SP-150273
(New)

SPECIAL PROVISIONS
FOR
TEMPORARY SHORING

Black Hawk County
NHSN-063-6(97)--2R-07

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.

150273.01 DESCRIPTION.

A. This work shall include furnishing, installing, and removing temporary shoring in area 1 through 4 as shown in the plans. The purpose of the temporary shoring is to retain the Chicago, Central and Pacific Railroad (CC&P) shoofly embankment fill, and to facilitate CC&P Bridge Abutment wing wall demolition and pile removal.

B. The temporary shoring shall consist of sheet piles, soldier piles and bracing elements as shown in the plans. The bracing elements shall consist of walers, struts and rakers.

C. The Contractor is responsible for all earthwork that is necessary to assist the wing wall demolition and pile removal. The Contractor is also responsible for providing sump pumps to keep excavated area (for wing wall demolition and pile removal) dry.

D. Design Criteria: Design stresses shall be in accordance with AASHTO LRFD 7th Edition, AREMA Manual for Railway Engineering 2017 and CC&P requirements. Each member or support element shall be designed to support the maximum loads that can occur during construction. In the event of contradiction, the most stringent of these shall prevail.

E. Qualifications: The Contractor shall meet the qualification requirements described in this section in order to perform the work.

1. An on-site superintendent shall be present at the job site at all times during the performance of the work. The on-site supervisor shall have at least 3 years of construction experience in the installation of soldier pile and lagging walls, 3 years of construction experience in the installation of sheet pile walls (including bracing), and shall have supervised the successful installation of three of each wall type in the past 5 years. The work experience time period is computed by the addition of all documented durations of the work time on construction projects.

2. Operators installing soldier piles and sheet piles shall have successfully installed at least three similar systems.

150273.02 MATERIALS.

A. Steel Soldier Pile.

1. Steel soldier pile shall 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. Timber Lagging.
Timber lagging shall be graded for extreme fiber stress of at least 1100 pounds per square inch and with the full dimension thickness shown in the plans.

C. Raker Footing Concrete.
Concrete for raker footings shall conform to Sections 2403 and 2405 of the Standard Specifications. Concrete shall be Class C in conformance with Materials I.M. 529 and have a minimum 28 day compressive strength of 3500 psi.

D. Steel Sheet Piles.

1. Steel sheet piles shall conform to Section 4167 of the Standard Specifications.

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

E. Walers, Struts and Rakers.

1. Walers and struts shall conform to Section 4167 of the Standard Specifications.

2. Rakers shall conform to Section 4152 of the Standard Specifications and ASTM A 500, Grade B.

3. Storage, transportation, and handling shall be performed in a manner to prevent bending stresses or other damage.

F. Steel Shims, Stiffener Plates, End Plates and Bent Plates.
Shims, stiffener plates, end plates and bent plates shall conform to Sections 2408 and 4152 of the Standard Specifications and ASTM A709, Grade 50.

G. Roll Chocks.
Roll chocks shall conform to Section 4152 of the Standard Specifications and ASTM A709, Grade 50. If cut sections of waler are substituted for the specified roll chock shape, as allowed per the plans, Section 4167 of the Standard Specification shall apply.

H. Epoxy Anchors.

1. Polymer grout for drilled-in anchors shall be as specified in the plans and conform to Sections 2405 and 2408 of the Standard Specifications and Materials I.M. 491.11.

2. Anchors shall be as specified in the plans and conform to ASTM F 1554, Grade 105.

150273.03 CONSTRUCTION.

A. Submittals.

1. Prior to initiating construction of the temporary shoring, the Contractor shall submit to the Engineer a report which identifies the Contractor's personnel who will be performing and supervising the work and meet the requirement under the article Qualification in this Special Provision. The report shall include the names on-site supervisors and operators. The report shall also contain a list of employees' names and telephone numbers, location and dates of previous projects, and the extent of work performed. This information must be verifiable.

2. The Contractor shall submit their proposed temporary shoring installation plans to the Engineer for review and approval. The submission shall consist of details required to completely describe the temporary shoring shall include the following:

- **a.** Shop drawings for the temporary shoring shall indicate, at a minimum, the following:
  - **1)** Coordination with temporary shoring and dewatering for groundwater suppression system construction, groundwater suppression system, shoofly embankment, CN Bridge demolition and permanent embankment fill.
  - **2)** Sequence of construction.
  - **3)** Sequence of installation for each area and type of shoring.
  - **4)** Raker concrete footing layout
  - **5)** Soldier pile layout.
  - **6)** Sheet pile layout.
  - **7)** Bracing layout
  - **8)** Corner details for the proposed sheet pile layout.
  - **9)** Connection detail between SPL and sheet piles.
  - **10)** Connection detail between SPL and the CC&P Bridge Abutment Wall.
  - **11)** Connection of bracing elements.
  - **12)** Grade and strength of all construction materials used.
  - **13)** Details of any earth work to create a working platform (if needed).
  - **14)** Sump pump locations (horizontal and the lowest vertical location) and capacity.
- **b.** Descriptive data and operating procedure for all equipment to be used. This shall include, at a minimum: machinery required to install soldier piles and sheet piles, install timber lagging, excavate soil, and remove obstructions. All pertinent equipment data shall be submitted, including sizes, weights, capacities, torques, and operating frequencies.
- **c.** Complete sump pump catalog information, descriptive literature, specifications, capacities and identification of materials of construction.
- **d.** Backfill and removal plan for temporary shoring.
- **e.** Contingency plan for the following:
  - **1)** Excessive ground movement
  - **2)** Excessive groundwater inflow

B. General.

1. The Contractor shall provide earthwork, excavation or fill as needed to provide a suitable working platform at the proposed location where temporary shoring is to be installed.

2. The Contractor shall install and maintain the soldier piles and lagging, sheet piles and necessary bracings in accordance with the design as shown in the plans and on the approved shop drawings 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.

3. The Contractor shall ensure no gaps or pockets occur between the retained soil and the temporary shoring.

4. Prior to driving soldier piles and sheet piles, the Contractor shall pothole to confirm the corner locations of the existing pile cap of the abutment walls, abutment wing walls, and pier.

C. Driven Soldier Pile and Lagging.

1. Installation of soldier piles shall comply with Article 2501.03, F of the Standard Specifications, except the following:
- **a.** Encasement is not required.
- **b.** Painting the piles is not required.
- **c.** If the Contractor encounters refusal before reaching the estimated tip elevation, the Contractor shall pull out the soldier pile and off-set the location to re-drive soldier pile. The adjusted location of soldier pile shall not be within 12 feet from the CC&P existing, temporary shoofly and ultimate track centerline.

2. The Contractor shall furnish soldier pile steel section in lengths based on the tip elevation provided in the plans.

3. The Contractor shall fill any gap between lagging and the retained soil with the same material specified for shoofly embankment.

D. Driven Steel Sheet Pile.

1. Before positioning sheet piles for driving, the Contractor shall clean the sheet piles and inspect for defects and proper interlock dimensions. Temporary guides or templates may be used at the Contractor's option to maintain the accuracy of the sheet pile position. Sufficient clearance shall be provided in the interlocks to allow sheet piles to slide, under sheet pile's own weight, in the interlock of the sheet pile previously placed until the top of existing ground is reached by the tip of the sliding sheet pile. The use of vibratory or impact hammer to force the interlocking of sheet piles is not permitted.

2. Before driving is started, the Contractor shall check sheet piles for position and alignment. Sheet pile top shall be located within 2 inches of the planned location. Sheet piles shall be installed in rotating stages such that the tip of any sheet pile is not more than 5 feet below the tip of any adjacent sheet pile. Sheet piles shall be driven to the approved tip elevations. Piles that are raised during the process of driving adjacent piles shall be driven down. If refusal is reached before driving to the specified tip elevation, an impact hammer may be used.

3. The Contractor shall extend sheet piles to required grade by welding on additional full length sheet piles. Sheet piles with damaged heads shall be cut off to permit further driving. Sheet piles adjoining spliced sheet piles shall be full length. These are considered incidental to the work and shall be at no additional compensation.

E. Accuracy in Placing and Driving Piles.

1. Comply with Article 2501.03, I of the Standard Specifications.

2. The driving tolerance shall be 1% of the vertical in all directions.

3. Driven piles not constructed within the required tolerances will be considered unacceptable. The Contractor shall correct all unacceptable piles to the Engineer's satisfaction. The Contractor shall furnish materials and work necessary, including engineering analysis and redesign, to complete corrections for out of tolerance construction (without either cost to the Contracting Authority or an extension of the completion dates of the project).

F. Bracing.

1. The Contractor shall install bracing system consisting of walers, rakers and struts as specified in the plans and approved shop drawings. Steel supports shall be installed true to the line and grades as per the plans and approved shop drawings. The Contractor shall

install steel shims to ensure firm contact between walers and the sheet piles, and between walers and soldier piles.

2. The Contractor is responsible for excavation to install raker's concrete footings. The excavation for raker concrete footing installation shall not extend below the bottom of the footing.

3. All rakers and waler of temporary shoring area 1 shall not be installed until shoofly embankment fill is placed to the bottom of shoofly subballast elevation. The waler of temporary shoring area 1 shall not be connected to the CC&P bridge abutment wall until shoofly embankment fill is placed to the bottom of shoofly subballast elevation.

G. Temporary Excavation for Wing Wall Demolition and Pile Removal.

1. The Contractor shall utilize both temporary dewatering system of project NHSX-063-6(96)--3H-07 and sump pumps for groundwater control measures. Installation of excavation support systems shall not be done without groundwater control measures. The Contractor shall provide at least sump pump(s) with 250 gallons per minute capacity at each northeast, southeast, and southwest wing wall area.

2. Sloped excavation in temporary shoring areas 2, 3 and 4 shall not be steeper than 1.5H:1V.

H. Removal of Temporary Shoring.

1. The Contractor shall remove all elements of temporary shoring, except rakers and raker concrete footing.

2. The Contractor shall repair any settlement or damage to the work or to adjacent property as a result of removing temporary shoring.

3. If backfill material is loosened as a result of removing sheeting, soldier pile or other members, the Contractor shall re-compact the loosened backfill. Re-compaction shall be incidental and shall not be compensated separately.

4. The Contractor shall be prepared to remove sheet piles and soldier piles by static method or by using a vibratory hammer.

I. Raker Concrete Footing Installation.

1. Do not place the raker concrete footing until after subgrade has been compacted.

2. Subgrade for raker concrete footing placement shall be compacted to minimum of 95% relative compaction as determined in accordance with ASTM D 698.

3. Raker concrete footings shall be placed and cured in conformance with Sections 2403 and 2405 of the Standard Specifications and reach the specified 28-day compressive strength prior to the installation of raker-footing connection.

150273.04 METHOD OF MEASUREMENT.

A. Driven Sheet Pile.
Measurement for Driven Sheet Pile, in square feet, will be the quantity shown in the contract documents. Measurement is based on sheet pile length along the baseline of the sheet pile and height from top of sheet piles to tip of sheet piles shown in plans.

B. Driven Soldier Pile.
Measurement for Driven Soldier Pile, in linear feet, will be the quantity shown in the plans. Measurement is based on soldier pile length along soldier pile section center from top of soldier piles to tip of soldier piles.

C. Timber Lagging.
Measurement for Timber Lagging, in square feet, will be the quantity shown in the plans. Measurement is based on areas between soldier pile webs, areas between soldier pile web and CC&P bridge abutment, areas between end of sheet piles and CC&P bridge abutment, and areas between soldier pile web and sheet pile, as shown in the plans.

D. Steel Waler and Strut.
Measurement for Steel Waler and Strut, in linear feet, will be the quantity shown in the plans.

E. Steel Raker.
Measurement for Steel Raker, in linear feet, will be the quantity shown in the plans.

F. Raker Concrete Footing.
Measurement for Raker Concrete Footing, in cubic yard, will be the quantity shown in the plans.

G. Excavation for Wing Wall/Pile Removal.
Measurement for Excavation for Wing Wall/Pile Removal, in cubic yard, will be the quantity shown in the plans. Measurement for northwest wing wall is based on excavation volume from shoofly grading to bottom of excavation. Measurement for southeast and southwest wing wall is based on excavation volume from existing grade to bottom of excavation.

150273.05 BASIS OF PAYMENT.

A. Driven Sheet Pile.

1. Payment for Driven Sheet Pile will be at the contract unit price per square foot.

2. Payment is full compensation for:
- Furnishing and installing driven sheet piles including the sheet pile corner welding.
- Splicing piles.
- Cutting off excessive pile lengths to the specified top of pile elevation.
- Removal of all sheet piles.

B. Driven Soldier Pile.

1. Payment for Driven Soldier Pile will be at the contract unit price per linear foot.

2. Payment is full compensation for:
- Furnishing and installing driven soldier piles.
- Splicing piles.
- Cutting off excessive pile lengths to the specified top of pile elevation.
- Removal of all soldier piles.
- Up to re-driving 5 soldier piles.

C. Timber Lagging.

1. Payment for Timber Lagging will be at the contract unit price per square foot.

2. Payment is full compensation for:

- Furnishing, installing and removal of timber lagging, and filling gaps between the timber lagging and the retained soil.
- Furnishing and installing angle plates and anchors associated with timber lagging installation.

D. Steel Waler and Strut.

1. Payment for Steel Waler will be at the contract unit price per linear foot.

2. Payment is full compensation for:
- Furnishing and installing steel walers and struts.
- Welding jointing sections.
- Furnishing and installing shims, stiffener plates, and end plates for all locations specified in the plans and approved shop drawings.
- Furnishing and installing waler connection to the CC&P bridge abutment.
- Cutting off excessive waler and strut lengths as needed.
- Removal of all walers and struts.

E. Steel Raker.

1. Payment for Steel Raker will be at the contract unit price per linear foot.

2. Payment is full compensation for:
- Furnishing and installing steel rakers.
- Furnishing and installing raker connection to waler and raker concrete footing.
- Fitting the length of the raker to field conditions by cutting or welding to fit field conditions.

F. Raker Concrete Footing.

1. Payment for Raker Concrete Footing will be at the contract unit price per cubic yard.

2. Payment is full compensation for:
- Excavation for raker concrete footing installation.
- Subgrade compaction.
- Furnishing and installing raker concrete footing.

G. Excavation for Wing Wall/Pile Removal.

1. Payment for Wing Wall/Pile Removal will be at the contract unit price per cubic yard.

2. Payment is full compensation for:
- Excavation needed for wing wall demolition and pile removal.
- Groundwater control using sump pump associated with excavation for wing wall demolition and pile removal.
- Coordination with temporary dewatering system of project NHSX-063-6(96)--3H-07.

3. Payment does not include backfill. Backfill shall be paid in accordance with project NHSX-063-6(75)--3H-07.