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adequately. If such drying is allowed, then additional effort will be necessary to assure even moisture distribution and hydration. Hydration times shall be evaluated and determined if acceptable by the POR.

2.2.4 Minimum Compaction Requirements

Processed loose lifts shall be leveled prior to compaction to provide uniform compaction effort over the lift. Each lift shall be compacted to the moisture and density requirements established for the project and as set forth in the provisions of this LQCP. The lifts shall be compacted to at least 95 percent of the maximum dry density with a corresponding moisture content at or up to 5 percent above optimum determined by standard Proctor test results (ASTM D698) conducted on similar representative material. The above criteria shall be utilized, unless pre-construction hydraulic conductivity tests were performed at higher or lower densities or moisture contents, in which case these density and moisture values will be used as field compaction minimums. The soil liner density must be expressed as a percentage of the maximum dry density and at the corresponding optimum moisture content as discussed in this section.

In the event that subsequent laboratory testing of samples from an area of constructed liner indicate an alternate moisture density curve is appropriate for the soil type, the CQA monitor will switch to the appropriate curve as necessary. It is recognized that laboratory data becomes available often several days after construction of an area of clay liner. If the laboratory data indicates that the area constructed using the incorrect moisture-density curve meets the permeability requirements for a constructed clay liner (i.e., less than or equal to 1×10^{-7} cm/sec), the area will be considered acceptable as clay liner.

Soil liners shall not be compacted with a bulldozer or any track-mobilized equipment unless it is used to pull a footed roller; however, this practice is not encouraged. All soil liners shall be compacted with a pad-footed or prong-footed roller only. Bulldozers, pneumatic rollers or scrapers, and flat-wheeled rollers will not be permitted for compaction.

Construction survey control should be conducted routinely during lift placement to verify that loose and finished lifts are of the proper thickness to ensure uniform compaction.

2.2.5 Lift Bonding and Liner Tie-In

Interlift bonding shall be accomplished prior to placing the subsequent loose lift. Compactors shall be of sufficient weight and foot length to penetrate the current lift when loose and provide bonding to the previous lift.

When lifts of the soil liner are not constructed continuously, a vertical construction joint may occur. To remove the vertical construction joint(s), the edge of the adjoining liner section shall be cut back or flattened to permit offsetting the tie-in for subsequent lifts as shown on Figure III-3F-1. For each 6-inch lift, the edge should be cut back at least 2.5 feet or graded to a maximum slope of 5H:1V, and then the corresponding adjoining lift should be placed against the existing finished lift. The new loose lift and at least 2 feet of the

2.2.4 Minimum Compaction Requirements

Processed loose lifts shall be leveled prior to compaction to provide uniform compaction effort over the lift. Each lift shall be compacted to the moisture and density requirements established for the project and as set forth in the provisions of this FCQCP. Lifts shall be compacted to at least 95 percent of the maximum dry density with a corresponding moisture content at or up to 5 percent above optimum determined by standard Proctor test results (ASTM D698) conducted on similar representative material. The above criteria shall be utilized, unless pre-construction hydraulic conductivity tests were performed at higher or lower densities or moisture contents, in which case these density and moisture values will be used as field compaction minimums. The soil liner density must be expressed as a percentage of the maximum dry density and at the corresponding optimum moisture content as discussed in this section.

In the event that subsequent laboratory testing of samples from an area of constructed cohesive soil cover indicate an alternate moisture density curve is appropriate for the soil type, the CQA monitor will switch to the appropriate curve as necessary. It is recognized that laboratory test results become available often several days after construction of an area of cohesive soil cover. If the laboratory testing data indicates that the area constructed using the incorrect moisture-density curve meets the permeability requirements (i.e., less than or equal to 1×10^{-5} cm/sec), the area will be considered acceptable as cohesive soil cover.

Cohesive soil covers shall not be compacted with a bulldozer or any track-mobilized equipment unless it is used to pull a footed roller; however, this practice is not encouraged. All cohesive soil covers shall be compacted with a pad-footed or prong-footed roller only. Bulldozers, pneumatic rollers or scrapers, and flat-wheeled rollers will not be permitted for compaction.

Construction survey control should be conducted routinely during lift placement to verify that loose and finished lifts are of the proper thickness to ensure uniform compaction.

2.2.5 Lift Bonding and Cohesive Soil Cover Tie-in

Interlift bonding shall be accomplished prior to placing the subsequent loose lift. Compactors shall be of sufficient weight and foot length to penetrate the current lift when loose and provide bonding to the previous lift.

When lifts of the cohesive soil cover are not constructed continuously, a vertical construction joint may occur. To remove the vertical construction joint(s), the edge of the adjoining section shall be cut back or flattened to permit offsetting of the tie-in for subsequent lifts. For each 6-inch lift, the edge should be cut back at least 2.5 feet or graded to a maximum slope of 5H:1V, and then the corresponding adjoining lift should be placed against the existing finished lift. The new loose lift and at least 2 feet of the adjoining existing lift will be processed together, and then recompacted, so that the existing cohesive soil cover edge is tied to new construction without superimposed vertical construction joints. This tie-in procedure shall be

repeated lift-by-lift until all corresponding adjacent lifts are constructed to the required elevation. The cut back edge of the existing cohesive soil cover may be done all at once or one lift at a time.

2.3 Construction Monitoring and Conformance Testing

Quality assurance of recompacted cohesive soil covers shall consist of monitoring the work as cohesive soil cover construction proceeds and laboratory and field testing to assure that material conformance and construction performance specifications are achieved.

2.3.1 Monitoring and Observations

Full-time quality assurance monitoring and testing will be performed during the course of cohesive soil cover construction. The work will be performed by a POR described in Section 1.2, or by a CQA monitor working under the general supervision of the POR. The CQA monitor will be on-site at all times when cover construction is ongoing, so that all relevant activities can be observed and documented. The POR will visit the site periodically as construction progress warrants. Such visits will be frequent enough so that the POR is fully knowledgeable of the construction methods and performance, so that the POR can determine that quality control monitoring and testing activities are adequate to meet the terms and intent of this FCQCP.

Visual observation shall include, but not be limited to, the following:

- Moisture content and distribution, particle size, and other physical properties of the soil during processing, placement, and compaction
- Type and level of compactive effort, including roller type and weight, drum size, foot length and face area, and number of passes
- Action of compaction equipment on soil surface (i.e., foot penetration, rolling, pumping, or shearing)
- Maximum clod size and breakdown of soil structure
- Method of bonding lifts together and making cohesive soil cover tie-ins
- Stones or other inclusions, which may damage overlying geosynthetics components or adversely affect compaction, lift bonding, and in-place testing/sampling
- Areas where damage due to excess moisture, insufficient moisture, or freezing may have occurred

2.3.2 Construction Testing

During cohesive soil cover construction, the minimum testing and sampling program presented in Table III-7A-2 shall be conducted to determine that adequate compaction and material conformance are being achieved.