**SPECIAL PROVISIONS**
**FOR**
**LEVEE CONSTRUCTION**

**Fremont County**
**NHSX-002-1(122)--3H-36**

**Effective Date**
**June 26, 2019**

**THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

## 150550.01 DESCRIPTION.

The work covered by these Special Provisions consists of furnishing all labor and materials, and performing all operations in connection with the construction of Missouri River Levee L-575 Highway 2 Setback Levee, as shown in the contract documents.

## 150550.02 MATERIALS.

### A. General.

1. The levee embankments shall be constructed of Cohesive Fill Material which shall be obtained from approved borrow areas.

2. The seepage berm embankment shall be constructed of Sand Fill Material which shall be obtained from approved borrow areas.

3. Earth used in construction of embankments shall be free of unsuitable materials.

### B. Cohesive Fill Material.

Cohesive Fill Material shall consist of cohesive materials having at least 50% passing the U.S. Standard 200 mesh sieve size. Cohesive materials consist of materials classifying as lean (CL), having a Plasticity Index of 10 or greater, and falling between the “U” line and the “A” line on Figure 3 in ASTM D 2487 – Standard Tests for Classifications of Soils for Engineering Purposes and a Liquid Limit less than 50.

### C. Sand Fill Material.

Sand Fill material shall consist of pervious material having less than 12% passing the U.S. Standard 200 mesh sieve size. Pervious materials consist of materials classifying as poorly graded sand (SP), poorly graded sand with silt (SP-SM), well graded sand (SW), and sell graded sand with silt (SW-SM).

**D. Unsuitable Materials.**
Unsuitable materials are materials containing debris, brush, roots, sod, organic matter or stones with dimensions greater than one-half the loose layer thickness and shall not be used in the levees. Frozen earth, snow, or ice be shall not be used in the levees.

**E. Suitable Materials.**
Suitable materials for construction of the levee embankment and seepage berm embankment will include materials described in this Article. A material will not be classified as unsuitable based on its moisture content. See Article 150550.02, D.

**F. Toe Drain.**

**1. Engineering Fabric.**
8-ounce per square yard nonwoven geotextile separation fabric with the following properties:
- Minimum Grab Strength = 200 pounds
- Minimum tear Strength = 80 pounds
- Minimum Puncture Strength = 500 pounds
- Apparent Opening size = No. 80 Sieve
- Minimum Water Flow Rate = 110 gallons per minute per square foot

**2. Porous Backfill Material.**
Material meeting the requirements of Section 4131 of the Standard Specifications.

**3. Erosion Stone.**
Material meeting the requirements of Section 4130 of the Standard Specifications.

**G. Pre-Construction Testing of Proposed Borrow Materials.**

**1.** Submit to the Engineer for approval the results of grain size testing (ASTM D 6913 and D 7928) and plasticity testing (ASTM D 4318) on all Cohesive Fill Materials proposed for use in the levee embankment.

**2.** Submit to the Engineer for approval the results of grain size testing (ASTM D 6913 and D 7928) on all Sand Fill Materials proposed for use in the seepage berm embankment.

**3.** The source of materials proposed for use in the levee and seepage berm embankments shall also be submitted. These submittals must be approved by the Engineer prior to the placement of materials within the levee section.

## 150550.03 CONSTRUCTION.

**A. Notifications.**
The following shall be notified at least 1 week prior to removal of the existing Levee.

**Design Engineer.**
Patrick H. Poepsel, P.E.
HDR, Inc.
1917 S 67th St.
Omaha, Nebraska 68106
Phone: 402-399-1368
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**B. Levee Embankment Subgrade Preparation.**

1. **General.**
   Following dewatering and after removal of flood-deposited sands and stripping and removal of organics and unsuitable foundation material, cavities or other depressions shall be broken down to flatten out the slopes. Immediately prior to the placement of Cohesive Fill Material the entire earth surface on or against which fill is to be placed, shall be thoroughly broken and scarified to a depth of 6 inches and the area to be occupied by the embankments shall be compacted in accordance with the provisions specified in Article 150550.03, C. If for any cause, this foundation surface or other fill surface that is to receive fill becomes compacted in such a manner that, in the opinion of the Engineer, a plane of seepage or weakness might be induced, it shall be scarified to a depth of 6 inches before the depositing of material thereon.

2. **Requirements.**
   The depth of stripping on the existing slopes of levees, seepage berms, and roadway embankments shall not exceed 6 inches. All slopes upon which fill is to be placed shall be notched and broken up so that the fill material will bond with the existing material. Water shall be added as needed to achieve compaction requirements. All notching, scarifying, and breaking of ground surface shall be done parallel to the centerline of the embankment being constructed. All foundation preparation shall be approved by the Engineer prior to placement of embankment. No fill shall be placed upon frozen ground.

3. **Existing Embankments.**
   At locations where the levee or other embankments tie to existing earth embankments to complete the levee construction, such embankment surface slopes shall be flattened to 4 Horizontal to 1 Vertical or flatter notched, scarified and compacted as specified herein. For slopes steeper than 4 Horizontal to 1 Vertical, 1 foot tall benches shall be cut into the existing slope.

4. **Inspection Trench.**
   An inspection trench shall be excavated a minimum of 2 feet deep and 16 feet wide beneath the riverward toe of the levee. The inspection trench shall be approved by the Engineer prior to placement of embankment.

**C. Seepage Berm Embankment Subgrade Preparation.**

1. No stripping of the subgrade or removal of flood-deposited sand in the areas outside of the roadway embankment footprint is required. Trees and shrubs shall be cleared and grubbed and flood debris shall be removed.

2. Stripping of the subgrade and removal of sand shall be completed within the footprint of the roadway embankment.

3. The depth of stripping on the existing slopes of levees, seepage berms, and roadway embankments shall not exceed 6 inches. No fill shall be placed upon frozen ground.

**D. Embankment Construction and Testing.**

1. **General.**
   a. Apply Section 2107 of the Standard Specifications, except when amended by requirements of this specification. Verify embankment placed with moisture and density control meets the requirements of Article 2107.03, I of the Standard Specifications.

   b. Place Cohesive Fill Material in successive horizontal layers not more than 8 inches in depth prior to compaction. Each layer shall be spread uniformly on the previously compacted surface; plowed, disked, or otherwise broke up; moistened or aerated as necessary; thoroughly mixed and compacted to produce embankments having the following moisture and density requirements. If in the opinion of the Engineer, the surface

of any compacted layer is too smooth to bond properly with the succeeding layer, it shall be scarified to the satisfaction of the Engineer before the succeeding layer is placed thereon. The Contractor shall use equipment which achieves the compaction specified below and which will not create seams between embankment lifts.

**c.** Place Sand Fill Material within the footprint of the roadway embankment as specified for roadway embankment material.

**d.** Place Sand Fill Material in successive horizontal layers not more than 12 inches in depth prior to compaction. Each layer shall be spread uniformly on the previously compacted surface; plowed, disked, or otherwise broke up; moistened or aerated as necessary; thoroughly mixed and compacted. The gradation and distribution of materials shall be such that the embankment will be free from lenses, pockets, streaks, and layers of material differing substantially in texture or gradation from surrounding material of the same material type. Hydraulic fill procedures shall be submitted for approval.

**e.** Sand fill Material within the limits of the roadway embankment shall be placed on a prepared subgrade where all grasses and topsoil have been completely removed.

**2. Quality Control Program.**

**a.** Provide and maintain a Quality Control Program (Embankment Construction). This is defined as process control sampling, testing, and inspection as described in Materials I.M. 540 for construction of embankments with moisture and density control.

**b.** Provide a Quality Control Technician who is responsible for all process control sampling, testing, and inspection. The Quality Control Technician shall obtain Soils Technician certification through the Iowa DOT Technical Training and Certification Program (TTCP).

**c.** Provide a laboratory facility and necessary calibrated equipment to perform required tests.

**d.** Notify the Engineer when a moisture content falls outside specified control limits or density falls below required minimum. If a moisture content falls outside control limits, fill material in this area will be considered unacceptable for compaction. Perform corrective action(s) to bring uncompacted fill material within control limits. If material has been compacted, disk it, bring to within control limits, and re-compact. When project has a density requirement, if an in-place density does not meet the requirements, compacted fill material in this area will be considered unacceptable. Perform corrective action(s) to material to meet density requirements. Compensation will not be allowed for delays resulting from moistening, disking, or re-compacting.

**3. Test Procedures.**

**a.** Use test procedures complying with Materials I.M. 204, Appendix A.

**b.** Atterberg Limits (ASTM D 4318) and grain size analysis (ASTM D 6913 and D 7928) shall also be determined for each of the representative materials. Copies of all test results made for and used as a basis for moisture and density control shall be furnished to the Engineer in advance of the time that materials are to be placed in the embankments.

**4. Moisture and Density Control (Levee Embankment Only).**

Cohesive Fill Materials placed in embankments shall be compacted to a density of at least 95% of the maximum dry density and be within -2% to +3% of the optimum moisture content at the time the compactive effort is applied which may require the addition of water or aeration of materials.

**5. Seepage Berm Embankment.**

**a.** Compaction of the seepage berm outside the limits of the roadway embankment shall be achieved by the controlled movement of the hauling and spreading equipment to create a stable surface for each lift of fill. Moisture content for each layer shall be controlled such that the material is stable under the hauling and spreading equipment without creating ruts greater than 3 inches.

**b.** The seepage berm material within the limits of the roadway shall be compacted as specified for roadway embankment material.

**E. As-Built Survey.**
Upon completion of placement of Cohesive Fill Material and Sand Fill Material and prior to placement of topsoil or surfacing, complete an as-built survey of the levee limits. The as-built survey shall be completed by a surveyor licensed in the State of Iowa. The results of the as-built survey shall be provided to the Engineer. Areas determined to be deficient by the Engineer shall be immediately restored and confirmed by survey. Survey information shall be reported in a table format with levee stations and elevations presented along the levee centerline at 25-foot intervals and in graphical format in plan and profile view and cross-sections at 25-foot intervals. The plan view shall show the levee centerline, levee station, and 1-foot elevation contours. The profile view shall show the elevation at the levee centerline.

**F. Removal of Existing Levee.**
The existing levee and existing levee cohesive material shall be excavated and stockpiled as indicated on the plans.

## 150550.04 METHOD OF MEASUREMENT.

**A.** The quantity of Embankment-In-Place, Contractor Furnished, Cohesive for Contractor-furnished Cohesive Fill Material will be measured in cubic yards placed. The Engineer will determine the quantity of materials placed using cross section and end area methods. The quantity for which payment is made will not exceed that necessary to construct the embankment to the neat cross section shown in the contract documents, adjusted for settlement. Shrinkage will not be included in the quantity.

**B.** The quantity of Embankment-In-Place Select, Contractor Furnished, Select Sand for Contractor-furnished Sand Fill Material will be measured in cubic yards placed. The Engineer will determine the quantity of materials placed using cross section and end area methods. The quantity for which payment is made will not exceed that necessary to construct the embankment to the neat cross section shown in the contract documents, adjusted for settlement. Shrinkage will not be included in the quantity.

**C.** The quantity of Surface Preparation for Levee for Levee Embankment Subgrade Preparation will be measured in square yards.

**D.** The quantity of Toe Drain for construction of the Toe Drain will be measured in linear foot.

**E.** The quantity of Excavate and Stockpile for existing levee cohesive material will be measured in cubic yards stockpiled. The Engineer will determine the quantity of materials stockpiled using cross section and end area methods. Shrinkage will not be included in the quantity.

## 150550.05 BASIS OF PAYMENT.

**A.** The quantities accepted for payment will be paid for at the contract unit price.

The contract unit prices will be full and complete payment for providing all design, materials, labor, equipment, and incidentals to complete the work.

Except for water added, payment for Embankment-In-Place, Contractor Furnished, Cohesive and Embankment-In-Place, Contractor Furnished, Select Sand is full compensation for all work involved in furnishing, excavating, hauling, and incorporating this material into the levee.

**B.** Payment for Compaction with Moisture and Density Control will be the contract unit price in cubic yards for the quantity of embankment placed with moisture and density control.

Payment is full compensation for furnishing a Quality Control Technician, sampling and testing, process control inspection, working of drying material, furnishing and applying water, controlling moisture content of the materials, and compacting the materials to the required density, as specified.