SP-150268
(New)

SPECIAL PROVISIONS
FOR
DRILLED-IN SOLDIER PILE AND CONCRETE PANEL WALL

Pottawattamie County
IM-NHS-029-3(69)53--03-78

Effective Date
June 20, 2017

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.

150268.01 DESCRIPTION.

A. This work shall consist of furnishing and constructing drilled-in soldier pile and concrete panel walls in accordance with this special provision and with the lines, grades and dimensions shown on the contract drawings and per the shop drawings prepared by the Contractor.

B. A drilled-in soldier pile and concrete panel wall is a fill retaining wall system composed of drilled-in steel soldier piles placed in pre-bored holes. The portion of the piles that will be embedded below the excavation are encased in structural concrete. After the soldier piles are installed, precast concrete panels are placed between the soldier piles to transfer lateral loads from the soil to the soldier piles.

C. The soldier piles will be drilled in from the existing grade to the tip elevation, followed by filling of the pre-drilled hole with structural concrete around the steel element. Excavation and placement of drainage pipes and concrete panels will follow. Granular fill or approved equivalent as shown in the drawings, will be used to fill between the proposed and the existing groundline.

150268.02 MATERIALS.

Contractor will provide all material for the construction of the drilled-in soldier pile and concrete panel wall. Contractor will provide equipment and manpower for building the wall.

A. Steel Soldier Pile.

1. Conform to Section 4167 of the Standard Specifications.

2. Storing, transporting, and handling shall be performed in a manner to prevent bending stresses or other damage.

B. Concrete for Drilled in Soldier Piles.

1. All materials, proportioning, air entraining, mixing, slump, and transporting of PCC shall be according to Section 2403 of the Standard Specifications, except as modified herein.

2. Water/cement ratio: not to exceed 0.45.

3. Drilled-in soldier pile construction: use Class D PCC mixture with a slump of 8 inches ±1.5 inches.

4. Portland cement: meet the requirements of ASTM C 150 Type I / II and Section 4101 of the Standard Specifications.

5. Air entrainment: apply Section 2403 of the Standard Specifications.

6. Mid-range water reducer is required according to Materials I.M. 403.

7. Retarder is required according to Materials I.M. 403 to maintain workable concrete.

8. Do not use Ground Granulated Blast Furnace Slag (GGBFS).

C. Concrete Panel.

1. Minimum compressive strength at 28 days shall be 4000 psi.

2. Exposed Surfaces shall be formed to produce a smooth and uniform appearance without rubbing or plastering. Exposed edges of 90 degrees are to be chamfered 3/4 inch by 3/4 inch. Top surface to have a smooth finish, free of all float or trowel marks.

3. Water/cement ratio: not to exceed 0.45.

4. Portland cement: meet the requirements of ASTM C150 type I/II or III.

5. Aggreagates: meet the requirements of ASTM C33 with coarse aggregate shall be size No. 67 and fine aggregate shall be natural sand.

6. Air entrainment: Between 5% and 7%.

7. Admixtures shall not be used.

8. Curing shall be accomplished by wet curing or application of a type 2 membrane.

9. The fabricator shall stencil the fabricator's name, date of fabrication, wall milepost number and piece mark at the location shown on the drawings.

10. Production shall be in accordance to Section 2403 of the Standard Specifications and the prestressed Concrete Institute's Manual MNL 116 for Quality Control.

11. Dimensional tolerances governing the manufacture of precast members shall conform to Division VI, Section 6.4 of the Precast Concrete Institute's Manual MNL 116 for Quality Control for the appropriate Shape. Tolerance for location of lifting holes shall be +/- 1/2 inch.

12. The fabricator shall be responsible for loading and properly securing all precast concrete members for shipment. All concrete components shall be made available for inspection by the Railroad at the Fabricator's plant prior to shipment, at the Railroad's discretion.

13. Panels must be fabricated at a certified precast concrete facility. They can not be cast on site.

14. Reinforcement: apply Section 2404 of the Standard Specifications

D. Granular Backfill Material.
Ensure the backfill material meets the requirements of Section 4133 of the Standard Specifications, except that the percent passing the No. 200 sieve is not to exceed 3.0%.

150268.03 CONSTRUCTION.

A. Submittals.
The Contractor shall submit their proposed drilled-in soldier pile and concrete panel wall installation plans to the Engineer for review and approval. The submission shall consist of details required to completely describe the retaining wall system and shall include the following:

1. Shop drawings for the drilled-in soldier pile and concrete panel wall shown on the contract drawings at least 2 weeks before beginning the work, which indicate at a minimum, the following:
- **a.** Grade and strengths of all construction materials used.
- **b.** Materials, details, arrangement, and method of construction of the proposed soldier pile and concrete panel retaining wall system.
- **c.** Details for the concrete panels.
- **d.** Method for installing soldier piles, including pre-drilling procedures. Driven soldier piles are not permitted.
- **e.** Mix designs for structural concrete and procedures for placing and verifying installation elevations of the structural concrete in accordance with the contract documents.
- **f.** Mix design for the cast in place concrete below ground in accordance with the contract documents.
- **g.** Details outlining additional grading to create a working platform (if needed).
- **h.** Details outlining traffic control (if needed) for performing construction within the railroad right of way
- **i.** Sequence of construction.

2. Descriptive data and operating procedure for all equipment to be used. This shall include, at a minimum; machinery required to install soldier piles (including drilling procedures), concrete panels, handrail, soil excavation, placing fill, and remove obstructions. Submit all pertinent equipment data including sizes, weights, capacities, torques, and operating frequencies.

3. Review and approval of the above submittals for the drilled-in soldier pile by the Engineer will not relieve the Contractor from the responsibility for the adequacy of the construction of drilled-in soldier pile and concrete panel wall to achieve the required results.

B. General Construction Methods.

1. Install and maintain the drilled-in soldier pile and concrete panel wall in accordance with the design as shown on the contract drawings and on the accepted shop drawings, and in such a manner as to minimize movement, settlement, loss of ground, removal of fines from adjacent ground, and damage to or movement of adjacent structures or utilities.

2. Ensure no gaps or pockets occur between the retained fill and concrete panel.

C. Drilled-in Soldier Pile and Concrete Panel Wall Construction.

1. Excavate or fill as needed to provide a suitable working pad at the proposed location where each soldier pile is to be installed, as shown on the plans.

2. Predrill holes for soldier pile installation. If needed use steel casing to prevent collapse of the hole. Diameter of the pre-drilled holes shall meet the dimensions shown on the contract documents. Prior to inserting the soldier pile, the Contractor shall make the necessary provisions to allow the Engineer to sound each hole to assure that loose soil has been removed to the Engineer's satisfaction. Once the design depth has been reached and loose soil removed from the bottom of the hole, the bottom of the hole shall be cleaned such that no more than 1 inch of loose/soft soil remains at the bottom. The soldier pile section shall then be lowered into the hole to the tip elevation specified on the contract drawings and structural concrete shall be immediately tremied to the proposed elevation shown on the contract drawings. Fine sand is then to be placed from the top elevation of the structural concrete to the existing grade. If casing is used for the construction of the soldier pile excavation, remove the casing as concrete placement progresses and throughout concrete placement. The Contractor shall maintain the bottom of the casing at least 3 feet below the level of structural concrete. Drilling for adjacent soldier piles shall not be permitted until concrete in adjacent drilled holes has set for a period of at least 24 hours.

3. After installation of the soldier piles, excavate along the proposed wall face in stages to the elevation shown on the contract drawings.

4. Allow no more than 5 feet of unsupported excavation prior to placing concrete panels. Install lagging as detailed in the contract drawings.

5. Fill any gap between the soldier pile and concrete panel wall and the retained fill with granular backfill specified in Section 2.

D. Construction Tolerances.

1. Ensure the drilled-in soldier pile is within 1 inches of plan position.

2. Ensure the vertical alignment of soldier pile excavation does not vary from the plan alignment by more than 1/4 inch per foot.

3. Soldier pile excavations and completed soldier piles not constructed within the required tolerances will be considered unacceptable. Correct all unacceptable excavations and completed soldier piles to the Engineer's satisfaction. Furnish materials and work necessary, including engineering analysis and redesign, to complete corrections for out of tolerance excavations (without either cost to the Contracting Authority or an extension of the completion dates of the project).

150268.04 METHOD OF MEASUREMENT.

A. The soldier piles will be measured from the finished tip elevation to the top of the soldier pile elevation for payment in units of linear feet, as shown on the contract drawings.

B. The drilled-in pile will be measured for payment in units of linear feet along the axis of the drilled-in pile from the top of the concrete encasement to the bottom of the drilled-in pile, as shown on the contract drawings.

C. Installation of precast concrete panels will be measured for each cubic yard of concrete provided and installed.

D. Class 20 excavation will be measured by volume in units of cubic yards, as shown on the contract drawings. This includes only the excavation of soil immediately in front (a maximum of 2 feet in front of the finished face of the wall) of the soldier pile wall to install the concrete lagging. Excavation does not include the excavation quantity for roadway earthwork that will take place to construct the proposed I-80 west bound lanes. Additional payment will not be provided for furnishing and placing granular backfill specified in Section 2 to fill voids between retained fill and concrete lagging due to over-excavation.

E. Handrail posts will be measured for payment for each handrail post and will include the hardware and wire rope necessary for installation.

150268.05 BASIS OF PAYMENT.

A. Payment for Piles, Steel, HP14x89 shall be made at the contract unit price per linear foot. The unit price bid per vertical linear foot of pile shall include all labor, material, and equipment for furnishing the pile and the cost of one splice per pile (if required).

B. Payment for Drilled-in Pile, 30 Inch Diameter shall be made at the contract unit price per linear foot. The unit price bid per vertical linear foot of pile shall include all labor, material and equipment for drilling and installing the drilled-in pile, including structural concrete, and incidental items include Concrete and the cost of centralizers (if necessary). The cost shall include drilled-in pile excavation from ground surface to tip of the pile, including temporary casing (if necessary), disposal of excavated material, water, installing the pile and all other materials, providing equipment for checking the dimensions, and alignment of each hole. No additional payment will be given for site preparation, establishing a working platform, or maintenance of traffic.

C. Payment for Concrete Panels shall be in cubic yards. The unit price will include labor, material and equipment required for installation. It also includes the reinforcing and the drainage material, elastomeric sealant and wire mesh screen.

D. Payment for porous back fill shall be in cubic yards. The unit price will include labor, material and equipment required for placing and compacting the backfill.

E. Payment for the Handrail shall include each handrail post. The unit price will include the associated hardware and wire rope required for installation of the completed handrail, including the labor, material and equipment for installation.