

1. Description

To meet the requirements of various regulatory agencies, stream channel construction requires that work be completed in a dry condition. During the construction phase, various techniques ranging from passive by-pass channels to pumps, are used to divert stream flows around the work area. While traditional riprap projects may allow for partial channel dewatering by diverting the flow to one side, geomorphic based restorations often involve significant channel work requiring stream flows to be diverted completely around the project.

The work conducted under this specification shall consist of the diversion of surface water and ground water, as necessary to perform the construction required by the contract. The work shall include but is not limited to: (1) constructing, installing, building, and maintaining all the necessary temporary diversions, (2) furnishing, installing, and operating necessary pumps, piping and other facilities and equipment and (3) removing all such temporary works and equipment after their intended function is no longer required.

2. Diverting Surface Water

The Contractor shall install, maintain, and operate all cofferdams, channels, flumes, sumps and all other temporary diversions and protective works needed to divert stream flow and other surface water through, or around the project site.

- 2.1** Diversion of surface water shall be continuous during the period that damage to the construction work could occur. Unless otherwise specified, diverted surface water shall be diverted to the same drainageway that the water would have reached before being diverted.
- 2.2** The Contractor is responsible to determine the number and sizes of pumps necessary to complete the de-watering process. To assist the Contractor with this determination, data on average seasonal flow in the project area is provided in Section 9: Special Conditions, to this specification. Data is based on USGS stream gaging stations and channel size measurements. The Project Sponsor is not responsible or liable for the accuracy of the data as presented to the Contractor in this specification.
- 2.3** The Contractor shall furnish the Contracting Officer a written, detailed plan for meeting the surface water diversion requirements set forth in the contract documents. The De-watering plan must be approved by the Contracting Officer prior to the start of work, and it shall include information on the type, number, sizes of pumps, refueling/service schedules, coffer dam construction techniques, discharge outfall protection, and other relevant information. All proposed activities shall meet the conditions set forth in the New York State Sediment & Erosion Control Guidelines or another similar, recognized specification. Acceptance of the de-watering plan, or the waiving of the plan requirements shall not relieve the

Contractor of the responsibilities related to this activity during the process of completing the work.

- 2.4** Contractors must plan their de-watering activities such that they account for increases in water flow due to storms or other events. No separate payment will be made for de-watering measures that are damaged or overwhelmed by significant and sudden increases in the water flow. Contractors must plan for such events. In some instances, water flows may exceed those reasonably expected to be de-watered and the Contractor may be required to suspend work until such time that the water flows return to a manageable level. In the event the work is suspended due to high water, the Contractor will not be compensated for repairs to dewatering measures, but additional days will be added to the schedule, at no additional cost, to offset the days lost to high water.

3. De-watering the Stream Channel

All work in the stream area will be performed in a fully de-watered channel. The Contractor shall de-water the main stream channel, as well as provide for diversion of water flows into the work area from secondary channels or drainageways.

3.1 Cofferdams & Diversions

To capture or divert stream flows, cofferdams are used across the stream channel and secondary drainageways above (up-slope from) the work site. (See Standard Detail CS-04a)

- a. Cofferdams will be constructed of clean, inert materials that will have a minimal impact on the stream system. Cofferdams constructed of soil or material from the stream will not be used unless specifically directed by the Contracting Officer.
- b. Acceptable materials shall include water structures, concrete jersey barriers, plastic barriers, and other comparable items.
- c. The Contractor is responsible to install all cofferdams/diversion structures in a safe and correct manner. Cofferdams must be installed so as to withstand the pressures exerted by the stream flow or ponded water against the cofferdam. Cofferdams must be installed so as to provide for adequate diversion during high flows.
- d. Commercial products used as cofferdams (i.e. water structures, temporary dams) shall be installed in accordance with the manufactures instructions.
- e. The Contractor is permitted to make minor disturbances to the streambed or banks as may be required to properly install the cofferdam. All disturbances will be limited to only that disturbance necessary to install the cofferdam. Cofferdam installation must be done in the presence of the Contracting Officer.
- f. If the Contract conditions call for the use of sand bags, or if the Contractor shall use sand bags to assist with de-watering, the Contractor shall fill the sand bags

with clean, washed sand. Soils with fine particles is prohibited. When placed in the flowing water, the sand bags shall not produce visible turbidity. If soil bleeds from the sandbags when placed in the stream flow, the Contractor shall immediately remove the sandbags.

3.2 Pumps

In instances where topography and/or space does not allow for the passive diversion of water, the Contractor shall be required to use pumps and pipes to divert the water flow. The Contractor shall be responsible for providing all pumps, hoses, pipelines, fuel tanks and other items required to pump the stream flow around the work site, and for providing supervision of the pumping operation during all hours the pumps are running.

- a. The Contractor shall be responsible for calculating the required pump capacity to handle the average stream flow in the area of the work. Available flow data from USGS and GCSWCD is provided in Attachment A to this specification.
- b. The Contractor shall provide the pumps required, as well as have available additional pumps in the event the stream flow increases, a pump becomes disabled, or to cover periods when pumps are out of operation for routine service.
- c. The Contractor shall provide pumps that are in good operating order and free of leaks. Pumps that are leaking fuel, lubricants, or other material, will be removed immediately from the work area, and repaired or replaced as necessary. All pump equipment will be properly equipped with mufflers and other noise suppression equipment to minimize noise impacts on the surrounding residences.
- d. Discharge hoses shall be reasonably free of leaks at either the fittings or the discharge hose casing. No leaks from discharge lines shall be allowed to create excessively wet spots or to cause erosion.
- e. The Contractor shall provide adequate suction hose length to allow the pumps to be placed back from the immediate edge of the stream. Electric sump type pumps are exempt from this requirement.
- f. Supplemental fuel tanks, used to minimize refueling requirements, must be installed in such a manner so as to eliminate any leaks from the fuel lines, and so they are protected from damage in the event of high water or flood which may occur during the projects. Fuel tanks over five (5) gallons in capacity will require a containment system, unless such tank is a component of the pump itself. Supplemental fuel tanks shall be placed no closer than twenty five feet (25') from the stream edge and must be placed such that they will be located out of the stream flow in the event of sudden high water. The Contractor is responsible to insure that all supplemental fuel storage facilities meet or exceed National Fire Protection Association (NFPA) standards or other applicable local, state and federal regulations.
- g. When flooding conditions can be reasonably expected, the Contracting Officer

shall have the authority to require the Contractor to remove the pumps and/or supplemental fuel tanks from the projected flood area. If the Contractor is required to remove pumps and fuel tanks due to flood or storm events, the Contractor shall not receive additional compensation for removal, or re-installation of the pumps and/or supplemental fuel tanks. Compensation will be provided in the form of additional time on the project schedule.

3.3 Discharge Outfall Protection

During the de-watering operations, the Contractor must provide adequate protection from erosion at the discharge area. The discharge of water from the pumping operations shall be undertaken so as to prevent erosion of soils and the downstream introduction of sediment.

- a. When discharges from the de-watering operation involve large volumes of water, the discharge area will require a concrete and/or stone structure to provide for dispersion of the discharge energy. The Contractor shall use geotextiles as appropriate to provide erosion protection. Discharge structures must be capable of dispersing the energy of the expected discharge from the pumps.
- b. All materials placed for the protection of discharge outfalls are temporary in nature, and shall be removed from the project area upon completion of the de-watering process.

3.4 Passive Diversion Channels

In situations where de-watering is to be accomplished by the use of a passive, non pumped diversion channel, the following conditions must be met:

- a. Cofferdam installation will be completed in accordance with item 3.1 above. Typically, the cofferdam is not installed until such time that the diversion channel is excavated and prepared as set forth in this specification.
- b. Diversion channels shall be excavated or prepared in the location as shown on the Project Drawings.
- c. Diversion channels shall be constructed under dry conditions. Excavation of the channel shall commence at the downstream limit, and shall proceed upstream to the point of diversion from the main channel. Connection of the new diversion channel to the main stream channel shall be done so as to minimize sediment production and release.
- d. When diversion channels are constructed in material of a fine to medium texture, a plastic or geotextile lining may be required in the diversion channel. Diversion channel linings shall be constructed of plastic with a minimal thickness of 6 mm, or a tight weave geotextile. The lining shall cover the entire channel and shall be secured with large rock or by burying

the edges at the top of the channel. Diversion channel linings shall be installed starting at the lower limit of the diversion channel, with succeeding sheets upstream providing adequate overlap such that water will not flow under the sheets. The sheets do not have to be sealed to prevent the loss of all water.

- e. When diversion channels are to be constructed in coarse materials, a lining may not be required. In coarse material channels, the Contractor shall use a small pump and hose with a spray head to irrigate the diversion channel. Irrigation of the channel shall be conducted prior to diverting stream flow through the channel and shall be completed so as to wash fine particles down into the porous material.

4. De-watering of Channel Excavations

When in-stream construction requires deep excavation for the placement of footer rocks, or the over excavation and backfilling of clay deposits, the Contractor shall keep the excavation reasonably clear of water to allow observation of the work.

The Contractor shall provide a pump(s) of adequate size to de-water the excavations with the water pumped to the stream channel or other drainageway in a downstream direction. In the event the discharge water is turbid, or if excessive turbidity is produced in the channel, the discharge will be pumped to a suitable filtration area. The Contractor shall de-water excavation areas to the satisfaction of the Project Contracting Officer and/or Project Engineer.

5. De-watering Of Borrow Areas

When on-site borrow areas are designated for obtaining materials, the Contractor shall maintain the borrow area free of surface water. The Contractor shall provide a pump(s) of a suitable capacity as well as discharge lines to provide for timely and effective removal of water from the excavation area.

All water pumped from the borrow area(s) shall be directed to a well vegetated area for filtration. At no time will turbid water from the borrow excavation be allowed to flow to the stream. Borrow material must be processed as necessary to provide for proper and uniform moisture content at the time of placement. Overly saturated borrow material will not be placed directly in the fill area due to the inability to achieve proper compaction. The Contracting Officer and/or Project Engineer shall be present during excavation and fill using borrow materials and will direct the Contractor

6. De-watering of Secondary Channels and Drainageways

When the project area has secondary drainageways entering the work site, the Contractor shall be responsible for diverting the flow of the drainageway(s) away from the work area. Secondary drainageways will be diverted by cofferdams, pumps or by a passive by-pass

channel. The Contractor shall follow all items in section 3 above

7. Maintenance, Removal and Restoration

The Contractor shall maintain all de-watering measures in good operating form until such time that the measures are no longer required.

- 7.1** In the event that high flows damage or remove de-watering measures, the Contractor shall repair or replace the measures as soon as the water flows recede. Under no conditions will work commence in the channel until the de-watering operations are reestablished.
- 7.2** Upon completion of the work, and approval of the Contracting Officer, the Contractor shall remove all de-watering measures. The Contractor shall remove pumps and hoses from the site, as well as cofferdams from the stream channel.
- 7.3** Any fill placed in the active channel during the de-watering process, shall be removed from the channel upon completion of the work. In the event sand-bags are used in the de-watering process, the sand bags will be removed and emptied outside of the active channel area.
- 7.4** Upon removal of the de-watering measures, the Contractor shall re-grade all disturbed surfaces, remove any contaminated soils, and restore all areas consistent with the stabilization of the project site as set forth in the Contract Documents.

8. Measurement and Method of Payment

Payment for de-watering procedures will be made by one of the following methods and as indicated in the Contract Documents and on the Bid Form.

Payment Method 1. Lump Sum

Payment for de-watering of the project site shall be paid at the contract lump sum price. Contractors may make requests for partial payment of de-watering expenses on a monthly basis. Payment requests shall include adequate documentation of the Contractors de-watering expenses as well as a measurement of the percentage of the de-watering completed to date. If the total payments made for de-watering is less than the Contract Lump Sum Price for this item, the unpaid balance will be included in the final contract payment. Payment of the Contract Lump Sum Price shall constitute full compensation for completion of the work.

Payment Method 2. Unit Bid Price

If specified in the Bid Documents, or Section 9: special Conditions of this specification, payment will be made based on a Bid Unit Price. Payment by unit pricing generally is based on both pumping during a normal work day (10 hours)

or a 24 hour cycle. Payment requests may be made on a monthly basis, with the Contractor submitting a summary of the pumps used and the dates and hours of use. Upon review and approval by the Contracting Officer, the Contractor shall be paid for de-watering expenses minus the standard retainage of five percent (5%) of the approved payment.

9. Special Conditions

- 9.1** During all construction in the existing or proposed stream channel, the Contractor shall divert the entire stream flow around the work area. Diversions must be maintained 24 hours per day, 7 days a week during the construction period. On this project, all flows must be pumped around the work area.
- 9.2** The Contractor is responsible to review all plan drawings, specifications, instructions and site conditions to familiarize themselves with the de-watering requirements.
- 9.3** Upon written notice from the GCSWCD, the Contractor shall have five (5) days to submit a written de-watering plan for review and approval by the Project Engineer. The de-watering plan must meet all of the requirements as set forth in this specification. In the event the de-watering plan is inadequate to meet the dewatering requirements, the contractor shall, at his/her expense, make sufficient modifications to the plan so as to provide the required de-watering.
- 9.4** The GCSWCD will provide for the Contractors use, an Aqua-Barrier, water cofferdam structure. In the event the cofferdam is lost or damaged during construction, and such damage is not the result of the Contractors negligence, the Contractor shall not be held responsible for the damage. In the event of loss or damage to the water barrier, the Contractor is responsible to provide a replacement cofferdam constructed of materials that meet the conditions of this specification.
- 9.5** Due to the nature of the site, passive de-watering of the main stream channel is not possible. Passive de-watering of secondary channels may be used if appropriate.
- 9.6** The Contractor shall be prepared to de-water a small secondary channel that is located in the lower project area. The drainageway is expected to be dry during the construction period, but a small pump may be required if seepage into the work area is excessive.
- 9.7** The Contractor shall consider the issue of noise from the pumps which must run 24 hours per day. The Contractor shall develop their specific de-watering strategy such that noise from the de-watering operations are minimized.
- 9.8** In regards to treatment of turbid water, the work site has ample opportunities for natural filtration. The primary turbidity treatment pump located at the bottom of the work limits can be pumped to the well vegetated field above the bottom of the project for treatment. The pumping required for deep excavation de-watering may require the Contractor to provide filtration equipment (i.e. DirtBags, constructed silt basin) for treatment of turbid water pumped from the site.