between adjacent panels).

7. Prevent wind uplift by providing adequate temporary loading and/or anchoring (e.g., sandbags, tires) that shall not damage geomembrane. In case of high winds, continuous loading is recommended along panel edges.

8. Protect geomembrane in areas where excessive traffic is expected with geotextiles, extra geomembrane, or other suitable materials.

C. The GEOSYNTHETICS INSTALLER shall adhere to the following requirements during geomembrane panel deployment:

1. Install field panels at locations indicated on the geomembrane approved layout plan, as approved by ENGINEER.

2. Replace seriously damaged (torn, twisted, or crimped) field panels or portions thereof, at no cost to OWNER. Repair less serious damage according to Article 3.03 H of this section. GEOSYNTHETICS QAC shall determine if material is to be repaired or replaced.

3. Remove from work area any damaged panels or portions of damaged panels that have been rejected.

4. Do not proceed with deployment at ambient temperature below 32°F (0°C) or above ambient temperature of 104°F (40°C) or above sheet temperature of 122°F (50°C) unless otherwise authorized, in writing, by OWNER AND ENGINEER.

5. Do not deploy during precipitation, in presence of excessive moisture (e.g., fog, dew), in area of ponded water or in presence of excessive winds.

6. Do not deploy more geomembrane field panels in l-day than can be seamed during that day.

D. The GEOSYNTHETICS INSTALLER shall adhere to the following requirements regarding seam location and layout:

1. When possible orient seams parallel to line of maximum slope, (i.e., oriented along, not across, slope).

2. No horizontal seam shall be less than 5 ft. (1.5 m) from toe of slope greater than 10H:1V or areas of potential stress concentration, unless otherwise authorized by OWNER AND ENGINEER and GEOSYNTHETICS QAC.

3. In general, maximize lengths of field panels and minimize number of field seams.

E. Temporary Bonding:

1. Hot air device (Liester) may be used to temporarily bond geomembrane panels that are to be extrusion welded. No other temporary bonding of geomembrane is allowed unless authorized by the ENGINEER.

2. Do not damage geomembrane when temporarily bonding adjacent panels. Apply minimal amount of heat to lightly tack geomembrane panels together. Control temperature of hot air at nozzle of any temporary welding apparatus to prevent damage to geomembrane.

3. Do not use solvent or adhesive.

F. Seaming Methods: Approved processes for field seaming are extrusion fillet welding and fusion welding. Proposed alternate processes shall be documented and submitted to OWNER and ENGINEER for approval. Alternate procedures shall be used only after being approved in writing by the OWNER and the ENGINEER.

1. Produce seams meeting following requirements in conformance with GRI GM19:

POLYETHYLENE SEAM PROPERTIES

PROPERTY	METHOD	VALUE (minimum)	
		40 MIL	80 MIL
Shear Strength	ASTM D4437*	80 lb/in	160 lb/in
Peel Strength			
Fusion	ASTM D4437*	60 lb/in	121 lb/in
Extrusion	ASTM D4437*	52 lb/in	104 lb/in

* Test methods as modified in Article 1.02.

2. Align geomembrane panels to have nominal overlap of 3 in. (75 mm) for extrusion welding and 5 in. (125 mm) for fusion welding. Provide sufficient overlap to allow peel tests to be performed on seam.

3. Use double-fusion welding as primary method of seaming adjacent field panels.

   a. For cross seam tees, associated with fusion welding, extrusion weld to minimum distance of 4 in. (100 mm) on each side of tee.

   b. When subgrade conditions dictate, use movable protective layer (e.g. extra piece of geomembrane) directly below each overlap of geomembrane that is to be seamed to prevent buildup of moisture between sheets and prevent debris from collecting around pressure rollers.

4. Use conventional fillet extrusion welding as secondary method for seaming between adjacent panels and as primary method of welding for detail and repair work. Fillet extrusion welding shall also be used as the primary method of welding in corners of the perimeter berm, and the perimeter/intercell berm.

   a. Purge heat-degraded extrudate from barrel of extruder prior to beginning seam and whenever extruder has been inactive.

   b. Use clean and dry welding rods or extrudate pellets.

   c. Complete grinding process without damaging geomembrane within 1 hr of seaming operation.

   d. Minimize exposed grinding marks adjacent to extrusion weld. Do not allow exposed grinding marks to extend more than ¼ in. outside finished seam area.

G. The GEOSYNTHETICS INSTALLER shall adhere to the following seaming procedures:

1. General Seaming Procedures

a. Perform seaming under dry conditions, i.e., no precipitation or other excessive moisture. Suspend seaming during periods of excessive winds. Portable shelters (tents) may be used to protect seam area, at no additional cost to the OWNER.

b. If required, provide firm substrate by using extra piece of geomembrane, or similar hard surface directly under seam overlap to achieve proper support for seaming apparatus.

c. Align seams with least possible number of wrinkles and fishmouths. Cut fishmouths or wrinkles along ridge of wrinkle in order to achieve flat overlap. Seam cut fishmouths or wrinkles and patch portions where overlap inadequate. Use oval or round patch of same geomembrane extending minimum of 6 in. (150 mm) beyond cut in all directions.

d. Provide adequate illumination if seaming operations carried out at night.

e. Extend seams to outside edge of panels placed in anchor trench.

f. Do not field seam without master seamer being present.

g. Prior to seaming, ensure that seam area is clean and free of moisture, dust, dirt, debris, or foreign material of any kind.

2. Cold Weather Seaming Procedures: The GEOSYNTHETICS INSTALLER shall meet the following conditions, in addition to general seaming procedures, if seaming is conducted when the ambient temperature is below 32°F (0°C).

a. Preheating of seams is required if the geomembrane surface temperature is below 32°F (0°C). GEOSYNTHETICS QAC shall determine geomembrane surface temperatures at intervals of at least once per 100 ft. of seam length. Preheating devices used shall be pre-approved by OWNER prior to use.

b. Preheating may be waived by OWNER based on recommendation from GEOSYNTHETICS QAC, if demonstrated to GEOSYNTHETICS QAC's satisfaction that welds of equivalent quality may be obtained without preheating at expected temperature of installation.

c. GEOSYNTHETICS QAC shall observe all areas of geomembrane that have been preheated by hot air device prior to seaming, to ensure they have not been subjected to excessive melting.

d. GEOSYNTHETICS QAC shall confirm that surface temperatures not lowered below minimum surface temperatures specified for welding due to winds or other adverse conditions. It may be necessary to provide wind protection for seam area.

e. Additional destructive seam tests, as described in Article 3.04 D of this section, shall be taken at interval between 500 ft. and 250 ft. of seam length, at GEOSYNTHETICS QAC's discretion.

f. Sheet grinding may be performed before preheating, if applicable.

g. Trial seaming, as described in Article 3.04 B of this section, shall be conducted under same ambient temperature and preheating conditions as actual seams. New trial seams shall be conducted if ambient temperature drops by more than 10°F (3°C) from initial trial seam test conditions. Such new trial seams shall be conducted upon completion of seams in progress during temperature drop.

3. Warm Weather Procedures: The GEOSYNTHETIC INSTALLER shall meet following conditions, in addition to general seaming procedures, if seaming conducted when sheet temperature above 122°F (50°C) or ambient temperature above 104°F (40°C).

a. At sheet temperatures above 122°F (50°C) or ambient temperature above 104°F (40°C), no seaming of geomembrane shall be permitted unless demonstrated to OWNER's satisfaction that geomembrane seam quality will not be compromised.

b. Trial seaming, as described in Article 3.04 B, shall be conducted under same ambient temperature conditions as actual seams. New trial seams shall be conducted if ambient temperature rises by more than 5°F (3°C) from initial trial seam test conditions. Such new trial seams shall be conducted upon completion of seams in progress during temperature rise.

c. Additional destructive seam tests, as described in Article 3.04 D of this section, shall be taken, at the GEOSYNTHETICS QAC's discretion.

H. The following repair procedures shall be performed by the GEOSYNTHETICS INSTALLER:

1. Repair portions of geomembrane that are damaged, exhibit flaws, or fail destructive or non-destructive seam tests.

2. Final decision as to appropriate repair procedure shall be agreed upon between OWNER, ENGINEER, GEOSYNTHETICS INSTALLER, and GEOSYNTHETICS QAC.

3. Available repair procedures include following:

a. Patching: Piece of the same geomembrane extrusion welded into place. Use to repair large holes, tears, non-dispersed raw materials, and contamination by foreign matter.

b. Spot welding or seaming: Bead of molten extrudate placed on flaw. Use to repair small tears, pinholes (≤ 1/16 of an in. in diameter), or other minor, localized flaws.

c. Capping: Strip of same geomembrane extrusion welded into place over inadequate seam. Use to repair large lengths of failed seams.

d. Extrusion welding flap shall not be allowed.

e. Removal and replacement: Remove bad area and replace with the same geomembrane welded into place. Use to repair large lengths of failed seams.

4. Repair seaming and welding shall comply with paragraphs F and G above.

5. For patches and cap strips extend repair a minimum of 6 in. beyond defect in all directions.

6. Do not place overlying layers over locations which have been repaired until appropriate passing nondestructive and destructive (laboratory) test results obtained.

I. Anchor Trench:

1. EARTHWORK CONTRACTOR shall excavate anchor trenches, unless otherwise specified, to lines and grades shown on design drawings, prior to geomembrane placement.

2. Slightly rounded corners shall be provided in anchor trench to avoid sharp bends in geomembrane.

3. If anchor trench excavated in clay material susceptible to desiccation, amount of trench open at any time should be minimized.

4. Remove all construction-related debris from anchor trench. Construction related debris shall be managed by EARTHWORK CONTRACTOR as directed by OWNER and ENGINEER.

5. EARTHWORK CONTRACTOR shall backfill and compact anchor trench as soon as practical after geomembrane installation completed. Care will be taken when backfilling trenches to prevent damage to geosynthetics.

6. GEOSYNTHETICS INSTALLER shall inspect the anchor trench subgrade prior to deploying geomembrane into the anchor trench. After GEOSYNTHETICS INSTALLER accepts subgrade, ensure excessive amounts of loose soil do not underlie geomembrane in anchor trench.

7. EARTHWORK CONTRACTOR shall ensure that anchor trench will be adequately dewatered to prevent ponding or softening of adjacent soils while trench open.

3.04 FIELD QUALITY CONTROL

A. Visual Inspection:

1. GEOSYNTHETICS QAC shall examine seam and non-seam areas of geomembrane for identification of defects, holes, blisters, non-dispersed raw materials, and any sign of contamination by foreign matter.

2. The GEOSYNTHETICS INSTALLER shall clean and wash the geomembrane surface if GEOSYNTHETICS QAC determines that the amount of dust or mud inhibits examination.

3. Do not seam any geomembrane panels that have not been examined for flaws by GEOSYNTHETICS QAC.

4. Non-destructively test each suspect location in seam and non-seam areas using methods described in Article 3.04 C of this section as appropriate.

B. The GEOSYNTHETICS INSTALLER shall adhere to the following Trial Seam requirements:

1. Prepare trial seams on fragment pieces of geomembrane under actual seaming conditions to verify those conditions are adequate for production seaming.

2. Make trial seams at the beginning of each seaming period, and at least once each 5 hrs, for each production welder/ seaming apparatus combination used that day.

3. Make trial seams only under observation of GEOSYNTHETICS QAC.

4. Make trial seam sample at least 5 ft. (1.5 m) long by 1 ft. (0.3 m) wide (after seaming) with seam centered lengthwise following procedures specified above.

5. Cut 2 specimens from sample with 1 in. (25 mm) wide die. GEOSYNTHETICS QAC shall select specimen locations randomly along trial seam sample. Test specimens in peel, as described in Article 3.04 D.5 of this section, and document the results.

6. If specimen fails, entire operation shall be repeated. If additional specimen fails, do not use the welder/seaming apparatus combination until deficiencies are corrected and 2 consecutive successful trial welds achieved.

7. Cut remainder of successful trial seam into 3 pieces; 1 to be retained in OWNER's archives, 1 to be retained by GEOSYNTHETICS INSTALLER, and 1 to be retained by GEOSYNTHETICS QAC for possible laboratory destructive seam testing. If required by OWNER, remaining portion of trial seam sample can be subjected to destructive testing as indicated in Article 3.04 D of this section.

C. The GEOSYNTHETICS INSTALLER shall adhere to the following non-destructive seam testing requirements:

1. General

   a. Perform non-destructive tests is in the presence of QAC to verify continuity of seams. These tests do not provide quantitative information on seam strength.

   b. Non-destructively test field seams over their full length using vacuum test (for extrusion seams), air pressure (for double-fusion seams) or other OWNER-approved method. Document the results.

   c. Non-destructive testing of extrusion welds for pipe/manhole boots and flatstock bases of riser vaults may be performed using spark-testing technique.

   d. Perform non-destructive testing as seaming work progresses, not at completion of all field seaming.

2. Vacuum Testing (for extrusion seam): Use following procedures.

   a. Energize vacuum pump and reduce tank pressure to approximately 5 psi (10 in. of Hg) (35 kPa) gauge pressure.

   b. Wet strip of geomembrane approximately 12 in. by 48 in. (0.3 m x 1.2 m) with soapy solution.

   c. Place vacuum box over wetted area, apply vacuum for a period of not less than 10 seconds, and examine geomembrane through viewing window for presence of soap bubbles.

   d. If no bubbles appear within 10 seconds, move box over to next adjoining area with minimum 3 in. (75 mm) overlap and repeat process.

   e. Mark and repair areas where soap bubbles appear in accordance with Article 3.03 H of this section.

3. Air Pressure Testing (for double-fusion seam): Use following procedures.

   a. Temporarily seal both ends of seam to be tested using locking pliers or other similar devices.

   b. Insert needle or other approved pressure feed device into air channel created by fusion weld.

   c. Pressurize air channel to pressure of approximately 30 psi (200 kPa). Close valve and allow pressure to stabilize for approximately 2 min. Ensure after 2 min. stabilization period pressure within range listed in Initial Pressure Schedule.

INITIAL PRESSURE SCHEDULE

MATERIAL (MIL)	MIN. PSI	MAX. PSI
40	24	30
80	30	35

d. Observe air pressure 5 min. after initial 2 min. stabilization period ends. If pressure loss exceeds Maximum Permissible Pressure Differential or pressure does not stabilize, locate faulty area and repair in accordance with Article 3.03 H.

MAXIMUM PERMISSIBLE PRESSURE DIFFERENTIAL
AFTER 5 MINUTES

MATERIAL (MIL)	PRESSURE DIFF. (PSI)
40	4
80	2

e. Cut opposite end of tested seam area once testing completed to verify continuity of air channel. If air does not escape, locate blockage and retest unpressurized area. Repair cut end of air channel in accordance with Article 3.03 H of this section.

f. Remove needle or other approved pressure feed device and seal hole in geomembrane.

4. Inaccessible Seams:

a. Cap-strip seams that cannot be nondestructively tested in accordance with Article 3.03 H of this section.

b. Examine cap-stripping operations with GEOSYNTHETICS QAC for uniformity and completeness. Document observations.

D. The GEOSYNTHETICS INSTALLER shall adhere to the following destructive seam testing requirements:

1. General:

a. The purpose of destructive seam testing is to evaluate seam strength.

b. Perform destructive seam tests as seaming progresses, not at completion of all fieldwork.

c. Failed destructive seam sample shall result if grips of testing machine cannot be closed on sample test flap (available flap ½-in. long or less) due to excessive temporary welding.

2. Location and frequency:

   a. Test at a minimum frequency of 5 subsamples transverse to each seam. Provide a test frequency not less than 1 test location per 500 ft. (150 m) of seam length performed by each welder. This minimum frequency to be determined as average taken throughout entirety of work. In the event a specific welder is used on a given day for minimal seaming activities (minimal shall be defined as less than 100 feet of seaming), the Geosynthetics QAC may use the welders trial weld (as discussed in Part 3.04 B of this Section) as a representative destructive sample for that day.

   b. Test locations shall be determined during seaming, at GEOSYNTHETICS QAC's discretion.

   c. GEOSYNTHETICS INSTALLER will not be informed in advance of locations where seam samples will be taken.

   d. OWNER reserves right to increase frequency of testing in accordance with performance results of samples previously tested.

3. Sampling Procedures:

   a. Cut samples at locations chosen by GEOSYNTHETICS QAC.

   b. GEOSYNTHETICS QAC shall number each sample and record sample number and location in panel layout drawing.

   c. Repair holes in geomembrane resulting from destructive seam sampling immediately in accordance with repair procedures described in Article 3.03 H of this section.

   d. Non-destructively test continuity of new seams in repaired area according to Article 3.04 C of this section.

4. Sample Dimensions: Take following 2 types of samples at each sampling location.

   a. Take 2 samples for field-testing. Cut each of these samples with 1 in. (25 mm) wide die, with seam centered parallel to width. Distance between these 2 samples shall be 42 in. (1.1 m). If both samples pass field test described in Article 3.04 D.5 of this section, take sample for laboratory testing as described in paragraph b below.

   b. Sample for laboratory testing shall be located between samples cut for field-testing. Cut sample for laboratory testing 12 in. (0.3 m) wide by 42 in. (1.1 m) long with seam centered lengthwise. Cut this sample into three parts. GEOSYNTHETICS QAC shall distribute parts as follows:

      1) One portion to GEOSYNTHETICS CONTRACTOR for optional laboratory testing, 12 in. by 12 in. (0.3 m by 0.3 m).

2) One portion to GEOSYNTHETICS QAL for testing, 12 in. by 18 in. (0.3 m by 0.5 m).

3) One portion to OWNER for archive storage, 12 in by 12 in. (0.3 m by 0.3 m). Final determination of sample sizes shall be agreed upon at pre-construction meeting.

5. Field Testing:

a. Test two 1 in. (25 mm) wide strips described in Article 3.04 D.4 for peel strength. Use tensiometer as described in paragraph b below to conduct these tests. These tests shall not fail according to criteria in Article 3.03 F.l of this section. Document the results.

b. Use tensiometer capable of maintaining constant jaw separation rate of 2 in. per minute. Tensiometer shall be calibrated, and certificate of calibration less than 1 yr. old kept with tensiometer.

c. Test field samples only under GEOSYNTHETICS QAC's observation.

d. If test sample passes in accordance with this section, seam qualifies for laboratory testing.

e. If any field test sample fails to pass, then follow procedures outlined in Article 3.04 D.6 of this section.

f. Final judgment regarding seam acceptability, based on failure criteria in these specifications, rests with GEOSYNTHETICS QAC.

6. Destructive Test Failure Procedures: Apply following procedures when sample fails destructive testing, whether that test is conducted by laboratory, or by GEOSYNTHETICS INSTALLER using field tensiometer.

a. GEOSYNTHETICS INSTALLER has following options:

1) Repair seam between any 2 passing destructive test locations.

2) Trace welding path to intermediate point [10 ft. (3 m) minimum from point of failed test in each direction] and take small sample with 1 in. (25 mm) wide die for additional field test at each location. If these additional samples pass test, take full laboratory samples. If these laboratory samples pass tests, repair the seam between these locations. If either sample fails, repeat process to establish zone in which seam should be repaired.

b. Acceptable repaired seams shall be bound by 2 locations from which samples passing laboratory destructive tests have been taken. Passing laboratory destructive tests, taken as indicated in Article 3.04 D, may be used as boundary for failing seam. In cases exceeding 150 ft. (50 m) of repaired seam, sample taken from zone in which seam has been repaired shall pass destructive testing. Make repairs in accordance with Article 3.03 H.

c. When sample fails, OWNER may require additional testing of seams that were welded by same welder and/or welding apparatus during same time shift.

E. Repair Verification:

1. GEOSYNTHETICS QAC shall number and log each repair.

2. Non-destructively test each repair using methods described in Article 3.04 C as appropriate. Document the results.

3. Passing non-destructive test results indicate adequate repair.

4. Repairs more than 150 ft. long require destructive test sampling, in accordance with Article 3.04 D of this section.

5. Failed destructive or non-destructive tests indicate that repair shall be redone and retested until passing test results.

F. Large Wrinkles: Wrinkle is considered to be large when geomembrane can be folded over onto itself.

1. When seaming of geomembrane liner is completed, and prior to placing overlying materials, GEOSYNTHETICS QAC shall identify all excessive geomembrane wrinkles.

2. Cut and reseam all wrinkles identified by GEOSYNTHETICS QAC. Test seam produced while repairing wrinkles in accordance with Article 3.03 H.

3. Repair wrinkles identified by GEOSYNTHETICS QAC. Repair during coldest part of installation period.

* * * END OF SECTION * * *

SECTION 02402
GEOELECTRIC LEAK LOCATION SURVEY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for performance of a geomembrane leak location survey using electrical methods for post-geomembrane installation performance for the secondary and primary geomembrane, baseliner components of the landfill cells and FAC Ponds.

B. Leak Location survey shall be conducted after water or earth materials are placed over the geomembrane liner to detect leaks resulting from installation defects and construction damage caused during placement of the overlying layers.

C. The optimum performance of a geomembrane leak location survey using electrical methods requires the conductive media above and below the geomembrane to be electrically isolated from each other except through the leaks being located in the geomembrane. It is also necessary to have a continuous electrically conducting pathway through an electrically conducting material above the geomembrane, through the leaks, and through an electrically conducting media under the geomembrane. Specifically, the conductive media must have some moisture.

D. GEOSYNTHETICS INSTALLER shall be aware of the leak detection activities outlined herein and shall account for these activities in the construction schedule.

1.02 REFERENCES

A. ASTM D7007 – Standard Practices for Locating Leaks in Geomembranes Covered with Water or Earth Materials.

1.03 SUBMITTALS

The LEAK LOCATION CONTRACTOR shall submit a Leak Location Survey Work Plan to the ENGINEER for approval prior to commencement of the leak location survey. The Leak Location Survey Work Plan shall include:

A. Qualifications of the proposed LEAK LOCATION CONTRACTOR including the number of years the LEAK LOCATION CONTRACTOR has performed the proposed survey method;

B. Resumes of proposed on-site supervisors;

C. Required site preparations;

D. Estimated duration of survey;

E. Quality control and field calibration procedures;

F. A list of projects demonstrating the qualifications and experience where the proposed Leak Location Contractor and leak location supervisor have met the requirements of paragraph 2.01 of this specification.

G. Sample of a final report (per ASTM D7007) provided by the Leak Location Contractor following the completion of the survey.

PART 2 PRODUCTS

2.01 LEAK LOCATION CONTRACTOR AND SUPERVISOR QUALIFICATIONS

The LEAK LOCATION CONTRACTOR shall have qualifications and experience in conducting the proposed survey method including having tested a minimum of 20,000,000 square feet of geomembrane liner within the previous three years. In addition, the leak location surveys must be supervised by a professional or technician with a minimum of three years and 6,500,000 square feet of liner testing experience using the proposed leak location survey method. The leak location supervisor must be on-site full-time during the performance of the leak location survey.

PART 3 EXECUTION

3.01 INFORMATION REQUIRED

The GEOSYNTHETICS QAC shall provide the LEAK LOCATION CONTRACTOR with drawings showing:

A. A Site Plan of the area to be leak location tested (including test limits).

B. Details of any liner penetrations.

C. Any structures and obstructions above the liner.

D. Any electrical equipment above the primary liner.

3.02 SITE PREPARATION

A. The GEOSYNTHETICS INSTALLER will identify actions required by the LEAK LOCATION CONTRACTOR to prepare the site for the leak location survey, including means to make electrical contact with the conductive material under the geomembrane. Specifically, bare copper wires shall be installed under the secondary geomembrane (ie. over the secondary soil layer) to test the secondary geomembrane layer of the baseliner system and under the GCL between the secondary and primary geomembranes to test the primary geomembrane layer of the baseliner system. To leak test the FAC ponds, bare copper wires shall be installed below the secondary geomembrane and the geocomposite between the secondary and primary geomembranes of the FAC Pond baseliner system. The bare copper wires shall be 10AWG or heavier. The bare copper wires shall be placed perpendicular to the machine direction of the overlying geosynthetic material. Four wires shall be spaced at 1/8, 3/8, 5/8, and 7/8 of the relevant dimension of the cell and/or FAC Pond (+/- 25 feet.) The wires shall exit from between the geomembranes at both edges of the cell and/or FAC Pond, remain exposed until after the leak location survey, not contact earth ground, and remain accessible to Leak Location Contractor. LEAK LOCATION CONTRACTOR shall be responsible for determining the placement of any electrodes needed for the leak location survey and the locations shall be depicted on the subgrade grading plan and submitted to the ENGINEER for review and record keeping purposes.

B. EARTHWORK CONTRACTOR shall ensure that the earth materials above and below the secondary and primary geomembranes contain sufficient moisture to conduct a leak location survey. For the landfill baseliner, the geocomposites placed on the geomembrane must be moist, either from a rainfall, from excess moisture in the granular material, or by wetting the area with the equivalent of 0.1 inch of water (2,700 gallons/acre) immediately prior to installing the earth materials on the geocomposites. Also, the granular layer must have some moisture. Adequate moisture is indicated when the material appears to be darker than the dry surface material. If the surface of the granular layer is dry, water must be sprayed on the granular layer immediately prior to the leak location survey, or the dry surface soil can be scraped from a narrow path along the survey lines. For the secondary geomembrane liner in the FAC Pond baseliner, the floor area of the pond must be filled with water to the toe of slope of the pond for the floor to be tested. The slope areas of the secondary geomembrane liner in the FAC Pond will be leak tested utilizing a water lance. For the FAC Pond primary geomembrane, the stone layer over the floor area of the pond must be saturated with water to the toe of slope of the pond for the floor area to be tested. The slope areas of the primary geomembrane liner in the FAC Pond will be leak tested utilizing a water lance.

C. GEOSYNTHETICS INSTALLER shall provide electrical isolation between the material above and below the geomembranes. This will be the case if the primary and secondary geomembrane are welded together. Any conducting penetrations through the geomembranes such as metal pipes or concrete structures should also be isolated using complete insulating coatings.

3.03 EXECUTION

A. LEAK LOCATION CONTRACTOR shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.

B. Any discrepancy in the required site preparation described above or in the Leak Location Survey Work Plan shall be reported to the GEOSYNTHETICS INSTALLER and/or EARTHWORK CONTRACTOR for corrective or appropriate action.

C. After the geocomposite and granular layer is placed on the geomembrane, conduct a leak location survey on the earth materials using the procedures for surveys with earth materials covering the geomembrane described in the latest version of ASTM Standard D7007 except use a 12-mm-diameter actual or artificial leak. This larger size is because the earth materials on the geomembrane are thicker than usual.

D. After the geotextile and granular (Ballast) layer is placed on the FAC Pond primary geomembrane, conduct a leak location survey using the procedures for surveys with water covering the geomembrane (floor area of the secondary geomembrane liner) described in the latest version of ASTM Standard D7007.

E. LEAK LOCATION CONTRACTOR shall inform the Engineer and mark the locations of all identified or indicated leaks with flags, spray paint, or written coordinates.

F. In addition, any leaks that are found must be exposed by GEOSYNTHETICS INSTALLER and isolated from the materials covering the geomembrane. Then additional leak location measurements shall be made on the two closest leak location survey lines to determine if additional leaks are in the vicinity. If an additional leak is found, this process shall be repeated.

3.04 REPORTING

The Leak Location Contractor shall provide a written report within 14 calendar days of completion of the leak location survey field work as described in ASTM D7007. The written report shall be submitted to GEOSYNTHETICS QAC for review.

** END OF SECTION **

SECTION 02405
ETHYLENE INTERPOLYMER ALLOY LINER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide 30 mil reinforced Ethylene Interpolymer Alloy (EIA) liner for Facultative (Fac) Pond liner system.

1.02 REFERENCES

A. ASTM D471-10 - Standard Test Method for Rubber Property - Effect of Liquids.

B. ASTM D751-06 - Standard Test Method for Coated Fabrics.

C. ASTM D413-98 - Standard Test Methods for Rubber Property- Adhesion to Flexible Substrate.

D. ASTM D3389-10 – Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader)

E. ASTM G153-04 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure to Nonmetallic Materials.

F. ASTM D1204-08 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at elevated Temperatures.

G. ASTM D2136-02 - Standard Test Method for Coated Fabrics-Low-Temperature Bend Test.

H. ASTM D4533-04 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

I. ASTM D4833-07 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.

J. ASTM D5641-94 - Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.

K. ASTM D696-08 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer.

L. ASTM D814-95 - Standard Test Method for Rubber Property- Vapor Transmission of Volatile Liquids.

1.03 QUALITY CONTROL SUBMITTALS.

A. Pre-installation: The GEOSYNTHETICS MANUFACTURER shall submit the following to the OWNER for approval prior to EIA liner delivery.

1. Origin (supplier's name and production plant) and identification (brand name and number) of raw materials.

2. Copies of dated quality control certificates issued by raw material supplier.

3. Manufacturer's specification, which includes properties, listed in Article 2.01 as measured using appropriate test methods.

4. Written certification that the minimum values given in EIA liner manufacturer's specification are guaranteed by EIA liner manufacturer.

5. Quality control certificates, signed by responsible entity employed by EIA liner manufacturer. Each quality control certificate shall include applicable testing procedures and results of quality control tests required by Article 2.03.A.

6. Submit shop drawings with the proposed panel layout to cover the area to be lined with EIA liner. Shop drawings shall indicate the direction of factory welds and shall show panel sizes (following factory welding) consistent with the material quantity requirements.

B. Installation: The GEOSYNTHETICS INSTALLER shall submit the following to the OWNER as installation proceeds:

1. Quality control documentation recorded during installation.

2. Submit prior to EIA liner deployment subgrade surface acceptance certificates signed by GEOSYNTHETICS INSTALLER for each area that will be covered directly by the EIA liner.

C. Completion: The GEOSYNTHETICS INSTALLER shall submit the following to the OWNER upon completion of the installation of the EIA liner:

1. The warranty obtained from the manufacturer of the EIA liner to warranty material for a period no less than 10 years.

2. An installation warranty shall be submitted to cover the installation for a period of 1 year.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping

1. The GEOSYNTHETICS MANUFACTURER shall provide the following information on labels attached to each fabricated panel of EIA liner delivered to the site:

a. Manufacturer's name.

b. Product identification.

c. Panel number.

d. Panel dimensions.

2. The GEOSYNTHETICS MANUFACTURER shall ensure that EIA liner panels are properly loaded and secured to prevent damage during shipping.

3. The GEOSYNTHETICS INSTALLER and/or EARTHWORK CONTRACTOR shall protect the EIA liner from excessive heat, cold, puncture, cutting, or other damaging or deleterious conditions while stored on-site.

B. Acceptance at Site

1. The GEOSYNTHETICS QAC and the GEOSYNTHETICS INSTALLER, together, shall perform inventory and surface inspection for defects and damage, of all EIA liner panels upon delivery.

2. The GEOSYNTHETICS QAC may require the GEOSYNTHETICS INSTALLER to unroll or unfold and inspect any EIA liner panel that shows signs of internal damage.

3. Damage resulting from handling and transport of EIA liner shall be repaired at no cost to OWNER. If irreparable, in opinion of the ENGINEER, damaged materials shall be replaced at no cost of OWNER.

C. Storage and Protection

1. The GEOSYNTHETICS INSTALLER and/or EARTHWORK CONTRACTOR shall provide on-site storage in the area indicated by OWNER for the EIA liner from time of delivery until installed.

2. The GEOSYNTHETICS INSTALLER and/or EARTHWORK CONTRACTOR shall store and protect the EIA liner from dirt, water, and other sources of damage.

3. The GEOSYNTHETICS INSTALLER and/or EARTHWORK CONTRACTOR shall preserve integrity and readability of EIA liner panel labels.

PART 2 PRODUCTS

2.01 MATERIALS

A. The GEOSYNTHETICS MANUFACTURER shall provide EIA liner materials in pre-fabricated panels that meet the following material specifications:

EIA LINER MATERIAL

PROPERTY	METHOD	VALUE
Base Material	NA	Polyester
Base Material Unit Weight	ASTM D751	6.5 oz per square yard

PROPERTY	**METHOD**	**VALUE**
Thickness	ASTM D751	30 mil nominal
Finished Coated Weight	ASTM D751	30 ± 2oz. per square yard
Trapezoidal Tear	ASTM D4533	40/55 pounds (minimum)
Grab Yield Strength	ASTM D751	550/550 pounds (minimum)
Elongation at Yield	ASTM D751	20% (minimum)
Adhesion – Heat Sealed Seam	ASTM D751 (Dielectric Weld)	40 pounds per 2-inch (minimum)
Adhesion – Ply	ASTM D413, Type A	15 pounds per inch (minimum) or Film Tearing Bond
Hydrostatic Resistance	ASTM D751 (Procedure A)	800 pounds per square inch (minimum)
Puncture Resistance	ASTM D4833	275 pounds (minimum)
Burst Strength	ASTM D751 (Ball Tip)	750 pounds (minimum)
Dead Load - Seam Strength, 4 Hour Test	ASTM D751 (2 in. Overlapped Seam)	240 pounds per inch of seam at 70 ^{o}F 120 pounds per inch of seam at 160 ^{o}F
Bonded Seam Strength	ASTM D751 (Grab Test Method, Procedure A)	550 pounds (minimum)
Low Temperature Resistance	ASTM D2136 (4 hours, 1/8-inch Mandrel)	Pass at -30 ^{o}F
Weathering Resistance	ASTM G153 (Carbon Arc)	8,000 hours (minimum) with no appreciable changes or stiffening or cracking of coating
Dimensional Stability	ASTM D1204 (212 ^{o}F for 1 hour)	0.5% (maximum each direction)
Water Absorption	ASTM D471 (Section 12, 7 days)	0.74 ounces per square yard (maximum) at 70 ^{o}F 4.13 ounces per square yard (maximum) at 212 ^{o}F
Abrasion Resistance	ASTM D3389 (H-18 Wheel, 1 kg load)	2,000 cycles (minimum) before fabric exposure 0.0018 ounce per 100 cycles maximum weight loss
Coefficient of Thermal Expansion/Contraction	ASTM D696	8x10^{-6} inches/inch/ ^{o}F (maximum)
Vapor Transmission (Water)	ASTM D814	0.0032 ounces/square yard/hour (maximum)

B. EIA liner shall be manufactured from new raw materials.

C. EIA liner manufactured from non-complying raw materials shall be rejected.

D. Raw materials shall be designed and manufactured specifically for use in EIA liners.

E. EIA liner shall be free of pinholes and non-dispersed raw materials or other signs of contamination by foreign matter.

F. Acceptable materials include 8130 XR-5 as manufactured by Seaman Corporation or equivalent.

2.02 MANUFACTURER QUALITY CONTROL

A. Tests and Inspections

1. EIA liner shall be tested by the manufacturer for quality control to demonstrate that raw materials meet these specifications.

2. GEOSYNTHETICS MANUFACTURER shall continuously monitor during manufacturing process for inclusions, bubbles, or other defects. EIA liner, which exhibit defects, shall not be acceptable for installation.

3. GEOSYNTHETICS MANUFACTURER shall monitor material quality continuously during manufacturing process. No EIA liner shall be acceptable for installation, which fails to meet specified values.

4. At minimum, the GEOSYNTHETICS MANUFACTURER shall perform the tests specified in Article 2.01 A of this section on the EIA liner, at a minimum frequency of once for every lot of EIA liner produced.

5. Samples not satisfying specifications shall result in rejection of rolls represented by tests. At the GEOSYNTHETICS MANUFACTURER's discretion and expense, additional testing of individual rolls may be performed to more closely identify non-complying rolls and to qualify individual rolls.

2.03 SEAMING AND TESTING EQUIPMENT

A. General

1. Use heat welding or RF welding apparatus with a minimum 2-inch overlap for all welds. Welding equipment shall include appropriate temperature monitoring devices during all welding activities.

2. Maintain on-site a minimum of 2 spare operable seaming apparatus, unless otherwise agreed upon at pre-construction meeting.

3. Seaming equipment shall not damage geomembrane.

B. Vacuum testing equipment shall consist of following:

1. Vacuum box assembly consisting of: rigid housing, transparent viewing window, soft neoprene gasket attached to bottom of housing, porthole or valve assembly, and vacuum gauge.

2. Pump assembly equipped with pressure controller and pipe connections.

3. Pressure/vacuum rubber hose with fittings and connections.

4. Bucket of soapy solution and a wide paint brush or other means of applying the soapy solution.

C. Air lance testing equipment shall consist of following:

1. Air compressor equipped with a pressure gauge, capable of generating, sustaining, and measuring air pressure of at least 55 psi , and mounted on cushion to protect the EIA liner.

2. Rubber hose with fittings and connections.

3. Air lance nozzle (3/16 of an inch diameter).

PART 3 EXECUTION

3.01 PREPARATION

A. Surface Preparation

1. GEOSYNTHETICS INSTALLER shall verify that supporting soil has been properly prepared for EIA liner deployment.

2. After prepared surface has been accepted in accordance with Quality Assurance Manual, report to OWNER any change in supporting soil condition that may require work. Take special care to maintain prepared soil surface.

3. Do not place EIA liner onto any area that has become softened by precipitation or cracked due to desiccation. Observe soil surface daily to evaluate softening and to check for desiccation cracking.

4. Repair, at GEOSYNTHETICS INSTALLER's expense, damage to subgrade caused by installation activities.

3.03 INSTALLATION

A. Panel Nomenclature

1. The GEOSYNTHETICS INSTALLER shall mark each field panel with identification code (number or letter-number) consistent with layout plan. OWNER, GEOSYNTHETICS INSTALLER, and GEOSYNTHETICS QAC shall agree upon this identification code.

B. The following presents requirements to be followed by the GEOSYNTHETICS INSTALLER to protect liner material during installation:

1. Do not use equipment, which damages the EIA liner by handling, trafficking, excessive heat, leakage of hydrocarbons, or other means. Provide a protective layer under equipment (e.g., generators, welding apparatus) to prevent damage.

2. Ensure prepared surface underlying the EIA liner has not deteriorated since previous acceptance and remains acceptable immediately prior to EIA liner deployment.

3. Keep any geosynthetic elements immediately underlying the EIA liner clean and free of debris.

4. Do not permit personnel to smoke or wear shoes that can damage the EIA liner while working on EIA liner. Personnel shall not bring glass bottles onto the EIA liner.

5. Unroll or unfold panels in manner, which does not cause excessive scratches or crimps in the EIA liner and does not damage supporting soil.

6. Place panels in manner, which minimizes wrinkles (especially differential wrinkles between adjacent panels).

7. Prevent wind uplift by providing adequate temporary loading and/or anchoring (e.g., sandbags, tires) that shall not damage the EIA liner. In case of high winds, continuous loading is recommended along panel edges.

8. Protect the EIA liner in areas where excessive traffic is expected with geotextiles, extra EIA liner, or other suitable materials.

C. The GEOSYNTHETICS INSTALLER shall adhere to the following requirements during EIA liner panel deployment:

1. Install field panels at locations indicated on the liner layout plan, as approved by OWNER.

2. Replace seriously damaged (torn, twisted, or crimped) field panels or portions thereof, at no cost to OWNER. Repair less serious damage according to Article 3.03 H of this section. GEOSYNTHETICS QAC shall determine if material is to be repaired or replaced.

3. Remove from work area any damaged panels or portions of damaged panels that have been rejected.

4. Do not proceed with deployment at ambient temperature below 32°F (0°C) or above ambient temperature of 104°F (40°C) or above sheet temperature of 122°F (50°C) unless otherwise authorized, in writing, by OWNER.

5. Do not deploy during precipitation, in presence of excessive moisture (e.g., fog, dew), in area of ponded water or in presence of excessive winds.

6. Do not deploy more EIA liner panels in any one day than can be seamed during that same day.

D. The GEOSYNTHETICS INSTALLER shall adhere to the following requirements regarding seam location and layout:

1. When possible orient seams parallel to line of maximum slope, (i.e., oriented along, not across, slope).

2. No horizontal seam shall be less than 5 ft. (1.5 m) from toe of slope greater than 10H:1V or areas of potential stress concentration, unless otherwise authorized by OWNER.

3. In general, maximize lengths of field panels and minimize number of field seams.

E. Temporary Bonding

1. Hot air device (Liester) may be used to temporarily bond EIA liner panels that are to be welded. No other temporary bonding of liner is allowed unless authorized by the OWNER.

2. Do not damage EIA liner when temporarily bonding adjacent panels. Apply minimal amount of heat to lightly tack liner panels together. Control temperature of hot air at nozzle of any temporary welding apparatus to prevent damage to the EIA liner.

3. Do not use solvent or adhesive.

F. Seaming Methods: the approved process for field seaming is heat welding or RF welding. Proposed alternate processes shall be documented and submitted to OWNER for approval. Alternate procedures shall be used only after being approved in writing by OWNER.

1. Produce seams meeting following requirements:

EIA LINER SEAM PROPERTIES

Property	Method	Value (minimum)
Bonded Seam Strength	ASTM D751 (Grab Test Method, Procedure A)	550 pounds
Dead Load - Seam Strength, 4 Hour Test	ASTM D751 (2 in. Overlapped Seam)	240 pounds per inch of seam at 70 ^{o}F 120 pounds per inch of seam at 160 ^{o}F

2. Align EIA liner panels to have nominal overlap of 2 in. for seaming.

G. The GEOSYNTHETICS INSTALLER shall adhere to the following seaming procedures:

1. General Seaming Procedures

a. Perform seaming under dry conditions, i.e., no precipitation or other excessive moisture. Suspend seaming during periods of excessive winds. Portable shelters (tents) may be used during inclement weather to protect seam area at no additional cost to the OWNER.

b. If required, provide firm substrate by using extra piece of EIA liner, or similar hard surface directly under seam overlap to achieve proper support for seaming apparatus.

c. Align seams with least possible number of wrinkles and fishmouths. Cut fishmouths or wrinkles along ridge of wrinkle in order to achieve flat overlap. Seam cut fishmouths or wrinkles and patch portions where overlap is inadequate. Use oval or round patch of same EIA liner extending minimum of 6 in. (150 mm) beyond cut in all directions.

d. Provide adequate illumination if seaming operations carried out at night.

e. Extend seams to outside edge of panels placed in anchor trench.

f. Do not field seam without master seamer being present.

g. Prior to seaming, ensure that seam area is clean and free of moisture, dust, dirt, debris, or foreign material of any kind.

2. Cold Weather Seaming Procedures: The GEOSYNTHETICS INSTALLER shall meet the following conditions, in addition to general seaming procedures, if seaming is conducted when the ambient temperature is below 32°F (0°C).

   a. Preheating of seams is required if the EIA surface temperature is below 32°F (0°C). GEOSYNTHETICS QAC shall determine EIA liner surface temperatures at intervals of at least once per 100 ft. of seam length. Preheating devices used shall be pre-approved by OWNER prior to use.

   b. Preheating may be waived by OWNER based on recommendation from GEOSYNTHETICS QAC, if demonstrated to GEOSYNTHETICS QAC's satisfaction that welds of equivalent quality may be obtained without preheating at expected temperature of installation.

   c. GEOSYNTHETICS QAC shall observe all areas of EIA liner that have been preheated by hot air device prior to seaming, to ensure they have not been subjected to excessive melting.

   d. GEOSYNTHETICS QAC shall confirm that surface temperatures not lowered below minimum surface temperatures specified for welding due to winds or other adverse conditions. It may be necessary to provide wind protection for seam area.

   e. Trial seaming, as described in Article 3.04 B of this section, shall be conducted under same ambient temperature and preheating conditions as actual seams. New trial seams shall be conducted if ambient temperature drops by more than 10°F (3°C) from initial trial seam test conditions. Such new trial seams shall be conducted upon completion of seams in progress during temperature drop.

3. Warm Weather Procedures: The GEOSYNTHETIC INSTALLER shall meet following conditions, in addition to general seaming procedures, if seaming conducted when sheet temperature above 122°F (50°C) or ambient temperature above 104°F (40°C).

a. At sheet temperatures above 122°F (50°C) or ambient temperature above 104°F (40°C), no seaming of EIA liner shall be permitted unless demonstrated to OWNER's satisfaction that EIA liner seam quality will not be compromised.

b. Trial seaming, as described in Article 3.04 B, shall be conducted under same ambient temperature conditions as actual seams. New trial seams shall be conducted if ambient temperature rises by more than 5°F (3°C) from initial trial seam test conditions. Such new trial seams shall be conducted upon completion of seams in progress during temperature rise.

H. The following repair procedures shall be performed by the GEOSYNTHETICS INSTALLER:

1. Repair portions of the EIA liner that are damaged, exhibit flaws, or fail destructive or non-destructive seam tests.

2. Final decision as to appropriate repair procedure shall be agreed upon between OWNER, GEOSYNTHETICS INSTALLER, and GEOSYNTHETICS QAC.

a. Available repair procedures include patching a piece of the same EIA liner into place over the damaged area. Use to repair large holes, tears, non-dispersed raw materials, and contamination by foreign matter.

b. Capping: Strip of same EIA liner welded into place over inadequate seam. Use to repair large lengths of failed seams.

c. Welding flap shall not be allowed.

d. Removal and replacement: Remove bad area and replace with the same EIA liner welded into place. Use to repair large lengths of failed seams.

3. Repair seaming and welding shall comply with paragraphs F and G above.

4. For patches and cap strips extend repair a minimum of 6 in. beyond defect in all directions.

5. Do not place overlying layers over locations which have been repaired until appropriate test results have been obtained.

I. Anchor Trench

1. EARTHWORK CONTRACTOR shall excavate anchor trenches, unless otherwise specified, to lines and grades shown on design drawings, prior to EIA liner placement.

2. Slightly rounded corners shall be provided in anchor trench to avoid sharp bends in geomembrane.

3. If anchor trench excavated in clay material susceptible to desiccation, amount of trench open at any time should be minimized.

4. Remove all construction-related debris from anchor trench.

5. EARTHWORK CONTRACTOR shall backfill and compact anchor trench as soon as practical after EIA liner installation completed. Care will be taken when backfilling trenches to prevent damage to geosynthetics.

6. GEOSYNTHETICS INSTALLER shall inspect the anchor trench subgrade prior to deploying EIA liner into the anchor trench. After GEOSYNTHETICS INSTALLER accepts subgrade, ensure excessive amounts of loose soil do not underlie the EIA liner in anchor trench.

7. The EARTHWORK CONTRACTOR shall ensure that anchor trench will be adequately dewatered to prevent ponding or softening of adjacent soils while trench open.

3.04 FIELD QUALITY CONTROL

A. Visual Inspection

1. GEOSYNTHETICS QAC shall examine seam and non-seam areas of EIA liner for identification of defects, holes, blisters, non-dispersed raw materials, and any sign of contamination by foreign matter.

2. The GEOSYNTHETICS INSTALLER shall clean and wash the EIA liner surface if GEOSYNTHETICS QAC determines that the amount of dust or mud inhibits examination.

3. Do not seam any EIA liner panels that have not been examined for flaws by GEOSYNTHETICS QAC.

4. Non-destructively test each suspect location in seam and non-seam areas using methods described in Article 3.04 C of this section as appropriate.

B. The GEOSYNTHETICS INSTALLER shall adhere to the following Trial Seam requirements:

1. Prepare trial seams on fragment pieces of EIA liner under actual seaming conditions to verify those conditions are adequate for production seaming.

2. Make trial seams at the beginning of each seaming period, and at least once each 5 hrs, for each production welder/seaming apparatus combination used that day.

3. Make trial seams only under observation of GEOSYNTHETICS QAC.

4. Make trial seam sample at least 3 feet long by l ft. (0.3 m) wide (after seaming) with seam centered lengthwise following procedures specified above.

7. Test trial seam for bonded seam strength in accordance with paragraph F above.

C. The GEOSYNTHETICS INSTALLER shall adhere to the following non-destructive seam testing requirements:

1. General

a. Perform non-destructive tests in the presence of QAC to verify continuity of seams. These tests do not provide quantitative information on seam strength.

b. Non-destructively test field seams over their full length using vacuum test and/or air lance test methods. Document the results.

c. Perform non-destructive testing as seaming work progresses, not at completion of all field seaming.

2. Visual Inspection

a. EIA seaming require the application of pressure to the seam areas to force the two heated sheets together in their molten states. This applied pressure causes molten polymer to extrude from the edge of the seam.

b. A visual inspection of the full length of every seam shall be performed to verify that extruded polymer is visible continuously along the seam.

c. Observe, mark, and document all seam areas not having visible extruded polymer along the edge of the seam.

d. Repair noncompliant seams in accordance with Article 3.03. H of this section. Verify repairs in accordance with Article 3.04 E of this section.

3. Vacuum Testing Procedure

a. Energize vacuum pump and reduce tank pressure to approximately 5 psi (10 in. of Hg) (35 kPa) gauge pressure.

b. Wet strip of EIA liner approximately 12 in. by 48 in. (0.3 m x 1.2 m) with soapy solution.

c. Place vacuum box over wetted area, apply vacuum for a period of not less than 10 seconds, and examine the EIA liner through viewing window for presence of soap bubbles.

d. If no bubbles appear within 10 seconds, move box over to next adjoining area with minimum 3 in. (75 mm) overlap and repeat process.

e. Mark and repair areas where soap bubbles appear in accordance with Article 3.03 H of this section. Verify repairs in accordance with Article 3.04 E.

4. Air Lance Testing Procedure

   a. Provide source of compressed air capable of sustained discharge of air at a minimum pressure of 55 psi gauge pressure.

   b. Using a 3/16 inch diameter nozzle, direct jet of compressed air perpendicular to edge of seam and towards the overlying liner sheet.

   c. Maintain nozzle no greater than 4 inches away from seam edge and as close to in-plane with the liner as possible.

   d. Progress along the length of the seam to be tested at no greater than 40 feet per minute.

   e. Observe, mark, and document all seam areas having incomplete seaming (i.e., seam areas that allow compressed air to pass through the seam and underneath the overlying liner sheet) and all seam edges having unseamed areas 1/8 inch or greater inward from the seam edge.

   f. Repair noncompliant seams in accordance with Article 3.03. H of this section. Verify repairs in accordance with Article 3.04 E of this section.

D. The GEOSYNTHETICS INSTALLER shall adhere to the following destructive seam testing requirements:

   1. A minimum frequency of one test location for each seam greater than 250 feet in length. For seams shorter than 250 feet in length, one test location shall be selected for every 500 linear feet of seaming collectively. Whenever possible, samples shall be collected near the anchor trenches to limit hydrostatic heads on seam repair areas and, depending on the amount of excess material at the anchor trench, to completely avoid the need to repair the sample area.

   2. Samples shall be collected near the anchor trenches to limit hydrostatic heads on seam repair areas.

   5. Results for destructive seam testing shall be in compliance with Article 3.03 F.

   6. Repair sample areas and any seams failing destructive testing requirements in accordance with Article 3.03 H. Verify repairs in accordance with Article 3.04 E.

E. Repair Verification

   1. GEOSYNTHETICS QAC shall number and log each repair.

   2. Non-destructively test each repair using methods described in Article 3.04 C as appropriate. Document the results.

   3. Passing non-destructive test results indicate adequate repair.

4. Failed non-destructive tests indicate that repair shall be redone and retested until passing test results.

F. Large Wrinkles: Wrinkle considered to be large when EIA liner can be folded over onto itself.

1. When seaming of EIA liner is completed, and prior to placing overlying materials, GEOSYNTHETICS QAC shall identify all excessive wrinkles.

2. Cut and reseam all wrinkles identified by GEOSYNTHETICS QAC. Test seam produced while repairing wrinkles in accordance with Article 3.03 H.

3. Repair wrinkles identified by GEOSYNTHETICS QAC. Repair during coldest part of installation period.

3.05 FACTORY PANEL FABRICATION QUALITY CONTROL

A. Factory-fabricated panels of EIA liner shall be subject to all seam testing requirements specified in this section or those recommended by the Manufacturer, whichever is more stringent.

B. Results of seam testing for factory-fabricated panels shall be provided to OWNER prior to delivery of subject panels.

* * * END OF SECTION * * *

SECTION 02410
GEOTEXTILE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-woven geotextiles for landfill lining and final cover systems and for erosion control and general use in ancillary construction outside of the landfill. Refer to Section 02430 - Geotextile/Geonet Composite for requirements of geotextile components of geocomposite drainage layers.

1.02 RELATED SECTIONS

A. Section 01400 - General Provisions for Geosynthetics

1.03 REFERENCES

A. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

B. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.

C. ASTM D4533 - Test Method for Trapezoid Tearing Strength of Geotextiles.

D. ASTM D4632 - Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).

E. ASTM D6241 - Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

F. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

G. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

H. ASTM D5101 - Standard Test Method for Measuring the Soil-Geotextile System Clogging Potential by the Gradient Ratio.

I. ASTM D5567 - Standard Test Method for Hydraulic Conductivity Ratio (HCR) Testing of Soil/Geotextile Systems.

J. AASHTO M288-06 - Geotextile Specification for Highway Applications.

Note: The most current version of the specified test methods indicated above should be followed by the GEOSYNTHETICS MANUFACTURER, GEOSYNTHETICS INSTALLER, or authorized testing laboratory. In the event that a new test method becomes available and is deemed by the

ENGINEER to be appropriate for use, either in addition to those methods indicated above or as a replacement to one or more of the methods indicated above, the new method will be used.

1.04 QUALITY CONTROL SUBMITTALS

A. Pre-installation:

The GEOSYNTHETICS MANUFACTURER shall submit the following to OWNER for approval, prior to geotextile deployment:

1. Origin (supplier's name and production plant) and identification (brand name and number) of resin.

2. Copies of dated quality control certificates issued by resin supplier.

3. Results of test conducted by GEOSYNTHETICS MANUFACTURER to verify that quality of resin used to manufacture geotextile meets GEOSYNTHETICS MANUFACTURER’s resin specifications.

4. Statement indicating that reclaimed polymer added to resin during manufacturing was done with appropriate cleanliness.

5. List of materials that comprise geotextile, expressed in following categories as percent by weight: base polymer, carbon black, and other additives.

6. GEOSYNTHETICS MANUFACTURER specification for geotextile that includes properties contained in Article 2.01 of this section.

7. Written certification that minimum average roll values given in manufacturer's specification guaranteed by the GEOSYNTHETICS MANUFACTURER.

8. For needle-punched, non-woven geotextiles, written certification that the GEOSYNTHETICS MANUFACTURER has continuously inspected geotextile for presence of needles and found geotextile to be needle-free.

9. Quality control certificates, signed by responsible entity employed by GEOSYNTHETICS MANUFACTURER. Each quality control certificate shall include roll identification numbers, testing procedures and results of quality control test.

B. Installation:

The GEOSYNTHETICS INSTALLER shall submit the following as installation proceeds:

1. Subgrade surface acceptance certificates, signed by GEOSYNTHETICS INSTALLER, for each area that geotextile will be in direct contact with subgrade. Submit prior to geotextile deployment. Deployment of geotextile will be considered acceptance of subgrade if certificate not submitted.

C. Temporary/Sacrificial Applications:

1. For geotextiles to be used in applications designated on the Drawings as "temporary" or "sacrificial," the quality control submittals identified in Part 1.04 of this Section are not required.

1.05 DELIVERY, STORAGE AND HANDLING

A. The GEOSYNTHETICS MANUFACTURER shall adhere to the following packaging and shipping requirements:

1. Geotextiles shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers.

2. Geotextile rolls shall be marked or tagged with following information.

a. Manufacturer's name;

b. Product identification;

c. Roll number;

d. Roll dimensions; and

e. Special instruction as necessary.

B. The GEOSYNTHETICS INSTALLER and/or EARTHWORK CONTRACTOR shall adhere to the following storage and protection requirements:

1. Provide on-site storage in OWNER designated area for geotextile rolls from time of delivery until installed.

2. Store and protect geotextile from dirt, water, ultraviolet light exposure, and other potential sources of damage.

3. Preserve integrity and readability of geotextile roll labels.

PART 2 PRODUCTS

2.01 MATERIALS

A. Baseliner System Cushion Geotextile: For baseliner geotextile serving as a cushion geotextile (i.e., the geotextile under the geosynthetic clay liner and the geotextile separating the liner system geomembranes from adjacent aggregate layers), the GEOSYNTHETICS MANUFACTURER shall provide material that meets or exceeds geotextile properties specified below. Certain values are based on survivability classification identified in the AASHTO M288-06 standard that was current as of the date of this specification. Should subsequent revisions to the AASHTO standard result in changes to these values, the values in the latest version of the AASHTO shall apply.

BASELINER SYSTEM CUSHION GEOTEXTILE PROPERTIES

Property	Method	Value (MARV)*
Mass per Unit Area	ASTM D5261	16 oz/sq yd min.
Grab Strength	ASTM D4632	157 lbs min. (AASHTO Class 2 Survivability)
Trapezoidal Tear Strength	ASTM D4533	56 lbs min. (AASHTO Class 2 Survivability)
Puncture Strength	ASTM D6241	309 lbs min. (AASHTO Class 2 Survivability)

* Minimum Average Roll Value

B. Baseliner System Separator Geotextile: For baseliner geotextile serving as a separator geotextile (i.e., the geotextile between the operations layer and the granular drainage layer and the geotextile used to wrap the leachate collection pipes and surrounding filter stone), the GEOSYNTHETICS CONTRACTOR shall provide material that meets or exceeds geotextile properties specified below. Certain values are based on survivability classification identified in the AASHTO M288-06 standard that was current as of the date of this specification. Should subsequent revisions to the AASHTO standard result in changes to these values, the values in the latest version of the AASHTO shall apply.

BASELINER SYSTEM SEPARATOR GEOTEXTILE PROPERTIES

Property	Method	Value (MARV, Except AOS)*
Grab Strength	ASTM D4632	157 lbs min. (AASHTO Class 2 Survivability)
Trapezoidal Tear Strength	ASTM D4533	56 lbs min. (AASHTO Class 2 Survivability)
Puncture Strength	ASTM D6241	309 lbs min. (AASHTO Class 2 Survivability)
Permittivity	ASTM D4491	$9.6 \times 10^{-2}\ s^{-1}$ min.
Apparent Opening Size	ASTM D4751	0.43 mm max.
Ultraviolet Stability	ASTM D4355	50% min. (after 500 hours of exposure)

* Minimum Average Roll Value

C. Final Cover Geotextile: For geotextile to wrap collection pipes in the final cover systems, the GEOSYNTHETICS CONTRACTOR shall provide material that meets or exceeds geotextile property values specified below. Certain values are based on survivability classification identified in the AASHTO M288-06 standard that was current as of the date of this specification. Should subsequent revisions to the AASHTO standard result in changes to these values, the values in the latest version of the AASHTO shall apply.

FINAL COVER GEOTEXTILE PROPERTIES

Property	Method	Value (MARV, Except AOS)*
Grab Strength	ASTM D4632	157 lbs min. (AASHTO Class 2 Survivability)
Trapezoidal Tear Strength	ASTM D4533	56 lbs min. (AASHTO Class 2 Survivability)
Puncture Strength	ASTM D6241	309 lbs min. (AASHTO Class 2 Survivability)
Apparent Opening Size	ASTM D4751	0.22 mm max.
Permittivity	ASTM D4491	0.1 s^{-1} min.
Clogging Potential	ASTM D5101	Constant Value ≤ 3
	or	
	ASTM D5567**	0.75 – 1.0
Ultraviolet Stability	ASTM D4355	50% min. (after 500 hours of exposure)

* Minimum Average Roll Value
** ASTM D5567 with modified sample and conditions as directed by the ENGINEER.

D. Erosion Control and General Use Geotextile: For geotextile to be placed beneath riprap for erosion control and for general use to separate dissimilar materials (e.g., underlayment beneath crushed stone material) in ancillary construction outside of RMU-2, the GEOSYNTHETICS CONTRACTOR shall provide material that meets or exceeds geotextile property values specified below. Certain values are based on survivability classification identified in the AASHTO M288-06 standard that was current as of the date of this specification. Should subsequent revisions to the AASHTO standard result in changes to these values, the values in the latest version of the AASHTO shall apply.

EROSION CONTROL AND GENERAL USE GEOTEXTILE PROPERTIES

Property	Method	Value (MARV, Except AOS)*
Mass per Unit Area	ASTM D5261	10 oz/sq yd min.
Grab Strength	ASTM D4632	202 lbs min. (AASHTO Class 1 Survivability)
Trapezoidal Tear Strength	ASTM D4533	79 lbs min. (AASHTO Class 1 Survivability)
Puncture Strength	ASTM D6241	433 lbs min. (AASHTO Class 1 Survivability)
Apparent Opening Size	ASTM D4751	0.22 mm max.
Permittivity	ASTM D4491	0.1 s^{-1} min.
Ultraviolet Stability	ASTM D4355	50% min. (after 500 hours of exposure)

* Minimum Average Roll Value

E. Temporary/Sacrificial Geotextile: For geotextiles indicated on the Drawings as “temporary” or “sacrificial,” the GEOSYNTHETICS CONTRACTOR shall provide material that has a minimum mass per unit area (ASTM D3776) of 6 oz/sq yd. No other minimum performance criteria apply to this material.

F. Geotextiles shall be a stock product, i.e., except when specifically authorized in writing by OWNER. Supplier shall not furnish products specifically manufactured to meet these specifications.

G. Geotextile shall be comprised of polymeric yarns, or fibers oriented into a stable network that retains its structure during handling and placement.

2.02 MANUFACTURER QUALITY CONTROL

Ensure that geotextile manufacturer meets conditions in this section for all geotextile materials identified in this Section, except Temporary/Sacrificial Geotextile.

A. Tests, Inspections:

1. GEOSYNTHETICS MANUFACTURER shall test geotextiles to evaluate characteristics for quality control. At minimum, the following tests shall be performed in accordance with test methods specified in Article 2.01 of this section. At a minimum, quality control tests shall be performed for at least one every lot or at minimum, every 100,000 ft^2 (10,000 m^2) of geotextile produced. Samples not satisfying these specifications and manufacturer's specifications shall result in rejection of applicable roll.

   a. Mass per unit area;

   b. Grab strength;

   c. Trapezoidal tear strength;

   d. Burst strength; and

   e. Puncture strength.

2. At OWNER'S discretion and expense, additional testing of individual rolls may be performed to more closely identify non-complying rolls and to qualify individual rolls.

3. GEOSYNTHETICS MANUFACTURER shall certify that UV resistance, filtration, and permeability testing has been performed for each product and resin type in accordance with test methods specified in Article 2.01 of this section. Frequency specified for other quality control tests does not apply to these three material properties.

PART 3 EXECUTION

3.01 EXAMINATION

A. Samples of the geotextile material(s) shall be collected for conformance testing. As outlined in Section 11.4 of the Construction Quality Assurance Manual (QAM), conformance samples shall be collected in one of the following manners:

1. The GEOSYNTHETICS QAC shall collect samples of geotextile for conformance testing at the time of delivery to the site; or

2. The GEOSYNTHETICS QAC shall direct representatives of the GEOSYNTHETICS QAL to collect samples of the geotextile for conformance testing from the material at the manufacturer's facility.

B. Conformance Testing: GEOSYNTHETICS QAC shall collect samples of all geotextile types delivered to the site for conformance testing, except Temporary/Sacrificial Geotextile. Sampling and testing shall be conducted as outlined in the QAM utilizing test methods provided in Part 1.03 of this Section.

3.02 INSTALLATION

A. Geotextile Deployment: The GEOSYNTHETICS INSTALLER shall handle geotextile in manner to ensure it is not damaged and complies with the following:

1. On slopes, anchor geotextile securely and deploy it down slope in a controlled manner to continually keep geotextile in tension.

2. Weight geotextile with sandbags or equivalent in presence of wind. Do not remove weights until replaced with cover material.

3. Cut geotextile with geotextile cutter (hook blade). Protect adjacent materials from potential damage due to cutting of geotextile.

4. Prevent damage to underlying layers during placement of geotextile.

5. During geotextile deployment, do not entrap in, or beneath geotextile, stones, excessive dust, or moisture that could damage underlying geomembrane, cause clogging, or impact subsequent seaming. Verify that materials such as stone, soil fill, etc. is not present beneath geotextile seams.

6. Visually examine entire geotextile surface before seaming. Ensure no potentially harmful or damaging foreign objects, such as needles, are present and remove any foreign objects encountered or replace geotextile.

7. Geotextile shall be protected during construction from damage by runoff and sedimentation. Damaged geotextile shall be removed and replaced.

8. If Geotextile is exposed to UV light for more than 4 months, 2 representative samples will be cut and submitted for wide width testing, at the GEOSYNTHETICS INSTALLER's expense, to determine if the Geotextile has sufficient tensile strength for use. The test results will be reviewed by the ENGINEER and accepted by the OWNER.

B. The GEOSYNTHETICS INSTALLER shall adhere to the following seaming procedures:

1. Horizontal seams or splices not allowed on slopes greater than 10H:1V, except as part of a patch. Seams shall be downslope, not across slope.

2. Overlap geotextile a minimum of 3 in. (75 mm) prior to seaming.

3. Seams shall be continuous using a locking stitch.

4. Thread shall be a polymeric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of geotextile. Thread color shall contrast with geotextile to allow for visual inspection.

C. Defects and Repairs: The GEOSYNTHETICS INSTALLER shall repair holes or tears in geotextile as follows.

1. Sew into place, in accordance with Paragraph 3.02.B of this section, a patch made from same geotextile, with a minimum 12 in. (0.30 m) overlap in all directions.

2. Remove soil or other material that may have penetrated torn geotextile.

3.03 INTERFACE WITH OTHER PRODUCTS

A. When installing materials over geotextile, the EARTHWORKS CONTRACTOR shall ensure the following:

1. Geotextile and underlying lining materials not damaged.

2. Minimal slippage of geotextile on underlying layers occurs.

3. No excess tensile stresses occur in geotextile.

4. Minimum of 12 in. of fill is placed over geotextile maintained in traffic areas.

5. Other conditions as required in Section 02401.

* * * END OF SECT1ON * * *

SECTION 02413
GEOSYNTHETIC CLAY LINER (GCL)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide all labor, materials, equipment, tools and appurtenances required to complete the installation of all GCL layers as shown on the Drawings.

B. GCL will be installed as part of the landfill baseliner system and final cover system construction. The following technical specifications present requirements for the manufacturing, testing, transport, storage and installation of the GCL.

1.02 REFERENCES

A. ASTM D4354 - Standard Practice for Sampling of Geosynthetics for Testing.

B. ASTM D4873 - Standard Guide for Identification, Storage and Handling of Geosynthetic Rolls and Samples.

C. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

D. ASTM D5721 - Standard Practice for Air-Oven Aging of Polyolefin Geomembranes.

E. ASTM D5887 - Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter.

F. ASTM D5888 - Standard Guide for Storage and Handling of Geosynthetic Clay Liners.

G. ASTM D5889 - Standard Practice for Quality Control of Geosynthetic Clay Liners.

H. ASTM D5890 - Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.

I. ASTM D5891 - Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.

J. ASTM D5993 - Standard Test Method for Measuring Mass per Unit Area of Geosynthetic Clay Liners.

K. ASTM D6102 - Standard Guide for Installation of Geosynthetic Clay Liners.

L. ASTM D6141 - Standard Guide for Screening Clay Portion of Geosynthetic Clay Liner (GCL) for Chemical Compatibility to Liquids.

M. ASTM D6243 - Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method (with the following clarifications):

1. For interface shear test, test GCL with materials which will be installed above and below the GCL (i.e., 80-mil textured geomembrane/GCL, GCL/nonwoven geotextile, 40-mil textured membrane/GCL interface, and GCL/separation layer interfaces).

2. All specimens and interfaces shall be fully hydrated for at least 24 hours, under 200 psf normal stress.

3. For Final Cover GCL, tests shall be performed at normal loads of 100, 250, 500 and 1,000 psf.

4. For Baseliner GCL, tests shall be performed at normal loads of 260, 2,500, 5,000, 10,000 and 15,000 psf.

N. ASTM D6495 - Standard Guide for Acceptance Testing Requirements for Geosynthetic Clay Liners.

O. ASTM D6496 - Standard Test Method for Determining Average Bonding Peel Strength Between the Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners.

P. ASTM D6766 - Standard Test Method for Evaluation of Hydraulic Properties of Geosynthetic Clay Liners Permeated with Potentially Incompatible Liquids.

Q. ASTM D6768 - Standard Test Method for Tensile Strength of Geosynthetic Clay Liners.

R. GRI GCL3 - Test Methods, Required Properties, and Testing Frequencies of Geosynthetic Clay Liners (GCLs).

Note: The most current version of the specified test methods indicated above should be followed by the GEOSYNTHETICS MANUFACTURER, GEOSYNTHETICS INSTALLER, or authorized testing laboratory. In the event that a new test method becomes available and is deemed by the ENGINEER to be appropriate for use, either in addition to those methods indicated above or as a replacement to one or more of the methods indicated above, the new method will be used.

1.03 DEFINITIONS

A. Minimum Value – Property value representing the lowest individual allowable result when tested according to the specified test method. This applies to individual readings such as thickness or for tests where only one specimen is tested for the specific parameter.

B. Minimum Average Value – Property value representing the lowest allowable value for the reported average of specimens tested for the specified parameter.

C. Minimum Average Roll Value (MARV) – Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7% degree of confidence that any sample taken during quality assurance will exceed the value reported.

D. Nominal Value – Property value that is representative of a measurable property, determined under a set of prescribed test conditions, by which a product may be described.

E. Typical Roll Value – Property value calculated from average or mean obtained from test data.

1.04 SUBMITTALS

A. The GEOSYNTHETICS MANUFACTURER and/or GEOSYNTHETICS INSTALLER shall submit to the OWNER, in accordance with Section 01340, all items described in subsequent sections, as outlined by the following schedule:

1. Prior to Delivery to the Site:

a. A project reference list demonstrating the GEOSYNTHETICS INSTALLER's experience on a minimum of 5 projects consisting of 10 million square feet of installed GCL, or as approved by the OWNER.

b. A list of all GCL installation crew personnel and resumes of the Supervisor and QC Manager including prior experience installing GCL. This information shall be submitted at least 60 days prior to the commencement of GCL installation. If the exact crew who will be performing the installation is not known 60 days in advance of the start date, the GEOSYNTHETICS INSTALLER shall submit a list of several potential crew members. This information shall be supplied in a timely manner for approval in order to avoid delay of any construction activities. GCL crew staff will be subject to approval by the OWNER.

c. A copy of the GEOSYNTHETICS MANUFACTURER's Manufacturing Quality Assurance/Manufacturing Quality Control (MQA/MQC) Plan for testing GCL.

d. A statement of the GEOSYNTHETICS MANUFACTURER's experience in manufacturing GCL, including the manufacturing and supplying company's name, address, and employee contact.

e. A certification from the GEOSYNTHETICS MANUFACTURER attesting that the proposed GCL meets the physical, mechanical and manufacturing requirements specified in Part 2 of this Section.

f. Copies of the Manufacturing Quality Control (MQC) certificates for the material to be delivered to the site. The reports shall include the quality control test results of samples obtained during the manufacturing of the material to be delivered to the site. The GCL will be rejected if it does not meet the specified requirements of Part 2 of this Section or if it is found to have defects, rips, holes, flaws, deterioration or other damage deemed unacceptable by the GEOSYNTHETICS QAC.

g. A certification from the manufacturer that the manufacturing process used to produce the GCL includes needle detection and a mechanism for removal of needles. The certification shall include a statement attesting that the needle detection and removal process will be applied to all GCL supplied to this project, and that all GCL rolls shall be needle free.

h. Summary report including results of MQC testing required by this Section for GCL material to be delivered to the site. The report must clearly demonstrate that the GCL material to be delivered to the site meets the requirements of Part 2 of this Section.

i. Proposed method of GCL panel seaming including overlap distance at sides and end of panels, and use of additional material to complete the seal (if any).

j. Proposed method of detection of needles in installed panels.

k. Internal and interface shear strength test results as required in Part 2, Article 2.01, Paragraph C and/or D of this Section.

2. Prior to Installation, the GEOSYNTHETICS INSTALLER shall provide:

   a. A schedule of operations including means and methods of installation.

   b. The proposed method of deploying material and placement of panels.

   c. Proposed method or process by which adjacent panels will be joined to provide a continuous hydraulic barrier.

   d. Shop drawings including details of all overlapping attachments and anchoring.

   e. Proposed method of protecting installed GCL panels from rain, ponding water or other elements that could hydrate or damage the GCL.

3. During installation, the GEOSYNTHETICS INSTALLER shall submit weekly:

   a. Weekly construction progress reports clearly showing GCL panels and GCL roll numbers placed by date.

4. Upon completion, the GEOSYNTHETICS INSTALLER shall provide:

   a. Record Panel Layout Diagram.

   b. Summary and log of all laboratory quality control and quality assurance completed by GEOSYNTHETIC INSTALLER.

   c. Summary and log of all field quality control work completed by the GEOSYNTHETICS INSTALLER.

   d. Certification that GCL installation is complete and in accordance with these specifications.

e. Statement of material and installation warranties.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. The GEOSYNTHETICS MANUFACTURER shall be responsible for the protection of the GCL against damage during transportation to the site. The GEOSYNTHETICS INSTALLER shall be responsible for the protection of the GCL against damage during storage and installation at the site and prior to placement of subsequent construction materials.

B. GCL labeling, shipment, and storage shall follow ASTM D4873 and D5888, as modified according to this Section.

C. Product labels shall clearly show the manufacturer or supplier name, style name, roll number and roll dimensions.

D. If any special handling is required, it shall be so marked on the outside surface of the wrapping, (e.g., do not stack more than three rolls high).

E. The GCL shall be supplied dry (i.e., unhydrated, less than 35% moisture content) and be delivered to the site undamaged.

F. Each GCL roll shall be wrapped with a material that will protect the bentonite from moisture and the GCL from damage due to shipment, water, sunlight and contaminants.

G. The protective wrapping shall be maintained during periods of shipment and storage. If the wrapping is damaged prior to installation, the packaging shall be immediately repaired and/or the roll covered with a tarp to prevent potential additional hydration. The roll shall be set aside and marked for closer inspection upon deployment. Sections of the roll may be rejected if the moisture content of the bentonite has become excessively high as determined by the GEOSYNTHETICS QAC.

H. Storage area should be relatively flat and well drained. During storage, the GCL rolls shall be elevated off the ground utilizing a method which will not damage the GCL. Material that is damaged as a result of the method of storage or handling shall be rejected and replaced at no additional cost to the OWNER. The GCL rolls shall be adequately covered to protect them from the following:

1. Site construction damage;

2. Precipitation and ponded water;

3. Chemicals that are strong acids or bases;

4. Flames or sparks, temperatures in excess of 49°C (120°F); and

5. Any environmental condition that might damage the GCL.

I. The GEOSYNTHETIC INSTALLER shall protect the work described in this Section before, during and after installation. Only non-damaged, sufficiently dry material (as determined by the GEOSYNTHETICS QAC) shall be included within the construction.

J. Roll numbers on partially used rolls shall be maintained such that each GCL roll number can be readily identified just prior to GCL deployment.

K. If the GEOSYNTHETICS QAC determines that GCL is damaged, the GEOSYNTHETICS INSTALLER shall make all repairs and replacements in a timely manner to prevent delays in the progress of work. Any material damaged by the GEOSYNTHETICS INSTALLER, or damaged by others due to improper delivery, installation and/or storage, as determined by the GEOSYNTHETICS QAC, shall be replaced by the GEOSYNTHETICS INSTALLER at no cost to the OWNER.

1.06 QUALITY ASSURANCE SAMPLING, TESTING AND ACCEPTANCE

A. FINAL COVER GEOSYNTHETIC CLAY LINER MATERIAL

1. The GCL shall be subject to sampling and testing to verify conformance with this specification. As outlined in Section 13.4 of Quality Assurance Manual (QAM), conformance samples of the GCL shall be collected in one of the following manners:

    a. The GEOSYNTHETICS QAC shall collect samples of GCL for conformance testing at the time of delivery to the site; or

    b. The GEOSYNTHETICS QAC shall direct representatives of the GEOSYNTHETICS QAL to collect samples of the GCL for conformance testing from the material at the manufacturer's facility.

2. Samples shall be taken across the entire width of the GCL roll. Unless otherwise specified or permitted by the ENGINEER, samples shall be three feet long by the roll width. The GEOSYNTHETICS QAC or authorized representative shall mark the machine direction on the samples with an arrow. Unless otherwise specified, samples shall be taken at a frequency of one per 100,000 square feet (ft^2) of material delivered to the site. An appropriate number of samples as determined by the GEOSYNTHETICS QAC will be shipped directly to the GEOSYNTHETICS QAL. The GEOSYNTHETICS QAC shall examine the material properties required by this Section against all results from laboratory conformance testing. Non-conforming material will be rejected and bracketed from subsequent rolls from the same product lot.

3. Conformance testing shall be the responsibility of the OWNER and conducted by the GEOSYNTHETICS QAL. Conformance testing shall be conducted in accordance with ASTM D6495 but shall include the following parameters:

    a. Hydraulic Conductivity (ASTM D5887 – 1 test per 250,000 square feet).

    b. Mass per Unit Area of Bentonite (ASTM D5993).

c. Mass per Unit Area Upper and Lower Layer Geotextile (ASTM D5261).

d. Bentonite Moisture Content (ASTM D5993).

e. Index Flux of GCL (ASTM D5887).

f. Tensile Strength of GCL (ASTM D6768).

4. The GEOSYNTHETICS INSTALLER and/or MANUFACTURER shall, at no additional cost to the OWNER, provide whatever reasonable assistance the GEOSYNTHETICS QAC may require in obtaining the samples for conformance testing.

5. The GEOSYNTHETICS MANUFACTURER shall provide MQC data issued by the manufacturer prior to site delivery of the GCL. In the event the material is delivered prior to receipt of the manufacturer's quality control certificates, the GCL without quality control certificates will be stored separate from GCL with quality control certificates. GCL rolls with unacceptable quality control data shall be segregated from approved material and marked for rejection.

6. Internal and interface shear strength testing of the GCL is the responsibility of the OWNER. All testing must be conducted prior to approval and delivery of the GCL material and performed with components that will be used in construction. Final Cover GCL material must meet the requirements of Part 2, Article 2.01, Paragraph C of this Section.

B. BASELINER GEOSYNTHETIC CLAY LINER MATERIAL

1. The GCL shall be subject to sampling and testing to verify conformance with this specification. As outlined in Section 13.4 of QAM, conformance samples of the GCL shall be collected in one of the following manners:

a. The GEOSYNTHETICS QAC shall collect samples of GCL for conformance testing at the time of delivery to the site; or

b. The GEOSYNTHETICS QAC shall direct representatives of the GEOSYNTHETICS QAL to collect samples of the GCL for conformance testing from the material at the manufacturer's facility.

2. Samples shall be taken across the entire width of the GCL roll. Unless otherwise specified or permitted by the ENGINEER samples shall be three feet long by the roll width. The GEOSYNTHETICS QAC or authorized representative shall mark the machine direction on the samples with an arrow. Unless otherwise specified, samples shall be taken at a frequency of one per 100,000 ft^2 of material delivered to the site. An appropriate number of samples as determined by the GEOSYNTHETICS QAC will be shipped directly to the GEOSYNTHETICS QAL. The GEOSYNTHETICS QAC shall examine the material properties required by this Section against all results from laboratory conformance testing. Non-conforming material will be rejected and bracketed from subsequent rolls from the same product lot.

3. Conformance testing shall be the responsibility of the OWNER and conducted by the GEOSYNTHETICS QAL. Conformance testing shall be conducted in accordance with ASTM D6495 but shall include the following parameters:

   a. Hydraulic Conductivity (ASTM D5887 – 1 test per 250,000 square feet).

   b. Mass per Unit Area of Bentonite (ASTM D5993).

   c. Mass per Unit Area Upper and Lower Layer Geotextile (ASTM D5261).

   d. Bentonite Moisture Content (ASTM D5993).

   e. Index Flux of GCL (ASTM D5887).

   f. Tensile Strength of GCL (ASTM D6768).

4. The GEOSYNTHETICS INSTALLER and/or MANUFACTURER shall, at no additional cost to the OWNER, provide whatever reasonable assistance the GEOSYNTHETICS QAC may require in obtaining the samples for conformance testing.

5. The GEOSYNTHETICS MANUFACTURER shall provide MQC data issued by the manufacturer prior to site delivery of the GCL. In the event the material is delivered prior to receipt of the manufacturer's quality control certificates, the GCL without quality control certificates will be stored separate from GCL with quality control certificates. GCL rolls with unacceptable quality control data shall be segregated from approved material and marked for rejection.

6. Internal and interface shear strength testing of the GCL is the responsibility of the OWNER. All testing must be conducted prior to approval and delivery of the GCL material and performed with components that will be used in construction. Baseliner GCL material must meet the requirements of Part 2, Article 2.01, Paragraph D of this Section.

PART 2 MATERIALS

2.01 GENERAL

A. The GCL shall consist of a low permeability sodium bentonite encapsulated between two geotextiles. The bentonite and finished product requirements are described in the following Parts and include the minimum MQA and MQC testing.

B. The GEOSYNTHETICS INSTALLER shall obtain a certificate from the GCL MANUFACTURER for MQC testing described in this Part.

C. FINAL COVER GCL MATERIAL - The GEOSYNTHETICS QAC shall obtain random samples of the proposed GCL and materials that will be installed above and below the GCL for the Final Cover System. These samples will undergo interface shear strength testing for each interface (i.e., 40 mil textured membrane/GCL interface and GCL/separation layer interfaces). Additionally, random samples of the proposed GCL for the Final Cover System shall be submitted for testing of internal shear strength. A minimum of one round of interface/internal shear strength testing (including testing at all indicated normal stresses, under all conditions, and for each interface) shall be completed prior to any construction season involving final cover construction. The interface/internal shear strength testing shall be repeated if, in the opinion of the ENGINEER, the manufacturer, product, or material characteristics of the associated products (GCL, geomembrane, or separation layer general fill) change following acceptance of the initial testing. All testing must be conducted prior to the approval and delivery of the materials and performed with components that will be used in the construction. Testing shall be conducted according to the most recent version of ASTM D6243. Test preparations shall be in accordance with Paragraph C.1 of this Part and the reported results shall meet the requirements of Paragraph C.2 of this Part.

1. All specimens and interfaces shall be hydrated under a normal load of 200 pounds per square foot (psf) for a minimum period of 24 hours prior to shearing at a strain rate of 0.04 in./min.

2. Tests for both internal and interface peak and residual shear strength shall be performed at normal loads of 100, 250, 500 and 1,000 psf with a minimum displacement of 6 in. The required peak and residual shear strengths are provided in the table below.

GCL INTERFACE AND INTERNAL SHEAR STRENGTH (ASTM D6243)
Frequency of 1 test per product type.

Normal Stresses (psf)	Required Peak Shear Strength (psf)*	Required Residual Shear Strength (psf)*
100	50	33
250	125	83
500	250	167
1,000	492	329

* The required shear strengths above include both internal friction and cohesion (adhesion) components. GCL residual internal shear strength testing is only required if laboratory testing indicates that the peak internal shear strength of the GCL is the lowest of the various materials or interfaces in the final cover system.

Additionally, testing for both internal and interface residual shear strength shall be performed at normal loads of 100, 250 and 500 psf at high strain rate (minimum of 0.5 in./min.) and large strains to simulate strength conditions during a seismic event. The required residual shear strengths are provided in the table below.

GCL INTERFACE AND INTERNAL SHEAR STRENGTH DURING SEISMIC EVENT (ASTM D6243) Frequency of 1 test per product type.

Normal Stresses (psf)	Required Residual Shear Strength (psf)*
100	38
250	95
500	191

* The required shear strengths above include both internal friction and cohesion (adhesion) components. GCL residual internal shear strength testing is only required if laboratory testing indicates that the peak internal shear strength of the GCL is the lowest of the various materials or interfaces in the final cover system.

D. BASELINER GCL MATERIAL - The GESOYNTHETICS QAC shall obtain random samples of the proposed GCL and materials that will be installed above and below the GCL for the Baseliner System. These samples will undergo interface shear strength testing for each interface (i.e., 80 mil textured geomembrane/GCL, GCL/non-woven geotextile). Additionally, random samples of the proposed GCL for the Baseliner System shall be submitted for testing of internal shear strength. A minimum of one round of interface/internal shear strength testing (including testing at all indicated normal stresses, under all conditions, and for each interface) shall be completed prior to any construction season involving baseliner construction. The interface/internal shear strength testing shall be repeated if, in the opinion of the ENGINEER, the manufacturer, product, or material characteristics of the associated products (GCL, geomembrane, or non-woven geotextile) change following acceptance of the initial testing. All testing must be conducted prior to the approval and delivery of the materials and performed with components that will be used in the construction. Testing shall be conducted according to the most recent version of ASTM D6243, test preparations shall be in accordance with Paragraph D.1 of this Part and the reported results shall meet the requirements of Paragraph D.2 of this Part.

1. All specimens and interfaces shall be hydrated under a normal load of 200 psf for a minimum period of 24 hours prior to shearing at a strain rate of 0.04 in./min.

2. Tests for both internal and interface shear strength shall be performed at normal loads of 260, 2,500, 5,000, 10,000 and 15,000 psf with a minimum displacement of 6 in. The minimum required residual shear strength for each of the interfaces is provided in the table below.

GCL INTERFACE AND INTERNAL SHEAR STRENGTH (ASTM D6243)
Frequency of 1 test per product type.

Normal Stresses (psf)	Required Residual Shear Strength (psf)*
260	70
2,500	1,200
5,000	2,100
10,000	3,500
15,000	4,400

* The required shear strengths above include both internal friction and cohesion (adhesion) components. GCL residual internal shear strength testing is only required if laboratory testing indicates that the peak internal shear strength of the GCL is the lowest of the various materials or interfaces in the baseliner system.

2.02 BENTONITE

A. The bentonite used for the production of the GCL shall be low permeability sodium bentonite.

B. The bentonite portion of the GCL shall be granular bentonite.

C. The supplier and/or source of the bentonite shall be included on the MQA results for the bentonite.

2.03 GEOSYNTHETIC CLAY LINER

A. The GCL shall consist of a low permeability sodium bentonite encapsulated between two nonwoven geotextiles.

B. The following table represents the minimum required MQC testing that must be conducted by the GEOSYNTHTICS MANUFACTURER on the GCL. The GCL shall be tested in accordance with ASTM D5889 as modified by the following table. Testing shall be conducted at the frequencies listed in the following table and must meet the required values provided:

GEOSYNTHETIC CLAY LINER

Property	Method	Value	Frequency
Bentonite Component Swell Index (As Received)	ASTM D5890	24 ml/2g min.	1 / 100,000 lb
Bentonite Component Fluid Loss (As Received)	ASTM D5891	18 ml max.	1 / 100,000 lb
Mass Per Unit Area			
1. Bentonite Content	ASTM D5993	0.75 lb/ft^2 dry weight MARV*	1 / 45,000 sf
2. Geotextile Upper Layer	ASTM D5261	5.8 oz/yd^2 MARV*	1 / 225,000 sf
3. Geotextile Lower Layer	ASTM D5261	5.9 oz/yd^2 MARV*	1 / 225,000 sf
Bentonite Moisture Content (As Manufactured)	ASTM D5993	35% max. ave. roll value	1 / 225,000 sf
Peel Strength	ASTM D6496	2.1 lb/in. MARV*	1 / 45,000 sf
Tensile Strength[2]	ASTM D6768	23 lbs/in MARV*	1 / 225,000 sf
Durability	GRI GCL3/ ASTM D5721/ ASTM D6768	65% of tensile strength (ASTM D6768) retained (min.) after 50 days incubation at 50^o C (ASTM D5721)	Yearly
Index Flux [1]	ASTM D5887	1 x 10^{-6} cm^3/cm^2/sec max.	1 / 270,000 sf
Permeability [1]	ASTM D5887	5 x 10^{-9} cm/sec max.	1 / 270,000 sf
Permeability with Potentially Incompatible Permeant[3]	ASTM D6766 (modified)	5x10^{-8} cm/s max. (10,000 psf Confining Pressure)	Yearly

* Minimum Average Roll Value.

1. Test according to manufacturer's recommendations, and in compliance with the specified ASTM standard as modified in this Section.

2. Tensile testing to be performed in the machine direction.

3. Permeability testing with potentially incompatible permeant to be performed using a calcium chloride solution as specified in GRI GCL3.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. The surface to be covered by the GCL shall be cleared of sharp objects, boulders, sticks, or any materials that may puncture, shear, or tear the GCL. The GCL subgrade shall have a smooth, finished surface, free from pockets, holes, ruts and depressions that will cause bridging and overstress the material to the judgment of the GEOSYNTHETICS QAC.

B. The GEOSYNTHETIC INSTALLER and GEOSYNTHETICS QAC shall inspect the subgrade for unsuitable areas or soft spots before the GCL is placed. Additional surface preparation will be required to eliminate any unsuitable areas as determined by the GEOSYNTHETICS QAC.

C. The subgrade/geosynthetic surface below the GCL shall:

1. Be prepared in accordance with the Plans and Specifications.

2. For GCL deployment over soil surfaces, the prepared soil surface shall have no stones or other protrusions that may be damaging to the GCL as determined by the GEOSYNTHETICS QAC.

3. For GCL deployment over geotextile, the approved geotextile surface shall be smooth, free from pockets, indentations, ruts or depressions and be free from loose granular material.

4. Be approved, accepted and certified by the GEOSYNTHETICS QAC and GEOSYNTHETICS INSTALLER's quality assurance inspector.

3.02 INSTALLATION

A. GCL shall not be deployed during periods of excessive winds which could prevent an acceptable installation as determined by the GEOSYNTHETICS QAC.

B. All GCL materials shall be installed according to the grades and locations presented in the Construction Drawings and in accordance with manufacturer's recommendations.

C. The GEOSYNTHETICS INSTALLER shall furnish the roll number and panel number to the GEOSYNTHETICS QAC prior to the installation of each panel.

D. The GEOSYNTHETICS INSTALLER shall maintain the GCL in an "as received" condition up to and including the time that the overlying layer of the Final Cover and/or Baseliner System is accepted by the OWNER. While the GCL will begin to hydrate immediately upon deployment, it is essential that the GCL not become fully hydrated prior to loading, as placement of material over hydrated bentonite may destabilize a given area. For Final Cover areas, the GCL must have a minimum of 1 ft. of cover soils in place prior to full hydration. For Baseliner areas, the GCL must have a minimum of 1 foot of primary leachate collection material in place prior to full hydration. Additional restrictions and guidance with regard to hydrated or wet GCL are as follows:

1. GCL shall not be placed on wet subgrade, as determined by the GEOSYNTHETICS QAC.

2. GCL becoming partially hydrated prior to covering with geomembrane shall be evaluated by the GEOSYNTHETICS QAC to ascertain the condition of the material and to determine if removal and replacement is necessary.

3. In the event that full hydration occurs prior to placement of the overlying materials described above, the GCL material shall be evaluated by the GEOSYNTHETICS QAC to ascertain the condition of the material and to determine if removal is necessary. Full hydration in this case shall be defined as a bentonite moisture content of 80% or more.

E. The EARTHWORKS INSTALLER is required to place cover materials described in Part 3.02, Paragraph D as quickly as possible after deployment of GCL and overlying geosynthetics. The time period between deployment of GCL and cover materials shall not exceed 20 days. This period of time may be extended, at the discretion of the ENGINEER, in the event the GEOSYNTHETICS INSTALLER can adequately demonstrate that the GCL does not hydrate above 50% moisture prior to placement of the cover materials.

F. Each panel shall be checked for the presence of broken needles from the manufacturing process according to the approved method submitted by the GEOSYNTHETICS MANUFACTURER. All identified needles must be removed by the GEOSYNTHETICS INSTALLER at no cost to the OWNER. Any panel or roll exhibiting the presence of excessive amounts of broken needles shall be rejected and removed at no additional cost to the OWNER. Excessive amounts of broken needles will be determined by the GEOSYNTHETICS QAC.

G. GEOSYNTHETIC INSTALLER personnel shall not be allowed to wear shoes that can damage the GCL during deployment or placement of subsequent geosynthetic materials.

H. GCL Panels shall be deployed in a direction from the highest elevation to the lowest elevation within the area to be lined. Whenever possible, GCL panels shall be staggered such that end seams between any two panels are not aligned with adjacent end seams. GCL panels shall be installed free of tension.

I. GCL seams shall be overlapped a minimum of 6 in. on edge seams and minimum of 12 in. on end seams after shrinkage and before placing cover.

J. The GEOSYNTHETICS INSTALLER shall not deploy more GCL in one day than can be covered by end of that day with overlying geomembrane materials.

K. The GCL rolls shall be handled in a manner that minimizes loss of bentonite along edges during deployment.

L. The GEOSYNTHETICS INSTALLER shall be responsible for protection of the GCL during installation. Unless otherwise approved by the ENGINEER, no rubber tire ATV's, tracked vehicles or any other equipment which may pose a risk of puncturing, tearing or otherwise damaging the GCL will be permitted for use directly over the GCL.

M. The GCL shall not be covered until inspected and approved by the GEOSYNTHETICS QAC. Field observations shall include a visual check of in-place GCL for the presence of needles.

3.03 REPAIRS

A. Repairs are to be made as soon as possible following deployment of GCL panels.

B. Damage to the GCL shall be repaired in the following manner, unless alternate procedures are proposed by the GEOSYNTHETICS INSTALLER and approved by the ENGINEER.

1. The damaged area shall be cleared of dirt and debris.

2. A patch of GCL shall be cut to extend a minimum of 12 in. beyond the damaged area in all directions.

3. Granular bentonite shall be placed around the perimeter of the damaged area at a rate of 0.25 pounds per linear foot.

4. The patch shall be placed over the damaged area and may be secured with an adhesive to keep the patch in position during backfilling or other activities over the GCL. The adhesive shall be approved by the GEOSYNTHETICS MANUFACTURER and the ENGINEER.

PART 4 QUALITY CONTROL

4.01 GENERAL

A. The GEOSYNTHETICS INSTALLER, before installation begins, shall appoint an experienced individual who will be on-site at all times during the installation, to represent the GEOSYNTHETICS INSTALLER in all matters pertaining to the work. This appointment shall be subject to approval by the OWNER.

B. All of the forms specified and required must be submitted in a timely fashion.

C. Any changes in the proposed method of work, subcontractors to be utilized, GCL or manufacturing, must be approved in advance by the OWNER. The GEOSYNTHETICS INSTALLER assumes all responsibility relevant to providing an acceptable product.

4.02 QUALITY CONTROL DURING MANUFACTURING

A. The GEOSYNTHETICS MANUFACTURER shall sample and test the GCL according to Part 2 of this Section to verify consistency of production and compliance with these specifications. Testing shall be in accordance with the test methods and at the frequencies specified in Part 2 of this Section.

B. The manufacturing process shall include a mechanism for needle detection and removal. This mechanism shall be in operation throughout the production of all GCL rolls to be delivered to the site. The GEOSYNTHETICS MANUFACTURER shall issue a certification listing all rolls with which the mechanism was utilized as well as a certification that all material supplied is needle-free.

C. The GEOSYNTHETICS MANUFACTURER shall provide the GEOSYNTHETICS QAC with certified copies of MQA/MQC test results. No material shall be installed prior to supply and approval of the required test results.

D. The GEOSYNTHETICS QAC may obtain additional random samples of the GCL for further confirmatory testing. This testing will be at the expense of the OWNER, unless the test reveals the GCL does not comply with the specifications, in which case the expense of the testing will be the responsibility of the GEOSYNTHETICS MANUFACTURER. This testing may include all properties specified in Part 2 of this Section or other tests deemed reasonable and necessary by the GEOSYNTHETICS QAC. The GEOSYNTHETICS INSTALLER shall, however, at no additional cost, provide whatever reasonable assistance the GEOSYNTHETICS QAC may require in obtaining the samples.

E. The GEOSYNTHETICS MANUFACTURER shall be solely responsible for the quality of the material provided. Should any tests performed on the material yield unsatisfactory results, the GEOSYNTHETICS MANUFACTURER will be responsible for replacing the material with materials that meet project specifications without delay to the project and at no additional cost to the OWNER.

4.03 QUALITY CONTROL DURING INSTALLATION

A. The GEOSYNTHETICS QAC and the GEOSYNTHETICS INSTALLER shall visually inspect all material for any damage incurred during transportation and for uniformity, and compare roll identification numbers with those on the certification provided by the manufacturer to assure delivery of the appropriate material.

B. The GEOSYNTHETICS QAC and GEOSYNTHETICS INSTALLER shall visually inspect all material for any damage incurred as a result of handling or on-site storage.

C. Damage to GCL during installation shall be repaired according to Part 3.03 of this Section. If the GEOSYNTHETICS QAC determines that the damage is considered un-repairable, the damaged material will be replaced at no additional cost to the OWNER.

D. Prior to installation, the GEOSYNTHETICS QAC will select random samples for internal shear strength and interface shear strength for each interface described in Part 2, Article 2.01, Paragraph C and/or D of this Section. Internal and interface shear strength testing will be at the expense of the OWNER, unless the tests reveal that the GCL does not comply with the specifications, in which case, the expense of the tests on failing material will be incurred by the GEOSYNTHETICS MANUFACTURER. No material will be installed before the internal and interface shear test results show that the GCL material meets the project specifications as determined and approved by the GEOSYNTHETICS QAC.

E. The GEOSYNTHETICS MANUFACTURER and GEOSYNTHETICS INSTALLER are responsible for verifying that the GCL is free of needles during both manufacturing and installation. If needles are detected or suspected by the GEOSYNTHETICS QAC, the OWNER may require the GEOSYNTHETICS INSTALLER to provide verification, at no additional cost to the OWNER, that installed GCL does not contain needles that could possibly damage the geomembrane.

* * * END OF SECTION * * *

SECTION 02430
GEOTEXTILE/GEONET COMPOSITE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Supply and install thermally bonded geotextile and geonet as a geocomposite drainage layer for landfill final cover system and landfill baseliner system.

1.02 RELATED SECTIONS

A. Section 01400 – General Provisions for Geosynthetics.

1.03 REFERENCES

A. ASTM D1238 - Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.

B. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.

C. ASTM D1603 - Standard Test Method for Carbon Black in Olefin Plastics.

D. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.

E. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

F. ASTM D4533 - Test Method for Trapezoid Tearing Strength of Geotextiles.

G. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

H. ASTM D4716 - Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using Constant Head. Modifications:

Baseliner Test 1: Applied load = 14,500 psf with a hydraulic gradient of 0.1. Substrate to be (from bottom up) a steel plate followed by a sample of 80 mil textured HDPE geomembrane. Superstrate to be (from bottom up) a sample of granular drainage layer stone followed by a steel plate.

Baseliner Test 2: Applied load = 3,000 psf with a hydraulic gradient of 0.33. Substrate to be (from bottom up) a steel plate followed by a sample of 80 mil textured HDPE geomembrane. Superstrate to be (from bottom up) a sample of operations layer stone followed by a steel plate.

Final Cover Test 1: Applied load = 2,500 psf with a hydraulic gradient of 0.1. Substrate to be (from bottom up) a steel plate followed by a sample of 40 mil textured HDPE geomembrane. Superstrate to be (from bottom up) a sample of general fill soil followed by a steel plate.

Final Cover Test 2: Applied load = 2,500 psf with a hydraulic gradient of 0.33. Substrate to be (from bottom up) a steel plate followed by a sample of 40 mil textured HDPE geomembrane. Superstrate to be (from bottom up) a sample of general fill soil followed by a steel plate.

Confining pressure at least 100 hrs prior to test.

I. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

J. ASTM D5199 - Standard Test Method for Measuring Nominal Thickness of Geosynthetics.

K. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

L. ASTM D5321 - Standard Test Method for Determining the Coefficient of Soil and Geosynthetic, or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.

Modifications:

1. Perform interface shear testing of geocomposite with materials which will be installed above and below the geocomposite (i.e., geocomposite/80 mil textured geomembrane, general fill/geocomposite, and geocomposite/40 mil textured geomembrane).

2. Normal loads: 100, 250, 500 and 1,000 psf for geocomposite in the cover system and 100, 250, 500, 1,000, 2,500, 5,000, 10,000 and 15,000 psf for geocomposite in the liner system.

M. ASTM D6241 - Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

N. ASTM D7005 - Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites.

O. AASHTO M288-06 - Geotextile Specification for Highway Applications.

Note: The most current version of the specified test methods indicated above should be followed by the GEOSYNTHETICS MANUFACTURER, GEOSYNTHETICS INSTALLER, or authorized testing laboratory. In the event that a new test method becomes available and is deemed by the ENGINEER to be appropriate for use, either in addition to those methods indicated above or as a replacement to one or more of the methods indicated above, the new method will be used.

1.04 QUALITY CONTROL SUBMITTALS

A. Pre-installation: The GEOSYNTHETICS MANUFACTURER shall submit the following to OWNER for approval, prior to geocomposite delivery.

1. Origins (supplier's name and production plant) and identifications (brand name and number) of geotextile and geonet used to manufacture geocomposite.

2. Copies of dated quality control certificates issued by geotextile and geonet manufacturer.

3. Specification for geocomposite that includes all properties published by manufacturer measured using appropriate test methods.

4. Written certification that minimum roll values given in manufacturer's specification guaranteed by geocomposite manufacturer.

5. Quality control certificates for geocomposite, signed by responsible party employed by geocomposite manufacturer. Quality control certificates shall include roll identification numbers, testing procedures, and results of quality control tests.

B. Installation: The GEOSYNTHETICS INSTALLER shall submit the following as installation proceeds.

1. Subgrade surface acceptance certificates if applicable, signed by GEOSYNTHETICS INSTALLER, for each area that will be covered directly by geocomposite. Submit prior to geocomposite deployment. Deployment of geocomposite will be considered acceptance of subgrade if certificate not submitted.

1.05 DELIVERY, STORAGE AND HANDLING

A. The GEOSYNTHETICS MANUFACTURER shall adhere to the following packing and shipping requirements:

1. Geocomposites shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers.

2. Geocomposite rolls shall be marked or tagged with following information:

   a. Manufacturer's name;

   b. Product identification;

   c. Roll number; and

   d. Roll dimensions.

B. The CONTRACTOR shall adhere to the following storage and protection requirements:

1. Provide on-site storage in OWNER designated area for geocomposite rolls from time of delivery until installed.

2. Store and protect geocomposite from dirt, water, ultraviolet light exposure, and other sources of damage.

3. Preserve integrity and readability of geocomposite roll labels.

PART 2 PRODUCTS

2.01. MATERIALS

A. FINAL COVER GEOCOMPOSITE MATERIAL - The GEOSYNTHETICS QAC shall obtain random samples of the proposed geocomposite and materials that will be installed above and below the geocomposite for the final cover system. These samples will undergo interface shear strength testing for each interface (i.e., general fill/geocomposite and geocomposite/40 mil textured geomembrane). A minimum of one round of interface shear strength testing (including testing at all indicated normal stresses, under all conditions, and for each interface) shall be completed prior to any construction season involving final cover construction. The interface shear strength testing shall be repeated if, in the opinion of the ENGINEER, the manufacturer, product, or material characteristics of the associated products (geocomposite, geomembrane, or general fill) change following acceptance of the initial testing. Testing must be conducted prior to the approval of the materials and performed with components that will be used in the construction. Testing may be performed prior to or following delivery of the geocomposite material to the site. In either case, testing must be conducted on the actual material that will be used in construction of the final cover. Testing shall be conducted according to the most recent version of ASTM D5321, and the reported results shall meet the requirements of Paragraph A.1 of this Part.

1. Tests shall be performed at a normal load of 100, 250, 500 and 1,000 psf with a strain rate of 0.04 in./min. and a minimum displacement of 6 in. The minimum required peak and residual interface shear strengths are provided in the following table.

GEOCOMPOSITE INTERFACE SHEAR STRENGTH (ASTM D5321) Frequency of 1 test per product type.		
Normal Stresses (psf)	Required Peak Shear Strength (psf)*	Required Residual Shear Strength (psf)*
100	50	33
250	125	83
500	250	167
1,000	492	329

* The required shear strengths above include both internal friction and cohesion (adhesion) components.

Additionally, testing for interface residual shear strength shall be performed at normal loads of 100, 250 and 500 psf at high strain rate (minimum of 0.5 in./min.) and large strains to simulate strength conditions during a seismic event. The required residual shear strengths are provided in the table below.

GEOCOMPOSITE INTERFACE SHEAR STRENGTH DURING SEISMIC EVENT (ASTM D5321) Frequency of 1 test per product type.	
Normal Stresses (psf)	Required Residual Shear Strength (psf)*
100	38
250	95
500	191

* The required shear strengths above include both internal friction and cohesion (adhesion) components.

B. BASELINER GEOCOMPOSITE MATERIAL - The GEOSYNTHETICS QAC shall obtain random samples of the proposed geocomposite and materials that will be installed above and below the geocomposite for the baseliner system. These samples will undergo interface shear strength testing for each interface (i.e., geocomposite/80 mil textured geomembrane). A minimum of one round of interface shear strength testing (including testing at all indicated normal stresses, under all conditions, and for each interface) shall be completed prior to any construction season involving baseliner construction. The interface shear strength testing shall be repeated if, in the opinion of the ENGINEER, the manufacturer, product, or material characteristics of the associated products (geocomposite or geomembrane) change following acceptance of the initial testing. Testing must be conducted prior to the approval and delivery of the materials and performed with components that will be used in the construction. Testing shall be conducted according to the most recent version of ASTM D5321, and the reported results shall meet the requirements of Paragraph B.1 and B.2 of this Part.

1. Tests shall be performed at a normal load of 100, 250, 500, and 1,000 psf with a strain rate of 0.04 in./min. and a minimum displacement of 1 in. The minimum required peak interface shear strengths are provided in the following table.

GEOCOMPOSITE INTERFACE SHEAR STRENGTH (ASTM D5321) Frequency of 1 test per product type.	
Normal Stresses (psf)	Required Peak Shear Strength (psf)*
100	41
250	103
500	206
1,000	412

* The required shear strengths above include both internal friction and cohesion (adhesion) components.

2. Tests shall be performed at a normal load of 100, 250, 500, 1,000, 2,500, 5,000, 10,000 and 15,000 psf with a strain rate of 0.04 in./min. and a minimum displacement of 6 in. The minimum required residual interface shear strengths are provided in the following table.

GEOCOMPOSITE INTERFACE SHEAR STRENGTH (ASTM D5321) Frequency of 1 test per product type.	
Normal Stresses (psf)	Required Residual Shear Strength (psf)*
100	31
250	78
500	156
1,000	311
2,500	1,200
5,000	2,100

10,000	3,500
15,000	4,400

* The required shear strengths above include both internal friction and cohesion (adhesion) components.

C. Geonet component shall meet the following specifications and be capable of retaining its structure during handling, placement, and long-term service. Geonet shall be a profiled mesh made from HDPE, and contain carbon black, anti-oxidants, and heat stabilizers. All geonet components shall be manufactured from resins provided by one supplier.

GEONET PROPERTIES

PROPERTY	METHOD	VALUE
Thickness	ASTM D5199	200 mils min.
Density (geonet)	ASTM D1505	0.936 g/cc min.
Melt Index (resin)	ASTM D1238	1.0 g/10 min.
Carbon Black Content	ASTM D1603	2.0 - 3.0%

D. Geotextile components shall meet the following specifications and be capable of withstanding stresses due to handling, installation, and long-term service. Certain values are based on survivability classification identified in the AASHTO M288-06 standard that was current as of the date of this specification. Should subsequent revisions to the AASHTO standard result in changes to these values, the values in the latest version of the AASHTO shall apply.

GEOTEXTILE PROPERTIES

Property	Method	Value (MARV, Except AOS)*
Mass per Unit Area	ASTM D5261	6 oz/sq yd min.
Grab Strength	ASTM D4632	157 lbs min. (AASHTO Class 2 Survivability)
Trapezoidal Tear Strength	ASTM D4533	56 lbs min. (AASHTO Class 2 Survivability)
Puncture Strength	ASTM D6241	309 lbs min. (AASHTO Class 2 Survivability)
Apparent Opening Size	ASTM D4751	0.43 mm max. (Baseliner Geocomposite) 0.25 mm max. (Final Cover Geocomposite)
Permittivity	ASTM D4491	0.5 s^{-1} min. (Baseliner Geocomposite) 0.2 s^{-1} min. (Final Cover Geocomposite)
Ultraviolet Stability	ASTM D4355	50% min. (after 500 hours of exposure)

* Minimum Average Roll Value

E. Provide geocomposite meeting following specifications and capable of retaining its structure during handling, placement and long-term service.

GEOCOMPOSITE PROPERTIES

PROPERTY	METHOD	VALUE
Ply Adhesion	ASTM D7005	0.5 lb/in min.
Transmissivity	ASTM D4716*	18.6 cm^2/s min. (Baseliner Test 1) 4.7 cm^2/s min. (Baseliner Test 2) 3.2 cm^2/s min (Final Cover Test 1) 1.1 cm^2/s min (Final Cover Test 2)

* Test methods as modified in Article 1.03.

F. Geotextiles and geonets used for manufacture of geocomposite shall be stock products, i.e., except when specifically authorized in writing by OWNER. Suppliers shall not furnish products specifically manufactured to meet specifications in Article 2.01 of this section.

2.02 MANUFACTURER QUALITY CONTROL

A. Tests, Inspection:

1. Geocomposites shall be tested by geocomposite manufacturer to evaluate characteristics for quality control. The manufacturer shall certify that these tests have been performed in accordance with test methods specified in Article 2.01 A of this section. At minimum, following tests shall be performed for quality control.

   a. Mass per unit area;

   b. Thickness;

   c. Geotextile-geonet adhesion (peel strength); and

   d. Transmissivity (one test per 100,000 ft^2).*

   * Transmissivity to be performed in accordance with ASTM D4716 and Article 1.03.

2. Geocomposite manufacturer shall perform quality control tests for at least every 40,000 ft^2 of geocomposite produced.

3. At geocomposite manufacturer's discretion and expense, additional testing of individual rolls may be performed to more closely identify non-complying rolls and to qualify individual rolls.

4. Geocomposite components shall be evaluated by the component manufacturers to determine characteristics for quality control. Each component shall be tested for the properties specified for that component, at a frequency of one per 40,000ft^2 of the component material produced.

PART 3 EXECUTION

3.01 EXAMINATION

A. Conformance Testing:

1. Samples of the geocomposite shall be collected for conformance testing. As outlined in Section 12.4 of the Quality Assurance Manual, conformance samples shall be collected in one of the following manners:

   a. The GEOSYNTHETICS QAC shall collect samples of geocomposite for conformance testing at the time of delivery to the site; or

   b. The GEOSYNTHETICS QAC shall direct representatives of the GEOSYNTHETICS QAL to collect samples of the geocomposite for conformance testing from the material at the manufacturer's facility.

2. GEOSYNTHETICS QAC (or GEOSYNTHETICS QAL representative) shall collect samples of the geocomposite for conformance testing. Sampling and testing shall be conducted as outlined in the QAM utilizing test methods provided in Part 1.03 of this specification.

3. GEOSYNTHETIC QAC shall collect archival samples of geocomposite to be installed.

3.02 INSTALLATION

A. Geocomposite Deployment: The GEOSYNTHETICS INSTALLER shall handle geocomposite material in a manner to ensure it is not damaged and complies with the following:

1. On slopes, anchor geocomposite securely and deploy it down slope in a controlled manner to continually keep geocomposite in tension.
2. Weight geocomposite with sandbags or equivalent in presence of wind. Do not remove weight until replaced with cover material.

3. Prevent damage to underlying layers during placement of geocomposite.

4. During deployment, do not entrap in or beneath geocomposite, stones, excessive dust, or moisture that could damage the underlying geomembrane, cause clogging of geocomposite, or hamper subsequent seaming.

5. Visually examine entire geocomposite surface before seaming. Ensure no potentially harmful or damaging foreign objects such as needles are present and remove any foreign objects encountered or replace geocomposite.

B. Geonet Seams and Overlap: The GEOSYNTHETICS INSTALLER shall join geonet in adjacent geocomposite panels in accordance with Design Drawings and Specifications and at minimum, meet the following requirements:

1. Overlap adjacent geonet minimum of 4 in.

2. Tie geonet overlaps with plastic fasteners. Use white or yellow tying devices for easy inspection. Do not use metallic devices.

3. Tie every 5 ft. along slope, every 6 in. in anchor trench, and every 6 in. along butt seams.

4. In corners of side slopes of rectangular landfill configurations, where overlaps between perpendicular geonet strips are required, unroll extra layer of geocomposite along slope, on top of previously installed geocomposite, from top to bottom of slope.

5. Stagger joints when more than one layer of geocomposite is installed.

C. Geotextile Seaming Procedures: The GEOSYNTHETICS INSTALLER shall adhere to the following seaming procedures:

1. Overlap geotextile a minimum of 3 in. prior to sewing.

2. Continuously sew top geotextiles using a locking stitch. Spot sewing is not allowed.

3. Ensure that no soil cover material is present beneath geotextile at seams.

4. When sewing, use polymeric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of geotextile.

D. Defects and Repairs: Repair small defects as judged by GEOSYNTHETICS QAC as follows, if geonet is undamaged but geotextile is damaged.

1. Remove damaged geotextile.

2. Cut patch of new geotextile to provide minimum 12 in. overlap in all directions.

3. Sew geotextile in-place.

E. If geonet is damaged:

1. Remove damaged geonet.

2. Cut patch of new material to replace geonet.

3. Secure patch to original geonet by tying every 6 in. Use tying device as indicated in Article 3.02 B of this section.

4. Place geotextile patch overlapping damaged area to provide minimum 12 in. overlap of geonet repair edge in all directions.

5. Sew geotextile in-place.

F. Replace geocomposite if judged by GEOSYNTHETICS QAC to be a large defect.

G. Geocomposite Installation Procedures:

The geocomposite will be installed in conformance with Article 3.02 B and 3.02 C of this section. At a minimum, meet the following requirements:

1. For baseliner applications, horizontal seams or field splices (butt seams) are not allowed on slopes greater than 10H:1V (i.e., seams shall be downslope, not across, slope) except as part of patch. Splices are defined as seams connecting the ends of 2 rolls.

2. Geocomposite butt seams are allowed on final cover slopes greater than 10H:1V.

3. Manufacturer's butt seams of the geotextile components of the geocomposite that exist on sideslopes shall be covered with a geotextile patch extending a minimum 6 in. in each direction. The geotextile patch shall be heat bonded to the geocomposite.

4. For butt seam locations where the geotextile cannot be pulled away from the geonet to the satisfaction of the GEOSYNTHETICS QAC, the seams are to be joined by overlapping sheets, utilizing plastic ties to fasten geonet with two rows of plastic ties spaced 6 in. apart. The butt seam is to then be capped by heat fusing a 2 ft. wide cap of geotextile over the full length of the seam. A minimum 6 in. of overlap of the geotextile to the seam is required.

5. Butt seams shall be staggered not less than 5 ft. unless otherwise authorized by the OWNER.

3.03 INTERFACE WITH OTHER PRODUCTS

A. The EARTHWORKS CONTRACTOR shall ensure the following when installing materials located on top of geocomposite.

1. Geocomposite and underlying lining materials are not damaged.

2. Minimize slippage of geocomposite on underlying layers.

3. Do not allow excess tensile stresses to occur in geocomposite.

4. Place a minimum initial lift thickness of 1 ft. post-compaction.

* * * END OF SECTION * * *

SECTION 02450
MECHANICALLY STABILIZED EARTH (MSE) WALL

PART 1 GENERAL

1.01 DEFINITIONS

A. ASTM: American Society for Testing and Materials.

B. GRI: Geosynthetics Research Institute.

1.02 REFERENCES

A. Reference standards for geosynthetic reinforcement and welded wire materials:

1. ASTM A123 - Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

2. ASTM A497 - Standard Specification for Steel Welded Wire Reinforcement, for Concrete.

3. ASTM D629 - Standard Test Method for Quantitative Analysis of Textiles.

4. ASTM D1238 - Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.

5. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

6. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.

7. ASTM D1777 - Standard Test Method for Thickness of Textile Materials.

8. ASTM D4354 - Standard Practice for Sampling of Geosynthetics for Testing.

9. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.

10. ASTM D4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

11. ASTM D4603 - Standard Test Method for Determining Inherent Viscosity of Polyethylene Terephthalate (PET) by Glass Capillary Viscometer.

12. ASTM D5035 - Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).

13. ASTM D5199 - Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.

14. ASTM D5261 - Standard Test Method for Measuring Mass Per Unit Area of Geotextiles

15. ASTM D5262 - Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics.

16. GRI GG-1 - Geogrid Rib Tensile Strength.

17. GRI GG-4(a) - Determination of the Long-Term Design Strength of Stiff Geogrids.

18. GRI GG-4(b) - Determination of the Long-Term Design Strength of Flexible Geogrids.

19. ASTM D6706 - Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil.

20. GRI GG-6 - Grip Types for Use in Wide Width Testing of Geotextiles and Geogrids.

21. GRI GG-7 - Determining Carboxyl End Groups in Polyethylene Terephthalate (PET) Geotextiles and Geogrids.

22. GRI GG-8 - Determination of the Number Average Molecular Weight of PET Yarns Based on a Relative Viscosity Value.

B. Reference standards for backfill materials (structural fill and aggregate):

1. ASTM G51 - Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing.

2. ASTM D422 - Standard Test Method for Particle Size Analysis of Soils.

3. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.

5. ASTM D2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

6. ASTM D2974 - Standard Test Method for Moisture, Ash and Organic Matter of Peat and Other Organic Soils.

7. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

8. ASTM D5321 - Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.

9. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.03 SUBMITTALS

A. The EARTHWORK CONTRACTOR shall provide a list of at least three projects demonstrating the EARTHWORK CONTRACTOR's experience installing MSE Walls of similar wall height and face areas.

B. The EARTHWORK CONTRACTOR shall submit a detailed construction sequence plan for installing the MSE Wall indicating the limits of work, sequence of earthwork and geosynthetic installation operations and the procedures to be followed during construction.

C. The EARTHWORK CONTRACTOR shall submit Manufacturer's Quality Control Plans followed during the production of geosynthetic reinforcement material and the welded wire form facing material.

D. The EARTHWORK CONTRACTOR shall submit manufacturer's certifications that materials provided for geosynthetic reinforcement and welded wire form facing meet the acceptable criteria provided in Articles 2.01 and 2.02, respectively, of this Section. Manufacturer's certification shall include MQC test results in accordance with test methods and standards provided in this section and at the frequencies specified in the Manufacturer's Quality Control Plan.

E. For the geosynthetic reinforcement materials, the manufacturer's certificate shall state that the furnished geosynthetic materials meet the requirements of the specifications as evaluated by the manufacturer's quality control program. The certificates shall be attested to by a person having legal authority to bond the manufacturer. In case of dispute over validity of values, the ENGINEER can require the EARTHWORK CONTRACTOR to supply test data from a laboratory accredited by the Geosynthetic Accreditation Institute (GAI) to support the certified values submitted**.** The manufacturer's certifications shall include:

1. List of applicable roll numbers.

2. Sampling procedures followed.

3. Results of Quality Control testing performed on the materials utilizing specified test methods.

F. Submit in accordance with Section 01340.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver welded wire form facing units, geosynthetic materials, and accessories necessary for construction of the MSE Wall to the project site in manufacturer's original packaging, with labels clearly identifying materials and name of manufacturer.

B. Storage: Store welded wire form facing units, geosynthetic materials, and accessories in a clean, dry area, off the ground, in accordance with manufacturer's instructions.

C. Handling: Protect welded wire form facing units, geosynthetic materials, and accessories during handling and installation from damage. Any damage to materials caused by EARTHWORK CONTRACTOR due to handling and/or installation will require the material to be replaced by the EARTHWORK CONTRACTOR at no additional cost to the OWNER.

PART 2 PRODUCTS

2.01 WELDED WIRE FORM FACING MATERIAL

A. Welded wire form facing units shall consist of prefabricated steel wire forms conforming to ASTM A497, and shall have the dimensions as shown on the Drawings.

B. All welded wire form facing units shall be hot-dipped galvanized per ASTM A123 after bending. All struts will be fabricated with hot-dipped galvanized wire. Strut length and cross-section dimensions of the forms shall be as noted on the Drawings.

2.02 GEOSYNTHETIC REINFORCEMENT MATERIAL

A. Geosynthetic reinforcement material shall consist of geogrids manufactured for primary and secondary soil reinforcement applications and shall be manufactured from high density polyethylene or high tenacity polyester yarn.

1. High density polyethylene materials shall conform to the requirements of ASTM D1248.

2. High tenacity polyester yarn shall conform to the requirements of ASTM D629 and shall be encapsulated in an acrylic latex or polyvinyl chloride material.

B. The geosynthetic reinforcement material shall meet the following requirements:

1. Open area: 60 percent minimum.

2. Long-term allowable design load (T_{AL}), as determined by GRI GG-4(a) and meeting the values shown on the Drawings for both primary and secondary reinforcement.

a. As described in GRI GG-4(a), T_{AL} is determined by considering reductions for creep, chemical and biodegradation, and installation damage and shall be based on MARV.

b. Service life to be 100 year minimum.

c. Backfill to be in accordance with Section 2.03 of this Specification.

3. Primary reinforcement shall consist of uniaxial geogrid. Secondary reinforcement shall consist of biaxial geogrid.

C. The base material from which the geosynthetic reinforcement is constructed shall meet the following, material-specific, minimum durability requirements:

Geosynthetic	Property	Test Method	Requirement
Polyethylene only	UV Oxidation Resistance	ASTM D 4355	Min. 70% strength retained after 500 hrs.
Polyester only	Hydrolysis Resistance	Intrinsic Viscosity Method (ASTM D 4603) with Correlation or Determined Directly Using Gel Permeation Chromatography	Min. Number (Mn) Molecular weight of 25,000
Polyester only	Hydrolysis Resistance	GRI GG-7	Max. Carboxyl End Group Number of 30
All materials	Survivability	Weight per Unit Area ASTM D 5261	Min. 270 g/m^2 (8 oz/sy)
All materials	% Post Consumer Recycled Material by Weight	Certification of material used	Maximum 0%

D. The geosynthetic reinforcement material shall be manufactured with a high degree of quality control. The Manufacturer is responsible for establishing and maintaining a quality control program to ensure compliance with the requirements of this section. Conformance testing shall be performed as part of the manufacturing process and varies for each type of product. At a minimum, the following index tests shall be considered as applicable for an acceptable quality assurance program:

Property	Test Method
Specific Gravity (HDPE only)	ASTM D1505
Wide Width Tensile Strength (All materials)	ASTM D4595 or GRI GG-1
Melt Flow (HDPE and PP only)	ASTM D1238
Intrinsic Viscosity (PET only)	GRI GG-8
Carboxyl End Group (PET only)	GRI GG-7

2.03 BACKFILL

A. Structural backfill shall comprise the majority of the MSE wall backfill and consists of material excavated from on-site or off-site sources and meeting the performance requirements of Section 02210 – Earthworks. Structural backfill shall provide a minimum shear strength described by a cohesion of 195 psf and a friction angle of 28.7 degrees.

B. NYSDOT #4 stone shall be used to backfill the welded wire form facing units. Material shall be crushed stone meeting the requirements of Section 703-02 of the NYSDOT "Standard Specifications," with the following gradation:

SCREEN SIZE	PERCENT PASSING (by weight)
4 in.	100
3 in.	90-100
2 in.	0 - 15
No. 200	0 - 0.7

C. NYSDOT #2 stone shall be used as the stone pad at the toe of the welded wire facing units. Material shall be crushed stone meeting the requirements of section 703-02 of the NYSDOT "Standard Specifications," with the following gradation:

SCREEN SIZE	PERCENT PASSING (by weight)
1.5 in.	100
1.0 in.	90-100
0.5 in.	0 - 15
No. 200	0 - 1.0

D. NYSDOT #1 stone shall be used as a filter between NYSDOT #4 stone and structural fill. Material shall be crushed stone meeting the requirements of Section 703-02 of the NYSDOT "Standard Specifications," with the following gradation:

SCREEN SIZE	PERCENT PASSING (by weight)
1 in.	100
0.5 in.	90-100
0.25 in.	0 - 15
No. 200	0 - 1.0

2.04 CQA CONFORMANCE TESTING

A. The GEOSYNTHETICS QAC shall perform sampling of geosynthetic reinforcement materials in accordance with ASTM D4354.

B. The GEOSYNTHETICS QAC shall obtain one random sample of the proposed geosynthetic reinforcement material and structural fill material, if not previously tested and accepted. These samples will be submitted to the QAL for interface friction/interaction testing. All testing must be conducted prior to the approval and delivery of the materials and performed with components that will be used in construction. Testing shall be conducted in accordance with, and results shall meet the following requirements:

Interaction Properties	**Test Method**	**Min. Required Value**
Coefficient of Interaction - C_I	ASTM D6706 (under normal loads of 500, 1,500, and 3,000 psf)	0.7

C. Conformance testing of structural fill material shall be in accordance with the test methods, frequencies and acceptable criteria required for structural fill in accordance with Technical Specification Section 02210 and the Quality Assurance Manual.

D. The GEOSYNTHETICS QAC shall verify that conformance testing performed on the geosynthetic reinforcement materials meet the minimum requirements specified above. The EARTHWORKS CONTRACTOR may request retesting of failed conformance tests, as outlined in the Quality Assurance Manual. EARTHWORKS CONTRACTOR shall bear the cost of retesting if results lead to material rejection. The GEOSYNTHETICS QAC shall bear the costs of retesting if the original conformance test results are found to be in error. Material that does not meet the requirements specified in this section shall be immediately removed from the site.

PART 3 EXECUTION

3.01 GENERAL

A. The EARTHWORKS CONTRACTOR shall coordinate the installation of required welded wire form facing units, geosynthetic materials, and backfill material such that the MSE Wall is constructed in accordance with this section, the Quality Assurance Manual and the Drawings.

B. The EARTHWORKS CONTRACTOR shall schedule a pre-construction meeting at least 30 days prior to the scheduled start of construction of the MSE Wall. The MSE Wall pre-construction meeting shall be attended by the EARTHWORK CONTRACTOR'S superintendent, necessary personnel from the QAC, the ENGINEER and the OWNER and/or OWNER'S Representative. At a minimum, the meeting shall include discussions on the required CQA procedures to be followed during construction of the MSE Wall and the EARTHWORKSCONTRACTOR'S construction sequence plan.

C. The EARTHWORKS CONTRACTOR shall determine exact configurations, lengths, sizes and quantities of welded wire form facing units, geosynthetic materials, backfill and associated ancillary items required by this section to construct the MSE Wall. The EARTHWORKS CONTRACTOR shall be responsible for the layout, elevation control, length, quantity, and quality of all items associated with construction of the MSE Wall.

D. The EARTHWORKS CONTRACTOR shall not prepare any subgrade, nor install any welded wire form facing units, geosynthetic materials, or backfill material unless the QAC is present. The EARTHWORKS CONTRACTOR shall keep the QAC informed of planned work activities to allow sufficient time to perform necessary CQA activities.

E. EARTHWORKS CONTRACTOR shall take appropriate actions to minimize erosion and fugitive dust during all phases of construction of the MSE Wall. EARTHWORKS CONTRACTOR shall modify construction procedures and equipment, as directed by the OWNER, to control dust during construction.

3.02 SUBGRADE PREPARATION

A. EARTHWORKS CONTRACTOR shall fill settled areas where excavations or trenches were backfilled and holes made by demolition, tree removal, and site preparation work in the areas immediately beneath the MSE Wall.

B. Natural soils or compacted fills softened by frost, flooding or weather shall be removed, replaced and compacted as required by the Soil QAC.

C. If EARTHWORKS CONTRACTOR and Soil QAC do not agree on the qualitatively defined excessive pumping or displacement, scarify top 6 to 8 inches of subgrade soils and compact to 90% of Modified Proctor density.

D. Remove and replace soft or loose zones with sufficient thickness of compacted general fill. Thickness of replacement layer shall be as required to support heavy equipment and trucks without excessive pumping or displacement. If thickness of replacement layer is not sufficient to prevent pumping of subgrade, material shall be removed, replaced and compacted with a thicker layer at no additional cost to OWNER.

E. Non-woven, heat-bonded geotextile or a geogrid may be used in conjunction with general fill to stabilize soft or loose zones of the subgrade.

F. Final subgrade conditions prior to the installation of MSE Wall materials shall be approved by the QAC.

3.03 MSE WALL CONSTRUCTION

A. The EARTHWORKS CONTRACTOR shall use welded wire form facing units to develop the specified wall face and batter. The welded wire form facing units, geosynthetic reinforcement, and backfill materials shall be placed in successive lifts in the sequence shown on the Drawings.

B. Wall Face Construction:

1. The MSE wall face shall be constructed by wrapping each layer of geosynthetic reinforcement around its overlying layer of backfill and then re-embedding the free end into the backfill, as indicated on the Drawings.

2. Welded wire form facing installation will be monitored by the Soils QAC during fill placement and compaction. The EARTHWORKS CONTRACTOR shall employ compaction equipment and procedures that will not result in excessive deformation of the welded wire form facing.

3. Adjacent welded wire form facing units shall be connected along vertical and horizontal seams with galvanized interlocking hog ring fasteners placed 4 in. on center.

C. Geosynthetic Reinforcement:

1. All materials shall be installed at the proper elevation and orientation as shown in the wall details on the Drawings. The geosynthetic reinforcement shall be installed in general accordance with the manufacturer's recommendations, unless otherwise modified by these specifications. The more stringent requirements shall govern in the event of any conflict between the references.

2. Overlap of the geosynthetic reinforcement in the design strength direction shall not be permitted, except where indicated on the Drawings. The design strength direction is that length of geosynthetic reinforcement perpendicular to the wall face and shall consist of one continuous piece of material. Adjacent sections of geosynthetic shall be placed in a manner to assure that the horizontal coverage shown on the Drawings is provided.

3. Place only that amount of geosynthetic reinforcement required for immediately pending work to prevent undue damage. After a layer of geosynthetic reinforcement has been placed and the next succeeding layer of backfill has been placed, the next geosynthetic reinforcement layer shall be installed. The process shall be repeated for each subsequent layer of geosynthetic reinforcement and backfill.

4. Geosynthetic reinforcement shall be placed to lay flat and be pulled tight prior to backfilling. After a layer of geosynthetic reinforcement has been placed, suitable means, such as pins or small stockpiles of reinforcement backfill shall be used to hold the geosynthetic reinforcement in position until the subsequent backfill layer can be placed.

5. During construction, the surface of the backfill should be kept approximately horizontal. Geosynthetic reinforcement shall be placed directly on the compacted horizontal fill surface. Geosynthetic reinforcements are to be placed within 3 in. of the design elevations and extend the length shown on the schedule unless otherwise directed by the ENGINEER. Correct orientation of the geosynthetic reinforcement shall be verified by the QAC.

C. Structural Fill Placement:

1. The structural fill shall be placed as shown on the Drawings in maximum compacted lift thicknesses of 9 inches. Each lift shall be compacted to 90% of the maximum dry density as determined by Modified Proctor Testing (ASTM D1557). Structural fill shall be placed, spread, and compacted in accordance with Section 02210 – Earthworks and the QAM and in such a manner that eliminates the development of wrinkles or movement of the geosynthetic reinforcement and the welded wire face. Any welded wire face forms or geosynthetic reinforcement that becomes damaged during reinforcement backfill placement shall be removed and replaced at the EARTHWORK CONTRACTOR'S expense. Any misalignment or distortion of the wall facing units outside the limits of these specifications shall be corrected at the EARTHWORK CONTRACTOR'S expense. Structural fill

placement methods near the facing shall assure that no voids exist directly beneath the reinforcing elements.

2. Tracked construction equipment shall not be operated directly on the geosynthetic reinforcement. A minimum thickness of 6 inches of structural fill is required, prior to operation of tracked vehicles over the geosynthetic reinforcement. Turning of tracked vehicles should be kept to a minimum to prevent displacing the fill and damaging or moving the geosynthetic reinforcement.

3. Rubber-tired equipment will not be allowed to pass over the geosynthetic reinforcement, unless it is performed in accordance with the manufacturer's recommendations and field tests are performed to demonstrate the geosynthetic reinforcement will not be damaged more than the geosynthetic manufacturer's installation damage reduction factor would indicate. If allowed, all equipment shall operate at speeds less than 10 mph. Sudden braking and sharp turning is prohibited.

4. At the end of each day's operation, the EARTHWORKS CONTRACTOR shall slope the last lift of structural fill away from the wall facing, to direct runoff of rainwater away from the wall face. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3.04 CONSTRUCTION QUALITY ASSURANCE

A. The QAC shall perform the following CQA activities during all phases of construction of the MSE Wall.

1. Observe the installation of all materials to verify the materials meet the requirements of this section, the Quality Assurance Manual or the Drawings. Any items of construction not meeting project requirements shall be immediately brought to the attention of the EARTHWORKS CONTRACTOR and the OWNER and/or OWNER's Representative.

2. Perform field moisture/density testing following compaction of structural fill material. Moisture/density testing shall be performed using a nuclear density gauge at a minimum frequency of one test for every 50 linear feet of each lift of structural fill material. Moisture/density tests shall be staggered across the surface of each lift of structural fill such that representative test results are obtained from the inside, center and outside areas of each lift. Structural fill compaction shall be considered acceptable if test results indicate compaction has achieved 90% of the maximum dry density identified by the Modified Proctor test results. Any areas identified by the QAC not meeting acceptable compaction criteria shall be immediately reported to the EARTHWORKS CONTRACTOR so the EARTHWORKS CONTRACTOR can take necessary action to correct unacceptable areas.

3. Verify that the welded wire form facing units, geosynthetic reinforcement material, and the backfill materials are obtained from approved stockpiles and/or staging areas.

* * END OF SECTION * *

SECTION 02910
TOPSOIL AND SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

Requirements for site restoration by placement of topsoil, seeding, fertilizing, and mulching.

1.02 REFERENCES

A. American Society for Testing and Materials:

1. ASTM D422 - Standard Method for Particle-Size Analysis of Soils.

2. ASTM D2976 - Standard Test Method for pH of Peat Materials.

3. ASTM D2974 - Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.

1.03 SUBMITTALS

A. Analysis of proposed topsoil material (to demonstrate material does not contain chemical constituents exceeding concentrations established by NYSDEC).

B. Analysis of the seed (to demonstrate compliance with the seed mix identified in Section 2.01 of this specification), fertilizer (to identify chemical composition) and other amendments, and proposed application rates.

C. Should hydro-seeder be used, submit all data including material and application rates.

D. Location of source, and grain-size, pH, and organic content testing of stockpile.

PART 2 PRODUCTS

2.01 TOPSOIL

A. Topsoil shall be unfrozen, friable, natural loam and shall be free of clay lumps, brush, weeds, litter, stumps, stones, and other extraneous matter.

B. pH of material shall be between 5.5 and 7.6.

C. Organic content shall be not less than 2% or more than 20%.

D. Gradation:

Sieve Size	Percent Passing by Weight
2 in.	100
1 in.	85 - 100
1/4 in.	65 - 100
No. 200 mesh	20 - 80

E. Topsoil stripped and stockpiled on-site may be used, provided it meets above requirements.

2.02 SEED MIXTURE

A. Utilize one of the specified seed mixtures. OWNER to approve selection of seed mixture and seed source.

B. Fresh, clean, new-crop seed consisting of the following varieties, proportioned by weight.

1. Seed Mixture No. 1: Allow variance of 5% for each component except weed seed and inert maximums listed below at a rate of 160 lbs/acre.

Name	% by Weight of Pure Live Seed
Kentucky Bluegrass	29.71
Aquarious Perennial Ryegrass	19.51
Patriot II Perennial Ryegrass	19.50
Red Fescue, Creeping Origin: Canada	14.73
Chewing Fescue	14.63
Other Crop Seed	0.54
Weed Seed	0.02 max.
Inert Matter	1.36 max.

2. Seed Mixture No. 2: Allow variance of 5% for each component except weed seed and inert maximum listed below at a rate of 110 lbs/acre.

Name	% by Weight of Pure Live Seed
Aquarious Perennial Ryegrass	43.88
Kentucky Bluegrass	19.81
Annual Ryegrass	19.38
Red Fescue, Creeping Origin: Canada	14.73
Other Crop Seed	0.95
Weed Seed	0.02 max.
Inert Matter	1.23 max.

3. Seed Mixture No. 3: Allow variance of 5% for each component except weed seed and inert maximum listed below at a rate of 110 lbs/acre.

Name	% by Weight of Pure Live Seed
Red Fescue	45.45
Kentucky Bluegrass	9.09
Perennial Ryegrass	36.36
White Clover	9.09
Weed Seed	0.02 max.
Inert Matter	1.00 max.

2.03 FERTILIZER

A. Shall be a standard quality commercial carrier of available plant food elements. A complete prepared and packaged material containing a minimum of 5% nitrogen, 10% phosphoric acid, and 10% potash.

B. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

2.04 MULCH

A. Dry application mulch:

1. Mulch shall be stalks of oats, wheat, rye, or other approved crops 100% free from noxious weeds and coarse materials.

B. Hydro-seeding application:

1. Chopped wood cellulose fiber product with tackifier specifically designed for as a hydro-mechanical applied mulch.

2. Acceptable products are Hydro-Mulch® 2000 by Conwed Fibers, Inc. or equal.

2.05 LIMESTONE

A. Limestone shall be commercially available ground limestone designed for agricultural use.

B. Limestone shall have a minimum total neutralizing value of 88% calcium carbonate equivalence. Minimum of 90% shall pass 20-mesh sieve and minimum of 60% shall pass 100-mesh sieve.

C. Each bag of limestone shall bear the manufacturer's guaranteed statement of analysis.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Topsoil:

1. Surface of subgrade shall be true to grade, uniform, and free of loose stones. Do not place topsoil until subgrade is approved by the QAC.

2. Spread topsoil to a uniform, loosely compacted depth of 6 in. to finish grade.

3. Do not place or work topsoil in frozen or muddy condition.

4. Finish grade is established final grade as shown on the Drawings. Grades not otherwise indicated are uniform levels or slopes between points where elevations given.

B. Seeding:

1. Do not seed when wind velocity exceeds 10 mph.

2. Seed topsoiled areas only.

C. Fertilizer:

1. Minimum of 800 lbs/acre shall be applied unless soil test verifies lower rates required as approved by OWNER.

2. Fertilize topsoiled and seeded areas only. Do not apply fertilizer directly into surface waters.

D. Limestone:

1. Apply at rates to comply with pH soil requirements.

E. Watering and Maintenance:

1. Water and maintain seeded areas until 2 in. vertical growth of grass is achieved over 85% of the area.

2. If grass dies before 2 in. vertical growth obtained, areas shall be re-seeded at no additional cost to OWNER.

3. Protect slopes and embankments against erosion until Work is accepted. Repair eroded portions of seeded areas by re-filling, re-mulching, and re-seeding as required by condition.

* * * END OF SECTION * * *

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 REFERENCES

A. American Concrete Institute (ACI):

1. ACI SP-66 - ACI Detailing Manual.
2. ACI 301 Specifications for Structural Concrete.
3. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
4. ACI 305R - Hot Weather Concreting.
5. ACI 306R - Cold Weather Concreting.
6. ACI 318 - Building Code Requirements for Structural Concrete.
7. ACI 347 - Guide to Formwork for Concrete.
8. ACI 350 – Concrete Structure for Containment of Hazardous Materials.
9. ACI 350R-01 – Code Requirements for Environmental Engineering Concrete Structures and Commentary.

B. American Society for Testing and Materials (ASTM):

1. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
2. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
3. ASTM C33 - Standard specification for Concrete Aggregates.
4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
5. ASTM C94 - Specification for Ready-Mixed Concrete.
6. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
7. ASTM C150 - Standard Specification for Portland Cement.
8. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

9. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

10. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

11. ASTM C494 - Specification for Chemical Admixtures for Concrete.

12. ASTM D471 - Test Method for Rubber Property- Effect of Liquids.

13. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

14. ASTM D746 – Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

D. Concrete Reinforcing Steel Institute (CRSI):

1. Placing Reinforcing Bars.

1.02 SUBMITALS

A. Statement by ready mix supplier giving source and material certificates, and proportions by weight of cement, fine and coarse aggregates, and admixtures. Provide test data for proposed mix design in accordance with ACI 301 4.2.

B. Provide with each load of concrete delivered, duplicate delivery tickets one for CONTRACTOR and one for ENGINEER with the following information.

1. Date and serial number of ticket.

2. Name of ready mixed concrete plant, operator, and job location.

3. Type of cement, admixtures, if any, and brand name.

4. Cement content in bags/cubic yards of concrete, and mix design.

5. Truck number, time loaded, and name of dispatcher.

6. Amount of concrete in load, in cubic yards, delivered.

7. Maximum size aggregate.

8. Gallons of water added at job, if any, and slump of concrete after water was added.

9. Temperature of concrete at delivery.

10. Number of revolutions of mixer.

C. Reinforcing steel Shop Drawings conforming to ACI SP-66 showing bending diagrams, assembly diagrams, location diagrams, splicing and laps of bars, shapes, dimensions, and details for bar reinforcing.

D. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Tolerances:

1. Maintaining formwork alignment during and after placing of concrete, in accordance with permissible tolerance limits set forth in ACI 347.

2. Concrete shall be within 1/4 in. of 10-ft. straightedge in all directions. Deviations from elevation indicated shall not exceed 1/4 in.

B. Concrete testing will be provided by QAC. Following tests will be performed.

1. Slump, ASTM C143; Air Entrainment, ASTM C231, and Temperature. If slump or air content fall outside of specified limit, a check test will be performed on another portion of same sample. If the second test fails, concrete load will be rejected. The frequency for testing will be one for each load of concrete delivered.

2. Compressive Strength, ASTM C31 and C39. Test cylinders will be tested for compressive strength at 7, 14, 21 and 28 days following concrete placement. In the event design compressive strength is achieved at 7, 14 or 21 days, the ENGINEER may waive subsequent compressive strength tests. If the design compressive strength is not achieved at 28 days, CONTRACTOR shall pay for testing, engineering analyses, and remedial work.

1.04 PROJECT/SITE CONDITIONS

A. Hot Weather:

1. Comply with ACI 305R.

2. Concrete temperature shall not exceed 85°F.

3. At air temperatures of 80°F or above, keep concrete as cool as possible during placement and curing. Cool forms by water wash.

B. Cold Weather:

1. Comply with ACI 306R.

2. Temperature of reinforcement, forms, fillers, and other materials in contact with concrete at time of placement shall not be less than 35°F. Preheat if temperature is below 35°F.

3. Maintain air and forms in contact with concrete at temperature above 50°F for at least first 3 days; and at temperature above 32°F for the remainder of the specified curing period.

PART 2 PRODUCT

2.01 MATERIALS

A. Portland Cement:

1. ASTM C150, Type I or II. Except tricalcium aluminae (C_3A) content of Type I shall not exceed 8%.

2. When aggregates are determined to be deleteriously reactive, as defined by Appendix XI of ASTM C33, alkali content of cement defined by Table 1A of ASTM C150 shall not exceed 0.60%.

B. Aggregates:

1. ASTM C33, free of foreign materials.

2. Fine Aggregate: Natural sand.

3. Coarse Aggregate: Crushed stone, crushed gravel or gravel. Size 467 (1 1/2 in. maximum).

4. Potential reactivity of aggregates shall be determined in accordance with Appendix XI of ASTM C33.

C. Admixtures for Concrete:

1. Air-Entraining: ASTM C260.

2. Chemical Admixtures: Optional, ASTM C494.

a. Water Reducing: Type A.

b. Retarding: Type B.

c. Water Reducing and Retarding: Type D.

D. Water: Potable.

E. Steel Reinforcing Bars:

1. Deformed bars conforming to ASTM A615, grade 60.

2. As noted on Drawings.

F. Waterstops:

1. Thermoplastic Elastrometric Rubber, Westec Envirostop TPE-R 600 series or equivalent.

2. Provide prefabricated tees, crosses, and other configurations as required. Splice in accordance with manufacturer's instructions.

3. Waterstops shall meet the following requirements:

Tensile Strength	ASTM D 638	2000psi
Elongation	ASTM D 638	450%
100% Modulus	ASTM D 638	1000psi
Brittle Temperature	ASTM D 746	-70F
Hardness	ASTM D 2240	85 Shore A

G. Membrane Forming Curing Compound:

1. Manufacturers:

a. Concrete Seal by Huntington Laboratories.

b. Toxkure by Tock Brothers, Inc.

c. Kur-N-Seal by Sonneborn Building Products, Inc.

d. Floor Treet by Forrer Chemical Company.

e. Or equal.

2. ASTM C309 and complete with coatings to be applied.

H. Epoxy Bonding Compound: Joining new to existing concrete.

1. Manufacturers:

a. Sikadur Hi-Mod by Sika Corporation.

b. Epoxtite 2362 by W.R. Grace and Company.

c. Euco Epoxy 452 mv or 620 by Euclid Chemical Company.

d. Or equal.

I. Non-epoxy Bonding Compound: Joining new to existing concrete where bonding compound cannot be placed immediately prior to pouring of new concrete.

1. Manufacturers:

a. Weld-Crete, by Larson Products Corporation.

b. Or equal.

J. Expansion Joints:

1. Premolded expansion joint material shall be sponge rubber conforming to ASTM D1752 Type 1. Expansion joint material shall be bonded to previously poured concrete edge with adhesive as recommended by the manufacturer.

2. Exposed edges of premolded expansion joint material shall be sealed with Sikaflex 2c NS elastomeric sealant.

2.02 CONCRETE MIX DESIGN

A. Concrete Mix: Measure and combine cement, aggregates, water and admixtures in accordance with ASTM C94.

1. Minimum Cement Content: 5-3/4-bags/cu yd.

2. Minimum Strength: 4,000 psi. @ 28 days.

3. Air Content: 6% $\pm$ 1%.

4. Maximum Slump: 4 in.

2.03 MIXING AND DELIVERY

A. Furnish and deliver concrete in conformance with ASTM C94.

B. Deliver and complete discharge within 1-1/2 hours of commencing mixing or before 300 revolutions of drum or blades, whichever comes first. This includes revolutions required by transit mix trucks. Limitations may be waived by ENGINEER if concrete is of such slump after 1-1/2 hours or 300-revolution limit; it can be placed without addition of water.

C. Do not add water on job unless authorized by OWNER. If water is added, additional mixing of 30 drum revolutions is required.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. Subgrade and Bedding: Compacted and free of frost. If placement is allowed at temperatures below freezing, provide temporary heat and protection as required to remove frost.

B. At CONTRACTOR's option, provide vapor barrier or soak subgrade the evening before placement and sprinkle ahead of placement of concrete.

C. Remove standing water, ice, mud, and foreign matter before concrete is deposited.

3.02 FORMS

A. Formwork shall prevent leakage of concrete and be of sufficient strength to prevent deformation during placement and curing. Removal of wall ties shall leave holes clean cut and without appreciable spalling at face of concrete.

B. Materials:

1. Unless specified otherwise, type of forms used is CONTRACTOR's option. CONTRACTOR may use metal, plywood, presswood form liners or plastic surfaced plywood.

2. Use approved commercially manufactured devices for form ties. Arrange ties so when forms are removed, no metal will be within 1 in. of formed face of concrete. Ties for exterior walls shall have integral waterstop.

C. Do not disturb forms until concrete has adequately cured.

D. Form system design shall be CONTRACTOR's responsibility.

3.03 JOINTS

A. Joints not shown on Drawings shall be subject to ENGINEER's approval.

B. Provide waterstop in construction joints of all exterior walls and base slabs and at other joints as shown on drawings. Secure in-place. Place wire tie holes, if used, within 1 in. of edge. Vibrate concrete on both sides to ensure intimate contact between waterstop and concrete.

3.04 REINFORCEMENT PLACEMENT

A. Correct displacement of reinforcement prior to and during concrete pouring operations. Maintain clear cover as noted on the Drawings. Tolerances shall be in accordance with ACI 318, unless noted otherwise.

B. Locate reinforcing to avoid interference with items that will be drilled in later, such as concrete anchors and pipe penetrations.

C. Placement of reinforcing steel is to be approved by the ENGINEER before being covered with concrete.

D. Use concrete brick for supporting bottom mat reinforcing on grade. Use bolsters or chairs supported on concrete brick for supporting upper reinforcing mat.

E. Do not field bend bars including bars partially embedded in concrete.

F. Welding of reinforcing bars will not be permitted.

3.05 CONCRETE PLACEMENT

A. Except as modified herein, ACI 304 - Chapter IV, shall constitute requirements of this Specification.

B. Reinforcing steel shall be tied at intersections in accordance with CRSI "Placing Reinforcing Bars". Maximum spacing for footings and walls shall be every third intersection or 3 ft.-0 in. Maximum spacing for slabs and other work shall be every fourth intersection or 3 ft.-0 in. Dowels shall be tied in-place.

C. Care shall be taken to avoid damage to waterstop and reinforcing and ensure their accurate positioning after concrete is placed.

D. Provide construction joints as shown on Drawings and specified herein and when placing of concrete is temporarily halted or delayed.

E. Place concrete with aid of internal mechanical vibrator equipment capable of 7,000 impulses/min. Transmit vibration directly to concrete. Duration of vibration at any location shall be amount necessary to produce thorough consolidation and also to cause maximum amount of air bubbles to migrate to top of pour. Do not move or spread concrete with vibrators.

F. Set embedded items such as bolts, anchors, and piping, in concrete as required by manufacturer of equipment used. Verify location with equipment manufacturers.

G. Place items constructed of dissimilar metals to avoid physical contact with reinforcing. Secure item and reinforcing to ensure they will not shift and come into contact during pouring. Contact between reinforcing and any other metal, other than bare, coated or plated carbon steel will not be permitted.

3.06 SLAB FINISHES

A. Float and Broom Finish: Broom at right angles to direction of traffic to give nonskid finish. Use fine, soft bristled broom.

3.07 FINISHING FORMED CONCRETE

A. Finish surfaces resulting directly from formwork.

1. Patch honeycombing, stone pockets, form ties, spalls, and other irregularities.

2. Grind joint marks and fins smooth with adjacent wall surface. Remove oil stains and rinse surface.

3.08 PROTECTION AND CURING

A. Protect concrete from frost, rapid drying and keep moist for minimum curing period of 7 days after placing.

B. Wet cure; apply curing compound after receiving approval from OWNER. Do not use curing compound where other coating will be applied unless curing compound is compatible with coating to be applied.

C. Formed surfaces may be cured by leaving forms in-place. Spray surface of forms left in-place during curing period as frequently as drying conditions may required, keeping concrete surface moist. For vertical surfaces, apply water to run down on inside of forms, if necessary to keep concrete wet.

D. Protect finished concrete from damage caused by construction equipment vibration or loads, rain, or running water.

E. Do not load self-supporting structures in such way as to overstress concrete.

F. Prior to placing any loads on or against a newly cast-in-place concrete structure, test cylinders created from the pour shall be submitted for compressive strength. The ENGINEER shall review the test results to verify that the concrete has attained adequate compressive strength prior to loads being placed.

* * * END OF SECTION * * *

SECTION 03400
PRE-CAST CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

A. Provide pre-cast concrete as shown on Drawings.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A48 - Standard Specification for Gray Iron Castings.

2. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars.

3. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.

4. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections or Tile.

B. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M198 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

1.03 SUBMITTALS

A. Include results of tests and certification reports with shipment of materials.

B. If manufacturer's test data is inadequate or unavailable, ENGINEER reserves right to require cores drilled for compressive strength tests.

C. Submit manufacturer’s data for flexible seals.

D. Submit in accordance with Section 01340.

1.04 QUALITY ASSURANCE

A. Source Quality Control:

1. Test pre-cast concrete structures in accordance with ASTM C497 for compressive strength compliance by compression tests on cores drilled from 5% of lot. Testing frequency may be reduced to 1% of lot, with minimum of 2 cores/lot, for manhole sections fabricated on sewer pipe machine.

2. Manufacturer's core drilling machine shall conform to ASTM C478. Operator shall take test cores as directed by testing laboratory.
3. Stamp risers and tops, meeting strength requirements, with appropriate monogram.

PART 2 MATERIALS

2.01 CAST-IN-PLACE STRUCTURES

A. Concrete: Comply with Section 03300.

2.02 PRE-CAST REINFORCED CONCRETE STRUCTURES

A. Provide flat pre-cast structures as shown on the Drawings with reinforced integral floors having a minimum thickness of 6 inches, or as shown on Drawings.

B. Elevations indicated on the Drawings designate pipe elevations at the center of the structures. Provide for pipe grade differential between center of structure and structure wall for each pipe penetration.

C. Minimum Wall Thickness:

Structure	Wall Thickness
Handhole	4 in.
Vault	6 in.

D. Seal pre-cast sections of structures with a 3/4-inch diameter, buytl rubber joint sealant, or as recommended by the manufacturer.

E. Mark each pre-cast section with the name or trademark of manufacturer and date of manufacture. Marking shall be indented into manhole section or painted on with waterproof paint.

2.03 CASTINGS

A. Conform to requirements of ASTM A48, Class 30-B, and dimensions shown on Drawings.

B. Castings shall be free from cracks, holes, swells, and cold shuts.

C. Casting types are shown on Drawings.

2.04 FLEXIBLE SEAL

A. Seals shall be Link-Seal (model S), as manufactured by Thunderline Corporation, or equal.

B. Size according to manufacturer's instructions for a watertight seal between pipe and core-drilled penetration or wall sleeve.

PART 3 EXECUTION

3.01 EXCAVATION AND PREPARATION OF SUBGRADE

A. Excavate and prepare subgrade in accordance with Section 02210, and as shown on the Drawings, to provide a minimum of 6 inches of select fill under base section.

3.02 BACKFILL

A. Backfill with required pipe bedding and cover material to spring line of incoming pipes as shown on the Drawings.

3.03 PIPE AND CONDUIT CONNECTIONS

A. Seal annular space between pipe and pre-cast wall with Link-Seal or approved equal.

B. Seal conduit openings with watertight caulking seal.

3.04 SETTING FRAMES AND CASTINGS

A. Set at elevation shown on the Drawings.

B. Provide a watertight seal between frame and structure using a buytl rubber sealing material or other material as approved by the OWNER.

C. Anchor frame to structure in accordance with manufacturer's instructions.

3.05 FIELD QUALITY CONTROL

A. Pre-cast reinforced concrete structures shall be subject to rejection on account of failure to conform to Specification requirements. In addition, individual sections may be rejected for any of following reasons.

1. Fractures or cracks passing through shell, except for single end crack not exceeding depth of joint.

2. Defects indicating imperfect proportioning, mixing, and molding.

3. The presence of surface defects indicating honeycombed or open texture.

4. Damaged ends where such damage prevents making satisfactory joint.

5. Internal diameter of section varies more than 1% from nominal diameter.

6. Continuous crack having surface width of 0.01 in. or more and extending for length of 12 in. or more, regard1ess of position.

* * * END OF SECTION * * *

SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.01 REFERENCES

A. American Institute of Steel Construction (AISC):

1. Specification for Design, Fabrication, and Erection of Structural Steel for Buildings.

2. Code of Standard Practice for Steel Buildings and Bridges.

3. Manual of Steel Construction (Allowable Stress Design), 9th Edition.

B. American Society for Testing and Materials (ASTM):

1. ASTM A36 - Standard Specification for Carbon Structural Steel.

2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

4. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

5. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

6. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

C. American Welding Society (AWS):

1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

2. AWS A5.5 - Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding.

3. AWS A5.17 - Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.

4. AWS D1.1 - Structural Welding Code-Steel.

D. Steel Structures Painting Council (SSPC):

1. SSPC SP6 - Commercial Blast Cleaning.

E. Aluminum Association (AA):

1. AA SAS30 - Specifications for Aluminum Structures Construction Manual Series Section 1.

F. American Iron and Steel Institute (AISI).

G. American Hot-Dip Galvanizers Association (AHDGA).

1.02 SUBMITTALS

A. Shop Drawings of items provided, detailing materials, sizes, connections, anchors, and painting.

1. One reproducible and one print of Shop Drawings.

B. Manufacturer's catalog sheets on manufactured items.

C. Provide International Conference of Building Officials (ICBO) or other similar building code organization recommendations regarding safe allowable design loads for concrete anchors.

D. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Welding:

1. Steel:

a. Conform to codes for arc and gas welding in building construction of AWS and to AISC Specifications. Surfaces to be welded shall be free from loose scale, rust, grease, paint, and other foreign material, except mill scale which will withstand vigorous wire brushing may remain. No welding shall be done when the base metal is lower than 0°F.

b. Qualify welding operators in accordance with AWS D1.1. Qualification tests shall be run by recognized testing laboratory approved by ENGINEER at the CONTRACTOR'S expense.

c. Welding operators shall be subject to examination for re-qualification using equipment, materials, and electrodes employed in execution of work. Such re-qualification, if ordered by the ENGINEER, shall be done at CONTRACTOR'S expense.

2. Aluminum: Weld with gas metal arc (GMA) or gas tungsten arc (GTA) processes in accordance with manufacturer's recommendations as approved and in accordance with recommendations of the AWS.

PART 2 PRODUCTS

2.01 MATERIALS

A. Conform to following specifications:

1. Steel Shapes and Plates: ASTM A36.

2. Square and Rectangular Structural Tubing: ASTM A500, Grade B.

3. Round Structural Tubing and Steel Pipe:

   a. ASTM A53, Type E or S, Grade B.

4. Stainless Steel: Exterior and Submerged -AISI, Type 316; Interior and Architectural -AISI, Type 304; Bolts and Anchors -AISI, Type 303 or 304.

5. Aluminum Structural Shapes and Plates: Alloy 6061-T6 or 6063-T6; conform to referenced specifications and ASTM sections found in AA current construction manual series.

6. Connection Bolts for Steel Members: ASTM A325.

7. Anchor Bolts: ½ in. minimum diameter, non-submerged - ASTM A307 galvanized; submerged-stainless steel.

8. Connection Bolts for Wood Members: ASTM A307, galvanized.

9. Connection Bolts for Aluminum: Stainless steel.

2.02 FABRICATION

A. Connections and Workmanship:

1. Fabricate details and connection assemblies in accordance with drawings and with projecting corners clipped and filler pieces welded flush.

2. Weld shop connections, bolt or weld field connections, unless otherwise noted or specified.

3. Provide clips, lugs, brackets, straps, plates, bolts, nuts, washers, and similar items, as required for fabrication and erection.

4. Use connections of type and design required by forces to be resisted and to provide secure fastening.

   a. AISC standard 2-angle web connections or single plate framing connections capable of supporting minimum of 50% total uniform load capacity of members joined as tabulated in uniform load constants of AISC "Manual of Steel Construction".

b. Connections shall consist of minimum of two ¾ in. diameter bolts or welds developing a minimum of 10,000 lbs.

c. Make bearing type bolted connections with minimum ¾ in. diameter bolts with threads included in shear plane, unless detailed otherwise.

5. Welding:

a. Grind exposed edges of welds to 1/8 in. minimum radius. Grind burrs, jagged edges, and surface defects smooth.

b. Prepare welds and adjacent areas so there is (1) no under-cutting or reverse ridges on weld bead, (2) no weld spatter on or adjacent to weld or any other area to be painted, and (3) no sharp peaks or ridges along weld bead. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.

6. Bolting:

a. Draw up bolts or nuts tight. Use bolts of lengths required so bolts project at least 4 to 5 threads beyond face of nut. Use washers unless detrimental. Provide hexagonal head bolts with hexagonal nuts.

b. Provide holes required for connection of adjacent or adjoining work wherever noted on Drawings. Locate holes for bolting equipment to supports to tolerance of $\pm$ 1/16 in. of dimensions indicated.

B. Fit Work together in fabrication shop and deliver complete or in parts, ready to be set in place or assembled in field.

C. Galvanizing:

1. Galvanize after fabrication.

2. Galvanize by hot-dip process conforming to appropriate ASTM and AHDGA specifications.

3. Galvanize in plant having facilities to produce quality coatings and capacity for volume of work.

4. Ship and handle in manner avoiding damage to zinc coating.

D. Painting and Finishes:

1. Do not paint ferrous metal items to be encased in concrete.

2. Where other finish not specified, clean ferrous metal after fabrication to remove oil, mill scale, rust, and foreign matter in accordance with SSPC SP6. Apply one coat of shop primer yielding 1.5 mil dry thickness.

3. Give surfaces not accessible after assembly or erection 2 shop coats using different colors of paint, 3.0 mil total dry thickness.

4. Paint aluminum in contact with concrete in accordance with AA SAS30. Under no circumstances shall aluminum contact dissimilar metal.

2.03 CONCRETE ANCHORS

A. Wedge Anchors:

1. Manufacturers:

a. Rawl-Stud Anchor by Rawlplug Company, Inc.

b. Wedge Anchor by ITT Phillips Drill Division.

c. Kwik-Bolt II by Hilti Corporation.

d. Or equal.

2. Usage: In concrete.

a. Zinc or chromate plated carbon steel may be used where totally embedded, in interior locations with controlled humidity and other protected locations.

b. Stainless steel shall be used in other locations such as outside, in tanks or whenever attaching aluminum or galvanized steel.

B. Drop-In Anchors:

1. Manufacturers:

a. HDI Anchor by Hilti Corporation.

b. Multi-Set Anchor by ITT Phillips Drill Division.

c. H/S Drop-In by Rawlplug Company, Inc.

d. Or equal.

2. Zinc or chromate plated carbon steel.

3. Usage: In concrete.

a. Interior locations with controlled humidity and other protected locations.

b. Do not use drop-in anchors in corrosive or humid areas such as wet wells, liquid containing tanks, exterior applications.

C. Adhesive Anchors:

1. Manufacturers:

a. Anchor-It Fastening System by Adhesive Technology Corporation.

b. Foil-Fast Epoxy Injection Gel System by Rawl/Sika.

c. EPCON Injection System by ITW Ramset/Red Head.

d. Or equal.

2. Epoxy adhesive with Type 316 stainless steel stud or anchor rod assembly, nuts, and washers.

2.04 LADDERS

A. Fixed rail ladders shall be fiberglass unless approved by OWNER.

B. Punch rails and pass rungs through rails. Fabricate brackets for fastening ladder to wall and attach to ladder. Ladder shall conform to applicable federal, state, and local safety requirements.

2.05 FIBERGLASS GRATING

A. Fiberglass grating, Chemgrate or equal, maximum ¼ in. deflection under uniform load of 100 psf.

B. Band edges and cut outs.

PART 3 EXECUTION

3.01 INSTALLATION

A. Layout and install connectors such as concrete anchors and anchor bolts to secure metal fabrications to structure.

B. Concrete Anchors:

1. Drill holes in concrete and masonry work with rotary driven twist drills only. Fill voids in masonry with grout.

2. Do not install until concrete has reached specified minimum strength (fc).

3. Do not install closer than 6-bolt diameters to edge of concrete or masonry, or closer than 12-bolt diameters to another anchor unless detailed on Drawings.

4. Minimum embedment shall be 8 bolt diameters.

5. Install in accordance with manufacturer's recommendations.

C. Erect to lines and levels, plumb and true, and in correct relation to adjoining work. Secure parts using concealed connections whenever practicable.

D. Plumb and true vertical members to tolerance of $\pm$ 1/8 in. in 10 ft. Level horizontal members to tolerance of $\pm$ 1/8 in. in 10 ft.

E. Provide items such as bolts, shims, blocks, nuts, washers, and wedging pieces to complete installation.

F. Drill field holes for bolts. Do not burn holes.

G. New holes or enlargement of unfair holes by use of cutting torch is cause for rejection of entire member.

H. Perform cutting, drilling, and fitting required for installation of metal fabrications.

I. Field welds shall be approved by OWNER before prime painting. Clean slag from welds prior to inspection.

3.02 ADJUSTMENTS AND CLEANING

A. Field repair of damaged galvanized coatings.

1. Repair galvanized surfaces damaged during shipping or erection/construction operations.

2. Repair surfaces using zinc-rich paint.

3. Prepare surfaces and apply in accordance with ASTM A780, Annex A2.

* * * END OF SECTION * * *

SECTION 05520
ALUMINUM HANDRAILS AND RAILINGS

PART 1 GENERAL

1.01 REFERENCES

A. Aluminum Association:

1. AA SAS30 - Specifications for Aluminum Structures Construction Manual Series Section 1.

1.02 SUBMITTALS

A. Shop Drawings:

1. Shop drawings for railings including splices, attachments, and mounting.

2. Identify location and type indicated.

3. Indicate railings in related and dimensional position with scale elevations.

4. Indicate required field measurements.

5. One reproducible and one print of Shop Drawings.

B. Design and Test Data:

1. Catalog data or design information.

a. Submit test data showing load, and deflection due to load, in enough detail to prove handrail system and base connections satisfy OSHA requirements.

C. Samples:

1. Duplicate samples, 6 in. long, of typical pipe showing finish.

2. Sample of each fitting.

D. Manufacturer's literature and assembly and installation instructions.

E. Maintenance Instructions: Manufacturer's recommendations describing procedures for maintaining including cleaning materials, application methods, and precautions as to use of materials which may be detrimental to finish when improperly applied.

F. Submit above in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Handrails and railings shall meet requirements of OSHA and local building codes.

B. Handrails provided shall be end products of one manufacturer to achieve standardization for appearance, maintenance, and replacement.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle components in manner preventing damage to finished surfaces.

1. Pack pipe and elbows in individual plastic shrink film to protect finish. Do not remove until after installation.

B. Storage of Materials:

1. Store components in dry, clean location, away from uncured concrete and masonry.

2. Cover with waterproof paper, tarpaulin or polyethylene sheeting.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Alumaguard.

B. Enerco Metal Products, Inc.

C. Or equal.

2.02 MATERIALS

A. Rails, Posts, and Formed Elbows: Aluminum, Alloy 6061-T6 or 6063-T6, Schedule 40, 1-1/2 in. IPS (1.90 in. OD, 0.145 in. wall thickness).

B. Fittings:

1. Fabricate from material similar to railings.

2. Elbows, flanges, sleeves, brackets, and similar items shall be set screw or bolted type.

3. Connections shall be continuous diameter type for smooth appearance and to permit continuous sliding of hands.

C. Safety Chains: ¼ in. stainless steel link chain with spring actuated stainless steel clasp.

2.03 FINISHES

A. Clear satin anodized finish on exposed surfaces.

1. Extruded Components: 0.7 mil anodized.

2. Cast Components: 0.4 mil anodized.

B. Light, circumferentially-brushed finish before anodizing on pipe shaped components.

2.04 FASTENINGS

A. Mechanical Fasteners: Stainless steel.

2.05 FABRICATION

A. Field verify dimensions before fabrication.

B. Fabricator to conform to details shown. Form connections and changes in rail direction by using prefabricated fittings or radius bends.

C. Remove burrs from exposed cut edges.

D. Form elbow bends and wall returns to uniform radius, free from buckles and twists, with smooth finished surfaces or use prefabricated bends.

E. Locate rails as shown on Drawings.

F. Close pipe ends using prefabricated fittings.

G. Space posts not more than 4 ft. on center. Erect posts plumb in each direction.

H. Provide minimum 1/4 in. thick toe plate. Extend not less than 4 in. above walking surface.

I. Blend in color discrepancies on anodized aluminum areas due to fabrication such as welding and exposed fasteners.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install as shown on the Drawings and approved submittals.

B. Coat base flanges to be in contact with concrete with bituminous paint.

C. Set posts plumb and aligned to within 1/8 in. in 12 ft.

D. Set rails horizontal or parallel to rake of steps to within 1/8 in. in 12 ft.

E. Assemble and install in accordance with printed instructions of manufacturer.

F. Locate safety chains as shown on the Drawings. One chain shall be at top, other chain shall be centered between grating and to chain. Chain drape shall not exceed 3 in.

3.02 CLEANING

A. Wash thoroughly using clean water and soap, rinse with clean water.

B. Do not use acid solution, steel wool or other harsh abrasive.

C. If stain remains after washing, remove finish, and restore in accordance with manufacturer's recommendations.

3.03 REPAIR OF DEFECTIVE WORK

A. Remove stained or otherwise defective work and replace with material meeting Specification requirements.

* * * END OF SECTION * * *

SECTION 08018
FIBERGLASS REINFORCED PLASTIC DOORS AND FRAMES

PART 1 GENERAL

1.01 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Door and Hardware Institute (DHI):

1. Recommended locations for Builder's Hardware.

1.02 SUBMITTALS

A. Shop Drawings:

1. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items. Indicate coordination of glazing frames and stops with glass and glazing requirements.

B. Product Data:

1. Manufacturer's technical product data, substantiating product compliance with requirements.

C. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Provide fiberglass doors, frames and accessories as complete units produced by one manufacturer.

B. Fiberglass door manufacturer shall provide hardware.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in sealed, undamaged containers identified with manufacturer's name, brand, style, pattern, and color.

B. Store in original cartons, on end on such manner to prevent falling or damage to face, corners, and edges.

1.05 GUARANTEE

A. Manufacturer shall unconditionally guarantee fiberglass doors and frames for five years against failure due to corrosion.

B. Alterations to door by OWNER will void warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Chem-Proof Door Company.

B. Or equal.

2.02 FABRICATION

A. Doors:

1. Construct of fiberglass reinforced plastic (FRP) using polymers tailored to specific corrosive environment with glass content of 35% by weight.

2. Flush construction having no seams or cracks and shall have mortises molded in by manufacturer.

3. 1-3/4-in. thick with 15 mil plus or minus 3 mil color gel coat and shall have a minimum R-factor of 9.

4. Sizes indicated on Drawings with clearances of 1/8 in. at jambs and head and 1/2 in. at bottom unless otherwise indicated or specified.

B. Styles and Rails:

1. Constructed of 2 layers of 1.5 oz/sq ft. fiberglass mat and one layer of 10 oz/sq yd fiberglass cloth.

2. Mold in one continuous piece to U-shaped configuration and to exact dimensions of door.

C. Door Plates:

1. Molded in one continuous piece with 2 layers of 1.5 oz/sq ft. of fiberglass mat and with 16 oz/sq yd uni-directional roving.

D. Frames:

1. Construct of same materials and method as doors.

2. Jamb shall be of uniform cross-sectional thickness so back of jamb shall preset uniform surface against wall opening.

3. Reinforcement for mounting hinges and other hardware shall be of mild steel plates strategically located, buried in matrix of polyester material so that they will not be exposed.

E. Reinforcing for Hardware:

1. Install reinforcing and compression members to accommodate half surface hinges and other hardware in voids between door plates.

2. Fill with equivalent of 4 to 6 lbs of expanded polyurethane foam having flame spread of 25 or less in accordance with ASTM E84.

F. Resins:

1. Fire retardant formulation plus antimony trioxide to achieve flame spread of 25 or less in accordance with ASTM E84.

2. Self-extinguishing in accordance with ASTM D635.

G. Ledge for Window Openings: One piece, molded integrally with both door plates so that no moisture may penetrate door cavity through window opening. Retain window glass by 4 fiberglass glazing pins and seal in such manner that integrity of seal remains intact.

H. Color: Grey.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install frames plumb, rigid and in true alignment. Brace securely during construction to retain their proper position and clearances.

B. Secure jambs with stainless steel concrete anchors.

C. Installation in accordance with manufacturer's written instructions using only non-corrosive materials and methods.

3.02 ADJUST AND CLEAN

A. Final Adjustment: Check and readjust operating finish hardware items, leaving frames undamaged and in complete and proper operating condition.

B. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from pre-finished doors.

* * * END OF SECTION * * *

SECTION 08110
STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI A115 - Door and Frame Preparation.

B. American Society for Testing and Materials (ASTM):

1. ASTM A153 - Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

2. ASTM A1008 - Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

3. ASTM A653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

4. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

5. ASTM A568 - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low Alloy, Hot-Rolled, and Cold-Rolled, General Requirements for.

6. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of Hot Box Apparatus.

7. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

8. ASTM E413 - Classification for Rating Sound Insulation.

C. Door and Hardware Institute (DHI):

1. Recommended Locations for Builder's Hardware.

D. National Fire Protection Association (NFPA):

1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

E. Steel Door Institute (SDI):

1. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames.

2. SDI 105 - Recommended Erection Instructions for Steel Frames.

3. SDI 106 - Recommended Standard Door Type Nomenclature.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data substantiating product compliance with requirements.

B. Shop Drawings: Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

1. Provide schedule of doors and frames using same reference numbers for details and openings as those on the Drawings.

2. Indicate coordination of glazing frames and stops with glass and glazing requirements.

C. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Provide doors and frames complying with SDI 100 and as specified.

B. Fire-Rated Door Assemblies: Where- indicated or required, provide fire-rated door and frame assemblies complying with NFPA 80 which have been tested, listed, and labeled in accordance with NFPA 252 by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Identify Work not permanently factory assembled before shipment to ensure proper assembly at Project site.

B. Deliver hollow metal work cartoned or crated to provide protection during transit and job storage.

C. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items equal new Work and are acceptable to OWNER, otherwise remove and replace damaged items.

D. Store doors and frames at Project site under cover. Place units on minimum 4 in. high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide minimum ¼ in. spaces between stacked doors to promote air circulation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Thermal Rated Steel Door and Frame Assemblies:

1. Ceco Corporation.

2. Curries Manufacturing, Inc.

3. Or equal.

2.02 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, ASTM A568.

B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, ASTM A1008 and A568.

C. Galvanized Steel Sheets: Zinc coated carbon steel sheets of commercial quality, ASTM A653 and A1101, G60 zinc coating, mill phosphatized.

D. Supports and Anchors: Fabricate of galvanized sheet steel, minimum 18 ga.

E. Inserts, Bolts, and Fasteners: Manufacturer's standard units, except hot-dip galvanize items built into exterior walls, ASTM A153, Class C or D as applicable.

F. Shop-Applied Paint:

1. Primer: Rust inhibitive enamel or paint, air-drying or baking, suitable as base for specified finish paints.

2.03 FABRICATION, GENERAL

A. Door and frame shall be rigid, neat in appearance, and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant.

B. Comply with SDI 100.

1. Exterior Doors: SDI 100, Grade III, extra heavy duty, Model 2, minimum 16 ga faces.

2. Interior Doors: SDI 100, Grade II, heavy duty, minimum 18 ga faces.

C. Materials:

1. Exposed faces of doors and panels, including stiles and rails of non-flush units shall be cold-rolled steel.

2. Frames, concealed stiffeners, reinforcement, edge channels, louvers, and moldings shall be cold- or hot-rolled steel, minimum 16 ga.

3. Exterior Doors: Close top and bottom edges as integral part of door construction or by addition of minimum 16 ga inverted steel channels.

D. Exposed Fasteners:

1. Countersunk flat Phillips heads for exposed screws and bolts.

E. Finish Hardware Preparation:

1. Comply with ANSI A115 for door and frame preparation.

2. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for surface applied finish hardware may be done at Project site.

3. Locate finish hardware as indicated on approved Shop Drawings or, if not indicated, in accordance with DHI.

F. Shop Painting:

1. Clean, treat, and paint exposed-surfaces of steel door and frame units, including galvanized surfaces.

2. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.

3. Apply shop coat of prime paint of even consistency to provide uniformly finished surface ready to receive finish paint.

2.04 STANDARD STEEL DOORS

A. Provide metal doors of types and styles indicated on Drawings or schedules.

B. Door Louvers:

1. Sightproof stationary louvers for interior doors constructed of inverted V- or Y-shaped blades formed of 24 ga cold-rolled steel set into 20 ga steel frames.

2.05 STANDARD STEEL FRAMES

A. Provide metal frames for doors, transoms, side lights, borrowed lights, and other openings of types and styles shown on Drawings and schedules.

1. Fabricate of minimum 14 ga hot-dip galvanized steel.

2. Conceal fastenings unless otherwise indicated.

3. Miter and weld corners.

B. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.

C. Plaster Guards: Provide 26 ga steel plaster guards or mortar boxes welded to frame at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation, and to close off interior of openings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install standard steel doors, frames, and accessories in accordance with Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames:

1. Comply with SDI 105 unless otherwise indicated.

2. Except for frames located at cast-in-place concrete or masonry and drywall installations, place frames prior to construction of enclosing walls and ceilings.

3. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors set.

4. After wall construction complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

5. Masonry Construction: Locate 3 wall anchors per jamb at hinge and strike levels.

6. Metal Stud: Install minimum of 3 wall anchors per jamb at hinge and strike levels.

7. Fire-Rated Frames: In accordance with NFPA 80.

C. Door Installation:

1. Fit hollow metal doors accurately in frames within clearances specified in SDI 100.

2. Place fire-rated doors with clearances as specified in NFPA 80.

3.02 ADJUST AND CLEAN

A. Prime Touch-up: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air drying primer.

B. Final Adjustments: Check and re-adjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and operating condition.

* * * END OF SECTION * * *

SECTION 10440
SPECIALTY SIGNS

PART 1 GENERAL

1.01 SUMMARY

A. Supply and install panel signs as indicated on the Drawings.

1.02 REFERENCES

A. Standard Specifications: "Standard Specifications for Construction and Materials," State of New York Department of Transportation (NYSDOT).

B. NYSDOT Standard Sheets.

C. New York State Manual for Uniform Traffic Control Devices (MUTCD).

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each type of sign required.

B. Samples: Submit samples of each sign form and material showing finishes, colors, surface textures, and qualities of manufacture.

C. Shop Drawings: Submit layout and design of each sign panel including graphics.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Signs shall be aluminum sheet alloy in accordance with NYSDOT 645-2.01 B or ABS Plastic High impact thermoplastic composed of copolymers of acrylonitrile, butadiene, and stryene.

B. Fasteners: Use concealed fasteners, unless otherwise indicated, fabricated from metals, which are non-corrosive to either sign materials or mounting surface.

C. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

D. Posts: Signposts shall be NYSDOT post size 2 (L 3 x 2.5 x 0.25) aluminum, or 4 x 4 pressure treated wood as approved by OWNER.

2.02 FABRICATION OF PANEL SIGNS

A. General:

1. Fabricate panel signs to comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

2. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 in. measured diagonally from corner to corner.

3. Unframed Panel Signs: Fabricate unframed panel signs with edges mechanically and smoothly finished to conform to the following requirements.

a. Edge Condition: Square cut.

b. Edge Color for Plastic Laminate: Same as copy.

c. Corner Condition: Rounded to radius indicated.

B. Graphic Image Process:

1. Graphic Content and Style: Provide sign copy to comply with requirements indicated for sizes, styles, spacings, content, positions, materials, finishes, and colors of letters, numbers, symbols, and other graphic devices as selected by OWNER.

2.02 FINISHES

A. General:

1. Colors and Surface Textures: For exposed sign materials which require selection of materials with integral or applied colors, surface textures, or other characteristics related to appearance, provide color matches indicated, or if not otherwise indicated, selected by OWNER from manufacturer's standards.

2. Metal Finishes: Comply with National Association of Architectural Metal Manufacturers (NAAMM) "Metal Finishes Manual" for finish designations and application recommendations.

B. Aluminum Finishes:

1. Baked Enamel Finish: AA-M4xC12C42R1x (manufacturer’s standard non-directional mechanical finish including sanding and filing; cleaning with inhibited chemicals’ conversion coated with an acid-chromate-fluoride-phosphate treatment; and painted with organic coating specified below).

a. Organic Coating: Manufacturer's standard thermosetting enamel system consisting of prime coat and finish coat.

PART 3 EXECUTION

3.01 INSTALLATION

A. Locate sign units and accessories where shown or scheduled, using mounting methods of type described and in compliance with manufacturer's instructions, unless otherwise indicated.

B. Install sign units level, plumb, and at height indicated, with sign surfaces free from distortion or other defects of appearance.

3.02 CLEANING AND PROTECTION

A. At completion of installation, clean soiled sign surfaces in accordance with manufacturer's instructions.

B. Protect units from damage until acceptance by OWNER.

* * * END OF SECTION * * *

SECTION 11309
PUMPS

PART 1 GENERAL

1.01 SUMMARY

A. Pumps to be used in primary and secondary leachate collection sumps and leachate vaults.

1.02 SUBMITTALS

A. Shop Drawings.

B. Manufacturer's written installation instructions.

C. Submit in accordance with Section 01340.

D. Operation and Maintenance (O&M) Data:

1. Submit in accordance with Section 01730.

1.03 QUALITY ASSURANCE

A. Performance Criteria:

1. Provide pumps that meet the performance criteria in Table 11309-1 of this section.
2. Working parts shall be readily accessible for inspection and repairs, easily duplicated, and replaced.
3. Direct connect to vertical shaft motor.
4. Pumps shall be capable of safely rotating in reverse direction due to water returning through pump.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Pumps:

1. Godwin Pumps of America, Inc.
2. Goulds, Inc.
3. Honda Power Equipment.
4. Or equal.

2.02 PUMPS

A. Provide pump and motor designed for continuous submerged operation.

B. Pumping down thrust absorbed by motor thrust bearing.

1. Adjustable Mitchell design (improved "Kingsbury" type).

2. Construct of ceramic running against self-aligning metal impregnated carbon pads.

C. Provide stainless steel priming inducer.

1. Design to ensure proper pump lubrication and prevent dry running if liquid level drops below pump intake.

D. Provide stainless steel filter screen.

1. Integral to suction inlet assembly.

E. Provide fabricated stainless steel diffuser guide vanes.

F. Provide fabricated stainless steel impellers.

1. Fit seal ring around each impeller eye or skirt.

a. Construct seal rings of stainless steel tetrafluoroethylene (TFE).

G. Provide centerless ground stainless steel pump shaft.

H. Provide TFE shaft bearings of hexed design.

I. Provide stainless steel split cones and split cone nuts.

J. Provide integral fabricated stainless steel diffuser chambers.

1. Design to eliminate up thrust.

2. Container diffuser guide vanes and intermediate shaft bearings.

K. Provide high tensile strength stainless steel straps.

L. Provide splined or keyed stainless steel pump shaft coupling.

M. Motor:

1. Canned rotor design.

2. Hermetically sealed epoxy encapsulated stator sealed in stainless steel enclosure.

3. Stainless steel clad rotor.

4. Construct parts in contact with pumped liquid of stainless steel.

5. Shaft and Seal:

   a. Tungsten carbide running on tungsten carbide.

   b. Upper seal ring molded into spring loaded rubber diaphragm.

6. Upper Radial Bearing:

   a. Diamond hard ceramic running against tungsten carbide shaft journal.

   b. Lubricated by pumped fluid.

7. Motor Circulation Pump:

   a. Stainless steel.

   b. Circulate pumped fluid in rotor.

   c. Design to ensure effective bearing lubrication and winding heat dissipation.

8. Lower Radial Bearing:

   a. Diamond hard ceramic running against tungsten carbide shaft journal.

   b. Lubricated with pumped fluid.

9. Rubber Diaphragm

   a. Design to automatically compensate for internal motor liquid expansion due to temperature or pressure changes.

10. Provide neoprene jacketed RHW insulated power cable.

2.03 SPECIAL REQUIREMENTS (Primary and Secondary Leachate collection sump pumps only)

A. Provide each pump with 100-ft, factory-installed, sealed, heavy duty, Teflon coated electric service cable.

2.04 ACCESSORIES (Primary and Secondary Leachate collection sump pumps only)

A. Hose and Quick Connect Couplings: Provide 100-ft. length of discharge hose with quick connect couplings, sized to match the discharge size of the Leachate pumps. For specifications of hose and quick connect couplings, refer to Section 15076.

B. Pullout Cable: Provide 100-ft of ¼ in. stainless steel, pullout cable.

C. Provide stainless steel fabricated wheeled carriage for conveyance of pump within the sump riser pipes.

PART 3 EXECUTION

3.01 INSTALATION

A. Install equipment according to manufacturer's written instructions and approved submittal.

B. Attach pump power cable to stainless steel pump pull-out cable at 5-ft intervals using nylon ties (Primary and Secondary Leachate collection sump pumps only).

C. Wiring shall conform to requirements of Division 16.

TABLE 11309-1
PUMP AND ELECTRICAL M0TOR CHARACTERISTICS

PUMP CHARACTERISTICS

Pump Designation (1)*	Medium Capacity Leachate Pump	Large Capacity Leachate Pump	Vault Pump
Number of Units	6 (includes 1 spare)	6 (includes 1 spare)	6 (includes 1 spare)
Materials Being Pumped	Leachate	Leachate	Vault Condensate
Minimum Solids Size (in.)	0.75	0.33	0.375
Constant or Variable Speed	Constant	Constant	Constant
Configuration (2)*	e	e	E
Minimum Suction Size (in.)(3)*	---	---	---
Minimum Discharge Size (in.)(3)*	2 NPT	3 NPT	1-1/4 NPT
Rated Capacity (gpm)	72	200	40
Total Dynamic Head at Rated Capacity (ft)(4)*	50	140	25
Minimum Capacity (gpm)	70	176	---
Total Dynamic Head at Minimum Capacity (ft)(4)*	34	57	---
Maximum Pump Speed (rpm)	3,500	3,400	---
Minimum Pump Speed (rpm)	---	---	---
Lubrication (5)*	Pumped Fluid	Pumped Fluid	Pumped Fluid
Rotation when Viewed from Driver	Clockwise	Clockwise	Clockwise
Type of Drive (6)*	---	---	---
Special Requirements	All Stainless Steel Construction	All Stainless Steel Construction	All Stainless Steel Construction

ELECTRIC MOTOR CHARACTERISTICS

Horsepower- Min.	1-1/2	13	1/3
Rated Speed (rpm)	3,500	3,400	---
Service Factor	1.15	1.15	1.15
General Type (7)*	a	a	---

Housing Type (8)*	c, d	c, d	c, d
NEMADesign	B	B	B
Insulation Class	B	B	F
Voltage	460	460	115
Phase	3	3	---
Code Letter	G	G	G
Special Requirements	---	---	---

()* Indicates footnotes on following page
NA Indicates not applicable

TABLE 11309-1
PUMP AND ELECTRIC MOTOR CHARACTERISTICS
(Continued)

1. Pump Designations:

   a. Medium Capacity Leachate Pump: Goulds Pumps Model WE15HH, or approved equal.

   b. Large Capacity Leachate Pump: Godwin Pumps Model GSP130HH, or approved equal.

   c. Vault Pump: Honda Submersible Pump Model WSP33AM, or approved equal.

2. Configuration can be

   a. Propeller pump - axial flow.

   b. Propeller pump - mixed flow.

   c. Vertical turbine pump - enclosed impeller.

   d. Vertical turbine pump - semi-open impeller.

   e. Vertical submersible pump.

3. If larger pump size or different pump other than those shown are furnished by CONTRACTOR, he shall be responsible for added expense of piping and changes in Drawings.

4. Does not include elbow, column, strainer, and other internal losses in pump.

5. Product lubricated or oil lubricated.

6. Type of drive can be:

   a. Variable frequency.

   b. Magnetic coupling (eddy current coupling).

   c. Wound rotor.

d. Fluid drive.

e. Variable sheave (local or remote control).

7. General type can be:

a. Squirrel cage.

b. Wound rotor.

c. Synchoronous.

8. Housing type can be:

a. ODP (open dripproof).

b. TEFC (totally enclosed fan cooled).

c. Explosionproof.

d. Submersible.

e. Splashproof.

f. Weather protected.

* * * END OF SECTION * * *

SECTION 13121
PRE-ENGINEERED METAL ROOF

PART 1 GENERAL

1.01 SUMMARY

A. Intent of these Specifications and Drawings is to establish quality and performance level for structural design, material, durability, and workmanship.

1.02 REFERENCES

A. Aluminum Association (AA):

1. Specification for Aluminum Structures.

B. American Institute of Steel Construction (AISC):

1. Manual of Steel Construction (Allowable Stress Design).

C. American Iron and Steel Institute (AISI):

1. Cold-Formed Steel Design Manual.

D. American Society for Metals (ASM):

1. Metals Handbook.

   a. Aluminum Alloy No.6063.

E. American Society for Testing and Materials (ASTM):

1. ASTM A6 - Standard Specification for General Requirements for Rolled Steel Bars, Plates, Shapes, and Sheet Piling, for Structural Use.

2. ASTM A36 - Standard Specification for Carbon Structural Steel.

3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

4. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

5. ASTM D4214 - Standard Test Methods For Evaluating the Degree of Chalking of Exterior Paint Films.

6. ASTM D2244 - Standard Practice for Calculation of Color Differences and Color Differences from Instrumentally Measured Color Coordinates.

7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. American Welding Society (AWS):

1. AWS D1.1 - Structural Welding Code: Steel.

G. Federal Specifications (FS):

1. FS TT-P-664C(2) - Primer Coating, Synthetic, Rust-Inhibiting, Lacquer-Resisting.

H. International Conference Building Officials (ICBO):

1. Uniform Building Code and Supplements.

I. Metal Building Manufacturers Association (MBMA):

1. Metal Building Systems Manual.

1.03 SUBMITTALS

A. Shop Drawings:

1. Include structural framing details, connections, plans and sections for site specific roof stamped by Professional Engineer registered in State of New York.

2. Include anchor bolt setting plans.

3. Provide horizontal and vertical forces applied to structure wall.

4. State type of material, finishes, and painting for all locations.

B. Roof panel guarantees.

C. Color chips for roof panels and trim.

D. Submit in accordance with Section 01340.

1.04 QUALITY ASSURANCE

A. Manufacturer’s Qualifications:

1. Roof shall be design of manufacturer regularly engaged in fabrication of pre-engineered structures.

2. Use new, unused materials, free from defect, and of American manufacture.

B. Regulatory Requirements:

1. Building code having jurisdiction over area in which site is located.

2. Underwriters' Laboratories, Inc. (UL).

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect stored materials from damage.

B. Replace damaged material if repair or corrections cannot be made in field.

1.06 GUARANTEE

A. Roof Panels:

1. Guarantee durability of roof panels due to rupture, structural failure, or perforation for 20 years.

PART 2 PRODUCTS

2.01 PERFORMANCE CRITERIA

A. Design Loads:

1. General:

a. Basic design loads: Dead, live, wind, and earthquake in addition to dead load.

b. Other design loads, whether static, dynamic, or kinetic nature, shall be considered as auxiliary loads.

2. Vertical Live Loads:

a. Design roof covering for 50 psf uniformly distributed or 200-lb concentrated (point) load (over 1ft. by 1ft. area) located at center of maximum roofing (panel) span. Most severe conditions govern.

b. Design purlins for 35 psf uniformly distributed over roof area they support.

c. Primary-framing (frames) shall be designed for 35 psf uniformly distributed over roof area it supports.

d. Above loads shall be in addition to applicable dead loads and applied to horizontal projection of roof.

3. Wind Loads:

a. Wind load: 15 psf pressure proportioned and applied as horizontal and uplift forces according to and as recommended by State of New York

Codes, Rules and Regulations Building Construction Subchapter B, and MBMA. Most severe condition governs.

4. Seismic (Earthquake) Loads:

   a. Design roof for seismic forces.

   b. Provisions for determining seismic forces shall be those as recommended by ICBO.

5. Auxiliary (Additional Collateral) Loads:

   a. Consider other superimposed dynamic or static loads as part of design requirements and combined with normal design (live and wind) loads as prescribed hereafter.

      1. Static loads such as piping and lighting systems.

B. Description:

1. Pre-engineered metal roof covered by this section shall be structure of steel (frames) rafter beams devoid of valleys.

2. Roof slope shall be not less than ½:12.

3. Interior column (supports) not allowed.

4. Horizontal plane bracing permitted if above building's required interior clear height.

5. Roof shall be designed for removal in one piece. Anchor bolts shall be readily accessible for roof removal. Provide lifting lugs at top of roof for removal.

2.02 COMPONENT CRITERIA

A. Structural Framing:

1. Shapes and Plates: ASTM A36 or manufacturer's standard.

2. Anchor Bolts: ASTM A307 minimum.

3. Connection Bolts: ASTM A325.

B. Roof Covering and Supports: Roof construction shall carry UL construction (uplift) classification of no less than Class 30.

1. Roof Panels:

   a. Exposed metal roof covering: 24 ga (minimum) commercially pure aluminum-coated or zinc-aluminum-coated steel panels of configuration to provide specified load carrying capabilities and deflection requirements of this section.

b. Roof panels: "Standing-seam interlocking" design, secured to purlins with concealed structural fastening systems.

c. Concealed system: Shall provide minimal through penetration of exposed roofing surface and allow roof covering to move independently of any differential thermal movement by structural framing system.

d. Except at concealed fastener, there shall be no thermal contact of roof panels with supporting purlin.

e. Standing seams shall have factory-applied, non-hardening sealant, and be continuously locked or crimped together by mechanical means during erection.

f. Roof panels with lap-type side (longitudinal) joints and exposed structural fasteners not acceptable.

g. Fasten to purlins with concealed clip or backing device of steel having protective metallic coating. Through penetration of roofing surface by exposed fasteners shall occur only at terminal locations of roof panels. Such fasteners shall be stainless steel or aluminum screws, bolts or rivets with weather-seal washers. Carbon steel shank fasteners with vinyl heads are acceptable.

h. Deflection of roof panel shall not exceed L/180 of span when supporting applicable vertical live loads previously described.

2. Purlins:

a. Purlin configuration, thickness, and spacing shall be building manufacturer's standard provided design criteria, including deflection, is met or exceeded.

b. Deflection of purlin shall not exceed L/180 of span when supporting applicable vertical live loads previously prescribed and any collateral loads required.

3. Roof Jacks and Curbs:

a. Openings, 8 in. or smaller:

1) May be flashed and sealed to roof panel by jacks, if complete structural support and weather-tightness maintained.

2) Material shall be metal with protective metallic coating or plastic alloy with acrylic film laminated to exterior surface.

2.03 FABRICATION

A. Fabricate as shown on approved Shop Drawing. Do not modify Shop Drawings or Specifications.

B. Welder shall be certified for type of welding required.

C. Fabrication and erection welding and welding equipment shall comply with requirements of AWS.

D. Electrodes for structural welds shall be E70 series.

E. Surface shall be free of scale, rust, grease, paint or other foreign matter prior to welding.

F. After welding, brush welds with wire brushes. Welds shall show uniform section, smoothness of weld metal, weather edges without overlaps, and freedom from porosity and clinkers. Where necessary to achieve smooth connections, joint shall be dressed smooth.

2.04 STRUCTURAL STEEL PRIMER

A. Provide uncoated structural steel surfaces one shop coat of rust inhibitive (primer) paint compatible with finish painting system.

B. Surfaces inaccessible after erection shall be covered with 2 coats before erection.

2.05 INSULATION

A. Providing overall heat transfer (U) value of not more than .09.

B. Apply insulation system under exposed metal roofing panels.

C. Place insulation of required thickness and density either over purlins or in roof cavity between purlins and support by sloped, unpierced, or pierced ceiling of noncombustible material.

D. Place vapor membrane nearest interior of building, whether it be exposed or non-exposed.

E. Lap or fold and staple joints in accordance with roof manufacturer's standard.

F. Except at each concealed structural fastener, thermal (break) spacer shall separate roof purlin from roof panel. Spacer shall be material having density of not less than 2 pcf and, if of combustible material, shall be classified (ASTM E84) as having flame spread rating no greater than 25.

G. Noncombustible roof insulation shall be flexible fiberglass blankets with vapor resistant membrane. Vapor resistant membrane may be laminated to insulation as composite unit or added as separate component of insulation system. Insulation and vapor membrane, if supplied as laminated composite unit, shall carry UL fire hazard classification indicating flame spread rating of 25 or less, as tested assembly. If supplied as separate components, each (tested separately) shall carry previously specified fire hazard classification.

PART 3 EXECUTION

3.01 GENERAL

A. Erection of metal roof, accessories, insulation, and interior finish, if applicable, shall be performed by one of the following:

1. Authorized dealers or builders of manufacturer.

2. Building manufacturer's crews.

3. Other erectors authorized by manufacturer as trained and qualified to erect manufacturer's product. In this case, manufacturer shall inspect Work and certify its correctness.

B. Assemble in accordance with approved erection or assembly drawings, details, and instructions. No modifications to assembly drawings, details, or instructions shall be made.

3.02 ADJUSTMENT AND CLEAING

A. Touch up defects such as mars and abrasions to panels and framing, weld burrs in field.

B. Adjust ridge ventilator to operate properly.

* * END OF SECTION * *

SECTION 13250
HIGH DENSITY POLYETHYLENE (HDPE) MANHOLES

PART 1 GENERAL

1.01 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM C1147 - Standard Practice for Determining the Short Term Tensile Weld Strength of Chemical Resistant Thermoplastics.

2. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

3. ASTM D790 - Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

4. ASTM D1238 - Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.

5. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.

6. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.

7. ASTM D2657 - Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.

8. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.

9. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

10. ASTM D3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings Material.

11. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

12. ASTM F1473 - Standard Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipe and Resin.

13. ASTM F1759 – Standard Practice for Design of High Density Polyethylene (HDPE) Manholes for Subsurface Applications.

1.02 SUBMITTALS

A. Submit results of manufacturer's tests with shipment of HDPE Manholes, with 2 additional copies of such test results furnished to OWNER. Cost for additional required testing not performed by the manufacturer shall be borne by the CONTRACTOR.

B. Submit shop drawings indicating the dimensions of HDPE Manhole(s), and location and dimensions of fittings (10-inch primary and secondary leachate containment pipe stub ends).

C. Submit manufacturer's certification that fittings for HDPE Manholes were constructed in accordance with ASTM D2657 (for butt fusion technique) or ASTM C1147 (for extrusion welding technique).

D. Submit certification from the manufacturer that each HDPE Manhole (with fittings) has passed a leak test (performed using air or water) prior to delivery of the HDPE Manhole to the project site. Manufacturer's certification for the leak test shall included appropriate data from the testing to verify results. The leak test shall be performed using the manufacturer's standard leak test procedures.

E. Submit in accordance with Section 01340.

1.03 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver HDPE Manholes to the project site in manufacturer's original packaging, with labels clearly identifying materials and name of manufacturer. Manufacturer shall provide clasps, hooks or other equipment necessary for unloading and installation upon delivery.

B. Storage: Store HDPE Manholes in a clean, dry area, off the ground, in accordance with manufacturer's instructions.

C. Handling: Protect HDPE Manholes during handling and installation from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ISCO Industries.

B. Or equal.

2.02 FABRICATION

A. Construct HDPE Manholes (with appropriate fittings) in accordance with dimensions and locations provided in the Drawings.

B. Construct HDPE Manholes and fittings in accordance with the following physical properties of pipe compound:

1. Density: ASTM D1505, no less than 0.941 grams per cubic centimeter and no more than 0.955 grams per cubic centimeter.

2. Melt Flow: ASTM D1238 (Condition E), no greater than 0.4 grams per 10 minutes.

3. Flexural Modulus: ASTM D790, shall be no less than 110,000 psi and no greater than 160,000 psi.

4. Tensile Strength at Yield: ASTM D638, shall be no less than 3,000 psi and no greater than 3,500 psi.

5. Slow Crack Growth Resistance: ASTM F1473, shall be greater than 100 hours.

6. Hydrostatic Design Basis: ASTM D2837, shall be 1,600 psi at 23^{o}C.

7. HDPE Cell Classification: ASTM D3350, shall be a minimum cell classification value of PE 345464C.

C. HDPE Manholes shall be 60 inches or 72 inches in diameter (outside diameter) with a Standard Dimension Ratio (SDR) of 17 as indicated on the Drawings.

D. Pipe stub ends for leachate forcemain outer containment pipes shall match the sizes indicated on the Drawings and be SDR 11. Stub ends shall be extrusion welded to the inside and outside of the manhole.

E. HDPE Manhole base shall be fabricated from high performance, high molecular weight polyethylene with a resin conforming to the quality of the manhole and pipe (fittings).

F. HDPE Manholes shall include lifting rings and clasps, hooks or other equipment necessary for unloading and installation.

G. HDPE Manholes shall be equipped with a 30-inch-diameter slab opening with heavy duty manhole frame and "flow seal" cover or approved equal. Cover shall contain lettering "CHEM SEWER".

2.03 CONSTRUCTION QUALITY ASSURANCE

A. The QAC shall confirm that submittals providing manufacturer's test results and certifications meet the requirements of this section.

B. The QAC shall measure the manhole and fittings to verify that minimum wall thicknesses and dimension requirements have been met.

PART 3 EXECUTION

3.01 INSTALLATION

A. Subbase Preparation:

1. CONTRACTOR shall prepare subbase of HDPE Manholes utilizing select fill meeting the requirements of Section 02210, Part 2.03.

2. Select fill shall be placed to a minimum thickness of 12 inches, extending a minimum of 36 inches beyond the base of the manhole in all directions.

3. Select fill shall be compacted to a minimum 95% of the maximum dry density, as determined by modified proctor testing (ASTM D1557).

B. HDPE Manhole Installation:

1. CONTRACTOR shall install HDPE Manholes to the lines, grades and elevations depicted on the Drawings.

2. Contractor shall lift and place HDPE Manholes utilizing lifting rings and clasps, hooks or other equipment provided by the manufacturer.

3. HDPE Manhole top shall be extrusion welded to HDPE flatstock base of riser vaults.

C. Backfilling:

1. CONTRACTOR shall backfill soil around HDPE Manholes utilizing structural fill meeting the requirements of Section 02220, Part 2.07.

2. Structural fill shall be placed and compacted in 12 inch thick (maximum) lifts. Structural Fill shall be compacted to a minimum 90% of the maximum dry density, as determined by modified proctor testing (ASTM D1557).

3. CONTRACTOR shall utilize hand compaction equipment (i.e. vibratory plate tamper) to perform compaction of structural fill adjacent to the HDPE Manhole.

3.02 CONSTRUCTION QUALITY ASSURANCE

A. QAC shall perform nuclear density testing of subbase and backfill material in accordance with ASTM D6938 to verify the requirements specified above have been met.

B. QAC shall inspect the HDPE Manhole following installation to verify the manhole and fittings were not damaged during installation. Any damage identified to the manhole and/or fittings shall be repaired at no cost to the OWNER.

C. HDPE Manhole Testing:

1. Prior to testing HDPE manholes, the CONTRACTOR shall seal the opening of the annular space between the inner and outer HDPE pipes for both all leachate forcemain piping that passes through the manholes. The seal shall be performed by extrusion welding an HDPE “doughnut” to the inner and outer pipes, as shown on the Drawings.

2. CONTRACTOR shall fill manhole with water to a minimum depth of 12 inches below the top of the HDPE Manhole.

3. The QAC shall monitor the level of water for 4 hours. If the water level drops, the CONTRACTOR shall refill to the original level at start of test. If the water level does not drop, continue monitoring water level for 24 hours (Initial 4 hours may be included as part of the 24 hour monitoring period).

4. The QAC shall record the water level at the end of the 24 hour test period. If water level has not dropped more than 1 inch, the test shall be considered passed. If the water level drops more than 1 inch, the inlet and outlet pipe penetrations shall be inspected and repaired, if necessary, and the test shall be performed again.

D. Riser Vault Testing:

1. Welds for joints of HDPE flatstock riser vault base to the HDPE manhole top shall be spark tested in accordance with Section 02401, Part 3.04, Paragraph C.1.

* * END OF SECTION * *

SECTION 13330
MISCELLANEOUS FIBERGLASS STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fiberglass reinforced plastic (FRP) molded grating.

B. Fiberglass reinforced plastic (FRP) handrails

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

3. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

4. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30ºC and 30ºC With a Vitreous Silica Dilatometer.

5. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

6. ASTM D2344 - Standard Test Method for Short Beam Strength of Polymer Matrix Composite Materials and Their Laminates.

1.03 SUBMITTALS

A. FRP Molded Grating:

1. Product Data: Submit manufacturer’s product data, including resin description, structural properties, structural design tables and chemical resistance tables.

2. Shop Drawings: Submit manufacturer’s shop drawings, indicating grating size, bar size, top surface type, panel dimensions and installation details.

3. Samples: Submit the following manufacturer’s samples to the OWNER

   a. Grating: 6 inch by 6 inch sample of grating made from specified resin type with appropriate top surface type and color.

   b. Grating Clips: Two samples of each type and size of grating clip required for installation.

4. Manufacturer’s Quality Assurance:

a. Submit manufacturer's ASTM E84 test results for grating.

b. Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

B. FRP Handrails:

1. Product Data: Submit manufacturer's published literature including structural design data, corrosion resistance tables, and design calculations for systems not sized or specified in the Drawings.

2. Shop Drawings: Submit manufacturer's shop drawings, indicating material sizes, types, styles, part or catalog numbers, complete details for the fabrication of and erection of components, including location, lengths, type and sizes of fasteners, clip angles, member sizes and connection details.

3. Manufacturer's Quality Assurance:

a. Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

C. Submit in accordance with Section 01340.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials to the project site in manufacturer's original packaging, with labels clearly identifying material name and manufacturer.

B. Storage: Store materials in a clean, dry area, off the ground, in accordance with manufacturer's instructions.

C. Handling: Protect materials during handling and installation from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. International Grating and Flanges, Inc.

B. Or equal.

2.02 FABRICATION

A. FRP Grating:

1. Grating shall consist of a mixture of fiberglass reinforcement and polyester resin

2. Grating shall be fabricated using an open-mold woven cast process.

3. Fiberglass reinforcement shall utilize a continuous roving process

4. Tops of bearing bars and crossbars shall be in the same plane.

5. Finished surfaces shall be smooth, uniform, free from dry spots, cracks, crazes, unreinforced areas and visible glass fibers.

6. Resin shall be polyester with a flame spread rating (ASTM E84) of Class 1, 25 or less.

7. Gating shall be 1 inch thick square style with grid spacing of 1 1/2 inches by 1 1/2 inches, or as approved by ENGINEER.

8. Top surface of grating shall be a non-slip surface utilizing coarse clear grit by encapsulating grit with resin.

9. Grating clips shall be Type 316 Stainless Steel.

10. Color: Yellow.

B. FRP Handrails.

1. All posts and rails are to be FRP structural shapes manufactured by the pultrusion process. All structural shapes shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet this section.

2. Fiberglass reinforcement shall be a combination of continuous roving, continuous strand mat, bi-directional roving mat and surfacing veil in sufficient quantities as required by the application and/or physical properties required.

3. Resin shall be isophthalic polyester (ISOFR) with a chemical formulation necessary to provide the corrosion resistance, strength and physical properties required by this section.

4. All finished surfaces of handrails and support structures shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure from wear or weathering.

5. Top and bottom rails are to be 2-inch by 0.125-inch wall square tubing.

6. Posts are to be 1.75-inch by 0.25-inch wall square tubing.

7. Kick plates are to be 0.5-inch thick by 4-inch wide with two reinforcing ribs.

8. Handrail components shall exhibit the following minimum longitudinal mechanical properties:

Property	**ASTM Method**	**Value**	**Units**
Tensile Strength	D638	30,000 (206)	psi (Mpa)
Tensile Modulus	D638	2.5 X 10^6 (17.2)	psi (Gpa)
Flexural Strength	D790	30,000 (206)	psi (Mpa)
Flexural Modulus	D790	1.8 x 10^6 (12.4)	psi (Gpa)
Flexural Modulus (Full Section)	N/A	2.8 x 10^6 (19.3)	psi (Gpa)
Short Beam Shear (Transverse)	D2344	4,500 (31)	psi (Mpa)
Shear Modulus (Transverse)	N/A	4.5 x 10^5 (3.1)	psi (Gpa)
Coefficient of Thermal Expansion	D696	8.0 x 10^{-6} (1.4 x 10^{-6})	in/in/^{o}F (cm/cm/^{o}C)
Flame Spread	E84	25 or less	N/A

9. Color: Yellow

PART 3 EXECUTION

3.01 INSTALLATION

A. FRP Grating:

1. Install in accordance with manufacturer's written instructions and approved submittals at locations indicated on the Drawings.

2. Install grating level, square, accurately aligned with adjacent panels, rigid and without warp.

3. Trim grating panels, as necessary, with panel turned bottom side up, using cutting equipment in accordance with maufacturer's instructions. Apply catalyzed wax/resin solution equal to resin used in grating manufacturing to all cut surfaces.

4. Install a minimum of 4 clips to each full length panel side.

5. Grating panel to be installed over manhole shall extend a minimum of 12 inches beyond the opening of the manhole in any direction. Install a minimum of 4 clips, evenly spaced, on all sides of grating panel over manhole.

6. Use manufacturer provided grating clips.

7. CONTRACTOR shall replace damaged or defective grating at no cost to the OWNER.

B. FRP Handrails:

1. The handrail post/rail connection is to be installed such that the rails are continuous over the post without the use of packs or splices.

2. The bottom rails are to be installed over the posts at prepared holes made to fit the outside dimensions of the posts. The posts are to fit into machined pockets formed into the rails.

3. The rails are to be joined to the post by riveting. Spacing of the posts shall not exceed 6 feet.

4. All manufacturer and field cuts are to be coated with a vinyl ester resin to provide corrosion resistance.

* * END OF SECTION * *

SECTION 13624
FLOW METERS

PART 1 GENERAL

1.01 SUMMARY

A. Provide standard paddlewheel flow meters and converters as shown on the Drawings and Schedule 1 of this section.

B. Provide standard magnetic flow meter (as substitute for paddlewheel flow meter) at locations approved by the OWNER and ENGINEER as shown on Schedule 2 of this section.

1.02 SUBMITTALS

A. Submit maintenance-service contract.

B. Submit in accordance to Section 01340.

C. Operation and Maintenance (O&M) Data:

1. Submit in accordance with Section 01730.

1.03 QUALITY ASSURANCE

A. Supplier's or Manufacturer's Services:

1. Supplier's or manufacturer's technician for equipment specified herein shall be present at job site or classroom designated by OWNER for minimum of 1 man-day, travel time excluded, for assistance during plant construction, plant startup, equipment calibration, and training of OWNER's personnel for plant operation. Include minimum of:

a. 1/2 man-day for Installation, Calibration, and Startup Services.

b. 1/2 man-day for Instructional and Post Startup Services.

2. Supplier or manufacturer shall direct services to system and equipment operation, maintenance, and troubleshooting and system related areas other than process design and philosophy. See Section 01600.

B. Source Quality Control:

1. Flow meter shall be hydraulically calibrated at facility located in United States and calibration traceable to National Bureau of Standards.

2. Wire and test meter, suitable for operation. Conduit and signal wiring for meter installed between converter and terminals at designated panel.

1.04 GUARANTEE

A. Provide replacement parts during guarantee period for defective component at no additional cost.

PART 2 PRODUCTS

2.01 STANDARD PADDLEWHEEL FLOW METER

A. Manufacturers:

1. Digiflow from Chemline.

2. Omega.

3. Or equal.

B. A coil/Hall effect type sensor shall produce dc pulse signal directly proportional and linear to liquid flow rate.

C. Use single conduit run between sensor/transmitter/meter and control panel.

D. Splash-proof and weather-resistant housing. Watertight external and internal electrical conduit connections. Suitable for installation and operation in Class 1, Division 1 hazardous areas.

E. Operate on 5-24vdc supply power. Meter driven in current loop.

F. Flow meter paddle and body material shall be suitable for process but restricted to materials listed under Material of Construction in Schedule 1 of this section.

G. Output signal may be transmitted up to 1000 meters without the need for conditioning.

H. Electronics are entirely encapsulated with epoxy resin.

I. Flow meter to be mounted in pipe section where pipe is always full of liquid.

2.02 STANDARD MAGNETIC FLOW METER

A. Manufacturers:

1. Foxboro.

2. Rosemount.

3. Or equal.

B. Low frequency, electromagnetic induction type and shall produce dc pulse signal directly proportional and linear to liquid flow rate.

C. Use single conduit run between sensor/transmitter/meter and control panel.

D. Splash-proof and weather-resistant housing. Watertight external and internal electrical conduit connections. Suitable for installation and operation in Class 1, Division 1 hazardous areas.

E. Operate on 5-24vdc supply power. Meter driven in current loop.

F. Flow meter liner, electrode materials, and electrode type shall be suitable for process but restricted to materials listed under Material of Construction in Schedule 1 of this section.

G. Provide meter with capability for portable electrode cleaning. Portable cleaner to have easily accessible connections from liquid meter body.

H. Use grounding rings or gaskets on each end of magnetic flow meter to provide good ground path and prevent interference with flow signal. Probes not acceptable.

I. Sensing head interchangeable with meter body of same manufacturer without performing flow recalibration.

J. Ratio of flow velocity to reference voltage signals generated identical for all meter sized. Meter shall be compatible with secondary readout instrument without circuit modifications.

K. Changes in density, viscosity, temperature, pressure or conductivity within limits of flow meter shall not affect accuracy. Maintain accuracy for field repairs performed by supplier's service technician during warranty period.

L. Magnetic flow meter shall be high impedance device of not less than 10^{12} ohms to minimize span shift due to electrode coating.

M. Limit power consumption to 5 watts/in. of pipe diameter.

N. Where continuous submergence specified, remote mount driver near magnetic flow meter to have driven shielding on leads from electrode to converter.

O. Output signal may be transmitted up to 1,000 meters without need for conditioning.

P. Electronics are entirely encapsulated with epoxy resin.

Q. Flow meter to be mounted in pipe section where pipe is always full of liquid.

2.03 SIGNAL CONVERTER (Paddlewheel Flow Meter)

A. Local mounted, microprocessor controlled.

1. Operate on 5-24 vdc power.

2. Flow sensor signal is a square wave output frequency generated proportional to the rate of rotor rotation and flow velocity.

3. Convert flow signal from flow sensor to analog output 4-20 mAdc signal.

4. Convert flow signal from flow meter to analog output signals.

B. Span to be continuously adjustable between 0.5 and 33 ft./sec over 10:1 range. Adjustment shall be by keypad on local flow meter. Calibration is easily performed in the field. Accurate low flow measurement down to 0.5ft/sec.

C. Digital LCD 6 digit display can be set to read flow rate or total flow in any volumetric unit.

D. Power: 5-24 vdc.

E. System accuracy to be 1.0% of flow rate over calibrated range. Repeatability shall be 0.5% and linearity 1.0% over calibrated range.

F. 4-20 mAdc analog current output into 250 ohm load.

G. Housed in enclosure to meet NEMA 4X requirements.

2.04 SIGNAL CONVERTER (Magnetic Flow Meter)

A. Remote mounted, microprocessor controlled.

1. Operate on 120 vac, 60 Hz power.

2. Provide pulsed dc voltage to magnet coils of magnetic flow meter to establish magnetic field.

3. Voltage Frequency: 7.5 or 15 Hz field selectable.

4. Convert flow signal from magnetic flow meter to analog and digital output signals, for bi-directional flow.

B. Span to be continuously adjustable between 3 and 31 ft/sec over 10:1 range. Adjustment shall be by direct reading range switches. Zero adjustment not necessary; zero stability characteristic of meter system.

C. Standard back lighted display for easy reading of flow data. Display shall have 2 rows of 16 alpha numeric characters. Top row shall indicate instantaneous flow rate in direct engineering units, field selectable. Bottom row shall indicate totalizer count in direct engineering units, field selectable.

D. Converter interchangeable with magnetic flow meter of same manufacturer and requires no additional flow calibration adjustment.

E. Power: 120 vac, 60 Hz.

F. System accuracy, including magnetic flow meter, to be 0.25% of flow rate between 10% and 100% flow. Repeatability shall be 0.25% and linearity 0.2%.

G. 4-20 mAdc analog current output into 0 to 900 ohm load and 24 vdc scaled, pulse output that is software adjustable.

H. Locate flow rate indicator within each converter.

I. House in cast aluminum enclosure to meet NEMA 4 requirements.

J. Provide integral zero return which shall provide constant zero output when activated by external non-powered contact.

K. Noise reduction feature to minimize effects of noise generating processes.

2.05 TAGGING

A. Provide Type 316 stainless steel tag permanently affixed to unit.

B. Engrave with process application as listed in Specifications.

C. Include ENGINEER's tag number as listed in Specifications and on P&IDs.

2.06 SPECIAL TOOLS AND EQUIPMENT

A. Provide:

1. One spare converter for every 10 paddlewheel (or magnetic) flow meter converters.

2. One spare digital LCD meter for every 10 paddlewheel (or magnetic) flow meter units.

3. For magnetic flow meters: portable electrode cleaning generators with handle and 50 feet of cable with plug-in connectors. To a ratio of one ultrasonic generator for every five meters.

4. For magnetic flow meters: three sets of circuit boards for sensing head and signal converter.

5. For magnetic flow meters: Two sets of special tools and test equipment, including calibrator required for repair and re-calibration of equipment.

B. Provide flow sensor saddle and spool piece for paddle wheel flow meters, same size and diameter as pipe.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer’s written instructions and approved submittals.

SCHEDULE 1 TO SECTION 13624
PADDLEWHEEL FLOW METER SCHEDULE

Tag No.	Location	Media	Flow Minimum (gpm)	Flow Maximum (gpm)	Design (gpm)	Size (in.)	Description
P-XXS	Cell XX Secondary Pump	Leachate	5	60	20	2”	2.5.8.10

XX = cell number

Type
1. standard
2. 2 wire sensor
3. 3 wire sensor

Body Material
4. PVC
5. 316 SS
6. PVDF
7. PP

Pipe Sizes
8. ½1/2”- 8” Standard Length Sensor
9. 10”- 40” Extended Length Sensor

Seal Material
10. Viton
11. EPDM

SCHEDULE 2 TO SECTION 13624
MAGNETIC FLOW METER SCHEDULE

Tag No.	Location	Media	Flow Minimum (gpm)	Flow Maximum (gpm)	Design (gpm)	Size (in.)	Description
P-XXS	Cell XX Secondary Pump	Leachate	5	60	20	2"	2.3.8.10.12

XX = cell number

Electrode Type
1. Plain (flush)
2. Bullet Nose

Liner Material
3. Teflon
4. Polyurethane
5. Neoprene

Electrode Material
6. Zirconium
7. Tantalum
8. Hastelloy "C"
9. 316 Stainless Steel

Flange Material
10. Carbon Steel
11. 304 Stainless Steel

Flange Rating
12. ANSI 150
13. ANSI 300

* * END OF SECTION * *

SECTION 15060
PIPE, TUBE, FITTINGS, AND MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Piping Materials:

    a. Steel Pipe.

    b. Plastic Pipe.

2. Pipe/Tube Fittings:

    a. Fittings for steel pipe.

    b. Fittings for plastic pipe

3. Miscellaneous piping materials/products.

4. Underground type plastic line markers.

B. Pipe, tube, fittings, and mechanical identification furnished as part of factory fabricated equipment, are specified as part of equipment assembly in other sections.

1.02 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI/ASME A13.1 - Scheme for the Identification of Piping Systems.

2. ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (Inch).

3. ANSI/ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

4. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300.

5. ANSI/ASME B16.4 - Gray Iron Threaded Fittings Classes 125 and 250

6. ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through 25 - Metric/Inch Standard.

7. ANSI/ASME B16.9 - Factory-Made Wrought Steel Buttwelding Fittings.

8. ANSI/ASME B16.11 - Forged Fittings, Socket Welding and Threaded.

9. ANSI/ASME B16.12 - Cast Iron Threaded Drainage Fittings.

10. ANSI/ASME B16.14 - Ferrous Pipe Plugs, Bushings, and Lock Nuts with Pipe Threads.

11. ANSI/ASME B16.28 - Wrought Steel Buttwelding Short Radius Elbows and Returns.

12. ANSI/ASME B16.39 - Pipe Unions, Malleable Iron Threaded.

13. ANSI/ASME B31.1 - Power Piping.

B. American Society of Mechanical Engineers (ASME):

1. ASME Boiler and Pressure Vessel Code, Section II, Part C: Specifications for Welding Rods, Electrodes, and Filler Metals.

2. ASME Boiler and Pressure Vessel Code, Section IX. Welding and Brazing Qualifications.

C. American Society for Testing and Materials (ASTM):

1. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.

2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless.

3. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.

4. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe.

5. ASTM A183 - Standard Specification for Carbon Steel Track Bolts and Nuts.

6. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

7. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

8. ASTM A333/A333M - Standard Specification for Seamless and Welded Steel Pipe

for Low-Temperature Service.

9. ASTM A518/A518M - Standard Specification for Corrosion-Resistant High-Silicon Iron Castings.

10. ASTM A536 - Standard Specification for Ductile Iron Castings.

11. ASTM A671 - Standard Specification for Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures.

12. ASTM A672 - Standard Specification for Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures.

13. ASTM A691 - Standard Specification for Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures.

14. ASTM D1785 - Standard Specifications for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.

15. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.

16. ASTM D2104 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedule 40.

17. ASTM D2464 - Standard Specification for Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80.

18. ASTM D2466 - Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.

19. ASTM D2467 - Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80.

20. ASTM D2564 - Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Piping Systems.

21. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.

22. ASTM D2665 - Standard Specification for Polyvinyl Chloride (PVC) Plastic Drain, Waste, and Vent Pipe Fittings.

23. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Pipe and Tubing.

D. American Water Works Association (AWWA):

1. ANSI/AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3-in.Through 48-in., for Water and Other Liquids.

2. ANSI/AWWA C111/A21.11 – Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

3. ANSI/AWWA C200 - Steel Water Pipe 6 inch (150MM) and Larger.

4. ANSI/AWWA C203 – Standard for Coal-Tar Protective Coatings and Linings for Steel Water Pipe Lines -- Enamel and Tape -- Hot Applied.

5. ANSI/AWWA C206 - Standard for Field Welding of Steel Water Pipe.

6. AMSI/AWWA C207 - Standard for Steel Pipe Flanges for Water Works Services -- Sizes 4-in. Through 144-in.

7. ANSI/AWWA C606 – Standard for Grooved and Shouldered Joints.

E. Manufacturing Standardization Society of Valves and Fittings (MSS):

1. MSS SP-43 - Wrought Stainless Steel Buttwelding Fittings. Included Reference to Other Corrosion-Resistant Materials.

2. MSS SP-51 - Class 150LW Corrosion-Resistant Cast Flanges and Flanged Fittings.

3. MSS SP-79 - Socket Welding Reducer Inserts.

1.03 SUBMITTALS

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of pipe, tube, fitting, and mechanical identification. Submit piping schedule showing manufacturer, pipe or tube weight, fitting type, and joint type for each piping system.

B. Welding Certifications: Submit reports as required for piping work.

C. Submit in accordance with Section 01340.

1.04 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of pipe, tube, fittings, and mechanical identification of types and sized required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Welding: Quality welding procedures, welders, and operators in accordance with ANSI/ASME B31.1, Paragraph 127.5, for shop and Project site welding of piping work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide factory-applied basic end caps on each length of pipe. Maintain end caps through shipping, storage, and handling as required to prevent pipe end damage and eliminate dirt and moisture from inside of pipe and tube.

B. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.

C. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

PART 2PRODUCTS

2.01 PIPING MATERIALS

A. General: Provide pipe of type, joint type, grade, size, and weight (wall thickness or class) indicated for each service.

B. Steel Pipe:

1. Black Steel Pipe: ASTM A53/A53M.

2. Seamless Steel Pipe: ASTM A53/A53M.

3. Electric Resistance-Welded Steel Pipe: ASTM A135/A135M.

4. Electric Fusion-Welded Steel Pipe: ASTM A671.

5. Alloy Steel Pipe: ASTM A333/A333M.

a. Grade: Provide Grade 9, except as otherwise noted.

6. Steel Water Pipe: ANSI/AWWA C200 for pipe 6 in. and larger.

7. Coal Tar Protective Coatings and Linings for Steel Water Pipe: ANSI/AWWA C203 for enamel and tape, hot applied.

8. Steel pipe shall be as follows.

a. 3-in. and smaller: Schedule 80.

b. 4-in. through 10-in.: Schedule 40.

c. 12-in. and greater: “Standard” class pipe.

C. Plastic Pipe:

1. Polyvinyl Chloride (PVC) Pipe: ASTM D1785.

2. Polyethylene (PE) Plastic Pipe: ASTM D2104.

3. Polyvinyl Chloride (PVC) Plastic Drain, Waste, and Vent Pipe: ASTM D2665.

4. PVC Pipe and Fittings: Schedule 80.

5. High Density Polyethylene (HDPE) Pipe; Section 15064.

2.02 PIPE FITTINGS

A. General: Provide factory-fabricated fittings of type, materials, grade, class, and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, and valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections and pipe manufacturer’s recommendations where applicable.

B. Fittings for Steel Pipe:

1. Cast Iron Flanged Fittings: ANSI/ASME B16.1, including bolting.

2. Cast Iron Threaded Fittings: ANSI/ASME B16.4.

3. Malleable Iron Threaded Fittings: ANSI/ASME B16.3, plain or galvanized as indicated.

4. Malleable Iron Threaded Unions: ANSI/ASME B16.39, selected by installer for proper piping fabrication and service requirements, including style, end connections, and metal-to-metal seats (iron, bronze or brass); plain or galvanized as indicated.

5. Threaded Pipe Plugs: ANSI/ASME B16.14.

6. Steel Flanges/Fittings: ANSI/ASME B16.5, including bolting and gasketing of following material group, end connection, and facing except as otherwise

indicated.

a. Material group: Group 1.1

b. End connections: Buttwelding.

c. Facings: Raised face.

7. Corrosion-Resistant Cast Flanges/Fittings: MSS SP-51, including bolting and gasketing.

8. Forged Steel Socket Welding and Threaded Fittings: ANSI/ASME B16.11, except MSS SP-79 for threaded reducer inserts rated to match schedule of connected pipe.

9. Wrought Steel Buttwelding Fittings: ANSI/ASME B16.9, except ANSI/ASME B16.28 for short radius elbows and returns, rated to match connected pipe.

10. Stainless Steel Buttwelding Fittings: MSS SP-43 (R01).

11. Forged Branch Connection Fittings: Except as otherwise indicated, provide type as determined by installer to comply with installation requirements.

12. Pipe Nipples: Fabricated from same pipe as used for connected pipe, except do not use less than Schedule 80 pipe where length remaining unthreaded is less than 1-1/2 in., where pipe size is less than 1-1/2 in., and do not thread nipples full length (no close nipples).

13. Provide 1 uninstalled “Spectacle” flange for each size steel pipe.

14. Flanged connections are required at tanks, pumps, valves, and equipment, unless specifically noted otherwise.

C. Fittings for Plastic Pipe:

1. PVC Pipe Fittings: ASTM D2464for Schedule 80 threaded fittings; ASTM D2467for Schedule 80 socket type; ASTM D2564e1; and ASMT D2665for drain, waste, and vent.

2. PE Pipe Fittings: ASTM D2609for insert fittings, ASTM D3261for Schedules 40 and 80.

3. HDPE Pipe Fittings: Section 15064.

2.03 MISCELLANEOUS PIPING MATERIALS/PRODUCTS

A. Welded Materials: Except as otherwise indicated, provide welding materials as determined by installer to comply with installation requirements.

  1. Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.

B. Gaskets for Flanged Joints: Full faced for cast iron flanges, raised face for steel flanges unless otherwise indicated.

C. Piping Connectors for Dissimilar Non-pressure Pipe: Elastomeric annular ring insert or elastomeric flexible coupling secured at each end with stainless steel clamps, sized for exact fit to pipe ends, and subject to approval by plumbing code.

2.04 VIBRATION ISOLATION

A. Provide vibration isolation between tanks, pumps, and piping.

  1. Type MFTFU or METNC with control cables, as manufactured by Mason Industries, Inc., or equal.

  2. Size equal to pipe size.

2.05 UNDERGROUND TYPE PLASTIC LINE MARKERS

A. General: Manufacturer’s standard permanent, bright colored, continuous printed plastic tape, intended for direct burial service; not less than 6 in. wide by 4 mils thick. Provide tape with printing most accurately indicating type of service of buried pipe.

B. Provide multi-ply tape consisting of solid aluminum foil core between 2 layers of plastic tape.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install pipe, tube, and fittings in accordance with recognized industry practices achieving permanently leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance and/or replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16 in. misalignment tolerance.

  1. Comply with ANSI/ASME B31.1- Code for Pressure Piping.

B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details, and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and equipment. Hold piping close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building; limit clearance to ½ in. where furring is shown for enclosure to concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1.0 in. clearance outside insulation.

C. Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures unless unavoidable. Install drip pan under piping that must be run through electrical spaces.

D. Piping System Joints: Provide joints of type indicated in each piping system.

1. Thread pipe in accordance with ANSI/ASME B1.20.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint, and tighten joint to leave not more than 3 threads exposed.

2. Weld pipe joints in accordance with ANSI/ASME B31.1.

3. Weld pipe joints of steel water pipe in accordance with ANSI/AWWA C206.

4. Flanged Joints: Match flanges within piping system and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.

E. Pipe greater than 3-in. diameter shall be connected by flange to pumps, tanks, meters, valves, cleanouts, air relief, and equipment.

1. At other locations, pipe greater than 3-in. diameter shall be welded.

2. Threaded connections may be used on pipe 3-in. diameter and smaller.

3.02 CLEANING, FLUSHING, INSPECTING

A. General: Clean exterior surfaces of installed piping systems of superflous materials and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

1. Inspect pressure piping in accordance with procedures of ANSI/ASME B31.1.

3.03 PIPE TESTS

A. Test pressure piping in accordance with ANSI/ASME B31.1.

B. Repair piping systems sections which fail required piping test, by disassembly and reinstallation, using new materials to extent required to overcome leakage. So not use chemicals, stop-leak compounds, mastics or other temporary repair methods.

C. Drain test water form piping systems after testing and repair work is complete.

3.04 IDENTIFICATION

A. Pipe shall be color coded and marked in accordance with ANSI/ASME A13.1"Scheme for Identification of Piping Systems", and as approved by OWNER.

1. For insulated and jacketed pipe, insulation or jacket shall be color coded and marked.

3.05 UNDERGROUND PIPING IDENTIFICATION

A. During backfilling/topsoiling of each exterior underground piping systems, install continuous underground type plastic line marker located directly over buried line at 6 to 8 inches below finished grade.

1. Plastic line marker tape as manufactured by Polycon or equal.

* * END OF SECTION * *

SECTION 15064
HIGH DENSITY POLYETHYLENE PIPE

PART 1 GENERAL

1.01 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

2. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

3. ASTM D1238 - Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.

4. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wires and Cables.

5. ASTM D1505 or ASTM D792 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.

6. ASTM D1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.

7. ASTM D2122 - Standard Method of Determining Dimensions of Thermoplastic Pipe and Fittings.

8. ASTM D2412 - Standard Test Method for Determining External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.

9. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.

10. ASTM D3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.

11. ASTM D3261 - Standard Specification for Butt Heat Fusion of Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

12. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

1.02 SUBMITTALS

A. Include results of Manufacturer’s tests with shipment of materials, with 2 additional copies of such test results furnished to OWNER. Cost for additional required testing not performed by the Manufacturer shall be borne by CONTRACTOR.

B. If Manufacturer’s test data inadequate or unavailable, OWNER reserves right to require cores drilled for compressive strength tests. Costs of these tests shall be borne by CONTRACTOR.

C. Submit manufacturing data listing stock density, melt flow, flextural modulus, tensile strength, and coloration.

D. Submit in accordance with Section 01340.

1.03. QUALITY ASSURANCE

A. Source Quality Control:

1. Conduct tests by OWNER approved testing agency to determine the following:

a. Pipe dimensions:

1) Average outside diameter.

2) Average inside diameter.

3) Minimum and average wall thickness.

b. Pipe flattening:

1) Deflect pipe to 40% deflection.

2) Remove load and examine specimen for evaluation of splitting, cracking or breaking.

2. Test reports shall show results of tests and conformance to ASTM requirements.

3. CQA engineer must confirm that all manufacturer’s piping certifications have provided testing to confirm that the required design parameters are met.

4. CQA engineer will randomly verify the pipe characteristics by measurement of the piping wall thickness and perforation hole diameter and spacing.

PART 2 PRODUCTS

2.01 PHYSICAL PROPERTIES OF PIPE COMPOUND

A. Density: ASTM D1505 or ASTM D792, not less than 0.941 to 0.955 gm/cu cm.

B. Melt Flow: ASTM D1238, Condition E, not greater than 0.4 gms/10 min.

C. Flexural Modules: ASTM D790, 110,000 to less than 160,000 psi.

D. Tensile Strength at Yield: ASTM D638, 3,000 to less than 3,500 psi.

E. Environmental Stress Crack Resistance (ESCR): ASTM D1693 - Condition C, shall be in excess of 1,000 hrs (5,000 hrs) with zero failures.

F. Hydrostatic Design Basis: ASTM D2837, 1,600 psi at 23^{0}C.

2.02 PIPE

A. Manufacturers:

1. Chevron Phillips Chemical Company, LP, Performance Pipe.

2. Or equal.

B. High performance, high molecular weight, high density polyethylene pipe.

C. ASTM D1248 (Type III, Class C, Category 5, P34).

D. ASTM D3350, minimum cell classification value PE 345464C.

E. Marking: Intervals of 5 ft. or less.

1. Manufacturer’s name or trademark.

2. Nominal pipe size.

3. HDPE cell classification, ASTM D3350.

4. Legend: 1000 Industrial pipe SDR 11.

5. ASTM D1248.

6. Extrusion date, period of manufacture or lot number.

F. Dimensions:

HDPE PIPE DIMENSIONS (inches)
SDR 7.3

Nominal Size	Nominal OD	Approx. ID	Minimum Wall	Nominal Weight lbs/ft
2-in.	2.375	1.686	0.325	0.92
3-in.	3.500	2.485	0.479	1.99
4-in.	4.500	3.194	0.616	3.29
6-in.	6.625	4.700	0.908	7.12
8-in.	8.625	6.119	1.182	12.07
10-in.	10.750	7.627	1.473	18.75
12-in.	12.750	9.046	1.747	26.38
24-in.	24.000	17.029	3.288	93.48

HDPE PIPE DIMENSIONS (inches)
SDR 11

Nominal Size	Nominal OD	Approx. ID	Minimum Wall	Nominal Weight lbs/ft
2-in.	2.375	1.943	0.216	0.64
3-in.	3.500	2.864	.318	1.39
4-in.	4.500	3.682	0.409	2.29
6-in.	6.625	5.421	0.602	4.97
8-in.	8.625	6.963	0.784	8.42
10-in.	10.750	8.796	0.977	13.09
12-in.	12.750	10.432	1.159	18.41
24-in.	24.000	19.636	2.182	65.24
26-in.	26.000	20.989	2.364	76.56
28-in.	28.000	22.604	2.545	88.80
30-in.	30.000	24.218	2.727	101.93
32-in.	32.000	25.833	2.909	116.67
34-in.	34.000	27.447	3.091	130.93

HDPE PIPE DIMENSIONS (inches)
SDR 26

Nominal Size	Nominal OD	Approx. ID	Minimum Wall	Nominal Weight lbs/ft
2-in.	2.375	---	---	---
3-in.	3.500	---	---	---
4-in.	4.500	4.133	0.173	1.03
6-in.	6.625	6.085	0.255	2.23
8-in.	8.625	7.921	0.332	3.80
10-in.	10.750	9.873	0.413	5.88
12-in.	12.750	11.710	0.490	8.27
24-in.	24.000	22.043	0.923	29.30
26-in.	26.000	23.880	1.000	34.39
28-in.	28.000	25.717	1.077	39.88
30-in.	30.000	27.554	1.154	45.78
32-in.	32.000	29.391	1.231	52.09
34-in.	34.000	31.228	1.308	58.81

2.03 FITTINGS

A. Molded from polyethylene compound having cell classification equal to or exceeding compound used in pipe to ensure compatibility of polyethylene resins.

B. Be or same manufacture as pipe being provided.

C. Flange Joints:

1. 150-lb stainless steel manufacturer-installed backup flanges as recommended by manufacturer.

2. Stainless steel bolts.

3. Flanges and bolt patterns as specified by manufacturer.

4. Surface weld joints to seal edges.

5. Seal riser joints within 80 mil HDPE boot welded and clamped to riser.

6. Stainless steel boot clamps.

D. Markings:

1. Manufacturer’s name of trademark.

2. Nominal size.

3. Material designation “HDPE”.

4. ASTM D1248.

2.04 LINER PENETRATION BOOTS

A. Minimum in accordance with dimensions indicated on Drawings.

B. Construction from 80 mil HDPE flexible membrane, with manufacturer’s recommendations. Clamp each boot to riser with stainless steel boot clamps, which will remain in-place after boot is welded to riser. Exposed edges of boot shall be filet welded to prevent moisture from penetrating between HDPE surfaces.

2.05 HIGH DENSITY POLYETHYLENE (HDPE) FLATSTOCK

A. Manufacturers:

1. Chevron Phillips Chemical Company, LP.

2. Or equal.

B. High performance, high molecular weight, sheet stock.

C. Provide to sizes and thickness indicated on the Drawings.

D. Conform to resin quality of pipe stock and liner stock.

E. Round cut edges to minimize potential for liner damage during installation.

2.06 DRAINAGE PIPE

A. Manufacturers

1. Advanced Drainage Systems, Inc.

2. Or equal.

B. Drainage pipe shall be corrugated smooth-bore HDPE, pipe compound and physical properties shall conform to Advanced Drainage Systems ADS N-12 Pipe, or equal.

C. Provide silt-tight pipe couplers.

D. Provide to sizes and type (solid wall or perforated wall) indicated on the Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Trench, backfill, and compact in accordance with Section 02210.

B. Welded Joints:

1. Weld in accordance with manufacturer's recommendation for butt fusion methods.

2. Butt fusion equipment used in joining procedures shall be capable of meeting conditions recommended by pipe manufacturer, including, but not limited to, temperature requirements, alignment, and fusion pressures.

3. Extrusion welding may be allowed as a secondary method for joining containment piping where butt fusion welding is not practical, but only where approved by ENGINEER and OWNER in writing.

C. Mechanical Jointing:

1. Use on riser pipe sections.

2. Butt fuse fabricated flange adapters to pipe.

3. Connect slip-on stainless steel backup flanges with stainless steel bolts.

4. Weld HDPE adapters to provide watertight fit. Fit mechanical jointing on risers with protective HDPE boots clamped and bolted to riser.

5. Clamp boot to riser with boot clamps to remain in-place after boot is welded to riser.

6. Filet weld exposed edges of boot to prevent moisture from penetrating between HDPE surfaces.

3.02 FIELD QUALITY CONTROL

A. Pipe may be rejected for failure to conform to Specifications, or following.

1. Fractures or cracks passing through pipe wall, except single crack not exceeding 2 in. in length at either end of pipe which could be cut off and discarded. Pipes within one shipment will be rejected if defects exist in more than 5% of shipment of delivery.

2. Cracks sufficient to impair strength, durability or service-ability of pipe.

3. Defects indicating improper proportioning, mixing, and molding.

4. Damaged ends, where such damage prevents making satisfactory joint.

B. Acceptance of fittings, stubs or other specially fabricated pipe sections shall be based on visual inspection at job site and documentation they conform to these Specifications.

C. The leachate collection pipes along the centerline of the primary and secondary leachate collection systems shall be placed directly on the geocomposite drainage layer. There shall be no requirement for tolerance regarding achievement of design grade and shimming is not required.

3.03 PRESSURE TESTING

A. Test in accordance with ASTM F2164.

B. Pressure testing is not required for the perforated leachate collection pipe and solid pipe extending from the perforated pipe as a riser pipe.

3.04 VERTICAL LEACHATE RISERS

A. Install first section of vertical HDPE risers. Concrete riser section length shall extend vertically no more than 2 ft below HDPE section. HDPE riser section shall be flanged to allow later extension during normal operations.

* * * END OF SECTION * * *

SECTION 15076
HOSE AND QUICK-CONNECT COUPLING

PART 1 GENERAL

1.01 REFERENCES

A. United States Department of Defense (DoD):

1. A-A-59326B - Coupling Halves, Quick-Disconnect, Cam-Locking Type.

1.02 SUBMITTALS

A. Submit manufacturer's literature and shop drawings in accordance with Section 01340.

PART 2 PRODUCTS

2.01 QUICK-CONNECT COUPLINGS

A. Manufacturers:

1. "Kamlok" quick couplings by OPW, Division of Dover Corporation.

2. Or equal.

B. Description:

1. Each coupling shall consist of 2 pieces; male part (adaptor), and female part (coupler). Connection of 2 parts shall be made by inserting male into female and then moving 2 cam arms into locked position.

C. Couplings shall conform to A-A-59326B.

D. Pressure Rating: 150 psig (hydrostatic).

E. Materials:

1. Body: Stainless steel.

2. Cam Arms: Stainless steel.

3. Gaskets: Teflon.

F. Couplers and adapters shall be mounted on hoses using hose shank or pipe nipple, and stainless steel, spiral, double bolt clamps.

G. Adaptors shall be mounted on fixed pipes using female NPT fitting.

2.02 HOSE

A. Manufacturers:

1. Green XLPE Chemical Transfer Hose, by Goodyear Tire and Rubber Company, Industrial Products Division.

2. Or equal.

B. Description:

1. Nominal Size: 2 in. through 6 in.

2. Smooth inner bore.

3. Flexible to min. 15^{o}F.

4. Abrasion resistant.

5. Crush resistant.

6. Pressure Rating: 150 psi.

7. Provide continuous, uncut lengths.

a. Couple only where shown on Drawings, or as specified by ENGINEER.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install equipment in accordance with manufacturer’s written instructions and approved submittals.

* * * END OF SECTION * * *

SECTION 15078
POLYVINYL CHOLORIDE (PVC) PIPE

PART 1 GENERAL

1.01 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

2. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

3. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.

4. ASTM D1785 - Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.

5. ASTM D2122 - Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

6. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading.

7. ASTM D2467 - Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80.

8. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.

1.02 SUBMITTALS

A. Include results of Manufacturer’s tests with shipment of materials, with 2 additional copies of such test results furnished of OWNER. Cost for additional required testing not performed by the Manufacturer shall be borne by CONTRACTOR.

B. If manufacturer’s test data inadequate or unavailable, OWNER reserves right to require cores drilled for compressive strength tests. Costs of these tests shall be borne by CONTRACTOR.

C. Submit manufacturing data listing stock density, flexural modules, and tensile strength.

D. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Source Quality Control:

1. Conduct tests by OWNER approved testing agency to determine by following.

a. Pipe dimensions:

1) Average outside diameter.

2) Average inside diameter.

3) Minimum and average wall thickness.

2. Test reports shall show results of the tests and conformance to ASTM requirements.

3. CQA engineer must confirm that all manufacturer's piping certifications have provided testing to confirm that the required design parameters are met.

4. CQA engineer will randomly verify the pipe characteristics by measurement of the piping wall thickness and perforation hole diameter and spacing.

PART 2 PRODUCTS

2.01 PHYSICAL PROPERTIES OF PIPE COMPOUND

A. The PVC pipe and fittings shall be manufactured from Type 1, Grade 1, PVC conforming to ASTM D1785.

B. All PVC pipe to be Schedule 80.

2.02 PVC PIPES AND FITTINGS

A. PVC pipe shall be supplied in standard laying lengths not exceeding 40 feet.

B. PVC pipe shall be furnished perforated as specified on the Drawings. If pipes are manufactured unperforated and are to be installed perforated, then perforations shall be drilled into the pipe prior to delivery to the site.

C. PVC pipes and fittings shall be homogeneous throughout, free of visible cracks, holes (other than international manufactured perforation), foreign inclusions, or other deleterious effects, and shall be uniform in color, density, melt index and other physical properties.

D. Fittings at the end of pipes shall consist of PVC end caps unless indicated otherwise on the Drawings.

E. The following shall be continuously indent printed on the pipe, or spaced at intervals not exceeding 5 feet:

1. Name and/or trademark of the pipe manufacturer.

2. Nominal pipe size.

3. Schedule.

4. Manufacturing Standard Reference (e.g. ASTM D1785).

5. A production code from which the date and place of manufacture can be determined.

F. Fittings.

1. Schedule 80 PVC.

2. Provide socket type joints at all locations.

G. Joints.

1. Provide socket type at all locations.

H. Solvent Cement.

1. No joint solvent shall be used for joint socket connections.

PART 3 EXECUTION

3.01 HANDLING AND PLACEMENT

A. Care shall be exercised when transporting, handling and placing PVC pipe and fittings, such that they will not be cut, kinked, twisted, or otherwise damaged.

B. Ropes, fabric or rubber-protected slings and straps shall be used as necessary when handling PVC pipe. Slings, straps, etc. shall not be positioned at joints. Chains, cables or hooks shall not be inserted in the pipe ends as a means of handling pipe.

C. Pipe or fittings shall not be dropped onto rocky or unprepared ground. Under no circumstances shall pipe or fittings be dropped into trenches.

D. PVC pipe shall be stored on clean level ground, free of sharp objects which could damage the pipe. Stacking shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions. The pipes should be stored out of direct sunlight.

E. The maximum allowable depth of cuts, gouges or scratches on the exterior surface of PVC pipe or fittings is 10 percent of the wall thickness. The interior of the pipe and fittings shall be free of cuts, gouges and scratches. Sections of pipe with excessive cuts, gouges or scratches shall be removed and the ends of the pipe joined at no cost to the OWNER.

F. Whenever pipe laying is not actively in progress, the open end of pipe that has been placed shall be closed using a watertight plug.

3.02 INSTALLATION

A. All PVC pipe and fittings shall be installed in accordance with the manufacturer's instructions.

B. The Contractor shall carefully examine all pipe and fittings for cracks, damage or defects before installation. Defective materials shall be immediately removed from the site and replaced at no cost to the OWNER.

C. The interior of all pipe and fittings shall be inspected, and any foreign materials shall be completely removed from the pipe interior before it is moved into final position.

D. Field-cutting of pipes, where required, shall be made with machine specifically designed for cutting pipe. Cuts shall be carefully made, without damage to pipe or lining, so as to leave a smooth end at right angles to the axis of pipe. Cut ends shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.

E. The leachate collection pipes along the centerline of the primary and secondary leachate collection systems shall be placed directly on the geocomposite drainage layer. There shall be no requirement for tolerance regarding achievement of design grade and shimming is not required.

3.03 PRESSURE TESTING

A. Pressure testing is not required for the perforated leachate collection pipe and solid pipe extending from the perforated pipe as a riser pipe.

* * * * END OF SECTION * * * *

SECTION 15090
PIPE HANGERS, SUPPORTS, AND ANCHORS

PART 1 GENERAL

1.01 SUMMARY

A. Description of Work:

1. Furnish complete system of pipe supports and anchors with necessary inserts, bolts, nuts, restraining and hanger rods, washers, miscellaneous steel, and other accessories.

2. Absence of pipe supports and details on the Drawings shall not relieve CONTRACTOR of responsibility for providing them.

1.02 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI/ASME B31.1 - Power Piping.

B. American Society for Testing and Materials (ASTM):

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

2. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

C. Manufacturer's Standardization Society (MSS):

1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, and Manufacture.

2. MSS SP-69 - Pipe Hangers and Supports - Selection and Application.

D. National Fire Protection Agency (NFPA):

1. NFPA No. 13 - Installation of Sprinkler Systems.

1.03 SUBMITTALS

A. Shop Drawings:

1. Pipe supporting system, including manufacturer's product data, dimensions, sizes, types, location, maximum loadings, thrust anchorage, and installation instructions.

B. Submit in accordance with Section 01340.

1.04 QUALITY ASSURANCE

A. Source Quality Control:

1. Firms regularly engaged in manufacture of pipe supports, hangers, anchors, and related products.

2. Provide factory fabricated piping hangers and supports, clamps, hanger rod attachments, building attachments, saddles, shields, thrust anchorage, and other miscellaneous products of MSS SP-69 type indicated or shop-fabricated supports; comply with MSS SP-58 and manufacturer's published product information.

B. Design Criteria:

1. Pipe support system components shall withstand dead loads imposed by weight of pipes filled with water plus insulation, internal test pressures, and have minimum safety factor of 5.

1.05 PROJECT/SITE CONDITIONS

A. Support piping, in general, as described hereinafter. MSS types indicated are typical of types and quality of standard pipe supports and hangers to be employed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fee and Mason.

B. Grinnell.

C. Carpenter-Patterson.

D. Unistrut.

E. Superstrut.

F. Or equal.

2.02 HORIZONTAL PIPING HANGERS AND SUPPORTS

A. Hangers:

1. Unless otherwise shown or specified, hangers for 3-in. and smaller pipe shall be stainless steel U-bolts. Hangers for 3-in. pipe or greater shall be clevis or roller type.

2. Each hanger shall be designed to permit minimum 1-1 ½ in. adjustment after installation.

B. Single Roll Support:

1. MSS Type 41, including axle roller and threaded sockets.

C. Miscellaneous Materials:

1. Steel Plates, Shapes and Bars: ASTM A36/A36Msteel.

PART 3 EXECUTION

3.01 GENERAL

A. Proceed with installation of hangers, supports, and anchors after required manholes complete.

B. Install hangers, supports, clamps, and attachments from manhold structure; comply with MSS SP-69. Group parallel runs of horizontal piping to be supported together on trapeze type hangers where possible.

C. Install supports to provide indicated pipe slopes and maximum pipe deflections allowed by ANSI/ASME B31.1 are not exceeded.

D. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

E. Install supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

F. Piping shall be free to move when pipe expands or contracts, except where fixed anchors are indicated. Where adequate hanger rod swing length cannot be provided or where pipe movement based on expansion of 1 in./100 ft. for each 100ºF change in temperature exceed ½ in., provide approved roller supports.

G. Prevent contact between dissimilar metals. Where concrete or metal pipe support used, place 1/8 in. thick teflon, asbestos, neoprene rubber or plastic strip under piping at point of bearing. Cut to fit entire area of contact between pipe and support.

H. Apply anti-seize compound to nuts and bolts.

I. Do not use pipe supports inside steel tank in leachate pump station. This is to preserve integrity of epoxy coating.

J. Support piping in junction manholes and leachate transfer manholes.

3.02 THRUST ANCHORS AND GUIDES

A. Thrust Anchors:

1. For suspended piping, center thrust anchors as closely as possible between expansion joints and between elbows and expansion joints. Anchors shall hold pipe securely and be sufficiently rigid to force expansion and contraction movement to take place at expansion joints or elbows and preclude separation of joints.

2. Provide thrust anchors as required to resist thrust due to changes in diameter or direction of dead ending of pipe lines. Anchorage shall be required wherever bending stresses exceed allowable for pipe.

B. Pipe guides shall be provided adjacent to sliding expansion joints in accordance with recommendations of National Association of Expansion Joint Manufacturers.

3.03 PIPE SUPPORT

A. Spacing:

Type of Pipe	Range of Diameters (in)	Maximum Pipe Support Spacing (ft)
HDPE	1 to < 4 4 to 8	2.5 5, and as noted below
Steel	1 to < 2 2 to < 4 4 to < 6 6 to 12	5 10 15 20

1. Support HDPE pipe on both sides of reducing tee in leachate transfer vaults.

2. In junction manholes, provide 3 pipe supports.

B. Where piping of various sizes is to be supported together, space supports for smallest pipe size or install intermediate supports for smaller diameter pipe.

C. Provide minimum of 2 pipe supports for each pipe run.

D. Where piping connects to equipment, support by pipe support and not equipment, unless otherwise approved by manufacturer.

E. Unless otherwise shown or authorized by ENGINEER, place piping running parallel to walls approximately 1 – 1½ inches out from face of wall and at least 3 inches below ceiling.

F. Pedestal pipe supports shall be adjustable with stanchion, saddle, and anchoring flange.

G. Piping supports for vertical piping passing through floor sleeves shall be galvanized steel riser clamps.

H. Support piping in a manner preventing undue strain on valve, fitting or equipment.

3.04 BURIED PIPING

A. Provide reaction blocking, anchorages or other fittings installed in fills or other unstable ground or above grade as shown on the Drawings.

* * * END OF SECTION * * *

SECTION 15092
MODULAR MECHANICAL SEAL SYSTEMS

PART 1 GENERAL

1.01 SUBMITTALS

A. Manufacturer's literature and fabrication drawings.

B. Submit in accordance with Section 01340.

PART 2 PRODUCTS

2.01 MODULAR MECHANICAL JOINT SEAL

A. Manufacturers:

1. "Link Seal" as manufactured by Thunderline Corporation, Wayne, Michigan.

2. Or equal.

B. Form continuous interlocking synthetic rubber links shaped to continuously fill annular space between pipe and wall opening or wall sleeve. Provide pressure plate under each bolt head and nut.

C. Compression of unit shall cause rubber sealing elements to expand and provide watertight seal.

D. Size according to manufacturer's instructions.

E. Withstand hydrostatic head of 40 ft of water.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide for penetration of vaults, manhole walls, bases, covers, and carrier pipes as shown on Drawings.

B. Verify size, location, and type of penetrations prior to pouring concrete.

C. Install in accordance with manufacturer's written instructions and approved submittals.

* * * END OF SECTION * * *

SECTION 15100
VALVES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Ball valves.

2. Check valves.

   a. Split disc check valves.

   b. Ball check.

1.02 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (Inch).

2. ANSI/ASME B16.1 - Cast-Iron Pipe Flanges and Flanged Fittings.

3. ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through 25 - Metric/Inch Standard.

4. ANSI/ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves.

5. ANSI/ASME B16.11 - Forged Fittings, Socket-Welding and Threaded.

6. ANSI/ASME B16.34 - Valves Flanged, Threaded, and Welding End.

B. American Society of Mechanical Engineers (ASME):

1. ANSI/ASME B31.1 - Power Piping.

C. Manufacturing Standardization Society of the Valves and Fittings Industry, Inc. (MSS):

1. MSS SP-25– - Standard Marking System for Valves, Fittings, Flanges and Unions.

2. MSS SP-45 - Bypass and Drain Connections Standard.

3. MSS SP-71 - Grey Iron Swing Check Valves, Flanged and Threaded Ends.

4. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing manufacturer's figure number, size, service rating, and valve features for each required valve.

B. Shop Drawings: Submit manufacturer's assembly type (exploded view) Shop Drawings for each type of valve indicating dimensions, weights, materials, and methods of assembly of components.

C. Submit in accordance with Section 01340.

D. Operation and Maintenance (O&M) Data:

1. Submit maintenance data and spare parts lists for each type of valve, include product data and Shop Drawings.

2. Submit in accordance with Section 01730.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of valves of types and sizes required, whose products have been in satisfactory service(s) for not less than 5 years.

B. Valve Types: Provide valves of same type by same manufacturer to greatest extent possible.

C. Valve and Rating Identification: Provide valves with manufacturer's name (or trademark) and pressure rating clearly marked on valve body.

D. Codes and Standards:

1. MSS Compliance: Mark valves in accordance with MSS SP-25.

2. ANSI Compliance: For face-to-face and end-to-end dimensions of flanged or welded end valve bodies, comply with ANSI B16.10.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ball Valves:

1. Conbraco Apollo.

2. Or equal.

B. Check Valves:

1. Techno Check.

2. APCO.

3. Or equal.

2.02 VALVES

A. General:

1. Factory fabricated valves recommended by manufacturer for use in service indicated.

2. Types and pressure ratings indicated.

3. End connections which properly mate with pipe, stub, and equipment connections.

4. Where more than one type indicated, selection is CONTRACTOR's option.

5. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.

B. Operators:

1. Lever handle for ¼ turn valves smaller than 6 in.

2. Mechanical gear operator for valves 6 in and larger.

C. Valve Features: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by CONTRACTOR for installation requirements.

1. ASME B31.1 for power piping.

2. Flanged: Valve flanges comply with ANSI B16.1 (cast iron), ANSI B16.5 (steel) or ANSI B16.34 (bronze).

2.03 BALL VALVES

A. Stainless Steel Construction: 1,500 psi WOG, 150 psi steam, reinforced TFE packing and trim, stainless steel lever and nut, stainless steel port ball.

B. MSS Compliance: MSS SP-72

2.04 SPLIT DISC CHECK VALVES

A. Incorporate true butterfly design.

B. Seatless construction.

C. Valve disc shall seal against body at angle of 30 to 45 degrees.

D. Nonslam operation.

E. Withstand temperature of -20ºF to 450ºF.

F. Type 316 stainless steel body and internals.

G. Teflon seal.

H. Capable of installation in any position.

I. Maximum pressure drop of 0.5 psi at 100 gpm flow rate.

J. 150-lb class.

K. Threaded or flanged body.

2.05 BALL CHECK VALVES

A. Cast iron body, cover, and baffle.

B. Stainless steel float, center guided for positive sealing.

C. Inlet and Outlet: 2-in. NPT.

D. Maximum diameter: 10 inches.

E. APCO Model 144 or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Except as otherwise indicated, comply with following requirements.

1. Install valves where required for proper operation of piping and equipment, include valves in branch lines where necessary to isolate sections of piping. Locate valves so accessible and separate support can be provided when necessary.

2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable.

B. Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

C. Fluid Control: Except as otherwise indicated, install ball valves to comply with ANSI/ASME B31.1.

3.02 ADJUSTING AND CLEANING

A. Valve Adjustment: After piping systems tested and put into service, but before final testing, adjusting, and balancing, inspect each valve for possible leaks. Adjust or replace packing to stop leaks. Replace valve if leak persists.

B. Valve Identification: Tag valves to include manufacturer's and supplier's name and phone number, and operating and basic maintenance instructions. Enclose in plastic sleeve fastened to valve.

C. Cleaning: Clean factory finished surfaces. Repair marred or scratched surface with manufacturer's touch up paint.

* * * END OF SECTION * * *

SECTION 16100
BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 REFERENCES

A. National Electrical Manufacturer's Association (NEMA).

B. Underwriters Laboratories, Inc. (UL):

1. UL 943 - Standard for Safety for Ground-Fault Circuit-Interrupters.

1.02 SUBMITTALS

A. Shop Drawings:

1. Required for all disconnects, motor starters and overcurrent protective devices. Include the following information:

a. Enclosure dimensions, nameplate nomenclature, electrical ratings, and thermal unit schedule.

b. Product data sheets with printed installation instructions.

c. Wiring diagrams and schematics.

B. Submit in accordance with Section 01340.

C. Operating and Maintenance (O&M) Data: Submit O&M data as specified for disconnects, motor starters and overcurrent protective devices.

1. Manufacturer's printed instructions for replacing parts, performing cleaning, and operating and maintaining equipment.

2. Repair parts list.

3. Submit in accordance with Section 01730.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. National Fire Protection Association (NFPA):

a. NFPA No. 70 - National Electric Code (NEC) and New York amendments thereto.

2. Underwriters Laboratories, Inc. (UL).

3. Local codes and ordinances.

PART 2 PRODUCTS

2.01 GENERAL

A. Use of manufacturer’s name and model or catalog number is for the purpose of establishing standard of quality and configuration desired.

2.02 GALVANIZED OR COATED RIGID STEEL CONDUITS

A. Manufacturers:

1. Allied Steel.
2. Republic Steel.
3. Plasti-Bond.
4. Or equal.

B. Manufacturer’s standard lengths.

C. Protected inside and outside by hot-dipped galvanized or electro-galvanized coating or inside by hot-dipped galvanized or electro-galvanized coating and outside by Plasti-Bond coating.

2.03 FLEXIBLE CONDUIT

A. Manufacturers:

1. Triangle PWC, Inc.
2. Flexsteel.
3. Or equal.

B. Galvanized flexible steel.

C. Standard conduit sizes.

D. Minimum Size: ½ in.

2.04 LIQUIDTIGHT FLEXIBLE CONDUIT

A. Manufacturers:

1. O-Z/Gedney Company.
2. Flex-Guard, Inc.
3. Carol Cable Company.

4. Or equal.

B. Galvanized flexible steel.

C. Standard conduit sizes.

D. Minimum Size: ½ in.

E. Heavy wall PVC jacket.

2.05 FITTINGS

A. Manufacturers:

1. Appleton Electric Company.

2. Steel City, Midland-Ross Corporation.

3. Or equal.

B. Steel or malleable iron, PVC coated steel (Plasti-Bond), zinc galvanized or cadmium plated.

C. Do not use set screw or indentor type fittings.

D. Galvanized Steel Connectors and Couplings:

1. Threaded.

2. Insulated throat.

3. Gland compression type.

E. Flexible Conduit Connectors and Couplings:

1. Threaded.

2. Grounding type.

3. Insulated throat.

4. Gland compression type.

F. Liquidtight Flexible Conduit Fittings:

1. Liquidtight.

2. As specified in Paragraph 2.05.E.

G. Expansion Joints:

1. Conduit expansion fittings complete with copper bonding jumper, Crouse-Hinds Type XJ.

2. Conduit expansion/deflection fittings with copper bonding jumper, Crouse-Hinds Type XD.

H. Seals:

1. Wall entrance, Appleton Type FSK or FSC.

I. Drain Fittings:

1. Automatic Drain Breather:

a. Explosion-proof.

1) Safe for Class I, Groups C and D.

b. Capable of passing minimum 25 cc water/min and minimum 0.05 cu ft air/min at atmospheric pressure.

J. Hazardous Areas:

1. Explosion-proof.

2. Horizontal seal fittings, Crouse-Hinds Type EYS.

3. Vertical Seal fittings, Crouse-Hinds Type EYD.

4. Vertical seal fittings shall have drain plug.

2.06 WIRES, CABLES AND CONNECTORS

A. Manufacturers:

1. Wire and Cable:

a. Rome.

b. ITT.

c. Beldon.

d. Dekoron.

e. Or equal.

2. Connectors:

a. Burndy.

b. Thomas and Betts.

c. Or equal.

B. Copper wire only.

C. 600 v insulation (ASTM standard compounds) color code conductors for low voltage (secondary feeders and branch circuits) as required by NEC.

1. Type THWN Stranded: Single conductor No. 10 American Wire Gauge (AWG) and smaller, No. 12 AWG minimum for 120 v, and 240 v general use wiring.

2. Type XHHW Stranded : Single conductor No 8. AWG and larger for 120 v, 240 v, and 480 v general use wiring.

3. Type TW Stranded: Single conductor green equipment ground.

4. Type USE Stranded: Single conductor for under-ground direct burial.

5. Type THWN Stranded: Single conductor No. 12 AWG minimum for 120 v control wiring and No. 14 AWG minimum for graphic indication, nonshielded instrumentation and other control wiring operating at less than 120 v unless otherwise noted on the Drawings.

   a. Provide high density polyethylene jacketed multi-wire cable assemblies in underground conduit or duct.

6. Polyethylene insulated, tinned copper (19 by 27) stranding, No. 16 AWG, two conductors cabled with aluminum polyester electrostatic shielding, stranded tinned copper drain wire, and chrome vinyl outer jacket for interference sensitive instrumentation wiring.

   a. Additional high density neoprene jacket on cables installed below ground and in duct encasements.

D. Joints, Taps, and Splices:

1. Joints, Taps, and Splices in Conductors No. 10 AWG and Smaller: Compression type solderless connectors with plastic cover.

2. Joints, Taps, and Splices in Conductors No. 8 AWG and Larger: Solderless compression type connectors of type that will not loosen under vibration or normal strains.

2.07 BOXES

A. Manufacturers:

1. Interior Outlet Boxes:

   a. Appleton Electric Company.

b. Raco.

c. Steel City, Midland-Ross Corporation.

d. Or equal.

2. Weatherproof Outlet Boxes:

a. Appleton Electric Company.

b. Crouse-Hinds Company.

c. O-Z/Gedney Company.

d. Or equal.

3. Junction and Pull Boxes:

a. Hoffman Engineering Company.

b. Keystone Columbia, Inc.

c. Or equal.

B. Outlet Boxes - Surface Mounted:

1. General Use: 4-in. sq with raised device cover.

2. Weatherproof: Cast galvanized box with threaded hub.

C. Junction and Pull Boxes:

1. Fabricate from code gauge galvanized steel, with covers held in-place by corrosion resistant machine screws.

2. Size as required by code for number of conduits and conductors entering and leaving box.

3. Provide with welded seams where applicable, and equip with corrosion resistant nuts, bolts, screws, and washers.

4. Finish with rust inhibiting primer.

2.08 WIRING DEVICES

A. Manufacturers:

1. Arrow-Hart, Inc.

2. Hubbel Wiring Device Division.

3. Pass and Seymour, Inc.

4. Appleton Electric Company.

5. Sierra Electric.

6. Crouse-Hinds Company.

7. Or equal.

B. Fabricated Devices:

1. Factory fabricated, specification grade wiring devices in type and electrical rating for service indicated.

2. Wiring devices of one manufacturer.

3. See Drawing symbol schedule for identification of device type.

C. Switches:

1. General Use Lighting Switches: 20 amp toggle, equal to Hubbell No. 1221-I series.

2. Switches controlling equipment, operation of which is not evident from switch position, shall include flush neon pilot light in conjunction with proper switch. Each switch shall be complete with engraved plate to identify equipment being controlled (white letters on black, 1/8 in. high minimum).

D. Receptacles:

1. General use duplex receptacles: NEMA No. 5-20R, grounding type, 20-amp Hubbell No. 5362.

2. Special purpose receptacles as shown on Drawings and schedules.

E. Wiring Device Plates and Covers:

1. Wall plates for wiring devices with ganging and cut-outs as indicated, provided with metal screws for securing plates to devices, screw heads colored to match finish of plate.

2. Device plates for surface mounted Type FS or FD boxes to be Type FSK galvanized steel.

3. Device plates for surface mounted, 4-in. square boxes to be ½-in. raised galvanized steel covers.

4. Weatherproof plates and covers for exterior devices or devices in damp locations to be galvanized gray cast malleable with gasketed, lift cover plate as shown on Drawings.

2.09 MOTOR STARTERS

A. Manufacturers:

1. Allen Bradley.

2. Cutler-Hammer.

3. Square D.

4. Or equal.

B. Magnetic Starters:

1. Minimum short circuit withstand rating in combination with motor circuit protective device shall be 22,000 symmetrical amps or as indicated on Drawings.

C. Magnetic Motor Starter Construction:

1. Mounted in vertical position, gravity dropout.

2. Double break silver alloy contacts.

3. Molded coil.

4. Contacts and/or coil replacement without removing starter from enclosure or power wiring from starter.

5. Straight-through wiring.

6. Overload Relay:

a. 1-piece thermal unit construction.

b. One melting alloy type overload relay per phase, manually reset.

c. Interchangeable thermal units.

d. Thermal units must be in-place to operate starter.

e. Replaceable overload relay circuit contacts.

f. Trip at 6 times LRC in 20 sec.

7. Overload relay submersible pumps and hermetically sealed motors.

a. Same as above except trip at 6 times LRC in 3 to 5 sec.

8. NEMA standards for size and hp rating.

9. NEMA 1 minimum.

D. Control Circuits:

1. Voltage not to exceed 120 v.

2. Control transformer mounted in starter enclosure.

3. Fuses on all ungrounded conductors.

4. One secondary line grounded.

5. Transformer sized for device, accessories connected thereto, and 25% extra capacity minimum.

E. Controls:

1. Reset button mounted in enclosure cover.

2. Heavy duty, oiltight green push to test pilot lights mounted in enclosure cover when indicated.

3. Heavy duty, oiltight pushbuttons and selector switches mounted in enclosure when indicated.

4. 6-digit type elapsed time meters in tenths of hr. mounted in enclosure cover when indicated.

F. Enclosures:

1. Magnetic Starters:

a. NEMA 4X stainless steel outdoors and wet locations.

2.10 MOTOR AND CIRCUIT DISCONNECTS

A. Manufacturers:

1. Cutler-Hammer.

2. Square D.

3. Or equal.

B. Enclosed Circuit Breaker Construction:

1. Dual cover interlock.

2. External trip indication.

3. Provisions for control circuit interlock.

4. Padlock provisions for padlock if Off position.

5. Handle attached to box, not cover.

6. Handle position indicates On, Off or Tripped.

7. Provisions for insulated or groundable neutral.

C. Safety Switches

1. NEMA heavy duty Type HD.

2. Dual cover interlock.

3. Visible blades.

4. Provisions for control circuit interlock.

5. Pin type hinges.

6. Tin plated current carrying parts.

7. Quick make and break operator mechanism.

8. Handle attached to box, not cover.

9. Handle position indication, On in up position, and Off in down position.

10. Padlock provisions for up to 3 padlocks in Off position.

11. UL listed lugs for type and size of wire specified.

12. Spring reinforced fuse clips for Type R fuses.

13. Provisions for insulated or groundable neutral.

D. Enclosures

1. Indoor: NEMA 1 or 12 code gauge steel with rust inhibiting primer and baked enamel finish, or as noted.

2. Outdoor: NEMA 3R code gauge zinc coated steel with baked enamel finish or NEMA 4X stainless steel, unpainted with metal finish determined by OWNER.

2.11 FUSES

A. Manufacturers:

1. Bussmann.

2. Chase Shawmut.

3. Or equal.

B. 250 v Fuses:

1. Class RK-1, 1-end rejection or to fit mountings specified, 0 to 600 amps, 200,000-amp interrupting rating.

   a. Bussmann Low-Peak. LPN-R, dual element, time delay with short circuit protection for motor, transformer, welder, feeder, and main service protection.

C. 600 v Fuses:

1. Class RK-1, 1-end rejection or to fit mountings specified, 0 to 600 amps, 200,000-amp interrupting rating.

   a. Bussmann Low-Peak. LPS-R, dual element, time delay with short circuit protection for motor, transformer, welder, feeder, and main service protection.

2. Class CC, fast acting, single element, 0 to 30 amps, 200,00-amp interrupting rating.

   a. Bussmann Limitron. KTK-R, UL listed for motor control circuits, lighting ballasts, control transformers, and street lighting fixtures.

D. Spare Fuses:

1. 10%, minimum of 3, of each type and rating of installed fuses.

2.12 PANELBOARDS

A. Manufacturers:

1. Cutler-Hammer.

2. Square D.

3. Or equal.

B. Panelboard Ratings:

1. UL listed short circuit rating (integral equipment rating):

   a. Up to 240v: 10,000 RMS symmetrical amp minimum.

   b. Up to 480v: 14,000 RMS symmetrical amp minimum.

   c. As shown on Drawings.

C. Panelboard Construction:

1. Main breaker or main lugs only, in accordance with panelboard schedule.
2. Branch Breaker Details: As specified in Article 2.13.
3. Terminals:
    a. UL listed for type of wire specified.
    b. Anti-turn solderless type.
4. Bussing:
    a. Distributed phase sequence type.
    b. 225 amps or as shown on panelboard schedule or Drawings.
    c. Plated copper.
    d. Behind usable space, with mounting hardware.
5. Gutters adequate for wire size used, 4-in. minimum.
6. Boxes:
    a. Code gauge galvanized steel.
    b. Without knockouts.
7. Fronts:
    a. Rust inhibiting primer, baked enamel finish.
    b. Dead front safety type.
    c. Concealed hinges.
    d. Flush stainless steel cylinder tumbler type locks with spring loaded door pulls.
    e. Circuit Directory:
        1) Suitable for complete descriptions.
        2) Clear plastic cover.
        3) Typewritten card.

2.13 MOLDED CASE CIRCUIT BREAKERS

A. Manufacturers:

1. Cutler-Hammer.
2. Square D.
3. Or equal.

B. Permanent Trip Circuit Breakers.

1. Lighting Panel Circuit Breakers:
    a. Thermal and magnetic protection.
    b. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).
    c. Bolt-on type unless otherwise noted on DRAWINGS.
    d. Quick make and break toggle action.
    e. Handle trip indication.
    f. Handle position indication, On, Off and Tripped centered.
    g. UL listed for type of wire specified.
    h. UL listed short circuit rating (integrated equipment rating).
        1.) Up to 240v: 25,000 RMS symmetrical amp minimum.
        2.) Up to 480v: 18,000 RMS symmetrical amp minimum.
2. Power Panel Circuit Breakers
    a. Thermal and magnetic protection.
    b. Magnetic protection only in combination with motor starters and motor circuit protectors (MCP).
    c. Single magnetic trip adjustment.
    d. Single-handle common trip, 2 or 3 poles, (handle ties not acceptable).
    e. Push-to-trip test button.
    f. Bolt-on type.
    g. Quick make and break toggle action.
    h. Handle trip indication.

i. Handle position indication, On, Off, and Tripped centered.

j. UL listed for type of wire specified.

k. UL listed short circuit rating (integrated equipment rating).

1.) Up to 240v: 25,000 RMS symmetrical amp minimum.

2.) Up to 480v: 18,000 RMS symmetrical amp minimum.

2.14 GROUND-FAULT CIRCUIT INTERRUPTER RECEPTACLES

A. Ratings:

1. 120 vac.

2. 20 amp.

B. Tripping Requirement:

1. UL Class A.

C. Construction:

1. Shallow depth.

2. Line and load terminal screws.

3. Noise suppression.

4. Feed through.

5. Standard duplex wall plates shall fit.

6. NEMA 5-20R configuration.

D. UL Listed:

1. Meet requirements of UL 943 Standard for Safety for Ground-Fault Circuit-Interrupters.

PART 3 EXECUTION

3.01 GENERAL

A. Install products in accordance with NEC, manufacturer's instructions, applicable standards, and recognized industry practices to ensure products serve intended function.

3.02 CONDUITS AND CONDUIT FITTINGS

A. Install conduit and tubing products in accordance with NEC, manufacturer's written instructions, applicable standards, and recognized industry practices to ensure products serve intended function.

B. Complete conduit installation prior to installing cables.

C. Unless specifically indicated otherwise on the Drawings, use rigid galvanized steel conduit for general wiring.

D. Use Schedule 40 PVC in concrete.

E. Provide watertight conduit system.

F. Use PVC coated rigid steel conduit when conduit is run below slabs on grade or in earth, unless otherwise noted on the Drawings.

   1. Exterior underground conduit shall be a minimum of 1 inch in diameter, buried at a depth of not less than 24 inches below grade.

   2. Provide conduits or ducts terminating below grade with means to prevent entry of dirt or moisture.

G. Conduit shall be run concealed except exposed surface conduit may be installed where noted on the Drawings or where concealment found to be impractical or impossible, and only with approval of DESIGNER.

H. Continuous from outlet to outlet and from outlets to cabinets, junction or pull boxes.

I. Enter and secure to boxes ensuring electrical continuity from point of service to outlets.

J. Conduit runs extending through areas of different temperature or atmospheric conditions or partly indoors and partly outdoors shall be sealed, drained, and installed in manner preventing drainage of condensed or entrapped moisture into cabinets, motors or equipment enclosures.

K. Secure conduit in-place with not less that 1 malleable corrosion-proof alloy strap or hanger/8 ft of conduit.

   1. Do not use perforated strapping.

L. Connections to Motors and Equipment Subject to Vibration:

   1. Flexible steel conduit not over 3 ft long or where exposed in mechanical and utility areas and not subjected to moisture, dirt, and fumes.

   2. Liquidtight flexible conduit not over 3 ft long where exposed in finished areas or where subject to moisture, dirt, fumes, oil, corrosive atmosphere, exposed or concealed, with connectors to ensure liquidtight, permanently grounded connection. Locate where least subject to physical abuse.

M. Use double lock nuts and insulated bushings with threads fully engaged.

N. Connectors at fixture bodies and boxes shall be rigidly secured with galvanized lock nut and bushing.

O. Cap conduits after installation to prevent entry of debris.

P. Use explosion-proof fittings and seals in hazardous areas in accordance with NEC.

Q. Install conduit expansion fittings complete with bonding jumper in following locations.

1. Conduit runs crossing structural expansion joint.

2. Conduit runs attached to two separate structures.

3. Conduit runs where movement perpendicular to axis of conduit may be encountered.

3.03 WIRE AND CABLE

A. Run wire and cable in conduit unless otherwise indicated on Drawings.

B. On branch circuits, use standard colors.

C. Each tap, joint or splice in conductors No. 8 AWG and larger shall be taped with two half-lap layers of vinyl plastic electrical tape and finish wrap of color coding tape, where required by code.

3.04 BOXES

A. Install knockout closures to cap unused knockout holes where blanks have been removed.

B. Locate boxes to ensure accessibility of electrical wiring.

C. Secure boxes rigidly to subsurface upon which being mounted or solidly embed boxes in concrete of masonry. Do not support from conduit.

D. Do not burn holes, use knockout punches or saw.

E. Provide outlet box accessories as required for each installation such as mounting brackets, fixture studs, cable clamps, and metal straps for supporting outlet boxes compatible with outlet boxes being used and meeting requirements of individual wiring situations.

F. Location of outlets and equipment as shown on the Drawings is approximate, and exact location to be verified.

G. Minor modification in location of outlets and equipment considered incidental up to distance of 10 ft with no additional compensation, provided necessary instruction given prior to roughing in of outlet.

H. Mounting Height:

1. Switches: 48 in. above floor.

2. AC Receptacles: 48 in. above floor in unfinished areas.
3. Wall Bracket Lighting Fixtures: 6 ft-6 in. above floor.
4. Pushbuttons: 48 in. above floor.
5. Motor Starters and Disconnect Switches: 60 in. above floor.
6. Thermostats: 60 in. above floor.
7. Bells and Horns: 8 ft-0 in. above floor.

3.05 WIRING DEVICES

A. Do not install devices until wiring complete.

B. Do not use terminals on wiring devices (hot or neutral) for feed-through connections, looped or otherwise. Make circuit connections via connectors and pigtails.

C. Install gasket plates for devices or system components having light emitting features such as switch with pilot light and dome lights. Where installed on rough textured surfaces, seal with black self-adhesive polyfoam.

D. Ground receptacles with insulated green ground wire from device ground screw to bolted outlet box connection.

3.06 MOTOR STARTERS

A. Examine area to receive motor starters to ensure adequate clearance for starter installation.

B. Install on equipment rack in MCC or anchor firmly to wall or structural surface.

3.07 MOTOR AND CIRCUIT DISCONNECTS

A. Locate disconnect switches as shown on Drawings and required by NEC.

B. Provide control circuit interlock as required by NEC.

3.08 OVERCURRENT PROTECTIVE DEVICES

A. Install fuses just prior to energizing equipment.

B. Locate circuit breakers as shown on Drawings.

C. Install GFCI receptacles as required by NEC.

3.09 PANELBOARDS

A. Surface mount as specified on Drawings and schedules.

B. Support panel cabinets independently to structure with no weight bearing on conduits.

C. Install panelboards so top breaker not higher than 6 ft-0 in. above floor.

D. Adjacent panel cabinets shall be same size and mounted in horizontal alignment.

E. Install typewritten directory in each panelboard, accurately indicating rooms or equipment being served.

3.10 FIELD QUALITY CONTROL

A. Control Circuits, Branch Circuits, Feeders, Motor Circuits, and Transformers;

1. Megger check of phase-to-phase and phase-to-ground insulation levels.

   a. Do not megger check solid state equipment.

2. Continuity.

3. Short circuit.

4. Operational check.

B. Wiring Devices:

1. Test receptacles with Hubbell 5200, Woodhead 1750 or equal tester for correct polarity, proper ground connection, and wiring faults.

3.11 ADJUSTMENT AND CLEANING

A. Motor Starters and Disconnects:

1. Adjust covers and operating mechanisms for free mechanical movement.

2. Tighten wire and cable connections.

3. Verify overcurrent protection thermal unit size with motor nameplate to provide proper operation and compliance with NEC.

4. Clean interior of enclosures.

5. Touch up scratched or marred surfaces to match original finish.

B. Circuit Breakers:

1. Adjustable settings shall be set to provide selective coordination, proper operation, and in compliance with NEC.

* * * END OF SECTION * * *

SECTION 16150
ELECTRIC MOTORS

PART 1 GENERAL

1.01 SUMMARY

A. Motors furnished under other sections of these Specifications as part of equipment items shall conform to requirements of this section except as noted otherwise in that section or indicated otherwise on Drawings or schedules.

1.02 REFERENCES

A. Anti-Friction Bearing Manufacturers Association (AFBMA):

1. AFBMA Standards for Ball and Roller Bearings and Balls.

B. Institute of Electrical and Electronic Engineers (IEEE):

1. IEEE 112 - Standard Test Procedure for Polyphase Induction Motors and Generators.

C. National Electrical Contractors Association (NECA):

1. Standard of Installation.

D. National Electrical Manufacturers Association (NEMA):

1. NEMA MG 1 - Motors and Generators.

1.03 SUBMITTALS

A. Include motor submittal as part of equipment submittal for equipment specified in other sections.

B. Include identification of equipment by name and tag number as indicated in Specifications or on Drawings.

1. Complete nameplate data in accordance with NEMA standards.

2. Full load power factor and maximum correction capacitor kVa for motors 5 hp and larger.

3. Nominal efficiency in accordance with Standard IEEE 112 for motors 5 hp and larger.

4. Motor dimensions and frame size.

5. Manufacturer’s printed data on each motor type being provided to indicate compliance with specified performance and construction.

6. Service manual to include storage and alignment instructions.

C. Submit in accordance with Section 01340.

D. Operation and Maintenance (O&M) Data:

1. Submit in accordance with Section 01730.

1.04 QUALITY ASSURANCE

A. Source Quality Control:

1. Perform individual motor test on motors over 1 hp.

2. Test shall be standard NEMA routine production test in accordance with MG 1-12.51 consisting of following:

a. No load running current.

b. Locked rotor current.

c. High potential test.

d. Bearing inspection.

B. Regulatory Requirements:

1. National Fire Protection Association (NFPA):

a. NFPA No. 70 - National Electrical Code (NEC) and New York amendments thereto.

2. Underwriters Laboratories, Inc. (UL).

3. Local codes and ordinances.

PART 2 PRODUCTS

2.01 GENERAL

A. Use of manufacturer's name and model or catalog number is for purpose of establishing standard of quality and general configuration desired.

2.02 MANUFACTURERS

A. Louis Allis.

B. General Electric.

C. Or equal.

2.03 GENERAL

A. Unless otherwise specified, meet or exceed following.

1. High efficiency, equivalent to Louis Allis Spartan for motors 3 hp and above.

2. Motors ½ hp and Larger: 3-ph, 60 Hz, 230/460 v.

a. Squirrel cage type, NEMA B.

b. Motor Housing and Bearing Brackets: Cast grey iron with tensile strength of 30,000 psi. Do not provide rolled steel and aluminum.

c. Secure bearing brackets to motor cast iron housing. Do not use bolt clamping methods.

3. Motors Less than ½ hp: 1-ph, 60 Hz, 115/230 v.

4. Suitable for continuous operation with line voltage variation within " 10% of rated voltage.

5. Suitable for continuous operation in 40^{o}C ambient.

6. Copper motor windings.

B. Design for frequent starting when specified in other sections.

2.04 ENCLOSURES

A. Totally Enclosed Fan Cooled (TEFC): Indoor or outdoor areas where exposed to moisture or dirt.

1. Waterproof conduit box.

2. Cast brass or polypropylene external ventilation fan.

3. Automatic breather/drain.

4. Ground wire.

5. External water slinger on shaft extension.

6. Lip seals on both ends of motor.

B. Explosionproof (EP): Indoor or outdoor areas exposed to flammable volatile liquids, flammable gases or mixtures or combustible flyings are handled, manufactured, stored or used.

1. Waterproof conduit box.

2. Cast brass or polypropylene external ventilation fan.
3. Automatic breather/drain.
4. Ground wire.
5. External water slinger on shaft extension.
6. Lip seals on both ends of motor.

C. Submersible (SUB): Underwater conditions.

1. As specified under equipment section.

2.05 INSULATION

A. TEFC: Class F, 1.15 service factor.

1. Two extra dips and bakes of epoxy varnish.

B. EP: Class F, 1.15 service factor.

1. Two extra dips and bakes of epoxy varnish.

C. SUB: Class F, 1.10 service factor.

2.06 BEARINGS

A. Ball or roller bearing type at manufacturer's option, unless specified in equipment sections of Specifications.

B. Support side thrust loadings.

C. Regreasable with alamite fittings extended to accessible location for Frame 250 and larger.

D. AFBMA B10 bearing life rated (flexible coupled) at 50,000 hrs.

2.07 SPEED

A. As specified under equipment section.

2.08 TORQUE

A. Breakdown torque shall be 200% or more of maximum torque load placed on motor shaft.

B. Provide necessary WK_2 curves for special loads to coordinate with motors.

C. Supply special motors where load requirements exceed standard design.

2.09 SLIDE RAILS AND SOLE PLATE

A. As required for application.

2.10 SINGLE PHASE FRACTIONAL HP MOTORS

A. Capacitor or open split phase start, unless otherwise specified.

2.11 3-PH MOTORS

A. Provide horizontal or vertical squirrel cage induction motors for standard duty.

B. Full voltage starting or as specified in equipment sections of Specifications or on Drawings.

C. Design in conformance with Article 2.08.

PART 3 EXECUTION

3.01 GENERAL

A. Install in accordance with manufacturer's written instructions, applicable requirements of NEC, NECA "Standard of Installation," and recognized industry practices.

3.02 ALIGNMENT

A. Contractor furnishing motor shall be responsible for alignment.

B. Check alignment of motors prior to startup.

* * * END OF SECTION * * *

SECTION 16450
GROUNDING

PART 1 GENERAL

1.01 REFERENCES

A. National Electrical Contractors Association (NECA):

1. Standard of Installation.

1.02 SUBMITTALS

A. Test Data:

1. Ground resistance at each ground rod.

a. Rod location.

b. Resistance.

c. Soil conditions.

2. Building water service resistance.

B. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. National Fire Protection Association (NFPA):

a. NFPA No. 70 - National Electrical Code (NEC) and New York amendments thereto.

2. Niagara Mohawk Power Company standards.

3. Local codes and ordinances.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ground Clamp Fittings:

1. Interlocking clamp type fabricated from high strength corrosion-resistant metal with high strength silicon bronze U-bolt, nuts, and lock washers.

B. Cable Connections and Joints:

1. Thermoweld.

C. Ground Rods:

1. Thick copper covering inseparably welded to strong steel core.

2. ¾ in. diameter minimum and 10 ft long unless otherwise shown on Drawings.

D. Ground Wires:

1. Copper.

2. Do not use aluminum.

3. Size as shown on Drawings or required by NEC.

4. No. 6 AWG minimum.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Ground electrical systems and equipment as required by code, utility, local ordinances, and requirements herein.

2. Install separate code-related grounding conductors to special equipment and activity areas as required by code.

3. Bond metallic piping systems and service equipment as required by NEC.

B. System Ground:

1. Attach ground wire to building steel and ground rods.

2. Augment piping systems ground with two supplemental NEC approved electrodes to achieve effective ground resistance as required by NEC.

C. Main Grounding Conductor:

1. Continuous without splice.

2. Install in rigid metal conduit.

3. Attach nonferrous metal tag to warn against removal.

D. Bond metallic conduits, supports, cabinets, and other equipment so ground will be electrically continuous from service to outlet boxes.

E. Locate grounding conductor in nonmetallic or flexible conduit to complete equipment ground continuity.

F. Where ground conductor runs through metallic conduit, bond to conduit at entrance and exit with bolted clamp.

G. Install separate equipment grounding conductor in each conduit containing branch circuit or feeder without neutral conductor and to special equipment as shown on Drawings.

H. Green ground bar in panels to be similar to neutral bar, except tinted green and bonded to panel tub.

I. Connections shall be accessible for inspection and checking. No insulation shall be installed over ground connections.

J. Clean ground connection surfaces.

K. Drive ground rod as shown on Drawings.

1. Drive top of ground rod to depth 4 in. below finished grade.

L. Make connections to ground electrodes with bolted clamp or approved molded exothermic weld process.

M. Attach rounds permanently before permanent building service energized.

N. Install green ground conductor from 1-ph motors or equipment frames to first junction box beyond flexible conduit.

3.02 MANHOLES AND HANDHOLES

A. Drive ground rod at convenient point close to wall.

B. Connect ground rod to metal cable supports, groundable end bushings on ducts and conduits, and metallic cable sheaths and armor with No. 4 AWG, tinned, stranded or equivalent braided copper cable.

C. Attach ground wire neatly and firmly to walls.

3.03 FIELD QUALITY CONTROL

A. Resistance Measurements:

1. Measure at each ground rod.

2. Measure at each connection to building water service.

3. Measure in normally dry conditions.

    a. Not less than 48

4. Isolate ground under test from other grounds.

* * * END OF SECTION * * *

SECTION 16471
FEEDER CIRCUITS

PART 1 GENERAL

1.01 REFERENCES

A. National Electrical Contractors Association (NECA):

1. Standard of Installation

1.02 QUALITY ASSURANCE

A. Regulatory Requirements:

1. National Fire Protection Association (NFPA):

   a. NFPA No. 70 - National Electrical Code (NEC) and New York amendments thereto.

2. Local codes and ordinances.

PART 2 PRODUCTS

2.01 FEEDERS

A. Materials shall comply with other sections of Specifications.

B. Size and protect in accordance with NEC 215.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's written instructions, applicable requirements of NEC, NECA "Standard of Installation," and recognized industry practices.

B. Extend feeders at full capacity from origin to termination.

C. Each conduit raceway shall contain only those conductors constituting single feeder circuit.

D. Where multiple raceways are used for single feeder, each raceway shall contain conductor of each phase and neutral if used.

E. Where feeder conductors run in parallel, conductors shall be of same length, material, circular-mil area, insulation type, and terminated in same manner.

F. Where parallel feeder conductors run in separate raceways, raceways shall have same physical characteristics.

G. Feeder shall follow most accessible routes exposed to minimum temperature gradient and fluctuation.

H. Trapped runs without facilities for continuous drainage not acceptable.

I. Where impractical to do otherwise and with approval of ENGINEER, feeder conduits may installed in ground floor slabs subject to requirements they be totally encased in concrete or through use of PVC jacketed rigid conduit if in direct contact with earth.

J. Do not draw conductors into conduits until building enclosed, watertight, and Work causing cable damage complete.

K. Identify main feeders with heavy tags.

L. On network systems, neutral shall be run with phase wires. Unbalanced neutral current shall not exceed normal or derated conductor capacity.

* * * END OF SECTION * * *

SECTION 16857
ELECTRIC HEAT TAPE

PART 1 GENERAL

1.01 SUMMARY

A. System consists of self-regulating heat tapes and control equipment to provide complete UL listed system to prevent pipelines from freezing, installed and tested in-place.

1.02 SUBMITTALS

A. Shop Drawings:

1. Submitted by supplier of electrical pipe tracing systems as specified in other sections.

2. Submit manufacturer's product data sheets.

3. Submit Shop Drawings showing isometric layout of pipe tracing cables over customer's piping layout. Drawings shall also include installation details and connection diagrams sufficient to install pipe tracing cable system.

B. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Design Criteria:

1. Provide pipe tracing cable system capable of maintaining pipe contents at temperature of 40^{o}F when outside ambient temperature is -20^{o}F with 20 mph wind.

B. Regulatory Requirements:

1. National Fire Protection Association (NFPA):

a. NFPA No. 70 - National Electrical Code (NEC) current edition, and New York amendments thereto.

2. Underwriters Laboratories, Inc. (UL).

3. Local codes and ordinances.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Chemelex, Division of Raychem Corporation.

B. Nelson Electric, Division of General Signal.

C. Or equal.

2.02 CABLE DESIGN

A. Voltage: 120 v, 60 Hz, 1-ph as shown on Drawings for electrical connection.

B. Parallel design, current flow across cable.

C. Heat output/ft constant, independent of length.

1. 5 watts/foot.

D. Capable of overlapping without creation of hot spots.

E. Cut to any length in field.

F. Self-regulating heat output.

G. Braided metallic shield.

H. Outer Flouropolymer jacket.

2.03 MATERIAL AND EQUIPMENT

A. Furnish electrical pipe tracing system as shown on Drawings.

B. Thermostatic ambient sensing control on each type set at 40^{o}F.

1. Provide non-adjustable thermostats, calibrated and tested at factory to operate pipe heating system when temperature of pipe drops to 40^{o}F.

2. Provide adjustable thermostats, calibrated and tested at factory to close alarm contracts when temperature of pipe drops to 35^{o}F at its coldest location.

3. Thermostats to have repeatability and maximum temperature differential of $\pm 2^{o}$F.

4. Provide thermostats with NEMA 4X die cast aluminum housing outdoor enclosures.

C. Provide each cable with proper fittings and appurtenances for field connection of system to conduit and wiring without need for procurement of special fittings or wiring devices.

D. Install heat tape with 2-1/2 inch aluminum tape.

E. Provide connection kit.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install pipe tracing cables where specified or indicated on Drawings in accordance with manufacturer's written instructions.

B. Coordinate circuit connection points and voltages with Drawings.

C. Apply "electrical traced" signs to outside of thermal insulation.

3.02 FIELD QUALITY CONTROL

A. Examine material for defects prior to installation.

B. Examine final installation for damage and defects in workmanship prior to startup and installation of insulation.

C. Prior to installation, start pipe tracing system and check for temperature increase over full length of each tracing cable.

D. Prior to and after installation of insulation, heat trace circuits shall be tested with minimum 1,000 vac megger and readings recorded. Readings shall be minimum of 20 mega-ohms regardless of circuit length. Take megger test between outer braid and 2 bus wires.

* * *END OF SECTION * * *

SECTION 16915
MISCELLANEOUS INSTRUMENT PANELS

PART 1 GENERAL

1.01 SUMMARY

A. Provide instrumentation and control (I&C) panels as shown on Drawings.

1.02 DEFINITIONS

A. Systems House: Organization whose principal function is design, manufacture, and servicing of I&C systems.

1.03 SUBMITTALS

A. Submit following information for each panel in accordance with Section 01340, tabulate in booklet form, and provide in one submittal.

1. Panel fabrication and dimension drawings, nameplate legends, and wiring and piping schematic diagrams.

2. Equipment dimension drawings.

3. Component specification sheets.

4. Equipment terminal and piping connections.

5. Loop-by-loop system electrical schematic including terminal-to-terminal interconnections between panel and field equipment.

6. Instruction manuals including detailed operating sequence descriptions and controller I/O charts.

7. Parts list.

B. Operation and Maintenance (O&M) Data:

1. Submit in accordance with Section 01730.

1.04 QUALITY ASSURANCE

A. Standardization:

1. Equipment shall be latest and most modern design at time of bidding.

2. I&C equipment components shall be end product of one manufacturer to achieve standardization for maintenance, spare parts, operation, and service.

B. Systems House’s Services:

1. Systems House shall provide services of qualified service engineer to supervise and inspect equipment installation to ensure it is installed in accordance with System House’s recommendations.

2. Systems House’s engineer for equipment specified herein shall be present at job site or classroom designated by OWNER for minimum of 7 man days, travel time excluded, for assistance during construction startup, equipment adjustment, and training of OWNER’S personnel.

3. Systems House shall provide, during first year after substantial completion of system, one 8-hr service call for preventative maintenance and to make necessary adjustments on no-charge basis.

1.05 RESPONSIBILITY AND COORDINATION

A. Install, adjust, and place into satisfactory operation.

B. Drawings and Specifications intended to identify overall system functions. Provide equipment necessary to provide complete and operable system whether specifically identified or not.

C. Inspect and test at factory prior to shipment.

D. Assume responsibility for additional costs resulting from deviations from Specifications.

E. Coordinate startup with startup services for equipment furnished under other sections.

1.06 GUARANTEE

A. During guarantee period, furnish and install replacement parts for defective component at no additional cost, except for those items normally consumed in service.

PART 2 PRODUCTS

2.01 I & C EQUIPEMNT

A. Provide I & C system as shown on Drawings and specified herein.

B. Equipment provided in this section shall conform to the following.

1. Instrument and Control Panel Construction: Section 16930.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install panels in locations indicated on Drawings and in accordance with manufacturer’s written instructions and approve submittals.

B. Touch up paint on panels after installation.

* * * END OF SECTION * * *

SECTION 16930
INSTRUMENT AND CONTROL PANEL CONSTRUCTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Panel and enclosure requirements for entire instrumentation and control (I&C) system.

1.02 REFERENCES

A. Instrument Society of America (ISA).

B. National Electrical Manufacturer's Association (NEMA).

1.03 QUALITY ASSURANCE

A. Test wiring and plumbing prior to shipment.

PART 2 PRODUCTS

2.01 CONTROL PANELS

A. Factory fabricate, install instruments, plumb and wire in factory.

B. Make external connections except for data highway cables by way of numbered terminal blocks.

C. Conform to ISA standards.

D. Refer to DRAWINGS for internal and external layout details.

2.02 PANEL CONSTRUCTION FOR OTHER THAN FREE-STANDING

A. Enclosures shall conform to NEMA requirements as follows.

1. Inside Buildings: NEMA 12 (except as noted).

2. Outside Buildings: NEMA 4X stainless steel.

3. Class I, Division 1 or 2 Areas: NEMA 7.

B. In addition to NEMA standards, conform to following requirements.

1. Minimum Metal Thickness: 14 ga.

2. Doors: rubber-gasketed with continuous hinge.

3. Wherever practical, enclosures shall be manufacturer's standard product.

4. Size to adequately dissipate heat generated by equipment mounted in or on panel.

5. Equip panels mounted outside buildings with thermostatically controlled space heaters capable of maintaining internal temperature of 10°C, ∀2°C, with 20 mph wind at ambient temperature of -30°C. Heaters shall operate on 110 vac, 60 Hz power.

6. Use manufacturers and model numbers as listed unless otherwise approved by OWNER.

7. Wireway, mounting hardware, wire and wire markers shall be used as required.

8. Provide isolation barriers around intrinsic safety barriers. Mount isolation barriers to panel enclosure and extend to the bottom of the enclosure. Provide access cover.

9. Control panel builder shall check all component mounting locations and dimension for proper clearance before mounting components or cutting holes in enclosure.

2.03 STANDARD SIGNAL INTERFACES

A. Unless otherwise specified, discrete input and output signals shall conform to following.

1. Isolated unpowered (dry) contact closures.

2. Power contact from panel receiving signal or device receiving signal.

2.04 PANEL FINISH (Applies to carbon steel panels only)

A. Sand panel and remove mill scale, rust, grease, and oil. Fill imperfections and sand smooth.

B. Paint interior and exterior with one coat of epoxy coating metal primer, 2 finish coats of 2-component type epoxy enamel.

C. Sand surfaces lightly between coats.

D. Dry film thickness shall not be less than 3.0 mils.

E. Color: Selected by OWNER.

F. Stainless steel panels shall be unpainted with the type of finish selected by OWNER.

2.05 NAMEPLATES

A. Provide nameplates for I&C panels and each front-of-panel instrument and device with designations as shown on Drawings and as listed in Specifications.

B. Panel Designation: Engraved with ENGINEER'S panel tag number and description with 1/2 in. high characters.

C. Application/Function Nameplate: Locate 3/16 in. characters above or near panel mounted instrument or device consisting of descriptive phrase using nomenclature as 1isted in Specifications (when available).

D. Tag Number: Include ENGINEER'S tag number as shown on P&ID and in Specifications on each nameplate.

E. Laminated white plastic inscribed with black characters.

F. Provide aluminum decal with black 3/16 in. characters on top side at rear of instrument on or near each device on rear side of panel using tag number or device designation.

G. Secure front-of-panel and front-of-instrument nameplate with drive screws or self-tapping fasteners.

2.06 SPARE PARTS

A. Provide 10% of each type fuse, light bulb, surge protector, intrinsic barrier, and I/O module used on project for use as spare components.

B. Provide minimum of 30% spare terminals; to be shown as such on panel drawings.

2.07 MATERIAL SPECIFICATIONS

LIST OF MATERIALS

(This list is typical for each remote primary & secondary pump control panel)

ITEM	DESCRIPTION	MANUFACTURER	PART NUMBER	QUANTITY
1	SINGLE DOOR NEMA 4X STAINLESS STEEL ENCLOSURE	HOFFMAN ENG. CO.	A-36H2410SSLP	1
2				
3	ENCLOSURE SUB-PANEL	HOFFMAN ENG. CO.	A-36P24	1
4				
5	FAST OPERATING ENCLOSURE CLAMP ASSEMBLY	HOFFMAN ENG. CO.	A-FC412SS	7
6	120VAC SURGE PROTECTOR BASE	PHOENIX CONTACT	UAK 2/2-110 AC-BE	1
7	120VAC SURGE PROTECTOR PLUG	PHOENIX CONTACT	UAK 2/2-110 AC-ST	1
8	TERMNAL BLOCK	ALLEN-BRADLEY	1492-F1	21
9	FUSIBLE SWITCH	ALLEN-BRADLEY	1492-H6	7
10	FUSE – 2 AMP	LITTELFUSE	313002	4
11	FUSE – 5 AMP	LITTELFUSE	313005	3
12	POWER SUPPLY 24VDC, 1.2 AMP	SOLA	SLS-24-012	1
13				
14				
15	ANALOG/DIGITAL I/O RACK	DUTEC	I/O PLEXER IOP-AD	2
16	SINGLE CHANNEL AC OUTPUT MODULE	DUTEC	OAC5	3
17	SINGLE CHANNEL AC INPUT MODULE	DUTEC	IAC5	9
18	4 TO 20 MA CURRENT INPUT MODULE	DUTEC	II420	1
19				
20				
21	RS-422/485 SURGE PROTECTOR BASE	PHOENIX CONTACT	UFBK 2-PE-24 DC-HF-	2
22	RS-422/485 SURGE PROTECTOR PLUG	PHOENIX CONTACT	UFBK 2-PE-24 DC-HF-ST	2
23	INTRINSIC SAFETY BARRIER	MTL INCORPORATED	MTL 702+	2
24	INTRINSIC SAFETY BARRIER	WARRICK	SERIES 17A1CO	4

25	PUSH TO TEST TRANSFORMER PILOT LIGHT W/RED LENS	ALLEN-BRADLEY	800H-PRT16R	1
26	PUSH TO TEST TRANSFORMER PILOT LIGHT W/GREEN LENS	ALLEN-BRADLEY	800H-PRT16G	1
27	PUSH TO TEST TRANSFORMER PILOT LIGHT W/AMBER LENS	ALLEN-BRADLEY	800H-PRT16A	2
28	MOMENTARY PUSHBUTTON SWITCH	ALLEN-BRADLEY	800H-AR2D1	1
29	HAND-OFF-AUTO 3 POSITION MAINTAINED SELECTOR	ALLEN-BRADLEY	800H-JR2B	2
30	9 PIN FEMALE D SHELL CONNECTOR W/HOOD	CINCH	DE-9S / SDH-9GL	1
31				
32	LEACHATE LEVEL TRANSMITTER	DELTA	591-GX-PVC-XX	1
33	LEAK DETECTOR ELECTRODE FITTING	WARRICK	SERIES 3E2C	2
34	LEAK DETECTOR ELECTRODE	WARRICK	SERIES 3R5C5	1
35				
36				
37				

PART 3 EXECUTION

3.01 INSTALLATION

A. Install panel in locations indicated on DRAWINGS and in accordance with manufacturer's written instructions and approved submittals.

B. Touch up panel after installation.

* * * END OF SECTION * * *

SECTION 16931
VAULT ELECTRICAL COMPONENTS

PART 1 GENERAL

1.01 REFERENCES

A. National Electrical Manufacturer's Association (NEMA).

B. Underwriters Laboratories, Inc. (UL):

1. UL 943 - Standard for Safety for Ground-Fault Circuit-Interrupters.

1.02 SUBMITTALS

A. Shop Drawings:

1. Required for all disconnects, motor starters, and overcurrent protective devices. Include the following information:

a. Enclosure dimensions, nameplate nomenclature, electrical ratings, and thermal unit schedule.

b. Product data sheets with printed installation instructions.

c. Wiring diagrams and schematics.

B. Submit in accordance with Section 01340.

C. Operating and Maintenance (O&M) Data: Submit O&M data as specified for disconnects, motor starters, and overcurrent protective devices.

1. Manufacturer's printed instructions for replacing parts, performing cleaning, and operating and maintaining equipment.

2. Repair parts list.

3. Submit in accordance with Section 01730.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. National Fire Protection Association (NFPA):

a. NFPA No. 70 - National Electric Code (NEC) and New York amendments thereto.

2. Underwriters Laboratories, Inc. (UL).

3. Local codes and ordinances.

1.04 PRODUCTS AND ELECTRICAL

A. Refer to Section 16100, Basic Materials And Methods, for general construction and materials.

1.05 MATERIAL SPECIFICATIONS

RMU-2 RISER VAULT ELECTRICAL SPECIFICATIONS TABLE

ITEM	QTY.	DESCRIPTION	MANUFACTURER	PART NUMBER(S)
1	1	INCOMING POWER PULL BOX, NEMA 4X STAINLESS STEEL, 316SS, WALL MOUNTED (ON OUTSIDE OF BUILDING).	HOFFMAN ENG. CO.	A-1412CHNFSS
2	1	MINI POWER ZONE TRANSFORMER, 3-PHASE 480VAC DELTA PRIMARY – 120/240VAC SINGLE PHASE SECONDARY, 60HZ, 7.5 KVA RATED, 2-5% FCBN, UL LISTED, WALL MOUNTED NEMA TYPE 3R RATED ENCLOSURE, WITH 30 AMP MAIN BREAKER AND (8) 20 AMP 1-POLE FEEDER BREAKERS.	SQUARE D	MPZB7S40F FAL24030 (FOR MAIN BREAKER)
3	1	CIRCUIT BREAKER PANEL DP-1, 100 AMP 480V RATED 3-POLE MAIN LUGS, 6 BRANCH CIRCUITS (2) 20/3, (3) 15/3 AND (1) 30/3 BREAKERS TO BE BOLT-ON, SURFACE MOUNTED PANEL, NEMA 12, 3-SINGLE COPPER BUSES, NEUTRAL/GROUND BAR AND LUG.	SQUARE D	NF SERIES PANELBOARD
4	1	CLASS 8538 COMBINATION STARTER AND ENCLOSURE NEMA 4X STAINLESS STEEL RATED, WITH NEMA SIZE 2 480V MAGNETIC STARTER, 120VAC STARTER COIL, AND RESETABLE THERMAL BI-METAL OVERLOADS.	SQUARE D	SDW16
5	1	CLASS 8538 COMBINATION STARTER AND ENCLOSURE NEMA 4X STAINLESS STEEL RATED, WITH NEMA SIZE 00 480V MAGNETIC STARTER, 120VAC STARTER COIL, AND RESETABLE THERMAL BI-METAL OVERLOADS.	SQUARE D	SBW13
6	1	INDUSTRIAL BASEBOARD ELECTRIC CONVECTION HEATER, WITH BUILT-IN THERMOSTAT, 120VAC 1 PHASE POWER, 1.0 KW.	INDEECO	905U01000B
7	1	WALL MOUNTED ELECTRIC CONVECTION (EXPLOSION PROOF) HEATER, WITH BUILT-IN THERMOSTAT, SIZE 2 MAGNETIC STARTER, 120VAC CONTROL TRANSFORMER, 2.5 KW, 480 VAC, 3-PHASE, RATED FOR CL 1, DIV 2, GP D AREA.	INDEECO	254-F0320252U
8	1	PRIMARY/SECONDARY PUMP CONTROL PANEL SEE SPECIFICATION SECTION 16930.		
9	1	SECONDARY PUMP PADDLEWHEEL FLOWMETER, 2-WIRE TRANSMITTER, 4-20 MADC OUTPUT, BODY MATERIAL PVC VITON SEALS, LCD DIGITAL DISPLAY, 24VDC SUPPLY. SUPPLY EEx ia IIC T6 INTRINSICALLY SAFE VERSION. (BY C.W.M.)	CHEMLINE DIGIFLOW	FLS TYPE 2110H
10	2	PRIMARY AND SECONDARY PUMP POWER RECEPTACLES, 480VAC, CLASS 1 DIV 1 GPS D, CPS 3-WIRE, 4-POLE ANGULAR HOUSING WITH CPP MATCHING PLUG.	CROUSE HINDS	
11	1	LEAK DETECTION PROBE, NEMA 4X STAINLESS STEEL HOUSING, 1"NPT MOUNTING CONN., 24VDC.	WARRICK	SERIES 3E2C
12	2	SWITCH, ON-OFF POSITIONS FOR INTERIOR LIGHT, 120VAC, 20 AMP, NEMA 4X STAINLESS STEEL HOUSING.	CROUSE HINDS	

13	1	OUTDOOR WEATHERPROOF DUPLEX GFCI RECEPTACLE, 120VAC, 20 AMP.	CROUSE HINDS	
14	1	DUPLEX WEATHERPROOF RECEPTACLE, 120VAC, 20AMP, NEMA 4X STAINLESS STEEL HOUSING.	CROUSE HINDS	
15	1	FLUORESCENT LIGHTING FIXTURE, 2-48" TUBES, 120VAC, 60HZ, LOW TEMPERATURE RAPID START BALLAST, WRAP-AROUND ACRYLIC DIFFUSER, NEMA 3R ENCLOSURE.		
16	4	FUSED SAFETY DISCONNECT SWITCH, NEMA 4X STAINLESS STEEL ENCLOSURE, RATED 60 AMP 480VAC 3-PHASE, SUPPLY WITH CLASS R 40 AMP FUSES.	SQUARE D	H362DS
17	2	INTERIOR LIGHTING FIXTURE, INCANDESCENT 100W, 120VAC, 60HZ, LIGHT BULB, EXPLOSION PROOF HOUSING, WRAP-AROUND ACRYLIC OR GLASS GLOBE.	CROUSE HINDS	

1.06 CONDUIT AND CABLE SCHEDULE

CABLE & CONDUIT SCHEDULE – RISER VAULT

CONDUIT NO.	CONDUIT SIZE	CABLE TYPE	CABLE SIZE	NO. OF WIRES
C-101	1"	XHHW	#8	4
C-102	1"	XHHW	#8	4
C-103	3/4"	ANALOG	2C#16 STP	1 Cable
C-104	3/4"	XHHW	#8	4
C-105	1"	THWN	#12	15
C-106	3/4"	THWN	#12	3
C-107	1-1/4"	XHHW,THWN	#8, #10, #14	4(8), 3(10), 6(14)
C-108	1"	THWN	#12, #14	3(12), 16(14)
C-109	3/4"	THWN	#12	3
C-110	3/4"	THWN	#12	2
C-111	3/4"	THWN	#12	3
C-112	3/4"	THWN	#12	3
C-113	3/4"	THWN	#14	4
C-114	3/4"	THWN	#10	6
C-115	3/4"	THWN	#14	4
C-116	3/4"	THWN	#14	6
C-117	3/4"	THWN	#10	3

C-118	3/4”	THWN	#14	6
C-119	3/4”	THWN	#14	3
C-120	3/4”	THWN	#14	3
C-121	3/4”	THWN	#12	6
C-122	3/4”	THWN	#12	3
C-123	3/4”	THWN	#12	3
C-124	3/4”	THWN	#12	2
C-125	3/4”	THWN	2C#18 STP, #14	1 Cable; 6(14)
C-126	3/4”	THWN	#14	2
C-127	3/4”	THWN	2C#18 STP, #14	1 Cable; 4(14)
C-128	3/4”	THWN	#14	2
C-129	3/4”	THWN	2C#18 STP	1 Cable
C-130	3/4”	THWN	#14	2

* * * END OF SECTION * * *

ATTACHMENT J

Application Appendix D-8 – RMU-2 Landfill Quality Assurance Manual

Infrastructure, environment, buildings

Imagine the result

WASTE MANAGEMENT, INC.

CWM Chemical Services, LLC

Construction Quality Assurance Manual

Residuals Management Unit 2

Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

April 2003
Revised August 2009
Revised March 2011

Appendices

1. General

1.1 Scope

This Construction Quality Assurance Manual (CQAM) addresses quality assurance (QA) for the installation of soil and geosynthetic materials used by the Model City Facility, owned by CWM Chemical Services, LLC (Owner) in the construction of Residuals Management Unit 2 (RMU-2). Extreme care and detailed documentation are required in the selection and installation of all soil materials and the production and installation of the geosynthetic materials used in waste containment applications.

This manual addresses QA testing, observations and documentation. In the context of this CQAM, QA refers to the means and actions employed to ascertain that the lining system production and installation conform with the project-specific Quality Assurance Plan (QAP) and contractual and regulatory requirements. QA is provided by a party independent from production and installation. Quality control (QC) refers only to those actions taken to determine that materials and workmanship meet the requirements of the plans and specifications. QC is provided by the manufacturers, suppliers, contractor and installers of the various components of the lining system.

A project-specific QAP is required for each project in accordance with 40 Code of Federal Regulations (CFR) Part 264. This project-specific plan consists of the following:

1. This CQAM.

2. Project-Specific Addenda to this CQAM. (Project-specific addenda shall be used to provide for additions, deletions and changes necessary to this CQAM)

3. Project-Specific Plans, Specifications and other specified documents.

4. Permits for RMU-2.

The scope of this CQAM applies to selecting, testing, handing and installing soil components, and to manufacturing, shipping, handling and installing geosynthetics that are components of the containment lining system. This CQAM contains the elements necessary to make certain that the project is constructed in accordance with design plans and specifications.

This CQAM was developed consistent with United States Environmental Protection Agency (USEPA) guidance, including "Construction Quality Assurance for Hazardous Waste Landfill Disposal Facilities," USEPA/530-SW-86-031, and regulations governing construction quality assurance (CQA) requirements listed in 40 CFR Part 264 at the date of this CQAM.

1.2 Parties

The parties discussed in this section are associated with the ownership, design, supply, manufacture, transportation, installation and QA of the lining system. The definitions, qualifications and responsibilities of these parties are outlined in the following subsections. A list (Appendix D) of parties' names and addresses will be prepared during the pre-construction meeting.

1.2.1 Project Manager

1.2.1.1 Definitions

The Project Manager is the official project representative of the Owner; in this CQAM, the term *Project Manager* shall apply equally to *Construction Coordinator* (i.e., the individual[s] responsible for coordinating construction and QA activities for the project). The Project Manager and/or Construction Coordinator may be one or more individuals designated by the Owner.

1.2.1.2 Responsibilities

The Project Manager is responsible for the organization and implementation of the CQAM for the project as outlined in Section 1.1 of this CQAM. Other responsibilities include approval of the Earthwork Contractor, Geosynthetics Installer, QAC and the QAL.

The Project Manager shall serve as communications coordinator for the project and shall initiate the resolution, pre-construction and construction meetings outlined in Section 1.3. As communications coordinator, the Project Manager shall serve as a liaison between all parties involved in the project to facilitate and maintain communications.

1.2.1.3 Qualifications

The selection of the Project Manager is the direct responsibility of the Owner. Qualifications for this position include familiarity with the following:

1. Sections of this CQAM or other applicable CQAMs.

2. General earthwork construction techniques.

3. General geosynthetic installation techniques.

4. All applicable permit and regulatory requirements.

5. Company policies and procedures for project management.

1.2.2 Engineer

1.2.2.1 Definitions

The Engineer is the individual and/or firm responsible for the preparation of the design, including plans and project-specific specifications for the lining system.

1.2.2.2 Responsibilities

The Engineer is responsible for performing the engineering design and preparing the associated drawings and specifications for the lining system. The Engineer is responsible for approving all design and specification modifications and making design clarifications necessitated during construction of the lining system. Design changes will be approved in writing by the Engineer. Design-related issues will be resolved through discussion directed by the Project Manager, with the Engineer responsible for the respective feature. Upon the request of the Project Manager, the Engineer may attend the resolution and pre-construction meetings outlined in Section 1.3 of this CQAM.

1.2.2.3 Qualifications

The Engineer shall be a qualified engineer, certified or licensed as required by regulation. The Engineer shall be familiar with the use of soils and/or geosynthetics, including detailed design methods and procedures. In addition, the Engineer should be familiar with applicable regulatory requirements.

1.2.2.4 Submittals

The Engineer shall submit the project design drawings, specifications and associated engineering calculation reports to the Project Manager. The Engineer shall also submit completed design or specification modification or clarification forms to the Project Manager in a timely manner upon request. Other information may also be required by the Owner.

1.2.3 Geosynthetics Manufacturer

1.2.3.1 Definitions

The Geosynthetics Manufacturer (Manufacturer) is the firm responsible for production of any of the various geosynthetic liner system components outlined in this CQAM. In the case of a geocomposite, the Manufacturer is the firm responsible for combining the components into the final product.

1.2.3.2 Responsibilities

Each Manufacturer is responsible for the production of its geosynthetic product. In addition, each Manufacturer is responsible for the condition of the geosynthetic until the material is accepted by the Project Manager upon delivery. Each Manufacturer shall produce a consistent product meeting the requirements set forth by this CQAM and the Project Specifications. Each Manufacturer shall provide QC documentation for its product as specified in this CQAM.

1.2.3.3 Qualifications

Each Manufacturer shall:

1. Be pre-qualified and approved by the Owner.

2. Provide sufficient production capacity and qualified personnel to meet the demands of the project.

3. Have an internal QC program for its product that meets the requirements presented in this CQAM.

1.2.3.4 Submittals

1.2.3.4.1 Pre-Qualification

A Manufacturer shall meet the following requirements and submit the following information to be considered for pre-qualification:

1. Corporate background and information.

2. Manufacturing capabilities:

    a. Information on plant size, equipment, personnel, number of shifts per day and capacity per shift;

    b. Daily production quantity available for the Owner's facilities;

    c. A list of material properties, including certified test results to that are attached geosynthetic samples; and

    d. A list of at least 15 completed landfill or surface impoundment facilities totaling a minimum of 15,000,000 square feet (ft^2) (1,500,000 square meters [m^2]), for which the Manufacturer has manufactured a geosynthetic. For each facility, the following information shall be provided:

        (1) Name and purpose of facility, its location and date of installation.

        (2) Name of owner, project manager, designer, fabricator (if any) and installer.

        (3) Type of geosynthetic and surface area of geosynthetic manufactured.

        (4) Available information on the performance of the lining system.

3. The Manufacturer's QC manual, including a description of the QC laboratory facilities.

4. The origin (i.e., supplier's name and production plant) and identification (i.e., brand name and number) of resin used to manufacture the product.

1.2.3.4.2 Pre-Installation

Prior to the installation of any geosynthetic material, the Manufacturer shall submit to the Project Manager all QC documentation required by the appropriate section of this CQAM and the Technical Specifications. This documentation shall be reviewed and approved in writing by the Geosynthetics QAC as outlined in Section 1.2.7 of this CQAM before installation can begin.

1.2.4 Earthwork Contractor

1.2.4.1 Definitions

The Earthwork Contractor is the firm responsible for the earthwork associated with site preparation, excavation and subgrade preparation and construction of the soil components of the lining system.

The Earthwork Superintendent is responsible for the Earthwork Contractor's field crew. The Superintendent shall represent the Contractor at all site meetings and shall be responsible for acting as the Earthwork Contractor's spokesman on the project. The Earthwork Superintendent shall be present (onsite) at all times during earthwork activities. In the event that the Earthwork Superintendent cannot be present, the Earthwork Superintendent shall inform the Project Manager, in advance of his/her absence, and designate an alternate on-site individual as the Superintendent capable of acting in the role outlined in this CQAM.

1.2.4.2 Responsibilities

The Earthwork Contractor is responsible for constructing soil components of the lining systems in conformance with the project design and specifications to a condition suitable for geomembrane placement. The Earthwork Contractor may also be responsible for locating and transporting the required earth and granular materials, concrete and piping and for other work, as outlined in the Project Specifications and/or contract documents.

1.2.4.3 Qualifications

The Earthwork Contractor shall be:

1. Pre-qualified and approved by the Owner.

2. Able to provide qualified personnel to meet the demands of the project.

At a minimum, the Earthwork Contractor shall provide an Earthwork Superintendent as described below.

The Earthwork Superintendent must be qualified based on previously demonstrated experience, management ability and authority. The Earthwork Superintendent, unless otherwise approved by the Project Manager, shall have previously managed, at a minimum, two projects that entailed the installation of at least 1,000,000 ft^2 (100,000 m^2) of soil liner or final cover components.

1.2.4.4 Submittals

1.2.4.4.1 Pre-Qualification

To be considered for pre-qualification, the Earthwork Contractor shall provide the following information to the Project Manager:

1. Company background and information.

2. Demonstration of bonding capability.

3. List of outstanding contracts.

4. List of readily available equipment required to perform the work (i.e., scrapers, graders, scarifiers, compactors, discing equipment, water trucks and admixing equipment, if required).

5. List of at least five comparable projects, with the following information for each project:

    a. Name of the facility, its location and date of installation;

    b. Name of project manager or contact person for the installation; and

    c. Description and purpose of installation and definition of contractor's scope of work.

6. Other information required by the Owner's Project Manager.

1.2.4.4.2 Pre-installation

Prior to commencement of the earthwork activities, the Earthwork Contractor shall submit to the Project Manager:

1. Resume of the Earthwork Superintendent to be assigned to this project, including the dates and duration of employment.

2. Schedule of construction activities; the schedule shall be submitted to the Owner at least 30 days prior to construction and shall be revised, as necessary, to reflect new tasks, new initiation dates or new completion dates and re-submitted within 1 week of any such changes.

3. List of specific equipment and personnel to be used on the project.

1.2.4.4.3 Installation

During the installation, the Earthwork Contractor shall be responsible for the submission of the QC documentation recorded during installation.

1.2.4.4.4 Completion

Upon completion of the installation, the Earthwork Contractor shall submit a letter certifying completion of the work in accordance with the project-specific requirements, unless otherwise approved by Owner.

1.2.5 Geosynthetics Installer

1.2.5.1 Definitions

The Geosynthetics Installer is the firm responsible for installation of the geosynthetic components of the lining system. The Geosynthetics Installer may be affiliated with the Manufacturer.

The Geosynthetics Superintendent is responsible for the Geosynthetics Installer's field crew. The Geosynthetics Superintendent shall represent the Geosynthetics Installer at all site meetings and shall act as the Geosynthetics Installer's spokesman on the project.

The Master Seamer shall be the most experienced seamer of the Geosynthetics Installer's field crew. The Master Seamer shall provide direct supervision over less-experienced seamers.

1.2.5.2 Responsibilities

The Geosynthetics Installer shall be responsible for field handling, storing, deploying, seaming, temporary restraining and all other aspects of the geosynthetics installation. The Geosynthetics Installer shall also be responsible for the protection and maintenance of exposed portions of installed geosynthetics until completion of the project(s). The Geosynthetics Installer may also be responsible for transportation of these materials to the site and for anchor systems, if required by the Project Specifications. The Geosynthetics Installer shall be responsible for submittal of the documentation listed in Section 1.2.5.4.

1.2.5.3 Qualifications

The Geosynthetics Installer shall be pre-qualified and approved by the Owner. The Geosynthetics Installer shall be able to provide qualified personnel to meet the demands of the project. At a minimum, the Geosynthetics Installer shall provide a Geosynthetics Superintendent and a Master Seamer as described below.

The Geosynthetics Superintendent must be qualified based on previously demonstrated experience, management ability and authority. The Geosynthetics Superintendent, unless otherwise approved by the Project Manager, shall have previously managed, at a minimum, two installation projects that entailed the installation of at least a total of 1,000,000 ft^2 (100,000 m^2) of polyethylene geomembrane.

For geomembrane installation, all personnel performing seaming operations shall be qualified by experience or by successfully passing seaming tests. These seaming tests shall be performed under similar site weather conditions and using seaming methods approved for this project. The Master Seamer shall have experience seaming a minimum of 1,000,000 ft^2 (100,000 m^2) of polyethylene geomembrane using the same type of seaming apparatus to be used at the site.

1.2.5.4 Submittals

1.2.5.4.1 Pre-Qualification

To be considered for pre-qualification, the Geosynthetics Installer shall submit the following information:

1. Corporate background and information.
2. Description of installation capabilities.
    a. Information on equipment (e.g., numbers and types) and personnel (e.g., number of Geosynthetics Superintendents, number of crews);
    b. Average daily production anticipated; and
    c. Samples of field geomembrane seams and a list of minimum values for geomembrane seam properties.
3. List of at least 10 completed facilities, totaling a minimum of 10,000,000 ft^2 (1,000,000 m^2) for which the Geosynthetics Installer has installed geosynthetics. For each installation, the following information shall be provided:
    a. Name and purpose of facility, its location and date of installation;
    b. Name of owner, project manager, designer, manufacturer, fabricator (if any) and name of contact at the facility who can discuss the project;
    c. Name and qualifications of the Geosynthetics Superintendent(s) and Master Seamer of the Geosynthetics Installer’s crew(s);
    d. Type of geosynthetic and surface area installed;
    e. Type of seaming and type of seaming apparatus used;
    f. Duration of installation; and
    g. Available information on the performance of the lining system.

4. The Geosynthetics Installer's QC manual.

5. A copy of a letter of recommendation supplied by the geomembrane manufacturer.

1.2.5.4.2 Pre-Installation

Prior to commencement of the installation, the Geosynthetics Installer must submit to the Project Manager:

1. Resume of the Geosynthetics Superintendent to be assigned to the project, including dates, duration of employment and managerial experience as specified in Section 1.2.5.3.

2. Resume of the Master Seamer to be assigned to the project, including dates, duration of employment and square footage of lines seamed as specified in Section 1.2.5.3.

3. A panel layout drawing showing the installation layout, identifying field seams, as well as any variance or additional details that deviate from the engineering drawings. The layout shall be adequate for use as a construction plan and shall include, but not be limited to, dimensions and details.

4. Installation schedule to be submitted to the Owner at least 30 days prior to installation and revised, as necessary, to reflect new tasks, new initiation dates or new completion dates and re-submitted within 1 week of any such changes.

5. A list of personnel performing field seaming operations, including pertinent experience information.

6. All geosynthetic QC certificates as required by this CQAM (unless submitted directly to the Project Manager by the Manufacturer).

7. Certification that extrudate to be used is composed of the same resin type as the geomembrane to be used.

This documentation shall be reviewed and approved in writing by the Geosynthetics QAC, as outlined in Section 1.2.5 of this CQAM, before installation of the geosynthetic can begin.

1.2.5.4.3 Installation

During the installation, the Geosynthetics Installer shall be responsible for the submission of:

1. QC documentation recorded during installation.

2. Subgrade surface acceptance certificates, signed by the Geosynthetics Installer, for each area to be covered by the lining system.

1.2.5.4.4 Completion

Upon completion of the installation, the Geosynthetics Installer shall submit, unless otherwise approved by the Owner:

1. The warranty obtained from the manufacturer of the flexible membrane liner (FML). This warranty shall be submitted to the Project Manager and warranty the material for a period no less than 10 years.

2. An installation warranty to be submitted to the Project Manager. The warranty shall cover the installation for a period of 1 year.

1.2.6 Soil Quality Assurance Consultant

1.2.6.1 Definitions

The Soil QAC is the firm responsible for observing and documenting activities related to the QA of the installation of the soil components of the lining system. The Soil QAC is independent from the Owner. The Soil QAC and Geosynthetics QAC may be the same party.

In this CQAM, the term *Lead Soil Quality Assurance Monitor* (LSM) refers to the engineer who is personally in charge of the soil QA work. In some cases, the duties of the LSM described below may be shared by two individuals: a Soil Quality Assurance Managing Engineer (Soil QAME), located at the headquarters of the Soil QAC, and a Soil Quality Assurance Resident Engineer (Soil QARE), located at the site. The personnel of the Soil QAC also include Soil Quality Assurance Inspectors (Soil QAIs) who are located at the site for construction observation and documentation. Although not located at the site, the Soil QAME shall visit the site often enough to be familiar with the project specifics.

1.2.6.2 Responsibilities

The Soil QAC is responsible for observing and documenting activities related to the QA of the construction of the soil components of the lining systems. The Soil QAC is responsible for the implementation of the Project Quality Assurance Manual (QAM) prepared by the Project Manager. The Soil QAC is also responsible for issuing a certification report, signed by a registered Professional Engineer, as outlined in Section 2.7 of this CQAM. Other duties of the Soil QAC shall include overseeing the soil laboratory testing.

The specific duties of the Soil QAC personnel are as follows:

1. The LSM:

    a. Reviews all design drawings and specifications.

    b. Develops, if necessary, a site-specific addendum for QA of soil components with the assistance of the Project Manager.

    c. Administers the soil portions of the CQAM, including assigning and managing all soil QA personnel, reviews all field reports and provides engineering review of all QA-related issues.

    d. Reviews all changes to design drawings and specifications as issued by the Engineer.

    e. Acts as on-site (resident) representative of the Soil QAC.

    f. Familiarizes all Soil QAIs with the site and the Project QAM, as well as all requirements detailed in the Technical Specifications.

    g. Attends all QA-related meetings, including pre-construction, resolution, daily and weekly meetings.

    h. Reviews the Earthwork Contractor's personnel qualifications for conformance with those qualifications pre-approved for work on site.

i. Manages the preparation of the soil documentation drawings.

j. Reviews the Soil QAIs, daily reports, logs and photographs.

k. Notes any on-site activities that could result in damage to the installed soil components.

l. Reports to the Project Manager and logs, in the daily report, any relevant observations reported by the Soil QAIs.

m. Prepares a daily report.

n. Prepares a daily summary of the soil component quantities installed each day of construction activity.

o. Prepares a summary of soil QA activities at the end of each week of the construction activity.

p. Oversees marking, packaging and shipping of all laboratory test samples.

q. Reviews the results of laboratory testing and makes appropriate recommendations.

r. Designates a Soil QAI to represent the LSM whenever the LSM is absent from the site while operations are ongoing.

s. Reports any unapproved deviations from this CQAM to the Project Manager.

t. Prepares the final certification report.

2. The Soil QAIs:

   a. Monitor, log, photograph and/or document all soil component installation operations. Photographs shall be taken routinely and in critical areas of the installation sequence. These duties shall be assigned by the LSM.

   b. Monitor the following operations for all soil components:

(1) Material delivery.

(2) Unloading and on-site transport and storage.

(3) Sampling and conformance testing.

(4) Deployment operations.

(5) Condition of the soil components as placed.

(6) Visual observation by walkover of the finished soil components.

(7) Sampling and field-testing of the soil components.

(8) Repair operations, if and when necessary.

c. Document any on-site activities that could result in damage to the constructed soil components. Any problems noted shall be reported as soon as possible to the LSM.

Any differences between the Soil QACs interpretation of the plans and specifications and the Earthwork Contractor's interpretation shall be properly and adequately assessed by the Soil QAC. If such assessment indicates any actual or suspected work deficiencies, the Soil QAC shall inform the Project Manager and the Earthwork Contractor, or the Earthwork Contractor's representative of these deficiencies.

1.2.6.3 Qualifications

The Soil QAC shall be pre-qualified and approved by the Owner. The Soil QAC shall be experienced in the preparation of QA documentation, including QA forms, reports, certifications and manuals.

The Soil QAC's on-site representative (the LSM or Soil QARE) shall have a B.S., M.S. or Ph.D. degree in civil engineering or a related field. The LSM shall also comply with the experience requirements listed in the previous paragraph. The LSM shall be specifically experienced in the installation of soil liners and shall have the necessary training and certification by the Soil QAC in the duties of an LSM. The LSM or one of the LSM's subordinate engineers shall be continually available during construction of the soil lining system, and shall inspect any suspected substandard work promptly when identified by the Soil QAIs. The LSM or LSM's subordinate engineer shall be present and witness initial installation of any significant components, critical aspects of work and all completed components prior to their being buried, covered or otherwise obscured. The LSM shall provide to the Project Manager a list of items that will require inspection in the field.

Soil QAIs shall have specific training in the CQA of engineered soil structures. At a minimum, one of every four monitors shall have a minimum of 1,000,000 ft^2 (100,000 m^2) of field experience in soil liner construction.

1.2.6.4 Submittals

1.2.6.4.1 Pre-Qualification

To be considered for pre-qualification, the Soil QAC shall provide the following information in writing to the Project Manager:

1. Corporate background and information:
    a. General company information.
    b. Proof of insurance:
        (1) Professional liability;
        (2) "Umbrella" coverage; and/or
        (3) Other coverages, as required by statute and/or proposed contractual agreement.
2. QA capabilities:
    a. A summary of the firm's experience in QA, specifically QA of soil components of the liner system.
    b. A summary of QA documentation and methods used by the firm, including sample QA forms, reports, certifications and manuals prepared by the firm.
    c. Resumes of key personnel.

1.2.6.4.2 Pre-Construction

Prior to beginning work on the project, the Soil QAC shall provide in writing to the Project Manager the following:

1. Resumes of personnel to be involved in the project, including LSM and Soil QAIs.

2. Qualifications of the personnel to be designated as the CQA Officer, LSM, QAME, and/or QARE..

3. Proof of the required soil component QA experience of all of the QA personnel.

4. For each Professional Engineer involved in the certification of the construction in any capacity:

   a. Name and work address;

   b. Professional Engineer license number assigned by the State of New York;

   c. Date registration period ends;

   d. Date of first issuance of license; and

   e. Resume of experience related to the types of construction involved in this facility.

5. Components or steps of construction that will be inspected or observed by each of the following:

   a. The LSM;

   b. Subordinate professional engineers; and

   c. Others without professional engineering licenses.

6. Training and instructions that will be given to any QAIs, including instructions to contact the LSM when requirements of the Permit are not being met.

1.2.7 Geosynthetics Quality Assurance Consultant

1.2.7.1 Definitions

The Geosynthetics QAC is a firm independent from the Owner that is responsible for observing and documenting activities related to the QA of the production and installation of the geosynthetic system on behalf of the Owner. The Geosynthetics QAC and Soil QAC may be the same party.

In this CQAM, the term *Lead Geosynthetics Quality Assurance Monitor* (LGM) shall be used to designate the engineer (working for the Geosynthetics QAC) in charge of the geosynthetic QA work. In some cases, the duties of the LGM described below may be shared by two individuals: a Geosynthetics QAME, located at an office of the Geosynthetics QAC, and a Geosynthetics QARE, located at the site. The personnel of the Geosynthetics QAC also include the Geosynthetics QAIs who are located at the site for construction observation and documentation. Although not located at the site, the Geosynthetics QAME shall visit the site often enough to be familiar with the project specifics.

1.2.7.2 Responsibilities

The Geosynthetics QAC is responsible for observing and documenting activities related to the QA of the production and installation of the geosynthetic system. The Geosynthetics QAC is responsible for implementation of the project QAP prepared by the Project Manager. The Geosynthetics QAC is also responsible for issuing a final geosynthetic certification report, signed by a registered Professional Engineer, as outlined in Section 2.7 of this CQAM.

The specific duties of the Geosynthetics QAC personnel are as follows:

1. The LGM:

    a. Reviews all design drawings and specifications.

    b. Reviews other site-specific documentation, including proposed layouts and Manufacturer's and Geosynthetics Installer's literature.

    c. Develops a site-specific addendum for QA of geosynthetics (if necessary) with the assistance of the Project Manager.

d. Administers the geosynthetic portions of the CQAM (e.g., assigns and manages all geosynthetic QA personnel, reviews all field reports and provides engineering review of all QA-related issues).

e. Reviews all changes to design drawings and specifications as issued by the Engineer.

f. Acts as the on-site (resident) representative of the Geosynthetics QAC.

g. Familiarizes all Geosynthetics QAIs with the site and the project QAP, as well as with all requirements detailed in the Technical Specifications.

h. Attends all QA-related meetings (e.g., resolution, pre-construction, daily and weekly).

i. Reviews all Manufacturer and Geosynthetics Installer certifications and documentation and makes appropriate recommendations.

j. Reviews the Geosynthetics Installer's personnel qualifications for conformance with those qualifications pre-approved for work on site.

k. Manages the preparation of the geosynthetic documentation drawing(s).

l. Reviews the calibration certification of the on-site geosynthetic testing equipment, if applicable.

m. Reviews all Geosynthetics QAI daily reports, logs and photographs.

n. Notes any on-site activities that could result in damage to the geosynthetics.

o. Reports to the Project Manager and logs in the daily report any relevant observations reported by the Geosynthetics QAIs.

p. Prepares daily reports.

q. Prepares daily summary of the quantities of geosynthetics installed that day.

r. Prepares weekly summary of geosynthetic QA activities.

s. Oversees the marking, packaging and shipping of all laboratory test samples.

t. Reviews the results of laboratory testing and makes appropriate recommendations.

u. Designates a Geosynthetics QAI to represent the LGM whenever the LGM is absent from the site while operations are ongoing.

v. Reports any unapproved deviations from the CQAM to the Project Manager.

w. Prepares the final certification report.

2. The Geosynthetics QAI:

    a. Monitors, logs, photographs and/or documents all geosynthetic installation operations. Photographs shall be taken routinely and in critical areas of the installation sequence. These duties shall be assigned by the LGM.

    b. Monitors the following operations for all geosynthetics:

        (1) Material delivery.

        (2) Unloading and on-site transport and storage.

        (3) Sampling for conformance testing.

        (4) Deployment operations.

        (5) Joining and/or seaming operations.

        (6) Condition of panels as placed.

        (7) Visual inspection by walkover.

        (8) Repair operations.

c. Monitors and documents the geomembrane seaming operations, including:

    (1) Trial seam.

    (2) Seam preparation.

    (3) Seaming.

    (4) Non-destructive seam testing.

    (5) Sampling for destructive seam testing.

    (6) Field tensiometer testing.

    (7) Laboratory sample marking.

    (8) Repair operations.

d. Documents any on-site activities that could result in damage to the geosynthetics. Any problems noted shall be reported as soon as possible to the LGM.

Any differences between the Geosynthetics QAC's interpretation of the plans and specifications and the Geosynthetics Installer's interpretation shall be properly and adequately assessed by the LGM and shall be reported to the Project Manager. If such assessment indicates any actual or suspected work deficiencies, the LGM shall inform the Project Manager, the Geosynthetics Installer or the Geosynthetics Installer's representative of these deficiencies.

1.2.7.3 Qualifications

The Geosynthetics QAC shall be pre-qualified by the Owner. The Geosynthetics QAC shall be experienced in QA of geosynthetics, with emphasis on polyethylene geomembranes. The Geosynthetics QAC shall be experienced in the preparation of QA documentation, including QA forms, reports, certifications and manuals.

The Geosynthetics QAC's on-site representative (the LGM or Geosynthetics QARE) shall have a B.S., M.S. or Ph.D. degree in civil engineering or a related field. The LGM shall comply with the experience requirements listed in the previous paragraph. The LGM shall be specifically experienced in the installation of geosynthetics and shall be trained and certified by the Geosynthetics QAC in the duties of an LGM. The LGM or the LGM's subordinate engineers shall be continually available during construction activities and shall inspect any suspected substandard work promptly when identified by the Geosynthetics QAIs. The LGM or the LGM's subordinate engineer shall be present and witness initial installation of any significant components, critical aspects of work and all completed components prior to their being buried, covered or otherwise obscured. The LGM shall provide to the Project Manager a list of items that will require inspection in the field.

Geosynthetics QAIs shall be QA personnel who have been specifically trained in the QA of geosynthetics. At a minimum, one of every four monitors (or at least one monitor per project) shall have a minimum of 1,000,000 ft^2 (100,000 m^2) of field experience in polyethylene geomembrane QA.

1.2.7.4 Submittals

1.2.7.4.1 Pre-Qualification

To be considered for pre-qualification, the Geosynthetics QAC shall provide, in writing, the following information:

1. Corporate background and information.
    a. General company information.
2. QA capabilities:
    a. A summary of the firm's experience with geosynthetics.
    b. A summary of the firm's experience in QA, including installation QA of geosynthetics.
    c. A summary of QA documentation and methods used by the firm, including sample QA forms, reports, certifications and manuals prepared by the firm.
    d. Resumes of key personnel.

1.2.7.4.2 Pre-installation

Prior to beginning work on a project, the Geosynthetics QAC must provide the Project Manager with the following information:

1. Resumes of personnel to be involved in the project, including LGM and Geosynthetics QAIs.

2. Proof of professional engineering registration for the engineer to be designated as the CQA Officer, LGM, or QAME.

3. Proof of the required QA experience of all of the QA personnel, with emphasis on polyethylene geomembranes.

4. For each professional engineer involved in the certification of the construction in any capacity:

    a. Name and work address.

    b. Professional Engineer license number assigned by the State of New York.

    c. Date registration period ends.

    d. Date of first issuance of license.

    e. Resume of experience related to the types of construction involved in this facility.

5. Components or steps of construction that will be inspected or observed by each of the following:

    a. The LGM.

    b. Subordinate Professional Engineers and intern engineers.

    c. Others without professional engineering licenses.

6. Training and instructions that will be given to any field observers who are not registered Professional Engineers, including instructions to contact the LGM when requirements of the Permit are not being met.

1.2.8 Construction Quality Assurance Officer

1.2.8.1 Definitions

The CQA Officer will be selected by the Project Manager from the Soil or Geosynthetics QACs, based on the personnel resumes.

1.2.8.2 Responsibilities

The CQA Officer is the individual assigned and has the responsibility for all aspects of CQA Plan implementation. The CQA Officer will report directly to the Project Manager.

1.2.8.3 Qualifications

The CQA Officer should possess a B.S., M.S. or Ph.D. degree in civil engineering or a related field and be registered as a Professional Engineer in the State of New York. The CQA Officer shall have sufficient practical, technical and managerial experience to successfully oversee and implement CQA activities for hazardous waste land disposal facilities. The CQA Officer is expected to make sure that communication of all CQA-related matters is conveyed to and acted upon by the affected organizations.

1.2.9 Soil Quality Assurance Laboratory

1.2.9.1 Definitions

The Soil Quality Assurance Laboratory (Soil QAL) is a firm independent from the Earthwork Contractor or the Owner. The Soil QAL and Geosynthetics QAL may be the same party.

1.2.9.2 Responsibilities

The Soil QAL is responsible for conducting the appropriate laboratory tests, as directed by the LSM. The test procedures shall be done in accordance with the test methods outlined in this CQAM and/or the project QAP. The Soil QAL shall be responsible for providing test results as outlined in this CQAM and the Technical Specifications.

1.2.9.3 Qualifications

The Soil QAL shall be approved by Owner. The Soil QAL shall have properly maintained and regularly calibrated appropriate testing equipment. The Soil QAL shall utilize personnel who are trained and experienced in soil testing fundamentals and are familiar with American Society for Testing and Materials (ASTM) and other applicable test standards. The Soil QAL shall be capable of providing test results within project deadlines throughout the installation phase of the soil components.

The Soil QAL shall submit to the Project Manager sample data and analysis to be used during the laboratory tests.

1.2.9.4 Submittals

The Soil QAL shall submit all test results within project deadlines to the LSM. Soil test results shall be provided verbally to the LSM as soon as possible after test completion. Written test results shall be in an easily readable format and include references to the standard test methods used.

1.2.10 Geosynthetics Quality Assurance Laboratory

1.2.10.1 Definitions

The Geosynthetics QAL is a firm independent from the Project Manager, Manufacturer(s) and Geosynthetics Installer and is responsible for conducting tests on samples of geosynthetics taken from the site. The Geosynthetics QAL and the Soil QAL may be the same party.

1.2.10.2 Responsibilities

The Geosynthetics QAL shall be responsible for conducting the appropriate laboratory tests as directed by the LGM. The test procedures shall be done in accordance with the test methods outlined in this CQAM and/or the project QAP. The Geosynthetics QAL shall be responsible for providing test results as outlined in this CQAM and the Technical Specifications.

1.2.10.3 Qualifications

The Geosynthetics QAL personnel shall have training and experience in testing geosynthetics and be familiar with ASTM, Geosynthetic Research Institute (GRI) and other applicable test standards. The Geosynthetics QAL shall be capable of providing verbal results of destructive seam tests within 24 hours of receipt of test samples and other test results within project deadlines throughout the installation. Destructive seam tests may be performed by the Geosynthetics QAC onsite, providing that the appropriately calibrated equipment and experienced personnel are present, as approved by the Owner. The Geosynthetics QAL shall be approved by the Owner.

1.2.10.4 Submittals

The Geosynthetics QAL shall submit all test results within project deadlines to the LGM. All destructive seam test results shall be submitted to the LGM in written form within 48 hours of receipt of test samples, unless otherwise specified by the Project Manager. Geomembrane destructive test results shall typically be provided verbally to the LGM within 24 hours of receipt of test samples. Written test results shall be in an easily readable format and include references to the standard test methods used.

1.3 Communication

To provide a high degree of quality during installation and to determine that the final product meets all Project Specifications, open channels of communication are essential. This section discusses appropriate lines of communication and describes all necessary meetings.

1.3.1 Lines of Communication

The typical lines of communication necessary during a project are illustrated in Exhibit 1-1 (shown below). The CQA Officer, QAME, QARE LSM and LGM, shall be capable of direct communication with the Project Manager at all times. Access to the Owner shall also be available for issue resolution, if necessary.

1.3.2 Resolution Meeting

Following permit approval and the completion of the construction drawings and specifications for the project, a resolution meeting may be held as determined by the Owner. The resolution meeting is recommended to be held prior to bidding the construction work and should include all parties involved; typically includes the Project Manager, Engineer, LSM/LGM, CQA Officer, QAME(s), QARE(s) and an Owner representative.

The purpose of this meeting is to establish lines of communication, review construction drawings and specifications for completeness and clarity, begin planning for coordination of tasks, anticipate any problems that might cause difficulties and delays in construction and complete the CQAM. All aspects of the design shall be reviewed during this meeting so that clarification and/or design changes may be made before the construction work is bid. In addition, the guidelines regarding QA testing and problem resolution must be known and accepted by all. In addition, design-related issues will be resolved through discussions directed by the Project Manager with the Engineer(s) responsible for the respective feature.

A recommended agenda for the resolution meeting is presented in Exhibit 1-2 (as listed below). The meeting shall be documented by a person designated at the beginning of the meeting, and minutes shall be transmitted to all parties. At the discretion of the Owner, the resolution meeting may be waived and the recommended agenda items discussed during the pre-construction meeting.

1.3.3 Pre-Construction Meeting

A pre-construction meeting shall be held at the site prior to baseliner/final cover system installation. Typically, the meeting shall be attended by the Project Manager, Engineer, Earthwork Contractor, Geosynthetics Installer, LSM/LGM and an Owner representative.

The agenda for this meeting should include a review of the Project QAM for any problems or additions. In addition, the responsibilities of each party should be reviewed and clearly understood. A recommended agenda with specific topics for the pre-construction meeting is presented in Exhibit 1-3 (as listed below). The meeting shall be documented by a person designated at the beginning of the meeting, and minutes shall be transmitted to all parties.

An additional meeting, a pre-work conference, may be held at the request of the Project Manager to further define project CQA requirements identified at the pre-construction meeting.

EXHIBIT 1-1
LINES OF COMMUNICATION

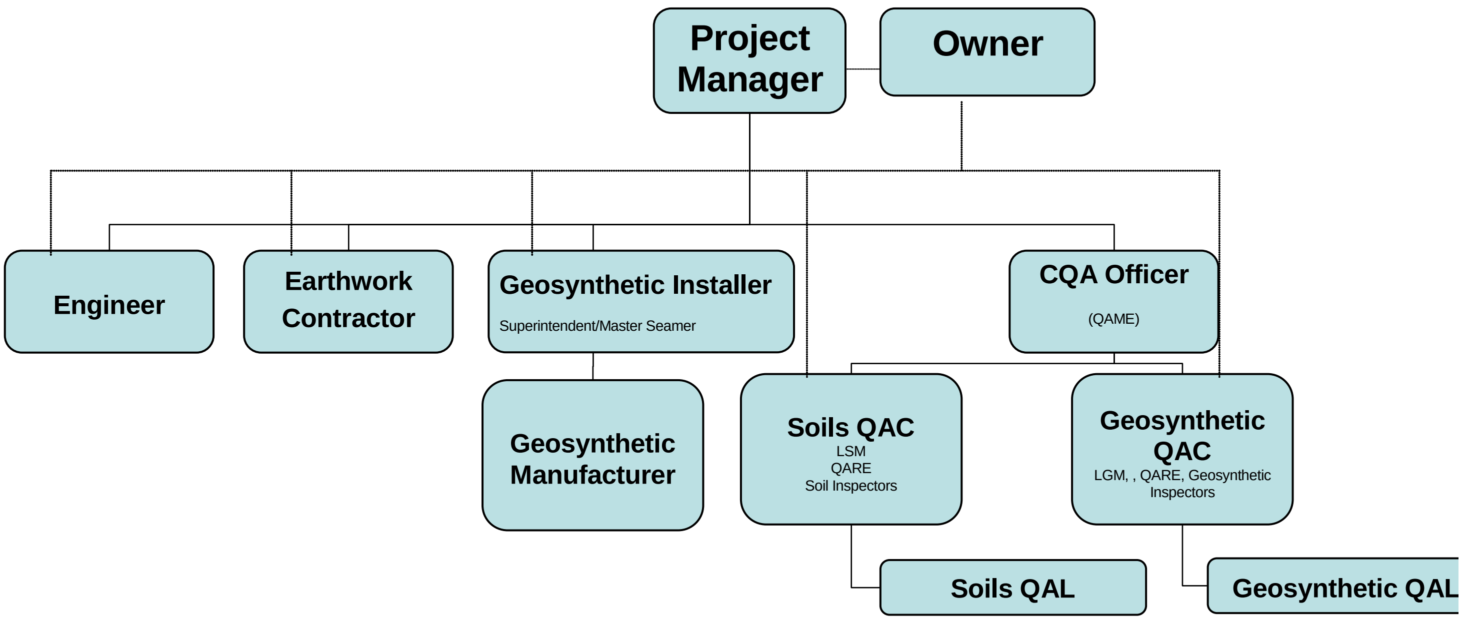

EXHIBIT 1-2
RESOLUTION MEETING AGENDA

1. Introduction

    A. Assign Minute Taker
    B. Identify Parties
        (1.) Project Manager
        (2.) Engineer
        (3.) Soil/Geosynthetics Quality Assurance Consultant
        (4.) Owner Representative
        (5.) Others

2. Tour Project Site

3. Distribute and Review Documents
    A. Design and Construction Drawings
    B. Specifications
    C. Construction Quality Assurance Manuals
    D. Permit Documents

4. Complete Quality Assurance Plan
    A. Project-specific Addendum to Quality Assurance Manual(s)
    B. Project-specific Addendum to Specifications

5. Discuss Contract Administration and Construction Issues

6. Define Lines of Communication

7. Define Project Deliverables

8. Determine Time Schedule

EXHIBIT 1-3
PRE-CONSTRUCTION MEETING AGENDA

1. Introduction

    A. Assign Minute Taker
    B. Identify Parties
        (1.) Project Manager
        (2.) Engineer
        (3.) Surveyor
        (4.) Earthwork Contractor
        (5.) Geosynthetics Installer
        (6.) Soil/Geosynthetics Quality Assurance Consultant
        (7.) Soil/Geosynthetics Quality Assurance Laboratory
        (8.) Owner Representative
        (9.) Others

2. Tour Project Site

3. Distribute and Review Documents
    A. Design and Construction Drawings
    B. Specifications
    C. Geosynthetic Panel Layout
    D. Project Quality Assurance Plan

4. Define Lines of Communication
    A. Lines of Communication
    B. Reporting Methods
    C. Distribution Methods
    D. Progress Meetings
    E. Procedures for Approving Design or Specifications Clarifications and Modifications during Construction

5. Review of Site Requirements
    A. Safety Rules
    B. Site Rules
    C. Work Schedule
    D. Storage of Materials
    E. Available Facilities

Exhibit 1-3 (Continued)
PRE-CONSTRUCTION MEETING AGENDA

6. Discuss Construction Issues
   - A. Scope of Work
   - B. Review Design
     - (1.) Construction Drawings
     - (2.) Specifications
     - (3.) Geosynthetic Panel Layout
   - C. Construction Procedures
     - (1.) Proposed Construction Sequencing
     - (2.) Development of Soil Test Fill
     - (3.) Location of Soil Stockpile Areas
     - (4.) Location of Geosynthetic Storage Area
     - (5.) Equipment
   - D. Construction Schedule
   - E. Procedures for Preparing and Approving Change Orders

7. Construction Quality Assurance Plan Specifics
   - A. Soils
   - B. Geosynthetics
   - C. Structural Systems (e.g., risers, piping)

8. Establish Project Deliverables

   - A. Responsibilities
     - (1.) Engineer
     - (2.) Geosynthetics Installer
     - (3.) Earthwork Contractor
     - (4.) Soil/Geosynthetics Quality Assurance Consultant
     - (5.) Soil/Geosynthetics Quality Assurance Laboratory
     - (6.) Project Manager

   - B. Distribution of Deliverables
   - C. Approval Procedures

1.3.4 Progress Meetings

A weekly progress meeting shall be held between the LSM/LGM, Earthwork Contractor's Superintendent, Geosynthetics Installer's Superintendent, Project Manager and any other concerned parties. This meeting shall discuss current progress, planned activities for the next week, issues requiring resolution and any new business or revisions to the work. The first progress meeting shall be held within 1 week of the start of work. The LSM/LGM shall log any problems, decisions or questions arising at this meeting in the meeting minutes. If any matter remains unresolved at the end of this meeting, the Project Manager shall be responsible for the resolution of the matter and the communication of the decision to the appropriate parties. Additional meetings can be called by any of the parties at any time. It is the responsibility of the LSM/LGM to request a meeting if problems arise without resolution.

On-site New York State Department of Environmental Conservation (NYSDEC) personnel will be invited to weekly meetings for the purpose of staying informed on current construction details. Schedules for such meetings will be distributed to the appropriate NYSDEC personnel prior to construction.

1.3.5 Training Program

The Soil and Geosynthetics QACs will provide an on-site training program to CQA personnel and may be observed by on-site NYSDEC monitors. This training program will consist of brief weekly meetings to highlight permit requirements and implementation of QA/QC activities, including construction observations, documentation procedures and data management. An outline of the training program will primarily be based on the preparation of progress reports, as discussed in Section 2.4, which includes those items found in reporting requirements and changes or additions to details. Also, the Soil and Geosynthetics QAC will provide checklists that will serve as guidelines for the CQA inspectors to successfully complete inspection.

2. Documentation

2.1 General

An effective CQAM depends largely on the identification of all construction activities that shall be monitored, and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of QA activities. The Soil/Geosynthetics QAC shall document that all requirements of the project QAP have been addressed and satisfied.

The Soil/Geosynthetics QAC shall provide the Project Manager with signed descriptive remarks, data sheets and checklists to verify that all monitoring activities have been carried out. The Soil/Geosynthetics QAC shall also maintain at the job site a complete file of all documents that comprise the CQAM, including plans and specifications, checklists, test procedures, daily logs and other pertinent documents.

All testing of soils and geosynthetics shall be performed in accordance with the current version of the test method stated in the Project Specifications or this CQAM.

2.2 Daily Reports

2.2.1 Soils Reports

Each Soil QAI shall complete a daily report and/or logs on prescribed forms that outline(s) the monitoring activities for that day. The report, at a minimum, shall consist of field notes, observations, test data sheets, construction problems and solution data sheets. A summary of all supporting data sheets, as well as with final testing results and the LSM's approval of the work shall be required upon completion of construction.

The Project Manager shall be made aware of any significant recurring non-conformance with the Project Specifications. The Project Manager shall then determine the cause and recommend appropriate changes. When this type of evaluation is made, the results must be documented and any revision to procedures or specifications shall be approved by the Owner and Engineer.

2.2.2 Geosynthetics Reports

Each Geosynthetics QAI shall complete a daily report and/or logs on prescribed forms that outline(s) the monitoring activities for that day. The precise areas, panel numbers, seam completed and approved and measures taken to protect unfinished areas overnight shall be identified. The location of failed seams or other panel areas requiring remedial action shall be identified with regard to nature of action, required repair and precise location. Repairs completed must also be identified. Any problems or concerns with regard to on-site operations should also be noted. This report must be completed at the end of each inspector's shift prior to his/her leaving the site and be submitted to the LGM.

The Geosynthetics Installer will provide the LGM with daily reports outlining:

1. Total amount of geomembrane deployed and location according to the panel layout drawing.

2. Total amount and location of seam completed, seamer and units used.

3. Changes to the panel layout drawing.

The LGM will provide to the QARE and CQA Officer daily reports outlining, at a minimum, the following:

1. Results of test seam completed.

2. Location (indicated on panel layout drawings) and results of non-destructive/destructive testing.

3. Location and results of repairs.

2.2.3 Daily CQA Summary Report

The QARE shall review the daily reports submitted by the QAIs and incorporate a summary of the reports into the QARE's daily report. Any matters requiring action by the Project Manager shall be identified. The report shall include a summary of the quantities of all material installed that day. This report must be completed daily and summarize the previous day's activities, and a copy must be submitted to the Project Manager at the beginning of the next workday following the report date.

2.3 Test Reports

2.3.1 Soils Field Testing Reports

Records of field and laboratory testing performed on the soil components of the landfill shall be collated by the Soil QAC. A summary list of test results shall be prepared by the Soil QAC on an ongoing basis and submitted with the weekly progress reports.

2.3.2 Geosynthetics Destructive Testing Reports

The destructive test reports from all sources shall be collated by the Geosynthetics QAC. This includes field tests, Geosynthetics Installer's laboratory tests (if performed) and Geosynthetics QAL tests. A summary list of test samples' pass/fail results shall be prepared by the Geosynthetics QAC on an ongoing basis and submitted with the weekly progress reports.

2.4 Progress Reports

Progress reports shall be prepared by the CQA Officer or QARE and submitted to the Project Manager. These reports shall be submitted every week, beginning on the first Friday of soil placement or geosynthetics deployment on site. This report shall include an overview of the progress to date and an outline of any changes made to the plans, drawings or specifications. The report shall also include any problems or deficiencies in installation at the site, an outline of any action taken to remedy the situation, a summary of weather conditions and a brief description of activities anticipated for the next reporting period. All applicable daily reports for the period should be appended to each progress report.

2.4.1 Reporting Requirements

The CQA Officer shall provide the Project Manager the following for submittal to the NYSDEC:

1. Borrow Area(s) Report(s);

2. Geosynthetic clay liner (GCL) Material Properties Report and QC Certifications;

3. GCL Conformance Testing Results Report;

4. Geomembrane Material Properties Report and QC Certificates;

5. Geotextile Conformance Testing Results Report;

6. Geocomposite Properties Report;

7. Geocomposite Conformance Testing Results Report;

8. Geomembrane Installer Qualifications;

9. Certifying Engineers Personnel Information;

10. Inspection of Exposed Surface Following Excavation Report; and

11. Weekly Reports on Construction, including the inspection of all installation practices and QA and QC monitoring:

    a. Clay placement and compaction.

    b. Prepared surface inspection and acceptance.

    c. GCL installation.

    d. Flexible membrane liner.

    e. Geomembrane liner installation and seam testing.

    f. Geotextile installation.

    g. Geocomposite installation.

    h. Placement of granular drainage layers.

    i. Leachate collection pipe installation.

    j. Leachate transfer system installation.

    k. Double containment leachate transmission pipe installation.

l. Miscellaneous installation.

m. Documentation drawings and summary report.

Note: The Project Manager will submit the weekly construction reports to the NYSDEC's Central and Region 9 offices.

2.4.2 Changes or Additions to Details

For all changes and/or additions to details, the Project Manager shall:

1. Obtain verbal approval from NYSDEC representatives;

2. Report changes or additions in weekly progress reports;

3. Obtain written agreement from the Engineer; and

4. Detail changes or additions in record drawings.

Failure to perform any of the above tasks may be basis for qualification of approval by the Commissioner of the NYSDEC.

2.4.3 Punchlist Completion

A punchlist for soils and geosynthetics CQA items shall be prepared by the CQA Officer and submitted to the Project Manager for items to be completed prior to liner placement. The CQA Officer is responsible for punchlist distribution to the QAIs and for the completion of punchlists.

2.5 Documentation Drawings

2.5.1 Soils Drawings

Documentation drawings shall be prepared by the Soil QAC. The documentation drawings shall include, at a minimum, the following information for soils:

1. Measured grade of the prepared subgrade.

2. Measured grade of the clay liner and other soil components.

3. Measured dimensions of any excavation within the subgrade and also within the soil liner.

4. Locations of all field tests and samples obtained for laboratory testing.

5. Locations of all repairs performed on soil components.

6. Location of grade changes relative to site survey grid.

If necessary and for the purpose of clarity in the drawings, separate sheets shall be used to illustrate the locations of test sampling points. The applicable drawings shall be shown in both plan and in cross-section views. A qualified land surveyor shall perform the surveying for all documentation information.

2.5.2 Geosynthetics Drawings

Documentation drawings shall be prepared by the Geosynthetics QAC. The documentation drawings shall include, at a minimum, the following geomembrane information:

1. Dimensions of all geomembrane field panels.

2. The location, as accurate as possible, of each panel relative to the site survey grid (furnished by the Project Manager).

3. Identification of all seams and panels with appropriate numbers or identification codes.

4. Location of all patches and repairs.

5. Location of all destructive testing samples.

The documentation drawings shall illustrate each layer of geomembrane and, if necessary, another drawing shall identify problems or unusual conditions of the GCL, geotextile or geocomposite layers. In addition, applicable cross-sections shall show the layouts of GCL and geocomposites in sump areas or any other areas that are unusual or differ from the design drawings. A qualified land surveyor shall perform the surveying for all documentation information.

2.6 Certification

The Geosynthetics QAC shall provide the following certification items:

1. Geomembrane Acceptance:

   a.) The Geomembrane shall be accepted by the Owner when:

      (1.) The installation is finished;

      (2.) All documentation of installation is completed; and

      (3.) Verification of the adequacy of all field seams and repairs, and associated testing are complete.

   A passing test seam shall be an indicator of the adequacy of the seaming unit and seamer working under prevailing site conditions, but not necessarily an indicator of seam adequacy. A passing non-destructive test of seams and repairs shall be taken to indicate the adequacy of field seams and repairs. If the field tests seams fail the laboratory tests, this failure shall be taken as an indicator of the possible inadequacy of the entire seamed length corresponding to the test seam. Destructive test portions shall then be taken by the Geosynthetics Installer at locations suggested by the LGM, and the same laboratory tests required of test seams shall be performed. Passing tests shall be taken as an indicator of adequate seams. Failing tests shall be an indicator of non-adequate seams, and the seams represented by the destructive test location shall be repaired. The repair shall be non-destructively tested and repaired, as required, until adequacy of the seams is achieved.

   b.) The geomembrane shall be accepted by the NYSDEC when:

      (1.) The installation is finished; and

      (2.) The Engineer's acceptance and supporting documentation are submitted to the NYSDEC by the Owner and the NYSDEC notifies the Owner in writing of its acceptance.

2. Certification of Construction.

The CQA Officer and the Owner will submit to the NYSDEC certification that the unit has been constructed in accordance with the specifications and requirements of the issued permit and the unit is fully capable of operation in accordance with the specifications and requirements of the permit.

2.7 Final Certification Report

Upon completion of the work, the QAC shall submit a final certification report to the Owner. The report shall summarize the duties of the project and document all aspects of the QA program performed.

The final certification report shall include, at a minimum, the following information:

1. Parties and personnel involved with the project.
2. Scope of work.
3. Outline of project.
4. QA methods.
5. Test results (e.g., conformance, destructive and non-destructive, including laboratory tests).
6. NYSDEC/Owner correspondence.
7. Design changes differing from original approved plans and specifications.
8. Certification: stamped and signed by a Professional Engineer registered in New York State.
9. Documentation drawings: stamped and signed by a Professional Engineer registered in New York State.

A recommended outline for the final certification report is given in Exhibit 2-1, below.

Exhibit 2-1
FINAL CONSTRUCTION QUALITY ASSURANCE CERTIFICATION REPORT
GENERAL OUTLINE

1. Introduction
   A. Facility/Unit Description
   B. Scope
   C. Organization of Document

2. Project Design
   A. General Description of Landfill
   B. Liner and Leachate Collection Systems
   C. Leachate Removal and Transfer System

3. Preconstruction Testing and Submittal Review
   A. Scope
   B. Soil Liner Material
   C. Geomembrane
   D. GCL
   E. Geotextiles
   F. Geocomposite
   G. Granular Materials
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J. Geosynthetic Contractor Personnel
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L. Geosynthetics Warranty
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3. Lining System Acceptance

3.1 Soil Components Acceptance

Upon written recommendation by the Soil QAC, the Project Manager shall consider accepting the soil components of the lining system. The Earthwork Contractor will retain all responsibility for the soil lining components until acceptance by the Owner.

The soil components of the lining system will be accepted by the Owner when:

1. The installation of the soil components is finished.

2. Verification of the adequacy of the constructed components, including repairs, if any, is completed in accordance with the project-specific QAP.

3. All documentation of installation is completed.

4. The Soil QAC is able to recommend acceptance.

The Soil QAC shall certify that installation of the soil components has proceeded in accordance with the project-specific QAP, except as noted by the Project Manager. This certification shall be provided in the final certification report, as outlined in Section 2.7.

3.2 Geosynthetic Components Acceptance

Upon written recommendation by the Geosynthetics QAC, the Project Manager shall consider accepting the geosynthetic components of the lining system, based on the conditions of acceptance described below. At the Owner's discretion, the geosynthetic lining system may be accepted in sections or at points of substantial completion. The conditions of acceptance are described below.

The Geosynthetics Installer and Manufacturer(s) will retain all ownership and responsibility for the geosynthetics in the lining system until acceptance by the Owner.

The geosynthetic lining system will be accepted by the Owner when:

1. The installation of the geosynthetic component of the lining system or section is finished.

2. Verification of the adequacy of all seam and repairs, including the associated testing, is completed.

3. Geosynthetics Installer provides a warranty in accordance with Section 1.2.5.4.4.

4. All documentation of installation is completed.

5. The Geosynthetics QAC recommends acceptance.

The Geosynthetics QAC shall certify that installation has proceeded in accordance with the geosynthetic portions of the project QAP, except as noted to the Project Manager. This certification shall be provided in the final certification report, as outlined in Section 2.7.

4. Soil Liner Material

4.1 Description and Applicability

Soil liner material generally consists of cohesive soils with low hydraulic conductivity and is used as barriers in lining systems. Soils used in soil liners shall consist of clean, select material that is free of trash, excessive coarse particles or other deleterious matter. Soils proposed for liner construction shall be classified as CL or CH in accordance with the Unified Soil Classification System. Soils with an organic content in excess of specifications or soils classified as organic slit or clay (OL, OH) shall not be used as soil liner materials.

4.2 Pre-Qualification Source Testing

Prior to construction of a soil liner, tests to confirm the adequacy of soil liner materials shall be performed on specimens procured from each source area. All material evaluation tests are to be performed in a geotechnical laboratory that may be the Soil QAL or another laboratory approved by the Project Manager. The Project Manager will forward the test results to the NYSDEC for review and approval prior to the installation of the soil liner.

Conformance testing will be performed as specified in Section 4.3 and the Project Specifications. Materials that do not meet minimum required properties shall be rejected. If additional soil liner sources become necessary during the construction, the same material qualification and testing procedures shall be applied to each new source.

The compaction method necessary to achieve the required hydraulic conductivity can be established by defining an acceptable moisture-density range and/or zone. The acceptable moisture-density range is the range of compaction that achieves the specified hydraulic conductivity. Definition of the acceptable range(s) can simplify the field QA work and increase the confidence level in the quality of the field compaction work.

A test fill will be constructed for each new borrow source to establish the placement and compaction procedure to be used during construction in order to achieve the required performance standard. Samples of compacted liner soil obtained from the test fill can be tested for hydraulic conductivity. The testing will establish the acceptability of the liner soil and the construction techniques. The detailed test fill procedure is presented in Appendix A. Alternate placement and compaction methods (i.e., thinner lifts and smaller compaction equipment) may be used for small areas of limited access provided that the specified compaction and hydraulic conductivity can be achieved as demonstrated by in-place density testing and laboratory testing respectively, as appropriate.

4.2.1 Borrow Source Evaluation

Potential borrow sources intended for use in this project shall be excavated to the full extent of the clay deposits in the borrow source and in a manner that will not exceed the limits of these deposits as identified through testing and field observations of the Soil QAC (i.e., test pits and/or soil borings). Test pits and/or soil borings shall be conducted in advance of the excavation to the full depth of the borrow source layer to be excavated. Additional test pits and/or soil borings shall be performed at any location in the borrow source to further define the extent of any unacceptable material, upon the request of the Soil QAC.

The Soil QAC shall record observations made at each test pit and/or soil boring and specifically note the type and thickness of any unsuitable material for segregation during excavation. The Soil QAC shall evaluate the suitability of the material in the area represented by each test pit or soil boring by visual observation and conformance testing results. The Soil QAC shall grant acceptance or qualified acceptance of the represented area of the borrow source prior to excavation of that area.

The Project Manager shall present the recorded field observations, as well as with the conformance testing results of each borrow source to the NYSDEC for review prior to use. Materials identified from test pit and soil boring observations or from observations of the actual borrow source excavation that do not meet the requirements of the Technical Specifications shall be put aside in a separate spoil pile(s) or will be avoided during the borrow source excavation.

4.2.2 Clay Stockpiles

If stockpiles are constructed, suitable clay soil material shall be placed in the designated stockpile areas in a manner that allows control of the material and its moisture content. Materials from different borrow sources or from markedly different sub-areas within one source shall be placed in separate stockpiles. Laboratory compaction tests (i.e., moisture-density relationship) shall be performed on stockpiled clay material prior to placement to establish the acceptable moisture/density zone, as specified in Appendix B.

4.2.3 Compatibility Demonstration

Representative samples of clay soil from each borrow source that were sampled and approved for use for this project by the Soil QAC shall be exposed to leachate samples from Residuals Management Unit 1 (RMU-1) and tested in accordance with the following procedures.

Atterberg limit testing (ASTM D4318) will be performed on two samples of clay soil obtained from each borrow source. On the first sample, Atterberg limit testing will be performed utilizing water, while on the second sample, Atterberg limit testing will be performed utilizing leachate obtained from RMU-1. The results of the two samples will then be reviewed by the LSM. The soil will be determined compatible with the leachate if the Atterberg limit test results for the two samples are within 10% of each other. It is recognized that if the leachate does not significantly alter the soils Atterberg limit properties, then it will have no effect on the permeability of the soil. In the event the Atterberg limit test results for the two samples are not within 10% of each other, the clay soil shall be tested in accordance with USEPA Method 9100 from the latest edition of the USEPA SW-846 using laboratory method ASTM D5084.

Borrow sources previously approved based on Method 9100 testing using secure landfill-12 or RMU-1 leachates are exempt from this requirement.

4.3 Conformance Testing

Conformance testing of the soil liner materials shall be performed to verify the consistency of the properties of the soil received from the borrow source. Conformance testing shall be performed prior to construction and after the completion of any necessary conditioning of the liner soil. Conditioning may include gradation adjustments, addition of admix materials or adjustments in the compaction moisture content.

The following tests should be performed in accordance with the Project Specifications on representative samples from each borrow source.

1. Organic content.

2. Particle size analysis.

3. Moisture content.

4. Atterberg limits.

5. Laboratory compaction.

6. Laboratory (remolded) hydraulic conductivity.

7. Direct shear (Internal Friction Angle).

Samples shall be obtained at least 1,000 cubic yards in advance of the borrow source excavation at the frequencies specified in Section 4.3.1 for each test. The Soil QAC must review the test results for each area of the borrow source and grant acceptance or qualified acceptance for each area based upon test results and field observations prior to commencing excavation of that area. The Soil QAC's acceptance, which includes test results and documented field observations, shall be made available to the NYSDEC for review, upon request.

In the event the soil QAC determines the test results are not in conformance with the project requirements, the soil QAC shall inform the Project Manager. The Project Manager shall accept or reject the soil based on this review and the requirements of the project specifications.

If the proposed soils fail to meet the specified requirements, then, at a minimum, special QC measures may be imposed, such as more frequent or additional tests. Soil amendments or alternative materials may be proposed to the NYSDEC.

4.3.1 Conformance Testing Frequency, Method and Criteria

4.3.1.1 Organic Content

- *Frequency During Construction*: Whenever organic materials are suspected, based on visual observation and cannot be removed (i.e., roots can be removed, peat cannot).

- *Method*: ASTM D2974.

- *Pass Criteria*: Less than 3.0%.

4.3.1.2 Particle Size Analysis (Except Hydrometer)

- *Frequency During Construction*: Every 1,000 cubic yards.
- *Method*: ASTM D422.
- *Pass Criteria*: Similar to material for which the most recent moisture-density curve has been developed.

4.3.1.3 Particle Size Analysis of Fines by Hydrometer

- *Frequency During Construction*: Every 5,000 cubic yards.
- *Method*: ASTM D422.
- *Pass Criteria*: Similar to material for which the most recent moisture-density curve has been developed. *Minimum*: 50% by weight passing No. 200 sieve.

4.3.1.4 Moisture Content (Drying in Oven and Microwave)

- *Frequency During Construction*: Every 1,000 cubic yards.
- *Method*: ASTM D4643 – Microwave; ASTM D2216 – Drying Oven.
- *Pass Criteria*: The results of each test should be compared to the acceptable compaction window to determine that the proper percent compaction and moisture content are being attained.

4.3.1.5 Atterberg Limits (Liquid Limit, Plastic Limit and Plasticity Index of Soils)

- *Frequency During Construction*: Every 1,000 cubic yards.
- *Method*: ASTM D4318.
- *Pass Criteria*: Similar to material for which the most recent moisture-density curve has been developed. Minimum plasticity index of 10 or greater.

4.3.1.6 Laboratory Compaction

- *Frequency During Construction*: Every 5,000 cubic yards, or changes in materials. This frequency may be extended to once every 10,000 cubic yards, if a 1-point Proctor test is determined after 5,000 cubic yards on a sample that is dried to moisture content below the optimum moisture content, upon approval of the Engineer.
- *Method*: ASTM D1557.
- *Pass Criteria*: Results shall be used for in-place density testing.

4.3.1.7 Laboratory Hydraulic Conductivity (Remolded Sample)

Note: The test sample shall be compacted to at least 90% Modified Proctor from 0 to 3% wet of optimum moisture content.

- *Frequency During Construction*: One prior to test fill construction and one at each change in soil characteristics, as documented by ± 5-pound change in the maximum dry density of a laboratory compaction test; based on comparison with a running average of maximum dry densities of previous tests of the same material.
- *Method*: ASTM D5084.
- *Pass Criteria*: Equal to or less than 1×10^{-7} centimeter per second (cm/sec).

4.3.1.8 Direct Shear Tests (Remolded Samples)

Note: The Engineer may delete this test if the soil is being used where strength parameters are not a concern.

- *Frequency During Construction*: Every 5,000 cubic yards and whenever the plasticity index changes. The frequency of every 5,000 cubic yards may be extended by the LSM if the borrow source has been determined to be consistent during the initial construction of this unit.
- *Method*: ASTM D3080.

- *Pass Criteria*: Acceptable material shall have an internal friction angle of at least 25 degrees.

4.4 Subbase Preparation

The Earthwork Contractor shall be responsible for preparing the subbase soil for liner placement in accordance with the requirements of the Project Specifications. Upon completion of the subgrade preparation work, the LSM shall inspect the subbase and prepare a notice of acceptance to be submitted to the Project Manager. In this notice of acceptance, the LSM shall, at a minimum:

1. Verify that a qualified land surveyor has verified all lines and grades.

2. Verify that a qualified engineer has verified that the subbase soil meets the criteria in the Project Specifications.

3. Determine the suitability of the subbase for fill placement by:

    a. Continuous visual inspection during proof rolling.

    b. Pocket penetrometer test in suspected soil areas.

At any time during construction of the liner, the LSM shall indicate to the Project Manager any locations that are not adequate for the placement of the soil liner. Such defects in the subbase soil shall be repaired by the Earthwork Contractor, at the direction of the Project Manager, in accordance with the Project Specifications.

4.5 Construction Observation and Inspection

Observation and inspection of the soil liner construction shall be coordinated with the construction testing described in Section 4.6. Acceptance criteria for construction work shall be as identified in the Project Specifications.

The LSM shall observe, inspect and record the following during the construction of soil liners:

1. Moisture content and consistency of the soil during processing, placement and compaction.

2. Type and level of compactive effort:

    a. Roller type.

    b. Rated Dynamic Force.

    c. Number of passes.

3. Action of compaction equipment on the soil surface (e.g., sheepsfoot penetration, pumping, cracking).

4. Maximum clod size.

5. Condition of any soil stockpile.

6. Loose and compacted lift thickness.

7. Method of tying together the lifts.

8. Dimensions of the compacted embankment.

9. Areas where damage due to excess moisture, insufficient moisture or freezing may have occurred.

10. Additional clay barrier placement requirements to be monitored are provided in Appendix C.

Upon completion of subbase and the soil liner construction, the LSM shall inspect the liner and prepare a certificate of acceptance to be submitted to the Project Manager. The LSM shall verify, at a minimum, the following:

1. A qualified land surveyor has verified all lines and grades on a 50-foot grid pattern. Also, document additional features, such as undercuts and sumps.

2. A qualified engineer has verified that the liner soil meets the criteria in the Project Specifications.

4.6 Construction Testing

All CQA testing shall be conducted in accordance with the Project Specifications or as directed by the Project Manager and as documented in the site-specific addenda to this CQAM. All field and laboratory tests shall be conducted on samples taken from the soil liner materials during the course of the construction work. CQA testing shall consist of field and laboratory testing as described in Sections 4.6.1 and 4.6.2, respectively. Testing and sampling procedures shall be observed and documented by the Soil QAC. Documentation and reporting of test results shall be in accordance with the requirements identified in Section 2.

4.6.1 Field Testing for Soil Compaction and Moisture Content

The Soil QAC shall perform the following field tests on each lift of the compacted soil liner:

Note: The calibration of each nuclear densitometer shall be checked when standard counts on the instrument indicate and as recommended by the equipment manufacturer. The zone of moisture content and density of each instrument shall be checked daily by ASTM D6398. Actual moistures and densities shall be within an acceptable range when compared to the values measured using the nuclear densitometer, as determined by the QAC. Gauge corrections will be made as necessary.

- *Frequency During Construction*: A minimum of 9 per acre per lift, but not less than 1 per 300 cubic yards in long thin areas and one per lift in small fill areas.
- *Method*: ASTM D6398 (nuclear methods), with the probe located at or slightly below the bottom of the upper lift.
- *Pass Criteria*: A minimum of 90% maximum dry density, and as required by the moisture-density range (i.e., zone) determined to meet Project Specifications for hydraulic conductivity (refer to Appendix B).

4.6.2 Laboratory Hydraulic Conductivity

Undisturbed samples (i.e., Shelby tube) shall be obtained from the compacted fill in a manner to avoid over consolidation of samples. Damaged Shelby tubes shall not qualify as laboratory samples. Each sample shall be recovered from a density test location between the probe and source. In addition to hydraulic conductivity, each tube shall be tested for moisture content, dry density, wet density, particle size and Atterberg limits. The laboratory shall report the condition of tube and extruded soil prior to testing. Dry lenses and rocks shall be documented and reported to the LSM.

- *Frequency During Construction*: One per acre per lift, but no less than one per 800 cubic yards in long thin areas.
- *Method*: ASTM D5084.
- *Pass Criteria*: 1 x 10^{-7} cm/sec or less.

4.6.3 Soil Repair and Additional Testing

Unless otherwise noted in the Project Specifications or as directed by the Project Manager, all perforations of the clay liner shall be backfilled with a soil bentonite mixture and be compacted in place with a tamping rod, Modified Proctor hammer or a hand tamper, as specified in the Project Specifications, depending upon the size of the perforation. At a minimum, the Soil QAC shall observe the backfilled areas. Perforations that must be backfilled shall include, but not be limited to, the following:

- Nuclear density test probe locations;
- Drive-cylinder test locations;
- Hydraulic conductivity sampling locations; and
- Survey grade stakes.

At the discretion of the Project Manager, if one or more of the following conditions develop during construction, the frequency of testing shall be increased based on the recommendations from the Soil QAC:

1. Rollers slip during operation.
2. Clay liner material is at improper and/or variable moisture content.
3. Dirt-clogged rollers are used to compact the material.

4. The uniformity of compaction of the material is suspect.

Additional testing may also be considered if the following conditions exist:

1. Weather conditions are adverse.

2. Rollers have not used optimum ballast.

3. Equipment breaks down frequently.

4. Grading is being started or finished.

4.7 Defects and Repairs

At locations where the field density and moisture content testing indicates that compaction is below the requirements of the specifications, the LSM shall determine the extent and the nature of the defect.

If the compacted soil liner has been subject to adverse weather conditions, the LSM shall re-inspect the liner for possible damage, including additional testing, if necessary.

Evaluation of layer bonding may be determined by using test pits to make visual observations. All test pits shall be excavated at least 1 foot in depth and in a manner acceptable to the LSM. All test pits shall be backfilled and compacted in accordance with the Project Specifications. The backfill shall be compacted using hand compaction equipment or other methods approved by the LSM.

4.7.1 Notification

After determining the extent and nature of the defect, the LSM shall promptly notify the Project Manager and the Earthwork Contractor. A work deficiency meeting shall be held, as needed, between the Earthwork Contractor, the LSM and the Project Manager to assess the problem, review alternative solutions and implement an action plan.

4.7.2 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to the satisfaction of the LSM. If Project Specification criteria cannot be met or unusual weather conditions hinder work, the LSM shall develop and present to the Project Manager suggested solutions for the Project Manager's approval.

The LSM shall schedule appropriate retests when the work defect has been corrected. All retests shall verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

5. Granular Drainage Media

5.1 Description and Applicability

Granular drainage media consist of high permeable materials as specified in the Project Specifications and are used in leachate collection layers and sumps.

5.2 Quality Control Documentation

Prior to the construction of a granular drainage layer, tests to confirm the adequacy of the granular drainage materials shall be performed on specimens procured from each source area. All material evaluation tests shall be performed in a geotechnical laboratory that may be the Soil QAL or another laboratory approved by the Project Manager. The Earthwork Contractor shall submit the source evaluation test results to the Project Manager for approval.

The following tests shall be conducted in accordance with the methods indicated in the Project Specifications:

1. Particle size (ASTM D1140 and ASTM D422).

2. Laboratory hydraulic conductivity (ASTM D2434).

Unless otherwise indicated in the Project Specifications, one series of these tests shall be performed per source or upon visually observable changes in the material type. If identification of additional drainage material sources becomes necessary during construction, the same material qualification and consistency checking procedures shall be applied to each such source.

5.3 Conformance Testing

Conformance testing of the granular drainage materials shall be performed to establish the consistency of the drainage layer material properties received from the borrow source.

The following tests shall be conducted in accordance with the methods indicated in the Project Specifications:

1. Particle size (ASTM D1140 and ASTM D422).

2. Laboratory hydraulic conductivity (ASTM D2434).

Unless otherwise indicated in the Project Specifications, particle size tests shall be performed on samples collected from in-place materials at a frequency of one per 1,000 cubic yards of drainage layer material placed or upon visually observable changes in the material type. The laboratory hydraulic conductivity tests shall be performed upon visually observable changes in the material type or as required in the Project Specifications.

The LSM shall examine all test results and report any non-conformance to the Project Manager. The Project Manager shall accept or reject the material based on a review and the requirements of the Project Specifications.

5.4 Construction Observation, Testing and Inspection

The Soil QAC shall observe the procedures used by the Earthwork Contractor during placement of the drainage material to determine that the materials are placed at the specified thickness. The thickness of the drainage layer shall be verified by a survey on a 50-foot grid pattern across cell base area by the Soil QAC following completion of the drainage layer placement.

In-place conformance samples will be taken for hydraulic conductivity at a frequency of one sample per 1,000 cubic yards. These samples may be the same samples collected for particle size testing required under Section 5.3. The frequency of in-place samples to be tested for hydraulic conductivity may be increased to one per 5,000 cubic yards by the CQA Officer and the Project Manager based on the results of the QC source evaluation, conformance and in-place testing for each source.

The Soil QAC shall prepare a certificate of acceptance for the drainage layer to be submitted to the Project Manager.

5.5 Defects and Repairs

If a defect is discovered in the final drainage layer product, the LSM shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the LSM shall determine the extent of the deficient area by additional tests, observations, a review of records or other means that the LSM deems appropriate.

5.5.1 Notification

After determining the extent and nature of the defect, the LSM shall promptly notify the Project Manager and the Earthwork Contractor. A work deficiency meeting shall be held, as needed, between the Earthwork Contractor, the LSM and the Project Manager to assess the problem, review alternative solutions and implement an action plan.

5.5.2 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to the satisfaction of the LSM. If Project Specification criteria cannot be met or unusual weather conditions hinder work, the LSM shall develop and suggest solutions to the Project Manager for his approval.

The LSM shall schedule appropriate retests when the work defect has been corrected. A retest shall verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

6. Operations Layer

6.1 Description and Applicability

The Operations Layer generally consists of non-cohesive soils used to protect the geosynthetic components of the lining systems during waste placement. This cover prevents direct contact between the liner system and the waste materials, as well as between the leachate collection system and the waste materials. The Operations Layer shall consist of select fill material that meets the requirements of the Project Specifications. The Operations Layer material shall not have a particle size or sharp edges that may damage the geosynthetic component. If necessary, processing may be required to remove oversized particles.

6.2 Quality Control Documentation

Prior to construction of the Operations Layer, tests to confirm the adequacy of the proposed materials shall be performed on samples collected from each source area. The LSM shall verify that the grain-size distribution of the Operations Layer material is as specified in the Project Specifications. All required testing shall be performed by the Soil QAL or another laboratory approved by the Project Manager. The Earthwork Contractor shall submit to the Project Manager the results of the source evaluation tests. The material shall be accepted or rejected by the Project Manager based on the results.

The following tests shall be conducted in accordance with the methods indicated in the Project Specifications:

1. Particle size (ASTM D422).

The particle size distribution tests shall be performed at a frequency of one per 20,000 cubic yards of Operations Layer material. If identification of additional sources becomes necessary during construction, the same material qualification and testing procedures shall be applied to each new source.

6.3 Conformance Testing

The Soil QAC shall conduct particle size tests (i.e., ASTM D422) from material at the frequency of one per 5,000 cubic yards of Operations Layer material prior to, or during, placement. The Soil QAC shall report any non-conformance to the Project Manager.

The Project Manager shall accept or reject the material based on a review and the requirements of the Project Specifications.

6.4 Construction Observation and Inspection

The Soil QAC shall verify the Operations Layer thickness by spot-checks and direct measurements after placement. The Soil QAC shall also observe the placement of any geosynthetic that may come in contact with the Operations Layer. The Soil QAC shall prepare a certificate of acceptance for the Operations Layer to be submitted to the Project Manager.

6.5 Defects and Repairs

If a construction defect is discovered in the Operations Layer, the LSM shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the LSM shall determine the extent of the deficient area by additional tests, observations, a review of records or other means that the LSM deems appropriate.

6.5.1 Notification

After determining the extent and nature of the defect, the LSM shall promptly notify the Project Manager and the Earthwork Contractor. A work deficiency meeting shall be held, as needed, between the Earthwork Contractor, the LSM and the Project Manager to assess the problem, review alternative solutions and implement an action plan.

6.5.2 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to the satisfaction of the LSM. If Project Specification criteria cannot be met or unusual weather conditions hinder work, the LSM shall develop and present to the Project Manager suggested solutions for approval.

The LSM shall schedule appropriate retests when the work defect has been corrected. A retest by the Soil QAC shall verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

7. Vegetative Cover

7.1 Description and Applicability

Vegetative cover material consists of medium-textured soils capable of supporting vegetative growth. The establishment of vegetation will provide the following items:

1. Protection of the soil and/or geosynthetic covers against damage due to frost and excessive temperatures;

2. Reduction in cover erosion due to water and wind; and

3. An aesthetically pleasing appearance to the landfill.

7.2 Quality Control Documentation

Prior to the construction of a vegetative cover layer, the particle size distribution, pH and organic content of soil from each source (one test per source) shall be determined by the Soil QAC and the results shall be submitted to the Project Manager. All testing shall be performed by the Soil QAL.

The Earthworks Contractor shall submit the source data for the proposed seed mix and soil amendments, as identified in the Project Specifications, to the Project Manager for approval. Specific requirements for topsoil, seed mixture, fertilizer and mulch materials, including placement procedures and testing requirements, are included in the Project Specifications.

7.3 Construction Observation and Inspection

The vegetative cover layer shall be placed uniformly to the specified thickness. The firmness of the compacted vegetative cover varies with the type of vegetation specified for the cover, and is indicated in the Project Specifications.

The Soil QAC shall:

1. Verify the thickness of the vegetative cover after placement by direct measurements. The vegetative layer final grades will be verified by surveying.

2. Make certain that care is taken in the vicinity of protrusions to prevent physical damage by the construction equipment.

3. Observe the quantity and the uniformity of any soil amendment incorporated within the tilled depth before seeding.

4. Determine that the seeding application equipment is appropriate for the job. The rate of seed and mulch application, amount and uniformity of coverage and watering instructions shall be observed, as provided in the construction specifications.

5. Examine the perimeter areas to make certain that no bare spots are left.

6. Periodically inspect the cover until the vegetative cover has been established.

If erosion protection is provided through the use of coarse materials (e.g., cobbles, riprap) instead of a vegetative cover, the LSM shall verify that the particle-size distribution is as specified in the Project Specifications.

The LSM shall report any non-conformance to the Project Manager. Upon completion of the vegetative cover layer placement, the Soil QAC shall prepare a certificate of acceptance for the vegetative layer to be submitted to the Project Manager.

7.4 Defect and Repairs

If a defect is discovered in the vegetative cover, the LSM shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the LSM shall determine the extent of the deficient area by additional tests, observations, a review of records or other means that the LSM deems appropriate. If the vegetative cover has been subject to adverse weather conditions during construction, the Soil QAC shall inspect the vegetative cover for possible damage in overly wet or desiccated areas.

7.4.1 Notification

After determining the extent and nature of the defect, the LSM shall promptly notify the Project Manager and the Earthwork Contractor. A work deficiency meeting shall be held, as needed, between the Earthwork Contractor, the LSM and the Project Manager to assess the problem, review alternative solutions and implement an action plan.

7.4.2 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to the satisfaction of the LSM. If Project Specification criteria cannot be met or unusual weather conditions hinder work, the LSM shall develop and present to the Project Manager suggested solutions for approval.

The LSM shall schedule appropriate retests when the work defect has been corrected. A retest by the Soil QAC must verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

8. General Fill

8.1 Description and Applicability

General fill consists of random granular or cohesive material from on-site excavations, approved off-site excavations or stockpiles that may be used for non-critical applications. General fill consists of a broad range of soils that are relatively free of organics, trash or other deleterious matter. Uses of general fill include facultative pond berm construction, replacement of unsuitable material in subgrade construction beneath soil liners, final cover construction, and other miscellaneous applications as identified on the Drawings. A subset of general fill, referred to as structural fill, will be used to construct the MSE wall and is discussed separately in Section 9.

This section does not identify specific tests to determine the suitability of earth materials for use in general fill. Testing and/or material qualification requirements specified for the general fill material in site-specific Project Specifications shall override the minimum qualifications given in this section.

8.2 Quality Control Documentation

The general fill sources shall be evaluated to determine acceptance with the Project Specifications, as appropriate, for the particular use. Testing may include the compaction characteristics, Direct Shear, remolded permeability, undisturbed sample permeability, and Atterberg limits. The visual inspection and laboratory testing of general fill soil shall be performed and documented by the Soil QAC. If required, the general fill shall be processed to remove particles exceeding the maximum size established in the Project Specifications. The Project Manager shall accept or reject the general fill.

8.3 Construction Observation and Inspection

The Soil QAC shall verify that the requirements of the Project Specifications are met. For unreinforced soil berms (such as around Fac Ponds), this includes minimum field density testing of one test per lift per 600 cubic yards of berm construction. For applications involving thinner placement over large areas, such as final cover construction, a minimum field density testing of nine tests per lift per acre shall be performed. The CQA Officer may request more frequent testing, if necessary. The LSM shall report all non-conformances to the Project Manager.

8.4 Defects and Repairs

If a defect is discovered in the finished general earthwork, the LSM shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the LSM shall determine the extent of the deficient area by additional tests, observations, a review of records or other means deems appropriate by the LSM. Defective soil is identified as damage to any compacted lift at any time during the construction, such as from weather or rutting under the loads imposed by earth moving equipment.

8.4.1 Notification

After determining the extent and nature of the defect, the LSM shall promptly notify the Project Manager and the Earthwork Contractor. A work deficiency meeting shall be held, as needed, between the Earthwork Contractor, the LSM and the Project Manager to assess the problem, review alternative solutions and implement an action plan.

8.4.2 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to the satisfaction of the LSM. If Project Specification criteria cannot be met or unusual weather conditions hinder work, the LSM shall develop and present to the Project Manager suggested solutions for approval.

The LSM shall schedule appropriate retests, if any required, when the work defect has been corrected. A retest by the Soil QAC must verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

8.5 Additional Requirements for General Fill to be Used in Final Cover System

General fill is used to construct a separation layer between the final waste surface and the bottom of the final cover system, as well as the majority of the soil thickness above the final cover geosynthetics. General fill to be used in the construction of the final cover system requires additional pre-qualification actions, testing during production, and conformance with additional performance standards. These additional requirements are discussed below. Unless otherwise noted, general fill to be used in the final cover system must comply with the additional requirements discussed below, as well as the general requirements presented above.

8.5.1 General Prequalification Testing

Prior to accepting the proposed general fill material for construction of the final cover system, tests to confirm adequacy of the material shall be performed on samples procured from each borrow area. The Soil QAC shall verify that the grain-size distribution of the material meets the requirements of the project specifications. Additionally, for the general fill to be placed above the final cover geosynthetics, compatibility of the general fill with the underlying geotextile component of the geocomposite drainage layer must be assessed to verify that fines from the general fill will not clog the geotextile.

For cohesive general fill materials, the Soil QAC shall obtain the moisture content of the material at the source, as specified in the project specifications, to evaluate its workability. The Atterberg Limits tests shall be performed on these materials at the frequency specified in the project specifications.

The proposed general fill material shall also be tested to verify that the material meets the minimum required shear strength values contained in the project specifications.

8.5.2 Compaction and Permeability Prequalification Testing for General Fill to be Placed Above Final Cover Geosynthetics

The proposed general fill material shall be tested for compaction characteristics (using standard Proctor, modified Proctor, and reduced Proctor efforts) to understand the range of in-place soil density and optimum moisture contents. Remolded permeability testing shall also be performed with the sample compacted to varying levels of compaction relative to modified Proctor. The range of compaction shall extend from 75 to 95% relative density, at approximately 5% increments (i.e., a total of five permeability tests). This will allow an assessment of the material to be compacted to meet the permeability requirement contained in the project specifications. Remolded samples shall be subject to a confining pressure of 1 psi to simulate anticipated field normal pressures experienced at mid-depth in the general fill layer. These test results shall be used to establish the line of optimums and develop an acceptable zone for compaction as described in Appendix B. The acceptable zone of compaction specifies the range of moisture content and dry unit weight that will allow the soil to achieve an in-place permeability that is less than or equal to the maximum allowable value contained in the project specifications. The lower bound of the acceptable zone of compaction is equal to the required density corresponding to the maximum allowable permeability and will be initially estimated from the remolded permeability test results.

The lower bound will then be refined, if necessary, based on the results of the test fill (discussed below).

Once the acceptable zone of compaction is determined from laboratory test results, a test pad shall be constructed to verify that the actual equipment and compaction methods to be used by the Earthwork Contractor to construct the general fill layer above the final cover geosynthetics can attain field soil densities that are within the acceptable zone of compaction. The test fill shall be constructed and tested as described in Appendix A.

8.5.3 Prequalification Test Results and Reporting

All required testing shall be performed by the Soil QAL or another laboratory approved by the Project Manager. The Earthwork Contractor shall submit to the Project Manager the results of source evaluation tests. The material shall be accepted or rejected by the Project Manager based on the laboratory testing results. If identification of additional soil sources becomes necessary during construction, the same material qualification and testing procedures shall apply for each new source.

8.5.4 Conformance Testing

Conformance testing of the general fill shall be performed to confirm the consistency of the material's physical properties and to verify that the material continues to comply with the specified requirements. The Soil QAC shall conduct particle size tests at the frequency of one per 5,000 yd^3 of material before placement.

The Soil QAC shall report any non-conformance to the Project Manager. The Project Manager shall accept or reject the material based on this review and the requirements of the project specifications prior to construction.

8.5.5 Construction Observation and Inspection for General Fill to be Placed Above Final Cover Geosynthetics

During construction of the general fill layer above the final cover geosynthetics, the Soil QAC shall perform in-situ moisture/density testing of the compacted material at a frequency of nine tests per acre. The Soil QAC shall verify that all moisture/density test results are within the acceptable zone for compaction established by pre-qualification testing. Additionally, the Soil QAC shall collect undisturbed samples from the constructed general fill layer at a frequency of four tests per acre for laboratory permeability testing. The Soil QAC shall notify the Project Manager of any unacceptable moisture/density test results, and the area shall be recompacted and retested until acceptable moisture/density test results are obtained.

The Soil QAC shall verify the general fill thickness by spot checks and direct measurements after placement. The Soil QAC shall also observe the placement of any geosynthetic the general fill may come in contact with. The Soil QAC shall prepare a certificate of acceptance for the protective layer to be submitted to the Project Manager.

9. Mechanically Stabilized Earth Wall

9.1 Description and Applicability

A mechanically stabilized earth (MSE) wall will be constructed as the perimeter berm for RMU-2. Because of the reinforcing properties of the Geosynthetics used in the MSE wall, the outboard sideslope of the MSE wall can be significantly steeper than the outboard sideslope of a general soil fill perimeter berm. For RMU-2, the outboard sideslope of the MSE wall will be 1:4 (approximately 76 degrees). The interior sideslope of the MSE wall will be 3:1 to provide required liner system stability. Components of the MSE wall include welded wire form facing units, geosynthetic reinforcement (i.e., geogrid), aggregate, and structural fill.

This section does not identify specific tests to determine the suitability of MSE wall construction components nor the minimum performance standards. Testing and/or material qualification requirements specified for the MSE wall components are contained in Section 02450 – Mechanically Stabilized Earth (MSE) Wall of the Project Specifications.

9.2 Structural Fill Pre-Qualification Source Testing

The majority of the MSE wall shall be constructed of structural fill, which is a subset of general fill with additional shear strength requirements. Structural fill may consist of either on-site or imported material meeting the minimum project requirements. Prior to construction of the MSE wall, tests to confirm the adequacy of structural fill materials shall be performed on specimens procured from each source area. Pre-qualification testing shall include one sample each for soil classification, Atterberg limits (if cohesive), particle size distribution, internal shear strength (consolidated drained and consolidated undrained), and compaction characteristics. All material evaluation tests are to be performed in a geotechnical laboratory that may be the Soil QAL or another laboratory approved by the Project Manager. The Project Manager will forward the test results to the NYSDEC for review and approval prior to the construction of the MSE wall.

9.3 Construction Material Conformance Testing

Conformance testing of the various materials associated with the MSE wall construction shall be performed to verify the consistency of the properties of the materials. Conformance testing shall be performed prior to and throughout construction at the indicated frequencies to verify that materials continue to meet the minimum requirements. Materials that do not meet minimum required properties shall be rejected. If other sources or products become necessary during the construction, the same material qualification and testing procedures shall be applied to each new source or product. Conformance testing for the various construction materials are discussed separately below.

9.3.1 Structural Fill Material

The structural fill material shall meet the requirements of Technical Specification 02210, Article 2.07 and Technical Specification 02450, Article 2.03.A. Conformance testing shall be performed in accordance with the Project Specifications on representative samples of soil from each borrow source as summarized in the following table.

Conformance Test	Frequency
Particle Size Analysis	1 test per 5,000 cubic yards
Atterberg Limits	1 test per 5,000 cubic yards
Laboratory Compaction (Modified Proctor)	1 test per 5,000 cubic yards

The Soil QAC must review the test results for each area of the borrow source and grant acceptance or qualified acceptance for each area based upon test results and field observations prior to commencing excavation of that area. The Soil QAC's acceptance, which includes test results and documented field observations, shall be made available to the NYSDEC for review, upon request.

In the event the soil QAC determines that the test results are not in conformance with the project requirements, the soil QAC shall inform the Project Manager. The Project Manager shall accept or reject the soil based on this review and the requirements of the project specifications.

If the proposed soils fail to meet the specified requirements, then, at a minimum, special QC measures may be imposed, such as more frequent or additional tests. Soil amendments or alternative materials may be proposed to the NYSDEC.

9.3.2 NYSDOT #4 Stone

NYSDOT #4 stone shall be used to backfill the welded wire form facing units. The stone shall meet the requirements of Technical Specification 02450, Article 2.03.B. Conformance testing shall be performed in accordance with the Project Specifications on representative samples of stone from each borrow source as summarized in the following table.

Conformance Test	Frequency
Particle Size Analysis	1 test per 5,000 cubic yards

If the proposed material fails to meet the specified requirements, then, at a minimum, special QC measures may be imposed, such as more rejecting the portion of the material stockpile represented by the failing sample, frequent or additional tests, or identification of an alternate source. Such measures shall be proposed to the NYSDEC for approval.

9.3.3 NYSDOT #2 Stone

NYSDOT #2 stone shall be used to construct a pad at the toe of the MSE wall. The stone shall meet the requirements of Technical Specification 02450, Article 2.03.C. Conformance testing shall be performed in accordance with the Project Specifications on representative samples of stone from each borrow source as summarized in the following table.

Conformance Test	Frequency
Particle Size Analysis	1 test per 5,000 cubic yards

If the proposed material fails to meet the specified requirements, then, at a minimum, special QC measures may be imposed, such as rejecting the portion of the material stockpile represented by the failing sample, more frequent or additional tests, or identification of an alternate source. Such measures shall be proposed to the NYSDEC for approval.

9.3.4 NYSDOT #1 Stone

NYSDOT #1 stone shall be used as a filter between NYSDOT #4 stone and the structural fill. The stone shall meet the requirements of Technical Specification 02450, Article 2.03.D. Conformance testing shall be performed in accordance with the Project Specifications on representative samples of stone from each borrow source as summarized in the following table.

Conformance Test	Frequency
Particle Size Analysis	1 test per 5,000 cubic yards

If the proposed material fails to meet the specified requirements, then, at a minimum, special QC measures may be imposed, such as rejecting the portion of the material stockpile represented by the failing sample, more frequent or additional tests, or identification of an alternate source. Such measures shall be proposed to the NYSDEC for approval.

9.3.5 Geosynthetic Reinforcement Material

The geosynthetic reinforcement material consists of geogrids manufactured for soil reinforcement applications meeting the requirements of Technical Specification Section 02450, Article 2.02. The geogrid may be manufactured from high-density polyethylene (HDPE) or high-tenacity polyester yarn. Prior to delivery of the rolls of geogrid, the LGM shall obtain one random conformance test sample from each geogrid material type to evaluate the coefficient of interaction with the proposed structural fill and verify that the proposed geogrid achieves the minimum value contained in the Project Specifications. The sample(s) shall be forwarded to the Geosynthetics QAL for testing to verify conformance with the Project Specifications.

The Geosynthetics QAC may perform the conformance test sampling at the manufacturing plant, if approval is granted by the Project Manager. This can be advantageous in expediting the installation process for large projects.

9.4 Subbase Preparation

The Earthwork Contractor shall be responsible for preparing the subbase soil for MSE wall construction in accordance with the requirements of the Technical Specifications. Upon completion of the subbase preparation work, the LSM shall inspect the subbase and prepare a notice of acceptance to be submitted to the Project Manager. In this notice of acceptance, the LSM shall, at a minimum:

1. Verify that a qualified land surveyor has verified all lines and grades.

2. Verify that a qualified engineer has verified that the subbase soil meets the criteria in the Project Specifications.

3. Determine the suitability of the subbase for fill placement by:

    a. Continuous visual inspection during proof rolling.

b. Pocket penetrometer test in suspected soil areas.

At any time during construction of the liner, the LSM shall indicate to the Project Manager any locations that are not adequate for subsequent construction of the MSE wall. Such defects in the subbase soil shall be repaired by the Earthwork Contractor, at the direction of the Project Manager, in accordance with the Technical Specifications.

9.5 Construction Observation and Inspection

Observation and inspection of the MSE wall construction shall be coordinated with the construction testing described in Section 9.6. Acceptance criteria for construction work shall be as identified in the Technical Specifications.

The LSM shall observe, inspect and record the following during the construction of the MSE wall:

1. Moisture content and consistency of the structural fill material during placement and compaction.

2. Source, material type, identification markings and condition of geosynthetic reinforcement material.

3. Type and level of compactive effort for structural fill material:

   a. Roller type.

   b. Rated dynamic force.

   c. Number of passes.

4. Action of compaction equipment on the soil surface (e.g., sheepsfoot penetration, pumping, cracking).

5. Condition of soil/aggregate stockpiles.

6. Loose and compacted lift thicknesses of structural fill.

7. Dimensions of the compacted embankment.

8. Areas where damage due to excess moisture, insufficient moisture or freezing may have occurred.

Upon completion of subbase and the MSE wall construction, the LSM shall inspect the MSE wall and prepare a certificate of acceptance to be submitted to the Project Manager. The LSM shall verify, at a minimum, the following:

1. A qualified land surveyor has verified all lines and grades as presented on the Drawings.

2. A qualified engineer has verified that the MSE wall meets the criteria in the Project Specifications.

9.6 Construction Testing

All CQA testing shall be conducted in accordance with the Project Specifications or as directed by the Project Manager. All field and laboratory tests shall be conducted on samples taken from materials during the course of the construction work. CQA testing shall consist of field testing as described in Section 9.6.1. Testing procedures shall be observed and documented by the Soil QAC. Documentation and reporting of test results shall be in accordance with the requirements identified in Section 9.6.2.

9.6.1 Field Testing for Soil Compaction and Moisture Control

The Soil QAC shall perform field density tests on each lift of the compacted structural fill material as indicated in the table below. Moisture/density tests shall be staggered across the surface of each lift such that representative test results are obtained from the inside, center and outside areas of each lift.

Test	Frequency
In-Place Field Density (Modified Proctor)	1 test per lift per 50 linear feet of wall

Notes:

1. The calibration of each nuclear density gauge shall be checked when standard counts on the instrument indicate that calibration is required and as recommended by the equipment manufacturer. The zone of moisture content and density of each instrument shall be checked daily by ASTM D2216 and ASTM D2937, respectively. Actual moistures and densities shall be within an acceptable range when compared to the values measured using the nuclear density gauge, as determined by the Soils QAC. Gauge corrections will be made as necessary.
2. Moisture/density probe shall be located at or slightly below the bottom of the upper lift.

9.6.2 Additional Testing

At the discretion of the Project Manager, if one or more of the following conditions develop during construction, the frequency of testing shall be increased based on the recommendations from the Soil QAC:

1. Rollers slip during operation.

2. Structural fill is at improper and/or variable moisture content.

3. Dirt-clogged rollers are used to compact the material.

4. The uniformity of compaction of the material is suspect.

Additional testing may also be considered if the following conditions exist:

1. Weather conditions are adverse.

2. Rollers have not used optimum ballast.

3. Equipment breaks down frequently.

4. Grading is being started or finished.

9.7 Defects and Repairs

At locations where the field density and moisture content testing indicates that compaction is below the requirements of the specifications, the LSM shall determine the extent and the nature of the defect. If the compacted structural fill material has been subject to adverse weather conditions, the LSM shall re-inspect the surface of the exposed layer for possible damage and perform additional testing, if necessary.

The Soils QAC shall immediately report any damaged or defective portions of in-place welded wire form facing material and/or geosynthetic reinforcement material to the Project Manager and the Earthwork Contractor. Any identified damaged or defective areas shall be repaired and/or replaced by the Earthwork Contractor in accordance with the Technical Specifications.

10. Geomembranes

10.1 Description and Applicability

Geomembranes are low hydraulic conductivity barriers used in lining systems. This section is applicable to smooth HDPE, roughened HDPE and co-extruded HDPE geomembranes. This section is not applicable to other geomembrane materials, including Hypalon, polyvinyl chloride and very low-density polyethylene.

10.2 Manufacturer's Plant Inspection

The purpose of the plant inspection is to review the manufacturing process and QC procedures implemented during the manufacturing of the geomembrane. The Owner may conduct an inspection of the Manufacturer's plant. In addition, the Project Manager or the Project Manager's designated representative may visit the manufacturing plant for a project-specific inspection, if deemed necessary. If possible, the project-specific inspection shall be conducted prior to or during the manufacturing of the geomembrane rolls for the project.

The manufacturing plant inspection shall include:

1. Verification that properties guaranteed by the Manufacturer meet all Project Specifications.

2. Verification that the measurement of properties by the Manufacturer is properly documented and the test method used is acceptable.

3. Spot inspection of the rolls and verification that they are free of imperfections or any sign of contamination by foreign matter.

4. Review of the handling, storage and transportation procedures and verification that the procedures will not damage the geomembrane.

5. Verification that roll packages have a label indicating the name of the manufacturer, type of geomembrane, thickness, roll number and roll dimensions.

6. Verification that extrusion rods and/or beads are produced from the same base resin type as the geomembrane.

A report describing the inspection shall be retained by the Owner for annual inspections and by the Project Manager for project-specific inspections.

10.3 Quality Control Documentation

Prior to the installation of any geomembrane material, the Geosynthetics Manufacturer or Geosynthetics Installer shall provide the Project Manager with the following information:

1. The origin (i.e., supplier's name and production plant) and identification (i.e., brand name and number) of the resin.

2. Copies of dated QC certificates issued by the resin supplier.

3. Results of tests conducted by the Manufacturer to verify that the resin used in the manufacture of the geomembrane meets the Project Specifications for melt flow index and density.

4. A statement indicating that the amount of reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness and did not exceed 2% by weight.

5. A list of the materials that comprise the geomembrane expressed as percent by weight of polyethylene, carbon black and other additives.

6. A specification for the geomembrane that includes all properties contained in the Project Specifications, measured using the appropriate test methods.

7. A written certification that states that the minimum values given in the specification are guaranteed by the Manufacturer.

8. QC certificates signed by a responsible party employed by the Manufacturer. Each QC certificate shall include roll identification numbers, testing procedures and results of QC tests. At a minimum, results shall be given for:

    a. Density.

    b. Carbon black content.

c. Carbon black dispersion.

d. Thickness.

e. Tensile properties.

f. Tear strength.

g. Puncture strength.

These QC tests shall be performed in accordance with the test methods as specified in the Project Specifications for every 40,000 ft^2 (4,000 m^2) of geomembrane produced.

Additional QC tests consisting of Dimensional Stability, Low Temperature Brittleness and Multi-Axial Elongation shall be performed in accordance with the Project Specifications at a frequency of 1 test per resin blend.

The Manufacturer shall identify the rolls of geomembrane with the following:

1. Manufacturer's name.

2. Product identification.

3. Thickness.

4. Roll number.

5. Roll dimensions.

The LGM shall review and approve in writing these documents and shall report any discrepancies with the above requirements to the Project Manager. The LGM shall verify the following:

1. Property values certified by the Manufacturer meet Project Specifications.

2. Measurements of properties by the Manufacturer are documented, and the test methods used are acceptable.

3. QC certificates have been provided at the specified frequency for the rolls and each certificate identifies the rolls related to it.

4. Rolls are appropriately labeled.

10.4 Conformance Testing

Upon delivery of the rolls of geomembrane, the LGM shall obtain conformance test samples from the geomembrane. The samples shall be forwarded to the Geosynthetics QAL for testing to verify conformance with the Project Specifications.

The Geosynthetics QAC may perform the conformance test sampling at the manufacturing plant, if approval is granted by the Project Manager. This can be advantageous in expediting the installation process for large projects.

The following conformance tests shall be performed in accordance with the test methods, as specified in the Project Specifications:

1. Density.

2. Carbon black content.

3. Carbon black dispersion.

4. Thickness.

5. Tensile characteristics.

Interface shear strength testing shall be performed in accordance with Project Specifications, at a frequency of 1 test per material type.

10.4.1 Sampling Procedures

The LGM shall select the rolls to be sampled. Samples shall be taken across the entire width of the roll and shall not include the first 3 feet of the roll. Unless otherwise specified, samples shall be 3 feet long by the roll width. The LGM shall mark the machine direction on the samples with an arrow.

Except for interface shear strength testing, samples shall be taken at a minimum rate of one per lot or one test per 100,000 ft^2 of geomembrane. A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. A lot may be designated by the LGM based on a review of the roll information, including QC documentation and manufacturing records.

10.4.2 Test Results

All conformance test results shall be reviewed and approved in writing, and the material accepted or rejected by the LGM prior to the deployment of the geomembrane. The LGM shall report any non-conformance to the Project Manager.

If a test result is in non-conformance, the material from that lot represented by the failing test should be considered out of specification and rejected. At the option of the Project Manager and at the Geosynthetics Manufacturer's expense, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when the rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out-of-specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If the additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If the additional tests fail, the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

If the Geosynthetics Manufacturer has reason to believe that failing tests may be the result of the Geosynthetics QAL conducting the tests, the Geosynthetics Manufacturer may request that the sample be re-tested by the Geosynthetics QAL with a technical representative of the Geosynthetics Manufacturer present during the testing. This re-testing shall be done at the expense of the Geosynthetics Manufacturer. The Geosynthetics Manufacturer may have the same sample re-tested at two different Owner-approved Geosynthetics QALs. If both laboratories produce passing results, the material shall be accepted; otherwise, the original Geosynthetics QAL's test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval by Project Manager.

10.5 Subgrade Preparation

10.5.1 Surface Preparation

The Earthwork Contractor shall be responsible for preparing the supporting soil for geomembrane placement. The Project Manager shall coordinate the work of the Earthwork Contractor and the Geosynthetics Installer so that the requirements of the Project Specifications and the project QAP are met.

Prior to the installation of the geomembrane, the LGM shall verify the following:

1. A qualified land surveyor has verified all lines and grades.

2. The LSM has verified that the supporting soil meets the criteria in the Project Specifications.

3. The surface to be lined has been rolled, compacted or hand-worked and is free of irregularities, protrusions, loose soil and abrupt changes in grade.

4. Sufficient leak locator probes have been installed on the surface to be lined. The leak locator probes shall be provided by the Leak Location Contractor and installed by the LGM in the locations determined by the Leak Location Contractor.

The Geosynthetics Installer shall certify, in writing, that the surface on which the geomembrane will be installed is acceptable. A certificate of acceptance shall be provided by the Geosynthetics Installer to the LGM prior to the deployment of the geomembrane in the area under construction. The LGM shall provide the Project Manager with a copy of this certificate.

After the supporting soil has been accepted by the Geosynthetics Installer, it is the Geosynthetics Installer’s responsibility to indicate to the Project Manager any change in the supporting soil condition that may require repair work. The Project Manager may consult with the LGM regarding the need for repairs. If the LGM concurs with Geosynthetics Installer, the Project Manager shall verify that the supporting soil is repaired. At any time prior to or during the geomembrane installation, the LGM shall indicate to the Project Manager any locations that may not be adequately prepared for the geomembrane.

Prior to the installation of geomembranes over GCL, the LGM shall verify the following:

1. The surface of the GCL is free of debris that may potentially damage the geomembrane.

2. The GCL has not become hydrated beyond the limits specified in the Technical Specifications.

3. Seaming and overlapping requirements of installed GCL are maintained.

10.5.2 Anchor Trench

The LGM shall verify that the anchor trench has been constructed according to the Design Drawings and Project Specifications. If the anchor trench is excavated in a clay material that is susceptible to desiccation, the amount of anchor trench open at any time shall be minimized. The LGM shall inform the Project Manager of any signs of significant desiccation associated with the anchor trench construction. The anchor trench shall be adequately drained to prevent ponding or softening of the adjacent soils while the trench is open. The anchor trench shall be backfilled and compacted as specified in the Project Specifications.

When backfilling the anchor trenches, care shall be taken to prevent any damage to the geosynthetics. A Geosynthetics QAI shall observe the backfilling operation and advise the Project Manager of any problems. Problems shall be documented by the Geosynthetics QAI in a daily report.

10.6 Geomembrane Deployment

10.6.1 Panel Nomenclature

A field panel is defined as a unit of geomembrane that is to be seamed in the field (i.e., a field panel is a roll or a portion of a roll cut in the field).

The LGM shall make certain that each field panel is given an identification code (i.e., number or letter-number) consistent with the layout plan. The identification code shall be agreed upon by the Project Manager, Geosynthetics Installer and LGM. The LGM shall establish a table or chart showing the relationship between roll numbers and field panel identification codes. The field panel identification code shall be referenced on all QA records.

The LGM shall verify that field panels are installed at the locations indicated on the Geosynthetics Installer's layout plan as approved by the Project Manager. The LGM shall record the identification code, location and date of installation of each field panel.

10.6.2 Panel Deployment Procedure

The LGM shall review the panel deployment progress of the Geosynthetics Installer (keeping in mind issues relating to wind, rain, clay liner desiccation and other site-specific conditions). The LGM shall advise the Project Manager on the compliance with the approved panel layout drawing and the suitability to the actual field conditions. Once approved, the Project Manager can authorize changes to the panel deployment procedure. The Geosynthetics QAI shall verify that the condition of the supporting soil does not change detrimentally during installation.

To protect against wind damage, a temporary hold-down (i.e., sandbagging, tires or other means as approved by the Project Manager) will be used during geomembrane installation. The selected temporary hold-down method will not damage or cause leakage on liner surfaces or other materials (i.e., clay liner). Sand used in sandbags shall be well graded and clean sand with a maximum particle size of 0.25 inches by visual inspection. The source of the sand will be approved by the Project Manager.

10.6.3 Deployment Weather Conditions

Geomembrane deployment shall not be undertaken if weather conditions will preclude material seaming following deployment (see Section 10.7.5). Ambient temperature shall be measured by the Geosynthetics QAI in the area where the panels are to be deployed. The LGM shall inform the Project Manager of any weather-related problems that may not allow geomembrane placement to proceed.

10.6.4 Method of Deployment

Before the geomembrane is handled on site, the Geosynthetics QAC shall verify that the handling equipment to be used on the site is adequate and does not pose a risk of damage to the geomembrane. During the handling, the Geosynthetics QAC shall observe and verify that the Geosynthetics Installer's personnel handle the geomembrane with care.

The Geosynthetics QAC shall verify the following:

1. Any equipment used on the liner does not damage the geomembrane by handling, excessive heat, leakage of hydrocarbons or other means.

2. The prepared surface underlying the geomembrane has not deteriorated since previous acceptance and is still acceptable immediately prior to geomembrane placement.

3. Any geosynthetic element immediately underlying the geomembrane is clean and free of debris.

4. No personnel shall smoke or wear damaging shoes while working on the geomembrane or engage in other activities that could damage the geomembrane.

5. The method used to unroll or adjust the panels does not cause excessive scratches or crimps in the geomembrane and does not damage the supporting soil.

6. The method used to deploy geomembrane panels does not adversely impact the leak locator probes installed on the approved surface to be lined.

7. The method used to place the panels minimizes wrinkles, especially differential wrinkles between adjacent panels.

8. Adequate temporary loading and/or anchoring (e.g., sand bags, tires) have been placed to prevent uplift by wind.

9. Direct contact with the geomembrane is minimized, and the geomembrane is protected by geotextiles, extra geomembrane or other suitable materials in areas where excessive traffic may be expected.

The LGM shall inform the Project Manager if the above conditions are not fulfilled.

10.6.5 Damage and Defects

Upon delivery to the site, the Geosynthetics QAC shall conduct a surface inspection of the rolls for defects and for damage. The inspection shall be conducted without unrolling the rolls unless defects or damages are found or suspected. The LGM shall advise the Project Manager, in writing, of any rolls or portions of rolls that should be rejected and removed from the site due to severe flaws and/or minor repairable flaws.

The Geosynthetics QAC shall inspect each panel after placement and prior to seaming for damage and/or defects. The LGM shall advise the Project Manager on which panels or portions of panels should be rejected, repaired or accepted. Damaged panels or portions of damaged panels that have been rejected shall be marked and removed from the work area and recorded by the Geosynthetics QAC. Repairs shall be made using procedures described in Section 10.10.

10.6.6 Writing on the Liner

The Geosynthetics Installer and the Geosynthetics QAC shall use different colored markers that are readily visible for writing on the geomembrane. The Geosynthetics Installer shall use a white marker and the Geosynthetics QAC shall use a yellow marker to write on the geomembrane. The markers used must be semipermanent and compatible with the geomembrane.

10.7 Field Seaming

10.7.1 Seam Layout

Before installation begins, the Geosynthetics Installer shall provide the Project Manager and the Geosynthetic QAC with a panel layout diagram. This diagram shall consist of a to-scale plan view of the area to be lined, the direction of slopes, the orientation of geomembrane panels, and the planned location of seams. The LGM shall review the panel layout diagram for acceptance with the project requirements and accepted state-of-practice. No panels shall be deployed or seamed until the Project Manager has reviewed and approved the Geosynthetics Installer’s panel layout diagram. In addition, panels not specifically shown on the panel layout drawing may not be used without the Project Manager’s prior approval. The Geosynthetics QAC shall use a seam numbering system compatible with the panel numbering system.

In general, seams should be oriented parallel to the line of maximum slope (i.e., oriented along, not across, the slope). In corners and odd-shaped geometric locations, the number of seams should be minimized. No horizontal seam should be less than 5 feet from the toe of the slope or from areas of potential stress concentrations, unless otherwise authorized by the Project Manager.

10.7.2 Accepted Seaming Methods

Approved processes for field seaming are extrusion welding and fusion welding. Proposed alternate processes shall be documented and submitted by the Geosynthetics Installer to the Project Manager for approval. Apparatus that have been specifically approved by make and model shall be used. The Project Manager shall submit documentation regarding the seaming methods to be used to the LGM for review.

Temporary bonding by leistering shall be performed in accordance with Appendix E, Leister Bond Procedures.

10.7.2.1 Extrusion Process

The Geosynthetics QAC shall log ambient temperature, seaming apparatus temperature and geomembrane surface temperature at appropriate intervals and report any non-compliance to the Project Manager.

The Geosynthetics QAC shall verify the following items:

1. Equipment used for seaming is not likely to damage the geomembrane.

2. Prior to beginning a seam, the extruder is purged until all heat-degraded extrudate has been removed from the barrel.

3. Clean and dry welding rods or extrudate pellets are used.

4. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane.

5. Grinding shall be completed no more than 1 hour prior to seaming.

6. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage such that no damage occurs to the geomembrane.

7. The geomembrane is protected from damage in heavy traffic areas.

8. Exposed grinding marks adjacent to an extrusion weld shall be minimized. In no instance shall exposed grinding marks extend more than ¼ inch from the finished seamed area.

9. In general, the geomembrane panels are aligned to have a nominal overlap of 3 inches (715 millimeters) for extrusion welding. The final overlap shall be sufficient to allow peel tests to be performed on the seam.

10. No solvent or adhesive is used.

The procedure used to temporarily bond adjacent panels together does not damage the geomembrane. The temperature of hot air at the nozzle or any temporary welding apparatus is controlled such that the geomembrane is not damaged.

10.7.2.2 Fusion Process

The Geosynthetics QAC shall log ambient temperature, seaming apparatus temperature and geomembrane surface temperature at appropriate intervals and report any non-compliance to the Project Manager.

The Geosynthetics QAC shall also verify the following:

1. Equipment used for seaming is not likely to damage the geomembrane.

2. For cross-seams, the edge of the cross-seam is ground to an incline prior to welding.

3. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane.

4. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage such that no damage occurs.

5. The geomembrane is protected from damage in heavy traffic areas.

6. In general, the geomembrane panels are aligned to have a nominal overlap of 5 inches for fusion welding. The final overlap shall be sufficient to allow peel tests to be performed on the seam.

7. No solvent or adhesive is used.

10.7.3 Seam Preparation

The Geosynthetics QAC shall verify that, prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris or foreign material of any kind. If seam overlap grinding is required, the Geosynthetics QAC must make certain that the process is completed according to the Manufacturer's instructions within 1 hour of the seaming operation and in a manner that does not damage the geomembrane. The Geosynthetics QAC shall also verify that seams are aligned with the fewest possible number of wrinkles and "fishmouths."

10.7.4 Trial Seams

Trial seams shall be made on scraps of the geomembrane liner to be seamed to verify that conditions are adequate for production seaming. Such trial seams shall be made at the beginning of each seaming period, and at least once every 5 hours for each production seaming apparatus/seamer combination to be used that day. Trial seams shall be made under the same conditions as actual seams.

The trial seam sample shall be at least 5 feet long by 1 foot wide (after seaming), with the seam centered lengthwise. Seam overlap shall be as required for production seams.

Two specimens shall be cut from the trial seam with a 1-inch-wide die by the Geosynthetics Installer at locations selected randomly by the Geosynthetics QAC. The specimens shall be tested in peel using a field tensiometer as described in Section 10.9.5. If a specimen fails, the entire operation shall be repeated. If the additional specimen fails, the seaming apparatus and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial seams are achieved. The Geosynthetics QAC shall observe all trial seam procedures.

The remainder of the successful trial seam sample shall be cut into three pieces and distributed as follows:

- One to the Project Manager;
- One to the Geosynthetics Installer; and

- One to the Geosynthetics QAC for possible laboratory testing.

Each portion of the sample shall be assigned a number and marked accordingly by the Geosynthetics QAC. The Geosynthetics QAC shall also log the date, hour, ambient temperature, number of seaming unit, name of seamer and pass or fail description.

If agreed upon between the Project Manager and the LGM and documented by the LGM in a daily report, the remaining portion of the trial seam sample can be subjected to destructive testing as indicated in Section 10.9.6. If a trial seam fails a test conducted by the Geosynthetics QAL, then a destructive seam test sample shall be taken from each seam completed by a combination of the production seaming apparatus and seamer related to the subject trial seam. These samples shall be forwarded to the Geosynthetics QAL for testing in accordance with Section 10.9.6 and, if they fail the tests, the procedures indicated in Section 10.9.7 shall apply. The conditions of this paragraph shall be considered satisfied for a given seam if a destructive seam test sample has already been taken.

10.7.5 Seaming Procedures

The Geosynthetics QAC shall verify that the seaming conditions, including weather conditions and seam preparation, meet the Project Specifications. The LGM shall notify the Project Manager, in writing, if the Project Specifications are not met. Ambient temperature shall be measured by the Geosynthetics QAC in the area where the panels are to be placed. The Project Manager will decide if the installation is to be stopped or if special procedures will be used.

Trial seaming, as described in Section 10.7.4, shall be conducted under the same ambient temperature conditions as the actual production seams. The LGM may recommend more frequent destructive tests to the Project Manager, as described in Section 10.9, for any suspect areas.

10.8 Non-Destructive Seam Testing

10.8.1 Concept

The purpose of non-destructive tests is to check the continuity of the seams. It does not provide quantitative information on the seam strength. The Geosynthetics Installer shall non-destructively test all field seams over the full length using a vacuum test unit, air pressure test for double-fusion seams only, or another method approved by the

Project Manager. Non-destructive testing shall be conducted in accordance with the Project Specifications as the seaming work progresses – not at the completion of all field seaming.

For all seams, the Geosynthetics QAC shall perform the following:

1. Observe non-destructive testing procedures.

2. Record location, data, test unit number, name of tester and outcome of all testing.

3. Visually inspect all tests.

4. Inform the Installer and Project Manager of any required repairs.

Any seams that cannot be non-destructively tested shall be cap-stripped with the same geomembrane material. The Geosynthetics QAC and Geosynthetics Installer shall inspect the completed cap-stripping operation for uniformity and completeness.

The spark test method may be used for non-destructive testing of extrusion welds associated with penetrations (e.g., HDPE pipe boots) or other areas where access is limited, as approved by the Project Manager.

10.8.2 Test Failure Procedures

The Geosynthetics Installer shall complete any required repairs in accordance with Section 10.10. For repairs, the Geosynthetics QAC shall perform the following:

1. Observe the repair and testing of the repair.

2. Mark on the geomembrane that the repair has been approved.

3. Document the repair procedures and test results.

10.9 Destructive Seam Testing

10.9.1 Concept

The purpose of destructive seam testing is to evaluate seam strength. Destructive seam tests shall be performed at locations selected by the Geosynthetics QAC, in accordance with the Project Specifications. Seam strength testing shall be done as the seaming work progresses – not at the completion of all field seaming.

10.9.2 Location and Frequency

The Geosynthetics QAC shall select locations where seam samples will be cut out for laboratory testing. The Geosynthetics Installer shall not be informed in advance of the locations where the seam samples will be taken. The seam sample locations shall be established as follows:

1. A minimum frequency of one test location per 500 feet of seam length performed by each welder. This minimum frequency is to be determined as an average taken throughout the entire facility. In the event a specific welder is used on a given day for minimal seaming activities (minimal shall be defined as less than 100 feet of seaming), the Geosynthetics QAC may use the welders trial weld (discussed in Section 10.7.4 above) as a representative destructive sample for that day.

2. Test locations shall be determined during seaming at the Geosynthetics QAC's discretion and may be influenced by suspicion of overheating, contamination, off-set welds or any other potential cause of unacceptable welding.

10.9.3 Sampling Procedures

Samples shall be cut by the Geosynthetics Installer at locations chosen by the Geosynthetics QAC as the seaming progresses, following the completion of non-destructive testing. This will allow the laboratory test results to be available prior to covering the geomembrane with another material. The Geosynthetics QAC shall perform the following:

1. Observe sample cutting.

2. Assign a number to each sample and mark it accordingly.

3. Record the sample location on layout drawing.

4. Record the reason for taking the sample at this location (e.g., statistical routine, suspicious weld).

5. Examine samples for holes, grooves, melt-through, wavering welds, unusual weld width and any other unusual characteristics.

All holes in the geomembrane resulting from destructive seam sampling shall be immediately repaired in accordance with repair procedures described in Section 10.10.3. The continuity of the new seams in the repaired area shall be tested according to Section 10.8.

10.9.4 Sample Dimensions

At each sampling location, two types of samples shall be taken by the Geosynthetics Installer. First, two samples will be collected for field testing by the Geosynthetics Installer. Each of the samples shall be cut with a 1-inch-wide die, with the seam centered parallel to the width. The distance between the two samples shall be 42 inches. If both samples pass the field test described in Section 10.9.5, a sample for laboratory testing shall be collected.

The sample for laboratory testing shall be located between the samples for field testing. The sample for laboratory testing shall be 12 inches wide by 42 inches long, with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:

1. One portion to the Geosynthetics Installer for optional laboratory testing (12 inches by 12 inches);

2. One portion for Geosynthetics QAL testing (12 inches by 18 inches); and

3. One portion to the Project Manager (12 inches by 12 inches).

Final determination of the samples sizes shall be made at the pre-construction meeting.

10.9.5 Field Testing

As mentioned in Section 10.9.4 and 10.7.4, the two 1-inch-wide strips shall be tested in the field using a tensiometer for peel adhesion and shall not fail according to the criteria in the Project Specifications. The tensiometer shall be capable of maintaining a constant jaw separation rate of 2 inches per minute. If the test passes in accordance with this section, the sample qualifies for testing in the laboratory. If it fails, the seam should be repaired in accordance with Section 10.10. Alternately, the Geosynthetics Installer may elect to collect additional destructive seam samples on both sides of the original sample and test them in an effort to bound the area. The alternate procedure shall be as per Section 10.9.7. Final judgment regarding seam acceptability, based on the failure criteria, is the responsibility of the LGM.

The Geosynthetics QAC shall observe all field tests and mark all samples and portions with their number. The Geosynthetics QAC shall also log the date, time, ambient temperature, number of seaming unit, name of seamer, welding apparatus temperatures and pressures and pass or fail description. A copy of this information shall be attached to each sample portion.

10.9.6 Laboratory Testing

Destructive test samples provided by the Geosynthetics Installer to the Geosynthetics QAC shall be packaged and shipped, if necessary, under the responsibility of the Geosynthetics QAC in a manner that will not damage the test sample. The sample shall be shipped as soon as possible to expedite laboratory testing by the Geosynthetics QAL. The Project Manager shall be responsible for storing archive samples.

Testing shall include “Seam Shear Strength and Peel Adhesion.” These terms, as well as with minimum acceptable values, shall be defined in the Project Specifications. At least five specimens shall be tested in both shear and peel. Specimens shall be selected alternately by test from the samples (e.g., peel, shear, peel and shear). A passing test shall meet the minimum acceptable values in at least four of the five specimens tested for each method.

The Geosynthetics QAL shall provide verbal test results within 24 hours of receipt of the sample. The LGM shall review laboratory test results as soon as the results become available and make appropriate recommendations to the Project Manager.

10.9.7 Destructive Test Failure Procedures

The following procedures shall apply when a sample fails a destructive test, whether that test is conducted by the Geosynthetics QAL or by field tensiometer. The Geosynthetics Installer has two options:

1. The Geosynthetics Installer can repair the seam between any two passing destructive test locations; or

2. The Geosynthetics Installer can trace the welding path to an intermediate location, a minimum of 10 feet from the point of the failed test in each direction, and take a sample with a 1-inch-wide die for an additional field test at each location. If these additional samples pass the test, full laboratory samples are taken. If the laboratory samples pass the tests, the seam is repaired between these locations. If either sample fails, the process is repeated to establish the zone in which the seam should be repaired.

All acceptable repaired seams shall be bound by two locations from which samples passing laboratory destructive tests have been taken. Passing laboratory destructive tests, taken as indicated in Section 10.9, may be used as a boundary for the failing seam. In cases exceeding 150 feet of repaired seam, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Section 10.10.3.

The Geosynthetics QAC shall document all actions taken in conjunction with destructive test failures. No installation of material above the HDPE geomembrane shall be done until destructive testing for that section is completed and accepted by the Geosynthetics QAC and test results are delivered to the NYSDEC monitor.

10.10 Defects and Repairs

10.10.1 Identification

All seams and non-seam areas of the geomembrane shall be examined by the Geosynthetics QAC for identification of defects, holes, blisters, undispersed raw materials and any sign of contamination by foreign matter. Light reflection by the geomembrane helps to detect defects. The surface of the geomembrane shall be clean at the time of examination. The geomembrane surface shall be cleaned by the

Geosynthetics Installer if the Geosynthetics QAC determines that the amount of dust or mud inhibits examination.

10.10.2 Evaluation

Each suspect location (seam and non-seam areas) shall be non-destructively tested using the methods described in Section 10.8. Each location that fails the non-destructive testing shall be marked by the Geosynthetics QAC and repaired by the Geosynthetics Installer. All defects found during testing shall be numbered and marked immediately after detection. Work shall not proceed with any materials that will cover locations that have been repaired until appropriate non-destructive and laboratory test results with passing values are available.

10.10.3 Repair Procedures

Any portion of the geomembrane exhibiting a major flaw or failing a destructive or non-destructive test shall be repaired in accordance with the Project Specifications. The Project Manager, Geosynthetics Installer and LGM shall be in agreement on the final decision as to the appropriate repair method.

1. The repair procedures available include the following:

   a. *Patching*: used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.

   b. *Patching*: used to repair small tears, pinholes or other minor, localized flaws.

   c. *Capping*: used to repair large lengths of failed seams.

   d. Removing bad seam and replacing with a strip of new material welded into place.

2. For any repair method, the following provisions shall be satisfied:

   a. Surfaces of the geomembrane that are to be repaired using extrusion methods shall be ground no more than 1 hour prior to the repair.

   b. All surfaces shall be clean and dry at the time of the repair.

c. All seaming equipment used in repairing procedures shall meet the requirements of the project QAP.

d. Extrusion welding the flap of a failed fusion weld shall not be accepted.

e. Patches or caps shall be of the same geomembrane thickness and extend at least 6 inches beyond the edge of the defect. All corners of patches shall be rounded, with a radius of approximately 3 inches.

f. Extrusion welding (i.e., “beads”) shall be used to repair very small tears, pin holes, punctures or other minor, localized flaws (less than or equal to 1/16 of 1 inch in greatest dimension).

10.10.4 Repair Verification

Each repair shall be non-destructively tested using the methods described in Section 10.8, as appropriate. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair. The Geosynthetics QAC shall observe all non-destructive testing of repairs and shall record the number of each repair, date and test outcome. Repairs more than 150 feet long require destructive test sampling at the discretion of the LGM. Failed tests indicate that the repair shall be redone and retested until a passing test results.

10.10.5 Large Wrinkles

When seaming of the geomembrane is completed, but prior to placing overlying materials, the LGM shall indicate to the Project Manager which wrinkles should be cut and re-seamed by the Geosynthetics Installer. The LGM shall also indicate to the Project Manager which areas are in tension (bridging or trampoline effect) and should be cut and repaired by the Geosynthetics Installer. The number of wrinkles and trampolines to be repaired should be kept to an absolute minimum. Therefore, wrinkles and trampolines should be located during the coldest part of the installation period while keeping in mind the forecasted weather to which the uncovered geomembrane may be exposed. Wrinkles are considered to be large when the geomembrane can be folded over onto itself. This is generally the case for a wrinkle that extends 12 inches from the subgrade. Trampolines are considered for repair when the geomembrane is 9 inches above the subgrade. Seams produced while repairing wrinkles or trampolines shall be tested as outlined in Section 10.10.4.

When placing overlying material on the geomembrane, every effort must be made to minimize wrinkle development. If possible, cover should be placed during the coolest periods of weather. In addition, small wrinkles should be isolated and covered as quickly as possible to prevent growth of that wrinkle. The placement of cover materials shall be observed by the Geosynthetics QAC to determine that wrinkle formation is minimized.

10.11 Electrical Resistivity Leak Testing

A geomembrane leak location survey shall be conducted on the secondary and primary geomembrane layers of the landfill cell baseliner system. For the landfill cell baseliner system, testing shall be conducted after the secondary granular drainage layer is placed for the secondary liner system and after the soil operations layer is completely placed over the primary geomembrane liner in the floor area of the landfill cells. If the sideslope area is only partially covered with the soil operations layer, then the leak location survey shall extend to the edge of the soil operations layer for the primary liner leak location survey. The Earthwork Contractor shall leave a small strip (3 to 5 feet wide) of soil operations layer uncompleted at the top of the sideslopes and tie-in areas to provide electrical isolation of the liner system. Completion of the soil operations layer placement will follow successful completion of the leak location survey.

The Geosynthetic Installer shall install, if applicable and at the direction of the Leak Location Contractor, at least two permanent electrodes in the soil liner or GCL located directly beneath the secondary and primary geomembrane liner layers during construction of the landfill baseliner system. The Earthwork Contractor shall prepare the liner for the leak location survey by ensuring that a minimum of 1 foot and maximum of 3 feet of the secondary and primary geomembrane layers are continuously exposed around the edge of the landfill cell for each test, including removal of a portion of the access ramp(s) to the operations layer.

The Geosynthetic Installer shall supply an AC power source for the leak location survey (110 volts, 5A).

For the landfill baseliner system, the Earthwork Contractor shall supply two supervised laborers with equipment to help lay out the survey string lines and apply water to the survey area if the operations layer is dry. Approximately 1 to 2% by weight of water is required in the earth materials located above the geomembrane liner. The Leak Location Contractor shall survey the established grid on the floor of the cell and mark any potential leaks identified by the survey with paint and/or flagging. The Geosynthetics Installer shall expose all potential leaks identified by the Leak Location Contractor and repair all identified leaks in accordance with repair requirements included in Section 10.10 above and the Technical Specifications. Following repair activities of identified leaks, the repaired areas shall be re-surveyed by the Leak Location Contractor.

10.12 Geomembrane Protection

The QA procedures indicated in this section are intended only to prevent damage to the geomembrane during the installation of adjacent materials. No installation of materials above the geomembrane shall proceed until all geomembrane testing has been completed for that segment. The QA of the adjacent materials is covered in other sections of this manual.

10.12.1 Soils

A copy of the specifications prepared by the Engineer for placement of soils shall be given to the LGM by the Project Manager. The LGM shall verify that these specifications are consistent with the current state-of-practice and are as follows:

1. Placement of soils on the geomembrane shall not proceed at an ambient temperature less than 32 degrees Fahrenheit (°F) or greater than 104°F, unless written approval is obtained from Project Manager.

2. Placement of soil on the geomembrane should be done during the coolest part of the day to minimize the development of wrinkles in the geomembrane.

3. A geotextile or other cushion approved by the Engineer is generally required between aggregate and the geomembrane.

4. Equipment used for placing soil shall not be driven directly on the geomembrane.

5. A minimum thickness of 1 foot of soil is required between light equipment, with ground pressures of 5 pounds per square inch (psi) or lighter, and the geomembrane.

6. In any areas traversed by vehicles other than low-ground-pressure vehicles approved by the Project Manager, the soil layer shall have a minimum thickness of 3 feet. This requirement may be waived if provisions are made to protect the geomembrane through an engineered design. Drivers shall proceed with caution when on the overlying soil and prevent spinning of tires or sharp turns. In the event that the QAC believes that underlying geosynthetics may have incurred damage due to “rutting” or excessive traffic on overlying soils, the Earthwork Installer shall expose the geosynthetic materials in the area in question for inspection by the QAC.

The Soil QAC shall measure soil thickness and verify that the required thicknesses are present. The Geosynthetics QAC must also verify that placement of the soil is done in such a manner that geomembrane is not damaged. The LGM shall inform the Project Manager if the above conditions are not fulfilled.

10.12.2 Concrete

A copy of the specifications prepared by the Engineer for placement of concrete shall be given by the Project Manager to the Geosynthetics QAC. The Geosynthetics QAC shall verify that the specifications are consistent with the state-of-practice, including the use of geosynthetic layers between concrete and geomembrane. The Geosynthetics QAC shall verify that geosynthetic layers are placed between the concrete and the geomembrane according to design specifications. The Geosynthetics QAC will also verify that construction methods used did not damage the geomembrane.

10.12.3 Sumps and Appurtenances

A copy of the plans and specifications prepared by the Engineer for sumps and appurtenances shall be given by the Project Manager to the Geosynthetics QAC. The Geosynthetics QAC shall review these plans and verify the following:

1. Installation of the geomembrane in sump and appurtenant areas and connection of geomembrane to sumps and appurtenances are made according to specifications.

2. Extreme care is taken while welding around appurtenances since neither non-destructive nor destructive testing may be feasible in these areas.

3. The geomembrane is been visibly damaged while making connections to sumps and appurtenances.

4. A representative of the Geosynthetics QAC is present at all times when the installer is welding geomembrane to appurtenant structures.

The Geosynthetics QAC shall inform the Project Manager, in writing, if the above conditions are not fulfilled.

11. Geotextiles

11.1 Definitions and Applicability

Geotextiles are used in the cushioning and filtering applications of lining systems. This section does not describe procedures for other applications (i.e., erosion control or reinforcement). This section is applicable to non-woven geotextiles made of polyester or polypropylene and is not applicable to non-woven geotextiles made of other materials or woven geotextiles.

11.2 Manufacturing and Plant Inspection

The purpose of the plant inspection is to review the manufacturing process and QC procedures. The Owner may conduct a periodic inspection of the Manufacturer's plant. In addition, the Project Manager or the designated representative may visit the manufacturing plant for a project-specific inspection, if deemed necessary. If possible, the project-specific inspection shall be prior to or during the manufacturing of the geotextile rolls for the project.

The manufacturing plant inspection shall include the following:

1. Verification that those properties guaranteed by the Manufacturer meet all Project Specifications.

2. Verification that the measurement of properties by the Manufacturer is properly documented and that test methods used are acceptable.

3. Spot inspection of the rolls and verification that the rolls are free of imperfections or any sign of contamination by foreign matter.

4. Review of packaging, handling, storage and transportation procedures and verification that these procedures will not damage the geotextile.

5. Verification that roll packages have a label indicating the name of the manufacturer, type of geotextile, thickness, roll number and roll dimensions.

6. Verification that the geotextiles are inspected continuously for the presence of needles, using a metal detector.

A report describing the inspection will be retained by the Owner for periodic inspections and by the Project Manager for project-specific inspections.

11.3 Quality Control Documentation

Prior to the installation of any geotextile, the Geosynthetics Manufacturer or Geosynthetics Installer shall provide the Project Manager with the following information:

1. The origin (i.e., resin supplier's name and resin production plant) and identification (i.e., brand name and number) of the resin used to manufacture the geotextile.

2. Copies of dated QC certificates issued by the resin supplier.

3. The Manufacturer's test reports that verify that the resin used to manufacture the geotextile meets the Manufacturer's resin specifications.

4. The Manufacturer QC test reports that verify that the geotextile manufactured for the project meets the Project Specifications.

5. Documentation that less than or equal to 2% of the resin was from reclaimed polymer during manufacturing and was done with the appropriate cleanliness.

6. A list of the materials that comprise the geotextile expressed in the following categories as percent by weight: base polymer, carbon black and other additives.

7. A geotextile specification that includes all properties published by the Manufacturer and measured using the appropriate test methods.

8. Written certification that the minimum roll values given in the specification are guaranteed by the Manufacturer.

9. Written certification that the Manufacturer has continuously inspected the geotextile for the presence of needles and has found the geotextile to be needle-free.

10. QC certificates signed by a responsible party employed by the Manufacturer. The QC certificates shall include roll identification numbers, testing procedures and results of QC tests. At a minimum, results shall be given in accordance with the methods indicated in the Project Specifications for the following:

    a. Mass per unit area;

    b. Grab strength;

    c. Trapezoidal tear strength;

    d. Puncture strength;

    e. Ultraviolet stability;

    f. Apparent opening size; and

    g. Permitivity.

QC tests shall be performed once for every 100,000 ft^2 of geotextile produced (minimum). Manufacturer QC certificates that include roll testing procedures and results of QC tests are required for all QC tests.

The Manufacturer shall identify all rolls of geotextiles with the following:

1. Manufacturer's name.

2. Product identification.

3. Roll number.

4. Roll dimensions.

5. Special instructions, when required (e.g., "this side up").

The LGM shall review these documents and approve them in writing and shall report any discrepancies with the above requirements to the Project Manager. The LGM shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable.

3. QC certificates have been provided at the specified frequency for all rolls and that each certificate identifies the rolls related to it.

4. Roll packages are appropriately labeled.

5. Certified minimum roll properties meet the Project Specifications.

6. Project Specifications were submitted by the Project Manager to the Geosynthetics Installer.

7. Certification has been provided that less than 2% reclaimed polymer has been added.

11.4 Conformance Testing

The Geosynthetics QAC shall make sure that conformance test samples are obtained from the geotextile materials manufactured for RMU-2. Conformance test samples may be either collected by the Geosynthetics QAC from material delivered to the site or collected by representatives of the Geosynthetics QAL, under the direction of the Geosynthetics QAC, from material at the manufacturer's facility. The samples shall be forwarded to the Geosynthetics QAL for testing to determine conformance with the Project Specifications.

Depending on the particular geotextile being tested and its intended application for the project, the following conformance tests shall be performed in accordance with the test methods specified in the Project Specifications on geotextiles:

1. Mass per unit area.

2. Grab strength.

3. Trapezoidal tear strength.

4. Puncture strength.

5. Apparent opening size.

6. Permitivity.

Refer to Project Specifications for required conformance testing for a given geotextile application.

11.4.1 Sampling Procedures

The rolls to be sampled shall be selected by the Geosynthetics QAC. Samples shall be taken across the entire width of the roll and shall not include the first complete revolution of fabric on the roll. Samples shall not be taken from any portion of a roll that has been subjected to excess pressure or stretching. Unless otherwise specified, samples shall be 3 feet long by the roll width. The Geosynthetics QAC shall mark the machine direction on the samples with an arrow.

Geotextile shall be sampled at a rate of one per lot, or at a minimum of one conformance test per 100,000 ft^2. A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. Alternatively, a lot may be designated by the Geosynthetics QAC based on a review of all roll information, including QC documentation and manufacturing records. All lots of material and the particular test sample that represent each lot should be defined before the samples are taken.

11.4.2 Test Results

All conformance test results shall be reviewed, and the material shall be accepted or rejected by the LGM prior to the deployment of the geotextile. The LGM shall examine the results from laboratory conformance testing and shall report any non-conformance to the Project Manager. The LGM shall be responsible for checking that all test results meet or exceed the property values listed in the Project Specifications. Materials that are in non-compliance shall be rejected.

If the Geosynthetics Manufacturer has reason to believe that failing tests may be the result of the Geosynthetics QAL incorrectly conducting the tests, the Geosynthetics Manufacturer may request that the sample in question be re-tested by the Geosynthetics QAL with a technical representative of the Geosynthetics Manufacturer present during the testing. The re-testing shall be done at the expense of the Geosynthetics Manufacturer. Alternatively, the Geosynthetics Manufacturer may have the same sample re-tested at two different Owner-approved Geosynthetics QALs at the expense of the Geosynthetics Manufacturer. If both laboratories produce a passing result, the material shall be accepted. If both laboratories do not produce a passing result, the original Geosynthetics QAL's test results shall be accepted. The use of these procedures is subject to the approval of the Project Manager.

If a test result is in non-conformance, all material from the lot represented by the failing test should be considered out of specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification. (Note that this procedure is valid only when rolls in the lot are consecutively produced and numbered from one manufacturing line.) To isolate the out-of-specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If additional test results are passing, the roll represented by the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional test results are failing, the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the specified lot.

11.5 Geotextile Deployment

During geotextile shipment and storage, the geotextile shall be protected from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, cutting or any other damaging conditions. Geotextile rolls shall be shipped and stored in opaque and watertight wrappings. Wrappings shall be removed shortly before deployment.

The Geosynthetics QAC shall observe rolls upon delivery to the site, and any deviation from the above requirements shall be reported to the Project Manager.

The Geosynthetics Installer shall handle all geotextiles in a manner as to make certain the geotextile is not damaged in any way, and the following items shall be complied with:

1. On slopes, the geotextiles shall be securely anchored and rolled down the slope in a manner as to continually keep tension on the geotextile sheet.

2. All geotextiles shall be temporarily weighted with sandbags or the equivalent to prevent wind damage. Temporary weights shall be installed during deployment and shall remain until replaced with cover material.

3. Geotextiles shall be cut using a geotextile cutter (i.e., hook blade) only. Care shall be taken to protect other materials from damage that could be caused by the cutting of the geotextiles.

4. The Geosynthetics Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geotextile.

5. During placement of geotextiles, care shall be taken not to entrap in or beneath the geotextile the following that could damage the geotextile or hamper subsequent seaming:

   a. Stones;

   b. Excessive dust;

   c. Surface runoff; or

   d. Moisture.

6. After installation, a visual inspection of the geotextile shall be performed over the entire surface to determine that no potentially harmful foreign objects (e.g., needles) are present.

7. Geotextile shall be placed and anchored in the manner and locations shown on the drawings. The Project Manager shall approve any modifications to geotextile placement requirements.

8. The geotextile shall be protected at all times during construction from contamination by surface runoff (silt and sediment control) and any geotextile so contaminated shall be removed and replaced with uncontaminated geotextile.

The Geosynthetics QAC shall record any non-compliance and report it to the Project Manager.

11.6 Seaming Procedures

The Geosynthetics QAC shall make certain that geotextile seaming is performed in accordance with the Project Specifications. Securing pins will not be used in geotextile installation. Sewing shall be done using polymeric thread with chemical and ultraviolet light-resistance properties that equal or exceed those of the geotextile. Sewing shall be done using the machinery and stitch types specified in the Project Specifications or as approved, in writing, by the Project Manager and the LGM.

As an option, the geotextile may be overlapped and heat-leistered in limited areas that are approved by the LGM, the Project Manager and the NYSDEC. When the Geosynthetics Installer has demonstrated that sewing is not feasible based on the field conditions, an alternate method will be used to overlap the existing geotextile onto the new geotextile a minimum of 12 inches and continuously heat-leister the two pieces together. If any burn holes are detected, the burn hole will be patched with a minimum 12 inches of overlap and continuously heat-leistered.

11.7 Defects and Repairs

Any holes or tears in the geotextile shall be repaired as follows:

1. On slopes greater than 10 horizontal (H):1 vertical (V), a patch made from the same geotextile shall be sewn into place in accordance with the Project Specifications. If any tear exceeds 10% of the width of the roll, the roll shall be removed from the slope and replaced.

2. On slopes equal to or less than 10H:1V, a patch made from the same geotextile shall be continuously heat-leistered or sewn into place with a minimum overlap of 12 inches in all directions.

The Geosynthetics QAC shall observe all repairs and report any non-compliance with the above requirements in writing to the Project Manager.

11.8 Geotextile Protection

All materials located on top of a geotextile shall be deployed in a manner as to make certain the following:

1. The geotextile and underlying lining materials are not damaged.

2. Minimal slippage of the geotextile on underlying layer occurs.

3. No excess tensile stresses occur in the geotextile.

Granular materials shall be placed on geotextiles in the prepared area. During placement, a minimum depth of 1 foot of granular material shall be maintained at all times between the fabric and placement equipment. All equipment used in spreading or traveling on the 1 foot granular material layer shall exert a pressure of less than 63 psi to the underlying geotextile using a 2H:1V stress distribution. Dozer blades and other equipment shall not make direct contact with the fabric. However, if a tear occurs in the fabric during spreading operations, the granular material shall be cleared from the fabric and the damage area repaired as described in Section 11.7.

Large fabric wrinkles that may develop during the spreading operations shall be folded and flattened in the direction of the spreading.

Any non-compliance shall be recorded by the Geosynthetics QAC and reported to the Project Manager.

12. Geocomposites

12.1 Definition and Applicability

Geocomposites are materials used as drainage and filter media in lining systems. This section is applicable to drainage geocomposites made of non-woven geotextiles (i.e., polyester or polypropylene) heat-bonded to a HDPE geonet (single or double-sided). This section is not applicable to composites made with other components.

12.2 Manufacturing Plant Inspection

The purpose of the geocomposite manufacturing plant inspection is to review the manufacturing process and QC procedures. The Owner may conduct a periodic inspection of the geocomposite Manufacturer's plant. In addition, the Project Manager or the designated representative may visit the manufacturing plant for a project-specific inspection, if deemed necessary. If possible, the project-specific inspection shall be prior to or during the manufacturing of the geocomposite rolls for the project.

The manufacturing plant inspection shall include the following:

1. Verification that the proper QC documentation has been received by the Geocomposite Manufacturer from the individual component manufacturers (geonet and geotextile).

2. Verification that those properties guaranteed by the Manufacturer meet all Project Specifications.

3. Verification that the measurement of properties by the Manufacturer is properly documented and test methods used are acceptable.

4. Spot inspection of rolls and verification that the rolls are free of imperfections or contamination by foreign matter.

5. Review of packaging, handling, storage and transportation procedures and verification that the procedures will not damage the geocomposite.

6. Verification that roll packages have a label indicating the name of the manufacturer, type of geocomposite, roll number and roll dimensions.

A report describing the inspection will be retained by the Owner for periodic inspections and by the Project Manager for project-specific inspections.

12.3 Quality Control Documentation

Prior to the installation of any geocomposite, the Geosynthetics Manufacturer or Geosynthetics Installer shall provide the Project Manager with the following information:

1. The origin (i.e., supplier's name and production plant) and identification (i.e., brand name and number) of the geotextile and geonet used to fabricate the geocomposite.

2. Copies of dated QC certificates issued by the geotextile and geonet supplier.

3. Certificates that contain the results of QC tests performed on the geocomposite components as outlined in the Project Specifications.

4. A geocomposite specification that includes all properties published by the Manufacturer, measured using the appropriate test methods.

5. Written certification that the minimum roll values given in the specification are guaranteed by the Manufacturer.

6. QC certificates for the geocomposite signed by a responsible party employed by the Manufacturer. The QC certificates shall include roll identification numbers, testing procedures and results of QC tests. At a minimum, results shall be given for the following:

   a. Mass per unit area;

   b. Thickness;

   c. Geotextile-geonet adhesion; and

   d. Transmissivity testing.

QC tests shall be performed in accordance with the Project Specifications for every 40,000 ft^2 (at a minimum), except that transmissivity testing shall be performed for every 100,000 ft^2 (at a minimum) of geocomposite produced.

The Geosynthetics Manufacturer shall identify all rolls of geocomposite with the following:

1. Manufacturer's name.
2. Product identification.
3. Roll number.
4. Roll dimensions.

The LGM shall review the documents and approve all documentation in writing. The LGM shall report any discrepancies with the above requirements to the Project Manager. The LGM shall verify the following:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.
2. Measurements of properties by the Manufacturer are properly documented, and the test methods used are acceptable.
3. QC certificates have been provided at the specified frequency for the rolls, and each certificate identifies the rolls related to it.
4. Roll packages are appropriately labeled.
5. Certified minimum roll properties meet the Project Specifications.
6. The Project Manager has submitted the Project Specifications to the Geosynthetics Installer.

12.4 Conformance Testing

The Geosynthetics QAC shall verify that conformance test samples are obtained for the geocomposite materials manufactured for RMU-2. Conformance test samples may be either collected by the Geosynthetics QAC from material delivered to the site or collected by representatives of the Geosynthetics QAL, under the direction of the Geosynthetics QAC, from material at the manufacturer's facility. The samples shall be forwarded to the Geosynthetics QAL for testing to verify conformance with the Project Specifications.

At a minimum, the following conformance tests shall be performed on geocomposites in accordance with the methods identified in the Project Specifications:

1. Density (geonet component only).
2. Thickness (geonet component only).
3. Melt Index (geonet component only).
4. Carbon Black Content (geonet component only).
5. Geotextile-geonet adhesion (geocomposite).
6. Tensile Strength (geocomposite).
7. Transmissivity (geocomposite).

Additional conformance tests may be required by the Project Specifications.

12.4.1 Sampling Procedures

The rolls to be sampled shall be selected by the Geosynthetics QAC. Samples shall not be taken from any portion of a roll that has been damaged. Unless otherwise specified, samples shall be 3 feet long by the roll width. The machine direction shall be marked on the conformance samples with an arrow. All lots of material and the particular test sample that represents each lot should be defined before the samples are taken.

Samples for conformance testing shall be taken at a rate of one per lot, or at a minimum of one per 100,000 ft^2 of geocomposite. A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. Also, a lot may be designated by the Geosynthetics QAC based on a review of the roll information, including QC documentation and manufacturing records.

12.4.2 Test Results

All conformance test results shall be reviewed, and the material shall be accepted or rejected by the LGM prior to the deployment of the geocomposite. The LGM shall be responsible for verifying that all test results meet or exceed the property values listed in the Project Specifications.

If the Geosynthetics Manufacturer has reason to believe that failing tests may be the result of the Geosynthetics QAL incorrectly conducting the tests, the Geosynthetics Manufacturer may request that the sample in question be re-tested by the Geosynthetics QAL with a technical representative of the Geosynthetics Manufacturer present during the testing. This re-testing shall be done at the expense of the Geosynthetics Manufacturer. Alternatively, the Geosynthetics Manufacturer may have the same sample re-tested at two different Owner-approved Geosynthetics QALs at the expense of the Geosynthetics Manufacturer. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, the original Geosynthetics QAL's test results shall be accepted. The use of the procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in non-conformance, all material from the lot represented by the failing test should be considered out-of-specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification. (Note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line.) To isolate the out-of-specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If the additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (i.e., next larger roll number) shall be rejected. If one or both of the additional tests fail, the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

12.5 Geocomposite Deployment

During shipment and storage, the geocomposite shall be protected from ultraviolet light exposure, moisture, mud, dirt, dust, puncture, cutting or any other damaging conditions. Geocomposite rolls shall be shipped and stored in opaque and watertight wrappings. The roll wrappings shall be removed shortly before deployment. The

Geosynthetics QAC shall inspect the rolls upon delivery to the site, and any deviation from the above requirements shall be reported to the Project Manager.

The Geosynthetics Installer shall handle the geocomposite in a manner as to make certain the geocomposite is not damaged in any way, and the following requirements shall be complied with. The Geosynthetics QAC shall note any non-compliance and report it to the Project Manager.

1. On slopes, the geocomposite shall be securely anchored and rolled down the slope in a manner as to continually keep tension on the geocomposite sheet. If necessary, the geocomposite shall be positioned by hand after being unrolled to minimize wrinkles.

2. In the presence of wind, all geocomposites shall be weighted with sandbags or the equivalent. Sandbags shall be installed during deployment and shall remain until replaced with cover material.

3. Geocomposites shall be cut using a hook blade or other tool approved by the Project Manager. If in place, special care shall be taken to protect underlying geosynthetics from damage that could be caused by the cutting of the geocomposite. Care shall be taken to remove all tools from the geocomposite.

4. The Geosynthetics Installer shall take necessary precautions to prevent damage to underlying layers during placement of the geocomposite.

5. During placement of geocomposite, care shall be taken not to entrap in or beneath the geocomposite stones or dirt that could damage the geocomposite and cause clogging of drains or filters, hampering subsequent seaming.

6. A visual examination of the geotextile of the geocomposite shall be performed over the entire surface after installation to determine that no potentially harmful foreign objects (e.g., needles, razor blades) are present.

12.6 Seaming Procedures

In general, no horizontal seams shall be allowed on sideslopes greater than 10H:1V (i.e., seams shall be along and not across the slope), except as part of a patch. Adjacent geocomposites (geotextile and geonet components) shall be joined according to the Engineering Drawings and Project Specifications. The Geosynthetics QAC shall note any non-compliance and report it to the Project Manager.

12.7 Defects and Repairs

Any portion of the geocomposite exhibiting a flaw shall be repaired. Prior to acceptance of the geocomposite, the Geosynthetics Installer shall locate and repair all damaged areas as directed by the Geosynthetics QAC. The Geosynthetics QAC shall observe any repair and report any non-compliance with the requirements in writing to the Project Manager.

12.7.1 Small Defects

If the Geosynthetics QAC determines a defect to be small (i.e., typically smaller than 3 feet by 3 feet), the geocomposite shall be repaired as follows:

1. If the geonet is determined to be undamaged but the geotextile is damaged, a patch of geotextile shall be placed. The geotextile patch shall be sewn in place with a minimum of 12-inch overlap in all directions.

2. Damaged geonet shall be removed and replaced with a section of geonet, equivalent to the damaged geonet, cut to fit. The geonet shall be tied to the existing geonet using white or yellow plastic fasteners that are placed every 6 inches (at a minimum). A geotextile patch shall be placed over the repaired geonet section. The geotextile patch shall be sewn in place or continuously heat-leistered (for slopes less than or equal to 10H:1V only) with a minimum of 12-inch overlap in all directions.

3. Care shall be taken to remove any soil or other material that may have penetrated the torn geotextile.

12.7.2 Large Defects

If the Geosynthetics QAC determines the defect to be large (i.e., typically larger than 3 feet by 3 feet), the geocomposite shall be replaced.

12.8 Protection

All materials located on top of the geocomposite shall be placed in a manner to provide the following:

1. The geocomposite and underlying lining materials are not damaged.

2. Minimal slippage of the geocomposite on underlying layers occurs.

3. No excess tensile stresses occur in the geocomposite.

Any non-compliance shall be recorded by the Geosynthetics QAC and reported to the Project Manager.

13. Geosynthetic Clay Liners

13.1 Definition and Applicability

GCLs are materials that consist of a low hydraulic conductivity montmorillonite-rich expansive clay (bentonite) core that is bonded to a geotextile backing. GCLs are used as barriers in lining systems.

13.2 Manufacturing Plant Inspection

The purpose of the plant inspection is to review the manufacturing process and QC procedures. The Owner or appropriate representative may conduct a periodic inspection of the Manufacturer's plant. In addition, the Project Manager or the designated representative may visit the manufacturing plant for a project-specific inspection, if deemed necessary. The project-specific inspection shall be prior to, or during, the manufacturing of the GCL rolls for the project.

The manufacturing plant inspection shall include the following:

1. Verification that properties guaranteed by the Manufacturer and all Project Specifications are met.

2. Verification that the measurement of properties by the Manufacturer is properly documented and that the test methods used are acceptable.

3. Spot inspection of the rolls and verification that the rolls are free of imperfections or contamination by foreign matter.

4. Review of handling, storage and transportation procedures, and verification that the procedures will not damage the GCL.

5. Verification that roll packages have a label indicating the name of the manufacturer, roll number and roll dimensions.

6. Verification that overlap lines are printed on the rolls.

A report describing the inspection shall be retained by the Owner for periodic inspections and by the Project Manager for project-specific inspections.

13.3 Quality Control Documentation

Prior to installation of any GCL, the Geosynthetics Manufacturer or Geosynthetics Installer shall provide the Project Manager with the following information:

1. QC certificates signed by a responsible party employed by the Manufacturer.

2. The origin (i.e., supplier's name and location of material source) and identification of the bentonite used for production of the GCL.

3. Copies of dated QC information issued by the bentonite supplier.

4. Results of QC tests conducted by the GCL Manufacturer to verify that the bentonite supplied meets the GCL Manufacturer's specifications.

5. Copies of dated QC information provided by the geotextile Manufacturer.

6. The Manufacturer's specification for the GCL that includes all properties contained in the Project Specifications for GCLs.

7. Written certification that the minimum values given in the Project Specifications are guaranteed by the Manufacturer. QC certificates shall include roll identification numbers, testing procedures and results of QC tests. At a minimum, results shall be given for the following:

    a. Bentonite swell index (as received).

    b. Bentonite fluid loss (as received).

    c. Bentonite mass per unit area in GCL.

    d. Geotextile mass per unit area (upper and lower layers).

    e. Bentonite moisture content (following manufacture into GCL).

    f. Peel strength.

    g. Tensile strength of GCL

h. Durability (based on percent of tensile strength retained).

i. Index flux.

j. Permeability.

k. Permeability with potentially incompatible permeant.

The QC tests shall be performed using methods and at frequencies as required by the Project Specifications.

The Geosynthetics Manufacturer shall identify the rolls of GCL with the following:

1. Manufacturer's name.

2. Product identification.

3. Roll number.

4. Roll dimensions.

The LGM shall review the documents and shall report any discrepancies with the above requirements to the Project Manager. The LGM shall verify the following:

1. Property values certified by the Manufacturer meet all of the guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented, and the test methods used are acceptable.

3. QC certificates have been provided at the specified frequency for the rolls, and each certificate identifies the rolls related to it. Rolls are appropriately labeled.

4. Certified minimum properties meet the Project Specifications.

5. The Project Manager has provided the Project Specifications and this CQAM to the GCL Installer.

6. The Manufacturer confirms a field drying shrinkage potential to allow proper seam overlap in the field.

13.4 Conformance Testing

The Geosynthetics QAC shall verify that conformance test samples are obtained from the GCL materials manufactured for RMU-2. Conformance test samples may be either collected by the Geosynthetics QAC from material delivered to the site or collected by representatives of the Geosynthetics QAL, under the direction of the Geosynthetics QAC, from material at the manufacturer's facility. The samples shall be forwarded to the Geosynthetics QAL for testing to verify conformance with the project specifications.

At a minimum, the following conformance tests shall be performed on the GCL in accordance with the methods identified in the project specifications:

1. Hydraulic Conductivity.

2. Mass per Unit Area of Bentonite.

3. Mass per Unit Area Upper and Lower Layer Geotextile (geotextile component only).

4. Bentonite Moisture Content.

5. Index Flux.

6. Tensile Strength of GCL.

7. Internal and Interface Shear Strength.

Additional conformance tests may be required by the project specifications.

13.4.1 Sampling Procedures

The rolls to be sampled shall be selected by the Geosynthetic QAC. Samples shall not be taken from any portion of a roll that has been damaged. Unless otherwise specified, samples shall be 1 foot long by the roll width. The machine direction shall marked on the conformance samples with an arrow. All lots of material and the particular test sample that represents each lot should be defined before the samples are taken.

Unless otherwise specified in the Project Specifications, samples shall be taken at a rate of one per lot, or at a minimum of one per 100,000 ft^2 of GCL, except for hydraulic conductivity and internal/interface shear strength testing. Samples for hydraulic conductivity conformance tests shall be taken at a rate of one per lot, or at a minimum of one per 250,000 ft^2 of GCL. One sample per material type, per application, is required for internal/interface shear strength testing (i.e., separate samples for baseliner and final cover are required). A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. A lot may also be designated by the Geosynthetics QAC based on a review of the roll information, including QC documentation and manufacturing records. If approval is obtained from the Project Manager, the Geosynthetics QAC can perform the conformance test sampling at the manufacturing plant. This testing may expedite the installation process for certain projects.

13.4.2 Test Results

All conformance test results shall be reviewed and be accepted or rejected by the LGM prior to the deployment of the GCL. The LGM shall be responsible for verifying that all test results meet or exceed the property values listed in the Project Specifications and shall report any non-conformance to the Project Manager.

If a test result is in non-conformance, all material from the lot represented by the failing test should be considered out-of-specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to “bracket” the portion of the lot not meeting specification. (Note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line.) To isolate the out-of-specification material, additional samples must be taken from the rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If additional tests pass, the roll that represents the initially failed test and the roll manufactured immediately after that roll (i.e., next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

If the Geosynthetics Manufacturer has reason to believe the failing tests may be the result of the Geosynthetics QAL incorrectly conducting the tests, the Geosynthetics

Manufacturer may request that the sample in question be re-tested by the Geosynthetics QAL with a technical representative of the Geosynthetics Manufacturer present during the testing. The Geosynthetics Manufacturer may have the same sample re-tested at two different Owner-approved Geosynthetics QALs. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, the original Geosynthetics QAL's test results shall be accepted. The use of these procedures with respect to a failed test result is subject to the approval of the Project Manager, and the cost of the additional testing will be responsibility of the Geosynthetics Manufacturer.

13.5 Geosynthetic Clay Liner Deployment

During shipment and storage, the GCL shall be protected from ultraviolet light exposure, moisture, excessive humidity, puncture, cutting or any other damaging conditions. GCL rolls shall be shipped and stored in opaque and watertight wrappings. The GCL rolls shall be stored away from wet ground and be covered with a watertight tarp or under a roof to protect from exposure to hydration or precipitation. The roll wrappings shall be removed shortly prior to deployment. The Geosynthetics QAC shall inspect GCL rolls upon delivery and prior to deployment at the site and report any deviations from the above requirements to the Project Manager.

The Geosynthetics QAC shall review the GCL panel deployment progress and advise the Project Manager on the conformance of the GCL with the Project Specifications. The Geosynthetics QAC shall verify that the Geosynthetics Installer handles the GCL material in a manner as to make certain the GCL is not damaged and to determine that the following requirements are satisfied:

1. Final cover subgrade areas prepared for GCL deployment have been proof rolled and visually observed by the Geosynthetics QAC in accordance with the Technical Specifications.

2. The supporting soil surface for the GCL is smooth, firm, unyielding and free of debris, vegetation, sticks, sharp rocks, void spaces, ice, abrupt elevation changes, standing water or other materials that could damage the GCL. As determined by the Geosynthetics QAC, all protrusions having the potential to damage the GCL must be removed, crushed or pushed into the surface with a smooth-drum compactor.

3. On slopes, the GCL rolls shall be securely anchored, and the GCL material shall be deployed down the slope in a manner as to keep tension on the GCL panel.

4. The GCL should be installed with the proper side of the material facing upward. The orientation of the GCL should be as specified by the Project Specifications.

5. The Geosynthetics Installer shall take necessary precautions to prevent damage to underlying layers during placement of the GCL. If the GCL is cut in place, special care shall be taken to protect underlying geosynthetic materials from damage that could be caused by cutting of the GCL.

6. During placement of the GCL, care shall be taken not to entrap beneath the GCL any stones, excessive dust or moisture that could damage the GCL or any underlying geosynthetics.

7. After installation, a visual examination of the GCL shall be performed over the entire surface to verify that no potentially harmful foreign objects, contaminated soil or damaged areas are present.

8. Excess loss of bentonite on edges during deployment should be minimized.

The Geosynthetics QAC shall verify that the final cover subgrade surface for which the GCL will be installed is not wet and meets the requirements of applicable sections of the Technical Specifications.

The Geosynthetics QAC shall verify that the quantity of GCL material deployed during 1 working day can be covered by the end of that day. The Project Manager may give exceptions to this requirement if dry weather is forecast for several consecutive days. GCL deployment shall not be undertaken during precipitation or when there is an immediate threat of precipitation. The Geosynthetics QAC shall record any non-compliance and report it to the Project Manager. It is the responsibility of the Geosynthetics Installer to protect the GCL from premature hydration during and after installation.

13.6 Seaming Procedures

Adjacent GCL panels shall be joined according to Project Plans and Specifications. At a minimum, the Geosynthetics QAC shall verify that the Geosynthetics Installer complies with the following requirements:

1. Edge seam overlap shall be a minimum of 6 inches.
2. Roll-end seam overlap shall be a minimum of 12 inches.
3. The addition of powdered bentonite to seam locations shall be in accordance with the Project Specifications.
4. End-to-end seams on slopes shall be minimized.

Prior to approval of the GCL, the Geosynthetics QAC shall visually verify the following requirements:

1. The required overlaps are provided. The overlap shall be continuously monitored since the panels may be subject to shrinkage.
2. The amount of the powdered bentonite is placed on the seam as required by the Project Specifications.

13.7 Defects and Repairs

Any portion of the GCL exhibiting flaws shall be repaired, as required by the Project Specifications. Prior to acceptance of the installed GCL, the Geosynthetics Installer shall locate and repair all damaged areas as directed by the Geosynthetics QAC. Defects or damage can be identified by rips, tears, premature hydration of the GCL or delamination of the geotextiles.

Rips or tears in the GCL shall be covered by a piece of geotextile equivalent to the damaged geotextile. The material shall extend a minimum of 6 inches in all directions and heat bonded (leistered) in place. If the bentonite layer has been damaged, additional bentonite of comparable quality shall be added.

Where the GCL has been exposed to moisture and has prematurely hydrated prior to placement of overlying material, the material shall be removed and replaced. The term "prematurely hydrated" shall not include minor partial hydration of the GCL material that may have been exposed to moisture within limited areas during construction. All defects and repairs shall be reported to the Project Manager.

13.8 Geosynthetic Clay Liner Protection

All materials located on top of the GCL shall be placed in a manner as to provide the following:

1. The GCL and underlying liner materials are not damaged.

2. Minimal slippage of the GCL on underlying layers occurs.

3. No excess tensile stresses occur in the GCL.

Any non-compliance with these guidelines or the Project Specifications shall be noted by the Geosynthetics QAC and reported to the Project Manager.

14. Facultative Pond Liner Geomembranes

14.1 Description and Applicability

Geomembranes are low hydraulic conductivity barriers used in lining systems. This section is applicable to ethylene interpolymer alloy (EIA) geomembranes, also referred to as EIA liners, to be used in the liner systems of facultative ponds. This section is not applicable to other geomembrane materials, including HDPE, Hypalon, polyvinyl chloride, and very low-density polyethylene.

14.2 Manufacturer's Plant Inspection

The purpose of the plant inspection is to review the manufacturing process and QC procedures implemented during the manufacturing of the EIA liner. The Owner may conduct an inspection of the Manufacturer's plant. In addition, the Project Manager or the Project Manager's designated representative may visit the manufacturing plant for a project-specific inspection, if deemed necessary. If possible, the project-specific inspection shall be conducted prior to or during the manufacturing of the EIA liner panels for the project.

The manufacturing plant inspection shall include:

1. Verification that properties guaranteed by the Manufacturer meet all project specifications.

2. Verification that the measurement of properties by the Manufacturer is properly documented and the test method used is acceptable.

3. Spot inspection of the panels and verification that they are free of imperfections or any sign of contamination by foreign matter.

4. Review of the handling, storage, and transportation procedures, and verification that the procedures will not damage the EIA liner.

5. Verification that panel packages have a label indicating the name of the manufacturer, type of EIA liner, thickness, panel number, and panel dimensions.

A report describing the inspection shall be retained by the Owner for annual inspections and by the Project Manager for project-specific inspections.

14.3 Quality Control Documentation

Prior to the installation of any EIA liner material, the Geosynthetics Manufacturer or Geosynthetics Installer shall provide the Project Manager with the following information:

1. A list of the materials that comprise the EIA liner expressed as percent by weight of polyester, finished coatings, and other additives.

2. A product information sheet for the EIA liner that includes all properties contained in the project specifications, measured using the appropriate test methods.

3. A written certification that states that the minimum values given in the product information sheet are guaranteed by the Manufacturer.

4. QC certificates signed by a responsible party employed by the Manufacturer. Each QC certificate shall include panel identification numbers, testing procedures, and results of QC tests. At a minimum, results shall be given for:

    a. Fabric weight

    b. Finished coated weight

    c. Tensile properties.

    d. Tear strength.

    e. Puncture strength.

These QC tests shall be performed in accordance with the test methods and at the frequency specified in the project specifications, or as indicated in the Manufacturer's quality control program documentation, whichever is more stringent.

The Geosynthetics Manufacturer shall identify the panels of EIA liner with the following:

1. Manufacturer's name.

2. Product identification.

3. Panel number, for which the installed location is to be indicated on the panel layout diagram.

4. Panel dimensions.

The EIA liner will be prefabricated in large panels at the Manufacturer's plant. Factory seams are subject to the same quality control/quality assurance standards and testing as field seams. Prior to the installation of any EIA liner material, the Manufacturer or Geosynthetics Installer shall provide the Project Manager with the results of all destructive and non-destructive seam testing for all factory seams, as well as the location and identification of any necessary repairs.

The LGM shall review and approve in writing these documents and shall report any discrepancies with the above requirements to the Project Manager. The LGM shall verify the following:

1. Property values certified by the Manufacturer meet project specifications.

2. Measurements of properties by the Manufacturer are documented, and the test methods used are acceptable.

3. QC certificates have been provided at the specified frequency for the material produced for the project and each certificate identifies the panels related to it.

4. Testing and repair of all factory seams has been performed in accordance with the project specifications, the Manufacturer's quality control program, and applicable testing standards.

5. Panels are appropriately labeled.

14.4 Conformance Testing

Prior to delivery of the panels of EIA liner to the site, the LGM shall obtain conformance test samples from the prefabricated EIA liner panels. The samples shall be forwarded to the Geosynthetics QAL for testing to verify conformance with the project specifications.

The following conformance tests shall be performed in accordance with the test methods, as specified in the project specifications:

1. Finished coated weight.

2. Thickness.

3. Tensile characteristics.

4. Destructive seam testing.

14.4.1 Sampling Procedures

The LGM shall collect samples from the manufactured material prior to the material being delivered to the site. The LGM shall collect destructive seam test samples from the prefabricated panels prior to the panels being packaged for shipping. Samples shall be taken from the edges that will be placed in the anchor trenches so that the panels can be folded in preparation for shipping as soon as the samples are collected. (Because the samples will be collected from the edges, repairs of sampled areas will not be necessary.) For this reason, the prefabricated panels should be sized slightly larger than the final installed dimensions would require to allow for the conformance samples to be collected from the edges and avoid the need to repair the sampled areas. Destructive seam test samples shall be collected at a frequency of one sample per prefabricated panel, unless the seaming for a given panel spans more than 1 working day, in which case, the sample frequency shall be one sample per day of seaming for that panel.

14.4.2 Test Results

All conformance test results shall be reviewed and approved in writing, and the material accepted or rejected by the LGM prior to the deployment of the EIA liner. The LGM shall report any non-conformance to the Project Manager.

If a material test result is in non-conformance, the material from the lot represented by the failing test will be considered out-of-specification and rejected. At the option of the Project Manager and at the Manufacturer’s expense, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when the rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out-of-specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If the additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If the additional tests fail, the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

If a destructive seam test result is in non-conformance, all seams in the panel represented by the failing test will be considered out-of-specification and rejected. At the option of the Project Manager and at the Manufacturer's expense, additional destructive seam test samples may be taken to bracket the non-conforming seam. To isolate the non-conforming seam, the seam to either side of the non-conforming seam shall be sampled and destructively tested. If both adjacent seams pass, only the seam that resulted in the non-conforming result will be considered out-of-specification and either cut out and replaced with a new seam. If either or both of the adjacent seams fail, all seams in the panel will be considered out-of-specification and shall be cut out and replaced with new seams or the panel may be replaced in its entirety.

If the Geosynthetics Manufacturer has reason to believe that failing tests may be the result of the Geosynthetics QAL conducting the tests, the Geosynthetics Manufacturer may request that the sample be re-tested by the Geosynthetics QAL with a technical representative of the Geosynthetics Manufacturer present during the testing. This re-testing shall be done at the expense of the Geosynthetics Manufacturer. The Geosynthetics Manufacturer may have the same sample re-tested at two different Owner-approved Geosynthetics QALs. If both laboratories produce passing results, the material shall be accepted; otherwise, the original Geosynthetics QAL's test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval by Project Manager.

14.5 Subgrade Preparation

14.5.1 Surface Preparation

The Earthwork Contractor shall be responsible for preparing the supporting soil for EIA liner placement. The Project Manager shall coordinate the work of the Earthwork

Contractor and the Geosynthetics Installer so that the requirements of the project specifications and this QAM are met.

Prior to the installation of the EIA liner, the LGM shall verify the following:

1. A qualified land surveyor has verified all lines and grades.

2. The LSM has verified that the supporting soil meets the criteria in the project specifications.

3. The surface to be lined has been rolled, compacted, or hand-worked and is free of irregularities, protrusions, loose soil, angular rocks, roots, grass, vegetation, and abrupt changes in grade.

4. All necessary testing of underlying layer(s) has been completed, and the associated results have been reviewed and approved by applicable parties.

5. Sufficient leak locator probes have been installed on the surface to be lined. The leak locator probes shall be provided by the Leak Location Contractor and installed by the LGM in the locations determined by the Leak Location Contractor.

The Geosynthetics Installer shall certify, in writing, that the surface on which the EIA liner will be installed is acceptable. A certificate of acceptance shall be provided by the Geosynthetics Installer to the LGM prior to the deployment of the EIA liner in the area under construction. The LGM shall provide the Project Manager with a copy of this certificate.

After the supporting soil has been accepted by the Geosynthetics Installer, it is the Geosynthetics Installer's responsibility to indicate to the Project Manager any change in the supporting soil condition that may require repair work. The Project Manager may consult with the LGM regarding the need for repairs. If the LGM concurs with the Geosynthetics Installer, the Project Manager shall verify that the supporting soil is repaired. At any time prior to or during the EIA liner installation, the LGM shall indicate to the Project Manager any locations that may not be adequately prepared for the EIA liner.

14.5.2 Anchor Trench

The LGM shall verify that the anchor trench has been constructed according to the Drawings and project specifications. If the anchor trench is excavated in a clay material that is susceptible to desiccation, the amount of anchor trench open at any time shall be minimized. The LGM shall inform the Project Manager of any signs of significant desiccation associated with the anchor trench construction. The anchor trench shall be adequately drained to prevent ponding or softening of the adjacent soils while the trench is open. The anchor trench shall be backfilled and compacted as specified in the project specifications.

When backfilling the anchor trenches, care shall be taken to prevent any damage to the geosynthetics. A Geosynthetics QAI shall observe the backfilling operation and advise the Project Manager of any problems. Problems shall be documented by the Geosynthetics QAI in a daily report.

14.6 EIA liner Deployment

14.6.1 Panel Nomenclature

The individual EIA liner roll sheets shall be prefabricated at the Manufacturer’s plant into large sheets custom designed to this project so as to minimize field seaming. If additional panels are deemed necessary by the LGM or to line odd-shaped areas (such as corners), a field panel may be used. A field panel is defined as a unit of EIA liner that is to be seamed in the field. Each prefabricated panel shall be shipped with a label identifying it with a unique designation that is also indicated on a panel layout diagram. The LGM shall verify that prefabricated panels are installed at the locations indicated on the Geosynthetics Installer’s panel layout diagram as approved by the Project Manager. The LGM shall record the identification code, location, and date of installation of each prefabricated panel.

14.6.2 Panel Deployment Procedure

The LGM shall review the panel deployment progress of the Geosynthetics Installer (keeping in mind issues relating to wind, rain, clay liner desiccation, and other site-specific conditions). The LGM shall advise the Project Manager on the compliance with the approved panel layout drawing and the suitability to the actual field conditions. Once approved, only the Project Manager can authorize changes to the panel deployment procedure. The Geosynthetics QAI shall verify that the condition of the supporting soil does not change detrimentally during installation.

To protect against wind damage, a temporary hold-down (i.e., sandbagging, tires, or other means as approved by the Project Manager) will be used during EIA liner installation. The selected temporary hold-down method will not damage or cause leakage on liner surfaces or other materials (i.e., clay layer). Alternatively, the EIA liner may be held down by the permanent weight tubes as indicated on the Drawings. Sand used in sandbags or permanent weight tubes shall be well graded and clean sand, with a maximum particle size of 0.25 inches by visual inspection. The source of the sand shall be approved by the Project Manager.

14.6.3 Deployment Weather Conditions

EIA liner deployment shall not be undertaken if weather conditions will preclude material seaming following deployment (see Section 14.7.5). Ambient temperature shall be measured by the Geosynthetics QAI in the area where the panels are to be deployed. The LGM shall inform the Project Manager of any weather-related problems that may not allow EIA liner placement to proceed.

14.6.4 Method of Deployment

Before the EIA liner is handled on site, the Geosynthetics QAC shall verify that the handling equipment to be used on the site is adequate and does not pose a risk of damage to the EIA liner or underlying surfaces. During the handling, the Geosynthetics QAC shall observe and verify that the Geosynthetics Installer's personnel handle the EIA liner with care.

The Geosynthetics QAC shall verify the following:

1. Any equipment used on the liner does not damage the EIA liner by handling, excessive heat, leakage of hydrocarbons, or other means. Additionally, the equipment and techniques used will not damage the underlying surfaces.

2. The prepared surface underlying the EIA liner has not deteriorated since previous acceptance and is still acceptable immediately prior to EIA liner placement.

3. Any geosynthetic element immediately underlying the EIA liner is clean and free of debris.

4. No personnel shall smoke or wear damaging shoes while working on the EIA liner or engage in other activities that could damage the EIA liner.

5. The method used to unroll or adjust the panels does not cause excessive scratches or crimps in the EIA liner and does not damage the supporting soil or underlying geosynthetics.

6. The method used to deploy EIA liner panels does not adversely impact the leak locator probes installed on the approved surface to be lined.

7. The method used to place the panels minimizes wrinkles, especially differential wrinkles between adjacent panels.

8. Adequate temporary loading and/or anchoring (e.g., sand bags, tires) have been placed to prevent uplift by wind.

9. Direct contact with the EIA liner is minimized, and the EIA liner is protected by geotextiles, extra geomembrane, or other suitable materials in areas where excessive traffic may be expected.

The LGM shall inform the Project Manager if the above conditions are not fulfilled.

14.6.5 Damage and Defects

Upon delivery to the site, the Geosynthetics QAC shall conduct an initial inspection of the panels for signs of shipping-related damage to the outer surfaces. The LGM shall advise the Project Manager, in writing, of any panels that appear to have been damaged in transit and that should be either rejected and removed from the site or noted so that a more complete inspection can be made following deployment.

The Geosynthetics QAC shall inspect each panel after placement for damage and/or defects. The LGM shall advise the Project Manager of panels or portions of panels that should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected shall be marked and removed from the work area and recorded by the Geosynthetics QAC. Repairs shall be made using procedures described in Section 14.10.

14.6.6 Writing on the Liner

The Geosynthetics Installer and the Geosynthetics QAC shall use different colored markers that are readily visible for writing on the EIA liner. The Geosynthetics Installer shall use a white marker, and the Geosynthetics QAC shall use a yellow marker to write on the EIA liner. The markers used must be semipermanent and compatible with the EIA liner.

14.7 Seaming

The majority of EIA liner seaming shall be performed by the Manufacturer when prefabricating large panels for the project. Limited field seaming will be necessary to join prefabricated panels, to line odd-shaped areas, such as corners, and to make repairs. However, field seaming should be minimized to the extent possible. All seaming, whether performed at the Manufacturer's plant or in the field, shall adhere to the same requirements as outlined below and in the project specifications. The format of the following sections is based on the seaming being performed in the field and responsible parties are identified as such. During the process of factory seaming, the Manufacturer will perform the role of the Geosynthetics Installer and the Geosynthetics QAC.

14.7.1 Seam Layout

Before installation begins, the Geosynthetics Installer shall provide the Project Manager and the Geosynthetic QAC with a panel layout diagram. This diagram shall consist of a to-scale plan view of the area to be lined, the direction of slopes, the orientation of geomembrane panels, and the planned location of seams. The LGM shall review the panel layout diagram for acceptance with the project requirements and accepted state-of-practice. No panels shall be deployed or seamed until the Project Manager has reviewed and approved the Geosynthetics Installer's panel layout diagram. In addition, panels not specifically shown on the panel layout drawing may not be used without the Project Manager's prior approval. The Geosynthetics QAC shall use a seam numbering system compatible with the panel numbering system.

In general, seams shall be oriented parallel to the line of maximum slope (i.e., oriented along, not across, the slope). In corners and odd-shaped geometric locations, the number of seams should be minimized. No end seam should be less than 5 feet from the toe of the slope or from areas of potential stress concentrations, unless otherwise authorized by the Project Manager.

14.7.2 Accepted Seaming Methods and General Process

Approved processes for EIA liner seaming are heat (hot air) welding or radio frequency (RF) welding. Proposed alternate processes may be proposed and submitted to the Project Manager for review and approval. Seaming shall only be performed using equipment that has been specifically designed and manufactured for this purpose. Regardless of seaming method, the proposed process and listing of equipment shall be submitted to the Project Manager and Geosynthetics QAC for review and approval.

During the seaming process, the Geosynthetics QAC (or the Manufacturer in the case of factory seaming) shall log ambient temperature, seaming apparatus temperature, and EIA liner surface temperature at appropriate intervals and report any non-compliance to the Project Manager. The Geosynthetics QAC (or the Manufacturer in the case of factory seaming) shall verify the following items:

1. Equipment used for seaming is not likely to damage the EIA liner.

2. The electric generator is placed on a smooth base such that no damage occurs to the EIA liner.

3. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage such that no damage occurs to the EIA liner.

4. The EIA liner is protected from damage in heavy traffic areas.

5. In general, the EIA liner panels are aligned to have a nominal overlap of 2 inches (50 millimeters) for seaming.

6. The liner has been cleaned using a cloth soaked in water or solvent to remove any foreign materials. In some instances, where excessive deposition of foreign material exists, abrasion of the membrane surface with a wire brush or mesh is suggested to loosen or remove pollutants.

14.7.3 Seam Preparation

The Geosynthetics QAC (or the Manufacturer in the case of factory seaming) shall verify that, prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris, or foreign material of any kind. The Geosynthetics QAC shall also verify that seams are aligned with the fewest possible number of wrinkles and “fishmouths.”

14.7.4 Trial Seams

Trial seams shall be made on scraps of the EIA liner to be seamed to verify that conditions, equipment, and personnel are adequate for production seaming. Such trial seams shall be made at the beginning of each seaming period, and at least once every 5 hours for each production seaming apparatus/seamer combination to be used that day. Trial seams shall be made under the same conditions as actual seams.

The trial seam sample shall be at least 3 feet long by 12 inches wide (after seaming), with the seam centered lengthwise. Seam overlap shall be as required for production seams.

The entire trial weld will first be non-destructively tested as described in Section 14.8. Following successful completion of non-destructive testing, the trial weld will be subject to destructive testing. Three specimens shall be cut from the trial seam with a 2-inch-wide die by the Geosynthetics Installer at locations selected randomly by the Geosynthetics QAC. The specimens shall be tested for bonded seam strength as described in Section 14.9.5. If the destructive testing results in non-conformance, the seaming apparatus and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial seams are achieved. The Geosynthetics QAC shall observe all trial seam procedures.

The remainder of the successful trial seam sample shall be cut into three 6-inch-long (measured along the seam length) pieces and distributed as follows:

- One to the Project Manager;

- One to the Geosynthetics Installer; and

- One to the Geosynthetics QAC for possible laboratory testing.

Each portion of the sample shall be assigned a number and marked accordingly by the Geosynthetics QAC. The Geosynthetics QAC shall also log the date, hour, ambient temperature, number of seaming unit, name of seamer, and pass or fail description.

If agreed upon between the Project Manager and the LGM and documented by the LGM in a daily report, the remaining portion of the trial seam sample can be subjected to laboratory destructive testing as indicated in Section 14.9.6. If a trial seam fails a laboratory test conducted by the Geosynthetics QAL, then a destructive seam test sample shall be taken from each seam completed by a combination of the production seaming apparatus and seamer related to the subject trial seam. These samples shall be forwarded to the Geosynthetics QAL for testing in accordance with Section 14.9.6 and, if they fail the destructive tests, the procedures indicated in Section 14.9.7 shall apply. The conditions of this paragraph shall be considered satisfied for a given seam if a destructive seam test sample has already been taken.

14.7.5 Seaming Procedures

The Geosynthetics QAC shall verify that the seaming conditions, including weather conditions and seam preparation, meet the project specifications. The LGM shall notify the Project Manager, in writing, if the Project Specifications are not met. Ambient temperature shall be measured by the Geosynthetics QAC in the area where the panels are to be placed. The Project Manager will decide if the installation is to be stopped or if special procedures will be used.

Trial seaming, as described in Section 14.7.4, shall be conducted under the same ambient temperature conditions as the actual production seams. The LGM may recommend more frequent destructive tests to the Project Manager, as described in Section 14.9, for any suspect areas.

14.8 Non-Destructive Seam Testing

14.8.1 Concept

The purpose of non-destructive tests is to check the continuity of the seams. It does not provide quantitative information on the seam strength. The Geosynthetics Installer shall visually inspect and then non-destructively test all field seams over the full length using a vacuum test unit and/or air lance method testing, or another method approved by the Project Manager. Non-destructive testing shall be conducted in accordance with the project specifications as the seaming work progresses – not at the completion of all field seaming.

For all seams, the Geosynthetics QAC shall perform the following:

1. Visually inspect the full length of all seams to insure that molten polymer has extruded from the seam edge.

2. Observe non-destructive testing procedures.

3. Record location, data, test unit number, name of tester, and outcome of all testing.

4. Visually inspect all tests.

5. Inform the Installer and Project Manager of any required repairs.

Any seams that cannot be non-destructively tested shall be cap-stripped with the same EIA liner material. The Geosynthetics QAC and Geosynthetics Installer shall inspect the completed cap-stripping operation for uniformity and completeness.

14.8.2 Test Failure Procedures

The Geosynthetics Installer shall complete any required repairs in accordance with Section 14.10. For repairs, the Geosynthetics QAC shall perform the following:

1. Observe the repair and testing of the repair.

2. Mark on the EIA liner that the repair has been approved.

3. Document the repair procedures and test results.

14.9 Destructive Seam Testing

14.9.1 Concept

The purpose of destructive seam testing is to evaluate seam strength. Bonded seam strength destructive tests shall be performed at locations selected by the Geosynthetics QAC, in accordance with the QAM and the project specifications. The minimum acceptance criteria for destructive testing are defined in the project specifications. Seam strength testing shall be done as the seaming work progresses – not at the completion of all field seaming.

14.9.2 Location and Frequency

The Geosynthetics QAC shall select locations where seam samples will be cut out for laboratory testing. The Geosynthetics Installer shall not be informed in advance of the locations where the seam samples will be taken. The seam sample locations shall be established as follows:

1. A minimum frequency of one test location for each seam greater than 250 feet in length. For seams shorter than 250 feet in length, one test location shall be selected for every 500 linear feet of seaming collectively. Whenever possible, samples shall be collected near the anchor trenches to limit hydrostatic heads on seam repair areas and, depending on the amount of excess material at the anchor trench, to completely avoid the need to repair the sample area.

2. Test locations shall be determined during seaming at the Geosynthetics QAC's discretion and may be influenced by suspicions of unacceptable welding or substandard quality.

14.9.3 Sampling Procedures

Samples shall be cut by the Geosynthetics Installer at locations chosen by the Geosynthetics QAC as the seaming progresses and following the successful completion of non-destructive testing. The Geosynthetics QAC shall perform the following:

1. Observe sample cutting.

2. Assign a number to each sample and mark it accordingly.

3. Record the sample location on layout drawing.

4. Record the reason for taking the sample at this location (e.g., statistical routine, suspicious weld).

5. Examine samples for holes, grooves, melt-through, wavering welds, unusual weld width, and any other unusual characteristics.

If samples are collected along the edge of the lined area and the sample is collected from what otherwise would be trimmed off as waste during anchor trench backfilling, the sample area does not require repair (i.e., patching). Otherwise, holes in the EIA liner resulting from destructive seam sampling shall be immediately repaired in accordance with repair procedures described in Section 14.10.3. The continuity of the new seams in the repaired area shall be tested according to Section 14.8.

14.9.4 Sample Dimensions

At each sampling location, a sample measuring at least 3 feet long by 8 inches wide, (after seaming) with the seam centered lengthwise, shall be cut from the production seam by the Geosynthetics Installer. Bonded seam strength testing requires that the test specimens be cut into 2-inch-wide strips (measured along the seam). The 3-foot-long sample shall be subdivided into two 6-inch-long pieces (measured along the seam), and one piece will be tested in the field by the Geosynthetics Installer and the other will be tested in a laboratory by the Geosynthetics QAL. The remainder of the sample shall be cut into three parts and distributed as follows:

1. One portion to the Geosynthetics Installer.
2. One portion for Geosynthetics QAL testing.
3. One portion to the Project Manager.

14.9.5 Field Testing

As mentioned in Sections 14.9.4 and 14.7.4, three 2-inch-wide strips shall be tested in the field using the modified grab test for bonded seam strength and shall not fail according to the criteria in the project specifications. If the test passes in accordance with this section, the sample qualifies for testing in the laboratory. If the field destructive testing fails, the seam should be repaired in accordance with Section 14.10. Alternately, the Geosynthetics Installer may elect to collect additional destructive seam samples on both sides of the original sample and test them in the field in an effort to bound the affected area. The alternate procedure shall be as per Section 14.9.7. Final judgment regarding seam acceptability, based on the failure criteria, is the responsibility of the LGM.

The Geosynthetics QAC shall observe all field tests and mark all samples and portions with their number. The Geosynthetics QAC shall also log the date, time, ambient temperature, number of seaming unit, name of seamer, welding apparatus temperatures, and pass or fail description. A copy of this information shall be attached to each sample portion.

14.9.6 Laboratory Testing

Destructive test samples provided by the Geosynthetics Installer to the Geosynthetics QAC shall be packaged and shipped, if necessary, under the responsibility of the Geosynthetics QAC in a manner that will not damage the test sample. The sample shall be shipped as soon as possible to expedite laboratory testing by the Geosynthetics QAL. The Project Manager shall be responsible for storing archive samples.

Laboratory destructive testing shall consist of the same test method as the field destructive testing and using the same number and individual size of test strips. The Geosynthetics QAL shall provide verbal test results within 24 hours of receipt of the sample. The LGM shall review laboratory test results as soon as the results become available and make appropriate recommendations to the Project Manager.

14.9.7 Destructive Test Failure Procedures

The following procedures shall apply when a sample fails a destructive test, whether that test is conducted by the Geosynthetics QAL or by field tensiometer. The Geosynthetics Installer has two options:

1. The Geosynthetics Installer can repair the seam between any two passing destructive test locations; or

2. The Geosynthetics Installer can trace the welding path to an intermediate location, a minimum of 10 feet from the point of the failed test in each direction, and take a sample as described in Section 14.9.4 at each location. If field destructive testing of these additional samples is successful, a portion of each sample shall be sent to the Geosynthetics QAL for laboratory destructive testing. If the laboratory testing is successful, the seam is repaired between these locations. If either sample fails, the process is repeated to establish the zone in which the seam should be repaired.

All acceptable repaired seams shall be bound by two locations from which samples passing laboratory destructive tests have been taken. In cases exceeding 150 feet of repaired seam, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Section 14.10.3.

The Geosynthetics QAC shall document all actions taken in conjunction with destructive test failures. No installation of material above the EIA liner shall be done until destructive testing for that section is completed and accepted by the Geosynthetics QAC and test results are delivered to the NYSDEC monitor.

14.10 Defects and Repairs

14.10.1 Identification

All seams and non-seam areas of the EIA liner shall be examined by the Geosynthetics QAC for identification of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Light reflection by the EIA liner helps to detect defects. The surface of the EIA liner shall be clean at the time of examination. The EIA liner surface shall be cleaned by the Geosynthetics Installer, if the Geosynthetics QAC determines that the amount of dust or mud inhibits examination.

14.10.2 Evaluation

Each suspect location (seam and non-seam areas) shall be non-destructively tested using the methods described in Section 14.8. Each location that fails the non-destructive testing shall be marked by the Geosynthetics QAC and repaired by the Geosynthetics Installer. All defects found during testing shall be numbered and marked immediately after detection. Work shall not proceed with any materials that will cover locations that have been repaired until appropriate non-destructive and laboratory test results with passing values are available.

14.10.3 Repair Procedures

Any portion of the EIA liner exhibiting a major flaw or failing a destructive or non-destructive test shall be repaired in accordance with the project specifications. The Project Manager, Geosynthetics Installer, and LGM shall be in agreement on the final decision as to the appropriate repair method.

1. The repair procedures available include the following:

    a. *Patching*: used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.

   b. *Patching*: used to repair small tears, pinholes or other minor, localized flaws.

   c. *Capping*: used to repair large lengths of failed seams.

   d. Removing bad seam and replacing with a strip of new material welded into place.

2. For any repair method, the following provisions shall be satisfied:

   a. All surfaces shall be clean and dry at the time of the repair.

   b. All seaming equipment used in repairing procedures shall meet the requirements of the QAM and the project specifications.

   c. Patches or caps shall be of the same liner material and extend at least 4 inches beyond the edge of the defect. All corners of patches shall be rounded, with a radius of approximately 3 inches.

   d. Patch shall be seamed to the original material using heat or RF welding. EIA liner shall be overlapped a minimum of 4 inches. Pressure shall be applied to the top and bottom surfaces for the full seam width while the welded area is in the melt condition. Heat and pressure shall be applied so as to cause a bead of material to extrude from the welded edges.

14.10.4 Repair Verification

Each repair shall be non-destructively tested using the methods described in Section 14.8, as appropriate. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair. The Geosynthetics QAC shall observe all non-destructive testing of repairs and shall record the number of each repair, date, and test outcome. Repairs more than 150 feet long require destructive test sampling at the discretion of the LGM. Failed tests indicate that the repair shall be redone and retested until a passing test results.

14.11 Electrical Resistivity Leak Testing

Leak location surveys shall be conducted on both the primary and secondary EIA liners on the floor and sideslopes of the Fac ponds. The surveys shall be performed as each layer is constructed to allow for the repair of identified defects.

The Geosynthetics Installer shall install at least two permanent electrodes in the soil liner located below the secondary EIA liner and above the geocomposite layer between the secondary and primary EIA liners. The permanent electrodes will be provided by the Leak Location Contractor and their locations established as directed by the Leak Location Contractor. The Contractor shall supply an AC power source for the leak location survey (110 volts, 5A).

For leak testing of the secondary EIA liner of the Fac pond in the floor areas, the Earthwork Contractor shall fill the base of Fac pond with water, such that the water extends to the toe of the sideslope of the Fac pond over the entire base of the Fac pond. For safety reasons, this may be done in stages to minimize the depths of water needed to perform the leak test. The sideslopes of the secondary EIA liner shall be leak tested utilizing a water lance. To test the primary EIA liner layer of the Fac Pond in the floor areas, the Earthwork Contractor shall wet the stone layer above the primary EIA liner over the entire base of the Fac Pond to the toe of the sideslopes. The sideslopes of the primary EIA liner shall be leak tested utilizing a water lance. The Leak Location Contractor shall establish a grid over the surface of the areas to be leak tested prior to conducting the leak testing. Areas where potential leaks are identified by the Leak Location Contractor shall be recorded and transferred to the surface of the EIA liner after the leak testing is completed. The Geosynthetics Installer shall expose all potential leaks identified by the Leak Location Contractor and repair all identified leaks in accordance with repair requirements included in the Technical Specifications.

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Appendix A

Test Fill Program for New Clay and CGL Final Cover Protective Soil Sources

TEST FILL PROGRAM FOR NEW CLAY AND GCL FINAL COVER PROTECTIVE SOIL SOURCES

1.0 PURPOSE AND SCOPE

The purpose of the test fill is to establish a sequential and logical approach for the development of the placement and compaction procedures to be used during construction of compacted clay liners and geosynthetic clay liner (GCL) final cover protective soil layers that meets the required performance standard. The test fill program will allow the Earthwork Contractor, the Engineer or Project Manager and the Soil Quality Assurance Consultant (QAC) to identify appropriate placement and compaction procedures. Once the construction procedures have been established by the test fill program, the Earthwork Contractor and the Soil QAC will monitor the compacted clay liner and GCL final cover protective soil layer construction procedures as an indicator that the performance standards are being achieved.

This test fill program documents the requirements for construction of the test fill. The test fill program will include:

- Subgrade preparation.
- Construction of the test fill.
- Inspection and testing of the test fill.
- Sampling of portions of the test fill.

This test fill program may be modified with approval from the New York State Department of Environmental Conservation (NYSDEC).

2.0 TEST FILL MATERIAL

Feasibility testing of new clay and GCL final cover protective soil sources (not previously qualified) shall be performed prior to construction of the test fill. The material shall be evaluated in accordance with Sections 4.2 and 8.2 of the Quality Assurance Manual (QAM), as well as requirements in the Project Specifications. These tests shall provide the basic relationship of permeability with varying density and moisture content. A typical representation of compaction and laboratory permeability test results for one clay source is shown on Figure 2.

3.0 CONSTRUCTION EQUIPMENT

The equipment to be used for the test fill shall be proposed by the Earthwork Contractor and approved by the QAC and Project Manager. The equipment to be used for the test fill shall be consistent with the equipment that will be used during actual layer construction. Variations may be approved by the Engineer provided that the equipment exhibits similar physical characteristics (e.g., weight, width, foot height, speed). For GCL final cover protective soil test fills, only tracked low ground pressure equipment may be used for compaction unless otherwise approved by the Engineer.

4.0 TEST FILL CONSTRUCTION

4.1 SUBGRADE PREPARATION

The area within the limits of the test fill shall be cleaned and grubbed of all trees, debris, brushes, stumps, roots, trash and any other vegetation or objectionable material. Following clearing and grubbing, the area shall be stripped of topsoil. Topsoil shall be stockpiled in an area designated by the Project Manager.

The surface of the subgrade shall be proof-rolled so as to be firm and free of irregularities, loose earth and abrupt changes in grade. A drainage layer shall be installed on the subgrade. The drainage layer shall be firm, smooth and flat, shall have a hydraulic conductivity of a least two orders of magnitude higher than the expected hydraulic conductivity of the constructed test fill and shall prevent fine particles of the test fill material from piping into the voids of the drainage layer. A layer of geotextile filter fabric may be placed between the drainage layer and test fill material, with the approval of the Engineer, to help prevent mixing of the materials. Upon the approval of the Engineer, the Earthwork Contractor may place a compacted sacrificial soil layer 2 to 5 inches thick over the drainage layer prior to construction of the first test fill lift. This is to provide a layer of separation between the drainage layer and the first lift compaction and testing equipment. The subgrade, drainage layer, and test fill surfaces shall be sloped at a 2% grade. Line and grades shall be controlled by survey. No standing water or excessive moisture shall be allowed on the surface of the subgrade. The surface shall be inspected by the Soil QAC prior to beginning construction of the test fill.

4.2 TEST FILL REQUIREMENTS

The test fill shall be constructed and evaluated with the minimum criteria below. The requirements of Section 5 and general guidance from the NYSDEC presented in Appendix B will form additional requirements. In general, clay test fills will include multiple lifts, whereas GCL final cover protective soil test fills will include a single lift. In both cases, lift thicknesses will be comparable to those used in actual layer construction.

4.2.1 Lift Thickness for Clay Test Fills

In general, loose lift thickness shall not exceed length of the feet or pads as measured from the drum of the compactor prior to compaction or 9 inches, whichever is less. Refer to test fill construction procedure for thicknesses of the various test fill lifts.

4.2.2 Lift Thickness for GCL Final Cover Protective Soil Test Fills

Post-compaction lift thickness shall be approximately 18 inches to simulate the minimum allowable lift thickness used in actual construction.

4.2.3 Density for Clay Test Fills

Dry density at or greater than 90% maximum modified proctor dry density.

4.2.4 Density for GCL Final Cover Protective Soil Test Fills

Required dry density will not be definitively known during the construction of the test fills. Approximate dry density will be known from laboratory remolded permeability testing. Exact value will be determined by the results of the test fill permeability testing. Required compaction is that which is determined necessary to achieve the maximum allowable permeability.

4.2.5 Moisture Content

1. At or greater than Optimum Moisture Content.
2. In-place moisture within acceptable compaction window.

4.2.6 Permeability Testing

1. For clay test fills, conduct field hydraulic permeability testing by using the Sealed Double Ring Infiltrometer (SDRI) Test, Single Ring Infiltrometer (SRI) or Boutwell Two Stage Borehole Test as specified in Appendix B.

2. For clay and GCL final cover protective soil test fills, obtain undisturbed samples by thin-walled Shelby tube or block as indicated on the example test fill configuration plan (Figure 1). Conduct constant head permeability testing on samples.

4.3 FILL PLACEMENT

The test fill shall be a rectangle approximately 60 feet long and at least 4 times wider than the widest piece of compaction equipment to be used in construction of a full-scale facility (Figure 1). In no case shall the width be less than 20 feet.

The test fill shall be constructed in uniform horizontal lifts to a total thickness of at least 24 inches for compacted clay and approximately 18 inches for GCL final cover protective soil after compaction in accordance with the procedures specified below. The procedures, which vary with the lift considered, are intended to allow determination of a relationship between soil compaction criteria, which include density and moisture content, permeability and compaction method parameters. Compaction method parameters include:

- Compactor characteristics.
- Thickness of compacted/uncompacted layers.
- Number of compactor passes and moisture content.

4.3.1 First Lift (Clay and GCL Final Cover Protective Soil Test Fills)

1. For both clay and GCL final cover protective soil test fills, the first lift shall be placed according to the thicknesses presented in Section 4.2.

2. Soil moisture content shall be maintained at or above optimum water content determined by the Soil QAC. The Earthwork Contractor shall adjust the moisture content as necessary to obtain the specified density criteria.

3. The test fill material shall be compacted with passes using the previously agreed compaction equipment.

4. The Earthwork Contractor shall permit the Soil QAC to performed in-place density tests and collect soil samples as specified in Section 5.3.1.

5. Holes left in the lift shall be repaired in accordance with methods outlined in the QAM. The repairs shall be made using procedures that have been shown to meet the required moisture and density criteria.

6. The test fill material shall be compacted a second time by applying two more one-way passes with the selected compactor.

7. Steps 4 and 5 shall be repeated. Second series of tests shall be taken near the original tests.

8. The test fill material shall be compacted a third time by applying two more one-way passes with the selected compactor.

9. Steps 4 and 5 shall be repeated. Third series of tests shall be taken near the first and second tests.

10. Steps 8 and 9, respectively, shall be repeated and continued until specified compaction criteria are obtained as identified by the Soil QAC.

4.3.2 Second Lift (Clay Test Fills Only)

1. The loose thickness of the second lift shall be such that the thickness of the lift will be 6 inches after compaction.

2. A competent bond with the first lift shall be achieved by the Earthwork Contractor and approved by the Soil QAC.

3. Steps 2 through 10 of Section 4.3.1 shall be repeated.

4.3.3 Remaining Lifts (Clay Test Fills Only)

1. The loose thickness of the remaining lifts shall be such that the thickness of the lifts will be 6 inches after compaction.

2. The procedures for compacting and testing the remaining lifts shall be those that have been tested and proven effective during the compaction of the second lift.

4.3.4 Final Surface Preparation (Clay Test Fills Only)

The surface of the test fill shall be rolled with a smooth steel drum or pneumatic roller so as to be free of irregularities, loose earth and abrupt changes in grade. Stones larger than 1 inch shall be removed. Stones which are smaller than 1 inch and are judged to be detrimental to a geomembrane liner will be removed. One-half of the prepared soil surface shall be protected against damage with temporary plastic sheets. The sheets shall be placed immediately after the completion of surface preparation. Observations and documentation of desiccation cracking versus time shall be made on the uncovered section of the test fill.

5.0 <u>INSPECTION AND TESTING</u>

5.1 TEST FILL MATERIAL

The Soil QAC shall perform testing on the soil material prior to its use in the test fill. Testing will be performed in accordance with the test methods provided in the technical specifications and include at least the following:

- Soil density/moisture content relationship using the Standard Proctor Method and Modified Proctor Method.
- Moisture content.
- Particle size distribution.
- Atterberg limits.
- Soil classification.
- Organic content.
- Hydraulic conductivity testing.
- Direct shear test (general fill source for GCL final cover protective soil only).
- Unconsolidated undrained triaxial shear test (clay source material only).

5.2 SUBGRADE PREPARATION

The Soil QAC shall observe the prepared subgrade for firmness, smoothness and absence of abrupt changes in grade. The subgrade shall be surveyed to serve as the origin when determining thicknesses.

5.3 TEST FILL CONSTRUCTION

Test fill shall be constructed as described previously under Section 4.

5.3.1 Lift Compaction

For the first and second lifts, the Soil QAC shall perform the following activities:

- Estimate the thickness of the loose lifts.
- Count the number of compactor passes and observe compactor coverage of the test fill.
- Perform a minimum of eight nuclear gauge in-place density and moisture readings at every two passes, and a minimum of two in-place density tests using the sand-come method, the rubber balloon method or the drive cylinder method to verify the nuclear gauge readings; compute degree of compaction (i.e., in-place dry density divided by the

Modified Proctor maximum dry density); collect four additional soil samples for moisture content determination and organic content.

- Observe the repair of holes left in the lift as a result of density testing and soil sample collection.

- Continue in-place density testing and moisture content determination to enable development of a curve giving in-place dry density versus number of compactor passes for each lift thickness (Figure 3).

For each of the remaining lifts on clay test fills, the Soil QAC shall perform the following activities:

- Verify that the thickness of the loose lift does not exceed the loose thickness determined from testing of the second lift.

- Count the number of compactor passes, determined from testing of the second lift, which are necessary to achieve the specified density and observe compactor coverage of the test till.

- Perform a minimum of eight nuclear density tests and two sand-cone density tests per lift to verify the adequacy of the construction procedures previously established.

The Soil QAC shall collect a minimum of six undisturbed Shelby tube samples or eight samples measuring 8-inch by 8-inch by 6-inch undisturbed block soil samples from varying depths of the completed test fill. The samples shall be waxed or otherwise protected to retain natural moisture and tested in the laboratory for the following:

- Hydraulic conductivity (permeability) using water as the permeant.
- Soil density/moisture with Modified Proctor.
- Particle size distribution.
- Atterberg limits.
- Soil classification.
- Soil moisture content.
- Organic content.

For clay test fills, the Soil QAC shall observe the test fill to verify the adequacy of the bonding between adjacent lifts. Such observation shall be exercised on the portion of the test fill that has been excavated to permit removal of undisturbed soil block samples and/or the sand-cone density testing.

5.3.2 Final Surface Preparation

The Soil QAC shall observe the prepared surface for firmness, smoothness and absence of abrupt changes in grade. The final surface will be surveyed to verify the test fill thickness.

5.4 BULK FIELD HYDRAULIC CONDUCTIVITY FOR CLAY TEST FILLS

One or more field bulk hydraulic conductivity test device(s) must be installed and performed in the area of the clay test fill that is prepared by the methods and controls that will be used in the actual construction. Acceptable field bulk hydraulic conductivity test devices include (but are not limited to) the following:

- SDRI.
- SRI.
- Boutwell two stage borehole.

Information from the field bulk hydraulic conductivity test must be used to confirm or deny that the soil, the methods of compaction and the controls on compaction have produced a uniformly compacted soil with a bulk hydraulic conductivity of $1x10^{-7}$ centimeters per second (cm/s) or less. The results of the bulk field hydraulic conductivity test(s) should be submitted to the NYSDEC for review and approval at least 30 days prior to actual construction involving the soil material for which the test fill was performed.

6.0 DOCUMENTATION

The Soil QAC shall document activities associated with the construction, monitoring and testing of the test fill and provide recommendations on placement and compaction procedures. Such documentation shall include daily reports of construction activities and oral communications with the Contractor. The following shall be documented for the specific sections listed below.

6.1 TEST FILL MATERIAL

The Soil QAC shall provide a moisture-density relationship for the test fill material and other test results as specified in Section 5.1

6.2 TEST FILL CONSTRUCTION

6.2.1 Subgrade Preparation

The Soil QAC shall document observations on a subgrade preparation, as specified in Section 5.2.

6.2.2 Test Fill Construction

The Soil QAC shall document activities of the test fill construction, monitoring and testing in a test fill summary report, which shall include, but not be limited to:

- Record the compactor type, configuration and weight for sheepsfoot compactors, record the drum diameter and length, empty and ballasted weight, length and face area of feet, yoking arrangement, if any.

- Record thicknesses of lifts prior to and after compaction.

- Observe that construction equipment reaches normal operating speed before entering the area to be used for testing.

- Record density versus number of compactor passes for each lift thickness, as specified in Section 5.3.1.

- Record the number of compactor passes, which will provide the specified degree of compaction and permeability.

- Record the procedure to bond lifts.

- Record results of moisture, in-place density and degree of compaction, as specified in Section 5.3.1.

- Document repair of holes left in the lift as a result of density testing and soil sample collection, as specified in Section 5.3.1.

- Record results of laboratory permeability testing and other soil properties tests performed on undisturbed soil samples.

- Include as-built drawing of the test fill and locations of all test samples for each lift.

- Include cross-section of the test fill showing number of lifts and lift thickness.

- Describe actual construction procedures.

- Observe test fill excavation for removal of undisturbed soil samples and observations of layer bonding, as specified in Section 5.3.1.

Appendix B

Requirements for Designing Acceptable Zone of Compaction Control

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Infrastructure, environment, buildings

Imagine the result

WASTE MANAGEMENT, INC.

CWM Chemical Services, LLC

Requirements for Designing Acceptable Zone of Compaction Control

Residuals Management Unit 2

Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

April 2003
Revised August 2009

Figures

1. Introduction

One of the most significant factors affecting the performance of compacted soil liners is the control of water content and dry unit weight during construction. A carefully written compaction specification can improve the likelihood of achieving low hydraulic conductivity while also satisfying other factors affecting performance, such as strength, compressibility and desiccation resistance. Because a soil liner is meant to be a hydraulic barrier, low hydraulic conductivity (or hydraulic conductivity lower than the regulatory standard) should be the primary factor affecting the design of a compaction specification. The specification should then be tightened to meet other performance standards.

2. Concept of Acceptable Zone

Figures 1 through 3 show three compaction curves that correspond to high compactive effort (Modified Proctor), moderate compactible effort (Standard Proctor) and low compactive effort (Reduced Proctor). It is believed that these compactive efforts simulate the range of compactive efforts that can be achieved in the field (Benson and Daniel, 1990). A description of the procedure to achieve Reduced Proctor compactive effort is included in Section 3.

For each compaction curve shown on these figures, the lowest hydraulic conductivity is achieved for water contents in excess of optimum water content. Furthermore, similar water contents can yield radically different hydraulic conductivities if the compactive effort is changed. For example, at a water content of 11%, the hydraulic conductivity of this soil can be as low as 2×10^{-9} centimeters per second (cm/sec) and as high as 1×10^{-6} cm/sec. Therefore, to achieve the required hydraulic conductivities, a compaction specification should be designed that delineates a zone in the compaction plane that yields the desired hydraulic conductivity for the rate of compactive efforts that may be realized in the field. This zone of water contents and dry unit weights is called an “Acceptable Zone.” For most cases, where the low hydraulic conductivity is desired, the acceptable zone will have a shape similar to the shaded region shown on Figures 1 through 3.

3. Developing an Acceptable Zone

The procedure to develop an Acceptable Zone involves: 1) establishing a zone of water content and dry unit weight that yields the required hydraulic conductivity and 2) modifying the zone to account for other factors beside hydraulic conductivity. A moisture and density control evaluation, as outlined in Section 3.1, will be conducted as required by the New York State Department of Environmental Conservation (NYSDEC) and submitted to the NYSDEC for approval of an acceptable zone.

3.1 Moisture and Density Control

Moisture and density control can be accomplished by meeting any of the three sets of requirements that are described as Case I, II or III. The overall basis for these approaches can be found in a paper entitled "Water Content-Density Criteria for Compacted Soil Liners," by D. E. Daniel and C. H. Benson in the *Journal of Geotechnical Engineering*, Vol. 116, No.12, pages 1811-1830, December 1990.

3.1.1 Case I

For this case, the following compaction control conditions have been proven to be necessary via the laboratory testing and the test fill.

1. The measured in-place moisture content immediately after soil compaction always shall be at, or greater than, the optimum moisture content from the most recent representative Modified Proctor curve developed on soil from the same borrow source.

2. The measured in-place dry density immediately after soil compaction shall be at, or greater than, 90% of the maximum Modified Proctor dry density from the most recent representative Modified Proctor curve developed on soil from the same borrow source.

3. The measured in-place moisture content and the measured in-place dry density immediately after soil compaction shall plot above the line of optimums on a plot of the most recent representative Modified and Standard Proctor curves. The line of optimums shall be a curve that passes through the maximums of both the Standard Proctor curve and the Modified Proctor curve and is parallel to the curve of zero air voids.

4. Compaction to the density required in Requirement 2 and 3 is waived at locations where any effort made to achieve this density would damage underlying geosynthetics, or otherwise prevent the material from achieving its intended function.

Requirements 1 through 3 of this case determine a bounded area on a plot of moisture and density that may be termed the "acceptable range." Figure 1, "Acceptable Moisture-Density Plot for Soil for Case I," illustrates this acceptable range for moisture and density.

A Standard Proctor curve and a Modified Proctor curve are determined and plotted on the same figure. The line of optimums is a line that passes through the maximum point on both the Modified and Standard Proctor curves and is generally parallel to the curve of zero air voids. This line of optimums is one of the bounds of the acceptable range. The other is the horizontal line determined by 90% of the maximum value on the Modified Proctor curve.

3.1.2 Case II

For this case, compaction control to a density below 90% of the maximum Modified Proctor density has been proven in the laboratory and the test fill to be acceptable.

1. The measured in-place moisture content immediately after soil compaction shall always be at, or greater than, the optimum moisture content from the most recent representative Modified Proctor curve developed on soil from the same borrow source.

2. The measured in-place dry density immediately after soil compaction shall be at, or greater than, a density that corresponds to an alternate percent of the maximum Modified or Standard Proctor dry density from the most recent representative Modified Proctor curve developed on soil from the same borrow source. The density limit should be greater than 90% of the Standard Proctor density to prevent incomplete compaction of a very moist soil and the consequent creation of a structurally weak soil mass. The density limit shall be shown to meet the hydraulic conductivity limit of 1×10^{-7} cm/sec maximum or less as demonstrated by remolded laboratory tested samples and by the field bulk hydraulic conductivity test on the test fill and shall be shown to have sufficient structural strength for the intended use.

3. The measured in-place moisture content and the measured in-place dry density immediately after soil compaction shall plot above the line of optimums on a plot of the most recent representative Modified and Standard Proctor curves. The line of optimums shall be a curve that passes through the maximums of both the Standard Proctor curve and the Modified Proctor curve and is parallel to the curve of zero air voids.

4. Compaction to the density required in Requirements 2 and 3 is waived at locations where any effort made to achieve this density would damage underlying geosynthetics, or otherwise prevent the material from achieving its intended function.

Requirements 1 through 3 of this case determine a bounded area on a plot of moisture and density that may be termed the “acceptable range.” Figure 2, “Example Acceptable Moisture-Density Plot for Soil for Case II,” illustrates one example of this acceptable range for moisture density.

A Standard Proctor curve and a Modified Proctor curve are determined and plotted on the same figure. Again, the line of optimums is one of the bounds of the acceptable range. In this second case, the other bound is the horizontal line determined by 90% of the maximum value on the Standard Proctor curve.

3.1.3 Case III

For this case, special compaction control below the line of optimums have been proven in the laboratory and the test fill to be acceptable.

1. The measured in-place moisture content immediately after soil compaction shall always be at, or greater than, the optimum moisture content from the most recent representative Modified Proctor curve developed on soil from the same borrow source.

2. The measured in-place dry density immediately after soil compaction shall be at, or greater than, 90% of the maximum Modified Proctor dry density from the most recent representative Modified Proctor curve developed on soil from the same borrow source.

3. The measured in-place moisture content and the measured in-place dry density immediately after soil compaction shall plot above an alternate line that

is parallel to the line of optimums on a plot of the most recent representative Modified and Standard Proctor curves. The line of optimums is described in Case II above. The alternate line shall be offset by a certain percent moisture from the line of optimums. The offset is arrived at by demonstrating that the soil compacted to a moisture and density, which plots above the alternate line, has a hydraulic conductivity less than or equal to 1 x 10^{-7} cm/sec as demonstrated by remolded laboratory tested samples and by the field bulk hydraulic conductivity test on the test fill. The compacted soil shall have sufficient structural strength for the intended use as demonstrated by laboratory triaxial strength tests.

4. Compaction to the density required in Requirements 2 and 3 is waived at locations where any effort made to achieve this density would damage underlying geosynthetics, or otherwise prevent the material from achieving its intended function.

Requirements 1 through 3 of this case determine a bounded area on a plot of moisture and density that may be termed the “acceptable range.”

Figure 3, “Example Acceptable Moisture-Density Plot for Soil for Case III,” illustrates one example of this acceptable range for moisture and density.

A Standard Proctor curve and a Modified Proctor curve are determined and plotted on the same figure. Similar to Case I, the horizontal line determined by 90% of the maximum value on the Modified Proctor curve is one of the bounds. The other bound is now an alternate line that is parallel to the line of optimums but is offset by a certain percent moisture.

3.2 Additional Moisture Control Details

The moisture content shall be maintained uniform throughout the lift. Whenever the moisture content of the soil at the borrow source is lower than the Modified Proctor optimum moisture content, water shall be added and distributed within the soil sufficiently soon to achieve complete dispersion within the soil mass. Usually this means that water must be added before shipment of the soil to the site. If examination of the most recent representative Modified and Standard Proctor curves indicates that the proper density cannot be reached at its present moisture content, then the material will be dried before compaction. Drying will be accomplished by blading, disking, harrowing or other aeration methods to hasten the drying process. The affected soil will be mixed thoroughly within the loose lift or stockpile to achieve an even distribution of moisture within every loose lift prior to compaction.

If additional moisture must be added at the compaction site, then disking, watering and disking again shall be conducted prior to compaction to achieve an even distribution of moisture within every lift.

4. Variable Soil Properties

In some cases, the borrow source may be so variable that different acceptable zones are needed to describe soils that have significantly different properties. If the soils can be easily distinguished in the borrow pit and/or the construction area, separate acceptable zones can be developed and supplied to field inspectors. If the soils are not easily distinguished, a composite acceptable zone can be developed by overlaying the acceptable zones, as shown on Figure 3. The intersection of the acceptable zones is then the composite Acceptable Zone.

5. Use of Acceptable Zone

The Acceptable Zone can be used directly in the field. Inspectors measuring water content and dry unit weight can plot the field data on the compaction curve. If the data fall in the Acceptable Zone and no visible defects are present, the compaction is deemed acceptable. Otherwise, the soil needs additional processing and compaction.

6. References

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Figures

Figure 1. Acceptable Moisture-Density Plot for Case I

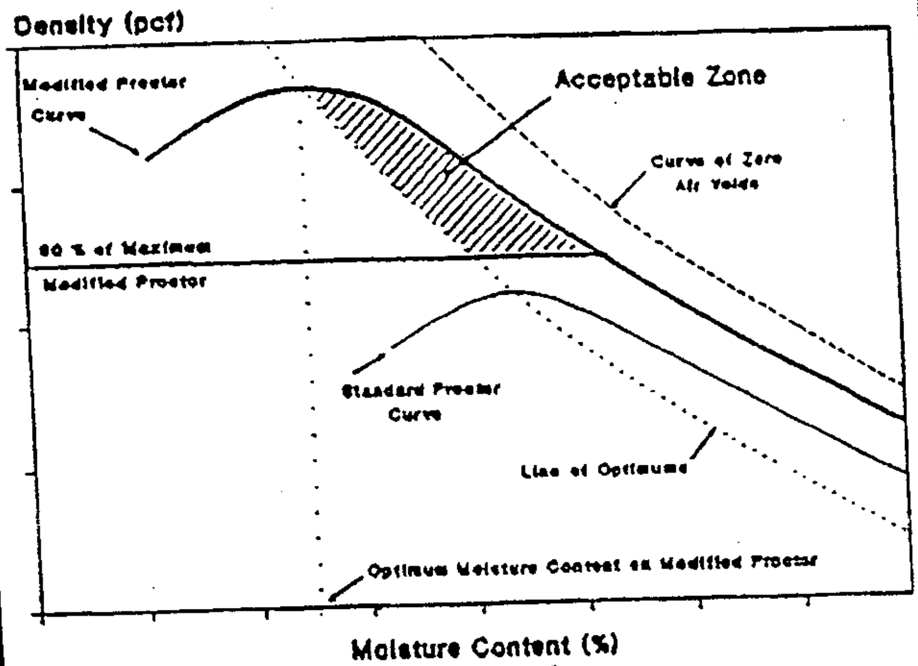


Figure 2. Acceptable Moisture-Density Plot for Case II

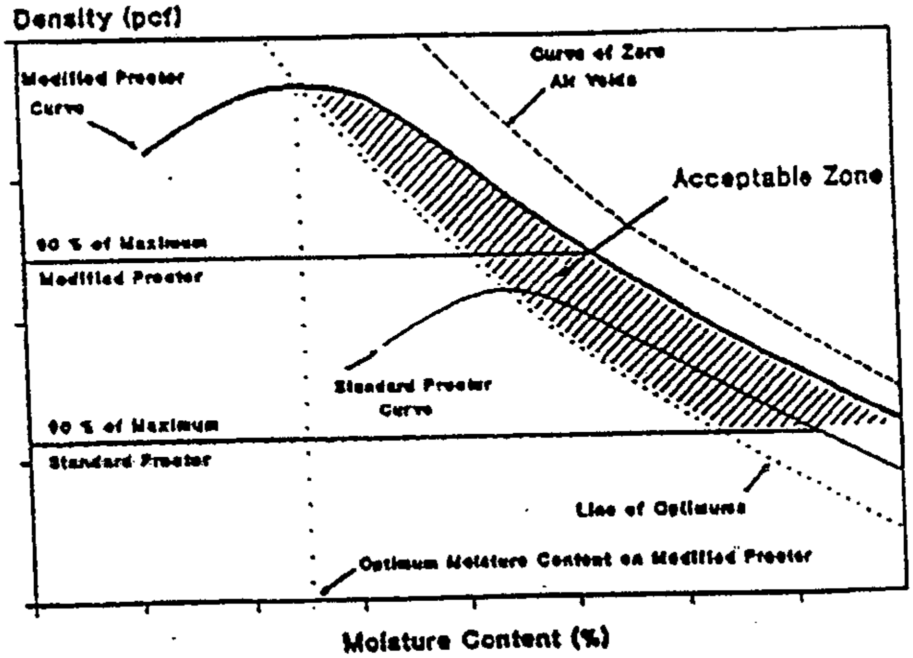
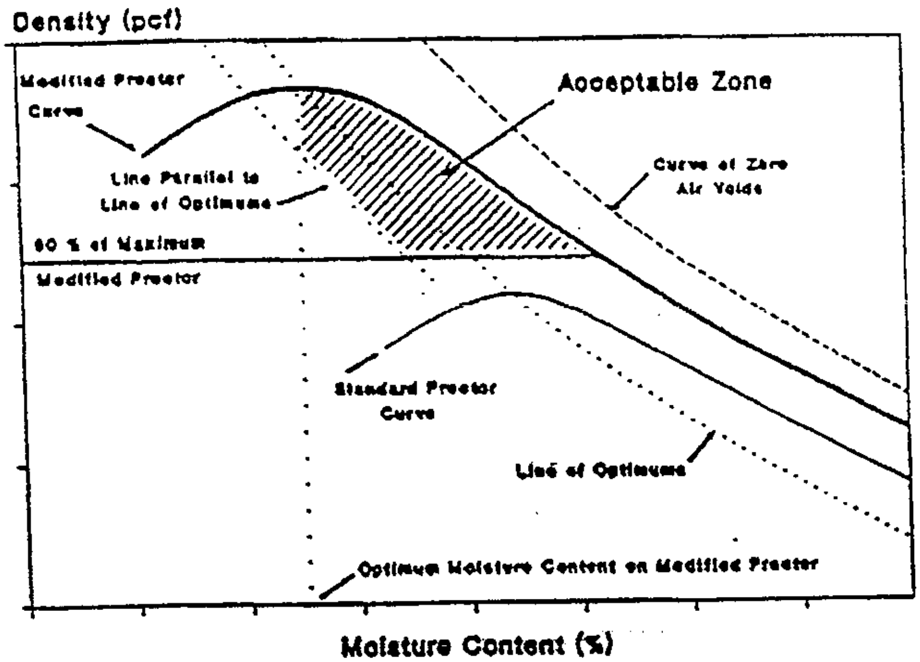


Figure 3. Acceptable Moisture-Density Plot for Case III



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Appendix C

Additional Clay Barrier Placements Required to be Monitored

Infrastructure, environment, buildings

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WASTE MANAGEMENT, INC.

CWM Chemical Services, LLC

Additional Clay Barrier Placements Requirements to be Monitored

Residuals Management Unit 2

Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

April 2003
Revised August 2009

1. Additional Clay Barrier Placement Requirements to be Monitored

The Earthwork Contractor will conform with the additional clay barrier construction requirements listed below. The Soil Quality Assurance Consultant (QAC) will verify through observation and documentation that the requirements are implemented.

1. Soil

   Only natural soil material shall be utilized in the compacted soil barrier. This soil material must be free from roots, organic matter, frost, ice, frozen soil, trash, debris, rocks or slag larger than 1 inch at the finish surface, and other deleterious materials.

   If additional moisture must be added at the compaction site, then disking, watering and disking again shall be conducted prior to compaction to achieve an even distribution of moisture within every lift.

2. Seal Rolling

   Intermediate lifts shall be rolled to seal for protection from infiltration of precipitation. To prepare for subsequent lifts, the sealed surface of intermediate lifts shall be scarified, as necessary, and shall be adjusted to a proper moisture content adequately in advance of subsequent soil placement to achieve a uniform moisture content in the intermediate lift and complete bonding of the lifts to one another.

3. Overworking

   The soil shall not be overworked such that compaction and permeability requirements cannot be achieved, as indicated by test fill or recent actual construction standards. In no case shall an excessively compacted crust be formed on the top of a lift that is too smooth to bond to the next lift or is so brittle that it cracks.

4. Facility Sidewalls

   Soil lifts used to build the facility sidewall liners shall be inclined at approximately the same angle sideslope. Lift interfaces must not traverse the barrier layer, unless special actions are taken to prevent these interfaces from becoming more permeable than the core of lifts.

5. Contact Surfaces

   A. Complete bonding of one placed volume of soil to another shall take place along any and all soil-to-soil contact surfaces. Contact surfaces include but are not limited to:

      1. Berm soil placed over the floor soil that was placed at a previous time;

      2. Newly placed soil subject to desiccation, including hot or freezing conditions; and

      3. Soil from one borrow source that contacts soil from a different borrow source.

   B. At a minimum, the previously placed soil shall be scarified and, if needed, adjusted to a proper moisture content. Frozen soil shall be removed from the liner area. If differences in the soil types are encountered or if incomplete bonding occurs, then the contact surface shall be stepped and/or keyed.

   C. Other contact surfaces as determined by the Soil QAC.

6. Final Surface

   Final lift shall be seal rolled as soon as practical after final compaction to prevent moisture loss.

   Within areas lined with flexible membrane liner (FML), the top surface of each completed soil barrier layer shall be smooth, and the final surface shall be free of stones larger than 1 inch in diameter.

   Surface to be lined with an FML shall be rolled with a smooth drum steel or pneumatic roller free of irregularities, loose earth and abrupt changes in grade. The surface shall be maintained after certification of acceptance of that surface by the Geosynthetic Installer and Soil QAC.

To achieve a seal, the FML shall be installed as soon as practicable after the soil barrier layer is judged acceptable by the Soil QAC. The soil surface shall be observed daily by the Soil QAC and FML Installer to check for soft areas or desiccation cracking.

No FML shall be placed in an area that has become softened by precipitation resulting in substandard strength requirements of 0.5 tons per square feet.

The FML Installer shall provide written acceptance of surface preparation to the Soil QAC prior to any FML installation. Thereafter, the FML Installer shall provide the Soil QAC with daily written acceptance of the surface to be covered by the FML in that day's operations.

7. Desiccation Crack Control and Repair

Daily or hourly observations shall determine the effects of surface desiccation cracking upon the integrity of soil barrier layer. The FML Installer shall take precautions for reducing the desiccation potential of the final soil surface prior to installation of any FML or succeeding layer (i.e., installation of a temporary FML cover, application of water or prompt placement of succeeding layers).

A temporary FML cover, such as a 10-mil polyethylene or other available FML, may be used as temporary protection for soil. A temporary FML should be overlapped 1 foot and does not need to be seamed. Temporary FML must be removed prior to placement of the design FML or succeeding layer.

Minor soil barrier layer cracks from desiccation that are visible but too narrow to measure depth may be repaired by re-wetting and allowing for sufficient time for crack healing.

The method for measuring any crack depth shall be the insertion of a 20-gauge wire. This method will remain consistent throughout soil barrier layer construction. If cracks exhibit bends that interfere with or prohibit crack measurement, then hand shovels will be used to excavate soil to assist in depth measurement. Any holes excavated with a hand shovel will be repaired by complete filling with dry powdered bentonite/clay mixture hand tamped in place.

In the event that measurable desiccation cracks develop on the soil surface, the following corrective procedures will be followed:

A. For cracks measuring 2 inches in depth or less, a dry powdered bentonite may be used for repairing, provided that the cracks do not have sharp bends that would interfere with complete filling of the crack with bentonite. If dry powdered bentonite is used, the cracks should be completely filled with bentonite. If this procedure is not used, then the following procedure must be used. Alternatively, a water truck may apply water over the surface, followed by smooth drum rolling.

B. If cracks deeper than 2 inches but less than the depth of penetration of the disking blade (depth of penetration is defined as 75% of the distance measured from the axle to the edge of blade) are present, addition of bentonite will not be acceptable, and the surface shall be rewetted, disked, re-compacted and retested, or the lift will be removed and the exposed soil will be scarified with a disk to the full depth of the cracks, if any remain. The soil barrier layer will be re-compacted in conformance with applicable requirements. If this procedure is not used, then the following procedure (below) must be used.

C. If cracks deeper than the depth of penetration of the disking blade are observed, the lift shall be removed; exposed soil scarified with a disk to full depth of the cracks, and re-compacted in conformance with the applicable requirements.

D. For cracks deeper than 2 inches in areas with limited access, an acceptable method for repairing cracks is as follows:

   1. Open the crack with a hand shovel or pick to the depth of the crack;

   2. Fill void with clay fines or a bentonite powder/clay mixture; and

   3. Compact clay/bentonite mixture with hand tools.

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Appendix D

Parties Involved

APPENDIX D
PARTIES INVOLVED

PROJECT MANAGER

Name: ______________________________
Title: ______________________________
Company Name: ______________________________
Address: ______________________________
City: ______________________________
State: ______________________________
Zip Code: ______________________________
Telephone: ______________________________
Fax: ______________________________
E-mail Address: ______________________________

ENGINEER

Representative: ______________________________
Title: ______________________________
Company Name: ______________________________
Address: ______________________________
City: ______________________________
State: ______________________________
Zip Code: ______________________________
Telephone: ______________________________
Fax: ______________________________
E-mail Address: ______________________________

GEOSYNTHETIC MANUFACTURER

Representative: ______________________________
Title: ______________________________
Company Name: ______________________________
Address: ______________________________
City: ______________________________
State: ______________________________
Zip Code: ______________________________
Telephone: ______________________________
Fax: ______________________________
E-mail Address: ______________________________

EARTHWORK CONTRACTOR

Representative: ____________________
Title: ____________________
Company Name: ____________________
Address: ____________________
City: ____________________
State: ____________________
Zip Code: ____________________
Telephone: ____________________
Fax: ____________________
E-mail Address: ____________________

EARTHWORK CONTRACTOR SUPERINTENDENT

Name: ____________________
Company Name: ____________________
Address: ____________________
City: ____________________
State: ____________________
Zip Code: ____________________
Telephone: ____________________
Fax: ____________________
E-mail Address: ____________________

GEOSYNTHETIC INSTALLER

Contract Representative: ____________________
Title: ____________________
Company Name: ____________________
Address: ____________________
City: ____________________
State: ____________________
Zip Code: ____________________
Telephone: ____________________
Fax: ____________________
E-mail Address: ____________________

GEOSYNTHETIC INSTALLER SUPERINTENDENT

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GEOSYNTHETIC INSTALLER MASTER SEAMER

Name: ______________________________
Company Name: ______________________________
Address: ______________________________
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E-mail Address: ______________________________

SOIL QUALITY ASSURANCE CONSULTANT

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SOIL QUALITY ASSURANCE CONULTANT MANAGING ENGINEER

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GEOSYNTHETIC QUALITY ASSURANCE CONSULTANT

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GEOSYNTHETIC QUALITY ASSURANCE CONSULTANT MANAGING ENGINEER

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SOIL QUALITY ASSURANCE LABORATORY

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GEOSYNTHETIC QUALITY ASSURANCE LABORATORY

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LAND SURVEYOR

Representative: ______________________
Title: ______________________
Company Name: ______________________
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Appendix E

Leister Bond Procedures

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WASTE MANAGEMENT, INC.

CWM Chemical Services, LLC

Leister Bond Procedures

Residuals Management Unit 2

Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

April 2003
Revised August 2009

1. Quality Assurance Monitoring Plan for Leister Bond Procedure

1.1 Purpose

The purpose of this plan is to establish a quality assurance (QA) plan for monitoring the leister bond method on high-density polyethylene (HDPE) geomembrane seams and repairs and geotextiles (including the geotextile component of geocomposites). Leister welds will be used to tack HDPE geomembrane sheets prior to extrusion welding and in limited use of performing geotextile repairs. Observance, by all parties, of a specific quality control protocol for the leister bond method, and assurance that no damage to the HDPE geomembrane and geotextile occurs as a result of this process is required.

1.2 Restricted Use

Use of the leister bond method for geomembranes shall be restricted to seam lengths where the extrusion seaming method is used. Extrusion seams may occur at the following locations:

1. Patches and cap strips;

2. Areas where the use of a fusion welder is physically impossible or is cumbersome and impractical. Such areas might include sump areas, short seam lengths or corner areas; and

3. Penetration points, such as boots around pipes.

The use of the leister bond method should be employed only in cases where the use of the extrusion seaming method is preferred over the fusion seaming method.

The use of the leister bond method for geotextiles (and geotextile components of the geocomposite) shall only be employed in cases where sewing geotextiles is not practical.

1.3 Leister Bonding Procedures for Geomembranes

1. Direction of seaming on slopes shall be the most expedient direction for the type of seaming used. Seaming shall extend to the outside edge of panels to be placed or as otherwise approved in writing by the manufacturer and

deemed acceptable by the New York State Department of Environmental Conservation (NYSDEC).

2. Lap joints shall be used to seam factory-fabricated HDPE geomembrane sheets together in the field. All field joints shall be made on a supporting smooth surface.

3. Set air discharge temperature typically at 250 degrees Celsius (^{o}C) to 270°C. This temperature may vary based on field conditions and on the adequacy of the temporary leister bond. The hot air discharge must always be below the true welding temperatures of 295°C for 80-mil HDPE geomembrane. Other temperatures for differing HDPE sheet thickness will be as per the manufacturer's specifications.

4. Align HDPE geomembrane with a minimum 3-inch overlap for seams and 6-inch overlap for patches and cap strips.

5. Insert air discharge nozzle between the overlap of the two HDPE geomembrane sheets and manually progress the nozzle along the overlap while, at the same time, compressing the heated overlap surface. At no time should the leister contact with a specific point on the FML exceed 10 to 15 seconds. (Estimated time for total burn-through on 80-mil HDPE at 250°C is 60 seconds.)

6. The following criteria for leister or "tack" bonds shall be observed:

   A. Ordinary Circumstances

      Under "ordinary" circumstances for patches or cap strips that are more than 2 feet in length on any one side, the leister bond spacing shall be a minimum of 2 feet in length, and a maximum of four leister bonds shall be allowed on each patch. Leister bonds that are used on a patch or cap strip shall at no time exceed 5 inches in length.

   B. Extraordinary Circumstances

      Leister bonding of patches or cap strips in a continuous fashion is proposed for "extraordinary" circumstances, such as imminent bad weather or difficult HDPE geomembrane configurations or conditions.

This procedure shall provide a surface-type "tack" bond to secure HDPE geomembrane overlaps prior to extrusion seaming.

1.4 Leister Bonding Procedures for Geotextiles

1. Set air discharge temperature to the manufactures' recommended temperature for specific geotextile unit weights and material type.

2. Align geotextile with a minimum 12-inch overlap in all directions.

3. Insert air discharge nozzle between the overlap of the two geotextile sheets and manually progress the nozzle along the overlap while, at the same time, compressing the heated overlap surface. At no time should the leister contact with a specific point on the geotextile cause excessive damage to either layers of the geotextile (excessive damage shall be determined by the LGM).

4. Leister bonding to be performed in a continuous fashion.

1.5 Quality Control Procedures

1. As part of the extrusion welding trial seam, the leister bond method is typically used to secure the two remnant pieces of HDPE geomembrane. An approximately 6-inch portion of the trial seam will be left unwelded so as to allow direct observation of the leister bond. On all trial seams, both the extrusion gun operator and the leister operator will be recorded. Trial seams will not be required for geotextiles.

2. Shear specimens for the extrusion method trial seam can be biased so as to include a section of the trial seam that has been "leistered" together. The field tensiometer is capable of reading load values. The load value for each shear test specimen shall be recorded, with a minimum passing value of 160 pounds per square inch; in peel, Film Tear Bond must be achieved.

3. The surface of the lapped edges of any embossed and/or textured sheets shall be prepared, as recommended by the manufacturer, to provide a seam to equal or exceed the bonded seam strength requirement specified. The fusion weld shall have a 2-inch minimum width. The extrusion welding process shall bond the exposed edge of the panel to the underlying HDPE geomembrane.

4. All leister bonds for geomembranes and geotextiles in the field will be 100% visually observed for overheating by the Master Seamer and/or field superintendent. In addition, technicians will maximize, as is practical, the spacing between individual leister "tacks."

5. When the leister tool is not in use, the switch shall in the "off" position, and care will be taken to avoid contact with geomembrane or geotextile by the nozzle until it has cooled.

6. It is not intended that the motor-propelled leister be used on this project.

The Geosynthetic Quality Assurance Consultant (QAC) shall verify the following:

1. The seaming personnel have the appropriate qualifications;

2. The overlaps meet the requirements;

3. The seaming area is clean;

4. Subgrade is hard, and no soft spots are present;

5. Seaming equipment is available on site and meets the requirements;

6. Weather conditions for seaming are acceptable;

7. Seaming procedures are followed;

8. All cap-snips required in an earlier section are placed;

9. Equipment for testing seams is available on site; and

10. Panels are properly positioned to minimize wrinkling, and the wrinkled areas are seamed according to the procedures presented in the Construction Quality Assurance Manual (CQAM) and Project Specifications.

1.5.1 Testing Requirements

1. For each extrusion weld trial seam, the leister bond will be employed to secure the overlap prior to welding. Approximately 6 inches of the trial seam will be

left unwelded to as to allow easy observation at the leister bond. The Geosynthetic QAC representative shall observe and document the condition of the leister bond on the unwelded portion of the seam and record the name of the leister operator.

Extrusion weld trial seam coupons will be cut using a 1-inch-wide die and removed from "leistered" portions of the trial seam. The peel adhesion and shear strength criteria shall, at a minimum, equal or exceed Project Specifications and criteria recommended in Table 4 of the National Sanitation Foundation (NSF) Standard No. 54-1991. Any trial seam test coupon that does not meet any of these test criteria will be considered a failure. Follow-up procedures for failed trial seams are stated in Section 9.10 of the CQAM.

Additionally, the Geosynthetic QAC monitor shall determine whether any failure in a test seam coupon was a result of the use of the leister. If it is determined that the cause of failure was from the use of the leister, then that leister operator will be disqualified for the day.

2. Destructive testing of extrusion weld field seams that contain leistered tack welds will be subjected to NSF Standard No. 54 test criteria. Any test coupons that fail to meet these criteria will be considered a failure. If any more than one test coupon in the shear or peel strength test fails to meet the NSF Standard No. 54 test criteria, the test will be considered a failure and will be repaired as stated in Section 9.10.3 of the CQAM. In addition, the laboratory technician performing the test will observe the yield areas of all extrusion weld destructive test coupons and record whether the yield originated in the leistered area.

3. For leister bonded geotextiles, the LGM shall observe the placement of cover materials over the geotextile to ensure the leister bonded area does not become detached during placement of overlying materials.

1.5.2 Field Applications

1. The operating temperature of each leister tool in use will be recorded at least daily by the Geosynthetic QAC and compared against the typical operating temperature.

2. The Geosynthetic QAC Inspector shall periodically observe the field use of the leister procedure and report cases of abuse.

3. If a particular leister operator is abusive in the field or does not appear to be knowledgeable about leistering procedures, the operator may be disqualified from leistering on the recommendation of the Geosynthetic QAC to the Owner or Project Manager.

4. In extraordinary cases, such as anticipated events of rain or high winds or in areas, such as the crest and toes of slopes, continuous leister of geomembrane patches may be allowed but only with supplemental approval from the QA Officer. The QA Officer shall document the circumstances of approval and consult the NYSDEC construction observer immediately if available or, if not available, at the next earliest time.

5. The Project Manager shall be notified if installer does not follow the procedures outlined in the approved Quality Control Protocol for the use of the leister.

ATTACHMENT K

Application Appendix D-9 - RMU-2 Landfill Response Action Plan

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WASTE MANAGEMENT

CWM Chemical Services, LLC

Response Action Plan

Residuals Management Unit 2

Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

April 2003
Revised August 2009
Revised August 2013

Appendices

1. Introduction

1.1 General

CWM Chemical Services, LLC (CWM) owns and operates the Model City Treatment Storage, Disposal, and Recovery (TSDR) Facility (Model City Facility), in Niagara County, New York. The Model City Facility is regulated at the federal level under the Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act. Since the United States Environmental Protection Agency (USEPA) has delegated the implementation of the RCRA regulations to the New York State Department of Environmental Conservation (NYSDEC), the Model City Facility operates under an NYSDEC-issued Permit pursuant to Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Part 373. The general site layout, shown on Permit Drawing No. 2 of the permit drawing set, comprises waste receiving areas, storage and mixing tanks, chemical treatment facilities, biological treatment impoundments, and secure landfills. Current operations include treatment, recovery, stabilization, disposal, and transfer of hazardous and industrial non-hazardous waste.

As part of the permit application for Residuals Management Unit 2 (RMU-2) and as required by 6 NYCRR Part 373-2.14(o), a Response Action Plan (RAP) must be approved prior to receipt of any waste. The RAP is a site-specific plan that the owner develops to address leakage through the primary liner and into the secondary leachate collection systems (SLCSs) to minimize the potential migration of liquids out of the unit. This RAP, which is part of CWM's overall leachate management program, describes the criteria used to establish key inflow rates to the SLCSs that require the implementation of certain response actions as described herein. RMU-2 consists of six cells, each divided by a cell separation berm. This RAP pertains to all six cells. The layout of RMU-2, including the cell orientation and designations, is shown on Permit Drawing No. 5.

This RAP addresses the potential sources of inflows to the SLCSs in RMU-2 and discusses the development of site-specific performance characteristics for the individual cells comprising RMU-2. It should be noted that liquids encountered in the SLCSs of RMU-2 are not necessarily derived from contact with waste materials. Depending on the rate, responses to inflows of liquids into the SLCSs of RMU-2 include no action, modifying operating procedures, and, where appropriate, notifying the USEPA and the NYSDEC. The various response actions are described in Section 4.

1.2 Action Leakage Rate and Response Rate

In accordance with 6 NYCRR Parts 373-2.14(n) and (o), this RAP presents the Action Leakage Rate (ALR) for the cells within RMU-2, which is the primary trigger to implement a response action. The ALR is based on the maximum flow rate that the SLCS can collect and remove from the cell without the fluid head on the secondary liner exceeding 1 foot. Consistent with the Residuals Management Unit 1 (RMU-1) RAP, this RAP also presents a secondary trigger level known as the Response Rate (RR). The RR is based on the anticipated maximum inflow to the SLCS that could be expected under normal operating conditions. The RR could be used in identifying potential problems with the primary liner by alerting CWM personnel to unanticipated inflows to the SLCS. The trigger levels are presented both as “unit-specific” and “cell-specific.” The term “unit-specific” relates to a unit area (e.g., 1 acre), whereas “cell-specific” is a function of each cell area. (Unit-specific rates are presented in terms of gallons per acre per day [gpad]; cell-specific rates are presented in terms of gallons per day [gpd]). The development of the ALR and RR values is discussed in greater detail in Sections 2 and 3, respectively.

1.3 RMU-2 Overview

The facility has been a waste TSDR facility since 1972. The portion of the Model City Facility accommodating RMU-2 encompasses approximately 43.5 acres (as measured to the outside toe of the perimeter mechanically stabilized earth wall). RMU-2 is divided into six cells that are separated hydraulically from each other by intercell berms. The size of the six cells varies from approximately 5.77 acres to 6.32 acres (as measured planimetrically to the centerlines of the intercell berms and the top of slope for the sideslope liner system).

1.3.1 RMU-2 Liner System Description

RMU-2 has been designed to meet or exceed the requirements for hazardous waste landfills as specified in 6 NYCRR Part 373-2.14. As shown on Permit Drawing No. 15, the RMU-2 liner system consists of the following components (in descending order):

- *Primary Leachate Collection System*
  - 1 foot of operations layer stone on the cell floors and 2 feet of operations layer stone on the cell sideslopes;

- A layer of non-woven geotextile on the cell floors;
- 1 foot of granular drainage material on the cell floors with an 8-inch-diameter perforated leachate collection pipe along the cell centerline; and
- A layer of geocomposite on the cell floors and sideslopes.

· *Primary Liner System*

- An 80-mil textured high-density polyethylene (HDPE) geomembrane on the cell floors and sideslopes; and
- A geosynthetic clay liner (GCL) layer on the cell floors (which extends a minimum of 15 feet up the cell sideslopes) that provides a maximum equivalent hydraulic conductivity equal to or less than 1.5 feet of compacted clay with a hydraulic conductivity of 1×10^{-7} centimeters per second (cm/s).

· *Secondary Leachate Collection System*

- A layer of non-woven geotextile on the cell floors;
- 1 foot of granular drainage material on the cell floors with an 8-inch-diameter perforated collection pipe along the cell floor centerline; and
- A layer of geocomposite on the cell floors and sideslopes.

· *Secondary Liner System*

- An 80-mil textured HDPE geomembrane on the cell floor and sideslopes; and
- 3 feet of compacted glacial till or other suitable clay having a maximum hydraulic conductivity of 1×10^{-7} cm/s on the cell floor and sideslopes.

On the RMU-2 perimeter sideslopes, the granular drainage layer of the primary leachate collection system (PLCS) has been omitted (consistent with RMU-1). However, both the primary and secondary HDPE geomembranes extend up the perimeter sideslopes. A 2-foot-thick operations layer will be maintained over the PLCS on the sideslopes during waste placement to protect the underlying geocomposite and geomembrane from damage by operating equipment. The operations layer on the cell floors and sideslopes will be run-of-crush stone or equal.

A low-permeability cut-off wall will be keyed at least 1 foot into the Glaciolacustrine Clay layer (discussed in Section 1.3.3 below), as shown on Permit Drawing No. 15. The cut-off wall will significantly restrict lateral groundwater flow beneath RMU-2 after it is constructed.

1.3.2 Liquid Collection and Removal from the Leachate Collection Systems

Each cell within RMU-2 is separated hydraulically from adjacent cells by cell separation berms. Each cell is equipped with both a PLCS and an SLCS and separate riser pipes for each system. The PLCSs and SLCSs are designed and managed to control and remove liquids in a manner consistent with the requirements of 6 NYCRR Part 373-2.14(c)(3)(ii) and (iii). Sumps located at the low point of individual cells collect liquids that enter the leachate collection systems. Liquids that collect in the PLCSs and SLCSs will be removed by pumping through the HDPE sideslope riser pipes. Liquids will be removed from each PLCS at regular intervals with dedicated automatic pumps to provide effective leachate management and to minimize the hydrostatic head on the primary liner. The performance of the PLCSs of RMU-2 will be monitored based on regular documentation of the liquid volume encountered in and removed from the SLCSs of the six cells.

1.3.3 Geologic and Hydrogeologic Setting

Numerous past investigations have been conducted throughout the Model City Facility. Geologic and hydrogeologic investigations for the entire Model City Facility have been performed and were submitted to the NYSDEC and the USEPA in March 1985 (*Hydrogeologic Characterization*, Golder Associates, Inc. [Golder], March 1985). Two updates to the 1985 hydrogeologic report were prepared and submitted in 1988 (*Hydrogeologic Characterization Update*, Golder, February 1988) and in 1993 (*Hydrogeologic Characterization Update*, Golder, June 1993). These studies detail the physiography, drainage, regional geology, site stratigraphy, hydrogeology and site hydrologic parameters. In terms of hydrogeology, these studies focused on defining the uppermost aquifer underlying the Model City Facility, groundwater flow direction and rates. A supplemental geologic investigation within the footprint of RMU-2 was also performed and presented in a letter report entitled *Geotechnical Investigation for Proposed Residuals Management Unit Number 2 Western Expansion Area* (Golder, December 2002). In general, the 2002 geotechnical investigation confirmed the geologic findings presented in the 1985, 1988 and 1993 site-wide investigations. Additional hydrogeologic investigations were performed by Golder in 2004 and again in 2009 to obtain geological and subsurface site stratigraphy data specific to the proposed RMU-2 location. The 2009 investigation was summarized in a report entitled *Landfill Footprint Analytical Data Study and Western Boundary Relocation Investigation, Residuals Management Unit Number 2* (Golder, August 2009). Additionally, groundwater elevation was collected in 2008 in the area of the proposed RMU-2. Copies of the 2002 and 2009 Golder reports are presented in Appendices A-2 and A-4, respectively, of the *RMU-2 Engineering Report* (ARCADIS, April 2003, revised June 2013).

The facility is situated on the Ontario Plain that is an area of low topographic relief between the Niagara Escarpment and Lake Ontario. The upper portion of the stratigraphy at the Model City Facility generally includes low-permeability silt and clay tills over Glaciolacustrine Clay, underlain by a Glaciolacustrine Silt/Sand unit. Beneath these units is a lodgment of till (Basal Red Till) above shale bedrock. Over the northwestern portion of the Model City Facility, the Glaciolacustrine Clay is separated into an upper and lower member by a silt till (Middle Silt Till). Because of variations in topography, the thickness of the prevailing materials and the subbase depth of the cells, RMU-2 penetrates either one or both of the Upper Tills and the Glaciolacustrine Clay units.

In general, a varying thickness of in-situ glacial till will be left in place above the in-situ Glaciolacustrine Clay formation to withstand hydrostatic pressures and provide a suitable surface for construction equipment. The thickness of glacial till varies because of the irregularity of the surface of the Glaciolacustrine Clay. However, in particular areas, the entire in-situ glacial till may be removed in order to accommodate excavation grades in certain sump elevations. Natural surface elevations in the vicinity of RMU-2 are approximately 320 feet above mean sea level.

The typical hydraulic conductivity values of the geologic formations indicate that the Glaciolacustrine Silt/Sand stratum is the most permeable geologic unit and forms the uppermost aquifer underlying the Model City Facility. The Silt Till, Clay Till and Glaciolacustrine Clay above this aquifer are very low-permeability materials and restrict aquifer recharge from infiltration. The Basal Red Till and bedrock beneath the aquifer are also low-permeability units, although the shallow, weathered bedrock is more permeable than the deep bedrock.

Water level data collected on May 15, 2001 and in October 2004 from wells screened in the Glaciolacustrine Silt/Sand unit appear to represent the period of greatest piezometric heads for the confined aquifer since regular recording of site-wide groundwater elevation data began in the early 1980s. Of these two monitoring events, the May 2001 levels were found to be more critical (i.e., higher) and, thus, governed the establishment of design elevations for the RMU-2 cells. The May 2001 levels were also used to estimate the inflow rate of groundwater through the secondary liner (see Section 3).

2. Action Leakage Rate

2.1 General

The purpose of this section is to quantify the ALR for each cell within RMU-2. The NYSDEC defines the ALR as the maximum design leakage rate that the SLCS can remove without the fluid head on the secondary liner exceeding 1 foot. As such, the ALR is dependent on the hydraulic capacities of the various components of the SLCS. The ALR for RMU-2 is established by evaluating each component of the SLCS to determine the limiting component (i.e., the component having the least hydraulic capacity that would cause the fluid head on the secondary liner to exceed 1 foot). A factor of safety is typically applied to the hydraulic capacity of the limiting component to arrive at the actual ALR. The individual flow rate components that are used to determine the ALR are discussed in the following section. The ALR calculation is presented in Appendix A and summarized in Section 2.3.

2.2 ALR Flow Rate Components

The following hydraulic capacities for the various SLCS components are calculated to determine the ALR for each cell:

- Flow rate through the 8-inch-diameter perforated leachate collection pipe along the cell centerline;
- Flow rate through the geocomposite that drains directly to the SLCS sump;
- Flow rate through the drainage stone surrounding the perforated section of the 24-inch-diameter sideslope riser pipe within the SLCS sump; and
- Flow rate through the perforations in the horizontal portion of the sideslope riser pipe.

The analysis of each of these components is discussed in greater detail below.

2.2.1 Flow Rate through the Leachate Collection Pipe

Each cell within RMU-2 contains a perforated leachate collection pipe along the cell centerline that discharges into the sump. The leachate collection pipe collects liquids from the majority of the geocomposite in each cell (a portion of the geocomposite in each cell drains directly into the sump and bypasses the leachate collection pipe). The capacity of the leachate collection pipe is designed to exceed the contributing maximum flow rate from the geocomposite. Consequently, the maximum flow rate conveyed through the leachate collection pipe is assumed to equal the maximum possible flow rate from the contributing geocomposite. This flow rate is estimated by multiplying the flow per unit width through the geocomposite by two times the length of the leachate collection pipe length. The factor of two accounts for the entry of liquids from both sides of the leachate collection pipe.

2.2.2 Flow Rate through the Geocomposite Draining Directly into the SLCS Sump

As described above, a portion of the geocomposite in each cell bypasses the leachate collection pipe and drains directly into the sump. The maximum flow rate conveyed into the sump via this mechanism is estimated by multiplying the flow per unit width through the geocomposite by the perimeter of the SLCS sump.

2.2.3 Flow Rate through the Drainage Stone Surrounding the Perforated Section of the Sideslope Riser Pipe within the SLCS Sump

Liquids that drain into the SLCS sump from the surrounding geocomposite and the leachate collection pipe must permeate through the stone surrounding the perforated section of the sideslope riser pipe and pass through the perforations. The maximum flow rate through the drainage stone is computed using Darcy's law and a flow net for the drainage stone surrounding the perforated portion of the sideslope riser pipe.

2.2.4 Flow Rate through the Perforations in the Horizontal Portion of the Sideslope Riser Pipe

Liquids that flow through the drainage stone surrounding the perforated portion of the sideslope riser pipe must ultimately pass through the perforations themselves. The flow rate through the perforations is determined from calculations presented in Appendix E-3 of the RMU-2 Engineering Report, which are based on the orifice equation and the effective head on each perforation in the sideslope riser pipe.

2.3 ALR Values

For all cells within RMU-2, the limiting flow rate is determined to be the flow rate through the geocomposite that drains directly into the sump (discussed in Section 2.2.2). Because this flow rate is dependent on the post-settlement slope of the cell floor, the ALRs are cell-specific (i.e., the ALR per unit area differs from one cell to the next). The calculated ALRs are summarized in the following table. As discussed above, these ALRs are calculated by multiplying the limiting flow rate by a factor of safety. To maintain consistency with the RMU-1 RAP, a factor of safety of two is applied to the calculated ALRs, as recommended by the USEPA.

Table 1: Calculated ALR Values

Cell	Cell-Specific ALR [gpd]	Cell Area[1] [acres]	Unit-Specific ALR [gpad]
15	31,458	6.07	5,183
16	30,700	6.12	5,016
17	31,670	5.81	5,451
18	34,901	5.77	6,049
19	30,054	5.77	5,209
20	30,700	6.32	4,858

Notes:

1. Cell area is the planimetric area as measured to the centerlines of intercell berms and the top of slope for the sideslope liner system.

Based on the lowest unit-specific ALR shown above, a unit-specific ALR of 4,858 gpad is selected for every cell in RMU-2. This unit-specific ALR value is multiplied by each cell area to calculate a cell-specific ALR, as summarized in the following table.

Table 2: Final ALR Values

Cell	Unit-Specific ALR[1] [gpad]	Cell Area[2] [acres]	Cell-Specific ALR [gpd]
15	4,858	6.07	29,488
16	4,858	6.12	29,731
17	4,858	5.81	28,225
18	4,858	5.77	28,031
19	4,858	5.77	28,031
20	4,858	6.32	30,703

Notes:

1. Unit-specific ALR is based on the minimum calculated value (Cell 20) from Table 1.
2. Cell area is the planimetric area as measured to the centerlines of intercell berms and the top of slope for the sideslope liner system.

3. Response Rate

3.1 General

The purpose of this section is to quantify the RR for each cell within RMU-2. As described earlier in this RAP, the RR is the anticipated maximum inflow to the SLCS that could be expected under normal operating conditions. The individual flow rate components that are used to determine the RR are discussed in the following section. The RR calculation is presented in Appendix B and summarized in Section 3.3.

3.2 RR Flow Rate Components

In order to estimate the RR, it is necessary to identify potential inflow sources to the SLCS and estimate the peak anticipated inflow to the SLCS from each source. The following potential inflow sources to the SLCS are considered in the estimation of the RR:

- Leakage and permeation of liquids through the primary liner due to 1 foot of hydrostatic head on the primary liner;
- Leakage and permeation of groundwater through the secondary liner; and
- Leakage and permeation of consolidation water from the compacted clay layer in the secondary liner.

Construction liquids (i.e., liquids that have entered the cell during the SLCS construction period) are not considered in the RR because these liquids will have been collected by the SLCS during the earlier stages of cell operation. Furthermore, because the liner system of RMU-2 utilizes a GCL in the primary liner in lieu of the 1.5-foot-thick compacted clay layer used in RMU-1, the RMU-2 RR calculation does not consider the generation of liquids from the consolidation of a primary clay layer. The potential inflow sources to the SLCS are discussed in greater detail below and in Appendix B.

3.2.1 Leachate Inflow through the Primary Liner

Leakage and permeation through the primary liner is considered one of the three main long-term sources for liquids entering the SLCSs. Higher heads on the primary liner will cause a corresponding increase in flow to the SLCS due to permeation and leakage through the primary geomembrane. In addition, increased flows above the PLCS increase the probability of liquids coming in contact with a defect in the primary HDPE geomembrane, particularly on landfill perimeter sideslopes. The computation of leakage and permeation rates through the primary liner is discussed separately in the following sections.

3.2.1.1 Leakage of Leachate through the Primary Liner

Past studies have shown that, even when good construction practices are followed and thorough construction quality control/quality assurance procedures are used, several defects in the geomembrane may typically occur per acre during the course of installation. Defects in the form of pinholes are also known to occur during the manufacturing process. The frequency and size of these installation and manufacturing defects are estimated from the *Hydrologic Evaluation of Landfill Performance (HELP) Model User's Guide for Version 3* (USEPA, September 1994).

Leakage through defects in the primary liner geomembrane will occur whenever a hydrostatic head exists on the primary liner geomembrane and is a function of the frequency of defects, their size, head on the geomembrane and the hydraulic conductivity of the material beneath the geomembrane (i.e., the GCL). For the purposes of determining the RR, the leakage rate is estimated assuming 1 foot of head on the primary liner geomembrane. Using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), leakage though the assumed geomembrane defects is estimated to be approximately 0.064 gpad and is the same for all cells within RMU-2.

3.2.1.2 Permeation of Leachate through the Primary Liner

Permeation of liquids through the primary liner will occur whenever a hydrostatic head exists on the primary liner. As with the leakage rate calculation in the preceding section, the permeation rate estimate assumes 1 foot of head on the primary liner geomembrane. In order for liquids to permeate completely through the primary liner and into the SLCS, they must pass through a geomembrane layer and a GCL. The presence of both of these low-permeability layers is accounted for in the permeation rate estimate by combining their individual thicknesses and using an average effective hydraulic conductivity, as recommended in the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994). The resulting permeation rate through the primary liner is 0.028 gpad and is the same for all cells within RMU-2.

3.2.2 Groundwater Inflow through Secondary Liner

In general, the elevations of the components in the secondary liner on the cell floors are below the historical high piezometric head in the confined aquifer (i.e., those recorded in May 2001). The resulting hydrostatic head exerted on the compacted clay layer and geomembrane in the secondary liner will cause groundwater to enter the SLCS by permeation and leakage through the geomembrane, similar to the mechanisms discussed in Section 3.2.1. Although the rate of groundwater inflow to the SLCS is expected to fluctuate due to seasonal variations in groundwater elevations, the presence of this external hydrostatic head is expected continuously throughout the life of the landfill. The computation of leakage and permeation rates of groundwater through the secondary liner is discussed separately in the following sections.

3.2.2.1 Leakage of Groundwater through the Secondary Liner

Leakage of groundwater into the SLCS through assumed defects in the secondary liner geomembrane (refer to Section 3.2.1.1) will occur whenever the confined aquifer piezometric head beneath a given cell exceeds the lowest SLCS elevation for that cell. For the purposes of determining the RR, the leakage rate of groundwater through the secondary liner is estimated using the bottom of the liner system design grades (i.e., subgrades) depicted on Permit Drawing No. 4 and the Glaciolacustrine Silt/Sand unit piezometric heads as measured in May 2001. Using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), leakage of groundwater though the assumed defects in the secondary liner geomembrane is estimated to range from 2.25 to 6.06 gpad and is cell-specific.

3.2.2.2 Permeation of Groundwater through the Secondary Liner

Permeation of groundwater into the SLCS through the secondary liner will occur whenever the confined aquifer piezometric head beneath a given cell exceeds the lowest SLCS elevation for that cell. As with the leakage rate calculation in the preceding section, the permeation rate estimate is based on the design grades for the bottom of the compacted clay layer in the secondary liner and the average piezometric heads from the May 2001 monitoring event. In order for groundwater to permeate completely through the secondary liner and into the SLCS, it must pass through the compacted clay layer and the geomembrane. As discussed in Section 3.2.1.2, the presence of both of these low-permeability layers is accounted for in the permeation rate estimate by combining their individual thicknesses and using an average effective hydraulic conductivity. The flow rate of groundwater through the cell floors due to permeation is estimated to range from 0.09 to 0.24 gpad and is cell-specific.

3.2.3 Consolidation Water Inflow from the Secondary Liner Compacted Clay Layer

Construction of the cell liner system and subsequent waste filling activities result in increasing applied stresses to the compacted clay layer in the secondary liner. The applied stress will continue to increase until final waste grades are achieved and the final cover is installed, and is expected to slowly dissipate over time. The resulting consolidation of the compacted clay layer produces excess pore pressures within the clay, which drive water from the clay layer. The resulting flow rate depends on, and is expected to temporarily lag slightly behind, the filling rate. The inflow of consolidation water to the SLCS is expected to continue well after the closure of the cell and gradually diminish over time. As with the other potential inflow sources discussed thus far, this consolidation water will enter the SLCSs via leakage and permeation through the secondary liner. The computation of leakage and permeation rates of consolidation water through the secondary liner is based on modeling of the fill progression design prepared for Cell 20 (depicted on Permit Drawing No. 8 and discussed separately in the following sections.

3.2.3.1 Leakage of Consolidation Water through the Secondary Liner

The leakage rate of consolidation water through assumed defects in the secondary liner geomembrane is calculated using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), as discussed in previous sections. The hydrostatic head used to calculate leakage is equal to the excess pore pressure produced within the compacted clay layer during consolidation divided by the unit weight of water. The resulting leakage rate through geomembrane defects is estimated to be approximately 35.46 gpad and is the same for all cells within RMU-2.

3.2.3.2 Permeation of Consolidation Water through the Secondary Liner

The permeation rate of consolidation water through the secondary liner geomembrane is estimated using Darcy’s law. The flow rate of consolidation water through the cell floors is estimated to be approximately 1.08 gpad and is the same for all cells within RMU-2.

3.3 RR Values

The individual flow rates into the SLCS from the sources described in Section 3.2 are combined to generate a single unit-specific RR for each cell within RMU-2. The following table summarizes the estimated flow rates into the SLCS from each potential inflow source for each cell within RMU-2.

Table 3: Calculated Unit-Specific RR Inflow Components (from Calculations in Appendix B)

Cell	Leachate Inflow through Primary Liner		Groundwater Inflow through Secondary Liner		Consolidation Water Inflow through Secondary Liner		Combined [gpad]
	Leakage Rate [gpad]	Permeation Rate [gpad]	Leakage Rate [gpad]	Permeation Rate [gpad]	Leakage Rate [gpad]	Permeation Rate [gpad]	
15	0.064	0.028	5.17	0.21	35.46	1.08	42.01
16			6.06	0.24			42.93
17			3.09	0.13			39.85
18			3.77	0.15			40.55
19			4.51	0.18			41.32
20			2.25	0.09			38.97

Although the calculated RR values presented in Table 3 are deemed reasonable, a unit-specific value of 20 gpad has been requested by the NYSDEC based on a recommendation by USEPA for an allowable flow rate in SLCSs of double-lined landfill cells. Consequently, the USEPA recommended value of 20 gpad has been adopted for all RMU-2 cells. The following table presents the final RR value for each cell based on the USEPA recommended unit-specific value of 20 gpad.

Table 4: Final RR Values

Cell	Unit-Specific RR[1] [gpad]	Cell Area[2] [acres]	Cell-Specific RR [gpd]
15	20	6.07	121
16		6.12	122
17		5.81	116
18		5.77	115
19		5.77	115
20		6.32	126

Notes:
1. Unit-specific RR is based on USEPA recommended value.
2. Cell area is the planimetric area as measured to the centerlines of intercell berms and the top of slope for the sideslope liner system.

4. Response Actions

4.1 General

The purpose of this section is to outline the required response actions corresponding to various flow rates in the SLCS sumps of each cell within RMU-2, including the ALRs and RRs calculated in Sections 2 and 3, respectively. For all flow rates, the following procedure is required for monitoring of the SLCS:

- Each SLCS sump will be monitored at least once every 7 days for the presence of liquids. Pumpable amounts of liquids contained in the sump will be removed, and the liquid quantity will be measured and recorded. The inflow value will be determined by adding the liquid volumes removed each week divided by 7 days to establish a daily average inflow for the week. If liquids are removed more frequently than once every 7 days, the inflow will be determined for each pumping event.

4.2 Flow Rates at or Below the RR

Routine monitoring should continue. No action is required.

4.3 Flow Rates Between the RR and the ALR

1. Verbally notify the NYSDEC within 3 working days of an apparent exceedance of the RR. Complete one or more of the following activities to determine whether the apparent exceedance is actually due to an electronic or mechanical equipment malfunction:

    a. Evaluate the SLCS volume data transferred from RMU-2 to the aqueous wastewater treatment system computer terminal by checking recent level trends and alarm summary logs.

    b. Verify proper operation of the SLCS pump via computer control and by manually switching it on and off.

    c. Inspect the SLCS flow meter and verify its proper operation using timed pumping and comparing the estimated volume with the meter flow readings.

d. Remove the SLCS pump and level probe and inspect for any obvious defects. Verify proper operation of level probe by either electrical simulation or by manually placing the probe in water.

2. If the average daily flow to an SLCS sump for a weekly pumping event exceeds the RR and if not conclusively determined within 2 weeks of an apparent RR exceedance to be clearly attributable to an operational failure (e.g., equipment or power failures based on the investigation specified in Item 1 above), the following will be performed:

   a. Conduct a review of the most recent SLCS and PLCS analytical data available from the sampling programs required by the site permit.

   b. Immediately perform the following tests and observations on samples of the SLCS and PLCS liquids:

      – color;

      – turbidity;

      – specific-conductance; and

      – pH.

      Make a preliminary comparison of these values with the previous results and record the information.

   c. Perform, within 1 week after the RR exceedance, the sampling and analysis of the SLCS liquid that would normally occur on a quarterly basis. Test results are to be available within 45 days of the exceedance. Results will be reviewed with the NYSDEC to determine what, if any, additional response actions are necessary based on the results. This sampling will satisfy the next quarterly sampling requirements for that sump and cell.

   d. Increase monitoring and pumping frequency of the SLCS sump of the cell involved, if pumpable quantities are present, to every day until flow decreases below the RR. Also, verify that the automatic removal of liquid from the PLCS sumps is occurring as designed. If the automatic pumping of the PLCS is unable to maintain a level of 12 inches or less in the PLCS, evaluate whether it is necessary to increase the pumping rate and prioritization of that cell.

e. Review all analytical data and investigate alternative sources of liquid.

3. If the flow is between the RR and the ALR for 7 consecutive additional daily pumping events, provide written notification to the NYSDEC within 14 days from the date of determination and implement the following steps:

   a. Remove all standing water, if any, from within the landfill.

   b. Assess the potential cause or causes of the RR exceedance. In the affected cell, examine any exposed portions of the cell liner.

   c. Repair any observed damage.

   d. If no obvious defects are detected, propose mitigative actions to return the leakage rate to below the RR. Upon approval, sequentially inspect sideslope liner and likely locations of base liner, if necessary, removing waste as needed. Repair any observed damage.

   e. Document location, type and extent of liner damage, if any.

4. If the leakage rate cannot be returned and maintained below the RR after all feasible mitigative measures have been taken, automatic pumping and volume measurement of the secondary collection system must be instituted.

4.4 Flow Rates Greater than the ALR

1. Notify, in writing, the USEPA and NYSDEC within 7 working days from the date of determination if the average flow to an SLCS sump for one pumping event exceeds the ALR, if this is not clearly attributable to an operational disturbance. Determine the need to temporarily stop placing waste into the affected cell during the cell's normal operation, unless the ALR value is exceeded within the first 30 days of operation of the cell when flows are not truly representative and unless this occurs during post-closure operations. If the ALR value is exceeded after the first 30 days of cell operation, determine whether waste placement in the cell should cease until repairs to the lining system or other appropriate actions are completed and flows to the SLCS

sump have decreased to below the ALR. Prepare a written preliminary assessment report describing the amount of liquids; likely source of liquids; possible location, size and cause of any leaks and short-term actions taken and planned. Submit this report to the USEPA and NYSDEC within 14 days from the date of determination of exceedance. Waste placement may not resume in the cell until written notification is given by the NYSDEC.

2. Increase monitoring and pumping frequency from the SLCS sump of the cell involved, if pumpable quantities are present, to every day until flow decreases below the ALR. Also, verify that the automatic removal of liquid from the PLCS sumps is occurring as designed.

3. Perform the following tests and observations on samples of the SLCS and PLCS liquids:

   – color;

   – turbidity;

   – specific-conductance; and

   – pH.

   Make a preliminary comparison of these values with the previous results and record the information.

4. Determine, to the extent practicable, the location, size and cause of any leak.

5. Determine other short-term and longer-term actions necessary to mitigate or stop any leaks.

6. Within 30 days after the notification that the ALR has been exceeded, submit to the USEPA and the NYSDEC the results of the analyses of Responses 1 through 5 above, as well as the results of actions taken and actions planned.

7. If the average flow exceeds the ALR for two consecutive pumping events, implement the following steps:

a. Test a sample of the liquid obtained from the SLCS for constituents listed in the table in Appendix C;

b. Remove all standing water inside RMU-2;

c. Examine any exposed portion of the cell liner; and

d. Repair any observed damage.

8. If flow continues to exceed the ALR for an additional two pumping events, provide third-party inspection by a registered professional engineer who will investigate alternative sources of liquid, review available analytical and pumping event data for the cell to identify any trends and prepare a written report to the USEPA and the NYSDEC on the findings and recommended actions to protect human health and the environment. The Groundwater Monitoring Plan will also be evaluated to determine whether supplemental response actions are necessary.

9. As long as the flow rate in the SLCS exceeds the ALR, submit monthly reports to the USEPA and the NYSDEC summarizing actions taken and planned.

10. If the ALR value continues to be exceeded after taking all reasonable corrective measures, closure of the affected cell shall be considered.

ARCADIS

Appendix A

Action Leakage Rate Calculation

ARCADIS

Infrastructure, environment, buildings

Imagine the result

Calculation Sheet

Client: CWM Chemical Services, LLC

Project Location: Model City, New York

Project: RMU-2 Response Action Plan **Project No.: B0023725.2011**

Subject: Appendix A: Action Leakage Rate Calculation

Prepared By: PTO **Date: August 2013**

Reviewed By: BMS **Date: August 2013**

Checked By: PHB **Date: August 2013**

OBJECTIVE:

Determine the action leakage rate (ALR) for the RMU-2 secondary leachate collection system (SLCS).

REFERENCES:

1. Appendix E-1 to the RMU-2 Engineering Report entitled "Liner System Geocomposite Design," ARCADIS, February 2013.

2. Appendix E-2 to the RMU-2 Engineering Report entitled "Leachate Collection Pipe Design," ARCADIS, May 2013.

3. Appendix E-3 to the RMU-2 Engineering Report entitled "Sideslope Riser Pipe Design," ARCADIS, February 2013.

4. RMU-2 Permit Drawing No. 5 entitled "Top of Operations Layer Grades," ARCADIS, February 2013.

5. Appendix C-1 to the RMU-2 Engineering Report entitled "Consolidation Settlement of Glaciolacustrine Clay," P.J. Carey & Associates, PC, August 2009.

6. RMU-2 Permit Drawing No. 12 entitled "Typical Sump Plans," ARCADIS, February 2013.

7. RMU-2 Technical Specification Section 02210 – Earthworks, ARCADIS, February 2013.

ASSUMPTIONS:

1. The pipe-full capacity of the 8-inch-diameter perforated leachate collection pipe along the centerline of the cell floor exceeds the maximum flowrate through the contributing geocomposite layer per Reference 2.

2. The flow capacity through the orifices in the 8-inch diameter perforated leachate collection pipe exceeds the maximum flowrate through the contributing geocomposite layer per Reference 2.

METHODOLOGY:

The ALR is equal to the steady-state flowrate through the SLCS which corresponds to 1 foot of head in the SLCS. In order for leachate to flow through the SLCS, it must be collected and conveyed to the sump (by one of several mechanisms) and then flow into the perforated section of the sideslope riser pipe and

Calculation Sheet

be pumped out. As such, several potentially limiting flowrates are evaluated to determine the ALR. They are:

- Flowrate from the 8-inch-diameter perforated leachate collection pipe along the cell centerline
- Flowrate from the geocomposite that drains directly into the sump
- Flowrate through the drainage stone in the vicinity of the perforated section of the sideslope riser pipe
- Flowrate through the perforations in the horizontal portion of the sideslope riser pipe

CALCULATIONS:

1. Flowrate from the 8-inch Diameter Perforated Leachate Collection Pipe

Based on Assumptions 1 and 2, the flowrate from the 8-inch-diameter pipe is not limited by the pipe-full flowrate or the flow through the orifices. Instead, the limiting flowrate is that of the contributing geocomposite layer. The daily flowrate from the geocomposite into the leachate collection pipe can be calculated as:

$$Q_{Pipe} = \Phi i(2L)$$

where,

Φ = geocomposite transmissivity = 18.6 cm^2/s = 0.020 ft^2/s (per Reference 1)

i = hydraulic gradient = average post-settlement slope of cell floor perpendicular to the leachate collection pipe (per Reference 5)
= 2.45% (Cell 15)
= 2.56% (Cell 16)
= 2.61% (Cell 17)
= 3.18% (Cell 18)
= 2.11% (Cell 19)
= 2.27% (Cell 20)

L = length of leachate collection pipe (later multiplied by 2 to account for flow from both sides of pipe)
= 267 ft (Cell 15)
= 452 ft (Cell 16)
= 644 ft (Cell 17)
= 623 ft (Cell 18)
= 305 ft (Cell 19)
= 408 ft (Cell 20)

$\therefore$ Q_{Pipe} = 0.262 cfs = 169,116 gpd (Cell 15)
= 0.462 cfs = 299,148 gpd (Cell 16)
= 0.672 cfs = 434,544 gpd (Cell 17)
= 0.792 cfs = 512,180 gpd (Cell 18)
= 0.257 cfs = 166,376 gpd (Cell 19)
= 0.370 cfs = 239,438 gpd (Cell 20)

Calculation Sheet

2. Flowrate from the Geocomposite that Drains Directly into the Sump

Because of the cell floor grading, some of the geocomposite does not drain into the 8-inch-diameter leachate collection pipe. Instead, it drains directly into the sump. The daily flowrate from this component can be calculated as:

$$Q_{Geo} = L\Phi i$$

where,

Φ = geocomposite transmissivity (per Reference 1)
= 18.6 cm^2/s = 0.020 ft^2/s for hydraulic gradients of 0.10 or smaller
= 4.7 cm^2/s = 0.0051 ft^2/s for a hydraulic gradient of 0.33

i = hydraulic gradient perpendicular to the rim of the sump (varies depending on which of the four sump edges is analyzed)

L = length of geocomposite draining directly into the sump at the sump rim (varies depending on which of the four sump edges is analyzed)
= 33.1 ft along the sump edges that are parallel with the cell centerline
= 34.9 ft or 31.1 ft along the sump edges that are perpendicular to the cell centerline

The slope of the geocomposite along the two sump edges parallel to the cell centerline is assumed to be equal to the post-consolidation slope perpendicular to the cell centerline (per Reference 5), which were presented above for each cell. The slope of the geocomposite along the sump edge at the toe of the perimeter berm sideslope is assumed to be 33 percent. The slope of the geocomposite along the fourth sump edge (across the sump from the 33 percent perimeter berm sideslope) is assumed to be equal to the post-consolidation slope parallel to the cell centerline (per Reference 5), which are presented below for each cell:

i = hydraulic gradient = post-settlement slope of cell floor parallel to the leachate collection pipe (per Reference 5)
= 1.80% (Cell 15)
= 1.24% (Cell 16)
= 1.59% (Cell 17)
= 1.90% (Cell 18)
= 1.77% (Cell 19)
= 1.78% (Cell 20)

Thus for Cell 15, for example, the daily flowrate from the geocomposite at the sump fringe is:

Q = 0.020 ft^2/s[(2)(33.1 ft)(0.0245) + (34.9 ft)(0.0180)] + (0.0051 ft^2/s)(31.1 ft)(0.33) = 0.097 cfs = 62,915 gpd

Similarly, for Cells 16 through 20, the daily flowrate from the geocomposite at the sump fringe, Q_{Geo}, is:

$\therefore Q_{Geo}$ = 0.095 cfs = 61,400 gpd (Cell 16)
= 0.098 cfs = 63,339 gpd (Cell 17)
= 0.108 cfs = 69,802 gpd (Cell 18)
= 0.093 cfs = 60,107 gpd (Cell 19)

Calculation Sheet

= 0.095 cfs = 61,400 gpd (Cell 20)

3. Flowrate Through the Drainage Stone Surrounding the Perforated Section of the Sideslope Riser Pipe

Because leachate enters the perforated section of the sideslope riser pipe through several sets of perforations, each with different heads, the daily flowrate through the drainage stone to the perforations is estimated using a flow net that assumes the circumference of the pipe is porous. The flow net is included in Attachment 1. The daily flowrate for the flow net is calculated as:

$$Q_{\text{Flow net}} = kH\frac{N_f}{N_d}L$$

where,

k = hydraulic conductivity of drainage stone = 0.4 cm/s = 1,134 ft/day (per Reference 7)
H = head difference between free surface at top of drainage stone (equal to 1 foot above the top of the secondary liner at the sump fringe) and average centroid of perforations (i.e., center of pipe)
= 2.7 ft
N_f = number of flow paths from flow net = 11
N_d = number of potential drops from flow net = 4
L = length of perforated section = 10 ft (Reference 6)

$\therefore$ $Q_{\text{Flow net}}$ = 84,200 ft^3/day = 629,860 gpd (Each cell – 15 through 20)

Because each cell in RMU-2 employs the same sump design, the above-calculated flowrate is constant for all cells in RMU-2.

4. Flowrate Through the Perforations of the Horizontal Portion of the Sideslope Riser Pipe

Based on Reference 3, the perforation pattern in the horizontal portion of the sideslope riser pipe provides a hydraulic capacity of 0.137 cfs per linear foot of perforated sideslope riser pipe. Reference 6 indicates that each sump contains 10 linear feet of perforated pipe. Therefore, the daily flowrate through the perforations in the horizontal portion of the sideslope riser pipe is:

Q_{perf} = (10 ft)(0.137 cfs/ft) = 1.37 cfs = 885,458 gpd (Each cell – 15 through 20)

Because each sump contains the same amount of perforated pipe, the above calculated flowrate is constant for all cells in RMU-2.

Calculation Sheet

SUMMARY:

The daily flowrate from the drainage composite at the edge of the sump is the limiting factor for flow to the pump in the SLCS sump. Because this flowrate is cell-dependent, the ALR is cell-specific within RMU-2. To be conservative and maintain consistency with the RMU-1 ALR calculations, a factor of safety of 2 is applied to determine the cell-specific ALRs:

ALR = ½*62,915 gpd = 31,458 gpd (Cell 15)
= ½*61,400 gpd = 30,700 gpd (Cell 16)
= ½*63,339 gpd = 31,670 gpd (Cell 17)
= ½*69,802 gpd = 34,901 gpd (Cell 18)
= ½*60,107 gpd = 30,054 gpd (Cell 19)
= ½*61,400 gpd = 30,700 gpd (Cell 20)

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Appendix B

Response Rate Calculation

Calculation Sheet

Client: CWM Chemical Services, LLC

Project Location: Model City, New York

Project: Response Action Plan Calculations **Project No.: B0023725.2011**

Subject: Appendix B: Response Rate Calculation

Prepared By: BMS **Date: August 2013**

Reviewed By: BMS **Date: August 2013**

Checked By: PHB **Date: August 2013**

OBJECTIVE:

Determine the response rate (RR) for the secondary leachate collection system (SLCS) in the RMU-2 cells.

REFERENCES:

1. RMU-2 Permit Drawing No. 4 entitled "Subgrade Grades," ARCADIS, February 2013.
2. RMU-2 Permit Drawing No. 15 entitled "Liner System Sections and Details," ARCADIS, February 2013.
3. "Report on Shear Strength Evaluation for Slope Stability Analyses RMU-1 Model City Treatment, Storage, and Disposal Facility Model City, New York," Koerner, K.R., Gilbert, R.B., Stark, T.D., and Adams, F.T., March 2001.
4. "Hydrologic Evaluation of Landfill Performance (HELP) Model Engineering Documentation for Version 3," U.S. Environmental Protection Agency, August 1994.
5. Appendix E-1 to the RMU-2 Engineering Report entitled "Liner System Geocomposite Design," ARCADIS, February 2013.
6. RMU-2 Technical Specifications, Section 02210 entitled "Earthworks", ARCADIS, February 2013.
7. Excess pore pressure data for secondary compacted clay layer during simulated construction of initial fill progression waste grades in Cell 20, PJ Carey & Associates, PC, provided to ARCADIS via e-mail August 6, 2013.
8. "Hydrologic Evaluation of Landfill Performance (HELP) Model User's Guide for Version 3," U.S. Environmental Protection Agency, September 1994.

ASSUMPTIONS:

1. Manufacturing defects within the geomembrane occur at the rate of 1 per acre and are approximately 1 mm in diameter (from page 81 of Reference 4). Therefore, each manufacturing defect is equivalent to a hole having an area of 0.0079 cm^2.
2. Installation defects within the geomembrane occur at the rate of 5 per acre and each is assumed to

Calculation Sheet

be 1 cm^2 in area (from page 82 of Reference 4).

3. The hydraulic conductivities of the various liner system components are:

   - Geomembrane: $2x10^{-13}$ cm/s = $5.7x10^{-10}$ ft/day (page 81 of Reference 4)
   - GCL: $5x10^{-9}$ cm/s = $1.4x10^{-5}$ ft/day (manufacturer literature)
   - Compacted clay: $1x10^{-7}$ cm/s = $2.8x10^{-4}$ ft/day (Reference 6)

4. The combined effective hydraulic conductivity through two or more liner components is calculated using the procedure described on page 29 of Reference 8.

METHODOLOGY:

The RR is equal to the maximum anticipated inflow to the SLCS from all likely sources.
Consistent with the RR calculation for RMU-1, the following inflow mechanisms are evaluated to determine the RR for RMU-2:

- Leakage and permeation through the primary liner due to 1 ft of head on primary liner
- Leakage and permeation through the secondary liner from groundwater
- Leakage and permeation through the secondary liner due to excess pore pressure from secondary clay layer consolidation

Since RMU-2 employs a GCL instead of a compacted clay layer in the primary liner, the RR calculation for RMU-2 does not include an analysis of consolidation water from a primary clay layer, as the RMU-1 RR did.

CALCULATIONS:

1. Leakage and Permeation Through Primary Liner Due to 1 ft of Head on Primary Liner

Leakage through the primary liner is attributable to the potential for a small number of manufacturer and installation defects in the primary liner geomembrane. The resulting flowrate through these imperfections is governed by the frequency of defects, their size, and the hydraulic conductivity of the material beneath the geomembrane (i.e., the GCL). Leakage through geomembrane imperfections is estimated using equation 149 from Reference 4:

$$q_h = k_s i_{ave} n \pi R^2 (0.87719)$$

where,

q_h = flow per unit area of geomembrane
k_s = hydraulic conductivity of controlling soil layer or GCL = $1x10^{-7}$ cm/s (clay) or $5x10^{-9}$ cm/s (GCL)
i_{ave} = average hydraulic gradient from HELP eqn. 150 (see below)
n = number of defects per unit area (Assumptions 1 and 2)
R = radius of wetted area around flaw from HELP eqns. 162 or 159 (see below)

The average hydraulic gradient is calculated using equation 150 from Reference 4:

Calculation Sheet

$$i_{ave} = 1 + \left[\frac{h_g}{2T_s \ln\left(\frac{R}{r_o}\right)}\right]$$

where,

h_g = head on geomembrane = 1 ft
T_s = thickness of controlling soil layer or GCL = 3 ft (clay) or 200 mil (GCL)
r_o = radius of flaw (calculated from Assumptions 1 and 2)

The radius of the wetted area around each flaw is dependent on the degree of contact between the geomembrane and the controlling soil layer adjacent to the flaw (i.e., whether the controlling layer is compacted clay or GCL). Based on Reference 4, the radius of the wetted area is calculated using equation 162 for situations where flawed geomembrane is in contact with compacted clay (based on "good" liner contact) or equation 159 for situations where flawed geomembrane is in contact with GCL (based on "excellent" liner contact). Equation 159 is as follows:

$$R = 0.5a_o^{0.05}h_g^{0.5}k_s^{-0.06}$$

where,

a_o = area of flaw

Assuming the size and frequency of defects in Assumptions 1 and 2, a head of 1 foot on the primary liner results in the following leakage rates using the above equations:

q_h = 0.005 gal/acre/day (gpad) due to manufacturing defects (i.e., pinholes)
q_h = 0.059 gpad due to installation defects

Calculations for these leakage estimates are provided in Attachment 1.

Permeation through the primary liner occurs regardless of the presence of material or installation defects. The flowrate through the primary liner (both the geomembrane and the GCL) is estimated using Darcy's Law:

Q=kiA

where,

k = effective hydraulic conductivity of geomembrane and GCL = $7.0\text{x}10^{-13}$ cm/s = $2.0\text{x}10^{-9}$ ft/day
i = hydraulic gradient across geomembrane and GCL = H/t
H = head on primary liner = 1 ft
t = combined thickness of geomembrane and GCL = 80 mil + 200 mil = 0.0233 ft
A = area = 1 acre = 43,560 ft^2

Q = 0.0037 ft^3/day/acre = 0.028 gpad

Summing these individual components, a total of 0.092 gpad (0.005 + 0.059 + 0.028 = 0.092) is calculated to enter the SLCS from leachate flow in the PLCS.

Calculation Sheet

2. Leakage and Permeation Through Secondary Liner from Groundwater

Leakage through the secondary liner from groundwater is evaluated using similar analyses outlined above except that the hydraulic heads, gradients, and hydraulic conductivities are different. To be conservative, the May 2001 piezometric heads from the confined aquifer in the Glaciolacustrine Silt/Sand unit are used. Groundwater levels measured during this time are generally accepted as representing the historical high since regular recording of site-wide groundwater levels began in the early 1980s. Using the piezometric head contours from this monitoring event, the following average piezometric heads are considered representative for the cells within RMU-2:

- Cell 15: 315.7 ft
- Cell 16: 315.9 ft
- Cells 17 and 18: 316.3 ft
- Cell 19: 316.4 ft
- Cell 20: 316.6 ft

Because the floor of each cell is sloped, the hydrostatic head acting on the bottom of the liner system varies across the cell floor. Therefore, an average hydrostatic head from the confined aquifer acting on the bottom of the compacted clay layer in the secondary liner of each cell is determined from an isopach surface created using Reference 1 and the average piezometric heads discussed above. Areas of the cell floor that lie above the average piezometric head elevation are not included in the computation of the average hydrostatic head because these areas would experience zero head. The resulting average hydrostatic head acting on the bottom of the compacted clay layer in the secondary liner of each cell is:

- Cell 15: 7.44 ft
- Cell 16: 8.66 ft
- Cell 17: 4.50 ft
- Cell 18: 5.49 ft
- Cell 19: 6.54 ft
- Cell 20: 3.26 ft

Supporting output for the determination of these average heads is included in Attachment 2 to this calculation sheet.

Groundwater inflow to the SLCS through defects in the secondary liner geomembrane is inhibited by the presence of the 3-foot thick compacted clay layer and is calculated using the equations from Reference 4 presented earlier. The radius of the wetted area is calculated using Equation 162 based on “good” contact between the geomembrane and the compacted clay layer as follows:

$$R = 0.26a_o^{0.05}h_g^{0.45}k_s^{-0.13}$$

Table 1 below summarizes the calculated groundwater leakage rates for each cell due to manufacturing and installation defects.

Calculation Sheet

Table 1 – Groundwater Leakage Through Secondary Geomembrane Flaws

Cell	Due to Manufacturing Defects [gpad]	Due to Installation Defects [gpad]	Total [gpad]
15	0.55	4.62	5.17
16	0.64	5.42	6.06
17	0.33	2.76	3.09
18	0.40	3.37	3.77
19	0.48	4.03	4.51
20	0.24	2.01	2.25

Calculations for the leakage estimates summarized in Table 1 are provided in Attachment 1.

Permeation through the secondary liner occurs regardless of the presence of material or installation defects. The flowrate through the secondary liner (both the compacted clay and the geomembrane) is estimated using Darcy's Law:

$Q=kiA$

where,

k = effective hydraulic conductivity of compacted clay and geomembrane = 9.0×10^{-11} cm/s = 2.6×10^{-7} ft/day
i = hydraulic gradient across compacted clay and geomembrane = H/t
H = cell-averaged head acting on the bottom of the compacted clay layer in the secondary liner (see values above)
t = combined thickness of compacted clay and geomembrane = 3 ft + 80 mil = 3.0067 ft
A = area = 1 acre = 43,560 ft^2

Q = 0.028 ft^3/day/acre = 0.21 gpad (Cell 15)
= 0.033 ft^3/day/acre = 0.24 gpad (Cell 16)
= 0.017 ft^3/day/acre = 0.13 gpad (Cell 17)
= 0.021 ft^3/day/acre = 0.15 gpad (Cell 18)
= 0.025 ft^3/day/acre = 0.18 gpad (Cell 19)
= 0.012 ft^3/day/acre = 0.09 gpad (Cell 20)

Table 2 summarizes the individual components representing groundwater leakage and permeation into the SLCS.

Calculation Sheet

Table 2 – Groundwater Leakage and Permeation Totals

Cell	Leakage [gpad]	Permeation [gpad]	Total [gpad]
15	5.17	0.21	5.38
16	6.06	0.24	6.30
17	3.09	0.13	3.22
18	3.77	0.15	3.92
19	4.51	0.18	4.69
20	2.25	0.09	2.34

3. Leakage and Permeation Through Secondary Liner Due to Excess Pore Pressure from Secondary Clay Layer Consolidation

Landfill construction and waste placement will result in consolidation of the compacted clay layer in the secondary liner. Reference 7 includes excess pore pressures in the secondary compacted clay layer of Cell 20 at different times during simulated waste placement associated with the initial fill progression design depicted on RMU-2 Permit Drawing No. 8. Specifically, the waste is assumed to advance instantaneously by one lift thickness (6 feet) at a time, at which point, the load is held constant for a time period approximately equal to the elapsed time associated with the waste filling in that lift. At each lift, the pressures are calculated for various locations along a typical cross section passing through the cell at specific time steps. Reference 7 indicates that the peak excess pore pressure occurs when the waste mass is at elevation 383 ft. For the worst-case time step at that lift, an average excess pore pressure of 2,389 psf along the cell floor is calculated. This is equivalent to a head of approximately 38.3 feet. The leakage from this excess pressure through defects in the secondary liner is calculated using the equations from Reference 4 presented earlier. The leakage rates are as follows:

q_h = 3.50 gpad due to manufacturing defects
q_h = 31.96 gpad due to installation defects

Calculations for these leakage estimates are provided in Attachment 1.

The permeation through the geomembrane in the secondary liner from the excess pore pressure in the compacted clay layer is estimated using Darcy's Law:

$Q=kiA$

where,
k = effective hydraulic conductivity of compacted clay and geomembrane = 9.0×10^{-11} cm/s = 2.6×10^{-7} ft/day
i = hydraulic gradient across compacted clay and geomembrane = H/t
H = head on geomembrane = excess pore pressure/unit weight of water = 38.3 ft
t = combined thickness of compacted clay and geomembrane = 3 ft + 80 mil = 3.0067 ft
A = area = 1 acre = 43,560 ft^2

Q = 0.14 ft^3/day/acre = 1.08 gpad

Summing these individual components, a total of 36.54 gpad (3.50 + 31.96 + 1.08 = 36.54) is calculated to enter the SLCS from consolidation water from the secondary compacted clay layer.

Calculation Sheet

The individual components quantified above are combined to yield a single RR value for each cell in RMU-2 as shown in Table 3.

Table 3 – Summary of Calculated RR Values

Cell	Leakage and Permeation Estimates from Various Sources [gpad]			
	From Leachate Flow in PLCS	From Groundwater Below Liner System	From Secondary Clay Consolidation	Total
15		5.38		42.01
16		6.30		42.93
17		3.22		39.85
18	0.092	3.92	36.54	40.55
19		4.69		41.32
20		2.34		38.97

Although the values summarized in Table 3 are deemed reasonable, a unit-specific value of 20 gpad has been requested by the NYSDEC, as recommended by USEPA (Federal Register No. 19, January 29, 1992) for leakage and permeation through primary liners.

SUMMARY:

The calculated RRs for the cells in RMU-2 range from 38.97 to 42.93 gpad. However, an RR of 20 gpad will be used for all cells based on a USEPA-recommended unit-specific value.

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Attachment 1

Calculated Leakages Through Geomembrane Flaws

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Leakage Through Primary Liner Due to Pinholes

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 159:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	1.00	0.3048
K_s = Permeability of Controlling Soil Layer [cm/s]	5.00E-09	5.00E-11
T_s = Thickness of Controlling Soil Layer [ft]	0.0167	0.00509016
r_0 = Radius of Flaw [mm]	0.5	0.0005
a_0 = Flaw Area [m^2]		7.85398E-07
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 159) [cm^2/s]		0.57
n = Density of Flaws [number per acre]	1	0.000247105

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 5.26

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane,q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 5.76E-14

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**0.005**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Leakage Through Primary Liner Due to Installation Defects

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 159:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	1.00	0.3048
K_s = Permeability of Controlling Soil Layer [cm/s]	5.00E-09	5.00E-11
T_s = Thickness of Controlling Soil Layer [ft]	0.0167	0.00509016
r_0 = Radius of Flaw [mm]	5.65	0.0057
a_0 = Flaw Area [m^2]		0.000100287
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 159) [cm^2/s]		0.72
n = Density of Flaws [number per acre]	5	0.001235527

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 7.17

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 6.38E-13

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**0.059**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Secondary Clay Layer Consolidation Water Leakage Due to Pinholes

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	38.30	11.67384
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	0.5	0.0005
a_0 = Flaw Area [m^2]		7.85398E-07
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Equn 162) [cm^2/s]		5.75
n = Density of Flaws [number per acre]	1	0.000247105

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.68

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 3.79E-11

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**3.503**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Secondary Clay Layer Consolidation Water Leakage Due to Installation Defects

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	38.30	11.67384
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	5.65	0.0057
a_0 = Flaw Area [m^2]		0.000100287
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 162) [cm^2/s]		7.33
n = Density of Flaws [number per acre]	5	0.001235527

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.89

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 3.46E-10

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**31.963**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 15 Groundwater Leakage Due to Pinholes

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	7.44	2.267712
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	0.5	0.0005
a_0 = Flaw Area [m^2]		7.85398E-07
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Equn 162) [cm^2/s]		2.75
n = Density of Flaws [number per acre]	1	0.000247105

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.14

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 5.90E-12

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**0.545**

Note: Shaded cells are calculated. All others are user-input.

__Leakage Through Geomembrane Flaws Using HELP Model Methods__

Scenario: Cell 15 Groundwater Leakage Due to Installation Defects

__Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:__

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	7.44	2.267712
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	5.65	0.0057
a_0 = Flaw Area [m^2]		0.000100287
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 162) [cm^2/s]		3.51
n = Density of Flaws [number per acre]	5	0.001235527

__Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:__

i_{avg} = 1.19

__Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:__

q_h [m/s] = 5.00E-11

__Step 4 - Determine Daily Leakage Volume Based on Acreage:__

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**4.615**

__Note:__ Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 16 Groundwater Leakage Due to Pinholes

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	8.66	2.639568
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	0.5	0.0005
a_0 = Flaw Area [m^2]		7.85398E-07
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Equn 162) [cm^2/s]		2.95
n = Density of Flaws [number per acre]	1	0.000247105

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.17

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 6.90E-12

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**0.637**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 16 Groundwater Leakage Due to Installation Defects

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	8.66	2.639568
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	5.65	0.0057
a_0 = Flaw Area [m^2]		0.000100287
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 162) [cm^2/s]		3.76
n = Density of Flaws [number per acre]	5	0.001235527

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.22

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 5.87E-11

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**5.421**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 17 Groundwater Leakage Due to Pinholes

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	4.50	1.3716
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	0.5	0.0005
a_0 = Flaw Area [m^2]		7.85398E-07
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Equn 162) [cm^2/s]		2.20
n = Density of Flaws [number per acre]	1	0.000247105

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.09

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 3.57E-12

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**0.330**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 17 Groundwater Leakage Due to Installation Defects

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	4.50	1.3716
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	5.65	0.0057
a_0 = Flaw Area [m^2]		0.000100287
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 162) [cm^2/s]		2.80
n = Density of Flaws [number per acre]	5	0.001235527

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.12

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 2.99E-11

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**2.758**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 18 Groundwater Leakage Due to Pinholes

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	5.49	1.673352
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	0.5	0.0005
a_0 = Flaw Area [m^2]		7.85398E-07
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Equn 162) [cm^2/s]		2.40
n = Density of Flaws [number per acre]	1	0.000247105

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.11

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 4.35E-12

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**0.402**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 18 Groundwater Leakage Due to Installation Defects

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	5.49	1.673352
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	5.65	0.0057
a_0 = Flaw Area [m^2]		0.000100287
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 162) [cm^2/s]		3.06
n = Density of Flaws [number per acre]	5	0.001235527

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.15

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 3.65E-11

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**3.371**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 19 Groundwater Leakage Due to Pinholes

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	6.54	1.993392
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	0.5	0.0005
a_0 = Flaw Area [m^2]		7.85398E-07
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Equn 162) [cm^2/s]		2.60
n = Density of Flaws [number per acre]	1	0.000247105

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.13

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane,q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 5.18E-12

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**0.478**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 19 Groundwater Leakage Due to Installation Defects

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	6.54	1.993392
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	5.65	0.0057
a_0 = Flaw Area [m^2]		0.000100287
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 162) [cm^2/s]		3.31
n = Density of Flaws [number per acre]	5	0.001235527

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.17

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 4.37E-11

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**4.034**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 20 Groundwater Leakage Due to Pinholes

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	3.26	0.993648
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	0.5	0.0005
a_0 = Flaw Area [m^2]		7.85398E-07
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Equn 162) [cm^2/s]		1.90
n = Density of Flaws [number per acre]	1	0.000247105

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.07

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 2.62E-12

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**0.242**

Note: Shaded cells are calculated. All others are user-input.

Leakage Through Geomembrane Flaws Using HELP Model Methods

Scenario: Cell 20 Groundwater Leakage Due to Installation Defects

Step 1 - User Input and Calculation of Wetted Radius, R, Using HELP Model Eqn. 162:

	User-Input Value	Value in SI Units (m, s)
h_g = Hydraulic Head on Liner [ft]	3.26	0.993648
K_s = Permeability of Controlling Soil Layer [cm/s]	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer [ft]	3	0.9144
r_0 = Radius of Flaw [mm]	5.65	0.0057
a_0 = Flaw Area [m^2]		0.000100287
R = Radius of Wetted Area Around Flaw (from HELP Model Engineering Documentation Eqn. 162) [cm^2/s]		2.42
n = Density of Flaws [number per acre]	5	0.001235527

Step 2 - Calculation of Average Hydraulic Gradient, i_{avg}, Using HELP Model Eqn. 150:

i_{avg} = 1.09

Step 3 -Calculation of Leakage Rate Through Flawed Geomembrane, q_h, Using HELP Model Eqn. 149:

q_h [m/s] = 2.17E-11

Step 4 - Determine Daily Leakage Volume Based on Acreage:

	Acres	Daily Leakage [gal]
Daily Leakage Volume:	**1**	**2.006**

Note: Shaded cells are calculated. All others are user-input.

ARCADIS

Attachment 2

Average Hydrostatic Head on Bottom of Secondary Clay Liner Compacted Clay Layer Due to Confined Aquifer

CELL 15 SURFACE TO DATUM VOLUME REPORT

ARCADIS
6723 Towpath Road PO Box 66
Syracuse, NY 13214
315.446.9120

Project: C:\Documents and Settings\BStone\Desktop\RMU-2 2009 Redesign.pro
Report Generated: Monday, July 27, 2009 11:08:07 AM

Where the DTM surface is above the datum the volume is reported as fill.
Where the DTM surface is below the datum the volume is reported as excavation.

Shrinkage/swell factors: Excavation 1.0000 Fill 1.0000

DTM Surface Layer Name	Number of Points	Datum Elevation
P-SUBGRADE REV	4,374	315.70

Volume limited to that within the constraining boundary - Object 432790
Area within boundary: 265,607.44 Sq. Ft. (6.0975 Acres)
Total triangulated area: 265,608.57 Sq. Ft. (6.0975 Acres)

Excavation Volume Beneath Datum (Cu. Yd.)	Fill Volume Above Datum(Cu. Yd.)
44,105.0	57,987.7

Net Difference: 13,882.7 Cu. Yd. excess volume above datum

Subgrade Area Below El. 315.7 = 160,002 sq.ft.

Ave Depth Below El. 315.7 = 44,105 x 27 / 160,002 = 7.44 ft

CELL 16 SURFACE TO DATUM VOLUME REPORT

ARCADIS
6723 Towpath Road PO Box 66
Syracuse, NY 13214
315.446.9120

Project: C:\Documents and Settings\BStone\Desktop\RMU-2 2009 Redesign.pro
Report Generated: Monday, July 27, 2009 11:14:25 AM

Where the DTM surface is above the datum the volume is reported as fill.
Where the DTM surface is below the datum the volume is reported as excavation.

Shrinkage/swell factors: Excavation 1.0000 Fill 1.0000

DTM Surface Layer Name	Number of Points	Datum Elevation
P-SUBGRADE REV	4,374	315.90

Volume limited to that within the constraining boundary - Object 432754
Area within boundary: 257,254.75 Sq. Ft. (5.9058 Acres)
Total triangulated area: 257,251.35 Sq. Ft. (5.9057 Acres)

Excavation Volume Beneath Datum (Cu. Yd.)	Fill Volume Above Datum(Cu. Yd.)
58,921.5	36,170.3

Net Difference: 22,751.2 Cu. Yd. excess volume beneath datum

Subgrade Area Below El. 315.9 = 183,665 sq.ft.

Ave Depth Below El. 315.9 = 58,922 x 27 / 183,665 = 8.66 ft

CELL 17 SURFACE TO DATUM VOLUME REPORT

ARCADIS
6723 Towpath Road PO Box 66
Syracuse, NY 13214
315.446.9120

Project: C:\Documents and Settings\BStone\Desktop\RMU-2 2009 Redesign.pro
Report Generated: Monday, July 27, 2009 11:26:29 AM

Where the DTM surface is above the datum the volume is reported as fill.
Where the DTM surface is below the datum the volume is reported as excavation.

Shrinkage/swell factors: Excavation 1.0000 Fill 1.0000

DTM Surface Layer Name	Number of Points	Datum Elevation
P-SUBGRADE	3,917	316.30

Volume limited to that within the constraining boundary - Object 328341
Area within boundary: 251,917.38 Sq. Ft. (5.7832 Acres)
Total triangulated area: 251,917.39 Sq. Ft. (5.7832 Acres)

Excavation Volume Beneath Datum (Cu. Yd.)	Fill Volume Above Datum(Cu. Yd.)
28,473.1	20,931.8

Net Difference: 7,541.2 Cu. Yd. excess volume beneath datum

Subgrade Area Below El. 316.3 = 170,955 sq.ft.

Ave Depth Below El. 316.3 = 28,473 x 27 / 170,955 = 4.50 ft

CELL 18 SURFACE TO DATUM VOLUME REPORT

ARCADIS
6723 Towpath Road PO Box 66
Syracuse, NY 13214
315.446.9120

Project: C:\Documents and Settings\BStone\Desktop\RMU-2 2009 Redesign.pro
Report Generated: Monday, July 27, 2009 11:31:31 AM

Where the DTM surface is above the datum the volume is reported as fill.
Where the DTM surface is below the datum the volume is reported as excavation.

Shrinkage/swell factors: Excavation 1.0000 Fill 1.0000

DTM Surface Layer Name	Number of Points	Datum Elevation
P-SUBGRADE REV	4,374	316.30

Volume limited to that within the constraining boundary - Object 317013
Area within boundary: 250,692.04 Sq. Ft. (5.7551 Acres)
Total triangulated area: 250,705.47 Sq. Ft. (5.7554 Acres)

Excavation Volume Beneath Datum (Cu. Yd.)	Fill Volume Above Datum(Cu. Yd.)
36,252.9	27,810.3

Net Difference: 8,442.6 Cu. Yd. excess volume beneath datum

Subgrade Area Below El. 316.3 = 178,273 sq.ft.

Ave Depth Below El. 316.3 = 36,253 x 27 / 178,273 = 5.49 ft

CELL 19 SURFACE TO DATUM VOLUME REPORT

ARCADIS
6723 Towpath Road PO Box 66
Syracuse, NY 13214
315.446.9120

Project: C:\Documents and Settings\BStone\Desktop\RMU-2 2009 Redesign.pro
Report Generated: Monday, July 27, 2009 11:36:11 AM

Where the DTM surface is above the datum the volume is reported as fill.
Where the DTM surface is below the datum the volume is reported as excavation.

Shrinkage/swell factors: Excavation 1.0000 Fill 1.0000

DTM Surface Layer Name	Number of Points	Datum Elevation
P-SUBGRADE REV	4,374	316.40

Volume limited to that within the constraining boundary - Object 317013
Area within boundary: 252,340.43 Sq. Ft. (5.7929 Acres)
Total triangulated area: 252,335.73 Sq. Ft. (5.7928 Acres)

Excavation Volume Beneath Datum (Cu. Yd.)	Fill Volume Above Datum(Cu. Yd.)
34,173.3	60,479.6

Net Difference: 26,306.3 Cu. Yd. excess volume above datum

Subgrade Area Below El. 316.4 = 141,057 sq.ft.

Ave Depth Below El. 316.4 = 34,173 x 27 / 141,057 = 6.54 ft

CELL 20 SURFACE TO DATUM VOLUME REPORT

ARCADIS
6723 Towpath Road PO Box 66
Syracuse, NY 13214
315.446.9120

Project: C:\Documents and Settings\BStone\Desktop\RMU-2 2009 Redesign.pro
Report Generated: Monday, July 27, 2009 12:10:04 PM

Where the DTM surface is above the datum the volume is reported as fill.
Where the DTM surface is below the datum the volume is reported as excavation.

Shrinkage/swell factors: Excavation 1.0000 Fill 1.0000

DTM Surface Layer Name	Number of Points	Datum Elevation
P-SUBGRADE REV	4,374	316.60

Volume limited to that within the constraining boundary - Object 317012
Area within boundary: 267,523.01 Sq. Ft. (6.1415 Acres)
Total triangulated area: 267,517.34 Sq. Ft. (6.1414 Acres)

Excavation Volume Beneath Datum (Cu. Yd.)	Fill Volume Above Datum(Cu. Yd.)
16,313.6	53,381.4

Net Difference: 37,067.8 Cu. Yd. excess volume above datum

Subgrade Area Below El. 316.6 = 135,222 sq.ft.

Ave Depth Below El. 316.6 = 16,314 x 27 / 135,222 = 3.26 ft

ARCADIS

Appendix C

Table of Priority Pollutants

TABLE OF

PRIORITY POLLUTANTS

NDPES
NO. COMPOUND

ACIDS

1A 2-Chlorophenol
2A 2,4-Dichlorophenol
3A 2,4-Dimethylphenol
4A 4,6-Dinitro-o-cresol
5A 2,4-Dinitrophenol
6A 2-Nitrophenol
7A 4-Nitrophenol
8A p-Chloro-m-cresol
9A Pentachlorophenol
10A Phenol
11A 2,4,6-Trichlorophenol

BASE/NEUTRALS

1B Acenaphthene
2B Acenaphtylene
3B Anthracene
4B Benzidine
5B Benzo(a)anthracene
6B Benzo(a)pyrene
7B Benzo(b)fluoranthene
8B Benzo(ghi)perylene
9B Benzo(k)fluoranthene
10B bis(2-Chloroethoxy)methane
11B bis(2-Chloroethyl)ether
12B bis(2-Chloroisopropyl)ether
13B bis(2-Ethylhexyl)phthalate
14B 4-Bromophenyl phenyl ether
15B Butyl benzyl.phthalate
16B 2-Chlornaphthalene
17B 4-Chlorophenyl phenyl ether
18B Chrysene
19B Dibenzo(a,h) anthracene
20B 1,2-Dichlorobenzene
21B 1,3-Dichlorobenzene
22B 1,4-Dichlorobenzene
23B 3,3-Dichlorobenzidine
24B Diethyl phthalate
25B Dimethyl phthalate
26B Di-n-butyl phthalate
27B 2,4-Dinitrotoluene

NDPES
NO. COMPOUND

BASE/NEUTRALS (CONTINUED)

28B 2,6-Dinitrotoluene
29B Di-n-octyl phthalate
30B 1,2-Diphenylhydrazine
31B Fluoranthene
32B Fluorene
33B Hexachlorobenzene
34B Hexachlorobutadiene
35B Hexachlorocyclopentadiene
36B Hexachloroethane
37B Indeno (1,2,3-c,d)pyrene
38B Isophorone
39B Naphthalene
40B Nitrobenzene
41B N-Nitrosodimethylamine
42B N-Nitrosodi-n-propylamine
43B N-Nitrosodiphenylamine
44B Phenanthrene
45B Pyrene
46B 1,2,4-Trichlorobenzene

METALS (TOTAL)

Antimony
Arsenic
Beryllium
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Silver
Thallium
Zinc

TABLE OF

PRIORITY POLLUTANTS

(Continued)

NOPES NO.	COMPOUND
PESTICIDES/PCB	
1P	Aldrin
2P	Alpha-BHC
3P	Beta-BHC
4P	Gamma-BHC
5P	Delta-BHC
6P	Chlordane
7P	4,4'-DDT
8P	4,4'-DDE
9P	4,4'-DDD
10P	Dieldrin
11P	Endosulfan I
12P	Endosulfan II
13P	Ensosulfan sulfate
14P	Endrin
15P	Endrin aldehyde
16P	Heptachlor
17P	Heptachlor epoxide
18P	PCB-1242
19P	PCB-1254
20P	PCB-1221
21P	PCB-1232
22P	PCB-1248
23P	PCB-1260
24P	PCB-1016
VOLATILES	
3V	Benzene
5V	Bromoform
6V	Carbon tetrachloride
7V	Chlorobenzene
8V	Chlorodibromethane
9V	Chloroethane

NDPES NO.	COMPOUND
VOLATILES (CONTINUED)	
10V	2-Chloroethylvinyl ether
11V	Chloroform
12V	Dichlorobromomethane
14V	1,1-Dichloroethane
15V	1,2-Dichloroethane
16V	1,1-Dichloroethylene
17V	1,2-Dichloropropane
18V	cis-1,3-Dichloropropylene
19V	Ethylbenzene
20V	Methyl bromide
21V	Methyl chloride
22V	Methylene chloride
23V	1,1,2,2-Tetrachloroethane
24V	Tetrachloroethylene
25V	Toluene
26V	1,2-Trans-dichloroethylene
27V	1,1,1-Trichloroethane
28V	1,1,2-Trichloroethane
29V	Trichloroethylene
31V	Vinyl chloride
18V	trans-1,3-Dichloropropylene

ATTACHMENT L

No Modifications Proposed

ATTACHMENT L

Sections D-10
Fugitive Dust Control Plan

TABLE OF CONTENTS

FUGITIVE DUST CONTROL PLAN

FUGITIVE DUST CONTROL PLAN

As a hazardous waste management facility, the possibility exists that potentially contaminated dust could be released to the atmosphere. 6 NYCRR 373-2.14(c)(9) specifies that if a landfill contains any particulate matter which may be subject to wind dispersal, the owner or operator must cover or otherwise manage the landfill to control wind dispersal. Controls, such as wetting, must be applied to dusty waste streams when they are disposed of in the landfill to prevent particulate emissions. Vehicles exiting the landfill are cleaned of any gross contamination at the exit of the landfill. In order to control any potentially contaminated dust that may accumulate on the roads outside the landfill which are used by waste hauling vehicles, road maintenance is performed.

In addition to the control of potentially contaminated dust from waste management activities, CWM employs best management practices to reduce the amount of soil-type particulate dust. The practices are employed during construction, site and stockpile maintenance and the maintenance of roadways which are used by non-waste hauling vehicles.

I. Control of Potentially Contaminated Dust

A. Landfill Operations

1. Waste stream evaluation.

   a) Waste streams are evaluated for dusting potential during the approval process. Recommendations for dust control, including wetting, containerization, stabilization treatment, etc. will be included on the disposal decision for any wastes identified with dusting potential.

   b) Recommendations for dust control will be considered by the On-Site DEC Monitors during their review and approval of the landfill waste stream. DEC comments will be incorporated into the management approach as appropriate.

   c) Upon receipt of the first shipment of any new waste, the sampler will inspect the load and consider its potential for dusting. The disposal decision may be updated if necessary.

   d) A dusty load for direct landfill disposal will be flagged for special handling by the landfill personnel and the control method prescribed on the Waste Tracking Form.

2. Waste Disposal

   a) If the prescribed method for dust control is wetting, an operator with a water canon may wet the load in the container in the landfill. If required, an operator may use a backhoe to mix the water and the material in the container prior to dumping to ensure proper wetting of the waste. Additional water may be sprayed during the unloading or after waste placement.

b) Any excess or free liquid resulting from the operations contemplated by the activity above shall be treated as liquid from a precipitation event and shall not be deemed to constitute the disposal of free liquids or bulk waste containing free liquids. This interpretation is in keeping with USEPA policy contained in a statutory interpretative guidance document issued in April, 1986.

c) If a dusty waste load not previous identified as having a dusting potential is noted by the landfill personnel, the lab will be notified and the disposal decision amended as needed to specify controls.

d) If the specified dust controls are unsuccessful during a trial load, CWM shall cease disposal of additional loads and revise the dust control procedure.

e) In addition, a trash fence is employed to prevent wind blown debris from escaping the landfill. On a routine basis, all plastic and paper debris escaping the boundaries of the waste management area will be collected.

f) Additional water may be applied to the landfill operating area to control dust. DEC approved cover material such as ConCover may be used to provide dust control of the waste placed in the landfill.

g) All exposed waste is covered at the end of each day of operation using a DEC approved cover material.

NOTE: The procedures specified above in sections 1. a)-c) and 2. c)-d) must be included in this and any future versions of CWM's Fugitive Dust Control Plan according to a Memorandum of Understanding (89-151) between CWM and NYSDEC.

B. <u>Roadways Used By Waste Hauling Vehicles</u>

1. Potential Contamination Control

a) Vehicles or any other equipment which have entered the landfill facility where it has come into direct contact with waste, shall be inspected for gross contamination prior to leaving the landfill area.

b) Any gross contamination identified on the wheels or equipment will be physically removed before leaving the area to prevent contamination of on-site roads.

c) Despite the efforts described above, the potential exists that contaminated dust may be present on the roadways outside the landfill. These roadways will be cleaned and maintained. A sweeper or other road cleaning equipment may be employed to minimize dust accumulation on these roads. Water trucks may also be employed to wet the road surfaces and to minimize air borne dust. Note: If truck washing is performed at the landfill exit, the potential for contaminated dust on the roadway will be eliminated.

d) In addition, the site traffic control plan has generally limited these roadways to waste hauling vehicles. A low speed limit has been posted and speed bumps are employed to minimize dust generation.

II. Control of General Particulate Dust

A. Construction Projects

Dust management procedures for new site and landfill construction projects are addressed in the related permit applications where appropriate. A Stormwater Pollution Prevention Plan has been developed for construction projects affecting areas of at least 5 acres to control soil erosion and contain sediments.

B. Erosion

Vegetative cover is maintained using on-site and contracted services. This includes the application of clay, top soil, fertilizer, hydroseeding and hand seeding. Some berm areas may also be covered with stone or gravel. The use of gabion mats and especially Miramet geotextile fabric has reduced erosion and enhanced vegetative growth.

C. Other Site Roads

Roadways other than those used by waste hauling vehicles will be cleaned and maintained as good housekeeping dictates. In general, the paved roads will be swept as needed, weather permitting. These roads may be wetted down as needed to provide general dust management, adequate visibility and nuisance control.

III. Air Monitoring - Fugitive Dust Emissions

CWM has an Ambient Air Monitoring Program. This program determines the impact, if any, of the hazardous waste activities and other site activities on the surrounding air quality at the Model City facility. This Ambient Air Monitoring Program has been approved by NYSDEC.

A. PM-10 Monitoring

A detailed discussion of the PM-10 monitoring network relative to dust emissions is presented in the PM-10 monitoring system QA/QC manual previously approved by NYSDEC (H. Sandonato to J. Pizzuto, 9/26/90). This monitoring program demonstrates CWM's compliance with the national primary and secondary 24 hour ambient air quality standard for particulate matter of 150 micrograms/cubic meter, 24 hour average concentration. The level of the national primary and secondary annual standards for particulate matter is 50 micrograms/cubic meter, annual arithmetic mean.

The fugitive dust control measures discussed in this plan have consistently resulted in particulate matter levels below the ambient air quality standards. If this monitoring network begins to show levels above the standards, CWM will investigate the cause and revise the Fugitive Dust Control Plan, if necessary.

ATTACHMENT M

Surface Water Sampling and Analysis Plan

SURFACE WATER

SAMPLING AND ANALYSIS PLAN

Revised August 2013

DISCLAIMER

It should be noted that the State Pollutant Discharge Elimination System (SPDES) monitoring and compliance requirements which are applicable to this Facility, are not part of this Surface Water Sampling & Analysis Plan (SWSAP), but are referenced in this SWSAP for informational purposes only. Adherence to this SWSAP in no way obviates CWM from fulfilling its SPDES monitoring and compliance obligations.

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1.0 INTRODUCTION

CWM Chemical Services, L.L.C. (CWM) owns and operates a Treatment, Storage, Disposal and Recovery (TSDR) Facility at Model City, New York. As a condition of the Part 373-2 Operating Permit, the New York State Department of Environmental Conservation (NYSDEC) has required the preparation of a Surface Water Sampling and Analysis Plan (SWSAP).

The overall purpose of the SWSAP is to demonstrate that there is no migration of hazardous constituents from the Model City Facility into surface water run-off, (i.e. stormwater). This sampling and analysis program in which long term trends of surface water quality are monitored meets the objective.

The SWSAP provides procedures for collecting surface water samples that are:

1) fully comprehensive to cover any sampling circumstance that might occur during the routine monitoring program;

2) technically sound so that the surface water samples collected are subject to minimal sampling and analytical bias; and

3) uniform so that all the surface water samples are collected and analyzed in a consistent manner for comparison purposes.

The SWSAP has been prepared to satisfy the *routine surface and storm water monitoring requirements of the above-mentioned Operating Permit and CWM's current State Pollutant Discharge Elimination System (SPDES) Discharge Permit.*

This document only addresses the current monitoring requirements of the site's routine surface water monitoring programs. These programs are very specific as to sample collection, location, parameters, and frequencies. Other monitoring programs (Groundwater Monitoring, Air Monitoring, etc.) have sampling and analysis plans developed specifically for them.

The SWSAP is kept at the facility and is updated as needed and all site personnel involved in collecting surface water samples are appropriately trained in its application.

2.0 SITE BACKGROUND

The Model City TSDR Facility is located in Niagara County, New York, near the Niagara River and Lake Ontario (see Figure 1). The facility was used for a variety of industrial purposes by the U.S. Government between 1942 and 1959.

The site was sold to a real estate company in 1966. In 1972, Chem-Trol Pollution Services purchased the site and began to use it as a private industrial waste operations facility. Chem-Trol was purchased by SCA Services, Inc. in 1973, then in 1984, SCA Services, Inc. was acquired by a WMI affiliate, Waste Management Acquiring Corporation, making SCA Chemical Services, Inc. a wholly-owned subsidiary of WMI.

In 1987, SCA Chemical Services, Inc. became a wholly owned subsidiary of Chemical Waste Management, Inc. and in July 1988, the facility name was changed to CWM Chemical Services, Inc. In 1998, CWM became a Limited Liability Company (L.L.C.) while its parent company, Waste Management, Inc. merged with USA Waste.

2.1 SITE DESCRIPTION

Current operations at the facility include treatment, recovery, disposal, and transfer of hazardous and industrial waste. The operations are comprised of waste receiving areas, storage and mixing tanks, chemical treatment facilities, biological treatment impoundments, and secure landfills.

The general site layout is shown on Figure 2.

2.2 SITE STRATIGRAPHY

The Model City Facility is situated on the Ontario Plain, an area of low topographic relief located between the Niagara Escarpment and Lake Ontario. The ground surface slopes northward at less than one percent with elevations ranging between approximately 310 and 320 feet above mean sea level.

Basically, the unconsolidated geology at the site consists of about 30 feet to 60 feet of glacial and glaciolacustrine deposits of Late Wisconsin Age. The glacial deposits overlie an estimated 1,000-foot thick sequence of red shale, siltstone, and sandstone of the Queenston Formation of Upper Ordovician Age.

2.3 SOIL CLASSIFICATION AND USE

The surface of the site is composed of low permeability soils. The U.S. Soil Conservation Service classifies many of the surface soil types present as Group C and Group D. These soil groups are characterized as having moderately high to high run-off potential, respectively, due to very slow infiltration rates.

Group C soil groups include the Appleton Silt Loam and the Ovid Silt Loam. Group D soil groups include the Canandaigua Silt Loam, Cheektowaga Fine Sandy Loam, Rhinebeck Silt Loam, Sun Silt Loam, and Madalin Silt Loam. Each group comprises approximately 50% of the soils on site .

The various land uses at the Model City Facility also influence site drainage characteristics. These uses are described in terms of the three general areas identified below:

1. Non-containment operational areas,

2. Active containment and disposal areas, and

3. Natural buffer area.

Each of these areas has different run-off and storage characteristics.

The non-containment operational areas include closed landfills, buildings, roads, parking lots, and open areas being prepared for future operations. These areas are not classified with a particular soil type as discussed above; rather they are referred to as "made land." The blacktop, roofing, and grading characteristics of these operational areas typically make them areas of rapid run-off.

The active containment and disposal areas include Stabilization, RMU-1, which is bermed, active tank farms, which have secondary containment, and the full trailer park, which has secondary containment. These areas act to contain surface water and prevent run-off and would not normally contribute to general site run-off. . Development of proposed RMU-2 will add additional active disposal capacity as well as replacements for the Stabilization and Full Trailer Parking areas. RMU-1 will be closed in accordance with the RMU-1 Closure Plan upon reaching capacity.

The natural buffer areas consist of wooded areas, wetlands, ponds, and topographically low areas that generally act as water storage areas. These buffer areas are mostly located in the central and northern portions of the site.

FIGURE 1

SITE LOCATION MAP

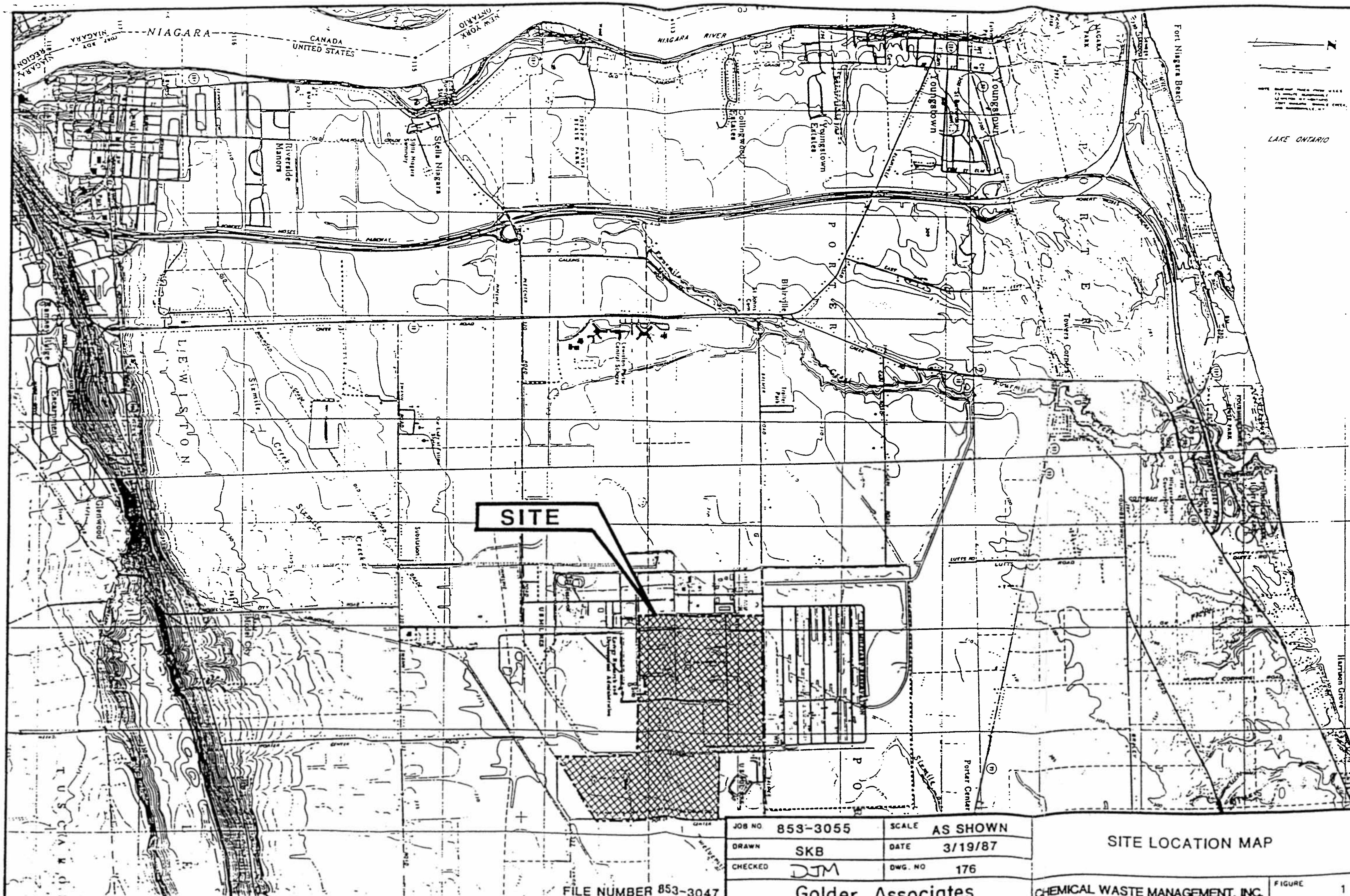

SITE
NIAGARA RIVER
CANADA
UNITED STATES
NEW YORK
ONTARIO
LAKE ONTARIO
Fort Niagara Beach
Youngstown
Youngstown Estates
Collingwood Estates
Stella Niagara
Riverside Manors
Lewiston
Blairville
Towers Corners
Porter Center
Harrison Grove
Glenwood
Model City
Sixmile Creek
Fourmile Creek
LEWISTON
PORTER
TUSCARORA
JOB NO. 853-3055
SCALE AS SHOWN
DRAWN SKB
DATE 3/19/87
CHECKED DJM
DWG. NO 176
SITE LOCATION MAP
FILE NUMBER 853-3047
Golder Associates
CHEMICAL WASTE MANAGEMENT, INC.
FIGURE 1

FIGURE 2

FIGURE 2 - MODEL CITY SURFACE WATER MONITORING POINT LOCATIONS

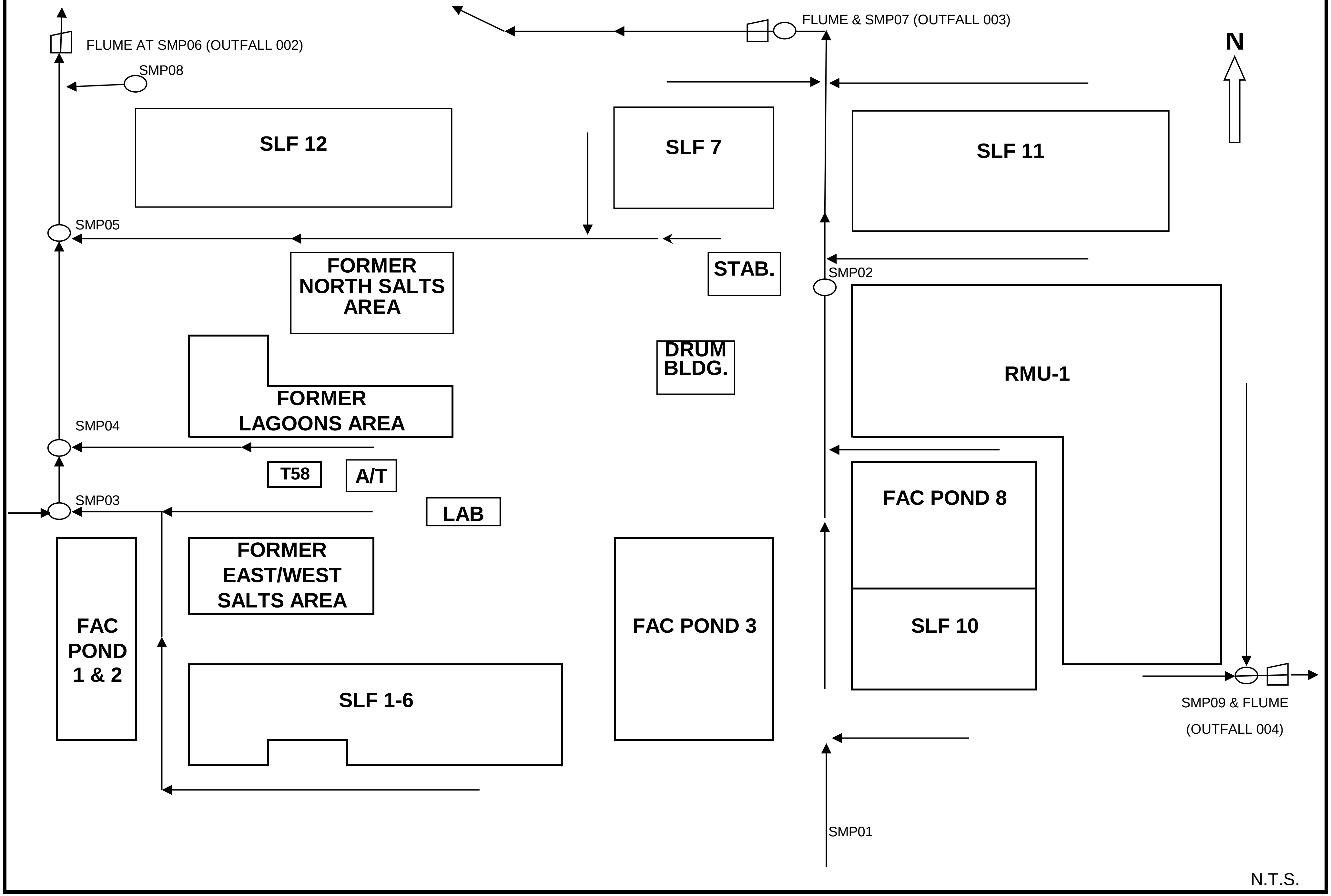
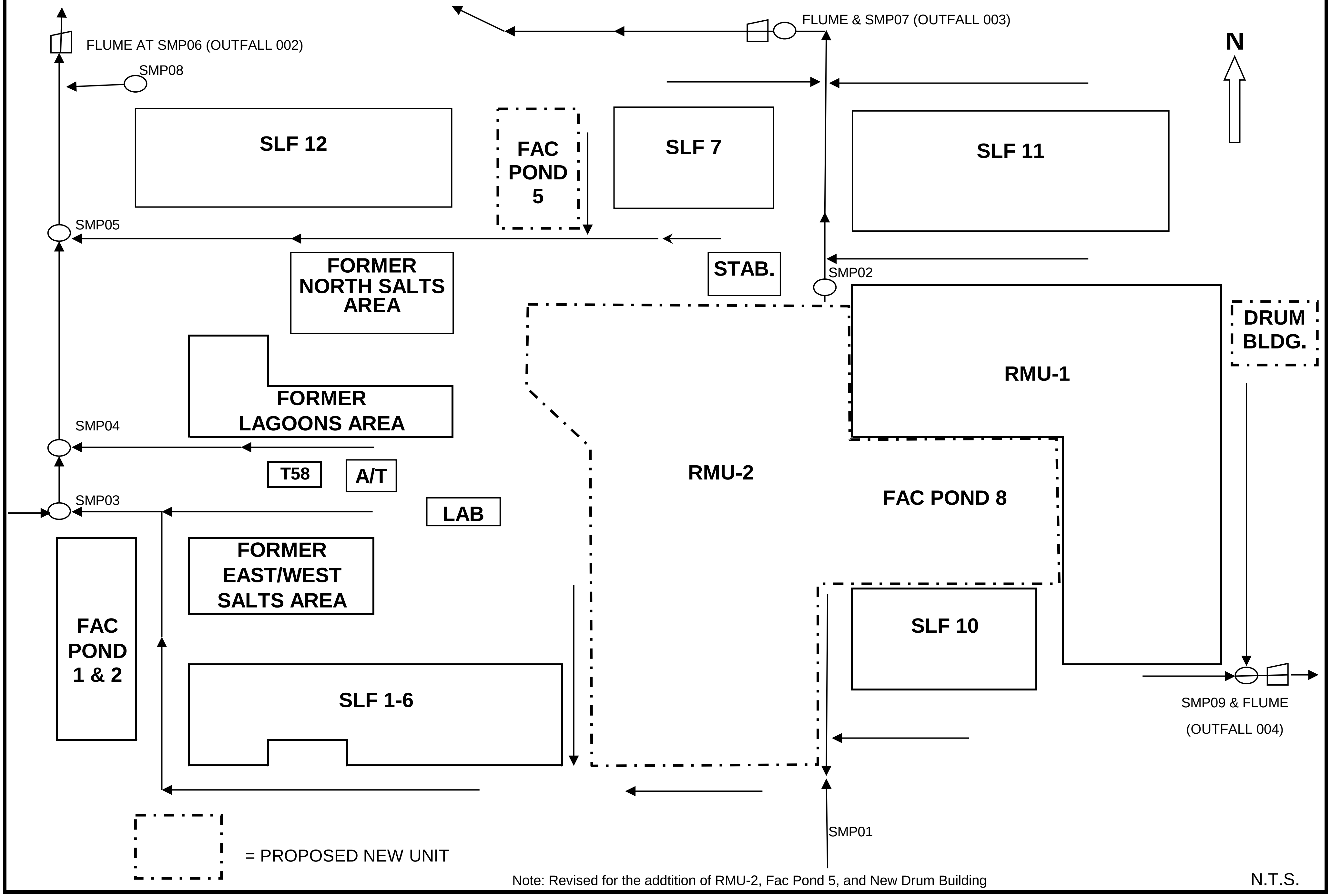


FIGURE 2a

FIGURE 2a - MODEL CITY SURFACE WATER MONITORING POINT LOCATIONS



3.0 SURFACE WATER CONDITIONS

The Model City Facility receives 2.40 inches of precipitation (as rainfall) per month and 29.3 inches per year on average. (Based on data collected at the Model City Facility from June 1976 through December 2012). Surface water run-off from the Model City Facility ultimately flows to either Four Mile Creek (Surface Water Index No. H-156-1C, C) or Twelve Mile Creek (Surface Water Index No. H-156-1C-3, C). Most of the Facility drains north and west until it finally reaches Four Mile Creek approximately one-quarter mile north of the Facility's northwestern boundary. Four Mile Creek then flows north to Lake Ontario. According to 6 NYCRR Part 701.8, Four Mile Creek and its tributaries contain Class C fresh surface waters, which are suitable for fish propagation and survival.

Twelve Mile Creek receives some surface water discharge from a small part of the Facility's southeastern property. On January 6 2004, approval was received from NYSDEC to allow additional run-off from the eastern and southern portions of RMU-1. This run-off is discharged to a Storm Water Retention Basin and then through Outfall 004 (SMP09) to Twelve Mile Creek, which flows northward to Lake Ontario. According to 6 NYCRR Part 701.8, Twelve Mile Creek also contains Class C fresh surface waters in the area of the Model City Facility. (See W. Mirabile to J. Knickerbocker, 01/06/04).

Figure 2 relates the locations of the various waterways at the Facility.

3.1 SURFACE WATER DRAINAGE SYSTEM

Surface water run-off at the Facility is managed in a complex series of man-made and natural ditches, swales, basins, and control gates. Retention capacity for a 25-year, 24-hour storm is required under the Facility's Operating Permit. The construction of retention basins and the placement of six control gates {SMP03, SMP04, SMP05, SMP07, SMP08, and SMP09} that are normally closed have achieved this. A seventh internal control gate {SMP02} is located upstream of SMP07. It is routinely left open, but may be closed if control or isolation of this area is desired.

Three main drainage channels receive all of the surface water run-off from the Facility. One channel receives run-off from the western and central portion of the Facility and is managed by 4 control gates. The second channel receives run-off from the eastern portion of the Facility and is managed by a control gate located at a retention basin north of the Facility. The third drainage channel flows to the southeast and receives controlled run-off from a portion of RMU-1.

Site surface water collects behind each of the six control gates in dedicated surface water holding areas; release occurs only after sampling and analytical qualification has occurred. Control gates are opened regularly and may be left open for several days to ensure that storage capacity is available for a large storm. The flow in all channels is intermittent; only occurring when there is sufficient precipitation to promote surface run-off.

3.2 CONTROL GATE OPERATION AND INSPECTION

As previously mentioned, storm water control gates are used to retain surface water until analytical qualification has occurred. These gates are equipped with manually-operated valves, which are used to release run-off.

Prior to release, water on the upstream side of each gate is visually inspected for an oil sheen or other visible evidence of potential contamination. Then it is sampled and analyzed for specific conductance. The results are compared with a “Site-Wide Alarm Value" of 2500 µmhos. (This value has been selected to prevent the unnecessary shutdown of operations due to groundwater infiltration, road salting, or other site wide construction activities; yet this value is still adequate for the determination of potential contamination based on the historic specific conductivity readings of landfill leachate and other on-site wastewaters.)

If the conductivity of the sample exceeds the alarm level, another sample is collected from the same location. If the conductivity of the resample exceeds the alarm level, then either the Technical Manager or Environmental Monitoring Manager is immediately notified. These individuals then determine whether to sample and analyze the surface water for VOCs, PCBs, or any other suspected contaminants.

Regardless of the conductivity level, CWM will sample and analyze the surface water at the control gates for VOCs, PCBs, or other suspected contaminants, if requested to do so by the On-Sire NYSDEC Monitors or other NYSDEC staff, unless it is demonstrated to the staff's satisfaction that such sampling is unnecessary. Also, CWM will, upon notification, allow the On-Site NYSDEC Monitors or other NYSDEC staff to collect surface water samples for NYSDEC analysis prior to, or during any release of surface water from a control gate.

Based on the results of any additional analyses and the manager's knowledge of activities (past or present) in the area, a decision will be made regarding the disposition of the stormwater. The manager will notify On-Site NYSDEC Monitors if elevated VOCs, PCBs, or other contamination is found. The presence of significant contamination may require the water to be processed to remove the constituent(s).

No storm water is released from the Facility at SMP06, SMP07, or SMP09 without prior testing if the manager has found or suspects contamination. All surface water released from control gates must meet the contamination concentration limits in the Facility's SPDES Permit at the respective Outfalls.

Continuous flow meters are installed at SMP06, SMP07, and SMP09 for measuring totalized flow exiting the Facility. Monthly, each flow meter is inspected to ensure that the equipment is in proper operating condition, (see Figure 3). The flow meters are routinely calibrated and maintained as necessary.

3.3 <u>SURFACE WATER MONITORING LOCATIONS</u>

The surface water monitoring point (SMP) sampling locations coincide with control gate locations unless noted and are as follows:

SMP01 - southwest of SLF 10, upgradient of all process areas. SMP01 is not equipped with a Control Gate. SMP01 is no longer routinely sampled. SMP01 was designated as an upgradient surface water reference point, which may be sampled in an investigation of a surface water contamination event.

SMP02 - northwest corner of RMU-1, receives surface water from the south of SLF 10 and from the west of SLF 10, Fac Pond 8, and RMU-1. SMP02 will also receive surface water from north and east portions of closed RMU-2 upon development and closure. SMP02 is an internal control gate, which is routinely maintained in an open position. It is no longer routinely sampled. It may be sampled in an investigation of a surface water contamination event.

SMP03 - northwest corner of FAC Ponds 1 & 2, receives surface water from a retention basin to the west and several smaller channels to the south and east. SMP03 will also receive surface water from western portions of closed RMU-2 upon development and closure. The water in SMP03 is routinely inspected and sampled for conductivity prior to opening the control gate. Additional sampling and analysis may be performed in the investigation of a surface water contamination event.

SMP04 - northwest corner of former West Drum Area, receives surface water from low lying areas in the vicinity of Tank 58 and the Aqueous Wastewater Treatment Facility. The water in SMP04 is routinely inspected and sampled for conductivity prior to opening the control gate. Additional sampling and analysis may be performed in the investigation of a surface water contamination event.

SMP05 - southwest corner of SLF 12, receives surface water from south of SLF 12 and north and west of the inactive Lagoons/Salts Areas. SMP05 will also receive surface water from western portions of closed RMU-2 upon development and closure. The water in

SMP05 is routinely inspected and sampled for conductivity prior to opening the control gate. Additional sampling and analysis may be performed in the investigation of a surface water contamination event.

SMP06 - SPDES Outfall 002, northwest of SLF 12, not equipped with a Control Gate, receives all water from SMP03, SMP04, SMP05, and SMP08. This location has a flow meter for measuring totalized flow and an ISCO Refrigerated Auto-Sampler or similar equipment.

SMP07 - SPDES Outfall 003, north of SLF 7 and SLF 11, this man-made Retention Basin receives all water from the northeast half of SLF 7, SLF 11, north of RMU-1, and SMP02. SMP07 will also receive surface water routed through SMP02 from north and east portions of closed RMU-2 upon development and closure. This location has a flow meter for measuring totalized flow and an ISCO Refrigerated Auto-Sampler or similar equipment.

SMP08 - a man-made Retention Basin north of SLF 12 and east of Castle Garden Road. The water in SMP08 is routinely inspected and sampled for conductivity prior to opening the control gate. Additional sampling and analysis may be performed in the investigation of a surface water contamination event

SMP09 - SPDES Outfall 004 is located southeast of RMU-1. This location has a flow meter for measuring totalized flow and an ISCO refrigerated Auto-Sampler or similar equipment.

3.4 OTHER SURFACE WATER RUN-OFF LOCATIONS

On occasion, precipitation from major rainfall events (or spring meltwater) may collect at locations other than those indicated above. For such occurrences, this water may be sampled and analyzed for Specific Conductance and/or PCBs and/or Volatile Organic Constituents and qualified for release at the nearest SMP location, if appropriate.

Water is released only after reviewing the analytical results. Careful consideration is given to the operating area from which the water may have come. Presence of significant contamination may require the water to be processed to remove the constituent(s). The manager will notify On-Site NYSDEC Monitors if elevated VOCs, PCBs, or other contamination is found.

3.5 MONITORING PARAMETERS, FREQUENCIES, AND METHODOLOGIES

Table A outlines the outfalls, parameters, analytical methodologies, and frequencies required by the current SPDES Permit . The SPDES requirements presented in this SWSAP can only be altered by obtaining a modification of both the Facility's SPDES and Operating Permits, as appropriate.

USEPA/TSCA requirements for surface water monitoring were eliminated effective July 1996.

FIGURE 3

CWM CHEMICAL SERVICES, L.L.C.

MODEL CITY, NEW YORK

GENERAL FACILITY SITE INSPECTION REPORT

FREQUENCY: Monthly

DATE AND TIME OF INSPECTION: ___/___/___/___:___.
MM DD YY TIME

EQUIPMENT/PROCESS UNIT NAME: Storm Water Flow Monitoring Flumes and ISCO Auto Samplers

INSPECTION CHECKLIST

INSPECTION ITEM	Y/N	COMMENTS
Are the Flow Level Indicators and ISCO Auto Samplers receiving power?		
Are the Flow Level Indicators and ISCO Auto Samplers in good operating condition and functioning properly?		
Is the water level indicated appropriate?		
Is the recorder marking and printing properly?		
Is there sufficient chart paper?		
Is each flume free of cracks, debris, and blockage?		
Acceptable ISCO calibration check performed? (I.e. Actual calibration volume between 100% and 110% of expected?)		SMP06: Expected Vol. = 200 mL. Actual Vol. = SMP07: Expected Vol. = 200 mL. Actual Vol. = SMP09: Expected Vol. = 200 mL. Actual Vol. =

NAME/TITLE:______________________________

SIGNATURE:______________________________

TABLE A

NYSDEC SURFACE WATER MONITORING REQUIREMENTS

OUTFALL	FREQUENCY	PARAMETER	ANALYTICAL METHOD
002, 003, 004	CONTINUOUS	FLOW	IN FIELD
	EACH DAY OF RELEASE	SETTLEABLE SOLIDS	2540F
	WEEKLY	SPECIFIC CONDUCTANCE	2510B
		pH	SM 4500 H* B
		TOTAL SUSPENDED SOLIDS	SM 2540D
		TOTAL DISSOLVED SOLIDS	SM 2540C
		PCB	608
	EVERY 2 WEEKS	OIL & GREASE (HEXANE EXTRACTABLES)	1664
		DICHLORODIFLUOROMETHANE	624 or 601
		2-CHLOROETHYL VINYL ETHER	624
		METHYLENE CHLORIDE	
		VOC	
	MONTHLY	BOD-5	SM 5210B
		DISSOLVED OXYGEN	IN FIELD
		AMMONIA (as N)	350.1
		TOTAL COPPER	200.7/220.2
		TOTAL ZINC	200.7/289.1
		TOTAL PHENOLS	420.1
	As required by Radiation Environmental Monitoring Plan	ISOTOPIC URANIUM	USDOE A-01-R MOD
		ISOTOPIC THORIUM	USDOE A-01-R MOD
		RADIUM-226	USEPA 903.0 MOD
		RADIUM-228	USEPA 904.MOD
		GAMMA Cs-137 & HITS	USEPA 901.1

NOTES: The Frequencies, Parameters, and Analytical Methods are prescribed by CWM's SPDES Permit and Radiation Environmental Monitoring Plan (REMP), as applicable. Adjustments to the above requirements may be made if the SPDES Permit or REMP changes.

4.0 GENERAL RESPONSIBILITIES

4.1 PERSONNEL RESPONSIBILITIES

Surface water monitoring at the Model City Facility is performed under the direction of the Environmental Monitoring Manager.

The Environmental Monitoring Manager is responsible for:

- communication between the laboratory and regulatory personnel,
- (re)-training sample personnel,
- scheduling, supervision, and proper execution of the sampling event, including field equipment procurement, calibration, maintenance, field parameter measurements, sample event documentation , prompt sample shipment, and inspections, and
- accurate data evaluation and timely reporting.

4.2 ANALYTICAL LABORATORIES AND RESPONSIBILITIES

Adirondack Environmental Services, Inc. (AES) (Lab Code No. NY00063) in Albany, New York provides primary analytical services. Additionally, primary radiological services are provided by Test America in St. Louis, Missouri.

Each laboratory provides the Facility with all sampling containers and associated paperwork in a sealable container (cooler). The Laboratory Contact shall notify the Environmental Monitoring Manager if sample containers do not arrive on schedule or intact after a sampling event. The Laboratory Contact is also responsible for overseeing the laboratory analysis and notifying the Environmental Monitoring Manager if problems arise.

5.0 PRE-SAMPLING PROCEDURES

All procedures for sampling, sample preservation, sample storage, chain-of-custody and sample transfer, and equipment calibration and field measurements will follow all applicable requirements specified in the contract laboratory's quality assurance management plan, CWM Chemical Services LLC Quality Manual and equipment manufacturer's manuals.

Pre-sampling procedures include the procurement and calibration of equipment and procurement and preparation of sample containers. Each of these procedures is addressed in the following sections. Preparation for a sampling event begins at least two weeks before the event is to take place to allow adequate time to accomplish all of the procedures and to correct any problems that may surface.

5.1 LABORATORY NOTIFICATION/VERIFICATION

The Environmental Monitoring Manager works closely with the laboratory to schedule sampling events for each month. Two weeks prior to each sampling event, the Environmental Monitoring Manager notifies the laboratory of tentative sampling dates, number and types of samples, and numbers and types of blanks. The laboratory prepares the necessary sample containers and sends them to the site in coolers. The Environmental Monitoring Manager checks in the coolers and notifies the lab of any discrepancies.

5.2 PROCUREMENT, INSPECTION, AND CALIBRATION OF EQUIPMENT

The procurement of equipment is the responsibility of the Environmental Monitoring Manager.

Field measurements along with proper documentation are integral parts of the monitoring program. Before the actual trip to the field, all equipment necessary for a sampling event is cleaned, checked, and calibrated, as necessary. Prior to use in the field, all meters are calibrated to ensure proper working order and to render integrity to the measured values. Calibration procedures provided by the manufacturer are followed.

When Dissolved Oxygen (D O_2) Measurements are required, calibration of the D O_2 field meter is made using the Air Saturated with Water Method. Calibration is performed each day that D O_2 readings are taken and whenever D O_2 readings appear to be erratic.

NOTE: Instrument-specific calibration procedures are subject to change as newer field equipment is put into use. CWM will continue to follow the Manufacturer's recommendations and standard QA/QC procedures.

A Log Book is maintained for all field meters. The log book contains information including field meter serial number, name and model of meter, year purchased, QA results, calibration notes for each day the equipment is used, etc.

5.3 PROCUREMENT AND PREPARATION OF SAMPLE BOTTLES

The procurement and preparation of sample bottles is the responsibility of the laboratory. For routine VOC monitoring, only pre-cleaned, pre-preserved, 40-mL, glass vials with Teflon-lined septa are used.

If parameters other than VOCs are required, the laboratory also supplies these additional bottles. As necessary, pre-measured amounts of preserving reagents are supplied by the laboratory along with the sample bottles. The appropriate preservative is attached to each bottle in a small vial or has been added to each container as required by the analytical method.

The lab sends sample bottles, trip blanks, and field blank water to the site in sealed coolers. Upon arrival, the cooler seal is checked for intactness. The cooler is then "checked in" which involves removing the Chain-of-Custody (COC) and Field Information Form (FIF), visually examining, inventorying, and labeling the sample bottles, and ensuring the appropriate number and types of preservatives are present. Also, Trip Blank samples are examined for air bubbles.

(NOTE: Not all laboratories utilize an FIF. When an FIF is not used, a bound Field Notebook is kept to record pertinent information and observations surrounding the sampling event. Although "FIF" is used throughout this document, FIF should be considered interchangeable with "Field Notes".)

5.4 STORAGE AND HANDLING OF SAMPLING EQUIPMENT

The sample bottles are stored inside coolers. When unattended, the coolers (and bottles) are stored in a designated "clean area" with limited access during the day. This building is kept locked overnight.

All equipment is handled in a responsible manner to prevent breakage or contamination. New clean, powderless PVC or Latex gloves may be worn when handling any equipment that will come in contact with the sample water.

6.0 SAMPLING PROCEDURES

Sampling is performed during run-off events caused by either precipitation or snow/ice melt. When rain falls (or a thaw occurs) at a greater rate than water can be absorbed by the soil, the excess water flows over the ground surface and into the drainage courses. The rate at which this process occurs is dependent upon storm intensity, soil type, cover, grading, etc.

If there is no flow through a given outfall during a given week, then the sampling event is canceled and a record is made of the cancellation.

6.1 FIELD OBSERVATIONS

Upon arrival at the sample point, various field observations regarding conditions at the sample point and its surrounding area are made and recorded on the FIF. These observations may include:

- The presence and condition of the sample point identification marker;
- Physical surroundings that may bias the sample (i.e. high weeds, stagnant water - no flow, nearby activities, etc.);
- Weather conditions;
- Any upwind or upstream site activity; and
- Evidence of contamination such as a visual sheen.

6.2 FIELD MEASUREMENTS

Field measurements are taken immediately for D O_2 and temperature, if required, and recorded on the FIF. Any additional parameter measurements would also be recorded on the FIF, as required.

The duplicate field measurements, if any, are also recorded on the FIF.

6.3 GRAB SAMPLE COLLECTION

(**NOTE:** Sampling for pH, Specific Conductance, and Settleable Solids is performed by trained Site personnel. All of these samples are analyzed "in-house." As such, collection, receiving, documentation, and laboratory procedures and methods may vary from those procedures that follow. However, the sampling and analysis for these parameters will be conducted in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater.")

Immediately prior to sampling, the sample point identity is recorded on the COC and FIF. The sample bottles, COC, and FIF forms are re-checked to ensure that all match with respect to sample point, parameter, and preservative.

Samples, which are to be split with regulatory agencies, are also checked for consistent sample point ID numbers and for other methods of identification if used by the agency.

Grab surface water samples are collected under flow conditions. Grab samples are collected for VOC, Oil & Grease, Phenols, Ammonia, BOD-5, Copper, and Zinc (and other additional parameters as may be required.) Grab samples may be taken using a dedicated, long-handled, polyethylene dipper. If used, the dipper is thoroughly rinsed at the outfall before each use. New, disposable, powderless PVC or latex gloves may be worn at each sample point during sampling and are changed when dirty, torn, etc. Flow-proportioned composite samples are collected over approximately 24 hours for PCB, Total Suspended Solids (TSS), and Total Dissolved Solids (TDS) (and other additional parameters as may be required.) (See Section 6.4 below.)

When filling sample bottles, the following procedures and precautions are followed:

1. Bottle caps are removed carefully so that the inside of the cap is not touched. Bottle caps are not interchanged between sample bottles. Caps for VOC vials contain a Teflon-lined septum. The Teflon side of the septum must face the sample to prevent contamination of the sample through the septum.

2. The sample bottles are filled with a minimal amount of air contact and without contacting the inside of the bottles.

3. Sample bottles containing preservatives are filled with as little overflow as possible and are inverted to mix the preservative with the sample. If the required preservative(s) are not in the bottles, the bottles should be filled, leaving adequate space to add the preservative(s) later.

No substitutes for the chemical preservatives supplied are used as the reagents are special high grade and are metal free. Arrangements may be made with the laboratory if the storage of additional preservatives at the site is necessary. If substitutions are made from on-site storage, it is noted on the COC form.

4. VOC vials are filled so that they contain no headspace. These sample vials, therefore, need to be over-filled (water tension will maintain a convex water surface in the bottle). The caps for these vials are replaced gently, so as to prevent introducing air bubbles in the sample. Check each vial by inverting and snapping it sharply with a finger. If any air bubbles appear, the vial is opened, more water is added, and the process is repeated until no air bubbles are present. The vial is not emptied and refilled as this would result in the loss of the preservative.

5. All sample bottles, once filled and preserved as necessary, are shipped on ice or refrigerated until they are ready to be shipped. The VOC vials are not placed in direct contact with ice as the samples may freeze and break.

6. Sample bottles, caps, or septa, which fall on the ground before filling, are thoroughly rinsed with sample water before being used or are discarded. All circumstances regarding dropped caps or bottles, and their subsequent rinsing and use, are noted on the FIF.

6.4 COMPOSITE SAMPLE COLLECTION

A flow-proportioned composite sample is collected for approximately 24 hours under normal flow conditions for PCB, TSS, and TDS. This sample is collected using a dedicated ISCO Model 6712FR Refrigerated Auto-Sampler or similar equipment.

The Auto-Sampler is programmed to collect a grab sample aliquot per a specified volume of stormwater run-off leaving the Facility in a 24-hour period as determined by the dedicated ISCO Model 4210 Flow Meter (or similar equipment.) If a heavier-than-normal (or lighter-than-normal) discharge volume is anticipated, the grab sampling frequency may be increased or decreased by adjusting the “Sample Pace” function on the Flow Meter. This function signals the Auto-Sampler to grab a sample each time a specified volume of liquid passes by the Flow Meter.

Proper Sample Pacing is essential to ensure that:

1. An adequate sample volume is collected,
2. the composite sample consists of at least 8 discreet grab samples, and
3. sampling continues for approximately 24 hours.

Improper Sample Pacing could result in:

1. Insufficient sample volume collected,
2. the termination of grab sampling well short of the required 24 hours, or
3. grab sampling to continue well beyond the required 24 hours.

However, as long as the sample volume collected is sufficient to perform analysis for the specified parameters (PCB, TSS, and TDS), the composite sample will be sent for analysis as usual.

Basic procedures for the collection of the composite sample are as follows:

1. Immediately prior to sampling, the sample point identity is recorded on the COC and FIF. The sample bottles, COC, and FIF forms are re-checked to ensure that all match with respect to sample point, parameter, and preservative.

2. Activate Auto-Sampler to immediately collect a sample thus demonstrating proper operability.

   If the Auto-Sampler has already been calibrated this collection month, skip this step. Otherwise, calibrate the Auto-Sampler. Catch the volume collected in a graduated cylinder and compare with the desired volume. If the volume collected is between 100% and 110% of the desired volume, the calibration is acceptable. Re-calibrate as necessary to ensure an adequate sample volume is collected.

3. Remove the dedicated 5 gallon glass collection bottle from the refrigerator and rinse it thoroughly with fresh surface water run-off. Return bottle to refrigerator.

   Set the Sampler Pacing to the appropriate anticipated discharge volume.

4. Begin composite sampling. View initial sample collection to ensure proper operations.

5. Record date, start time, start volume, location, and other appropriate field information at this time.

As soon as possible after the completion of the 24-hour sample period, the following steps are taken.

1. Check the main menu screen to ensure that there were no interruptions in the sampling program. (Note any error messages that may impact sample integrity.)

2. Remove the sample collection bottle and, if used, the dedicated glass funnel.. Agitate the sample collection bottle to ensure sample homogeneity. If needed, rinse the dedicated, glass, sample funnel thoroughly.

3. Fill all sample bottles completely, leaving room for any necessary preservatives. Cap bottles, complete field information forms, and package samples for shipment to the lab.

4. Record the end time, end volume, and number of grab samples taken to make the composite.

{NOTE: During freezing weather conditions, the ISCO sample line may freeze before 24 hours have elapsed. In such instances, the "partial" composite sample is used providing sufficient volume is available to fill the necessary bottles. Circumstances surrounding these "partial" composite samples are noted.}

6.5 ORDER OF SAMPLE COLLECTION

In the event that parameters other than VOCs are required, the priority sequence of parameter collection during sampling is as follows:

Priority	Parameter
1	pH, Specific Conductance, Temperature, Dissolved Oxygen, Settleable Solids
2	Volatile Organics
3	PCB, Total Suspended Solids, Total Dissolved Solids
4	Total Metals {Copper and Zinc only}
5	Total Phenols
6	Ammonia
7	Oil & Grease
8	BOD-5
9	Radiologicals

This priority list is only followed if there was insufficient sample volume available to completely fill all sample bottles.

6.6 DUPLICATE SAMPLES

For every tenth sample collected, the sampling team must submit a duplicate sample to the lab. A different sample point is selected for the duplicate sample each time. Eventually, all sample points will be utilized as duplicates.

The duplicate sample, identified as "DUP," receives the same analyses as the other routine samples. The actual identity of the duplicate sample is noted in the Comments section of the FIF.

6.7 TRIP BLANKS AND FIELD BLANKS

Trip blanks and field blanks are used as controls and/or external QA/QC samples. They indicate contamination that may have been introduced in the field, in transit to or from the sampling site, during bottle preparation, sample log-in, or sample storage at the laboratory. The blanks may also reflect contamination that may have occurred during the analytical process.

Trip blanks are samples of GC/MS Reagent Grade water that are prepared at the same location and time as the bottles that are to be used for sampling. They remain with the sample bottles while in transit to the site, during sampling, and during the return trip to the laboratory. Upon returning to the laboratory, they are analyzed for VOCs using the same QA/QC procedures as a sample. Trip blanks are not to be opened until they are returned to the lab. If they are opened by accident, it must be noted on the COC form.

Each daily shipment of coolers to the laboratory will contain a trip blank if any cooler contains samples for VOA analysis. Trip blanks are reported in the Technical Report as separate samples using "TB" as the sample point designation.

Field blanks are similar to trip blanks, however, the field blank is prepared at the sampling location using empty bottles and GC/MS reagent grade water supplied by the laboratory. The location where the field blank is prepared is noted in the Comments section of the FIF and on the COC.

The number of field blanks is dependent on the number of samples included in the sampling event. For every 10 VOC samples collected, one field blank is analyzed for VOCs. Field blank results are reported in the laboratory's Technical Report as separate samples using "FB" as the sample point designation.

6.8 SAMPLE PACKAGING AND SHIPMENT PROCEDURES

After sampling, samples are placed in coolers containing loose ice or are otherwise refrigerated in a clean, secure area until shipping arrangements can be made.

There are three important reminders for repacking the coolers:

1. Glass should not be packed in contact with glass. Ice or packing sleeves are placed around and between bottles.

2. Completed COC and FIF forms must be returned to the cooler <u>before</u> the cooler is sealed.

3. Sample coolers are sealed with a Custody Seal provided by the lab.

Once the samples have been placed on ice, the COC and FIF are completed. All paper work is then put into a plastic bag and placed inside the cooler. A member of the sampling team arranges for sample pickup and transportation to the laboratory. Coolers are transported via overnight courier for receipt at the laboratory within 72 hours of sample collection; often samples are received within 24 hours. (NOTE: Although samples are chilled after sampling, it is a priority to ship the samples to the lab as soon as possible. As a result, some of the samples may arrive at the lab with a temperature of greater than 4°C. The Lab notes this on the COC and these "warm" samples are typically analyzed as usual.)

6.9 SAMPLE RECEIPT

Upon arrival at the laboratory, the samples are logged-in and COC procedures are maintained until the analyses are completed and reported.

Once a cooler is received at the laboratory, the Environmental Monitoring Manager is notified if the Sample Control Group encounters any discrepancies. Prompt notification is essential since analyses could be delayed beyond the allowable holding times.

7.0 FIELD RECORDS AND DOCUMENTATION

Standard COC and FIFs are filled out during a sampling event and are used to establish and document COC, sampling conditions, field measurements, and sampler's names . The original forms are sent with the samples to the laboratory and copies are included in the Technical Report when the analysis is complete. All forms are completed using permanent ink only.

The Technical Report, including copies of the COC and FIF are maintained by the Environmental Monitoring Manager for easy reference. Analytical data is also permanently maintained in the site files.

7.1 CHAIN-OF-CUSTODY FORM

In order to maintain and document sample integrity, strict COC procedures are necessary.

From the time the empty sample bottles leave the laboratory until the analytical results are issued, the sample and/or sample containers are in the custody of trained CWM or laboratory personnel. In order to maintain COC, the samples must be either:

- in sight of the assigned custodian;
- locked in a tamper-proof location; or
- sealed with a tamper-proof seal.

A written record of sample bottle possession and transfer is maintained and documented on the COC form.

The COC form is signed with the date and time for the following activities:

- Initially, when the cooler is opened for inspection, the COC is signed and the condition is noted.
- Whenever the cooler is transferred to a new sample custodian if the tamper-proof seal has been compromised.
- When the cooler is finally sealed for transport to the laboratory. If samples collected from one sample point are placed in more than one cooler, a COC is placed in each cooler.

Additional information on the COC includes the sample point ID, sample date, and sample start time. Any problems with cooler or its contents are also noted on the form. Upon receipt of the cooler at the laboratory, the date and time the seal is broken, the condition of the samples, and the temperature, are recorded on the COC form.

7.2 FIELD INFORMATION FORM

The FIF contains information regarding site conditions, sampling procedures used, and field measurements. The FIF is filled out for each sample point and is enclosed along with the COC in the cooler. FIFs are filled out for each sample point, unless no sample is collected. Information to be documented is as follows:

Sample Point - which is contained on the COC is also recorded on the FIF.

Sampling Information - Includes the types of equipment used for sample collection.

Field Measurements - For surface water sampling events, temperature, and dissolved oxygen are determined, as required. Additional parameters, (e.g. color, odor, turbidity, etc.) may also be required.

Field Comments - The section on field comments may include the following field observations:

- Condition of the sample point and dedicated equipment;
- Weather conditions (e.g. wind speed and direction, precipitation, temperature, upwind activities, etc.);
- Sample appearance - odor, color, etc.;
- Location where field blank or duplicate is prepared;
- Duplicate field measurement results;
- Any other uncommon sampling conditions, such as sample splits with regulatory agencies, potential safety or health hazards (i.e. presence of flying, stinging insects, etc.).

Sampling Certification - On the bottom of the FIF, the sampler must certify that the sampling procedures used were in accordance with applicable USEPA, State, and Corporate Protocols.

NOTE: AES does not provide an FIF with their sample bottles. For samples sent to AES, pertinent information regarding the sampling event is documented in a field notebook.

8.0 LABORATORY HANDLING AND ANALYTICAL PROTOCOLS

The following information provides a brief description of how samples are analyzed.

8.1 LABORATORY PROCESSING PROCEDURES

The laboratory receives, logs-in samples, and maintains the COC procedures until the analyses are completed and reported, as described in Section 6.9.

8.2 LABORATORY METHODOLOGIES

For the routine surface water monitoring at the site, samples are analyzed according to Table A for NYSDEC SPDES requirements. The SPDES requirements presented in this SWSAP can only be altered by obtaining a modification of both the Facility's SPDES and Operating Permits, as appropriate.

For the analysis of samples outside the routine monitoring program, the methodology will be specified by the Environmental Monitoring Manager and will depend on the Data Quality Objectives.

8.3 QUALITY ASSURANCE

The analytical laboratory used for the analysis of surface water samples has NYSDOH ELAP certification and CWM approval. In addition, QA is provided by following the standard analytical methods referenced in

Table A. Technical Reports contain analytical results and methodologies, dates sampled and received, sample identification, COC, and FIFs.

8.4 QUALITY CONTROL

Quality control is provided in the field through the collection of duplicate samples, field blanks, trip blanks, and duplicate field measurements.

Duplicate - collected from any sample location (SMP) and analyzed for a complete set of parameters once every 10 samples, (see Section 6.6).

Field Blank - one collected and analyzed for every ten samples taken for VOC analysis only. (See Section 6.7).

Trip Blank - one analyzed for every "batch" of samples sent to the analytical laboratory for VOC analysis only. (See Section 6.7).

Numerous laboratory and field quality control checks are performed. The following list includes the various checks used and the frequency at which the checks are performed.

BLANKS

- Method Blank or Laboratory Blank - Daily
- Reagent Blank - Daily
- Trip Blank - Determined by field staff (daily with VOC analysis)
- Field Blank - Determined by field staff, once every 10 samples.

DUPLICATES

- Field Duplicate - Determined by field staff, once every 10 samples.
- Laboratory Duplicate - once every 20 samples or daily, whichever is more frequent
- Matrix Spike Duplicate - once every 20 samples or daily, whichever is more frequent

SPIKES

- Spiked Blank - once every 20 samples or daily, whichever is more frequent
- Surrogate Spike - every sample and QC sample, (organic analyses only)
- Matrix Spike - once every 20 samples or daily, whichever is more frequent

INDEPENDENT QC CHECKS

- Laboratory Control Standards - daily
- Blind QC - each analyte at least quarterly
- Check Sample - as requested by Quality Programs Coordinator
- Internal Standard - as method requires

- Standards - daily
- Control Standards - as method requires
- Method of Standard Additions - every sample that demonstrates matrix interference

9.0 DATA EVALUATION

Typically, all analytical results are reviewed within five days of receipt from the analytical laboratory.

Data from SMP06, SMP07, and SMP09 are compared with the discharge limitations established in the Facility's SPDES Permit. Any exceedences are noted in the monthly Discharge Monitoring Report (DMR) including an explanation of the potential cause(s).

Since the control gates are routinely closed and visually inspected and tested prior to release, it is unlikely that any potentially contaminated surface water would be released from the Facility. If such an unlikely situation were to occur, then a follow-up investigation would be performed to determine the source and extent of contamination. This investigation would be based upon current SPDES Permit requirements and guidance received from NYSDEC.

10.0 REPORTING

SPDES Discharge Monitoring Reports (DMRs) are due to NYSDEC by the 28th of each month. DMR submittal requirements are specified in the Facility's SPDES Permit. If additional monitoring (i.e., an additional constituent or sampling event beyond that required under the Facility's SPDES Permit) is conducted, the results will be submitted as an appendix to the required DMR.

10.1 RECORDS

Records of all surface water monitoring activities, including Technical Reports, QA/QC Reports, COCs, and FIFs are maintained at the Model City Facility. The analytical labs also maintain a computer data base system which is backed-up daily for permanent storage.

ATTACHMENT N

No Modifications Proposed

ATTACHMENT O

Major/Minor Modifications

<u>ATTACHMENT O - MAJOR/MINOR MODIFICATIONS</u>

All Permit modifications shall be listed in the following Permit Modification Log.

The name of the specific document being modified (sections, and/or attachments)	Modified page numbers		Date of Revised pages	The effective date of permit modification	The nature of the modifications
	Old	New			
Schedule I of Module I,	S-1 to S-16	S-1 to S-16	12/18/13		**MAJOR PERMIT MODIFICATION:** Development of Residuals Management Unit No. 2, including construction of Fac Pond 5, new Tank T-9001, new Full Trailer Parking Area, New Stab Trailer Parking Area, new Drum Management Building, new Loading/Unloading ramps at T-109 and T-158
Schedule I of Module I, Exhibit A (General Provisions)	A-5, A-7, A-9	A-5, A-7, A-9	12/18/13		
Schedule I of Module I, Exhibit C (Containers)	C-1 to C-10	C-1 to C-13	12/18/13		
Schedule I of Module I, Exhibit D (tanks)	D-4, D-6 to D-15	D-4, D-6 to D-15	12/18/13		
Schedule I of Module I, Exhibit E (surface impoundments)	E-1 to E-3	E-1 to E-6	12/18/13		
Schedule I of Module I, Exhibit F (landfills)	F-56 to F-71	F-56 to F-72	12/18/13		
Attachment A	Page 4 of 4 Page 1 of 6 Page 3 of 6 Page 5H of 6 Fig A-2 Photo 1	Page 4 of 4 Page 1 of 6 Page 3 of 6 Page 5H of 6 Fig A-2 Photo 1 Photos 16 to 25	11/08/13		
Attachment D, Appendix D-1 (text)	TOC Page iv	TOC iv, v,	12/18/13		

The name of the specific document being modified (sections, and/or attachments)	Modified page numbers		Date of Revised pages	The effective date of permit modification	The nature of the modifications
	Old	New			
		Pages 36-47			
Attachment D, Appendix D-1 (permit drawings)		Dwg C-2, Dwg C-5, Dwg E-8, Dwg FP-1, Dwg FP-2, Dwg S-0, Dwg S-1, Dwg S-2, Dwg S-3, Dwg S-4, Dwg S-5	10/22/13 6/11/13 1/19/12 6/20/12 6/20/12 6/20/12 6/20/12 6/2012 6/20/12 8/13/13 8/13/13		
Attachment D, Appendix D-1, Figures & Calcs.		Figs-D1B	1/22/13 & 6/22/12		
		D3A D4A, D12A,D14A & Calc pages	7/2013 & 8/2013		
Attachment D, Appendix D-2	Toc Page i, Pages 1-4	Toc Page i, Pages 1-7,	11/08/13		
Attachment D, Appendix D-2 (permit drawings)	N/A	Dwgs 1-14	11/05/13		
	N/A	Fac Pond RAP	11/08/13		

The name of the specific document being modified (sections, and/or attachments)	Modified page numbers		Date of Revised pages	The effective date of permit modification	The nature of the modifications
	Old	New			
Attachment D, Appendix D-3 (text)	Toc Page i, Pages 11,12, 19-22	Toc Page i, Pages 11,12, 19-23	11/08/13		
Attachment D, Appendix D-3, Section VIII	Sec VIII	Sec VIII	11/08/13		
Attachment D, Appendix D-3, Figures & Calcs.	N/A	Fig D-36 & Calc pages	10/28/13		
Attachment F (Inspection Forms)	7, 18, 20	7, 12a, 14a, 14b, 14c, 14d 18, 20	12/18/13		
Attachment G (Contingency Plan)	Entire Text	Entire Text	12/18/13		
	Org Chart	Org Chart	12/18/13		
Attachment I, Section I.1 (Site-Wide Closure Plan)	Cover Toc ii,iii 4-8,11, 17-36	Cover Toc ii,iii 4-8,11, 17-38	11/08/13		Revise Sitewide Closure Plan
Attachment I, Section I-1	N/A	Add New	02/2013		Add RMU-2 Closure Plan for proposed RMU-

The name of the specific document being modified (sections, and/or attachments)	Modified page numbers		Date of Revised pages	The effective date of permit modification	The nature of the modifications
	Old	New			
(RMU-2 Closure Plan)					2 to Section I-1 and revise Sitewide Closure Plan for proposed development associate with RMU-2.
Attachment I, Section I-2 (RMU-2 Post Closure Plan)	N/A	Add New	2/2013		Add RMU-2 Post-Closure Plan for proposed RMU-2 to Section I-2.
Attachment J, Appendix D-6 (RMU-2 Permit Drawings)	N/A	Add New Dwg Nos. 1 2 3 to 7 8 9 to 25 26, 27 28 to 36	 2/27/13 11/5/13 2/27/13 6/3/13 2/27/13 8/15/13 2/27/13		New RMU-2 Permit Drawings, Technical Specifications, and Construction Quality Assurance Manual for proposed RMU-2 added to Appendix D-6, D-7, and D-8, respectively, of Attachment J
Attachment J, Appendix D-7 (RMU-2 Technical Specifications)	N/A	Add New	03/2011		
Attachment J, Appendix D-8 (RMU-2 Quality Assurance Manual)	N/A	Add New	03/2011		
Attachment K, Appendix D-9 (RMU-2 Response Action Plan)	N/A	Add New	8/28/13		New RMU-2 Response Action Plan for proposed RMU-2 added to Appendix D-9 of Attachment K

The name of the specific document being modified (sections, and/or attachments)	Modified page numbers		Date of Revised pages	The effective date of permit modification	The nature of the modifications
	Old	New			
Attachment M (Surface Water SAP)	Cover, TofC Pages i-iii Pares, 2,4 – 19	Cover, TofC Pages i-iii Pares, 2,4 – 20	8/28/13		

The name of the specific document being modified (sections, and/or attachments)	Modified page numbers		Date of Revised pages	The effective date of permit modification	The nature of the modifications
	Old	New			
<u>Incorporated Documents:</u>					**MAJOR PERMIT MODIFICATION: (continued)**
Department-Approved "Site-Wide and RMU-1 Closure Cost Estimates"	N/A	Add New			Development of Residuals Management Unit No. 2
2.01 New Drum Management Building			8/28/13		
4.01 Stabilization Area (Revised)			8/28/13		
5.32 AWTS (Fac Pond 5 w/1 tk)			8/28/13		
6.01 Fac Ponds (3&1-2			11/08/13		
6.02 Fac Ponds (3&1-2 & New Fac 5)			11/08/13		
6.03 Fac Ponds (1-2 & New Fac 5)			11/08/13		
8.01 CSA New Full Trail Parking (5 tankers)			8/28/13		
P&IDs	Sht 3,9a	Sht 3,9a	5/23/13		
AWTS O&M Manual	Fig 1.1	Fig 1.1a, 1.1b	11/08/13		

The name of the specific document being modified (sections, and/or attachments)	Modified page numbers		Date of Revised pages	The effective date of permit modification	The nature of the modifications
	Old	New			
GWSAP	Entire Doc	Entire Doc	8/28/13		
New Reference Documents					
RMU-2 Closure Cost Estimate 15.01 RMU - 2 (1 cell) 15.02 RMU - 2 (2 cells) 15.03 RMU - 2 (3 cells) 15.04 RMU - 2 (4 cells) 15.05 RMU - 2 (5 cells) 15.06 RMU - 2 (6 cells)	N/A	Add New	8/28/13		
RMU-2 Post-Closure Cost Estimate PCC-9.01 RMU - 2 (1 cell) PCC-9.02 RMU - 2 (2 cells) PCC-9.03 RMU - 2 (3 cells) PCC-9.04 RMU - 2 (4 cells) PCC-9.05 RMU - 2 (5 cells) PCC-9.06 RMU - 2 (6 cells)	N/A	Add New	8/28/13		
RMU-2 Engineering Report	N/A	Add New	11/08/13		
RMU-2 SEMP including CA Plan	N/A	Add New	11/08/13		
RMU-1 to RMU-2 Transition Plan	N/A	Add New	4/29/13		