SP-151159
(Replaces SP-15132)

SPECIAL PROVISIONS
FOR
WATER CONTROL AND DEWATERING

Polk County
EDP-PA26(001)--7Y-77

Effective Date
November 1, 2022

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

151159.01 DESCRIPTION.

A. General.

1. The work of this section consists of controlling groundwater, all surface flows including but not limited to: site drainage, river flows, and storm flows as needed or required to construct all aspect of the work as shown on the plans during construction and tuning.

2. The groundwater within the limits of work shall be lowered and maintained to ~~a minimum of 2 feet below~~ the lowest ~~excavation~~ excavated surface at all times during construction and placement of rock, grout, revetment, and bedding. During construction and placement of the cast-in-placed reinforced concrete structures, ~~and~~ the groundwater within the limits of work shall be lowered and maintained to a minimum of 2 feet below the lowest excavated surface ~~during construction and placement of all rock, grout, and revetment and bedding~~. During construction and placement of the south bank Type I Bank Armoring, the water shall be lowered and maintained to the proposed subsurface toe line as shown in the Bank Armoring Details in the plans. The groundwater requirements stated above do not apply where submerged construction is allowed on the plans or as otherwise approved by the Engineer.

3. Construction work involves construction in and around leveed portions of the Des Moines River and is subject to frequent periodic inundation and USACE Emergency Action Plan (EAP) requirements per Special Provisions for Emergency Action Plan.

B. At a minimum, Contractor responsibilities shall include:

1. Project accountability by taking precautions as may be necessary to construct the project in a dry condition where needed.

2. Providing for drainage, dewatering, and control of all surface and subsurface water. The term water shall be interpreted as including water in all its forms including, but not limited to, liquid water, snow, and ice.

3. Erecting any necessary temporary structures or other facilities at their expense to control surface water and groundwater.

4. The design, installation, operation, monitoring, removal, and abandonment of the water control and dewatering systems to comply with the requirements of this section and any applicable regulatory agencies including but not limited to USACE, Iowa DNR, and the City of Des Moines.

5. Adjustments or installation of additional water control and dewatering equipment as may be required throughout the duration of the project to manage seasonal flows, maintain groundwater levels, and to meet regulatory requirements.

6. Safely passing all Des Moines River flows, regardless of the flow magnitudes that occur, while maintaining the existing levels of flood protection. The Contractor is advised they are working in a major drainage course subject to continuous low flow and intermittent flow of significant magnitude.

C. Until the Engineer issues final written acceptance of the project, the Contractor shall take every precaution against damage to any part of the project including the adjacent land, riverbed, vegetation, utilities, paving, structures, and levees from any cause, including all surface and subsurface water, whether arising from the execution of work or any other cause. The Contractor shall rebuild, repair, restore, replant, and make good all damages to any portion of the work due to causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to high water or floods. The Contracting Authority will only reimburse the Contractor for costs associated with rebuilding, repairing, restoring, replanting, and making good damages to portions of the work when damage results from unforeseen Acts of God, structural deficiencies as identified in a pre-construction inspection, or flows exceeding the Design River Flows ~~paid for under the bid items~~ as described in this ~~section~~ special provision. The Contractor is responsible for Cost of repairing any damage to adjacent structures and restoration of levees or facilities due to water control or dewatering operations.

D. The Contractor shall carefully evaluate and plan the work and develop a water control and dewatering plan that avoids localized flooding, prevents extensive soil erosion, and minimizes risks to adjacent properties, existing infrastructure, completed work and in-progress work. Contractor shall perform and document a pre-construction inspection of any structures, levees, and utilities potentially impacted by water control operations. The water control and dewatering plan shall minimize riverbed destruction outside of dewatered areas. The Contractor shall accommodate phasing with the Des Moines Phase C Levee Improvement Project and follow the limited duration of north access availability as described in the contract documents. See Article 151159.03 for more information on the water control and dewatering plan and submittal requirements.

E. The Contractor shall be responsible for submitting the applications and obtaining the required permits for all water control and dewatering. The Contractor shall also be responsible for carrying out the terms and conditions of the Iowa Department of Natural Resources (IDNR) NPDES General Permit Number 2 and the Stormwater Pollution Prevention Plan. The Engineer will notify the Contractor of any demands brought upon the project by the Iowa DNR, USACE, City of Des Moines or other regulatory agency not already specified in this special provision. The Contractor shall cooperate with the Contracting Authority in its efforts to comply with the site-specific guidelines provided by the regulatory agency including the possibility of adjusting the dewatering system if the discharge exceeds limits imposed by the Iowa DNR.

F. Water control operations and temporary crossings shall be removed, if necessary, to maintain the existing levels of flood protection for the 1% annual chance event (Q100) within 72 hours of notification by the Engineer due to direction by the City of Des Moines. Removal of the water control operations and temporary crossings per the emergency removal plan (see Article

151159.03, A, 8), when directed by the Engineer due to the direction of the City of Des Moines, will be paid for as extra work in accordance with Article 1109.03, B of the Standard Specifications.

G. Design River Flows, Seasons, and Flood Occurrence Definitions.

1. All Design River Flows are measured at the USGS Gage #05485500 Des Moines River Below Raccoon River at Des Moines, IA.

~~**2.** The Summer Flow season is defined as the beginning of March through the end of August.~~

~~**3.** The Winter Flow season is defined as the beginning of September through the end of February.~~

~~**4**~~ **2.** The Design River Flow ~~Level 1~~ is defined as 18,585 cubic feet per second ~~and flows at or above this flow rate are approximately estimated to occur on the average of two times during the Winter Flow seasons throughout a 2 year construction period~~.

~~**5.** The Design River Flow Level 2 is defined as 36,615 cubic feet per second and flows at or above this flow rate are approximately estimated to occur on the average of two times throughout a 2 year construction period.~~

~~**6**~~ **3.** One Design Flood Occurrence begins when the river flows measured at USGS Gage #05485500 exceed the Design River Flow ~~Level 1 during the Winter Flow season or the Design River Flow Level 2 during the Summer Flow season~~ and ends after 30 consecutive calendar days below the Design River Flow ~~Level 1~~.

151159.02 QUALIFICATIONS.

The Contractor shall use the services of a Professional Engineer licensed in the State of Iowa to complete the water control and dewatering design drawings and calculations and is referred to in this section as the Water Control Engineer. The Water Control Engineer is expected to have expertise with hydrology, hydraulic, structural, and geotechnical design to comply with the requirements of this section. The Contractor shall be responsible to make their own evaluation of hydrologic data, flooding conditions, and probabilities. Estimates and definitions of flows, frequencies, and occurrences estimated herein are for ~~development of bid quantities~~ planning purposes.

151159.03 SUBMITTALS.

A. Water Control and Dewatering Plan

Prior to commencement of construction, the Contractor shall submit a detailed water control and dewatering plan with a cofferdam design. Contractor shall allow for 60 calendar days review of the submittal and any resubmittals. The design will be reviewed by the Engineer, Iowa DNR, City of Des Moines, and USACE before construction is started. The reviews shall not relieve the Contractor of any responsibility under the Contract for the successful completion of the water control and dewatering. At a minimum, the Water Control and Dewatering Plan shall include:

1. Descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment, methods, standby equipment, and power supply, means of measuring inflow excavations, pollution control facilities, discharge locations to be utilized, and types of construction, such as: temporary dewatering well, cofferdams, channels, or other flow diversion schemes.

2. Drawings showing locations, dimensions, and relationships of elements of each water control and dewatering system, construction access, and haul roads.

3. Design calculations demonstrating calculated flow rates and flood frequency, adequacy of proposed water control and dewatering systems, components, and assumptions used for

design. Contractor's Engineer is responsible for making his/her own hydraulic calculations and judgements regarding the planning and execution of measures to dewater.

4. Sequencing of water control and dewatering systems including separate phases for north bank and south bank access.
5. Plan for monitoring and projecting river flows; safely removing people, equipment and materials from project work areas; protecting work areas from excessive damage; and cleaning up and repairing damaged work areas should river flows exceed the cofferdam design flow capacity.

6. Best Management Practices that will be used to minimize sediment at any point source discharge.

7. Method(s) of providing primary and backup power for the dewatering wells.

8. Emergency removal plan addressing provisions the Contractor will take to maintain the existing level of flood protection during flood events. Hydraulic calculations may be required.

9. Final removal plan for temporary flow diversion schemes.

10. Cofferdam design shall include:
    - **a.** The gradation, source, and dimensions of the temporary berms (height, crest width, side slopes). On-site materials may be used within Sediment Removal Areas as shown in the plans.
    - **b.** The underseepage, foundation, and slope stability analysis in accordance with USACE requirements.
    - **c.** Sequencing of cofferdam enclosures and configurations to accommodate phased work.
    - **d.** The design water surface elevations and associated cofferdam design flow planned for with the temporary berm design during each sequence.
    - **e.** The anticipated water surface elevations adjacent to the proposed cofferdam associated with the seasonal Design River Flows provided in Article 151159.01, G.

If the system is modified during installation or operation, the Water Control and Dewatering Plan shall be revised, sealed, and signed by the Water Control Engineer. The Water Control Engineer shall inspect the performance of diversion and dewatering systems during construction and make revisions to the Water Control and Dewatering Plan when such revisions are necessary for safe and efficient execution of the work.

B. Geotechnical Information

Geotechnical information collected by the Contractor to supplement the information provided in the contract documents shall be provided to the Engineer for review. The geotechnical information provided was prepared for design purposes only and may not be adequate for a Contractor to evaluate construction conditions or design the water control and dewatering system. Fluctuations of the groundwater level can occur due to seasonal variations in the amount of rainfall, runoff, stage level of the Des Moines and Raccoon Rivers, and other factors not evident at the time the borings were completed. The Contractor should independently interpret the soil/groundwater conditions taking into consideration their intended means and methods of construction. Contractor may perform additional exploration and laboratory testing at their own expense as necessary for design of the water control and dewatering system. Due to possible variations of soil conditions and groundwater levels between soil boring locations, the Contractor shall be responsible for changing or modifying the water control and dewatering system to accommodate such variations.

C. Pre-construction Inspections

Pre-construction inspections of structures, levees, and utilities potentially impacted by water control operations collected by the Contractor to supplement the information provided in the

contract documents shall be provided to the Engineer for review.

151159.04 CONTROL AND OBSERVATION.

A. Adequate control shall be maintained by the Contractor to ensure that the stability of excavated slopes are not adversely affected by water, that erosion is controlled and that flooding of the excavation or damage to structures does not occur. The Contractor is solely responsible for site excavation safety and compliance with OSHA regulations, in particular Standard 29 CFR, part 1926. The Engineer assumes no responsibility for site safety; the above information is provided for consideration by the Contractor only.

B. Monitor flows within the Des Moines River and tributaries using publicly available gage data for the Des Moines River and its tributaries. Coordinate diversion measures and work with Saylorville Dam operations.

C. Per the Special Provisions for Emergency Action Plan, the water level in the Des Moines River shall be monitored on a daily basis by the Contractor and recorded in the daily construction log. The extended forecast of future river levels shall also be monitored and recorded in the daily construction log. The Contractor shall be able to react quickly to the required actions described in this section.

D. A qualified Aquatic Biologist provided by the Contracting Authority shall be on site at all locations being dewatered for construction of the proposed projects during the drawdown to monitor for additional mussels and/or mudpuppies not previously identified/relocated as part of the pre-construction surveys/relocations not in this contract. The Iowa DNR shall be notified immediately upon discovery of additional animals and all animals shall be relocated to suitable habitat outside the area of construction impact approved by the Iowa DNR.

151159.05 INSPECTION.

A. If during water control or dewatering operations, there is evidence of any unanticipated issues related to uplift, seepage, etc., inspection by the Water Control Engineer is required.

B. If after dewatering has lowered the groundwater level as specified and unacceptable conditions are found by the Engineer, then the Contractor may be directed to increase dewatering pumping rates or install additional wells to lower the groundwater to an acceptable level lower than that defined in Article 151159.01, A. If more extensive dewatering is required, the Contractor shall achieve the revised acceptable groundwater level before construction may continue.

151159.06 CONSTRUCTION.

A. General.

1. The Contractor shall furnish, install, and operate equipment of sufficient capability to remove water and maintain the groundwater elevation within the excavation limits until excavation is backfilled, unless otherwise authorized by the Engineer. An adequate system shall be designed, installed and maintained to permit excavation, construction of structures, and placement of fill materials as indicated on the plans. All excavations made as part of water control and dewatering operations shall be backfilled with the same type material as was removed and compacted per Special Provisions for In-River Earthwork, except where replacement by other materials and/or methods are required.

2. Contractor shall continuously control water during course of construction, including weekends and holidays and during periods of work stoppages, and provide adequate backup systems to maintain control of water.

3. Pumps and generators used for dewatering and water control shall be quiet equipment enclosed in sound deadening devices.

4. The Contractor shall supply best management practices (sediment bags, filter socks, etc.) to minimize sediment released at any point source discharge. The turbidity of the receiving water shall not be increased by more than 25 Nephelometric turbidity units (NTU) at any point source discharge in accordance with Iowa's water quality standards (567 Iowa Administrative Code Chapter 61).

5. Increases in uplift pressure on the existing dam and proposed river structures due to cofferdams or other Contractor operations shall be mitigated and incorporated into the water control and dewatering plan. Such mitigation may include, but is not limited to, installation of perimeter subdrains, pumping from drill holes or pumping from sumps excavated below the subgrade elevation. Any damages to in-progress or completed river structures due to increased uplift during contractor operations shall be repaired at Contractor's cost.

6. At no time during construction shall the dewatering operations affect existing surface or subsurface drainage patterns on adjacent properties. Any damage to adjacent property resulting from the Contractor's alteration of surface or subsurface drainage patterns shall be repaired by the Contractor at their own expense.

7. During all phases of the work, Contractor shall maintain a free-flowing width of river, never blocking off the entire river cross section.

8. Contractor shall make assessment of potential for dewatering induced settlement. Provide and operate devices or systems, including but not limited to reinjection wells, infiltration trenches and cutoff walls, necessary to prevent damage to existing facilities, completed work, and adjacent property.

9. Securely support existing facilities, completed work, and adjacent property vulnerable to settlement due to water control and dewatering operations. Support shall include, but not be limited to, bracing, underpinning, or compaction grouting.

10. Existing sediment within the Des Moines River channel may be borrowed and incorporated into temporary cofferdam and access road construction. Areas available for borrow are shown in the plans. If used, the Contractor shall make their own judgement regarding the locations, quantity, and characteristics of sediment available and its suitability for use in the intended application. The quantity of available sediment varies, no guarantee is made regarding the quality or accessibility or processing requirements of sediment available. Comply with all applicable Federal, State, and Local regulations when borrowing river sediments. Upon completion of the work, borrowed sediment may be redistributed within the river channel. Trash, junk, concrete rubble, and other waste shall be disposed offsite and considered incidental to Class 13, Excavation Waste.

B. Surface Water Control.

1. Temporary berms or other techniques shall be used, where necessary, to prevent surface water from entering the excavation and shall be removed at the end of construction. The Contractor shall coordinate, evaluate, design, construct, and maintain temporary water conveyance systems. Contractor is responsible to ensure that the temporary water conveyance systems shall not worsen flooding, alter major flow paths, or worsen normal flow characteristics during construction. At a minimum, Contractor shall be responsible for diverting the quantity of surface flow around the construction area so that the excavations will remain free of surface water for the time it takes to install the work, and the time required for curing of any concrete or Boulder Grout.

2. The Contractor shall, at all times, maintain a flow channel or route for the river. Existing trees and vegetation should be preserved (unless specifically noted for removal in the contract documents). The Contractor shall conduct the operation in such a manner that storm waters may proceed uninterrupted along the drainage courses. Any damage done during storm flows to temporary or partially completed structures, or resulting from the Contractor's operations, shall be repaired by the Contractor at the Contractor's expense unless a Design Flood has occurred.

3. In the event that river levels reach flood stage or when directed by the Engineer, the Contractor will assume responsibility for maintaining the existing level of flood protection. Water control operations and temporary crossings shall be removed, if necessary, to maintain the existing levels of flood protection for the 1% annual chance event (Q100) (107,500 cubic feet per second) within 72 hours of notification by the Engineer due to the direction of the City of Des Moines. The Contractor, under its own direction, may remove the temporary construction obstruction material from the floodplain at any point during, or in advance of, a projected flood event at their own cost. The 100 year, or 1% annual chance, water surface elevation is approximately 24 feet (Des Moines Datum) at the project location.

4. Temporary control of flows through the fish passage and recreational features will be required during the Start-up and Tuning phase. See Special Provisions for Start-up and Tuning for water control and dewatering requirements during the start-up and tuning phase. Costs associated with water control and dewatering during start-up and tuning shall be paid for per the start-up and tuning bid item.

C. Cofferdams.

1. Selection of design flows for cofferdams is the responsibility of the Contractor but shall in no case be less than the Design River Flows defined in Article 151159.01, F. The Contractor will be solely responsible and fully bear all costs, without compensation, for any cleanup, repairs, rework or additional work that may be required due to flooding and inadequate cofferdams, dewatering and dewatering systems of inadequate capacity or design to accommodate any flood or sequence of floods up to the Design River Flows that occurs prior to project completion.

2. If cofferdams or other diversion measures fail or are overtopped by river flows less than the Design River Flows ~~during their respective season~~, Contractor shall be solely responsible for all delays, cleanup, repairs, materials, and other costs without additional compensation. However, if failure or overtopping occurs at a river flow greater than the Design River Flows ~~during their respective season~~, up to 15 working days per ~~overtopping occurrence~~ Design Flood Occurrence will be added to the contract completion date to accommodate ~~periods when in river~~ construction ~~cannot occur~~ of site repairs.

3. The proposed permanent sheet pile in the river structures can be considered for cofferdam protection by temporarily extending its height during construction. ~~Any modifications to the permanent river structures to support water control and dewatering operations shall be designed by the Contractor's Engineer and submitted to the Engineer for approval.~~

4. If the existing dam or storm sewers are proposed to be used as part of the cofferdams or will otherwise be subject to increased forces or pressures than in the current conditions, the Water Control Engineer shall perform a structural analysis and submit to the Engineer. Approval for this must be granted by the City.

5. If cofferdam sheeting is used for river construction, walls shall be well braced. No timber or bracing shall be left in the cofferdams or cribs in a way as to extend into the permanent concrete, without written permission from the Engineer.

6. Cofferdams for foundation construction shall be as watertight as practicable and carried to a depth that will allow them to function properly without displacement. The interior dimensions of cofferdams shall be such as to give sufficient clearance for the construction of permanent structures. Cofferdams that are tilted or moved laterally during sinking shall be realigned to provide the necessary clearance.

7. When weighted cofferdams are employed and the weight is used to overcome the hydrostatic pressure acting against the bottom of the foundation seal, anchorage, such as dowels or keys, shall be provided to transfer the entire weight of the cofferdam into the foundation seal.

D. Groundwater Control and Subsurface Seepage.

1. The Contractor shall install adequate measures to maintain the level of groundwater and subsurface seepage around or underneath any cofferdam or barrier, below the foundation subgrade elevations and maintain sufficient bearing capacity for structures, pipelines, earthwork, and rock work. Groundwater and subsurface seepage levels may fluctuate. Such measure may include, but are not limited to, installation of perimeter subdrains, pumping from drill holes or pumping from sumps excavated below the subgrade elevation.

2. The foundation bearing surfaces are to be kept dewatered and stable until the structure or other types of work are complete and backfilled. Disturbance of foundation subgrade by Contractor operations shall not be considered as originally unsuitable foundation subgrade and shall be repaired at Contractor's cost. The Contractor shall coordinate ground water control measures with surface water diversions since the effectiveness of ground water control will depend on the amount of surface water infiltration allowed by the diversion system.

151159.07 METHOD OF MEASUREMENT.

For the construction of material of the class specified, payment will be the contract unit price as follows:

A. Water Control and Dewatering: Measurement will not be made. Payment is by Lump Sum.

~~**B.** Site and coffer dam repairs due to Design River Flow Level 1 exceedance during Winter Flow season: Measurement will be by the number of times the river flow measured by USGS Gage #05485500 exceeds the Low Design River Flow Level 1 without exceeding the Design River Flow Level 2 within one Design Flood Occurrence during the Winter Flow Season. The Contractor shall be actively working within the limits of the river during the time of the initial river flow exceedence to measure the event and collect payment.~~

~~**C.** Site repairs due to Design River Flow Level 2 exceedance: Measurement will be by the number of times the river flow measured by USGS Gage #05485500 exceeds the Design River Flow Level 2 within one Design Flood Occurrence. The Contractor shall be actively working within the limits of the river during the time of the initial river flow exceedence to measure the event and collect payment.~~

151159.08 BASIS OF PAYMENT.

A. Water Control and Dewatering: Payment will be a Lump Sum at the contract price. The measurement and payment for all work covered under this specification will be made at the contract lump sum price for Water Control and Dewatering which shall constitute full compensation for obtaining any necessary permits and furnishing all equipment, labor, and materials to design, install, sample, test, operate, maintain, monitor, and remove the dewatering system in accordance with all applicable regulations. Payment of this item is dependent on the following requirements:

1. The Contractor, at their expense, shall furnish all necessary equipment and materials required to control the surface and subsurface water in all the areas from start of work through the completion of the total project work.

2. No payment shall be made to the Contractor until copies of the permits are supplied to the Contracting Authority.

3. The cost of installing and maintaining best management practices (sediment bags, filter socks, etc.) to minimize sediment released at any point source discharge shall be considered incidental to the lump sum pay item Water Control and Dewatering.

4. The Contractor shall be required to submit a schedule of values to the Engineer to explain the breakdown of the lump sum price. This schedule of values will only be used to determine the appropriate amount of the lump sum to be attributed to each progress payment. The maximum value of each phase of the Work for the dewatering shall not exceed 40 percent of the value estimated for that phase. The remainder of the lump sum shall be proportioned based upon the number of days estimated by the Contractor to complete the protected Work and remove the cofferdams and dewatering systems. The distribution between the phases shall be approximately proportioned based upon the length of cofferdams planned for each phase of the Work to be protected unless otherwise approved by the Engineer. The following list contains items that should be used, at a minimum, for the schedule of values:
   - Obtaining permits and complying with permit requirements.
   - Installing cofferdams.
   - Drilling the wells.
   - Installing the pumps.
   - Installing power supply.
   - Discharge and/or manifold piping.
   - Removal and abandonment of wells
   - Removal of temporary berms, cofferdams, or sheet pile.

B. Emergency Removal/Replacement of Construction Access. Removal of the water control operations and temporary crossings per the emergency removal plan (See Article SP-151159.03, A, 8), when directed by the Engineer, will be paid for as Extra Work in accordance with Article 1109.03, B of the Standard Specifications.

~~**B**~~ **C.Site repairs due to Design River Flow ~~Level 1~~ exceedance ~~during Winter Flow season~~.** ~~Payment will be at the contract unit price for each time the~~ Work to repair damage caused by river flow ~~exceeds~~ exceeding the Design River Flow ~~Level 1 without exceeding the Design River Flow Level 2 within one Design Flood Occurrence during the Winter Flow Season~~ will be considered Extra Work and paid for in accordance with Article 1109.03, B of the Standard Specifications. ~~The contractor unit price shall constitute full compensation for any site damages to the water control and dewatering system or completed and in-progress site work due to a Design Flood Occurrence.~~ The Contractor shall be actively working within the limits of the river during the time of the initial river flow exceedence to negotiate Extra Work payment.

~~**C. Site repairs due to Design River Flow Level 2 exceedance**. Payment will be at the contract unit price for each time the river flow exceeds the Design River Flow Level 2 within one Design Flood Occurrence. The contractor unit price shall constitute full compensation for any site damages to the water control and dewatering system or completed and in-progress site work due to a Design Flood Occurrence.~~