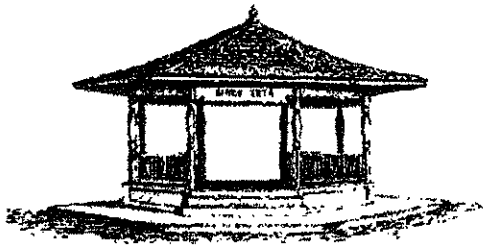
SKYLINE LANDFILL

ATTACHMENT C2

APPENDIX C2-D

REGULATORY CORRESPONDENCE

City of Ferris



"A Texas Main Street City"

February 28, 2012

Kenneth J. Welch, P.E.
Principal Engineer
Biggs & Mathews Environmental, Inc.
1700 Robert Road, Suite 100
Mansfield, Texas 76063

Re: Waste Management of Texas, Inc.
Skyline Landfill
Coordination of 100-Year Floodplain
City of Ferris, Texas

Dear Mr. Welch:

The City of Ferris Floodplain Administrator is responsible for floodplain management within the City of Ferris. The responsibilities of the City of Ferris Floodplain Administrator are part of the duties of the City Manager's Office. The City Manager's Office has reviewed the 100-year Floodplain Analysis of Ten Mile Creek related to the expansion of the Skyline Landfill. The Skyline Landfill is located entirely within the city limits of Ferris.

The 100-year Floodplain Analysis states that the proposed expansion of the Skyline Landfill requires placement of approximately 2,500 cubic yards of fill within the limits of the Federal Emergency Management Agency (FEMA) 100-year floodplain resulting in a loss of temporary floodplain storage volume of about 1.55 acre-feet. The analysis also states that the proposed expansion includes approximately 2,600 cubic yards of excavation within the limits of the FEMA 100-year floodplain providing about 1.61 acre-feet of temporary floodplain storage volume. These improvements within the 100-year floodplain are not within the 100-year floodway of Ten Mile Creek.

Our review of this analysis finds that the Skyline Landfill, if expanded as proposed, will not restrict the flow of the 100-year flood, will not reduce the temporary water storage capacity of the floodplain, and that the proposed encroachment in the 100-year floodplain by placement of fill is authorized. Waste Management of Texas, Inc. at the time of development within the 100-year floodplain will submit certified as-built information to the FEMA through the City of Ferris for a LOMR-F to be issued.

Sincerely,

Eric Strong
City Manager
City of Ferris, Texas

COORDINATION OF 100-YEAR FLOODPLAIN SUBMITTAL TO CITY OF FERRIS

BIGGS & MATHEWS ENVIRONMENTAL
Consulting Engineers • Hydrogeologists
Mansfield • Wichita Falls

February 1, 2012

Mr. Eric Strong
City Manager – City of Ferris, Texas
100 Town Plaza
Ferris, Texas 75125

Re: Waste Management of Texas, Inc.
Skyline Landfill
Coordination of 100-Year Floodplain
City of Ferris, Texas

Dear Mr. Strong:

Biggs and Mathews Environmental, Inc. (BME) is preparing a permit amendment application for the proposed expansion of the Skyline Landfill on behalf of Waste Management of Texas, Inc. (WMTX). The Skyline Landfill is located entirely within the city limits of the City of Ferris. We have prepared the attached documentation which requests approval from the City of Ferris to encroach into the 100-year floodplain as part of the expansion of the Skyline Landfill. We are requesting documentation from the City of Ferris approving placement of fill within the 100-year floodplain along Ten Mile Creek, within the City of Ferris.

The proposed expansion of the Skyline Landfill requires placement of approximately 2,500 cubic yards of fill within the limits of the 100-year floodplain. This results in a loss of temporary floodplain storage volume of about 1.55 acre-feet. Further, the proposed expansion provides for excavation of approximately 2,600 cubic yards, adjacent to the existing 100-year floodplain limits. This will create temporary floodplain storage volume of about 1.61 acre-feet to replace the storage volume that will be lost with the expansion. These improvements are not within the 100-year floodway of Ten Mile Creek. The Skyline Landfill, if expanded as proposed, will not restrict the flow of the 100-year flood and will not reduce the temporary water storage capacity of the floodplain.

At the time of development within the 100-year floodplain, certified as-built information will be submitted to the Department of Homeland Security's Federal Emergency Management Agency (DHS-FEMA) through the City of Ferris to request a Letter of Map Revision – Fill (LOMR-F). The National Flood Insurance Program (NFIP) regulations do not require that a Conditional Letter of Map Revision – Fill (CLOMR-F) be requested and issued for a proposed project.

We appreciate your review of the attached Flood Control Analysis Report. We respectfully request that as City of Ferris Floodplain Administrator, a written response be provided as it relates to the 100-year floodplain, should you concur with the conclusions

1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • Phone: 817-563-1144 • Fax: 817-563-1224

of this submittal. Please include in your response letter that the Skyline Landfill, if expanded as proposed, will not restrict the flow of the 100-year flood, will not reduce the temporary water storage capacity of the floodplain, and that the proposed encroachment in the 100-year floodplain by placement of fill is authorized. Waste Management of Texas, Inc. at the time of development within the 100-year floodplain will submit certified as-built information to the DHS-FEMA through the City of Ferris for a LOMR-F to be issued.

A copy of this submittal will be provided to Dallas County and the City of Wilmer for their information.

Please feel free to contact Kenneth Welch or Felipe Wescoup if you have any questions.

Sincerely,

BIGGS & MATHEWS ENVIRONMENTAL
TBPE No. F-256 ♦ TBPG No. 50222

Kenneth J. Welch, P.E.
Principal Engineer

Felipe A. Wescoup, P.E.
Project Engineer

Attachments: Flood Control Analysis Report

cc: Ms. Alberta L. Blair, P.E., Floodplain Administrator, Dallas County, Texas
Ms. Crystol Birdwell, City Secretary, City of Wilmer, Texas
Mr. Walter C. Hunt, P.E., Waste Management
Mr. Rick Losa, Waste Management

SKYLINE LANDFILL
CITY OF FERRIS
DALLAS AND ELLIS COUNTIES, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 42D

100 – YEAR FLOODPLAIN ANALYSIS
CITY OF FERRIS COORDINATION

Prepared for

Waste Management of Texas, Inc.

February 2012

2/01/2012

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

CONTENTS

2/01/2012

1 INTRODUCTION

Waste Management of Texas, Inc. (WMTX) plans to expand the existing Skyline Landfill. The Skyline Landfill is located in both Dallas and Ellis Counties, entirely within the city limits of the City of Ferris. The expansion of the landfill will result in placement of fill within the limits of the FEMA defined 100-year floodplain along Ten Mile Creek.

WMTX will submit to the Texas Commission on Environmental Quality (TCEQ) a permit amendment application to expand the existing Skyline Landfill. TCEQ requires a demonstration that no solid waste disposal operations will be conducted within the 100-year floodway as defined by the Federal Emergency Management Administration; that new solid waste management units, existing municipal solid waste units, and lateral expansions located in 100-year floodplains shall not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste so as to pose a hazard to human health and the environment.

In addition, TCEQ requires approval from the city, county, or other agency with jurisdiction over proposed improvements to be constructed in a floodplain. Since the expansion of the Skyline Landfill will encroach into the FEMA defined 100-year floodplain with placement of fill, WMTX is requesting approval from the City of Ferris, as the FEMA designated Floodplain Administrator, to encroach into the 100-year floodplain. This analysis provides to the City of Ferris the demonstration that solid waste disposal operations will not be conducted in the 100-year floodway; and that expansion of the skyline landfill will not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste.

2 100-YEAR FLOODPLAIN

The 100-year floodplain elevations for Ten Mile Creek adjacent to the Skyline Landfill are from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) of Dallas County, Texas and unincorporated areas community panel number 48201C0505L, revised August 23, 2001. However, the hydrologic and hydraulic modeling of Ten Mile Creek to determine the 100-year floodplain elevations was performed in 1979. Subsequent Flood Insurance Studies (FIS) since 1979 have only revised the limits of the 100-year floodplain based upon the topography. Hydrologic and hydraulic calculations have not been performed to revise the 100-year floodplain elevations.

The Federal Emergency Management Agency (FEMA) has defined the limits of the 100-year floodplain in the vicinity of the landfill as Zone AE; base flood elevations have been determined by FEMA. The limits of the floodplain are depicted on Drawing A-2, which is a drawing compiled from the Flood Insurance Rate Map (FIRM), Community Panel Number 48201C0505L, with a revision date of August 23, 2001. As depicted on Drawing A-2, portions of the permit boundary along Ten Mile Creek are located within the FEMA defined 100 year floodplain.

The proposed expansion of the Skyline Landfill requires fill within the 100-year floodplain removing approximately 2,500 cubic yards (1.55 acre-feet) of temporary floodplain storage volume. This volume will be removed as shown on Drawing A-5. The removed volume will be replaced with approximately 2,600 cubic yards (1.61 acre-feet) of temporary floodplain storage volume as shown on Drawing A-6. These improvements are not within the 100-year floodway of Ten Mile Creek.

As stated on the FEMA publication, *Application Forms for Conditional and Final Letters of Map Amendment and Letters of Map Revision based on Fill*, OMB Control Number 1660-0015, which expires Feb 28, 2014, "The NFIP regulations do not require that a CLOMA or CLOMR-F be requested and issued for a proposed project." At the time of development within the 100-year floodplain certified as-built information will be submitted to Department of Homeland Security's Federal Emergency Management Agency (DHS-FEMA) for a Letter of Map Revision – Fill (LOMR-F) to be issued. Once issued, the LOMR-F will officially modify the National Flood Insurance Program (NFIP) map.

The proposed expansion of the Skyline Landfill has been designed consistent with the requirements of TCEQ regulations 30 TAC §330.63(c)(2). This section and Drawings A-2 through A-4 provide the information required by 30 TAC §330.63(c)(2).

In accordance with §330.547(a), the Skyline Landfill's waste disposal operations will not be located in the 100-year floodway as defined by FEMA. In accordance with §330.547(b), the Skyline Landfill's new and existing municipal solid waste units will not

be located in the 100-year floodplain. The Skyline Landfill, if expanded as proposed, will not restrict the flow of the 100-year flood, will not reduce the temporary water storage capacity of the floodplain, and will not result in the washout of solid waste.

Refer to Appendix A – 100-Year Floodplain Analysis for drawings depicting the development of the Skyline Landfill and its relation to the Ten Mile Creek 100-year floodplain.

The Regional Drainage Map, Drawing A-1, shows the location of the Skyline Landfill in relation to Ten Mile Creek. It also delineates the drainage area contributing to Ten Mile Creek adjacent to the Skyline Landfill.

The Flood Insurance Rate Map (FIRM), Drawing A-2, shows the 100-year floodplain elevations and limits determined by the Federal Emergency Management Agency (FEMA). The FIRM map delineates this area as Zone AE; base flood elevations have been determined by FEMA.

The 100-year Floodplain Map Current Permitted, Drawing A-3, shows the 100-year floodplain elevations determined by FEMA and the 100-year floodplain limits based upon the existing topography and the current permitted final closure configuration.

The 100-year Floodplain Map Postdeveloped, Drawing A-4, shows the 100-year floodplain elevations determined by FEMA and the 100-year floodplain limits based upon the existing topography and the postdeveloped final closure configuration.

The Floodplain Volume Removed by Fill, Drawing A-5, shows the location and storage volume that will be removed by fill from the 100-year floodplain.

The Floodplain Volume Replaced by Excavation, Drawing A-6, shows the location and storage volume that will be replaced by excavation to the 100-year floodplain.

3 FLOOD CONTROL ANALYSIS

To demonstrate that the proposed development of the Skyline Landfill will not impact the 100-year flooding condition of Ten Mile Creek, a regional hydrologic analysis and a hydraulic analysis of Ten Mile Creek adjacent to the Skyline Landfill was performed based upon the current permitted condition of the Skyline Landfill. The hydrologic modeling for the current permitted condition is not included, but will be provided if requested. The hydraulic modeling for the current permitted condition is included in Appendix B. The results of the hydraulic modeling for the 25-year and 100-year storm events are provided on Drawing B-1 – Current Permitted Flood Stage Analysis Summary.

A regional hydrologic analysis and a hydraulic analysis of Ten Mile Creek adjacent to the Skyline Landfill was performed based upon the postdeveloped condition of the Skyline Landfill. The hydrologic modeling for the postdeveloped condition is not included, but will be provided if requested. The hydraulic modeling for the current permitted condition is included in Appendix C. The results of the hydraulic modeling for the 25-year and 100-year storm events are provided on Drawing C-1 – Postdeveloped Flood Stage Analysis Summary.

The tables on pages 6 and 7 compare the current permitted and postdeveloped conditions for the 25-year and 100-year storm events, respectively. These tables demonstrate that the proposed development of the Skyline Landfill will not impact the flooding condition of Ten Mile Creek.

The Current Permitted Flood Stage Analysis Summary, Drawing B-1 shows the 100-year water surface elevations and the limits of the 100-year water surface for the current permitted condition based upon the current permitted hydraulic analysis. The current permitted HEC-RAS results are included in Appendix B and represent the current permitted final closure configuration. A summary table shows the results of the hydraulic analysis. The water surface elevation and energy grade line are graphically shown for each cross section.

The Postdeveloped Flood Stage Analysis Summary, Drawing C-1 shows the 100-year water surface elevations and the limits of the 100-year water surface for the postdeveloped condition based upon the postdeveloped hydraulic analysis. The postdeveloped HEC-RAS results are included in Appendix C and represent the postdeveloped final closure configuration. A summary table shows the results of the hydraulic analysis. The water surface elevation and energy grade line are graphically shown for each cross section.

Prep by: FAW
Date: 1/30/12

Chkd by: KJW
Date: 1/30/12

Waste Management of Texas, Inc.
Skyline Landfill
Current Permitted/Postdevelopment Flood Stage Analysis Summary

Ten Mile Creek 25-Year Flood Stage Analysis Summary

HEC-RAS Cross Section	Current Permitted 25-Year Flow Rate (cfs)	Postdevelopment 25-Year Flow Rate (cfs)	Difference	Current Permitted 25-Year Water Surface* (ft)	Postdevelopment 25-Year Water Surface* (ft)	Difference	Current Permitted 25-Year Velocity (fps)	Postdevelopment 25-Year Velocity (fps)	Difference
2.269	25,033.43	25,033.43	0.00	417.00	417.00	0.00	7.67	7.67	0.00
2.183	25,025.76	25,025.74	-0.02	416.68	416.68	0.00	3.47	3.47	0.00
2.104	25,097.97	25,097.97	0.00	416.32	416.32	0.00	4.79	4.79	0.00
2.050	25,096.93	25,096.91	-0.02	416.00	416.00	0.00	5.50	5.50	0.00
2.006	25,095.26	25,095.24	-0.02	415.75	415.75	0.00	5.58	5.58	0.00
1.966	25,092.91	25,092.90	-0.01	415.37	415.37	0.00	6.25	6.25	0.00
1.919	25,093.41	25,093.38	-0.03	414.85	414.85	0.00	6.05	6.05	0.00
1.873	25,071.88	25,071.87	-0.01	414.30	414.30	0.00	6.80	6.80	0.00
1.768	25,070.45	25,070.42	-0.03	413.65	413.65	0.00	5.53	5.54	0.01
1.725	25,140.87	25,140.83	-0.04	413.22	413.22	0.00	6.01	6.01	0.00
1.609	25,172.68	25,170.25	-2.43	411.57	411.57	0.00	6.90	6.90	0.00
1.522	25,168.02	25,165.50	-2.52	410.92	410.92	0.00	4.24	4.24	0.00
1.441	25,136.91	25,134.41	-2.50	410.00	410.00	0.00	7.98	7.98	0.00
1.389	25,132.65	25,130.21	-2.44	409.32	409.31	-0.01	7.68	7.68	0.00
1.350	25,138.84	25,122.76	-16.08	409.16	409.15	-0.01	4.68	4.68	0.00
1.267	25,134.51	25,118.50	-16.01	408.67	408.67	0.00	6.08	6.08	0.00
1.222	25,128.96	25,113.05	-15.91	408.37	408.37	0.00	5.74	5.74	0.00
1.180	25,080.42	25,064.35	-16.07	408.20	408.19	-0.01	4.40	4.40	0.00
1.114	25,079.32	25,063.40	-15.92	407.97	407.97	0.00	4.30	4.30	0.00
0.990	25,079.72	25,062.64	-17.08	407.45	407.45	0.00	4.70	4.70	0.00
0.947	25,082.79	25,068.31	-14.48	407.15	407.15	0.00	5.43	5.43	0.00
0.927	25,080.83	25,066.37	-14.46	406.58	406.58	0.00	8.80	8.79	-0.01
0.883	25,076.64	25,062.21	-14.43	406.30	406.30	0.00	5.33	5.33	0.00
0.772	25,154.91	25,140.13	-14.78	405.23	405.23	0.00	5.40	5.40	0.00
0.734	25,154.00	25,139.22	-14.78	404.78	404.77	-0.01	6.26	6.26	0.00
0.462	25,125.76	25,111.08	-14.68	403.10	403.10	0.00	3.28	3.28	0.00
0.381	25,198.91	25,184.35	-14.56	402.80	402.80	0.00	4.27	4.27	0.00

Waste Management of Texas, Inc.
Skyline Landfill
Current Permitted/Postdevelopment Flood Stage Analysis Summary

Ten Mile Creek 100-Year Flood Stage Analysis Summary

HEC-RAS Cross Section	Current Permitted 100-Year Flow Rate (cfs)	Postdevelopment 100-Year Flow Rate (cfs)	Difference	Current Permitted 100-Year Water Surface* (ft)	Postdevelopment 100-Year Water Surface* (ft)	Difference	Current Permitted 100-Year Velocity (fps)	Postdevelopment 100-Year Velocity (fps)	Difference
2.269	33,597.52	33,597.52	0.00	418.09	418.09	0.00	8.11	8.11	0.00
2.183	33,595.84	33,595.84	0.00	417.71	417.71	0.00	4.12	4.12	0.00
2.104	33,692.12	33,692.13	0.01	417.29	417.29	0.00	5.46	5.46	0.00
2.050	33,689.20	33,689.23	0.03	416.94	416.94	0.00	6.15	6.15	0.00
2.006	33,685.70	33,685.72	0.02	416.67	416.67	0.00	6.15	6.15	0.00
1.966	33,681.46	33,681.47	0.01	416.26	416.26	0.00	6.75	6.75	0.00
1.919	33,660.69	33,660.75	0.06	415.77	415.77	0.00	6.20	6.20	0.00
1.873	33,659.63	33,659.70	0.07	415.25	415.25	0.00	7.12	7.12	0.00
1.768	33,656.20	33,656.27	0.07	414.62	414.62	0.00	5.84	5.84	0.00
1.725	33,750.80	33,750.88	0.08	414.20	414.20	0.00	6.27	6.27	0.00
1.609	33,791.77	33,788.27	-3.50	412.63	412.63	0.00	7.17	7.17	0.00
1.522	33,785.60	33,782.18	-3.42	411.98	411.98	0.00	4.65	4.65	0.00
1.441	33,746.72	33,743.45	-3.27	411.10	411.10	0.00	8.23	8.23	0.00
1.389	33,743.07	33,740.04	-3.03	410.40	410.40	0.00	8.15	8.15	0.00
1.350	33,799.64	33,790.07	-9.57	410.21	410.21	0.00	5.19	5.19	0.00
1.267	33,745.65	33,735.55	-10.10	409.76	409.76	0.00	6.23	6.22	-0.01
1.222	33,743.05	33,733.22	-9.83	409.48	409.47	-0.01	5.91	5.91	0.00
1.180	33,739.30	33,729.80	-9.50	409.30	409.29	-0.01	4.74	4.74	0.00
1.114	33,731.90	33,722.92	-8.98	409.05	409.05	0.00	4.75	4.75	0.00
0.990	33,723.18	33,713.00	-10.18	408.52	408.52	0.00	5.01	5.01	0.00
0.947	33,724.86	33,718.09	-6.77	408.24	408.24	0.00	5.58	5.58	0.00
0.927	33,705.00	33,697.21	-7.79	407.61	407.61	0.00	9.91	9.91	0.00
0.883	33,702.71	33,695.19	-7.52	407.28	407.28	0.00	5.86	5.86	0.00
0.772	33,829.79	33,822.39	-7.40	406.15	406.14	-0.01	5.99	5.98	-0.01
0.734	33,826.83	33,819.63	-7.20	405.70	405.70	0.00	6.63	6.62	-0.01
0.462	33,795.38	33,787.94	-7.44	404.07	404.07	0.00	3.90	3.90	0.00
0.381	33,889.52	33,882.88	-6.64	403.77	403.77	0.00	4.56	4.56	0.00

4 CONCLUSIONS

The following conclusions summarize the results of the Flood Control Analysis Report:

- The proposed expansion of the Skyline Landfill requires fill within the 100-year floodplain removing approximately 2,500 cubic yards (1.55 acre-feet) of temporary floodplain storage volume. The removed volume will be replaced with approximately 2,600 cubic yards (1.61 acre-feet) of temporary floodplain storage volume.

- As required by DHS-FEMA, Waste Management of Texas, Inc. at the time of development within the 100-year floodplain will submit certified as-built information to the DHS-FEMA for a LOMR-F to be issued.

- In accordance with TCEQ regulations, §330.547(a), the Skyline Landfill's waste disposal operations are not located in the 100-year floodway as defined by FEMA.

- In accordance with TCEQ regulations, §330.547(b), the Skyline Landfill's new and existing municipal solid waste units are not located in the 100-year floodplain. The Skyline Landfill, if expanded as proposed, will not restrict the flow of the 100-year flood, will not reduce the temporary water storage capacity of the floodplain, and will not result in the washout of solid waste.

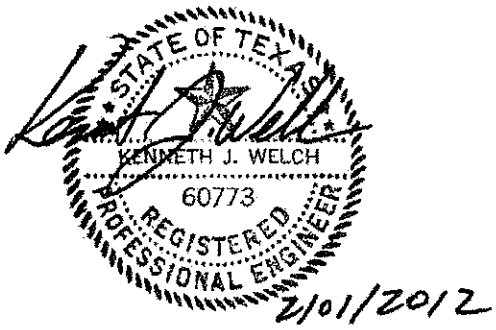
- The drainage design criteria and analyses used for these drainage calculations meet the requirements of TCEQ regulations, §330.63(c).

- The proposed expansion of the Skyline Landfill will not adversely impact the receiving channel, Ten Mile Creek.

SKYLINE LANDFILL

APPENDIX A

100-YEAR FLOODPLAIN ANALYSIS



Includes pages A-1 through A-6

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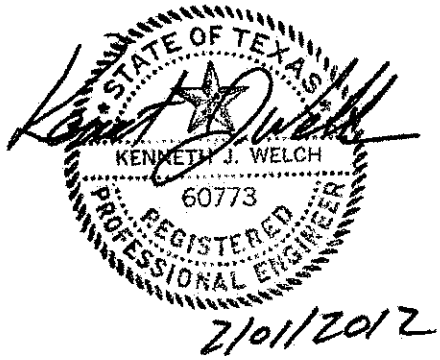

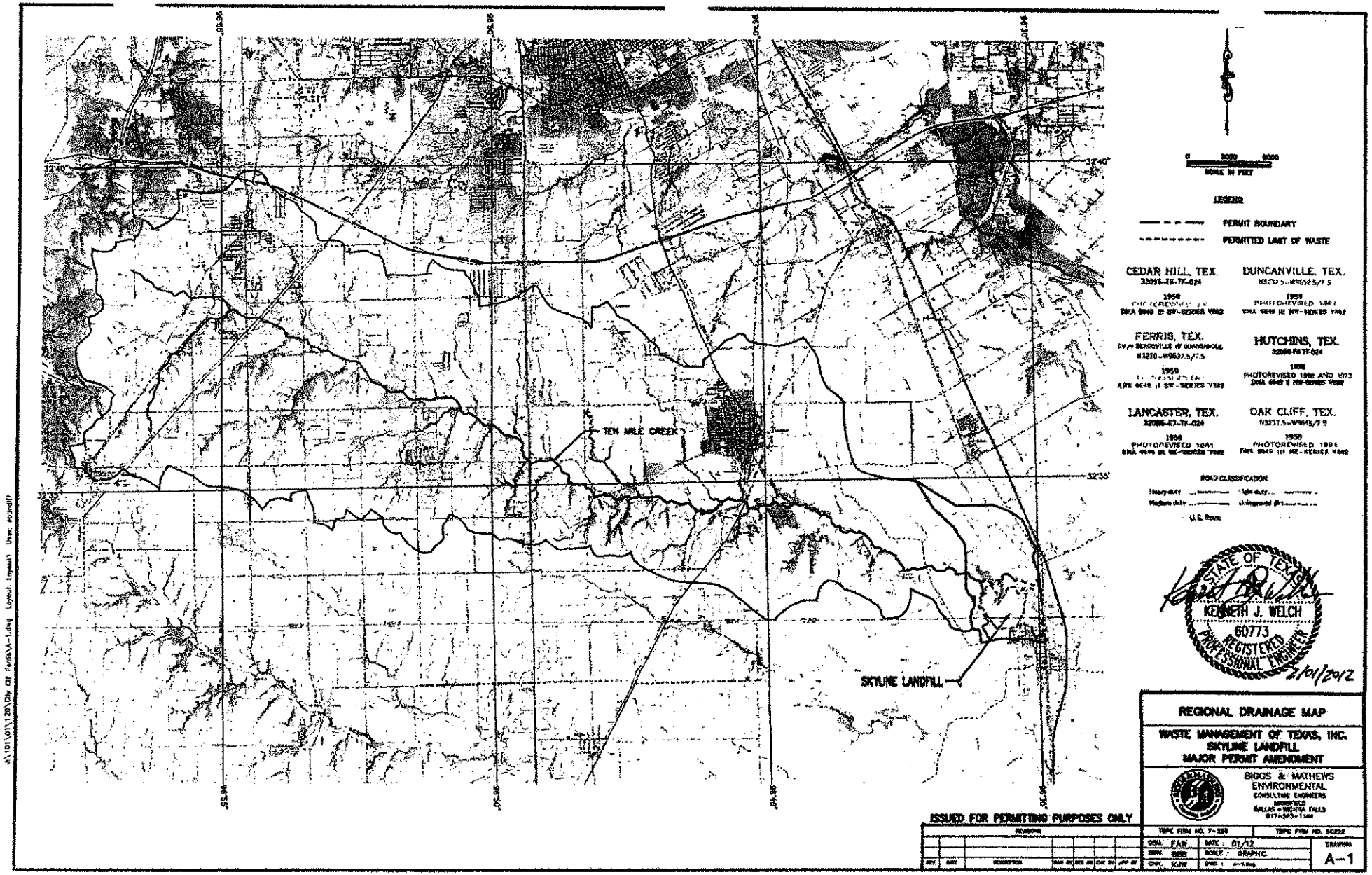

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS									
REV	DATE	DESCRIPTION	DRN BY	DES BY	CHK BY	APP BY			

TBPE FIRM NO. F-258 | TBPG FIRM NO. 50232

DSN. FAN | DATE : 01/12 | DRAWING

DWG. BBB | SCALE : GRAPHIC | A-1

CHK. KJW | DWG : A-1.dwg

REGIONAL DRAINAGE MAP

WASTE MANAGEMENT OF TEXAS, INC.
SKYLINE LANDFILL
MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
DALLAS • WICHITA FALLS
817-563-1144

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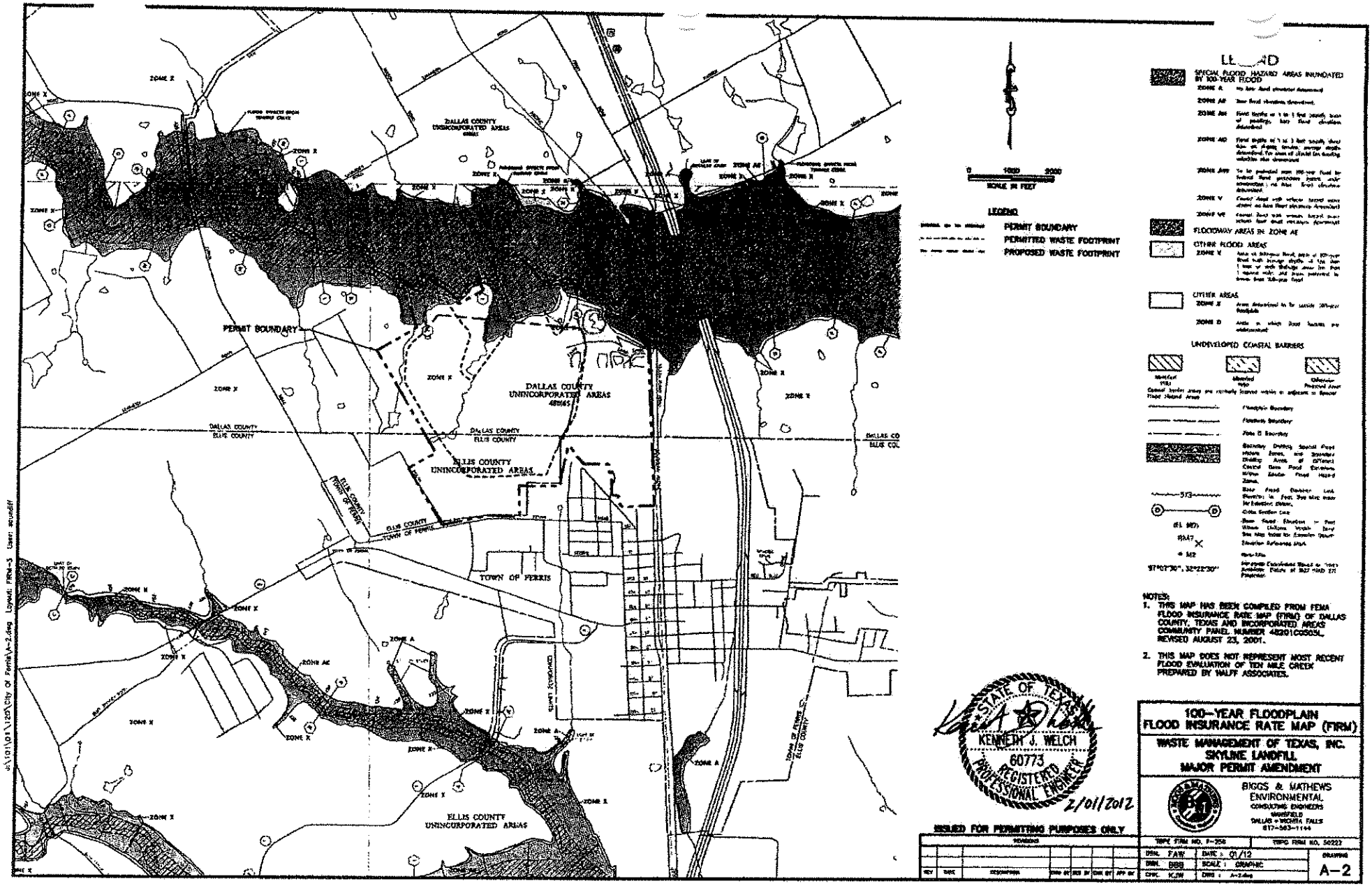
PERMIT BOUNDARY
DALLAS COUNTY UNINCORPORATED AREAS
DALLAS COUNTY ELLIS COUNTY
ELLIS COUNTY UNINCORPORATED AREAS
TOWN OF PERRIS
ELLIS COUNTY UNINCORPORATED AREAS
ZONE X
ZONE A
ZONE AE
0 1000 2000
SCALE IN FEET
LEGEND
PERMIT BOUNDARY
PERMITTED WASTE FOOTPRINT
PROPOSED WASTE FOOTPRINT
LEGEND
SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
FLOODWAY AREAS IN ZONE AE
OTHER FLOOD AREAS
OTHER AREAS
UNDEVELOPED COASTAL BARRIERS
NOTES:
1. THIS MAP HAS BEEN COMPILED FROM FEMA FLOOD INSURANCE RATE MAP (FIRM) OF DALLAS COUNTY, TEXAS AND INCORPORATED AREAS COMMUNITY PANEL NUMBER 48291C0505L, REVISED AUGUST 23, 2001.
2. THIS MAP DOES NOT REPRESENT MOST RECENT FLOOD EVALUATION OF TEN MILE CREEK PREPARED BY WALFF ASSOCIATES.
STATE OF TEXAS
KENNETH J. WELCH
60773
REGISTERED PROFESSIONAL ENGINEER
2/01/2012
ISSUED FOR PERMITTING PURPOSES ONLY
100-YEAR FLOODPLAIN
FLOOD INSURANCE RATE MAP (FIRM)
WASTE MANAGEMENT OF TEXAS, INC.
SKYLINE LANDFILL
MAJOR PERMIT AMENDMENT
BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222
DRN. FAW
DATE : 01/12
DRN. BBB
SCALE : GRAPHIC
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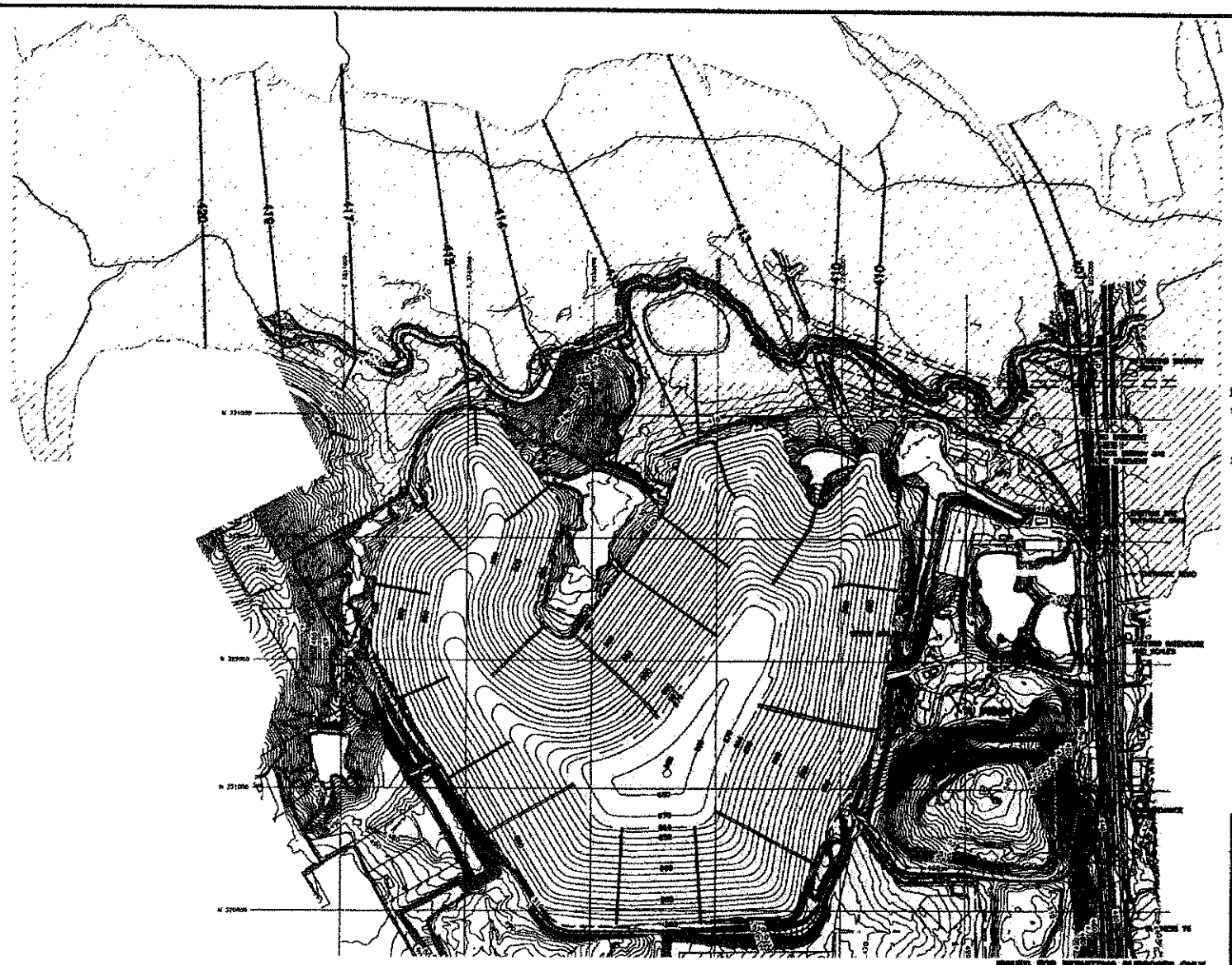

NOTES:

1. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL SURVEY FLOWN MARCH 6, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL.
2. 100-YEAR FLOODPLAIN PROVIDED BY HALFF ASSOCIATES. FLOODPLAIN DATA COMPILED FROM FEMA FLOOD INSURANCE RATE MAP (FIRM) OF DALLAS COUNTY, TEXAS AND INCORPORATED AREAS COMMUNITY PANEL NUMBER 48201C0505L, REVISED AUGUST 23, 2001.

STATE OF TEXAS
KENNETH J. WELCH
80773
REGISTERED
PROFESSIONAL ENGINEER

2/01/2012

ISSUED FOR PERMITTING PURPOSES ONLY

100-YEAR FLOODPLAIN MAP CURRENT PERMITTED

WASTE MANAGEMENT OF TEXAS, INC. SKYLINE LANDFILL MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

TBPE FIRM NO. F-256 | TBPG FIRM NO. 50222

REV	DATE	DESCRIPTION	DSGN BY	RES BY	DWN BY	APP BY

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DWN. BRB | SCALE : GRAPHIC
CHK. KJW | DWG : A-3.dwg

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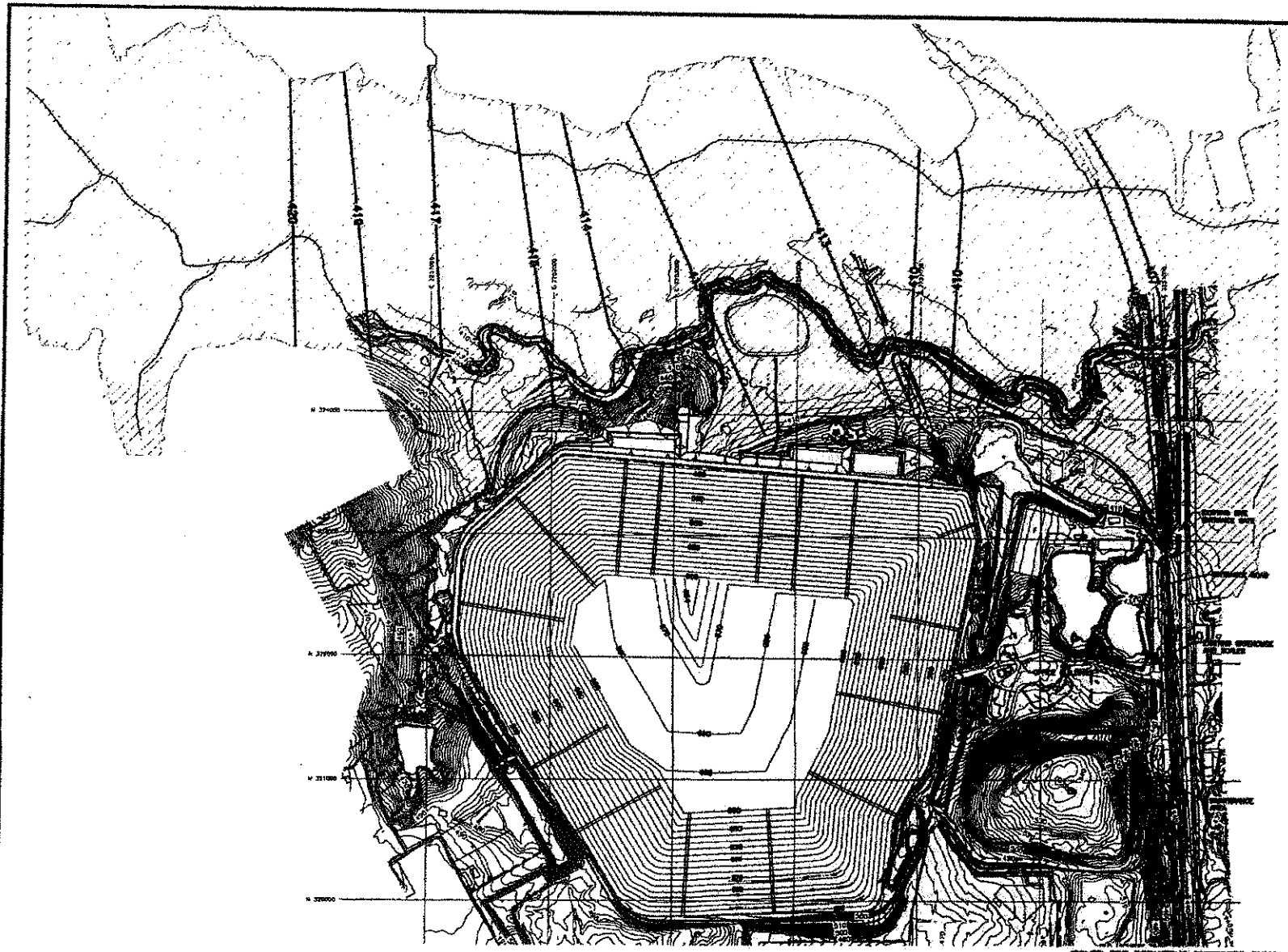

0 500 1000
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LANDFILL FOOTPRINT
- 60 EXISTING CONTOUR
- N 6253000 STATE PLANE GRID
- 100-YEAR FLOODPLAIN

NOTE:

1. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL SURVEY FLOWN MARCH 6, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL.
2. 100-YEAR FLOODPLAIN PROVIDED BY HALFF ASSOCIATES. FLOODPLAIN DATA COMPILED FROM FEMA FLOOD INSURANCE RATE MAP (FIRM) OF DALLAS COUNTY, TEXAS AND INCORPORATED AREAS COMMUNITY PANEL NUMBER 48231C0560L, REVISED AUGUST 23, 2001.
3. SKYLINE LANDFILL PROPOSED DEVELOPMENT PROVIDED BY BIGGS AND MATHEWS ENVIRONMENTAL.
4. SEE ATTACHMENT C3 FOR DRAINAGE SYSTEM PLANS AND DETAILS.

STATE OF TEXAS
KENNETH J. WELCH
60773
REGISTERED
PROFESSIONAL ENGINEER
7/01/2012

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REVISIONS								
REV	DATE	DESCRIPTION	DRN BY	DES BY	CHK BY	APP BY		

100-YEAR FLOODPLAIN MAP POSTDEVELOPED

WASTE MANAGEMENT OF TEXAS, INC. SKYLINE LANDFILL MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-563-1144

TBPE FIRM NO. F-256		TBPG FIRM NO. 50122	
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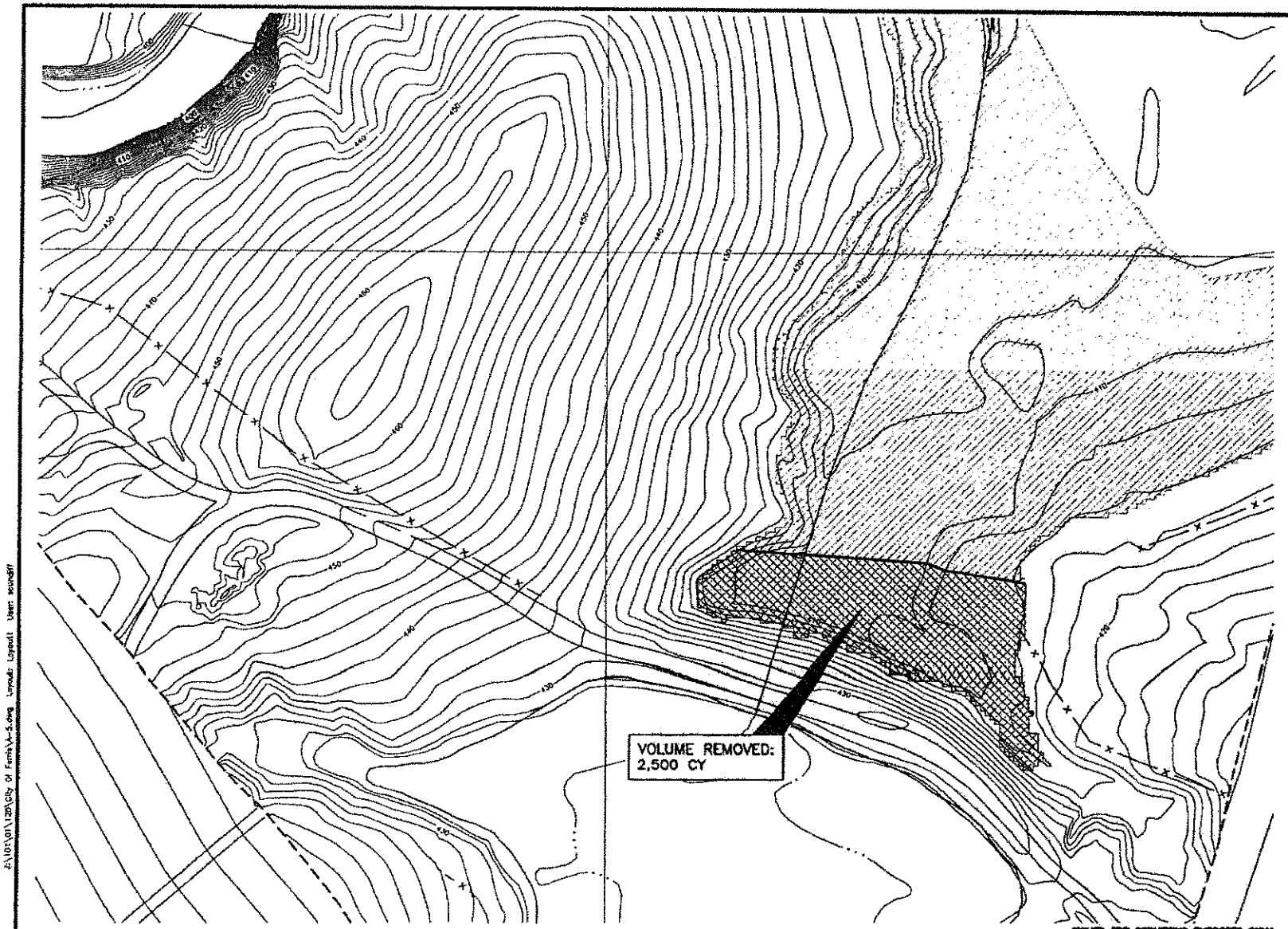

0 50 100
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LANDFILL FOOTPRINT
- EXISTING CONTOUR
- STATE PLANE GRID
- 100-YEAR FLOODPLAIN

NOTE:

1. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL SURVEY FLOWN MARCH 4, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL.
2. 100-YEAR FLOODPLAIN PROVIDED BY HALFF ASSOCIATES. FLOODPLAIN DATA COMPILED FROM FEMA FLOOD INSURANCE RATE MAP (FIRM) OF DALLAS COUNTY, TEXAS AND INCORPORATED AREAS COMMUNITY PANEL NUMBER 48201C0505L, REVISED AUGUST 23, 2001.
3. SKYLINE LANDFILL PROPOSED DEVELOPMENT PROVIDED BY BIGGS AND MATHEWS ENVIRONMENTAL.

STATE OF TEXAS
KENNETH J. WELCH
60773
REGISTERED PROFESSIONAL ENGINEER
2/01/2012

ISSUED FOR PERMITTING PURPOSES ONLY

NO.	DATE	DESCRIPTION	DRN BY	DES BY	CHK BY	APP BY

FLOODPLAIN VOLUME REMOVED BY FILL

WASTE MANAGEMENT OF TEXAS, INC.
SKYLINE LANDFILL
MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
AMARILLO
DALLAS & WICHITA FALLS
817-563-1144

TBPE FIRM NO. F-256 | TBPG FIRM NO. 50322

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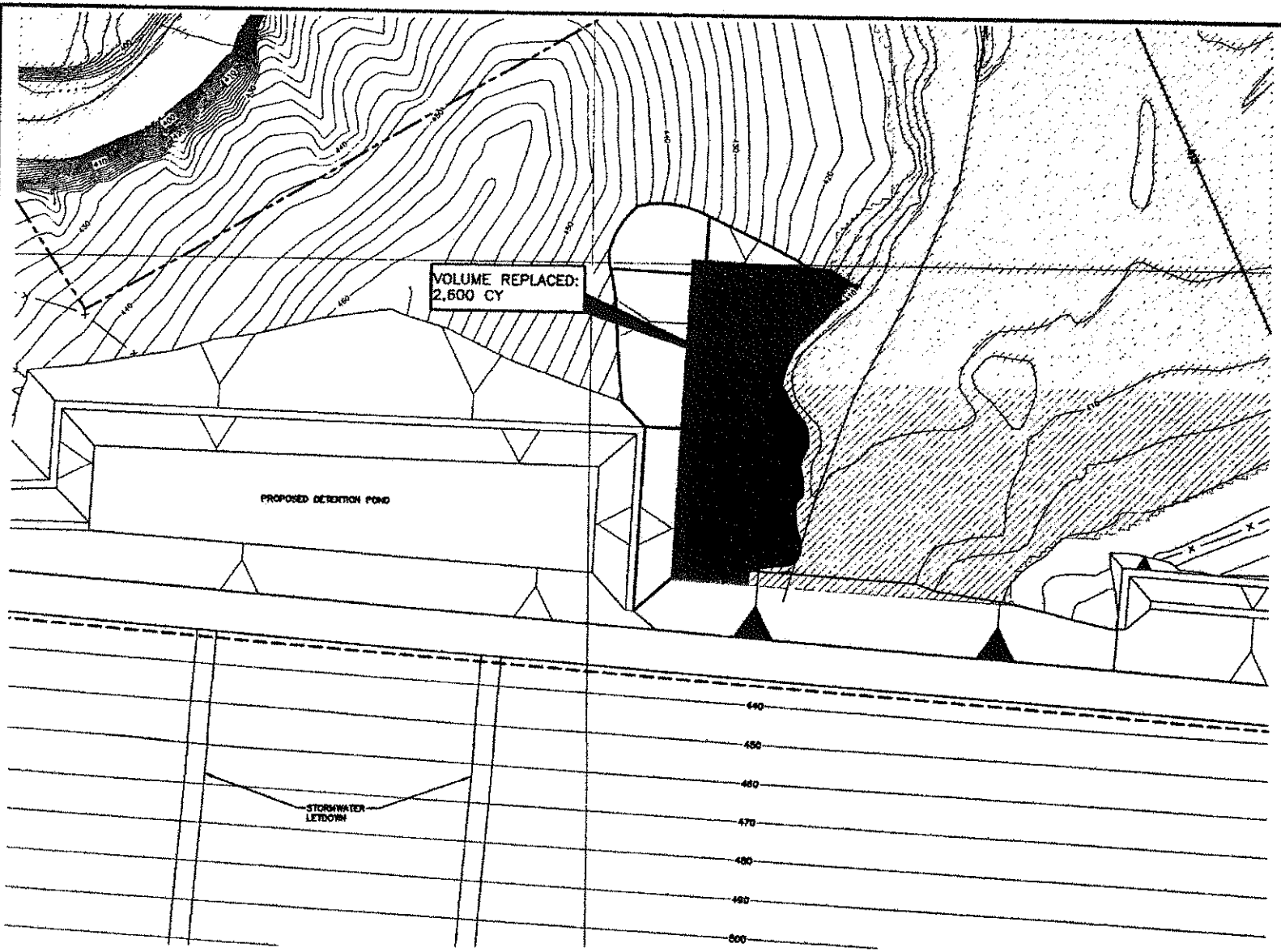

0 50 100
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PROPOSED LANDFILL FOOTPRINT
- 60 EXISTING CONTOUR
- 6,873X000 STATE PLANE GRID
- 100-YEAR FLOODPLAIN

NOTE:

1. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL SURVEY FLOWN MARCH 9, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL.
2. 100-YEAR FLOODPLAIN PROVIDED BY HALFF ASSOCIATES. FLOODPLAIN DATA COMPILED FROM FEMA FLOOD INSURANCE RATE MAP (FIRM) OF DALLAS COUNTY, TEXAS AND INCORPORATED AREAS COMMUNITY PANEL NUMBER 48251C0505L. REVISED AUGUST 23, 2001.
3. SKYLINE LANDFILL PROPOSED DEVELOPMENT PROVIDED BY BIGGS AND MATHEWS ENVIRONMENTAL.

STATE OF TEXAS
KENNETH J. WELCH
80773
REGISTERED
PROFESSIONAL ENGINEER
2/01/2012

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REVISIONS								
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TBPE FIRM NO. F-356 | TBPG FIRM NO. 50223

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DES. SRC | SCALE: GRAPHIC
CHK. KJW | DWG: A-6.dwg

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FLOODPLAIN VOLUME REPLACED BY EXCAVATION

WASTE MANAGEMENT OF TEXAS, INC.
SKYLINE LANDFILL
MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-543-1144

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C2-D-21

SKYLINE LANDFILL

APPENDIX B

CURRENT PERMITTED HEC-RAS EVALUATION

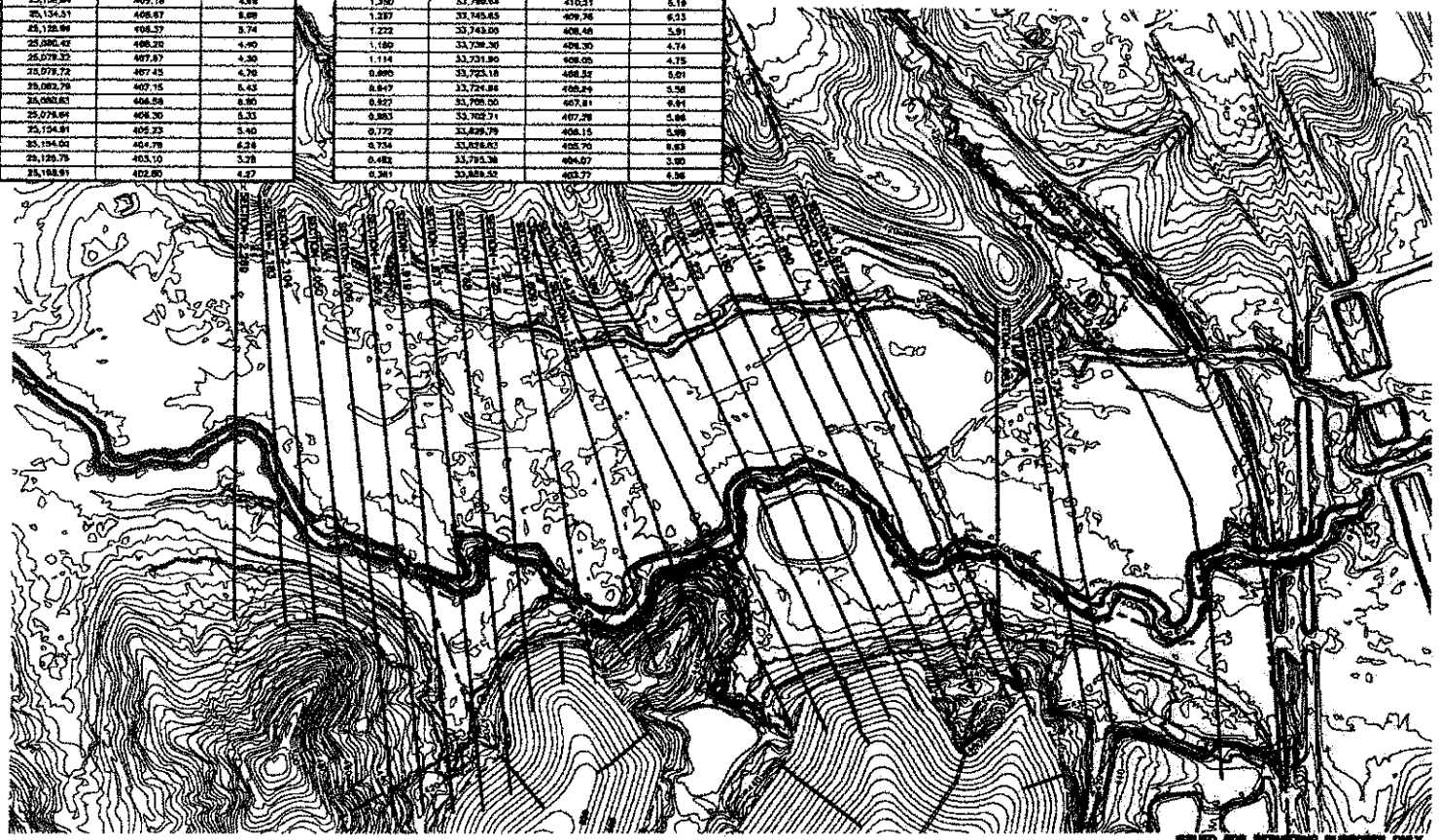
Includes pages B-1 through B-61

CONTENTS

2/01/2012

HEC-RAS Cross Section	25-YEAR FLOW RATE (cfs)	25-YEAR WATER SURFACE (ft)	25-YEAR VELOCITY (fps)
2.269	25,033.43	417.00	7.87
2.183	25,025.78	416.68	3.47
2.104	25,097.97	416.39	4.79
2.050	25,094.83	416.06	5.56
2.006	25,095.38	415.75	5.58
1.969	25,092.91	415.37	8.25
1.919	25,083.41	414.85	8.05
1.873	25,071.86	414.30	5.80
1.788	25,070.45	413.85	5.53
1.725	25,140.87	413.32	8.01
1.609	25,172.68	411.57	6.90
1.523	25,198.02	410.62	4.34
1.441	25,138.91	410.00	7.96
1.389	25,132.85	409.32	7.68
1.350	25,138.84	409.16	4.88
1.287	25,134.51	408.67	8.89
1.222	25,128.99	408.27	3.74
1.180	25,080.42	408.20	4.90
1.114	25,079.33	407.87	4.30
0.990	25,078.72	407.45	4.76
0.847	25,083.79	407.15	5.43
0.827	25,060.61	406.58	8.80
0.883	25,078.64	406.30	5.33
0.772	25,154.91	405.93	5.40
0.734	25,154.00	404.78	6.24
0.482	25,125.75	403.10	3.28
0.381	25,168.91	402.80	4.27

HEC-RAS Cross Section	100-YEAR FLOW RATE (cfs)	100-YEAR WATER SURFACE (ft)	100-YEAR VELOCITY (fps)
2.269	33,697.52	418.09	8.11
2.183	33,965.64	417.71	4.12
2.104	33,995.12	417.39	5.48
2.050	33,899.30	416.94	6.15
2.006	33,905.70	416.47	6.15
1.969	33,881.46	416.06	8.75
1.919	33,860.89	415.77	8.39
1.873	33,829.83	415.35	7.12
1.788	33,959.20	414.82	5.84
1.725	33,750.80	414.30	8.27
1.609	33,791.77	412.83	7.17
1.523	33,765.66	411.86	4.85
1.441	33,746.72	411.30	8.23
1.389	33,743.07	410.40	8.15
1.350	33,799.64	410.21	5.19
1.287	33,745.65	409.76	9.03
1.222	33,743.00	408.48	5.91
1.180	33,739.30	408.30	4.74
1.114	33,731.90	408.05	4.75
0.990	33,723.18	408.37	5.01
0.847	33,724.86	408.29	5.56
0.827	33,708.00	407.81	9.91
0.883	33,702.71	407.78	5.86
0.772	33,829.79	406.15	5.98
0.734	33,828.62	405.70	6.83
0.482	33,795.38	404.07	3.80
0.381	33,859.52	403.77	4.96



SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LANDFILL FOOTPRINT
- EXISTING CONTOUR
- HEC-RAS CROSS SECTIONS
- STREAM
- FIRM 100-YEAR FLOODPLAIN
- BME 100-YEAR WATER SURFACE

NOTES:

1. EXISTING CONTOUR PROVIDED BY NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS FROM AERIAL PHOTOGRAPHY CAPTURED BETWEEN JANUARY AND MARCH 2007. COORDINATE SYSTE IS BASED ON TEXAS STATE PLANE, NORTH CENTRAL ZONE, NAD 83.
2. CONTOURS WITHIN EXISTING WASTE DISPOSAL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.

STATE OF TEXAS
KENNETH J. WELCH
60773
REGISTERED
PROFESSIONAL ENGINEER
7/01/2012

CURRENT PERMITTED FLOOD STAGE ANALYSIS SUMMARY

WASTE MANAGEMENT OF TEXAS, INC. SKYLINE LANDFILL MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • WICHITA FALLS
817-453-1164

TBPE FIRM NO. F-256 | TBPG FIRM NO. 50222

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ISSUED FOR PERMITTING PURPOSES ONLY

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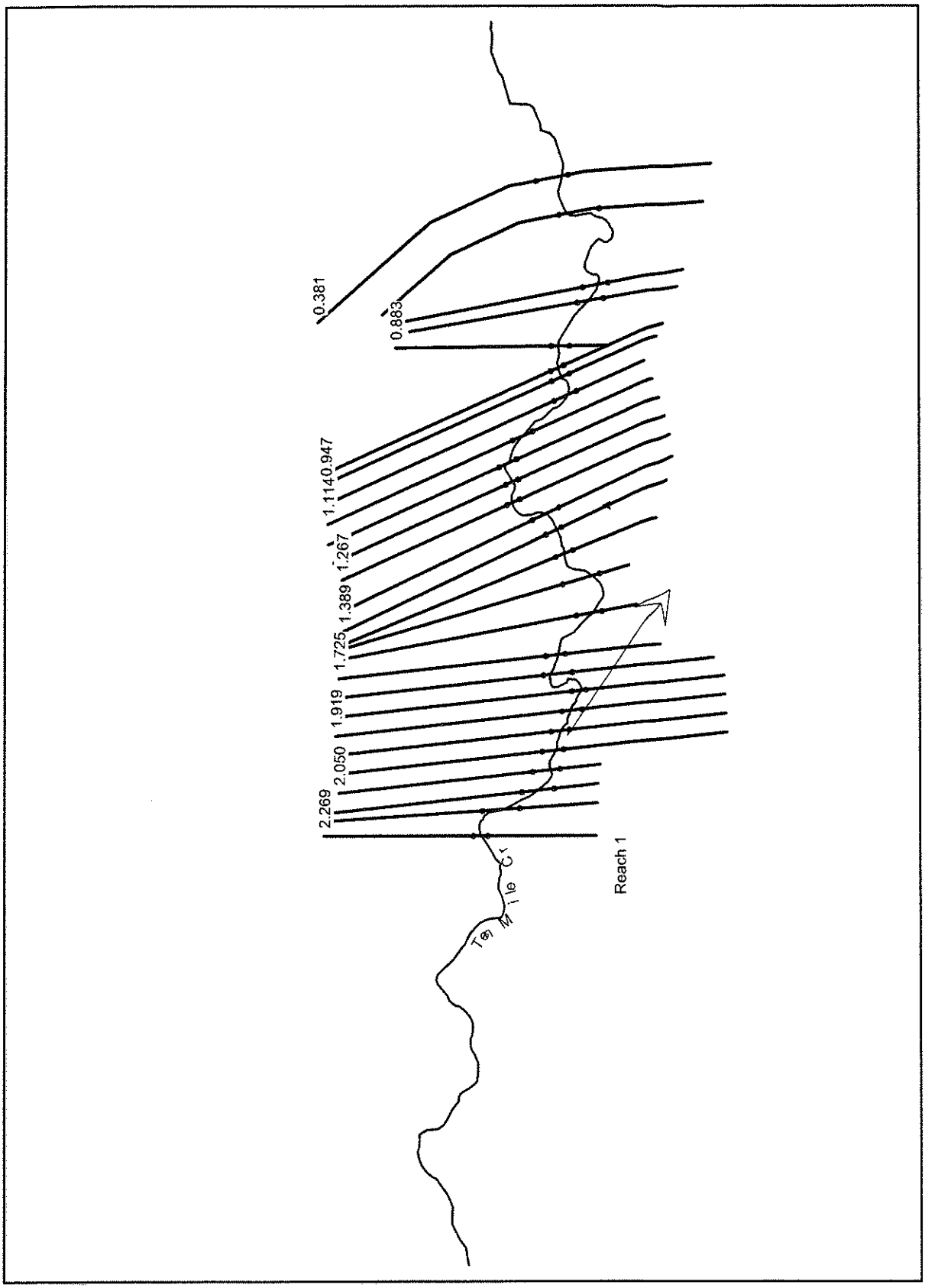
CURRENT PERMITTED HEC-RAS SCHEMATIC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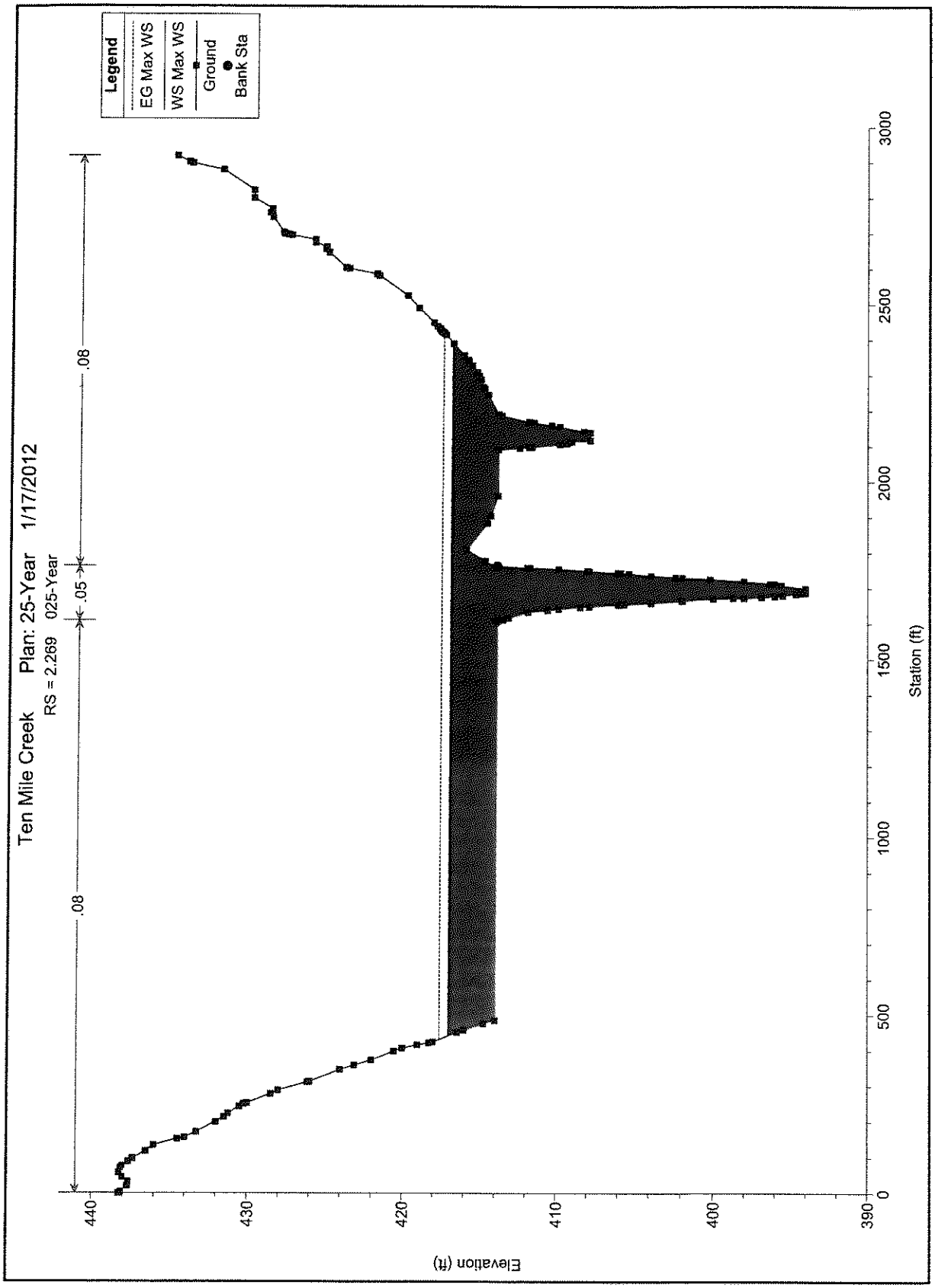
0.947
1.267
1.389
1.725
1.919
2.050
2.269
Reach 1
Ten Mile Cr

CURRENT PERMITTED 25-YEAR HEC-RAS ANALYSIS

HEC-RAS Plan: CP-25 River: Ten Mile Cr Reach: Reach 1 Profile: Max WS

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2.269	Max WS	25033.43	394.00	417.00		417.59	0.002265	7.67	7271.27	1948.96	0.37
Reach 1	2.183	Max WS	25025.76	395.88	416.68		416.84	0.000362	3.47	10988.07	2009.46	0.16
Reach 1	2.104	Max WS	25097.97	396.00	416.32		416.61	0.000931	4.79	8622.93	2061.66	0.24
Reach 1	2.050	Max WS	25096.93	394.00	416.00		416.37	0.001301	5.50	8243.64	2142.33	0.28
Reach 1	2.006	Max WS	25095.26	394.00	415.75		416.05	0.001398	5.58	9311.17	2253.71	0.29
Reach 1	1.966	Max WS	25092.91	394.00	415.37		415.70	0.001983	6.25	8739.23	2293.98	0.34
Reach 1	1.919	Max WS	25093.41	394.00	414.85		415.13	0.002524	6.05	9014.88	2900.09	0.37
Reach 1	1.873	Max WS	25071.88	394.00	414.30		414.69	0.001892	6.80	8946.63	2755.60	0.34
Reach 1	1.786	Max WS	25070.45	392.00	413.66		413.94	0.002000	5.53	8812.31	2553.32	0.33
Reach 1	1.726	Max WS	25140.87	394.00	413.22		413.50	0.002245	6.01	8940.80	2385.74	0.35
Reach 1	1.692	Max WS	25172.68	394.00	411.57		412.06	0.003017	6.90	6998.43	2042.98	0.41
Reach 1	1.592	Max WS	25168.02	393.95	410.92		411.12	0.000976	4.24	10262.61	2262.15	0.24
Reach 1	1.441	Max WS	25136.91	392.00	410.00		410.68	0.002786	7.98	6673.57	1967.37	0.41
Reach 1	1.388	Max WS	25132.65	389.35	409.32		409.95	0.002520	7.68	6700.19	1898.45	0.39
Reach 1	1.350	Max WS	25138.84	388.00	409.16		409.41	0.000875	4.68	9823.48	2433.86	0.23
Reach 1	1.267	Max WS	25134.51	388.00	408.67		408.94	0.001689	6.08	10163.71	2646.49	0.31
Reach 1	1.222	Max WS	25128.96	388.00	408.37		408.61	0.001295	5.74	11191.09	2798.00	0.28
Reach 1	1.180	Max WS	25080.42	388.00	408.20		408.36	0.000700	4.40	13149.08	2831.99	0.21
Reach 1	1.114	Max WS	25079.32	388.00	407.97		408.15	0.000569	4.30	12864.52	2774.51	0.19
Reach 1	1.050	Max WS	25079.72	388.00	407.45		407.65	0.001072	4.70	11256.05	2691.10	0.25
Reach 1	0.997	Max WS	25082.79	388.00	407.15		407.37	0.001696	5.43	10250.46	2656.84	0.31
Reach 1	0.927	Max WS	25080.83	388.00	406.58		407.39	0.003254	8.80	5815.68	1977.91	0.44
Reach 1	0.882	Max WS	25076.64	388.00	406.30		406.51	0.001875	5.33	8928.06	1891.14	0.32
Reach 1	0.772	Max WS	25154.91	388.77	405.23		405.51	0.001671	5.40	8752.01	1987.41	0.31
Reach 1	0.734	Max WS	25154.00	388.00	404.78		405.13	0.003024	6.26	7723.06	2123.12	0.40
Reach 1	0.452	Max WS	25125.76	380.00	403.10		403.25	0.000331	3.28	12117.80	2689.08	0.15
Reach 1	0.391	Max WS	25198.91	380.00	402.80	396.86	402.97	0.001009	4.27	12024.87	3486.84	0.24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.08
.05
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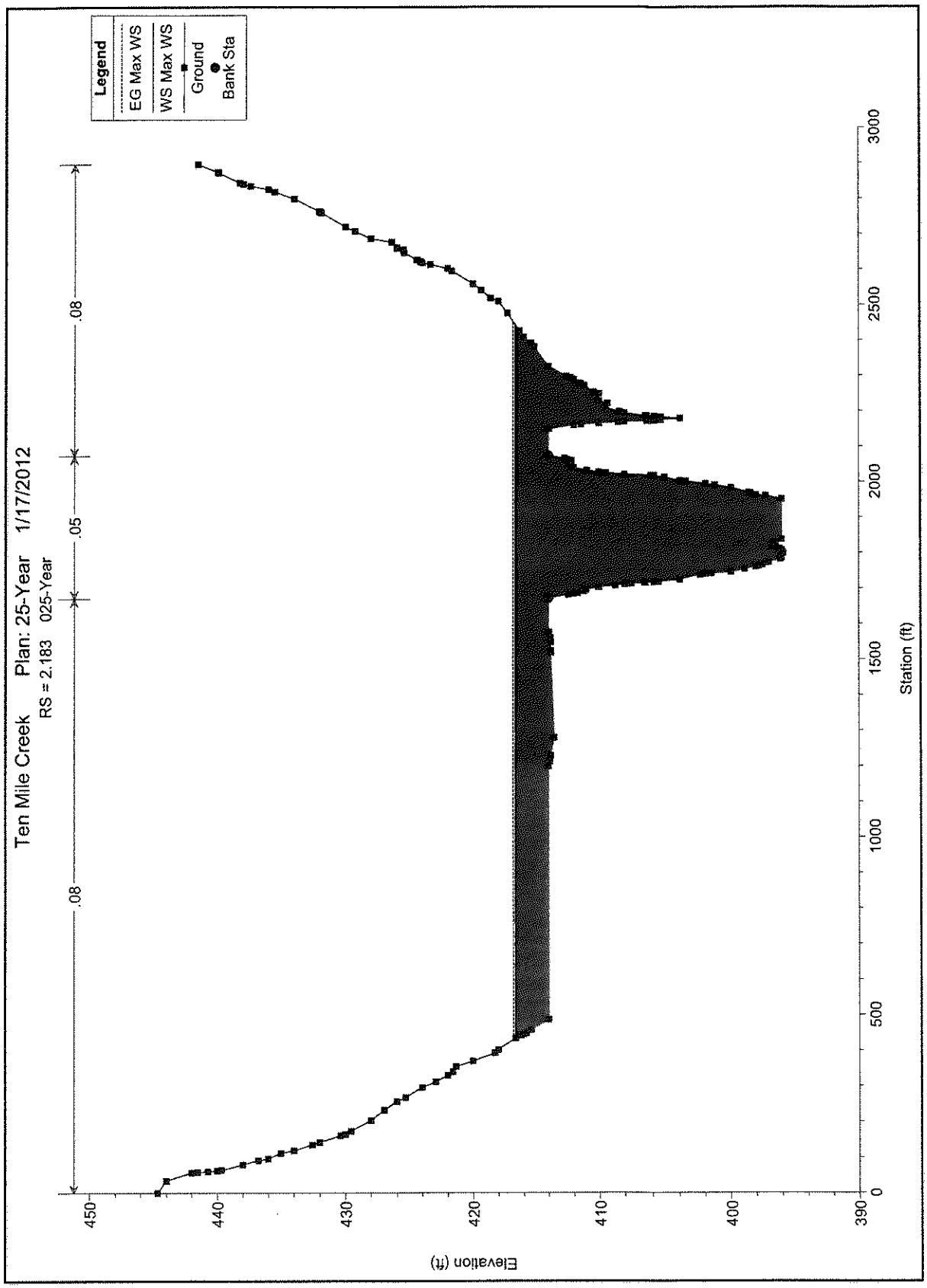
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
Station (ft)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.05
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Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
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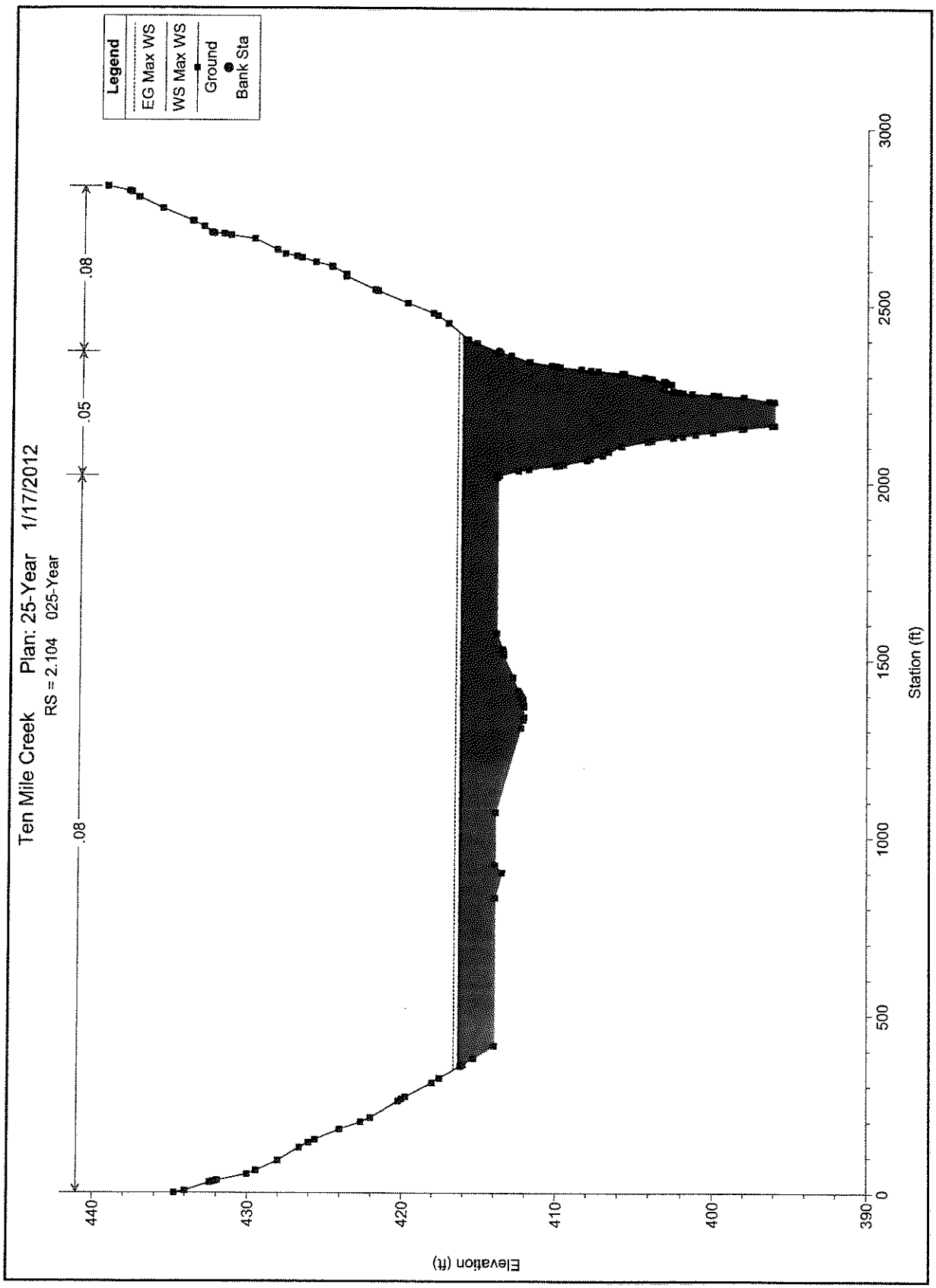
Station (ft)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.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
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430
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390
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2500
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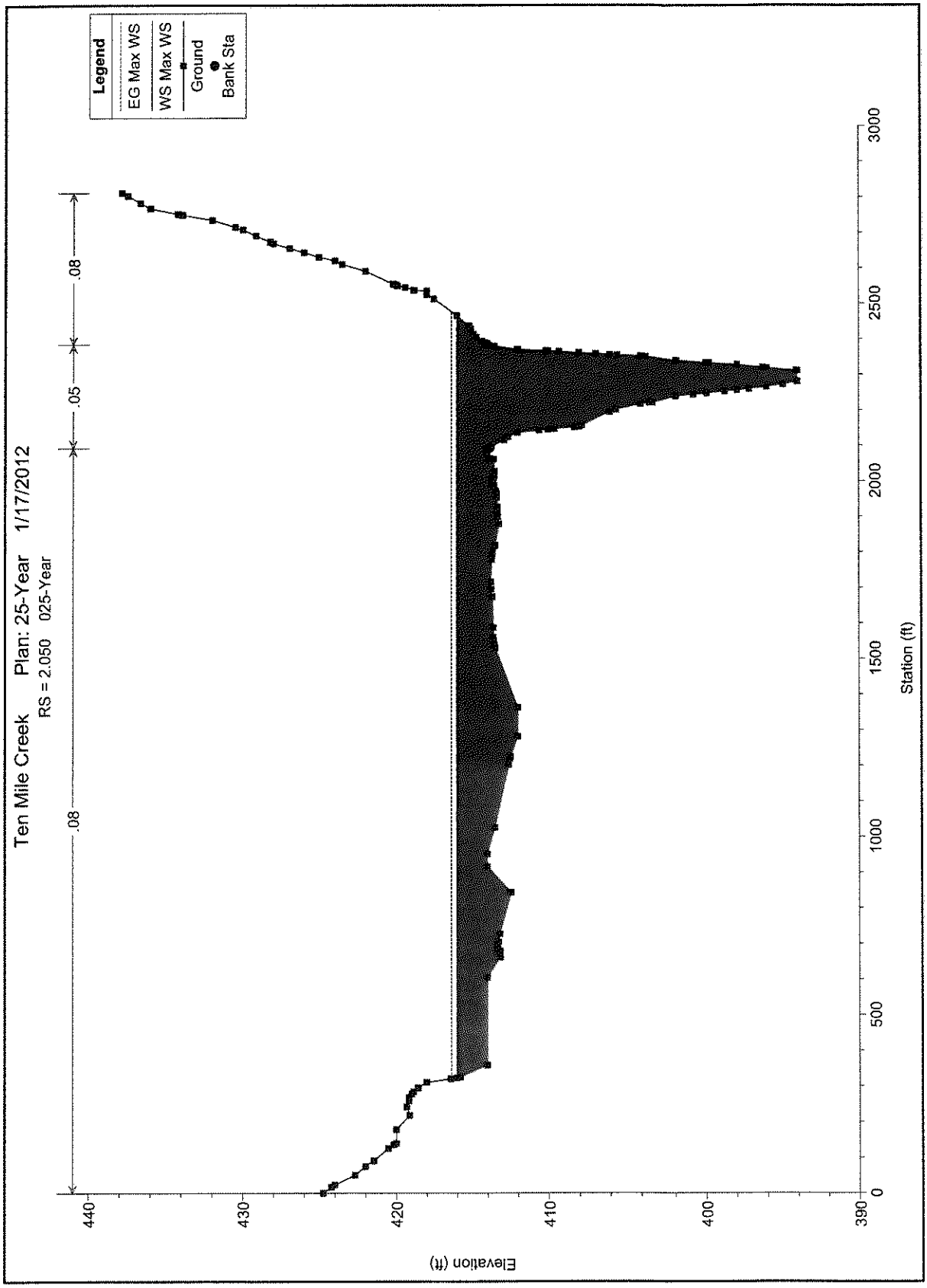
Station (ft)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EG Max WS
WS Max WS
Ground
Bank Sta
.08
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Elevation (ft)
Station (ft)
440
430
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390
0
500
1000
1500
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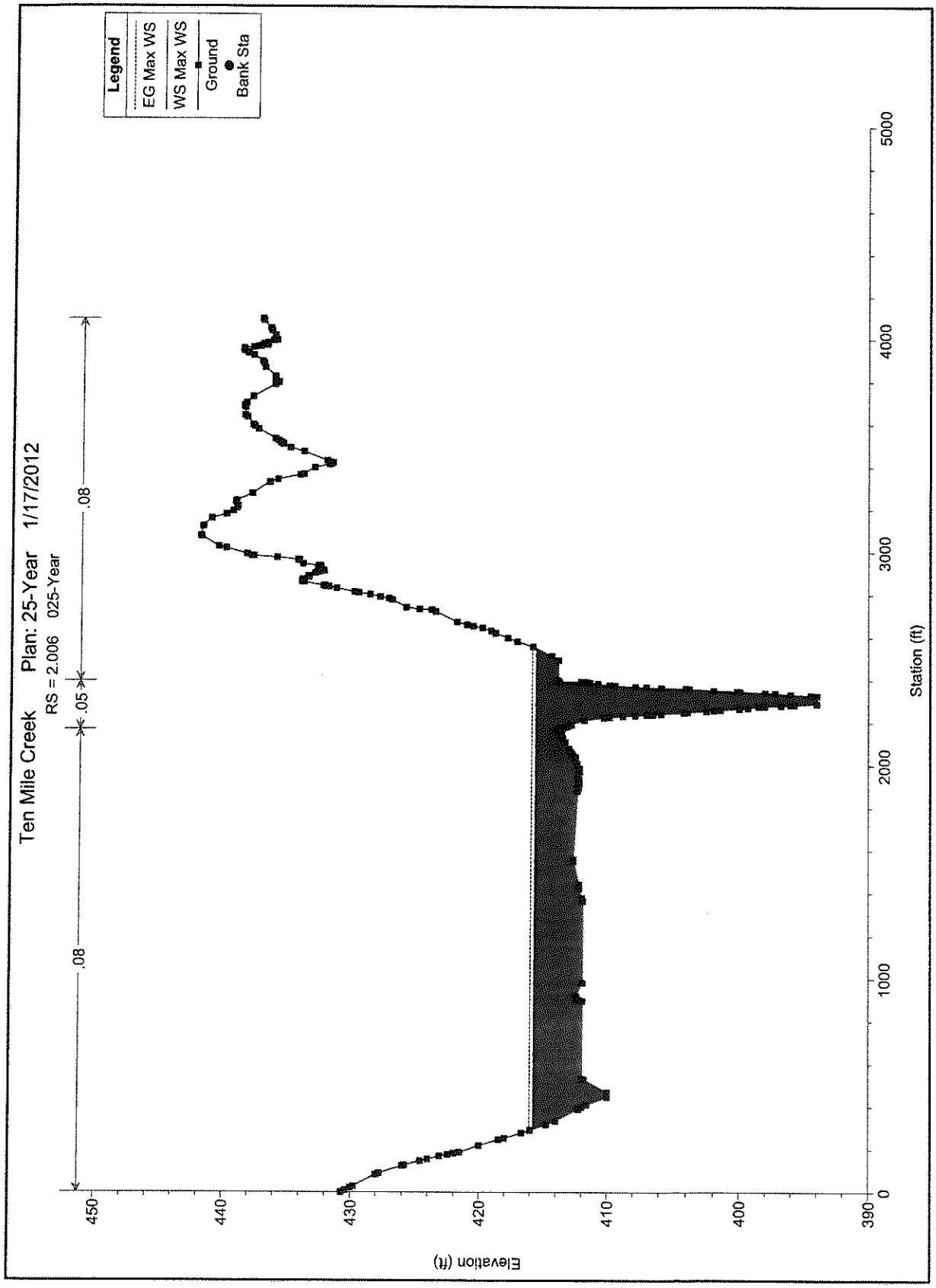
2500
3000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EG Max WS
WS Max WS
Ground
Bank Sta
Ten Mile Creek Plan: 25-Year 1/17/2012
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.05
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Elevation (ft)
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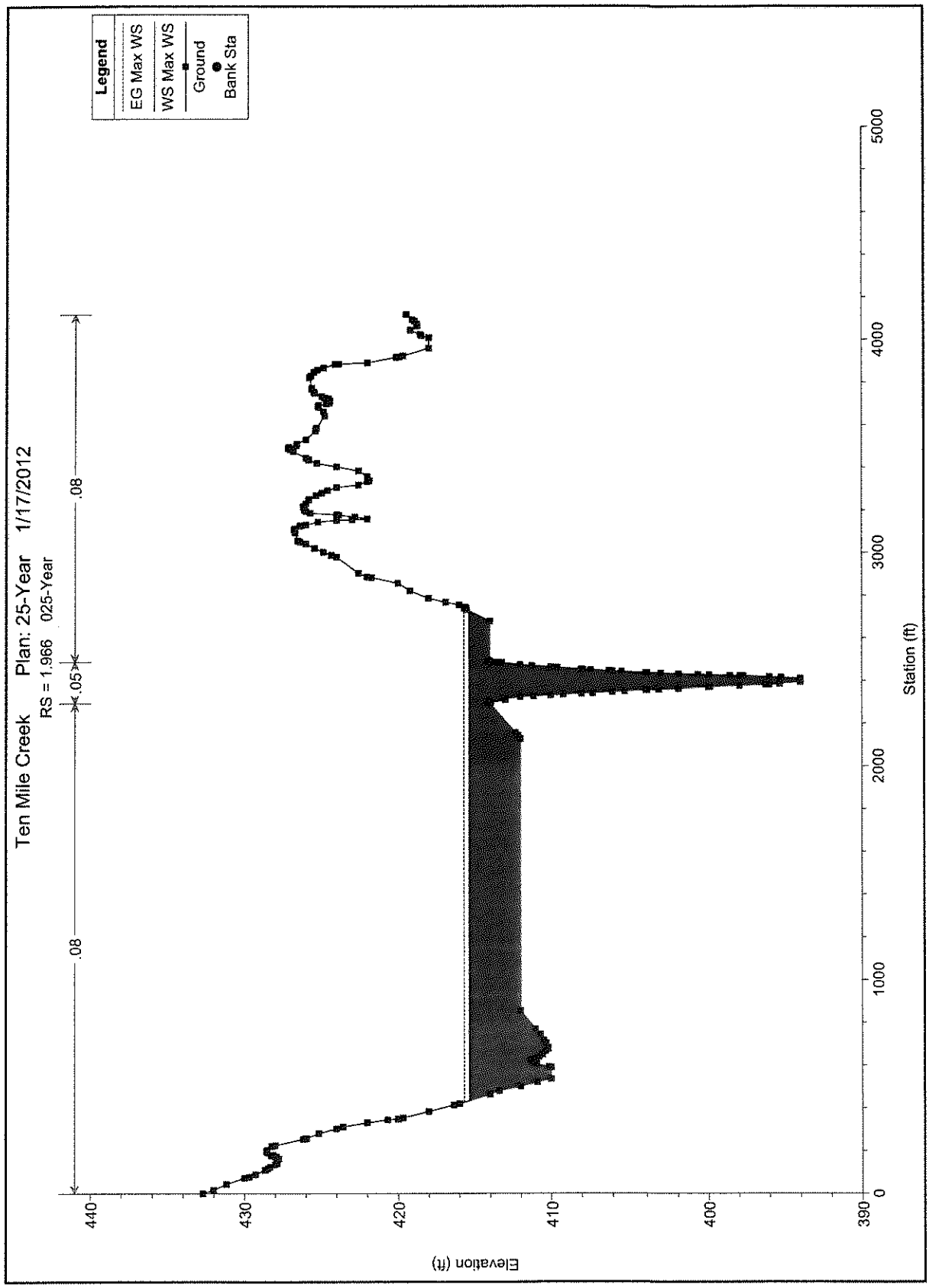
5000
Station (ft)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WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
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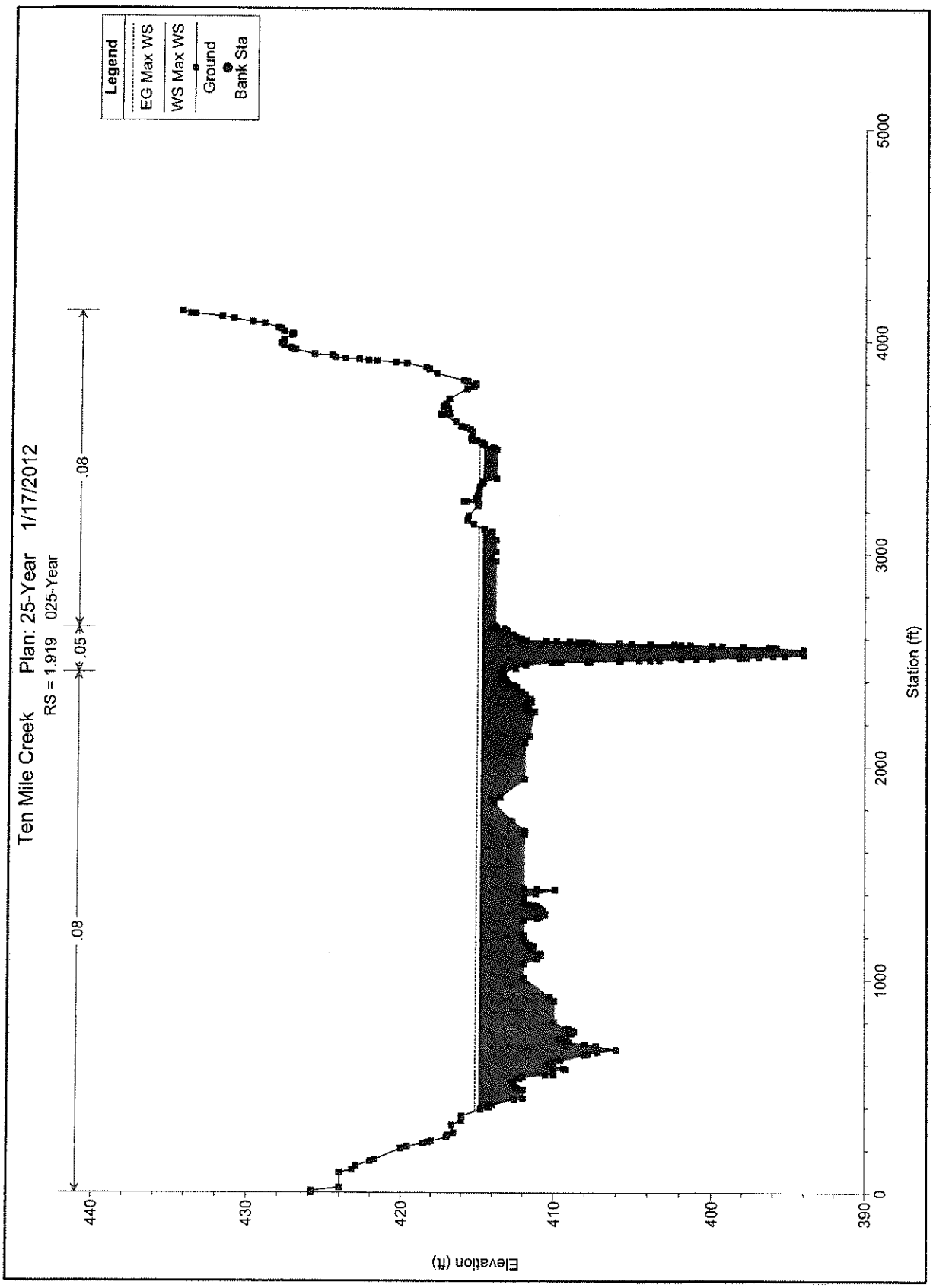
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WS Max WS
Ground
Bank Sta
Elevation (ft)
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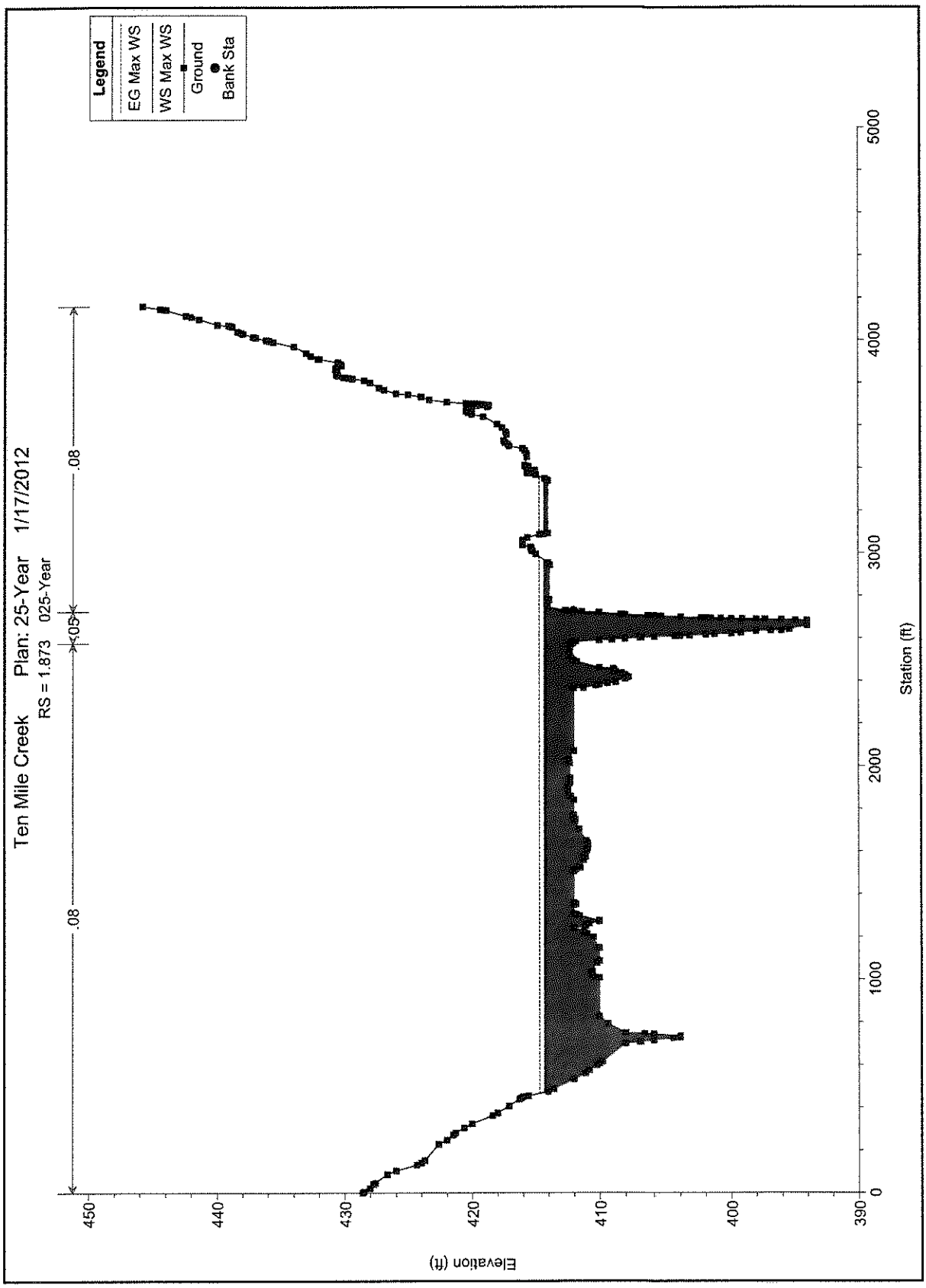
0
1000
2000
3000
4000
5000
Station (ft)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Bank Sta
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.08
Elevation (ft)
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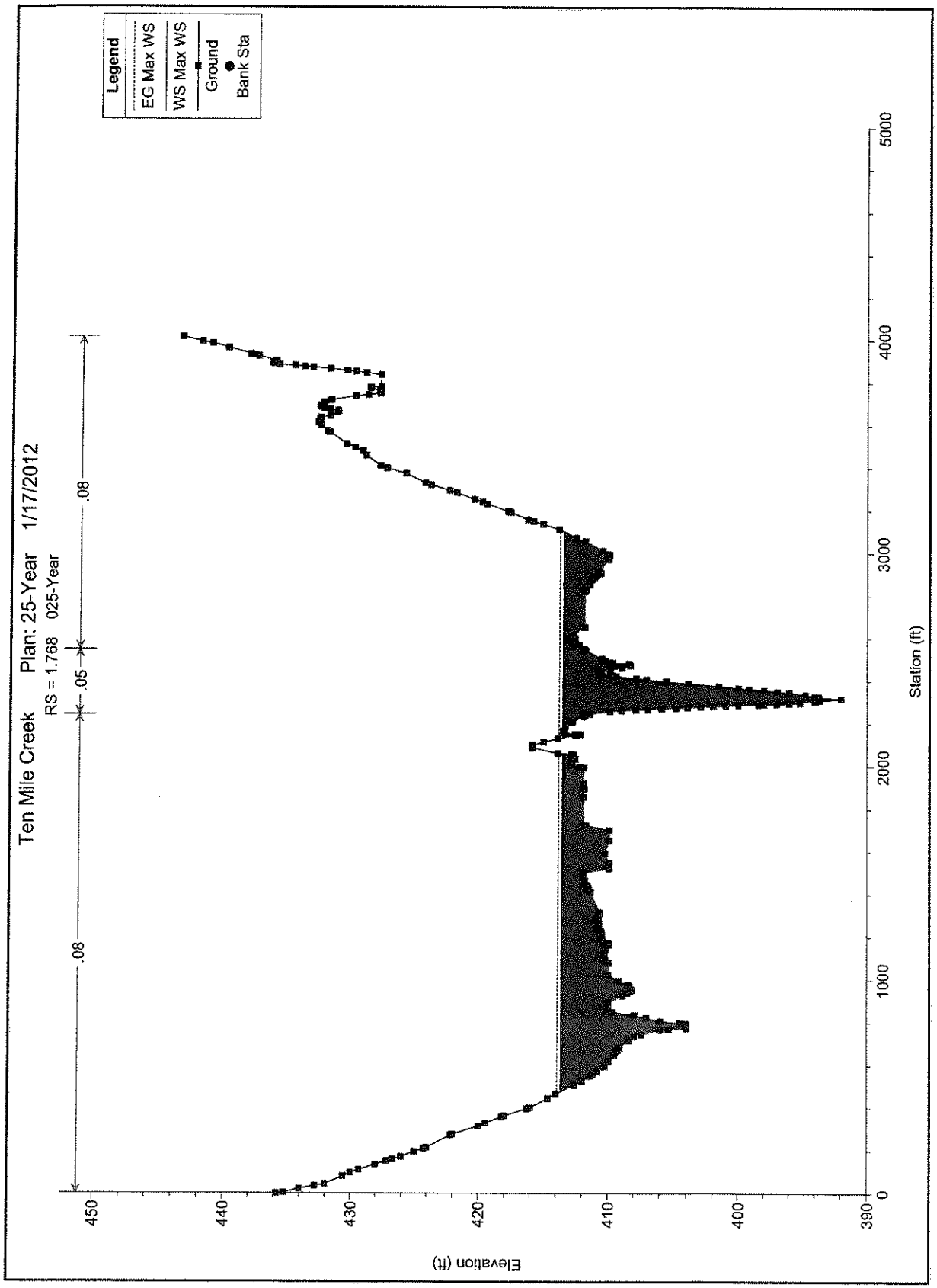
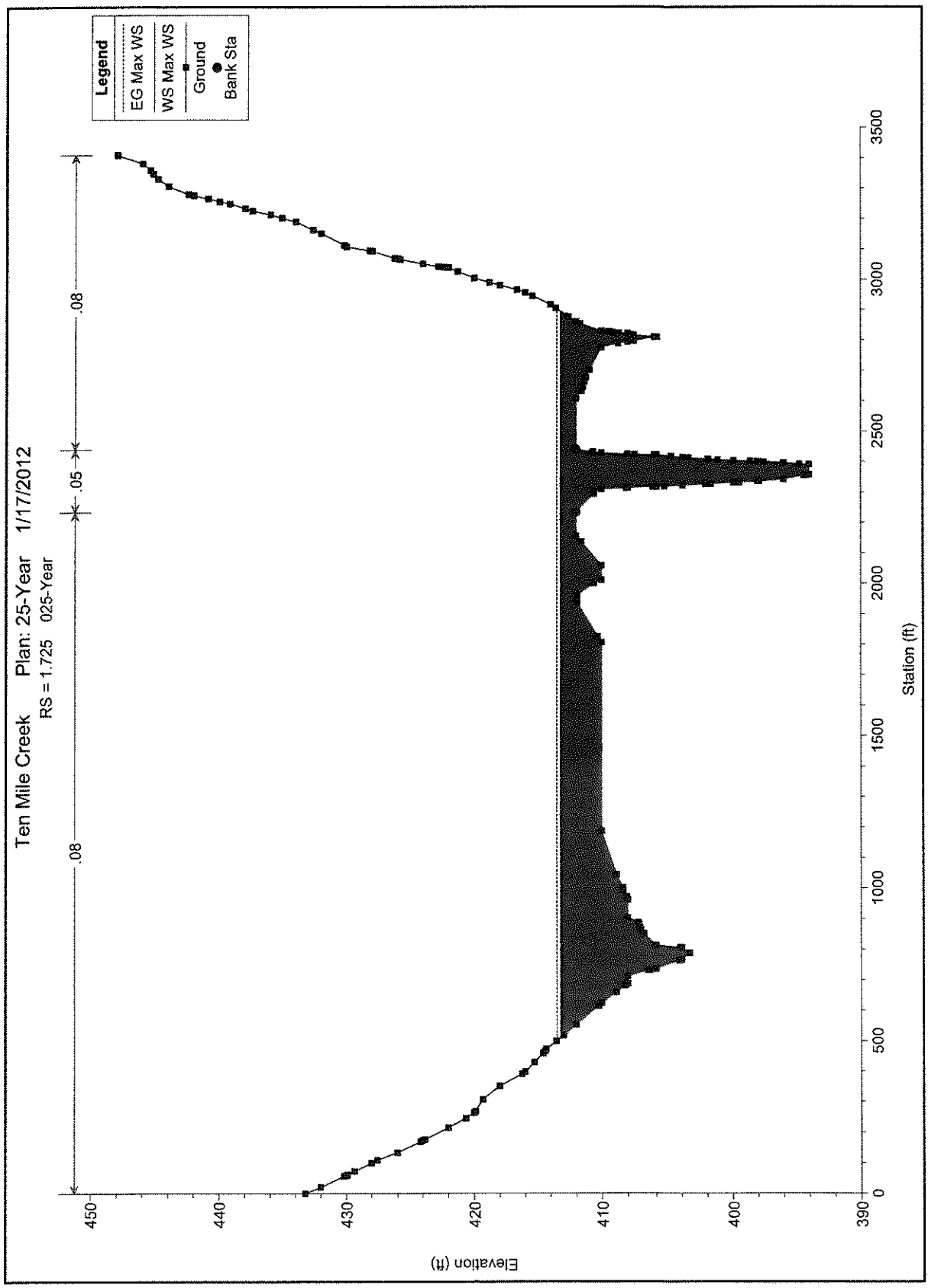
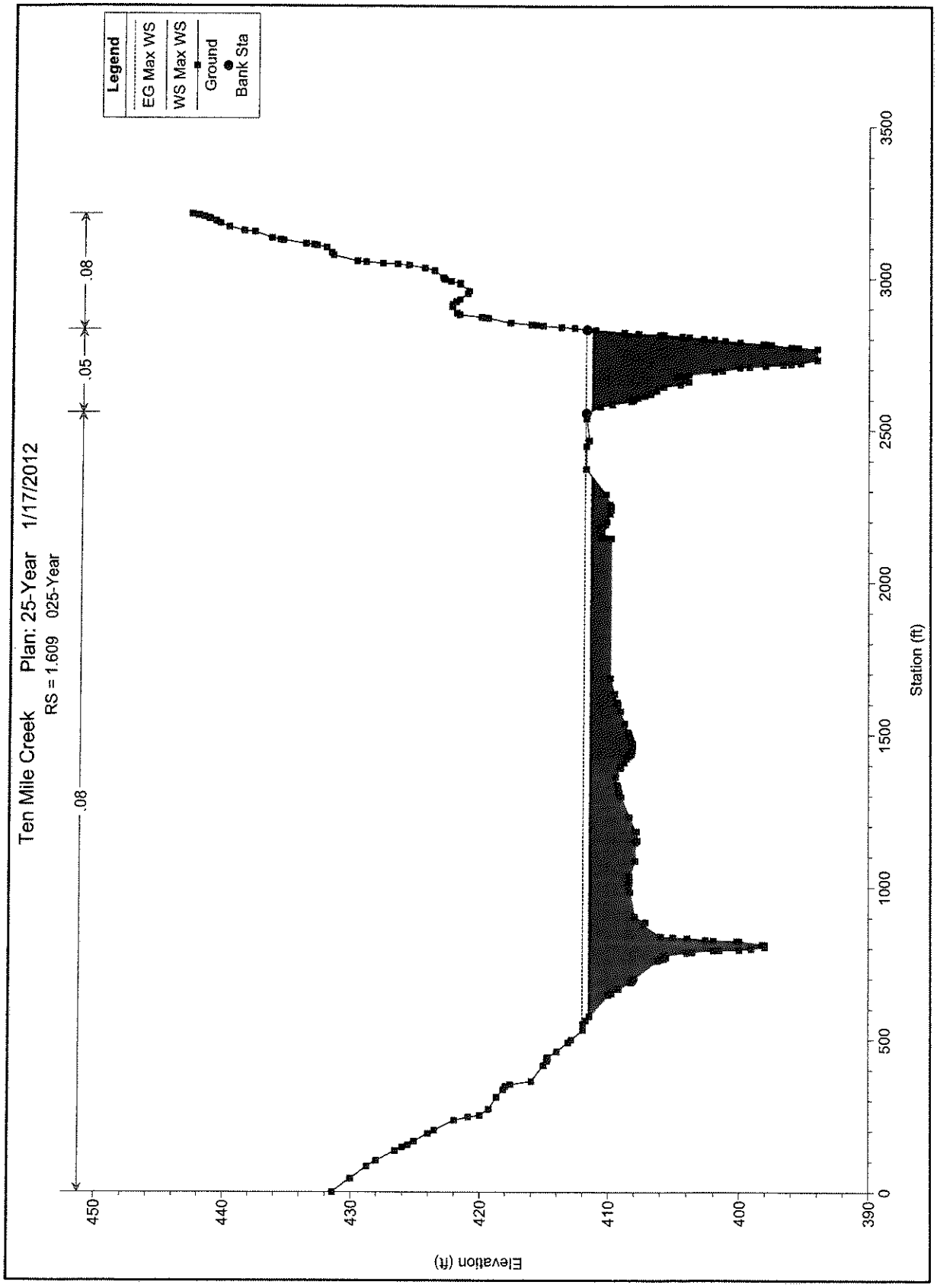
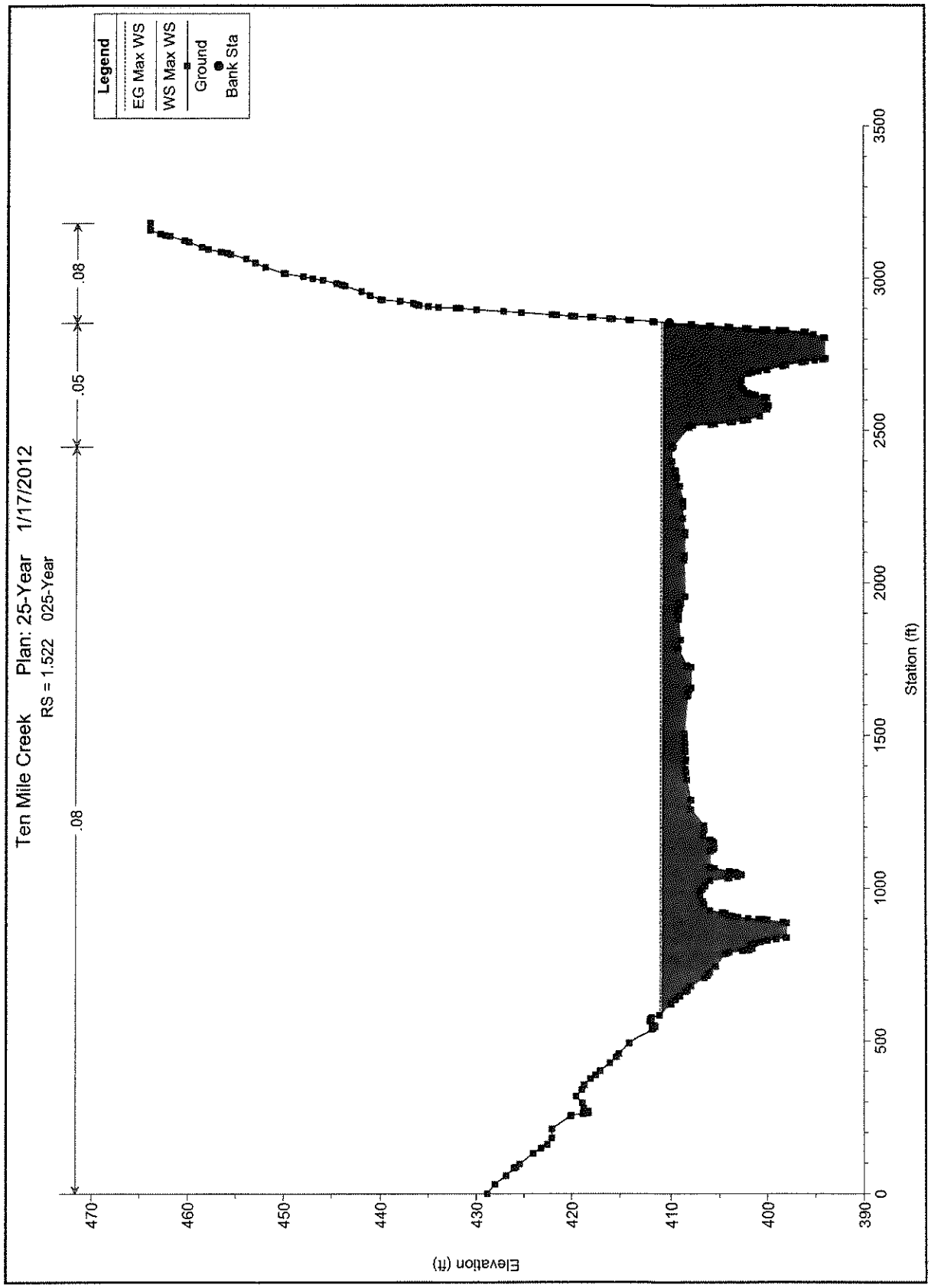
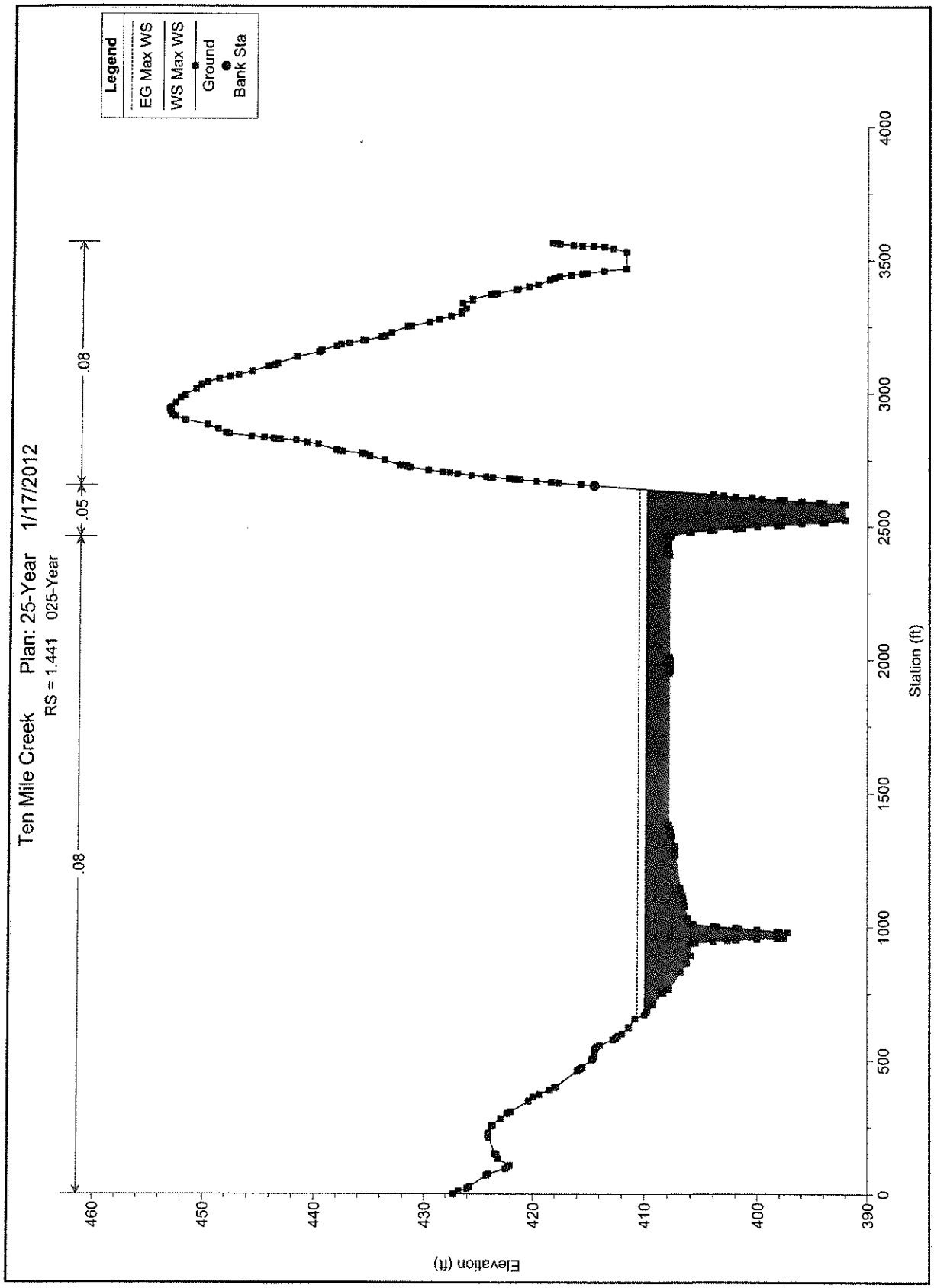
430
420
410
400
390
0
1000
2000
3000
4000
5000
Station (ft)

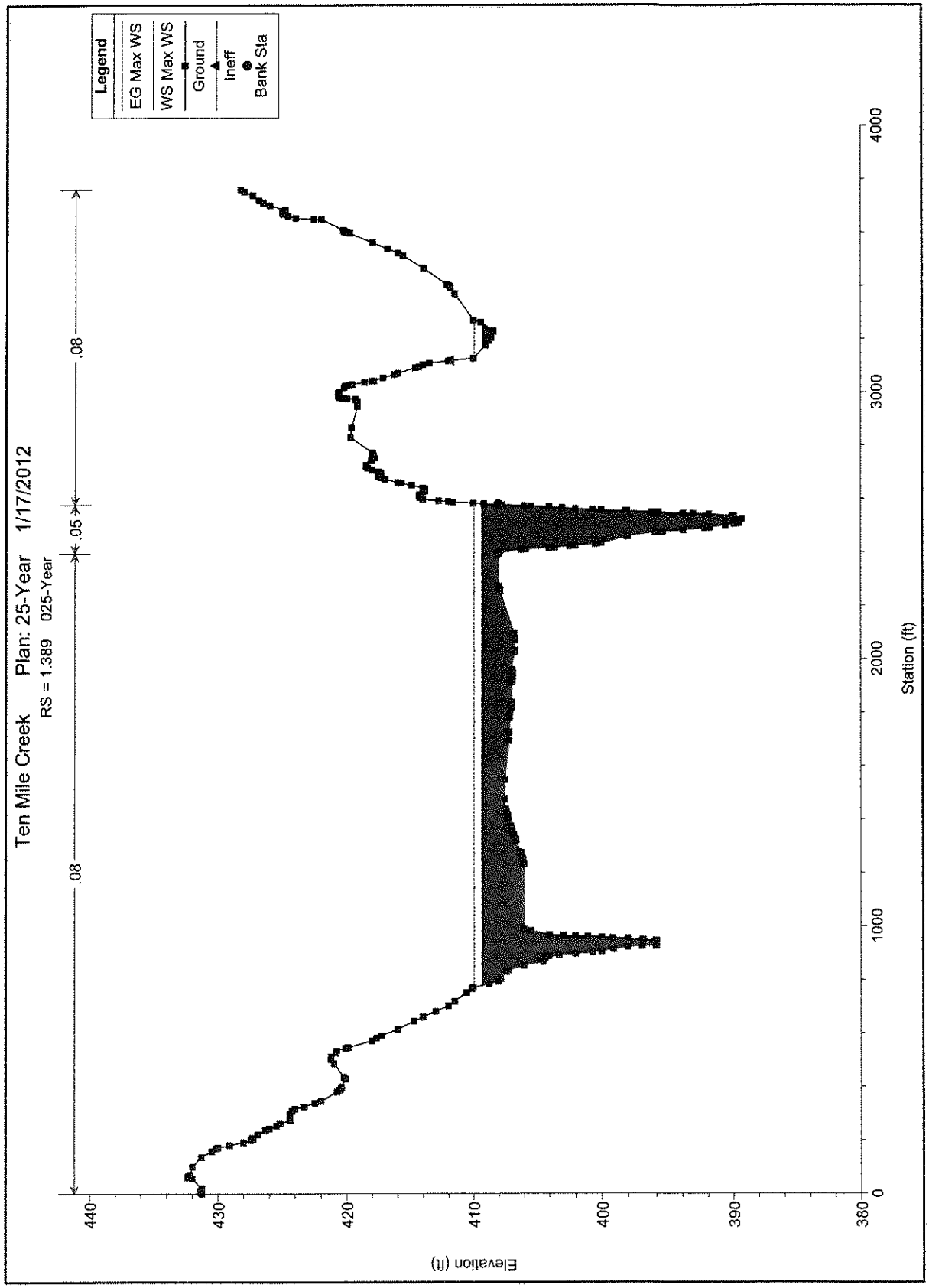

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.768 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
1000
2000
3000
4000
5000

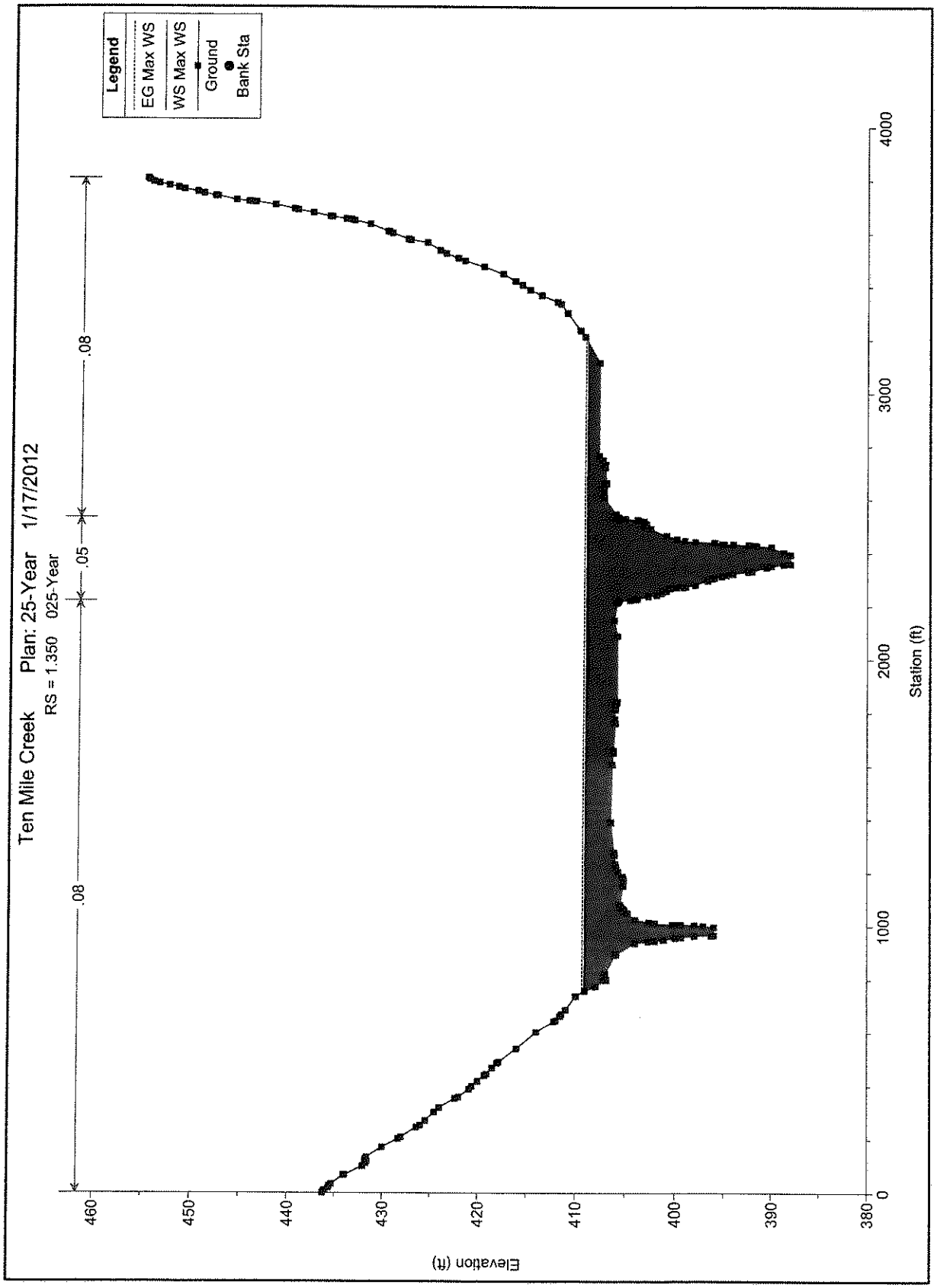

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.725 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500

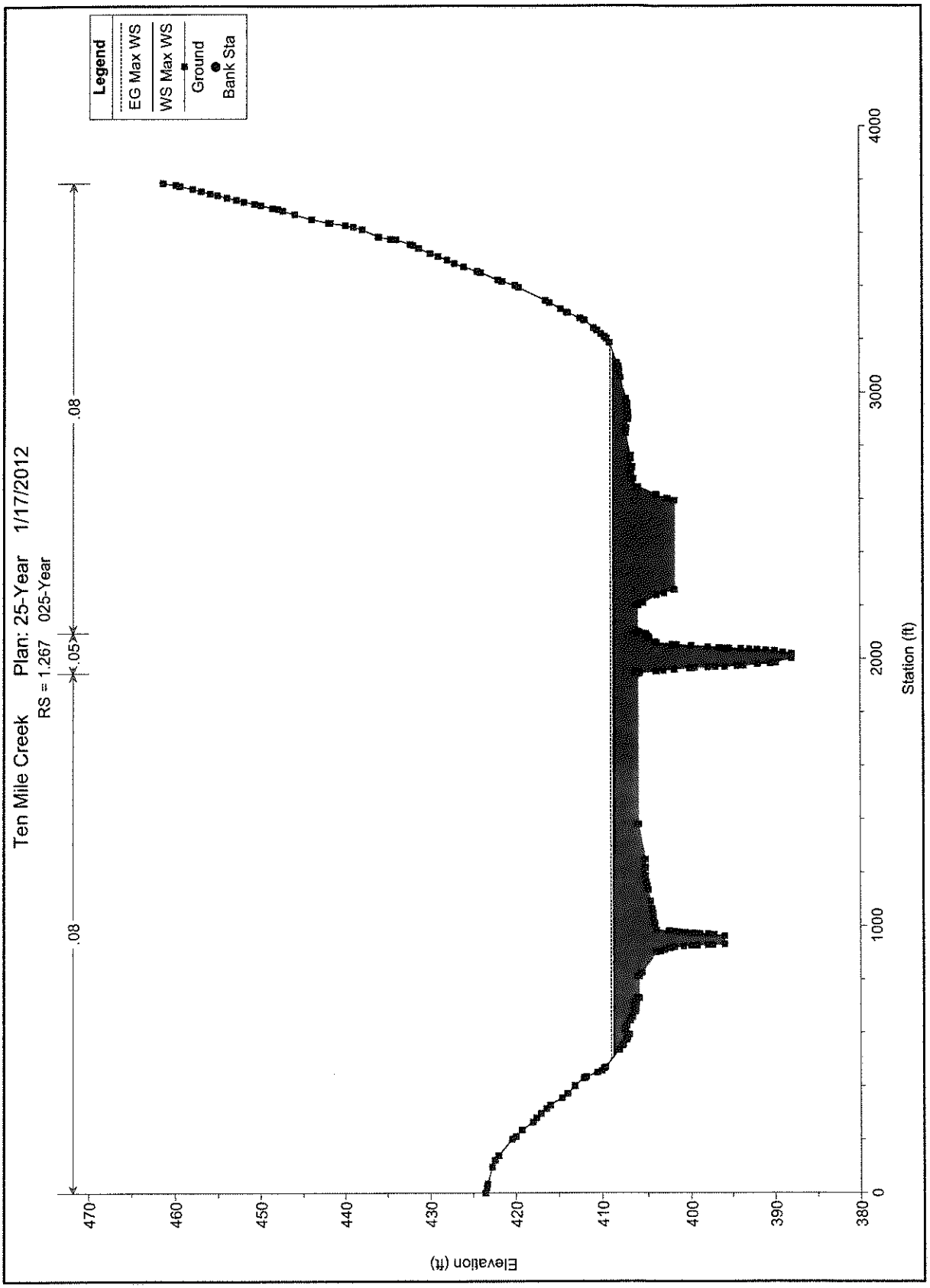

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.609 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500

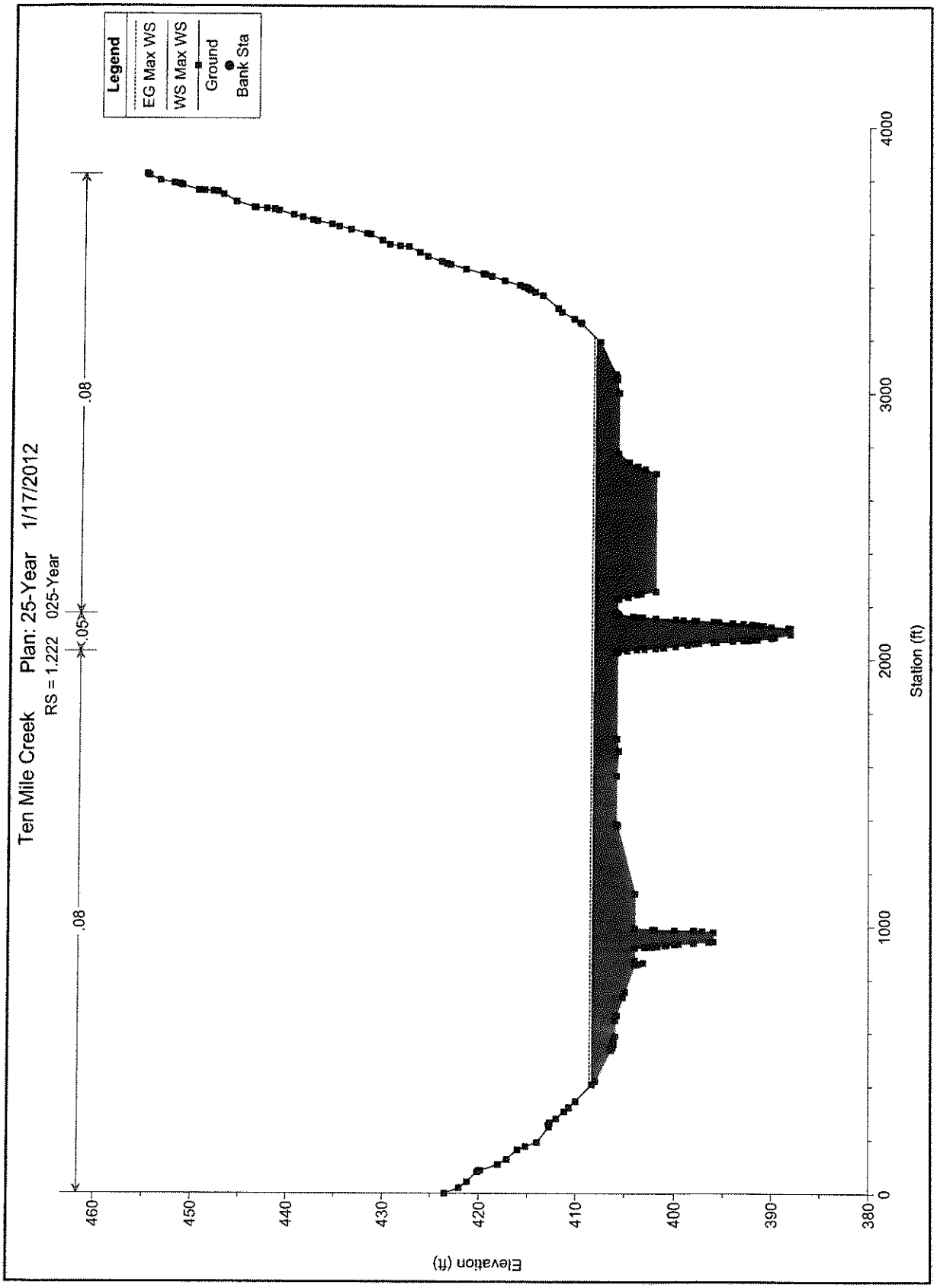

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.522 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
470
460
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500

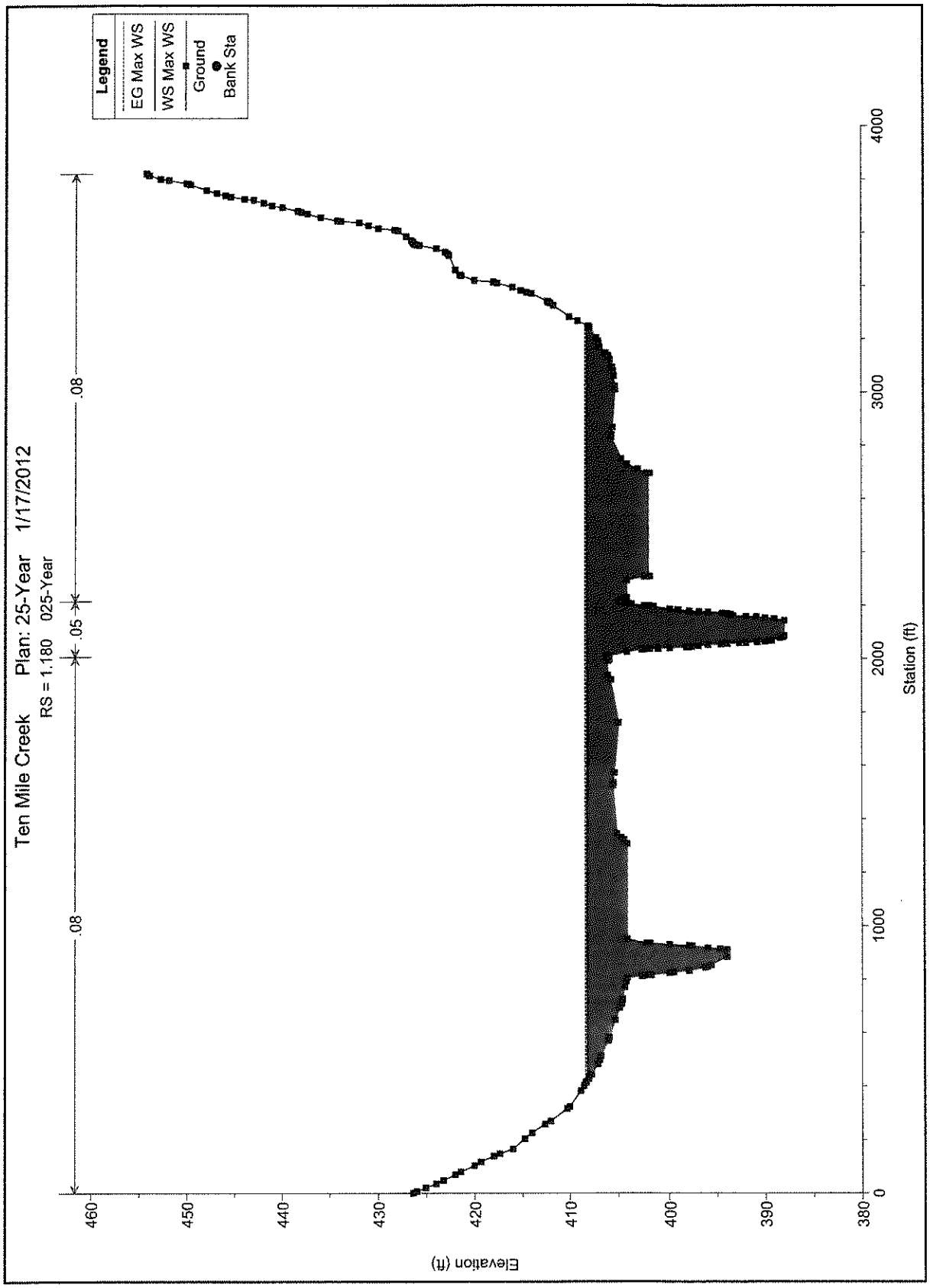

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.441 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
460
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500
4000

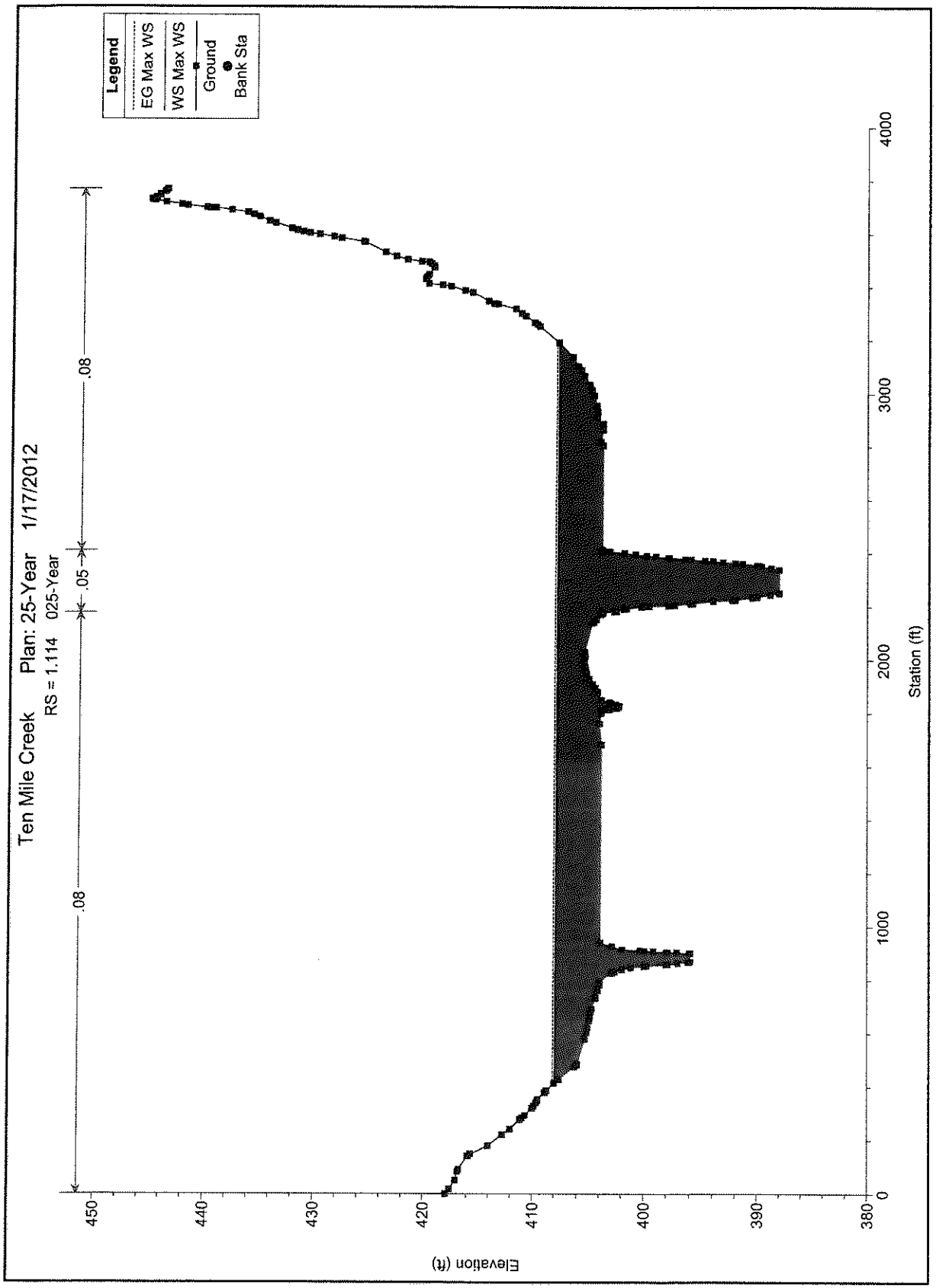

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.389 025-Year
Legend
EG Max WS
WS Max WS
Ground
Ineff
Bank Sta
.08
.05
.08
Elevation (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

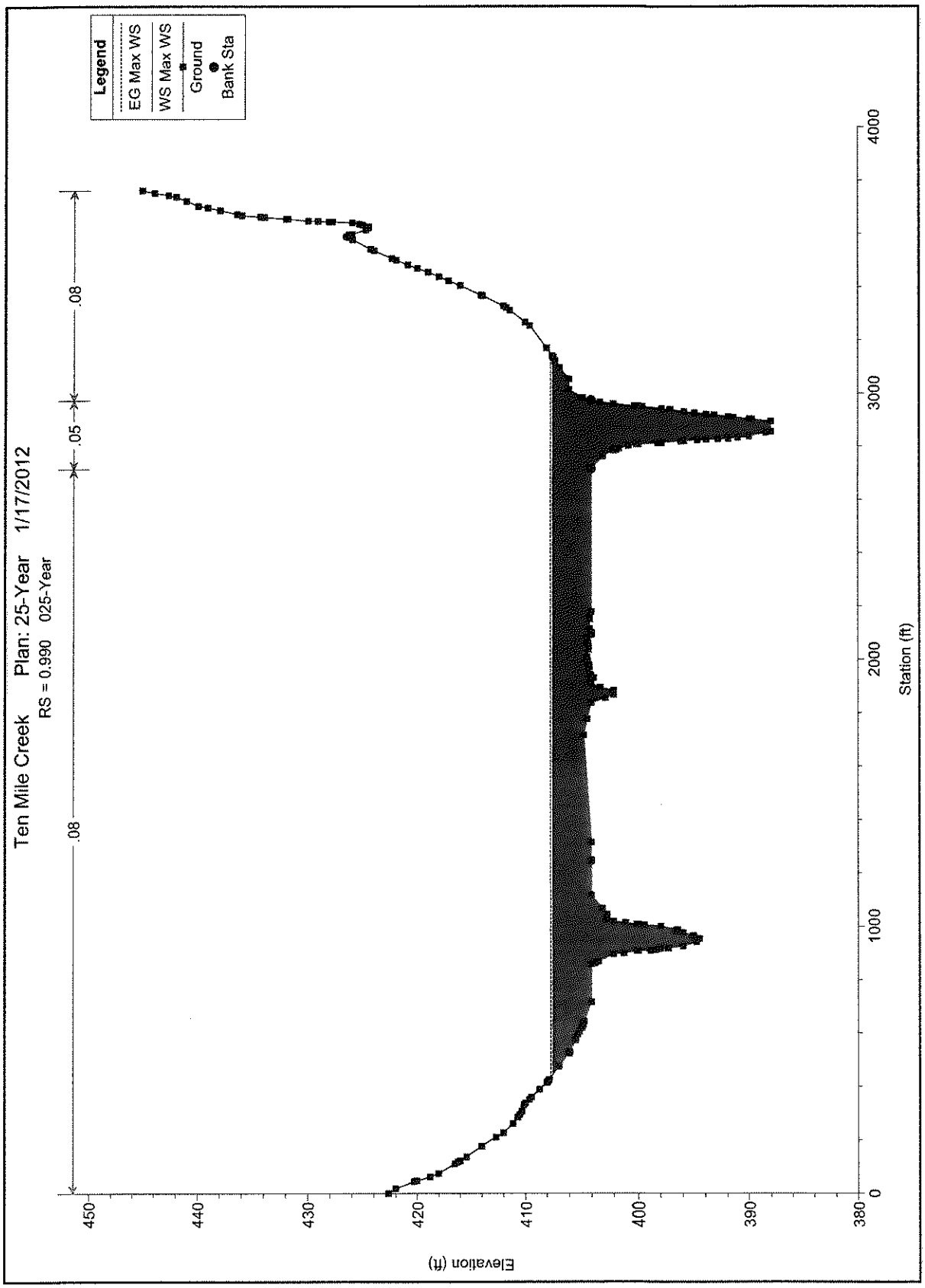

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.350 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

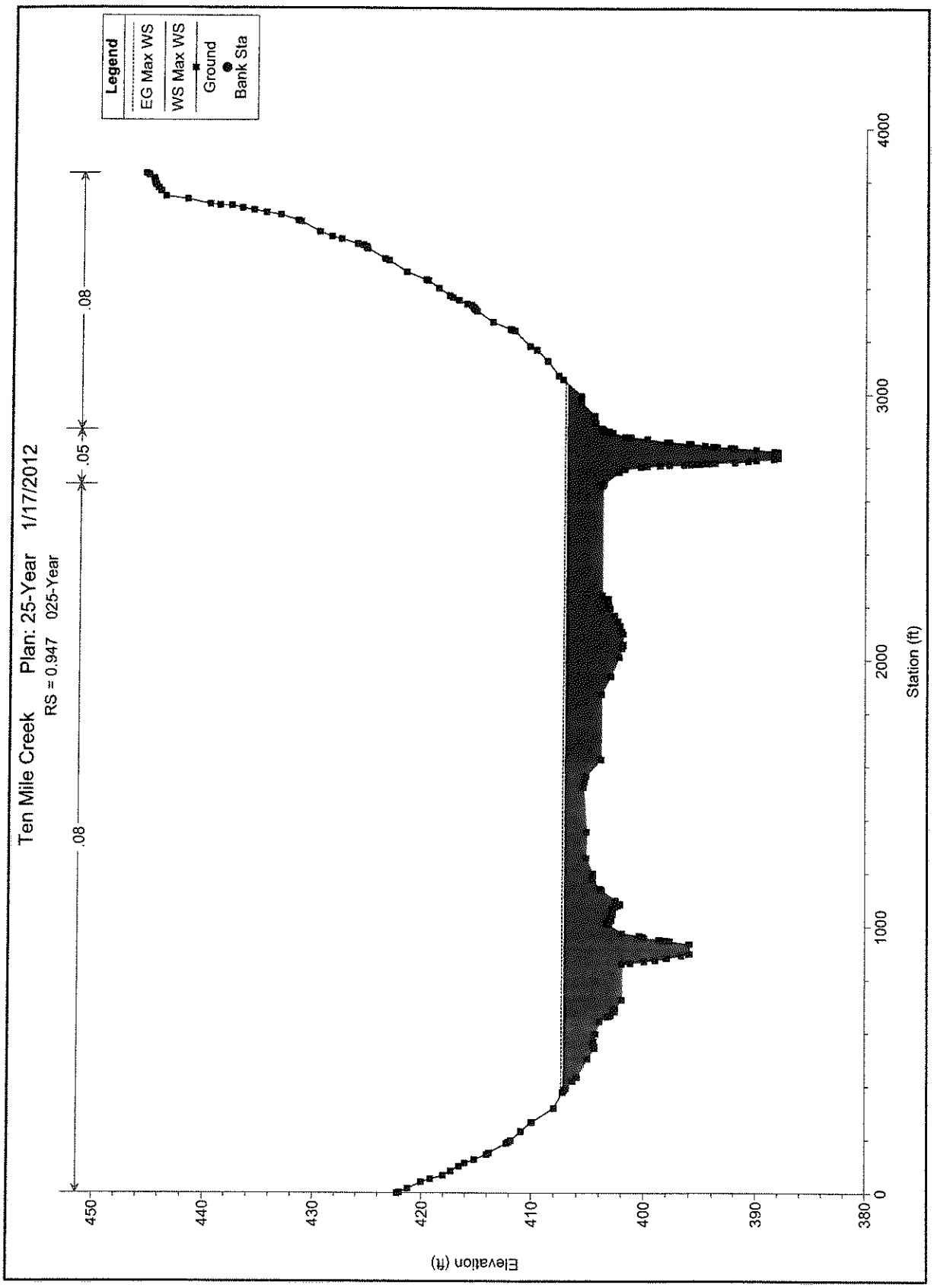

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.267 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
470
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000

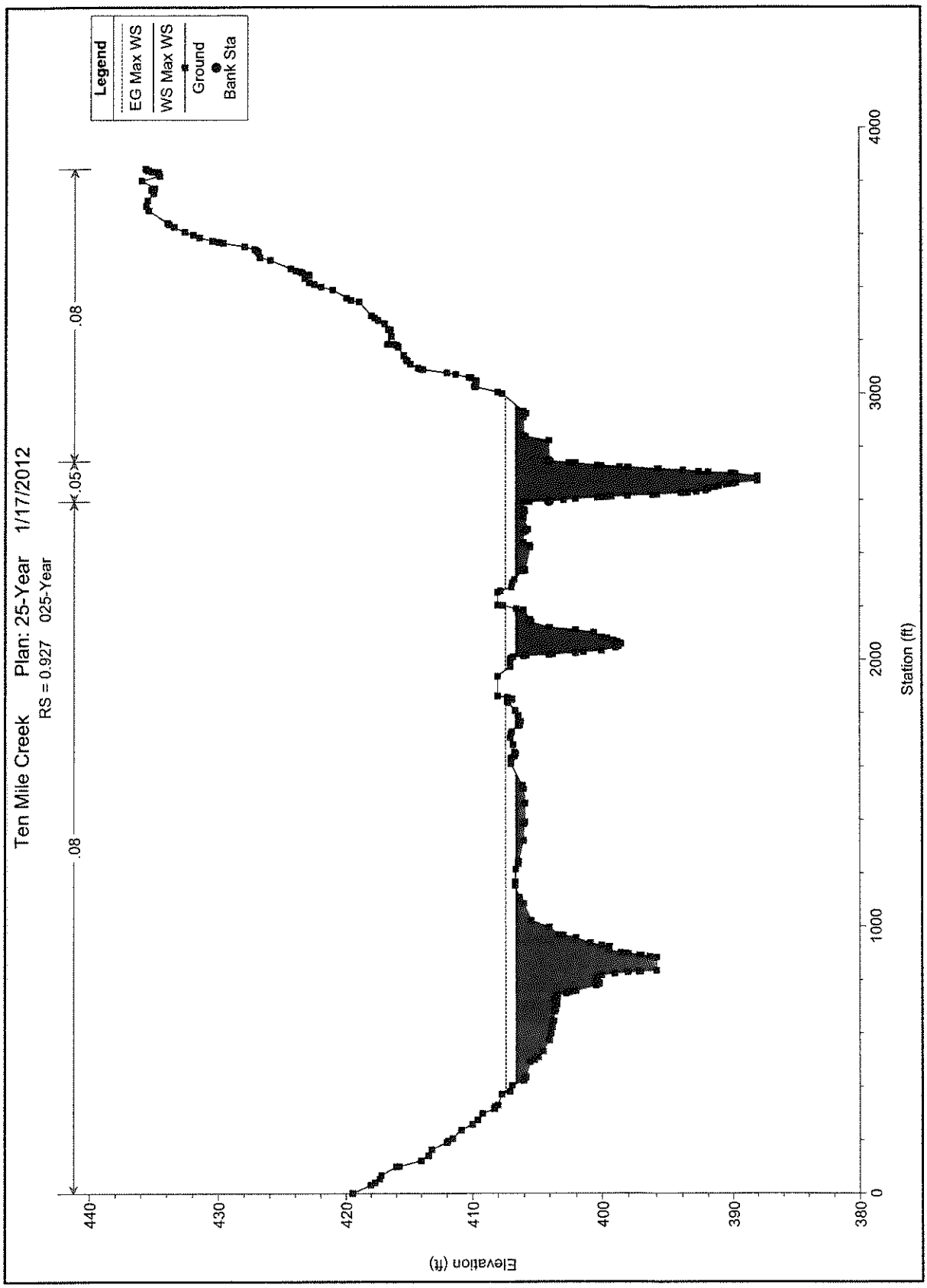

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.222 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

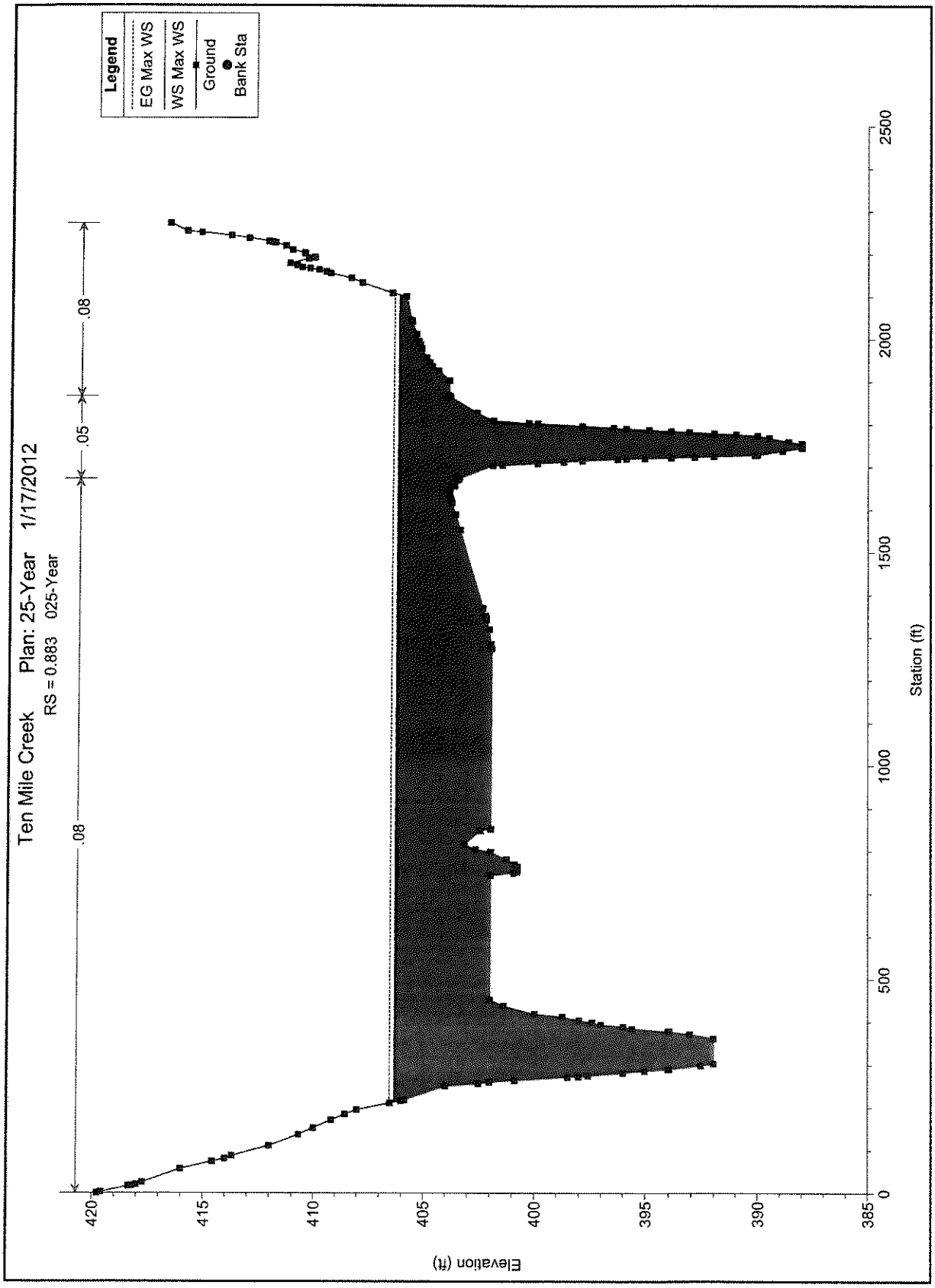

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.180 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

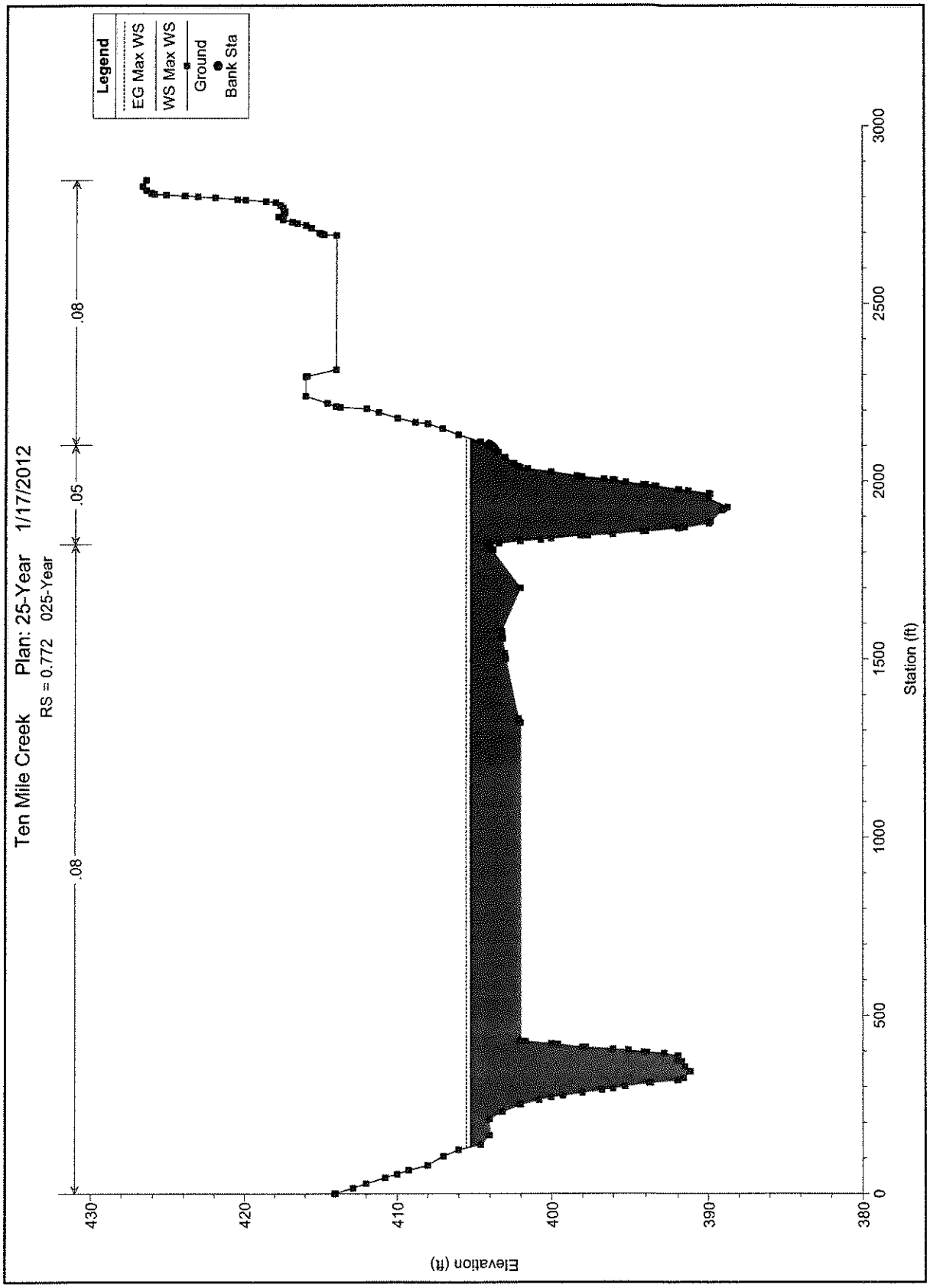

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 1.114 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000

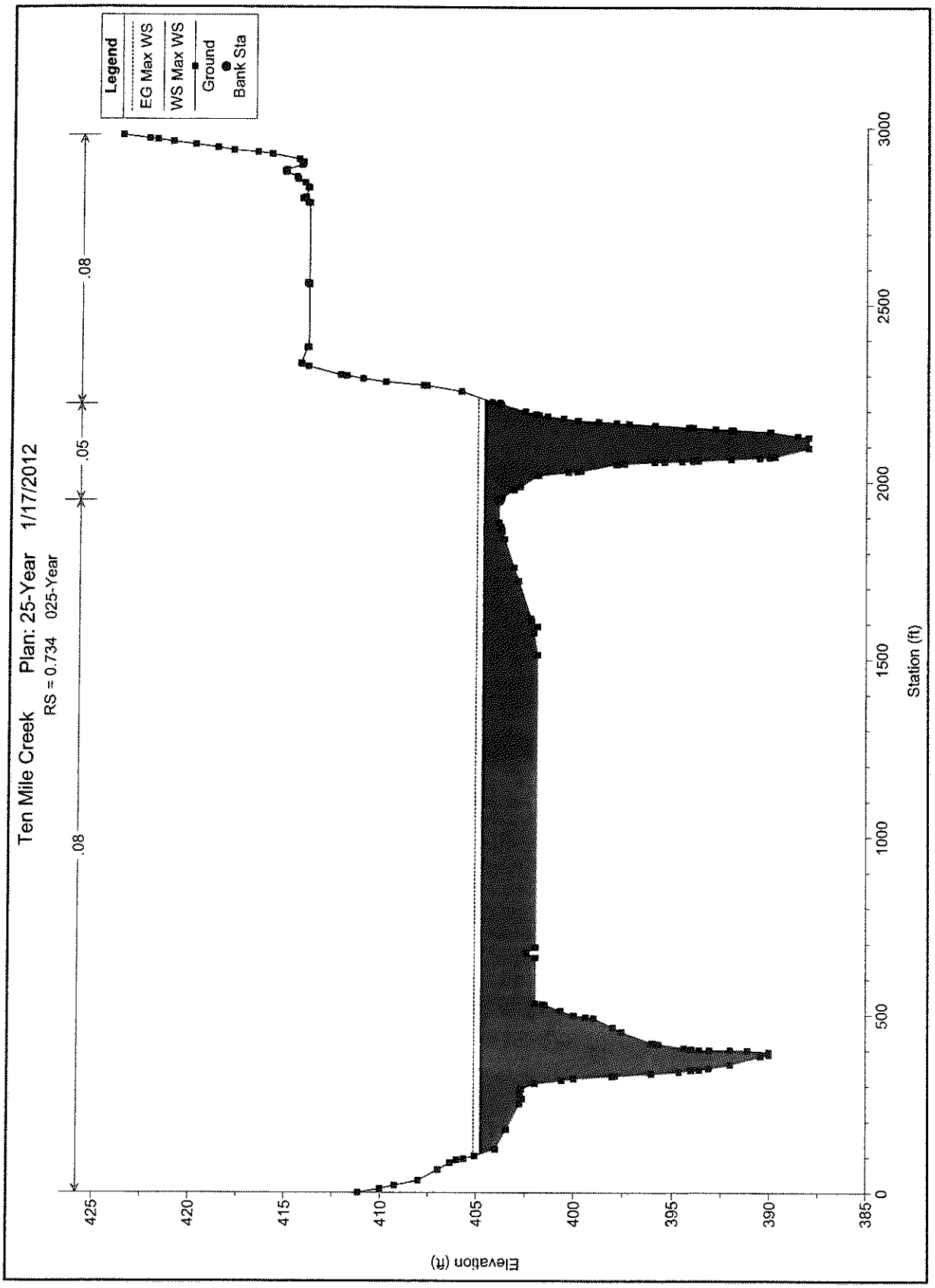

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 0.990 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

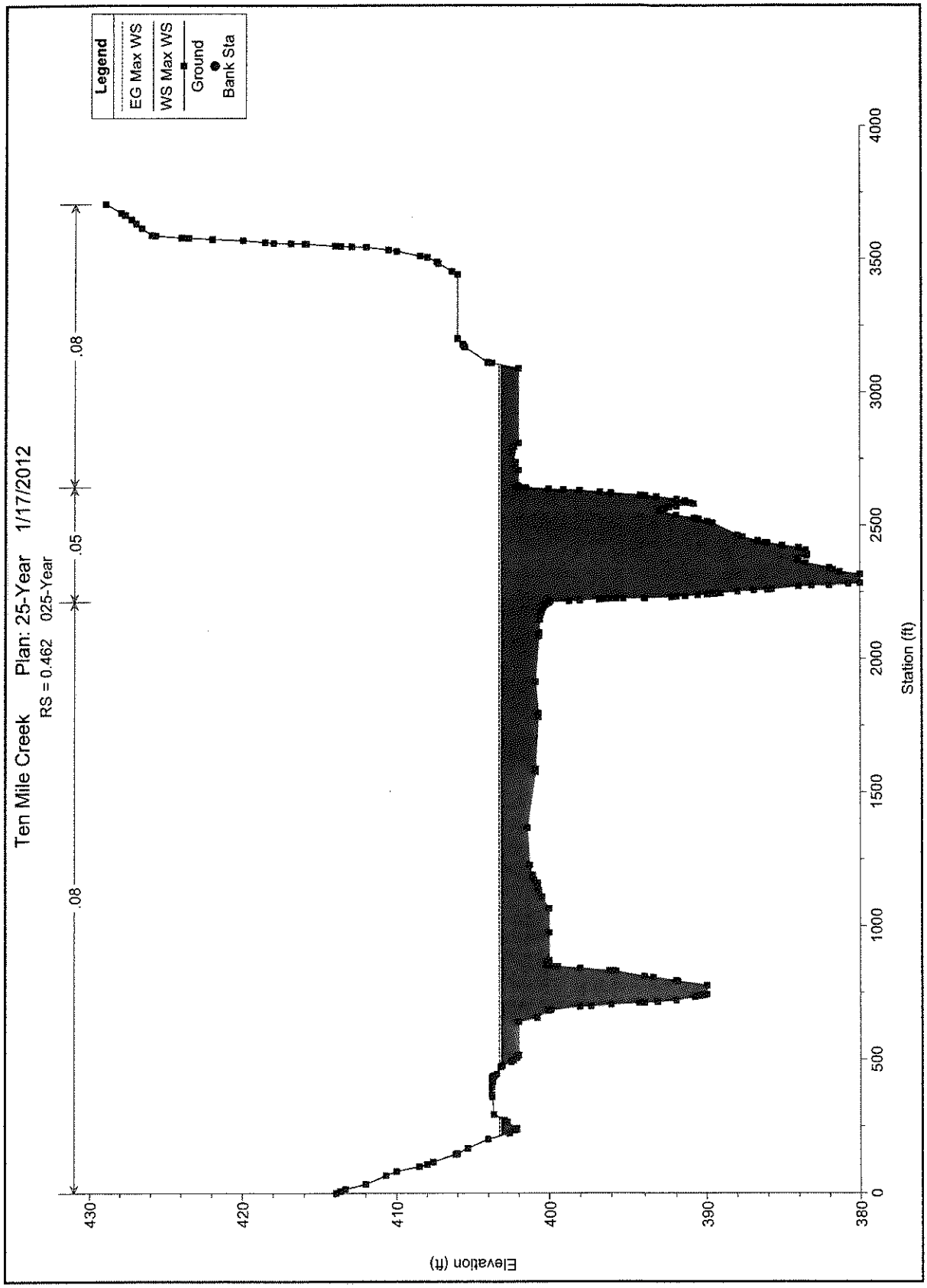

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 0.947 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000

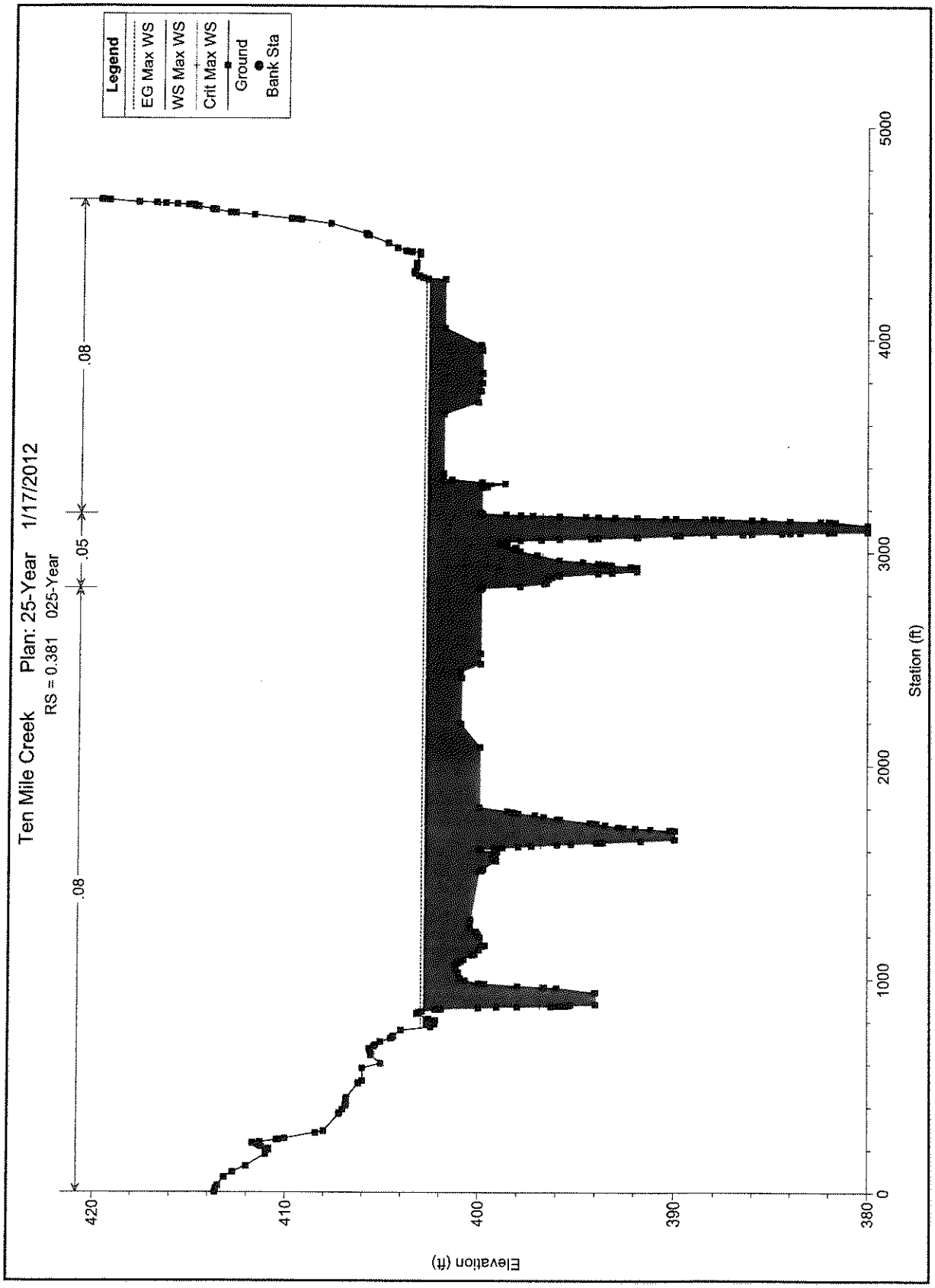

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 0.927 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000


Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 0.883 025-Year
.08
.05
.08
Elevation (ft)
420
415
410
405
400
395
390
385
0
500
1000
1500
2000
2500
Station (ft)


Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 0.772 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
430
420
410
400
390
380
0
500
1000
1500
2000
2500
3000


Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 0.734 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
425
420
415
410
405
400
395
390
385
0
500
1000
1500
2000
2500
3000

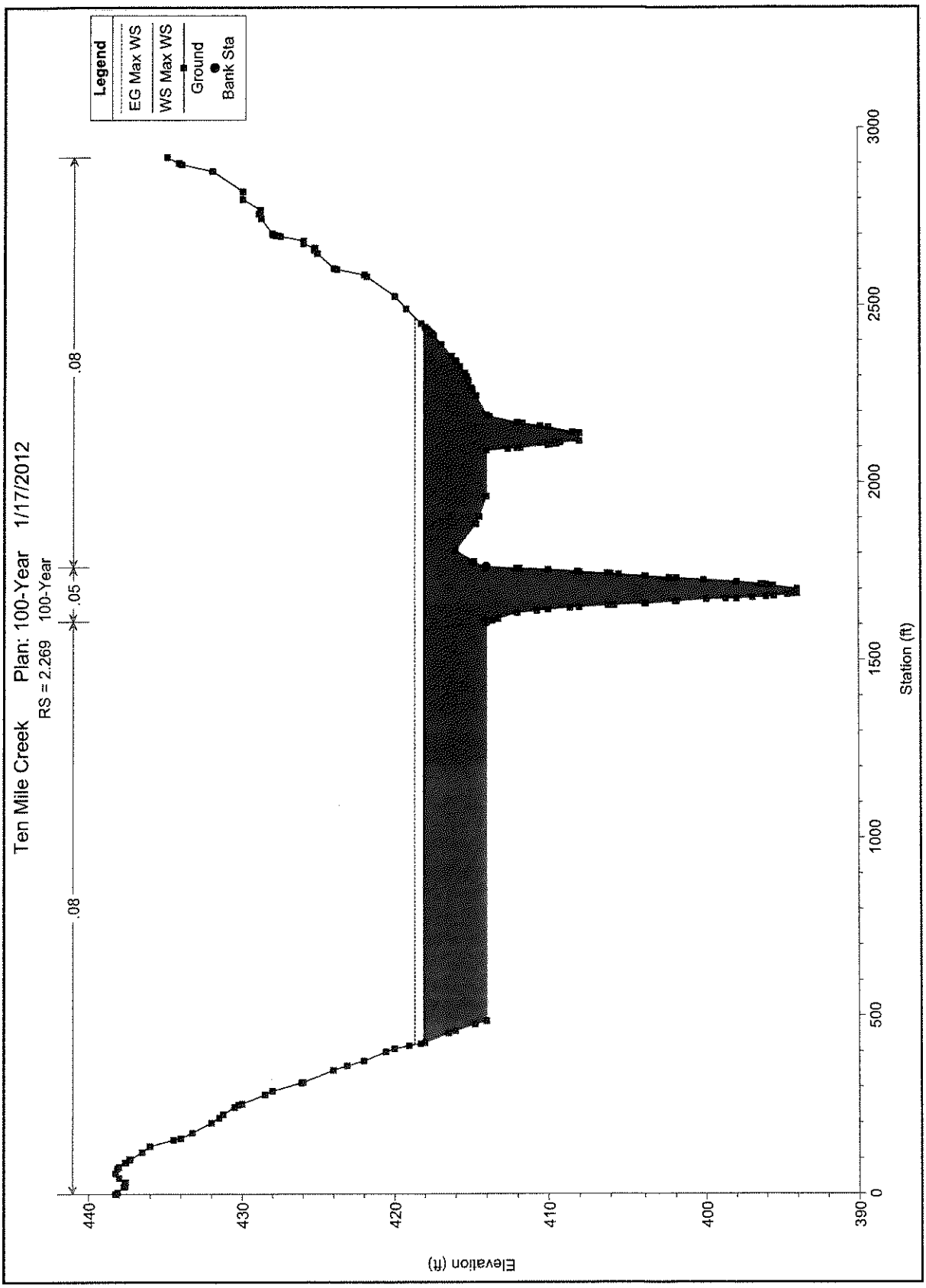

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 0.462 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
430
420
410
400
390
380
0
500
1000
1500
2000
2500
3000
3500
4000
Station (ft)

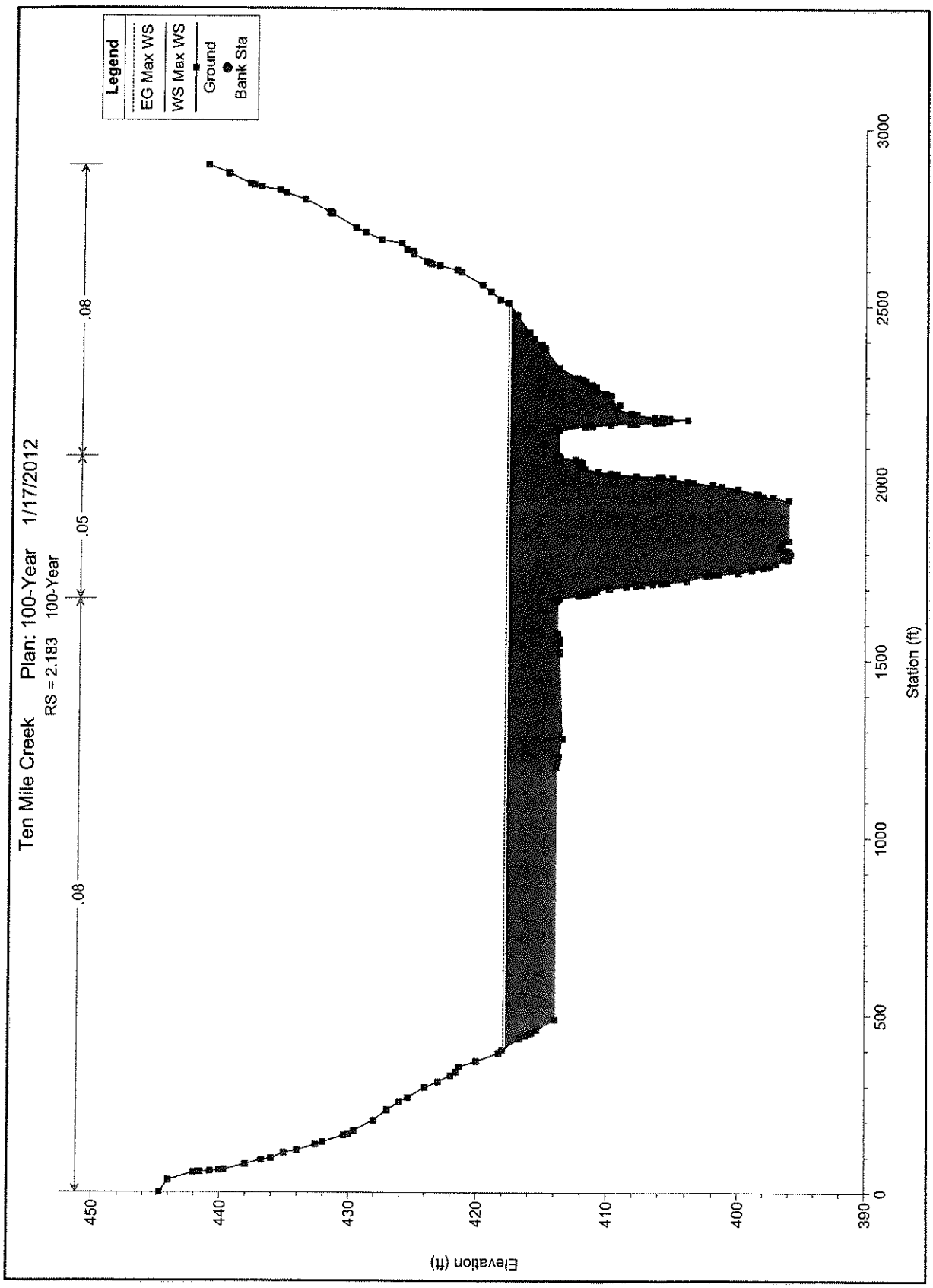

Ten Mile Creek Plan: 25-Year 1/17/2012
RS = 0.381 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
420
410
400
390
380
0
1000
2000
3000
4000
5000
Station (ft)

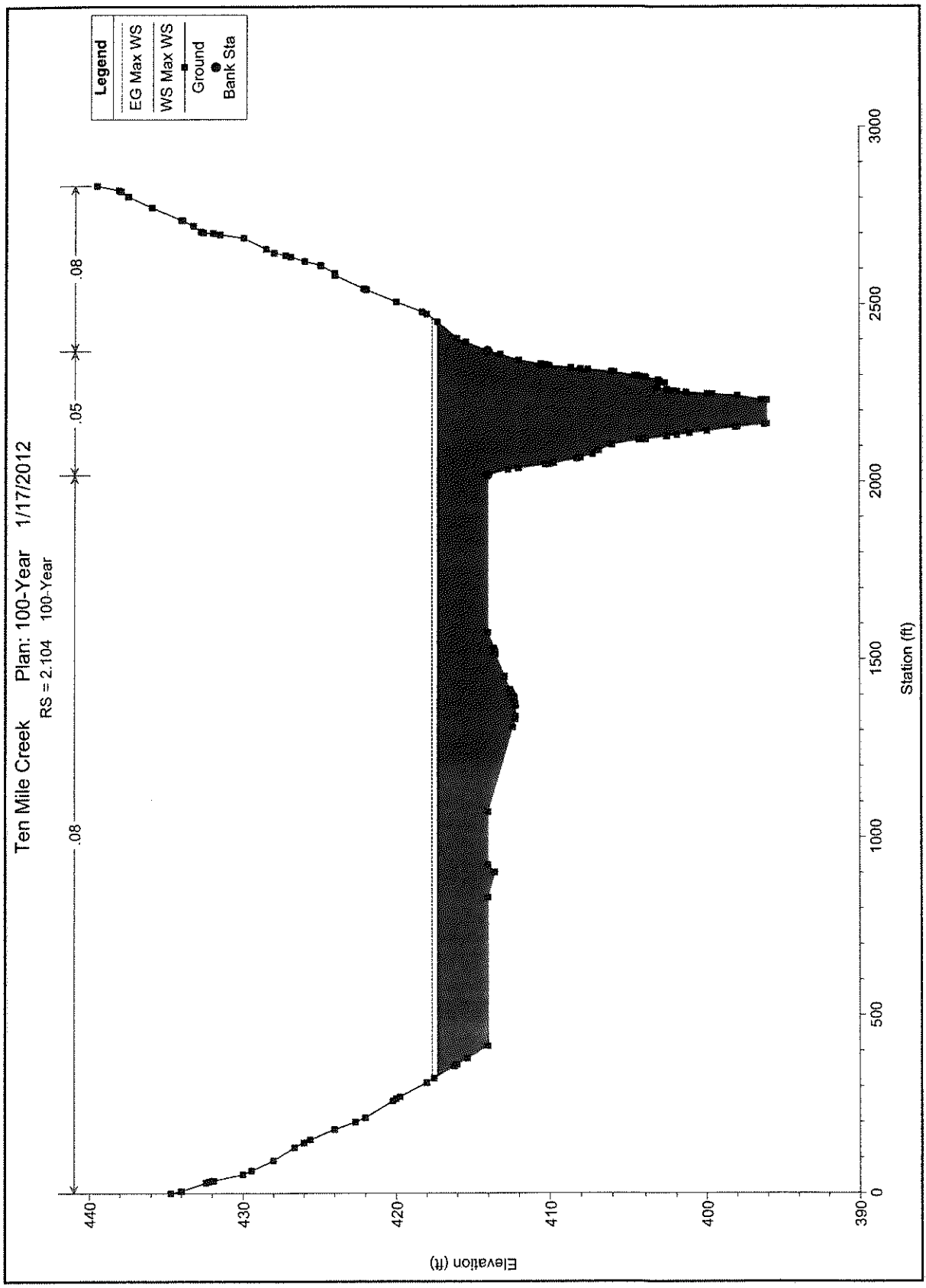
CURRENT PERMITTED 100-YEAR HEC-RAS ANALYSIS

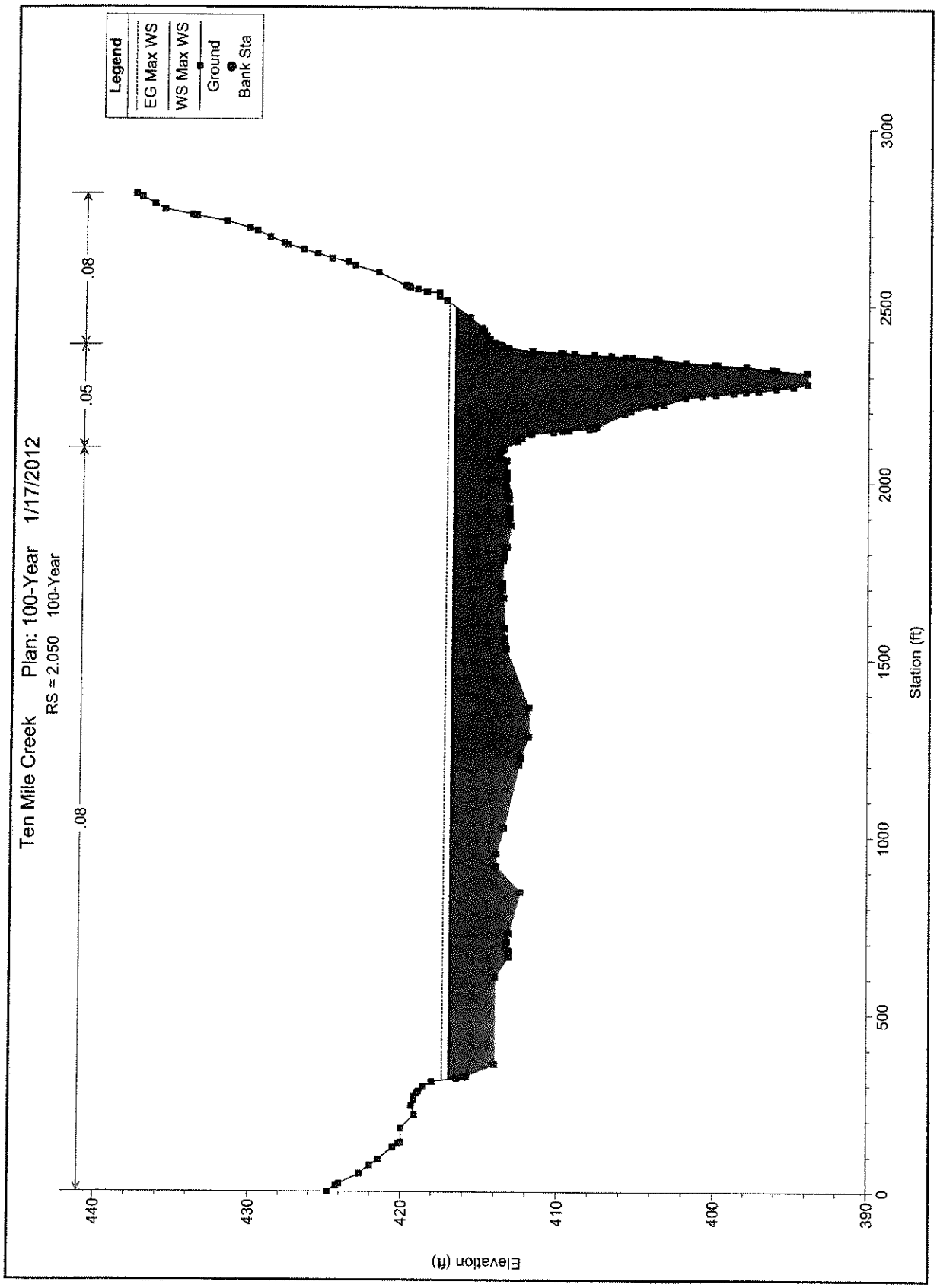
HEC-RAS Plan: CP-100 River: Ten Mile Cr Reach: Reach 1 Profile: Max WS

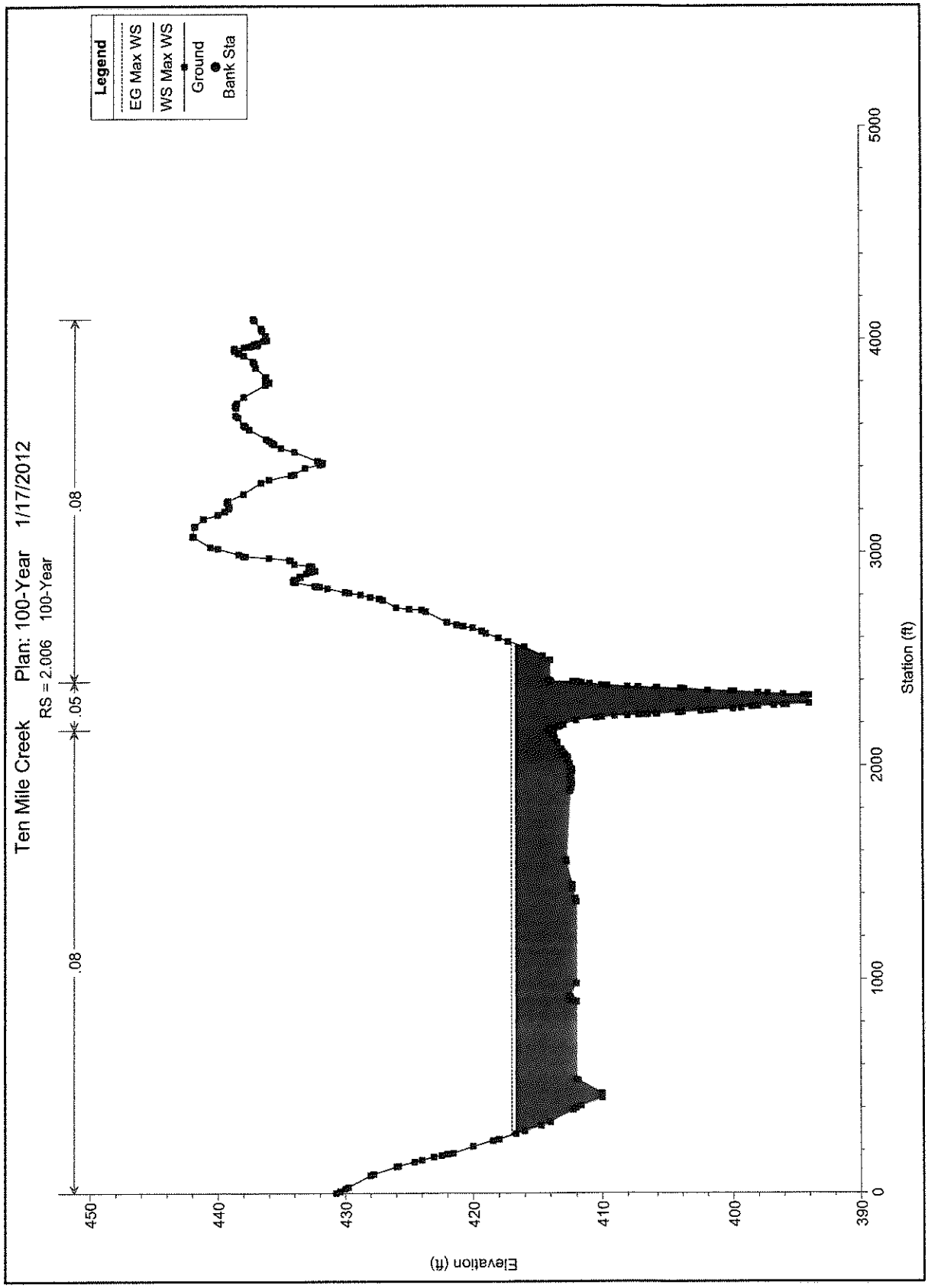
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	2.269	Max WS	33597.52	394.00	418.09		418.66	0.002277	8.11	9416.37	2016.25	0.38
Reach 1	2.183	Max WS	33595.84	395.88	417.71		417.92	0.000467	4.12	13098.57	2086.13	0.18
Reach 1	2.104	Max WS	33692.12	396.00	417.29		417.64	0.001092	5.46	10654.41	2120.50	0.26
Reach 1	2.050	Max WS	33689.20	394.00	416.94		417.36	0.001465	6.15	10274.12	2176.79	0.30
Reach 1	2.006	Max WS	33685.70	394.00	416.67		417.00	0.001534	6.15	11390.88	2292.57	0.31
Reach 1	1.966	Max WS	33681.46	394.00	416.28		416.62	0.002075	6.75	10815.21	2342.80	0.35
Reach 1	1.919	Max WS	33660.69	394.00	415.77		416.04	0.002311	6.20	11829.68	3204.23	0.36
Reach 1	1.875	Max WS	33659.63	394.00	415.25		415.63	0.001886	7.12	11611.75	2860.44	0.34
Reach 1	1.765	Max WS	33658.20	392.00	414.62		414.92	0.001931	5.84	11328.20	2627.99	0.33
Reach 1	1.735	Max WS	33750.80	394.00	414.20		414.49	0.002136	6.27	11328.13	2444.14	0.35
Reach 1	1.695	Max WS	33791.77	394.00	412.63		413.11	0.002918	7.17	9366.93	2326.02	0.41
Reach 1	1.628	Max WS	33785.60	393.95	411.98		412.20	0.001026	4.65	12669.91	2295.46	0.25
Reach 1	1.141	Max WS	33746.72	392.00	411.10		411.72	0.002697	8.23	8851.86	2001.13	0.41
Reach 1	1.085	Max WS	33743.07	389.35	410.40		411.03	0.002529	8.15	8659.75	1998.69	0.40
Reach 1	1.036	Max WS	33799.64	388.00	410.21		410.49	0.000966	5.19	12436.45	2519.99	0.25
Reach 1	1.002	Max WS	33745.65	388.00	409.76		410.01	0.001570	6.23	13101.02	2747.43	0.31
Reach 1	0.922	Max WS	33743.05	388.00	409.46		409.70	0.001228	5.91	14328.95	2861.31	0.28
Reach 1	0.786	Max WS	33739.30	388.00	409.30		409.46	0.000733	4.74	16306.27	2909.99	0.22
Reach 1	0.714	Max WS	33731.90	388.00	409.05		409.25	0.000633	4.75	16901.60	2856.33	0.21
Reach 1	0.666	Max WS	33723.18	388.00	408.52		408.72	0.001076	5.01	14175.21	2800.99	0.26
Reach 1	0.597	Max WS	33724.86	388.00	408.24		408.45	0.001556	5.58	13191.74	2771.57	0.30
Reach 1	0.527	Max WS	33705.00	388.00	407.61		408.54	0.003705	9.91	8213.00	2475.07	0.48
Reach 1	0.383	Max WS	33702.71	388.00	407.28		407.53	0.001958	5.86	10796.03	1916.80	0.33
Reach 1	0.776	Max WS	33829.79	388.77	406.15		406.47	0.001817	5.99	10572.71	2011.13	0.33
Reach 1	0.737	Max WS	33826.83	388.00	405.70		406.06	0.002905	6.63	9696.29	2154.54	0.40
Reach 1	0.652	Max WS	33795.38	380.00	404.07		404.27	0.000430	3.90	14836.92	2914.08	0.17
Reach 1	0.387	Max WS	33889.52	380.00	403.77	398.31	403.95	0.001013	4.56	15489.06	3650.32	0.24

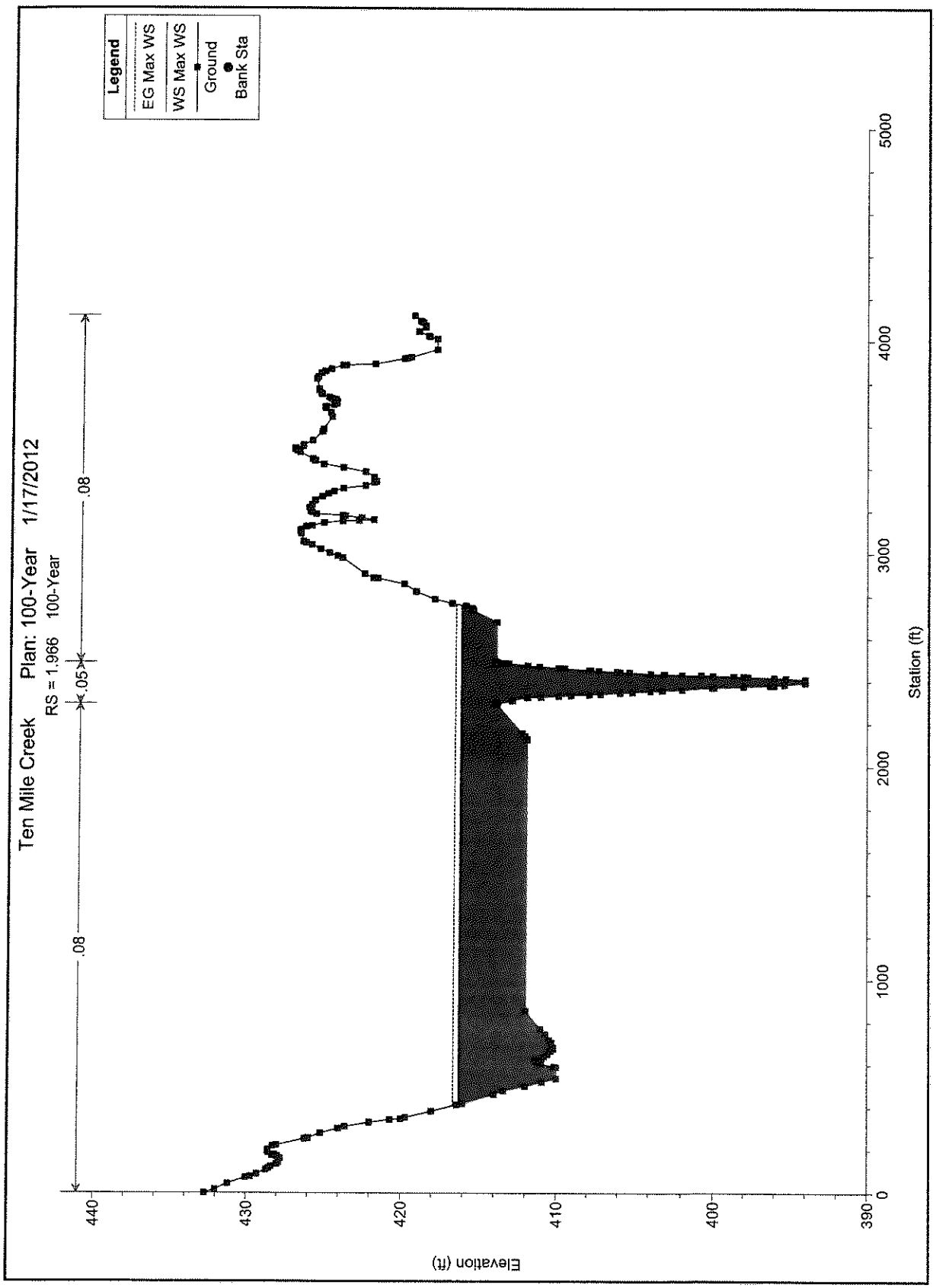

Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 2.269 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
Station (ft)

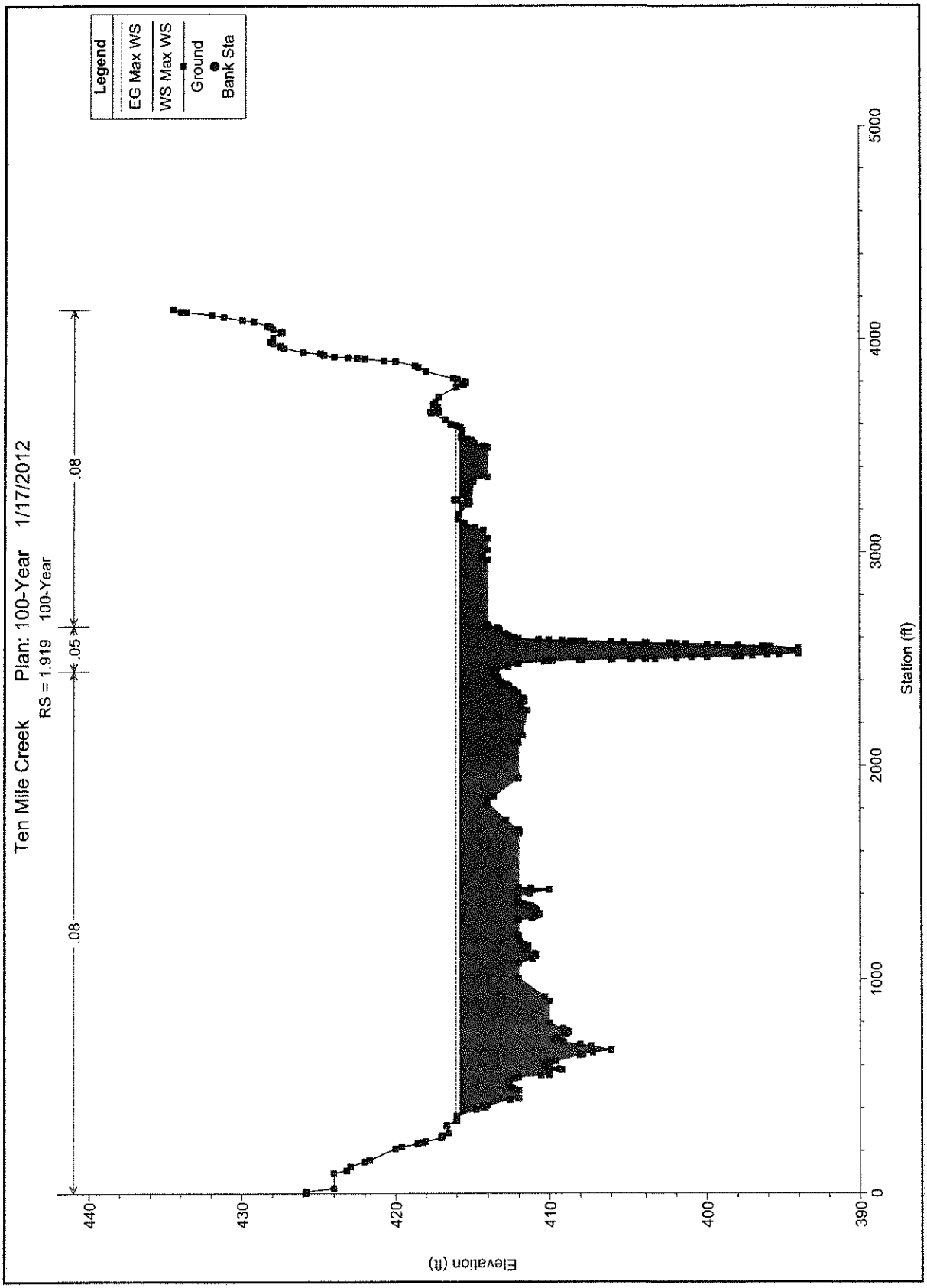

Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 2.183 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000

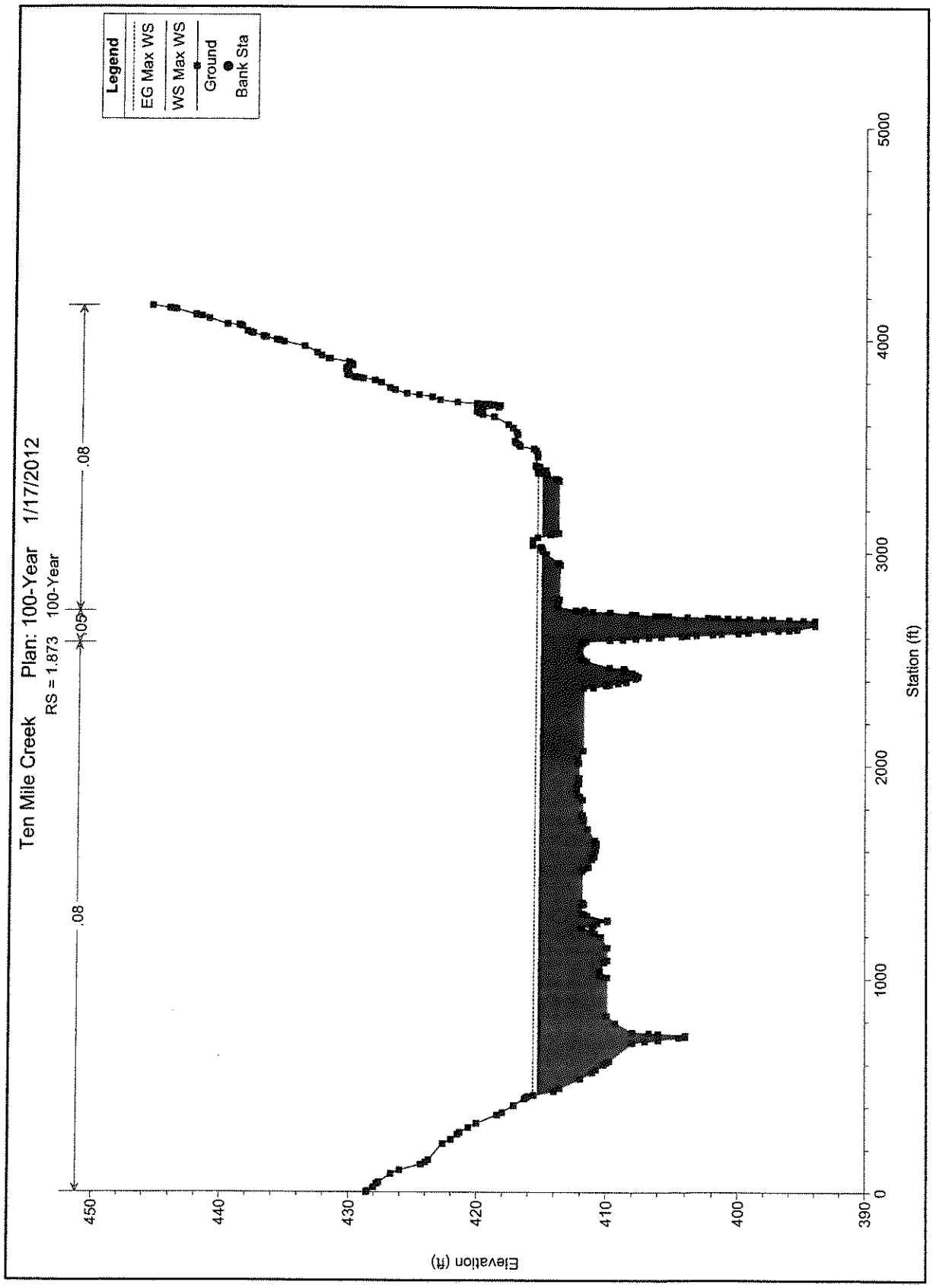

Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 2.104 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
Station (ft)

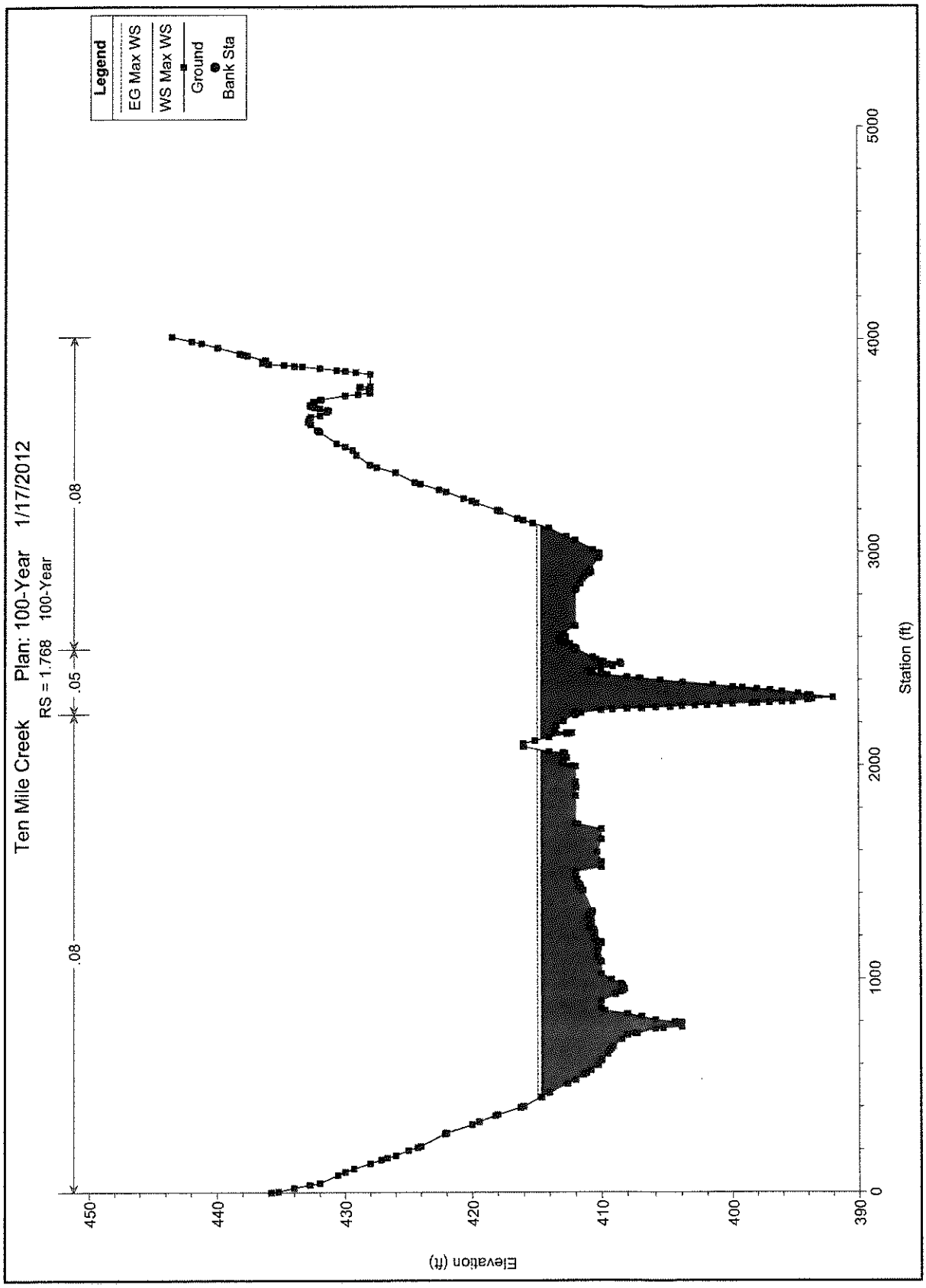

Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 2.050 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 2.006 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
1000
2000
3000
4000
5000


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 1.966 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
1000
2000
3000
4000
5000


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 1.919 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
390
400
410
420
430
440
0
1000
2000
3000
4000
5000


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 1.873 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
0
1000
2000
3000
4000
5000
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 1.768 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
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0
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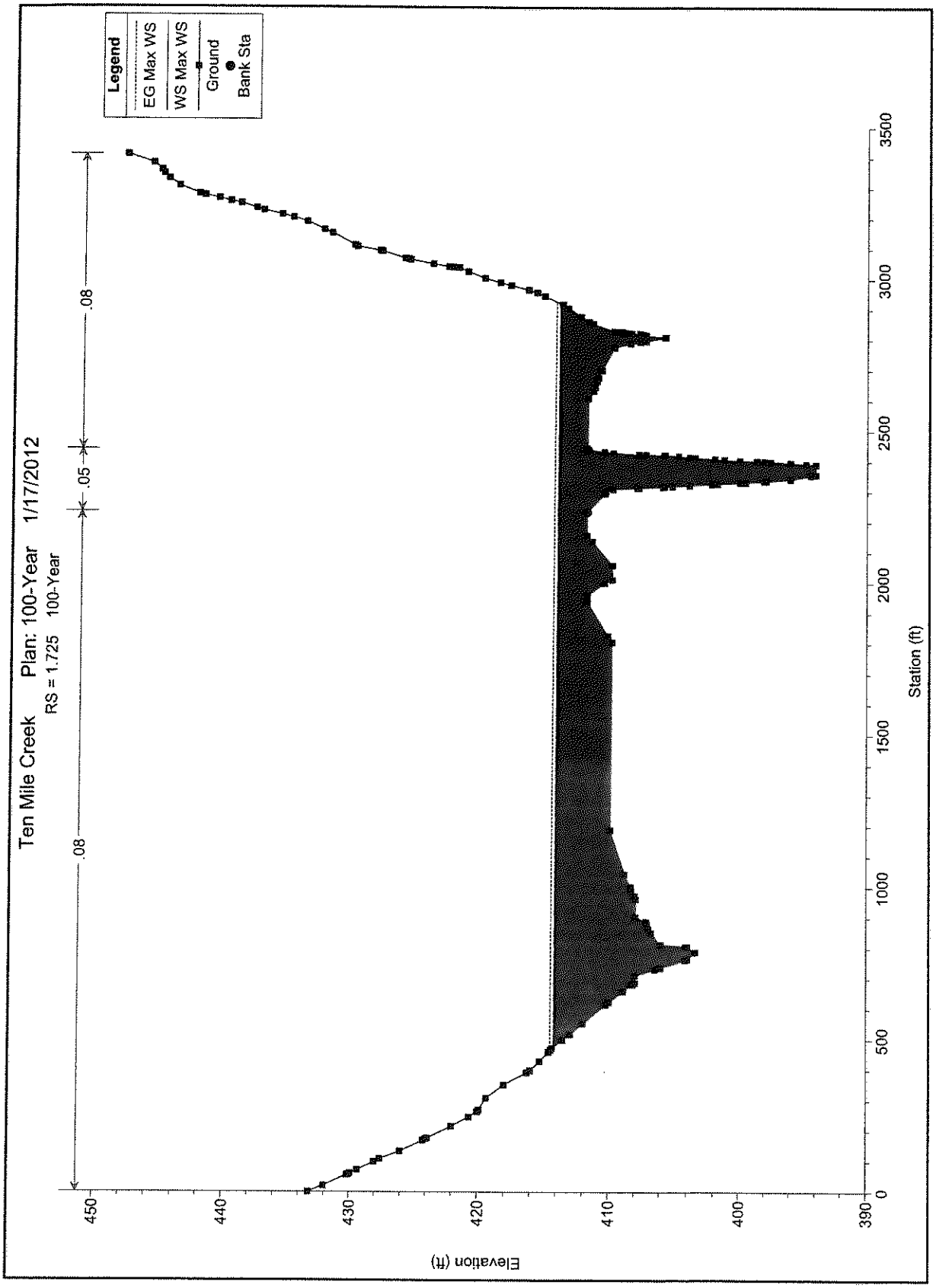
2000
3000
4000
5000
Station (ft)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.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
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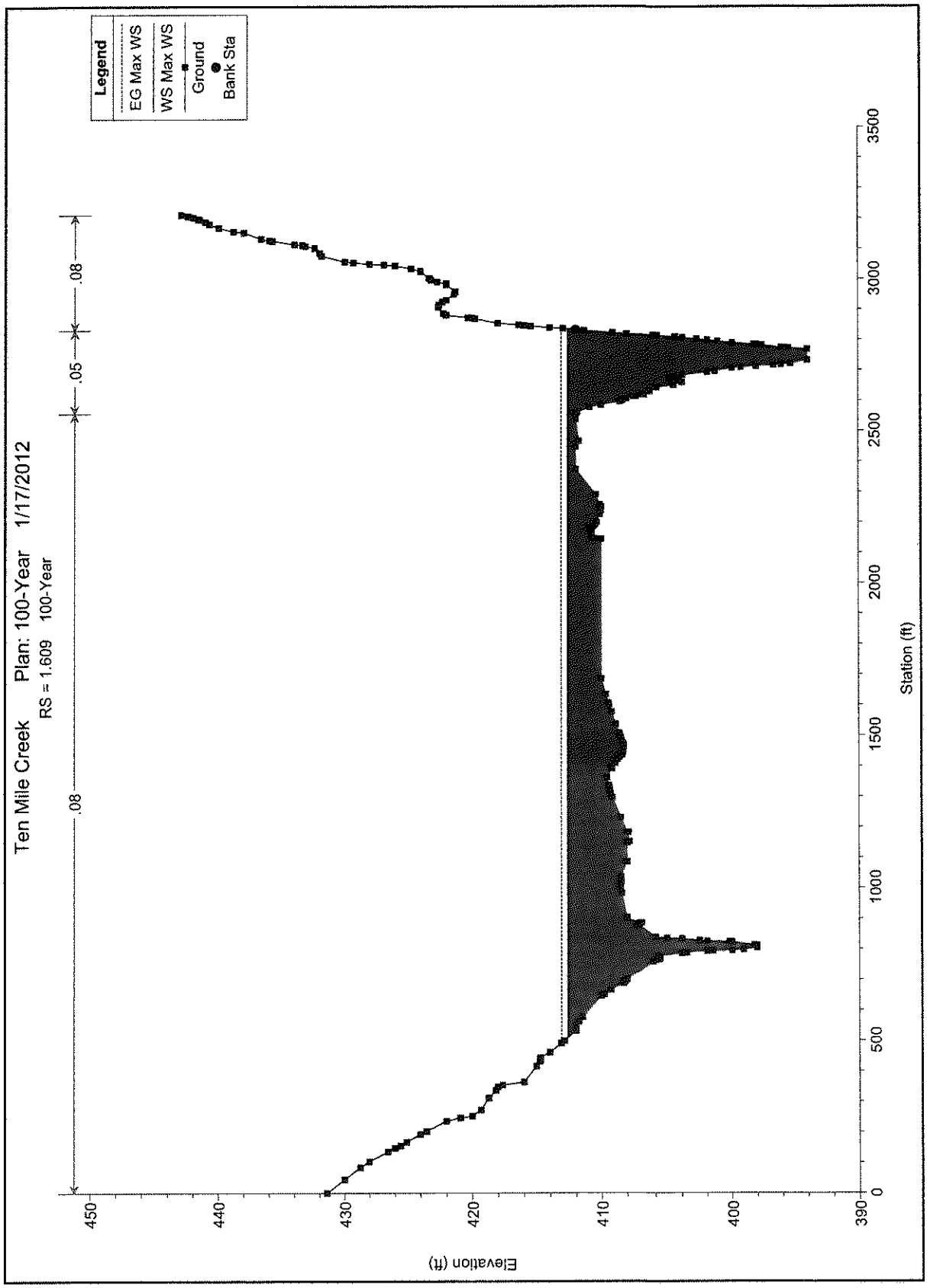
3000
3500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.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
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440
430
420
410
400
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0
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1000
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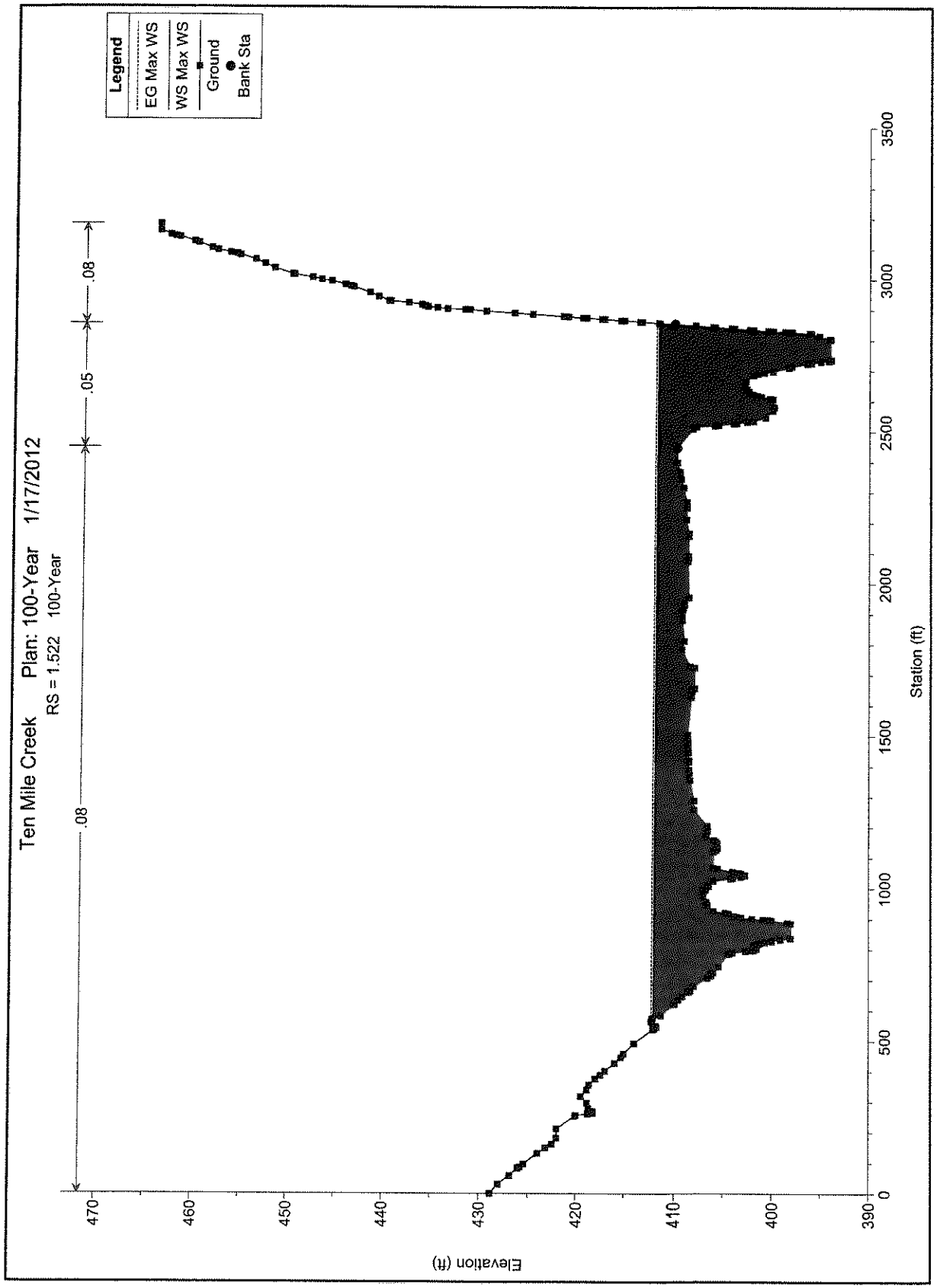
2000
2500
3000
3500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.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
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460
450
440
430
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410
400
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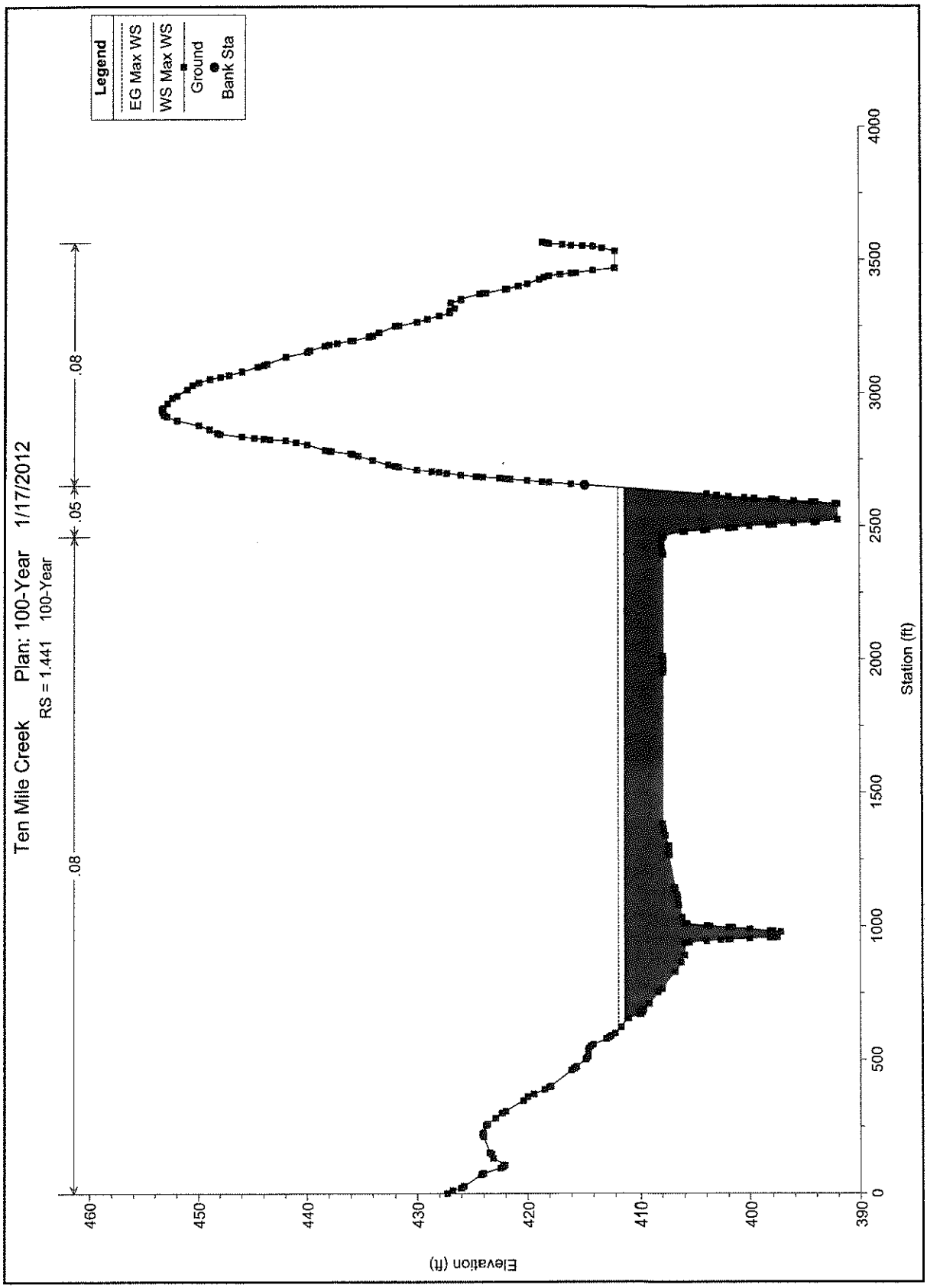
500
1000
1500
2000
2500
3000
3500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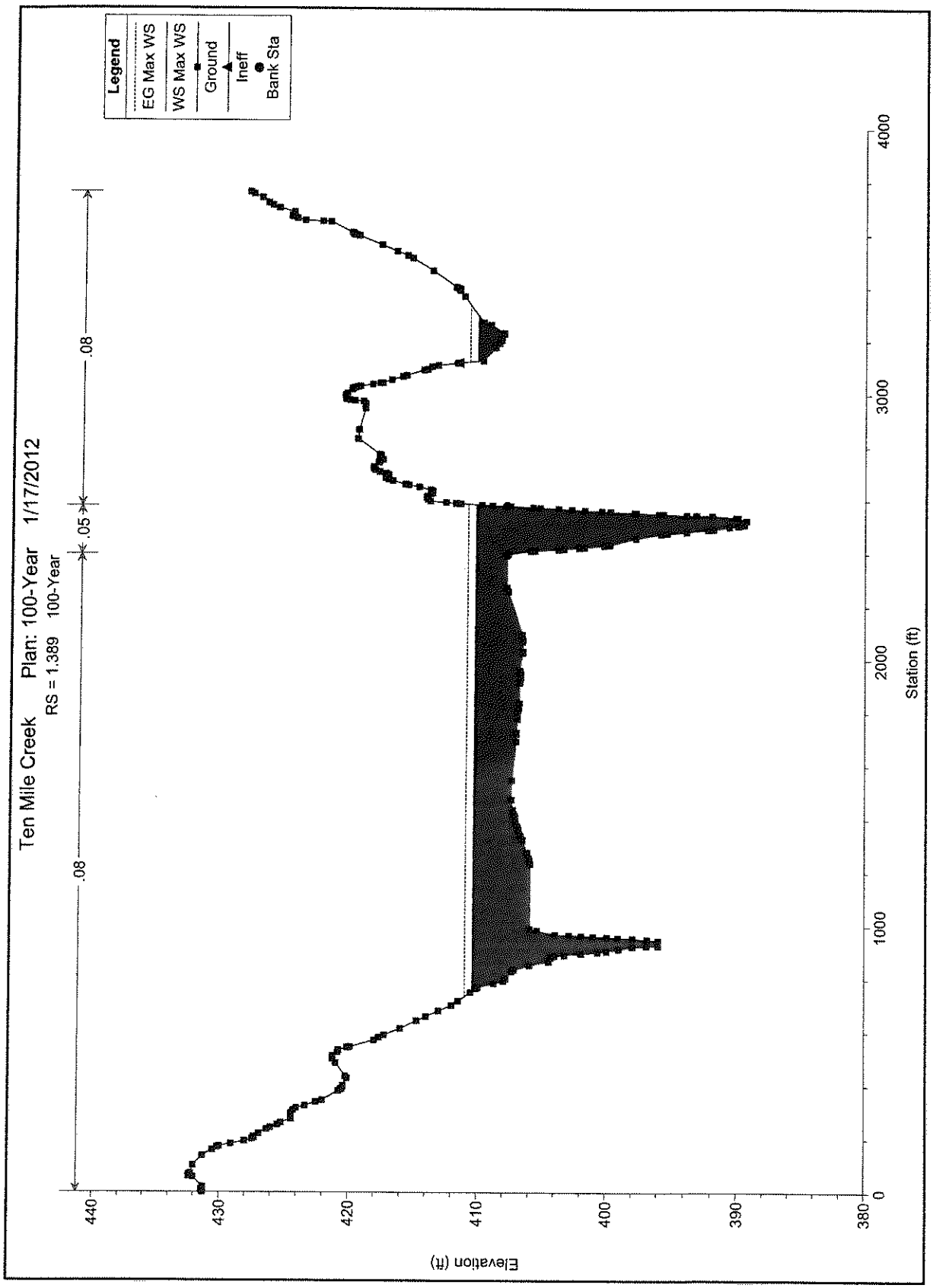
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500
4000
Station (ft)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.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
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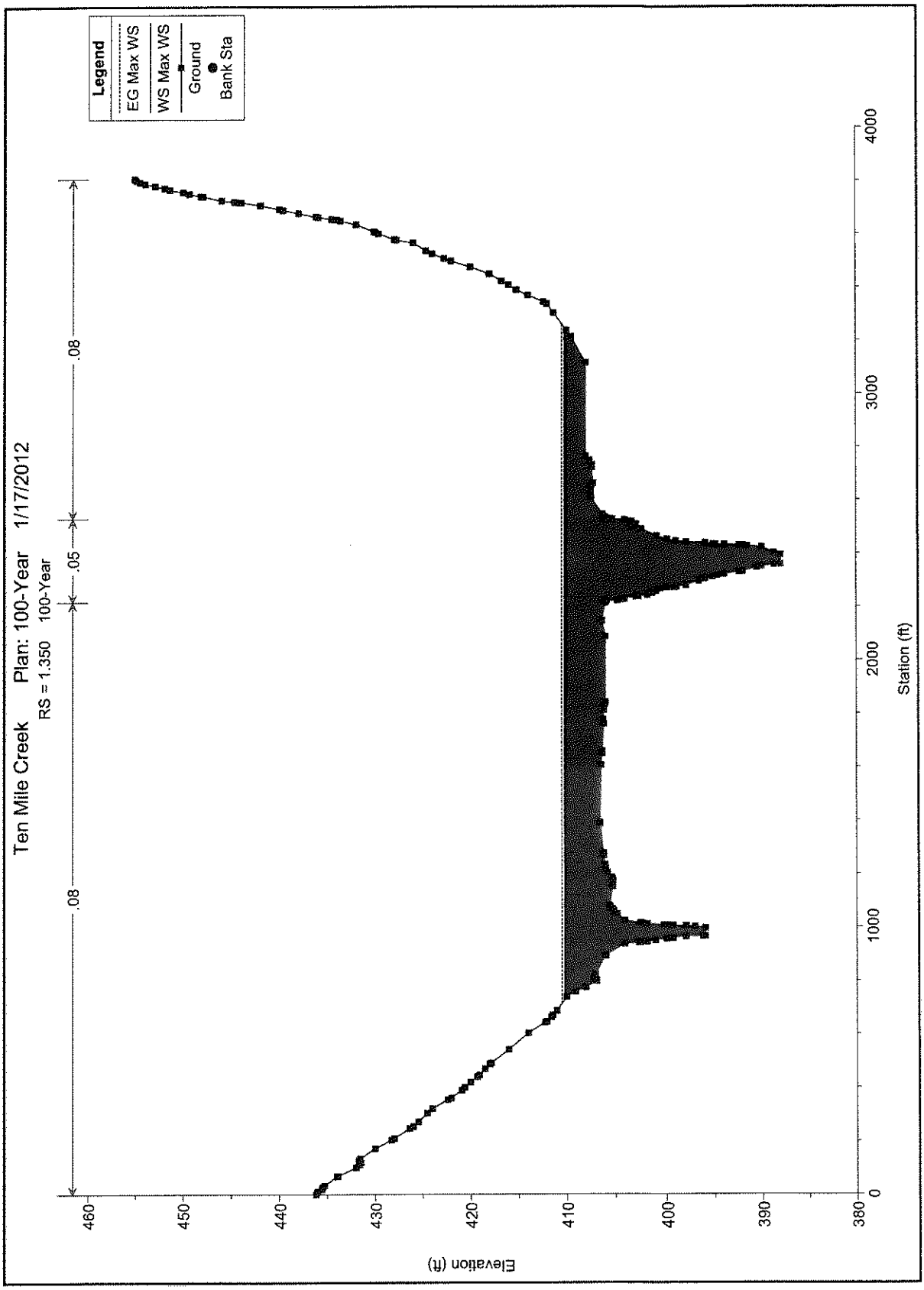
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)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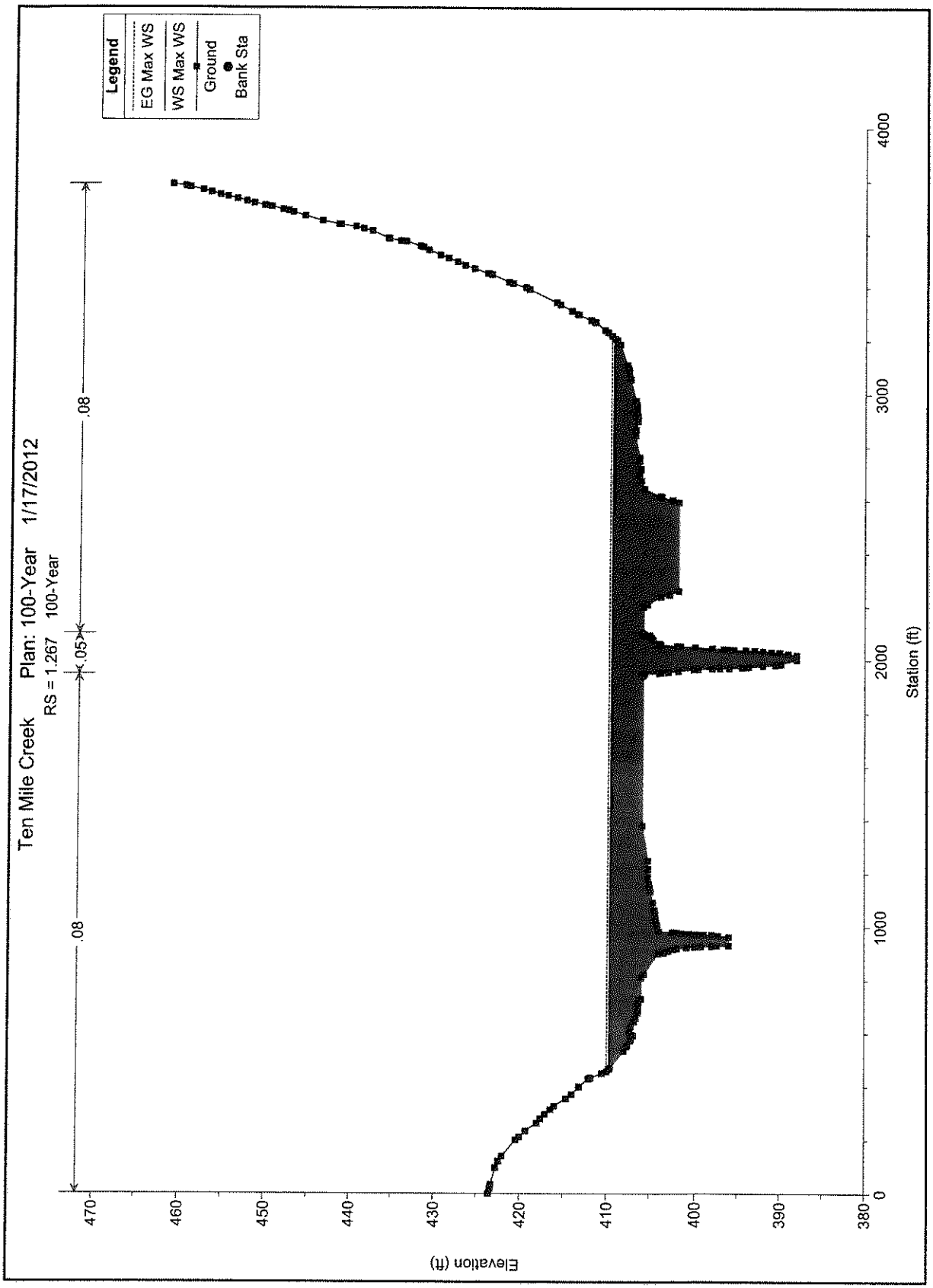
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)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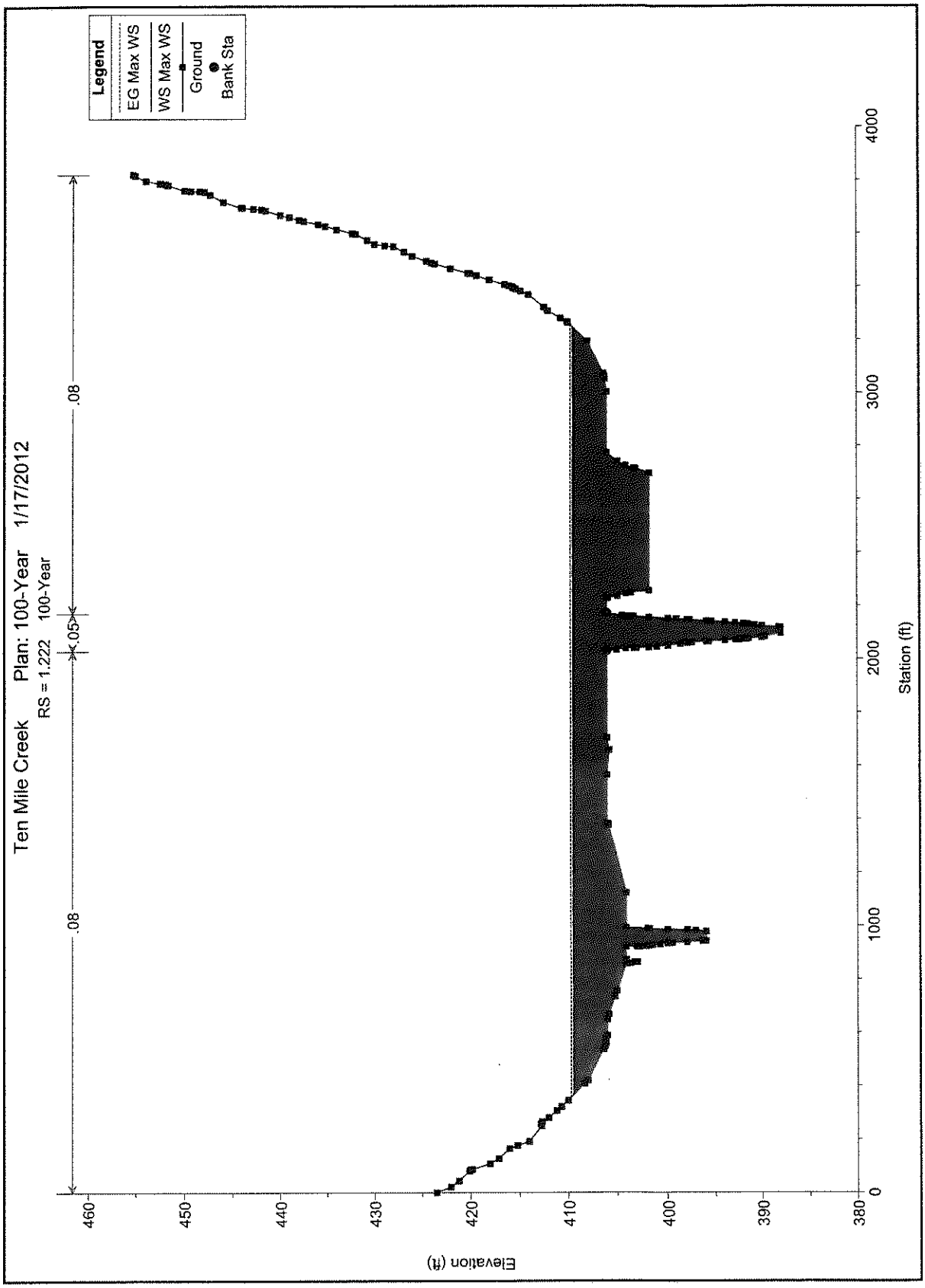
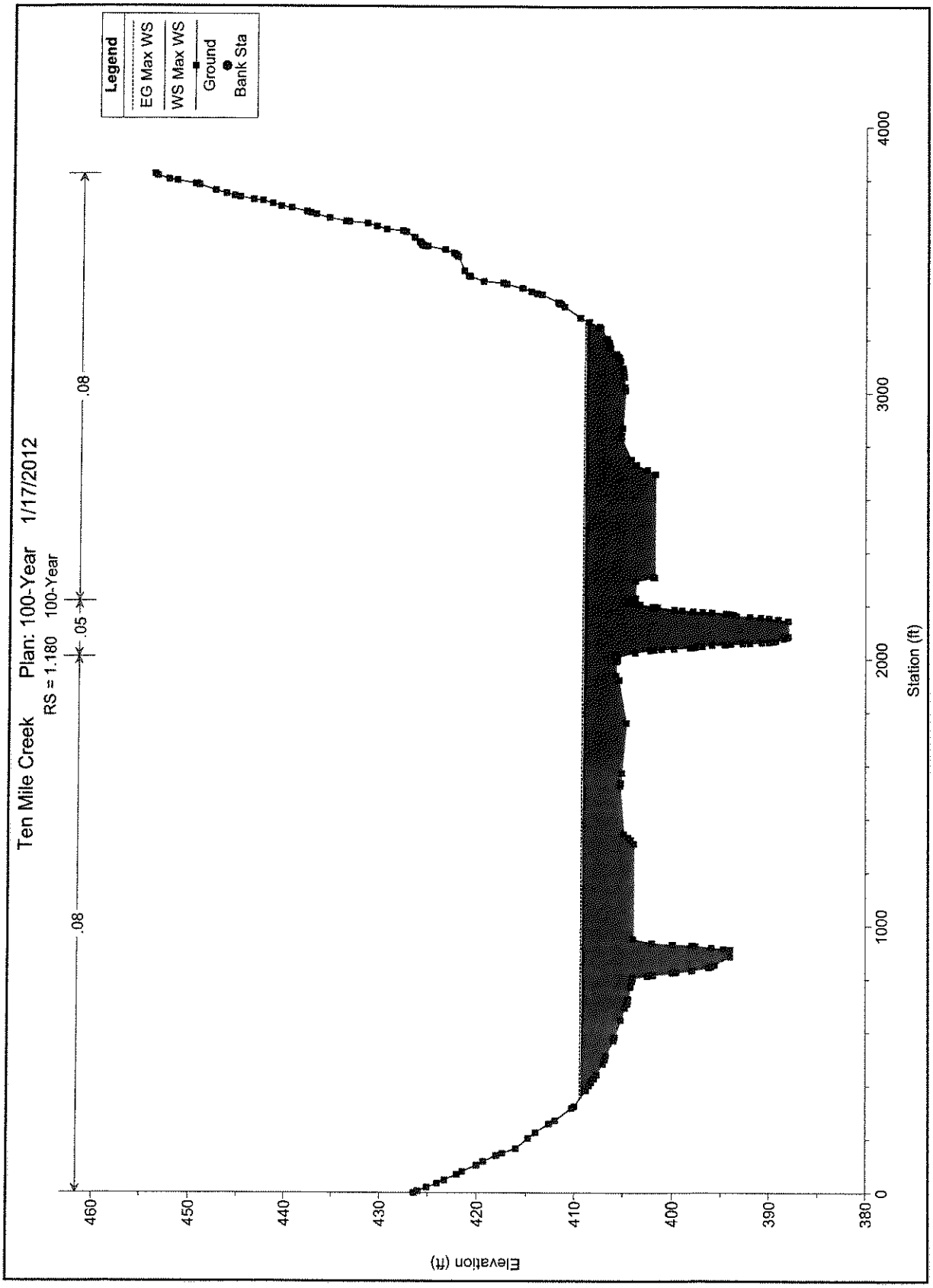
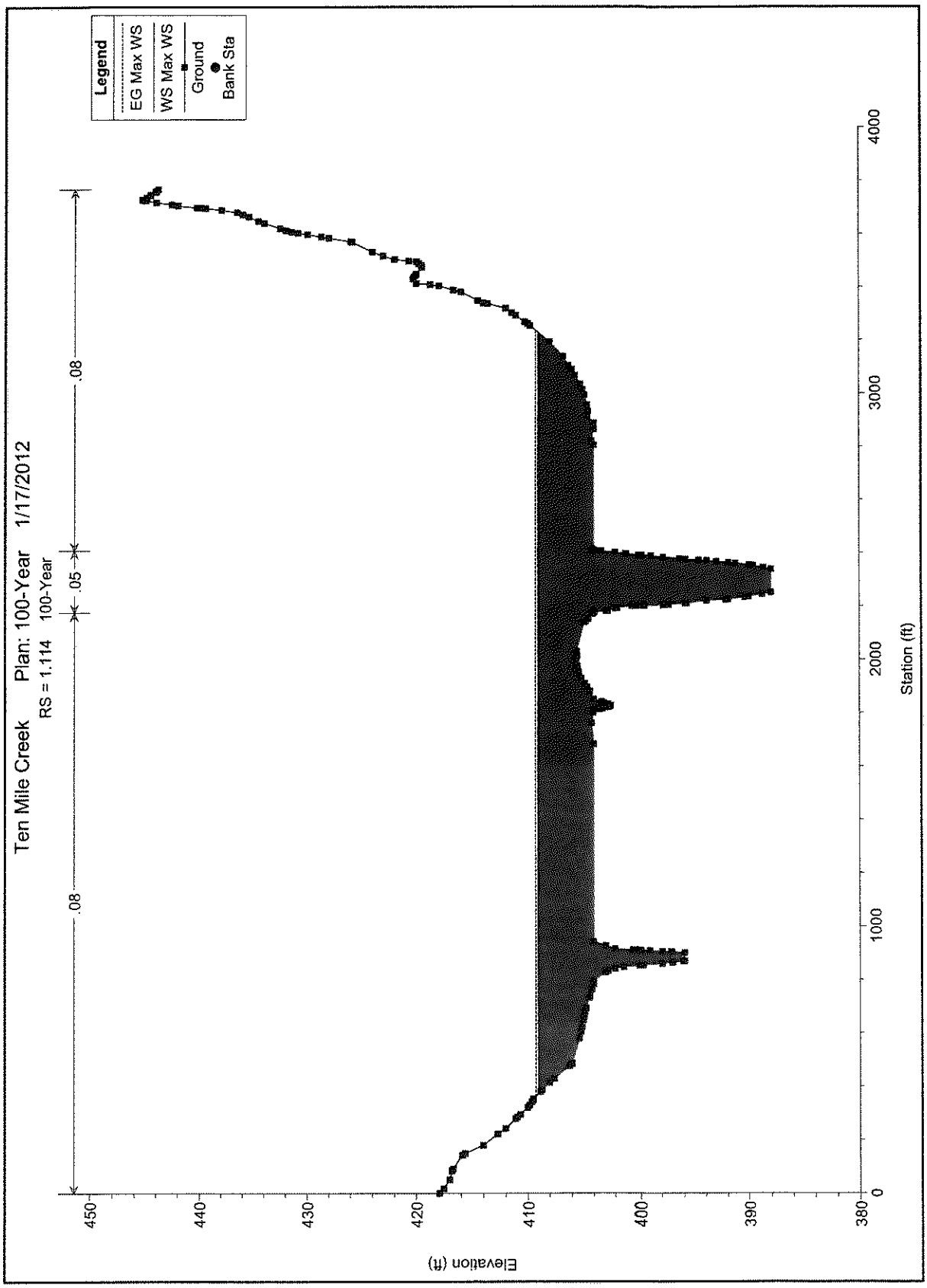
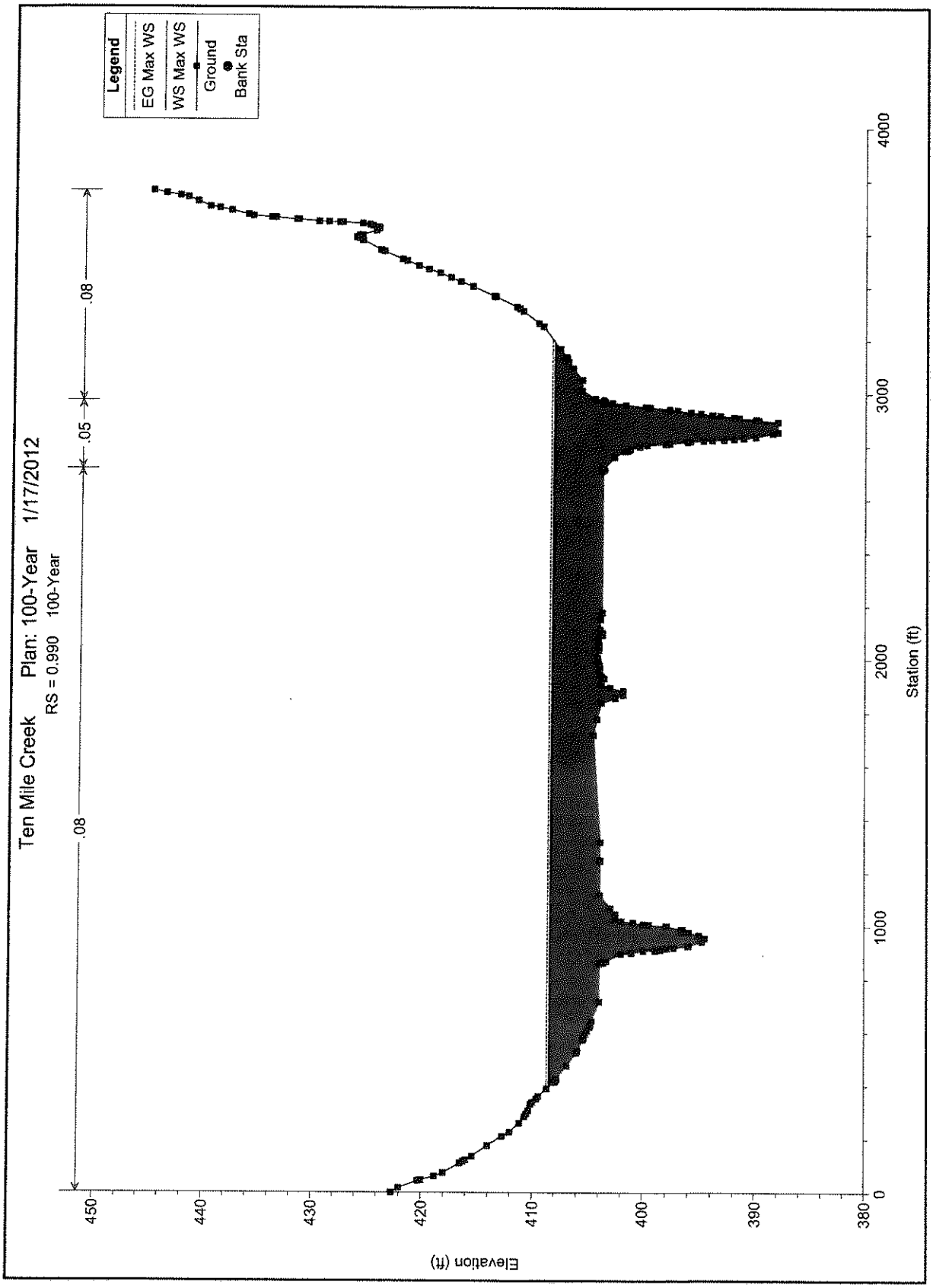
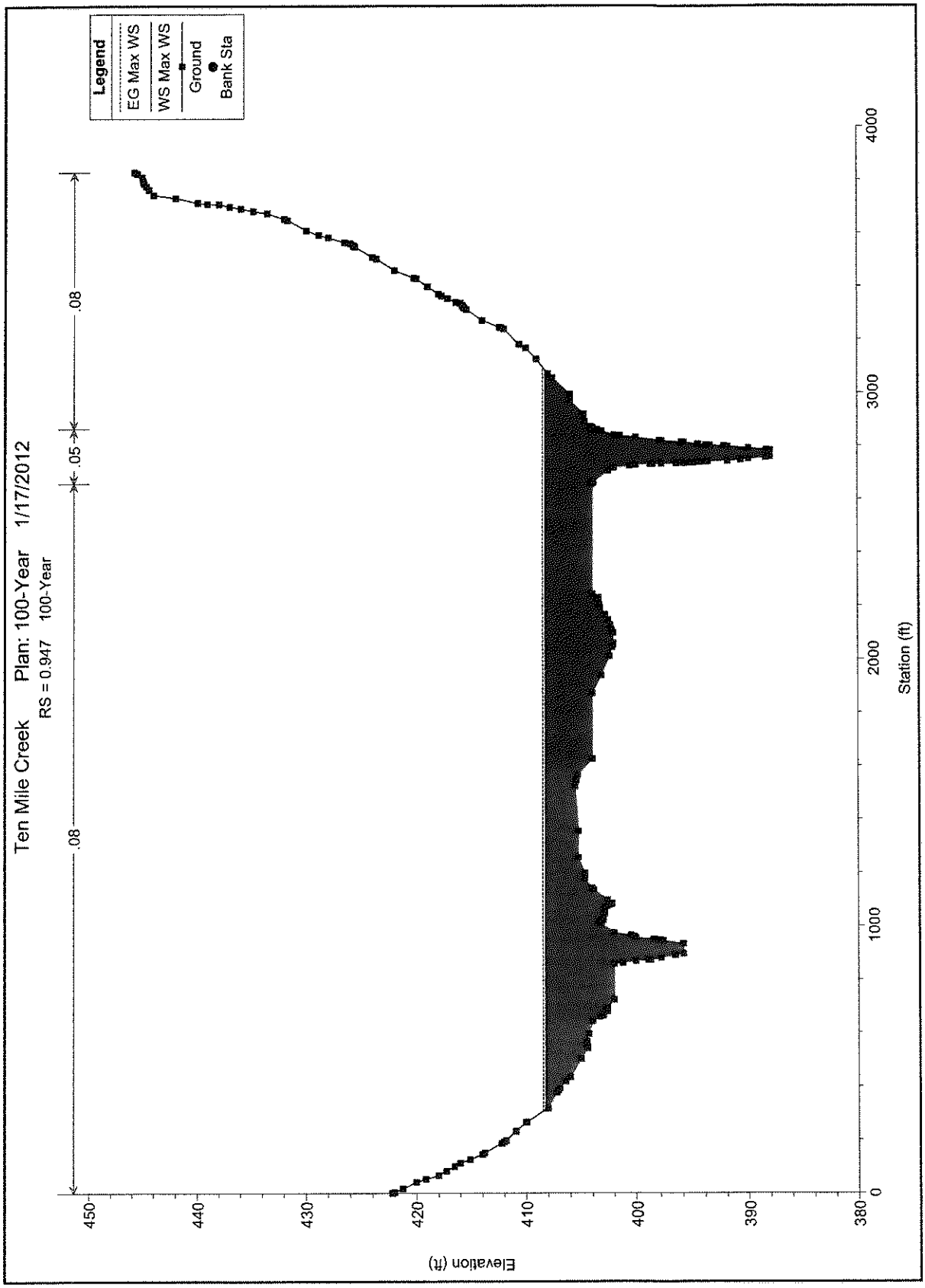
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
470
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 1.222 100-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 1.180 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 1.114 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 0.990 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 0.947 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
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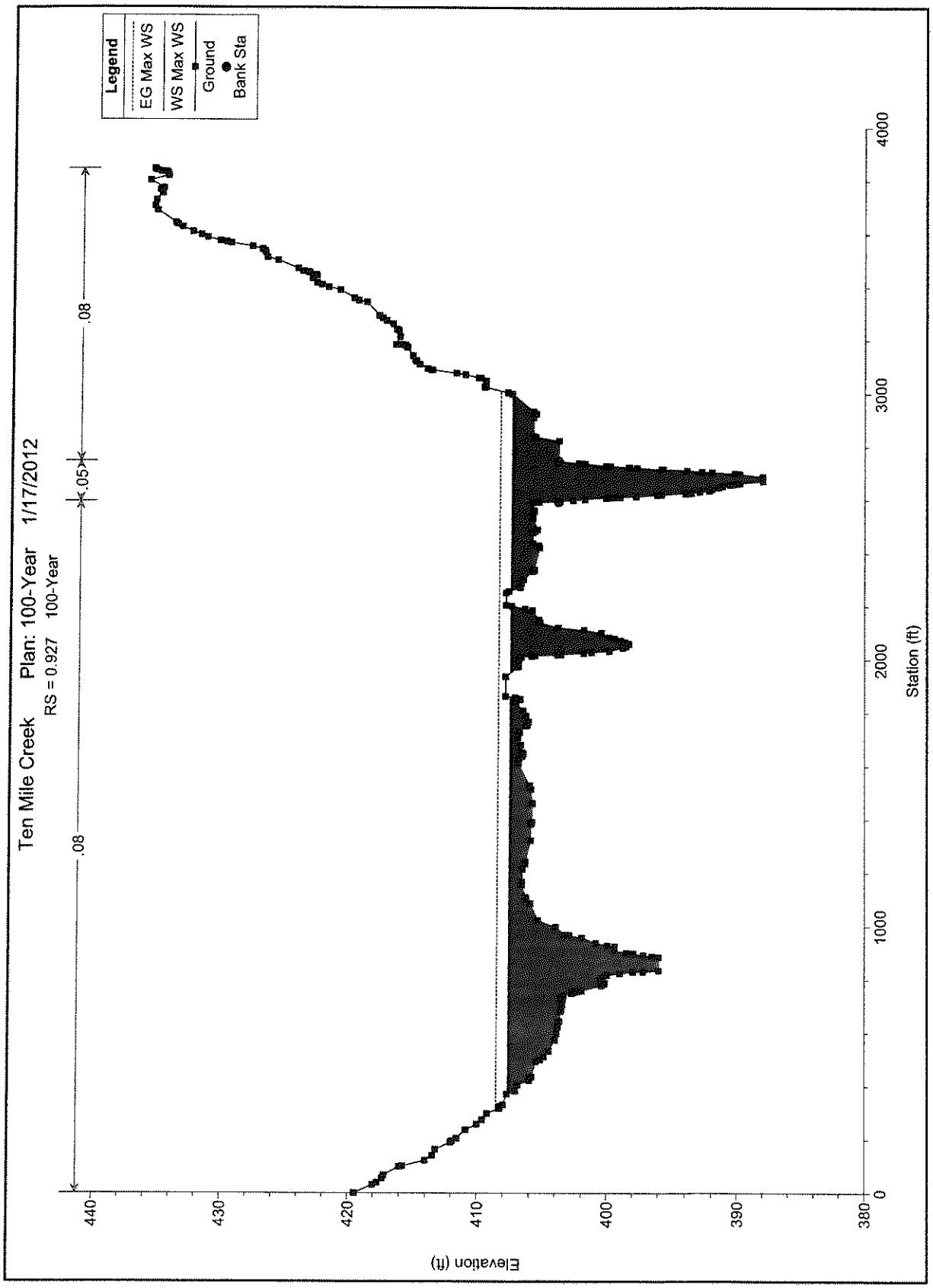
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 0.927 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
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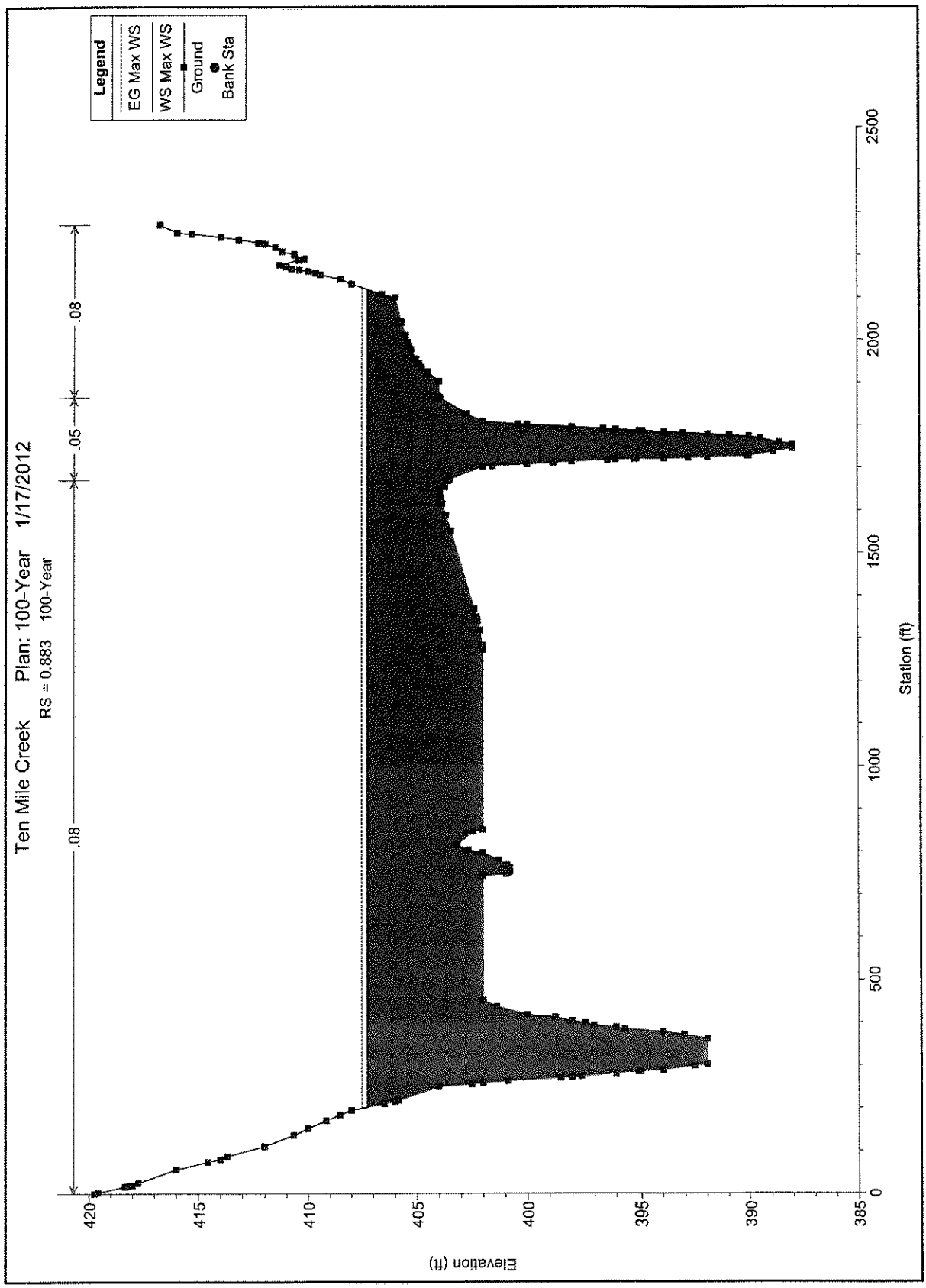
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 0.883 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
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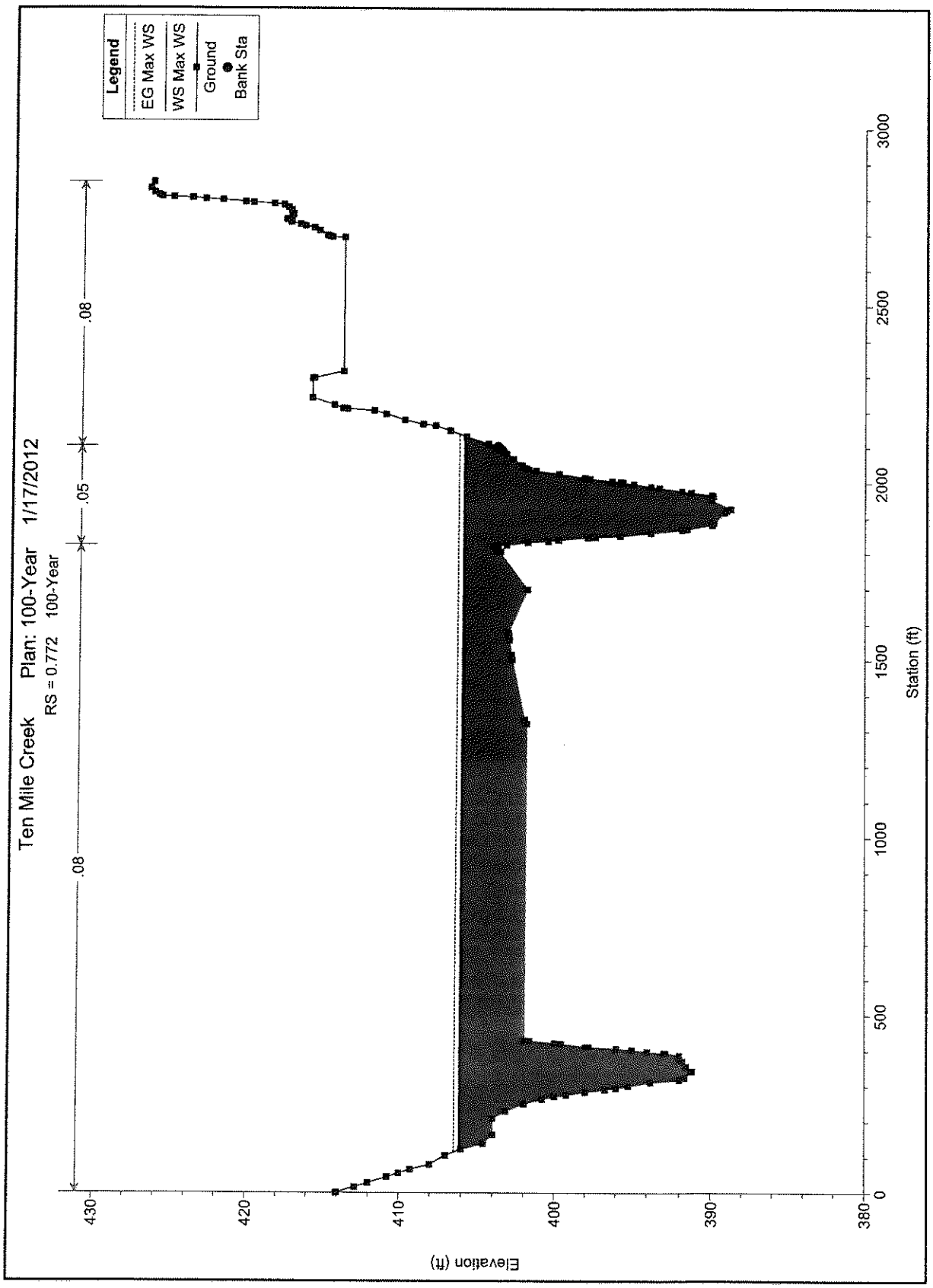
415
410
405
400
395
390
385
0
500
1000
1500
2000
2500
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 0.772 100-Year
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.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
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420
410
400
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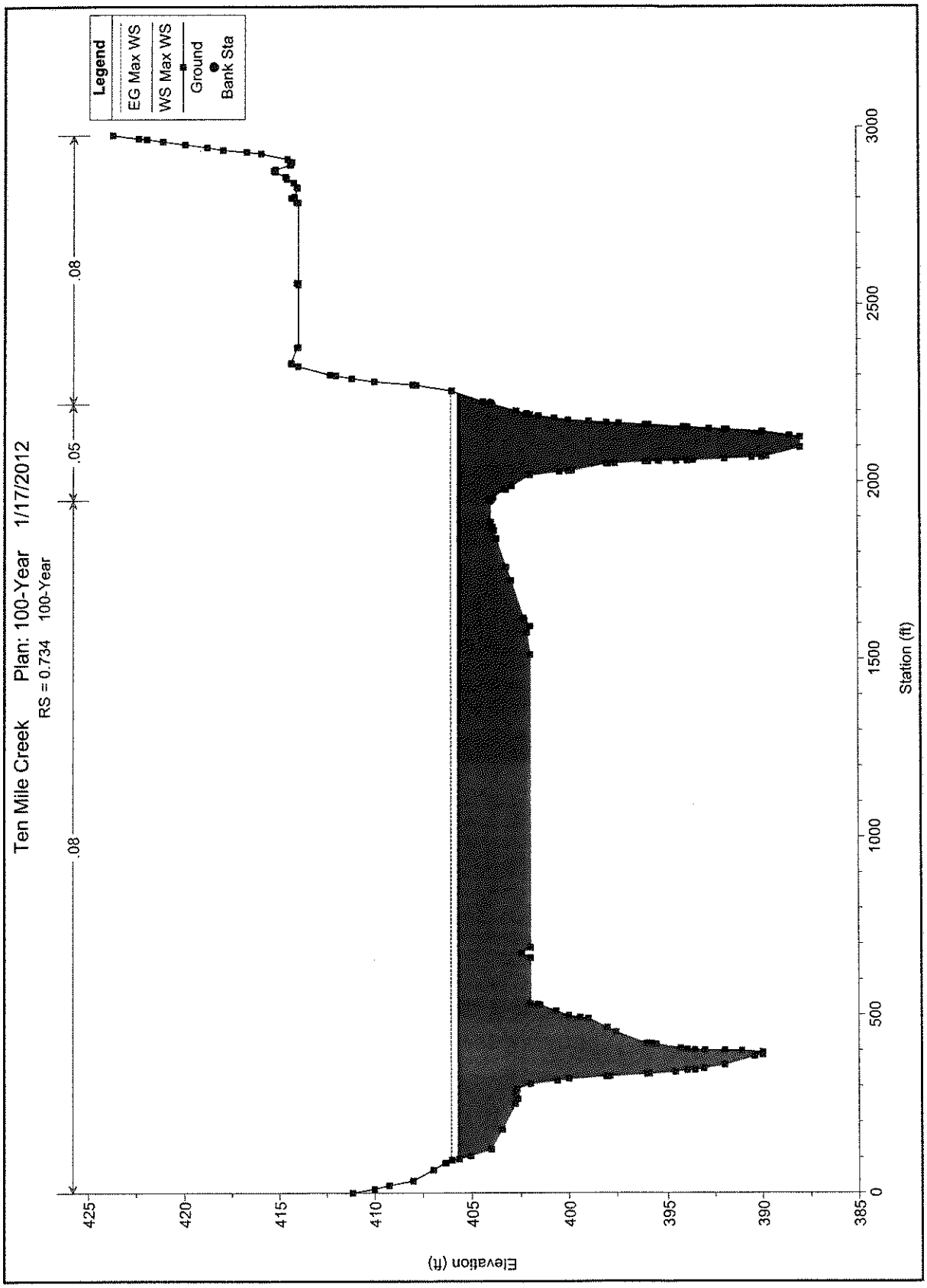
380
0
500
1000
1500
2000
2500
3000
Station (ft)


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 0.734 100-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
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400
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390
385
0
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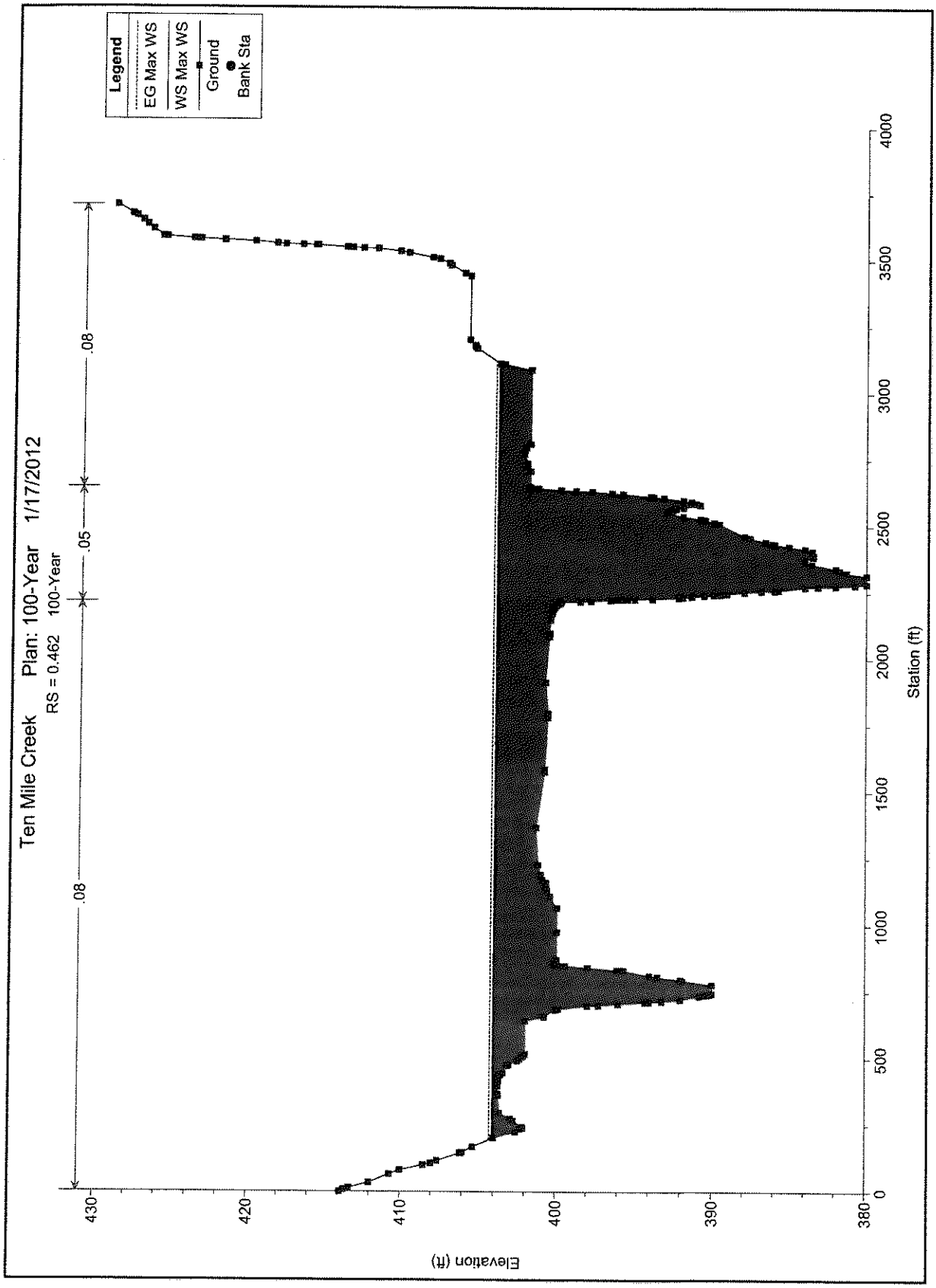
2500
3000


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 0.462 100-Year
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.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
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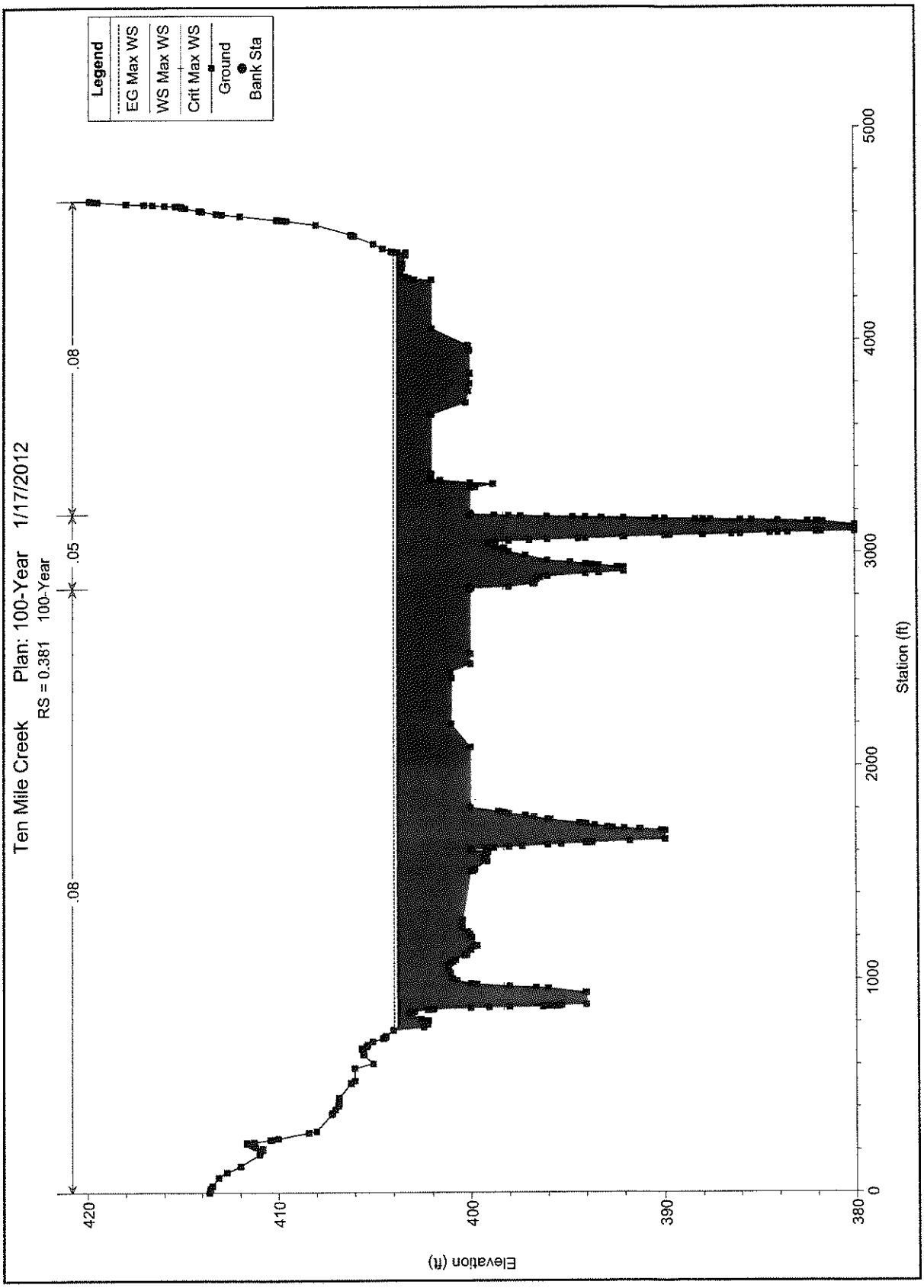
400
410
420
430
0
500
1000
1500
2000
2500
3000
3500
4000


Ten Mile Creek Plan: 100-Year 1/17/2012
RS = 0.381 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
420
410
400
390
380
0
1000
2000
3000
4000
5000
Station (ft)

SKYLINE LANDFILL

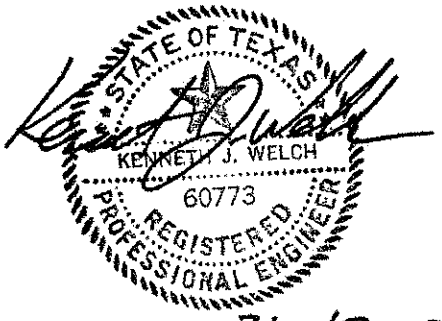
APPENDIX C

POSTDEVELOPMENT HEC-RAS EVALUATION

2/01/2012

Includes pages C-1 through C-61

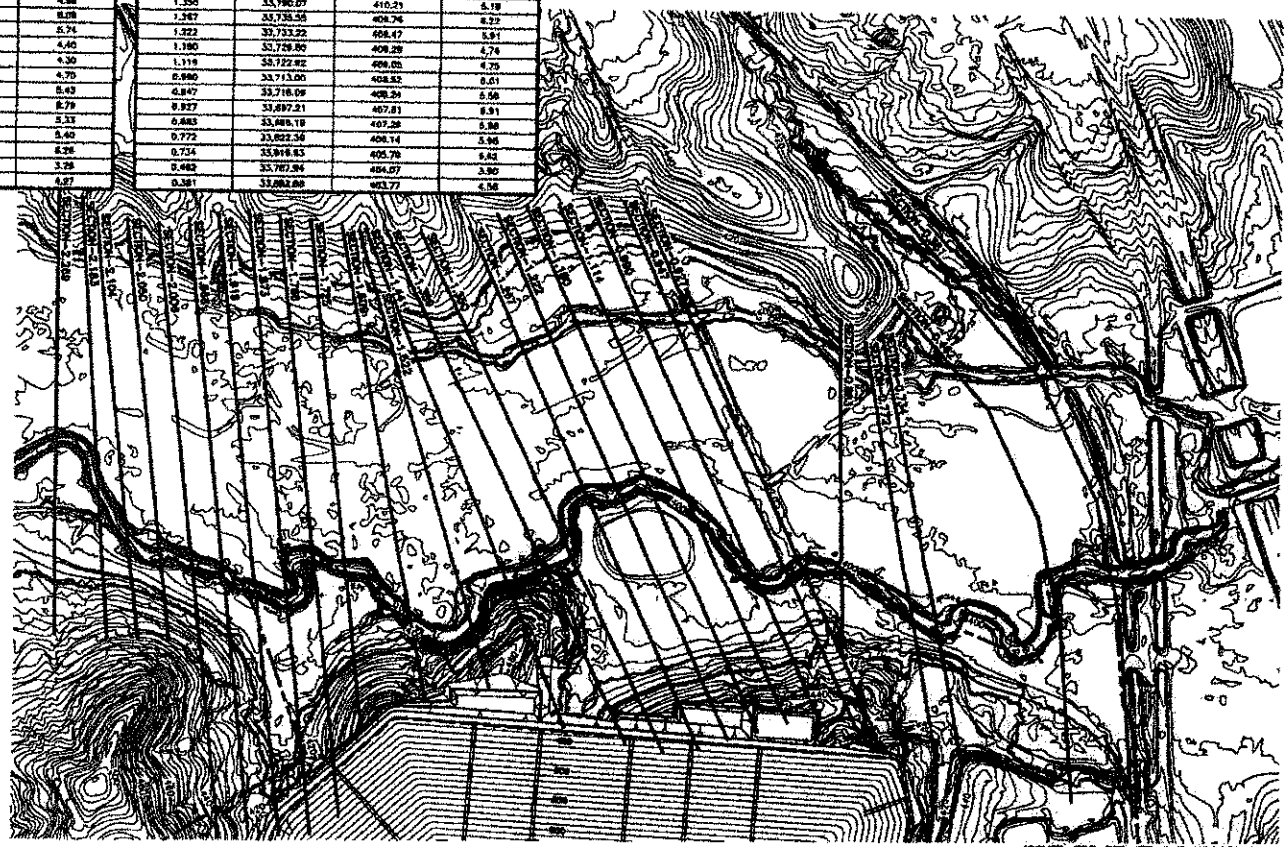
CONTENTS



2/01/2012

HEC-RAS Cross Section	25-YEAR FLOW RATE (cfs)	25-YEAR WATER SURFACE (ft)	25-YEAR VELOCITY (fps)
2.286	25,633.43	417.00	7.67
2.183	25,625.74	416.86	3.47
2.104	25,697.97	416.32	4.79
2.050	25,694.91	416.00	5.50
2.006	25,685.24	415.75	5.86
1.966	25,693.80	415.37	6.25
1.919	25,693.38	414.85	8.05
1.873	25,671.87	414.30	8.80
1.798	25,678.42	413.65	5.54
1.725	25,140.83	413.32	8.67
1.609	25,170.25	411.57	8.90
1.522	25,193.56	410.92	4.24
1.441	25,134.41	410.60	7.66
1.369	25,130.21	409.31	7.88
1.356	25,122.79	409.15	4.88
1.267	25,118.80	408.87	8.08
1.223	25,113.05	408.37	5.74
1.180	25,084.35	408.18	4.46
1.114	25,063.46	407.97	4.30
0.980	25,062.84	407.48	4.75
0.847	25,062.31	407.18	5.43
0.927	25,058.37	406.56	8.79
0.883	25,058.31	406.30	5.33
0.772	25,149.13	405.93	5.40
0.734	25,139.22	404.77	6.26
0.462	25,111.08	402.10	3.28
0.381	25,184.35	402.80	4.87

HEC-RAS Cross Section	100-YEAR FLOW RATE (cfs)	100-YEAR WATER SURFACE (ft)	100-YEAR VELOCITY (fps)
2.286	33,997.09	418.09	8.11
2.183	33,986.84	417.71	4.12
2.104	33,992.13	417.39	5.46
2.050	33,986.83	416.94	6.16
2.006	33,985.72	416.67	6.56
1.966	33,981.47	416.28	6.76
1.919	33,966.75	415.77	8.20
1.873	33,958.70	415.28	7.12
1.798	33,958.27	414.62	5.84
1.725	33,790.88	414.20	8.27
1.609	33,788.87	412.83	7.17
1.522	33,782.18	411.98	4.60
1.441	33,743.45	411.70	8.23
1.369	33,740.04	410.40	8.15
1.356	33,780.07	410.21	5.19
1.267	33,736.56	409.74	8.22
1.223	33,733.22	409.17	5.91
1.180	33,729.80	409.29	4.74
1.114	33,722.92	409.01	4.75
0.980	33,713.00	408.52	5.01
0.847	33,716.09	408.24	5.56
0.927	33,697.21	407.81	8.91
0.883	33,695.19	407.29	5.98
0.772	33,822.36	406.14	5.96
0.734	33,818.83	405.78	6.62
0.462	33,787.94	404.07	3.90
0.381	33,882.89	403.77	4.56



LEGEND

- PERMIT BOUNDARY
- PROPOSED LANDFILL FOOTPRINT
- EXISTING CONTOUR
- HEC-RAS CROSS SECTIONS
- STREAM
- FIRM 100-YEAR FLOODPLAIN
- BME 100-YEAR WATER SURFACE

NOTES:

1. EXISTING CONTOURS PROVIDED BY THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS FROM AERIAL PHOTOGRAPHY CAPTURED BETWEEN JANUARY AND MARCH 2007. COORDINATE SYSTEM WAS BASED ON TEXAS STATE PLANE, NORTH CENTRAL ZONE, NAD 83.
2. CONTOURS WITHIN THE WASTE DISPOSAL FOOTPRINT DEPICT POSTDEVELOPMENT FINAL CONTOURS.

STATE OF TEXAS
KENNETH J. WELCH
60773
REGISTERED PROFESSIONAL ENGINEER
2/10/2012

POSTDEVELOPED FLOOD STAGE ANALYSIS SUMMARY

WASTE MANAGEMENT OF TEXAS, INC. SKYLINE LANDFILL MAJOR PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD
DALLAS • FORT WORTH
817-561-1144

ISSUED FOR PERMITTING PURPOSES ONLY

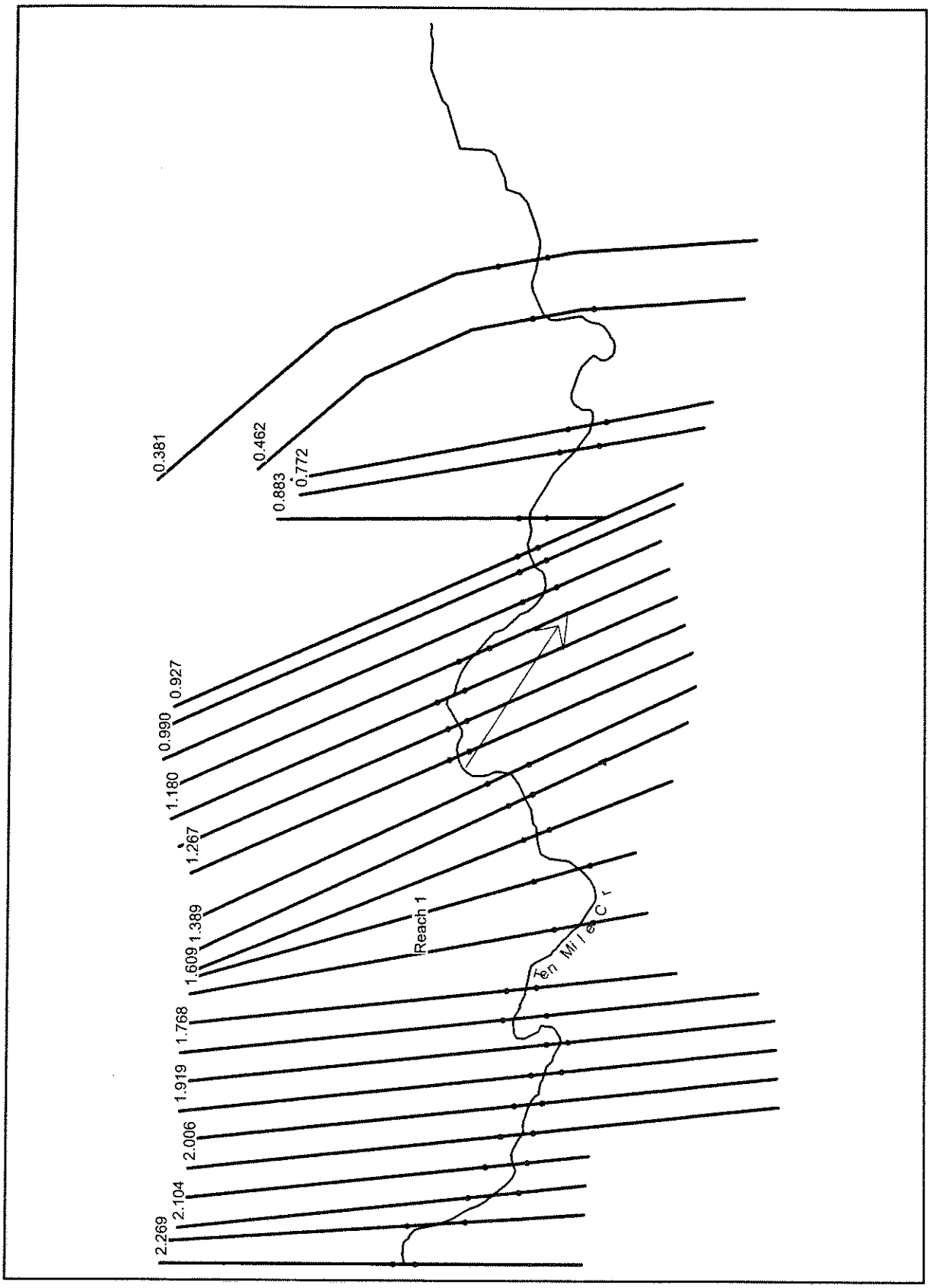
REVISIONS								
REV	DATE	DESCRIPTION	DRAWN BY	DES BY	CHK BY	APP BY		

TBPE FIRM NO. F-356 | TBPG FIRM NO. 50222

DSN. FAW | DATE : 01/12 | DRAWING C-1
DWN. DBS | SCALE : GRAPHIC
CHK. KJW | DWG : C-1.dwg

J:\101\01\120\City Of Ferris\C-1.dwg Layout: Layout1 User: rsmith

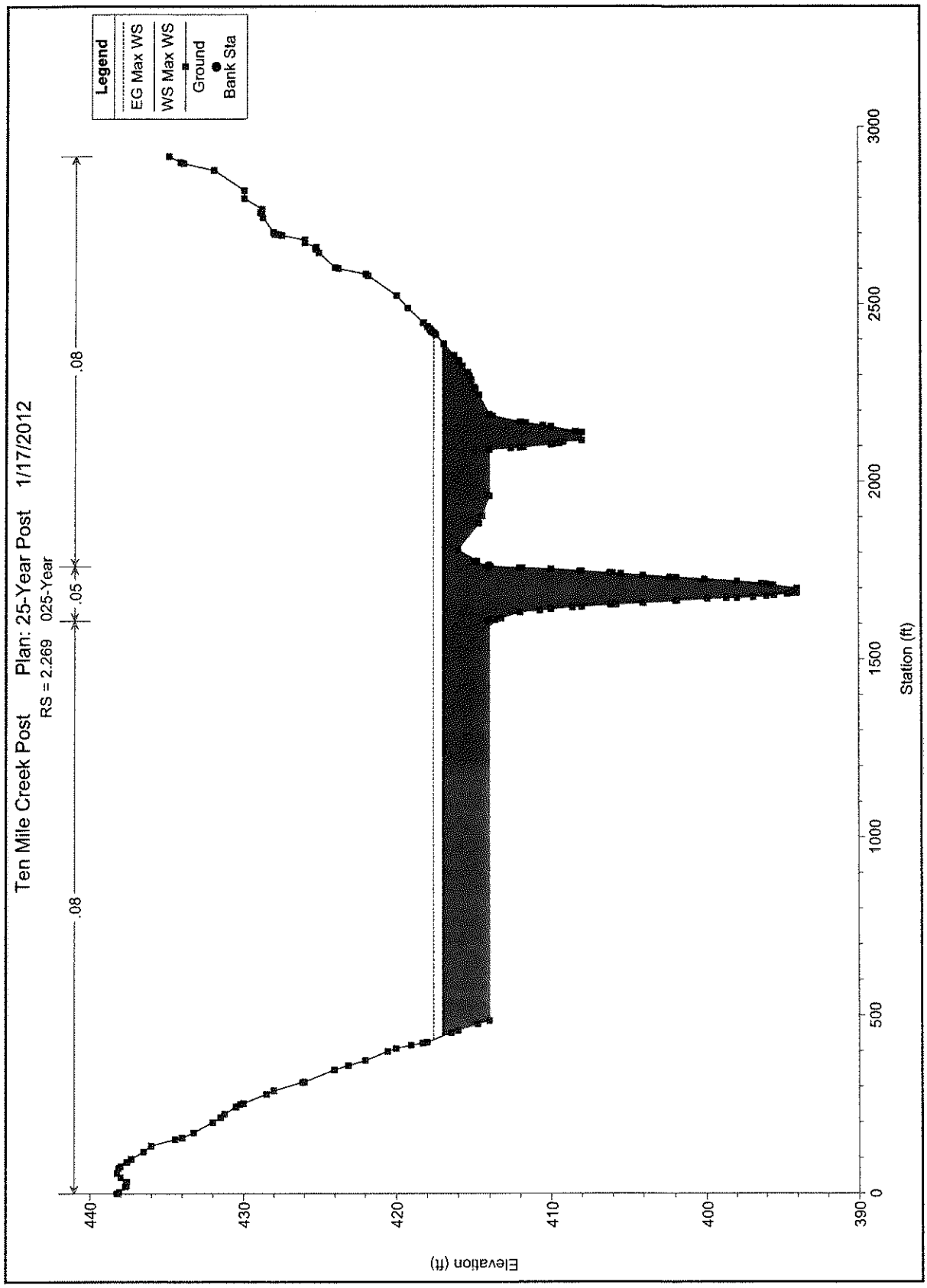
POSTDEVELOPED HEC-RAS SCHEMATIC

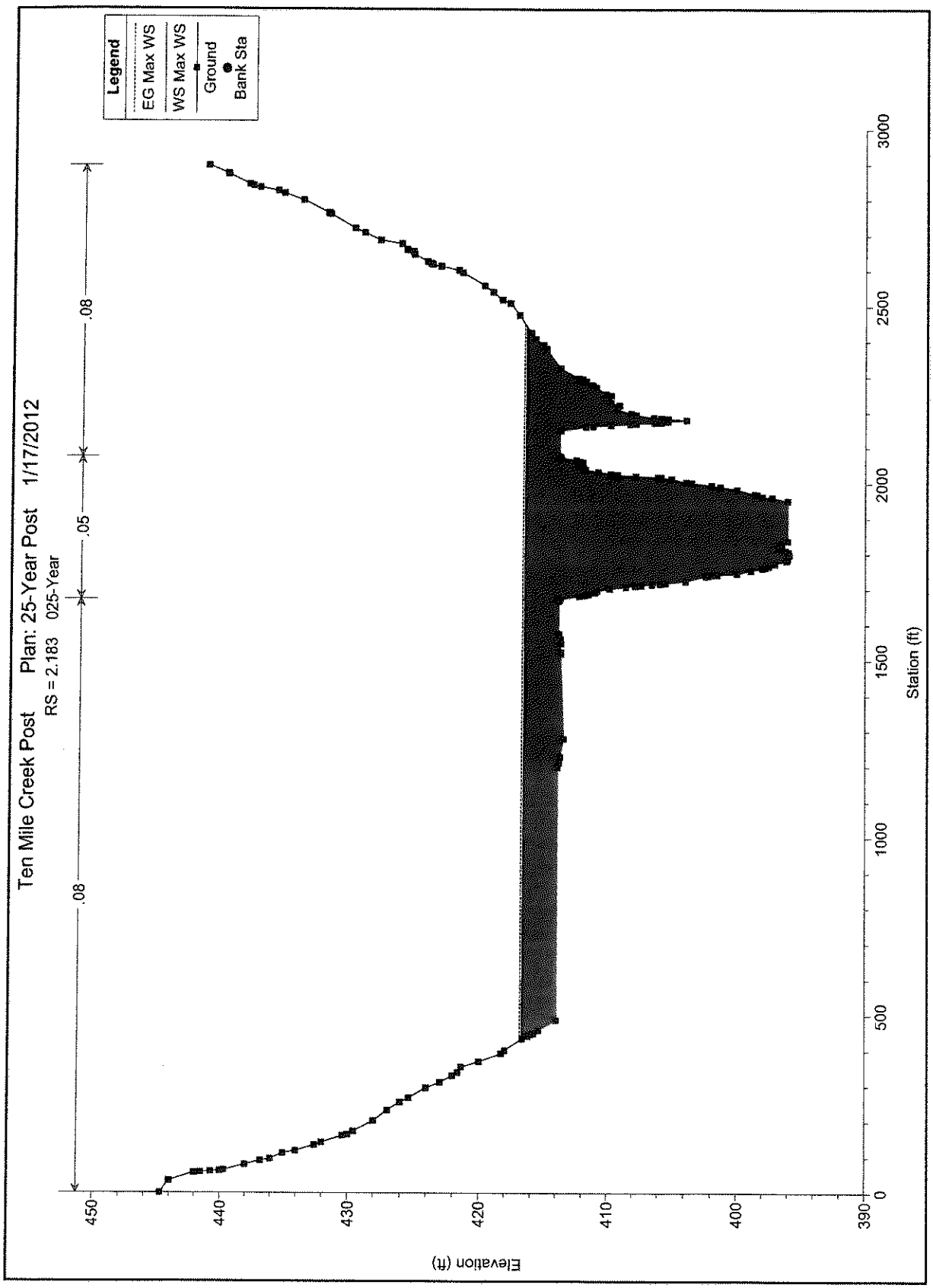

0.381
0.462
0.772
0.883
0.927
0.990
1.180
1.267
1.389
1.609
1.768
1.919
2.006
2.104
2.269
Reach 1
Ten Mile Cr

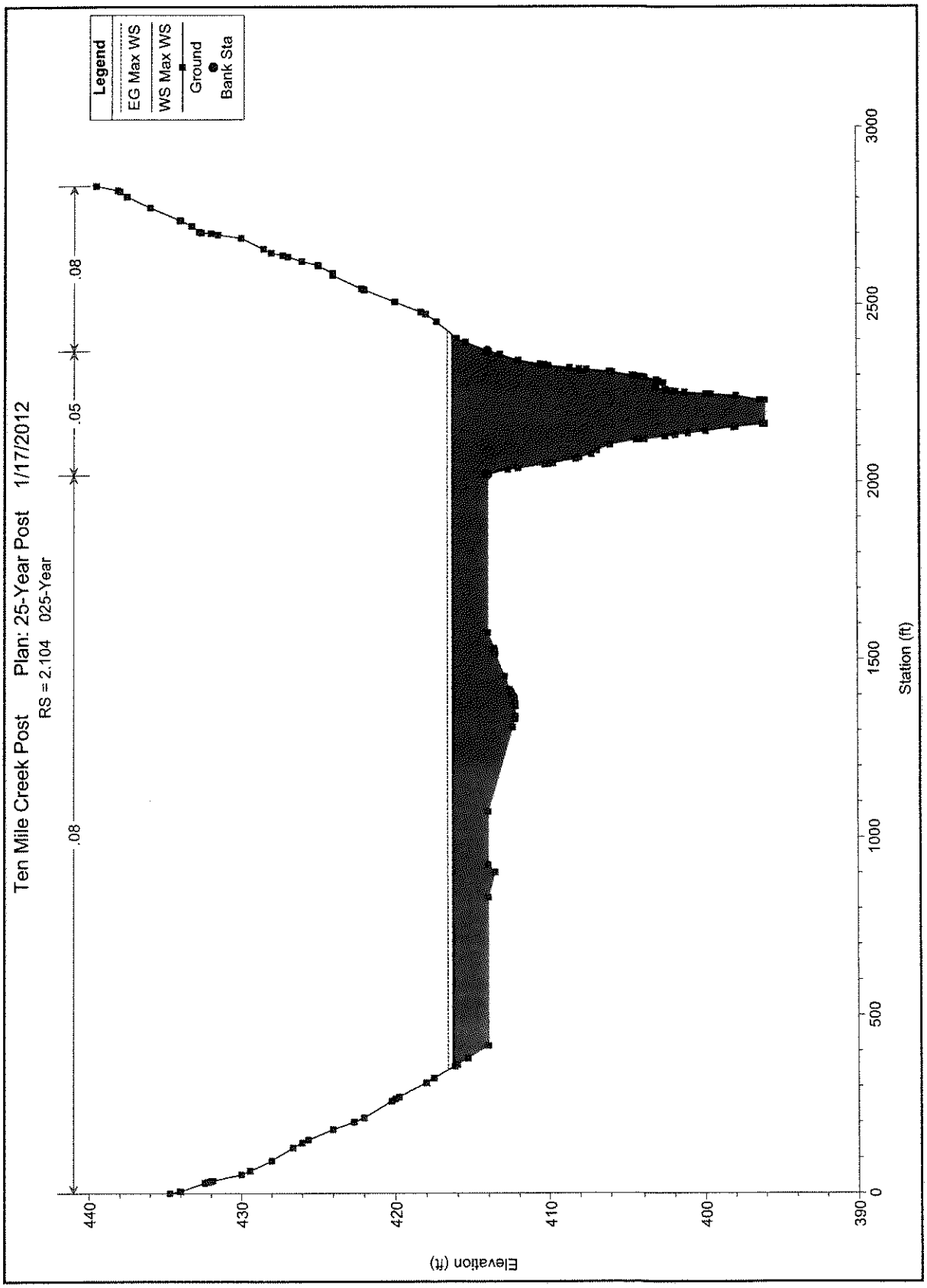
POSTDEVELOPED 25-YEAR HEC-RAS ANALYSIS

HEC-RAS Plan: 25 Year Post River: Ten Mile Cr Reach: Reach 1 Profile: Max WS

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top W dth (ft)	Froude # Chl
Reach 1	2.259	Max WS	25033.43	394.00	417.00		417.59	0.002265	7.67	7271.27	1948.96	0.37
Reach 1	2.184	Max WS	25025.74	395.68	416.68		416.64	0.000362	3.47	10988.88	2009.45	0.16
Reach 1	2.104	Max WS	25097.97	396.00	416.32		416.61	0.000931	4.79	8622.93	2061.66	0.24
Reach 1	2.050	Max WS	25096.91	394.00	416.00		416.37	0.001301	5.50	8243.38	2142.32	0.28
Reach 1	2.005	Max WS	25095.24	394.00	415.75		416.05	0.001398	5.58	9310.96	2253.71	0.29
Reach 1	1.956	Max WS	25092.90	394.00	415.37		415.70	0.001983	6.25	8739.02	2293.98	0.34
Reach 1	1.918	Max WS	25093.38	394.00	414.85		415.13	0.002525	6.05	9014.53	2900.08	0.37
Reach 1	1.872	Max WS	25071.87	394.00	414.30		414.69	0.001892	5.80	8946.38	2755.59	0.34
Reach 1	1.756	Max WS	25070.42	392.00	413.65		413.94	0.002000	5.54	8811.77	2553.30	0.33
Reach 1	1.725	Max WS	25140.83	394.00	413.22		413.50	0.002245	6.01	8940.07	2385.73	0.35
Reach 1	1.605	Max WS	25170.25	394.00	411.57		412.06	0.003017	6.90	6997.06	2042.89	0.41
Reach 1	1.532	Max WS	25165.50	393.95	410.92		411.12	0.000977	4.24	10260.54	2262.12	0.24
Reach 1	1.441	Max WS	25134.41	392.00	410.00		410.67	0.002788	7.98	6670.39	1967.27	0.41
Reach 1	1.329	Max WS	25130.21	389.35	409.31		409.95	0.002523	7.68	6695.84	1898.22	0.39
Reach 1	1.350	Max WS	25122.76	388.00	409.15		409.41	0.000874	4.68	9818.65	2433.69	0.23
Reach 1	1.347	Max WS	25118.50	388.00	408.67		408.94	0.001689	6.08	10157.90	2646.20	0.31
Reach 1	1.249	Max WS	25113.05	388.00	408.37		408.61	0.001295	5.74	11185.20	2797.85	0.28
Reach 1	1.188	Max WS	25064.35	388.00	408.19		408.35	0.000700	4.40	13143.12	2831.86	0.21
Reach 1	1.119	Max WS	25063.40	388.00	407.97		408.15	0.000569	4.30	12858.68	2774.35	0.19
Reach 1	0.996	Max WS	25062.64	388.00	407.45		407.64	0.001072	4.70	11250.72	2690.86	0.25
Reach 1	0.947	Max WS	25068.31	388.00	407.15		407.37	0.001696	5.43	10245.20	2656.62	0.31
Reach 1	0.927	Max WS	25066.37	388.00	406.58		407.38	0.003254	8.79	5811.94	1976.79	0.44
Reach 1	0.885	Max WS	25062.21	388.00	406.30		406.51	0.001875	5.33	8924.66	1891.10	0.32
Reach 1	0.824	Max WS	25140.13	388.77	405.23		405.51	0.001670	5.40	8748.98	1987.37	0.31
Reach 1	0.793	Max WS	25139.22	388.00	404.77		405.12	0.003024	6.26	7719.69	2123.07	0.40
Reach 1	0.462	Max WS	25111.08	380.00	403.10		403.24	0.000331	3.28	12113.21	2688.91	0.15
Reach 1	0.361	Max WS	25184.35	380.00	402.80	396.85	402.97	0.001009	4.27	12018.90	3486.73	0.24


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 2.269 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 2.183 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000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RS = 2.104 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
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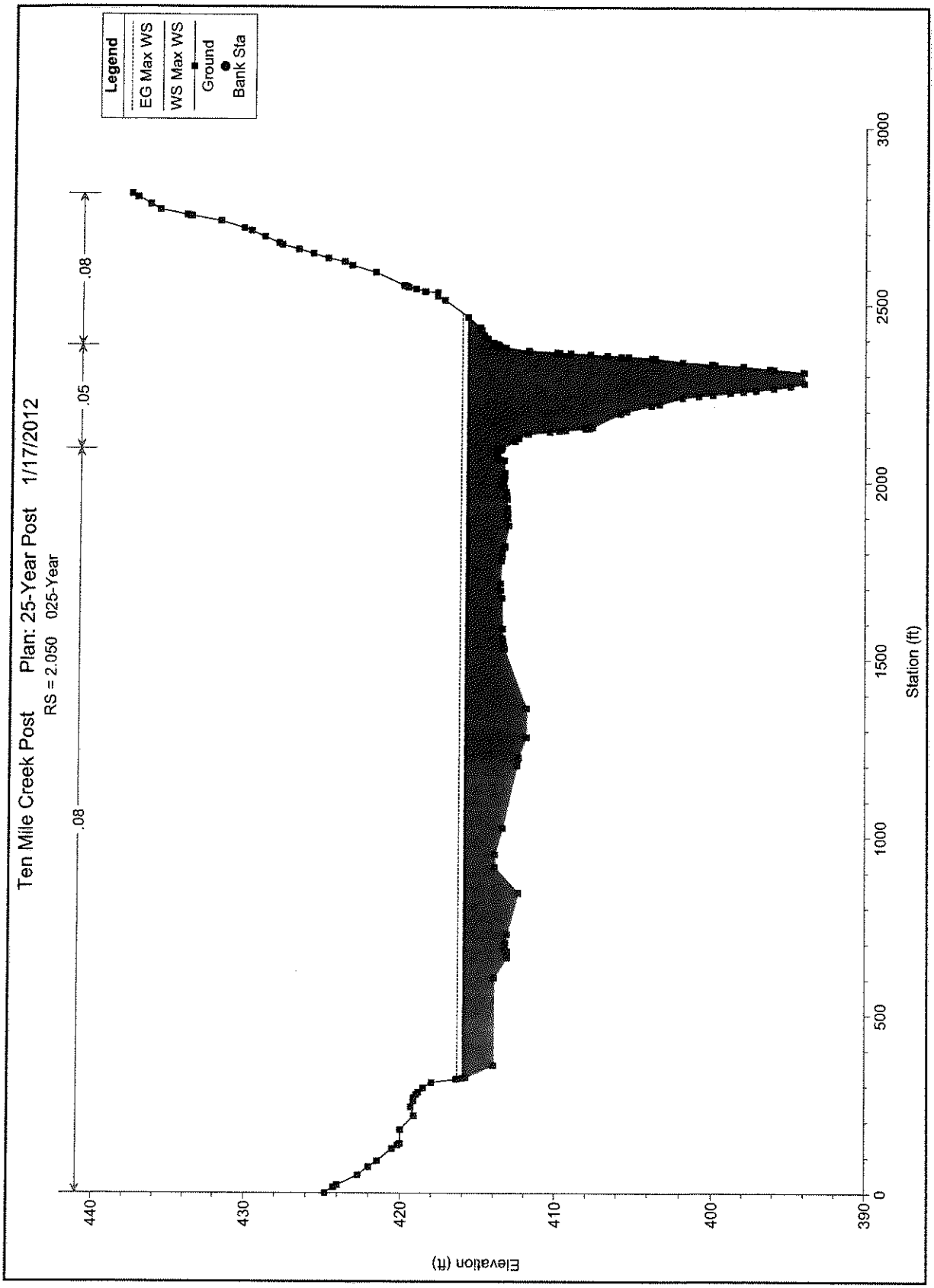
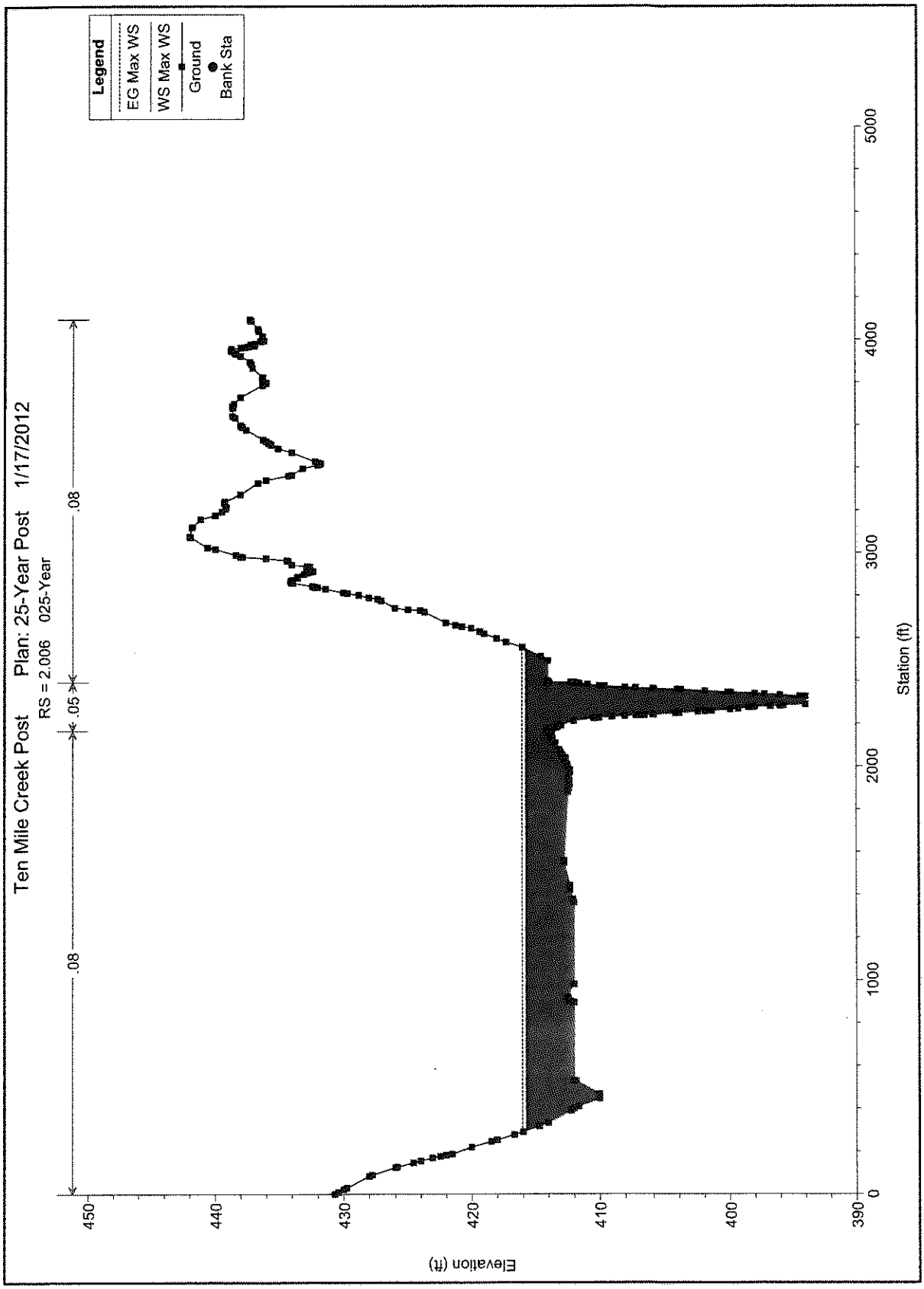
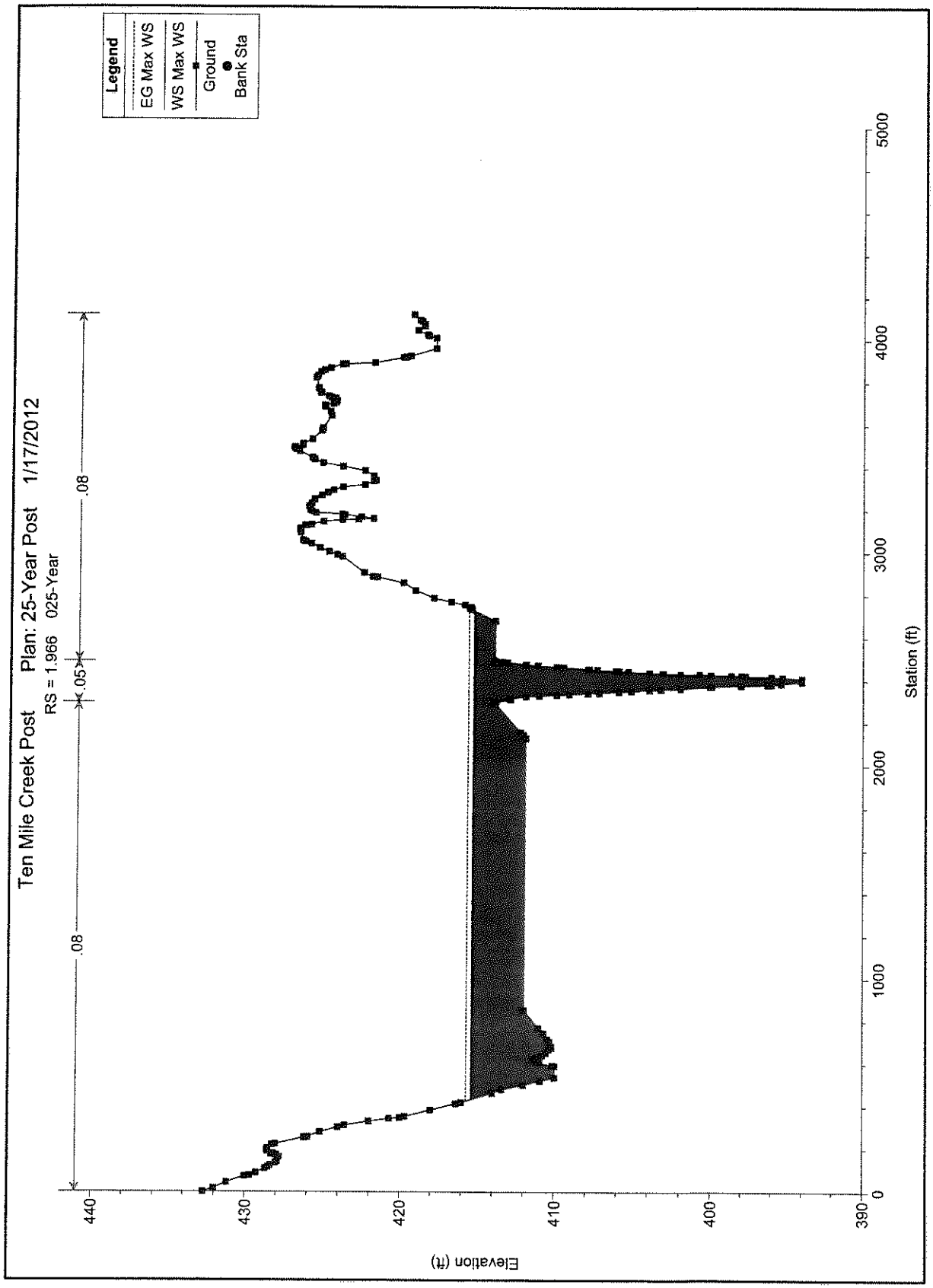
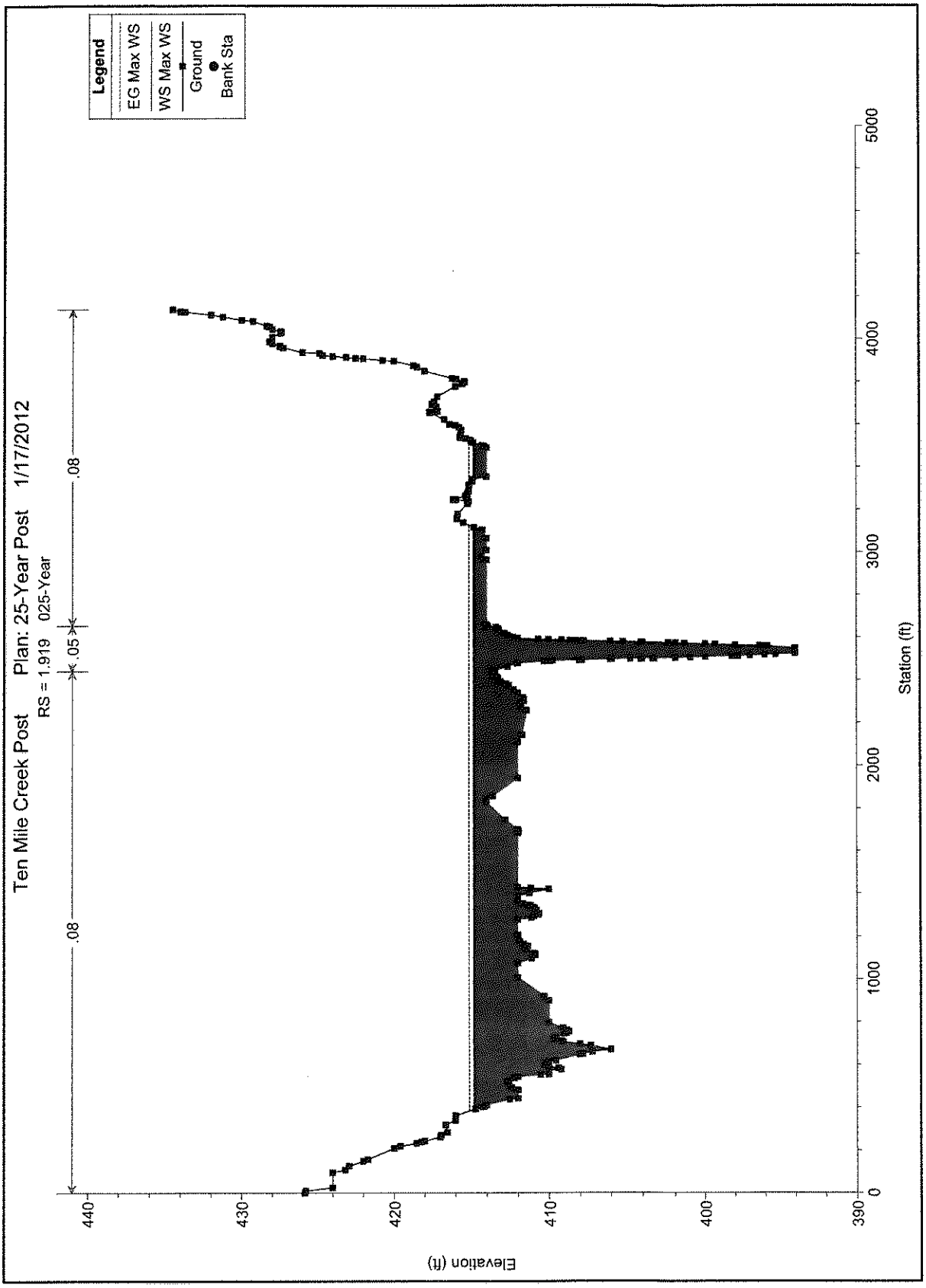
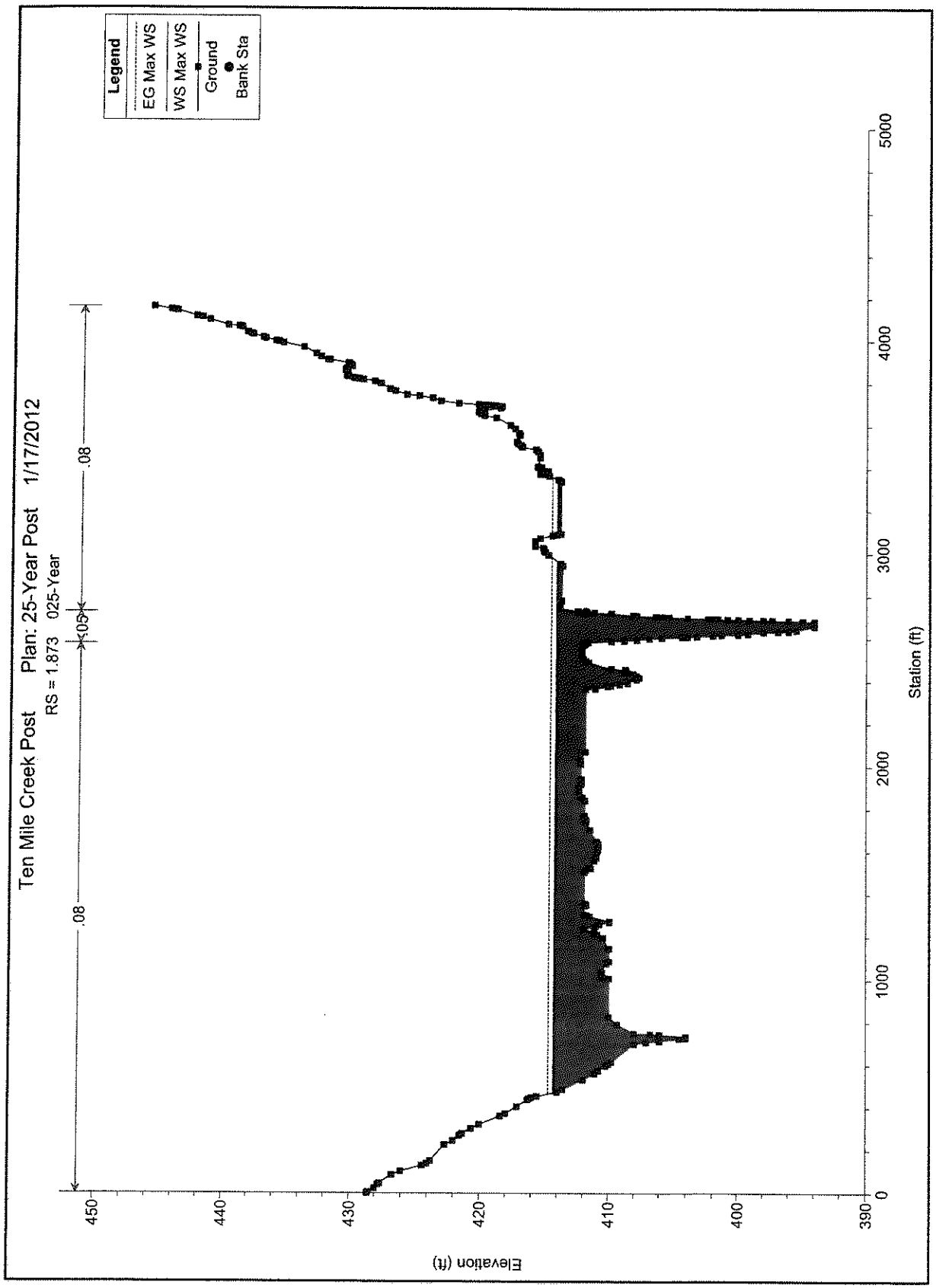
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
Station (ft)

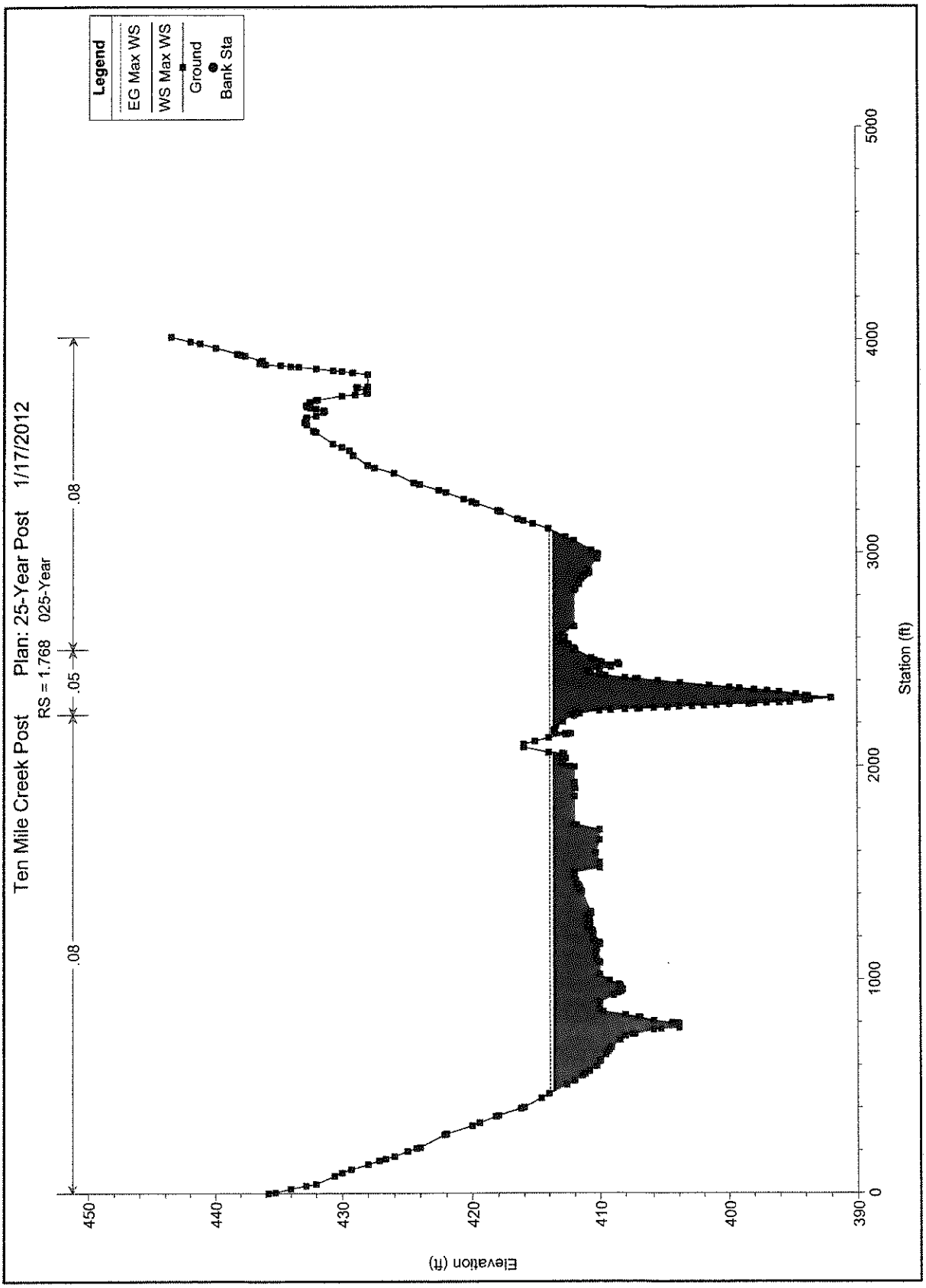

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 2.050 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000

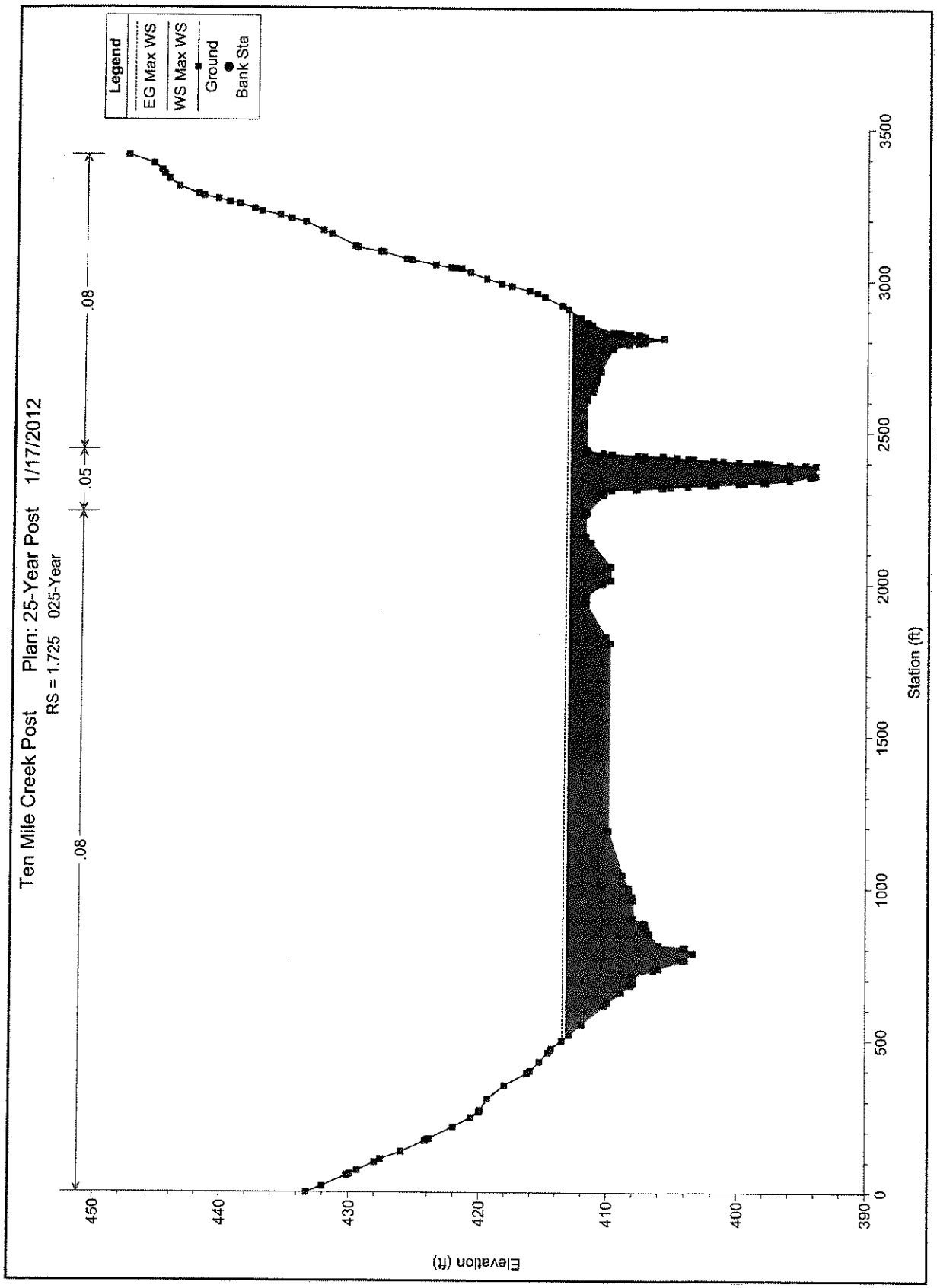

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 2.006 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
1000
2000
3000
4000
5000

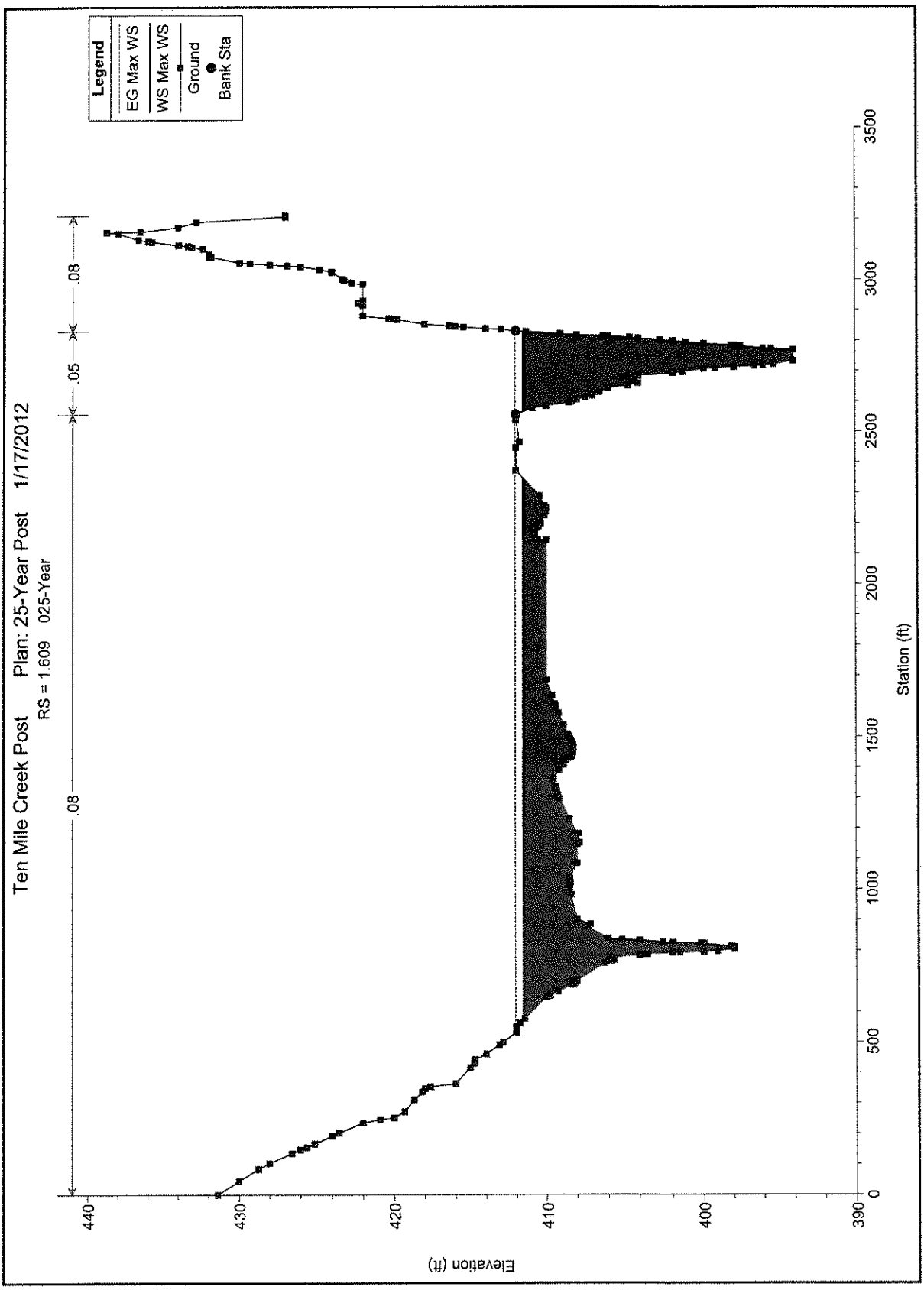

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.966 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
440
430
420
410
400
390
0
1000
2000
3000
4000
5000
Station (ft)


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.919 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
1000
2000
3000
4000
5000


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.873 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
Station (ft)
0
1000
2000
3000
4000
5000


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.768 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
0
1000
2000
3000
4000
5000
Station (ft)


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.725 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.609 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
440
430
420
410
400
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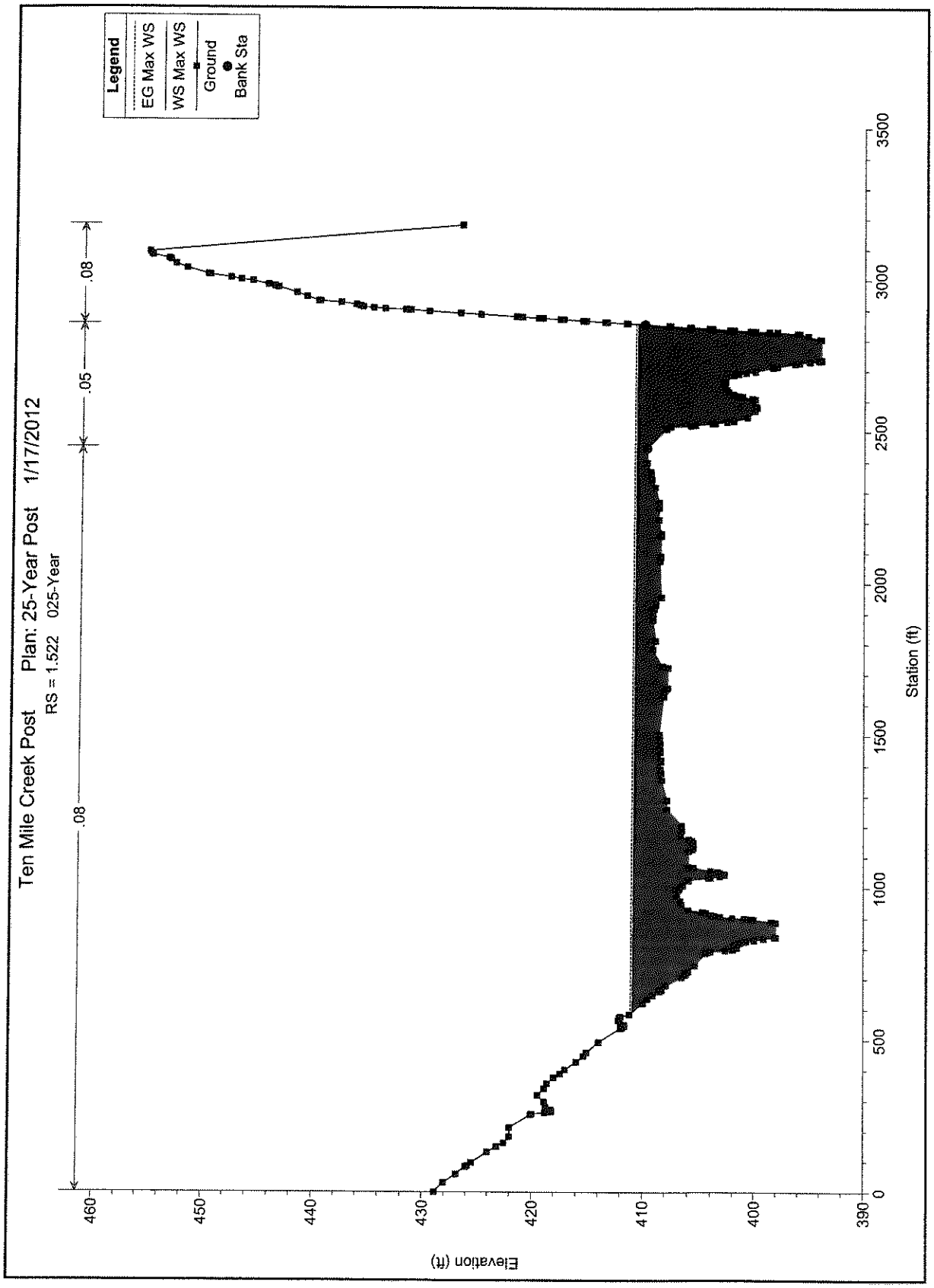
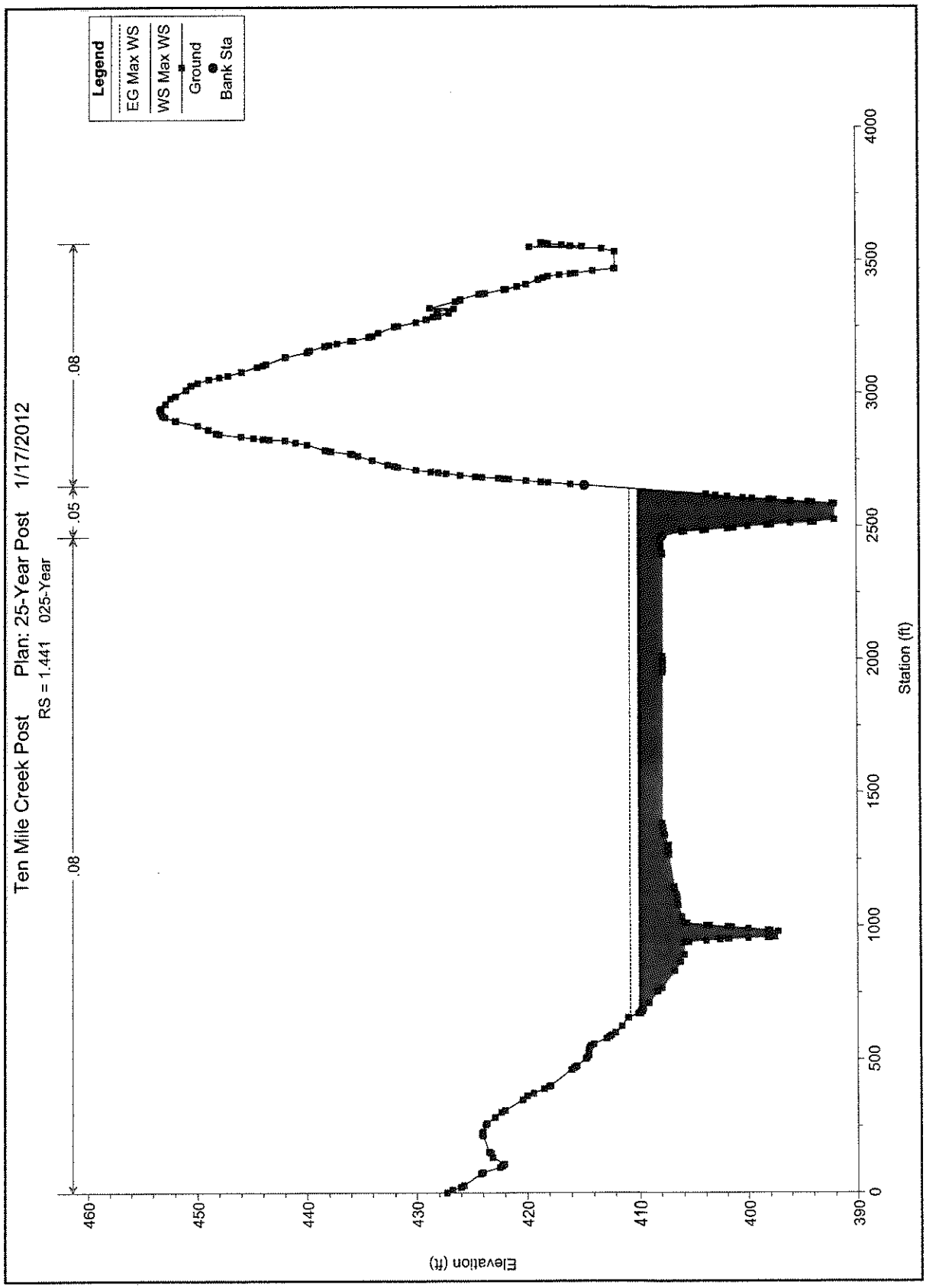
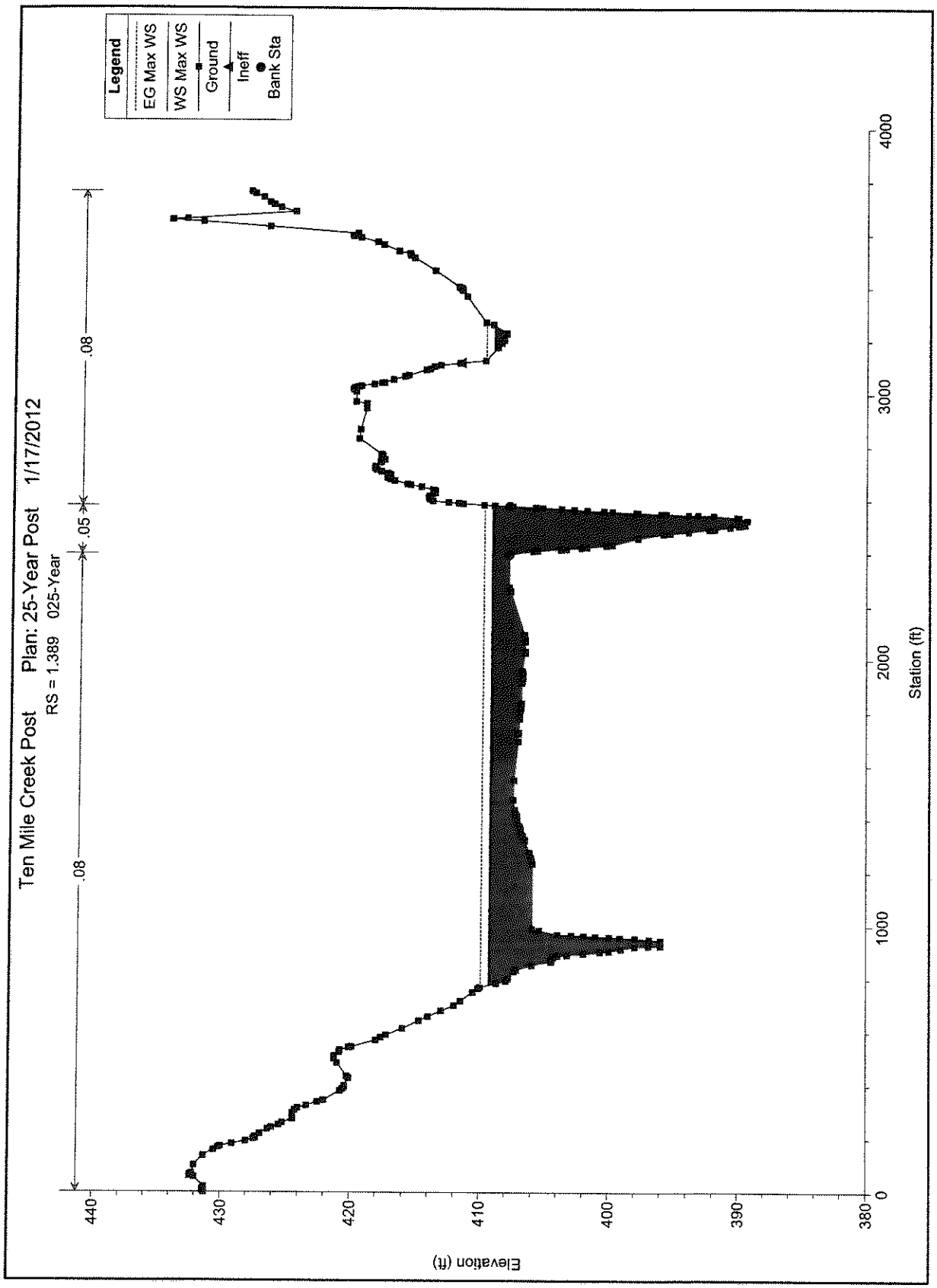
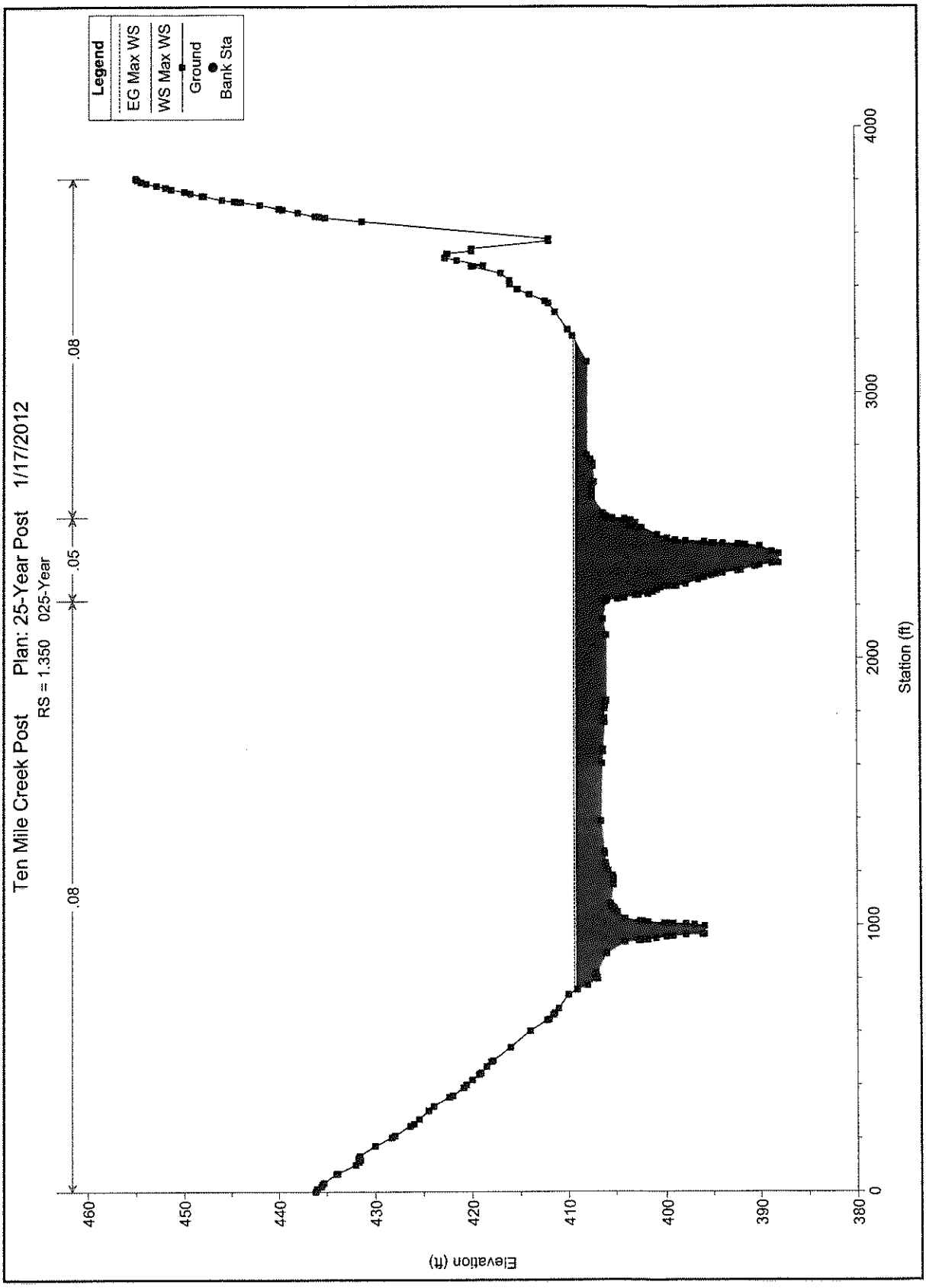
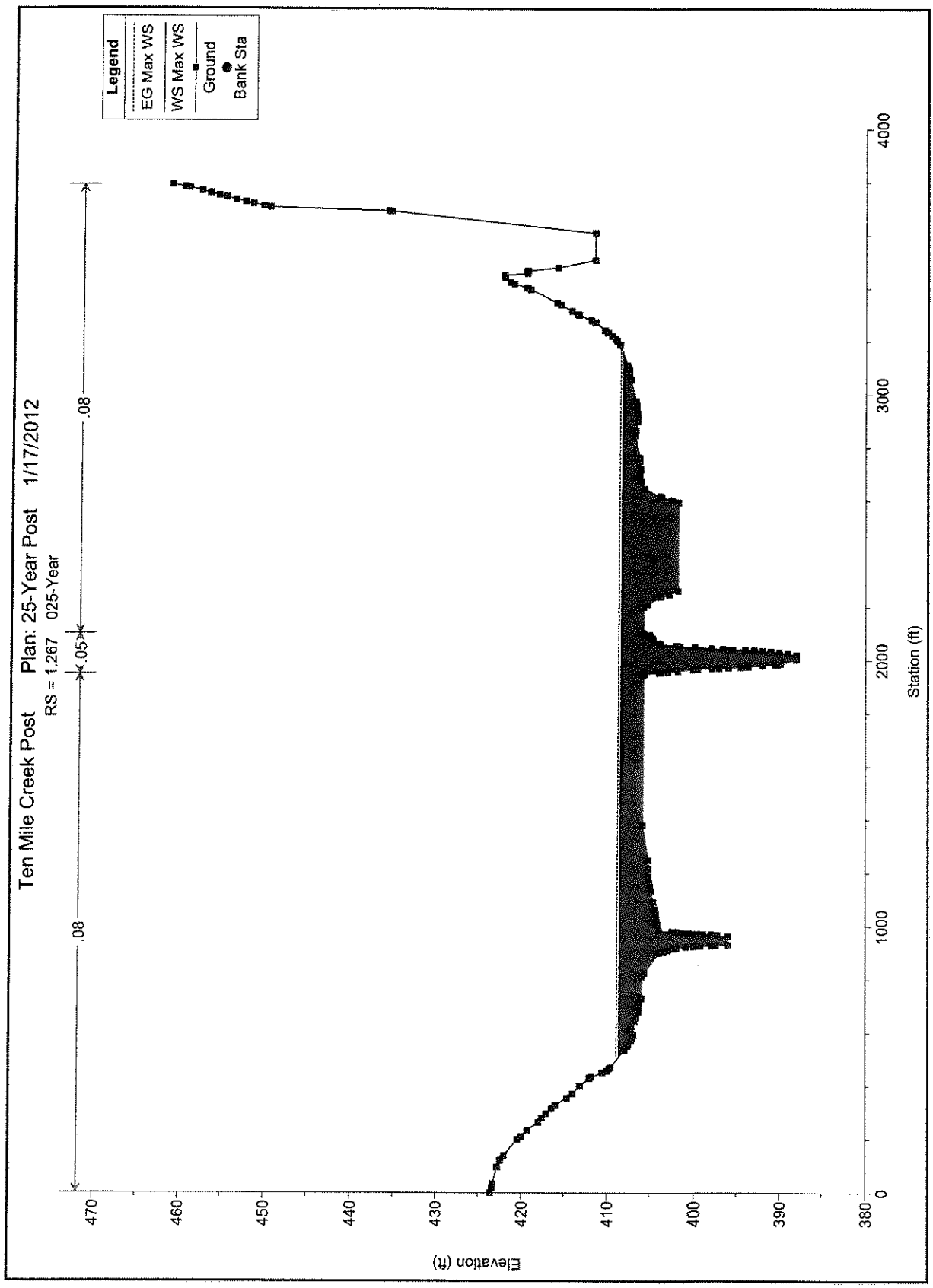
0
500
1000
1500
2000
2500
3000
3500
Station (ft)

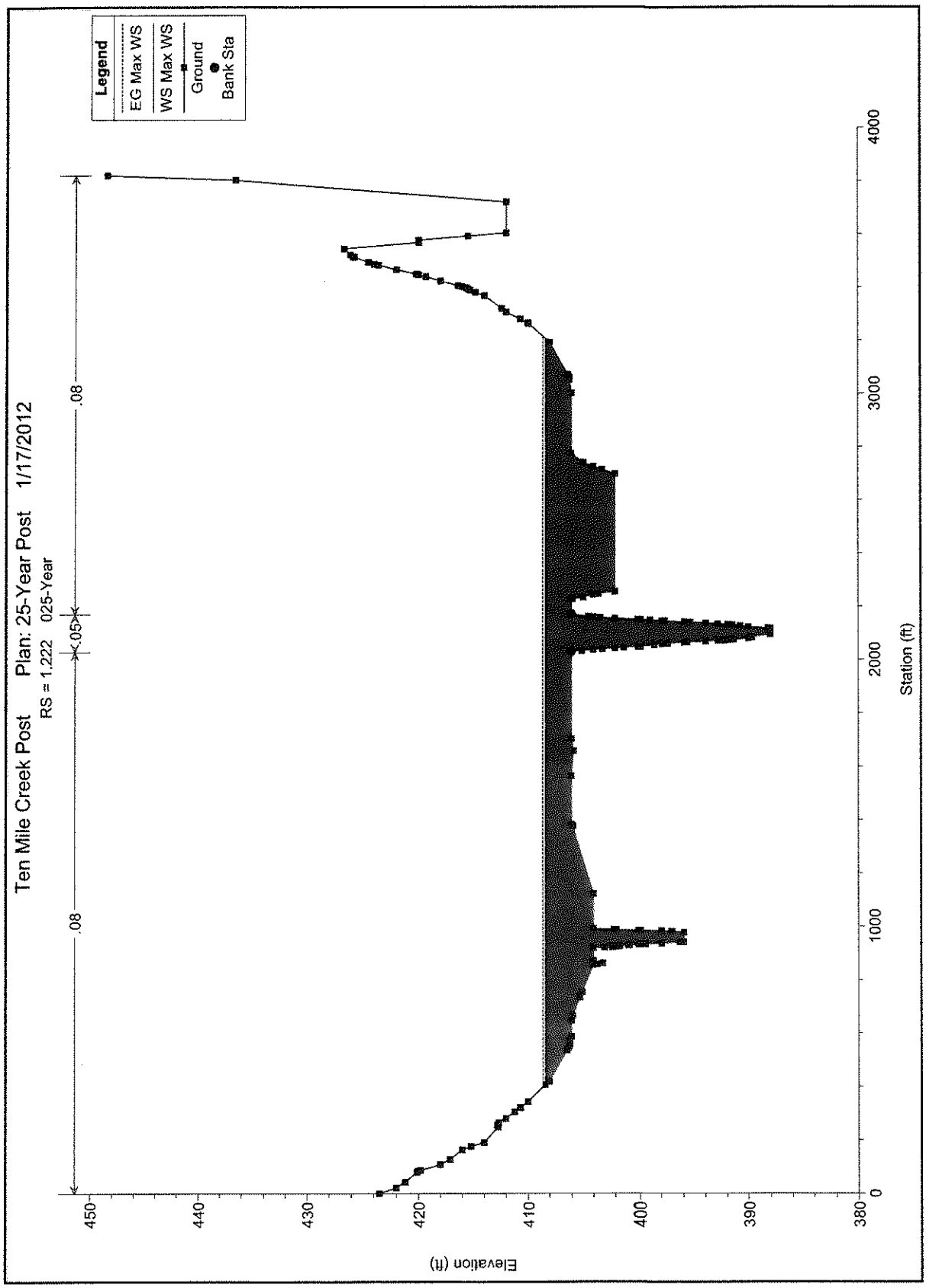

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.522 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500
Station (ft)

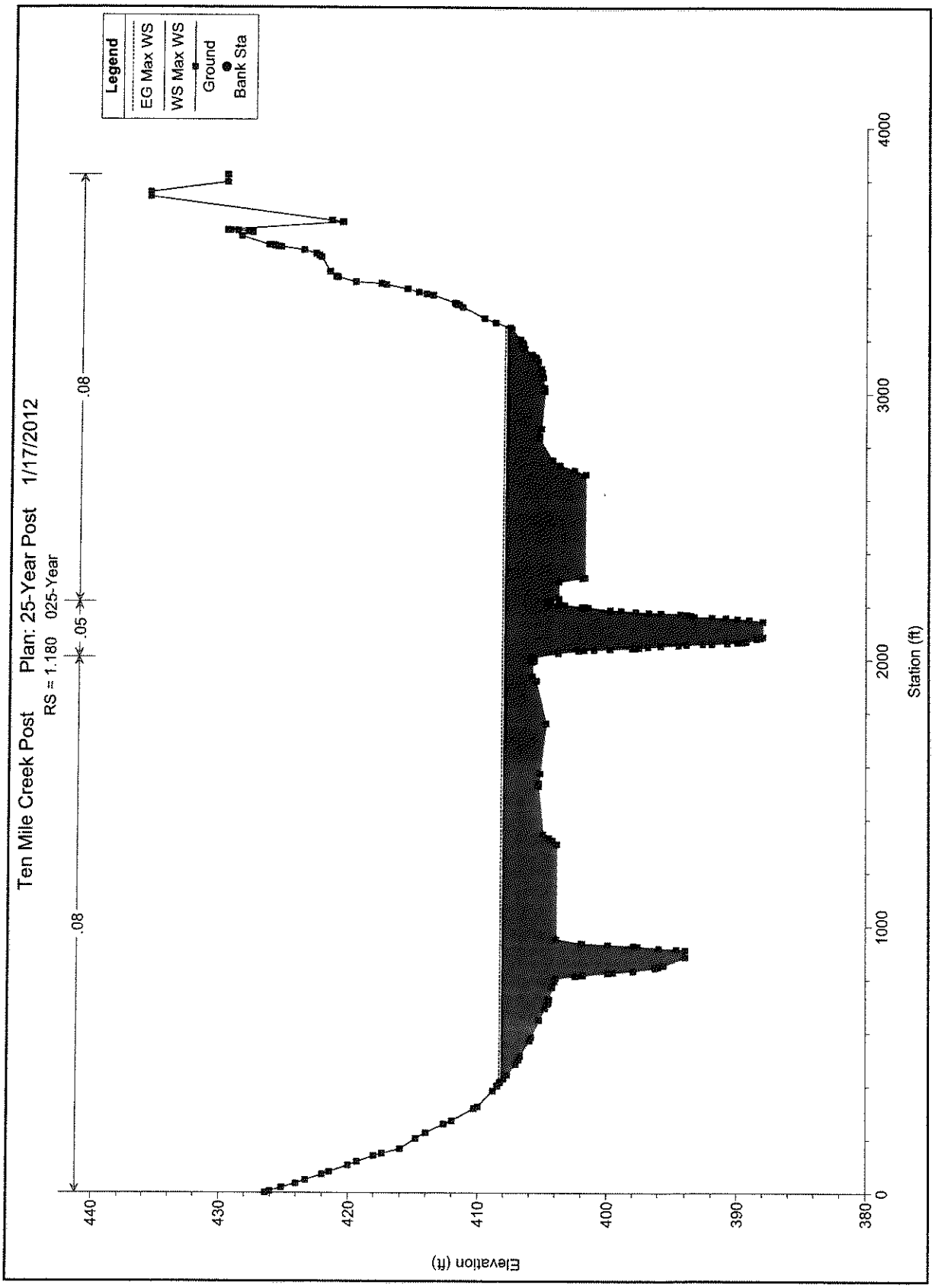

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.441 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500
4000
Station (ft)

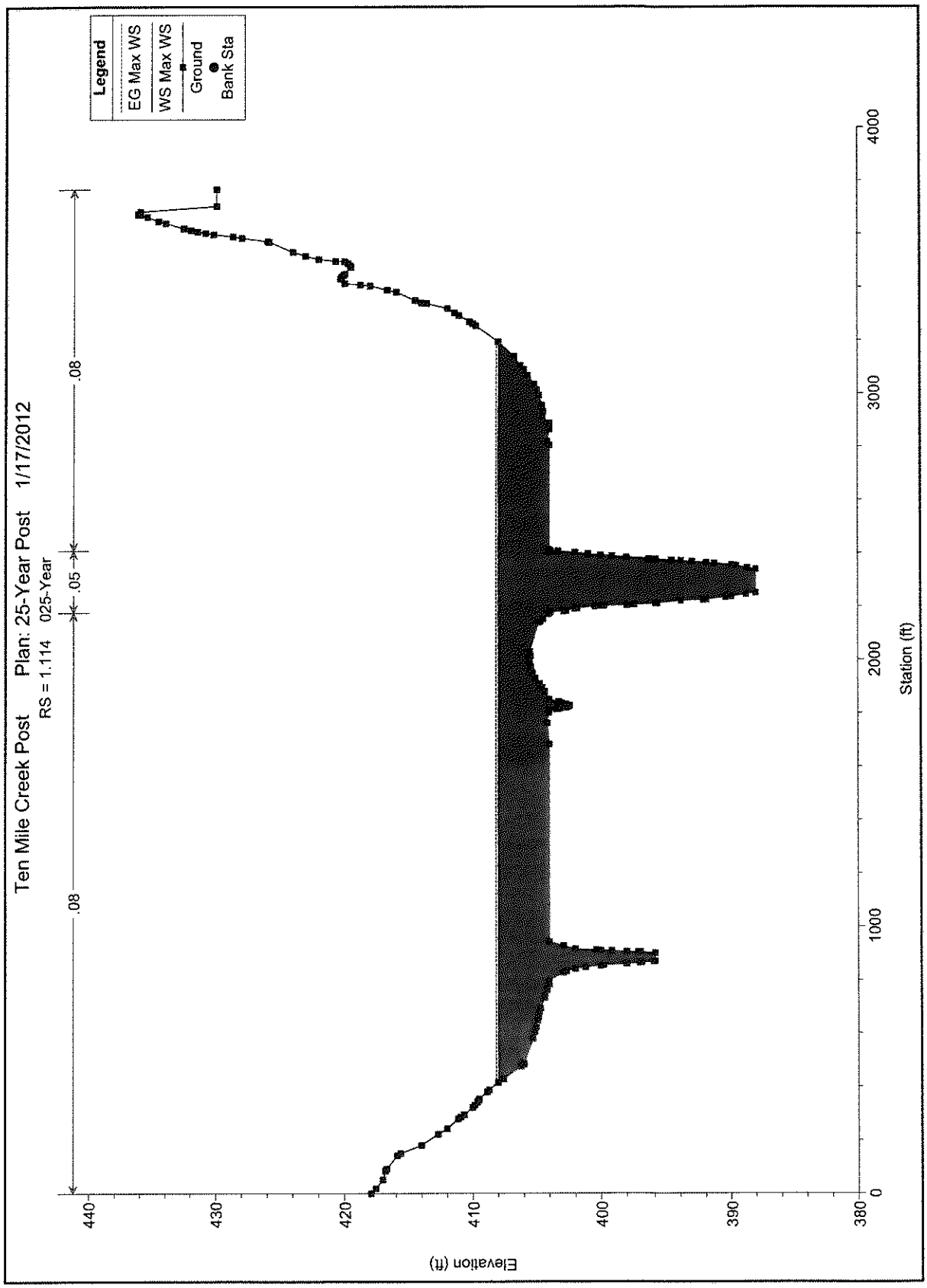

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.389 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000

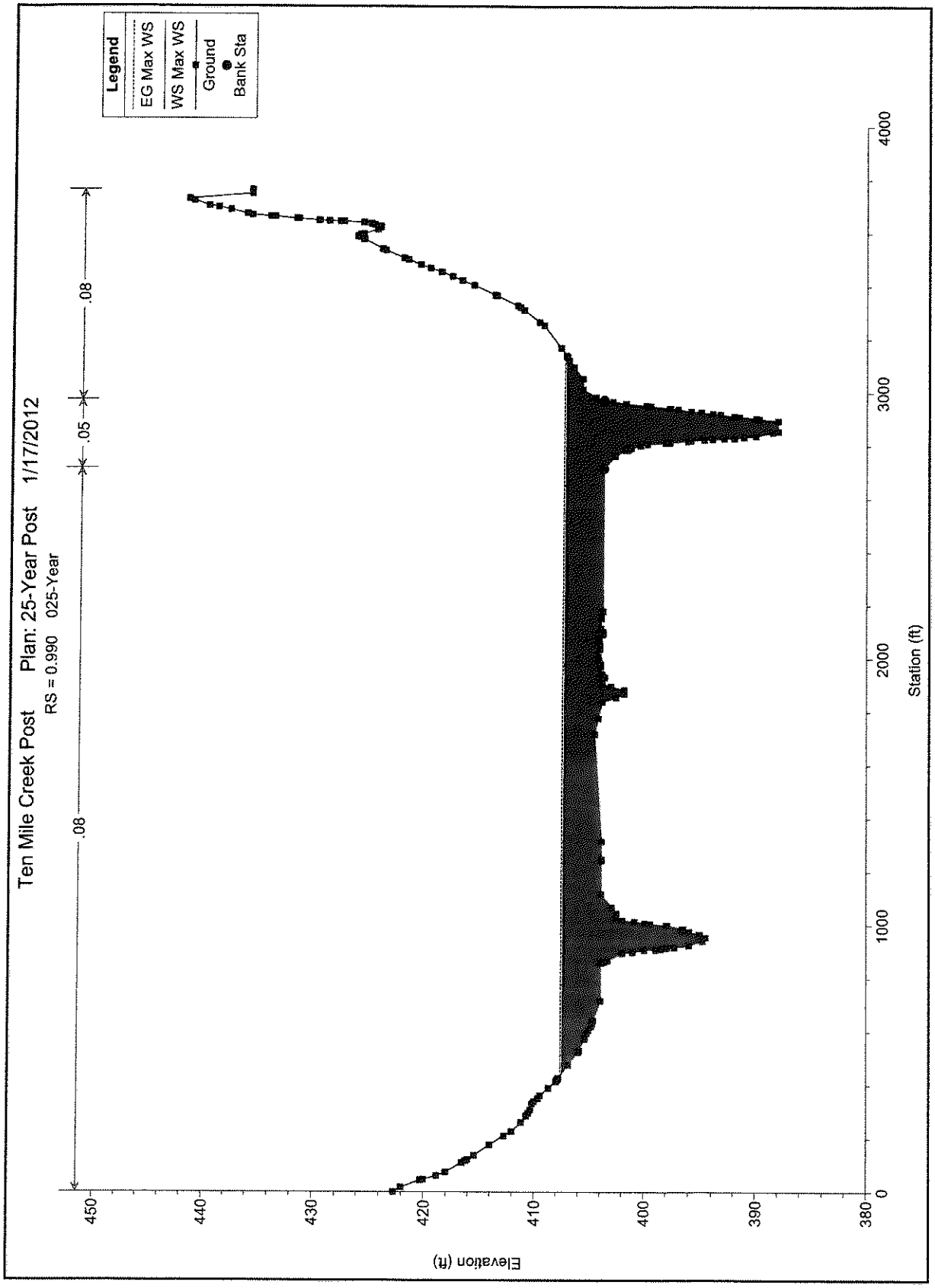

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.350 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

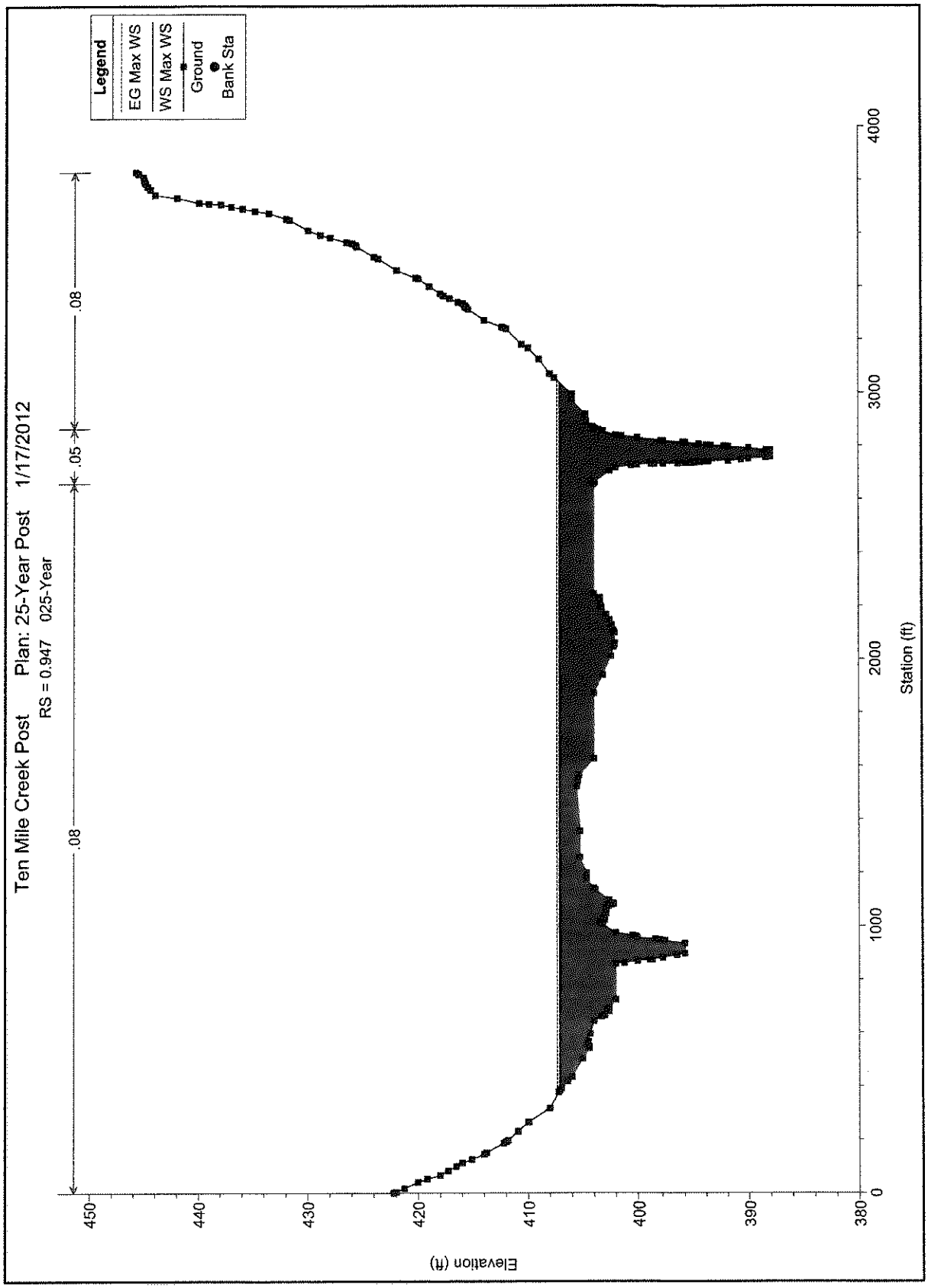

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.267 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
470
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

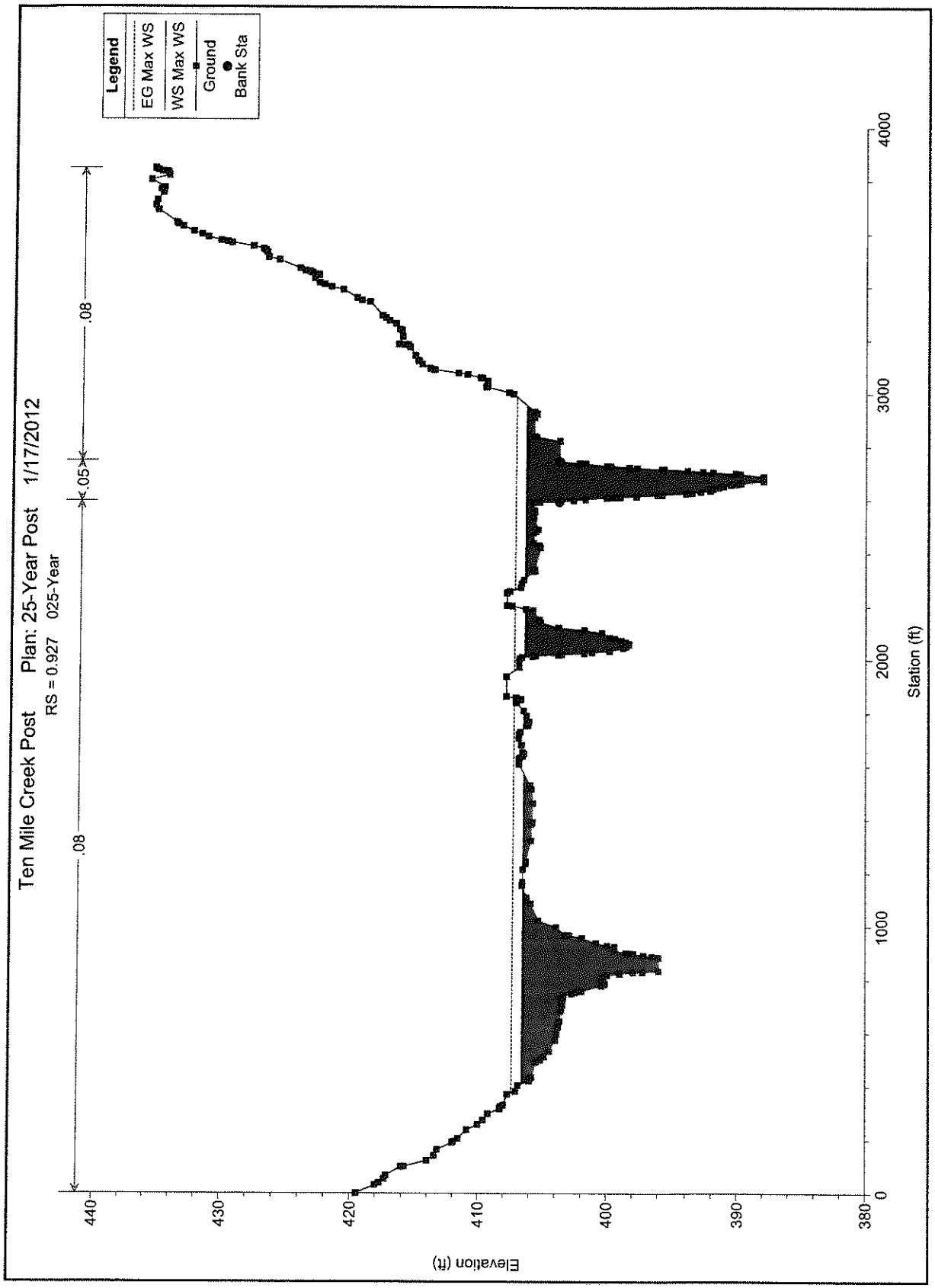

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.222 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000

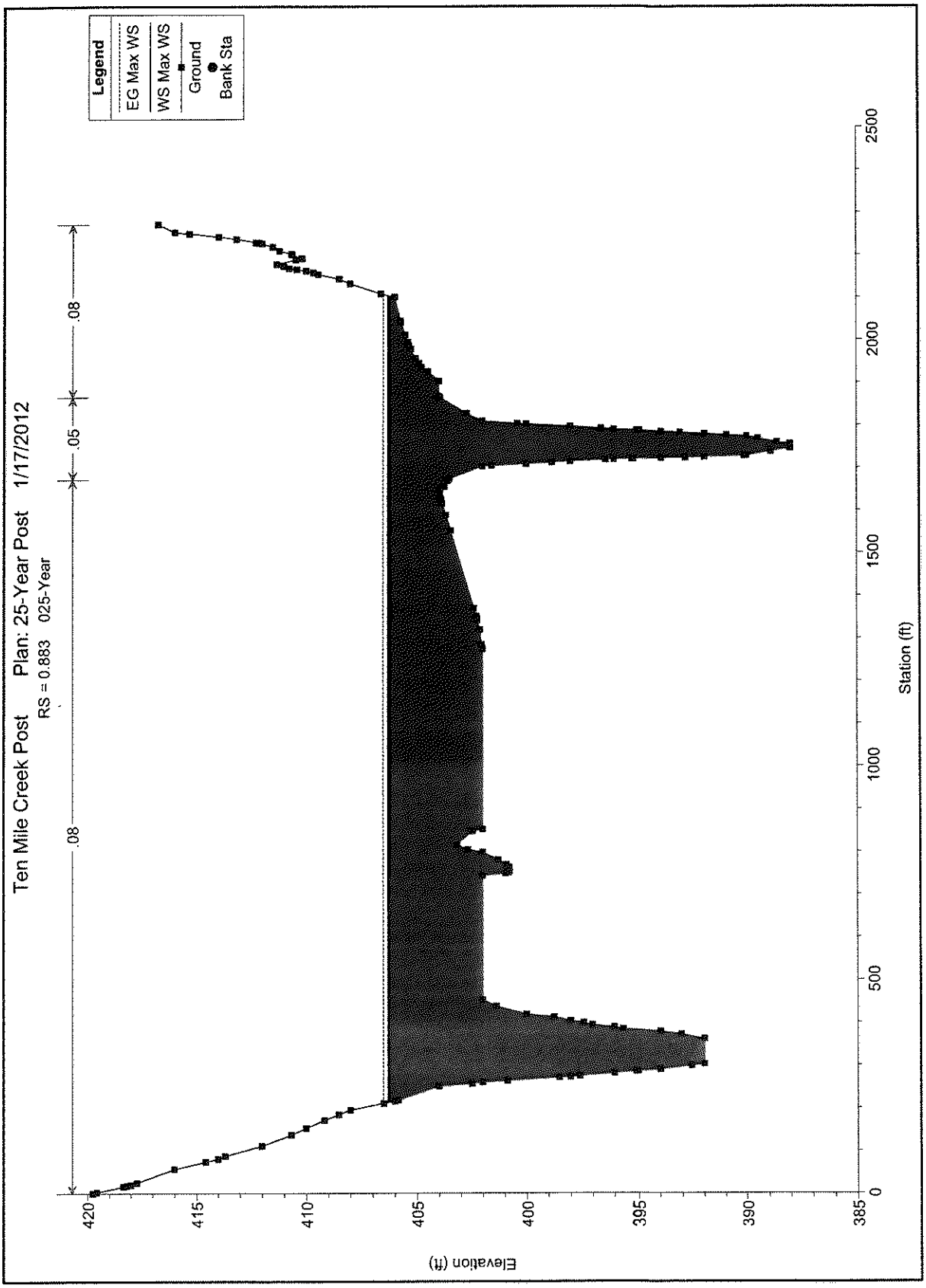

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.180 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000

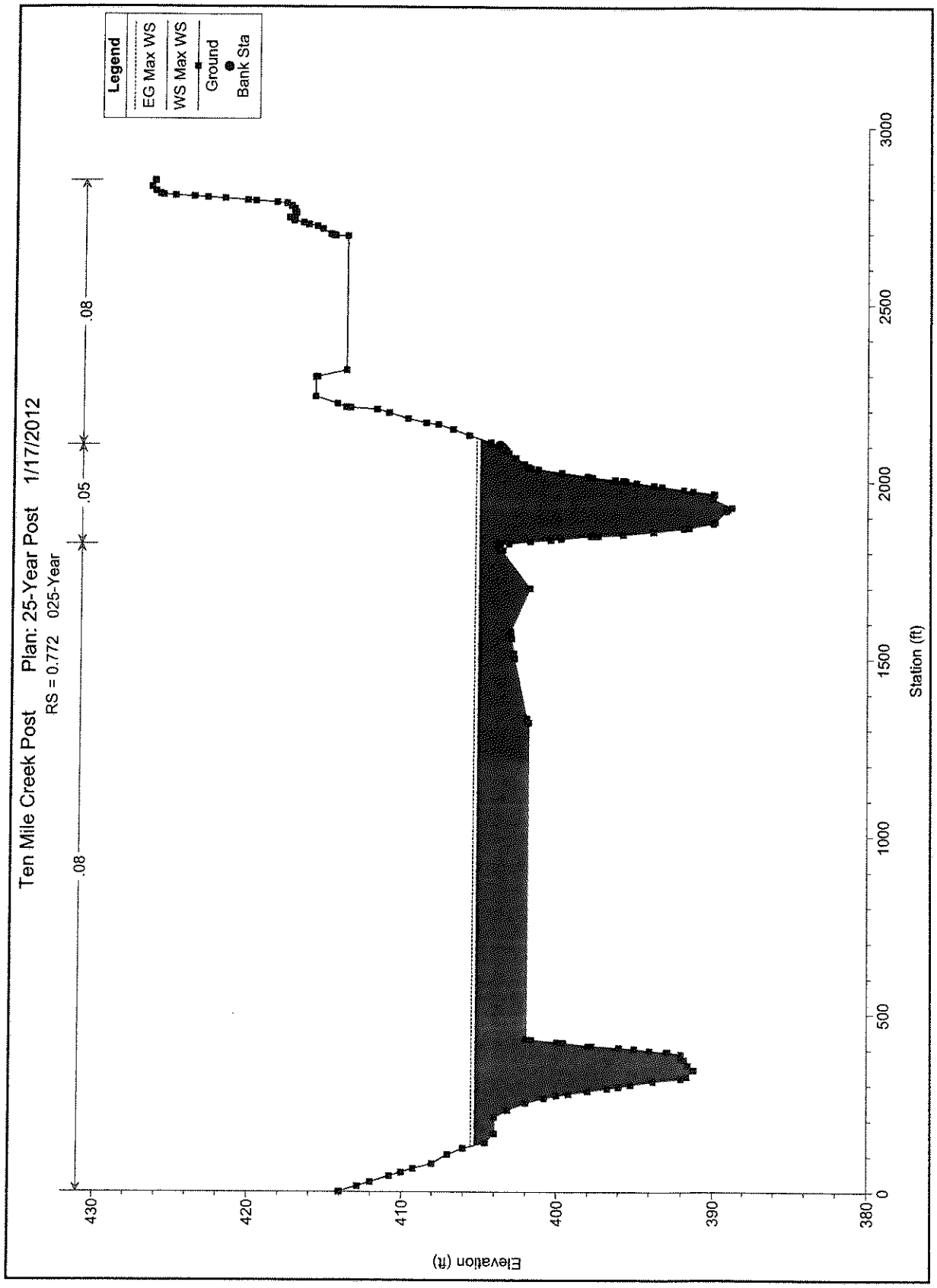

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 1.114 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000

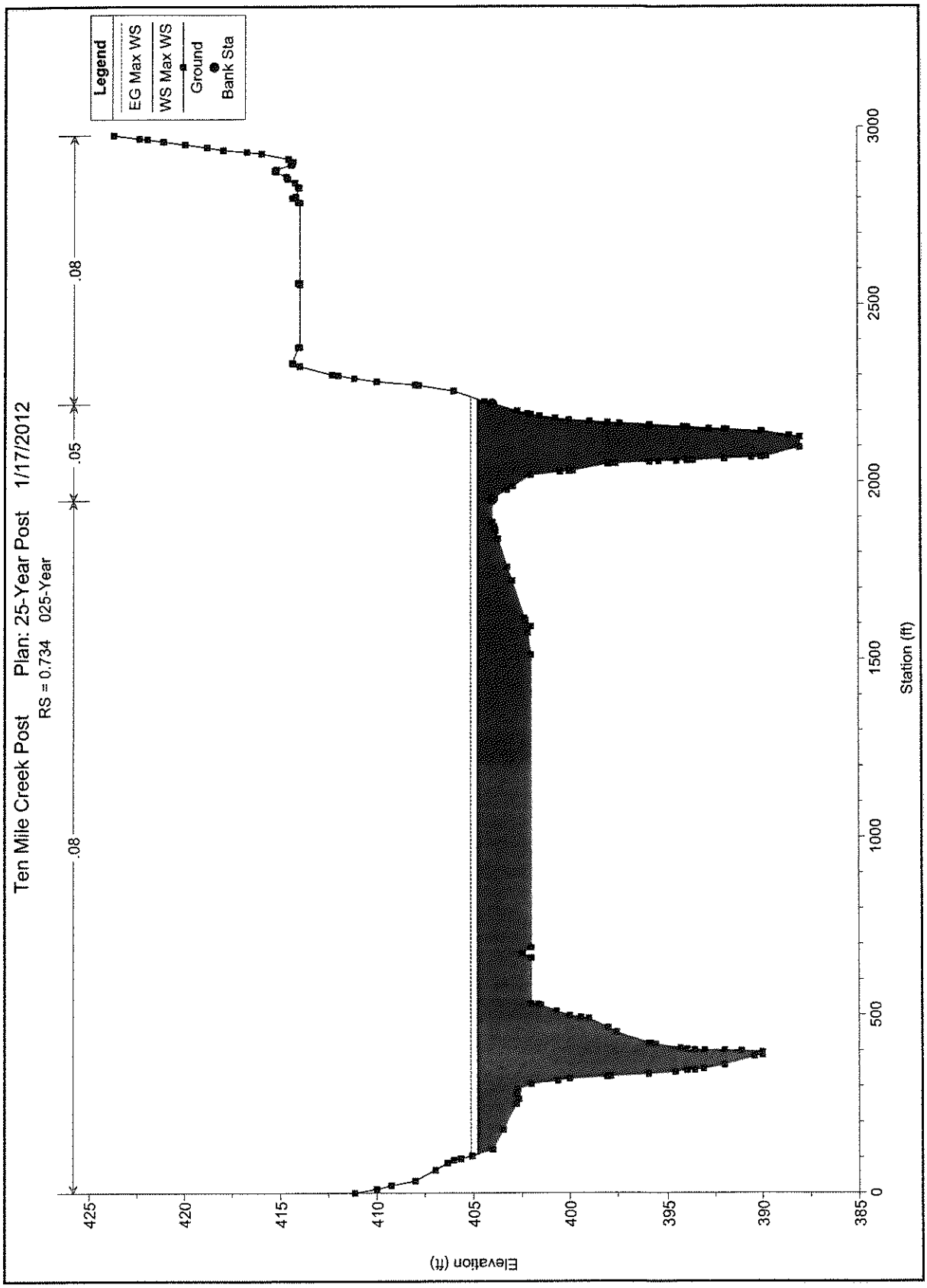

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 0.990 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

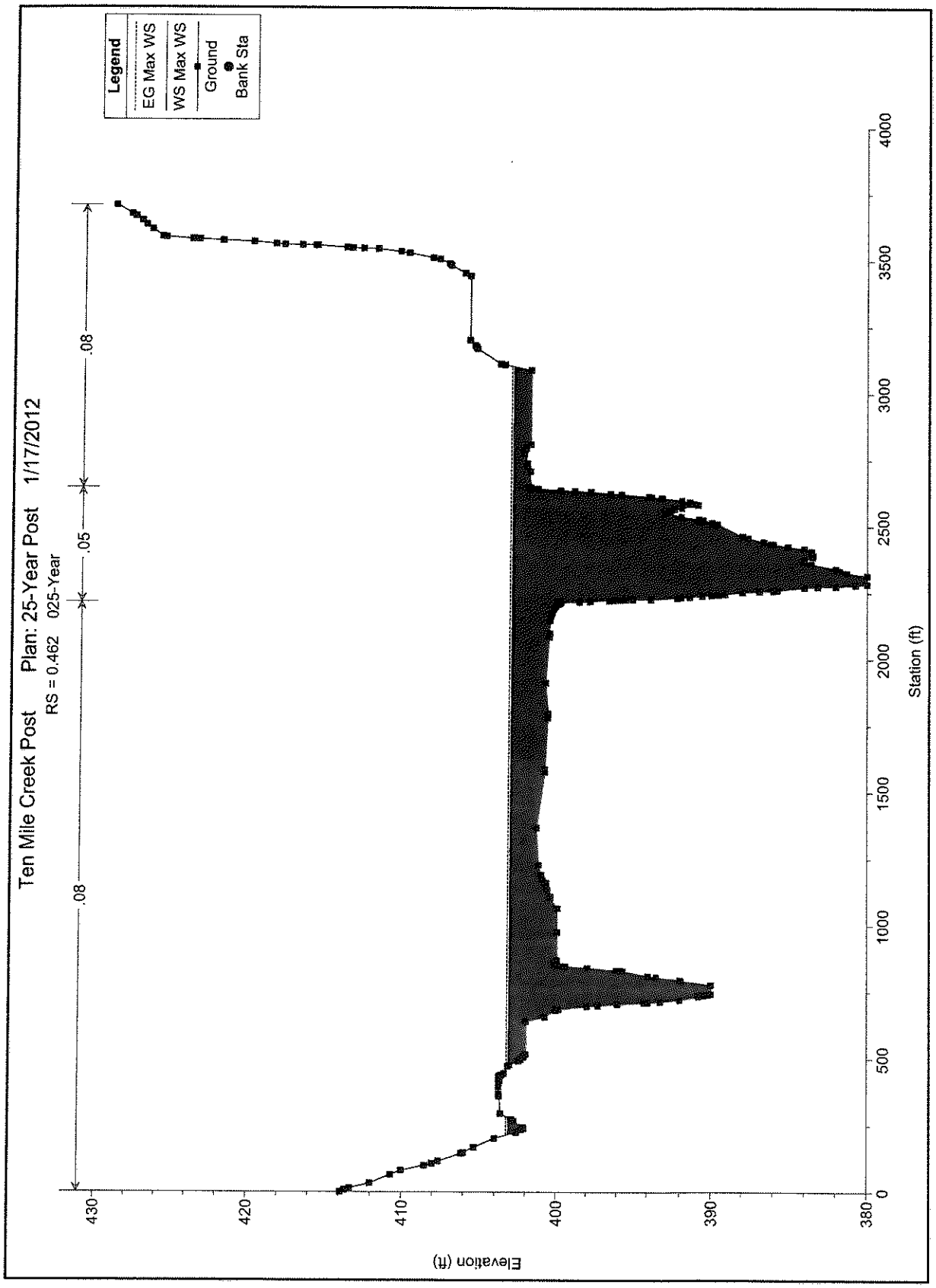

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 0.947 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000

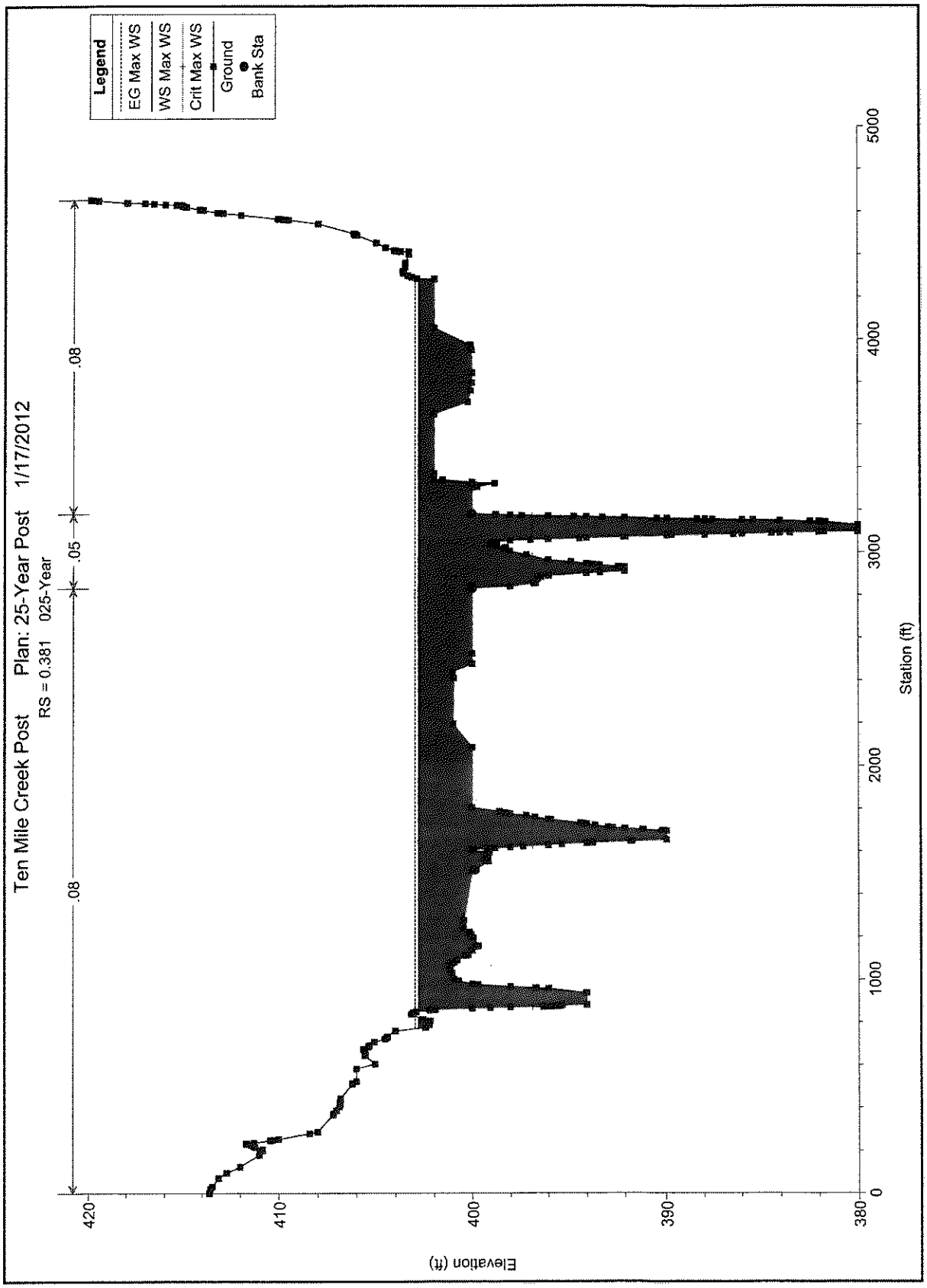

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 0.927 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 0.883 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
420
415
410
405
400
395
390
385
0
500
1000
1500
2000
2500


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 0.772 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
430
420
410
400
390
380
0
500
1000
1500
2000
2500
3000


Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 0.734 025-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
425
420
415
410
405
400
395
390
385
0
500
1000
1500
2000
2500
3000

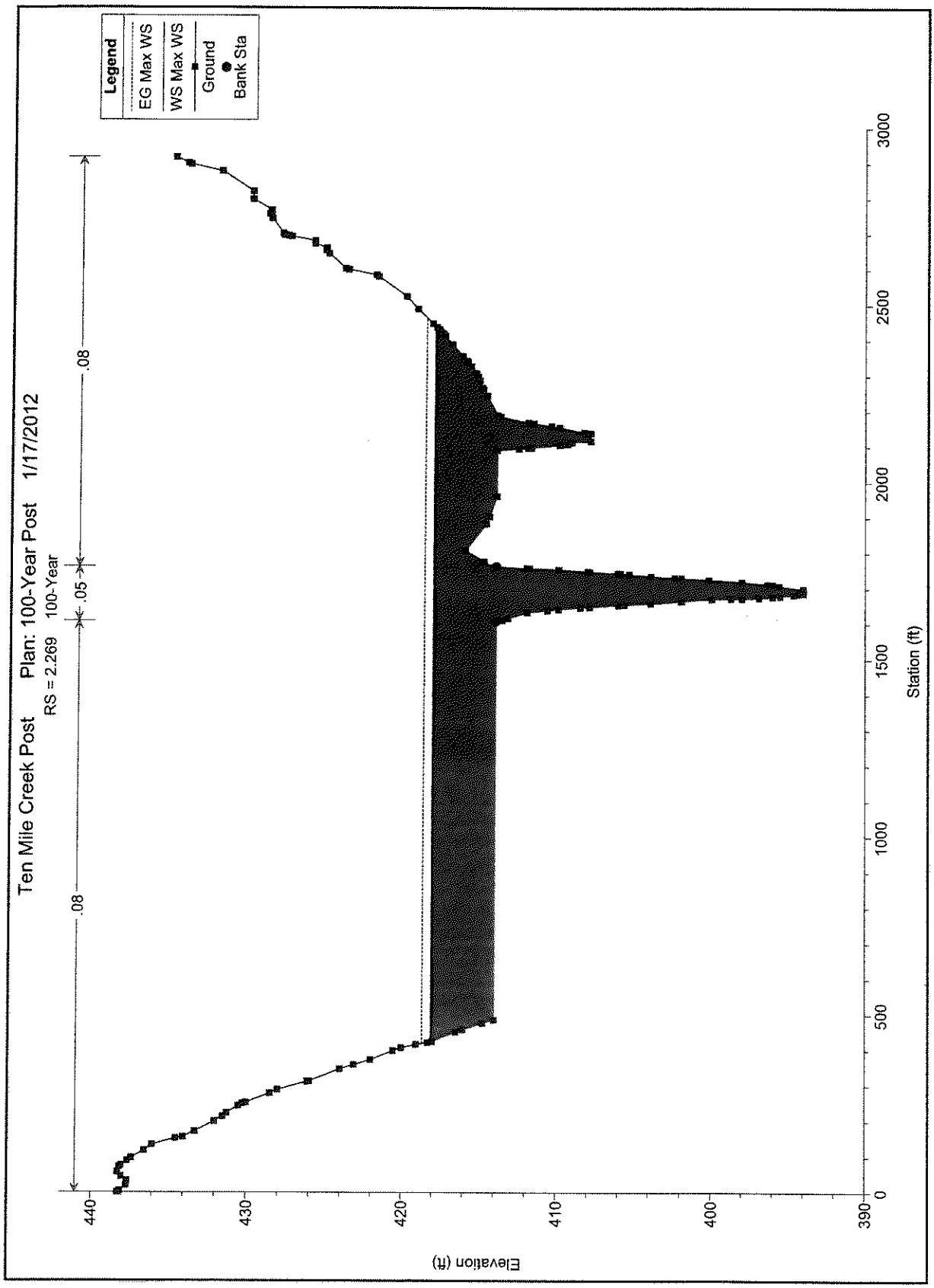

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 0.462 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
430
420
410
400
390
380
0
500
1000
1500
2000
2500
3000
3500
4000

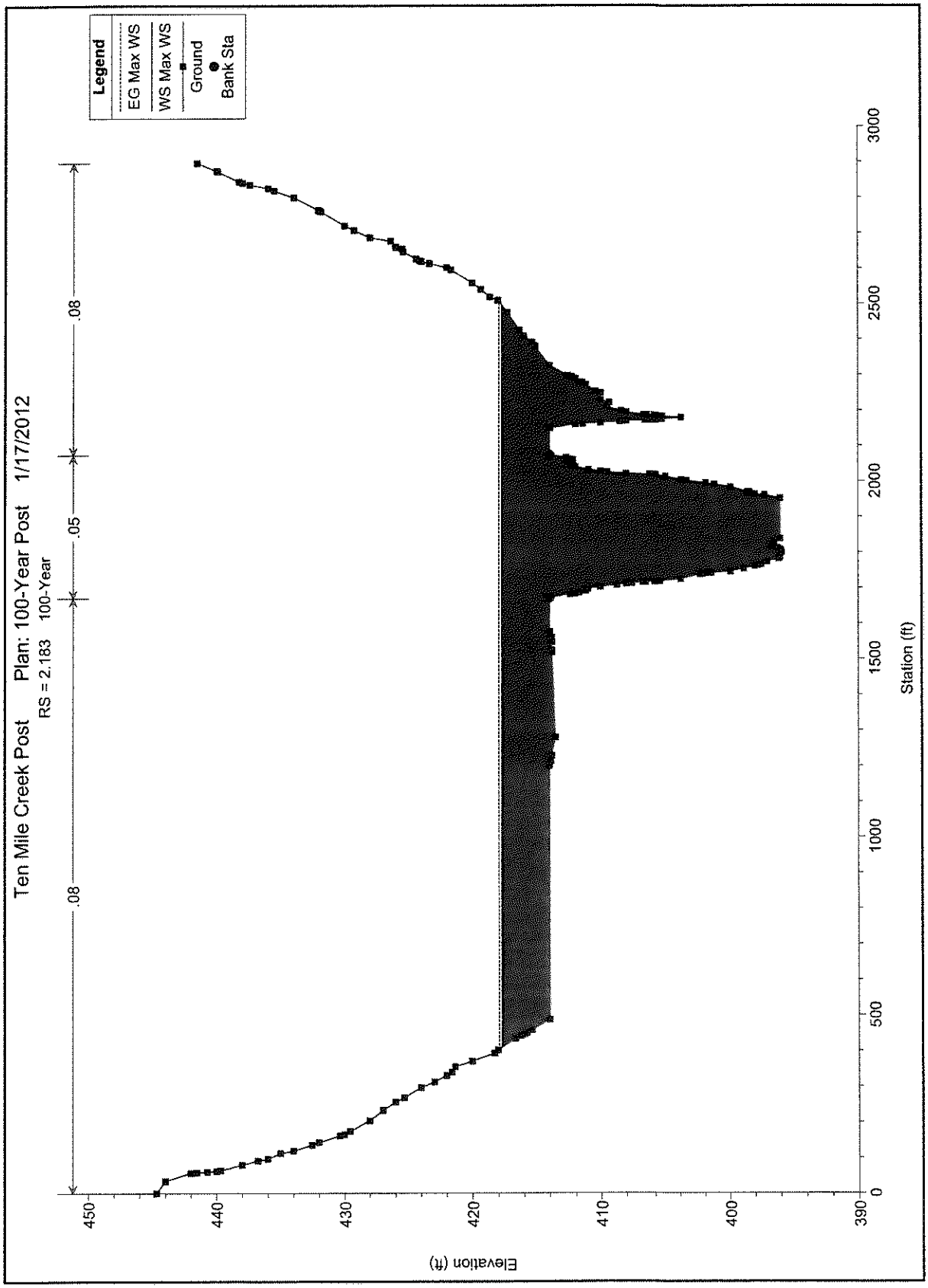

Ten Mile Creek Post Plan: 25-Year Post 1/17/2012
RS = 0.381 025-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
420
410
400
390
380
0
1000
2000
3000
4000
5000
Station (ft)

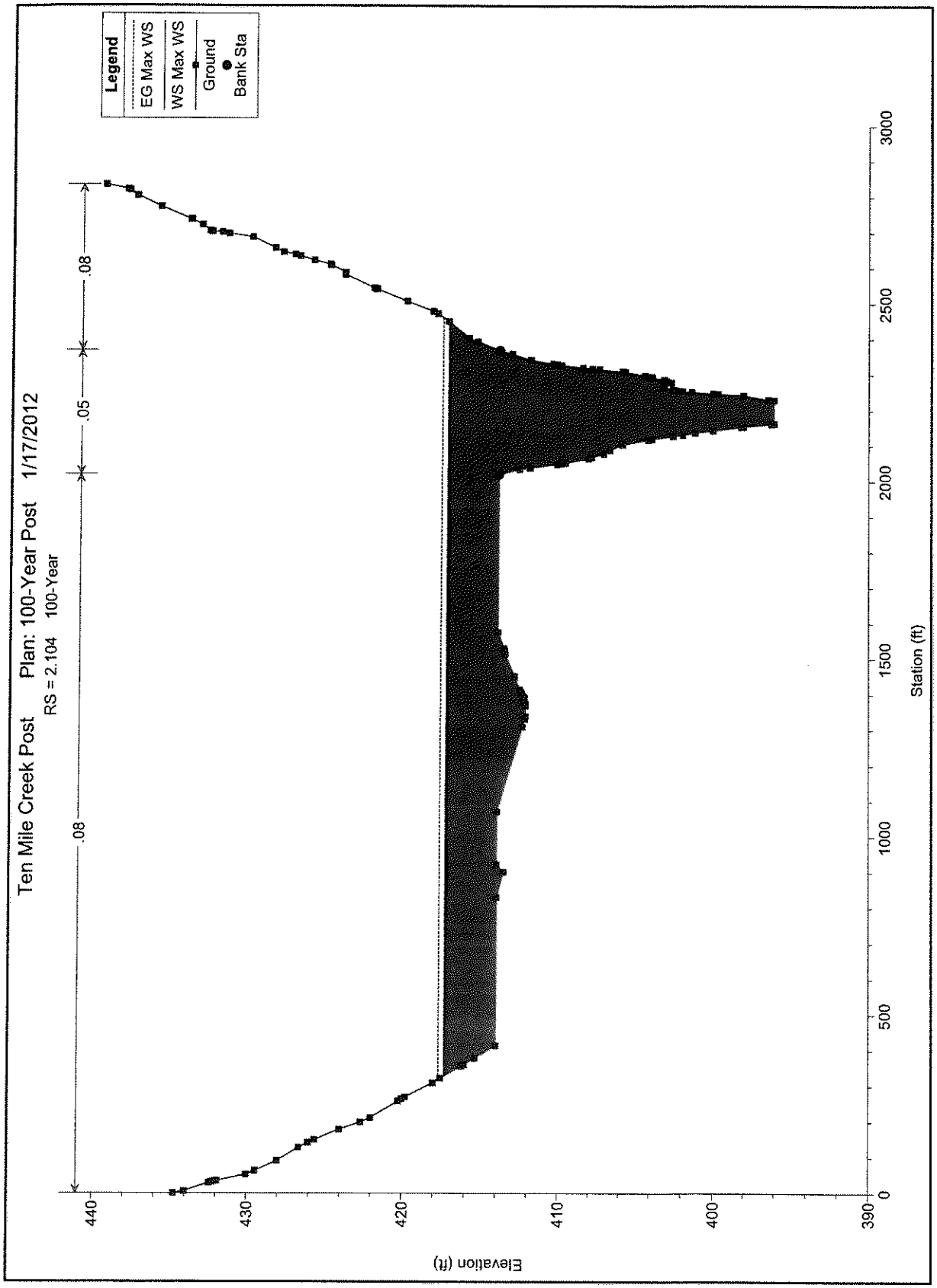
POSTDEVELOPED 100-YEAR HEC-RAS ANALYSIS

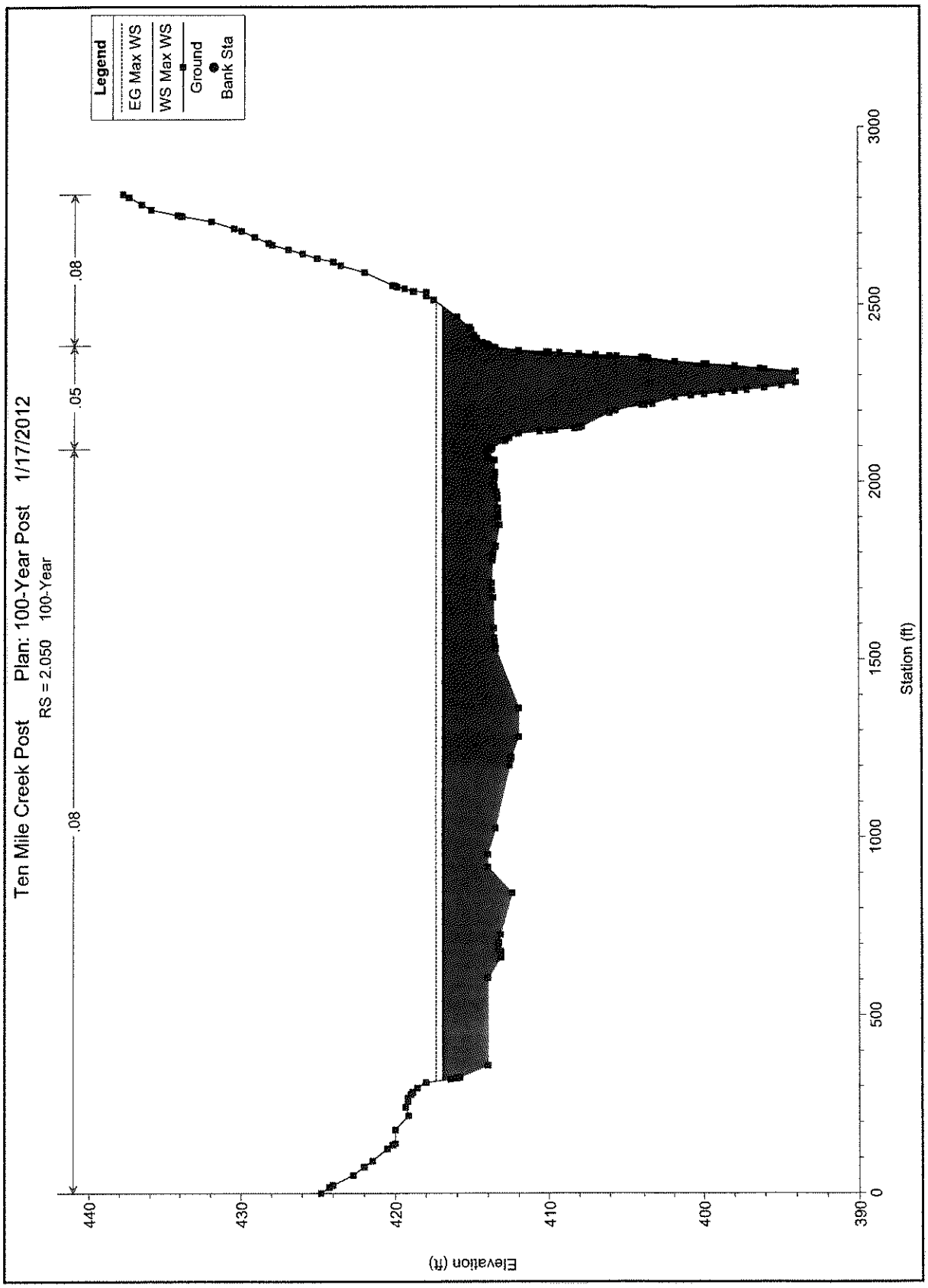
HEC-RAS Plan: 100-Year Post River: Ten Mile Cr Reach: Reach 1 Profile: Max WS

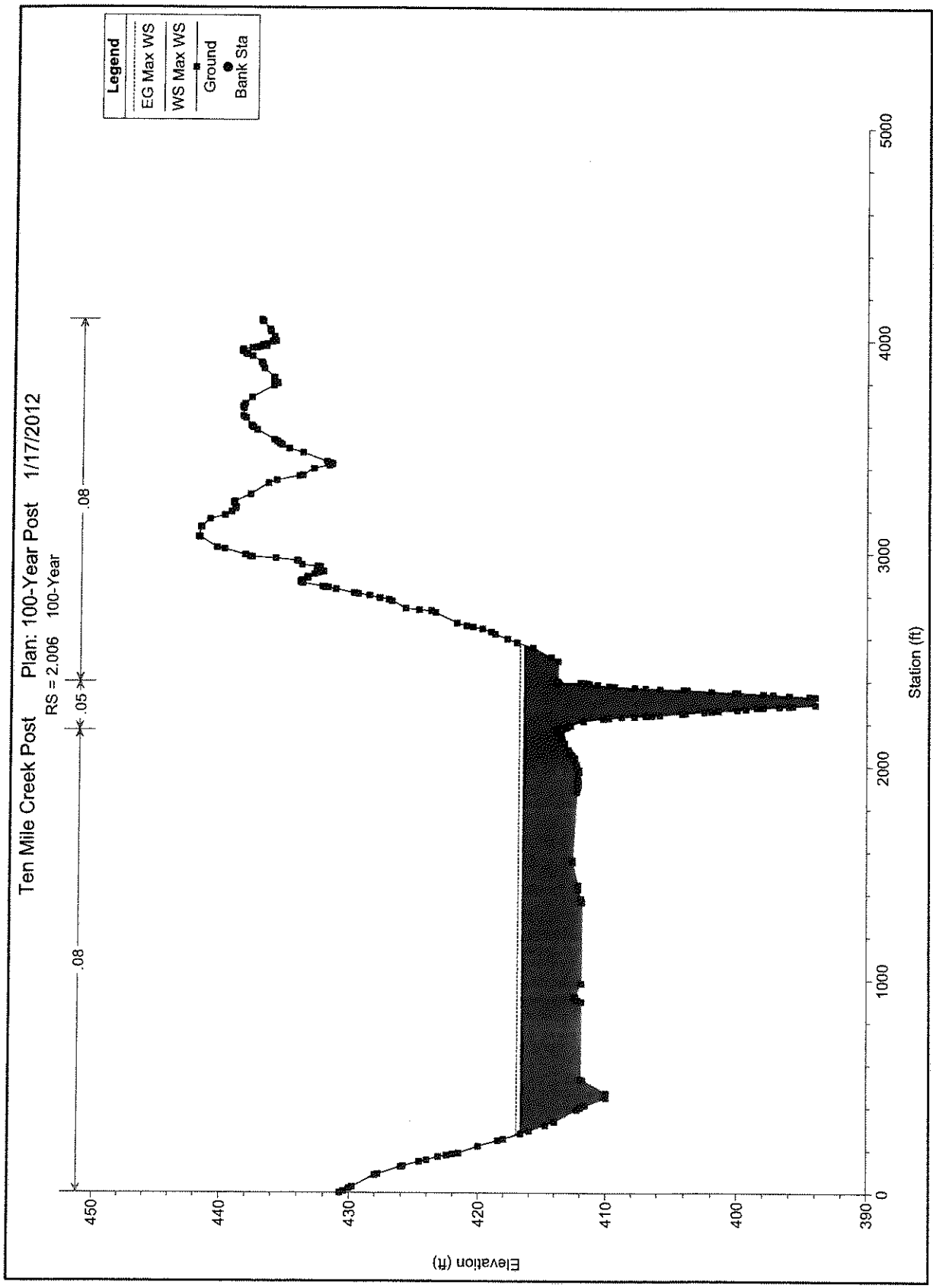
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	2.209	Max WS	33597.52	394.00	418.09		418.66	0.002277	8.11	9416.37	2016.25	0.38
Reach 1	2.186	Max WS	33595.84	395.88	417.71		417.92	0.000467	4.12	13098.38	2086.13	0.18
Reach 1	2.084	Max WS	33692.13	396.00	417.29		417.64	0.001092	5.46	10654.15	2120.49	0.26
Reach 1	2.055	Max WS	33689.23	394.00	416.94		417.36	0.001465	6.15	10273.92	2176.79	0.30
Reach 1	2.008	Max WS	33685.72	394.00	416.67		417.00	0.001534	6.15	11390.88	2292.57	0.31
Reach 1	1.956	Max WS	33681.47	394.00	416.26		416.62	0.002075	6.75	10815.21	2342.80	0.35
Reach 1	1.919	Max WS	33660.75	394.00	415.77		416.04	0.002311	6.20	11829.68	3204.23	0.36
Reach 1	1.873	Max WS	33659.70	394.00	415.25		415.63	0.001886	7.12	11611.49	2860.43	0.34
Reach 1	1.798	Max WS	33656.27	392.00	414.62		414.92	0.001931	5.84	11327.40	2627.98	0.33
Reach 1	1.729	Max WS	33750.88	394.00	414.20		414.49	0.002136	6.27	11327.38	2444.13	0.35
Reach 1	1.668	Max WS	33788.27	394.00	412.63		413.11	0.002918	7.17	9365.79	2326.00	0.41
Reach 1	1.592	Max WS	33782.18	393.95	411.98		412.20	0.001026	4.65	12668.72	2295.44	0.25
Reach 1	1.441	Max WS	33743.45	392.00	411.10		411.72	0.002697	8.23	8850.46	2001.09	0.41
Reach 1	1.389	Max WS	33740.04	389.35	410.40		411.03	0.002530	8.15	8858.13	1998.60	0.40
Reach 1	1.358	Max WS	33790.07	388.00	410.21		410.49	0.000966	5.19	12434.38	2519.91	0.25
Reach 1	1.297	Max WS	33735.55	388.00	409.76		410.01	0.001570	6.22	13098.51	2747.37	0.31
Reach 1	1.230	Max WS	33733.22	388.00	409.47		409.70	0.001228	5.91	14326.57	2881.25	0.28
Reach 1	1.180	Max WS	33729.80	388.00	409.29		409.46	0.000733	4.74	16303.96	2909.94	0.22
Reach 1	1.129	Max WS	33722.92	388.00	409.05		409.25	0.000633	4.75	15899.60	2856.28	0.21
Reach 1	0.998	Max WS	33713.00	388.00	408.52		408.71	0.001075	5.01	14173.33	2800.93	0.26
Reach 1	0.941	Max WS	33718.09	388.00	408.24		408.45	0.001556	5.58	13190.05	2771.52	0.30
Reach 1	0.897	Max WS	33697.21	388.00	407.81		408.54	0.003705	9.91	8211.26	2474.98	0.48
Reach 1	0.833	Max WS	33695.19	388.00	407.28		407.53	0.001958	5.86	10794.69	1916.78	0.33
Reach 1	0.772	Max WS	33822.39	388.77	406.14		406.47	0.001817	5.98	10571.55	2011.11	0.33
Reach 1	0.734	Max WS	33819.63	388.00	405.70		406.06	0.002905	6.62	9694.78	2154.52	0.40
Reach 1	0.462	Max WS	33787.94	380.00	404.07		404.26	0.000430	3.90	14834.87	2914.04	0.17
Reach 1	0.391	Max WS	33882.88	380.00	403.77	398.31	403.95	0.001013	4.56	15486.50	3650.31	0.24

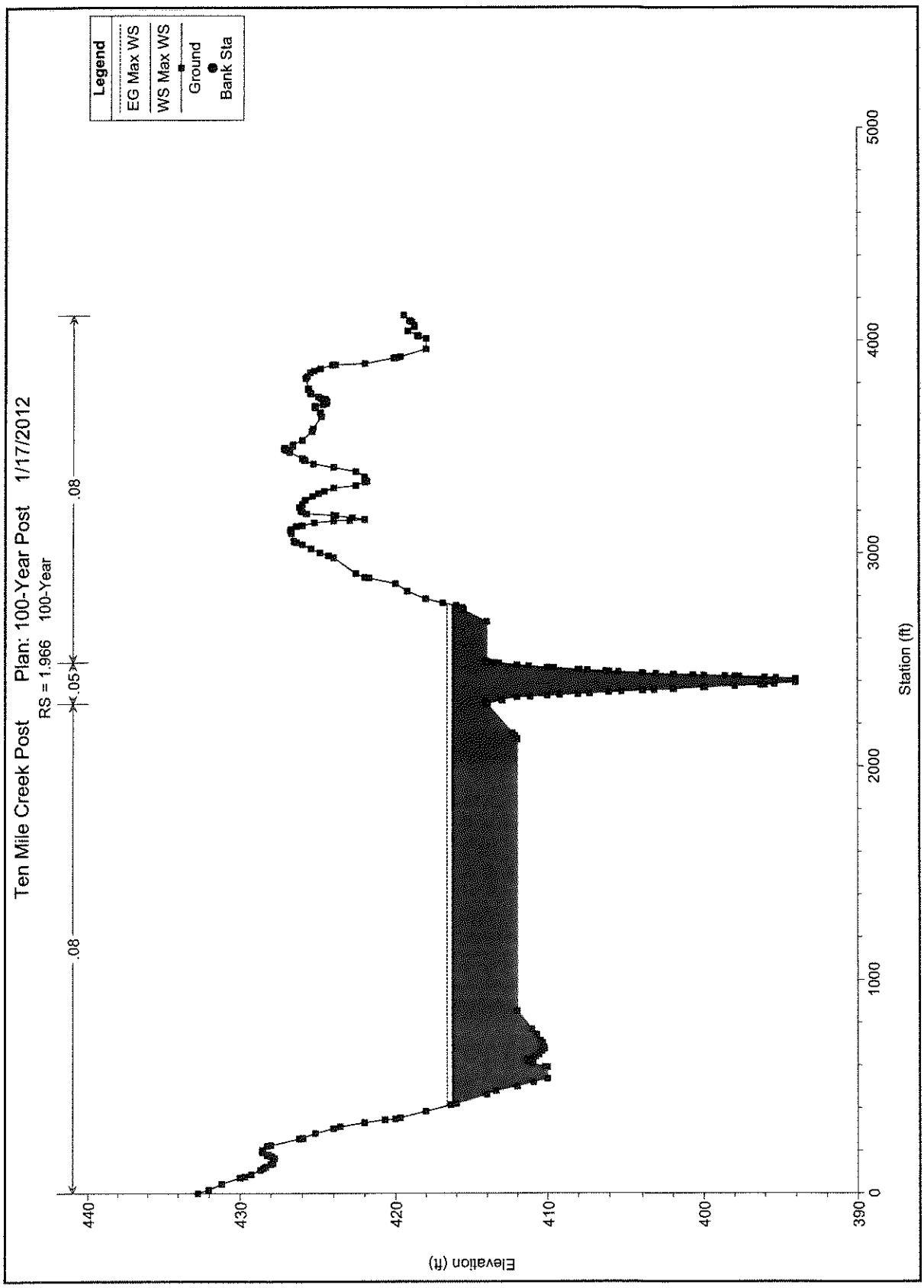

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 2.269 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
Station (ft)

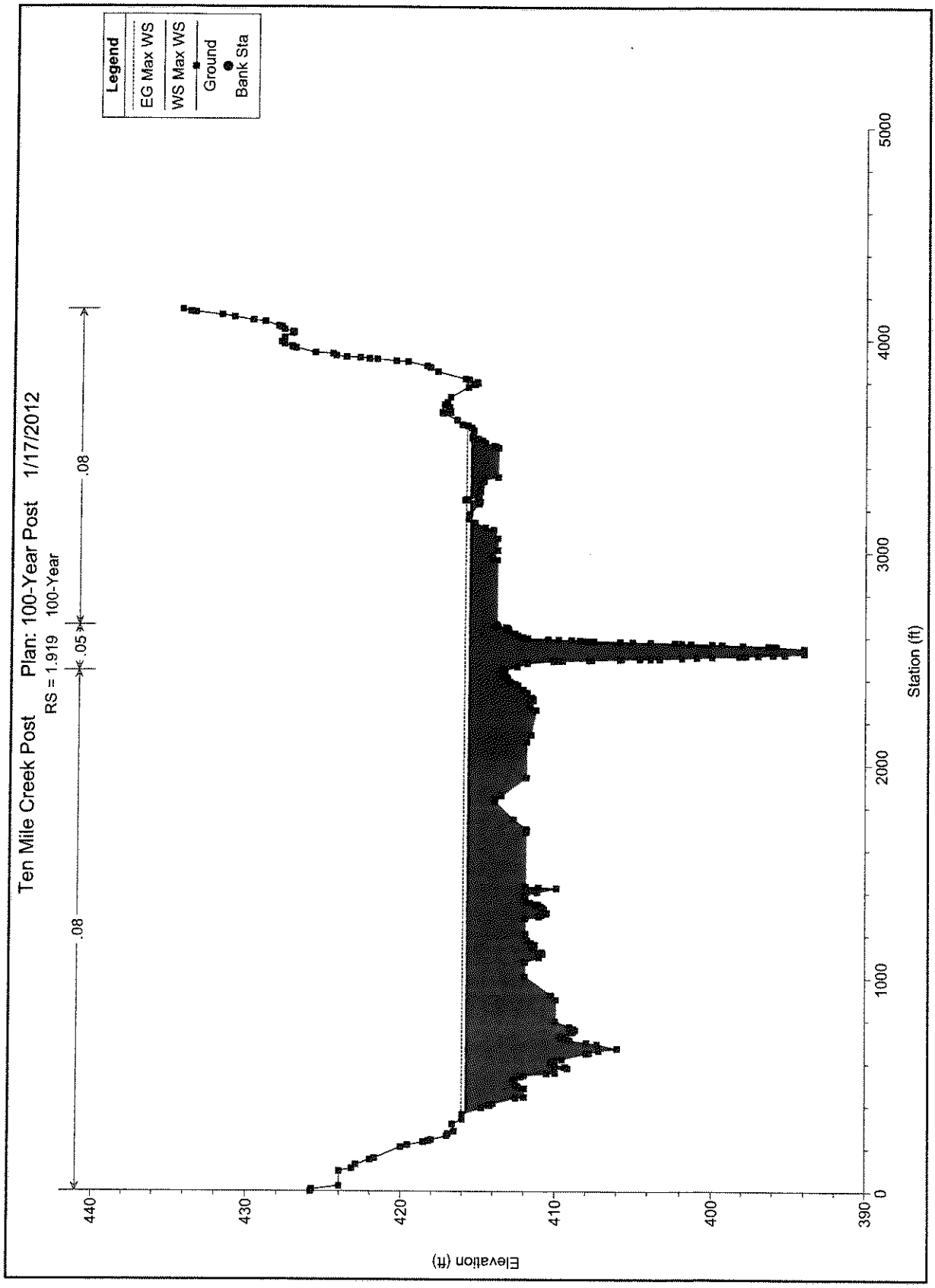

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 2.183 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000

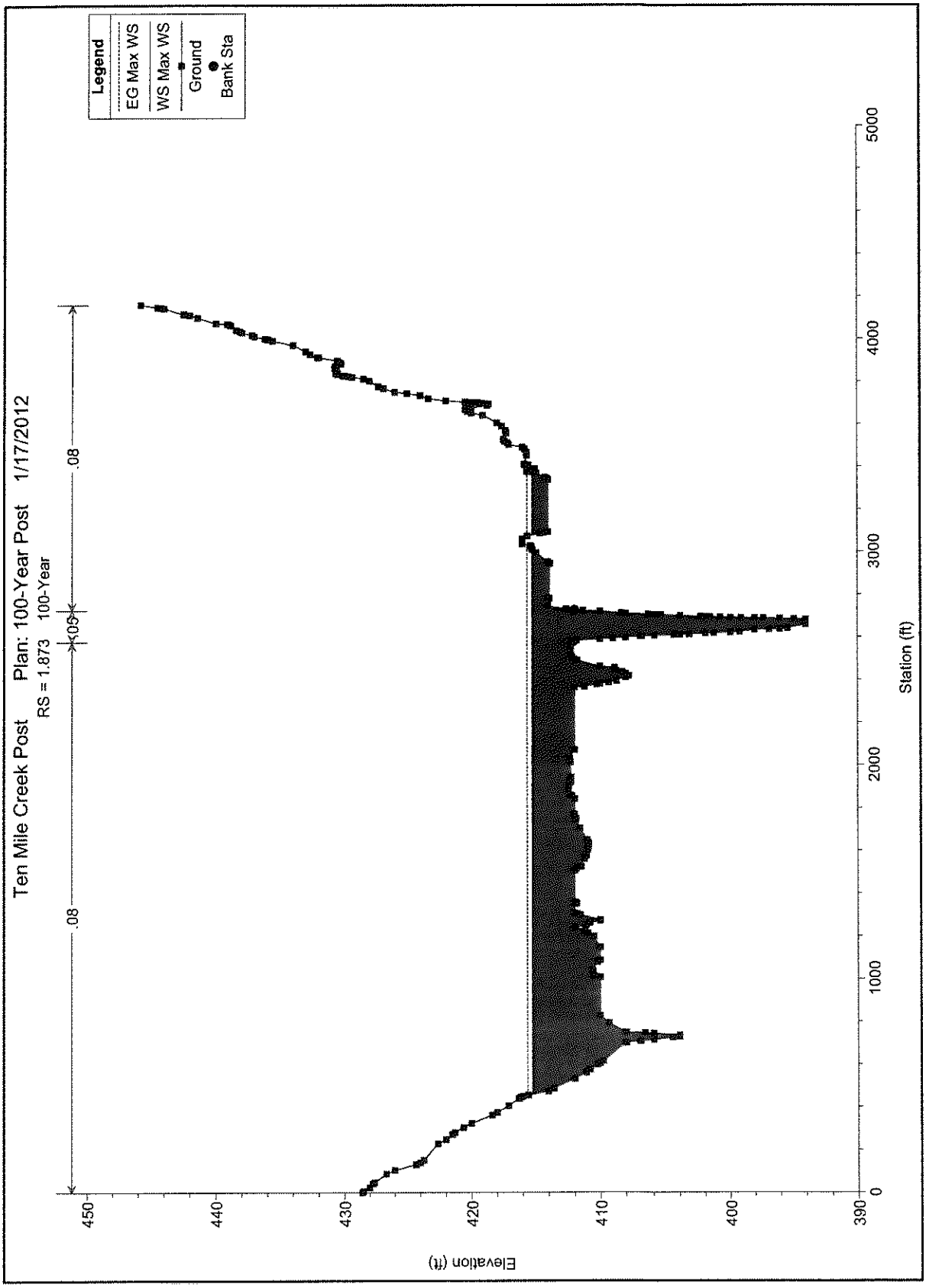

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 2.104 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000

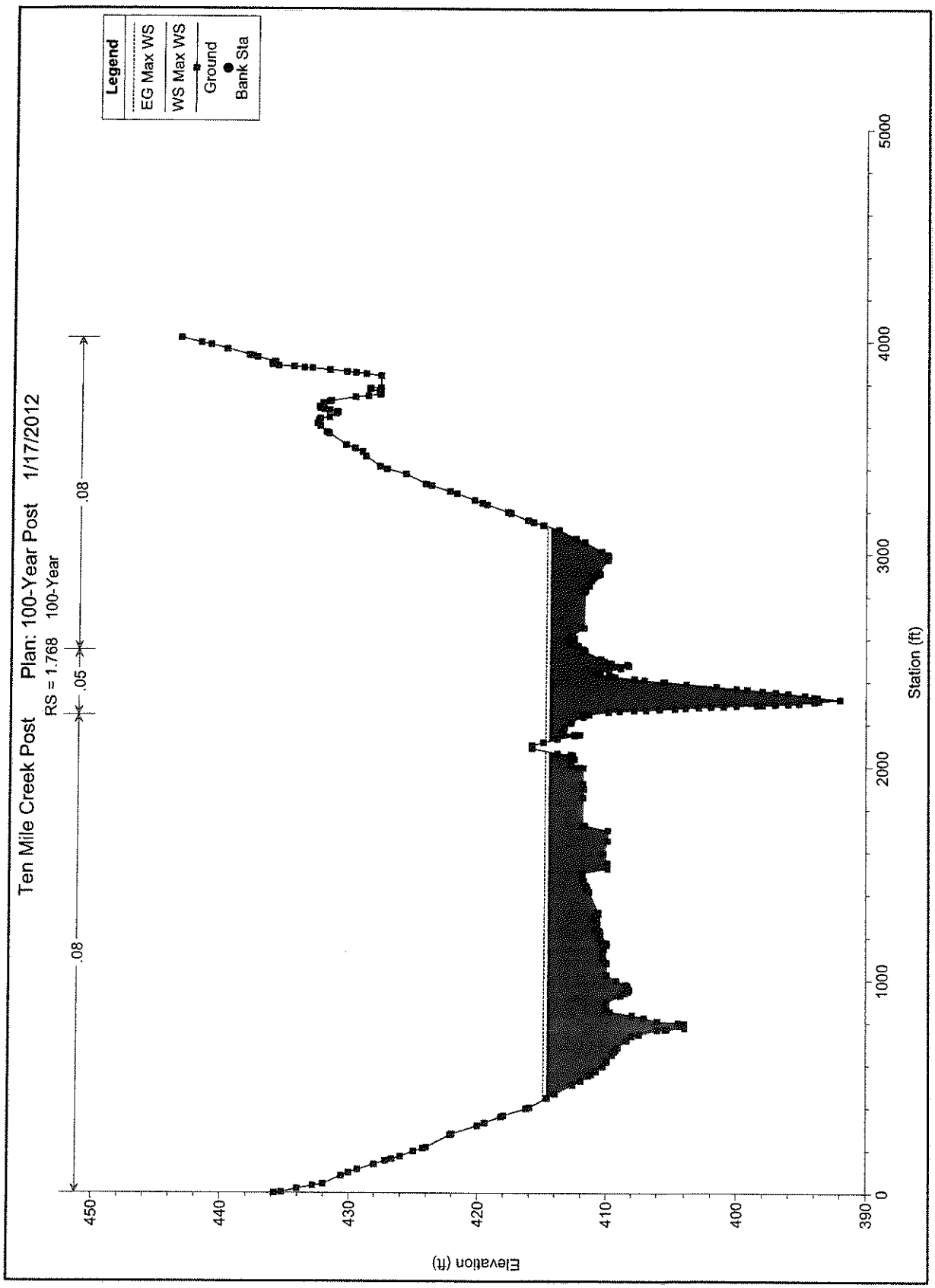

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 2.050 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
Station (ft)

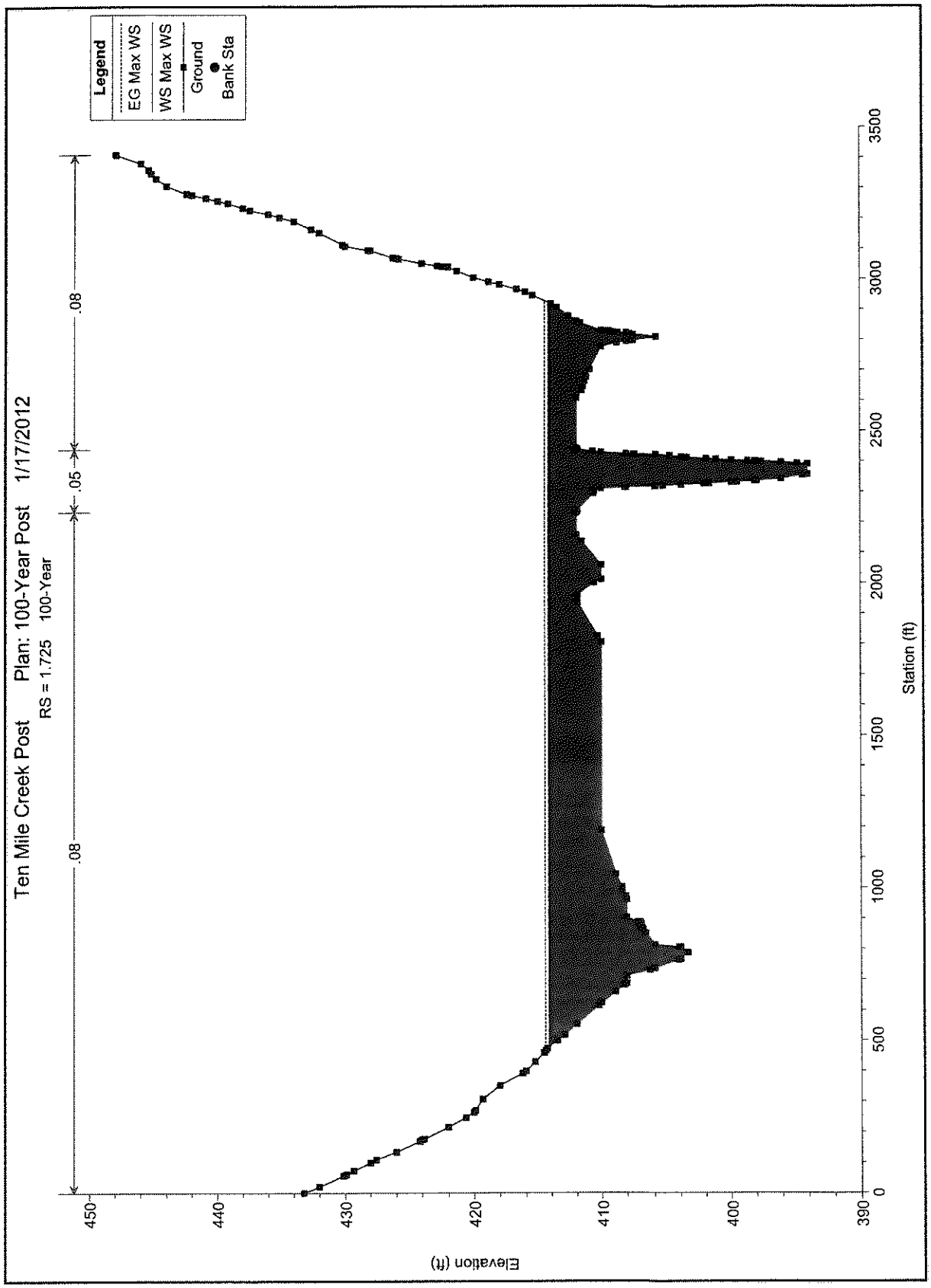

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 2.006 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
1000
2000
3000
4000
5000

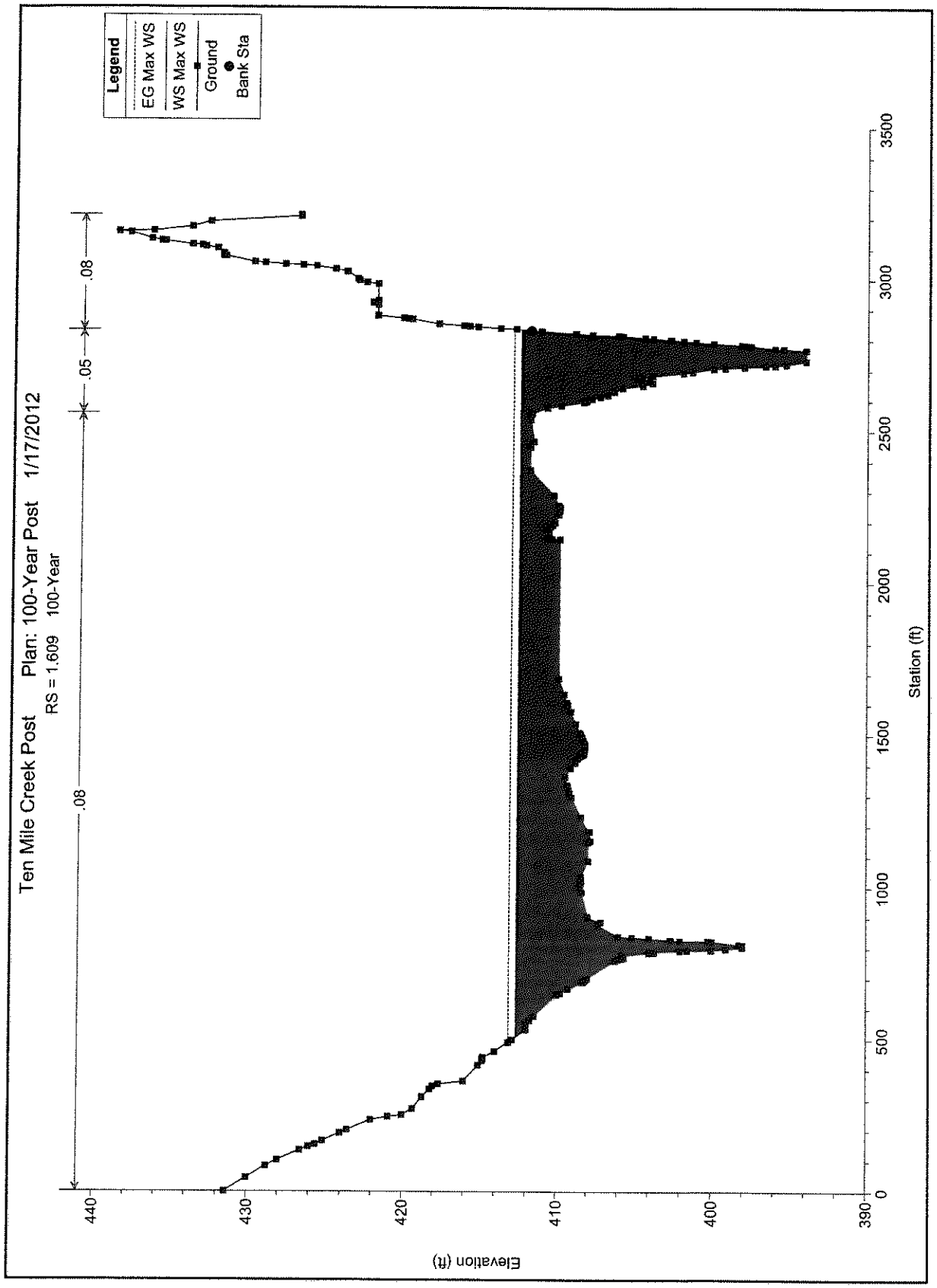

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.966 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
1000
2000
3000
4000
5000

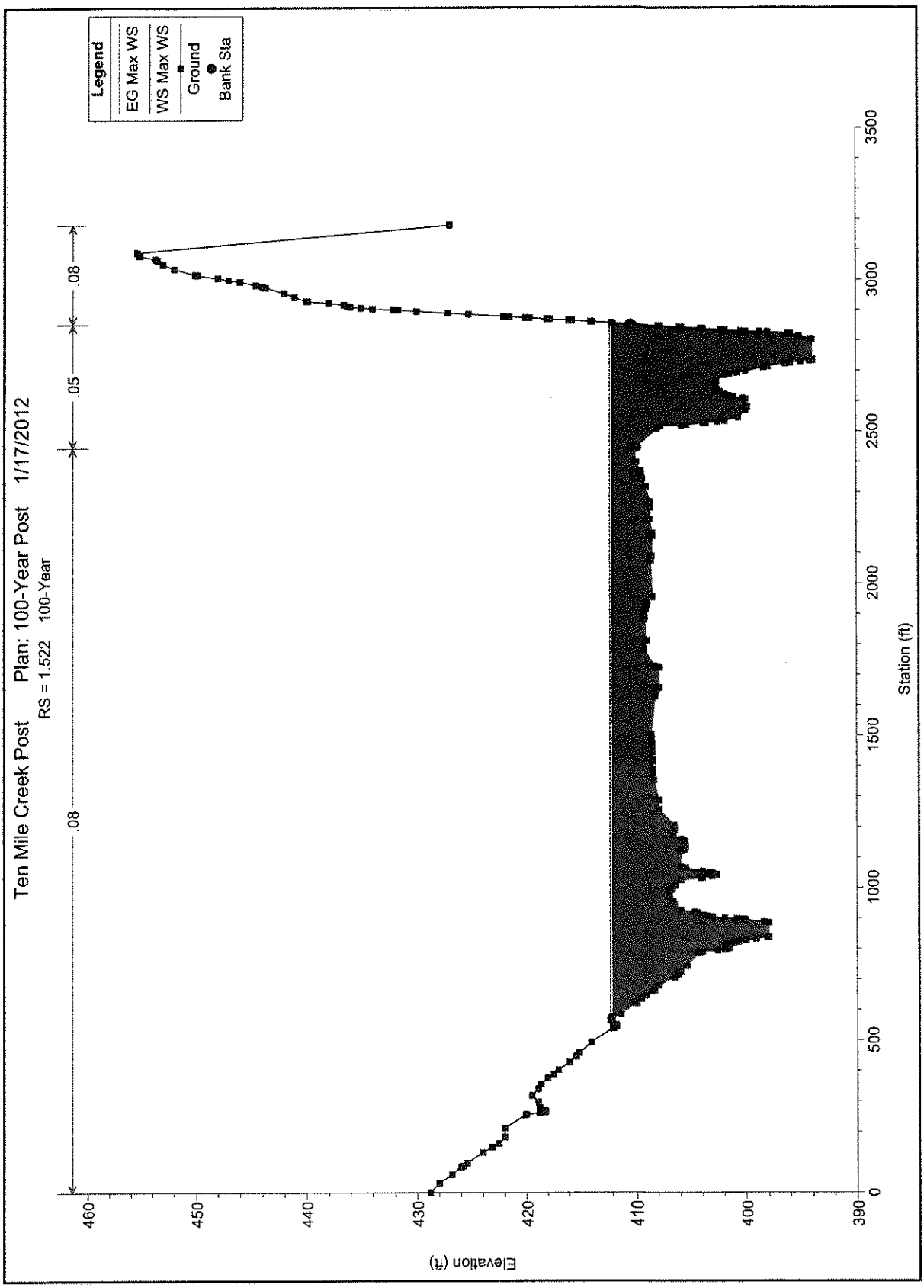

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.919 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
1000
2000
3000
4000
5000

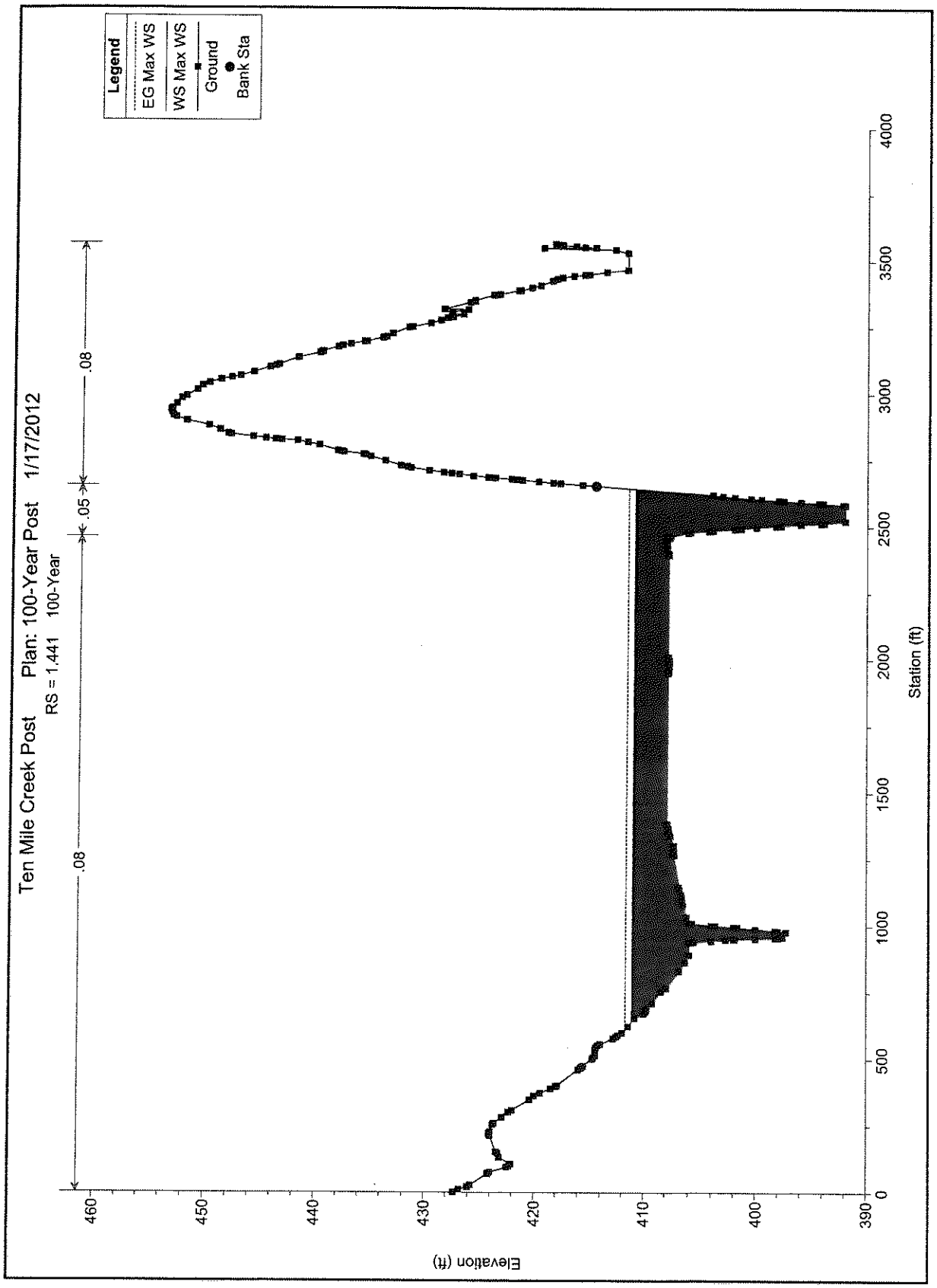

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.873 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
1000
2000
3000
4000
5000

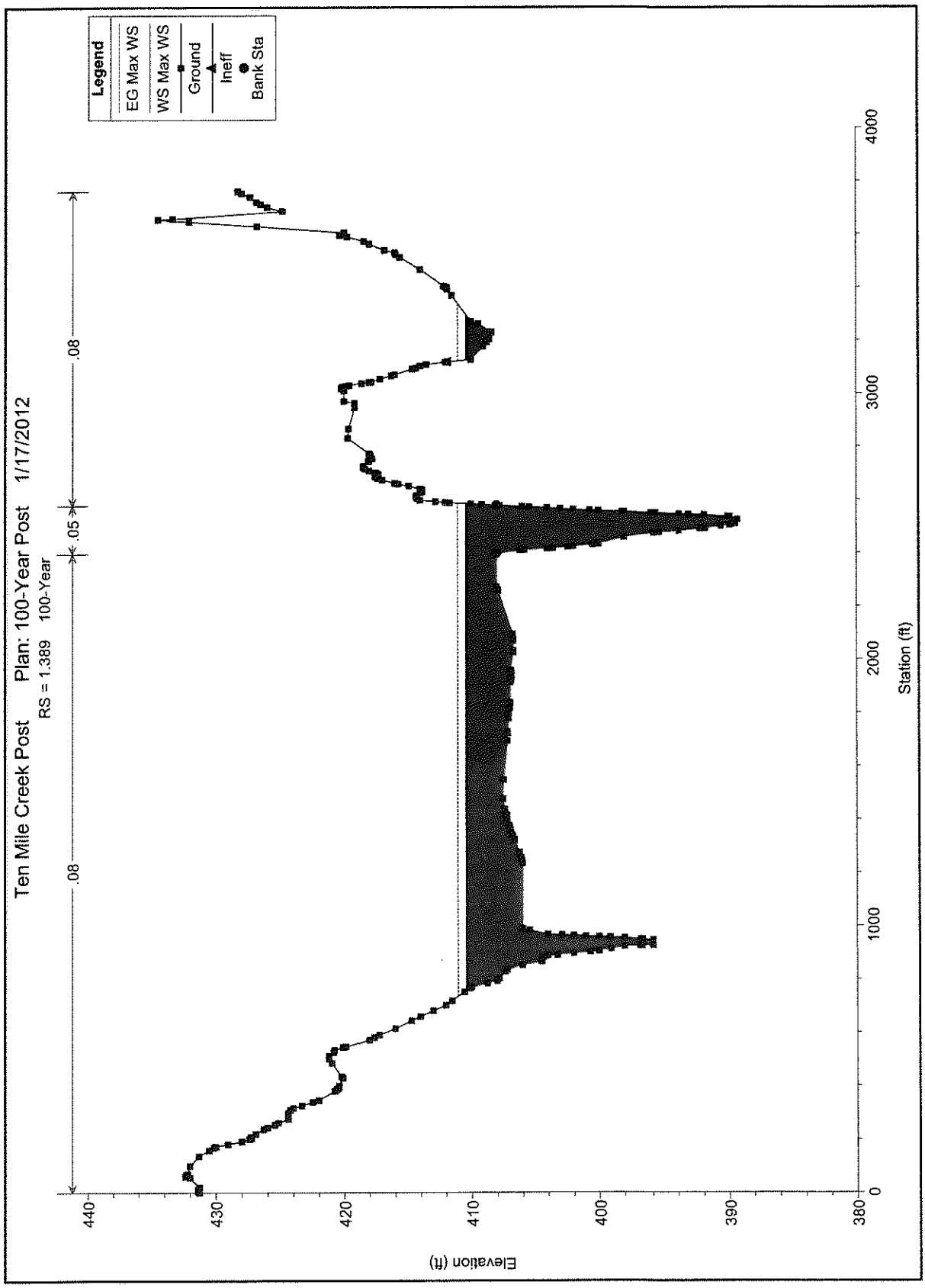

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.768 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
0
1000
2000
3000
4000
5000

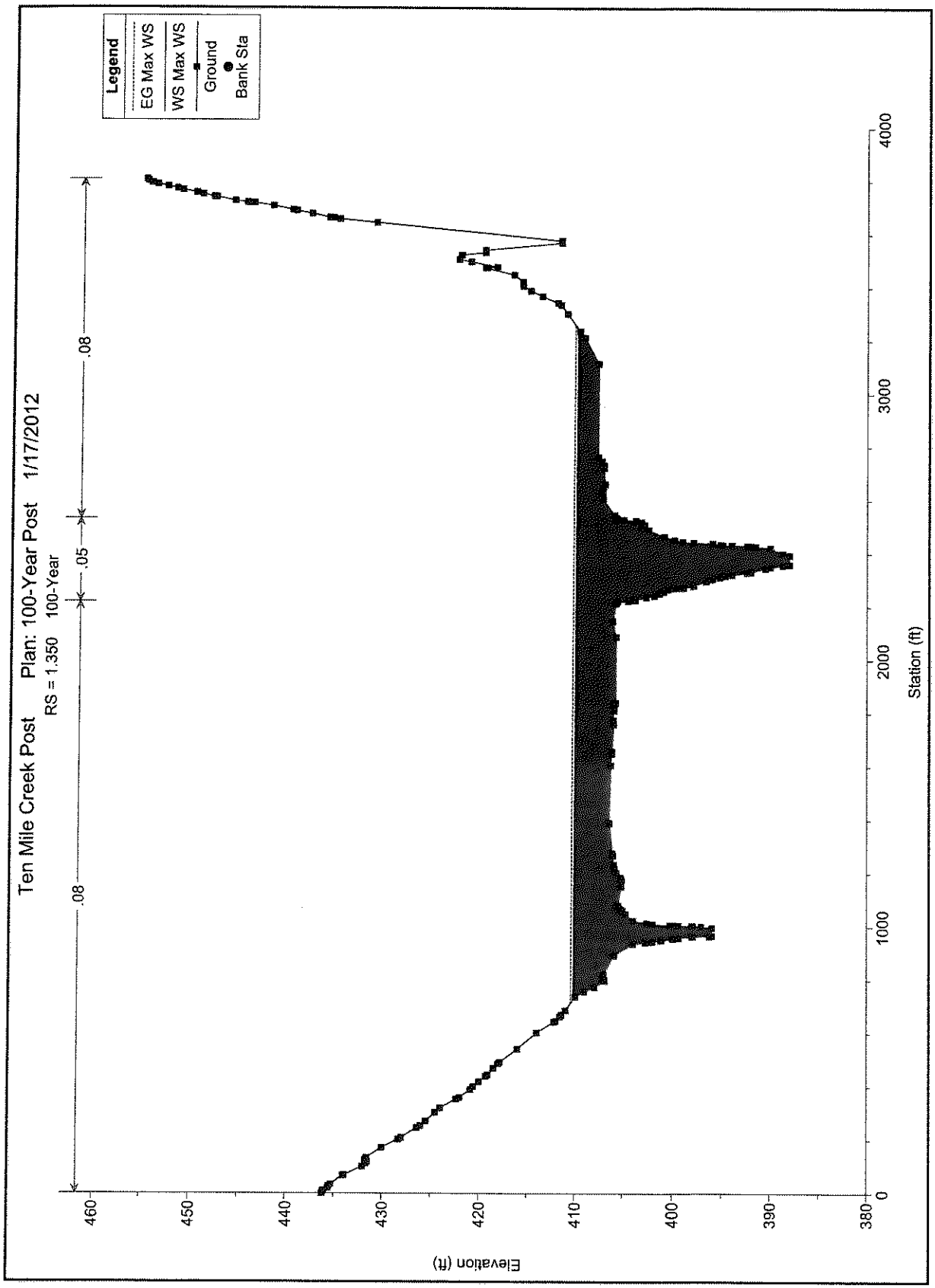

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.725 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500
Station (ft)

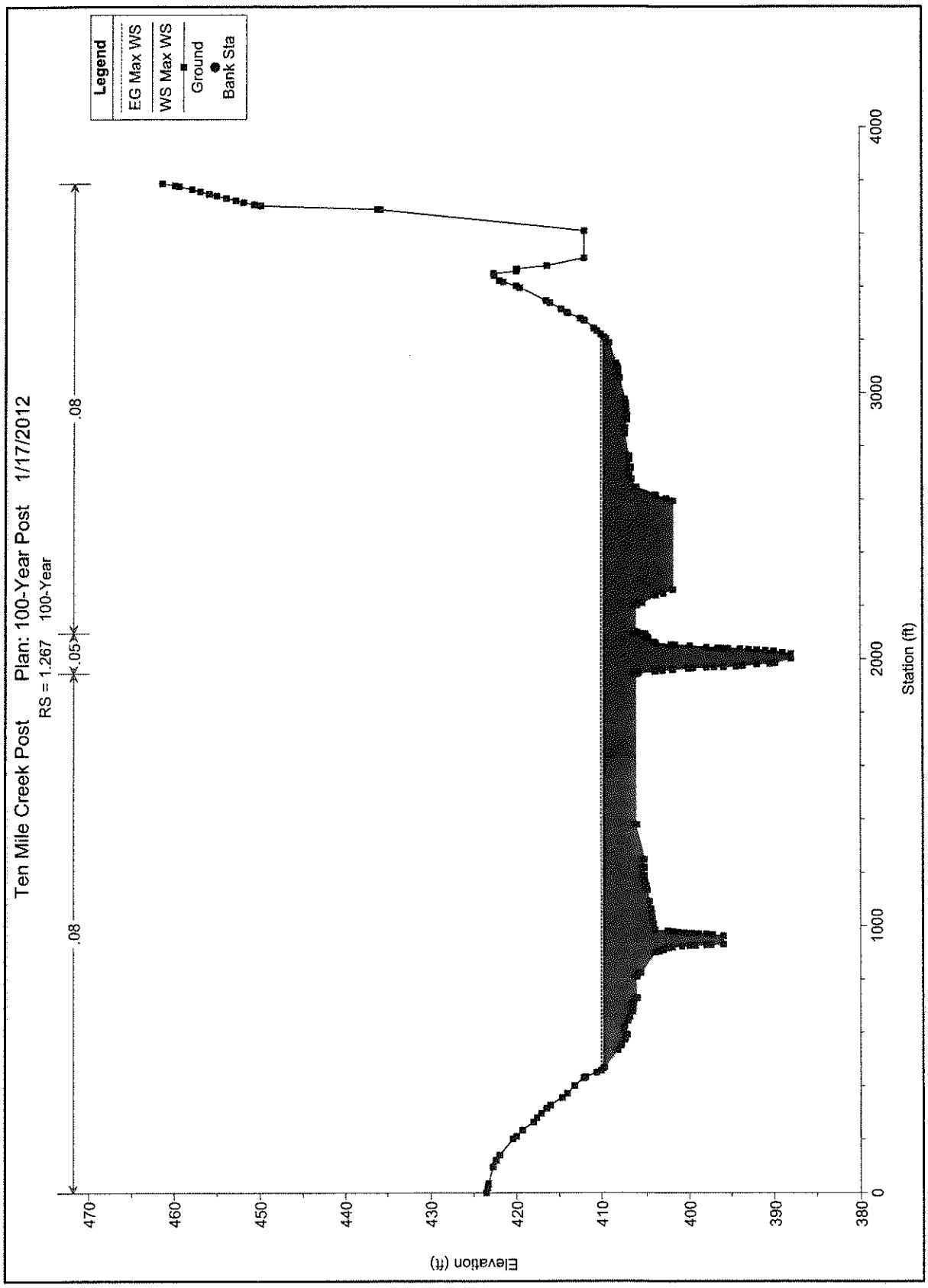

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.609 100-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
Station (ft)
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500

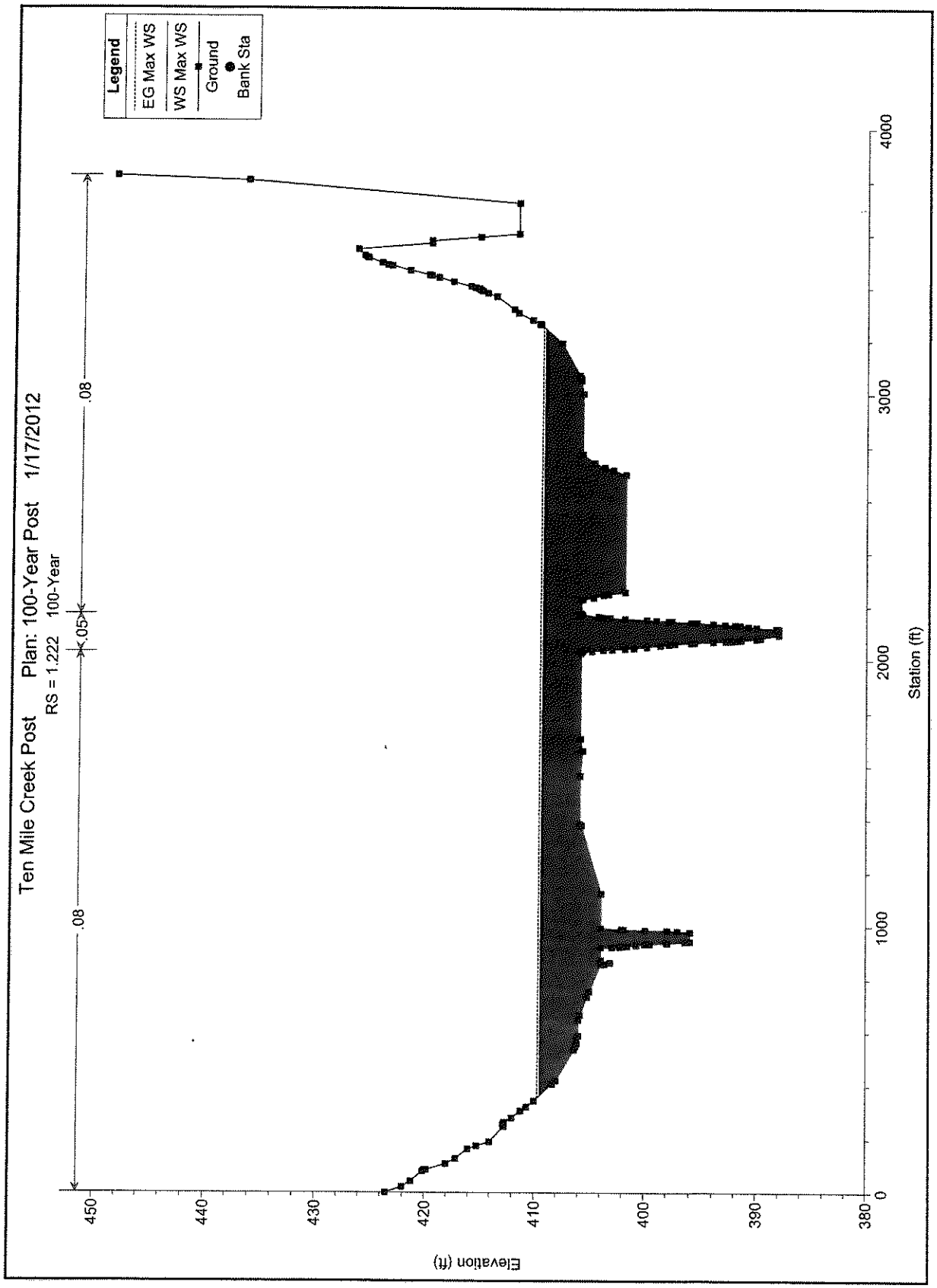

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.522 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
460
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500

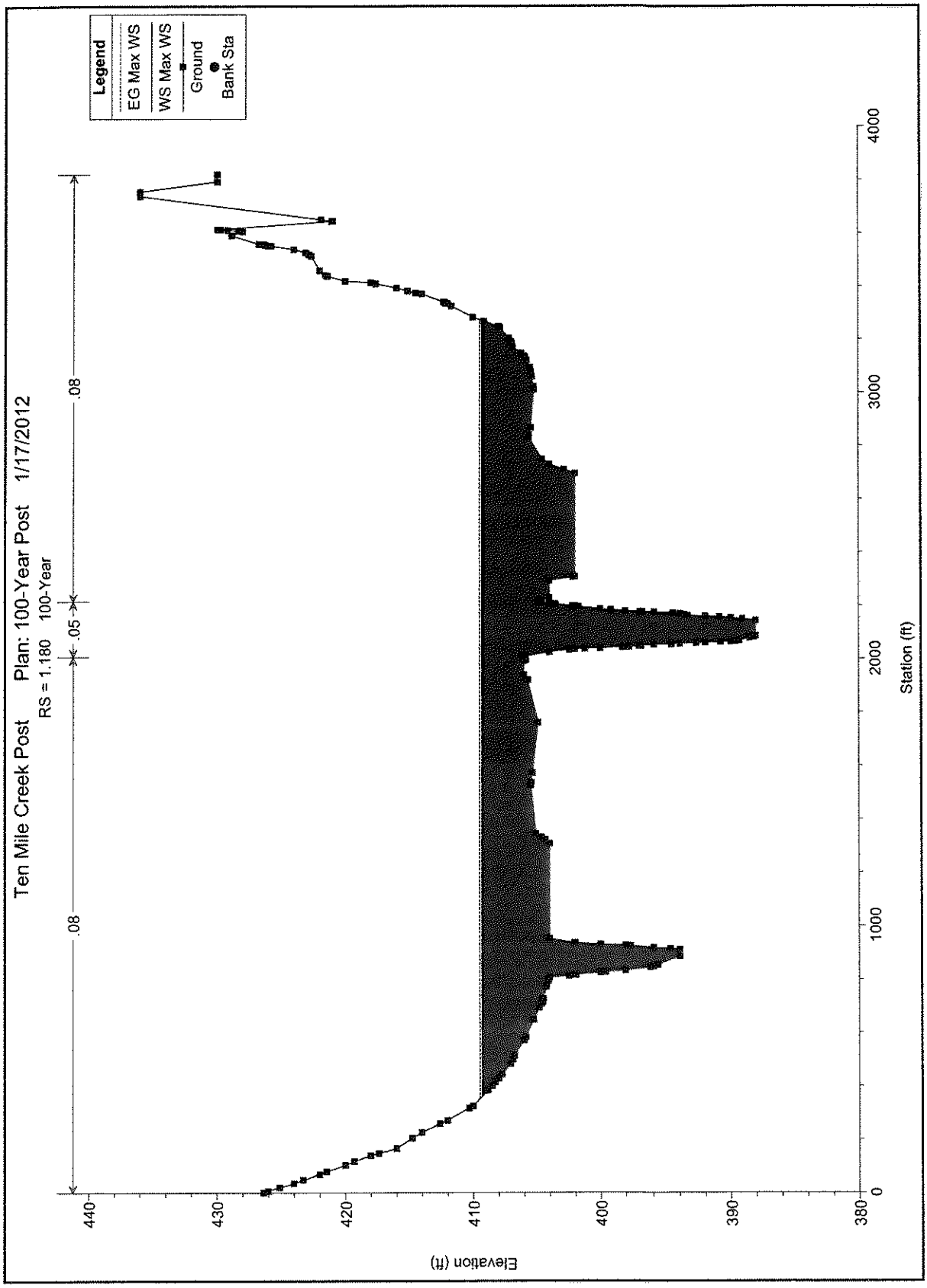

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.441 100-Year
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
.08
.05
.08
Elevation (ft)
460
450
440
430
420
410
400
390
0
500
1000
1500
2000
2500
3000
3500
4000
Station (ft)

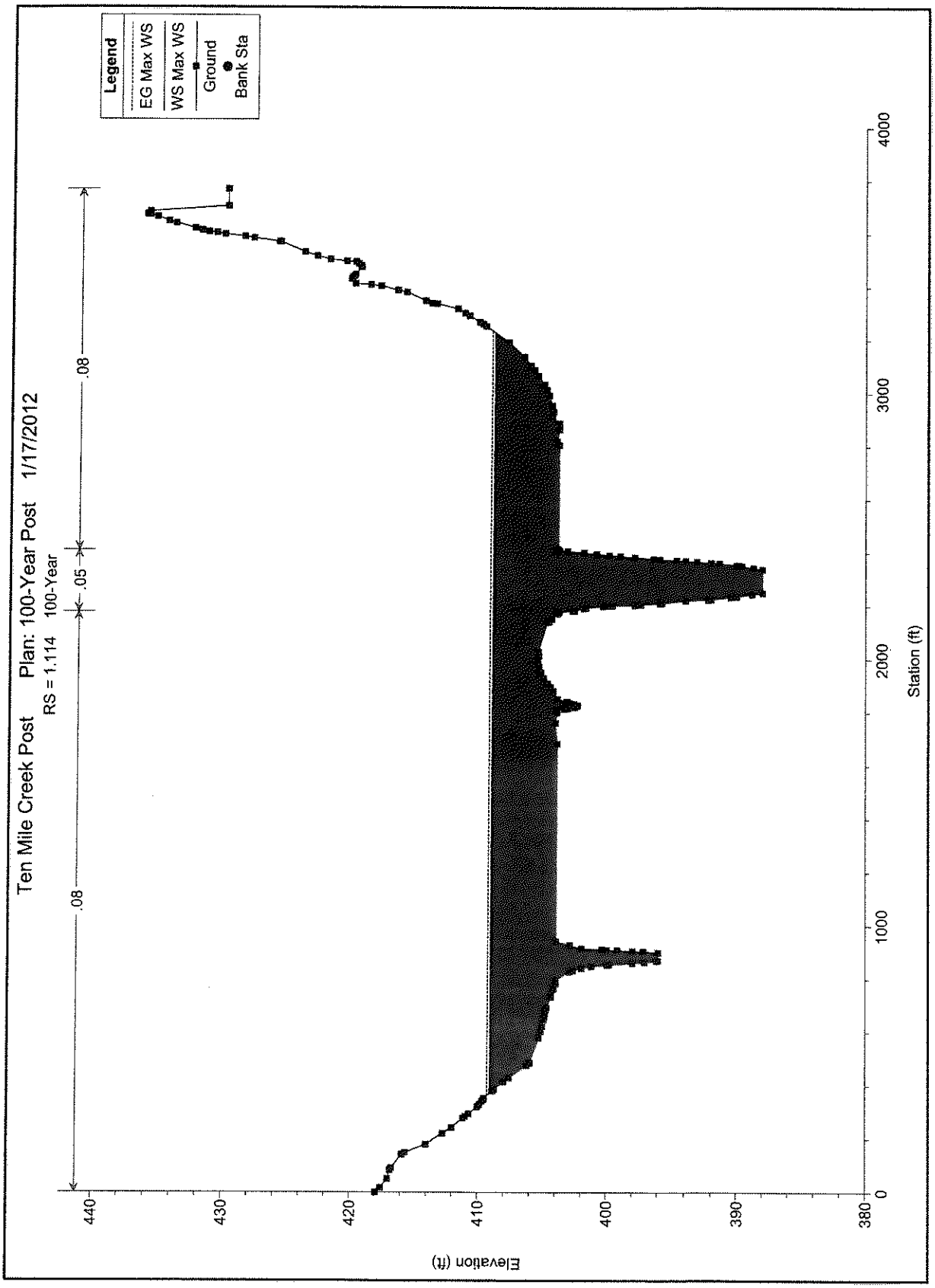

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.389 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

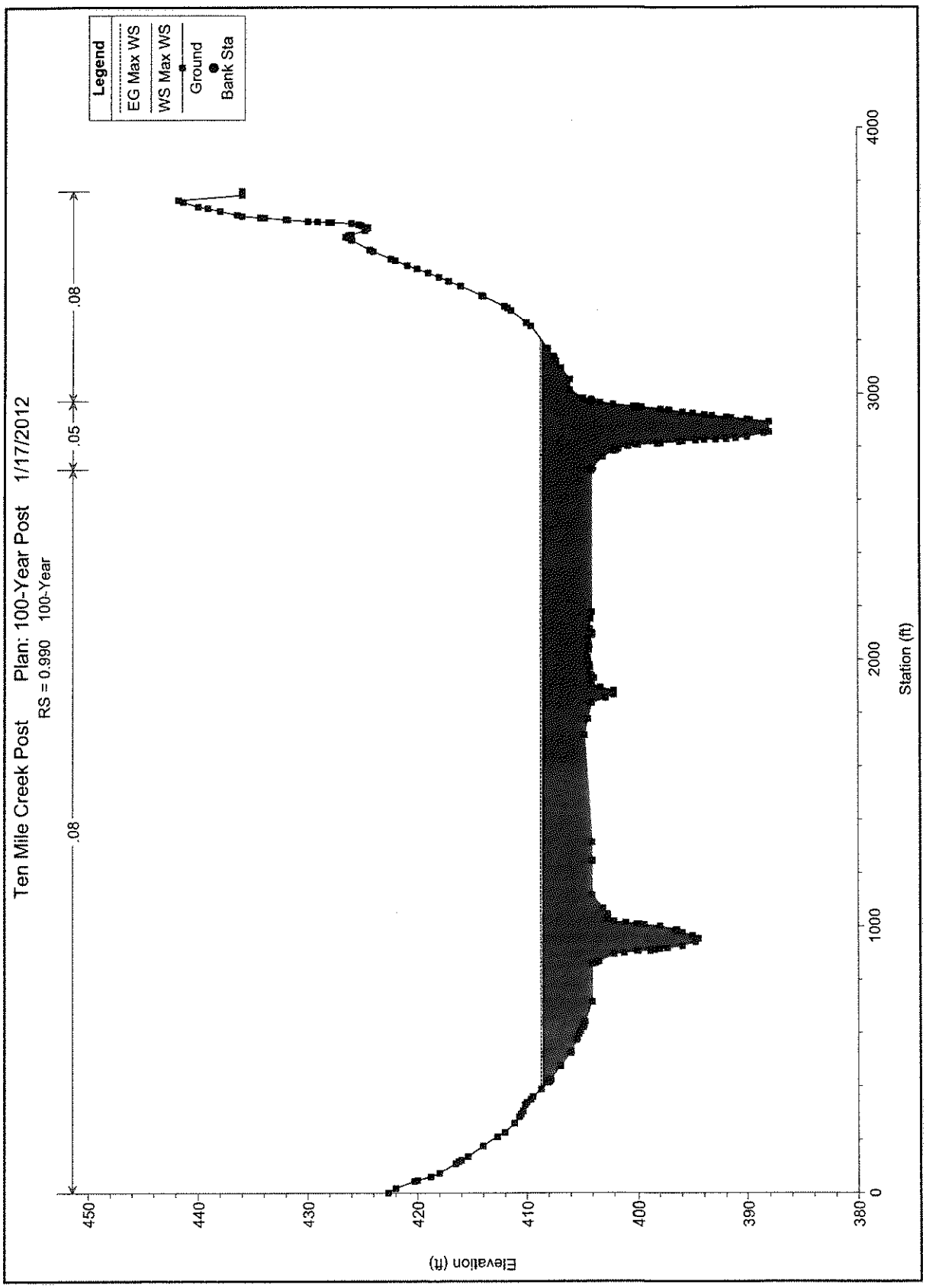

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.350 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

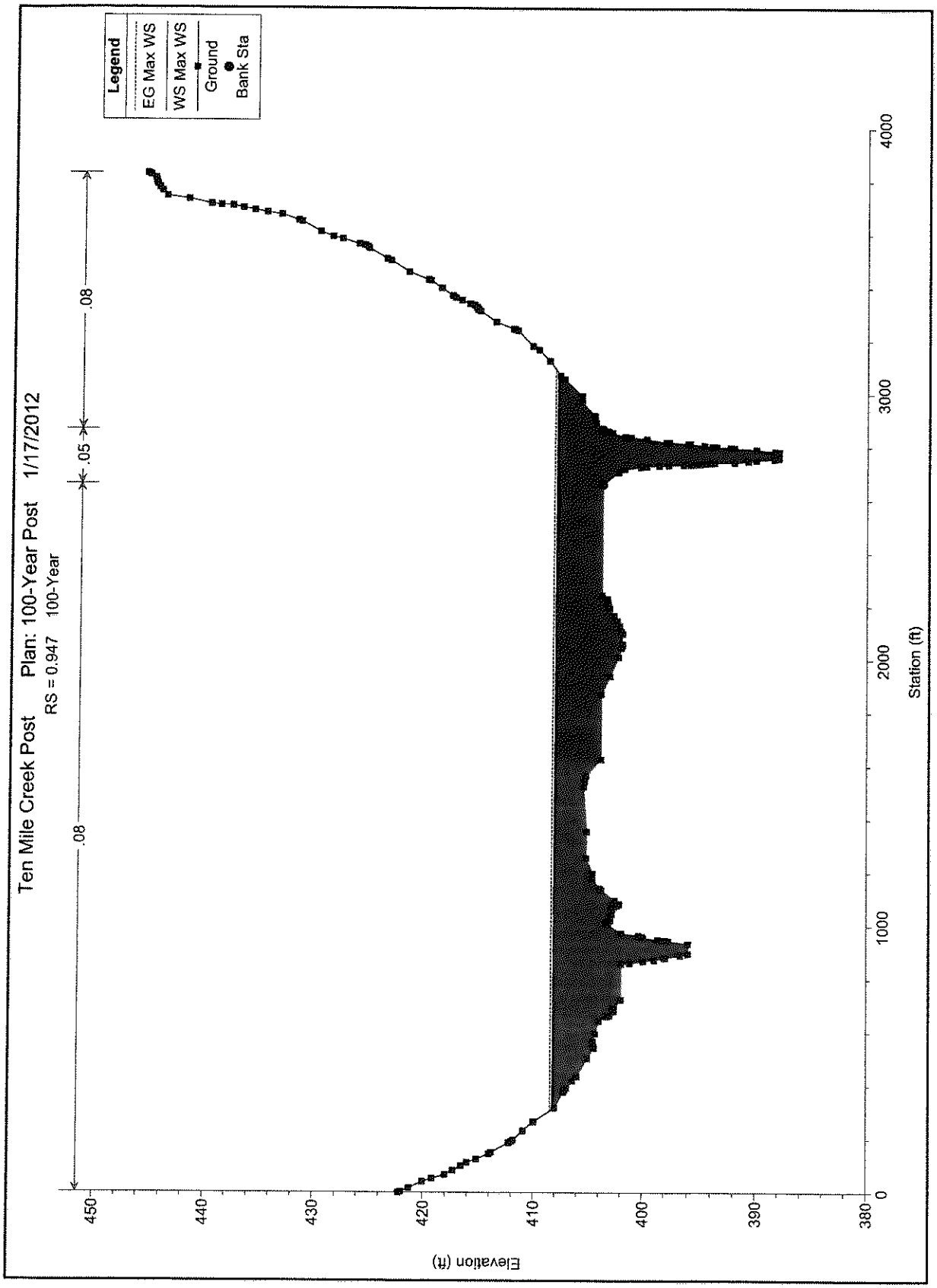

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.267 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
470
460
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000

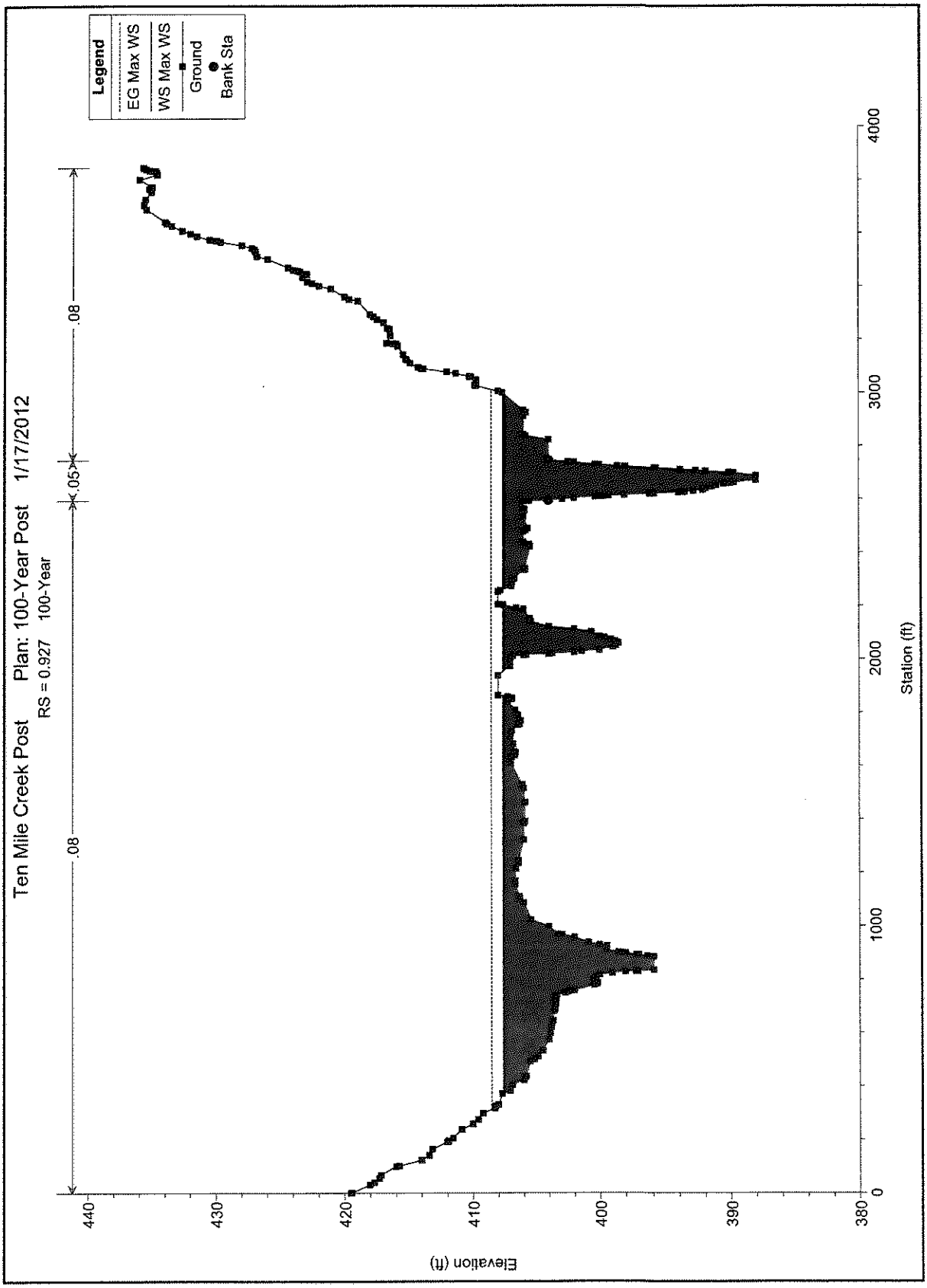

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.222 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000

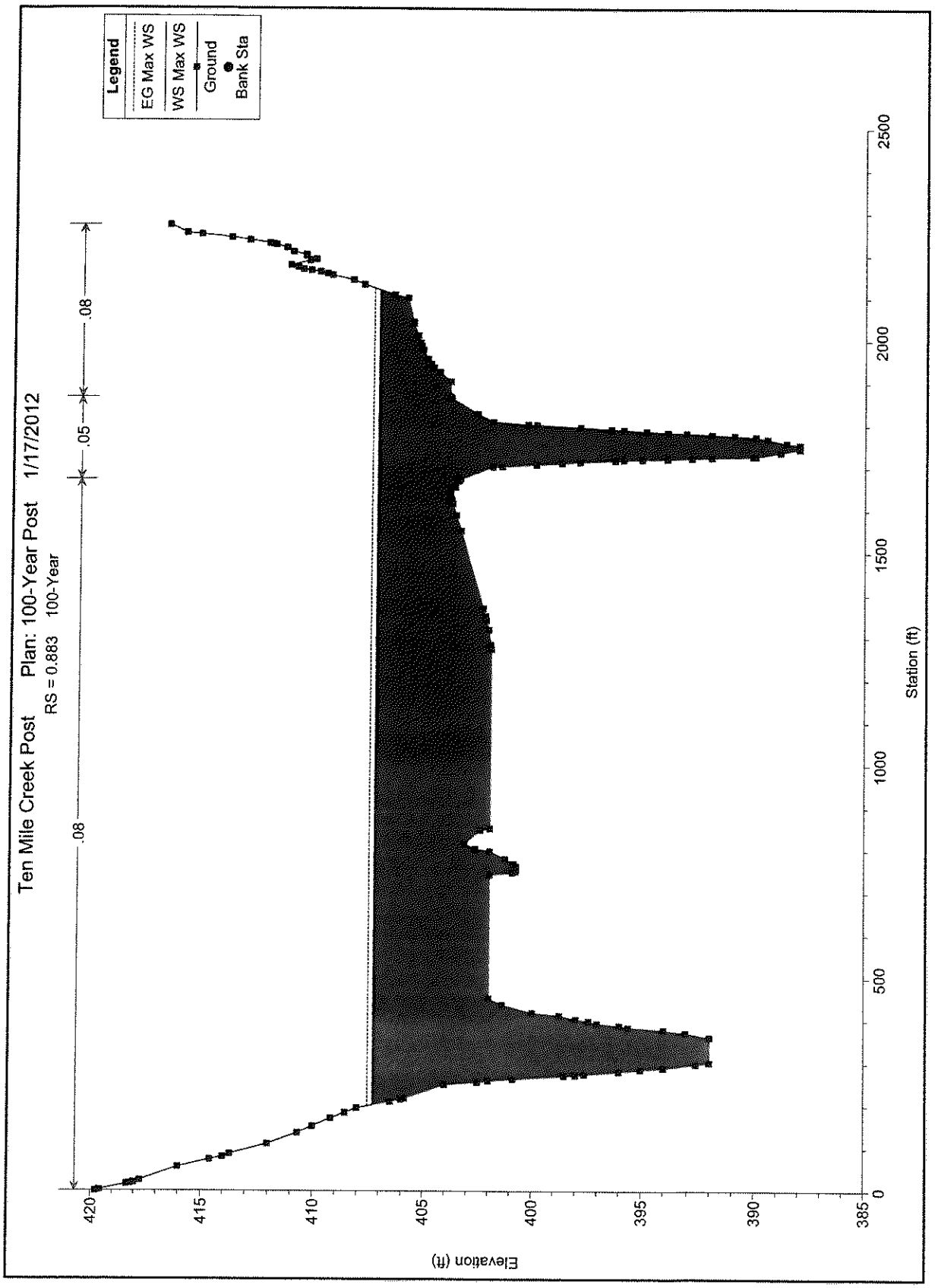

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.180 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

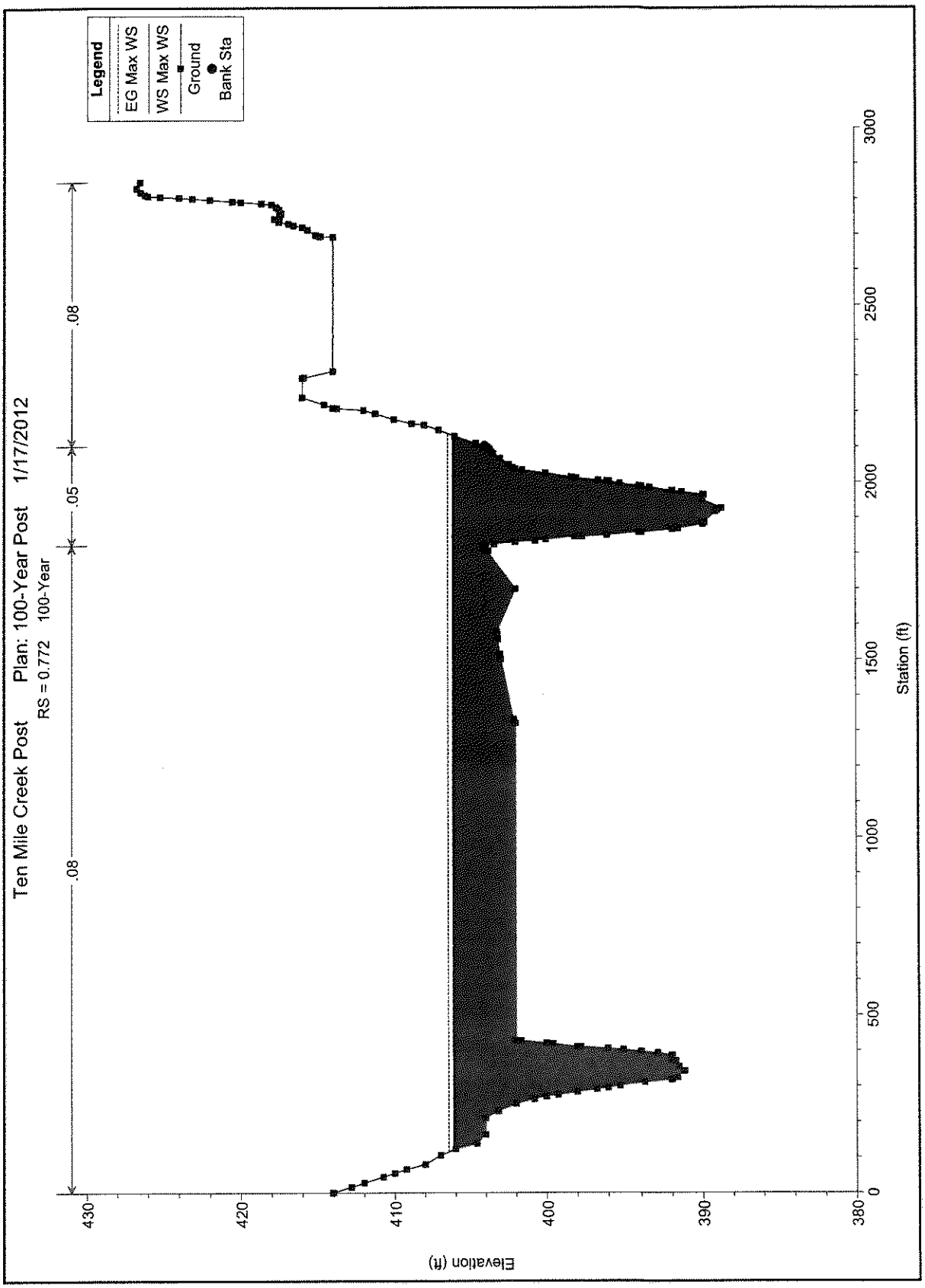

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 1.114 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000

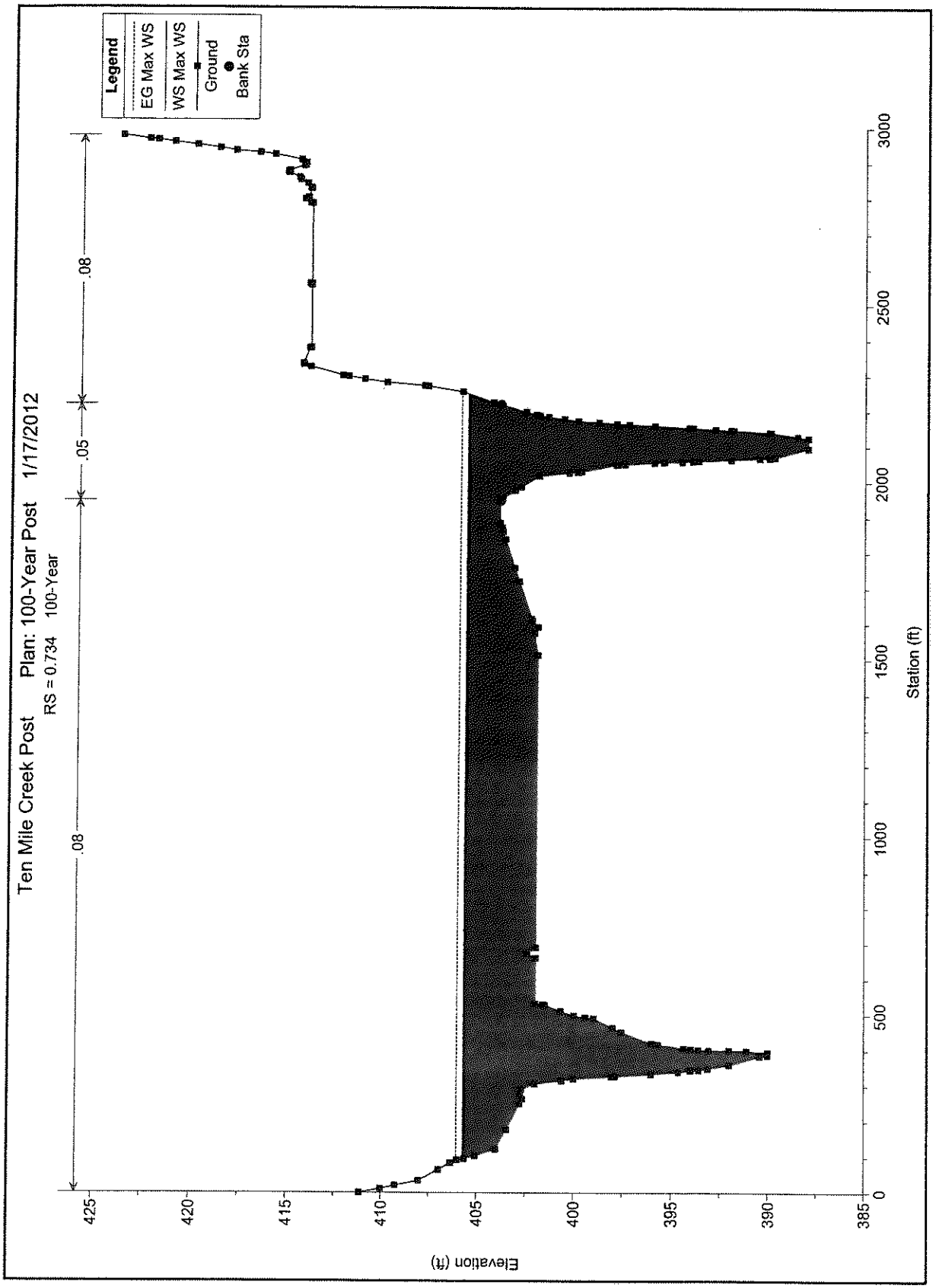

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 0.990 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

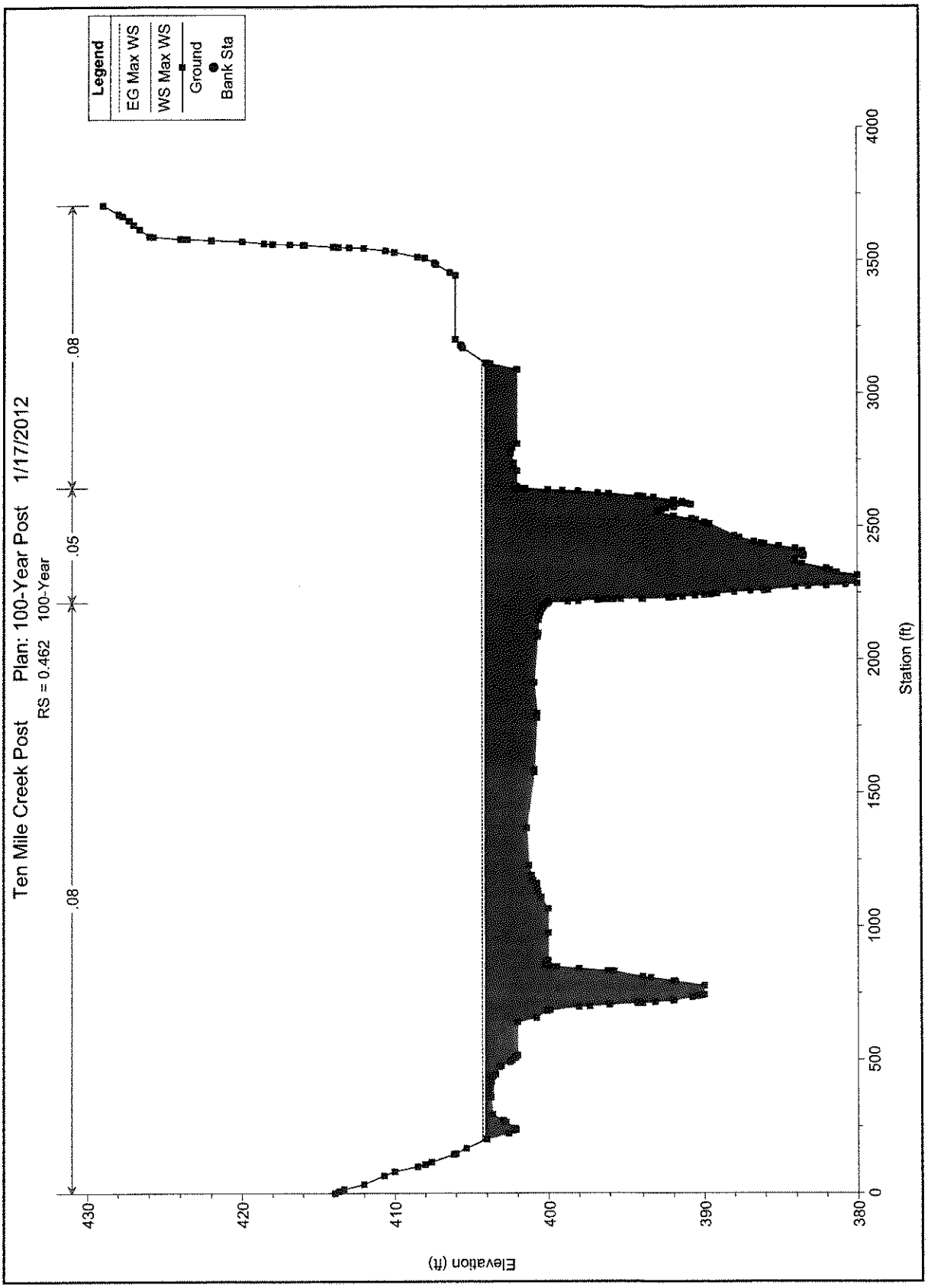

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 0.947 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
450
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)

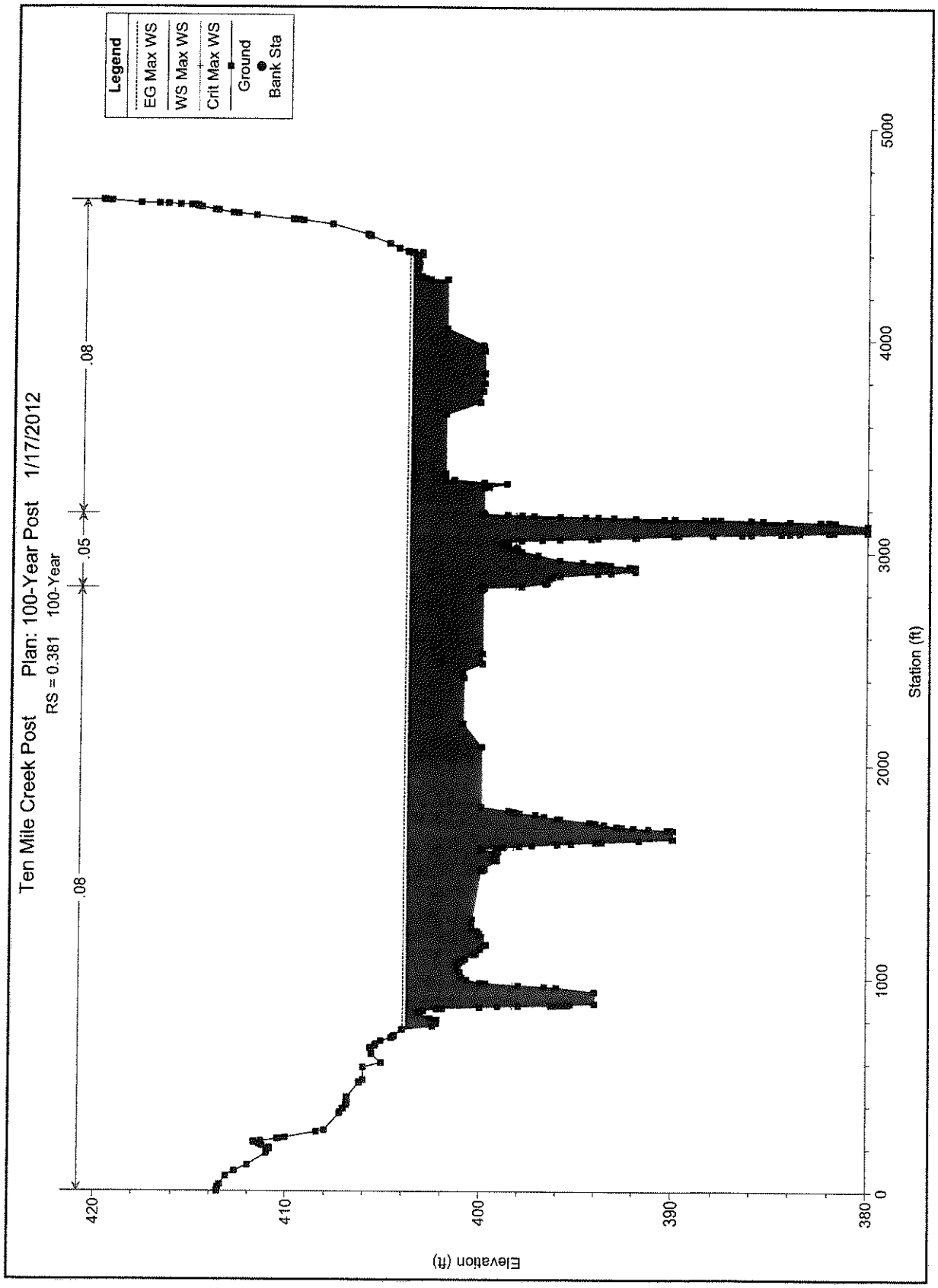

Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 0.927 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
440
430
420
410
400
390
380
0
1000
2000
3000
4000
Station (ft)


Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 0.883 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
420
415
410
405
400
395
390
385
0
500
1000
1500
2000
2500
Station (ft)


Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 0.772 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
430
420
410
400
390
380
0
500
1000
1500
2000
2500
3000
Station (ft)


Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 0.734 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
425
420
415
410
405
400
395
390
385
0
500
1000
1500
2000
2500
3000
Station (ft)


Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 0.462 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
430
420
410
400
390
380
0
500
1000
1500
2000
2500
3000
3500
4000
Station (ft)


Ten Mile Creek Post Plan: 100-Year Post 1/17/2012
RS = 0.381 100-Year
.08
.05
.08
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
420
410
400
390
380
0
1000
2000
3000
4000
5000
Station (ft)