

SECTION 01 57 05

TEMPORARY DEWATERING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Design, provide, install, maintain operate and remove temporary construction dewatering systems as required to control groundwater levels during construction; dispose of pumped water; constructing, maintaining, observing, and, removing of equipment and instrumentation for control of the system except where indicated or required to remain in place.
 - 2. Furnish, install, operate, and maintain dewatering equipment and systems as required to provide stable subgrades and dry excavations.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. Order of Conditions
 - 2. Environmental Protection Agency National Pollutant Discharge Elimination System (NPDES)
- B. Definitions
 - 1. *Normal Dewatering* is defined as using conventional pumps installed in open excavations, ditches, or sumps to control water and allow for installation of the pipe in a dry trench.
 - 2. *Special Dewatering* is defined as installing wellpoints, deep wells, or eductor and ejector systems to control groundwater and hydrostatic pressures to allow for installation of the work. Special dewatering includes design of the dewatering system by a Professional Engineer registered in the state where the Project is located in good standing, and conducting additional borings or subsurface explorations deemed necessary by the Contractor, and approved by the Engineer, to support design.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1. Coordinate dewatering work with trenching operations, support of excavation systems, and excavation.
- B. Pre-installation Conference: Conduct conference at Project site at least 30 days prior to the start of dewatering activities.
1. At a minimum, pre-installation conference shall be attended by the Owner, Engineer, Contractor's Superintendent, support of excavation Installer, geotechnical instrumentation Installer, and dewatering Installer.
 2. Verify availability of dewatering Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review condition of site to be dewatered including coordination with temporary erosion-control measures and temporary controls and protections.
 4. Review geotechnical reports.
 5. Review proposed site clearing and excavations. Confirm coordination with the earth support system, geotechnical instrumental monitoring, and trench excavation activities.
 6. Review requirements for observation, testing, and monitoring of dewatering system.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Approved NPDES Dewatering General Permit (DGP)
- C. Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions
- D. Qualifications for Installer and designer
- E. Dewatering Plan
 1. Submit plan prepared, signed, and sealed by a qualified designer registered in the state where Project is located at least 45 calendar days prior to commencement of the dewatering Work.
 2. Minimum contents of Dewatering Plan
 - a. Plans and description of the Normal and/or Special Dewatering systems, including the number, location and depth of wells, wellpoints or sumps; designs of filters to prevent pumping of fine soil; method and location for filtering, sedimentation tanks and legal

disposal of pumped water; and flow capacity of proposed system, accounting for groundwater level relative to tide cycles if applicable

- b. Design calculations and analysis data demonstrating the adequacy of the proposed dewatering system and its compliance with the performance requirements specified including calculations to estimate the quantity of discharge and calculations addressing excavation base stability and uplift
 - c. Local Best Management Practices for the dewatering system conditions
 - d. Plans, elevations, sections, and details
 - e. Arrangement, locations, and details of sumps, well points, deep wells, ditches; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
 - f. Location of the discharge points and the method by which effluent will be conveyed.
 - g. Complete description of equipment and materials to be used, and the procedure to be followed for installation, operation, and maintenance in relation to the proposed sequence of excavation and backfilling.
 - h. Methods to be used for drilling, construction, and development of dewatering wells
 - i. Standby equipment and standby power supply with contingency plan for the loss of power to the dewatering system
 - j. Proposed locations of points of effluent treatment equipment, effluent flow equalization tanks, if any, and discharge of water
 - k. Forms proposed for use during inspection and monitoring of the dewatering system
 - l. Sequence of installation coordinated with support of excavation system, and grouting work, as necessary.
- F. Treatment System Plan
1. Submit treatment system Plan prepared, signed, and sealed, by a qualified designer registered in the state where Project is located.
 2. Provide treatment system design and operating plan capable of meeting permit requirements (including NPDES DGP) prior to system installation and start-up which includes the following.
 - a. Layout drawings and site location plan including equipment sizes and capacities.

- b. Operating plan including monitoring and maintenance schedule, screening and sampling program, and reporting schedule. The screening and sampling program shall, at a minimum, meet the sampling requirements of the NPDES DGP
 - c. Name of DEP-certified laboratory used for analyzing dewatering influent and effluent samples in accordance with the NPDES DGP
 - d. Stamps and signatures by licensed professionals for the design of the treatment system
 - e. Type of flow meter to measure volume of treated water discharged from the treatment system including calibration plan and methods
3. Treatment system discharge flow meter calibration records and flow readings
 4. Laboratory results of dewatering influent and effluent samples
- G. Field Quality Control
1. Average flow rate and time of operation of each pump used in the dewatering system on a daily basis during the period the dewatering system is in operation on form approved by the Engineer
 2. Volume stored in frac tanks and volume disposed of
 3. Reports of observations, field reports, including flow rate and groundwater level monitoring and daily field observation/inspection reports
- H. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.
1. Locations and depths of decommissioned wells and/or well points and other abandoned-in-place dewatering equipment

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications
1. Installer: specialized in dewatering work continuously for at least 5 years in similar subsurface conditions.
 2. Designer: professional civil/geotechnical engineer registered in the state where Project is located having a minimum 5 years' experience and successfully designing dewatering systems in similar conditions.
 - a. For *Special Dewatering*, retain the services of a professional engineer registered in the state where Project is located who is in

good standing and experienced in design of dewatering systems, to independently evaluate the boring logs and other soils information available to determine those areas that will require special dewatering techniques and to design the required system.

- b. Contractor's dewatering professional engineer shall provide sufficient on-Site inspection and supervision to ensure that the dewatering is carried out in accordance with the approved design.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.
 1. Review geotechnical and subsurface information provided with Contract Documents.
 2. Determine if additional test borings are required and conduct other exploratory operations necessary for dewatering according to the performance requirements at no additional cost to Owner.
 3. Prior to start of any construction activity jointly inspect the Site with dewatering Installer, Owner and Engineer to observe and document the preconstruction condition of the site, existing structures, and facilities.

PART 2 – PRODUCTS

2.01 DEWATERING SYSTEM

- A. Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control groundwater levels and to lower, control, remove, treat, and dispose of groundwater and permit excavation and construction to proceed on dry, stable subgrades.
 1. Design dewatering system(s), including comprehensive engineering analysis by a qualified professional engineer, registered in the state where Project is located, using performance requirements and criteria indicated.
 2. Design dewatering system to:
 - a. lower groundwater level within the Work area without adversely affecting existing structures, utilities, pavements, sidewalks or wells outside of the Work area;
 - b. maintain groundwater levels inside the excavation at a minimum of 2 feet below the bottom of excavation and groundwater drawdown at a distance of 15 feet outside the excavation limited to no more

than 5 feet. Continuously monitor groundwater levels inside and outside the excavation;

- c. effectively reducing the hydrostatic pressure below excavation subgrade in the existing fills, organic peat, organic and inorganic silts/clays and sands and gravel, so that excavation bottoms are firm and dry and a factor of safety of at least 1.2 is maintained against uplift; and
- d. be capable of maintaining a dry and stable subgrade until the structures, pipes, appurtenances, and drainage pipe and structure bedding to be built therein have been completed to the extent that structures, pipes, and appurtenances will not be floated or otherwise damaged.

3. Basis of Design

- a. Existing groundwater levels measured at the Site as reported in the geotechnical and subsurface information.
- b. Based on the variability of thicknesses and discontinuous nature of cohesive soil strata encountered, pressure relief wells may be required to prevent uplift of these cohesive strata during excavation and dewatering for installation of underground systems. Reduction of the extent of dewatering may be accomplished by installing a temporary cutoff such as steel sheet piling.
- c. On-Site recharge of dewatering effluent is the preferred method for disposal. Review available geotechnical and subsurface information to identify those areas where the presence of low permeability soils may require storage in sedimentation tanks and/or transport of the dewatering effluent. Disposal of effluent within 100 feet of buildings is prohibited.
- d. Locate groundwater control facilities where they will not interfere with the Work or the work of other contracts.
- e. Provide for prevention of surface water from entering excavations by grading, dikes, or other means.
- f. Provide for dewatering without damaging adjacent streets, utilities, existing buildings, structures, and site improvements adjacent to excavation.
- g. Minimum capacity of back-up equipment for the dewatering system: equal to the primary equipment and available in operating condition continuously. Provide electrically operated dewatering equipment, powered with independent generators adequately sized to operate the dewatering system and capable of running on commercial power. Provide standby equipment independent of commercial power and provide for dewatering within 24 hours upon primary pump or power failure.

- h. Materials and equipment: in compliance with accepted industry standards, in good operating condition, and able to perform satisfactorily over the required duration of construction dewatering, including pipes, well screens, filter sand, grout, pumps, meters, and controls.

- B. Provide units/equipment in accordance with approved Dewatering Plan.
 - 1. Provide electrically operated dewatering equipment, powered with dedicated generators adequately sized to operate the dewatering system and capable of running on commercial power. Provide standby equipment independent of commercial power and provide for dewatering within 24 hours upon primary pump or power failure. No work shall be performed by the Contractor below the pre-construction groundwater level during dewatering system failure.
 - 2. Provide suitable temporary pipes, flumes or channels for water that may flow along or across the Site of the Work.
- C. Provide dewatering equipment with noise attenuation systems capable of meeting the governing noise regulation requirements.

2.02 TREATMENT SYSTEM

- A. Provide units/equipment in accordance with approved treatment system.
- B. Include properly sized and designed fractionation tank(s) with bag filtration system.
- C. Provide additional storage units to handle quantities of water in excess of treatment system capacity to allow Work to proceed without interruption.
- D. Provide flow meter at discharge locations to allow accurate measurement of flow rate and cumulative flow volume.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GENERAL

- A. Obtain necessary regulatory approvals and permits for operation of the dewatering system and the disposal of dewatering flows, including, among others, approval by under NPDES program for construction dewatering activities. Prepare and obtain the NPDES DGP.
- B. Maintain dewatering operations to ensure erosion control, stability of excavations, prevention of uplift, prevention of flooding in excavation, and prevention of damage to subgrades and adjacent structures. Make modifications to the dewatering system and/or operations if required performance is not met at no additional cost to the Owner.
- C. Do not perform Work below the pre-construction groundwater level during dewatering system failure.
- D. Do not use dewatering pumps on Site without factory installed sound attenuating equipment.
- E. Perform Work in accordance with approved Dewatering Plan.

3.02 INSTALLATION

- A. Furnish, install, operate, and maintain dewatering equipment and systems as required to provide stable subgrades and dry excavations, including but not limited to the following.
 - 1. Construction dewatering at all typical open-trench excavations along the drainage pipe alignments and associated drainage structures
 - 2. Construction dewatering at all stormwater basins
 - 3. Construction dewatering inside excavation for pump house station
 - 4. Construction dewatering at all building foundations
 - 5. Construction dewatering at both sand drying beds
 - 6. Construction dewatering at on-site wastewater disposal system and related appurtenances
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades, and from flooding site or surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

- C. Install dewatering system within limit of Work. Minimize interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction. Do not operate equipment on paved surfaces to prevent damaging these surfaces.
- D. Locate dewatering facilities to prevent interference with utilities and construction work to be done by others.
- E. Provide temporary grading to facilitate dewatering and control of surface water.
- F. Install dewatering system utilizing sumps, wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material, valves, appurtenances, water disposal, and surface-water controls as indicated on approved Dewatering Plan.
 - 1. Space sumps, well points or wells at intervals required to provide sufficient dewatering.
 - 2. Use filters or other means to prevent loss of fine sands or silts during dewatering activity.
- G. Provide system to lower and control groundwater to permit excavation and construction in the dry for open-cut excavation and excavation inside sheeting. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of carrying pipes and casings.
- H. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- I. Provide standby equipment on Site, installed, and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged utilities, structures, foundation soils, and other facilities at no additional expense to Owner.
- J. Be prepared to modify the dewatering system and methods as required by actual field conditions encountered during construction, at no additional cost to the Owner.
- K. Monitor quality of discharge from dewatering system to determine if soil particles are being removed from the system.
 - 1. Encapsulate the suction end of the pump with crushed stone, filter fabric, and other materials to minimize the amount of silt discharged to the amount allowed by the construction dewatering permit.

- a. For dewatering operations with relatively minor flows, direct pump discharges using filtration bag or system per erosion and sediment control requirements, or pump into hay bale sedimentation traps lined with filter fabric. Filter water through the hay bales and filter fabric prior to seepage into storm drainage or any natural water course.
 - b. For dewatering operations with larger flows, provide pump discharges into a steel dewatering/sedimentation basin. Use steel baffle plates to slow water velocities, to increase the contact time, and allow adequate settlement of sediment prior to discharge into waterways, storm drainage or discharge point allowed by the construction dewatering permit.
 - c. Utilize silt sacks in catch basins when excess silt is suspended in the discharge water per erosion and sediment control requirements. If siltation basin is used, size to effectively filter for the volume and discharge rate of water anticipated without overflow.
- L. Take measures to prevent damage to adjacent buildings, structures, utility lines, and work resulting from groundwater pumping.
- M. Modify system if, after installation and while in operation, it causes or threatens to cause damage to existing buildings, structures, utilities, or facilities.
- N. Repair damage, disruption, or interference resulting directly or indirectly from dewatering operations as approved by its Engineer.
- O. Special Dewatering
1. Use *Special Dewatering* as necessary if *Normal Dewatering* methods are inadequate to ensure dry and stable excavation subgrade conditions.
 2. *Special Dewatering* techniques may consist of one- or two-stage wellpoint systems, deep wells, or eductor and ejector type systems. Design with suitable screens to prevent pumping of fines and to address specified Work Site conditions.
 3. In areas requiring special dewatering, lower the groundwater level to a minimum of 2 feet below the existing fill and/or organic peat subgrades or to the excavation subgrade for organic silt/clay subgrades prior to any installation and maintain that groundwater level until excavation has been backfilled. Provide monitoring by Contractor's dewatering professional engineer.
 4. Furnish materials and install at least 2 observation wells at each excavation area at locations proposed by the Contractor's dewatering professional engineer and reviewed and approved by Engineer.

3.03 OPERATIONS

- A. Operate system continuously until proposed construction is completed and backfill materials have been placed or until dewatering is no longer required in accordance with the requirements of the Engineer and Owner and permits.
- B. Monitor dewatering systems continuously.
- C. Promptly repair damages to adjacent facilities caused by dewatering.
- D. Operate system to lower and control groundwater to permit excavation, construction of structures, and placement of backfill materials on dry subgrades.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
 - 2. Maintain groundwater water levels a minimum of 24 inches below bottom of excavation, inside the excavation.
 - 3. Limit groundwater drawdown outside the excavation to no more than 5 feet from preconstruction levels at a distance of 15 feet from the excavation.
- E. Maintain a sufficient volume of water in the frac tanks to prevent oil, if present, from exiting the frac tank. Take steps to remediate oil released from the frac tanks.
- F. Furnish, install, operate, maintain, and remove all necessary equipment to perform pH adjustments if required to meet the pH discharge limits required under the NPDES DGP.
- G. Sample and analyze the dewatering influent and effluent to meet system maintenance requirements and the NPDES DGP requirements.
- H. Meet standards and requirements of the NPDES DGP.
- I. Include any other items incidental to the placement on Site, operation, maintenance, disconnection, dismantling, and removal of the treatment system.
- J. Report any sign of subgrade disturbance due to seepage or unaccountable change in effluent flow rate to the Engineer and steps immediately taken to correct the condition.
- K. Implement additional treatment and different permits if necessary and if sheen or oil is observed in the dewatering effluent.
- L. Legally dispose of water removed by dewatering to avoid endangering public health, property, and portions of Work under construction or completed and legally dispose of sediment off Site at an appropriate disposal site.

3.04 MONITORING

- A. Install an adequate number of observation wells to monitor the dewatering operations for the duration of the Work.
- B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

3.05 PROTECTION

- A. Protect and maintain dewatering system during dewatering operations.
- B. Promptly repair damages to adjacent facilities caused by dewatering.

3.06 DECOMMISSIONING

- A. Remove dewatering system from the Project Site upon completion of dewatering.
- B. Unless otherwise directed by the Engineer, fill well holes with sand-cement grout and cut off wells a minimum of 24 inches below finished grade.

3.07 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.08 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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