

## **1. Description**

In natural channel restoration projects, primary focus is placed on excavation and grading to produce a stream channel with correct geomorphic features. During the implementation of these projects, extensive excavation and fill may be required to restore a streams planform (meanders) and cross sectional area. Excavation under this specification also focuses on the development of a stable streambed profile and may require the construction of a step-pool, riffle-pool, plunge pool or cascade streambed complex.

## **2. Materials**

Typically, excavation of the channel form will be conducted using cuts and fills from the project site. In some instances, there may be insufficient materials on site to meet the fill requirements.

- 2.1** In cases where additional fill is required, the GCSWCD will identify suitable borrow areas in the project site area. After removal of the required material from the borrow area, the Contractor will grade the site and establish a vegetative cover as shown in Section 3 below.
- 2.2** In some instances, borrow areas will be excavated and left as ponds. In these cases, the borrow area pond, will be constructed such that the side slopes do not exceed 2:1, and with a depth of no less than ten feet (10').
- 2.3** When a borrow area is not available, fill may be required from off-site sources. The type and quality of fill, as may be required, is set forth in Section 7: Special Conditions to this specification.
- 2.4** When fill materials are stockpiled at the site by the Contractor, silt control may be required by the Contracting Officer, Project Engineer and/or regulatory agencies. The requirement for silt control during the material storage period is determined on a case by case basis. Contractors should be prepared to provide adequate silt control as provided for in Construction Specification CS-03:Pollution Control.

## **3. Construction**

Excavation for the construction of the design stream channel shall be as shown on the Project Drawings. Construction shall be as shown in the plan view, cross sections and the stream profile drawings.

- 3.1 The existing elevations and contours shown on the plans, cross sections and profile were surveyed in December 1999. Grades and elevations may have changed slightly since the original survey was completed due to erosion, sedimentation and fill. The Contractor is responsible for confirming existing grades and to adjust the excavation and fill quantities as necessary to produce the desired channel configuration.
- 3.2 Due to the requirement to de-water the stream channel, all excavation and fill to construct the new channel, as well as to install in-stream structures, must be done in an expeditious manner. De-watering periods must be limited, and the stream flow returned to the new channel as soon as reasonably possible. The Contractor is responsible to provide adequate equipment, manpower, as well as to establish a work schedule which will meet this requirement. Excavation and fill must be completed within the time frame set forth in Section 7: Special Conditions, of this specification.
- 3.3 In areas where fill is required to establish the design channel, the Contractor shall place the required fill in a manner so as to provide adequate compaction of the material. No fill will be placed in lifts to exceed two feet (2') and each soil lift shall be adequately compacted with heavy equipment before placement of succeeding lifts. In addition, the Contractor shall place the fill as shown in Typical Drawing SR-07a: Channel Fill Material. Coarser material, cobble and gravel will be used below the bankfull elevation as shown on the Project Drawings, while topsoil or finer materials can be used above the bankfull elevation and/or to complete any required fill in the floodplain.
- 3.4 The Contractor, shall at all times, conduct their work in full compliance with all OSHA regulations and any other applicable local, state or federal regulations.

#### **4. Over Excavation & Re-fill to Address Clay Exposures**

In some instances, pre-construction test pits, or excavation work after the contract is signed, may reveal the presence of clay deposits in the stream bottom. Clay exposures present a significant scour and water quality problem and must be mitigated by removal of the clay material and filling of the excavation with a clean, coarse gravel or cobble material.

- 4.1 In the event clay exposures are found in the project area, the Contractor shall mitigate such exposures by over excavating the area of exposure to a minimum depth of three feet (3'). See Typical Detail SR-07b. The Contracting Officer shall observe excavations for clay materials and will determine the final depth of the excavation.
- 4.2 In the area of over excavation, the clay material will be removed from the stream channel, and disposed of in an area approved by the Contracting

Officer. Typically, disposal will be in a low lying area adjacent to the stream channel but out of the way of potential erosive flows.

- 4.3 The excavation will then be back-filled to the design stream profile with cobble or gravel material obtained from the site, a borrow area, or trucked in from off-site sources.

## **5. Site Stabilization**

- 5.1 The Contractor shall be responsible for providing stabilization of all disturbed areas immediately after the completion of grading. Stabilization will be either temporary or permanent in nature. The Contractor shall provide stabilization of the work areas as set forth in construction specification VS-05: Seeding & Mulching.
- 5.2 Immediately upon completion of all grading, and the installation of in-stream structures, the Contractor will provide temporary stabilization of those areas where bio-engineering materials will be placed at a later time. Permanent stabilization is excluded in those areas of the streambank where Live Fascines, Brush Layering, Brush Packing and Live Stakes are to be installed, and when installation of these measures is delayed due to timing of the operations.
- 5.3 Permanent stabilization will be completed on all remaining disturbed areas and will be conducted as set forth in construction specification VS-04: Live Material Transplants and/or vegetation specification VS-05: Seeding and Mulching.

## **6. Measurement and Method of Payment**

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| Method #1 | Payment will be at the contract lump sum price. The contract lump sum price shall be full compensation for all materials, labor, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents.         |
| Method #2 | Payment will be made at the Contract Unit Bid Cost , based on total units as presented by the Contractor and verified by the Contracting Officer.  |
| Method #3 | Payment shall be made at both a Lump Sum Price and a Contract Unit Bid Cost. Payments for all cuts and fills of existing materials shall be made at a lump sum price, while payment for borrow materials will be made at the Contract Unit Cost. |

In each case, payment shall be full compensation for the transport of all materials, excavation, installation, grading and compaction associated with the development of the design stream channel, and for all materials, labor, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents.

## 7. Special Conditions

- 7.1 Prior to commencement of any work, the Contractor shall review with the Contracting Officer the sequence and methods of construction the Contractor will use to complete the work. The Contractor shall review with the Contracting Officer the sequence and methods for cutting, filling and grading of existing materials, as well as the method and sequence of operations for excavation of borrow materials from the pond areas. Such discussions shall include the order of work, equipment to be used and de-watering operations. The Contracting Officer retains the right to make a final determination on the Contractor's proposed work plan. The GCSWCD may designate alternate borrow areas during progression of the work. Any alternate borrow areas will be reviewed with the Contractor and will meet the conditions as set forth in this specification.
- 7.2 Estimates of material quantities indicate that an additional **+/- 45,000** cubic yards of materials will be required to construct the stream channel. As shown on the project drawings, seven (7) pond sites have been designated as borrow areas. The borrow sites have been located such that the Contractor shall not have to move material a distance of greater than one thousand feet (1000') from the borrow area to the fill location. Soil test pit logs conducted at each pond site are provided as **Attachment C** of these specifications.
- 7.3 The ponds created by the borrow of materials, shall be graded such that side slopes do not exceed 2:1. Excavation and grading of the pond shall be completed as shown in Standard Detail SR-07c: Borrow Pond Excavation.
- 7.4 The Contractor shall remove the borrow material to the depth (10'-11') of the underlying clay layer. To provide for sealing of the pond walls, upon completion of the excavation, the Contractor shall line the pond with a 12" layer of clay materials excavated from the pond bottom.
- 7.4 During excavation and sealing of the pond walls, the Contractor shall de-water the borrow area to remove excessive water. In the event ground water conditions prevent effective pumping of the borrow areas, the Contractor may remove the material in a wet state providing that the Contractor stockpiles the materials prior, to use and allows for adequate drainage of the borrow materials. The Contractor shall not use borrow materials from a "wet-excavation" until such time that the Contracting Officer gives his/her approval. **The Contractor shall be required to provide adequate sediment control in the borrow material stock pile area such that no visible turbidity is leaving the stock piles both under conditions of clear weather or rain.**
- 7.5 The Contractor shall complete all stream channel excavation within **Thirty (30)** calendar days of de-watering the main stream channel.
- 7.6 In the event clay deposits are discovered during construction of the design stream channel, the clay materials shall be excavated from the channel,

and disposed of on-site, in an area designated by the Contracting Officer. Clay materials shall be excavated to a depth as shown on Typical Drawing SR-07b or as directed by the Contracting Officer and/or Project Engineer.

**7.7** Method of payment for stream channel excavation shall be Method #3.

Lump Sum      A bid price lump sum will be paid for that portion of the work associated with excavation and fill of the on-site materials, either by cutting or filling of the new design channel.

Unit Cost      A bid unit cost will be paid for excavation and placement of borrow materials and for over excavation of the clay materials. Bid unit costs shall be on a cubic yard basis.