



**SPECIAL PROVISION
FOR
LEVEE CONSTRUCTION**

**Pottawattamie County
IM-NHS-080-1(385)0--03-78**

**Effective Date
April 21, 2015**

THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

120292.01 DESCRIPTION.

The work covered by this Special Provision consists of furnishing all labor and materials, and performing all operations in connection with the construction of the Ramp C Levee, North Levee, and South Levee, as shown in the contract documents.

120292.02 MATERIALS.

A. General.

The levee embankments shall be constructed of impervious fill and random fill which shall be obtained from on site excavation and approved borrow areas. Earth used in construction of embankments shall be free of unsuitable materials.

See Article 120292.03, D, 2 for zoning requirements in the impervious fill and random fill.

B. Impervious Fill.

Impervious fill 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. Random Fill.

Material for random fill shall consist of clays, silts, and sands that are obtained from the project site or approved borrow areas. The maximum particle size for the random fill shall be 3 inches in diameter.

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 shall not be used in the levees.

E. Suitable Materials.

Suitable materials for construction of the levee embankment will include materials described in this Article. A material will not be classified as unsuitable based on its moisture content. See Article 120292.02, D.

F. Pre-Construction Testing of Proposed Borrow Materials.

Submit to the Engineer for approval the results of grain size testing (ASTM D 422), plasticity testing (ASTM D 4318), and CU triaxial compression testing (3-point test with pore pressure measurements) (ASTM D 4767) on all Impervious Fill materials obtained from contractor provided off-site borrows proposed for use in the levee construction.

Submit to the Engineer for approval the results of direct shear testing on all cohesionless (sand) materials proposed for use in the levee construction. The tests shall be performed in accordance with ASTM D 3080.

The strengths of the borrow materials proposed for use in the levee construction shall be equal to or greater than the minimum required values presented below.

Design Shear Strengths – Levee Fill					
Material	Unit Weight	CU Strengths		CD Strengths	
	γ_{total}	c	Φ	c'	Φ'
	(pcf)	(psf)	(psf)	(psf)	(degrees)
new fill – clay	120	500	14	50	28
new fill – sand	117	0	30	0	30

The Impervious Fill material obtained from the Detour 293 excavation are excluded from the pre-construction testing requirements.

For the North Levee Seepage Berm material only the grain size testing (ASTM D 422) shall be submitted.

The estimated quantity and location of materials proposed for use in the levee embankment shall also be submitted. These submittals must be approved by the Engineer prior to the placement of materials within the levee section. Allow 9 weeks for review of any submittal or resubmittal.

120292.03 CONSTRUCTION.

A. Notifications.

The following shall be notified at least 1 week prior to beginning any excavations within the existing South Levee section, at least 1 week prior to construction of the Ramp C Levee or North Levee.

City of Council Bluffs.

Jeff Krist, P.E.
 City of Council Bluffs, Public Works Dept.
 290 Pearl Street
 Council Bluffs, Iowa 51503
 Phone: 712-328-4635 (office)
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Iowa DOT Resident Construction Engineer.

David Dorsett, P.E.
 3538 S. Expressway
 Council Bluffs, Iowa 51501
 Phone: 712-366-0568

Email: David.Dorsett@dot.iowa.gov

Iowa DOT District 4 Construction Engineer.

George Feazell, P.E.
2210 East 7th Street
Atlantic, Iowa 50022
Phone: 712-243-3355
Email: George.Feazell@dot.iowa.gov

Section 408 Engineer.

Patrick H. Poepfel, P.E.
HDR, Inc.
8404 Indian Hills Drive
Omaha, Nebraska 68114
Phone: 402-399-1368
Email: Patrick.Poepfel@hdrinc.com

B. Subgrade Preparation.

1. General.

After stripping and removal of unsuitable foundation material, cavities or other depressions shall be broken down to flatten out the slopes. Immediately prior to the placement of fill material the entire earth surface on or against which fill is to be placed, shall be thoroughly broken 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 120292.03, 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 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 notched, scarified and compacted as specified herein. When directed by the Engineer, such operations shall be accomplished parallel to the axis of the existing embankment.

C. 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. Fill material, as specified in Article 120292.02, shall be placed 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 must use equipment which achieves the compaction specified below and which will not create seams between embankment lifts.

2. Quality Control Program (Embankment Construction).

- 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 422) 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.

Cohesive materials placed in embankments shall be compacted to a density of at least 95% of the maximum dry density and be within -1% to +4% of the optimum moisture content at the time the compactive effort is applied which may require the addition of water or aeration of materials. Non-cohesive materials used in the embankments will be placed in a moist condition and compacted with approved equipment to a density of at least 95% of the maximum dry density.

D. Levee Section and Zoning.

1. Levee Section.

- a. South Levee: The riverside face of the existing South Levee shall be overexcavated a minimum of 5 feet, measured normal to the slope, or as directed by the Engineer. Backfill to reconstruct the levee section shall consist of impervious fill meeting the requirements of Article 120292.02, B, placed and compacted as specified in Article 120292.03.
- b. Ramp C Levee: For the Ramp C Levee, the embankment shall be comprised of a facing of impervious fill meeting the requirements of Article 120292.02, B, and random fill meeting the requirements of Article 120292.02, C. The facing shall consist of lean clay (CL) soils placed a minimum of 5 feet in thickness on the riverside slope. The impervious fill and the random fill shall be placed and compacted as specified in Article 120292.03.
- c. North Levee: For the North Levee, the embankment shall be comprised of a facing of impervious fill meeting the requirements of Article 120292.02, B, and random fill meeting the requirements of Article 120292.02, C. This facing shall consist of lean clay (CL) soils placed a minimum of 5 feet in thickness on the riverside slope and 3 feet in thickness on

the crest and landside slope measured normal to the slope. The impervious fill and the random fill shall be placed and compacted as specified in Article 120292.03.

- d. North Levee Seepage Berm: For the North Levee Seepage Berm, the embankment shall be comprised of random fill meeting the requirements of Article 120292.02, C. This embankment shall consist of silty sand or poorly graded sand (SM or SP). The random fill shall be placed and compacted as specified in Article 120292.03.

2. Zoning of Materials.

In general, the levee section shall be relatively homogeneous except for the impervious facing. Where materials of varying permeability are encountered in the borrow areas, the more impervious material shall be placed toward the riverside slope and the more pervious material toward the landside.

E. As-Built Survey.

Upon completion of placement of Impervious Fill 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.

120292.04 METHOD OF MEASUREMENT.

- A. The quantity of Class 10 Excavation, Roadway and Borrow requiring excavation and placement of impervious fill and random fill will be measured in cubic yards for which payment made will be the quantity shown in the contract documents.
- B. The quantity of Embankment-In-Place for Contractor furnished Impervious Fill, will be measured in cubic yards placed.

120292.05 BASIS OF PAYMENT.

- A. The quantities of Class 10 Excavation, Roadway and Borrow and Embankment-In-Place 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.
- 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.