

**SPECIFICATIONS AND SUPPLEMENTAL  
MEASUREMENT PAYMENT / ITEMS OF WORK**

**FOR**

**CREP Wetland Project  
Site Har892036A**

**Hardin County, Iowa**

**September 2013**



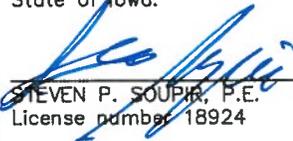
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FOX Project Number 7048-12A.420

**CREP Wetland Project  
Site Har892036A**

**Hardin County, IOWA**

**September 2013**

	<p>I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.</p> <p> _____ <u>9/13/13</u> STEVEN P. SOUPIR, P.E. DATE License number 18924</p> <p>My license renewal date is December 31, 2013.</p> <p>Pages or sheets covered by this seal: <u>ALL</u></p>
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**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-1 SITE PREPARATION**

**1. SCOPE**

Site preparation work shall consist of clearing, grubbing, stripping, refuse removal, bank sloping and structure removal on the site as necessary to rid the site of all undesirable materials on or near the surface and prepare the site for the structure. All woody growth within the construction area shall be cleared and all stumps and roots one inch in diameter or larger shall be grubbed from the site. In addition, all areas within 25 feet of the footprint of the structure shall be cleared and grubbed except as directed by Engineer. The work shall also consist of the removal and of structures (including fences) that must be removed to perform other items of work, and excavation of shallow pockets as shown on the plans and disposal of material.

**2. FOUNDATION PREPARATION**

The construction areas shall be stripped of all unsuitable materials such as organic matter, grasses, weeds, sod, debris, and stones larger than 6 inches in diameter.

In an earth embankment foundation area, all channel banks and sharp breaks shall be sloped to no steeper than 1.5 horizontal to 1 vertical.

The foundation area shall be thoroughly scarified before placement of fill material. The surface shall have moisture added or shall be compacted if necessary so that the first layer of fill material can be compacted and bonded to the foundation.

**3. STRIPPED MATERIAL DISPOSAL**

Suitable soil material shall be stockpiled for use as topsoil. The other stripped materials shall be buried, removed from the site, or disposed of as directed by the owner or Engineer. Whenever possible, material shall not be disposed of in the pool area created by the structure.

Stockpiled materials around a construction site should be placed so as not to hinder subsequent construction operations and existing drainage patterns.

**4. DISPOSAL OF REFUSE MATERIALS**

Waste materials from clearing and structure removal shall be burned or buried at locations approved by the owner. Buried materials shall be covered with a minimum of 2 feet of earthfill. Whenever possible, material shall not be disposed of in any pool area created by the structure.

All refuse shall be disposed of in a manner which complies with all local and state regulations.

## **5. SALVAGE**

Items to be salvaged shall be as shown on the drawings. Structures and fencing materials that are designated to be salvaged shall be carefully removed and neatly placed in the specified storage areas.

## **6. SPECIAL SPECIFICATIONS**

### **A. MEASUREMENT AND PAYMENT**

Compensation for any work item described in the contract documents but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and bid items to which they are made subsidiary are identified in Items of Work and Construction Details section of this specification.

For items of work which lump sum prices are established in the contract, the quantity of work will not be measured for payment. Payment for each item will be made at the contract lump sum price and will constitute full compensation for completion of the work.

### **B. ITEMS OF WORK AND CONSTRUCTION DETAILS**

Items of work to be performed in conformance with this specification and the construction details therefore are:

#### **1. Site Preparation - Bid Item No. 1**

- (a) This item will consist of work necessary to begin construction including, but not limited to, removing and disposing of existing vegetation on areas to be excavated for structural fill, core trench excavation, and pool area excavation. Includes excavation of shallow pockets and stripping topsoil from structure excavation, pool area, construction areas, borrow areas and stockpiling for later incorporation into the project. Includes respread of 6-inches of topsoil in disturbed areas.

#### **2. Subsidiary Item, Tree Removal**

- (a) This item will consist of all work to clear, grub, and dispose of material and wood growth as required in Section 1 Scope, above.
- (b) No separate payment will be made for tree removal, compensation for this item will be included in the payment for Site Preparation.

3. **Subsidiary Item, Fence Removal and Replacement**
  - (a) This item will consist of all work to remove, replace, and dispose of fences as required in Section 1 Scope, above, that are in the permanent pool area or must be removed to perform other items of work. Fencing shall be reinstalled at the locations indicated on the plans.
  - (b) No separate payment will be made for fence removal and replacement. Compensation for this item will be included in the payment for Site Preparation.
  
4. **Subsidiary Item, Refuse and Debris Removal**
  - (a) This item will consist of all work to remove, dispose or bury refuse and debris within the easement area per Section 1 Scope and Section 4 Disposal of Refuse Materials, above.
  - (b) No separate payment will be made for refuse and debris removal. Compensation for this item will be included in the payment for Site Preparation.
  
5. **Subsidiary Item, Topsoil Strip and Respread**
  - (a) This item will consist of all work to strip 6-inches of topsoil in the areas to be disturbed. Includes respread of topsoil to a depth of 6-inches in disturbed areas.
  - (b) The quantity estimated for topsoil stripping is approximately 5,004 Cubic Yards. The quantity estimated for topsoil respread unadjusted is approximately 4,670 Cubic Yards. The Engineers quantity estimate for topsoil stripping and respread is based on the proposed finished site elevations and 6-inches of topsoil strip and respread. This quantity provided is for the Contractor's information. The bid price for this item shall reflect the Contractor's own estimation of earthwork quantities based upon the information provided and the type of soil encountered.
  - (c) No separate payment will be made for topsoil strip and respread in all disturbed areas. Full compensation for this item will be included in the payment for site preparation.
  
6. **Subsidiary Item, Gravel Entrance and Temporary Access Drive**
  - (a) This item will consist of all work to construct a gravel entrance and temporary access drive as indicated on the drawings. Shall include transport, installation, and compaction of soil material from the project site borrow areas to build the entrance. Shall include rock placement on temporary access drive necessary to allow construction to take place. Includes 4-inches of Class A road stone at the entrance location as indicated on the plans.

Area of disturbance for temporary access drive shall be deep ripped after construction and prior to seeding to allow a seed to establish.

- (b) No separate payment will be made for gravel entrance and temporary access drive. Compensation for this item will be included in the payment for site preparation.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-5. POLLUTION CONTROL**

**1. SCOPE**

The work shall consist of installing measures or performing work to control erosion and minimize the production of sediment and other pollutants to water and air during construction operations.

**2. MATERIALS**

All materials furnished shall meet the requirements shown on the drawings or in the specifications.

**3. EROSION AND SEDIMENT CONTROL MEASURES AND WORKS**

The measures and works shall include, but are not limited to, the following:

**Staging of Earthwork Activities:** The excavation and moving of soil materials shall be scheduled so that areas unprotected from erosion will be minimized. These areas will be unprotected for the shortest time feasible.

**Seeding:** Structures and disturbed areas shall be seeded as soon as possible after construction is completed.

Temporary seedings may be used as an alternative to other stabilization measures as approved by NRCS.

**Mulching:** Construction areas that have been disturbed but have no construction activity scheduled for 21 days or more shall have erosion protection measures applied by the 14th day. This erosion protection may be mulching or other approved temporary measures. Construction areas shall not be left open during a winter shutdown period and shall be protected by mulching.

All seeding and mulching shall be completed in accordance with the seeding plan and Iowa Construction Specification IA-6, Seeding and Mulching for Protective Cover.

The following works may be temporary. If they are installed as a temporary measure, they shall be removed and the area restored to its original state when they are no longer needed or when permanent measures are installed.

**Diversions:** Diversions may be required to divert clean runoff water away from work areas and to collect runoff from work areas for treatment and safe disposition.

**Stream Crossings:** Culverts or bridges may be required where construction equipment must cross streams.

**Sediment Basins:** Sediment basins may be required to settle and filter out sediment from eroding areas to protect properties and streams below the construction site.

**Sediment Filters:** Straw bale filters, geotextile sediment fences, or other equivalent methods may be used to trap sediment from areas of limited runoff. Sediment filters shall be properly anchored to prevent erosion under them.

**Waterways:** Waterways may be required for the safe removal of runoff from fields, diversions, and other structures or measures.

#### **4. CHEMICAL POLLUTION**

The Contractor shall provide watertight tanks or barrels or construct a sump sealed with plastic sheets to be used to dispose of chemical pollutants, such as drained lubricating or transmission oils, greases, soaps, concrete mixer wash water, asphalt, etc., produced as a by-product of the construction work. At the completion of the construction work, sumps shall be removed and the area restored without causing pollution.

Sanitary facilities such as chemical toilets or septic tanks shall not be placed adjacent to live streams, wells, or springs. They shall be located at a distance sufficient to prevent contamination of any water sources. At the completion of construction work, facilities shall be disposed of without causing pollution.

#### **5. AIR POLLUTION**

The burning of brush or trash or disposal of other materials shall adhere to local and state regulations.

Fire prevention measures shall be taken to prevent the start or the spreading of wild fires, which result from project work. Fire breaks or guards shall be constructed at locations shown on the drawings.

All public access or haul roads used by the contractor during construction of the project shall be sprinkled or otherwise treated to fully suppress dust. All dust control methods shall insure safe operations at all times. If chemical dust suppressants are used, the material shall be a commercially available product specifically designed for dust suppression and the application shall follow manufacturer's requirements and recommendations. A copy of the product data sheet and manufacturer's recommended application procedures shall be provided to the Engineer five working days before use.

#### **6. MAINTENANCE, REMOVAL, AND RESTORATION**

All pollution control measures and works shall be adequately maintained in a functional condition as long as needed during the construction operation. All temporary measures shall be removed and the site restored to as near original conditions as practical.

#### **7. SPECIAL SPECIFICATIONS**

##### **A. ITEMS OF WORK AND CONSTRUCTION DETAILS**

Items of work to be performed in conformance with this specification and the construction details therefore are:

1. Subsidiary Item, Sediment Filters
  - (a) This item shall consist of all work to install, maintain and remove sediment filters for the project. Sediment filters to be removed once vegetation is established.
  - (b) No separate payment will be made for this item. Compensation for this item will be included in the payment for Mobilization; Channel Excavation; and Earth Fill.

2. Subsidiary Item, Pollution Control

- (a) This item shall consist of applying and performing all construction activities in a manner that will minimize water pollution, air pollution and soil erosion.
- (b) No separate payment will be made for Pollution Control. Compensation for this item will be included in the payment Mobilization; Channel Excavation; Earthfill; Corrugated Metal Pipe; Water Control Structure; Steel Sheet Piling; Riprap; and Grout.

3. Subsidiary Item, Stream Crossings

- (a) This item shall consist of providing temporary stream crossing as required for construction.
- (b) No separate payment will be made for Stream Crossings. Compensation for this item will be included in the payment Mobilization; Earthfill; and Excavation.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-6 SEEDING AND MULCHING FOR PROTECTIVE COVER**

**1. SCOPE**

The work shall consist of seeding, mulching, and fertilizing all disturbed areas and other areas as indicated on the drawings or otherwise designated.

**2. SEEDBED PREPARATION AND APPLICATION**

The entire area to be seeded shall be reasonably smooth and all washes and gullies shall be filled to conform to the desired cross-section before actual seedbed preparation is begun. At this stage of the operation, the required fertilizer and lime shall be applied uniformly and incorporated into the top 3 inches of the soil with suitable tillage equipment. The seedbed preparation operation shall be suspended when the soil is too wet or too dry. The seedbed shall be loosened to a depth of at least three inches.

On side slopes steeper than 2-1/2:1, the 3-inch minimum depth of seedbed preparation is not required, but the soil shall be worked enough to insure sufficient loose soil to provide adequate seed cover.

Unless otherwise specified, the seeding operation shall be performed immediately after preparation of the seedbed. The seed shall be drilled or broadcast by equipment that will insure uniform distribution of the seed.

**3. MATERIALS**

The seeding, fertilizing, and mulching requirements are as specified on Form IA-CPA-4.

Straw from cereal grains or hay will be used as mulching material. It shall be relatively free of weeds.

**4. MULCH APPLICATION**

The required mulching shall be performed as soon as possible after seeding unless otherwise specified. The mulch shall be applied uniformly over the area. The type and rate shall be as specified. When mulching is required, all areas seeded during any one day shall be mulched within 24 hours. The mulch may be spread by any means that results in a uniform cover.

The mulch shall be anchored. Anchoring of the mulch may be performed by a mulch anchoring tool or regular farm disk weighted and set nearly straight, by installation of mulch netting, or by other methods approved by NRCS.

**5. SPECIAL SPECIFICATIONS**

- A. Paragraph 1 of 4. MULCH APPLICATION - "...approved by NRCS. " to be replaced with "...approved by the Engineer or Engineer's Representative."

B. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, each area treated is measured as specified in this specification section and the area calculated to the nearest 0.1 acre. Payment for treatment is made at the contract unit price for the designated treatment, which will constitute full compensation for completion of the work.

C. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

1. Structure and Channel Fertilizer and Seeding - Bid Item No. 2

(a) This item will consist of seeding the dike except the upstream sideslopes below the weir elevation, the side slopes of tile outlet channels, auxiliary spillway, the silt stabilization areas, diversion berms and any other disturbed areas as determined by the Engineer.

(b) All seed must be cleaned and weed free. Seeding rates are expressed in bulk pounds per acre. Seed quality shall not drop below 70% Pure Live Seed (PLS) where PLS = (percent germination plus percent dormant seed) times percent purity.

(c) Seeding rates are as follows:

Smooth Bromegrass                      25 lbs./ac.

(d) Seed shall be applied with a drill and placed at 1/4 to 1/2 inch deep.

(e) Fertilizer shall be applied on the entire seeding area at the following rate:

Nitrogen                                      30 lbs./ac.

Phosphorus (P<sub>2</sub>O<sub>5</sub>)                      30 lbs./ac.

Potassium (K<sub>2</sub>O)                              40 lbs./ac.

No lime is needed.

(f) Straw mulch shall be applied at the rate of 2 tons per acre on the embankment and the auxiliary spillway.

(g) Seeding will be completed during the following seeding periods:

Spring	March 1 to May 15
Summer	August 1 to September 15
Fall	November 15 to Freeze-up

If construction is completed during any other time of the year, the seeding shall be performed at the next seeding period.

- (h) If seeding is completed during the spring seeding period, a companion crop of oats shall be seeded at a rate of one and one-half bushels per acre.
- (i) Measurement will be based on the area successfully seeded.

2. Buffer Seeding - Bid Item No. 3

- (a) This item will consist of seeding the borrow area and the other disturbed areas not seeded by Structure and Channel Seeding and that are above the weir elevation within the easement boundary.
- (b) All seed must be cleaned and weed free. Seeding rates are expressed in pounds of pure live seed per acre. All seed must be yellow-tagged Iowa ecotype.
- (c) Seeding rates are as follows:
- (d) Seeding mixture shall include a minimum of 5 native grasses and 10 native forbs. The mixture shall provide a minimum of 30 grass seeds per square foot and 10 forbs seeds per square foot. Number of seeds will be based on Table 3 in NRCS Standard 327 "Conservation Cover". Contractor's proposed seed mix shall be submitted to the Engineer for approval at least 2 weeks before seed is to be applied.
- (e) Alternative seeding mixtures which meet NRCS Standard 327 (Conservation Cover) requirements for native grass and forb/legume mixture may be substituted by above seeding mixture and must be approved by the Engineer.
- (f) Seeding will be completed during the following seeding periods.

Spring	April 1 to July 1
Fall	November 15 to Freeze-up

- (g) Prepare a firm seedbed for all planting methods:
  - 1. If the land was in soybeans, no additional tillage is required. If the land was in corn or other vegetation, till all areas to be seeded by disking or other approved method; thoroughly loosen and pulverize the soil to a depth of three (3) inches. This may require multiple passes of the disk or other approved equipment.

If the land was used for pasture and has a smooth surface, the preparation in non-disturbed areas to be seeded shall include mowing the vegetation taller than 12 inches and

applying a burn down herbicide, such as glyphosate, at the labeled rates to emergent growth 2 to 4 weeks after mowing. After the vegetation has died, the area shall be disked as needed to thoroughly loosen and pulverize the soil to a depth of three (3) inches. If emergent growth occurs again prior to seeding, the area shall receive a second application of herbicide. Seeding shall not occur until the existing vegetation has died (about one week). If the pasture has a rough surface that would negatively impact the seeding, the area shall be thoroughly disked and then cultipacked prior to seeding.

2. After the disking operation, and prior to seed application, firm the seedbed with a cultipacker or similar piece of equipment.
  3. No lime or fertilizer will be applied.
- (h) Sow seed with the contour using a grassland or rangeland drill set for the specified seeding rates. The drill shall be equipped with double coulter furrow openers. The drill shall be subject to acceptance by Engineer. Overlap each successive seeding pass to ensure complete coverage.
  - (i) Plant seed no more than one-quarter inch deep; some seed may be seen on the surface after seeding.
  - (j) Broadcasting by centrifugal-type or hydroseeder broadcasters, or by hand shall also be allowed in areas not accessible to drills or other equipment. Once broadcast, the seed must be covered with soil to a depth no greater than one quarter (1/4) inch by means of hand rakes or other approved methods.
  - (k) Upon completions of the seeding operation, cultipack the seedbed to provide a positive seed-soil contact. If the drill seeder is equipped with an approved cultipacker or press wheels, separate operations shall not be necessary. The type of cultipacker/seeder to be used shall be subject to acceptance by Engineer.
  - (l) No mulch will be applied.
  - (m) Measurement will be based on the area successfully seeded.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-8. MOBILIZATION AND DEMOLITION**

**1. SCOPE**

This work shall consist of the mobilization and demobilization of the Contractor's forces and equipment necessary for performing the work required under the contract.

The work shall not include mobilization and demobilization for specific items of work for which payment is provided elsewhere in the contract.

Mobilization will not be considered as work in fulfilling the contract requirement for commencement of work.

**2. EQUIPMENT AND MATERIALS**

Mobilization shall include all activities and costs for transportation of personnel, equipment, and operating supplies to the site; establishment of offices, building, and other necessary facilities for Contractor's operations at the site; premiums paid for performance and payment bonds, including coinsurance and reinsurance agreements as applicable; and other items specified in Section 4.

Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies not included in the contract from the site; including the disassembly, removal and site cleanup of offices, buildings, and other facilities assembled for this contract.

The work includes mobilization and demobilization activities required by the contract at the time of award. If additional mobilization and demobilization activities and costs are required during the performance of the contract as a result of changed, deleted or added items of work for which the contractor is entitled to an adjustment in contract price, compensation of such costs will be included in the price adjustment for the item or items of work changed or added.

**3. SPECIAL SPECIFICATIONS**

**A. MEASUREMENT AND PAYMENT**

Payment will be made as the work proceeds, after presentation of invoices by the contractor showing specific mobilization and demobilization costs and evidence of the charges of suppliers, subcontractors, and others. If the total of such payments is less than the lump sum contract price, the unpaid balance will be included in the final contract payment. Payment of the lump sum contract price for mobilization and demobilization will constitute full compensation for the completion of the work.

Payment will not be made under this item for the purchase costs of materials having a residual value, the cost of materials to be incorporated in the project, or the purchase costs of operating supplies.

**C. ITEMS OF WORK AND CONSTRUCTION DETAILS**

Items of work to be performed in conformance with this specification and the construction details therefore are:

1. Mobilization and Demobilization - Bid Item No. 4

- (a) This item shall consist of mobilizing and demobilizing personnel and equipment in preparation to perform the work within the scope of this contract.
- (b) Any work that is necessary to provide access to the site including, but not limited to, grading, temporary culverts, rock installation and removal, and clearing will be included in this item. When construction is completed access areas will be restored, as close as practical, to its original condition.
- (c) Any fence removed for access and /or to provide work area shall be replaced with same or like materials as approved by the engineer.
- (d) The Contractor shall exercise caution to minimize the amount of damage caused by the grading and clearing operations.
- (e) Portable toilets shall be provided at the construction site and used for the sanitary facilities.
- (f) This item shall not include transportation of personnel, equipment and operating supplies within the work limits areas of this contract.
- (g) Payment will constitute full compensation for related subsidiary items, Pollution Control; and sediment filters.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-9. DRAINAGE TILE INVESTIGATION AND REMOVAL**

**1. SCOPE**

This work will consist of the investigation, location, and removal of drainage tile near new or existing animal waste storage or wetland restoration facilities.

**2. INVESTIGATION AND LOCATION**

An inspection trench at least 10 inches wide shall be dug at the location shown on the drawings or as directed by the engineer. The trench shall be at least 6 feet deep measured from the original ground line. The engineer shall examine the trench and excavated material to locate tile lines. Backfilling shall not be started without approval of the engineer. After inspection all trenches shall be backfilled.

**3. TILE REMOVAL**

On new facilities all tile lines located within the area bounded by the investigation trench shall be removed. Drainage tiles found upgrade from the structure shall be rerouted as directed by the engineer.

On existing animal waste facilities the owner shall contact the Iowa Department of Natural Resources (IDNR) for permission to remove the drainage tile under the structure. The structure shall be emptied of waste or lowered to a point below the tile prior to its removal. The structure must be retested for percolation and the results submitted to IDNR and approval received prior to reusing the structure. An alternative to removing tile on existing facilities is to grout the entire length of tile with concrete or Portland cement grout.

**4. SPECIAL SPECIFICATIONS**

- A. The inspection trench shall be dug ten (10) feet upstream of the toe of the earthen wetland embankment or at the location of the core trench. Any tiles found shall be traced to the upstream inlet or wetland boundary whichever is encountered first.

B. MEASUREMENT AND PAYMENT

Compensation for any work item described in the contract documents but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and bid items to which they are made subsidiary are identified in Items of Work and Construction Details section of this specification.

For items of work which lump sum prices are established in the contract, the quantity of work will not be measured for payment. Payment for each item will be made at the contract lump sum price and will constitute full compensation for completion of the work.

C. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

1. Drainage Tile Investigation and Removal - Bid Item No. 5

- (a) This item will consist of the excavation necessary to locate and remove any tile under the dike, to remove tile at the other tile main locations shown on the plans, and locate the field tile lines in the pool area.
- (b) The outlet location is all that is currently known about these tiles.
- (c) The extent of removal shall be as shown on the drawings.
- (d) The investigation should reveal where the tile crosses the dike line or where it is located if it does not cross the dike line. The tile will be removed only if it crosses the dike line.
- (e) Payment will constitute full compensation for related subsidiary items; Site Preparation, Stripping, Topsoiling, Pollution Control, Removal of Water, Structure Excavation and Backfill of Required Excavations.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-11. REMOVAL OF WATER**

**1. SCOPE**

The work shall consist of the removal of surface water and ground water as needed to perform the required construction in accordance with the plans and specifications.

**2. DIVERTING SURFACE WATER**

The Contractor shall build, maintain and operate all cofferdams, channels, diversions, flumes, sumps, and other temporary protective works needed to divert surface water away from the construction site while construction is in progress.

**3. DEWATERING THE CONSTRUCTION SITE**

Foundations, cutoff trenches, borrow areas and other parts of the construction site shall be dewatered as needed for proper execution of the construction work. The Contractor shall furnish, install, operate and maintain all works and equipment needed to perform the dewatering.

**4. EROSION AND POLLUTION CONTROL**

Removal of water from the construction site, including the borrow areas shall be accomplished in such a manner that erosion and the transmission of sediment and other pollutants are minimized.

**5. REMOVAL OF TEMPORARY WORKS**

After temporary works have served their purposes and before the Contractor leaves the site, they shall be removed.

**6. SPECIAL SPECIFICATIONS**

A. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

1. Subsidiary Item, Dewatering
  - (a) This item shall include all costs to divert, pump, dam, or other means to dewater the site.
  - (b) No separate payment will be made for Removal of Water. Compensation for this item shall be included in the payment for Earthfill; Corrugated Metal Pipe; and Water Control Structure.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-13. SHEET PILING**

**1. SCOPE**

The work shall consist of furnishing and driving the specified sheet piling at the location shown on the drawings.

**2. MATERIALS**

Sheet piling shall conform to the requirements of ASTM A328 (Steel Sheet Piling), A572 (High-Strength Low-Alloy Columbium-Vanadium Structural Steel), or A690 (High-Strength Low-Alloy steel H-Piles and Sheet Piling for Use in Marine Environments). The sheet piling provided shall meet the required cross-section, section modulus, thickness, and steel grade shown on the drawings. Fabrication of sheet piles from shorter lengths of pile stock is not permitted.

**3. DRIVING SHEET PILE**

The piling shall be driven in a manner so as to insure perfect interlocking throughout the entire length of each pile. The piles shall be held in proper alignment during driving by means of suitable temporary guide structures which shall be removed when they have served their purpose.

Piling shall be driven to the full depth shown on the drawings unless otherwise approved by the engineer.

**4. CUTTING OFF PILES**

The contractor shall cut the piling off at the specified elevations. Piling length shall be sufficient to permit removal of all materials damaged by driving.

**5. DEFECTIVE PILING**

Any piling damaged in driving, driven out of its proper location, driven below the specified cut off elevation, or inaccurately cut off shall be pulled and replaced or re-driven. Any piling ruptured in the interlock or otherwise damaged during driving shall be pulled and replaced.

**6. SPECIAL SPECIFICATIONS**

**A. MEASUREMENT AND PAYMENT**

For items of work for which specific unit prices are established in the contract, the area of sheet pile walls, acceptably placed, will be computed to the nearest square foot within the neat lines shown on the drawings. Payment will be made at the contract unit price for each type, kind and weight of piling. Such payment will constitute full payment for all labor, materials, equipment and all other items necessary and incidental to the completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in this specification section.

A. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

1. Steel Sheet Pile - Bid Item No. 6

- (a) This item shall consist of furnishing and installing the sheet piling shown on the drawings. This item shall include field cutting the side slopes of the sheet piling to the specified 3:1 slope shown on the drawings.
- (b) The sheet piling will be installed starting from the center of the weir section and progressing away from centerline.
- (c) Sheet piling shall have the requirements of Table 1:

Table 1. Minimum Sheet Pile Requirements

	<b>Section Modulus</b>	<b>Moment of Inertia</b>		<b>Grade of Steel</b>
<b>Wall Section (Reference G.07 for Dimensions)</b>	<b>Sx minimum/ft</b>	<b>Ix minimum/ft</b>	<b>Thickness</b>	<b>Grade</b>
<b>Outside (12'-6")</b>	20.5 in <sup>3</sup> /ft	110 in <sup>4</sup> /ft	0.315"	A572 GD. 50
<b>Center (66'-8")</b>	30.2 in <sup>3</sup> /ft	212 in <sup>4</sup> /ft	0.335"	A572 GD. 50
<b>Outside (12'-6")</b>	20.5 in <sup>3</sup> /ft	110 in <sup>4</sup> /ft	0.315"	A572 GD. 50

- (d) Payment will constitute full compensation for related subsidiary items: Removal of Water, Pollution Control, Structure Excavation, Backfill of Structure Excavation, metal fabrication, and C-Channel Waler.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-21. EXCAVATION**

**1. SCOPE**

The work shall consist of the excavation required by the drawings and specifications and disposal of the excavated materials.

**2. USE OF EXCAVATED MATERIALS**

Suitable materials from the specified excavations shall be used in the construction of required permanent earth fill. The suitability of materials for specific purposes shall be determined by the NRCS Inspector.

**3. DISPOSAL OF WASTE MATERIAL**

All surplus or waste material shall be disposed of in areas shown on the drawings or as approved by the NRCS Inspector. The waste material shall be smoothed and sloped to provide drainage.

**4. STRUCTURE AND TRENCH EXCAVATION**

Structure or trench excavations will conform to all safety requirements of OSHA.

**5. BORROW EXCAVATION**

When the quantities of suitable materials obtained from specified excavations are insufficient to construct the specified fills, additional materials shall be obtained from the designated borrow areas as shown on the drawings or as approved by the NRCS and the landowner.

Borrow areas shall be excavated and grading completed in a manner to eliminate steep or unstable side slopes or hazardous or unsightly conditions.

**6. OVER-EXCAVATION**

Excavation beyond the specified lines and grades shall be corrected by filling the resulting voids with compacted earthfill, except that if the earth is to become the subgrade for riprap, sand or gravel bedding or drainfill, the voids shall be filled with material conforming to the specifications for the riprap, bedding or drainfill, as appropriate.

**7. SPECIAL SPECIFICATIONS**

- A. Paragraph 1 of 2. USE OF EXCAVATED MATERIALS - "...determined by the NRCS Inspector." to be replaced with "...determined by the Engineer or Engineer's Representative."
- B. Paragraph 1 of 5. BORROW EXCAVATION - "...approved by the NRCS..." to be replaced with "...approved by the Engineer or Engineer's Representative..."

C. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the volume of excavation will be computed to the nearest cubic yard by computer model or the method of average cross-sectional end areas. The pay limits for computation shall be as shown on the drawings with further provision that excavation required to fill voids resulting from over excavation of the foundation, outside specified lines and grades, will be included in the measurement for payment only under the following conditions:

- Where such overexcavation is directed by the Engineer to remove unsuitable material, and
- Where the unsuitable condition is not a result of the contractor's improper construction operations as determined by the Engineer.

Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in this specification Section.

D. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specifications and the construction details therefore are:

1. Excavation, Bid Item No. 7 (Pool Area, Core Trench, Channels, and Stilling Basin)

- (a) This item will consist of excavation of the pool, channels, sheet pile structure outlet channel, borrow, core trench, stilling basins, and auxiliary spillway.
- (b) The material excavated from the pool may be used to fill pool and channel areas, if suitable material, to the grades indicated on the plans.
- (c) Topsoil excavated within this area shall be used to provide six (6) inches of cover needed within the areas excavated and filled.
- (d) Excess material shall be disposed of within the existing drainage channel in the pool area and then in the spoil areas shown on the plans and as directed by the Engineer, graded to drain and covered with six (6) inches of topsoil.
- (e) Payment will constitute full compensation for this bid item and related subsidiary items; Pool Excavation, Channels Excavation, Borrow Excavation, Structure Excavation, Core Trench Excavation, Outlet Channel for Sheet Pile Structure Excavation, and Auxiliary Spillway Excavation.

Pool Area Excavation Includes:

- (a) This item will consist of excavation to increase pool area as shown on drawings.
- (b) The pool areas to be excavated do not require undercut and topsoil cover.

- (c) The material excavated from the pool may be used to fill pool and channel areas to the grades indicated on the plans.
- (d) Topsoil excavated within this area shall be used to provide six (6) inches of cover needed within the areas excavated and filled.
- (e) Excess material shall be disposed of within the spoil areas shown on the plans, graded to drain and covered with six (6) inches of topsoil.
- (f) The quantity estimated for the pool excavation is approximately 6,892 Cubic Yards. The Engineers quantity estimate for excavation in the pool areas is based on the proposed finished site elevations prior to any topsoil re-spread. This quantity provided is for the Contractor's information. The bid price for this item shall reflect the Contractor's own estimation of earthwork quantities based upon the information provided and the type of soil encountered.
- (g) Payment will constitute full compensation for this bid item and for related subsidiary items; Site Preparation, Pollution Control, Removal of Water, Backfill of Required Excavations, Topsoil Stripping, and Topsoil Spreading.

Sheet Pile Weir Outlet Channel and Channel Excavations Include:

- (a) This item will consist of the excavation for the outlet channel for the tile outlet channels for tile outlets and the plunge pool for the sheet pile structure.
- (b) The excavated material from any channel excavation shall be used for dike and berm fill if suitable. Excess material shall be disposed of within the existing drainage channel in the pool area and then, upon approval by the Engineer, within the spoil laydown areas shown on the plans, graded to drain and covered with six (6) inches of topsoil.
- (c) The quantity estimated for the pool excavation is approximately 405 Cubic Yards. The Engineers quantity estimate for excavation in the channel excavations is based on the proposed finished site elevations prior to any topsoil re-spread. This quantity provided is for the Contractor's information. The bid price for this item shall reflect the Contractor's own estimation of earthwork quantities based upon the information provided and the type of soil encountered.
- (d) Payment will constitute full compensation for this bid item and related subsidiary items; Site Preparation, Topsoiling, Pollution Control, Removal of Water, and Backfill of Require Excavations.

Core Trench Excavation Includes:

- (a) This item shall consist of excavation of the core trench along the centerline of the berm as shown on the drawings.
- (b) Clean clay material shall be kept separate for backfill of the core trench. Other materials may be mixed with borrow for construction of the embankment.
- (c) Additional backfill shall be obtained from designated borrow areas.

- (d) Backfill to be compacted in full compliance with Specification Section IA-23 and for Method 2 described therein or as otherwise specified on the plans or in IA-23.
- (e) The quantity estimated for the core trench excavation is approximately 1,082 Cubic Yards. The Engineer's quantity estimate for excavation in the core trench areas is based on the proposed finished site elevations with 6-inches of topsoil removed. This quantity provided is for the Contractor's information. The bid price for this item shall reflect the Contractor's own estimation of earthwork quantities based upon the information provided and the type of soils encountered.
- (f) Payment will constitute full compensation for this bid item and for related subsidiary items; Site Preparation, Pollution Control, Removal of Water, Backfill of Required Excavations, Topsoil Stripping, and Topsoil Spreading.

Auxiliary Spillway Excavation Includes:

- (a) This item shall consist of excavation of the auxiliary spillway as shown on the plans.
- (b) The quantity estimated for the auxiliary spillway excavation is approximately 654 Cubic Yards. The Engineer's quantity estimate for excavation in the auxiliary spillway areas is based on the proposed finished site elevations with 6-inches of topsoil removed. This quantity provided is for the Contractor's information. The bid price for this item shall reflect the Contractor's own estimation of earthwork quantities based upon the information provided and the type of soil encountered.
- (c) Payment will constitute full compensation for this bid item and for related subsidiary items; Site Preparation, Pollution Control, Removal of Water, Backfill of Required Excavations, Topsoil Stripping, and Topsoil Spreading.

2. Subsidiary Item, Borrow Excavation

- (a) This item will consist of borrowing suitable material from excavated and borrow areas shown on the drawings as needed to construct the dike, berms and auxiliary spillway and fill areas.
- (b) Borrow from any other area will not be allowed unless directed and approved by the Engineer. Borrow will be allowed in the wetland pool area only where indicated on the drawings and as approved by the Engineer.
- (c) The topsoil from the borrow area shall be removed to a minimum depth of six (6) inches and stockpiled. When the borrow operations have been completed, grades shall be returned to that indicated on the plans and the topsoil shall be uniformly spread over the entire borrow area to a depth of six (6) inches.
- (d) No separate payment will be made for borrow excavation or topsoil spreading. Compensation for this item will be included in the payment for Earthfill.

3. Subsidiary Item, Structure Excavation

- (a) This item shall consist of the excavation necessary to install the steel sheet pile, riprap, corrugated metal pipe conduit, corrugated metal pipe tile outlets, water control structure, and riser inlet structure in the locations and as shown on the drawings.
- (b) No separate payment will be made for Structure Excavation. Compensation for this item will be included in payment for Corrugated Metal Pipe, Water Control Structure, Riser Inlet Structure, Corrugated Metal Pipe Tile Outlet, Steel Sheet Pile, Riprap, and Tile Drains.

4. Subsidiary Item, Topsoil Stripping Excavation

- (a) This item shall consist of stripping and salvaging the topsoil to a depth of six (6) inches from excavation, earthfill, borrow and embankment areas.
- (b) No separate payment will be made for Stripping of Topsoil. Compensation for this item will be included in payment for Site Preparation.

5. Subsidiary Item, Topsoil Spreading

- (a) This item shall consist of spreading of topsoil to a depth of six (6) inches in disturbed areas.
- (b) No separate payment will be made for Spreading of Topsoil. Compensation for this item will be included in payment for Site Preparation.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-23. EARTHFILL**

**1. SCOPE**

The work shall consist of the construction of earth fills required by the drawings and specifications.

**2. MATERIALS**

All fill materials shall be obtained from required excavations and designated borrow areas. Fill materials shall contain no sod, brush, roots or other bio-degradable materials. Rocks larger than 6 inches in diameter shall be removed prior to compaction of the fill.

**3. FOUNDATION PREPARATION**

Foundations for earthfill shall be stripped to remove vegetation and other unsuitable materials. Foundation surfaces shall be scarified to a minimum depth of 2 inches.

**4. PLACEMENT**

Fill shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved by NRCS. Fill shall not be placed upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill.

Adjacent to structures or pipes, fill shall be placed in a manner which will prevent damage. The height of the fill adjacent to structures or pipes shall be increased at approximately the same rate on all sides.

The materials used throughout the earth fill shall be essentially uniform. Selective placement shall be as shown on the drawings or approved by NRCS.

If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified to a depth of not less than 2 inches before the next layer is placed.

The top surfaces of embankments shall be maintained approximately level during construction, except that a cross-slope of approximately 2% shall be maintained to ensure effective drainage.

When moving fill material from the borrow area(s) to the embankment by use of bulldozers only, the following steps shall be followed:

- Immediately after the borrow material is pushed to the embankment, it shall be spread in horizontal lifts placed parallel to the centerline of the embankment.
- Compactive effort will then be applied by operating equipment parallel to the centerline of the fill or embankment.
- Lift thicknesses shall be in strict compliance with Clause 6, below.

## **5. CONTROL OF MOISTURE CONTENT**

The moisture content of the fill material shall be adequate for obtaining the required compaction. Material that is too wet shall be dried to meet this requirement, and material that is too dry shall have water added and mixed until the requirement is met.

The moisture content of the fill material shall be such that a ball formed with the hands does not crack or separate when struck sharply with a pencil and will easily ribbon out between the thumb and finger.

Earth foundations under and adjacent to concrete structures shall be prevented from drying and cracking before concrete and backfill are placed.

The application of water to the fill materials shall be accomplished at the borrow areas insofar as possible.

## **6. COMPACTION**

Earth fill shall be compacted by one of the following methods as specified on the plans. If no method is specified, compaction will be in accordance with Method 1.

- Method 1 - Earthfill shall be placed so that the wheels or tracks of the loaded hauling equipment, traveling in a direction parallel to the centerline of fill, pass over the entire surface of each layer being placed.
- Method 2 - Two (2) complete passes of a tamping-type roller will be made over each layer. The roller shall be capable of exerting a minimum of one hundred (100) pounds per square inch.
- Method 3 - Minimum density shall be 90% of the maximum density as determined by ASTM D 698 and as shown on the plans.

The maximum thickness of a lift of fill before compaction shall be 9 inches, unless otherwise indicated on the drawings.

Fill adjacent to structures, pipe conduits, and anti-seep collars shall be placed in layers not more than 4 inches thick and compacted to a density equivalent to that of the surrounding fill by hand tamping, manually directed power tampers, or plate vibrators. Care should be taken so that compaction around the spillway pipe does not cause uplift of the pipe resulting in a void beneath the pipe. Hand tamping only shall be used to compact the earthfill under the bottom half of circular pipes. Equipment shall not be operated within 2 feet of any structure or pipe.

Compacting of fill adjacent to concrete structures shall not be started until the concrete is 7 days old.

## **7. SPECIAL SPECIFICATIONS**

- A. Paragraph 1 of 4. REPLACEMENT - "...approved by NRCS." to be replaced with "...approved by Engineer or Engineer's Representative."
- B. Paragraph 3 of 4. REPLACEMENT - "approved by NRCS." to be replaced with "...approved by Engineer or Engineer's Representative."

## C. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the volume of earthfill will be computed to the nearest cubic yard by the method of average cross-sectional end areas. No deduction in volume will be made for embedded items such as conduits, inlet structures and their appurtenances. The pay limits for computation shall be as shown on the drawings with further provision that earthfill required to fill voids resulting from over excavation of the foundation, outside specified lines and grades, will be included in the measurement for payment only under the following conditions:

- Where such overexcavation is directed by the Engineer to remove unsuitable material, and
- Where the unsuitable condition is not a result of the contractor's improper construction operations as determined by the Engineer.

Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in this specification Section.

## D. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in accordance with this specification and the construction details therefore are:

### 1. Earthfill, Embankment and Core Trench, Controlled Density - Bid Item No. 8

- (a) This item shall consist of the earthfill necessary to construct the embankment, any associated berms, and adjacent fill areas including backfill of the stripping, topsoil and core trench excavations as shown on the plans.
- (b) The majority of earthfill approved soil material shall be taken from excavation areas with the remainder of the borrow from the designated borrow areas, unless other areas are approved by the engineer.
- (c) Compaction shall be Method 1.
- (d) Rocks larger than 6" shall be removed prior to compaction.
- (e) The quantity estimated for the embankment earthfill, including an adjustment for 25% shrinkage is approximately 4,556 Cubic Yards. The quantity estimated for the core trench earthfill, including an adjustment for 25% shrinkage is approximately 1,352 Cubic Yards. The Engineers quantity estimate for earthfill in the embankment and core trench areas are based on the proposed finished site elevations prior to any topsoil re-spread. This quantity provided is for the Contractor's information. The bid price for this item shall reflect the Contractor's own estimation of earthwork quantities based upon the information provided and the type of soil encountered.

- (f) Payment will constitute full compensation for the following related subsidiary items; Pollution Control, Removal of Water, Topsoil Spreading and Borrow Excavation.

2. Earthfill, Pool - Bid Item No. 9

- (a) This item shall consist of the earthfill necessary to construct the pool areas including backfill of the stripping and topsoil excavations as shown on the plans.
- (b) The majority of earthfill material shall be taken from excavation areas with the remainder of the borrow from the designated borrow areas, unless other areas are approved by the engineer.
- (c) Compaction shall be Method 1.
- (d) Rocks larger than 6" shall be removed prior to compaction.
- (e) The quantity estimated for the pool area earthfill, including an adjustment for 15% shrinkage is approximately 1,610 Cubic Yards. The Engineers quantity estimate for earthfill in the pool areas are based on the proposed finished site elevations prior to any topsoil re-spread. This quantity provided is for the Contractor's information. The bid price for this item shall reflect the Contractor's own estimation of earthwork quantities based upon the information provided and the type of soil encountered.
- (f) Payment will constitute full compensation for the following related subsidiary items; Pollution Control, Removal of Water, Topsoil Spreading and Borrow Excavation.

3. Subsidiary Item, Backfill Required Excavation

- (a) This item shall consist of backfilling the areas excavated to install other components related to the project such as piping or structures and to locate and remove the tile line.
- (b) Compaction adjacent to the structures shall be as indicated above. All other compaction shall be Method 1 or equivalent.
- (c) No separate payment will be made for Backfill of Structure Excavation. Compensation for this item will be included in payment for Corrugated Metal Pipe, Water Control Structure, Riser Inlet Structure, Tile Investigation and Removal, and Corrugated Plastic Tubing Tile Drains.

4. Subsidiary Item, Topsoil Spreading

- (a) This item shall consist of spreading of topsoil to a depth of six (6) inches in disturbed areas.
- (b) No separate payment will be made for Spreading of Topsoil. Compensation for this item will be included in payment for Site Preparation.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-24. DRAINFILL**

**1. SCOPE**

The work shall consist of furnishing and placing drainfill required in the construction of structure drainage systems.

**2. MATERIALS**

Drainfill shall be sand, gravel, or crushed stone. It shall be composed of clean, hard, durable mineral particles free from organic matter, clay balls, soft particles, or other substances that would interfere with their free-draining properties. Aggregates of crushed limestone may be used only for coarse drainfill but shall be thoroughly washed and screened so that not more than 3 percent by weight is finer than a No. 4 sieve.

Coarse drainfill shall be graded as follows:

<u>U.S. Sieve Designation</u>	<u>Percent Passing Sieve</u>
1 1/2	100
3/4	75-100
1/2	25-80
3/8	20-60
No. 4	0-10
No. 8	0-5
No. 100	0-3

Fine drainfill shall be graded as follows:

<u>U.S. Sieve Designation</u>	<u>Percent Passing Sieve</u>
3/8	100
No. 4	95-100
No. 8	75-95
No. 16	50-70
No. 30	25-50
No. 50	10-20
No. 100	0-6
No. 200	0-3

**3. BASE PREPARATION**

Foundation surfaces and trenches shall be free of organic matter, loose soil, foreign substances, and standing water when the drainfill is placed.

**4. PLACEMENT**

Drainfill shall not be placed until the trench excavation has been inspected and approved by NRCS. Installation of the drainage conduit shall be inspected and approved by NRCS before covering it with drainfill. No foreign materials shall be allowed to become intermixed with or otherwise contaminate the drainfill. Drainfill material shall be placed in a manner to avoid segregation of particles by size.

## 5. COMPACTION

### A. Foundation Trench Drain

- (1) No compaction will be required beyond that resulting from the placing and spreading operations.

### B. Drainage Diaphragm

- (1) Each layer of sand material shall be flooded with clean water prior to compaction.
- (2) Compaction shall be accomplished while the material is wet from step (1) above.
- (3) Each layer shall be compacted by 2 (minimum) passes of a hand-directed, vibratory compactor over the entire layer surface.
- (4) Layer thickness shall not exceed 12 inches after compaction.

## 7. SPECIAL SPECIFICATIONS

- A. Paragraph 1. PLACEMENT - "...approved by NRCS." to be replaced with "...approved by Engineer or Engineer's Representative."

### B. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the volume of drainfill will be computed to the nearest ton as evidenced by weight ticket less any material not used.

Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in this Specification Section.

### C. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in accordance with this specification and the construction details therefore are:

#### 1. Drainfill - Bid Item No. 10

- (a) This item shall consist of the drainfill necessary to construct the corrugated drainage tile and fill with suitable backfill material as shown on the plans. Backfill shall be fine drainfill.
- (b) Payment will constitute full compensation for the following related subsidiary items.

#### 2. Subsidiary Item, Backfill Required Excavation

- (a) This item shall consist of backfilling the areas excavated to install other components related to the project such as piping or structures.

- (b) Compaction adjacent to the structures shall be as indicated in the specifications. All other compaction shall be Method 1 or equivalent.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-26. TOPSOILING**

**1. SCOPE**

The work shall consist of salvaging topsoil from borrow areas or required excavations and spreading it on the exposed disturbed areas.

**2. QUALITY OF TOPSOIL**

Topsoil shall consist of friable surface soil reasonably free of grass, roots, weeds, sticks, stones, or other foreign materials.

**3. EXCAVATION**

After the site has been cleared and grubbed, the topsoil shall be removed from borrow areas and required excavation areas to the depth as shown on the drawings. Topsoil shall be stockpiled at locations approved by NRCS.

**4. SPREADING**

Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Surfaces designated to be covered shall be lightly scarified just prior to the spreading operation. Where compacted fills are designated to be covered by topsoil, the topsoil shall be placed concurrently with the fill and shall be bonded to the compacted fill with the equipment.

Topsoil shall be placed to the minimum depth shown on the drawings. After the spreading operation is completed, the surface shall be finished to a reasonably smooth surface.

**5. SPECIAL SPECIFICATIONS**

A. A. Paragraph 1 of 3. EXCAVATION - "...approved by NRCS." to be replaced with "...approved by Engineer or Engineer's Representative."

B. MEASUREMENT AND PAYMENT

Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in this Specification Section.

C. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in accordance with this specification and the construction details therefore are:

1. Subsidiary Item, Topsoiling

(a) This item shall consist of the work necessary to remove, stockpile and respread suitable topsoil in disturbed areas.

- (b) No separate payment will be made for topsoiling. Compensation for this item will be included in the payment for Site Preparation.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-32. CONCRETE FOR NONSTRUCTURAL SLABS**

**1. SCOPE**

The work shall consist of forming, placing, finishing, and curing Portland cement concrete slabs including steel reinforcement.

**2. MATERIALS**

Portland Cement shall be Type I or Type II Portland cement.

Air entraining agents shall conform to ASTM C 260.

Fly ash may be used as a partial substitution for Portland cement and shall be in strict compliance with ASTM C 618, Class F or C. The loss by ignition shall not exceed 4.0 percent.

Blast-furnace slag may be used as a partial substitution for Portland cement and shall be in conformance with ASTM C 989 for ground granulated blast-furnace slag (GGBF slag).

Water-reducing admixtures shall conform to ASTM C 494 and may be of Type A, D, F or G. Type D or G admixtures may be used when the air temperature is over 80 degrees F. at the time of mixing and/or placement.

Preformed expansion joint filler shall be a commercially available product made of bituminous, sponge rubber or closed cell foam materials with a minimum thickness of 1/2 inch.

Coarse and Fine Aggregate shall conform to ASTM C 33 and shall be clean, hard, durable and free from clay or coating of any character. The maximum size of coarse aggregate shall be 1 1/2 inches or as shown on the drawings.

Reinforcing steel shall be deformed billet-steel bars, Grade 40 or 60. Welded wire fabric shall conform to the requirements of ASTM A 185.

Water shall be clean and free of harmful chemicals.

Calcium Chloride or other antifreeze compounds or accelerators will not be allowed.

**3. CONCRETE MIX**

The concrete mix shall provide a minimum strength of 3500 psi at 28 days. The mix shall contain not less than 6 sacks of cement per cubic yard and not more than 5.6 gallons of water per sack of cement. The water/cement ratio shall not exceed 0.50 including free water in the aggregates. Air entrainment shall range from 4% to 8%. The slump shall be 2 to 5 inches except when superplasticizer is used. The slump shall be 3 inches or less prior to the addition of superplasticizer admixture and shall not exceed 7 1/2 inches following addition and mixing.

The contractor shall be responsible for determining the design mix proportions and shall provide a copy of the mix to the NRCS Inspector at least 3 days prior to placing any concrete. A concrete batch ticket shall be supplied to the Inspector at the time of delivery to the site. The minimum information to be included shall be the name of the supplier, size of load, time of loading, type and amount of cement, type

and amount of admixtures, saturated surface dry weights of fine and coarse aggregate, mixing water added at the plant and free water in aggregates.

#### **4. REINFORCING STEEL**

Reinforcing steel shall be free from loose rust, concrete, oil, grease, or paint.

Reinforcing shall be accurately placed and secured in position in a manner that will prevent its displacement during placement of concrete. The use of heat or welding in cutting, bending and splicing of reinforcing steel will not be permitted.

In slabs, steel shall be supported by precast concrete bricks, corrosion resistant metal chairs, or non-metal chairs. The concrete brick shall have strength equal to or greater than 3500 psi. Metal chairs shall have a protective epoxy coating, plastic coating, galvanized finish or be stainless steel.

Splices of reinforcing bars shall be lapped 30 diameters but not less than 12 inches. Bars shall not be spliced by welding. Welded wire fabric shall be lapped at least one mesh width.

#### **5. SUBGRADE**

The subgrade shall be excavated or filled with suitable material to produce the required subgrade elevation(s). Subgrade materials shall be blended or unsuitable materials removed and replaced as required to obtain uniform materials, moisture and compaction. Fill sections shall be thoroughly compacted in layers to the specified density and shall extend a minimum of 1 foot beyond the form lines. The subgrade shall be uniformly smooth, moist, dense, and free of ruts, frost, mud and standing water prior to placement of concrete.

If the above requirements for subgrade cannot be achieved using in-place materials, a granular base shall be provided, as specified or shown on the drawings. Granular base shall be well compacted, meeting all requirements for subgrade listed in the preceding paragraph.

Grading tolerances for the finished subgrade (or granular base, if used) shall be a maximum of ¼ inch above grade to ½ inch below grade. If granular base is provided between the subgrade and the concrete, grading tolerances for the subgrade shall be plus or minus 0.1 foot.

#### **6. FORMS FOR CONCRETE**

All edges shall be formed. All forms shall be true to line and grade, mortar tight, and rigid. Forms shall be left in place for a minimum of 24 hours.

#### **7. PLACING CONCRETE**

Concrete shall not be placed until the subgrade, granular base, forms, and steel reinforcement have been inspected and approved by the Inspector. Any deficiencies are to be corrected before the concrete is delivered for placement.

Concrete shall be placed in final position within one and one-half hours after mixing the aggregate with cement and shall be consolidated by spading or mechanical vibration. The concrete shall not be forced to flow laterally to its final location. Concrete shall not be dropped more than 5 ft. vertically.

Addition of water at the job site may be done at the beginning of placement of each load of concrete in order to obtain allowable slump, provided that the specified water/cement ratio will not be exceeded. Addition of water will not be permitted after placement of the load has proceeded.

Concrete shall be placed at air temperatures between 40°F and 80°F, unless special measures are taken to protect the concrete. Review special concrete placement procedure with NRCS prior to placement of concrete. Concrete shall be protected from freezing for 7 days after placement.

## **8. JOINTS**

Install joints as shown on the drawings. A formed construction joint shall be made at the locations shown on the drawings, at the end of the day or at any time when a cold joint would occur.

Control joints are required every 12.5 to 15 ft. in both directions, unless otherwise shown on the drawings. They shall be tooled or sawed to a depth of 1/4 of the slab thickness.

## **9. CURING CONCRETE**

Concrete shall be cured for 7 days by either:

- a) Applying white pigmented curing compound at a rate of 1 gallon per 150 square feet or as recommended by the manufacturer.
- b) Water soak exposed surface for the entire 7 days.
- c) Cover with burlap, mats or other material and maintain in a moist condition.
- d) Cover with 4 mil plastic sheeting while concrete is still wet.

## **6. SPECIAL SPECIFICATIONS**

### **A. ITEMS OF WORK AND CONSTRUCTION DETAILS**

Items of work to be performed in conformance with this specification and the construction details therefore are:

1. Subsidiary Item, Concrete
  - (a) This item shall include all costs to place concrete bases for the inlet structure and the control structure.
  - (b) No separate payment will be made for concrete. Compensation for this item shall be included in the payment for Corrugated Metal Pipe; Water Control Structure; and Inlet Control Structure.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-46. TILE DRAINS FOR LAND DRAINAGE**

**1. SCOPE**

The work shall consist of furnishing and installing drainage tubing and tile and the necessary fittings and appurtenances.

**2. MATERIALS**

Concrete drain tile shall conform to the requirements of ASTM C 412 and clay drain tile shall conform to the requirements of ASTM C 4.

Corrugated polyethylene tubing and fittings shall conform to ASTM F 405 or F 667, as appropriate. Corrugated profile wall polyethylene (PE) pipe shall conform to ASTM F 2648. Perforated tubing shall have a water inlet area of at least 1 square inch per foot, provided by perforations spaced uniformly along the long axis of the tubing. The perforations shall be circular or slots. Circular perforations shall not exceed 3/16 inch in diameter. Slots shall not be more than 1/8 inch wide.

**3. EXCAVATION**

Unless otherwise specified, excavation for and subsequent installation of each drain line shall begin at the outlet end and progress upstream.

The trench or excavation for the tile shall be constructed to the line, depths, cross-sections, and grade shown on the drawings or as directed by the NRCS Inspector. If not otherwise shown on the drawings, trench width at the top of the drain should be the minimum required to permit installation and provide bedding conditions suitable to support the load on the drain but with not less than 3 inches of clearance on each side of the drain.

Trench shields, shoring and bracing, or other methods, necessary to safeguard the workers and work, and to prevent damage to the existing improvements shall be furnished, placed, and subsequently removed by the contractor.

Plow installation is allowed. Minimum trench width shall be 2 inches wider than the conduit. Grade control and bedding conditions shall be closely inspected during plow installation. Boulders, cobbles, or cemented soils can cause the plow to jump and lose grade. These hardpoints can also puncture or dimple and deform the pipe.

**4. PREPARING THE BEDDING**

Unless otherwise specified, no filter or envelope is required. In stable soils, the bottom of the trench shall be shaped to form a semicircular, trapezoidal, or 90-degree "V" groove in its center. The groove shall be shaped to fit the size of tile. The 90-degree "V" groove shall not be used on conduits greater than 8 inches in diameter.

If the bottom of the trench does not provide a sufficiently stable or firm foundation for the drain tile, a sand-gravel mix or other approved materials shall be used to stabilize the bottom of the trench.

Drain tile shall not be laid on a rock foundation. In the event that boulders, rock or ledge rock or cemented materials that prevent satisfactory bedding are encountered at the required grade, the trench

shall be excavated to a depth of at least 6 inches below grade and backfilled to grade with a sand-gravel mixture or other approved material.

## **5. FILTER OR ENVELOPE MATERIAL**

When a filter is specified, the shape of the bottom of the trench, gradation and the thickness of the filter or envelope material to be placed around the tile will be as shown on the drawings. The envelope or filter material shall be placed in the bottom of the trench just prior to the laying of the tile. The tile shall then be laid and the envelope or filter material placed over the tile.

## **6. PLACEMENT AND JOINT CONNECTIONS**

All drains shall be laid to grade.

Joints between lateral concrete and clay drain tiles shall vary with soil type as follows:

- a. Peat and muck - 1/4 inch preferred, 3/8 inch maximum
- b. Clay - 1/8 inch preferred, 1/4 inch maximum
- c. Silt and loam - 1/16 inch preferred, 1/8 inch maximum
- d. Sand - tightest possible fit.

Joints between main drain tile, which serve only to collect and transport drainage water from lateral tile lines, should be the tightest fit possible.

Where the joint width exceeds the maximum above, the joint shall be covered with a permanent type material such as coal tar pitch treated roofing paper, fiber glass sheet or mat, or plastic sheet.

After placement and blinding of plastic tubing, but prior to backfilling, sufficient time shall elapse to allow the tubing to reach the ambient temperature of the trench. All split fittings shall be securely tied with nylon cord before backfill is placed. When corrugated plastic tubing is used, no more than 5% stretch will be allowed.

## **7. CONNECTIONS**

Lateral connections will be made with manufactured appurtenances (wyes, tees, etc.) comparable in strength and durability with the specified tile or tubing unless otherwise shown on the drawings.

Existing tile lines not shown on the drawings but encountered during installation shall be bridged across the trench or connected into the new line, as directed by NRCS.

Connections with the outlet pipe shall be made watertight.

## **8. OUTLETS**

A continuous section of non-perforated conduit at least 20 feet long shall be used at the outlet. Two-thirds of the outlet pipe shall be buried in the ditch bank, and the cantilever section must extend to the toe of the ditch side slope or the side slope protected from erosion. Acceptable materials for use at the outlet include the following:

- a. Corrugated metal pipe, galvanized or aluminum, 16 gauge;
- b. Smooth steel pipe with a minimum wall thickness of 3/16 inch;
- c. Smooth plastic pipe, polyvinyl chloride (PVC), with a SDR of 26 or less or schedule 40 or heavier; or

- d. Dual wall corrugated polyethylene pipe (PE).

All plastic (PVC) and polyethylene pipe (PE) outlets shall include an ultra-violet stabilizer. PVC and PE pipe outlets shall not be used where burning vegetation on the outlet ditch bank is likely to create a fire hazard.

The outlet shall be equipped with a flap-gate type rodent guard.

## **9. BLINDING**

After the tubing or tile is placed in the excavated groove, friable material from the sides of the trench shall be placed around the tubing, completely filling the trench to a depth of not less than three inches over the top of the tubing. For material to be suitable it must not contain hard clods, rocks, frozen soil, or fine material which will cause a silting hazard to the drain. Tubing placed during any one day shall be blinded by the end of the day's work.

## **10. BACKFILLING**

The backfilling of the trench shall be completed as rapidly as consistent with the soil conditions. Automatic backfilling machines may be used. Backfill shall extend above the ground surface and be well rounded over the trench.

## **11. SPECIAL SPECIFICATIONS**

- A. Paragraph 3 of 11. EXCAVATION - "...directed by the NRCS Inspector." to be replaced with "...directed by the Engineer or Engineer's Representative."
- B. Paragraph 7 of 11. CONNECTIONS - "...directed by NRCS." to be replaced with "...directed by Engineer or Engineer's Representative."
- C. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the quantity of each kind and size of tile or tubing is determined to the nearest foot of length measured along the centerline of the installed tile or tubing. Payment for each kind and size of tile or tubing will be made at the contract unit price for that kind or size of tile or tubing. Such payment constitutes full compensation for furnishing, transporting and installing the tubing or tile including excavation, shoring, geotextile or granular fill (when specified), backfill and all fittings appurtenances and other items required to complete the work. Payment for appurtenances listed separately in the bid schedule will be made at the contract lump sum price for the size and type of appurtenances listed.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the bid items to which they are made subsidiary are identified in this specification.

### **C. ITEMS OF WORK AND CONSTRUCTION DETAILS**

Items of work to be performed in accordance with this specification and the construction details therefore are:

1. Corrugated Polyethylene Tubing, 5-Inch - Bid Item No. 11

- (a) This item will consist of furnishing and installing the corrugated polyethylene tubing used as drain tile as shown on the drawings.
- (b) The corrugated polyethylene tubing shall conform to ASTM F405 or F667.
- (c) Payment will constitute full compensation for the following subsidiary items:  
Structure Excavation and Backfill of Structure Excavation.

2. Corrugated Polyethylene Tubing, 8-Inch - Bid Item No. 12

- (a) This item will consist of furnishing and installing the corrugated polyethylene tubing used as drain tile as shown on the drawings.
- (b) The corrugated polyethylene tubing shall conform to ASTM F405 or F667.
- (c) Payment will constitute full compensation for the following subsidiary items:  
Structure Excavation and Backfill of Structure Excavation.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-51. CORRUGATED METAL PIPE CONDUITS**

**1. SCOPE**

The work shall consist of furnishing and placing circular, arched or elliptical corrugated metal pipe and the necessary fittings.

**2. MATERIALS**

Metallic-coated steel corrugated pipe and fittings shall be zinc-coated or aluminized, Type 2, and shall conform to the requirements of ASTM A 760 and A 929 for the specified type and size of pipe. Aluminum corrugated pipe shall conform to the requirements of ASTM B 745 for the specified type and size of pipe. All pipe is subject to the following additional requirements:

- A. When polymer coating is specified, pipe, coupling bands and anti-seep collars shall be coated in accordance with ASTM A 762. All riveted joints shall be caulked as described in paragraph B.
- B. Pipe with annular corrugations shall be furnished with caulked seams. Riveted pipe joints shall be caulked with a bituminous mastic material during fabrication to provide a watertight joint. All circumferential and longitudinal seams shall be caulked before riveting. This shall be accomplished by applying a uniform bead of the mastic compound to the inner lap surface before riveting such that when the rivets are in place, all voids are filled and a coating of mastic is between the lap surfaces. The inner surface of coupling bands shall be asphalt coated in the field prior to installation. A neoprene gasket having a minimum thickness of 3/8 inch and a minimum width of 7 inches may be used in lieu of mastic coated coupling bands.
- C. Welded or lock seams in helical corrugated pipe are considered to be watertight.
- D. When close riveted pipe is specified: (1) the pipe shall be fabricated so that the rivet spacing in the circumferential seams shall not exceed 3 inches, except that 12 rivets will be sufficient to secure the circumferential seams in 12-inch pipe, and (2) in those portions of the longitudinal seams that will be covered by the coupling bands, the rivets shall have finished flat heads or the rivets and holes shall be omitted and the seams shall be connected by welding to provide a minimum of obstruction to the seating off the coupling bands.
- E. Double riveting or double spot welding of pipe less than 42 inches in diameter may be required. If specified, the riveting or welding shall be done in the manner specified for pipe 42 inches or greater in diameter.

**3. COUPLING BANDS**

Coupling bands shall meet the requirements of the table below or have detailed drawings submitted for approval by the State Conservation Engineer. Coupling bands shall be of the same minimum thickness (gage) as the pipe being connected.

<u>Description of Coupling Band</u>	<u>Maximum Fill Height, Ft.</u>	<u>Maximum Pipe Diam., In.</u>
18-inch wide coupling band with four 1/2-inch Diam. galvanized rods with tank lugs for annular or helical corrugated metal pipe. Bands shall have a minimum lap of 3 inches.	All	All
Hugger band from Armco Steel Corp. for helical corrugated metal pipe with reformed ends; and for annular corrugated pipe. Bands include O-ring gaskets and two 1/2-inch Diam. galvanized rods and lugs. <sup>1/</sup>	35	48
Hugger band without rods and lugs but including O-ring gaskets. <sup>1/</sup>	20	24
Angles riveted or welded to a coupling band and drawn tight with bolts. Bands shall be a minimum of 7 corrugations wide and have a minimum lap of 2 inches.	35	15
Flanged couplings for helical corrugated pipe welded to the ends of the pipe and field assembled by a minimum of 3/8-inch Diam. bolts. A joint sealer shall be placed between the flanges to ensure water tightness.	25	12

<sup>1/</sup> Use is limited to sites where soft foundation and conduit elongation is not anticipated.

#### **4. FABRICATION**

Fabrication of all appurtenances shall be done as shown on the drawings. All appurtenances shall be made of metallic-coated steel when corrugated steel pipe is used and aluminum when used with aluminum pipe. Dissimilar metals shall not be installed in contact with each other.

#### **5. REPAIR OF DAMAGED COATINGS**

The Contractor shall place the pipe without damaging the pipe or coatings. The pipe shall be transported and handled in a manner to prevent damage to the pipe or coating.

Breaks, scuffs, or other damage to the various coatings shall be repaired as follows:

- A. Metallic Coating - by thoroughly wire brushing the damaged area and cleaning with solvent, and then painting two coats of one of the following paints:
  - (1) Zinc Dust - Zinc Oxide Primer conforming to ASTM D 79 and D 520.
  - (2) Single package, moisture cured urethane prime in silver metallic color.
  - (3) Zinc-rich cold galvanized compound, brush, or aerosol applications.

- B. Polymer Coating - apply two coats of polymer material similar to and compatible with the durability, adhesion and appearance of the original polymer coating. The repair coating shall be a minimum thickness of 0.010 (10 mils) after drying and shall bond securely to the pipe.

## **6. LAYING AND BEDDING THE PIPE**

The pipe shall be laid to the line and grade shown on the drawings and shall be firmly and uniformly bedded throughout its entire length. Details of the bedding are as shown on the drawings.

The pipe shall be laid with the outside laps of circumferential joints pointing upstream and with longitudinal laps on the sides at approximately the vertical mid-height of the pipe. Field welding of corrugated galvanized steel pipe will not be permitted. The pipe sections shall be joined with coupling bands.

## **7. BACKFILLING**

Special care shall be taken during backfill operations not to disturb the grade and alignment.

The pipe shall be tied down or loaded sufficiently during backfilling around the sides to prevent its being lifted from the bedding.

Backfill material shall have sufficient moisture so that optimum compaction can be obtained. Backfill around the pipe shall be placed in layers not more than 4 inches thick before compaction.

Each layer of backfill shall be compacted with power tampers, hand tampers, or plate vibrators to the same density requirements as specified for the adjacent embankment. Backfill over and around the pipe shall be brought up uniformly on all sides. The passage of earth moving equipment will not be allowed over the pipe until backfill has been placed above the top of the pipe surface to a depth of two (2) feet.

## **8. SPECIAL SPECIFICATIONS**

### **A. MEASUREMENT AND PAYMENT**

For items of work for which specific unit prices are established in the contract, the quantity of each pipe size is determined as the sum of the nominal laying lengths of the pipe sections installed. Payment will be made at the contract unit price for the length of pipe installed. Such payment constitutes full compensation for transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work.

For items of work for which lump sum prices are established in the contract, payment for corrugated metal pipe structures is made at the contract lump sum price. Such payment constitutes full compensation for transporting and installing the pipe structure complete with metal pipe, fittings and appurtenances, and all other items necessary and incidental to the completion of the work, which includes required excavation, dewatering and earth backfill.

Compensation for any items of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the bid items to which they are made subsidiary are identified in this specification Section.

## B. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in accordance with this specification and the construction details therefore are:

### 1. Corrugated Metal Pipe Tile Outlet Pipe, 6-Inch - Bid Item No. 13

- (a) This item will consist of furnishing and installing the corrugated metal pipe tile outlets including animal guards as shown on the drawings.
- (b) The corrugated metal pipe shall be 16 gage aluminum coated with annular or helical corrugations.
- (c) Payment will constitute full compensation for the following related subsidiary items: Structure Excavation and Backfill of Structure Excavation.

### 2. Corrugated Metal Pipe Tile Outlet Pipe, 10-Inch - Bid Item No. 14

- (a) This item will consist of furnishing and installing the corrugated metal pipe tile outlets including animal guards as shown on the drawings.
- (b) The corrugated metal pipe shall be 16 gage aluminum coated with annular or helical corrugations.
- (c) Payment will constitute full compensation for the following related subsidiary items: Structure Excavation and Backfill of Structure Excavation.

### 2. Corrugated Metal Pipe, 18-Inch - Bid Item No. 15

- (a) This item will consist of furnishing and installing the corrugated metal pipe as shown on the drawings including bar guards and animal guards at the inlet end of the pipe and animal guard at the outlet end of the pipe.
- (b) The corrugated metal pipe shall be closed riveted caulk seam (CRCS) round pipe with 2-2/3" x 1/2" annular corrugations and shall conform to ASTM A760.
- (c) Payment will constitute full compensation for the following related subsidiary items: Pollution Control, Removal of Water, Structure Excavation and Backfill of Structure Excavation, Antiseep Collars, and CMP Aprons.

### 3. CMP Water Control Structure With Stop Logs, 48-Inch - Bid Item No. 16

- (a) This item will consist of providing and installing the corrugated metal pipe and water control structure as shown on the drawings including the 18-inch bar guard at the inlet end of the pipe and a 18-inch rat guard at the outlet end of the pipe.
- (b) The 18-inch CMP shall be closed riveted caulk seam (CRCS) round pipe with 2-2/3"x1/2" annular corrugations and shall conform to ASTM A760.
- (c) Provide detailed shop drawings of the water control structure and appurtenances. Water control structure shall include the following:

- i. 54-inch diameter riser pipe with 24-inch diameter stubs. Riser pipe shall be 14 gage, CRCS pipe with 2-2/3" x 1/2" annular corrugations. Stub pipe shall be 16 gage CRCS pipe of same corrugations, 2' minimum length.
- ii. Permanent access ladder on the dry side of riser extending full length of riser structure.
- iii. Riser height/length shall be 11 feet from the bottom.
- iv. Stub inverts shall be 6-inches above riser bottom.
- v. Channel for stop logs shall be equal to riser height.
- vi. Embed riser pipe, ladder, stop log, channel and lowest stop log, 3-inches, into poured concrete base. Concrete base shall have a minimum thickness of 8-inches and extend a minimum of 8-inches horizontally around the edge of the riser. Base shall be non-reinforced concrete, minimum 28-day compressive strength of 3,500 psi.
- vii. Stop logs shall have a tongue-and-groove interlocking configuration, 1-1/2-inch thick x 12-inches high (max) PVC. Configure stop logs to match normal pool plan elevation of 1097.0 ft. Provide 6 feet 6 inches of stop logs. Stop logs shall be of 6-inch and 12-inch sizes and shall be installed as follows:
  - (a) Bottom shall be (1) 6-inch stop log with a top elevation of 1091.0 ft.
  - (b) Continue with (4) 12-inch stop logs
  - (c) Continue with (7) 6-inch stop logs and (2) 12-inch stop logs, alternating between 6-inch and 12-inch stop logs until all 12-inch stop logs are used, then continue with 6-inch stop logs to the elevation of 1100.50 ft.
- viii. Extra track to store stop logs not in use.
- (d) Payment will constitute full compensation for the following related subsidiary items: Pollution Control, Removal of Water, Structure Excavation, Backfill of Structure Excavation, Antiseep Collars, and CMP Aprons.

4. CMP Riser Inlet Structure, 30-Inch - Bid Item No. 17

- (a) This item will consist of providing and installing the corrugated metal pipe and riser inlet structure as shown on the drawings including the 30-inch riser, anti-vortex, trash rack, perforations, rock backfill, concrete base, excavation and backfill, and 18-inch outlet pipe as indicated on the details.
- (b) The 18-inch CMP shall be closed riveted caulk seam (CRCS) round pipe with 2-2/3"x1/2" annular corrugations and shall conform to ASTM A760.

- (c) Provide detailed shop drawings of the water control structure and appurtenances. Water control structure shall include the following:
  - i. 30-inch diameter riser pipe with 18-inch diameter stub. Riser shall be 14 gage, CRCS pipe with 2-2/3" x 1/2" annular corrugations. Stub pipe shall be 16 gage CRCS pipe of same corrugations, 2' minimum length.
  - ii. Riser height/length shall be a minimum that indicated on the plans to top of riser elevation of 1096.0 feet.
  - iii. Stub inverts shall be 6-inches above riser bottom.
  - iv. Backfill around perforated riser with 3-inch ballast stone as indicated on the plans.
- (d) Payment will constitute full compensation for the following related subsidiary items: Pollution Control, Removal of Water, Structure Excavation, Backfill of Structure Excavation, Antiseep Collars, ballast stone, CMP Aprons, and CMP watertight coupling bands.

5. Subsidiary Item, Corrugated Metal Pipe Aprons, 18-Inch

- (a) This item will consist of furnishing and installing the corrugated metal pipe 18-inch aprons as shown on the drawings.
- (b) No separate payment will be made for the CMP aprons. Compensation for this item shall be included in the payment for Corrugated Metal Pipe, 18-inch.

6. Subsidiary Item, Corrugated Metal Pipe Bends 18-Inch

- (a) This item will consist of furnishing and installing the corrugated metal pipe 18-inch bends as shown on the drawings.
- (b) No separate payment will be made for the CMP bends. Compensation for this item shall be included in the payment for Corrugated Metal Pipe, 18-inch.

7. Subsidiary Item, Corrugated Metal Water Tight Coupling Bands

- (a) This item will consist of furnishing and installing the corrugated metal coupling bands for connections of all pipe sections and structure stubouts.
- (b) No separate payment will be made for the CMP coupling bands. Compensation for this item shall be included in the payment for Corrugated Metal Pipe, 18-inch., Water Control Structure, and Riser Inlet Structure.

8. Subsidiary Item, 3-inch Ballast Stone

- (a) This item will consist of furnishing and installing the 3-inch ballast stone around the riser inlet structure as indicated on the plans.

- (b) No separate payment will be made for the 3-inch ballast stone. Compensation for this item shall be included in the payment for the Riser Inlet Structure.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-61. LOOSE ROCK RIPRAP**

**1. SCOPE**

The work shall consist of the construction of loose rock riprap revetments, structures and blankets, including filter layers or bedding where specified.

**2. MATERIALS**

Rock for loose rock riprap, filter layers or bedding shall come from sources approved by NRCS. The rock shall be excavated, selected and handled as necessary to meet the quality and grading requirements of this specification and the construction drawings.

Individual rock fragments shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock fragments shall be angular to sub rounded in shape. The least dimension of an individual rock fragment shall be not less than 1/3 the greatest dimension of the fragment unless otherwise specified on the construction drawings.

**3. SUBGRADE PREPARATION**

The subgrade surfaces on which the riprap or bedding course is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it shall consist of approved materials and shall be compacted to a density equal to the adjacent existing soil material.

Rock materials shall not be placed until the foundation preparation is completed and the subgrade surfaces have been inspected and approved by NRCS.

**4. EQUIPMENT-PLACED ROCK RIPRAP**

Rock shall be placed by equipment on the surfaces and to the depths specified. The riprap shall be constructed to the full thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials. The rock shall be delivered and placed in a manner that will insure that the riprap in place shall be reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact, one to another with the smaller rocks and spalls filling the voids between the larger rocks.

Riprap shall be placed in a manner to prevent damage to structures. Hand placing will be required to the extent necessary to prevent damage to adjacent structures.

**5. HAND-PLACED RIPRAP**

Rock shall be placed by hand on the surfaces and to the depths specified. It shall be securely bedded with the larger rocks firmly in contact, one to another. Spaces between the larger rocks shall be filled with smaller rocks and spalls. Smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on edge unless otherwise specified.

## 8. SPECIAL SPECIFICATIONS

A. Paragraph 3 of 7. SUBGRADE - "...approved by NRCS." to be replaced with "...approved by Engineer or Engineer's Representative."

### B. MEASUREMENT AND PAYMENT

For times of work for which specific unit prices are established in the contract, the quantity of rock riprap placed within the specified limits will be measured to the nearest ton by actual weight. For each load of rock riprap placed as specified the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight, to the nearest 0.1 ton. Payment will be made at the contract unit price for rock riprap. Such payment will be considered full compensation for completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in this specification Section.

### C. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in accordance with this specification and the construction details therefore are:

#### 1. Riprap, Class E - Bid Item No. 18

- (a) This item shall consist of furnishing and place rock riprap in the stilling basin downstream and upstream reach of the steel sheet pile as shown on the drawings.
- (b) Rock shall be Class E Revetment Stone as defined by Iowa Department of Transportation.
- (c) All riprap shall be screened by running the stone over a grizzly plate screen with a minimum opening of 8-inches. This operation shall be done at the quarry. The portion of the stone that is removed by the screening operation will not be acceptable for use as riprap.
- (d) Payment will constitute full compensation for the following related subsidiary items: Pollution Control, Removal of Water, Structure Excavation and Geotextile.

#### 2. Riprap, Erosion Stone - Bid Item No. 19

- (a) This item shall consist of furnishing and place rock riprap as shown on the drawings.
- (b) Rock shall be Erosion Stone as defined by Iowa Department of Transportation.
- (c) Payment will constitute full compensation for the following related subsidiary items: Pollution Control, Removal of Water, Structure Excavation and Geotextile.

### 3. Subsidiary Item - 3-Inch Stone

- (a) This item shall consist of furnishing and place rock riprap as shown on the drawings.
- (b) Rock shall be 3-inch ballast stone as defined by Iowa Department of Transportation.
- (c) No separate payment will be made for the 3-inch stone. Compensation for this item shall be included in the payment for CMP Riser Inlet Structure, 30-inch.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-62. CONCRETE GROUT FOR RIPRAP**

**1. SCOPE**

The work shall consist of furnishing, transporting, and placing concrete grout in the construction of grouted rock riprap sections as shown on the drawings.

**2. MATERIALS**

Cement shall be Type I or Type II Portland cement conforming to ASTM C 150. Fly ash shall be in strict compliance with ASTM C 618, Class F or C. It may be used as a partial substitution for Portland cement for amounts not to exceed 20 percent of the total amount of cementitious material in the grout. The loss by ignition shall not exceed 4.0 percent. Fine aggregate shall conform to ASTM C 33 and shall be composed of clean, uncoated grains of material. Water shall be clean and free of harmful chemicals. Air entraining admixtures shall conform to ASTM C 260.

**3. GROUT MIX**

The grout mix shall be as follows:

- |                             |  |
|-----------------------------|--|
| a) Cement:                  | 10 sacks or 940 pounds per cubic yard  |
| b) Fine concrete aggregate: | 2,100 pounds per cubic yard  |
| c) Water:                   | 45 gallons per cubic yard or<br>enough to provide a thick creamy consistency |
| d) Air content:             | 6 to 10 percent.   |

When ready-mixed grout is furnished, the contractor shall furnish to NRCS a delivery ticket showing the time of loading and the quantities of materials used for each load of grout mix.

No mixing water in excess of the amount called for in the grout mix shall be added during mixing, hauling or after arrival of the mix at the delivery point.

**4. CONVEYING AND PLACING**

Grout mix shall be delivered to the site and placed within 1 1/2 hours after the introduction of the cement to the aggregates. In hot weather or under conditions contributing to quick setup of the grout mix, discharge of the concrete shall be accomplished in 45 minutes unless a set-retarding admixture is used, in which case the manufacturer's recommended time limit will apply.

Grout mix shall not be dropped more than 5 feet vertically unless suitable equipment is used to prevent segregation.

The grout mix shall not be placed until the rock riprap has been inspected and approved.

Rock to be grouted shall be kept wet for at least 2 hours immediately prior to grouting. Grout shall not be placed in standing or flowing water.

The grout shall be consolidated by spading or mechanical vibration. The grout shall not be forced to flow laterally to its final location.

The average rate of grout application shall be 5.4 cubic feet per square yard of riprap (0.6 cubic feet per square foot).

## **5. CURING CONCRETE**

Concrete shall be cured for 7 days by either:

- a) Applying white pigmented curing compound at a rate of 1 gallon per 150 square feet or as recommended by the manufacturer.
- b) Water soak exposed surface for the entire 7 days.
- c) Cover with burlap, mats or other material and maintain in a moist condition.
- d) Cover with four (4) mil plastic sheeting while concrete is still wet.

Grout mix shall not be placed when daily minimum temperatures are expected to be lower than 40 degrees F unless facilities are provided to maintain the temperature of the materials at 50 to 90 degrees F during the placement and curing period. Grout may not be placed on frozen surfaces. When freezing conditions are expected, rock shall be heated to 50 to 90 degrees F for at least 24 hours prior to placing grout.

## **6. SPECIAL SPECIFICATIONS**

- A. Paragraph 3 of 9. GROUT MIX - "...shall furnish to NRCS..." to be replaced with "...shall furnish to Engineer or Engineer's Representative..."

B. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the quantity of concrete grout placed within the specified limits will be computed to the nearest 0.1 cubic yard by volume. The volume of grout will be determined from the summation of all statement-of-delivery tickets for concrete grout delivered to the site and acceptably placed in the work. Payment for concrete grout will be made at the contract unit price for each item. Such payment will be considered full compensation for all labor, materials, equipment, and all other items necessary and incidental to the completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in this specification Section.

C. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in accordance with this specification and the construction details therefore are:

1. Concrete Grout For Riprap - Bid Item No. 20

- (a) This item shall consist of furnishing and placing concrete grout on those portions of the riprap shown on the drawings.
- (b) The grout shall be consolidated into the voids with the use of a concrete vibrator. A smooth surface is NOT to be created by the grouting operation.

- (c) Grouting operation shall not be performed except in the presence of the Engineer or Engineer's representative.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-81. METAL FABRICATION AND INSTALLATION**

**1. SCOPE**

The work shall consist of furnishing, fabricating, and installing metalwork including metal parts of composite structures.

**2. MATERIALS**

Steel shall be of structural quality. Finished surfaces shall be smooth and true to assure proper fit.

Bolts, nuts, washers, rods, rivets, etc., shall be of a material equal to the steel being fastened.

**3. PROTECTIVE COATINGS**

Protective coatings will consist of either galvanizing or painting and shall be applied by the fabricator.

Galvanizing shall consist of a zinc coating by the hot dip process, except that bolts, nuts, and washers may have an electrodeposited zinc coating.

Paint System for this specification shall consist of the application of one coat of Epoxy Polyamide Primer (lead and chromate free) and one or more coats of Epoxy Polyamide (intermediate or finish), lead free. When finished, it will have a minimum dry film thickness of 8.0 mils.

**4. FABRICATION**

Materials shall be carefully fabricated as shown on the drawings. The fabrication shall be smooth and true to assure proper fit. Galvanized items shall not be cut, welded, or drilled after the zinc coating is applied.

**5. ERECTION**

The metal shall be erected true and plumb, closely conforming to the drawings.

**6. SPECIAL SPECIFICATIONS**

**A. ITEMS OF WORK AND CONSTRUCTION DETAILS**

Items of work to be performed in accordance with this specification and the construction details therefore are:

1. Subsidiary Item, C-Channel Waler

(a) Items shall consist of furnishing and placing the C-Channel waler located on the weir overflow structure.

(b) No Separate payment will be made for the C-Channel waler. Compensation for this item will be included in the payment for the Steel Sheet Piling.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**IA-95. GEOTEXTILE**

**1. SCOPE**

This work shall consist of furnishing all materials, equipment, and labor necessary for the installation of geotextile.

**2. MATERIAL QUALITY**

Geotextile shall be manufactured from synthetic long chain or continuous polymeric filaments or yarns, having a composition of at least 95 percent, by weight, of polypropylene, polyester or polyvinylidene-chloride. The geotextile shall be formed into a stable network of filaments or yarns that retain their relative position to each other, are inert to commonly encountered chemicals and are resistant to ultraviolet light, heat, hydrocarbons, mildew, rodents and insects. Unless otherwise specified, the class and type of geotextile shall be as shown on the drawings and shall meet the requirements for materials that follow:

- a. Woven Geotextile shall conform to the physical properties listed in Table 1. The woven geotextile shall be manufactured from monofilament yarns that are woven into a uniform pattern with distinct and measurable openings. The geotextile shall be manufactured so that the yarns will retain their relative position with regard to each other. The yarns shall contain stabilizers and/or inhibitors to enhance their resistance to ultraviolet light or heat exposure. The edges of the material shall be selvaged or otherwise finished to prevent the outer yarn from unraveling.
- b. Nonwoven Geotextile shall conform to the physical properties listed in Table 2. Nonwoven geotextile shall be manufactured from randomly oriented fibers that have been mechanically bonded together by the needle-punched process. In addition, one side may be slightly heat bonded. Thermally bonded, nonwoven geotextile, in addition to mechanically bonded, nonwoven geotextile, may be used for Road Stabilization. The filaments shall contain stabilizers and/or inhibitors to enhance their resistance to ultraviolet light or heat exposure.
- c. The geotextile shall be shipped in rolls wrapped with a protective covering to keep out mud, dirt, dust, debris and direct sunlight. Each roll of geotextile shall be clearly marked to identify the brand, type and production run.

**3. STORAGE**

Prior to use, the geotextile shall be stored in a clean dry place, out of direct sunlight, not subject to extremes of either hot or cold, and with the manufacturer's protective cover in place. Receiving, storage, and handling at the job site shall be in accordance with the requirements in ASTM D 4873.

**4. SURFACE PREPARATION**

The surface on which the geotextile is to be placed shall be graded to the neat lines and grades as shown on the drawings. The surface shall be reasonably smooth and free of loose rock and clods, holes, depressions, projections, muddy conditions and standing or flowing water (unless otherwise shown on the drawings).

## 5. PLACEMENT

Prior to placement of the geotextile, the soil surface will be inspected for quality assurance of design and construction. The geotextile shall be placed on the approved prepared surface at the locations and in accordance with the details shown on the drawings. The geotextile shall be unrolled along the placement area and loosely laid (not stretched) in such a manner that it will conform to the surface irregularities when material is placed on or against it. The geotextile may be folded and overlapped to permit proper placement in the designated area.

The geotextile shall be joined by overlapping a minimum of 18 inches (unless otherwise specified), and secured against the underlying foundation material. Securing pins, approved and provided by the geotextile manufacturer, shall be placed along the edge of the panel or roll material to adequately hold it in place during installation. Pins shall be steel or fiberglass formed as a "U", "L", or "T" shape or contain "ears" to prevent total penetration. Steel washers shall be provided on all but the "U" shaped pins. The upstream or up-slope geotextile shall overlap the abutting down-slope geotextile. At vertical laps, securing pins shall be inserted through both layers along a line through approximately the midpoint of the overlap. At horizontal laps and across slope laps, securing pins shall be inserted through the bottom layer only. Securing pins shall be placed along a line approximately 2 inches in from edge of the of the placed geotextile at intervals not to exceed 12 feet unless otherwise specified. Additional pins shall be installed as necessary and where appropriate, to prevent any undue slippage or movement of the geotextile. The use of securing pins will be held to the minimum necessary. Pins are to be left in place unless otherwise specified.

Should the geotextile be torn or punctured, or the overlaps disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, or grade distortion, the backfill around the damaged or displaced area shall be removed and restored to the original approved condition. The repair shall consist of a patch of the same type of geotextile being used, overlaying the existing geotextile. The patch shall extend a minimum of 2 feet from the edge of any damaged area.

The geotextile shall not be placed until it can be anchored and protected with the specified covering within 48 hours or protected from exposure to ultraviolet light. In no case shall material be dropped on uncovered geotextile from a height greater than 3 feet.

## 6. SPECIAL SPECIFICATIONS

### A. MEASUREMENT AND PAYMENT

For times of work for which specific unit prices are established in the contract, the quantity of geotextile placed within the specified limits will be measured to the nearest square yard. Payment will be made at the contract unit price for geotextile. Such payment will be considered full compensation for completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in this specification Section.

### B. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in accordance with this specification and the construction details therefore are:

#### 1. Geotextile Fabric - Bid Item No. 21

- (a) This item shall consist of furnishing and placing geotextile on all earth surfaces that contact the rock riprap as shown on the drawings.
- (b) Geotextiles shall conform to the requirements of IDOT Engineering Fabric for embankment erosion control.
- (c) The geotextile shall be placed with the long dimension parallel to the channel.
- (d) Payment will constitute full compensation for the following related subsidiary items: Pollution Control, Removal of Water, Structure Excavation, and Riprap.

**TABLE 1. REQUIREMENTS FOR WOVEN GEOTEXTILES**

Property	Test Method	Class I	Class II & III	Class IV
Tensile strength (pounds) <sup>1/</sup>	ASTM D 4632 grab test	200 minimum in any principal direction	120 minimum in any principal direction	180 minimum in any principal direction
Elongation at failure (percent) <sup>1/</sup>	ASTM D 4632 grab test	< 50	< 50	< 50
Puncture (pounds) <sup>1/</sup>	ASTM D 4833	90 minimum	60 minimum	60 minimum
Ultraviolet light (% residual tensile strength)	ASTM D 4355 150-hr exposure	70 minimum	70 minimum	70 minimum
Apparent opening size – AOS	ASTM D 4751	As specified, but no smaller than 0.212 mm (#70) <sup>2/</sup>	As specified, but no smaller than 0.212 mm (#70) <sup>2/</sup>	As specified, but non smaller than 0.212 mm (#70) <sup>2/</sup>
Percent open area (percent)	CWO-02215-86	4.0 minimum	4.0 minimum	1.0 minimum
Permittivity sec <sup>-1</sup>	ASTM D 4491	0.10 minimum	0.10 minimum	0.10 minimum

1/ Minimum average roll value (weakest principal direction).

2/ U.S. standard sieve size

Note: CWO is a USACE reference.

**TABLE 2. REQUIREMENTS FOR WOVEN GEOTEXTILES**

Property	Test Method	Class I	Class II	Class III	Class IV
Tensile strength (pounds) <sup>1/</sup>	ASTM D 4632 grab test	180 minimum	120 minimum	90 minimum	115 minimum
Elongation at failure (%) <sup>1/</sup>	ASTM D 4632	≥ 50	≥ 50	≥ 50	> 50
Puncture (pounds)	ASTM D 4833	80 minimum	60 minimum	40 minimum	40 minimum
Ultraviolet light (% residual tensile strength)	ASTM D 4355 150-hr exposure	70 minimum	70 minimum	70 minimum	70 minimum
Apparent opening size – AOS	ASTM D 4751	As specified max. # 40 <sup>2/</sup>			
Permittivity sec <sup>-1</sup>	ASTM D 4491	0.70 minimum	0.70 minimum	0.70 minimum	0.10 minimum

1/ Minimum average roll value (weakest principal direction).

2/ U.S. standard sieve size

3/ Heat-bonded or resin bonded geotextile may be used for classes III and IV. They are particularly well suited to class IV. Needle punched geotextiles are required for all other classes.