PART IV
SPECIFICATIONS

USDA NRCS

United States Department of Agriculture
Natural Resources Conservation Service

DENTON CREEK WATERSHED
SITE 23A EWP REPAIR
SITE 23B EWP REPAIR
WISE COUNTY, TEXAS

CONSTRUCTION SPECIFICATIONS

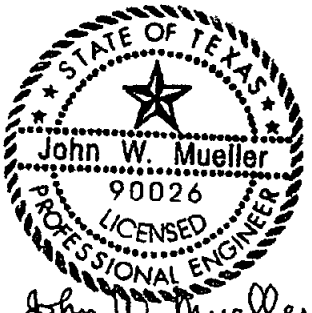
SPONSORED BY:

WISE COUNTY SOIL AND WATER CONSERVATION DISTRICT
WISE COUNTY COMMISSIONERS COURT

COOPERATING WITH:

NATURAL RESOURCES CONSERVATION SERVICE
OF THE
U.S. DEPARTMENT OF AGRICULTURE

June 2016



John W. Mueller, P.E.
8/16/16
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1. Specifications:

Construction Specification No.:	Title:	Date:
2	Clearing and Grubbing	5/01
3	Structure Removal	5/01
5	Pollution Control	1/14
6	Seeding, Sprigging and Mulching	1/14
7	Construction Surveys	1/09
8	Mobilization and Demobilization	5/01
9	Traffic Control	5/01
11	Removal of Water	5/01
21	Excavation	5/01
23	Earthfill	1/09
26	Topsoiling	5/01
61	Rock Riprap	1/14
92	Field Fence	1/09
94	Contractor Quality Control	1/09
95	Geotextile	1/14
420	Site Preparation	5/16

Material Specification No.:	Title:	Date:
523	Rock for Riprap	1/14
582	Galvanizing	5/01
591	Field Fencing Material	1/14
592	Geotextile	1/14

2. Definitions:
   Contracting Officer (CO) – Natural Resources Conservation Service Contracting Officer
   Government - Natural Resources Conservation Service (NRCS)
   Service - NRCS
   Engineer - NRCS Construction Engineer
   Government Representative (GR) - NRCS Construction Engineer
   Inspector - NRCS Construction Inspector (on-site)
   Quality Assurance (QA) - NRCS Construction Inspector (on-site)
   Quality Control (QC) - Contractor's Construction Inspector (on-site)

3. Drawings:
   Denton Creek, Site No. 23A EWP Repair, Drawing No. TX-EN-0682, cover sheet plus sheets 1 through 6.

   Denton Creek, Site No. 23B EWP Repair, Drawing No. TX-EN-0683, cover sheet plus sheets 1 through 7.

4. Location:
   Denton Creek Site No. 23A is located approximately 3.0 miles north, northeast of Decatur, Wise County, Texas on Old Greenwood Road.

   Denton Creek Site No. 23B is located approximately 1.9 miles north, northeast of Decatur, Wise County, Texas on Old Greenwood Road.

5. Time to be allowed for completion of work is 54 calendar days for Denton Creek 23A and 53 calendar days for Denton Creek 23B (holidays and weather days not included).

Construction Specification 2—Clearing and Grubbing

1. Scope

The work consists of clearing and grubbing and disposal of trees, snags, logs, brush, stumps, shrubs, and rubbish from the designated areas.

2. Protection of existing vegetation

Trees and other vegetation designated to remain undisturbed shall be protected from damage throughout the duration of the construction period. Any damages resulting from the contractor's operations or neglect shall be repaired by the contractor.

Earthfill, stockpiling of materials, vehicular parking, and excessive foot or vehicular traffic shall not be allowed within the drip line of vegetation designated to remain in place. Vegetation damaged by any of these or similar actions shall be replaced with viable vegetation of the same species, similar condition, and like size unless otherwise approved by the contracting officer.

Any cuts, skins, scrapes, or bruises to the bark of the vegetation shall be carefully trimmed and local nursery accepted procedures used to seal damaged bark.

Any limbs or branches 0.5 inch or larger in diameter that are broken, severed, or otherwise seriously damaged during construction shall be cut off at the base of the damaged limb or branch flush with the adjacent limb or tree trunk. All roots 1-inch or larger in diameter that are cut, broken, or otherwise severed during construction operations shall have the end smoothly cut perpendicular to the root. Roots exposed during excavation or other operations shall be covered with moist earth or backfilled as soon as possible to prevent the roots from drying out.

3. Marking

The limits of the area(s) to be cleared and grubbed will be marked by stakes, flags, tree markings, or other suitable methods. Trees to be left standing and uninjured will be designated by special markings placed on the trunk about 6 feet above the ground surface.

4. Clearing and grubbing

All trees not marked for preservation and all snags, logs, brush, stumps, shrubs, rubbish, and similar materials shall be cleared from within the limits of the designated areas. Unless otherwise specified, all stumps, roots, and root clusters that have a diameter of 1 inch or larger shall be grubbed out to a depth of at least 2 feet below subgrade for concrete structures and 1 foot below the ground surface at embankment sites and other designated areas.

5. Disposal

All materials cleared and grubbed from the designated areas shall be disposed of at locations shown on the drawings or in a manner specified in section 7. The contractor is responsible for complying with all local rules and regulations and the payment of any and all fees that may result from disposal at locations away from the project site.

6. Measurement and payment

Method 1—For items of work for which specific units prices are established in the contract, the cleared and grubbed area is measured to the nearest 0.1 acre. Payment for clearing and grubbing is made for the total area within the designated limits at the contract unit price. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the

completion of the work.

Method 2—For items of work for which specific unit prices are established in the contract, the length of the cleared and grubbed area is measured to the nearest full station (100 feet) along the line designated on the drawing or identified in the specifications. Payment for clearing and grubbing is made for the total length within the designated limits at the contract unit price. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 3—For items of work for which specific unit prices are established in the contract, each tree, stump, and snag having a diameter of 4 inches or larger and each log having a diameter of 4 inches or larger and a length of 10 feet are measured before removal. The size of each tree and snag is determined by measuring its trunk at breast height above the natural ground surface. The size of each log is determined by measuring the butt and by measuring its length from butt to tip. The size of each stump is measured at the top. Diameter is determined by dividing the measured circumference by 3.14.

Payment for clearing and grubbing of each tree, stump, and snag having a diameter of 4 inches or larger and each log having a diameter of 4 inches or larger and a length of 10 feet or larger is made at the contract unit price for its size designation as determined by the following schedule:

Measured diameter (in)	Size designation (in)
4 to 8	6
8 to 12	10
12 to 24	18
24 to 36	30
36 to 60	48
Over 60	60

The sum of such payments shall constitute full compensation for clearing and grubbing (including the clearing and grubbing of smaller trees, stumps, snags, logs, brush, shrubs, and roots), applicable permits and associated fees, and rubbish removal. Such payment shall constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 4—For items of work for which specific lump sum prices are established in the contract, payment for clearing and grubbing is made at the contract lump sum price. Such payment shall constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

All Methods—The following provisions apply to all methods of measurement and payment. 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 7.

7. Items of work and construction details

7. Items of work and construction details

In Section 5, Disposal, all materials removed from the cleared and grubbed areas shall be burned and buried, or mulched on-site at areas designated or approved by the Contracting Officer.

Burning shall be local to the area being cleared and shall have a minimum buffer of 300 feet maintained between the burn area and any existing structures and trees.

The initiation of burning shall commence no earlier than one hour after sunrise and shall be completed on the same day not later than one hour before sunset, and shall be attended by a responsible party at all times during the active burn phase. Open burning shall be in accordance with state and local regulations.

Materials that are to be buried (including residual ash and debris from burning operations) shall be buried at locations designated at the time of the showing of the site to prospective bidders. Buried material shall have a minimum earthfill cover of not less than 2 feet. The cover shall be placed in two lifts with each lift compacted by traversing the entire surface with one tread track of the material placement equipment. The top lift shall be mounded at least 6 inches higher than the surrounding undisturbed area to prevent unsightly depressions after settlement. The finished surface of the disposal area shall be uniformly graded to prevent ponding of water.

All trees, snags, logs, brush, shrubs, stumps, and rubbish that are felled, detached, or otherwise dislocated in or near stream channels shall be disposed of as specified or removed to higher ground prior to the end of each workday. The Contractor is to take precaution, when temporarily stockpiling cleared and grubbed materials, to guard against such cleared and grubbed materials being floated or transported off the worksite by rainstorm runoff.

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

a. Subsidiary Item, Clearing and Grubbing

(1) This item shall consist of all clearing and grubbing within the work limits required for construction of the works of improvement as shown on the drawings.

(2) The approximate locations of areas to be cleared and grubbed are shown on the drawings. The actual limits of required clearing and grubbing will be as designated or staked at the time of showing the site to prospective bidders.

(3) Upon completion of the clearing and grubbing operation, all areas which have been cleared and grubbed shall be dressed to be reasonably smooth by blading, dragging or floating. The entire area shall be reasonably free of abrupt mounds, dips and windrows to provide a clear area for construction staking.

(4) Separate payment will not be made for this item of work. Compensation for this item will be included in the payment for the bid items for Site Preparation, Site 23A and Site Preparation, Site 23B.

Construction Specification 3—Structure Removal

1. Scope

The work shall consist of the removal, salvage, and disposal of structures (including fences) from the designated areas.

2. Marking

Method 1—Each structure or structure part to be removed will be marked with stakes, flags, paint, or other suitable method.

Method 2—The area boundaries from which structures must be removed will be marked using stakes, flags, paint, or other suitable method. Structures to remain undisturbed or to be salvaged will be designated by special markings.

3. Removal

Method 1—All structures designated for removal in the contract shall be removed to the specified extent and depth.

Method 2—within the areas so marked, all visible and buried structures identified shall be removed to the specified extent and depth.

4. Salvage

Structures or structure parts that are designated to be salvaged shall be carefully removed and neatly placed in the specified or approved storage location. Salvaged structures that are capable of being disassembled shall be dismantled into individual members or sections. Such structures shall be neatly and systematically match marked with paint before disassembly. All connectors and other parts shall be marked to indicate their proper location within the structure and shall be fastened to the appropriate structural member or packed in suitable containers.

Material from fences designated to be salvaged shall be placed outside the work area on the property on which the fence was originally located. Fence wire shall be rolled into uniform rolls of suitable size and neatly piled with other salvaged materials. Posts and rails shall be neatly stacked.

5. Disposal of refuse materials

Refuse materials resulting from structure removal shall be disposed of in a manner and at locations specified in section 7 of this specification or in an acceptable manner and at locations approved by the contracting officer. Disposal by burning shall be in accordance with local rules and regulations.

6. Measurement and payment

Method 1—for items of work for which specific unit prices are established by the contract, payment for the removal of each structure unit, except fences, is made at the contract unit price. Fences removed or removed and salvaged are measured to the nearest linear foot. Payment for fence removal or removal and salvage is made at the contract unit prices for each type and size of fence.

Such payment will constitute full compensation for all labor, equipment, tools, and applicable permits and associated fees for burning and disposal of refuse, and all other items necessary and incidental to the completion of the work.

Method 2—for items of work for which specific lump sum prices are established by the contract, payment for structure removal is made at the contract lump sum price.

Such payment will constitute full compensation for all labor, equipment, tools, and applicable permits and associated fees for burning and disposal of refuse, and all other items necessary and incidental to the completion of the work.

All Methods—The following provisions apply to all methods of measurement and payment.

Compensation for any item of work described in the contract, but not listed as a contract line item number in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and items to which they are made subsidiary are identified in section 7 of this specification.

7. Items of work and construction details

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In Section 2, Marking, Method 1 shall apply.

In Section 3, Removal, Method 1 shall apply. The items shall be removed to the bottom of the footing and/or post.

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

a. Subsidiary Item, Structure Removal, Fence

(1) This item shall consist of the removal and salvage of all designated fences in the construction area.

(2) Salvaging of the fences materials is required.

(3) The approximate limits of fences to be removed are shown on the drawings. The actual limits of required fences to be removed will be determined by the contractor and shall not exceed that which is required to implement the specified the repairs.

(4) Separate payment will not be made for this item of work. Compensation for this item will be included in the payment for the bid items Mobilization and Demobilization.

Construction Specification 5—Pollution Control

1. Scope

The work consists of installing measures or performing work to control erosion and minimize the production of sediment and other pollutants to water and air from construction activities.

The following BioPreferred® product categories are applicable to this specification: — mulch and compost materials

erosion control materials
fertilizers
dust suppressants
agricultural spray adjuvants

2. Material

Silt fence shall conform to the requirement of Materials Specification 592, Geotextile. All other material furnished shall meet the requirements of the material specifications listed in section 8 of this specification.

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 to minimize the size of areas disturbed and unprotected from erosion for the shortest reasonable time.

Seeding—Seeding to protect disturbed areas shall occur as soon as reasonably possible following completion of that earthwork activity.

Mulching—Mulching to provide temporary protection of the soil surface from erosion.

Diversions—Diversions to divert water from work areas and to collect water from work areas for treatment and safe disposition. They are temporary and shall be removed and the area restored to its near original condition when the diversions are no longer required or when permanent measures are installed.

Stream crossings—Culverts or bridges where equipment must cross streams. They are temporary and shall be removed and the area restored to its near original condition when the crossings are no longer required or when permanent measures are installed.

Sediment basins—Sediment basins collect, settle, and eliminate sediment from eroding areas from impacting properties and streams below the construction site(s). These basins are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.

Sediment filters—Straw bale filters or geotextile silt fences trap sediment from areas of limited runoff. Sediment filters shall be properly anchored to prevent erosion under or around them. Silt fences shall be installed and maintained in accordance with ASTM D6462. These filters are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.

Waterways—Waterways for the safe disposal of runoff from fields, diversions, and other structures or measures. These works are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.

Other—Additional protection measures as specified in section 8 of this specification or required by Federal, State, or local government.

4. Chemical pollution

The contractor shall provide watertight tanks or barrels or construct a sump sealed with plastic sheets to collect and temporarily contain chemical pollutants, such as drained lubricating or transmission fluids, grease, soaps, concrete mixer washwater, or asphalt, produced as a by-product of the construction activities. Pollutants shall be disposed of in accordance with appropriate state and Federal regulations. At the completion of the construction work, tanks, barrels, and sumps shall be removed and the area restored to its original condition as specified in section 8 of this specification. Sump removal shall be conducted without causing pollution.

Sanitary facilities, such as chemical toilets, or septic tanks shall not be located next to live streams, wells, or springs. They shall be located at a distance sufficient to prevent contamination of any water source. At the completion of construction activities, facilities shall be disposed of without causing pollution as specified in section 8 of this specification.

5. Air pollution

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

Fire prevention measures shall be taken to prevent the start or spreading of wildfires that may result from project activities. Firebreaks or guards shall be constructed and maintained 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 construction operations at all times. If chemical dust suppressants are applied, 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 5 working days before the first application.

6. Maintenance, removal, and restoration

All pollution control measures and temporary works shall be adequately maintained in a functional condition for the duration of the construction period. All temporary measures shall be removed and the site restored to near original condition.

7. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, each item is measured to the nearest unit applicable. Payment for each item is made at the contract unit price for that item. For water or chemical suppressant items used for dust control for which items of work are established in section 8 of this specification, measurement for payment will not include water or chemical suppressants that are used inappropriately or excessive to need. Such payment will constitute full compensation for the completion of the work.

Method 2—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds and supported by invoices presented by the contractor that reflect actual costs. If the total of all progress payments is less than the lump sum contract price for this item, the balance remaining for this item will be included in the final contract payment. Payment of the lump sum contract price will constitute full compensation for completion of the work.

Method 3—For items of work for which lump sum prices are established in the contract, payment will be prorated and provided in equal amounts on each monthly progress payment estimate. The number of months used for prorating shall be the number estimated to complete the work as outlined in the contractor's approved construction schedule. The final month's prorate amount will be provided with the

final contract payment. Payment as described will constitute full compensation for completion of the work.

All Methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items, and the items to which they are made subsidiary, are identified in section 8 of this specification.

8. Items of work and construction details

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This construction site is greater than one (1) acre in area and is subject to the Texas Pollutant Discharge Elimination System (TPDES) requirements administered by the Texas Commission on Environmental Quality (TCEQ). Rules for the TPDES process relative to construction sites are contained in the TPDES General Permit NO. TXR150000. A copy of General permit No. TXR150000 may be found at the TCEQ website.

In conformance with TPDES General Permit TXR150000, a Storm Water Pollution Prevention Plan (SWP3) is required for the construction site. A SWP3 prepared by NRCS is provided. The Contractor shall review the SWP3, and shall amend the plan with a detailed work sequence outline which defines and delineates the proposed construction operation. The amended SWP3 shall be signed by the Contractor and submitted to the Contracting Officer prior to issuance of the Notice to Proceed. A copy of the approved SWP3, as amended, will be maintained at the construction site by the Contractor. A copy of the permit shall be attached to the SWP3.

A copy of the Notice of Intent (NOI) shall be posted at the site until the TPDES permit number is issued for the site. An 8 ½" x 11" notice shall be posted at the site giving the following information about the permit: permit number, contact name, contact phone and project description. If a permit number has not been issued, a copy of the NOI shall be posted with the notice.

If the Contractor identifies sediment control items, which are considered essential to the anticipated construction operation but which are not reflected by the contract bid schedule, a written request for a contract modification will be provided to the Contracting Officer. The request will identify the items, operation, and provide an assessment of changes to the contract cost and performance time.

TPDES also requires an NOI and Notice of Termination (NOT) to be filed with TCEQ. The Contractor will be responsible for submitting the Contractor's copy of the NOI to the Engineer at least five business days before work begins. When the contract is completed, the Contractor shall provide the NRCS Project Engineer a copy of the NOT that he/she will file with the TCEQ.

In conformance with TPDES requirements, the Inspector and the Contractor (or the Contractor's Quality Control person) shall perform periodic inspections of the sediment control practices. Inspections will be conducted bi-weekly (first work day of each week) and within 24 hours of any rainfall event of 0.5 inch or greater at the construction site. After each inspection, a written report will be prepared which summarizes the status of inspected items. The reports will (a) evaluate effectiveness, (b) identify maintenance needs and/or (c) recommend remedial corrective action and will be prepared and signed by the GR and the Contractor. The report shall be filed on site in the same location as the SWP3. The Contractor shall be responsible for identified corrective maintenance needs.

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

a. Bid Items 1 & 11, Pollution Control

(1) This item shall consist of performing all work and furnishing all materials necessary to accomplish the work defined in section 1 of this specification, including all works required to implement the Storm Water Pollution Prevention Plan, including maintenance of sediment filters and installation of stabilized construction entrance, but not the installation of sediment filters.

(2) In Section 7, Measurement and payment, Method 3 shall apply.

(3) The item of work subsidiary to Bid Item 1 is Rock Filter as specified in Construction Specification 61.

b. Bid Item 2, Sediment Filters, Site 23A

(1) This item shall consist of furnishing and installing sediment filters to the lengths and locations designated on the drawings and otherwise needed to control sediment from leaving the construction site. Maintenance of installed filters shall be paid for under the bid item for Pollution Control.

(2) In Section 3, Erosion and sediment control measures and works, sediment filters shall be limited to geotextile sediment filters.

(3) The sediment filter material shall meet the requirements of Material Specification 592.

(4) The sediment filter shall be installed according to the requirements in ASTM D6462.

(5) In Section 7, Measurement and payment, Method 1 shall apply.

c. Bid Item 12, Sediment Filters. Site 23B

(1) This item shall consist of furnishing and installing sediment filters to the lengths and locations designated on the drawings and otherwise needed to control sediment from leaving the construction site. Maintenance of installed filters shall be paid for under the bid item for Pollution Control.

(2) In Section 3, Erosion and sediment control measures and works, sediment filters shall be limited to geotextile sediment filters.

(3) The sediment filter material shall meet the requirements of Material Specification 592.

(4) The sediment filter shall be installed according to the requirements in ASTM D6462.

(5) In Section 7, Measurement and payment, Method 1 shall apply.

Construction Specification 6—Seeding, Sprigging, and Mulching

1. Scope

The work consists of preparing the area for treatment; furnishing and placing seed, sprigs, mulch, fertilizer, inoculant, lime, and other soil amendments; and anchoring mulch in designated areas as specified.

The following BioPreferred® product categories are applicable to this specification:

— mulch and compost materials
— erosion control materials
— fertilizers
— agricultural spray adjuvants

2. Material

Seed—All seed shall conform to the current rules and regulations of the state where it is being used and shall be from the latest crop available. It shall meet or exceed the standard for purity and germination listed in section 7.

Seed shall be labeled in accordance with the state laws and the U.S. Department of Agriculture rules and regulations under the Federal Seed Act in effect on the date of invitations for bids. Bag tag figures are evidence of purity and germination. No seed will be accepted with a test date of more than 9 months before the delivery date to the site.

Seed that has become wet, moldy, or otherwise damaged in transit or storage will not be accepted. The percent of noxious weed seed allowable shall be as defined in the current State laws relating to agricultural seeds. Each type of seed shall be delivered in separate sealed containers and fully tagged unless exception is granted in writing by the contracting officer.

Fertilizer—Unless otherwise specified, the fertilizer shall be a commercial grade fertilizer. It shall meet the standard for grade and quality specified by State law. Where fertilizer is furnished from bulk storage, the contractor shall furnish a supplier's certification of analysis and weight. When required by the contract, a representative sample of the fertilizer shall be furnished to the contracting officer for chemical analysis.

Inoculants—The inoculant for treating legume seeds shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species and shall not be used later than the date indicated on the container or as otherwise specified. A mixing medium, as recommended by the manufacturer, shall be used to bond the inoculant to the seed. Two times the amount of the inoculant recommended by the manufacturer shall be used except four times the amount shall be used when seed is applied using a hydraulic seeder. Seed shall be sown within 24 hours of treatment and shall not remain in the hydraulic seeder longer than 4 hours.

Lime and other soil amendments—Lime shall consist of standard ground agriculture limestone, or approved equivalent. Standard ground agriculture limestone is defined as ground limestone meeting current requirements of the State Department of Agriculture. Other soil amendments shall meet quality criteria and application requirements specified in section 7.

Mulch tackifiers—Asphalt emulsion tackifiers shall conform to the requirements of ASTM D 977, Specification for Emulsified Asphalt. The emulsified asphalt may be rapid setting, medium setting, or slow setting. Nonasphaltic tackifiers required because of environmental considerations shall be as specified in section 7.

Straw mulch material—Straw mulch shall consist of wheat, barley, oat or rye straw, hay, grass cut from

native grasses, or other plants as specified in section 7. The mulch material shall be air-dry, reasonably light in color, and shall not be musty, moldy, caked, or otherwise of low quality. The use of mulch that contains noxious weeds is not permitted. The contractor shall provide a method satisfactory to the contracting officer for determining weight of mulch furnished.

Other mulch materials—Mulching materials, such as wood cellulose fiber mulch, mulch tackifiers, synthetic fiber mulch, netting, and mesh, are other mulching materials that may be required for specialized locations and conditions. These materials, when specified, must be accompanied by the manufacturer's recommendations for methods of application.

3. Seeding mixtures, sod, sprigs, and dates of planting

The application rate per acre for seed mixtures, sprigs, or sod and date of seeding or planting shall be as shown on the plans or as specified in section 7.

4. Seedbed preparation and treatment

Areas to be treated shall be dressed to a smooth, firm surface. On sites where equipment can operate on slopes safely, the seedbed shall be adequately loosened (4 to 6 inches deep) and smoothed. Depending on soil and moisture conditions, disking or cultipacking, or both, may be necessary to properly prepare a seedbed. Where equipment cannot operate safely, the seedbed shall be prepared by hand methods by scarifying to provide a roughened soil surface so that broadcast seed will remain in place.

If seeding is to be accomplished immediately following construction operations, seedbed preparation may not be required except on a compacted, polished, or freshly cut soil surface.

Rocks larger than 6 inches in diameter, trash, weeds, and other debris that will interfere with seeding or maintenance operations shall be removed or disposed of as specified in section 7.

Seedbed preparation shall be discontinued when soil moisture conditions are not suitable for the preparation of a satisfactory seedbed as determined by the contracting officer's technical representative (COTR).

5. Seeding, sprigging, fertilizing, mulching, and stabilizing

All seeding or sprigging operations shall be performed in such a manner that the seed or sprigs are applied in the specified quantities uniformly in the designated areas. The method and rate of seed application shall be as specified in section 7. Unless otherwise specified, seeding or sprigging shall be accomplished within 2 days after final grading is completed and approved.

Fertilizer, lime, and other soil amendments shall be applied as specified in section 7. When specified, the fertilizer and soil amendments shall be thoroughly incorporated into the soil immediately following surface application.

The rate, amount, and kind of mulching or mesh shall be as specified in section 7. Mulches shall be applied uniformly to the designated areas. They shall be applied to areas seeded not later than 2 working days after seeding has been performed. Straw mulch material shall be stabilized within 24 hours of application using a mulch crimper or equivalent anchoring tool or by a suitable tackifier. When the mulch crimper or equivalent anchoring tool is used, it shall have straight blades and be the type manufactured expressly for and capable of firmly punching the mulch into the soil. Where the equipment can be safely operated, it shall be operated on the contour. Hand methods shall be used where equipment cannot safely operate to perform the work required.

The tackifier shall be applied uniformly over the mulch material at the specified rate, or it shall be injected into the mulch material as it is being applied. Mesh or netting stabilizing materials shall be applied smoothly, but loosely on the designated areas. The edges of these materials shall be buried or securely anchored using spikes or staples as specified in section 7.

The contractor shall maintain the mesh or netting areas until all work under the contract has been completed and accepted. Maintenance shall consist of the repair of areas damaged by water erosion, wind, fire, or other causes. Such areas shall be repaired to reestablish the intended condition and to the design lines and grades required by the contract. The areas shall be refertilized, reseeded, and remulched before the new application of the mesh or netting.

6. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, each area treated is measured as specified in section 7 and the area calculated to the nearest 0.1 acre. Payment for treatment is made at the contract unit price for the designated treatment, which will constitute full compensation for completion of the work.

When specified as an item of work, mesh or netting is measured to the nearest square yard of surface area covered and accepted. Payment is made at the contract unit price and will constitute full compensation for completion of the work.

Method 2—For items of work for which specific lump sum prices are established in the contract, the quantity of work will not be measured for payment. Payment for this item is made at the contract lump sum price for the item and will constitute full compensation for the completion of the work.

Method 3—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds. Progress payments will be determined as specified in section 7. Payment of the lump sum contract price will constitute full compensation for completion of the work.

All Methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the item(s) to which they are made subsidiary are identified in section 7.

7. Items of work and construction details

7. Items of work and construction details

In Section 2, Material, Straw mulch material – shall consist of coastal bermudagrass or a native bluestem mix and the rate of application shall be 2-1/2 tons per acre.

In Section 5, Seeding, sprigging, fertilizing, mulching, and stabilizing, mulches shall be stabilized by a non-asphaltic tackifier and shall be applied at a rate of 40 pounds per acre or by a mechanical crimper. The contractor shall submit the manufacturer's product data and installation instructions for the tackifier to the Contracting Officer for approval of the product.

Fertilizer shall be of the slow release, pelleted form and shall be uniformly mixed. Prior to planting the grasses, fertilizer shall be applied and worked into the soil by disking with a weighted tandem disk to a depth of approximately 4 inches. No fertilizer shall be applied when the ground is excessively wet, frozen, or otherwise in an untillable condition. The rate of application of the fertilizer shall be forty (40) pounds of nitrogen (N), forty (40) pounds of phosphorus (P) and forty (40) pounds of potassium (K) per acre.

When working on slopes which are steeper than 3:1 horizontal to vertical, all rubber tire equipment on the slope will be held with truck or tractor and winch line with the truck or tractor operating along the crown of the embankment or other suitable flat surface. As an alternative, track (crawler) equipment with a low center of gravity may be used to perform work on slopes without a winch line requirement when operated in accordance with applicable OSHA requirements.

The plowing shall be on the approximate contour. Plowing will not be permitted when the ground is frozen or wet to the point that rutting would occur during plowing. The ground surface shall be left reasonably smooth and free of windrows, ridges, or depressions.

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

a. Bid Items 3, Vegetation Establishment, Site 23A

(1) This item shall consist of preparing the seedbed and furnishing and applying seed, hay mulch, tackifer and fertilizer to all disturbed areas that receive topsoil treatment and that are not covered with rock riprap as shown on the drawings.

(2) The grass seed shall be drilled or broadcast onto a firm, clean seedbed. Seed drilled shall be on the approximate contour. A grass seed drill equipped with depth control bands, grain drill with a grass seed attachment, or Brillion (type) seeder shall be used. The seed shall not be planted or covered deeper than ½ inch below the soil surface. The distance between rows shall not exceed 6 inches. Seed shall be distributed over the entire area at uniform rates. The areas shall be firmed before seeding and immediately following seeding with a cultipacker or corrugated packer roller weighing 180 to 190 pounds per foot of width. Only on areas not accessible to the drilling equipment, seed may be broadcast by hand. The hand seeded areas shall be hand raked and then firmed with a hand operated roller.

(3) Seed of high quality customarily sold in the trade is required. The seed must be in sound, clean bags with each bag containing a tag showing, among other things with respect to the contents of the bag, name of the seed, locality and year of harvest, and the percentage of purity and germination. Bag tag figures will be accepted for purity and germination and the seed will either be accepted or rejected by the designated representative on the basis of the bag tag test. Seeding rates are for "Pure Live Seed (PLS)" therefore, the percentage of purity as shown

on the seed tag will determine the number of pounds of bulk material needed to obtain the required amount of pure live seed per acre.

(4) The seed mixture and application rate shall be:

(a) Common Bermuda grass, unhulled (*Cynodon dactylon*) 6.0 lb. PLS/Acre

(b) Common Bermuda grass, hulled (*Cynodon dactylon*) 4.6 lb. PLS/Acre

(c) Texhoka Buffalo grass burs (*Buchloe dactyloides*) 8.0 lb. PLS/Acre

(5) Seeding shall take place immediately after completion of earthwork activities.

(6) In Section 6, Measurement and payment, Method 1 will apply.

b. Bid Items 13, Vegetation Establishment, Site 23B

(7) This item shall consist of preparing the seedbed and furnishing and applying seed, hay mulch, tackifer and fertilizer to all disturbed areas that receive topsoil treatment and that are not covered with rock riprap as shown on the drawings.

(8) The grass seed shall be drilled or broadcast onto a firm, clean seedbed. Seed drilled shall be on the approximate contour. A grass seed drill equipped with depth control bands, grain drill with a grass seed attachment, or Brillion (type) seeder shall be used. The seed shall not be planted or covered deeper than ½ inch below the soil surface. The distance between rows shall not exceed 6 inches. Seed shall be distributed over the entire area at uniform rates. The areas shall be firmed before seeding and immediately following seeding with a cultipacker or corrugated packer roller weighing 180 to 190 pounds per foot of width. Only on areas not accessible to the drilling equipment, seed may be broadcast by hand. The hand seeded areas shall be hand raked and then firmed with a hand operated roller.

(9) Seed of high quality customarily sold in the trade is required. The seed must be in sound, clean bags with each bag containing a tag showing, among other things with respect to the contents of the bag, name of the seed, locality and year of harvest, and the percentage of purity and germination. Bag tag figures will be accepted for purity and germination and the seed will either be accepted or rejected by the designated representative on the basis of the bag tag test. Seeding rates are for "Pure Live Seed (PLS)" therefore, the percentage of purity as shown on the seed tag will determine the number of pounds of bulk material needed to obtain the required amount of pure live seed per acre.

(10) The seed mixture and application rate shall be:

(a) Common Bermuda grass, unhulled (*Cynodon dactylon*) 6.0 lb. PLS/Acre

(b) Common Bermuda grass, hulled (*Cynodon dactylon*) 4.6 lb. PLS/Acre

(c) Texhoka Buffalo grass burs (*Buchloe dactyloides*) 8.0 lb. PLS/Acre

(11) Seeding shall take place immediately after completion of earthwork activities.

(12) In Section 6, Measurement and payment, Method 1 will apply

Construction Specification 7—Construction Surveys

1. Scope

The work consists of performing all surveys, measurements, and computations required by this specification.

2. Equipment and material

Equipment for construction surveys shall be of a quality and condition to provide the required accuracy. The equipment shall be maintained in good working order and in proper adjustment at all times. Records of repairs, calibration tests, accuracy checks, and adjustments shall be maintained and be available for inspection by the engineer. Equipment shall be checked, tested, and adjusted as necessary in conformance with manufacturer's recommendations.

Material is field notebooks, stakes, templates, platforms, equipment, spikes, steel pins, tools, and all other items necessary to perform the work specified.

3. Quality of work

All work shall follow recognized professional practice and the standards of the industry unless otherwise specified in section 9 of this specification. The work shall be performed to the accuracy and detail appropriate for the type of job. Notes, sketches, and other data shall be complete, recorded neatly, legible, reproducible and organized to facilitate ease in review and allow reproduction of copies for job documentation. Survey equipment that requires little or no manual recording of field data shall have survey information documented as outlined in section 9 of this specification.

All computations shall be mathematically correct and shall include information to identify the bid item, date, and who performed, checked, and approved the computations. Computations shall be legible, complete, and clearly document the source of all information used including assumptions and measurements collected.

If a computer program is used to perform the computations, the contractor shall provide the engineer with the software identification, vendor's name, version number, and other pertinent data before beginning survey activities. Computer generated computations shall show all input data including values assigned and assumptions made.

The elevations of permanent and temporary bench marks shall be determined and recorded to the nearest 0.01 foot. Differential leveling and transit traverses shall be of such precision that the error of vertical closure in feet shall not exceed plus or minus 0.1 times the square root of the traverse distance in miles. Linear measurements shall be accurate to within 1 foot in 5,000 feet, unless otherwise specified in section 9 of this specification. The angular error of closure for transit traverses shall not exceed 1 minute times the square root of the number of angles turned.

The minimum requirements for placing slope stakes shall be at 100-foot stations for tangents, as little as 25 feet for sharp curves, breaks in the original ground surface and at any other intermediate stations necessary to ensure accurate location for construction layout and measurement. Slope stakes and cross sections shall be perpendicular to the centerline. Significant breaks in grade shall be determined for cross sections. Distances shall be measured horizontally and recorded to the nearest 0.1 foot. Side shots for interim construction stakes may be taken with a hand level.

Unless otherwise specified in section 9 of this specification, measurements for stationing and establishing the location of structures shall be made to the nearest 0.1 foot.

Elevations for concrete work, pipes, and mechanical equipment shall be determined and recorded to the nearest 0.01 foot. Elevations for earth work shall be determined and recorded to the nearest 0.1 foot.

4. Primary control

The baselines and bench marks for primary control, necessary to establish lines and grades needed for construction, are shown on the drawings and have been located on the job site.

These baselines and bench marks shall be used as the origin of all surveys, layouts, and measurements to establish construction lines and grades. The contractor shall take all necessary precautions to prevent the loss or damage of primary control points. Any stakes or control points lost or damaged by construction activity will be reestablished by the contractor or at contractor expense.

5. Construction surveys

Before work starts that requires contractor performed surveys, the contractor shall submit in writing for the engineer's review: the name, qualifications, and experience of the individuals to be assigned to the survey tasks.

Method 1—Contractor performed surveys shall include:

- checking and any supplemental or interim staking
- performing quantity surveys, measurements, and computations for progress payment
- other surveys as described in section 9 of this specification

Method 2—Contractor performed surveys shall consist of all work necessary for:

- establishing line and grade for all work
- setting slope stakes for all work
- checking and any supplemental or interim staking
- establishing final grade stakes
- performing quantity surveys, measurements, and computations for progress payment
- other surveys as described in section 9 of this specification

Method 3—Contractor performed surveys shall consist of all work necessary for:

- establishing line and grade for all work
- setting slope stakes for all work
- checking and any supplemental or interim staking
- establishing final grade stakes
- performing quantity surveys, measurements, and computations for progress payments
- performing original (initial) and final surveys for determinations of final quantities
- other surveys as described in section 9 of this specification.

6. Staking

The construction staking required for the item shall be completed before work on any item starts. Construction staking shall be completed as follows or as otherwise specified in section 9 of this specification:

Clearing and grubbing—The boundary of the area(s) to be cleared and grubbed shall be staked or flagged at a maximum interval of 200 feet, closer if needed, to clearly mark the limits of work. When contractor staking is the basis for determining the area for final payment, all boundary stakes will be reviewed by the engineer before start of this work item.

Excavation and fill—Slope stakes shall be placed at the intersection of the specified slopes and ground line. Slope stakes and the reference stakes for slopes shall be marked with the stationing, required cut or

fill, slope ratio, and horizontal distance from the centerline or other control line. The minimum requirements for placing slope stakes is outlined in section 3, Quality of work.

Structures—Centerline and offset reference line stakes for location, alignment, and elevation shall be placed for all structures.

7. Records

All survey data shall be recorded in fully identified standard hard-bound engineering survey field notebooks with consecutively numbered pages. All field notes and printed data shall include the purpose or description of the work, the date the work was performed, weather data, sketches, and the personnel who performed and checked the work. Electronically generated survey data and computations shall be bound, page numbered, and cross referenced in a bound field notebook containing the index for all survey activities. All work shall follow recognized professional practice.

The construction survey records shall be available at all times during the progress of the work for examination and use by the engineer and when requested, copies shall be made available. The original field notebooks and other records shall be provided to and become the property of the owner before final payment and acceptance of all work.

Complete documentation of computations and supporting data for progress payments shall be submitted to the engineer with each invoice for payment as specified in section 9 of the specification. When the contractor is required to conduct initial and final surveys as outlined in section 5, Construction Surveys, notes shall be provided as soon as possible after completion to the engineer for the purpose of determining final payment quantities.

8. Payment

Method 1—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds, after presentation of correct and accurate invoices by the contractor showing related costs and evidence of the charges of suppliers, subcontractors, and others for supplies furnished and work performed. Invoices for the total amount of the contract price will not be accepted until all surveys are complete and required documentation has been determined complete. If the total of such payments is less than the lump sum contract price for this item, the unpaid balance will be included in the final contract payment. Payment of the lump sum contract price will constitute full compensation for completion of all work under the bid item.

Method 2—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds with progress payment amounts determined as a percentage of the total work planned as projected from the contractor's approved construction schedule. Payment of the lump sum contract price will constitute full compensation for completion of all work under this bid item.

All Methods—Payment will not be provided under this item for the purchase price of materials or equipment having a residual value.

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 item to which they are made subsidiary are identified in section 9 of this specification.

9. Items of work and construction details

9. Items of work and construction details

In Section 5, Construction Surveys, Method 2 shall apply. The surveys conducted by the Contractor shall include but not be limited to: (1) those required to check all excavation and earthfill slopes as work progresses to insure such slopes are maintained at those specified. (2) earthfill slopes shall be checked at least each five feet vertical interval and corrected to planned slope. (3) Those required to set "bluetops" for subgrades and finished grades of all excavations, earthfills, and appurtenances to the works.

In Section 8, Payment, Method 2 shall apply.

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

a. Bid Item 4 and 14, Construction Surveys

(1) This item shall consist of all work required by Section 1 of this specification.

(2) Initial and final surveys for determinations of final quantities will be performed by the Government.

(3) All surveys shall proceed from benchmarks, reference points and /or stakes set or established by the Government. The benchmarks are shown on the drawings.

Construction Specification 8—Mobilization and Demobilization

1. Scope

The work consists of the mobilization and demobilization of the contractor's forces and equipment necessary for performing the work required under the contract. It does 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 requirements for commencement of work.

2. Equipment and material

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

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

This work includes mobilization and demobilization 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 for 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 paid invoices or documentation of direct costs by the contractor showing specific mobilization and demobilization costs and supporting evidence of the charges of suppliers, subcontractors, and others. When the total of such payments is less than the lump sum contract price, the balance remaining will be included in the final contract payment. Payment of the lump sum contract price for mobilization and demobilization will constitute full compensation for completion of the work.

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

4. Items of work and construction details

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 5 and 15, Mobilization & Demobilization

(1) This item shall consist of performing all items of work for mobilization and demobilization as required by sections 1 and 2 of this specification.

(2) The mobilization operation shall include but not be limited to the items in Section 2 of this specification and the following items of work:

(a) Access to the work area shall be as shown on the construction drawings. The final location will be specified by the Engineer at the site showing. The access road shall be a minimum of 14 feet wide and be graded and smoothed to provide a surface which can be easily traversed by automobiles. Culverts shall be installed at crossings of low areas where significant concentrations of runoff water accumulate and cause ponding of water. The road shall be maintained in a smooth rut-free condition throughout the contract period. Culverts installed as a part of this item of work shall have sufficient strength to support the anticipated loads imposed by construction traffic, shall be of sufficient size to carry a 2-year runoff, and shall be left in place in good condition at the end of the contract period. If damage occurs to the culverts due to construction activities, those culverts shall be replaced. Minimum culvert size shall be 18 inch i.d. and a minimum of 24 feet long. A minimum of 18 inches of compacted fill shall be placed over top of the pipe before construction equipment is allowed to pass.

(3) The demobilization operation shall include, but not be limited to the following items of work:

(a) All debris, trash, tires, equipment, equipment parts, chains, cables, and other such items resulting from the construction operation shall be removed from the worksite and disposed of in an approved sanitary land fill of the Contractor's own choosing.

(b) All disturbed areas shall be bladed or smoothed to blend the area with the surrounding land surface. The bladed or smoothed surface shall be free of abrupt mounds, windrows, depressions or other irregularities that would prevent the safe operation of ordinary farm equipment thereon. The finished surface shall prevent diversion of surface runoff and shall prevent standing or ponding water.

(c) All buildings, trailers, chain link fence, storage sheds, sanitary facilities and other such items shall be removed from the worksite when construction work is completed.

(d) All utilities shall be removed from the site as required by the owner of the utility after construction work is completed.

(e) The access road shall be bladed to be smooth and shall be left in a rut-free condition. If road base/rock is used on the access road it shall be removed after construction work is completed.

(4) The items of work subsidiary to these bid items are:

(a) Structure Removal, Fence as specified in Construction Specification 3.

(b) Traffic Control as specified in Construction Specification 9.

(c) Fences, Barbed Wire, as specified in Construction Specification 92.

Construction Specification 9—Traffic Control

1. Scope
The work shall consist of establishing traffic control and maintaining safe, convenient use of public roads and rights-of-way.

2. Traffic and access
The contractor's operations shall cause no unnecessary inconvenience to the public. The public rights-of-way shall be maintained at all times unless interruption is authorized by proper local authority. Contractor's authorized closing or detour plans shall be provided to the engineer for approval.

Safe and adequate access shall be provided and maintained to all public protection devices and to all critical utility control locations. Facility access shall be continuous and unobstructed unless otherwise approved.

3. Storage of equipment and material in public streets
Construction materials and equipment shall not be stored or parked on public streets, roads, or highways. During any material or equipment loading or unloading activities that may temporarily interfere with traffic, an acceptable detour shall be provided for the duration of the activity. Any associated expense for this activity is the responsibility of the contractor.

Excavated material, including suitable material that is intended for adjacent trench backfill or other earth backfill as specified in section 5 of this specification, shall not be stored on public streets, roads, or highways that remain in service for the public. Any waiver of this requirement must be obtained from the proper local authority and approved by the engineer. All excess and unsuitable material shall be removed from the site as soon as possible. Any spillage shall be removed from roadways before they are used by the public.

4. Street closures, detours, and barricades
The contractor shall comply with the requirements of all applicable responsible units of government for closure of any street, road, or highway. The contractor shall provide the required barriers, guards, lights, signs, temporary bridges, and flaggers together with informing the public of any detours and construction hazards by the most suitable means available, such as local newspapers or radio stations. The contractor is also responsible for compliance with additional public safety requirements that may arise during construction. The contractor shall furnish, install, and, upon completion of the work, promptly remove all signs, warning devices, and other materials used in the performance of this work.

Unless otherwise specified, the contractor shall notify, in writing, the fire chief, police chief, county sheriff, state patrol, schools that operate school buses, or any other government official as may be appropriate no less than 7 days before closing, partly closing, or reopening any street, road, or highway.

Unless otherwise specified, the contractor shall furnish to the engineer a written plan showing the proposed method of signing, barricading for traffic control, and safety for street detours and closures.

All temporary detours will be maintained to ensure use of public rights-of-way is provided in a safe manner. This may include dust control, grading, and graveling as required in section 7 of this specification.

5. General and specific references

All signs, signals, barricades, use of flaggers, and other traffic control and public safety devices shall conform to the general requirements set forth in the Manual of Uniform Traffic Control Devices (MUTCD) and the latest edition of *Standard Highway Signs and Standard Alphabets for Highway Signs* and/or OSHA *Construction Industry Standards (29 CFR Part 1926), Subpart G, Signs, Signals, and Barricades* unless otherwise specified in section 7 of this specification.

6. Measurement and payment

For items of work for which specific lump sum prices are established in the contract, payment for the work is made at the contract lump sum price. Progress payments will be made based upon the percentage of estimated total time that traffic control will be required unless otherwise specified in section 7 of this specification. Payment will constitute full compensation for all flaggers, labor, materials, equipment, and all other items necessary and incidental to completion of the work.

Compensation for any item of work described in the contract, but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and items to which they are made subsidiary are identified in section 7 of this specification.

7. Items of work and construction details

7. Items of work and construction details

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

a. Subsidiary Item, Traffic Control

(1) This item shall consist of performing all items of work for traffic control as required by Sections 1 and 2 of this specification.

(2) In Section 4, Streets closures, detours, and barricades, the Contractor shall furnish a written plan showing the proposed method of signing, barricading for traffic control, use of flaggers, etc. to be approved by TxDOT (if necessary), Wise County and this contract's Engineer.

(3) Separate payment will not be made for this item of work. Compensation for this item will be included in the payment for the bid items Mobilization and Demobilization.

Construction Specification 11—Removal of Water

1. Scope

The work consists of the removal of surface water and ground water as necessary to perform the construction required by the contract in accordance with the specifications. It shall include: (1) constructing, installing, building, and maintaining all necessary temporary water containment facilities, channels, and diversions; (2) furnishing, installing, and operating all necessary pumps, piping, and other facilities and equipment; and (3) removing all such temporary works and equipment after their intended function is no longer required.

2. Diverting surface water

The contractor shall install, maintain, and operate all cofferdams, channels, flumes, sumps, and all other temporary diversion and protective works needed to divert streamflow and other surface water through or around the construction site. Control of surface water shall be continuous during the period that damage to construction work could occur. Unless otherwise specified and/or approved, the diversion outlet shall be into the same drainageway that the water would have reached before being diverted.

The contractor shall furnish the contracting officer, in writing, a proposed plan for diverting surface water before beginning any construction activities for which a diversion is required, unless waived in section 8 of this specification. Acceptance of this plan or the waiving of the plan requirement will not relieve the contractor of the responsibilities related to this activity during the process of completing the work as specified.

3. Dewatering the construction site

Foundations, cutoff trenches, and all other parts of the construction site shall be dewatered and kept free of standing water and muddy conditions as necessary for the proper execution of the work. The contractor shall furnish, install, operate, and maintain all drains, sumps, pumps, casings, well points, and all other equipment required to properly dewater the site as specified. Dewatering systems that cause a loss of soil fines from the foundation areas will not be permitted.

The contractor shall furnish the contracting officer, in writing, a proposed plan for dewatering before commencing with any construction activity for which dewatering may be required, unless waived in section 8 of this specification. Acceptance of this plan or the waiving of the plan requirement will not relieve the contractor of the responsibilities for completing the specified work.

4. Dewatering borrow areas

The contractor shall maintain all borrow areas free of surface water or otherwise provide for timely and effective removal of surface and subsurface water that accumulates within the borrow area, unless waived in section 8 of this specification. Borrow material shall be processed as necessary to achieve proper and uniform moisture content at the time of placement.

If pumping to dewater borrow areas is included as a bid item of work in the bid schedule, each pump discharge pipe shall be equipped with a water meter. The meter shall be such that the measured quantity of water is accurate within 3 percent of the true quantity. The contractor shall provide necessary support to perform accuracy tests of the water meter when requested by the contracting officer.

5. Erosion and pollution control

Removal of water from the construction site, including the borrow areas, shall be accomplished so that erosion and the transporting of sediment and other pollutants are minimized. Dewatering activities shall

be accomplished in a manner that the water table water quality is not altered. Pollution control activities shall not conflict with the requirements of Construction Specification 5, Pollution Control, if it is a part of this contract.

6. Removal of temporary works

When temporary works are no longer needed, the contractor shall remove and return the area to a condition similar to that which existed before construction. Areas where temporary works were located shall be graded for sightly appearance with no obstruction to natural surface waterflows or the proper functioning and access to the works of improvement installed. The contractor shall exercise extreme care during the removal stages to minimize the loss of soil sediment and debris that was trapped during construction.

Pipes, casings, and any other material used to dewater the site shall be removed from temporary wells. The wells shall be filled to ground level with clean gravel or other suitable material approved by the contracting officer. The contractor shall exercise extreme care to prevent pollution of the ground water by these actions.

7. Measurement and payment

Method 1—Items of work listed in the bid schedule for removal of water, diverting surface water, and dewatering construction sites and borrow areas are paid for at the contract lump sum prices. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 2—Items of work listed in the bid schedule for removal of water, diverting surface water, dewatering construction sites, and dewatering borrow areas are paid for at the contract lump sum prices. Such payment will constitute full compensation for furnishing, installing, operating, and maintaining the necessary trenches, drains, sumps, pumps, and piping and for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work. The exception is that additional payment for pumping to dewater borrow areas and the removal of water will be made as described in the following paragraph.

If pumping to dewater borrow areas is a contract bid item, payment is made at the contract unit price, which shall be the price per 1,000 gallons shown in the bid schedule. Such payment will constitute full compensation for pumping only. Compensation for equipment and preparation and for other costs associated with pumping is included in the lump sum payment for removal of water or the lump sum payment for dewatering the borrow areas. Payment is made only for pumping that is necessary to dewater borrow areas that cannot be effectively drained by gravity or that must have the water table lowered to be usable as a suitable borrow source. Pumping for other purposes will not be included for payment under this item.

All Methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the contract line item to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 8 of this specification.

8. Items of work and construction details

8. Items of work and construction details

In Section 7, Measurement and payment, Method 1 shall apply.

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

a. Bid Item 6 and 16, Removal of Water

(1) This item shall consist of all operations necessary to accomplish the work defined in Section 1 of this specification.

(2) Written plans for diverting surface waters and for dewatering the site are required. The Contractor's plans for diverting surface waters and dewatering the sites shall be submitted to the Engineer prior to the start of construction operations.

(3) There is no guarantee that the slide gates at the sites will function in order to dewater the sites. Therefore, pumping of the sites may be required in order to keep sites dewatered and water level down. The status of the gates functioning will be addressed at the time of the site showing.

(4) Payment shall be made as the work proceeds with progress payment amounts determined as a percentage of the total work planned as projected from the Contractor's approved construction schedule. The final month's prorate amount will be provided with the final contract payment.

Construction Specification 21—Excavation

1. Scope

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

2. Classification

Excavation is classified as common excavation, rock excavation, or unclassified excavation in accordance with the following definitions.

Common excavation is defined as the excavation of all materials that can be excavated, transported, and unloaded using heavy ripping equipment and wheel tractor-scrapers with pusher tractors or that can be excavated and dumped into place or loaded onto hauling equipment by excavators having a rated capacity of one cubic yard or larger and equipped with attachments (shovel, bucket, backhoe, dragline, or clam shell) appropriate to the material type, character, and nature of the materials.

Rock excavation is defined as the excavation of all hard, compacted, or cemented materials that require blasting or the use of ripping and excavating equipment larger than defined for common excavation. The excavation and removal of isolated boulders or rock fragments larger than 1 cubic yard encountered in materials otherwise conforming to the definition of common excavation shall be classified as rock excavation. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

For the purpose of these classifications, the following definitions shall apply:

Heavy ripping equipment is a rear-mounted, heavy duty, single-tooth, ripping attachment mounted on a track type tractor having a power rating of at least 250 flywheel horsepower unless otherwise specified in section 10.

Wheel tractor-scraper is a self-loading (not elevating) and unloading scraper having a struck bowl capacity of at least 12 cubic yards.

Pusher tractor is a track type tractor having a power rating of at least 250 flywheel horsepower equipped with appropriate attachments.

Unclassified excavation is defined as the excavation of all materials encountered, including rock materials, regardless of their nature or the manner in which they are removed.

3. Blasting

The transportation, handling, storage, and use of dynamite and other explosives shall be directed and supervised by a person(s) of proven experience and ability who is authorized and qualified to conduct blasting operations.

Blasting shall be done in a manner as to prevent damage to the work or unnecessary fracturing of the underlying rock materials and shall conform to any special requirements in section 10 of this specification. When specified in section 10, the contractor shall furnish the engineer, in writing, a blasting plan before blasting operations begin.

4. Use of excavated material

Method 1—To the extent they are needed, all suitable material from the specified excavations shall be used in the construction of required permanent earthfill or rockfill. The suitability of material for specific purposes is determined by the engineer. The contractor shall not waste or otherwise dispose of suitable excavated material.

Method 2—Suitable material from the specified excavations may be used in the construction of required earthfill or rockfill. The suitability of material for specific purposes is determined by the engineer.

5. **Disposal of waste materials**

Method 1—All surplus or unsuitable excavated materials are designated as waste and shall be disposed of at the locations shown on the drawings.

Method 2—All surplus or unsuitable excavated materials are designated as waste and shall be disposed of by the contractor at sites of his own choosing away from the site of the work. The disposal shall be in an environmentally acceptable manner that does not violate local rules and regulations.

6. **Excavation limits**

Excavations shall comply with OSHA Construction Industry Standards (29CFR Part 1926) Subpart P, Excavations, Trenching, and Shoring. All excavations shall be completed and maintained in a safe and stable condition throughout the total construction phase. Structure and trench excavations shall be completed to the specified elevations and to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work. Excavations outside the lines and limits shown on the drawings or specified herein required to meet safety requirements shall be the responsibility of the contractor in constructing and maintaining a safe and stable excavation.

7. **Borrow excavation**

When the quantities of suitable material obtained from specified excavations are insufficient to construct the specified earthfills and earth backfills, additional material shall be obtained from the designated borrow areas. The extent and depth of borrow pits within the limits of the designated borrow areas shall be as specified in section 10 or as approved by the engineer.

Borrow pits shall be excavated and finally dressed to blend with the existing topography and sloped to prevent ponding and to provide drainage.

8. **Overexcavation**

Excavation in rock beyond the specified lines and grades shall be corrected by filling the resulting voids with portland cement concrete made of materials and mix proportions approved by the engineer. Concrete that will be exposed to the atmosphere when construction is completed shall meet the requirements of concrete selected for use under Construction Specification 31, Concrete for Major Structures, or 32, Structure Concrete, as appropriate.

Concrete that will be permanently covered shall contain not less than five bags of cement per cubic yard. The concrete shall be placed and cured as specified by the engineer.

Excavation in earth beyond the specified lines and grades shall be corrected by filling the resulting voids with approved, compacted earthfill. The exception to this is that if the earth is to become the subgrade for riprap, rockfill, sand or gravel bedding, or drainfill, the voids may be filled with material conforming to the specifications for the riprap, rockfill, bedding, or drainfill. Before correcting an overexcavation condition, the contractor shall review the planned corrective action with the engineer and obtain approval of the corrective measures.

9. **Measurement and payment**

For items of work for which specific unit prices are established in the contract, the volume of each type and class of excavation within the specified pay limits is measured and computed to the nearest cubic yard by the method of average cross-sectional end areas or by methods outlined in section 10 of this specification. Regardless of quantities excavated, the measurement for payment is made to the specified pay limits except that excavation outside the specified lines and grades directed by the engineer to remove unsuitable material is included. Excavation required because unsuitable conditions result from the contractor's improper construction operations, as determined by the engineer, is not included for measurement and payment.

Method 1—The pay limits shall be as designated on the drawings.

Method 2—The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed before the start of construction operations except that where excavation is performed within areas designated for previous excavation or earthfill, the upper limit shall be the modified ground surface resulting from the specified previous excavation or earthfill.

b. The lower and lateral limits shall be the neat lines and grades shown on the drawings.

Method 3—The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed before the start of construction operations except that where excavation is performed within areas designated for previous excavation or earthfill, the upper limit shall be the modified ground surface resulting from the specified previous excavation or earthfill.

b. The lower and lateral limits shall be the true surface of the completed excavation as directed by the engineer.

Method 4—The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed before the start of construction operations except that where excavation is performed within areas designated for previous excavation or earthfill, the upper limit shall be the modified ground surface resulting from the specified previous excavation or earthfill.

b. The lower limit shall be at the bottom surface of the proposed structure.

c. The lateral limits shall be 18 inches outside of the outside surface of the proposed structure or shall be vertical planes 18 inches outside of and parallel to the footings, whichever gives the larger pay quantity, except as provided in d below.

d. For trapezoidal channel linings or similar structures that are to be supported upon the sides of the excavation without intervening forms, the lateral limits shall be at the underside of the proposed lining or structure.

e. For the purposes of the definitions in b, c, and d, above, any specified bedding or drainfill directly beneath or beside the structure will be considered to be a part of the structure.

All methods—The following provisions apply to all methods of measurement and payment.

Payment for each type and class of excavation is made at the contract unit price for that type and class of excavation. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to the performance of the work except that extra payment for backfilling overexcavation will be made in accordance with the following provisions.

Payment for backfilling overexcavation, as specified in section 8 of this specification, is made only if the excavation outside specified lines and grades is directed by the engineer to remove unsuitable material and if 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 10 of this specification.

10. Items of Work and Construction Details

10. Items of Work and Construction Details

Items of work to be performed in conformance with this specification and the applicable construction details are contained in Construction Specification 420, Site Preparation.

Construction Specification 23—Earthfill

1. Scope

The work consists of the construction of earth embankments, other earthfills, and earth backfills required by the drawings and specifications.

Earthfill is composed of natural earth materials that can be placed and compacted by construction equipment operated in a conventional manner.

Earth backfill is composed of natural earth material placed and compacted in confined spaces or adjacent to structures (including pipes) by hand tamping, manually directed power tampers or vibrating plates, or their equivalent.

2. Material

All fill material shall be obtained from required excavations and designated borrow areas. The selection, blending, routing, and disposition of material in the various fills shall be subject to approval by the engineer.

Fill materials shall contain no frozen soil, sod, brush, roots, or other perishable material. Rock particles larger than the maximum size specified for each type of fill shall be removed prior to compaction of the fill.

The types of material used in the various fills shall be as listed and described in the specifications and drawings.

3. Foundation preparation

Foundations for earthfill shall be stripped to remove vegetation and other unsuitable material or shall be excavated as specified.

Except as otherwise specified, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earthfill, and the surface material of the foundation shall be compacted and bonded with the first layer of earthfill as specified for subsequent layers of earthfill.

Earth abutment surfaces shall be free of loose, uncompacted earth in excess of 2 inches in depth normal to the slope and shall be at such a moisture content that the earthfill can be compacted against them to produce a good bond between the fill and the abutments.

Rock foundation and abutment surfaces shall be cleared of all loose material by hand or other effective means and shall be free of standing water when fill is placed upon them. Occasional rock outcrops in earth foundations for earthfill, except in dams and other structures designed to restrain the movement of water, shall not require special treatment if they do not interfere with compaction of the foundation and initial layers of the fill or the bond between the foundation and the fill.

Foundation and abutment surfaces shall be no steeper than one horizontal to one vertical unless otherwise specified. Test pits or other cavities shall be filled with compacted earthfill conforming to the specifications for the earthfill to be placed upon the foundation.

4. Placement

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

Earthfill shall be placed in approximately horizontal layers. The thickness of each layer before compaction shall not exceed the maximum thickness specified in section 10 or shown on the drawings. Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified thickness before being compacted.

Hand compacted earth backfill shall be placed in layers whose thickness before compaction does not exceed the maximum thickness specified for layers of earth backfill compacted by manually directed power tampers.

Earth backfill shall be placed in a manner that prevents damage to the structures and allows the structures to assume the loads from the earth backfill gradually and uniformly. The height of the earth backfill adjacent to a structure shall be increased at approximately the same rate on all sides of the structure.

Earthfill and earth backfill in dams, levees, and other structures designed to restrain the movement of water shall be placed to meet the following additional requirements:

(a) The distribution of materials throughout each zone shall be essentially uniform, and the earthfill shall be free from lenses, pockets, streaks, or layers of material differing substantially in texture, moisture content, or gradation from the surrounding material. Zone earthfills shall be constructed concurrently unless otherwise specified.

(b) The surface of each layer shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.

(c) The top surface of embankments shall be maintained approximately level during construction with two exceptions: A crown or cross-slope of about 2 percent shall be maintained to ensure effective drainage, or as otherwise specified for drainfill or sectional zones.

(d) Dam embankments shall be constructed in continuous layers from abutment to abutment except where openings to facilitate construction or to allow the passage of streamflow during construction are specifically authorized in the contract.

(e) Embankments built at different levels as described under (c) or (d) above shall be constructed so that the slope of the bonding surfaces between embankment in place and embankment to be placed is not steeper than 3 feet horizontal to 1 foot vertical. The bonding surface of the embankment in place shall be stripped of all material not meeting the requirements of this specification and shall be scarified, moistened, and recompacted when the new earthfill is placed against it. This ensures a good bond with the new earthfill and obtains the specified moisture content and density at the contact of the inplace and new earthfills.

5. Control of moisture content

During placement and compaction of earthfill and earth backfill, the moisture content of the material being placed shall be maintained within the specified range.

The application of water to the earthfill material shall be accomplished at the borrow areas insofar as practicable. Water may be applied by sprinkling the material after placement on the earthfill, if necessary. Uniform moisture distribution shall be obtained by disking.

Material that is too wet when deposited on the earthfill shall either be removed or be dried to the specified moisture content prior to compaction.

If the top surface of the preceding layer of compacted earthfill or a foundation or abutment surface in the zone of contact with the earthfill becomes too dry to permit suitable bond, it shall either be removed or scarified and moistened by sprinkling to an acceptable moisture content before placement of the next layer of earthfill.

6. Compaction

Earthfill—Earthfill shall be compacted according to the following requirements for the class of compaction specified:

Class A compaction—Each layer of earthfill shall be compacted as necessary to provide the density of the earthfill matrix not less than the minimum density specified in section 10 or identified on the drawings. The earthfill matrix is defined as the portion of the earthfill material finer than the maximum particle size allowed in the reference compaction test method specified (ASTM D698 or ASTM D1557).

Class B compaction—Each layer of earthfill shall be compacted to a mass density not less than the minimum density specified.

Class C compaction—Each layer of earthfill shall be compacted by the specified number of passes of the type and weight of roller or other equipment specified or by an approved equivalent method. Each pass shall consist of at least one passage of the roller wheel or drum over the entire surface of the layer.

Earth backfill—Earth backfill adjacent to structures shall be compacted to a density equivalent to that of the surrounding inplace earth material or adjacent required earthfill or earth backfill. Compaction shall be accomplished by hand tamping or manually directed power tampers, plate vibrators, walk-behind, miniature, or self-propelled rollers. Unless otherwise specified heavy equipment including backhoe mounted power tampers or vibrating compactors and manually directed vibrating rollers shall not be operated within 3 feet of any structure. Towed or self-propelled vibrating rollers shall not be operated within 5 feet of any structure. Compaction by means of drop weights operating from a crane or hoist is not permitted.

The passage of heavy equipment will not be allowed:

- Over cast-in-place conduits within 14-days after placement of the concrete
- Over cradled or bedded precast conduits within 7 days after placement of the concrete cradle or bedding
- Over any type of conduit until the backfill has been placed above the top surface of the structure to a height equal to one-half the clear span width of the structure or pipe or 3 feet, whichever is greater, except as may be specified in section 10.

Compacting of earth backfill adjacent to structures shall not be started until the concrete has attained the strength specified in section 10 for this purpose. The strength is determined by compression testing of test cylinders cast by the contractor's quality control personnel for this purpose and cured at the work site in the manner specified in ASTM C 31 for determining when a structure may be put into service.

When the required strength of the concrete is not specified as described above, compaction of earth backfill adjacent to structures shall not be started until the following time intervals have elapsed after placement of the concrete.

Structure	Time interval (days)
Vertical or near-vertical walls with earth loading on one side only	14
Walls backfilled on both sides simultaneously	7

Conduits and spillway risers, cast-in-place (with inside forms in place)	7
Conduits and spillway risers, cast-in-place (inside forms removed)	14
Conduits, pre-cast, cradled	2
Conduits, pre-cast, bedded	1
Cantilever outlet bents (backfilled both sides simultaneously)	3

7. Reworking or removal and replacement of defective earthfill

Earthfill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content or otherwise not conforming to the requirements of the specifications shall be reworked to meet the requirements or removed and replaced by acceptable earthfill. The replacement earthfill and the foundation, abutment, and earthfill surfaces upon which it is placed shall conform to all requirements of this specification for foundation preparation, approval, placement, moisture control, and compaction.

8. Testing

During the course of the work, the contractor shall perform quality control tests, as applicable, to identify earthfill and earth backfill materials; determine the reference maximum density and optimum moisture content; and document that the moisture content of material at the time of compaction and the density of earthfill and earth backfill in place conform to the requirements of this specification.

Determining Reference Maximum Density and Optimum Moisture Content—For Class A compaction, the reference maximum density and optimum moisture content shall be determined in accordance with the compaction test and method specified on the drawings or in section 10.

Documenting Specification Conformance—In-place densities of earthfill and earth backfill requiring Class A compaction shall be measured in accordance with ASTM D1556, D2167, D2937, or D6938. Moisture contents of earthfill and earth backfill at the time of compaction shall be measured in accordance with ASTM D2216, D4643, or D6938. Values of moisture content determined by ASTM D2216 are considered the true value of the soil moisture. Values of moisture content determined by ASTM D4643 or D6938 shall be verified by comparison to values obtained by ASTM D2216. Values of in-place density and moisture content determined by these tests shall be compared to the minimum density and moisture content range specified on the drawings or in section 10.

Correction for Oversize Particles—If the materials to be used for earthfill or earth backfill contain more than 5 percent by dry weight of oversize rock particles (particles larger than those allowed in the specified compaction test and method), corrections for oversize particles shall be made using the appropriate procedures explained in ASTM D4718.

9. Measurement and payment

For items of work for which specific unit prices are established in the contract, the volume of each type and compaction class of earthfill and earth backfill within the specified zone boundaries and pay limits is measured and computed to the nearest cubic yard by the method of average cross-sectional end areas. Unless otherwise specified in section 10, no deduction in volume is made for embedded items, such as, but not limited to, conduits, inlet structures, outlet structures, embankment drains, sand diaphragm and outlet, and their appurtenances.

The pay limits shall be as defined below, with the further provision that earthfill required to fill voids resulting from overexcavation of the foundation, outside the specified lines and grades, will be included in the measurement for payment only under the following conditions:

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

Earthfill beyond the specified lines and grades to backfill excavation required for compliance with OSHA requirements will be considered subsidiary to the earthfill bid item(s).

Method 1—The pay limits shall be as designated on the drawings.

Method 2—The pay limits shall be the measured surface of the foundation when approved for placement of the earthfill and the specified neat lines of the earthfill surface.

Method 3—The pay limits shall be the measured surface of the foundation when approved for placement of the earthfill and the measured surface of the completed earthfill.

Method 4—The pay limits shall be the specified pay limits for excavation and the specified neat lines of the earthfill surface.

Method 5—The pay limits shall be the specified pay limits for excavation and the measured surface of the completed earthfill.

Method 6—Payment for each type and compaction class of earthfill and earth backfill is made at the contract unit price for that type and compaction class of earthfill. Such payment will constitute full compensation for all labor, material, equipment, and all other items necessary and incidental to the performance of the work.

Method 7—Payment for each type and compaction class of earthfill and earth backfill is made at the contract unit price for that type and compaction class of earthfill. Such payment will constitute full compensation for all labor, material, equipment, and all other items necessary and incidental to the performance of the work except furnishing, transporting, and applying water to the foundation and earthfill material. Water applied to the foundation and earthfill material is measured and payment made as specified in Construction Specification 10.

All methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 10 of this specification.

10. Items of work and construction details

10. Items of Work and Construction Details

Items of work to be performed in conformance with this specification and the applicable construction details are contained in Construction Specification 420, Site Preparation.

Construction Specification 26—Topsoiling

1. Scope
The work consists of furnishing and spreading topsoil to specified depths at locations shown on the drawings.

2. Quality of topsoil
Topsoil shall consist of friable surface soil reasonably free of grass, roots, weeds, sticks, rocks, or other unsuitable material. Additional quality requirements, if any, are in section 7 of this specification.

3. Furnishing
Method 1—Topsoil shall be salvaged from designated earth surfaces that will be disturbed by construction activities. After designated sites have been cleared and grubbed, the topsoil shall be removed from the designated areas and stockpiled at locations shown on the drawings or acceptable to the engineer. Unsuitable material encountered during removal of topsoil shall be disposed of at locations shown on the drawings or approved by the engineer, or it will be otherwise hauled and disposed of at locations removed from the construction site. The contractor is responsible for complying with all local rules and regulations and the payment of any and all fees that may result from the disposal at locations outside the construction work limits.

Method 2—Topsoil shall be furnished from an offsite source designated by the contractor. The engineer shall be granted access to the source for inspection and acceptance before delivery to the site. Test results and samples shall be provided when specified in section 7 of this specification.

4. Stockpiling
Stockpiles of topsoil shall not conflict with the requirements of Construction Specification 5, Pollution Control, when made a part of this contract.

5. Spreading
Method 1—Spreading shall not be conducted when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to uniform spreading operations. Surfaces designated to receive a topsoil application shall be lightly scarified just before the spreading operation.

Following the spreading operation, the topsoil surface shall be left reasonably smooth and without ruts or surface irregularities that could contribute to concentrated waterflow downslope.

Method 2—Spreading shall not be performed when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to uniform spreading operations. Surfaces designated to receive a topsoil application shall be lightly scarified just before the spreading operation. Where compacted earthfills are designated to be topsoiled, the topsoil shall be placed concurrently with the earthfill and shall be bonded to the compacted fill with the compacting equipment.

Following the spreading operation, the topsoil surface shall be left reasonably smooth and without ruts or surface irregularities that could contribute to concentrated waterflow downslope.

6. Measurement and payment
Method 1—The total surface covered by topsoil is measured and the area(s) computed to the nearest square yard. Payment for furnishing and placing topsoil is made at the contract unit price.

Method 2—The total surface covered by topsoil, except the surface area of embankments, levees, dikes, and other earthfills not included for payment, is measured and the area(s) computed to the nearest square yard.

Payment for topsoil spread on the surface of embankments, levees, dikes, and other earthfills is included

in the measurement and payment for that item of earthfill where topsoil application occurred.

Method 3—For items of work for which specific unit prices are established in the contract, the volume of topsoil furnished and spread is computed to the nearest cubic yard by the method of average cross-sectional end areas from surveys of the excavated topsoil stockpile or, if not stockpiled, cross-sectional surveys of the borrow area(s). Payment for furnishing and spreading topsoil is made at the contract unit price.

All methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 7 of this specification.

All payment methods—Payment will constitute full compensation for all labor, equipment, material, and all other items necessary and incidental to the completion of the work. This includes excavating, stockpiling, hauling, spreading, and the wasting of unsuitable excavated material.

7. Items of work and construction details

7. Items of work and construction details

In Section 3, Furnishing, Method 1 shall apply.

In Section 5, Spreading, Method 1 shall apply. After spreading the topsoil on the required areas, a minimal amount of compacted effort shall be applied by passing over the entire surface with at least one pass of a dozer track. Care shall be taken to avoid over compaction that will hinder the establishment of grass.

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

a. Subsidiary Item, Salvaging and Placing Topsoil

(1) This item shall consist of the salvaging of approved topsoil from required excavations; from the foundation stripping operations; and from the borrow area and placing and spreading it on the earthfill and exposed cut slopes as designated on the drawings.

(2) The thickness of topsoil placed normal to the slope or approved surface shall be 6 inches. No topsoil shall be placed in repair areas covered by rock riprap.

(3) Separate payment will not be made for this item of work. Compensation for this item of work will be include in the payment for the bid items Site Preparation, Site 23A and Site Preparation, Site 23B.

Construction Specification 61—Rock Riprap

1. Scope

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

2. Material

Rock riprap shall conform to the requirements of Material Specification 523, Rock for Riprap, or if so specified, shall be obtained from designated sources. It shall be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits.

At least 30 days before rock is delivered from other than designated sources, the contractor shall designate in writing the source from which rock material will be obtained and provide information satisfactory to the contracting officer that the material meets contract requirements. The contractor shall provide the contracting officer's technical representative (COTR) free access to the source for the purpose of obtaining samples for testing. The size and grading of the rock shall be as specified in section 8.

Rock from approved sources shall be excavated, selected, and processed to meet the specified quality and grading requirements at the time the rock is installed.

Based on a specific gravity of 2.65 (typical of limestone and dolomite) and assuming the individual rock is shaped midway between a sphere and a cube, typical size/weight relationships are:

Sieve size of rock	Approx. weight of rock	Weight of test pile
16 inches	300 pounds	6,000 pounds
11 inches	100 pounds	2,000 pounds
6 inches	15 pounds	300 pounds

When specified in section 8 or when it is necessary to verify the gradation of the rock riprap, a particle size analysis shall be performed in accordance with ASTM D5519, Test Method A or B. The analysis shall be performed at the work site on a test pile of representative rock. The mass of the test pile shall be at least 20 times the mass of the largest rock in the pile. The results of the test shall be compared to the gradation required for the project. Test pile results that do not meet the construction specifications shall be cause for the rock to be rejected. The test pile that meets contract requirements shall be left on the job site as a sample for visual comparison. The test pile shall be used as part of the last rock riprap to be placed.

Filter or bedding aggregates when required shall conform to Material Specification 521, Aggregates for Drainfill and Filters, unless otherwise specified. Geotextiles shall conform to Material Specification 592, Geotextile.

3. Subgrade preparation

The subgrade surface on which the rock riprap, filter, bedding, or geotextile 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 material and shall conform to the requirements of the specified class of earthfill.

Rock riprap, filter, bedding, or geotextile shall not be placed until the foundation preparation is completed and the subgrade surface has been inspected and approved.

4. Equipment-placed rock riprap

The rock riprap shall be placed by equipment on the surface and to the depth specified. It shall be installed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying material. The rock for riprap shall be delivered and placed in a manner that ensures the riprap in place is 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. Some hand placing may be required to provide a neat and uniform surface.

Rock riprap shall be placed in a manner to prevent damage to structures. Hand placing is required as necessary to prevent damage to any new and existing structures.

5. Hand placed rock riprap

The rock riprap shall be placed by hand on the surface and to the depth specified. It shall be securely bedded with the larger rocks firmly in contact one to another without bridging. 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 its vertical edge except where it is laid like paving stone and the thickness of the rock equals the specified depth of the riprap course.

6. Filter or bedding

When the contract specifies filter, bedding, or geotextile beneath the rock riprap, the designated material shall be placed on the prepared subgrade surface as specified. Compaction of filter or bedding aggregate is not required, but the surface of such material shall be finished reasonably smooth and free of mounds, dips, or windrows.

7. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest ton by actual weight. The volume of each type of filter or bedding aggregate is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. For each load of rock riprap placed as specified, the contractor shall furnish to the GR a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

Method 2—For items of work for which specific unit prices are established in the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest 0.1 ton by actual weight. The quantity of each type of filter or bedding aggregate delivered and placed within the specified limits is computed to the nearest 0.1 ton. For each load of rock riprap placed as specified, the contractor shall furnish to the engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton. For each load of filter or bedding aggregate, the contractor shall furnish to the GR a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

Method 3—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap and filter or bedding aggregate is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

Method 4—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap, including filter and bedding aggregate, is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, including filter and bedding. Such payment is considered full compensation for completion of the work.

Method 5—For items of work for which specific unit prices are established by the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest ton by actual weight. For each load of rock for riprap placed as specified, the contractor shall furnish to the GR a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, and includes compensation for any aggregate or geotextile installed as specified for filter or bedding. Such payment is considered full compensation for completion of the work.

Method 6—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, and includes compensation for any aggregate or geotextile installed as specified for filter or bedding. Such payment is considered full compensation for completion of the work.

All methods—The following provision applies to all methods of measurement and payment.

Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 8.

No separate payment is made for testing the gradation of the test pile. Compensation for testing is included in the appropriate bid item for riprap.

8. Items of work and construction details

8. Items of work and construction details Items of work and construction details

In Section 2, Material, second paragraph, the Contractor shall provide written notice of proposed source of rock material at least five working days before delivery.

In Section 7, Measurement and payment, Method 1 shall apply.

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

a. Bid Items 7, Rock Riprap, Site 23A

(1) This item shall include furnishing and placing the loose rock riprap required for the repair of the wave berm as shown on the drawings.

(2) Rock for use as riprap shall comply with the requirements of Material Specification 523, Rock Type 1.

(3) Rock shall conform to the gradation requirements of ASTM D6092 R-150.

(4) Rock size requirements are shown on the construction drawings. Prior to delivery of rock to each construction site, the Contractor shall provide a certified gradation analysis from the rock quarry and other evidence satisfactory to the Engineer showing that the rock to be supplied complies with the specified gradation(s). Any differences of opinion between the Engineer, Contracting Officer, and the Contractor concerning gradation of the rock riprap being delivered to the site shall be resolved by dumping and checking the gradation of one random truck load of rock.

(5) In the event such additional checking procedures become necessary, the mechanical equipment, scales, preparation of sorting site, and labor needed to prove the gradation by weighing shall be provided by the Contractor at no additional cost.

(6) Rock will be subject to additional testing beyond ASTM's listed in Material Specification 523 when in judgment of the Engineer, delivered rock has defects that may not have been detected by the specified laboratory tests. These defects may result in accelerated weathering. Any rock delivered that experiences degradation when selected samples are placed in water for a time period of 7 days will be in non-compliance of the specification.

(7) If, at the time the rock is delivered to the construction site, separation or segregation of the smaller rock fraction from the larger rock fraction has occurred, the rock shall be reworked as necessary to insure a reasonably uniform distribution of the various rock sizes prior to placement of the rock. Due care shall be exercised during this reworking operation (if required) to prevent inclusion of earth or other undesirable materials in the riprap.

(8) The contractor shall have various layers in the source rock quarry tested in accordance with ASTM D5240 if the rock quality is in question as determined by the Engineer.

(9) Riprap delivery shall be made only during scheduled working hours and delivery tickets shall be furnished to the Inspector.

(10) Riprap shall be equipment placed except within a distance of 2 feet around the principal spillway and the irrigation pipe and appurtenances. Hand placement

shall be required within 2 feet of the principal spillway, the irrigation pipe and the related appurtenances. Equipment shall not be allowed on the rock during or after placement.

(11) The Contractor shall use care when installing rock riprap around the principal spillway, the irrigation pipe and appurtenances. All damage to the principal spillway, the irrigation pipe and appurtenances shall be repaired according to manufacturers' recommendations and at no cost to the government.

b. Bid Items 17, Rock Riprap, Site 23B

(1) This item shall include furnishing and placing the loose rock riprap required for the repair of the upstream stability berm and the outlet channel armoring as shown on the drawings.

(2) Rock for use as riprap shall comply with the requirements of Material Specification 523, Rock Type 1.

(3) Rock shall conform to the gradation requirements of ASTM D6092 R-150.

(4) Rock size requirements are shown on the construction drawings. Prior to delivery of rock to each construction site, the Contractor shall provide a certified gradation analysis from the rock quarry and other evidence satisfactory to the Engineer showing that the rock to be supplied complies with the specified gradation(s). Any differences of opinion between the Engineer, Contracting Officer, and the Contractor concerning gradation of the rock riprap being delivered to the site shall be resolved by dumping and checking the gradation of one random truck load of rock.

(5) In the event such additional checking procedures become necessary, the mechanical equipment, scales, preparation of sorting site, and labor needed to prove the gradation by weighing shall be provided by the Contractor at no additional cost.

(6) Rock will be subject to additional testing beyond ASTM's listed in Material Specification 523 when in judgment of the Engineer, delivered rock has defects that may not have been detected by the specified laboratory tests. These defects may result in accelerated weathering. Any rock delivered that experiences degradation when selected samples are placed in water for a time period of 7 days will be in non-compliance of the specification.

(7) If, at the time the rock is delivered to the construction site, separation or segregation of the smaller rock fraction from the larger rock fraction has occurred, the rock shall be reworked as necessary to insure a reasonably uniform distribution of the various rock sizes prior to placement of the rock. Due care shall be exercised during this reworking operation (if required) to prevent inclusion of earth or other undesirable materials in the riprap.

(8) The contractor shall have various layers in the source rock quarry tested in accordance with ASTM D5240 if the rock quality is in question as determined by the Engineer.

(9) Riprap delivery shall be made only during scheduled working hours and delivery tickets shall be furnished to the Inspector.

(10) Riprap shall be equipment placed except within a distance of 2 feet around the principal spillway and the irrigation pipe and appurtenances. Hand placement

shall be required within 2 feet of the principal spillway, the irrigation pipe and the related appurtenances. Equipment shall not be allowed on the rock during or after placement.

(11) The Contractor shall use care when installing rock riprap around the principal spillway and appurtenances. All damage to the principal spillway and appurtenances shall be repaired according to manufacturers' recommendations and at no cost to the government.

c. Subsidiary Item, Rock Filter

(1) This item shall consist of furnishing and installing the rock filter at Site 23A in the location designated on the drawings to control sediment from leaving the construction site.

(2) Rock riprap for the rock filter shall come from rock riprap supplied to the site for installation the wave berm on Site 23A as shown on the drawings.

(3) The rock filter shall remain in place until the outlet channel work is complete. At that time, the rock filter shall be removed and the rock shall be used to complete the wave berm armoring.

(4) Separate payment will not be made for this item of work. Compensation for this item will be included in the payment for the Bid Item 1, Pollution Control

Construction Specification 92—Field Fence

1. Scope
The work shall consist of furnishing and installing field fence, including gates and fittings.

2. Material
Material for field fence shall conform to the requirements of Material Specification 591. All wooden posts shall be of the same species, when available.

Unless otherwise specified, surfacing, cutting, and boring of preservative treated wooden posts and braces shall be completed before treatment. If field cutting or field repair of treated material is approved, all cuts and abrasions shall be carefully trimmed and coated with copper naphthenate preservative containing a minimum of 2.0 percent copper metal. The treatment preservative shall be applied according to the product label. Any excess preservative not absorbed by the wood member shall be cleaned from the surface prior to the use of the member. Bored holes for connectors or bolts may be treated by pumping coal-tar roofing cement meeting ASTM D5643 into the holes using a caulk gun or similar device. After assembly, any unfilled holes shall be plugged with tightly fitting wooden plugs that have been treated with preservative as specified.

3. Setting posts
Concrete or wood posts shall be set in holes and backfilled with earth except where otherwise specified. Wood posts may be driven when approved by the engineer. Steel posts shall be driven unless otherwise specified.

Holes for installing fence posts shall be at least 6 inches larger than the diameter or side dimension of the posts.

Earth backfill around posts shall be thoroughly tamped in layers not thicker than 4 inches and shall completely fill the posthole up to the ground surface. Concrete backfill around posts shall be rodded into place in layers not thicker than 12 inches and shall completely fill the posthole to the surface of the ground. Backfill, either earth or concrete, shall be crowned-up around posts at the ground surface.

No stress shall be applied to posts set in concrete for a period of not less than 24 hours following the development of a firm set of the concrete.

4. Corner assembly
Unless otherwise specified in section 11, corner assemblies shall be installed at all points where the fence alignment changes 15 degrees or more.

5. End panels
End panels shall be built at gates and fence ends.

6. Pull post assembly
Pull post assembly (bracing within a section of straight fence) shall be installed at the following locations:

a. In straight fence sections, at intervals not to exceed 660 feet.

b. At any point where the vertical angle described by two adjacent reaches of wire is upward and exceeds 10 degrees (except as provided in section 11 of this specification).

c. At the beginning and end of each curved fence section.

7. Attaching fencing to posts

The fencing shall be stretched and attached to posts as follows:

a. The fencing wire or netting shall be placed on the side of the post opposite the area being protected except for installation along curved sections.

b. The fencing wire or netting shall be placed on the outside for installation along curved sections.

c. The fencing wire or netting shall be fastened to each end post, corner post, and pull post by wrapping each horizontal strand around the post and tying it back on itself with not less than three tightly wound wraps.

d. The fencing wire or netting shall be fastened to wooden line posts by means of steel staples. Woven-wire fencing shall be attached at alternate horizontal strands. Each strand of barbed wire shall be attached to each post. Steel staples shall be driven diagonally with the grain of wood and at a slight downward angle and shall not be driven so tightly as to bind the wire against the post.

e. The fencing wire or netting shall be fastened to steel or concrete line posts with either two turns of 14 gauge galvanized steel or iron wire or in accordance with recommendations provided by the post's manufacturer.

f. Wire shall be spliced by means of a Western Union splice or by suitable splice sleeves applied with a tool designed for that purpose. The Western Union splice shall have no less than eight wraps of each end about the other. All wraps shall be tightly wound and closely spaced. Splices made with splice sleeves shall have a tensile strength no less than 80 percent of the strength of the wire being spliced.

8. Stays

Stays shall be attached to the fencing at the spacing outlined in section 11 or as shown on the drawings to ensure maintenance of the proper spacing of the fence wire strands.

9. Crossings at depressions and watercourses

Where fencing is installed parallel to the ground surface, the line posts subject to upward pull shall be anchored.

a. If the fence wire or netting is installed parallel to the ground surface, the line posts subject to uplift shall be anchored by means of extra embedment or by special anchors as detailed on the drawings.

b. If the fence wire is installed with the top wire straight and parallel to the ground surface on either side of the depression, extra length posts shall be used to allow normal post embedment. Unless otherwise specified, excess space between the bottom of the fence and the ground shall be closed with extra strands of barbed wire or with netting.

10. Measurement and payment

Method 1—The length of each type and kind of fence is measured to the nearest foot along the profile of the fence, including gate openings. Payment for each type and kind of fence is made at the contract unit price for that type and kind of fence. Such payment constitutes full compensation for completion of the work, including fabricating and installing gates.

Method 2—The length of each type and kind of fence is measured to the nearest foot along the profile of the fence, excluding gate openings. Payment is made at the contract unit price for the specified height of fence. The number of each size and type of gate installed is determined. Payment is made at the contract

unit price for that type and size of gate. Such payment constitutes full compensation for all labor, material, equipment, and all other items necessary and incidental to the completion of the work.

All methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 11 of this specification.

11. Items of work and construction details

11. Items of work and construction details

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

a. Subsidiary Item, Fences, Barbed Wire

(1) This item shall consist of furnishing all materials required reinstall all fences and gates to their original locations after completion of construction.

(2) The location of the fences (including corners, gates, pull and brace panels, and special anchorage) shall be as staked by the Engineer.

(3) After completion of construction, the Contractor shall replace the fences in the same locations as they were removed. All fences shall be built to like or better condition as they existed prior to construction.

(4) When replacing unsalvageable/damaged material, the fencing material shall meet the requirements of Material Specifications 591 and 582.

(5) Separate payment will not be made for this item of work. Compensation for this item will be included in the payment for the bid item Mobilization and Demobilization.

Construction Specification 94—Contractor Quality Control

1. Scope
The work consists of developing, implementing, and maintaining a quality control system to ensure that the specified quality is achieved for all materials and work performed.

2. Equipment and materials
Equipment and material used for quality control shall be of the quality and condition required to meet the test specifications cited in the contract. Testing equipment shall be properly adjusted and calibrated at the start of operations and the calibration maintained at the frequency specified. Records of equipment calibration tests shall be available to the engineer at all times. Equipment shall be operated and maintained by qualified operators as prescribed in the manufacturer's operating instructions, the references specified, and as specified in section 10 of this specification. All equipment and materials used in performing quality control testing shall be as prescribed by the test standards referenced in the contract or in section 10.

All equipment and materials shall be handled and operated in a safe and proper manner and shall comply with all applicable regulations pertaining to their use, operation, handling, storage, and transportation.

3. Quality control system
Method 1—The contractor shall develop, implement, and maintain a system of quality control to provide the specified material testing and verification of material quality before use. The system activities shall include procedures to verify adequacy of completed work, initiate corrective action to be taken, and document the final results. The identification of the quality control personnel and their duties and authorities shall be submitted to the contracting officer in writing within 15 calendar days after notice of award.

Method 2—The contractor shall develop, implement, and maintain a system adequate to achieve the specified quality of all work performed, material incorporated, and equipment furnished before use. The system established shall be documented in a written plan developed by the contractor and approved by the contracting officer. The system activities shall include the material testing and inspection needed to verify the adequacy of completed work and procedures to be followed when corrective action is required. Daily records to substantiate the conduct of the system shall be maintained by the contractor. The quality control plan shall cover all aspects of quality control and shall address, as a minimum, all specified testing and inspection requirements. The plan provided shall be consistent with the planned performance in the contractor's approved construction schedule. The plan shall identify the contractor's onsite quality control manager and provide an organizational listing of all quality control personnel and their specific duties. The written plan shall be submitted to the contracting officer within 15 calendar days after notice of award. The contractor shall not proceed with any construction activity that requires inspection until the written plan is approved by the contracting officer.

All methods—The quality control system shall include, but not be limited to, a rigorous examination of construction material, processes, and operation, including testing of material and examination of manufacturer's certifications as required, to verify that work meets contract requirements and is performed in a competent manner.

4. Quality control personnel
Method 1—Quality control activities shall be accomplished by competent personnel. A competent person is: One who is experienced and capable of identifying, evaluating, and documenting that materials and processes being used will result in work that complies with the contract; and, who has authority to take prompt action to remove, replace, or correct such work or products not in compliance. Off-site testing laboratories shall be certified or inspected by a nationally recognized entity. The Contractor shall submit to the Contracting Officer, for approval, laboratory certification or inspection information. The Contractor

shall submit to the Contracting Officer, for approval, the names, qualifications, authorities, certifications, and availability of the competent personnel who will perform the quality control activities.

Method 2—Quality control activities shall be accomplished by competent personnel who are separate and apart from line supervision and who report directly to management. A competent person is one who is experienced and capable of identifying, evaluating, and documenting that material and processes being used will result in work that complies with the contract, and who has authorization to take prompt action to remove, replace, or correct such work or products not in compliance. Offsite testing laboratories shall be certified or inspected by a nationally recognized entity. The Contractor shall submit to the Contracting Officer, for approval, laboratory certification or inspection information. The contractor shall submit to the contracting officer, for approval, the names, qualifications, authorities, certifications, and availability of the competent personnel who will perform the quality control activities.

5. Post-award conference

The contractor shall meet with the contracting officer before any work begins and discuss the contractor's quality control system. The contracting officer and the contractor shall develop a mutual understanding regarding the quality control system, including procedures for correcting quality control issues.

6. Records

The contractor's quality control records shall document both acceptable and deficient features of the work and corrective actions taken. All records shall be on forms approved by the contracting officer, be legible, and be dated and signed by the competent person creating the record.

Unless otherwise specified in section 10 of this specification, records shall include:

a. Documentation of shop drawings including date submitted to and date approved by the contracting officer, results of examinations, any need for changes or modifications, manufacturer's recommendations and certifications, if any, and signature of the authorized examiner.
b. Documentation of material delivered including quantity, storage location, and results of quality control examinations and tests.
c. Type, number, date, time, and name of individual performing quality control activities.
d. The material or item inspected and tested, the location and extent of such material or item, and a description of conditions observed and test results obtained during the quality control activity.
e. The determination that the material or item met the contract provisions and documentation that the engineer was notified.
f. For deficient work, the nature of the defects, specifications not met, corrective action taken, and results of quality control activities on the corrected material or item.

7. Reporting results

The results of contractor quality control inspections and tests shall be communicated to the engineer immediately upon completion of the inspection or test. Unless otherwise specified in section 10, the original plus one copy of all records, inspections, tests performed, and material testing reports shall be submitted to the engineer within one working day of completion. The original plus one copy of documentation of material delivered shall be submitted to the engineer before the material is used.

8. Access

The contracting officer and the engineer shall be given free access to all testing equipment, facilities, sites, and related records for the duration of the contract.

9. Payment

Method 1—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds, after presentation by the contractor of invoices showing related costs and evidence

of charges by suppliers, subcontractors, and others for furnishing supplies and work performed. If the total of such payments is less than the lump sum contract price for this item, the remaining balance is included in the final contract payment. Payment of the lump sum contract price constitutes full compensation for completion of the work.

Payment is not made under this item for the purchase cost of material and equipment having a residual value.

Method 2—For items of work for which lump sum prices are established in the contract, payment is prorated and paid in equal amounts on each monthly estimate. The number of months used for prorating shall be the number estimated to complete the work. The final month's prorate amount is made with the final payment. Payment as described above constitutes full compensation for completion of the work.

Payment is not made under this item for the purchase cost of material and equipment having a residual value.

All methods—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 10.

10. Items of work and construction details

10. Items of work and construction details

In Section 3, Quality control system, Method 1 shall apply with the exception that the identification of the quality control personnel and their duties and authorities shall be submitted to the Contracting Officer in writing within 1 calendar day after notice of award.

In Section 4, Quality control personnel, Method 1 shall apply.

In Section 9, Payment, Method 2 shall apply.

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

a. Bid Item 8 and 18, Contractor Quality Control

(1) This item shall consist of furnishing all equipment, tools, materials, and labor and performing all work to accomplish the work defined in section 1 of this specification.

(2) The burden of proof that work performed meets contract requirements rests upon the Contractor. Quality assurance inspections and tests by the Government are for the sole benefit of the Government. The use of such words as "as approved by the Engineer or Contracting Officer" and words of like import in the specifications or drawings which refer to approval by the Contracting Officer are considered to be a part of the Government's Quality Assurance program and do not relieve the Contractor in any part for the Contractor's quality control responsibilities as specified.

(3) Quality Control is defined as a rigorous examination and inspection of construction materials, processes and operations to verify that the work being performed meets contract requirements and shall be performed by a qualified Inspector employed by or under contract to the Contractor.

(4) The Contractor's quality control system shall be approved and operational before commencement of work. The Contractor's quality control personnel shall submit to the on-site NRCS Inspector daily Quality Control Reports, for each day the Contractor is on site performing work.

(5) Quality control tests shall be conducted in accordance with the standard test methods identified in the specifications. The Contractor shall provide all equipment required to perform all quality control tests. Testing equipment shall meet the requirements as specified by ASTM test methods and be properly calibrated and serviced.

(6) Quality control tests for moisture in the field shall be as stated in Construction Specification 420, Site Preparation.

(7) Quality control tests for density in the field shall not be required.

(8) All mention of inspection or Inspector in (7) and (8) below is referring to work performed by the Contractor's quality control personnel unless otherwise noted.

(9) The degree of quality control specified shall be defined as:

(a) Periodic review or inspection is defined as the intermittent presence of the Inspector to observe construction operations and/or perform tests and take measurements as needed to determine and document that the work being performed complies with the specifications.

(b) Full time inspection is defined as the full time presence of the Inspector to observe one or more construction operations and/or perform tests and take measurements at critical points in various operations to determine and document that the work being performed complies with the specifications and to be available for consultation in case of emergency or changes in work conditions.

(c) Continuous inspection is defined as the continuous presence of the Inspector to observe one construction operation and/or perform tests and take measurements at critical points in the operation to determine and document that the work being performed complies with the specifications and to be immediately available for consultation in case of emergency or changes in work conditions.

(10) The Contractor's inspection system shall include the following items of work that will require the Contractor's quality control. Any item of work not listed below shall be performed or constructed as shown on the drawings and as specified in the construction and material specifications.

(a) The Contractor's inspection on all items not listed in (b) through (f) below shall consist of periodic review of those items to assure that all contract specifications are being met and that the items are being properly installed or carried out.

(b) Seeding, Sprigging, and Mulching - Quality control shall consist of determining that the vegetative materials supplied comply with the specifications; that the areas to be vegetated are properly prepared, smoothed and graded; and that sprigging is performed as specified. Full time inspection shall be required.

(c) Excavation - Quality control shall consist of full time inspection to determine that all excavation is being accomplished as specified and that the specified excavation has removed all required or unsuitable materials and that grades are properly documented. The Inspector shall determine that all materials selected for use in backfill of the specified works are free of undesirable materials and that all materials are placed in the designated waste, stockpile or fill areas.

(d) Earthfill– Quality control shall consist of continuous inspection of earthfill. The Inspector shall select materials from the required excavations, stockpiles and/or borrow area(s) to insure the completed earthfills are constructed in accordance with the drawings and specifications. The Inspector shall select and obtain representative samples of the materials; check soil moisture and assure that the required passes for compaction are made as stated in Construction Specification 420, Site Preparation. The Inspector shall route the various materials to the proper zones and determine the suitability of each type of material for a particular zone.

(e) Rock Riprap - Quality control shall consist of full time inspection during delivery and placement of the rock riprap. The Inspector shall also determine that the rock riprap complies with the specified quality and gradation limits; that proper certifications are provided; that the rock is

placed as shown on the drawings and as specified; and that segregation of particle sizes has not occurred during delivery and placement.

(f) Geotextile - Quality control shall consist of continuous inspection during the installation of the geotextile. The Inspector shall determine and document that the geotextile complies with the specifications, that the subgrade has been excavated and smoothed to grade, that the geotextile is installed in accordance with the plans and specifications, and that the geotextile is not punctured, damaged or caked with mud during installation.

(11) The skills, knowledge, abilities and experience needed by the Contractor's quality control personnel to perform the quality control shall be as follows:

(a) Must have the ability to maintain communications with the landowners, the Contracting Officer and the Contractor.

(b) Knowledge of cut and grade staking and earthwork installations.

(c) Knowledge of soils, including foundation conditions, density and classifications.

(d) Knowledge of sampling of soils and determination of density of in-place soils.

(e) When applicable, must have knowledge of acceptable moisture-density test methods and the ability to satisfactorily perform the tests.

(f) Have the ability to interpret survey notes and to prepare quantity computations.

(g) Have the ability to maintain adequate files and records of construction inspection work.

(h) Have the ability to interpret construction drawings and specifications.

(i) Must have knowledge of the United Soil Classification System and the ability to interpret soil classification requirements from the construction drawings.

(12) Quality control personnel shall also be responsible for maintaining a record of progress with photographs. Construction activities shall be documented with 5 megapixels or greater digital photography in a JPEG file format. Photographs of daily construction work, problems encountered, and unique construction practices shall be taken to insure full coverage of all work performed. The photographs shall be numbered, dated and time imprinted and indexed with documentation explaining construction activities shown, and must be submitted with the request for final payment.

Construction Specification 95—Geotextile

1. Scope
This work consists of furnishing all material, equipment, and labor necessary for the installation of geotextiles.

2. Quality
Geotextiles shall conform to the requirements of Material Specification 592 and this specification.

3. Storage
Before use, the geotextile shall be stored in a clean, dry location out of direct sunlight, not subject to extremes of either hot or cold temperatures, and with the manufacturer's protective cover undisturbed. Receiving, storage, and handling at the job site shall be in accordance with the requirements listed in ASTM D4873.

4. Surface preparation
The surface on which the geotextile is to be placed shall be graded to the neat lines and grades as shown on the drawings. It shall be reasonably smooth and free of loose rock and clods, holes, depressions, projections, muddy conditions, and standing or flowing water (unless otherwise specified in section 7 of this specification).

5. Placement
Before the geotextile is placed, the soil surface will be reviewed for quality assurance of the design and construction. The geotextile shall be placed on the approved prepared surface at the locations and in accordance with the details shown on the drawings and specified in section 7 of this specification. It shall be unrolled along the placement area and loosely laid, without stretching, in such a manner that it conforms to the surface irregularities when material or gabions are placed on or against it. The geotextile may be folded and overlapped to permit proper placement in designated area(s).

Method 1—The geotextile shall be joined by machine sewing using thread material meeting the chemical requirements for the geotextile fibers or yarn. Thread shall be polypropylene, polyester, or Kevlar™ aramid thread, unless a specific thread type is specified. The thread shall be consist of two parallel stitched rows at a spacing of about 1 inch and shall not cross (except for any required re-stitching). The stitching shall be a lock-type stitch. Each row of stitching shall be located a minimum of 2 inches from the geotextile edge. Unless otherwise specified, the seam tensile strength as measured according to ASTM D4884 shall be a minimum of 90 percent of the geotextile tensile strength in the weakest principal direction as measured according to ASTM D4632.

The geotextile shall be temporarily secured during placement of overlying material to prevent slippage, folding, wrinkling, or other displacement of the geotextile. Unless otherwise specified, methods of securing shall not cause punctures, tears, or other openings to be formed in the geotextile.

Method 2—The geotextile shall be joined by overlapping a minimum of 18 inches (unless otherwise specified) and secured against the underlying foundation material. Securing pins, approved and provided by the geotextile manufacturer, shall be placed along the edge of the panel or roll material to adequately hold it in place during installation. Pins shall be steel or fiberglass formed as a **U**, **L**, or **T** shape or contain "ears" to prevent total penetration through the geotextile. Steel washers shall be provided on all but the U-shaped pins. The upstream or upslope geotextile shall overlap the abutting downslope geotextile. At vertical laps, securing pins shall be inserted through the bottom layers along a line through approximately the mid-point of the overlap. At horizontal laps and across slope laps, securing shall be inserted through the bottom layer only. Securing pins shall be placed along a line about 2 inches in from the edge of the

placed geotextile at intervals not to exceed 12 feet unless otherwise specified. Additional pins shall be installed as necessary and where appropriate to prevent any undue slippage or movement of the geotextile. The use of securing pins will be held to the minimum necessary. Pins are to remain in place unless otherwise specified.

Should the geotextile be torn or punctured, or the overlaps or sewn joint disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, or grade distortion, the backfill around the damaged or displaced area shall be removed and restored to the original approved condition. The repair shall consist of a patch of the same type of geotextile being used and overlaying the existing geotextile. When the geotextile seams are required to be sewn, the overlay patch shall extend a minimum of 1 foot beyond the edge of any damaged area and joined by sewing as required for the original geotextile except that the sewing shall be a minimum of 6 inches from the edge of the damaged geotextile. Geotextile panels joined by overlap shall have the patch extend a minimum of 2 feet from the edge of any damaged area.

Geotextile shall be placed in accordance with the following applicable specification according to the use indicated in section 7:

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

Subsurface drains—The geotextile shall not be placed until drainfill or other material can be used to provide cover within the same working day. Drainfill material shall be placed in a manner that prevents damage to the geotextile. In no case shall material be dropped on uncovered geotextile from a height of more than 5 feet.

Road stabilization—The geotextile shall be unrolled in a direction parallel to the roadway centerline in a loose manner permitting conformation to the surface irregularities when the roadway fill material is placed on its surface. In no case shall material be dropped on uncovered geotextile from a height of more than 5 feet. Unless otherwise specified, the minimum overlap of geotextile panels joined without sewing shall be 24 inches. The geotextile may be temporarily secured with pins recommended or provided by the manufacturer, but they shall be removed before the permanent covering material is placed.

6. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, the quantity of geotextile for each type placed within the specified limits is determined to the nearest specified unit by measurements of the covered surfaces only, disregarding that required for anchorage, seams, and overlaps. Payment is made at the contract unit price. Such payment constitutes full compensation for the completion of the work.

Method 2—For items of work for which specific unit prices are established in the contract, the quantity of geotextile for each type placed with the specified limits is determined to the nearest specified unit by computing the area of the actual roll size or partial roll size installed. The computed area will include the amount required for overlap, seams, and anchorage as specified. Payment is made at the contract unit price. Such payment constitutes full compensation for the completion of the work.

Method 3—For items of work for which specific lump sum prices are established in the contract, the quantity of geotextile is not measured for payment. Payment for geotextiles is made at the contract lump sum price and constitutes full compensation for the completion of the work.

All methods—The following provisions apply to all methods of measurement and payment.

Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 7 of this specification.

7. Items of work and construction details

7. Items of work and construction details

In Section 5, Placement, Method 2 shall apply. The geotextile shall be placed as a slope protection underlayment prior to installing rock riprap.

In Section 6, Measurement and payment, Method 1 shall apply.

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

a. Bid Items 9, Geotextile, Site 23A

(1) This item shall consist of furnishing and placing the geotextile under the rock riprap and including all excavation, fill and backfill required for keying geotextile into the slope as shown on the drawings.

(2) Geotextiles shall be non-woven Class I.

(3) The geotextile shall be placed immediately prior to the placement of the rock riprap. The placement of the geotextile shall be approved by the Engineer before rock riprap is installed.

b. Bid Items 19, Geotextile, Site 23A

(1) This item shall consist of furnishing and placing the geotextile under the rock riprap and including all excavation, fill and backfill required for keying geotextile into the slope as shown on the drawings.

(2) Geotextiles shall be non-woven Class I.

(3) The geotextile shall be placed immediately prior to the placement of the rock riprap. The placement of the geotextile shall be approved by the Engineer before rock riprap is installed.

Construction Specification 420 – Site Preparation

1. Scope

The work shall consist of the excavation and/or earthfill placement required by the drawings and specifications.

2. Classification

Site preparation consists of a combined volume of required excavation and earthfill ranging from 3400 to 4300 cubic yards on Site 23A and a combined volume of required excavation and earthfill ranging from 2000 to 2500 cubic yards on Site 23B.

3. Excavation

Excavations required to prepare the sites shall be done in accordance with the requirements of Construction Specification 21. All excavations shall be unclassified excavations. The depths of excavations as shown on the drawings are approximate. The actual depth and extent of excavations will be determined after examination of materials encountered.

Suitable materials resulting from required excavations shall be used for the required earthfills and backfills. Any materials not utilized in the required fills shall be disposed of in the waste areas. These materials shall be approved on site prior to placement.

In Construction Specification 21 the following shall apply:

> Section 4, Use of excavated material - Method 1 - There is no guarantee that materials obtained from the specified excavations may be used directly in specified fill areas. Stockpiling of selected materials to insure their availability for use in specific zones of the fill areas may be required. Additional compensation will not be made for stockpiling of excavated materials. Cost for stockpiling of excavated materials shall be included in the compensation for the bid items for Site Preparation.
>
> Section 5, Disposal of waste materials - Method 1 - The disposal of the excavated materials shall include transporting, depositing, and spreading the materials to and on the designated fill or waste areas. The area on which each load of material shall be deposited shall be approved on-site beforehand. The surfaces of waste areas shall be dressed to be reasonably smooth and to be free of mounds, dips, windrows, or depressions which would prevent the safe operation of ordinary farm equipment thereon. Additional compensation for disposal of excavated materials and dressing of the surface of the waste area will not be made. Cost for disposal of excavated materials and dressing of the surfaces of waste areas will be included in the compensation for the bid items for Site Preparation.

4. Earthfills

Earthfills required to prepare the site shall be placed in accordance with the requirements of Construction Specification 23. All compaction shall be Class C in accordance with Section 6 of Construction Specification 23. Compaction shall be accomplished by a minimum of five (5) complete passes of a tamping roller weighing not less than 1,200 pounds per foot of roller width at a towing or traveling speed of 2 m.p.h. or greater; or an approved equivalent method.

Soil moisture content at the time of compaction shall be at or slightly above the plastic limit. A soil is at its plastic limit when a sample can be rolled between the hands to form a 1/8" thread without cracking or breaking apart. Soil that can be rolled to a 1/16" thread without cracking or breaking apart is too wet. Other methods for determining soil moisture content shall be approved by the Engineer. The moisture

content of the backfill materials when placed shall be adjusted as necessary to meet the requirements. Fill lifts shall not be more than 9" thick prior to compaction and the maximum allowable particle size shall be 6". Earth backfill lifts adjacent to pipes shall not be more than 6" thick prior to compaction, and the maximum particle size shall be 3".

5. Measurement and payment

Payment shall be made at the contract lump sum price for site preparation. Such payment will constitute full compensation for all labor, equipment, materials and all other items necessary and incidental to the completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and items to which they are made subsidiary are identified in Section 6 of this specification.

6. Items of work and construction details

6. Items of work and construction details

The borrow areas and the waste areas shown on the drawings are approximate. The final location of the waste areas and borrow areas will be designated at the time of site showing.

Site preparation quantities are based on quantities derived from preliminary survey data. Variations in these quantities may be possible when the work is actually performed. However, modification to the contract will not be made for work performed in excess of these estimated quantities except under the following conditions:

a. The variation must exceed 10% more than the maximum quantity established for the site preparation and have a minimum contract value for the additional work in excess of $1,000.00. (The contract value is to be determined by dividing the lump sum amount in the bid schedule by the applicable maximum yardage of site preparation shown for the contract item in this specification.) If the variation exceeds 10% and $1,000.00, the site preparation will be adjusted and paid for at the rate for the adjusted amount.

b. It is the Contractor's responsibility to submit proof that the estimated site preparation in question exceeds the percentage and cost parameters in item (a) above. Proof will consist of applicable survey data or other measurements made by a qualified surveyor in accordance with recognized professional practice and the contract specifications.

c. The survey data or other measurements as applicable shall be presented to the NRCS prior to any work on the contract item for which the quantity is questioned. Three working days shall be provided to the NRCS to verify data prior to the beginning of work for this contract item.

d. A final survey or other measurements as applicable shall be made and presented to the NRCS after the work is completed which will allow measurement for the quantity in question. If this survey data indicates justification for a contract modification within the parameters of item (a) above, it will be made in accordance with the changes clause contained in the contract.

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

a. Bid Items 10, Site Preparation, Site 23A

(1) This item shall consist of performing all earthwork required reconstruct the wave berm and the outlet channel on Site 23A as shown in the drawings.

(2) The total earthwork is estimated to be in the range of 3,500 to 4,000 cubic yards.

(3) All low density materials shall be excavated and wasted as described in Section 3.

(4) The wave berm and outlet channel shall be stripped of vegetal, organic and any other unsuitable materials.

(5) After the limits of excavation shown on the drawings are complete, the Engineer will examine the completed surfaces and mark areas that need additional excavation to remove low density materials.

(6) All excavations in the vicinity of the principal spillway inlet, the irrigation pipe and appurtenances shall not be performed with mechanical machinery closer than 2 feet from the structures. Any damages to the inlet structure, the outlet structure, the irrigation pipe and appurtenances during construction activity will be the

responsibility of the Contractor to repair at their time and expense. Repairs shall be approved by the Contracting Officer prior to implementation.

(7) Suitable materials resulting from the required excavations shall be used to construct the specified fills except materials suitable for topsoil shall be stockpiled at the locations designated by the Engineer. Unsuitable materials shall be placed in the waste area shown on the drawings.

(8) After being deposited on the fill, each lift of fill material shall be spread, bladed and smoothed to the extent necessary to insure that the surface is free of abrupt mounds, depressions or windrows to provide a smooth uniform surface for operation of plowing and compaction equipment.

(9) The finished surface above the rock riprap on the upstream berm and the finished surfaces of the outlet channel not covered in rock riprap shall have 6 inches of topsoil placed uniformly over the surface as shown in the construction drawings.

(10) The items of work subsidiary to this bid item are:

(a) Clearing and Grubbing as specified in Construction Specification 2.

(b) Excavation, Common, Borrow as specified in this specification.

(c) Excavation, Common, Foundation Stripping as specified in this specification.

(d) Salvaging and Placing Topsoil as specified in Construction Specification 26.

b. Bid Items 20, Site Preparation, Site 23B

(1) This item shall consist of performing all earthwork required reconstruct the upstream berm, auxiliary spillway (left bank) and the outlet channel on Site 23B as shown in the drawings.

(2) The total earthwork is estimated to be in the range of 2,000 to 2,500 cubic yards.

(3) All low density materials shall be excavated and wasted as described in Section 3.

(4) The berm, auxiliary spillway (left bank) and outlet channel shall be stripped of vegetal, organic and any other unsuitable materials.

(5) After the limits of excavation shown on the drawings are complete, the Engineer will examine the completed surfaces and mark areas that need additional excavation to remove low density materials.

(6) All excavations in the vicinity of the principal spillway inlet and appurtenances shall not be performed with mechanical machinery closer than 2 feet from the structures. Any damages to the inlet structure, the outlet structure and appurtenances during construction activity will be the responsibility of the Contractor to repair at their time and expense. Repairs shall be approved by the Contracting Officer prior to implementation.

c. Subsidiary Item, Excavation, Common, Borrow

(1) This item shall consist of all excavation from within the borrow areas required to complete the specified earthfills as designated on the drawings.

(2) All excavated slopes within the limits of the borrow areas shall be maintained to be no steeper than four horizontal to one vertical (4:1). Borrow slopes shall be dressed and maintained as specified herein as borrow excavation progresses.

(3) All borrow areas shall be maintained to provide positive drainage to the natural and constructed drainage ways. Dressing and grading of borrow areas to accomplish this drainage shall be accomplished as borrow excavation progresses. Additional compensation will not be made for work required to accomplish the dressing and grading herein specified.

(4) All borrow areas shall be maintained to be contiguous with no berms, ridges or mounds remaining that extend more than two feet above the lowest point in adjacent borrow areas. All berms, ridges, and mounds shall be removed to meet this height limitation. Additional compensation will not be made for work required to accomplish the removal of berms, ridges and mounds within the limits of the borrow areas as herein specified.

(5) Separate payment will not be made for this item. Compensation for this item will be included in the payment for the bid items Site Preparation, Site 23A and Site Preparation, Site 23B.

d. Subsidiary Item, Excavation, Common, Foundation Stripping

(1) This item shall consist of removing weeds, grass, roots and soils containing significant vegetative or organic material from the ground surface (including any waste areas) prior to placing earthfill in required areas. The depth of stripping shall be sufficient to remove the vegetative material and soil containing significant organic matter and is estimated to be 3 to 12 inches (on average). The total required volume of stripping shall not exceed that obtained by assuming a depth of 6 inches.

(2) Separate payment will not be made for this item. Compensation for this item will be included in the payment for the respective bid items for Site Preparation, Site 23A and Site Preparation, Site 23B.

Material Specification 523—Rock for Riprap

1. Scope

This specification covers the quality of rock to be used in the construction of rock riprap.

2. Quality

Individual rock fragments shall be dense, sound, and free from cracks, seams, and other defects conducive to accelerated weathering. Except as otherwise specified, the rock fragments shall be angular to subrounded. The least dimension of an individual rock fragment shall be not less than one-third the greatest dimension of the fragment. ASTM D4992 provides guidance on selecting rock from a source.

Except as otherwise provided, the rock shall be tested and shall have the following properties:

Rock type 1

- ***Bulk specific gravity (saturated surface-dry basis)***—Not less than 2.5 when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- ***Absorption***—Not more than 2 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- ***Soundness***—The weight loss in 5 cycles shall not be more than 10 percent when sodium sulfate is used or more than 15 percent when magnesium sulfate is used.

Rock type 2

- ***Bulk specific gravity (saturated surface-dry basis)***—Not less that 2.5 when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- ***Absorption***—Not more than 2 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- ***Soundness***—The weight loss in 5 cycles shall be not more than 20 percent when sodium sulfate is used or more than 25 percent when magnesium sulfate is used.

Rock type 3

- ***Bulk specific gravity (saturated surface-dry basis)***—Not less than 2.3 when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- ***Absorption***—Not more than 4 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- ***Soundness***—The weight loss in 5 cycles shall be not more than 20 percent when sodium sulfate is used or more than 25 percent when magnesium sulfate is used.

3. Methods of soundness testing

Rock cube soundness—The sodium or magnesium sulfate soundness test for all rock types (1, 2, or 3) shall be performed on a test sample of 5,000 ± 300 grams of rock fragments, reasonably uniform in size and cubical in shape, and weighing, after sampling, about 100 grams each. They shall be obtained from rock samples that are representative of the total rock mass, as noted in ASTM D4992, and that have been sawed into slabs as described in ASTM D5121. The samples shall further be reduced in size by sawing the slabs into cubical blocks. The thickness of the slabs and the size of the sawed fragments shall be determined by the size of the available test apparatus and as necessary to provide, after sawing, the approximate 100-gram samples. The cubes shall undergo five cycles of soundness testing in accordance with ASTM D1512.

Internal defects may cause some of the cubes to break during the sawing process or during the initial soaking period. Do not test any of the cubes that break during this preparatory process. Such breakage, including an approximation of the percentage of cubes that break, shall be noted in the test report.

After the sample has been dried following completion of the final test cycle and washed to remove the sodium sulfate or magnesium sulfate, the loss of weight shall be determined by subtracting from the

original weight of the sample the final weight of all fragments that have not broken into three or more fragments.

The test report shall show the percentage loss of the weight and the results of the qualitative examination.

Rock slab soundness—When specified, the rock shall also be tested in accordance with ASTM D5240. Deterioration of more than 25 percent of the number of blocks shall be cause for rejection of rock from this source. Rock shall also meet the requirements for average percent weight loss stated below.

- For projects located north of the Number 20 Freeze-Thaw Severity Index Isoline (fig. 523–1). Unless otherwise specified, the average percent weight loss for Rock Type 1 shall not exceed 20 percent when sodium sulfate is used or 25 percent when magnesium sulfate is used. For Rock Types 2 and 3, the average percent weight loss shall not exceed 25 percent for sodium sulfate soundness or 30 percent for magnesium sulfate soundness.
- For projects located south of the Number 20 Freeze-Thaw Severity Index Isoline, unless otherwise specified, the average percent weight loss for Rock Type 1 shall not exceed 30 percent when sodium sulfate is used or 38 percent when magnesium sulfate is used. For Rock Types 2 and 3, the average percent weight loss shall not exceed 38 percent for sodium sulfate soundness or 45 percent for magnesium sulfate soundness.

4. Field durability inspection

Rock that fails to meet the material requirements stated above (if specified), may be accepted only if similar rock from the same source has been demonstrated to be sound after 5 years or more of service under conditions of weather, wetting and drying, and erosive forces similar to those anticipated for the rock to be installed under this specification.

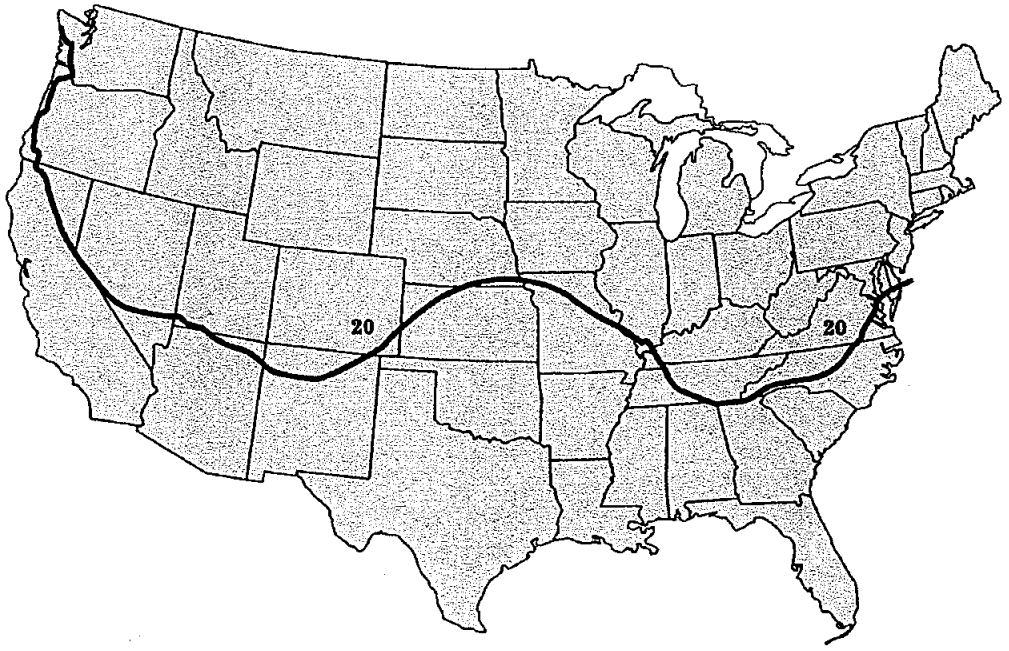
A rock source may be rejected if the rock from that source deteriorates in 3 to 5 years under similar use and exposure conditions expected for the rock to be installed under this specification, even though it meets the testing requirements stated above.

Deterioration is defined as the loss of more than one-quarter of the original rock volume, or severe cracking that would cause a block to split. Measurements of deterioration are taken from linear or surface area particle counts to determine the percentage of deteriorated blocks. Deterioration of more than 25 percent of the pieces shall be cause for rejection of rock from the source.

5. Grading

The rock shall conform to the specified grading limits after it has been placed within the matrix of the rock riprap. Grading tests shall be performed, as necessary, according to ASTM D5519, Method A, B, or C, as applicable.

Figure 523–1 Number 20 freeze-thaw severity index isoline (map approximates the map in ASTM D 5312)



Material Specification 582—Galvanizing

1. Scope

This specification covers the quality of zinc coatings applied to iron and steel productions.

2. Quality

Zinc coatings shall conform to the requirements of ASTM A 123 for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products or as otherwise specified in the items of work and construction details of the Construction Specification.

ASTM A 123 covers both fabricated and nonfabricated products; e.g., assembled steel products, structural steel fabrications, large tubes already bent or welded before galvanizing, and wire work fabricated from noncoated steel wire. It also covers steel forgings and iron castings incorporated into pieces fabricated before galvanizing or which are too large to be centrifuged (or otherwise handled to remove excess galvanizing bath metal).

Items to be centrifuged or otherwise handled to remove excess zinc shall meet the requirements of ASTM A 153, except bolts, screws, and other fasteners 0.5 inch or less in diameter may be coated with electro-deposited zinc or cadmium coating conforming to the requirements of ASTM B 766, coating thickness Class 5, Type III, or ASTM B 633, Service Condition SC-3, unless otherwise specified.

Material Specification 591—Field Fencing Material

1. Scope

This specification provides the minimum quality requirements for the material used in the construction of field fences.

2. Wire gauge

When the size of steel wire is designated by gage number, the diameter shall be as defined for U.S. Steel Wire Gauge.

3. Fencing

Fencing material shall conform to the requirements of ASTM A 121 for barbed wire, ASTM A 116 for woven wire, ASTM A 390 for poultry fence or netting, and ASTM A 854 for high-tensile wire. Barbed wire and woven wire shall be class 3 zinc coated as specified in ASTM A 641 unless otherwise specified. High-tensile wire shall have type I zinc coating unless otherwise specified.

4. Stays, fasteners, and tension wire

Stays and fasteners shall conform to the requirements of the appropriate ASTM for the fencing material specified unless otherwise specified. Tension wires shall have a tensile strength not less than 58,000 pounds per square inch. Stays, fasteners and tension wire shall have class 3 zinc coating as specified in ASTM A 641 unless otherwise specified.

5. Wood fence posts and braces

Unless otherwise specified, wood posts shall be naturally rot resistant, preservative-treated, or other wood of equal life and strength. At least half the diameter or diagonal dimension of naturally rot resistant posts shall be in heartwood. Provide new wood posts that are sound, free from decay with all limbs trimmed substantially flush with the body. All posts shall be substantially straight throughout their full length. Make tops convex rounded or inclined. Provide posts free of ring shake, season cracks more than a quarter-inch wide, splits in the end, and unsound knots. Pine shall be pressure treated in conformance with Material Specification 585, Wood Preservatives and Treatment. Wood braces shall be of wood material equal to or better than construction grade Douglas fir. Wood braces shall be pressure treated in conformance with Material Specification 585.

6. Steel fence posts and braces

Steel fence posts shall conform to the requirements of ASTM A702. Posts with punched tabs for fastening the wires shall not be installed. Bracing pipes shall conform to the requirements of ASTM A53 except that the A53 requirements for hydrostatic test shall not apply.

7. Concrete fence posts

Concrete fence posts shall be manufactured to the specified requirements of size, shape, and strength.

8. Panel gates

Panel gates shall be the specified types, sizes, and quality and shall include the necessary fittings required for installation. Gates shall be of rigid construction free from sag or twist. The fittings shall consist of not less than two hinges and one latch or galvanized chain for fastening. Latches shall be of such design that a padlock may be used for locking. All fittings shall not be of lesser quality than the gate manufacturer's standard.

9. Wire gates

Wire gates shall be the type shown on the drawings, constructed in accordance with specifications, at the locations, and to the dimensions shown on the drawings. The material shall conform to the kinds, grades, and sizes specified for new fence, and shall include the necessary fittings and stays.

10. Staples

Staples required to secure the fence wire to wood posts shall be 9-gauge galvanized wire with a minimum length of 1.5 inches for soft woods and a minimum length of 1 inch for close-grain hardwoods.

11. Galvanizing

All iron and steel fencing material, except as otherwise specified, shall be zinc coated by the hot dip process meeting the requirements of Material Specification 582. Clips, bolts, and other small hardware may be protected by electro-deposited zinc or cadmium coating.

Material Specification 592—Geotextile

1. Scope

This specification covers the quality of geotextile, including geotextile for temporary silt fence.

2. General Requirements

Fibers (threads and yarns) used in the manufacture of geotextile must consist of synthetic polymers composed of a minimum of 85 percent by weight polypropylenes, polyesters, polyamides, polyethylene, polyolefins, or polyvinylidene-chlorides. They must be formed into a stable network of filaments or yarns retaining dimensional stability relative to each other. The geotextile shall be free of defects, such as holes, tears, and abrasions. The geotextile shall be free of any chemical treatment or coating that significantly reduces its porosity. Fibers shall contain stabilizers, inhibitors, or both to enhance resistance to ultraviolet light. Geotextile other than for temporary silt fence must conform to the requirements in tables 592-1 or 592-2, as applicable. Geotextile for temporary silt fence shall conform to the requirements in table 592-3.

Thread used for factory or field sewing shall be of contrasting color to the fabric and made of high-strength polypropylene, polyester, or polyamide thread. Thread shall be as resistant to ultraviolet light as the geotextile being sewn.

3. Classification

Geotextiles shall be classified based on the method used to place the threads or yarns forming the fabric. The geotextiles will be grouped into woven and nonwoven types. Geotextile for temporary silt fence may be either woven or nonwoven. Slit film woven geotextile may not be used except for temporary silt fence.

Woven—Fabrics formed by the uniform and regular interweaving of the threads or yarns in two directions. Woven fabrics must be manufactured from monofilament yarn formed into a uniform pattern with distinct and measurable openings, retaining their position relative to each other. The edges of fabric must be selvedged or otherwise finished to prevent the outer yarn from unraveling.

Nonwoven—Fabrics formed by a random placement of threads in a mat and bonded by needle punching, heat bonding, or resin bonding. Nonwoven fabrics must be manufactured from individual fibers formed into a random pattern with distinct but variable small openings, retaining their position relative to each other when bonded by needle punching, heat- or resin- bonding. The use of heat- or resin-bonded nonwovens is restricted as specified in note 2 of table 592-2.

4. Sampling and Testing

The geotextile must meet the specified requirements (tables 592-1, 592-2, or 592-3, as applicable) for the product type shown on the label. Product properties as listed in the latest edition of the "Specifiers Guide," Geosynthetics, (Industrial Fabrics Association International, 1801 County Road B, West Roseville, MN 55113-4061 or at *http://www.geosindex.com*), and that represent minimum average roll values, are acceptable documentation that the product style meets the requirements of these specifications.

For products that do not appear in the above directory or do not have minimum average roll values listed, typical test data from the identified production run of the geotextile is required for each of the specified tests (see table 592-1, 592-2, or 592-3, as applicable) as covered under clause AGAR 452.236-76.

5. Shipping and Storage

The geotextile must be shipped and transported in rolls wrapped with a cover for protection from moisture, dust, dirt, debris, and ultraviolet light. The cover must be maintained undisturbed to the maximum extent possible before placement.

Each roll of geotextile must be labeled or tagged to clearly identify the brand, class, and the individual production run in accordance with ASTM D4873.

Table 592-1 Requirements for woven geotextiles 1/

Property	Test Method	Units	Class I	Class II	Class III	Class IV
Grab Tensile Strength	ASTM D4632	pounds	247 min.	180 min.	180 min.	315 min.
Elongation at Failure	ASTM D4632	percent	< 50	<50	<50	<50
Trapezoidal Tear Strength	ASTM D4533	pounds	90 min.	67 min.	67 min.	112 min.
Puncture Strength	ASTM D6241	pounds	495 min.	371 min.	371 min.	618 min.
Ultraviolet Stability (Retained Strength)	ASTM D4355	percent	50 min.	50 min.	50 min.	50 min.
Permittivity	ASTM D4491	sec^{-1}	as specified			
Apparent Opening Size (AOS) 2/	ASTM D4751	mm	as specified			
Percent Open Area (POA)	USACE CWO-02215	percent	as specified			

1/ All values are minimum average roll values (MARV) in the weakest principal direction, unless otherwise noted.

2/ Maximum average roll value.

Note: CWO is a USACE reference.

Table 592-2 Requirements for nonwoven geotextiles 1/

Property	Test Method	Units	Class I 2/	Class II 2/	Class III 2/	Class IV 2/
Grab Tensile Strength	ASTM D4632	pounds	202 min.	157 min.	112 min.	202 min.
Elongation at Failure	ASTM D4632	percent	50 min.	50 min.	50 min.	50 min.
Trapezoidal Tear Strength	ASTM D4533	pounds	79 min.	56 min.	40 min.	79 min.
Puncture Strength	ASTM D6241	pounds	433 min.	309 min.	223 min.	433 min.
Ultraviolet Stability (Retained Strength)	ASTM D4355	percent	50 min.	50 min.	50 min.	50 min.
Permittivity	ASTM D4491	sec^{-1}	0.7 min. or as specified			
Apparent Opening Size (AOS) 3/	ASTM D4751	mm	0.22 max. or as specified			

1/ All values are minimum average roll values (MARV) in the weakest principal direction, unless otherwise noted.

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

3/ Maximum average roll value.

Table 592-3 Requirements for Temporary Silt Fence 1/

Property	Test Method	Units	Requirements, Supported Silt Fence 2/	Requirements, Unsupported Silt Fence 2/	
				Woven Geotextile (Elongation < 50% 3/)	Nonwoven Geotextile (Elongation ≥ 50% 3/)
Maximum Post Spacing		ft	4	6.5	4
Grab Tensile Strength	ASTM D 4632	pounds			
Machine Direction			90	124	
X-Machine Direction			90	101	
Permittivity	ASTM D 4491	sec-1	0.05	0.05	
Apparent Opening Size (AOS) 4/	ASTM D 4751	mm	0.60	0.60	
Ultraviolet Stability (Retained Strength)	ASTM D 4335	%	70% after 500 hours of exposure	70% after 500 hours of exposure	

1/ All values are minimum average roll values (MARV) in the weakest principal direction, unless otherwise noted.

2/ Silt fence support must consist of 14-gage steel wire with a mesh spacing of 6 inches each way or prefabricated polymeric mesh of equivalent strength.

3/ As measured in accordance with ASTM D4632.

4/ Maximum average roll value.