Technical Specifications
Lower Toppenish Creek Dam Removals
Restoration Project

LIST OF TECHNICAL SPECIFICATIONS

Section 01300	Submittals
Section 01400	Construction Staking
Section 01505	Mobilization and Demobilization
Section 01560	Environmental Controls
Section 01600	Protection of Materials
Section 01640	Owner Furnished Materials
Section 01720	Record Drawings
Section 02140	Dewatering, Fish Salvage and Work Area Isolation
Section 02160	Site Preparation
Section 02200	Earthwork
Section 02900	Seeding
Section 02930	Tree and Shrub Planting
Section 02990	Willow Trench
Section 05000	Large Wood Structures
Section 05001	Engineered Fill

SECTION 01300
SUBMITTALS

PART 1 – GENERAL

1.1 SCOPE

Submittals covered by these requirements include manufacturers' information, test procedures, test results, samples, requests for substitutions, and miscellaneous work-related submittals. Submittals shall also include, but not be limited to, rock sources, coir fabric sources, and fabricated items. The Contractor shall furnish all drawings, specifications, descriptive data, certificates, samples, tests, methods, and schedules and other instructions as specifically required in the contract documents to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the contract documents.

1.2 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items which are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall ensure that there is no conflict with other submittals and notify the Engineer in each case where the submittal may affect the work of another contractor. The Contractor shall coordinate submittals among their subcontractors and suppliers including those submittals complying with unit responsibility requirements specified in applicable technical sections.

B. The Contractor shall coordinate submittals with the work so that work will not be delayed. The Contractor shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals. The Contractor shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment shall be returned to the Contractor stamped "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

C. The Contractor shall certify on each submittal document that they have reviewed the submittal, verified field conditions, and complied with the contract documents.

D. The Contractor may authorize in writing a material or equipment supplier to deal directly with the Engineer with regard to a submittal. These dealings shall be limited to contract interpretations to clarify and expedite the work.

1.3 STANDARD COMPLIANCE

A. When materials or equipment must conform to the standards of organizations such as, but not limited to, the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL) documents showing, or proving, conformance shall be submitted.

B. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual Sections. In lieu of the label or listing, the Contractor shall submit a certificate from an independent testing organization, which is competent to perform acceptable tests, and is approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product, and the referenced standard and shall state that the manufacturer certifies that the product conforms to all requirements of the project Specification and of the referenced standards listed.

1.4 REVIEW OF CONTRACTOR'S INFORMATION

A. When review and checking for acceptance is required of any drawing, or information regarding materials and equipment, the Contractor shall prepare or secure, and submit for review, two (2) copies. The Engineer, after taking appropriate action, will return (1) marked copies to the Contractor. Within 7 calendar days after receipt of said submittal copies, the Engineer will return the marked copies indicating one of the following four (4) actions:

1. If review and checking indicates no exceptions, copies will be returned marked "NO EXCEPTIONS TAKEN" and work may begin immediately on incorporating the material and equipment covered by the submittal into the work.
2. If review and checking indicates limited corrections are required, copies will be returned marked "MAKE CORRECTIONS NOTED". Work may begin immediately on incorporating into the work the material and equipment covered by the corrected submittal.
3. If review and checking indicates insufficient, or incorrect data, has been submitted, copies will be returned marked, "AMEND AND RESUBMIT". No work may begin on incorporating the material and equipment covered by this submittal into the work until the submittal is revised, resubmitted, and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".
4. If review and checking indicates the material and equipment submittal is unacceptable, copies will be returned marked "REJECTED-RESUBMIT". No work may begin on incorporating the material and equipment into the work until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".

B. Approval by the Engineer shall not relieve Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with requirements of this Contract.

1.5 EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS

Review of contract drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of their responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Engineer, or by any officer or employee thereof, and the Contractor shall have no claim under the contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed. A mark of "NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED" shall mean that the Engineer has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

PART 2 – PRODUCTS

2.1 MANUFACTURER'S DATA

Submittals for each manufactured item shall be comprised of manufacturer's descriptive literature, drawings, diagrams, performance and characteristic curves, and catalog cuts. Manufacturer's name, trade name, model or catalog number, nameplate data, size, layout dimensions, capacity, project specification references, and any other additional information necessary to establish contract compliance shall be clearly indicated.

PART 3 – EXECUTION

3.1 SUBMITTAL PROCEDURE

A. At least 7 calendar days prior to the Contractors need for approval, contractor shall forward to the Engineer all submittals required by the individual Sections of the Specifications.

B. All submittals shall be identified by submittal number and specification section number on the letter of transmittal. Submittals shall be numbered consecutively, and resubmittals shall have a letter suffix. For example:

1. First submittal: 05001
2. Resubmittal: 05001A
3. Second resubmittal: 05001B, *etc*.

3.2 CONTRACTOR SUBMITTALS

Items to be submitted are specified in individual Sections of these Specifications. Submittals

for each Section shall be bound together in one book. Book shall have numbered tab dividers for each item. Submittals that are related to, or affect, each other shall be forwarded simultaneously as a package to facilitate coordinated review. Uncoordinated submittals will be rejected. Do not combine unrelated materials in the same submittal. Submittals shall be arranged in same order as they appear in the Specification Section. Items shall be clearly marked with the same identification number as indicated on the drawings. The Contractor shall include submittal time appropriate within each item of work on the Construction Schedule. The Engineer will receive submittals at the preconstruction meeting.

END OF SECTION

SECTION 01400
CONSTRUCTION STAKING

PART 1 – GENERAL

1.1 CONSTRUCTION STAKING

The Contractor shall provide survey staking for construction. The Engineer will provide survey control and grading surfaces for equipment with GPS machine control capability. When the Contractor requires horizontal and vertical control the contractor shall notify the Engineer of this requirement a minimum of three working days in advance of this need.

1.2 STAKEOUT AND MEASUREMENT TO BE PERFORMED BY CONTRACTOR

A. The Engineer will provide an initial layout of the restoration design in consultation with the Contractor. After the initial layout, the Contractor shall be responsible for staking reference points/markers to complete the work from the initial control points and grading surfaces provided by the Engineer and shall be responsible for all measurements required for the execution of the work. The Contractor shall protect all stakes and shall pay for the time and materials required to replace stakes that have been disturbed or obliterated if necessary.

B. The Contractor shall use information provided by the Engineer to stake the boundaries of construction extents, access roads, staging areas, materials salvage areas, vegetation preservation areas, grading extents and structure locations. The Engineer shall approve staking boundaries prior to commencement of work.

C. The Contractor shall furnish at the Contractor's own expense, such stakes, equipment, tools, materials, and all labor as required in stakeout of any parts of the work from the control points and grading surfaces provided by the Engineer.

D. The Engineer may require that work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking of the work.

END OF SECTION

SECTION 01505
MOBILIZATION AND DEMOBILIZATION

PART 1 – GENERAL

1.1 MOBILIZATION

A. Mobilization shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the site; for the establishment of all facilities necessary for work on the project; and for all other work and operations which must be performed, or costs incurred prior to beginning work, on the various items on the project site. Mobilization includes obtaining any permits not provided by the Owner and obtaining project-specific bonds.

B. Mobilization shall also include the construction of temporary ramps and access ways, temporary roads, grading, temporary fencing including highly visible fencing of all wetland edges adjacent to construction limits as marked by Engineer, salvaging of weed free topsoil, removing noxious weeds from areas within the construction limits, and the necessary preparatory work required to allow for the safe and stable movement of all vehicles that are required to construct the improvements outlined in the Contract Documents.

C. Equipment

1 All construction equipment shall be staged in a location and manner to minimize air, soil and water pollution. All equipment shall be washed prior to mobilization to the site to minimize the introduction of foreign materials and fluids to the project site. All equipment shall be free of oil, hydraulic fluid, and diesel fuel leaks. To prevent invasion of noxious weeds or the spread of whirling disease spores, all equipment shall be power washed or cleaned to remove mud and soil prior to mobilization into the project area. It will be the contractor's responsibility to ensure that adequate measures have been taken.

2 Equipment shall be in a well-maintained condition to minimize the likelihood of a fluid leak. If a fluid leak does occur, the Engineer shall be notified immediately, and all work ceased until the leak has been rectified. At all times during the construction phase, fluid spill containment equipment shall be present on-site and ready for deployment should an accidental spill occur.

3 Storage of fuel and lubricants -all fuel and lubricants shall be stored in containers and areas that are in conformance with the State Department of Environmental Quality, biological opinion or biological assessment terms and conditions, and local, state and federal regulations.

4 Servicing 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 and shall be done at least 150 feet from all waterbodies. Yakama Nation Water Code

shall be notified immediately of any spill, and the operator shall contain the spillage.

5 If a spill of chemical pollutants such as fuel or hydraulic fluid should occur, immediately attempt to contain the spilled material. The following procedures shall be followed:

(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.

6 Sanitary facilities -sanitary facilities such as chemical toilets shall be located at least 150 feet from water bodies to prevent contamination of surface or subsurface water.

1.2 DEMOBILIZATION AND SITE RECLAMATION

A. Demobilization shall consist of work and operations necessary to disband all mobilized items and clean up the site. The removal of all temporary ramps, access ways, roads, signs, temporary fencing, construction debris including rock chips, wood debris, construction stakes, and other construction-related refuse, and temporary facilities or works and the restoration of surfaces to an equal or better than existing condition, including replacement of salvaged or other topsoil, fertilization based on soil testing, and seeding with a landowner-approved seed mix, shall also be included as part of demobilization.

B. Site reclamation is included under demobilization. Site reclamation includes reclamation of any other areas not included under A that are disturbed during construction including replacement of salvaged or other topsoil, fertilization based on soil testing, and seeding with a landowner-approved seed mix, to pre-project conditions or better.

C. All damaged or disturbed streambanks are to be restored to a natural slope pattern and profile for establishment of permanent woody vegetation.

D. All disturbed streambank and wetland vegetation is to be replaced. Use a variety of species native to the project area, region or as specified on project drawings and specifications. Replant or reseed each area requiring revegetation before the end of the first planting season following construction.

E. Boulders, rock, woody materials and other natural construction materials used for the project shall be obtained beyond the bankfull elevation and at least 150 feet from any water bodies, except for native materials obtained from within the project footprint to be stockpiled and reused on site. Leave native materials, e.g., down wood, where they are found, if possible. If native materials (e.g., downed wood) are destroyed, replace them with a functional equivalent during site restoration.

F. Stockpiled materials (i.e. trees, vegetation, sand, topsoil, and other excavated material from restoration project areas) shall be used to rehabilitate areas disturbed

by equipment to pre-work conditions. Short-term stabilization measures will be implemented until permanent erosion control measures (plant restoration) are effective, and include seeding and planting as specified on project drawings and specifications. Reclamation planting shall be completed before the end of the first planting season following completion of construction.

1.3 RELATED WORK:

A. Section 01300	Submittals
B. Section 01560	Environmental Controls
C. Section 01600	Protection of Materials
D. Section 02160	Site Preparation

PART 2 – PRODUCTS

Materials and product specifications are included on drawings and in related specifications.

PART 3 -EXECUTION

Not used.

END OF SECTION

SECTION 01560
ENVIRONMENTAL CONTROLS

PART 1 – GENERAL

1.1 SITE MAINTENANCE

A. The Contractor shall keep the work site, staging areas, and Contractor's facilities clean and free from rubbish and debris. The Contractor staging area is noted on the drawings. Materials and equipment shall be removed from the site when they are no longer necessary. Equipment removed as part of demolition shall not be stored on site. Upon completion of the work and before final acceptance, the work site shall be cleared of equipment, unused materials, and rubbish to present a clean and neat appearance.

B. Waste material of any kind will not be permitted to remain on the site of the work or on adjacent roads. Immediately upon such materials becoming unfit for use in the work, they shall be collected, carried off the site, and properly disposed of by the Contractor.

C. The Contractor may provide temporary restroom and cleanup facilities for Contractor's employees and shall keep these areas clear of all refuse, rubbish, and debris that may accumulate from any source and shall keep them in a neat condition to the satisfaction of the Engineer.

D. In the event that waste material, refuse, debris, and/or rubbish are not so removed from the work by the Contractor, the Engineer reserves the right to have the waste material, refuse, debris, and/or rubbish removed and the expense of the removal and disposal charged to the Contractor.

1.2 AIR POLLUTION CONTROL

The Contractor shall not discharge smoke, dust, and other contaminants into the atmosphere that violate the air pollution regulations for the area. The Contractor shall maintain construction vehicles and equipment in good repair. Exhaust emissions that are determined to be excessive by the Engineer shall be repaired or replaced. Contractor shall provide a water truck to manage project area dust.

1.3 NOISE CONTROL

A. The Contractor shall comply with all local controls and noise level rules, regulations, and ordinances which apply to any work performed pursuant to the Contract. If the requirements of this Section are more restrictive than those of the local regulations, the requirements of this Section shall govern.

B. Each internal combustion engine, used for any purpose related to this Contract, shall be enclosed and be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler and enclosure.

1.4 STORMWATER AND EROSION CONTROL

A. A Stormwater and Erosion Control Plan for construction activities shall be prepared and

carried out by the Contractor to prevent pollution related to construction operations.

B. Erosion control measures shall be in place prior to commencing construction. During construction, all erosion controls shall be inspected by the contractor daily to ensure they are working adequately.

   1. If inspection shows that the erosion controls are ineffective, work crews will be mobilized immediately to make repairs, install replacements, or install additional controls as necessary.

   2. Sediment must be removed from erosion controls once it has reached 1/3 of the exposed height of the control.

C. Contractor shall provide measures to prevent movement of soil into waterways or wetlands identified on the Drawings using filter bags, sediment traps or catch basins, vegetative strips, berms, jersey barriers, fiber blankets, bonded fiber matrices, geotextiles, mulches or compost, wattles or sediment fences.

D. Contractor shall provide measures to prevent stockpile erosion during rain events or when the stockpile site is not moved or reshaped for more than 48 hours, by surrounding piles with compost berms, covering piles with impervious materials or other equally effective methods.

E. Contractor shall provide measures to prevent construction vehicles from tracking sediment offsite or onto roadways where it is subject to washing into storm drains, waterways, or wetlands; including gravel access pads, wheel wash stations, or other equally effective methods.

F. Contractor shall install removable pads or mats to prevent soil compaction in all temporary construction access points and staging areas in riparian or wetland areas; including interlocking composite mats, laminated timber or hardwood mats, or polymer modular mats.

1.5 SUBMITTALS

A. A Stormwater and Erosion Control Plan for construction activities shall be prepared and carried out by the contractor to prevent pollution related to construction operations. The plan will include a drawing and narrative that addresses:

   1. Site-specific practices to prevent erosion and sedimentation associated with access roads, stream crossings, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations and staging areas.

   2. Site-specific practices to prevent construction debris from dropping into any stream or water body, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

B. Submit in accordance with 01300.

PART 2 – PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01600
PROTECTION OF MATERIALS

PART 1 – GENERAL

Contractor furnished materials shall be shipped, handled, stored, and installed in ways that will prevent damage to the items. Damaged items will not be permitted as part of the work, except in cases of minor damage that have been satisfactorily repaired and are acceptable to the Engineer. Materials supplied by the Owner shall be protected as contractor furnished materials upon delivery to the project site.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

3.1 DELIVERTY OF MATERIAL

The Owner's and Engineer's personnel will not accept material deliveries for the Contractor.

3.2 STORAGE OF CUTTINGS

A. The Contractor shall construct a staging area for cuttings at the project site. The staging area shall consist of a ponded area between 1 and 3 feet deep that is large enough to store the specified number of cuttings with a minimum of 1/3 of the stem length submersed in the water. The staging area must be approved by the Engineer before cuttings are delivered.

B. Cuttings shall be placed in the staging area immediately upon delivery to the site, where they must be fully covered with burlap or other shade cloth and kept moist the entire time they are held in the staging area. Cuttings shall not be stored for more than one week before installation. Cuttings shall be protected to prevent browse from wildlife.

END OF SECTION

SECTION 01640
OWNER FURNISHED MATERIALS

PART 1 – GENERAL

Owner-furnished items and materials will be provided for incorporation into the work. The Contractor shall coordinate delivery time, handling, and storage for each material with the Owner.

PART 2 – PRODUCTS

The Owner will provide the following materials

- Containerized plants for tree and shrub planting
- Wood for large wood structures and streambank structures
- Seed for reclamation seeding

The Owner may provide additional materials as needed.

PART 3 – EXECUTION

3.1 DELIVERY OF MATERIAL

Wood materials will be delivered to the staging areas and will be placed into piles of like material. The Owner shall deliver product data, samples, tests, and certificates to the Contractor. The Contractor shall handle products once on-site, including storage and transportation to points of installation. The Engineer will not accept material deliveries for the Owner or Contractor.

3.2 PROTECTION OF MATERIALS

Materials supplied by the Owner shall be protected as contractor furnished materials upon delivery to the project site as per Section 01600.

3.3 CONSTRUCTION DELAY

If Owner furnished items cause delay in the critical path schedule, the Contractor shall notify the Owner in writing. Only changes to the critical path shall be considered as evidence for changes in contract time.

END OF SECTION

SECTION 01720
RECORD DRAWINGS

PART 1 – GENERAL

1.1 SCOPE

This section describes requirements for the preparation and maintenance of the project record drawings used to document as-built conditions based on field changes and modifications.

PART 2 – PRODUCTS

2.1 PROJECT RECORD DRAWINGS

The Contractor shall maintain a neatly and accurately marked set of record drawings showing the final locations and layout of all structures, grading, planting and other facilities. Drawings shall be kept current weekly, with all work instructions and change orders; and construction adjustments. Drawings shall be subject to the inspection of the Owner and Engineer at all times, and progress payments, or portions thereof, may be withheld if Drawings are not accurate and current. Prior to acceptance of the work, the Contractor shall deliver to the Engineer one (1) set of neatly marked record drawings, accurately showing all the information required above. The record drawings shall include the final locations and details of the project with changes/modifications clearly marked in red.

END OF SECTON

SECTION 02140
DEWATERING, FISH SALVAGE AND WORK AREA ISOLATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section provides performance standards for dewatering systems and it is intended that the Contractor will provide site specific details as to their proposed way of dewatering the site during construction.

B. The Contractor shall comply with all applicable Tribal, federal, state, and local laws and regulations concerning environmental pollution arising from construction activities. All permit conditions must also be adhered to by the Contractor.

1.2 SUBMITTALS

A. Before dewatering commences, the Contractor shall obtain the acceptance of the Engineer for the method, installation, and details of the proposed dewatering system. The Contractor shall submit plans in accordance with Section 01300 (Submittals) setting forth the details of the proposed dewatering systems. The dewatering system plans, at a minimum, shall indicate the following:

1. Sizes of pumps, discharge piping, and piping appurtenances.
2. The personnel responsible for monitoring the dewatering system and dewatered excavations. The contact person must be available at all times, or a designated person must be specified in their absence.
3. Provisions to confine fuel and oil spills in the event of their occurrence.
4. Plans to segregate construction water (contaminated with form oils, concrete residues, *etc*.) from clean water.
5. Plans to dispose of the construction water and residue solids.
6. A contingency plan must be provided as part of the approved plan that outlines next steps if the initial plan does not work satisfactorily.

B. The Contractor's dewatering plan must be approved by the Engineer, and those provisions in place, prior to in-water excavation.

1.3 QUALITY ASSURANCE

A. The Owner and Engineer shall be notified at least 48 hours in advance of commencing dewatering activities.

B. The Engineer or representative shall be present during initial dewatering.

PART 2 – MATERIALS

Not Used

PART 3 – EXECUTION

3.1 GENERAL

A. The Contractor shall furnish, install, operate, and maintain all machinery, appliances, and equipment to maintain all excavations free from moving water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or menace to the public.

B. The control of groundwater shall be such that softening of the bottom of excavations, or formation of "quick" conditions or "boils," does not occur. Dewatering systems shall be designed and operated to prevent removal of the natural soils.

C. Dewatering systems shall operate continuously until project construction has been completed, or at a minimum, construction within a reach has been completed.

D. The Contractor shall be fully responsible and liable for all damages, including flotation of structures, which may result from failure to adequately keep excavations dewatered.

E. The Contractor shall isolate each construction area from active flow with temporary sheet piles installed by a vibratory driver as specified on project drawings. All sheet piles shall be removed after completion of the work.

3.2 DISPOSAL OF WATER

A. The Contractor shall dispose of water resulting from the dewatering operation in a suitable manner without damage to adjacent property and in accordance with all federal, state, and local laws and regulations. Sediment-laden water should be discharged to adjacent ground and not allowed to return to the stream until sediments have been removed from the sediment-laden water.

B. Clean, uncontaminated water resulting from dewatering operations must be returned to the stream.

3.3 FISH SALVAGE

A. The Owner will supply staff and equipment to carry out fish salvage operations.

B. Isolation of the work area, fish removal, and release of fish will be conducted or directed by the Owner's fisheries biologist who possesses the competence to ensure safe handling of all Endangered Species Act (ESA) listed fish and other aquatic organisms, and who is also experienced with work area isolation techniques.

C. The Contractor will accommodate the Owner's fish salvage operations.

END OF SECTION

SECTION 02160
SITE PREPARATION

PART 1 – GENERAL

1.1 SCOPE

This section specifies site preparation which consists of clearing, grubbing, and disposal of materials.

1.2 JOB CONDITIONS

A. Existing Conditions

The Contractor shall determine the actual condition of the site as it affects this portion of work.

B. Protection of Existing Facilities

Site preparation shall not damage existing structures, landscaping, fencing, gates, or vegetation adjacent to the areas designated for site preparation. The Contractor shall repair or replace any and all damaged property.

1.3 RELATED WORK:

A. Section 01400 Construction Staking

B. Section 01505 Mobilization and Demobilization

C. Section 01505 Environmental Controls

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.1 CLEARING AND GRUBBING

A. General

All areas comprising the work shall be cleared and grubbed in accordance with the requirements of this section.

B. Clearing and Grubbing

Preservation of existing vegetation and trees is of utmost importance. The Engineer will flag and walk the entire site with the Contractor's representative to clearly mark the clearing limits and vegetation to be saved or salvaged as specified on project drawings and specifications. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove all stumps, roots, buried logs and all other

objectionable material of any kind.

C. Noxious and Invasive Species

Noxious or invasive species shall be marked in the field by the Engineer prior to mobilization and these areas shall either be avoided if possible or material shall be grubbed and handled in accordance with applicable Tribal, state and local laws regarding handling of noxious or invasive weed species.

D. Top Soil Salvage

Where clearing and grubbing requires removal of top soil, this material shall be salvaged from areas free of noxious or invasive species, or where noxious and invasive species have been effectively treated prior to removal of the soils and stockpiled for later use in site reclamation.

3.2 PROTECTION

The Contractor shall provide protection devices or demarcation of areas outside the project site to be avoided and protected.

3.3 CLEANUP

Debris, rubbish, and excess material resulting from the clearing and grubbing process shall be removed from the site in a manner that will prevent spillage on streets or adjacent areas.

Spillage shall be removed from streets and adjacent areas. Applicable Tribal, Federal, State, and local hauling disposal regulations shall be complied with. Cleanup shall be an on-going activity throughout the contract period.

3.4 DISPOSAL OF MATERIALS

All excess material will remain on site and under control of the Owner. Other debris and rubbish may be hauled off with approval by the Owner. The Contractor may not enter into agreements with property owners for disposal of material and all permits must be approved by the Owner.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, grading, hauling, and compaction required to complete the work shown on the Drawings, and specified herein. The work shall include, but not necessarily be limited to excavation, backfilling and grading for structures; excavation, backfill and grading for streambanks and channels; placement of rock materials for channels and structures; disposal of surplus and unsuitable materials; and all incidental related work.

1.2 QUALITY ASSURANCE

A. The Contractor shall use equipment with survey-grade GPS capability, and the Engineer shall furnish the Contractor with computer files representing finished ground surfaces and structure subgrade for use with GPS equipment. The Contractor is responsible for checking grade to assure grading is in accordance with design surface provided by the Engineer.

B. The Engineer shall inspect excavation, backfill, and re-graded surfaces, and will either approve or reject grading based on conformance with design surface, the Drawings, and these specifications.

1.3 APPLICABLE PUBLICATIONS

USDA NRCS. 2017. Practice Code 582 – Open Channel.

1.4 RELATED WORK

A. Section 01560 Environmental Controls

B. Section 02160 Site Preparation

C. Section 02990 Willow Trench

PART 2 – PRODUCTS

2.1 EXCAVATION AND BACKFILL VOLUME ESTIMATES

All volumes reported on the Drawings are based on estimates from terrain model surfaces. Earthwork quantities reported on the Drawings do not include subgrade quantities or quantities of imported materials such as logs and rock. Earthwork quantities reported on the Drawings do not include adjustment factors to account for moisture or compaction. The Contractor shall use the surfaces provided by the Engineer to confirm earthwork quantities.

PART 3 – EXECUTION

3.1 GENERAL

A. Control of Water

The Contractor shall keep excavations free from water during construction.

B. Surplus Material

Surplus excavated material shall be disposed of in designated repositories as noted in the Drawings. The Contractor shall confirm that there is sufficient material available for the completion of the work before disposing of surplus excavated material. Shortage of material, caused by premature disposal of any material by the Contractor, shall be replaced at the Contractor's expense.

All excess material will remain on site and under control of the Owner. Other debris and rubbish may be hauled off with approval by the Owner. The Contractor may not enter into agreements with property owners for disposal of material and all permits must be approved by the Owner.

C. Hauling

When hauling is done over highways or streets, the loads shall be trimmed and the vehicle shelf areas shall be cleaned to avoid spillage.

D. Maintenance of Roadways

All earthwork operations shall be performed in a manner which does not disrupt the continuous flow of traffic on existing roadways. All public streets shall be swept clean daily where dirt and debris result from Contractor's operations.

E. Finish Grading

Finished grades and existing or natural grades in the area of work are indicated on the Drawings. The Contractor shall do all grading, filling or excavating as required to completely grade the site to lines and grades shown. Where finished grade corresponds practically with existing grade, the ground shall be worked up and graded off evenly with existing grade. Filled areas shall be compacted so as to prevent settlements and the Contractor shall be responsible for a period of one year after final acceptance of the project to provide additional fill as necessary to bring to grade any areas which settle below the indicated grades and to replace or repair any planting or work damaged by such settlement.

G. Tolerances

Finished grade shall be to the line and grade shown on the Drawings to within a vertical tolerance of plus or minus 0.3 feet for general grading and for structures. Allowance for topsoil and grass cover, and sub-base and pavement thickness shall be made so that the specified thickness can be applied to attain the finished grade. Horizontal tolerance shall be plus or minus 1.0 feet for grading and structures.

H. Control of Erosion

The Contractor shall maintain earthwork surfaces true and smooth and protected from erosion.

I. Over-excavation of Unsuitable Soils

Where organic materials, yielding subgrade, or other deleterious materials are encountered during excavations, they shall be removed, as directed by the Engineer. The resulting excavation shall be backfilled with material approved by the Engineer. The Contractor shall promptly notify the Engineer if these materials are encountered and over-excavation shall not proceed without approval of the Engineer.

3.2 EXCAVATION

A. Excavation shall be in accordance with the grading plan indicated on the Drawings and as required for construction. Excavations shall be kept free from water while construction is in progress. The Engineer shall be notified immediately in writing in the event that it becomes necessary to remove soft, weak, or wet material.

B. Soil disturbed or weakened by the Contractor's operations and soils permitted to soften from exposure to weather shall be excavated to firm foundation and refilled with material approved by the Engineer. All work of this nature will be at the Contractor's expense.

3.3 SUBGRADE PREPARATION

Ground surfaces receiving engineered fill shall be prepared by clearing and grubbing as specified in Section 02160, Site Preparation, and by removing soil which is high in organic content and other deleterious material. Removed topsoil that is high in organic content and not occurring within areas of existing weed infestations, or is otherwise suitable as growth media, should be stockpiled for later use in site reclamation as described in Section 02160, Site Preparation.

3.4 SALVAGE, SORTING AND STAGING SPECIFIED CATEGORIES OF SUBSTRATE

A. The Contractor shall salvage specified materials prior to excavation or backfilling.

B. The Contractor shall sort and mix excavated materials to generate volumes of specified substrate categories identified on the Drawings. Sorting and mixing shall occur in conformance with gradations specified in Section 05001 Engineered Fill.

C. The Contractor shall stage at an approved staging area salvaged and sorted materials for use during construction.

3.5 FILLING OPERATIONS

Filling operations must comply with criteria specified in the Drawings.

3.6 COMPACTION

Compaction requirements for individual fill components shall comply with specifications listed on the Drawings. Compaction for finished ground surfaces created from fill shall be in one foot lifts using the weight of equipment with minimum weight of 15 tons, unless specified otherwise on the Drawings. Compaction of fill within structures shall be by equipment bucket compaction unless specified otherwise on the Drawings.

3.7 CLEAN UP

After completing all earthwork, the Contractor shall leave the site in a neat and clean condition,

doing such grading as is required by the Drawings. Any existing features, structures, and other facilities damaged or affected by the work shall be replaced, repaired, or restored to their original condition or better.

END OF SECTION

SECTION 02900

SEEDING

PART 1 – GENERAL

DESCRIPTION:

This section specifies seeding including seed acquisition, seed bed preparation, and broadcast seeding. The Contractor shall provide all labor, tools, equipment, and incidentals necessary to complete the Work as specified.

1.1 RELATED WORK:

A. Section 01300 Submittals

B. Section 01505 Mobilization and Demobilization

C. Section 01560 Environmental Controls

D. Section 01600 Protection of Materials

E. Section 01640 Owner Furnished Materials

F. Section 02160 Site Preparation

1.2 QUALITY ASSURANCE:

A. The Engineer shall mark by flags or stakes the outer extent of each seeding location prior to seeding.

B. The Engineer shall be notified at least 48 hours in advance of seeding.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01300, Submittals.

B. Proposed substitutions if species included in the Drawings are not available. Alternative seed mixes shall be approved by the Engineer.

C. Seeding equipment and contractor qualifications shall be approved by the Engineer.

D. Seed bed preparation shall be inspected and approved by the Engineer prior to seed application.

1.4 APPLICABLE PUBLICATIONS:

ANSI Z60.1-2014 American Nursery and Landscape Association: American Standard for Nursery Stock

PART 2 – PRODUCTS

2.1 SEED

The Owner will furnish the seed for Restoration and Reclamation seed mixes from certified seed suppliers. The seed mix shall conform with the Drawings. If species are not available, any changes in seed mix must be approved by the Engineer prior to purchase of seed. If species substitutions are requested, the Engineer shall provide the Contractor with updated seed mixes that include the approved substitutions and updated seeding rates. The Contractor shall keep seed cool, dry,

and rodent free after delivery.

Custom seeding consists of seed collected within the watershed at approved locations. The Engineer will provide locations, and species lists for seed collection prior to collection and will accompany the Contractor to collect seed.

2.2 GROWTH MEDIA

Growth media shall consist of salvaged and stockpiled topsoil as described in Section 02160, Site Preparation, or other approved on-site or off-site sources of topsoil, with similar texture and chemistry properties as the native soil, which is approved by Engineer.

PART 3 – EXECUTION

3.1 SEED BED PREPARATION

The Engineer shall mark seeding areas with flags and/or stakes, indicating extents for each seed mix. The final seeding acreages shall be provided to the Contractor by the Engineer prior to seeding.

The Contractor shall ensure that all surfaces to be seeded are properly prepared. Seed bed preparation methods vary depending on the final grading surface conditions, the seed application method, and the final restoration or reclamation surface designs.

Reclaimed access routes and staging areas shall be decompacted and left without large clumps or blocks of soil prior to seeding. Equipment traffic on access routes with fine textured soils may compact lower soil layers and additional topsoil may be needed to achieve the pre- project elevation and to match the elevation of adjacent undisturbed surfaces.

Seedbed preparation within Restoration seeding areas, shall ensure that the soil surface is firm but not overly compacted, and free of equipment tracks prior to application of seed. All ruts and compaction resulting from plant installation activities shall be removed prior to seed application. This sequence is necessary to ensure proper seed bed preparation and to limit equipment or foot traffic over seeded areas.

In Custom Seeding – Revegetation and Inundation Zone locations, no ground disturbance will occur as part of construction and these seeding areas will receive no additional seed bed preparation.

3.2 BROADCAST SEEDING

Sow seed at rate as indicated on the Drawings for Reclamation and Restoration seeding. The Contractor shall plant seed using broadcast methods, whereby seed is scattered on the surface of the ground instead of planted in the ground. Broadcast seeding methods shall use a hand operated broadcast seed spreader or other similar tools as approved by the Engineer.

Custom Seeding in Revegetation and Inundation Zone locations shall utilize hand broadcast methods that evenly scatter seed on the ground surface where bare mineral soils are present as indicated by the Engineer. The Engineer shall be present for all Custom Seeding applications.

END OF SECTION

SECTION 02930
TREE AND SHRUB PLANTING

PART 1 – GENERAL

1.1 DESCRIPTION:

This section specifies planting containerized trees and shrubs.

1.2 RELATED WORK:

A. Section 01300 Submittals
B. Section 01560 Environmental Controls
C. Section 01600 Protection of Materials
D. Section 01640 Owner Furnished Materials
E. Section 02929 Vegetative Cuttings

1.3 QUALITY ASSURANCE:

A. The Engineer shall mark by flags or stakes the outer extent of each planting location prior to construction.
B. The Engineer shall be notified at least 48 hours in advance of planting.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01300, Submittals.
B. Name and qualifications of the plant installation supervisor. The Contractor shall designate a plant installation supervisor. The supervisor must have at least two years of native plant installation experience. The plant installation supervisor shall be present during planting to ensure installation of species within appropriate planting sites, and that planting meets all other planting specifications described below.
C. Plant installation supervisor qualifications shall be approved by the Engineer.

1.5 APPLICABLE PUBLICATIONS:

ANSI Z60.1-2014 – American Nursery and Landscape Association: American Standard for Nursery Stock

PART 2 – PRODUCTS

2.1 CONTAINERIZED PLANTS

Containerized plants will be provided by the Owner. Container plants will comply with ANSI Z60.1-2014. Plant materials and quantities to be provided by the Owner are included in the Drawings.

PART 3 – EXECUTION

3.1 GENERAL

Planting units and quantities shown on the Drawings are approximate. Planting locations, plant numbers and species shall be identified by the Engineer after floodplain surfaces are constructed. The Contractor shall transport plants from the staging areas to designated planting sites. The Contractor shall provide all labor, tools, equipment, and incidentals necessary to complete the Work as specified.

3.2 DELIVERY

The Contractor shall coordinate delivery of plants from the nurseries to ensure plant materials are available as needed. Nurseries are responsible for delivery of plants to the Site. The Contractor shall unload plants in a designated staging area upon delivery to the Site. The Engineer shall ensure the proper quantity and species are delivered.

3.3 STORAGE AND HANDLING

Plant material shall be protected from browse by beaver, deer and other wildlife at all times while in the staging areas. Suitable browse protection measures may include temporary fencing, browse repellent effective for ungulate wildlife and beavers, or other methods approved by the Engineer.

Plant material shall be irrigated as needed while in the staging areas. If browse repellent is used, it shall be reapplied following watering or rainfall events where water is in contact with the leaves of the plants or according to the manufacturer's directions.

Containerized plants shall be moved and transported by holding the plant container and not the plant stems.

The Contractor shall transport plants from the staging area to the designated planting areas.

3.4 LOCATION AND SPACING

The exterior limits of planting areas shall be staked by the Engineer following approval of final grade surfaces and completion of floodplain roughness treatments. During planting, the plant installation supervisor shall field-fit planting within appropriate micro-sites based on site microtopography and hydrologic requirements of the plant species. Spacing of container and specimen plants shall follow instructions on the Drawings for planting units throughout the project area. Where floodplain roughness is shown on the Drawings, plants shall be placed between woody debris maintaining surface roughness.

3.5 PLANTING

Planting shall comply with recommendations from ANSI Z60.1-2014, American Nursery and Landscape Association: American Standard for Nursery Stock. All plants shall be kept in their containers and protected from drying until installed. Immediately prior to planting, plants shall be removed from their containers and the roots loosened if they are excessively root bound.

Planting holes for container plants shall be at least 2 inches more than the container height and 3 times the diameter of the container. The soil in and around the planting hole shall be loosened to allow the roots to expand freely once the tree or shrub is planted.

Once the shrub or tree is placed in the planting hole, the hole shall be backfilled and gently tamped to remove any air pockets. Plants shall be planted so their root collars are flush with the surface. Additional soil shall be mounded in a ring around the base of all plants to create a shallow water basin.

3.6 WATERING

All plants and willow fascines shall be watered in using five gallons of water applied to each plant, within one (1) day of being planted. Water shall be applied directly to the base of the plant using a bucket, hose, or other similar method to create a steady stream of water that will fill in void spaces, but not cause localized runoff. After watering in, additional backfill shall be added to fill the planting hole as needed to ensure all roots are covered and to maintain the water basin around the plant.

3.7 CLEANUP

After work is completed, any trash created by the work shall be removed from the site. Contractor shall return all plant containers to the designated staging area, sorting containers by size, and neatly stacking containers for return to the nurseries. All ruts and tracks resulting from equipment used to install plants shall be roughed out, and the final surface left as per the grading plan.

END OF SECTION

SECTION 02990

WILLOW TRENCH

PART 1 – GENERAL

1.1 DESCRIPTION:

This section specifies construction of trenches and placement of brush and willow cuttings in the trenches to create surface roughness in the floodplain to support natural vegetation colonization and establishment.

1.2 RELATED WORK:

A. Section 01600 Protection of Materials

B. Section 01640 Owner Furnished Materials

1.3 QUALITY ASSURANCE:

1.3.1 The Engineer shall mark locations where willow trenches will be installed.

1.3.2 The Engineer shall be notified at least 48 hours in advance of vegetated brush trench construction.

1.4 APPLICABLE PUBLICATIONS:

USDA-NRCS Plant Materials Technical Note #29: Collecting Willow, Poplar and Redosier Dogwood Hardwood Cuttings for Riparian Site Plantings.

PART 2 – PRODUCTS

2.1 VEGETATIVE CUTTINGS

Vegetative cuttings shall be supplied by the Owner. Vegetative cuttings for willow trenches shall be 6 feet in length.

2.2 BRUSH

Brush shall be supplied by the Owner. Brush dimensions shall comply with the Drawings.

PART 3 – EXECUTION

3.1 WILLOW TRENCH CONSTRUCTION

Trenches shall be excavated in the existing floodplain surface as shown in the Drawings and extend the length of the marked treatment locations. Brush shall be placed in the trench at the rate specified in the Drawings and be oriented at a near vertical angle. Vegetative cuttings shall be placed in the trench at the rate specified in the Drawings and intermixed with the brush. Vegetative cuttings shall be placed with the large diameter (cut) end in the ground and at least two-thirds of cutting length shall be within the trench below the adjacent floodplain grade. The trench shall be backfilled with material excavated to create the trench and should

meet the adjacent floodplain grade elevation. After installation, willow cuttings shall be trimmed back so one foot extends from the ground surface.

END OF SECTION

SECTION 05000
LARGE WOOD STRUCTURES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies construction of large wood structures in channels and streambanks. Structures consist of complexes of logs.

1.2 RELATED WORK:

A.	Section 01400	Construction Staking
B.	Section 01560	Environmental Controls
C.	Section 01600	Protection of Materials
D..	Section 01640	Owner Furnished Materials
E.	Section 02140	Dewatering, Fish Salvage and Work Area Isolation
F.	Section 02160	Site Preparation
G.	Section 02200	Earthwork
H.	Section 05001	Engineered Fill

1.3 QUALITY ASSURANCE:

A. The Engineer shall be notified at least 48 hours in advance of construction.

B. The Engineer or representative shall be present during construction.

C. The Engineer will provide subgrade excavation and subgrade preparation surfaces for the Contractor's use in machinery with GPS capability.

D. The Engineer shall inspect subgrade and foundation surfaces prior to installation of rock and logs.

1.4 APPLICABLE PUBLICATIONS:

U.S. Army Corp of Engineers. 2021. Large Wood National Manual: Guidelines for Planning, Design, Placement, and Maintenance of Large Wood in Fluvial Ecosystems.

USDA NRCS. June 2021. Practice Code 580 – Toe Wood: Streambank and Shoreline Protection.

PART 2 - PRODUCTS

Materials shall be delivered to the site and stored in a manner that preserves the integrity of each material to be incorporated into the work. Wood materials will be stored proximate to the work site and sorted into piles of like material composition (i.e., large logs, medium logs, small logs, and brush) as identified on the Drawings.

2.1 ROCK

Rock will be used to build the foundation, or bench, for large wood structures, and will be used for backfill around wood members to counteract buoyancy. Rock must comply with Section 05001, Engineered Fill, and the gradation listed on the Drawings.

2.2 LOGS AND BRUSH

Owner will provide small logs and brush. Logs and brush used for large wood structures shall comply with the dimensions shown on the Drawings. Contractor shall roughen and break saw-cut ends of logs and brush that will be exposed above finished ground surfaces in order to create a natural appearance.

2.3 ANCHORING HARDWARE

If specified on the Drawings, anchoring hardware shall be used to secure wood members at locations specified or as indicated in the field by the Engineer. Anchoring hardware shall meet ASTM A706, and sizes of anchoring hardware shall comply with dimensions listed on the Drawings. At the Contractor's discretion, it is permissible to sharpen one end of the anchoring hardware for ease in driving hardware through wood members.

PART 3 - EXECUTION

3.1 DEWATERING

Large wood structures shall be isolated from flowing conditions during installation. Work area isolation measures shall prevent turbid water in excavation areas from entering waterbodies. Work area isolation techniques shall include sheet pile, pumping and other measures to control discharge of turbid construction water. Work area isolation techniques and details are shown on the Drawings.

3.2 SUBGRADE EXCAVATION

Subgrade excavation shall be in accordance with the elevations and locations shown on the Drawings. Contractor shall salvage and stockpile woody vegetation removed at the structure location. Alluvium rock that is excavated from the subgrade trench shall be separated and stockpiled for use as backfill in a nearby location. Salvaged alluvium rock shall be inspected by the Engineer prior to use as backfill. Excavated material that does not meet the gradation specified for backfill shall be hauled away or used for general fill in a nearby location approved by the Engineer. The Contractor shall identify a temporary stockpile location for excavated

material subject to approval by the Engineer. Excavation for structure installation and handling of excess material are incidental to the work.

3.3 SUBGRADE PREPARATION

The Contractor shall place rock to build the foundation of the structure as shown on the Drawings. The foundation shall be compacted using excavator bucket compaction.

3.4 LOG PLACEMENT AND REBAR PINNING

The Contractor shall place logs on the subgrade foundation as shown on the Drawings. Key log members shall be pinned together using anchoring hardware as shown on the Drawings. Anchoring hardware shall be driven fully through both logs and shall be driven flush with the top surface of the logs except for applications requiring bolts. Logs and brush shall be interlocked with and woven together to prevent buoyancy and movement.

3.5 LOG MEMBER END TREATMENT

Exposed saw-cut ends of all large wood shall be roughened and broken. Exposed sawed butt ends are not acceptable. Trees and logs shall be handled and transported such that damage is minimized to the rootwad, stem, limbs, bark and branches.

3.6 BACKFILL

The Contractor shall backfill the logs and brush with angular rock to the finished ground elevations as shown on the Drawings. The Contractor shall use backfill techniques that prevent damage to logs and brush during backfilling. The Contractor shall compact the backfill using excavator bucket compaction. Care shall be taken to minimize damage to containerized plants installed in the subgrade trench. The Contractor shall stabilize structure end points with rock or logs as approved by the Engineer. The upstream and downstream ends of the large wood structures shall transition smoothly into a stable streambank or other structure to reduce the potential for short-term erosion.

END OF SECTION

SECTION 05001
ENGINEERED FILL

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies construction of native or imported channel substrate and boulders used to create a stable river channel bed and banks, including the sourcing and delivery of rock materials to the staging area. The construction of channel bed features such as rock toes, engineered riffles, boulder grade controls, and all channel bed features shall comply with this section.

1.2 RELATED WORK:

A. Section 01600 Protection of Materials

B. Section 02200 Earthwork

C. Section 05000 Large Wood Structures

1.3 QUALITY ASSURANCE:

A. Rock material sourcing and selection shall be approved by the Engineer prior to delivery.

B. The Engineer shall be notified at least 48 hours in advance of materials delivery to project site.

C. The Engineer shall be notified at least 48 hours in advance of streambed placement, at least 48 hours in advance of streambed sealing, and at least 48 hours in advance of boulder placement.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01300, Submittals.

B. Supplier information and Materials Data: Submit the following as one package to the Engineer:

1. Rock source, size, description, and gradation.
2. Rock density and absorption tests results.
3. Borrow area location(s) for natural gradation materials

1.5 APPLICABLE PUBLICATIONS:

ASTM Method C-127. Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

PART 2 - PRODUCTS

2.1 ROCK - GENERAL

Individual rock fragments shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering.

The rock shall have the following properties:

A. Bulk specific gravity (saturated surface-dry basis) not less than 2.6.
B. Absorption not more than 2 percent by weight.

2.2 RIFFLE MATERIAL

Riffle material is alluvium rock that is natural round river rock, and the origin of the rock material must be from the riverbed, or an approved alluvial source. The least dimension of an individual rock fragment shall be approximately one-third the greatest dimension of the fragment. Riffle material is placed below grade and at the surface of the streambed at depths, extents, and grades indicated on the Drawings. Riffle material shall be graded as indicated in the Drawings.

2.3 STREAMBANK AND SUBGRADE MATERIAL

Streambank and subgrade material is alluvium rock that is natural round river rock, and the origin of the rock material must be from the riverbed, or an approved alluvial source. The least dimension of an individual rock fragment shall be approximately one-third the greatest dimension of the fragment. Streambank material is placed below grade and at the surface of the streambed at depths, extents, and grades indicated on the Drawings. Subgrade material is placed below the riffle material at depths, extents, and grades indicated on the Drawings. Both streambank and subgrade materials shall have a material gradation as indicated in the Drawings.

PART 3 - EXECUTION

3.1 DELIVERY AND STORAGE

Materials shall be delivered to the site and stored in a manner that preserves the gradation and identity of each material to be incorporated into the work. The engineer will measure and inspect the materials upon delivery to determine compliance with these specifications and the Drawings. Engineer may reject any or all construction materials that do not satisfactorily meet requirements.

3.2 MIXING

If rocks originate from different sources or different size classes, rock materials of varying gradations and angularity shall be mixed to create mixture specific to that rock type in conformance with rock material gradations shown on Drawings prior to placement. The mixture should not contain fines smaller than the #200 sieve. Materials shall be thoroughly mixed to create a homogenous rock mixture prior to placement.

3.3 PLACEMENT

If rocks originate from different sources or different size classes, rock materials of varying gradations and angularity shall be mixed to create a homogenous mixture prior to placement.

Rock material shall be placed by machine in small increments and released as close to their final position as practical. Rehandling, “raking”, or dragging should be minimized to prevent stone segregation and breakage. For similar reasons, dropping stone materials from excessive height will not be accepted.

END OF SECTION