

# White River Park Improvements Construction Specifications

Meeker, CO

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PREPARED FOR  
**The Town of Meeker**

PREPARED BY  
**SWCA Environmental Consultants**

# 1 CONSTRUCTION SPECIFICATIONS

## 1.1 CS-002 CLEARING AND GRUBBING

### 002.1 Scope

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

### 002.2 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 proper NRCS Representative.

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.

### 002.3 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.

### 002.4 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.

### 002.5 Salvage

Trees to be salvages for saw logs shall be trimmed and cut to planned lengths and hauled to the loading area.

Brush piles for wildlife shall be established as shown on the drawings.

### 002.6 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 002.7 of this specification. 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.

### 002.7 Items of Work and Construction Details

All roots 1 inch or larger in diameter that are cut, broken, or otherwise severed during channel shaping shall have the end smoothly cut perpendicular to the root. Roots exposed during channel shaping operations shall be covered with moist soil as soon as possible to prevent roots from drying out.

#### **004.3 Marking**

The limits of the area(s) to be cleared and shaped are marked by stakes, flags, paint, tree markings, or other suitable methods or as specified in Section 004.7 of this specification or they will be shown on the drawings. Trees to remain standing, undisturbed, and uninjured are designated by special markings.

#### **004.4 Clearing**

Trees and other vegetation marked for clearing shall be cut off as near the ground surface as conventional tools and equipment normally permit. All trees not marked for preservation and all snags, logs, brush, shrubs, stumps, and rubbish shall be cleared from within the area limits identified.

#### **004.5 Disposal**

All woody material, vegetation, and rubbish resulting from clearing from designated areas shall be disposed of at the locations and in a manner shown on the drawings, or as specified in Section 004.7 of this specification.

#### **004.6 Shaping**

The channel bottom and side slopes shall be shaped as shown on the drawings. The resulting shaped channel surface shall be reasonably smooth. Material excavated during the channel shaping operation shall be removed from the channel and disposed of as specified in Section 004.7 of this specification.

#### **004.7 Items of Work and Construction Details**

## **1.4 CS-005 POLLUTION CONTROL**

### **005.1 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

### **005.2 Material**

Silt fence shall conform to the requirement of Materials Specification MS-592, Geotextile. All other material furnished shall meet the requirements of the material specifications listed in section 005.8 of this specification.

### **005.3 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.

- (a) For spillage on land, construct earthen berms or use other suitable barricade material of sufficient size to contain the spill and keep it from spreading.
- (b) For spillage on water, attempt to isolate and contain the spilled material. Commercial booms or other suitable materials shall be kept on site during construction to contain fuel and oil spills on water.
- (c) Call the Oregon Emergency Response System (ORES) at (800) 452-0311.

**Service and Refueling Equipment** - All fuel and lubricants used in the servicing of construction equipment shall be done in a manner that avoids spills and over filling. The Oregon State Department of Environmental Quality shall be notified immediately of any spill and the operator shall contain the spillage.

**Sanitary Facilities** - Sanitary facilities such as chemical toilets shall be located at least 100 feet from water bodies to prevent contamination of surface or subsurface water.

**Environmentally Sensitive Areas** - All environmentally sensitive areas, as shown on the drawings or as flagged at the construction site, shall be avoided. If human remains are discovered stop construction immediately, secure the site and contact the County Sheriff. If cultural materials are discovered stop construction immediately and contact the NRCS Cultural Resources Specialist. The contractor shall be responsible for mitigating any damages to sensitive areas that are a result of construction activities not approved by the NRCS technician.

#### **005.6 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.

#### **005.7 Items of work and construction details**

## **1.5 CS-006 SEEDING, SPRIGGING, AND MULCHING**

### **001.1 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

### **006.2 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 a qualified NRCS representative.

**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 rate, amount, and kind of mulching or mesh shall be as specified in Section 006.6 of this specification. 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 006.6 of this specification.

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.

#### **006.6 Items of work and construction details**

## **1.6 CS-007 CONSTRUCTION SURVEYS**

### **007.1 Scope**

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

### **007.2 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.

### **007.3 Quality of work**

All work shall follow recognized professional practice and the standards of the industry unless otherwise specified in Section 007.8 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 007.8 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.

- a. **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.
- b. **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 007.3, Quality of Work, of this specification.
- c. **Structures** — Centerline and offset reference line stakes for location, alignment, and elevation shall be placed for all structures.

#### **007.7 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 007.8 of the specification. When the contractor is required to conduct initial and final surveys as outlined in Section 007.5, Construction Surveys, of this specification, notes shall be provided as soon as possible after completion to the engineer for the purpose of determining final payment quantities.

#### **007.8 Items of work and construction details**

## **1.7 CS-008 MOBILIZATION AND DEMOBILIZATION**

### **008.1 Scope**

The work consists of the mobilization and demobilization of the contractor's forces and equipment necessary for performing the work required as well as any work required to remove excess materials and equipment from the work site once the project is complete.

### **008.2 Equipment and Material**

Mobilization shall include all activities involved in the 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; any permits, insurance, and/or bonds required to do the work; and other items specified in Section 008.3 of this specification.

Demobilization shall include all activities involved in the 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.

### **008.3 Items of Work and Construction Details**

### **021.6 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.

### **021.7 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 021.9 of this specification 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.

### **021.8 Overexcavation**

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.

### **021.9 Items of work and construction details**

## **1.9 CS-023 EARTHFILL**

### **023.1 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.

### **023.2 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.

### **023.3 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

### **023.5 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.

### **023.6 Compaction**

#### **023.6.1 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.

#### **023.6.2 Earth Backfill**

Earth backfill adjacent to structures shall be compacted to a density equivalent to that of the surrounding in-place 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:

- (a) Over cast-in-place conduits within 14-days after placement of the concrete
- (b) Over cradled or bedded precast conduits within 7 days after placement of the concrete cradle or bedding
- (c) 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 023.9 of this specification.

Compacting of earth backfill adjacent to structures shall not be started until the concrete has attained the strength specified in Section 023.9 of this specification 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.



## **026.2 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 026.6 of this specification.

## **026.3 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.

## **026.4 Stockpiling**

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

## **026.5 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.

## **026.6 Items of Work and Construction Details**

# **1.11 CS-061 ROCK RIPRAP**

## **061.1 Scope**

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

## **061.2 Material**

Rock riprap shall conform to the requirements of Material Specification MS-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 qualified NRCS representative that the material meets contract requirements. The contractor shall provide the NRCS representative 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 061.7 of this specification.

## 1.12 CS-095 GEOTEXTILE

### 095.1 Scope

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

### 095.2 Quality

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

### 095.3 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 D 4873.

### 095.4 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 095.6 of this specification).

### 095.5 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 095.6 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 labs, 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

No concrete, man-made logs, or softwood logs shall be used for the construction of in-stream structures.

Coir Fabric: Coir matting shall have an open area of 50%, have a tensile strength of 1250-1600 lbs./ft, biodegrade after approximately 36 months, and handle a flow velocity of 10 ft/sec.

Soil: Native soil shall be used for building this structure. The soil shall be free of any large roots or woody debris.

#### **999.4 Installers**

Contractor and Subcontractor shall have prior construction experience using similar construction techniques.

Supervision of Construction:

- 1 There shall be an on-site meeting held prior to construction of the In-Stream Structures. Attendees shall include, but are not limited to: The Project Manager, the Design Engineer, the Contractor, and the Subcontractor performing the work.
- 2 The Engineer shall direct the placement and arrangement of In-Stream Structures.

Final acceptance of In-Stream Structures shall be determined by the COR.

#### **999.4 Preparation**

Trim and dress the bankfull channel bottom and side slopes to proper lines and grade prior to placing In-Stream Structures. Where shown on the Plans, place erosion control matting in accordance with Section **Error! Reference source not found.**

Contractor shall only conduct work on in-stream structures that can be completed and stabilized within the same working day.

#### **999.5 Installation**

Soil Lift shall be placed at the stations, offsets, elevations, and configurations shown on the construction plans or as directed by the COR. Toe Wood shall be constructed according to the Toe Wood Detail shown on the plans or as directed by the COR.

Soil backfill shall be compacted such that future settling will be kept to a minimum; yet, not such that the underlying soil lift is displaced or damaged.

The top of the backfill for the first lift shall be sloped at approximately 5% away from the stream.

Place a layer of topsoil and live branches on top of each soil lift such that approximately 6 inches to 1 foot of each live branch will be exposed and the remainder (2' to 4') of each live branch will be covered by the next soil lift.

Place a layer of 6.5 feet wide erosion control blanket, on top of the topsoil and live branches such that 2.5 feet of the blanket will be buried below the next soil lift. Allow the remaining 4.0 feet of blanket to hang over the preceding soil lift or coir fiber logs.

Place a layer of 6.5 feet wide non-woven coir matting over the erosion control blanket to the same limits.

Soil can be compacted by stacking a piece of 2' x 6' sawn lumber edgeways up to the lift height specified in the structure table and securing with wooden stakes to provide a rigid backstop for compacting soil lift.

Place soil backfill up to the lift height specified of no greater than 1.0 ft being careful not to push/pull or tear the fabric previously placed.

## 1000.2 Site Grading

The Contractor shall grade all areas required to achieve the design subgrades and final grades as defined by the drawings and all areas disturbed during excavation or borrow operations at the completion of those operations. Final surfaces shall be uniform and smooth with rounded tops and bottoms. Grading of excavated or borrow areas shall promote free water drainage.

## 1000.2 Ramp Construction

The Contractor shall construct and install the reinforced concrete launch ramp as detailed on the drawings and specified herein. The construction of the concrete launch ramp shall generally be as follows. Once site grading begins, the work shall be completed in the sequence submitted by the Contractor with the minimum necessary gap between construction activities.

1. Base Preparation - The existing shore shall be graded to designed slope and elevations to accept the the ramp in its final design position. Base grade shall be as even as practicable and free from any irregularities.
2. Cut-off walls should be constructed down both sides and across the lower end (anchor wall) of the cast-in-place launch ramp. The 2- foot deep, tapered cut-off walls around the perimeter of the launch ramp help protect it from being undermined in case of erosion protection (riprap) failure (see Figure ) and also function as grade beams to strengthen the ramp edges.
3. The concrete should be placed over a thoroughly compacted subgrade, geotextile fabric, minimum 6-inch-thick layer of compacted aggregate subbase and 6-inch thick layer of compacted aggregate base course and all concrete shall have a 28-day compressive strength of at least 3,750 psi.
4. Subbase material should be 2½-inch or 3-inch minus crushed aggregate. Base material should be ¾-inch or 1-inch minus crushed aggregate

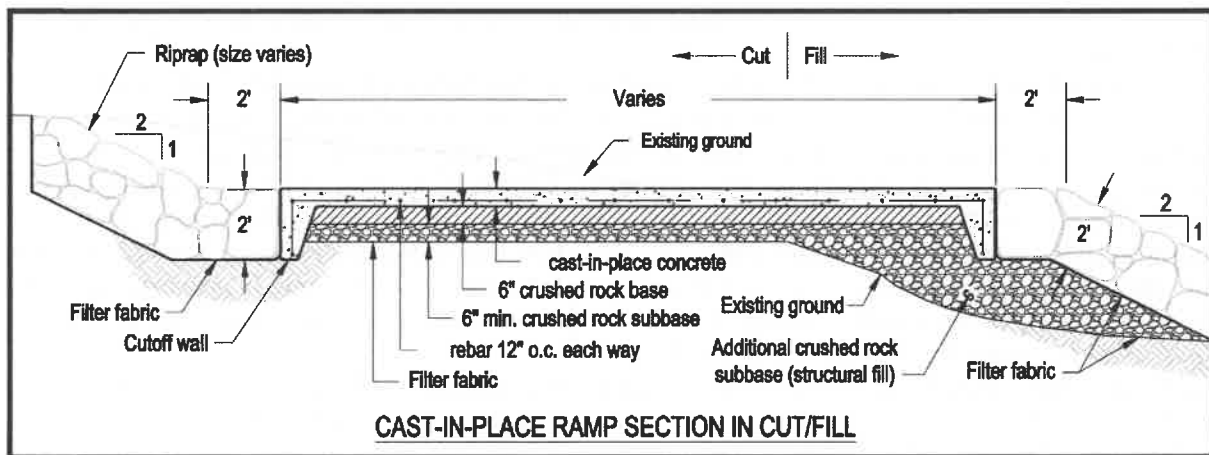


Figure 1: Cast in place ramp section

5. An air entrainment agent shall be added to all stone concrete so as to entrain 5% - 8% by volume to ensure strength requirements are being fully met.
6. The Contractor shall plan his placements so that concrete surfaces can be properly finished. The Contractor shall exercise great caution in the timing of his concrete placements, and not get unreasonably ahead of the finishers. He shall be sensitive to heat and wind and not allow the concrete to "suddenly set" and thereby prevent the proper formation of the surface texture.
7. The concrete shall be placed, vibrated, screeded, etc., as per normal procedures and the surface floated smooth with a wood float.

## 2.2 MS-523 ROCK FOR RIPRAP

### 523.1 Scope

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

### 523.2 Quality

Individual rock fragments must be dense, sound, and free from cracks, seams, and other defects conducive to accelerated weathering. Except as otherwise specified, the rock fragments must be angular to sub-rounded shape. The least dimension of an individual rock fragment must not be less than one-third the greatest dimension of the fragment. ASTM D 4992 provides guidance on selecting rock.

Except as otherwise provided, the rock must be tested and must 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 five cycles must 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 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 five cycles must not be 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 five cycles must not be more than 20 percent when sodium sulfate is used or more than 25 percent when magnesium sulfate is used.

### 523.3 Methods of soundness testing

**Rock cube soundness**—The sodium or magnesium sulfate soundness test for all rock types (1, 2, or 3) must be performed on a test sample of  $5,000 \pm 300$  grams of rock fragments, reasonably uniform in size and cubical in shape, and weighing, after sampling, about 100 grams each. They must 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 must further be reduced in size by sawing the slabs into cubical blocks. The thickness of the slabs and the size of the sawed fragments must be determined by the size of the available test apparatus and as necessary to provide, after sawing, the approximate 100-gram samples. The cubes must undergo five cycles of soundness testing in accordance with ASTM C88.

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, must 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 must 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.

In order to meet the gradation requirements shown in the plans, the rock must conform to the specified grading limits after it has been placed for its intended purpose. If necessary, grading tests must be performed according to ASTM D 5519, Method A, B, or C, as applicable.

## 2.3 MS-592 GEOTEXTILE

### 592.1 Scope

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

### 592.2 General requirements

Fibers (threads and yarns) used in the manufacture of geotextile shall consist of synthetic polymers composed of a minimum of 85 percent by weight polypropylenes, polyesters, polyamides, polyethylene, polyolefins, or polyvinylidene-chlorides. They shall 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 shall 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.

### 592.3 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 shall 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 shall be selvaged 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, heatbonding, or resin-bonding. Nonwoven fabrics shall 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 heater resin-bonded nonwovens is restricted as specified in note 2 of table 592-2.

### 592.4 Sampling and testing

The geotextile shall meet the specified requirements (table 592-1 or 592-2) for the product style 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 will be required for each of the specified tests (tables 592-1 or 592-2) as covered under clause AGAR 452.236-76.

### 592.5 Shipping and storage

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	lbs			
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 shall 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 D 4632.

4/ Maximum average roll value.

**Willow Plantings**

A contractor will plant willow poles and whips within and near the Project areas to stabilize the streambanks and enhance riparian habitat. Peach-leaf and coyote willow (*Salix amygdaloides* and *Salix exigua*) are well established in the existing riparian vegetation areas inside and outside of the proposed enhancement areas and will be utilized as sources for willow cuttings. Willow poles and whips will be harvested from the two species known to occur in and around the Project areas (see Attachment B of the PCN submittal) following best management practices included in **Attachment A – Harvest Best Management Practices** to the extent practicable. Willow poles and whips will be planted in areas proposed for enhancement in bunches of approximately 12 to 20 at an average density of 1.5-foot on-center spacing (approximately 4 plants per square meter) with a goal of achieving 35% aerial cover; approximately 1,500 willows poles and whips will be harvested and planted. A qualified ecologist will oversee the work and will guide crews to avoid damage to existing plants and in best practices for willow planting. A sequence and schedule for this work plan is outlined in **Table 1**.

Adaptive project design and management will likely be necessary because of variability in soil, terrain, weather, and stream flow conditions. The Town and District will adjust and innovate strategies so that field fit and implementation results in successful revegetation.

**Maintenance and Monitoring**

A qualified ecologist will visit the Project areas one time during the late growing season (August-September) to evaluate the health of the establishing vegetation and note the presence of any other maintenance concerns (e.g., presence of noxious weeds or other undesirable species, site stability and evidence of erosion, etc.). Performance of the mitigation areas and restoration success will be documented during site visits for yearly mitigation monitoring and included in yearly monitoring reports. Observations and photographs will be summarized in an annual report and provided to the Town and District per the milestone schedule identified in **Table 1**. The contractor will submit yearly monitoring reports to the USACE Grand Junction Regulatory Office.

The reference habitat for this project are the palustrine scrub-shrub wetlands and riparian habitat found around each of the Project areas. Enhancement areas will be considered successful when the following are measured during the growing season:

- willows represent at least 35% absolute cover and
- living willows represent at least 60% of willow coverage.

It is anticipated that weed control will be an important part of the maintenance program, especially during the first few growing seasons. An integrated weed management approach will be used to reduce the need for herbicides in sensitive riparian habitats. If there are poorly vegetated areas in the enhancement areas, they will be re-seeded or replanted. If erosion is a problem, repairs will be completed as necessary. Damage from human or wildlife use may require protective fencing or signage.

If planting success criteria are not met by the end of the third growing season following planting, the contractor will provide additional scope to achieve mitigation performance standards.

**Table 1. Tentative Willow Enhancement Work Plan Schedule (dependent on grant funding and bid process timing)**

Activity	Milestone Date
Enhancement project notice to proceed	January 2024



## ATTACHMENT A

### WILLOW CUTTING AND HARVESTING

Willow cuttings will be harvested during dormancy and prior to leaf out between late-April and early-May, as weather and site conditions allow. Approximately 1,500 willow cuttings (poles and whips) will be collected to support riparian habitat enhancement at the Project. Willow stock will be gathered from on-site sources within and adjacent to the Project to ensure stock from similar hydrology, landscape position, and elevation. This will promote the successful establishment and budding of planted willow stock. Best management practices (BMPs) for stand selection and collection/planting of stock are provided below and will be implemented to further facilitate successful establishment and budding of planted willow cuttings. SWCA understands that willow thickets are plentiful around each of the Project areas and that they will be used as sources for willow whips and poles for planting.

#### BEST MANAGEMENT PRACTICES – SELECTING WILLOW STEMS<sup>1,2,3</sup>

1. **Locate a collection site** near the project site with similar willow species, comparable site conditions (e.g., hydrology, landscape position, elevation), and abundant, vigorous willow stands.
2. **Choose healthy stems** (i.e., “green” wood in cross section): relatively straight, covered in smooth bark (i.e., not furrowed or damaged), and free of insect/pathogen damage:
  - Use live wood at least 2 years old or older, but very old wood should not be used.
  - Avoid whips and suckers that lack the stored energy reserves necessary to consistently sprout when planted, especially in dry conditions.
3. **Follow ethical harvest guidelines** (conserve health of donor stand):
  - Select branches that will not impair the source willow’s health and appearance and ensure the stand will not be denuded or destroyed by cutting/salvaging activity.
  - Remove no more than 1/3 of the branches from any single willow.
  - Never remove more than 40% of the overall willow canopy cover.
  - Harvest stems evenly through the stand (e.g., not from one side of the willow only), and consider removing cuttings from inside the crown areas rather than the more visually obvious exterior portion.
4. **Willow cutting handling and preparation:** properly handle and prepare cuttings to promote successful establishment and budding of stock:
  - Use clean and sharp equipment (e.g., pruners, loppers, etc.)
  - Remove the apical bud plus several inches off of the cutting – reroute energy to the side buds and root buds and reduce loss of stored energy.
  - Trim off all side branches so cutting is a single stem.
  - Cup the top of cutting with a horizontal cut and bottom of cutting with a 45-degree cut for recognition of cutting top during planting.
5. **Willow cutting storage/rooting:** properly store cuttings to protect willow stock and promote early rooting (if applicable):

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<sup>1</sup> Gage, E.A. and D.J. Cooper. 2004. Controls on willow cutting survival in a montane riparian area. *Journal of Range Management* 57(6): 597–600.

<sup>2</sup> Hoag, J.C. 2007. How to Plant Willows and Cottonwoods for Riparian Restoration. U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). TN PLANT MATERIALS NO. 23. Boise, Idaho, January 2007 (Revision).

<sup>3</sup> Lezberg, A. and J. Giordanengo. 2008. A Guide for Harvesting, Storing, and Planting Dormant Willow Cuttings. *Wildlands Restoration Volunteers*. May 2008