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September 1, 2020

ADDENDUM 3 – JOB 2

TO: All prospective bidders on Project NHU-2-094(169)932, Job No. 2 scheduled for the September 4, 2020 bid opening.

The following request for proposal revision shall be made:

Request for Proposal Revisions:
See attached summary from Matt Linneman, P.E. dated September 1, 2020 for an explanation.

Remove and Replace SP 1148(14) SOLDIER PILE WALL with the revised version dated 9/1/2020.

This addendum is to be incorporated into the bidder's proposal for this project.

PHILLIP MURDOFF, P.E. – CONSTRUCTION SERVICES ENGINEER
80: jwj
Enclosure

PLAN ADDENDUM SUMMARY AND APPROVAL

PROJECT INFORMATION					
Project:	NHU-2-094(169)932			**PCN:**	22787
Location:	Valley City I-94 East Business Loop				
Date:	09/01/2020	**Lead Designer:**	Aaron Murra		
Bid Opening Date:	09/04/2020	**JOB#:**	2	**Addendum#:**	3

1148(14) SPECIAL PROVISION CHANGES		
Section	**Page #**	**Description**
Timber Lagging	1	Changed the minimum allowable bending stress to 875psi for the timber lagging.
Basis of Payment	8	Clarified that the soldier pile wall will be paid as plan quantity.

APPROVAL

Should the revisions described above be processed as a plan addendum?

_X_____ Yes _____ No

Matt Linneman 09/01/20

Matt Linneman, P.E. – Materials & Research Engineer

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

SOLDIER PILE WALL

Project NHU-2-094(169)932 – PCN 22787

DESCRIPTION

This work consists of furnishing equipment, materials, and experienced labor to complete a soldier pile wall. The work includes but not limited to mobilization, drilled shaft excavations, installation of steel soldier piles, timber lagging and drainage aggregate. Furnish all labor, materials, tools, supervision, transportation, installation equipment, and incidentals necessary to complete the work specified herein and as shown in the plans

MATERIALS

A. General.
Do not deliver the materials to the site until the Engineer has approved the Contractor E xperience Requirement submittals.

B. Steel Soldier Piles.
Provide steel soldier piles conforming to Section 840.01 “Steel Piling” and the type and weight indicated in the plans. Galvanize the exposed portion of the soldier piles conforming to Section 854.01 “Galvanizing”.

C. Structural Concrete Backfill
Provide Concrete conforming to Section 802 “Portland Cement Concrete” with the following revisions:

- Attain a minimum compressive strength of 3,000 psi at 7 days.
- Minimum slump of 8 inches, as measured at the chute of the concrete truck.
- Use Class F fly ash to replace 25 to 35 percent of the cement by weight.
- Provide water reducing and/or retarding concrete admixtures Types A, B or D, as classified under ASTM C 494 that meet the requirements of AASHTO M 194, to achieve the required concrete workability and slump throughout concrete placement.

D. Lean-Mix Concrete Backfill
Provide Concrete conforming to Section 802 “Portland Cement Concrete” with the following revisions:

- Ensure the lean-mix concrete backfill can be removed to accommodate the timber lagging

E. Timber Lagging
Use a minimum 6-inch thick timber with a minimum allowable bending stress of 875 psi and a minimum allowable shear stress parallel to the grain of 75 psi. Furnish timber lagging consisting treated with Copper Napthenate according to AASHTO M 133. Alternative

Timber lagging can be submitted for approval with calculations supporting its adequacy.

F. Drainage Aggregate

Supply aggregate meeting Class 7 aggregate from section 816.02, table 816-01.

The Engineer will sample and test drainage aggregate according to Section 816.04 of the Field Sampling and Testing Manual.

CONSTRUCTION REQUIREMENTS

A. Contractor Experience Requirements

1.) Within 5 business days after the bid opening (prior to award of the Contract):

a. Submit proof that the Contractor performing the work described in this special provision has installed similar size and length drilled shafts/soldier pile walls, using similar installation methods in comparable ground conditions. Provide a list describing at least three drilled shaft projects completed in the last 5 years and at least 1 soldier pile wall completed in the last 10 years. Provide a single-page summary for each project including the following:

- A brief description of the project,
- The project's location and project date,
- The project's owner, and
- An owner reference, including an individual's name, relationship to the project, and current phone number.

2.) Once the project is awarded:

a. Assign an on-site supervisor with at least two years of experience supervising construction of drilled shafts and/or soldier pile walls of similar size and scope to those shown in the plans, and in similar geotechnical conditions to those described in the plans. Provide a resume for the on-site supervisor documenting this experience. Project management level positions indirectly supervising on-site shaft construction operations are not acceptable for this experience requirement.

b. Provide drill rig operators that have at least one year of experience in construction of drilled shaft foundations on the equipment proposed for this project using the methods proposed for this project (wet method drilled shaft construction, etc.). Submit a list of projects for each of the drill operators demonstrating at least one year of experience installing soldier pile wall foundations of similar size (diameter and depth) and scope to those shown in the Plans.

c. Submit the information documenting and satisfying the on-site supervisor and drill rig operator as described above within 5 business days after the award of the Contract, to the NDDOT Construction Services Division. Only those individuals designated as meeting the qualifications requirements can be used for the project. No substitutes for any of these individuals can be made without written approval of the Engineer. Work may be suspended if unqualified personnel are substituted for the approved personnel during construction.

B. Shaft Installation Narrative.

Develop a Shaft Installation Narrative referencing the available subsurface data for the project. Submit the Shaft Installation Narrative to the Engineer for acceptance at least 14 calendar days before the project Pre-Construction Conference.

In the Shaft Installation Narrative, account for potential ground movement due to the active landslide in the selection of drilling equipment, drill tooling, stabilization of the drilled shaft excavation, steel soldier pile placement, and concrete placement operations. Include the following information in the Shaft Installation Narrative:

1) Proposed overall construction operation sequence.

2) The description, size, and capacities of proposed drilling equipment, including but not limited to, cranes, drills, auger, bailing buckets, final cleaning equipment, and drilling unit. Describe why the equipment was selected and describe equipment suitability to the anticipated site conditions and work methods. Include a project history of the drilling equipment demonstrating the successful use of the equipment on drilled shafts of equal or greater hole size in similar soil/rock conditions. Include specific details of drilled shaft excavation and cleanout methods.

3) A list of potential problems that could occur during construction of the drilled shafts and proposed solutions. Include equipment breakdowns and related contingency plans. Include potential problems related to the subsurface conditions at the site, and landslide movement considering the rate of ground movement measured at the site.

4) Details of method(s) proposed to ensure drilled shaft stability (i.e., prevention of caving, bottom heave, using temporary casing, slurry, or other means) during excavation (including pauses and stoppages during excavation) and concrete placement.

5) A slurry mix design (if slurry is proposed), listing and describing all additives and their specific purpose in the slurry mix, with a discussion of their suitability to the anticipated subsurface conditions. Discuss the procedures for mixing, using, and maintaining the slurry.

6) A detailed plan for quality control of the selected slurry (if slurry is proposed), listing:

   - The tests to be performed,
   - Test methods to be followed,
   - Name and qualifications of individual(s) completing testing, and
   - Slurry properties to achieve with consideration of the anticipated subsurface conditions and shaft construction methods, in accordance with the slurry manufacturer's recommendations and these Special Provisions.

7) A description and details of the storage and disposal plan for excavated material and drilling slurry (if applicable). Include permit applications and approved permits required for slurry storage and disposal.

8) The details of concrete placement, including proposed operational procedures for pumping methods, the estimated time for concrete placement, and a sample uniform yield form for plotting the approximate volume of concrete placed versus the depth of shaft for all shaft concrete placement.

9) A concrete mix design meeting the requirements of this Special Provision.

10) The procedure and materials that will be used to grout the annulus between permanent casing and the soil/rock, if drilling procedures will result in an annulus. Provide a grout mix design that can be pumped to the bottom of the permanent casing and achieves an unconfined compressive strength of at least 100 psi at 7 days per ASTM D 2166.

C. Shaft Excavation.

Excavate the shafts to the required depth as shown in the Plans. Select appropriate methods and equipment. The shafts should be no larger than 2" of the specified diameter as shown in the plans.

Ensure that the sidewalls of the shafts do not collapse during drilling. If the sidewalls are collapsing during open hole drilling use (a) mineral or polymer slurry, (b) casing that is intimate contact with the sidewalls of the excavation, (c) casing that is intimate contact with the sidewalls of the excavation in combination with water slurry, or (d) a combination of (a) and (b) to maintain excavation stability during shaft excavation, installation of the steel soldier piles, and concrete placement.

Conduct shaft excavation operations, including casing installation and removal, such that the soil adjacent to the shaft for the full height of the shaft is not disturbed. Disturbed soil is defined as soil whose geotechnical properties have been changed from those of the original in-situ soil, and whose altered condition adversely affects the structural integrity of the drilled shaft or the interface between the drilled shaft and the soil.

Provide equipment for checking the dimensions and alignment of each shaft excavation. Determine the dimensions and alignment of each shaft. The Engineer will check the alignment of the drilling equipment at the beginning of shaft construction and periodically thereafter. Measure the final depth of the shaft after the final cleaning is completed.

Contain all water and drilling slurry for disposal. Collect and dispose of excavated soil and slurry without allowing erosion or runoff. Follow all local, state and federal laws and regulations for handling, collecting, storage, transporting and disposing of the drilled shaft spoils and slurry.

1) Excavation Stops.

a. **General.**

Conduct the excavation in a continuous operation until the excavation of the shaft is completed, except for pauses and stops as noted.

Pauses for casing splicing, tooling changes, slurry maintenance, and removal of obstructions are permissible during excavation operations.

Stops are shaft excavation operation interruptions for anything other than casing splicing, tooling changes, slurry maintenance, or removal of obstructions.

Do not exceed 65 hours for stops in any excavations.

During stops, stabilize the shaft excavation to prevent bottom heave, caving, loss of slurry, and loss of ground. The Contractor bears full responsibility for selection and

execution of the method(s) of stabilizing and maintaining the shaft excavation. Stabilize the shaft in conformance to the approved Shaft Installation Narrative Submittal.

b. **Slurry Levels.**
If slurry is present in the shaft excavation, maintain the minimum slurry level required by this special provision throughout the stoppage of the shaft excavation operation. Before resuming excavation, recondition the slurry to the required slurry properties.

2) Temporary Drilled Shaft Casing.
If using temporary drilled shaft casing for excavation stabilization, furnish temporary drilled shaft casing in with this Special Provision and the approved Shaft Installation Narrative.

Provide enough temporary casing to meet the needs of the anticipated construction method. Provide a casing with an outside diameter at least 3 inches greater than the outside diameter of the permanent casing. Completely remove temporary casing after shaft construction is complete, without deforming or causing damage to the completed shaft and without disturbing the surrounding soil. As the temporary casing is withdrawn, maintain the concrete and slurry inside the casing at a level sufficient to balance the hydrostatic pressure outside the casing.

3) Bottom of Shaft Excavation.
Use a cleanout bucket or air lift to clean the bottom of the excavation of all shafts. Ensure that no more than 2 inches of loose or disturbed material is present over the shaft base area immediately prior to placing concrete.

Sound the bottom of the excavated shaft with a steel tape with a heavy weight of at least 1 pound attached to the end of the tape or other means acceptable to the Engineer to determine that the shaft bottom is at the depth shown in the plans.

After observing the Contractor inspecting each shaft for cleanliness and depth, the Engineer will approve each shaft prior to the Contractor proceeding with construction.

4) Required Use of Slurry in Shaft Excavation.
Use slurry to maintain a stable excavation during excavation and concrete placement operations once water begins to enter the shaft excavation at an infiltration rate of 12 inches of depth or more in 1 hour. If concrete is to be placed in the dry, pump all accumulated water in the shaft excavation down to a 3-inch maximum depth prior to beginning concrete placement operations.

D. Wall Tolerances
Place the soldier piles at the locations shown in the plans. The soldier piles should not deviate more than 2 inches from the horizontal alignment and should not deviate more than 1 inch from the vertical alignment of the wall as shown in the plans. Place the soldier piles within the shaft so that they are vertical and not inclined more than 1 inch between top to bottom. Do not allow the orientation of the flanges to vary by more than 10 degrees. Support the soldier pile so that it does not move during concrete placement.

Install the soldier pile tips within 0.5 feet of the specified tip elevations shown in the plans. Up to 2 feet of concrete can be placed at the bottom of the shaft to assist in aligning the

soldier pile. Block or clamp the soldier pile in place at the ground surface prior to placing any concrete.

Check the position, the vertical alignment and orientation of the soldier pile immediately after concrete placement. Provide corrective measures for any wall element that does not meet the tolerance requirements described above. All materials and work associated with completing necessary corrections for out of tolerance soldier piles must be furnished without cost to the Department. Any proposed corrective measure must be approved by the Engineer in writing.

E. Welding and Splicing

Splicing of the soldier piles is not permitted unless approved by the Engineer. Certified and qualified welders should perform any necessary structural welding. Cut the soldier piles to the elevations shown in the plans and properly dispose of any cut-off lengths.

F. Concrete Placement.

1) General.

Commence concrete placement immediately after approval of the completed excavation by the Engineer. Place structural concrete from the bottom of the shaft to the bottom elevation of the timber lagging. Place lean mix concrete from the bottom elevation of the timber lagging to the top of the wall as shown in the plans.

2) Dry Excavation.

If 3 inches of water or less is present at the base of the drilled shaft before concrete placement, concrete can be placed by free-falling the concrete from the ground surface down the drilled shaft and around the steel soldier pile.

3) Wet Excavation.

If greater than 3 inches or more of water or slurry is present at the base of the excavation immediately prior to concrete placement, place the concrete at the bottom of the shaft by using a watertight tremie pipe having a minimum diameter of 4 inches and equipped with an attached hopper.

Keep the discharge end of the tremie pipe at the bottom of the shaft during placement of the concrete until the concrete level in the excavation is at least 5 feet above the discharge end of the tremie pipe.

Include a device to seal out water from the discharge end of the tube on the tremie pipe while it is first filled with concrete. Alternatively, use a plug manufactured for use in concrete tremie pipes that is inserted at the top of the tremie pipe and travels through the tremie to keep the concrete separated from the water and slurry. Completely fill the tremie pipe and hopper with concrete prior to allowing the plug to discharge from the end of the tremie pipe.

Throughout the concrete placement operation, keep the discharge end of the tremie pipe submerged in the concrete at least 5 feet and maintain a sufficient level of concrete in the tremie pipe contain to prevent water from entering the pipe.

Place concrete in a single continuous operation, resulting in a shaft composed of seamless, uniform concrete. Overpump the concrete in the excavation until uniform

concrete visually free from slurry, soil, and laitance reaches the top elevation of the shaft. Remove excess concrete and contaminated concrete above the top elevation of the shaft.

4) **Testing and Repair of Concrete Placed in a Wet Excavation.**
If the underwater concrete placement operation is interrupted, the Engineer may require the Contractor to prove by core drilling or other tests that the shaft contains no voids or horizontal joints. If testing reveals voids or joints, repair or replace the shaft at no expense to the Department. If no voids or joints are discovered, responsibility for coring costs will be in accordance with Section 109.03, “Negotiated Price.”

5) **Cleaning and Removal of Placed Drilled Shaft Concrete.**
Remove all accumulations of soil, loose aggregate, contaminated concrete, or other debris on the surface of the drilled shaft concrete to expose fresh concrete and smooth any high spots on the upper surface of the exposed fresh concrete. Verify that the top of the drilled shaft is in conformance with the planned elevation.

6) **Protection Fresh Concrete.**
Ensure no shaft is installed adjacent to a shaft in which the concrete has less than a 48-hour cure. Installing the shafts in an alternating sequence or any other sequence that meets this criteria is permissible. Cover unattended open shafts to prevent anything from falling in. No shaft excavation is allowed to be left un-poured overnight.

7) **Uniform Yield Form.**
Except for shafts where the shaft concrete is placed in the dry or inside permanent casing, complete a uniform yield form, consistent with the sample form submitted as part of the approved Shaft Installation Narrative, for each shaft. Submit the completed form to the Engineer within 24 hours of completing the concrete placement in the shaft.

8) **Rejection of Shafts and Revisions to Concrete Placement Operations.**
If the Engineer determines that the concrete for a given shaft is structurally inadequate, that shaft will be rejected. Suspend subsequent placement of concrete until submitting written changes to the Shaft Installation Narrative. Describe the actions that will be taken to ensure concrete is structurally adequate. Do not continue with shaft installation until the revised Shaft Installation Narrative is approved by the Engineer.

G. Timber Lagging

Place the lagging boards between the flanges of the soldier piles and bearing against the flanges on the exposed side of the wall so that the soldier pile flange overlaps the end of the lagging by at least 2.5 inches at both ends of the lagging boards. Perform excavation for placement of the lagging in such a manner that the lagging is tight against the excavation cut face. To permit drainage, provide 1/8 inch spacing between the lagging boards. Do not install lagging or backfill behind the soldier piles or lagging until concrete has reached the minimum compressive strength requirement.

H. Drainage Aggregate Installation

Place drainage aggregate to fill the depression created by the existing landslide as shown in the plans. Do not run compaction equipment within 6 feet of the timber lagging.

METHOD OF MEASUREMENT

The soldier pile wall will be paid as plan quantity.

BASIS OF PAYMENT

The unit price of the soldier pile wall is full compensation of the work, including but not limited to, all necessary excavations for the drilled shafts; hauling, stockpiling and disposal of excavated material; performing all necessary pumping; furnishing and placing required concrete; any casing or slurry required; furnishing, placement, and removal of temporary casings; permits, placement, maintenance, storage, removal and disposal of slurry; furnishing and placing soldier piles, timber lagging and drainage aggregate; and for furnishing all tools, labor, equipment, materials and incidentals necessary to complete the work.

The plan quantity for soldier pile wall will be paid for at the contract unit price for:

Spec - Code	Pay Item	Pay Unit
930-9543	RETAINING WALL	Square Feet

Such payment is full compensation for furnishing all material, equipment, labor, and incidentals to complete the work as specified.