

# CONSTRUCTION AND MATERIAL SPECIFICATIONS

Covering the proposed works of improvement for the Big Dry Wood Creek bank rehabilitation project extending 250' upstream of the Hwy 54 bridge, approximately 1 mile east of the town of Deerfield. The rock armament bank rehabilitation project is located in Section 7, Township 35 North, Range 32 West in Vernon County.

Specifications referred to herein shall form a part of these Construction and Material Specifications and the Contractor shall exercise special care to refer to them in request for quotations, in orders, and in subcontracts. Materials so specified shall conform to the technical requirements of the respective specifications referred to. Where used in these specifications, the terms Engineer, Contracting Officer, Contracting Officer's Representative and Contracting Officer's Technical Representative refer to the project sponsor's personnel unless otherwise noted.

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## CONSTRUCTION SPECIFICATION

### 2. CLEARING AND GRUBBING

#### 1. SCOPE

The work shall consist of the clearing and grubbing and disposal of trees, snags, logs, 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

For items of work for which specific lump sum prices are established in the contract, payment for clearing and grubbing will be 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 completion of the work.

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

**7. ITEM OF WORK AND CONSTRUCTION DETAILS**

Item 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 clearing and grubbing the stream channel within the limits indicated on the drawings.
- (2) All timber removed from clearing and grubbing areas shall be removed from the site. If burning and/or burial of debris is approved by the Contracting Officer's Representative the timber may be burned or buried at a location specified by the Contracting Officer's Representative.
- (3) This item of work will not be measured. No separate payment will be made for this item. Item is subsidiary to Bid Item #1, Rock Riprap.

## CONSTRUCTION SPECIFICATION

### 5. POLLUTION CONTROL

#### 1. SCOPE

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

#### 2. MATERIALS

All materials 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 soil surfaces from erosion.

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

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

Sediment Basins Sediment basins to 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 sediment fences to trap sediment from areas of limited runoff. Sediment filters shall be properly anchored to prevent erosion under or around them. 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.

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 water-tight tanks or barrels, or construct a sump sealed with plastic sheets to be used to dispose of chemical pollutants, such as drained lubricating or transmission fluids, grease, soaps, concrete mixer wash water, asphalt, etc., produced as a by-product of the construction activities. At the completion of the construction work, 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 adjacent 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 and/or slash, and disposal of other materials shall adhere to state and local regulations.

Fire prevention measures shall be taken to prevent the start or spreading of wild fires which 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 insure 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 five (5) working days prior to 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 will be measured to the nearest unit applicable. Payment for each item will be 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 will be 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 above 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 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 8 of this specification.

8. ITEM OF WORK AND CONSTRUCTION DETAILS

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

a. Bid Item 2, Pollution Control

- (1) This item shall consist of scheduling of work, installing measures and performing work as needed to control erosion and minimize the production of sediment and other pollutants to the water and air during construction operations.

These temporary pollution control provisions contained herein shall be coordinated with other temporary and permanent pollution control features specified elsewhere in the contract or by state and local laws to assure effective pollution control.

- (2) Stripping, clearing and grubbing shall not be done until the area is needed in the construction operations.
- (3) All state and local laws governing pollution shall be followed.
- (4) The construction site shall be maintained in a clean and safe condition during construction operations.
- (5) Trash barrels shall be provided and utilized at the site. Trash shall be regularly collected and disposed of properly.
- (6) Employ measures to prevent spilled fuels, lubricants, excessive suspended solids including dredged materials from entering the waters of the United States and formulate a contingency plan to be effective in the event of a spill. All waste oil, other chemicals, sewage and soils contaminated by such pollutants shall be removed from the site and disposed of in approved landfills.
- (7) Conduct activities during low water periods to the extent possible. Limit crossing of waterways and use of construction machinery in waterways to the minimum extent necessary.
- (8) Remove and properly dispose of all debris to prevent the accumulation of unsightly, deleterious and/or toxic materials in or near the water body. All construction debris must be disposed of off site in such a manner that it cannot enter into a waterway or into a wetland.

- (9) Store all construction materials, equipment, and/or petroleum products, when not in use, above anticipated high water levels.
- (10) Restrict the clearing of timber and other vegetation to the absolute minimum required to accomplish the work. Work should be limited to one side of the channel.
- (11) Payment shall be by Method 2. A one-time payment for this item will be made upon successful completion of the project. No intermediate payments will be made.

## CONSTRUCTION SPECIFICATION

### 95. GEOTEXTILE

#### 1. SCOPE

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

#### 2. QUALITY

Geotextiles shall conform to the requirements of Material Specification 592, Geotextile, and this specification.

#### 3. STORAGE

Prior to 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 D 4873.

#### 4. SURFACE PREPARATION

The surface on which the geotextile is to be placed shall be graded to the neat lines and grades as shown on the drawings. 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

Prior to placement of the geotextile, the soils 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. The geotextile shall be unrolled along the placement area and loosely laid, without stretching, in such a manner that it will conform 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. The sewn overlap shall be six (6) inches and the sewing shall consist of two (2) parallel stitched rows at a spacing of approximately one (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 two (2) inches from the geotextile edge. The seam type and sewing machine to be used shall produce a seam strength, in the specified geotextile, that provides a minimum of 90-percent of the tensile strength in the weakest principal direction of the geotextile being used, when tested in accordance with ASTM D 4884. The seams may be factory or field sewn.

The geotextile shall be temporarily secured during placement of overlying materials 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 up-slope geotextile shall overlap the abutting down-slope 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 pins shall be inserted through the bottom layer only. Securing pins shall be placed along a line approximately two (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 one (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 six (6) inches from the edge of the damaged geotextile. Geotextile panels joined by overlap shall have the patch extend a minimum of two (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:

- a. 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 greater than three (3) feet.
- b. 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 greater than five (5) feet.
- c. 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 greater than five (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 prior to placement of the permanent covering material.

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. ITEM OF WORK AND CONSTRUCTION DETAILS**

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

a. Subsidiary Item, Geotextile

- (1) This item shall consist of furnishing and installing the geotextile beneath the rock riprap.
- (2) The geotextile fabric shall be non-woven, Class I, and meet or exceed requirements in Table 592-2, Material Specification 592. Fabric weight shall be a minimum of 14 ounces per square yard.
- (3) Placement shall be by Method 2.
- (4) This item of work will not be measured. No separate payment will be made for this item. Item is subsidiary to Bid Item #1, Rock Riprap.

## CONSTRUCTION SPECIFICATION

### 424. CHANNEL EXCAVATION

1. SCOPE

The work shall consist of removing sediment and debris from channel and the disposal of all excavated material.

2. EXCAVATION

The channel shall be excavated to the cross sections and grades shown on the plans. The excavated surfaces shall be reasonably smooth. The channel bank alignment shall be uniform.

3. DISPOSAL OF EXCAVATED MATERIALS

Material excavated from the channel shall be placed in spoil dikes as shown on plans. Spoil dikes shall be shaped reasonably smooth and shall be placed so surface water does not pond. Debris shall be separated from the soil materials, then burned, buried or otherwise disposed of at locations shown on the drawings or staked in the field.

4. MEASUREMENT AND PAYMENT

The quantity of this work shall not be measured.

Payment for items of work listed in the bid schedule will be made at the specific lump sum prices established in the contract. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to the performance of the work.

**5. ITEM OF WORK AND CONSTRUCTION DETAILS**

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

a. Subsidiary Item, Channel Excavation

- (1) This item shall consist of removing all of the material required to construct the stream bank protection or to place the geotextile fabric.
- (2) Excavated material shall be removed from the project site.
- (3) This item of work will not be measured. No separate payment will be made for this item. Item is subsidiary to Bid Item #1, Rock Riprap.

## CONSTRUCTION SPECIFICATION

### 426. EARTHFILL

#### 1. SCOPE

The work shall consist of the construction of earth embankments and other earthfills required by the drawings and specifications.

#### 2. MATERIALS

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

Fill materials shall contain no sod, brush, roots or other perishable materials. 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 materials used in the various fills shall be as listed and described in the specifications and drawings.

#### 3. FOUNDATION PREPARATION

Foundation for earthfill shall be stripped to remove vegetation and other unsuitable materials 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 materials 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 two inches in depth normal to the slope and shall be at such a moisture content that the earthfill can be compacted against them to effect a good bond between the fill and the abutments.

Foundation and abutment surfaces shall not be steeper than 1 horizontal to 1 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

Fill 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. Fill shall not be placed upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill. Fill shall be placed in approximately horizontal layers. The thickness of each layer before compaction shall not exceed the maximum thickness specified. Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified thickness before being compacted.

Earthfill in dams, levees and other structures designed to restrain the movement of water shall be placed so as to meet the following additional requirements.

- a. The distribution of material throughout each zone shall be essentially uniform, and the fill shall be free from lenses, pockets, streaks or layers of material differing substantially in texture or gradation from the surrounding material.
- b. If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it 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 surfaces of embankments shall be maintained approximately level during construction, except that a crown or cross-slope of not less than 2 percent shall be maintained to insure effective drainage, and except as otherwise specified for drain fill zones. If the drawings or specifications require or the Engineer directs that fill be placed at a higher level in one part of an embankment than another, the top surface of each part shall be maintained as specified above.
- d. Embankments shall be constructed in continuous layers from abutment to abutment except where openings to facilitate construction or to allow the passage of stream flow during construction are specifically authorized in the contract.

## 5. CONTROL OF MOISTURE CONTENT

During placement and compaction of fill, the moisture content of the materials being placed shall be maintained within the specified range.

The application of water to the fill materials shall be accomplished at the borrow areas insofar as practicable. Water may be applied by sprinkling the materials after placement on the fill, if necessary. Uniform moisture distribution shall be obtained by discing, blading or other approved methods prior to compaction of the layers.

Material that is too wet when deposited on the fill 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 fill or a foundation or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond it shall be scarified and moistened by sprinkling to an acceptable moisture content prior to placement of the next layer fill.

## 6. COMPACTION

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

Class C Compaction: Each layer of fill shall be spread, processed, and shall be compacted by one of the following methods, as specified in Section 10 of this specification or on the Drawings:

Dozer – Complete coverage by tread or track of hauling or spreading equipment. Each lift shall not exceed 5 inches in thickness.

Roller – two passes of standard tamping tpe roller over the entire area to be compacted. Complete coverage by the treads of loaded hauling equipment is considered equivalent to two (2) passes of tamping roller. Each lift shall not exceed 9 inches in thickness.

The tamping-type roller shall have tampers or feet projecting not less than six (6) inches from the surface of the drum and shall have a minimum static load on each tamper of 250 pounds per square inch of tamping area. Tamping rollers with a minimum static load of 125 pounds per square inch may be used if the number of passes is increased to four (4) or the thickness of the lifts is reduced to four (4) inches. (Sheepsfoot or wedgefoot drum rollers are considered tamping rollers.)

7. REMOVAL AND PLACEMENT OF DEFECTIVE FILL

Fill 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 fill. The replacement fill and the foundation, abutment and fill 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 work, the Engineer will perform such tests as are required to identify materials, to determine compaction characteristics, to determine moisture content, and to determine density of fill in place. These tests performed by the Engineer will be used to verify that the fills conform to the requirements of the specifications. Such tests are not intended to provide the Contractor with the information required by him for the proper execution of the work and their performance shall not relieve the Contractor of the necessity to perform tests for that purpose.

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 within the specified zone boundaries and pay limits will be measured and computed to the nearest cubic yard by the method of average cross-sectional end areas. Unless otherwise specified, no deduction in volume will be made for embedded conduits and appurtenances.

Payment for each type and compaction class of earthfill will be made at the contract unit price for that type and compaction class of fill. Such payment will constitute full compensation for all labor, materials, equipment and other items necessary and incidental to the performance of the work.

For items of work for which specific lump sum prices are established in the Contract, payment will be made at the contract lump sum prices.

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 10 of this specification.

**10. ITEM OF WORK AND CONSTRUCTION DETAILS**

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

a. Subsidiary Item, Earthfill

- (1) This item shall consist of constructing earthfill material required to construct the stream bank protection or place geotextile fabric.
- (2) This item of work will not be measured. No separate payment will be made for this item. Item is subsidiary to Bid Item #1, Rock Riprap.

## CONSTRUCTION SPECIFICATION

### 427. MOBILIZATION

#### 1. SCOPE

The work shall consist of the cost of premiums paid for performance and payment bonds and the mobilization of the Contractor's forces and equipment necessary for performing the work required under the contract.

It shall include the transportation of personnel, equipment, and operating supplies to the site; establishment of offices, building, and other necessary facilities at the site; and other preparatory work at the site.

It shall not include mobilization for any specific item of work for which payment for mobilization is provided elsewhere in the contract.

The specification covers mobilization for work required by the contract at the time of award. If additional mobilization costs are incurred during performance of the contract as a result of changed 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 items of work changed or added.

This item also includes demobilization, which is all activities and cost for transportation of personnel, equipment, and supplies not required or included in the contract from the site.

#### 2. PAYMENT

Payment for this item is made at the contract lump sum bid price.

**3. ITEM OF WORK AND CONSTRUCTION DETAILS**

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

a. Bid Item 3, Mobilization

- (1) This item shall consist of all mobilization and demobilization needed to perform all work.

## CONSTRUCTION SPECIFICATION

### 440B. SEEDING AND MULCHING (South Missouri)

1. **SCOPE**

The work shall consist of preparing the area for treatment and furnishing and placing seed, legume inoculant, mulch, fertilizer, and soil amendments as specified. The area to be seeded and mulched shall include the designated work area and other disturbed areas. The limits of the area will be marked on the ground.

2. **MATERIALS**

**Seed** - All seed shall conform to the current rules and regulations of the state of Missouri and all seed will be from the latest crop available. 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 will be evidence of purity and germination. No seed will be accepted with a test date of more than nine (9) months prior to the date of delivery 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 an exception is granted in writing by the Contracting Officer.

**Inoculation** - All legume seeds such as ladino clover not pre-inoculated will be inoculated with the proper viable inoculant within 24 hours of planting. Pre-inoculated seed shall be planted prior to the expiration date of the inoculant tag or be re-inoculated with the appropriate inoculant within 24 hours prior to seeding. A sticker product will be used to adhere inoculant to the legume seeds.

**Fertilizer** - The fertilizer shall be a commercial grade fertilizer. The fertilizer 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.

**Soil Amendments** - Lime shall consist of standard ground agricultural limestone. Standard ground agricultural limestone is defined as ground limestone meeting current requirements of the State Department of Agriculture. Agricultural lime will be uniformly applied at a rate of 1500 pounds per acre of effective neutralizing material (ENM).

**Mulch Materials** - Mulch shall consist of wheat, oat, or rye straw, or grass hay as approved by the Contracting Officer's Technical Representative. 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 will not be permitted. The contractor shall provide a method satisfactory to the Contracting Officer's Technical Representative for determining the weight of mulch furnished.

3. **SEEDING MIXTURES AND DATES OF PLANTING**

Unless otherwise specified on the drawings, seed will be sown:

- 1) Dormant Seeding Period from December 16 through February 29
- 2) Spring Seeding Period from March 1 through May 15
- 3) Summer Seeding Period from August 16 through September 15
- 4) Fall Seeding Period from September 16 through October 15

From May 16 to August 15, a cool season grass and legume mixture may be seeded if there is adequate soil moisture to a depth of 18 inches at the time of planting. Adequate soil moisture shall be the minimum moisture content as defined in this specification.

Seeding will not be performed outside of the date ranges stated above. From October 16 to December 15 or drought periods between May 16 and August 15, all operations may be performed except sowing the seed.

Seed will be applied based on pounds of Pure Live Seed (PLS) per acre. Calculate PLS for each species and seed lot with the following formula:

$$\text{PLS (Pure Live Seed)} = \frac{\text{Purity}}{100} \times \frac{(\text{Germination} + \text{Hard Seed})}{100}$$

Calculate the total seed required per species on the following formula:

$$\text{Bulk Seed (lb.)} = \frac{\text{Seeding Rate (lb./ac.)} \times \text{Seeded Area marked on ground (ac.)}}{\text{PLS}}$$

4. **SEEDING RATES AND DATES FOR SOUTH MISSOURI: 1/**

**Mixture Seeding Rates (PLS) – Broadcast Seeding Methods Only**

Species:	Dec 16 – May 15	May 16 – Aug 15	Aug 16 – Sept 15	Sept 16 – Oct 15
Tall Fescue	12.0 lb./ac.	18.0 lb./ac.	12.0 lb./ac.	12.0 lb./ac.
Redtop	1.3 lb./ac.	2.0 lb./ac.	1.3 lb./ac.	1.3 lb./ac.
Switchgrass <u>2/</u>	2.1 lb./ac.	3.2 lb./ac.		
Ladino Clover	0.9 lb./ac.	1.4 lb./ac.	0.9 lb./ac.	
Orchardgrass			1.9 lb./ac.	3.2 lb./ac.

**Mixture Seeding Rates (PLS) – Drill Seeding Methods Only**

Species:	Dec 16 – May 15	May 16 – Aug 15	Aug 16 – Sept 15	Sept 16 – Oct 15
Tall Fescue	8.0 lb./ac.	12.0 lb./ac.	8.0 lb./ac.	8.0 lb./ac.
Redtop	0.9 lb./ac.	1.3 lb./ac.	0.9 lb./ac.	0.9 lb./ac.
Switchgrass <u>2/</u>	1.4 lb./ac.	2.1 lb./ac.		
Ladino Clover	0.6 lb./ac.	0.9 lb./ac.	0.6 lb./ac.	
Orchardgrass			1.3 lb./ac.	2.1 lb./ac.

1/ South Missouri counties are Bates, Henry, Benton, Morgan, Moniteau, Cole, Osage, Gasconade, Franklin, and St. Louis including those counties to the south of those listed.  
2/ An improved cultivar of switchgrass will be required for these seedings. Approved switchgrass cultivars are “Cave-In-Rock”, “Blackwell”, “Alamo” (lowland sites only), and “Kanlow” (lowland sites only).

5. **FERTILIZING, SEEDBED PREPARATION, AND TREATMENT**

Disturbed areas will be treated with seed, mulch, fertilizer, and soil amendments as specified in this construction specification. Areas to be seeded shall be dressed to a reasonably smooth, firm surface.

**Fertilizer** furnishing the following minimum amounts of available plant nutrients per acre shall be applied.

	<u>All Areas</u>
Nitrogen (N)	30 lb./ac.
Phosphate (P <sub>2</sub> O <sub>5</sub> )	90 lb./ac.
Potash (K <sub>2</sub> O)	90 lb./ac.

Fertilizer shall be applied uniformly over the designated seeding area. Fertilizer and soil amendments shall be thoroughly incorporated into the upper 3 to 6 inches of soil within 24 hours after being applied.

The seedbed will be prepared with common farm implements such as disks, harrows and cultipackers. Alterations to the finished lines and grades of any structure caused by seedbed preparation shall be regraded by the contractor to meet the requirements of the applicable drawings and specifications prior to seeding.

The moisture content of the finished seedbed (upper 3-4 inches) must be adequate for germination. **Minimum moisture content** is present when the soil material will form a ball which does not readily separate when kneaded in the hand. **Maximum moisture content** is present when free water is evident on the surface of the kneaded soil ball. Areas not accessible to field machinery shall be prepared by hand. Parking areas shall be ripped or disked to a minimum depth of 6 inches prior to seedbed preparation.

If seeding is to be completed within 24 hours following construction, seedbed preparation may not be required unless soil conditions are compacted, polished or freshly cut areas.

Rocks larger than 6 inches in diameter, trash, weeds, woody materials, and other debris that will interfere with seeding or maintenance shall be removed or disposed of as directed by the Contracting Officer's Technical Representative.

Seedbed preparation shall be suspended when soil moisture conditions are not suitable for the preparation of a satisfactory seedbed as determined by the Contracting Officer's Technical Representative.

6. **SEEDING AND MULCHING**

All seeding operations shall be performed in such a manner that the seed is applied in the specified quantities uniformly on the designated areas. Prior to mulching, apply seed uniformly at a depth of 1/8 to 1/4 inch with a drill or cultipacker type of seeder - or - broadcast seed uniformly and immediately cover to a depth of 1/8 to 1/4 inch with a cultipacker or smooth wheel roller. Seeding operation shall be performed immediately after seedbed preparation, if seeding dates permit.

Mulch shall be applied uniformly to the designated areas at the rate of two tons per acre. Mulch shall be applied to the seeding areas not later than two (2) days after seeding has

been performed. During the non-seeding periods mulch shall be applied within two (2) days after incorporation of fertilizer and soil amendments. An adequately weighted mulch tacker or crimper shall be used to anchor the mulch into the top one (1) inch of soil. On those areas too steep for safe operation if a mulch tacker or crimper, a non-asphalt tackifier will be applied with the straw mulch according to the manufacturer's recommendation in lieu of a mechanical operation. When required by the Contracting Officer's Technical Representative or as shown on plans, mulch tackifiers, binders, mesh, or netting will be used to help anchor mulch materials.

7. **OVERSEEDING**

When overseeding into mulch is necessary, planting will occur during the next seeding period with minimal disturbance to the mulch. The seeding rates listed in Section 4 will be increased by 100 percent (doubled) when overseeding into mulch. Seed may be applied either by broadcast methods only December 16 through February 29 in the dormant seeding period or with a no-till drill during any of the seeding periods designated in Section 3. There will be no tillage or mechanical operation to cover broadcasted seed during an overseeding operation. Prior to overseeding into mulch cover, any existing competitive growth will be controlled with suitable herbicides.

Adequate mulch cover will be maintained to provide protection for the establishing seedlings.

8. **MEASUREMENT AND PAYMENT**

For items of work for which specific unit prices are established in the contract, each area treated as specified will be measured to the nearest 0.1 acre. Payment for treatment will be made at the contract unit price for the designated treatment which shall constitute full compensation for all materials, labor, equipment, tools, and other items necessary and incidental to the completion of the work.

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

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

a Subsidiary Item: Seeding and Mulching

1. This item shall consist of all work and materials needed to seed and mulch the disturbed areas.
2. Apply ground agricultural limestone and fertilizer uniformly as per soil test. In lieu of soil test information, the following application rates for fertilizer and lime will be used:
  - a. In lieu of the rate shown in Section 2 of this specification, apply ground lime at a rate of 1500 lbs./acre of effective neutralizing material (ENM).
  - b. In lieu of the rates shown in Section 5 of this specification, apply fertilizer uniformly over the designated seeding area at these rates:

Nitrogen (N)	60 pounds/acre
Phosphate (P <sub>2</sub> O <sub>5</sub> )	90 pounds/acre
Potash (K <sub>2</sub> O)	90 pounds/acre

3. Incorporate lime and fertilizer to a depth of at least 3” into the soil immediately after application during preparation of seedbed. All rills and gullies shall be filled and smoothed prior to application of lime and fertilizer.
4. In areas not accessible to or too small for practical use of field machinery, the seedbed shall be prepared by hand.
5. In lieu of the mixtures shown in Section 4 of this specification, seed shall be furnished in amounts that equal or exceed the following rate per acre:

Tall Fescue	32 Pounds (PLS)
Wheat	25 Pounds per acre

6. Mulch shall be small grain straw or grass hay relatively free of weed seed. The mulch shall be applied uniformly over the designated area at a rate of two tons per acre.
7. This item is subsidiary to Bid Item #1, Rock Riprap. No measurement of area seeded will be made for payment purposes.

## CONSTRUCTION SPECIFICATION

### 445. ROCK RIPRAP

#### 1. SCOPE

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

#### 2. MATERIALS

Rock riprap shall be obtained from the designated source or other approved source. It shall be free from dirt, clay, sand, rock fines and other materials not meeting the required gradation limits.

The size and grading of the rock shall be specified on the drawings.

Rock from designated sources shall be excavated, selected and processed as necessary to meet the quality and grading requirements as specified. The installed rock riprap shall conform to the specified grading limits.

Bedding aggregates when required, shall, unless otherwise specified, conform to the requirements for riprap.

Individual rock fragments for rock riprap and bedding shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock fragments shall be angular to sub-rounded in shape. The least dimension of an individual rock fragment shall be not less than one-third the greatest dimension of the fragment.

Rock for riprap and bedding shall be sound, durable unweathered rock from approved sources.

Filter fabric when required, shall be of heavy duty non-woven materials of type specified on the drawings or otherwise approved.

#### 3. SUBGRADE PREPARATION

The subgrade surfaces on which the rock riprap, filter, filter fabric or bedding is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When earth fill to subgrade lines is required, it shall consist of approved materials and shall conform to the earthfill requirements.

Rock riprap, filter, filter fabric or bedding shall not be placed until the foundation is completed and the subgrade surfaces have been inspected and approved by the Engineer.

4. EQUIPMENT-PLACED ROCK RIPRAP

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

Rock riprap shall be placed in a manner to prevent damage to structures. Hand placing will be required to the extent necessary to prevent damage to the permanent works.

5. EQUIPMENT PLACED FILTER OR BEDDING

Bedding beneath riprap or filter shall be placed on the prepared subgrade surfaces as specified. Compaction of the filter or bedding aggregate will not be required, but the surface of such material shall be finished reasonably free of mounds, dips, or windrows.

6. 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 Engineer a statement-of-delivery ticket showing the weight, to nearest 0.1 ton.

Payment will be 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 Engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment will be made at the contract unit price for 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 will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment will be 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, will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment will be 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 Engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

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

Method 7 For items of work for which specific unit prices are not established by the contract, the quantity of rock shall not be measured.

Payment will be made at the contract lump sum price, including geotextile used for filter or bedding. Such payment is considered full compensation for completion of the work.

All Methods The following provision 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.

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

## **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) Bid Item #1, Rock Riprap
  - 1) This item shall consist of furnishing and placing rock riprap to construct the riprap stream bank protection as shown on the drawings and providing traffic control.
  - 2) All work shall be completed in compliance with the conditions of U.S. Army Corps of Engineers General Permit 41 (GP-41).
  - 3) The source of the rock riprap shall be approved by the Government Representative prior to delivering the rock to the project location.
  - 4) The Contractor shall provide a representative gradation pile of rock at the rock source location and at the project location. The size of the gradation pile shall be a minimum of two (2) tons. The length and width of each rock shall be individually measured along with the weight of each rock. The Contractor shall provide the Contracting Officer's Representative a copy of all of the weights and measurements of the rock in order to determine if the rock conforms to the gradation as listed on the plans.
  - 5) The gradation of the rock riprap for the stream bank protection shall meet the gradation table requirements as shown on the plans. The Contractor may use riprap that meets Missouri Standard Specifications for Highway Construction requirements for Type 4 Rock Ditch Liner. Geotextile material conforming to Material Specification 592 will be used in lieu of rock bedding.
  - 6) The rock shall be equipment placed.
  - 7) Measurement and Payment shall be by Method 7 as stated in Section 6 of this specification.
  - 8) Traffic control shall be provided as described in the Scope of Work. All work zone traffic management shall be in accordance with applicable portions of Division 100 and Division 600 of the Missouri Standard Specifications for Highway Construction.
  - 9) Items of work subsidiary to this bid item are:
    - a). Geotextile Fabric – Construction Specification 095.
    - b). Seeding and Mulching – Construction Specification 440.
    - c). Clearing and Grubbing – Construction Specification 002.
    - d). Channel Excavation – Construction Specification 424.
    - e). Earthfill – Construction Specification 426.
    - f). Traffic Control – MoDOT Specifications, Division 100 and Division 600.