ISG

PROJECT MANUAL FOR
IDALS
WETLAND DEVELOPMENT
POCAHONTAS COUNTY, IOWA
2021

PROJECT NO. 20-24044
POC933134D-FP WETLAND

LICENSED PROFESSIONAL ENGINEER IVAN D. DROESSLER 11837 IOWA	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. Ivan D. Droessler 2-19-2021 Ivan D. Droessler, P.E. Date License No.: 11837 My License Renewal Date is December 31, 2021 Sections covered by this seal: All sections Listed in Table of Contents

1725 NORTH LAKE AVE.
STORM LAKE, IA 50588

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 disposal of structures (including fences) that must be removed to perform other items of work.

For wetland restoration, enhancement, or creation projects, the wetland area shall be disturbed as little as possible and existing naturally vegetated spillway areas shall not be disturbed.

2. FOUNDATION PREPARATION

The construction areas shall be stripped a minimum of 12 inches to remove 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.

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 3 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

1. For items of work for which specific unit prices are established in the contract, the volume of stripping will be computed to the nearest cubic yard by measuring the strip area from the site plan and multiplying this by the depth of stripping.

2. 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 Section 6B of this specification.

B. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item No. 1: Clearing, Grubbing, and Spraying

(1) This item shall include work necessary to clear, grub, spray, and dispose of trees and brush encountered on site including but not limited to the entire easement area as shown on plans, and along tile installation routes.

(2) No tree or brush count will be provided.

(3) This item should be bid assuming the following process:
   a. Easement area should be mechanically cleared followed by a two-week waiting period to allow broadleaf vegetation to leaf out.
   b. Easement area should then be sprayed with appropriate herbicide for a full chemical burn down of all broadleaf vegetation.
   c. Construction may proceed following a two-week post-spraying waiting period.

(4) Removed trees larger than two (2) inches in diameter shall be stockpiled and burned within the easement area with any remaining portions buried on site in a location and manner approved by the Engineer. Burial of materials within the permanent pool area will not be acceptable. Care shall be exercised during burning operations, and the contractor shall comply with all local and state burning requirements.

(5) Includes all labor, equipment, tools, and materials to complete work as specified.

(6) Alternative vegetation control methods may be considered after bidding. Acceptance of alternative methods is at the discretion of the Engineer. No change in contract price is expected.

(7) Measured in lump sum completed as described herein and shown on the plans.

(8) Payment will constitute full compensation for Bid Item Clearing, Grubbing, and Spraying, Site Preparation, and excavating and backfilling of any burial bits.

b. Bid Item No. 2: Rubbish Disposal – Remove & Bury

(1) This item shall include work necessary to clear and dispose of miscellaneous fence encountered on site and along tile installation routes.

(2) Includes removing and burying of site small quantities of field rocks encountered.

(3) Includes all labor equipment, tools, and materials to complete work as specified.

(4) Measured in lump sum completed as described wherein and shown on the plans.

(5) Payment will constitute full compensation for Bid Item Rubbish Disposal, Site Preparation, and excavating and backfilling of burial pits.

c. Bid Item No. 3: Topsoil: Strip, Stockpile, Respread

(1) Designation of topsoil quantity to be stripped by location:
    a. Topsoil stripped for the berm footprints shall be twelve (12) inches.
    b. Topsoil stripped for grading areas shall be twelve (12) inches where cut exceeds six (6) inches.
    c. Topsoil stripped along tile alignments shall be twelve (12) inches.

(2) All material stripped shall be stockpiled at a location outside the wetland pool area designated by the Engineer.

(3) Any excess or unsuitable stripped material shall be disposed of as directed by the Engineer.

(4) Designation of topsoil quantity to be respread by location:
    a. Respread a minimum twelve (12) inch layer of topsoil on the wetland berm.
    b. Respread a minimum twelve (12) inch layer of topsoil on surface water diversion berms.
    c. Respread a minimum twelve (12) inch layer of topsoil along tile alignments.
    d. Respread a minimum twelve (12) inch layer of topsoil on waste locations. Waste topsoil from pool excavation may be used.
    e. Additional topsoil respread a minimum (6) inches as designated on plans or by Engineer.

(5) Payment will constitute full compensation for related subsidiary items: Site Preparation, Removal of Water, and Topsoiling.

d. Subsidiary Item, Site Preparation

(1) This item shall consist of the work necessary to begin construction including, but not limited to, mowing existing vegetation on area to be excavated or foundation areas for fill.

(2) No separate payment will be made for this item. Compensation shall be included in payment for Item Rubbish Disposal.

* * * END OF DOCUMENT IA-1 * * *

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 seeding may be used as an alternative to other stabilization measures as approved by Engineer.

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 ensure 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

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

   a. Subsidiary Item, Pollution Control

      (1) This item will consist of applying and performing all construction activities in accordance will all federal, state, and local permits and standards with intent to minimize water and air pollution and soil erosion.

      (2) No separate payment will be made for additional pollution control. Compensation for this item will be included in the payment Bid Item Mobilization.

* * * END OF DOCUMENT IA-5 * * *

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 horizontal to 1 vertical, 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. Measurement and Payment

1. 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 designated treatment, which will constitute full compensation of the work.

B. Items of Work and Construction Details

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

   a. Bid Item No. 4: Seeding, Buffer

      (1) This item will consist of seeding the disturbed areas within the easement and outside of the permanent pool elevation.

      (2) Some areas of the site may have existing CRP vegetation or steep slopes with existing vegetation. Engineer will determine if these areas will be included as part of the buffer seeding areas for this project or will be left as is. This may affect the bid quantity and Contractor will verify with Engineer the number of acres that will require buffer seeding.

      (3) All seed must be clean and weed free. Seeding rates are expressed in pounds of pure live seed per acre. Effort should be made such that a majority of seed be yellow-tagged Iowa ecotype.

      (4) 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 Iowa Conservation Practice 327 "Native Species for Wildlife". Contractor's proposed seed mix shall be submitted to Engineer and local NRCS office for approval at least 2 weeks before seed is to be applied.

      (5) Seeding shall be completed during the following seeding periods:

Spring	April 1 to June 30
Fall	November 15 to Freeze-up

      (6) The seed bed shall be properly prepared prior to seeding:

         a. Any weed control measures shall be completed prior to seeding. If spraying is used, then a span of two weeks shall be allowed between spraying and seeding.

         b. If the land was in soybeans, no additional tillage is required. If the land was in corn or other vegetation, areas to be seeded shall be disked to thoroughly loosen and pulverize the soil to a depth of 3 inches. This may require multiple passes of 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 any vegetation taller than 12 inches and applying an appropriate herbicide at the labeled rates to emergent growth 2 to 4 weeks after mowing. After the vegetation has died, the area shall be disked thoroughly loosen and pulverize the soil depth of 3 inches. If emergent growth occurs prior to seeding, the areas shall receive a second application of herbicide. Seeding shall not occur until the existing vegetation has died (about 1 week).

c. If deeper disking is used at the site, a lighter disk or spring harrow shall be used to remove deep furrows.

d. After disking operations and prior to seed application, the seedbed shall be firmed with a cultipacker or similar piece of equipment.

e. No lime or fertilizer is to be applied.

(7) Sow seed with 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.

(8) Plant seed not more than 1/4 inch deep; some seed may be seen on the surface after seeding.

(9) Broadcasting by centrifugal-type or hydroseeder broadcasters, or by hand shall 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 1/4 inch by means of hand rakes or other approved methods.

(10) Upon completion 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.

(11) Measurement will be based on the area successfully seeded.

b. Extra Work, Weed Control

(1) Weed control may be needed in portions of this site depending upon the start date of the contract, the initiation of grading, and the seeding dates.

(2) Weed control will be added to the contract with a change order to be negotiated between Contractor and Division based on conditions observed and the type of weed control used and will be paid only once. If delays require additional weed control, this will be paid for at Contractor's own expense.

(3) Weed control may include placement of a cover crop such as oats or rye, spraying with appropriate chemicals, or disking. If thistles are present, only spraying is allowed for weed control and shall include appropriate chemicals designed to control thistles.

* * * END OF DOCUMENT IA-6 * * *

NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-8. MOBILIZATION AND DEMOBILIZATION

1. SCOPE

The work shall consist of 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 supplied to the site; establishment of offices, buildings, and other necessary facilities for the Contractor's operations at the site; premiums paid for performance and payment bonds, including coinsurance and reinsurance agreements as applicable.

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. 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 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.

4. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item No. 5: Mobilization/Demobilization

(1) This item shall consist of mobilizing and demobilizing personnel and equipment in preparation to perform the work within the scope of this contract.

(2) Any work that is necessary to provide access to the site including, but not limited to, grading, temporary culverts, and clearing will be included in this item. When

construction is completed, access areas will be restored as close as practical to their original condition.

(3) Any fence removed for access and/or to provide work area that is designated on the plans to be replaced shall be replaced with same or like materials as approved by the Engineer.

(4) The Contractor shall exercise caution to minimize the amount of disturbance caused by the grading and clearing operations.

(5) Portable toilets shall be provided at the construction site and used for the sanitary facilities.

(6) This item shall not include transportation of personnel, equipment and operating supplies within the work limit areas of this contract.

(7) Payment will constitute full compensation for Bid Item Mobilization/Demobilization and related Subsidiary Item, Pollution Control.

(8) Contractor is to contact "Iowa One Call" for utility locations a minimum of two (2) business days prior to any excavation/construction (1-800-292-8989). The ticket number must be provided to engineer.

b. Subsidiary Item, Pollution Control

(1) See description in IA-5 Pollution Control, Section 7.

* * * END OF DOCUMENT IA-8 * * *

NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-9 SUBSURFACE DRAIN INVESTIGATION, REMOVAL, AND REPAIR

1. SCOPE

The work shall consist of investigation, location, repair, and/or removal of subsurface drains (tile) near new or existing animal waste storage facilities or in wetland restoration, enhancement, or creation project areas, or other situations where subsurface drains may be present.

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 or their representative. The trench shall be at least six (6) feet deep measured from the original ground line, unless otherwise shown on the plans. The Engineer or their representative shall examine the trench and excavated material to identify tile lines.

Size, material, operating condition, and direction of flow of each conduit shall be documented. Location and flow line elevation of each conduit shall be surveyed with horizontal and vertical control based on benchmarks shown on the plans.

The inspection trench shall be documented by surveying the natural ground and trench bottom location and elevations at the beginning, end, and every 50 feet for trenches longer than 50 feet.

Backfilling shall not be started without approval of the Engineer. See Section 5 for backfill specifications.

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.

3. TILE REPAIR

Unless designated for removal, replace damaged conduit with new conduit having equal or greater capacity using material specified in Section 6 or 7. When replacing short sections of clay or concrete tile with single-wall corrugated polyethylene pipe, use the next larger nominal size.

Make connections with manufactured fittings and tight joints. Where joints have gaps that would allow soil to enter, cover the joint with a permanent type material such as coal tar pitch treated roofing paper, fiberglass sheet or mat, or plastic sheet.

If the investigation trench has been excavated below the existing drain grade, backfill the trench with gravel or well-pulverized soil in layers not over four (4) inches thick and tamp by hand or manually directed power tamper to provide a firm foundation for the conduit at the existing grade. Do not backfill with any soil containing broken tile fragments.

Using selected soil free of hard clods, rocks, or frozen soil, hand tamp the backfill material around the haunch of the pipe in layers not over four (4) inches thick to provide support. Hold the conduit in place mechanically while placing excavated material around and over the conduit to ensure proper alignment and grade is maintained. Complete the backfill operation according to Section 5.

4. TILE REMOVAL

Remove conduits as shown on the plans or directed by the Engineer or their representative, including envelope filter material or other flow enhancing material when present.

Cap or plug the open ends of the disconnected conduit to prevent soil entry when the conduit will continue to function downstream, or otherwise shown on the plans. For a minimum distance of two feet around each sealed conduit end, backfill in layers not over four (4) inches thick and tamp by hand or manually directed power tamper to a density equal to or greater than the surrounding undisturbed soil. Do not backfill with any soil containing broken tile fragments, large stones, frozen material, or large dry clods.

Where tile are located beneath an existing animal waste facility, remove the tile or fill the entire length of tile with concrete or Portland cement grout as shown on the plans. When tile removal is specified, 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.

Where tile are located beneath a county, state or federal roadway, remove the tile or fill the entire length of tile with concrete or controlled low strength material (CLSM) in accordance to Section 2503.03 of the IDOT Standard Specifications Manual. Cap and close the old tile in designated areas called out on the plans.

If shown on the plans or directed by the Engineer, reroute upstream drain lines so the capacity of the upstream drainage system is maintained. Install conduit in accordance with Iowa Construction Specification IA-46, Tile Drains for Land Drainage.

5. BACKFILL

Compact soil around disturbed tile as specified in Section 3 (Tile Repair) and Section 4 (Tile Removal). Keep the backfill within 5 feet of the conduit free from large stones, frozen material, and large dry clods. Unless otherwise shown on the plans, backfill the remainder of the trench as follows:

For trenches located under or near structures, backfill in 12 inch layers and compact each layer to a density equal to or greater than the surrounding undisturbed soil.

For other locations, backfill the remainder of each trench with the excavated soil material which shall extend above the ground surface and be well rounded over the trench.

6. MATERIALS

Unless otherwise shown on the plans, conduit and fittings used for repair shall conform to the specifications listed in Table 1. Perforated pipe 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 pipe. The perforations shall be circular or slots. Circular perforations shall not exceed 3/l6 inch in diameter. Slots shall not be more than l/8 inch wide.

Table 1. Acceptable pipe for subsurface drain repair

Kind of Pipe[#]	Specification
Corrugated Polyethylene (PE) Pipe and Fittings, 3 to 6 inch	ASTM F 4O5
Corrugated Polyethylene (PE) Pipe and Fittings, 3 to 24 inch	ASTM F 667
Corrugated Profile Wall (Dual Wall) Polyethylene (PE) pipe, 2 to 60 inch	ASTM F 2648[$]
Corrugated Profile Wall (Dual Wall) Polyethylene (PE) pipe, l2 to 60 inch	ASTM F 23O6[$]
Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and l20	ASTM D l785
PVC Pressure-Rated Pipe (SDR Series)	ASTM D 224l
Clay drain tile	ASTM C 4
Concrete drain tile	ASTM C 4l2

[#] Pipe sizes are nominal and the ranges are inclusive
[$] Pipe conforming to AASHTO M 252 (3 to 10 inch), or AASHTO M 294 (l2 to 60 inch) is acceptable.

7. SPECIAL SPECIFICATIONS

A. MEASUREMENT AND PAYMENT

1. Compensation for the spot tile investigation will be measured based on the actual number of hours used in excavating for, locating, and/or exposing existing drain tile at the locations designated by the Engineer and backfilling where specified.

2. Compensation for the quantity of miscellaneous drain tile connections will be measured for each connection made.

3. For items of work for 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

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

    a. Bid Items No. 6: Field Diversion Tile Connection

        (1) This item includes all labor, tools, equipment, and materials to make the specified connections between the existing field tile lines and the new tile main including: excavation, trench bottom shaping, cutting and fitting of tile, placement of concrete collars, placement and binding of tile compaction of soil bedding envelope, trench backfill, the keeping and delivery of a log of connections made, and miscellaneous associated work necessary to complete the item.

        (2) Does not include repairs or connections to tile intercepted during installation of new tile as a part of the wetland project.

(3) Does not include furnishing or installation of crushed rock bedding and envelope, where required, payable under bid item Trench Stabilization & Cradling Rock. Three (3) tons per connection unless otherwise approved by Engineer prior to backfill.

b. Bid Item No. 7: Tile Investigation

(1) This item includes the time to locate field tile as indicated on plan or directed by Engineer.

(2) The tile information on the drawings is all that is currently known about the approximate tile locations and sizes.

(3) Payment will constitute full compensation for this Bid Item and related Subsidiary Items; Excavation, Removal of Water, and Backfill of Excavation.

* * * END OF DOCUMENT IA-9 * * *

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

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

    a. Subsidiary Items, Removal of Water

        (1) This item shall consist of diverting surface water and dewatering the site as needed for construction

        (2) No separate payment will be made for Removal of Water. Compensation for this item will be included in the payment for Tile Investigation, Earthfill, PVC Pond Inlet Structure, PVC Manhole with Gate Valve, CMP Water Control Structure, HDPE Pipe, and Topsoil Stripping.

* * * END OF DOCUMENT IA-11 * * *

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. The core trench and any other required excavations shall be dug to the lines and grades shown on the drawings or as staked in the field. Structure or trench excavations will conform to all safety requirements of OSHA.

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 Engineer or their 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 Engineer or 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 Engineer and the landowner. On wetland projects, borrow shall not be taken from the wetland area within 10 feet of the embankment or as shown on the drawings.

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. Measurement and Payment

1. For items of work for which cubic yard prices are established in the contract, the volume of excavation will be computed to the nearest cubic yard by computer modeling or by end area.

2. 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 Section 7B of this specification.

B. Items of Work and Construction Details

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

   a. Bid Item No. 8: Pool Grading & Shaping

      (1) This item shall consist of the excavation for the wetland pool expansion and slotted intake riser outlet structure.

      (2) The excavated material designated "Grade & Waste" shall be spread on the existing surface outside of the FEMA floodplain extents as detailed in the plan sheet. Final grade shall be shaped to drain towards the wetland pool area.

      (3) Payment will constitute full compensation for this Bid Item and related subsidiary items: Site Preparation and Removal of Water.

   b. Subsidiary Item, Structure Excavation

      (1) This item shall consist of the excavation necessary to install the Water Control Structures, Pond Inlet Structures, HDPE Pipe, and Erosion Stone.

      (2) No separate payment will be made for Structure Excavation. Compensation for this item will be included in payment for Water Control Structures, Pond Inlet Structures HDPE Pipe, and Erosion Stone.

* * * END OF DOCUMENT IA-21 * * *

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. The completed work shall conform to the lines, grades, and elevations shown on the drawings or as staked in the field.

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 six (6) inches in diameter shall be removed prior to compaction of the fill.

3. FOUNDATION PREPARATION

Foundations for earth fill shall be stripped a minimum of twelve (12) inches to remove vegetation and other unsuitable materials. Foundation surfaces shall be scarified to a minimum depth of two (2) inches prior to placing fill material.

Foundation and abutment surfaces shall not be sloped steeper than 1.5 horizontal to 1 vertical unless otherwise shown on the drawings.

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 Engineer. 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 Engineer.

If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified to a minimum depth of two (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.

Sectional fills are not allowed unless they are shown on the construction drawings.

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 or in Section 8, Special Specifications. 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. Low ground pressure vehicles shall not be used for this purpose.

- 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 force of two hundred (200) 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 nine (9) inches, unless otherwise indicated on the drawings.

Fill adjacent to structures, pipe conduits, and appurtenances shall be placed in layers not more than four (4) inches thick and compacted to a density equivalent to that of the surrounding fill. Methods used to obtain compaction for fine or coarse grained materials are as follows:

- For fine grained materials, hand tamping or manually directed power tampers may be used. Hand compaction only shall be used to compact the earthfill under the bottom half of circular pipes. Manually directed power tampers shall not be used in tight spaces where applying full compactive effort will result in direct contact of the tamper plate with the pipe. 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.

- For coarse grained materials (sands and gravels), vibratory plate compactors shall be used for obtaining compaction. However, hand tamping shall be used to compact the material under the bottom half of circular pipes.

In all cases, follow manufacturer instructions for the specific compaction equipment being used. Heavy equipment shall not be operated within two (2) feet of any structure or pipe.

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

7. ISLANDS, MOUNDS, AND LOAFING AREAS ON WETLAND RESTORATION, ENHANCEMENT, OR CREATION PROJECTS

Islands shall be randomly located within the wetland area at locations shown on the drawings or as staked in the field. The orientation of island shorelines shall be random with attention given to prevailing winds to limit wave damage. In general, the side of the island with the longest dimension shall be parallel to the prevailing wind direction. Side slopes of islands shall be as shown on the drawings, but in no case shall be steeper than 6 horizontal to 1 vertical. Island shapes shall be irregular.

Loafing areas shall be constructed in the areas shown on the drawings or as staked in the field and shall be graded to drain runoff water. The elevation of at least one loafing area should be above the maximum water level whenever possible.

Excavated material not suitable for embankments, wetland dikes, or islands can be used to create mounds or blended into surrounding topography to create a natural appearance. Spoil material shall not be spread on existing wetland areas.

Organic soils shall not be used to construct islands, loafing areas, dikes, or embankments.

8. SPECIAL SPECIFICATIONS

A. MEASUREMENT AND PAYMENT

1. 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 computer modeling. 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 the 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 over excavation 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 Section 8B of this specification.

B. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

   a. Bid Item No. 9: Compacted Earthfill- Earthen Berms

      (1) This item shall consist of the grading, and shaping of the fill areas as designated on the plan sheet.

      (2) Earthfill material to be free of sod, roots, frozen soils, and other objectionable materials.

      (3) The earthfill shall be placed in shallow lifts (max. 8 inches). Compaction shall be

by Method 1.

(4) The fill shall be graded to maintain drainage and scarified before topsoil is placed.

(5) Slopes shall be graded to existing surface on a 4:1 or slope as specified on the plan set.

(6) Payment will constitute full compensation for this bid item and the following related subsidiary items: Site Preparation, and Removal of Water.

b. Subsidiary Item, Backfill of Required Excavation for structures

(1) This item shall consist of backfilling the areas excavated to install the Water Control Structures, Pond Inlet Structures, Drawdown Outlet Structure, pipe, and other structures.

(2) Compaction adjacent to the water control structure and the pipes shall be as indicated above in Section 6. All other compaction shall be Method 1 or equivalent.

(3) No separate payment will be made for backfill of required excavations for structures. Compensation for this item will be included in payment for Water Control Structures, Pond Inlet Structures, Drawdown Structure, pipe, other structures, and Drainage Tile Investigation.

c. Subsidiary Item, Backfill of Required Excavation of Unsuitable Materials

(1) This item shall consist of the grading, and shaping of the fill areas incidental to the excavation of materials unsuitable for wetland development.

(2) Earthfill material to be free of sod, roots, frozen soils, and other objectionable materials.

(3) The earthfill shall be placed in shallow lifts (max. 8 inches). Compaction shall be by Method 1.

(4) The fill shall be graded to maintain drainage and scarified after topsoil is placed.

(5) No separate payment will be made for Backfill of Required Excavations of Unsuitable Materials. Compensation for this item will be included in payment for Bid Item No. 8: Pool Grading & Shaping.

* * * END OF DOCUMENT IA-23 * * *

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 Engineer.

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 or indicated in construction notes. After the spreading operation is completed, the surface shall be finished to a reasonably smooth surface.

5. SPECIAL SPECIFICATIONS

A. Measurement and Payment

1. For items of work for which cubic yard prices are established in the contract, the volume of excavation will be computed to the nearest cubic yard by computer modeling or by end area.

2. For items of work for which cubic yard prices are established in the contract, the volume of stripping and topsoiling will be measured in cubic yards as computed by multiplying the surface area to be stripped by a depth of twelve (12) inches as designated at that location. Payment for the item will be made at the contract cubic yard price and will constitute full compensation for completion of the work.

3. 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 Section 5B of this specification.

B. Items of Work and Construction Details

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

a. Subsidiary Item, Topsoiling

(1) This item will consist of spreading suitable salvaged stripping materials as the surface layer of all excavations and earthfills that will be seeded.

(2) Areas to receive a minimum twelve (12) inch layer of topsoil include: the excavated pool area, soil waste locations, and the berm surfaces. Additional areas for a twelve (12) inch layer of topsoil may be directed by the Engineer. Area of topsoil respread will not exceed area of topsoil strip.

(3) Grading areas with less than six (6) inches of cut will not require topsoil respread.

(4) No separate payment will be made for Topsoiling. Compensation for this item will be included in the bid item for Topsoil: Strip, Stockpile, Respread.

* * * END OF DOCUMENT IA-26 * * *

NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-31 CONCRETE

1. SCOPE

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

2. MATERIALS

Portland Cement shall conform to ASTM C 150 and shall be Type I or Type II.

Fine Aggregates shall conform to ASTM C 33 and shall be composed of clean, uncoated grains of material.

Coarse Aggregates shall be gravel or crushed stone conforming 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.

Water shall be clean and free from injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances.

Air entraining agent 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 the following types:

1. Type A - Water-reducing admixture
2. Type D - Water-reducing and retarding admixture
3. Type F - Water-reducing, high range admixture (superplasticizer).
4. Type G - water-reducing, high range, and retarding admixture (superplasticizer).

   Type D or G admixture may be used when the air temperature is over 80 degrees F at the time of mixing and/or placement.

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

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.

Reinforcing steel shall be free from loose rust, oil, grease, paint, or other deleterious matter. Reinforcing steel shall conform to one or more of the following:

1. Reinforcing Bars - ASTM A 615 or A 996, Grade 40 or greater, deformed.
2. Welded Wire Fabric - ASTM A 185 or A 497.

Waterstops shall be either metallic or nonmetallic. Metallic waterstops shall be fabricated from sheets of copper or galvanized steel. Nonmetallic waterstops shall be made of natural or synthetic rubber or vinyl chloride polymer or copolymer. Rubber, polymer and copolymer waterstops shall have ribbed or bulb-type anchor flanges and a hollow tubular center bulb, unless otherwise shown on the drawings. All waterstops shall be of the sizes shown on the drawings.

Curing compound shall be a liquid membrane-forming compound suitable for spraying on the concrete surface. The curing compound shall meet the requirements of ASTM C 309 Type 2 (white pigmented).

3. CONCRETE DESIGN MIX

The contractor will be responsible for determining the design mix proportions in accordance with the requirements included in this paragraph and shall provide a copy of the mix to the Engineer at least three (3) days prior to placing any concrete. The concrete mix shall be of such proportions as to provide a minimum strength of 3500 p.s.i. in 28 days, unless otherwise shown on the drawings. The air content shall be 4 to 8 percent of the volume of the concrete at the time of placement. 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 fine aggregate shall be 30 to 50 percent of the total combined aggregate based on oven dry weights. The contractor shall provide tests to verify that the design mix meets the requirements. In lieu of this, one of the following mix proportions per cubic yard may be used:

Mix Number	Minimum Cement, Pounds	Fly Ash, Pounds	GGBF Slag, Pounds	Maximum ** Water, Gallons
1	564	0	0	33
2	470	45-90	0	31-34
3	517	129	0	31 *
4	366	114	91	31 *
5	259	103	155	31 *

** Total of available aggregate moisture, mixing water added at the plant and mixing water added at the job site (one gallon equals 8.33 pounds).

* Requires water reducing admixture.

4. MIXTURES AND MIXING

Ready-mixed concrete shall be batched, mixed and transported in accordance with ASTM C 94. Concrete shall be uniform and thoroughly mixed when delivered to the forms. No mixing water in excess of the amount shown for the design mix or in an amount that would cause the maximum slump to be exceeded shall be added to the concrete during mixing, hauling or after arrival at the point of delivery. The concrete shall be batched and mixed so that the temperature of the concrete at the time of placing shall be between 50 and 90 degrees F.

5. BATCH TICKET

The Contractor shall obtain from the supplier a delivery ticket for each batch of concrete before unloading at the site. The following information shall be included on the ticket: name of concrete supplier, job name or location, date, truck number, amount of concrete, time loaded or time of first mixing cement, aggregate, and mixing water added at the plant, type and amount of cement, type and amount of admixtures, oven dry weights of fine and coarse aggregate, and moisture content (%) or weight of water contained in the aggregates.

The following information shall be added to the batch ticket on site: mixing water added on site, time concrete arrived on site and time concrete was unloaded.

Upon completion of the concrete placement, copies of all batch tickets shall be provided to Engineer.

6. REINFORCING STEEL

Before reinforcement is placed, the surfaces of the bars or mesh shall be cleaned to remove any loose and/or flaky rust, mill scale, oil, grease, or other foreign substances. After placement, the reinforcement shall be maintained in a clean condition until it is completely embedded in the concrete.

Reinforcing bars shall be cut and bent according to ACI Standard 315.

Tack welding of bars shall not be permitted. Reinforcement shall be accurately placed as shown on the drawings and secured in position in a manner that will prevent its displacement during placement of concrete. Metal chairs, metal hangers, metal spacers or concrete chairs shall be used to support reinforcement. Precast concrete chairs shall be manufactured from concrete equal in quality to the concrete being placed. Precast concrete chairs shall be moist at the time concrete is placed.

Splices of reinforcing bars shall be made only at the locations shown on the drawings, unless otherwise approved by the Engineer. All reinforcing splices and placement shall be in accordance with ACI 318 and shown on the drawings.

After placement of the reinforcement, concrete shall not be placed until the reinforcement has been inspected and approved by Engineer.

7. PREPARATION OF FORMS AND SUBGRADE

Prior to placement of concrete, the forms and subgrade shall be free of woodchips, sawdust, debris, water, ice, snow, extraneous oil, mortar, or other harmful substances or coatings. Any oil on the reinforcing steel or other surfaces required to be bonded to the concrete shall be removed. All surfaces shall be firm and damp prior to placing concrete. Placement of concrete on mud, dried earth, uncompacted fill, or frozen subgrade will not be permitted.

The forms and associated false-work shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and elevations. Forms will be mortar tight. Forms with torn surfaces, worn edges, dents, or other defects will not be used. Forms shall be coated with a nonstaining form release agent before being set into place. Excess form coating material shall not stand in puddles in the forms or come in contact with the steel reinforcement or hardened concrete against which fresh concrete is to be placed.

Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be of a commercially manufactured type. Non fabricated wire shall not be used. Form ties shall be constructed so that the ends or end fasteners can be removed without causing spalling at the surface of the concrete.

Metal form ties used within the forms on structures with a total volume of concrete exceeding fifteen (15) cubic yards shall be equipped with cones or other devices that permit their removal to a depth of at least one inch without damage to the concrete. The holes resulting from cones and other devices shall be patched in accordance with Section 9.

Form ties except those specifically covered by the preceding paragraph shall be broken off flush with the formed surface. Any surface areas which have been spalled or otherwise damaged shall be repaired in accordance with Section 9.

Steel tying and form construction adjacent to new concrete shall not be started until concrete has cured at least twelve 12 hours.

Concrete joints shall be of the type and at the locations shown on the drawings.

Splices in metal waterstops shall be brazed, welded, or overlapped and bolted. Splices in nonmetallic waterstops shall be cemented or joined as recommended by the manufacturer.

8. PLACING CONCRETE

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

Concrete shall be delivered to the site and discharged into the forms within 1 1/2 hours after the introduction of the cement to the aggregates. When a superplasticizer is used, the concrete shall be discharged within the manufacturer's recommended time limit for discharge after addition of the admixture. In hot weather or under conditions contributing to quick setup of the concrete, 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.

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 maximum water content and water/cement ratio in the design mix is not exceeded. Addition of water will not be permitted after placement of the load has started.

The concrete shall be deposited as closely as possible to its final position in the forms and shall be worked into corners and around reinforcement and other embedded items in a manner which prevents segregation. Formed concrete shall be deposited in layers 24 inches or less in depth and shall be continuously deposited so that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of "cold joints". Concrete containing superplasticizer shall be placed in lifts not exceeding five (5) feet in depth. If the surface layer of concrete sets during placement to the degree that it will not flow and merge with the succeeding layer when tamped or vibrated, the contractor shall discontinue placing concrete and install a construction joint. Construction joints shall be completed as shown on the drawings or by one of the following methods:

1. The joint shall be constructed using a six (6) inch wide by 1/4 inch steel plate. The surfaces of the construction joint shall be prepared by washing and scrubbing with a wire brush or wire broom to expose coarse aggregate. The steel plate shall be embedded three (3) inches in the concrete.

2. The joint surface shall be cleaned to expose coarse aggregate by sandblasting or air-water cutting after the concrete has gained sufficient strength to prevent displacement of the coarse aggregate or cement fines. The surface of the concrete shall not be cut so deep as to undercut the coarse aggregate. The joint shall be washed to remove all loose material after cutting.

The surfaces of all construction joints shall be kept continuously moist for at least one (1) hour prior to placement of the new concrete. The new concrete shall be placed directly on the cleaned and washed surface. New concrete shall not be placed until the hardened concrete has cured at least twelve (12) hours.

Concrete shall not be dropped more than five (5) feet vertically unless suitable equipment is used to prevent segregation. Concrete containing superplasticizer shall not be dropped more than twelve (12) feet vertically.

Immediately after the concrete is placed in the forms, it shall be consolidated by vibration, spading or hand tamping as necessary to insure smooth surfaces and dense concrete. Care should be taken not to over-vibrate concrete containing superplasticizer. Vibration shall not be supplied directly to the reinforcing steel, the forms or concrete which has hardened to the degree that it does not insure a monolithic bond with the preceding layer. The use of vibrators to transport concrete in the forms or conveying equipment will not be permitted.

9. FORM REMOVAL AND FINISHING

Forms shall be left in place for at least 24 hours after placing concrete. Forms shall be removed in such a way as to prevent damage to the concrete. Supports shall be removed in a manner that will permit concrete to take the stresses due to its own weight uniformly and gradually.

Immediately after removal of the forms, concrete which is honey combed, damaged or otherwise defective shall be repaired or replaced. All cavities or depressions resulting from form tie removal shall be patched with a non-shrink grout, mortar mix or epoxy-type sealer. Non-shrink grout consists of 1 part cement and 2-1/2 parts sand that will pass a No. 16 sieve. Only enough water shall be added to produce a filling which is at the point of becoming rubbery when the material is solidly packed.

All repaired and patched areas shall be cured as required in Section 10.

10. CURING

Concrete shall be cured for a period of not less than seven (7) consecutive days by one of the following approved methods:

A. Membrane Curing: Concrete shall be cured with white pigmented curing compound. The compound shall be sprayed on moist concrete as soon as free water has disappeared, but shall not be applied to any surface until patching, repairs and finishing of that surface are completed. Curing compound shall not be applied to surfaces requiring bond to subsequently placed concrete, such as construction joints, shear plates, reinforcing steel, and other embedded items. Surfaces subjected to heavy rainfall or running water within three (3) hours after curing compound has been applied or surfaces damaged by subsequent construction operations during the curing period, shall be reapplied in the same manner as the original application.

B. Moist Curing: Concrete shall be cured by maintaining all surfaces continuously wet for the entire curing period.

C. Cover: Adequately cover an exposed structure with burlap mats, or other material and continually soak with water.

11. BACKFILLING

Backfilling may begin when the curing period has ended. Backfill against the structure will be placed in no more than four (4) inch layers and compacted by hand tamping or with manually directed power tampers or plate vibrators. Layers compacted in this manner shall extend not less than two (2) feet from any part of the concrete structure.

12. HOT AND COLD WEATHER CONCRETING

When the atmospheric temperature may be expected to drop below 40° F at the time concrete is delivered to the work site, during placement, or at any time during curing period, concrete shall be mixed, placed, and protected in accordance with ACI Standard 306, “Recommended Practice for Cold Weather Concreting”.

When climatic or other conditions are such that the temperature of the concrete may reasonably be expected to exceed 90° F. at the time of delivery to the work site, during placement, or during the first 24 hours after placement, concrete shall be mixed, placed and protected in accordance with ACI Standard 305, “Recommended Practice for Hot Weather Concreting”.

13. SPECIAL SPECIFICATIONS

A. Measurement and Payment

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

   a. Subsidiary Item, Concrete

      (1) This item will consist of all necessary concrete, reinforcing steel, formwork, materials and labor needed for supplying and constructing the Water Control Structures as shown on the plans.

      (2) This item will consist of necessary concrete for concrete collars at pipe connections.

      (3) No separate payment will be made for this item. Payment is included in bid items Water Control Structure and Field Diversion Tile Connections.

END OF DOCUMENT IA-31

NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-45 PLASTIC (PVC, PE) PIPE

1. SCOPE

The work shall consist of furnishing and installing plastic pipe and the necessary fittings specified herein or as shown on the drawings. This specification does not cover subsurface drainage systems.

2. MATERIALS

Corrugated Polyethylene (PE) Tubing. Corrugated PE tubing and fittings shall conform to the requirements of the applicable specification listed below:

Kind of Pipe	Specification
Corrugated Polyethylene (PE) Tubing and Fittings, Nominal Sizes 3 to 6 inch, inclusive	ASTM F 405
Large Diameter Corrugated Polyethylene Tubing and Fittings, Nominal Sizes 8 to 24 inch, inclusive	ASTM F 667
Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe	ASTMF 894

Poly Vinyl Chloride (PVC) Plastic Pipe. PVC pipe and fittings shall conform to the requirements of the applicable specification listed below:

Kind of Pipe	Specification
PVC Plastic Pipe, Schedules 40, 80 and 120	ASTM D 1785
PVC Pressure-Rated Pipe (SDR Series)	ASTM D2241
PVC Pressure Pipe, 4 to 12 inch, inclusive for Water Distribution	AWWA C900
PVC Water Transmission Pipe, Nominal Diameters 14 to 36 inches, inclusive	AWWA C905

PVC and PE Plastic Pipe. Plastic pipes meant for non-potable, livestock water supply shall conform to the requirements of the applicable specification listed below:

Kind of Pipe	Specification
Polyethylene (PE) Plastic Pipe, (SIDR-PR) Based on Controlled Inside Diameter	ASTM D 2239
PVC Pressure-Rated Pipe (SDR Series)	ASTM D2241

3. FITTINGS AND JOINTS

Pipe joints shall conform to the details shown on the drawings. Pipe shall be installed and joined in accordance with the manufacturer's recommendations.

Joints may be bell and spigot type with elastomeric gaskets, coupling type with elastomeric gasket on each end, or solvent cemented. Gaskets shall conform to ASTM D 1869. Solvent cemented joints shall not be used for pond spillway pipes. Solvent cemented joints for PVC pipe and fittings shall be in accordance with ASTM D 2855. When a lubricant is required to facilitate joint assembly, it shall be a type having no detrimental effect on the gasket or pipe material.

Mechanical joints (split couplings and snap couplings) may be used when joining PE pipe and fittings when the pipe is used for non-pressure flow and a free draining sand or gravel bedding material is provided. Elastomeric-sealed mechanical joints shall be used when joining PE pipe and

fittings under pressure flow or where seepage cannot be tolerated. Where non-pressure pipe is specified, the fittings shall be of the same or similar materials as the pipe and shall provide the same durability and strength as the pipe.

A special case of livestock water supply involves pipes through a dam or embankment. Only PE pipe meeting the above specification may be used. PE pipe, of 1 1/4, 1 1/2, or 2-inch diameter shall be installed so that there are no joints within the embankment area.

Where pressure pipe is specified, fittings shall have a design capacity equal to or exceeding that specified for the pipe to which it is attached. Fittings shall be cast iron, steel, one piece injection molded plastic fitting or fabricated from plastic pipe and one piece injection molded plastic fittings. Pressure pipe fittings shall conform to the requirements of the applicable specification listed below.

Kind of Fitting	Specification
Threaded PVC Plastic Pipe Fittings, Schedule 80	ASTM D 2464
PVC Plastic Pipe Fittings, Schedule 40	ASTM D 2466
PVC Plastic Pipe Fittings, Schedule 80	ASTM D 2467
Butt Heat Fusion (PE) Plastic Fittings for PE Plastic Pipe and Tubing	ASTM D 3261
Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	ASTM D3139
PVC Pressure Pipe, 4 to 12 inches, inclusive for Water Distribution	AWWA C900
PVC Water Transmission Pipe, Nominal Diameters 14 to 36 inches, inclusive	AWWA C905

4. HANDLING AND STORAGE

Pipe shall be delivered to the job site and handled by means which provide adequate support to the pipe and does not subject it to undue stresses or damage. When handling and placing plastic pipe, care shall be taken to prevent impact blows, abrasion damage, and gouging or cutting (by metal surfaces or rocks). All special handling requirements of the manufacturer shall be strictly observed. Special care shall be taken to avoid impact when the pipe must be handled at temperatures of 40 degrees F (4.4 degrees C) or less.

Pipe shall be stored on a relatively flat surface so that the barrels are evenly supported. Unless the pipe is specifically coated to withstand exposure to ultraviolet radiation, it shall be covered with an opaque material when stored outdoors for a period of 15 days or longer.

5. TRENCHING

Plastic pipe conduits shall be installed in trenches or plowed in according to the following methods:

A. **Trencher Constructed -** When conditions permit, trenching for pipelines, which are buried from 5 to 6 feet deep, are usually done with a narrow 4 to 6 inch wide chain trencher. Where there is little gravel and the ground is not too wet, these trenchers bring up well pulverized soil that makes good backfill material. Where rocks are not present, any of this material may be backfilled directly around the pipe. There is no practical way to compact the fill in these narrow trenches. The owner must be made aware that this material normally consolidates to its maximum extent in two (2) to five (5) years, but depressions or low spots can be hazards to livestock, humans and equipment.

B. **Backhoe Constructed Trench** – Backhoe trenches are usually a minimum of twelve (12) inches wide. The material frequently comes out of the trench as clods, large chunks, and rocks. Immediately backfill over the pipe with 4 to 6 inches of soil that is free of these clods, large chunks, and rocks. If adequate excavated material is not available, then material such as sand or fine gravel should be imported and placed around the pipe to a depth of 4 to 6 inches over the top of the pipe. Fill the trench with the remaining excavated material.

C. **Plowing** – Plowing, or ripping, is a trenchless method for installing plastic pipe. It is a multi-stage process consisting of positioning a vibrating or static (non-vibrating) plow equipped with a trailing product guide which feeds pipe to the depth setting of the plow as it moves forward. The pipe is inserted into the ground continuously along a predetermined path and depth. The vertical depth of installation is controlled by hydraulic adjustment of the plow shear head and the surface contours. The depth of insertion must be continually adjusted to compensate for changes in terrain.

6. LAYING AND BEDDING THE PIPE

Plastic pipe conduits and fittings shall be installed as shown on the drawings and specified herein. The pipe shall be laid so that there is no reversal of grade between joints, unless otherwise shown on the drawings. The pipe shall be placed with the bell end upstream, unless otherwise specified. The pipe shall be carefully placed on the bedding or into the pipe trench.

Care shall be taken to prevent distortion and damage during unusually hot (over 90 degrees F) or cold weather (under 40 degrees F). After the pipe has been assembled in the trench, it shall be allowed to reach ground temperature before backfilling to prevent pull out of joints due to thermal contraction.

The pipe ends and the couplings shall be free of foreign material when assembled. During the placement of the pipe, each open end of the pipeline shall be closed off by a suitable cover or plug at the end of work on the pipeline each day and until work resumes or installation is complete.

Perforated pipe shall be laid with the perforations down and oriented symmetrically about the vertical centerline. Perforations shall be clear of any obstructions when the pipe is laid.

Pipe shall be firmly and uniformly supported throughout the entire length. Bell-holes shall be made in the bedding under bells or couplings and other fittings to prevent the pipe from being supported by fittings.

a. Earth Bedding. When bedding is specified, the pipe shall be firmly and uniformly bedded in a shaped bedding groove that closely conforms to the bottom of the pipe for a depth equal to a minimum of one (1) inch or 5 percent of the diameter of the pipe, whichever is greater. The bedding material shall be free of rocks or stones greater than 1/2 inch diameter and earth clods greater than two (2) inch diameter.

b. Sand or Gravel Bedding. When sand or gravel bedding is specified, the pipe shall be firmly and uniformly placed on a sand or gravel bed. Sand or gravel fill shall be carefully placed and compacted as specified herein and as shown on the drawings.

A few installations of above ground pipelines have been noted. These installations are normally laid directly on the ground and very close to an existing fence line for protection. Only those pipelines designed to withstand exposure to ultraviolet radiation may be utilized for these installations. Adequate thrust control shall be incorporated in these installations.

7. BACKFILL

The pipe shall be held down during backfilling to the top of the pipe to prevent its being lifted from its original placement.

Within two (2) feet of the pipe, backfill shall be carefully placed and compacted by means of hand tamping or manually directed power tampers or plate vibrators to form a continuous uniform support around the pipe. Maximum thickness of layers before compaction within two (2) feet of the pipe shall be four (4) inches and at more than two (2) feet from the pipe a maximum thickness before compaction shall be nine (9) inches. Unless otherwise specified, the initial backfill shall be compacted to a density equivalent to that of the adjacent fill or foundation materials.

The water content of cohesive backfill material shall be such that, kneaded in the hand, the soil will form a ball which does not readily separate. For non-cohesive sand and gravel backfill material, water content is not a concern for thin lifts.

8. SPECIAL SPECIFICATIONS

A. Measurement and Payment

1. 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 the 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 appurtenance listed.

2. 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 Section 8B of the specification.

B. Items of Work and Construction Details

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

    a. Bid Item No: 11: PVC Pond Inlet Structures with Dome Grate

        (1) This item will consist of furnishing and installing the PVC Pond Inlet Structures as shown on plans with all appurtenances including the lockable dome grate collar and aggregate bedding.

        (2) Work includes compliance with plan notes regarding placement, fill material, and compaction of satisfactory backfill around the pipe.

        (3) Contractor shall provide padlocks for collar. Pond Inlet Structures shall be keyed alike to match the Water Control Structures. Four (4) keys shall be provided upon project completion.

        (4) Payment will constitute full compensation for this bid item and the following related subsidiary items: Concrete, Trench Excavation, Backfill of Required Excavation, Site Preparation and Removal of Water.

* * * END OF DOCUMENT IA-45 * * *

NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-46 TILE DRAINS FOR LAND DRAINAGE

1. SCOPE

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

2. MATERIAL

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 (PE) pipe (tubing) and fitting shall conform to ASTM F 405 (3" to 6") or F 667 (3" to 24"), as appropriate. Corrugated profile wall (dual wall) polyethylene (PE) pipe shall meet or exceed the requirements of ASTM F 2648 (2" to 60") or ASTM F 2306 (12" to 60"). Pipe conforming to AASHTO M 252 (3" to 10"), or AASHTO M 294 (12" to 60") is acceptable. Perforated tubing shall have a water inlet area of at least one (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.

Tile extensions of corrugated metal pipe (CMP) shall conform to the requirements of AASHTO M 36 Type 1 for circular pipe. Wall thickness shall be a minimum of 16 gage unless otherwise shown on the plans.

Precast concrete manholes and structures shall comply with ASTM C 478 for manhole sections and provide pipe block outs, cast-in specialties and access openings as required.

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 conduit shall be constructed to the line, depth, cross section, and grade shown on the drawings, or as directed by the Engineer or Inspector. The trench bottom shall be smooth and free of exposed rock. If rock is encountered in the trench bottom, over-excavate the trench and place at least six (6) inches of compacted earth or sand bedding in the trench to bring it up to the conduit grade.

If not otherwise shown on the drawings, trench width at the top of the conduit shall be the minimum required to permit installation and provide bedding conditions suitable to support the load on the conduit, but with not less than three (3) inches of clearance on each side of the conduit. Maximum trench width shall be the conduit diameter plus twelve (12) inches measured at the top of the conduit, unless approved bedding is installed.

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 two (2) inches wider than the conduit on each side. 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 hard points 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 the tile. The 90-degree "V" groove shall not be used on conduits greater than six (6) 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.

5. JUNCTION STRUCTURES

Construction of junction structures shall be as specified in the plans and installed at the designated locations of the Engineer.

6. 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 conduit 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 conduit. The conduit shall then be laid and the envelope or filter material placed over the conduit.

7. 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 maximum
b. Clay – 1/8 inch preferred, 1/4 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 fitting 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.

8. CONNECTIONS

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

Existing drain lines not shown on the drawings but encountered during installation shall be bridged across the trench or as directed by Engineer.

Connections with the outlet pipe shall be made watertight.

9. OUTLETS

A continuous section of non-perforated conduit at least 20 feet long shall be used at the outlet. At least 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 minimum;
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. Corrugated profile wall (dual wall) polyethylene pipe (PE).

All plastic (PVC) and polyethylene pipe (PE) outlets shall include 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.

10. BLINDING

After the conduit is placed in the excavated groove, friable material from the sides of the trench shall be placed around the conduit, completely filling the trench to a depth of not less than six (6) inches over the top of the conduit. 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. Conduit placed during any one day shall be blinded by the end of the day's work. Blind with care to not disturb tile alignment.

11. 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.

Unless otherwise shown on the plans, in mineral soils, the minimum depth of cover over subsurface drains shall be 2.4 feet. In organic soils, the minimum depth of cover after initial subsidence shall be 3.0 feet.

12. SPECIAL SPECIFICATIONS

A. MEASUREMENT AND PAYMENT

1. For items of work for which specific unit prices are established in the contract, compensation for the quantity of HDPE pipe will be measured in linear feet along the centerline of the newly furnished pipe. Fractions of feet will be disregarded.
2. For items of work for 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.

3. 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 Section 12B of this specification.

B. ITEMS OF WORK AND CONSTRUCTION DETAILS

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

   a. Bid Item No. 12: 6" Dualwall HDPE Non-Perforated (Watertight)

      (1) This item will consist of furnishing and installing the Dual Wall non-perforated HDPE inlet tile.

      (2) Work includes compliance with plan notes regarding placement and compaction of satisfactory backfill around the pipe.

      (3) Work includes related appurtenances such as manufactured fittings.

      (4) Does not include the District Tile Connections or Miscellaneous Drain Tile Repairs & Connections.

      (5) Payment will constitute full compensation for this bid item and the following related subsidiary items: Trench Excavation, Backfill of Required Excavation, Site Preparation, and Removal of Water.

   b. Bid Item No. 13: 10" Dualwall HDPE Non-Perforated (Watertight)

      (1) This item will consist of furnishing and installing the Dual Wall non-perforated HDPE inlet tile.

      (2) Work includes compliance with plan notes regarding placement and compaction of satisfactory backfill around the pipe.

      (3) Work includes related appurtenances such as manufactured fittings.

      (4) Does not include the District Tile Connections or Miscellaneous Drain Tile Repairs & Connections.

      (5) Payment will constitute full compensation for this bid item and the following related subsidiary items: Trench Excavation, Backfill of Required Excavation, Site Preparation, and Removal of Water.

c. Subsidiary Item, Furnish and Install PVC and HDPE Fittings

(1) Includes excavation for placement, installation of the fitting on the pipe, placement and compaction of soil against the fitting, and final backfill.

(2) Contractor shall follow manufacturer's instructions for proper installation.

(3) No separate payment will be made for the fitting installations. Compensation for the item will be included in the corresponding pipe work.

* * * END OF DOCUMENT IA-46 * * *

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 seven (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 three (3) inches, except that twelve (12) rivets will be sufficient to secure the circumferential seams in twelve (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.

Description of Coupling Band	Maximum Fill Height, Ft.	Maximum Pipe Diam., In.
24 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 three (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.1/	35	48
Hugger band without rods and lugs but including O-ring gaskets.1/	20	24
Angles riveted or welded to a coupling band and drawn tight with bolts. Bands shall be a minimum of seven (7) corrugations wide and have a minimum lap of two (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 diameter bolts. A joint sealer shall be placed between the flanges to ensure water tightness.	25	12

1/ 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.

(4) Aluminized pipe shall be coated in a manner appropriate to manufacturer's recommendations.

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 it from 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 four (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

1. 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 even 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 appurtenance listed.

2. 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 Section 8B of this specification.

B. Items of Work and Construction Details

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

   a. Bid Item No 14: 4’ CMP Slotted Intake Riser with Dome Grate, 24” Dia.

      (1) This item will consist of furnishing and installing the slotted intake riser and dome grate as shown on the plans with all appurtenances. Pipe sections shall be compatible with the supplied pipe.

      (2) This item does not include required Erosion Stone needed to form the side-slopes around the riser. Erosion Stone will be paid for under the Erosion Stone bid item.

      (3) This item does not include required tile connections which will be paid for under the 10” Dualwall HDPE bid item.

      (4) Payment will constitute full compensation for this bid item and the following related subsidiary items: Removal of Water, Required Excavation, and Backfill of Required Excavation.

   b. Bid Item No 15: 6’ CMP Water Control Structure with Locking Grate Lid, 48” Dia.

      (1) This item will consist of furnishing and installing the water control structure as shown on the plans with all appurtenances include cast-in-place base, and lid with access grate.

      (2) Top stop log elevation and structure height shall be as specified on the plans.

      (3) This item includes aluminum stop logs and lifting handle(s) which shall be provided to remove the stop logs, as shown on the plans.

      (4) Contractor shall provide padlocks for access grates. They shall be keyed alike and match the locks on the Pond Inlet Structures and Inlet Water Control Structures. Four (4) keys shall be provided upon project completion.

      (5) This item does not include required tile connections which will be paid for under the 10” Dualwall HDPE bid item.

      (6) Payment will constitute full compensation for this bid item and the following related subsidiary items: Removal of Water, Required Excavation, and Backfill of Required Excavation.

* * * END OF DOCUMENT IA-51 * * *

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, erosion stone, filter layers, or bedding shall come from sources approved by Engineer. 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 not be 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, erosion stone, or bedding 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 Engineer or Inspector.

4. EQUIPMENT-PLACED ROCK RIPRAP & EROSION STONE

Rock shall be placed by equipment on the surfaces and to the depths specified. The riprap and erosion stone 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 ensure that the riprap or erosion stone 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. Placement of rock shall begin at the bottom of the slope or downstream end of the structure.

Riprap and erosion stone 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 & EROSION STONE

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. Placement of rock shall begin at the bottom of the slope or downstream end of the structure.

6. FILTER LAYERS OR BEDDING

When the drawings specify filter layers or bedding beneath riprap, the filter or bedding material shall be spread uniformly on the prepared subgrade surfaces to the depth specified. Compaction of filter layers or bedding will not be required, but the surface of such layers shall be finished reasonably free of mounds, dips or windrows.

7. SPECIAL SPECIFICATIONS

A. Measurement and Payment

1. For items of work for which specific unit prices are established in the contract, the quantity of erosion stone placed within the specified limits will be measured to the nearest ton by actual weight. For each load erosion stone 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 erosion stone. Such payment will be considered full compensation for completion of the work.

2. For items of work for which specific unit prices are established in the contract, the quantity of aggregate placed within the specified limits will be measured to the nearest ton by actual weight. For each load of aggregate 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 aggregate. Such payment will be considered full compensation for completion of the work.

3. 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 Section 7B.

Items of Work and Construction Details

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

   a. Bid Item No.16: Trench Stabilization & Cradling Rock

      (1) This item shall consist of furnishing, stockpiling, transporting, and installing the specified material, necessary shaping of the trench base, shaping and compaction of the material, equipment, tools, and miscellaneous associated work needed to complete them.

      (2) Includes furnishing and installing crushed rock bedding and envelope where required for all tile connections.

   b. Bid Item No. 17: Erosion Stone

      (1) This item shall consist of furnishing and placing the erosion stone around the slotted intake riser, and other areas as shown on the drawings.

      (2) All erosion stone shall be screened with a minimum opening of 3 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 erosion stone.

      (3) Rock shall be Erosion Stone as defined by Section 4130 of the IDOT Standard Specifications for Highway and Bridge Construction. (Maximum stone weight = 100 lbs.)

      (4) Measurement shall not include erosion stone rejected by Engineer as not in compliance with specifications. The Engineer will estimate the volume of rejected stone for adjustment of quantity.

(5) Payment will constitute full compensation for this bid item and the following related subsidiary items: Site Preparation and Removal of Water.

* * * END OF DOCUMENT IA-61 * * *