SECTION 31 24 00

EMBANKMENT

PART 1 - GENERAL

1.01 This work shall consist of forming embankments using materials from excavation or other approved sources and complying with the lines, grades, and cross sections shown on the drawings.

1.02 Before placing embankment thereon, complete the clearing and grubbing of embankment areas in accordance with the requirements of Section 31 11 00, Clearing and Grubbing.

1.03 Conduct all embankment operations in accordance with the requirements of the geotechnical report, available at the office of the A/E and the owner.

1.04 All embankment operations shall be conducted in strict compliance with the erosion control requirements and the contractor-obtained NPDES permit for the project.

1.05 Owner shall employ and pay for services of an independent testing laboratory to perform specified inspection and testing.

1.06 Employment of testing laboratory shall in no way relieve contractor of obligation to perform work in accordance with requirements of contract documents.

1.07 General Contractor (GC) to deliver to laboratory at designated location adequate samples of the materials to be used that require testing together with proposed mix designs.

1.08 Cooperate with laboratory personnel, and provide access to work and to manufacturers' facilities, as applicable.

1.09 General Contractor (GC) to provide incidental labor and facilities, access to work to be tested, to obtain and handle samples at the site or at the source of product to be tested, to facilitate tests and inspections, and for storage and curing of test samples.

1.10 General Contractor (GC) to notify Architect/Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

PART 2 - PRODUCTS

2.01 Use only acceptable materials in embankment formation. Do not place frozen material, stumps, logs, roots, or other perishable materials in any embankment. Do not place stone or masonry fragments greater than 4 inches in any dimension within 12 inches of the finished subgrade elevation.

PART 3 - BORROW EXCAVATION

3.01 Whenever the backfill of excavated areas or the placement of embankments requires more material than is available from authorized excavations, or whenever the backfill material from such excavation is unsuitable, then obtain additional material from other sources. This may require the opening of borrow pits at points accessible to the work. In such cases, make suitable arrangements with the property owner and pay all incidental costs, including any royalties, for the use of the borrowed material. Before a borrow pit is opened, the quality and suitability of its material shall be approved by the A/E and the geotechnical engineer. Provide copies of

agreements from the property owner for borrow pits, and copies of all permits, including NPDES Construction Stormwater and Grading permits.

3.02 Excavate borrow pits in such a way that the remaining surfaces and slopes are reasonably smooth and that adequate drainage is provided over the entire area. Construct drainage ditches wherever necessary to provide outlets for water to the nearest natural channel, thus preventing the formation of pools in the pit area. Leave the sides of borrow pit cuts at a maximum slope of 3:1 unless otherwise directed by the A/E.

3.03 Properly clear and grub borrow pits, and remove all objectionable matter from the borrow pit material before placing it in the backfill.

3.04 The Contractor is responsible for paying all costs and obtaining any permits required for the opening of any borrow pits associated with the project.

PART 4 - EXECUTION

4.01 Remove topsoil from all embankment areas to a depth of approximately 6 inches, or to a greater depth wherever the soils investigation report or Geotechnical Engineer so indicates.

4.02 Form earth, soft shale, soft sandstone, weathered rock, bank gravel, or creek gravel embankment by distributing the material in successive uniform horizontal layers no more than 8 inches thick (loose depth) to the full width of the cross section. However, layers less than 8 inches in loosed thickness will be required whenever necessary to obtain the specified density. Compact each layer as specified below. Shape the upper surface of the embankment so as to provide complete drainage of surface water at all times. The forming of ruts will not be permitted.

4.03 In embankments constructed principally of unweathered limestone, hard shale, or hard sandstone, the layer thickness shall not exceed 3 feet; the maximum dimensions of boulders or large rocks placed in the embankment shall be 3 feet vertically and approximately 4-1/2 feet horizontally. Keep rocks with any dimension greater than 2 feet at least 2 feet below the subgrade elevation. Follow the geotechnical engineer recommendations or structural engineer requirements as to layer thickness or material dimensions if they are more stringent than these requirements. Do not dump the rock into final position, but instead distribute it by blading or dozing in a manner that will ensure proper placement in the embankment so that voids, pockets, and bridging will be reduced to a minimum. The slopes shall conform substantially with the requirement of the drawings.

4.04 In areas where layers of rock and shale or soil are encountered and embankments are constructed of a mixture of rock and soil, place, manipulate, and compact the material in layers no more than 12 inches thick; however, when the thickness of the rock exceeds 12 inches, the thickness of the embankment layers may be increased (except beneath building areas) as necessary due to the nature of the material and as approved by the A/E. Follow the geotechnical engineer recommendations or structural engineer requirements as to layer thickness or material dimensions if they are more stringent than these requirements. In no case allow the layer thickness to exceed 3 feet. Do not dump the mixture into final position, but distribute it by blading or dozing in a manner that will ensure proper placement in the embankment so that voids, pockets, and bridging will be reduced to a minimum. Then compact the mixture with suitable compaction equipment.

4.05 Compact the embankment to a density of at least 98% of the maximum density as determined by ASTM D698 (Standard Proctor) for roadway or in accordance with the geotechnical investigation, whichever is more stringent. Areas for landscaping can be compacted to 90%. Refer to the geotechnical investigation for additional fill and compaction recommendations. See Part 5, Testing.

4.06 During compaction, wet embankment material that does not have enough moisture for proper compaction to be obtained, and thoroughly mix as necessary. Allow embankment material containing an excess of moisture to dry before compacting it, manipulating as necessary to speed drying.

4.07 Perform construction operations so that simultaneous rolling and placing of material in the same lane or section is prevented. To avoid uneven compaction, see that hauling equipment traverses the full width of the cross section as much as possible. Compact each layer as necessary before depositing material for the next layer.

4.08 The density requirements shall be the controlling factor in compaction. Use only such equipment as will satisfy requirements at all times.

4.09 Construct embankments adjacent to structures as outlined to the height of the structure, and slope far enough away from the structure to permit easy access of compacting equipment used in normal embankment construction.

4.10 Over-construct embankments, compact in accordance with the above requirements and cut the embankment slopes to finished grades as required by the plans.

4.11 Where buildings are construction on embankments, the embankment shall extend a minimum of 10 feet outside of the foundation or as required by the geotechnical engineer and structure engineer.

4.12 Embankments to be constructed at a maximum slope of 3 feet horizontal to 1 foot vertical (3:1), unless otherwise allowed by the geotechnical engineer.

PART 5 - TESTING

5.01 SELECTION AND PAYMENT

A. Owner shall employ and pay for services of an independent testing laboratory to perform specified inspection and testing.

B. Employment of testing laboratory shall in no way relieve contractor of obligation to perform work in accordance with requirements of contract documents.

5.02 CONTRACTOR RESPONSIBILITIES

A. Deliver to laboratory at designated location adequate samples of the materials to be used that require testing together with proposed mix designs.

B. Cooperate with laboratory personnel, and provide access to work and to manufacturers' facilities, as applicable.

C. Provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples at the site or at the source of product to be tested, to facilitate tests and inspections, and for storage and curing of test samples.

D. Notify Architect/Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

END OF SECTION