SP- 231049
(New)

SPECIAL PROVISIONS
FOR
LEVEE CONSTRUCTION

Polk County
HDP-1945(411)--71-77

Effective Date
January 22, 2025

THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART 1 GENERAL

1.01 Description of Work.

A. This specification covers the furnishing of all material, equipment, labor, temporary measures, and performing operations associated with levee construction.

B. Levee Construction shall consist of:
1. Clearing, grubbing, and stripping of the areas specified herein or indicated on the plans
2. Excavations
3. Foundation preparation and construction of levee embankments
4. All work under this section will comply with the requirements of Section 2102 of the Standard Specifications.

1.02 Related Documents.

The conditions and description of work shown in other special provisions, the plans, and the (SWPPP) apply to this section.

1.03 Definitions.

A. Embankment: The earth fill portions of the levee structure or other fills related to the levee structure and includes all types of earth fill and filter materials for the levee and all other fills within the limits of the levee as shown on the plans.

B. Backfill: That fill material which cannot be placed around or adjacent to a structure until the structure is completed or until a specified time interval has elapsed after completion.

C. Excavation: Consists of removal of material to the lines and grades shown on the plans, or as otherwise directed or approved by the Engineer and as described in Part 3 - Execution.

1.04 Submittals.

A. At least 30 days prior to delivery of any Contractor-furnished material to the site of the work, submit soil classification test results, moisture-density curves, gradation curves, and laboratory results of the required tests of the proposed material.

B. Borrow Plan: Submit complete and detailed descriptions of proposed excavation plan. Obtain approval of the detailed plan from the Engineer prior to starting the work. Any modifications of the plan to meet field conditions must be approved prior to use.

C. All independent field and laboratory testing reports shall be submitted to the Engineer. Preliminary copies shall be furnished weekly.

D. Contractor is required to submit a plan for excavations greater than 20 feet that is prepared and sealed by a Professional Engineer licensed in the State of Iowa.

1.05 Measurement and Payment.

A. Clearing and Grubbing by Area: Refer to Articles 2101.04, and 2101.05 of the Standard Specifications.

B. Clearing and Grubbing per acre:
1. Measurement: Per acre
2. Payment: Payment will be at the unit price per acre.
3. Includes: Unit price includes, but is not limited to, removal of tree and root-ball, placement of backfill in area where roots have been removed, and removal and disposal of all materials.

C. On-site Topsoil: Refer to Article 2105.04 of the Standard Specifications.

D. Off-site Topsoil: Refer to Article 2105.04 of the Standard Specifications.

E. Excavation and Embankment: Refer to Articles 2102.04 and 2102.05 of the Standard Specifications.

PART 2 - PRODUCTS

2.01 Topsoil.

A. Refer to Article 2105.02 of the Standard Specifications.

B. Topsoil shall be spread on top of the finished levee at the thickness(es) shown in the plans.

C. On-Site Topsoil: Unless noted in the plans at specific locations, on-site topsoil is intended to be utilized on the project. On-site topsoil material is material stripped from the top 6 inches of the project site.

D. Off-Site Topsoil: Contractor shall also provide to the Engineer documentation indicating thorough evaluation of topsoil borrow sites for environmental impacts prior to material delivery. This shall include wetland delineation, threatened and endangered species assessments, and cultural and archeological resources evaluations.

2.02 Suitable Embankment Materials.

A. Suitable embankment material includes all materials used to construct embankments and backfill structures, unless otherwise specified, and shall meet the following requirements:

B. Materials classified in accordance with ASTM D 2487 as CL and CL-ML free of rock or gravel larger than one inch in any dimension, contamination from hazardous substances, trash, debris, and frozen materials.

C. 3% organic content maximum, per ASTM 2974, is allowed.

D. Total in-place density of 110 pounds per cubic foot or greater.

E. Soils not meeting these requirements are considered unsuitable soils, regardless of classification.

F. Granular backfill is not approved.

G. Materials to be used for construction of embankments shall also be subjected to the following tests at a rate of one test per soil type with a minimum of one test per 5000 cubic yards of material placed:

1. Classification according to ASTM D 2487.
2. Plasticity Index according to ASTM D 4318.
3. Gradation according to ASTM D 422 / ASTM D 7928.
4. Standard Proctor compaction test per ASTM D 698.
5. The above tests shall be performed and reported to the Engineer for approval of the material and material source prior to material placement.
6. Do not use unsuitable materials in any levee or other required fill. Unsuitable materials also include man-made fills (unless excavated, sorted/separated/stockpiled, and tested); trash; refuse; and backfills from previous construction.

2.03 Borrow Site(s).

A. Borrow: The volume of fill material required to construct the project is available within the limits of construction. Contractor shall be responsible for providing the borrow/fill materials on this project with approval from the Engineer if an off-site source is used.

B. Borrow shall be obtained from the City of Des Moines' Borrow stockpile located at the north end of SE 36th Street within the roadway footprint. Additional borrow will be generated from on-site detention pond excavation.

PART 3 - EXECUTION

3.01 General.

A. Construct embankment and backfill to the lines, grades, and cross sections indicated on the Plans, unless otherwise directed by the Engineer.

B. Maintain and protect the embankment and backfill in a satisfactory condition at all times until final completion and acceptance of all work under the contract.

C. The Contractor may be required to remove, at no additional payment, any embankment material placed outside of prescribed slope lines. Replace approved embankment or backfill material which is lost in transit or rendered unsuitable after being placed in the embankment or backfill and before final acceptance of the work in a satisfactory manner and no additional payment will be made therefore.

D. Excavate and remove from the embankment or backfill any material which is unsuitable, dispose of such material, and refill the excavated area as directed, all at no cost to the Contracting Authority.

3.02 Clearing and Grubbing.

Refer to Article 2101.03 of the Standard Specifications.

3.03 Stripping (Topsoil).

A. Refer to Article 2105.03 of the Standard Specifications.

B. Remove an adequate amount of topsoil from the upper 12 inches of existing on-site topsoil to allow finish grading with a finished grade of 6 inches of salvaged or amended topsoil. The topsoil may be moved directly to an area where it is to be used or may be stockpiled for future use.

3.04 Removals and Disposal.

A. Refer to Article 1107.07 of the Standard Specifications.

B. Dispose of debris, trash, scrap, and other unsalvageable materials resulting from the removal operations in accordance with all applicable federal, state and local regulations. Storage of removed materials on the project site is prohibited.

3.05 Borrow and Waste Sites.

A. Borrow shall be obtained from the City of Des Moines' Borrow stockpile located at the north end of SE 36th Street within the roadway footprint. Additional borrow will be generated from on-site detention pond excavation.
   1. Contractor shall become familiar with the site conditions at this location and perform required clearing, grading, SWPPP activities, excavation, and required activities to obtain suitable embankment fill from this site, including testing specified herein.
   2. These activities are incidental to Class 10 excavation items.

B. It is not anticipated that the Contractor will need to provide borrow from a Contractor-furnished source; however, any Contractor-furnished borrow material utilized on this project must meet all applicable environmental regulatory requirements, including but not limited to USACE Environmental Requirements. The Contractor shall submit documentation for approval by the Engineer that shows appropriate evaluations for borrow sites for environmental and cultural impact. Such documentation for each type of source shall include, at a minimum, the following:
   1. Greenfield Site (undisturbed).
      a. Wetland Delineation Survey
      b. Threatened and Endangered Species Assessment
      c. Phase I Archeological and Historic Structures Assessment
   2. Existing Developed Site.
      a. Wetland Delineation Survey
      b. Threatened and Endangered Species Assessment
      c. Phase I Archeological and Historic Structures Assessment
      d. Phase I Environmental Site Assessment for Hazardous Materials
   3. Existing Stockpiles.
      a. Contractor shall not create stockpiles for this project for use as borrow material. If stockpiles are created, documentation shall be provided for

each source of the stockpiled material as described above for greenfield and/or existing developed sites.

4. Chemical testing for parameters listed in following Imported Fill Chemical Screening Limits. One test per source and per 5000 cubic yards of material at minimum, or at any change in observed material properties.
5. General Chemical Testing Requirements - Offsite soils from existing stockpiles must be chemically tested prior to being considered as fill material onsite. The sample results must then be compared against the "Imported Fill Chemical Screening Limits" values outlined in this specification.
6. Material from an offsite borrow area can only be brought onsite after the City has provided approval confirming that the material meets the soil screening criteria.
7. Submit a work plan to the City for approval. Conduct the sampling activities according to the approved plan.
8. The Contractor is responsible for ensuring that the testing is performed, and the results are submitted as part of the Offsite Borrow Site Chemical Suitability Certification Report.

Table 1: Imported Fill Chemical Screening Limits

Constituent	USEPA Method No.	Maximum Concentration for Soil Analysis (mg/kg)	Reference
Polychlorinated Biphenyls (PCBs)			
PCBs	SW-8082	1.1	
Metals			
Antimony	6010B	31	a
Arsenic	6010B	1.9	a
Barium	6010B	15,000	a
Beryllium	6010B	110	a
Cadmium	6010B	70	a
Chromium, total	6010B	190	a
Chromium, hexavalent	6010B	210	a
Cobalt	6010B	23	a
Copper	6010B	15,000	a
Lead, total	6010B	400	a
Manganese	6010B	10,000	a
Mercury	7471A	23	a
Nickel	6010B	1500	a
Selenium	6010B	390	a
Silver	6010B	370	a
Thallium	6010B	0.78	a
Vanadium	6010B	350	a
Zinc	6010B	23,000	a
Boron	6010B	16,000	a
Molybdenum	6010B	390	a
Strontium	6010B	47,000	a
Toxicity Characteristic Leaching Procedure (TCLP) Testing			
Arsenic	6010B	1.9	a
Barium	6010B	15,000	a
Benzene	8021	56	a
Cadmium	6010B	70	a
Chlordane	8081A	8.1	a
Chlorobenzene	8260B	1500	a

Constituent	USEPA Method No.	Maximum Concentration for Soil Analysis (mg/kg)	Reference
Chloroform	8260B	760	a
Chromium	6010B	190	a
o-Cresol	8270C	3100	a
p-Cresol	8270C	6100	a
2,4,D	8151A	690	a
1,4-Dichlorobenzene	8260B	760	a
1,2-Dichloroethane	8260B	34	a
1,1-Dichloroethylene	8260B	380	a
2,4 Dinitrotoluene	8270C	3.5	a
Endrin	8081A	18	a
Heptachlor	8081A	0.54	a
Hexachlorobenzene	8270C	1.5	a
Nitrobenzene	8270C	120	a
Pentachlorophenol	8270C	4.5	a
Trichloroethylene	8270C	67	a
2,4,5-Trichlorophenol	8270C	6100	a
Methoxychlor	8081A	310	a
Methyl ethyl ketone	8260B	46,000	a
Mercury	7471A	23	a
Lindane	8081A	2.6	a
Lead	6010B	400	a
Hexachlorethane	8270C	77	a
Hexachlorobutadine	8270C	40	a
Tetrachloroethylene	8260B	1500	a
Toxaphene	8081A	2.2	a
Silver	6010B	370	a
Selenium	6010B	390	a
2,4,6-Trichlorophenol	8270C	220	a
2,4,5-TP	8151A	490	a
Vinyl Chloride	8260B	2.1	a

Reference
a - Iowa DNR Statewide Standards for Soil

9. Sample Collection: Soil samples must be collected from evenly distributed locations across the offsite stockpile borrow site in order that the analytical results are as close as possible to being representative of the overall site. Samples shall be preserved, transported and analyzed in accordance with EPA SW-846.3-3. The discrete soil samples from the offsite borrow site will normally be composited into one sample by the analytical laboratory for analyses; individual site conditions; however, may also dictate that the discrete samples be analyzed separately. Sample collection locations should be noted in the field and recorded in latitude-longitude and/or Iowa State Plane coordinate formats.
10. Chemical Testing: In the event any of those limits are exceeded, perform testing to determine the potential soluble concentration of the constituent(s). All analysis must be performed at a facility that is certified by the Environmental Laboratory Accreditation Program (ELAP) or the National Environmental Laboratory Accreditation Program (NELAP) for the methods used.
11. Offsite Borrow Site Chemical Suitability Certification Report
    a. A report detailing the chemical testing performed and confirming the chemical suitability of the offsite borrow site soil is to be provided within 45 calendar days after sample collection and at least 30 days prior to the

first scheduled date for importing offsite borrow material. The report must include but is not limited to the following: all chemical testing results with a section describing how results compare to the screening limits, a map of sample locations with GPS coordinates, a brief summary of sampling activities, sample composite details, and any other pertinent information. This report must be certified by an Iowa-licensed Civil Engineer or Professional Geologist.

b. The report will include all laboratory chemical results outlined in this specification. The results must be compared against the values provided in the "Imported Fill Chemical Screening Limits."

c. In addition to the chemical result comparison, additional location information (e.g., soil history, date of sampling, etc.) and commercial contact information (e.g., company name, laboratory used for testing, etc.) must be provided in the report. Material from an offsite borrow site can be brought onsite only after the City has provided approval to the report. It is the Contractor's responsibility to allow ample time for the City to review and approve the report and avoid any project delays.

d. Sampling Costs: All costs associated with the chemical sampling will be coordinated and paid for by the Contractor.

C. Any borrow material utilized on this project must meet USACE Environmental requirements.

D. The project SWPPP submitted and prepared by the Contractor shall include borrow sites used on the project. Borrow sites shall be operated in compliance with the approved SWPPP.

E. Erosion and sediment controls shall be in place at borrow areas prior to earth disturbance activities or site clearing. This includes, but is not limited to, perimeter controls, site entrance/exit controls, and dust management/suppression.

F. Borrow Plan: Submit complete and detailed descriptions of proposed excavation plan. Obtain approval of the detailed plan from the Engineer prior to starting the work. Any modifications of the plan to meet field conditions must be approved prior to use. This plan must include:

1. Proposed methods for preventing interference with, or damage to, existing underground or overhead utility lines, trees designated to remain, and other man-made facilities or natural features designated to remain within or adjacent to the construction rights-of-way.
2. Provision for coordinating the work with other contractors working in the construction rights-of-way or on facilities crossing or adjacent to this work.
3. The proposed methods for controlling surface and ground water in the borrow areas and required excavations.
4. Stockpiling plan for embankment material before it is transported to the project site showing locations, stockpile heights, slopes, limits, and drainage around the stockpile areas.
5. A complete listing of equipment used for excavation and to transport the excavated material.
6. The proposed haul road and haulage patterns, and plan for implementing dust control measures.
7. Proposed disposition of all excavated materials, including items which are anticipated to be disposed of off-site.
8. Borrow sites shall be restored upon completion of earthwork operations. The following minimum criteria shall be implemented:
   a. Preconstruction drainage patterns shall be maintained.
   b. Finished slopes shall not exceed 4H:1V.

c. Seeding of disturbed areas shall be as detailed in the Standard Specifications and the Special Provisions.
d. Project waste and refuse shall be taken to licensed, upland waste facilities.

3.06 Dewatering.

Refer to Bid item or Dewatering.

3.07 Excavation.

A. Excavation will consist of removal of material in preparing the foundations to the lines and grades shown on the plans and removal of objectionable materials and obtaining required fill materials from the project borrow areas.

B. Over excavation will be backfilled to grade with satisfactory material and compacted to a density of at least that of the surrounding material. Backfill and compact excavation beyond the lines shown on the plans in accordance with adjacent materials as directed.

C. Excavations shall extend a minimum of 4 feet out from each wall of a structure.

D. Shape excavations for pipe beds to fit the contour of the pipe over a width of not less than 0.6 of the pipe diameter.

E. Incorporate satisfactory excavated material into the appropriate zones of the embankment.

F. When direct placement is not practicable, satisfactory material from the excavation may be stockpiled for subsequent use in parts of the work for which it is specified herein and/or as indicated on the plans.

G. Dispose of satisfactory materials in excess of the quantity necessary to construct backfills and embankments as specified for in the plans.

H. Care should be taken to avoid disturbance of the bottom of the excavation. Soils loosened during excavation shall be removed from the excavation, and the excavation restored to a condition at least equal to the undisturbed subgrade. Prior to fill placement the foundation subgrade shall be proof rolled with a fully loaded 1000 gallon water truck.

I. Completed excavations shall be protected from becoming unacceptable including but not limited to becoming wet, frozen, or soft due to weather, and or construction operations. Grading around excavations for structures shall be performed to prevent water from running into the excavation or from damaging completed foundations. Should any free water, ground water, or springs be encountered, the Contractor shall be required to keep excavations free from water during construction of the foundations by the use of trenches, well points, or other means as reviewed and accepted by the Engineer.

J. The Contractor is responsible for notifying the Engineer as soon as excavations are completed in order that subgrade may be reviewed.

3.08 Preparation.

A. Scarify soil foundation areas and each fill lift surface so that the surface materials will bond and compact with the first lift of fill. Scarification shall consist of discing material a minimum of 4 inches in depth such that no smooth surfaces are present and moisture conditioning the scarified material to meet the moisture requirements in this Section.

B. Proof roll soil subgrades. Excavate soft/yielding subgrade as determined by the Engineer and replace with the appropriate compacted new suitable levee fill material for the location in the foundation and adjacent new levee embankment zone.

C. Conform to the grades and cross-sections shown on the Plans and written or verbal field clarifications by Engineer.

D. Grade areas to receive fill material to the lines and grades shown prior to placement.

3.09 Placement And Spreading.

A. Do not place fill on any part of the embankment foundation until such areas have been inspected and given final approval in writing by the Engineer.

B. During the placing and spreading process, maintain at all times a force of workers adequate to remove all roots, debris, and oversize stone from all embankment materials.

C. Gradation and Distribution
1. The gradation and distribution of materials throughout each zone of the levee must 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 class.
2. If lenses, pockets, or layers of materials differing substantially in texture or gradation from surrounding material occur in the spread material, mix the layer by harrowing or any other approved method to blend the materials.

3.10 Suitable Embankment Material.

A. Place and spread the levee fill material in layers not more than 8 inches in uncompacted thickness, except that within 4 feet of structures, reduce the uncompacted layer thickness to 4 inches.

B. Layers should be started full out to the slope stakes and must be carried substantially horizontal and parallel to the levee centerline with sufficient crown or slope to provide satisfactory drainage during construction.

3.11 Topsoil.

A. Final grading of topsoil shall be to the lines and grades shown on the plans.

B. Place topsoil at least 6 inches in thickness; smooth and finish grade according to the contract documents.

C. If topsoil is being amended with compost, thoroughly blend compost with on-site topsoil at the rate specified in Section 2102 of the Standard Specifications.

D. Only low ground pressure equipment shall be used to spread topsoil.

E. Tracked equipment shall be operated up and down slopes to result in track indentations parallel to the levee alignment.

F. Engineer will determine when placement of fill must cease due to cold weather.

G. Engineer may elect to use average daily air temperatures, and/or physical observation of the soils for the determination.

3.12 Frozen Materials.

A. Do not place embankment on a foundation which contains frozen material, or which has been subjected to freeze-thaw action. This encompasses all foundation types, including the natural ground, all prepared subgrades, and all layers of previously placed and compacted earth fill which become the foundations for successive layers of earth fill.

B. Remove all material that freezes or has been subjected to freeze-thaw action during the construction work or during periods of temporary shutdowns to a depth that is acceptable to Engineer and replace with new material.

C. Alternatively, thaw, dry, rework and recompact the material to the specified criteria before placing additional material.

3.13 Placement Of Embankment And Backfill Against Structures.

A. Do not place embankment or backfill on or against concrete less than 7 days after placement or once 70% of the design strength has been achieved and confirmed by testing, without prior approval of the Engineer.

B. Do not use crawler-type tractors, vibratory equipment and other similar compaction equipment within 4 feet of any completed or partially completed structure.

C. Accomplish compaction within 4 feet of completed or partially completed structures by the use of mechanical hand tampers, vibrating plates, or other approved methods and equipment.

D. Ensure that compaction operations do not damage any existing utilities. Any damage caused by the Contractor's operation must be repaired at the Contractor's expense.

3.14 Equipment Traffic.

A. Route equipment traffic on any embankment zone to distribute the compactive effort as much as practicable.

B. Ruts formed in the surface of any layer of spread material will be filled before that material is compacted.

C. If, in the opinion of the Engineer, the hauling equipment causes horizontal shear planes or slicken sides, rutting, quaking, heaving, cracking, or excessive deformation of the embankment or backfill, Contractor will limit the type, load, or travel speed of the hauling equipment on the embankment or backfill.

D. If, in the opinion of the Engineer, the compacted surface of any layer of material is too smooth to bond properly with the succeeding layer, loosen the surface by scarifying or other approved methods before material from the succeeding layer is placed.

3.15 Moisture Control.

A. The materials in each layer of the fill must contain the amount of moisture, within the limits specified below or as directed by the Engineer, necessary to obtain the required compaction. Rework material that is not within the specified moisture content limits after compaction to obtain the specified moisture content, regardless of density.

B. Insufficient Moisture for Suitable Bond: If the top or contact surfaces of a partial fill section become too dry to permit suitable bond between these surfaces and the additional fill to be placed thereon, loosen the dried materials by scarifying or discing to

such depths as may be directed by the Engineer, dampen the loosened material to an acceptable moisture content, and compact this layer.

C. Excessive Moisture for Suitable Bond: If the top or contact surfaces of a partial fill section become too wet to permit suitable bond between these surfaces and the additional fill to be placed thereon, scarify and dry the wet material, assisted by discing or harrowing, if necessary, to such depths as may be directed by the Engineer. Dry the material to an acceptable moisture content and compact.

D. Drying Wet Material: Material that is too wet must be either spread on the embankment and permitted to dry or dried in the borrow area prior to bringing to the levee embankment be assisted by discing or harrowing, if necessary, until the moisture content is reduced to an amount within the specified limits.

E. Increasing Moisture in Dry Material:
1. The moisture content of material that is too dry will be either adjusted on the levee embankment or adjusted in the borrow area prior to bringing to the levee embankment.
2. Add water to the fill material and by harrowing, or other approved methods, work the moisture into the material until a uniform distribution of moisture within the specified limits is obtained.
3. Control the amount of water applied on a layer of fill on the levee embankment so that free water will not appear on the surface during or subsequent to rolling.
4. Should too much water be added to any part of the embankment, delay the rolling on that section of the embankment until the moisture content of the materials is reduced to an amount within the specified limits.

F. If it is impracticable to obtain the specified moisture content by wetting or drying the material on the fill, the Contractor may be required to pre-wet or dry back the material at the source of excavation or in the borrow area.

3.16 Compaction of Levee Fill.

A. Refer to Section 2102.03 of the Standard Specifications.

B. The Contractor shall provide earthwork and grading as necessary to meet the site elevations shown on the plans.

C. Levee Grading Tolerances
1. Vertical: 0.0 feet to +0.2 feet
2. Centerline Horizontal: +/- 0.25 feet
3. Crest Width: 0.0 feet to +0.5 feet
4. Slope: No steeper than maximum slopes shown in plans

D. Dumping, spreading, sprinkling, and compacting may be performed at the same time at different points along a section when there is sufficient area to permit these operations to proceed simultaneously.

E. Scarify embankment between lifts to promote bonding. Overbuild benches as necessary to attain proper compaction and cut benches to the dimensions as shown on the plans.

F. After a layer of material has been dumped and spread, harrow it to break up and blend the fill materials to obtain uniform moisture distribution.

G. Perform harrowing with a heavy disk plow, or other approved harrow, to the full depth of the layer. If one pass of the harrow does not accomplish the breaking up and blending of the materials, additional passes of the harrow are required.

H. When the moisture content and the condition of the layer are satisfactory, compact the lift to the required density with an approved tamping roller traversing in a direction parallel to the axis of the levee.

I. In areas which are not accessible by roller, place the fill in layers not more than 4 inches in uncompacted depth and compact with an approved hand operated compactor to a density equal to that obtained in other areas which are accessible to rollers.

J. Operate compaction equipment such that the strip being traversed by the roller overlaps the rolled adjacent strip by not less than 3 feet.

K. Do not operate heavy equipment for spreading and compacting fill within 4 feet of structures or utilities, except as otherwise specified herein. Compact material within 4 feet using appropriate hand operated compactors specified herein.

L. If the compaction of any portion of the embankment does not meet the density requirements, additional compaction will be required as directed by the Engineer to meet project requirements. No additional payment will be provided for additional compaction in order to meet the project requirements.

3.17 Field Quality Control.

A. Refer to Materials I.M. 540 for Quality Management & Acceptance of Embankment Construction.

B. Materials to be used for construction of embankments shall also be subjected to the following tests at a rate of one test per soil type with a minimum of one test per 5000 cubic yards of material placed:
1. Classification according to ASTM D 2487.
2. Plasticity Index according to ASTM D 4318.
3. Gradation according to ASTM D 422 / ASTM D 7928.
4. Standard Proctor per ASTM D 698.

C. All topsoil materials used will be tested for compliance at a minimum frequency of one test per soil type and one test per 1000 cubic yards of topsoil placed.

D. The above tests shall be performed and reported to the Engineer for approval of the material and material source prior to material placement.

E. Perform in-place field density and moisture testing according to ASTM D 6938.
1. Ensure that moisture content falls within a range of 3% below optimum moisture to 3% above optimum moisture as determined by ASTM D 698.
2. Compact levee fill to no less than 95% of maximum dry density as determined by ASTM D 698; and cohesionless soils to no less than 70% of Relative Density.

F. Test locations will be selected by Engineer.

G. Frequency of Density and Moisture testing: Work shall be made available to the Engineer for one test for each 500 cubic yards of material placed, with at least two tests per lift.
1. The Engineer may request additional tests if there is reason to doubt the adequacy of the compaction, special compaction procedures are being used, materials change, the Engineer determines that previous testing is inadequate, or Contractor is concentrating backfill and fill operations in a relatively small area.
2. Retest backfill and fills not meeting the required specifications for moisture and density after corrective measures have been applied.

3. Passing test documentation shall be provided to the Engineer prior to placing subsequent lifts.

H. Excavation Records: Maintain field quality control records for excavation operations to assure compliance with contract requirements, and maintain records of the Contractor's quality control for all construction operations including but not limited to the following:
1. Equipment; type, size, suitability for the work.
2. Lines, grades and tolerances.
3. Segregation/Disposition of materials.
4. Disposal and/or stockpiling of materials.
5. Unsuitable materials.
6. Conditions that may induce seepage or weaken the foundation or embankment
7. Stability of excavations.
8. Foundation Preparation: Methods of preparing the foundations in advance of embankment and backfill construction and methods for providing drainage of the foundation and partially completed fills.
9. Construction: Layout, maintaining existing drainage, moisture control, thickness of layers, spreading and compacting.
10. Grade and Cross Section: Crown width, crown slope, side slopes, and grades.
11. Roads and Ramps: Location of temporary roads to fields or buildings, location and placement of fills for ramps in accordance with specified dimensions and grades.
12. Grade Tolerances: Check fills to determine if placement conforms to prescribed grade and cross section.
13. Quantity Surveys: Accuracy and timeliness.

I. Engineer shall survey to verify that the dimensions, slopes, lines and grades conform to those shown on the plans when Contractor determines that embankment has been placed and no additional grading is necessary, prior to placing topsoil.

J. On a daily basis, furnish the inspection records and all material testing results, as well as the records of corrective action taken.