

November 10, 2020

ADDENDUM 2 – JOB 1

TO: All prospective bidders on Project SU-IM-8-984(153)156, Job No. 1 scheduled for the November 13, 2020 bid opening.

The following plans and request for proposal revision shall be made:

Plan Revisions:

See attached summaries from Paul Benning, P.E. dated November 9, 2020 for an explanation.

Request for Proposal Revisions:

Revised Special Provision SP 73(20) GEOFOAM & WICK DRAINS.

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:	SU-IM-8-984(153)156	PCN: 21564
Location:	Fargo, ND	
Date:	11/09/2020	Lead Designer: Scott Middaugh
Bid Opening Date:	Nov 13, 2020	JOB#: 1 Addendum#: 2

PLAN SHEET CHANGES		
Section	Sheet	Description
6	3	Revised note 203-P02. Added language that material will be measured at point of placement.
6	10	Revised note 770-P08. Revised note to allow for either aluminum light standards with transformer bases or stainless steel light standards with H-bases. Added "Type A" to note title to denote that this pole is used with the "Type A" luminaire. Revised note 770-P09. Added "Type B" to the note title to denote that this pole is used with the "Type B" luminaire. Revised note 770-P11. Revised the catalog number to specify the shorting cap instead of the photoeye. Revised note 770-P12. Revised catalog number to add knockouts and denote it as a special order
170	28	Added Top Post Connection Detail Moved items around on sheet to make room for detail

SPECIAL PROVISION CHANGES	
Special Provision	Description
SP 73(20) GEOFOAM & WICK DRAINS	Revised specification for geomembrane.

APPROVAL

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

 X Yes No

Paul M. Benning
Paul Benning, P.E. – Local Government Engineer

11/9/2020
Date

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

GEOFOAM & WICK DRAINS

Project: SU-8-984(153)156 - PCN 21564

DESCRIPTION

This work consists of furnishing and placing sand drainage layer, wick drains, sand cushion, expanded polystyrene (EPS) geofoam, and geomembrane.

EQUIPMENT

A. Sand Drainage & Sand Cushion

Refer to Section 302.02 EQUIPMENT in the Standard Specifications.

B. Wick Drains

The wick drains shall be installed with equipment which will cause minimum disturbance to the subsoil during installation. The wick drains shall be installed with a sleeve or mandrel that will be advanced to the required depth using constant load, or constant rate of advancement methods. The mandrel shall protect the wick drain material from tears, cuts and abrasions during installation and shall be withdrawn after the installation of the drain. The drain shall be installed with the approved anchorage to anchor the bottom of the drain at the required depth at the time of mandrel removal. This cross sectional area of the mandrel and anchor combination shall not be greater than 10 square inches. The wick drain installation unit shall be capable of applying a minimum downward force of 30,000 pounds.

The use of falling weight impact hammers or jetting shall not be permitted for installation of wick drains. Vibratory techniques may be used to penetrate stiff upper soil layers but may not be used once the mandrel has penetrated underlying compressible soils.

C. EPS Geofoam

Use machine or handheld equipment that will not result in damage to the underlying soil or geofoam on which the blocks are placed. Any blocks damaged by equipment shall be replaced at the Contractor's expense.

D. Geomembrane

Use machine or handheld equipment that will not result in damage to the underlying soil or geofoam on which the membrane is placed. Any membrane or geofoam blocks damaged by equipment shall be replaced at no cost to the owner

MATERIALS

A. Sand Drainage & Sand Cushion

Supply aggregate that meets the requirements of the table below:

Sieve Size	Percent Passing
2 inch	100
No. 40	5-40
No. 200	0-5

B. Wick Drains

Wick drains shall be commercially available prefabricated type made up of a ribbed or corrugated plastic core wrapped in a filter of non-woven synthetic material. The core shall be fabricated with suitable drainage channels. Drains shall be free of defect, rips, holes, or tears. During shipment and storage, drains must be wrapped in a protective covering to prevent exposure to natural light.

The core shall have a minimum thickness of 0.089" and a minimum width of 3.8".

The fabric wrap must meet the requirements of the table below:

Geosynthetic Material Property	Test Method	Value
Core Tensile Strength	ASTM D638	175 lbs. min.
Fabric Grab Tensile Strength	ASTM D4632/D4632M	110 lbs. min.

Handling and storage of wick drain materials should follow the manufacturer's recommendations. During shipment and storage, the wick drain material shall be wrapped in a heavy-duty protective covering. The storage area shall be such that the wick drain material is protected from sunlight, mud, dirt, dust, debris, and detrimental substances. The drains shall be free of defects, rips, holes, or flaws. Damaged materials shall be replaced at the Contractor's expense.

All wick drain material delivered to the site shall be labeled or tagged for quality control purposes. Each roll shall be identified by lot or control numbers, individual roll number, date of manufacture, manufacturer, and product identification.

Wick drains shall be produced by a manufacturer with an in-place quality control program which is monitored by an independent third-party testing organization.

C. EPS Geofoam

Geofoam shall be commercially available material meeting the requirements of Rigid Cellular Polystyrene Geofoam, ASTM D6817 with the following minimums.

- Minimum Compressive Strength at 1% Deflection of 5.8 PSI
- Minimum Flexural Strength of 30.0 PSI
- Minimum Density of 1.15 lbs/CF

Handling and storage of EPS geofoam materials should follow the manufacturer's recommendations. During shipment and storage, the EPS geofoam material shall be wrapped in a heavy-duty protective covering. The storage area shall be such that the wick drain material is protected from sunlight, moisture, fire, mud, dirt, dust, debris, and detrimental substances. The EPS geofoam should not be exposed to open flame or other ignition sources, nor should it be exposed to organic solvents, petroleum product and their vapors (examples include, but are not limited to, acetone, paint thinner and gasoline). Damaged materials shall be replaced at the Contractor's expense.

Provide temporary ballast or other restraint prior to and during installation.

All EPS geofoam material delivered to the site shall be labeled or tagged for quality control purposes. Each block or group of blocks shall be identified by lot or control numbers, date of manufacture, manufacturer, and product identification.

EPS geofoam shall be produced by a manufacturer with an in place quality control program which is monitored by an independent third party testing organization.

D. Geomembrane

The geomembrane material shall consist of a separate, puncture free geomembrane. The geomembrane shall be a LLDPE-B membrane, or approved equal. The geomembrane must be able to protect the geofoam from spilled liquid hydrocarbons (like gasoline, diesel fuel, kerosene, etc.) as well as cover and conform to the corners of the EPS geofoam blocks at 45 degrees Fahrenheit, without heat being applied. It shall meet the following physical and chemical requirements, specified as minimum or maximum, not average roll properties:

Property	Test Standard	Value
Thickness	D-5199	Min. 30 mil
Density	D-1505	Min. 0.94g/cm ³
Carbon Black Content	D-1603	Min. 2.00%
Tensile Properties		
Stress at Yield		Min. 63/lb/in-width (smooth and textured)
Stress at Break		Min. 114 lb/in-width (smooth), 45 lb/in-width (textured)
Strain at Break		Min. 700% (smooth), 100% (textured)
Strain at Yield	D-6693	Min. 12%
Tear Resistance	D-1004	min. 21 lbs (smooth and textured)
Puncture Resistance	D-4833	min. 54 lbs (smooth), 45 lbs (textured)
Bonded Seam Strength	D-4437	min. 63 lb/in-width (smooth), 45 lb/in-width (textured)

The geomembrane roll stock shall be factory fabricated into the largest panels possible to minimize field seams. Field fabrication will not be allowed. Prior to factory seaming, all roll goods shall be inspected. All factory seams shall have a minimum width of 1 inch. The surface of the welded areas must be dry and clean. Pressure must be applied to the full width of the seam on the top and bottom surface while welded area is in a melt-type condition.

All panels and seams shall be 100% visually inspected during fabrication. No defective seams will be allowed. Upon discovery of any defective seam, production shall stop and the seam shall be repaired. Production personnel shall determine and rectify the cause of the defect prior to continuation of the seaming process.

In addition to visual inspection, a 48-inch weld sample shall be made with each factory seam welding unit used in this work at the beginning of every work shift and every four hours of production thereafter. Sample shall be taken from a seam specifically made for quality testing and not taken from the fabricated panel itself. Test specimens shall be cut at quarter points from each 48-inch seam sample (a total of three places) and tested for seam strength and peel adhesion. The bonded seam strength shall be tested in accordance with ASTM D4437.

A log shall be maintained showing the date, time, panel number and test results. Failure of the material and/or seams to meet all the requirements of these specifications may be cause for rejection of the material and/or seams as appropriate. Test results shall be provided to the Engineer upon request.

Each factory-fabricated panel shall be accordion-folded and placed onto a sturdy wooden pallet designed to be moved by a forklift or similar equipment. Each panel shall be given prominent and unique identifying markings indicating the proper direction of unfolding to facilitate layout and position in the field. The panels shall be suitably packaged, enclosed and protected to prevent damage during shipment and each package shall be prominently marked in the same fashion as the panels within. Until needed, packaged factory fabricated panels shall be stored in their original unopened wrapping, and protected from the direct heat of the sun, where possible. Pallets should not be stacked.

CONSTRUCTION REQUIREMENTS

A. Sand Drainage & Sand Cushion

Refer to Section 302.04 CONSTRUCTION REQUIREMENTS except for the following:

- 302.04 A 1
- 302.04 A 3
- 302.04 F

Install the sand cushion per the geofoam manufacturers recommendations.

B. Wick Drains

Prior to the installation of wick drains, demonstrate that equipment, methods, and materials produce satisfactory installation in accordance with these specifications. For this purpose, install trial wick drains at locations designated by the Engineer. Approval by the Engineer of the method and equipment used to install the trial wicks shall not necessarily constitute acceptance of the method for the remainder of the project. If the Engineer considers that the method of installation does not produce a satisfactory wick, methods and equipment shall be altered to comply with these specifications.

1. Request the Engineer stake the proposed locations of the wick drains and take all reasonable precautions to preserve the markers. Verify the location of all existing utilities and instrumentation devices prior to installing the wick drains.
2. Wick drains that deviate from the plan locations by more than 6 inches, or are damaged, or are improperly installed, will be rejected and no compensation will be allowed for any materials furnished or for any work performed on such wick drains.

Replacement wick drains shall be offset from the location of the rejected wick drains as directed by the Engineer. The rejected wick drains shall remain in place.

3. Install the wick drains vertically to the depth(s), elevation(s), described levels, or to the firm substratum indicated in the Plans. Firm substratum is defined as the layer which resists further penetration at a reasonable effort. Provide the Engineer with a suitable means of verifying plumbness of the mandrel and determining the tip elevation of the wick drain at any time. The equipment shall be carefully checked for plumbness and shall not deviate more than $\frac{1}{4}$ inch per foot from the vertical. The wick drains shall be installed in such a sequence that construction equipment will not damage previously placed wick drains.
4. Splicing of the drain material shall be conducted in accordance with the manufacturer's recommendation to ensure structural integrity and hydraulic conductivity of the drain. A maximum of one splice per drain will be permitted without specific permission from the Engineer.
5. Where obstructions or hard layers are present that prevent the installation of a wick drain, make two additional attempts to install a wick drain within 18 inches of the original location. If the drain can still not be installed, the location will be marked and designated for obstruction clearance by means of augering, drilling, punching, or spudding. Obstruction clearance in accordance with the approved procedure will be permitted to a maximum depth shown on the Plans, or as directed by the Engineer, and only where prior approval is given by the Engineer.
6. Where obstructions cannot be cleared by the methods listed in B.5, the Engineer will determine if the wick drain is to be abandoned or installed to the required tip elevation.
7. Cut wick drains neatly at the upper end with a 4 to 8-inch length protruding above the working surface, or as shown on the Plans.
8. Installation of the drains shall be coordinated with the appropriate subcontractors such that geotechnical instrumentation (vibrating wire piezometers, shape arrays, and settlement plates) can be properly installed. Special care shall be taken to install the drains in such a manner so as not to disturb the instrumentation already in place. Reimburse the project owner for replacement of instrumentation damaged as a result of the Contractor's activities.

C. EPS Geofam

Prior to the placement of EPS geofam, the Contractor shall submit a work plan describing its proposed operations. The work plan should demonstrate that its equipment, method, and materials will produce a satisfactory installation in accordance with these specifications. If the Engineer considers that the method of installation does not produce a satisfactory geofam product meeting the intent of the project design, methods and equipment shall be altered to comply with these specifications.

Installation of the EPS geofoam shall be coordinated with the appropriate subcontractors such that geotechnical instrumentation (vibrating wire piezometers, vibrating wire settlement cells, and settlement plates) can be properly installed. Special care shall be taken to install the geofoam in such a manner so as not to disturb the instrumentation already in place. The Contractor will be required to reimburse the State for replacement of instrumentation damaged as a result of the Contractor's activities.

Coordinate with other construction elements to ensure that appropriate box outs are properly created for items that will extend into or through the geofoam.

D. Geomembrane

At least 30 days prior to the commencement of work the Contractor shall submit the following for review and approval:

1. Experience. A list of projects for the manufacturer, fabricator, and installer. Supplied information should include projects identified by name, location, project description, size, completion date, description of soil conditions, and contact person for the contracting organization.
2. Manufacturer's material specifications indicating conformance with the requirements of Sections 4.0 Materials, 5.0 Factory Seams, and 6.0 Inspection and Testing of Factory Seams.
3. The fabricator shall furnish a proposed geomembrane panel layout to be approved in writing by the Engineer prior to material shipment. The drawings will show: the direction of factory seams, the size of panels and the location of field seams, consistent with the requirements of the project drawing. These details shall include the recommended termination details of the geomembrane.
4. Manufacturer's qualifications: The manufacturer of the geomembrane of the type specified shall have at least five years of experience in the manufacture of geomembranes. In addition, the geomembrane manufacturer shall have manufactured at least one million square feet of the specified type of geomembrane in the last five years.
5. Fabricators qualifications: The fabricator of the proposed geomembrane shall have a minimum of five million square feet of fabrication experience.
6. Installer qualifications: The geomembrane installer shall have at least three years of experience in the installation of the specified geomembrane and shall have installed a minimum of five million square feet of the specified geomembrane.

Preparation: The surfaces on which the membrane is to be placed shall be maintained in a firm, clean, dry and smooth condition during the installation. All surfaces shall be compacted and smooth graded (if soil). All surfaces the membrane is to be placed on shall be free of rocks, roots, gravel, grade stakes or debris that may puncture the geomembrane.

All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to placement of the geomembrane. If groundwater is present within 12 inches below the surface to be lined, the general contractor shall dewater the area prior to and during installation of the liner.

Immediately prior to the installation of the geomembrane, the Engineer and the geomembrane installer shall perform a complete and detailed inspection to determine acceptance of the finished subgrade and elevations. Any erosion or other damage to the subgrade that has occurred shall be corrected before geomembrane placement.

Placement: Geomembrane shall not be deployed until all applicable submittals (and associated certifications) listed in Construction Requirements Section D of this specification are submitted and approved by the owner's representative. Should the geomembrane be deployed prior to approval of the Engineer, it will be at the sole risk of the geomembrane installer and/or general contractor. If the material does not meet the specification it shall be removed from the site at no cost to the owner.

Only those panels of lining material that can be anchored and seamed together the same day shall be unpackaged and placed into position. In areas where high wind is prevalent, the lining installation should begin on the upwind side of the project and proceed downwind. The leading edge of the liner shall be secured at all times with sandbags sufficient to hold it down during high winds. The leading edges of the liner material left exposed after the day's work shall be anchored with sand bags spaced no less than 10 feet to prevent damage or displacement due to wind.

The geomembrane shall be placed over the prepared surfaces in such a manner as to ensure minimum handling and in accordance with the approved shop drawings. The geomembrane shall be closely fitted and sealed around any projections through the lining. Liner panels, damaged from any cause, shall be repaired in accordance with the Repairs section of this specification.

Geomembrane placement shall not be performed if moisture present prevents proper subgrade preparation, panel placement or panel seaming.

In general, field seams shall be oriented parallel to the line of the maximum slope, i.e., the seam should run down the slope. In corners and odd geometric locations, the total length of the field seam shall be minimized. If at all possible, seams shall not be located at low points in the subgrade unless geometry requires seaming to be done at these locations.

No vehicles will be allowed on the geomembrane. Small rubber tired equipment with a ground pressure not exceeding 5 psi and a total weight not exceeding 750 lbs will normally be allowed. Typical equipment that is usually used during installation and

testing and allowed on the geomembrane include air compressors, generators, etc. Materials, equipment or other items shall not be dragged across the geomembrane surface or be allowed to slide down slopes on the lining. All parties walking or working on the liner shall wear soft-sole shoes. No smoking shall be permitted on the liner.

Field Seams: Solvent adhesive, a capable hot air welder or a wedge welder shall be used to seal the factory-fabricated panels together in the field.

These seams shall be made as a lap joint formed by lapping the edges of the sheets in accordance with the following recommendations or as specified by welder manufacturer.

Panel Overlapping for Seams:

- Chemical Seam: 6" to 8" overlap with a 2" wide seam.
- Thermal Seams: 4" to 6" overlap and a minimum 1.5" wide seam.

Avoid fishmouths, wrinkles, folds or pleats in the same area. Where fishmouths do occur, they should be slit out far enough from the seam to dissipate them, lapped, seamed together in the lapped area and patched. Any necessary repairs to the geomembrane shall be done using an additional piece of the specified parent material applied in accordance with the Repairs section this specification. All patching material shall have rounded edges.

Inspection and Testing of Field Seams: The owner's representative shall be notified prior to all pre-qualification and production welding and testing.

1. Prequalification Test Seams:

- i) Test seams shall be prepared and tested by the geomembrane installer to verify that the seaming parameters are adequate.
- ii) Test seams shall be made in accordance with ASTM D 4437 by each welding technician at the beginning of each seaming period. Test seaming shall be conducted under the same conditions and with the same equipment and operator as production seaming. The test seams shall be approximately 5 feet long for all types of field welds.
- iii) Samples shall be tested and evaluated in accordance with the specifications in Materials Section D. It should be noted that conditioning of samples and appropriate temperature and humidity requirements must be met to allow for proper testing of the geomembrane.
- iv) If there is no area on site to provide for these requirements, the trial weld samples can be sent to an independent laboratory to verify seam strength.

- v) For peel and shear testing, see Section 3, Destructive Field Seam Testing section of this document.
- vi) If a test seam fails, an additional test seam shall be immediately completed. If the additional test seam fails, the seaming apparatus shall be rejected and not used until the deficiencies are corrected and a successful full test seam can be produced.
- vii) Each test seam shall be labeled with date, geomembrane temperature, number of seaming unit, panel identification, seam number or test location, technician performing the test seam and a pass or fail description and be stored by the installer for future reference.

2. Non-Destructive Field Seam Testing

- i) The installer shall non-destructively test the full length of all field seams before the seams are covered. Each seam shall be numbered or otherwise designated. The location, date, test unit, name of QC person, and outcome of all non-destructive tests shall be recorded and submitted to the Engineer.
- ii) Testing should be performed as the seaming progresses, not at the completion of all field seaming, unless agreed to in advance by the Engineer. All defects found should be repaired, re-tested and remarked to indicate acceptable completion of repair.
- iii) Non-destructive testing shall be performed using the air lance test method (ASTM D4437).
- iv) Air Lance Testing
 - (1) Chemical and solid thermal, i.e., single track, welds can be tested utilizing the Air Lance Test Method ASTM D4437. The installer shall provide an air compressor, air hose and air lance wand with a pressure gauge capable of measuring the air flow at the tip. Experienced technicians familiar with this procedure shall perform the testing.
 - (2) This non-destructive test involves placing the air lance wand 1/4" to 1/2", but not more than 2", from the edge of the completed seam and closely monitoring the backside of the sheet for any air penetration through the seam, loose edges, ripples, and/or noise. If air penetrates the seam area, the technician will either see this visibly or hear it audibly.
 - (3) All seams tested by the air lance method shall be marked with the date tested, name of the technician, length of the seam, and test results. As with all QC work this should be documented on all QC paperwork and preferably witnessed by the owner's representative.

3. Destructive Field Seam Testing

- i) When air lance testing is performed using ASTM D4437, a minimum of one destructive sample per 500 lineal feet of field seam or at another pre-determined length should be obtained and tested in accordance with ASTM D6392 by the

geomembrane installer from a location specified by the Engineer. To obtain test results prior to completion of geomembrane installation, the geomembrane installer shall cut destructive samples as seaming progresses. The Engineer will direct where the samples are cut. The geomembrane installer shall not be informed in advance of the sample location. When air channel testing is performed, no destructive samples will be taken from the production liner but destructive samples can be obtained from the anchor trench or test welds.

- ii) All field samples shall be marked with their sample number and seam number. The sample number, date, time, location, and seam number shall be recorded. The geomembrane installer shall repair all holes in the geomembrane resulting from obtaining the samples. All patches shall be repaired and tested using an air lance test. All destructive seam areas shall be patched and tested the same day as the destructive sample.
- iii) The destructive sample size shall be 12" wide by 36" long with the seam centered lengthwise. The sample shall be cut lengthwise. The sample shall be cut into three equal sections and distributed as follows; one section given to the Engineer as an archive sample, one section given to the Engineer for laboratory testing and one section given to the geomembrane installer for field testing.
- iv) For field testing of destructive samples, the geomembrane installer shall cut 10 identical 1" wide replicate specimens from his sample. The geomembrane installer shall test 5 replicate specimens for seam shear strength and 5 for peel strength. Peel strength tests will be performed on both the inside and outside of dual track welds. To be acceptable, an average of five specimens must pass field seam specification testing requirements shown in Materials Section D.
- v) Reports of the results of examinations and testing shall be prepared and submitted to the Engineer.
- vi) For field seams, if laboratory tests fail, that shall be considered an indicator of possible inadequacy of the entire seam length corresponding to the test sample. Additional destructive samples of the subject seam shall be taken by the geomembrane installer at locations indicated by the Engineer, typically 10 feet on either side of the failed sample and laboratory seam tests shall be performed. Passing tests shall be an indicator of adequate seams. Failing tests shall be an indicator of inadequate seams. All destructive sample locations shall be repaired with a cap strip either thermally or chemically welded into place. All cap stripped seams shall be non-destructively tested with an air lance test.

4. Identification of Defects

- i) The geomembrane installer and Engineer shall inspect panels and seams during and after panel deployment to identify all defects, including holes, blisters, and undispersed raw materials.
- ii) The geomembrane installer and Engineer shall inspect seams before, during, and after field seaming to identify all dirty and wrinkled areas and any defects.

5. Evaluation of Defects

Each suspect location (both in seam and non-seam areas) shall be non-destructively tested using the air lance test method in ASTM 04437. Each location which fails non-destructive testing shall be marked, numbered, measured and posted on the daily installation drawings and subsequently repaired.

- i) If a destructive sample fails the field or laboratory tests, the geomembrane installer shall repair the seam between the two nearest passed locations on both sides of the failed destructive sample location.
- ii) Defective seams, tears, or holes shall be repaired by re-seaming or applying a cap strip.
- iii) Re-seaming may consist of either:
 - (1) Removing the defective area and rewelding the parent material using the original welding equipment, or
 - (2) Reseaming by cap stripping as described in the Repairs section of this specification.
- iv) Each patch shall extend a minimum of 6" in all directions beyond the defect.
- v) All repairs shall be measured, located and recorded.

6. Verification of repairs on seams

Each repair shall be non-destructively tested using the air lance test in ASTM D4437. Tests which pass the non-destructive test shall be taken as an indication of a successful repair. Failed tests shall be re-seamed and retested until a passing test result is obtained. The number date, location, technician, and test outcome of each patch shall be recorded.

Repairs: Any repairs made to the liner shall be made with parent material supplied by the manufacturer. For the best welding performance, the repair should be made with newly manufactured material. Patches shall be cut with rounded corners and shall extend a minimum of 6" in each direction from the damaged area. The entire surface of the patch shall be bonded to the lining material.

METHOD OF MEASUREMENT

A. Sand Drainage & Sand Cushion

The sand drainage layer will be measured according to Section 109.01 MEASUREMENT OF QUANTITIES in the Standard Specifications.

The sand cushion will not be measured for payment and will be incidental to the geofoam.

B. Wick Drains

Wick drains that are accepted by the Engineer will be measured from the bottom of the sand drainage layer to the tip of the installed wick. No additional payment will be made for the 4 to 8-inch length protruding above the working surface.

C. EPS Geofom

The amount of geofom installed will be measured by survey conducted by the Engineer.

D. Geomembrane

The Engineer will measure, completed and in place, the surface area of geofom covered by the geomembrane. The Engineer will not measure overlaps or geomembrane not covering geofom.

BASIS OF PAYMENT

The accepted quantities will be paid at the contract unit price for per the bid items below:

SPEC	CODE	ITEM DESCRIPTION	UNIT
920	1000	GEOFOAM	CY
920	1050	GEOMEMBRANE	SY
920	1300	PREFABRICATED VERTICAL WICK DRAINS	LF
920	2130	SAND DRAIN	TON

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SU-8-984(153)156	6	3

NOTES

203-P01 SURCHARGE & GEOFOAM CONSTRUCTION: Prior to construction of the surcharge, strip all topsoil up to a maximum of 12" within the footprint of the surcharge embankment and sand drain layer. Grade the stripped surface to the lines and grades shown in the plans to accommodate the sand drain layer. Place 12" of the 18" of drainage sand prior to installing the prefabricated vertical wick drains. After completion of the wick drain installation, place the remaining 6" of the sand drain layer. All costs associated with the sand drains and wick drains will be paid by the bid items "Sand Drain" and "Prefabricated Vertical Wick Drains" respectively.

Place surcharge embankment over the top of the drainage sand in four stages. Place material in accordance with Section 203.04 E.2. Refer to Section 20 for the thickness of each stage along with the stage elevation. Once Stage 1 is completed a 14-calendar day waiting period must be observed. During the waiting period no construction equipment can be driven across the embankment and no materials can be placed on the embankment. After the 14-day waiting period, stage 2 of the surcharge can proceed. After completion of stage 2 another 14-day waiting period must be observed. Upon completion of the second 14-day waiting period, stage 3 of the surcharge can begin. After completion of stage 3 a third 14-day waiting period must be observed. Upon completion of the third 14-day waiting period, stage 4 of the surcharge can begin. Include all costs to construct the surcharge in the unit price bid for "Mandatory Borrow."

Upon completion of the surcharge per Section 20 of the plans, a 180-day waiting period must be observed. During this waiting period the Engineer will monitor the settlement of the surcharge. After completion of the 180-day waiting period, excavate the surcharge embankment to an elevation of approximately 914.8 and place the sand cushion to an elevation of 915. Refer to note 203-P03 Clay Excavation regarding removal of the surcharge and reincorporating the material back into the project. Place geofoam as shown in Section 20 of the plans and cover with geomembrane. Upon completion of the geofoam and geomembrane installation, construct the remaining roadway embankment to the proposed subgrade elevations.

203-P02 MANDATORY BORROW: Utilize the borrow sources as shown in Section 20 for all borrow material required on the project. The Engineer will measure Mandatory Borrow at the point of placement by taking an initial measurement of the original ground after removing topsoil and then a second measurement after final placement of the borrow material. Provide a minimum of 48-hour notice of when the original ground is ready for measurement.

West Borrow Source

The west borrow source is a stockpile that will be located in the SE ¼ of the SW ¼ of Section 4, Township 138 North, Range 49 West. The City of Fargo will be bidding a project over the winter of 2020-2021 to excavate material and construct the stockpile. The material will be available for use on July 6, 2021. Refer to Section 20 of the plans for haul routes/access to/from the stockpile to different locations within the project corridor. It is anticipated that multiple contractors will be using this borrow source for multiple different projects in the area along with the haul route along 64th Ave from the borrow source to the realigned 38th Street. Coordinate with the contractors utilizing the borrow source and haul route for maintenance and dust control.

If borrow material is needed prior to July 6, 2021, provide material from an alternate source or coordinate with the excavation contractor to determine if material will be available sooner. After July 6, 2021 or when adequate material is available at the stockpile location, whichever is sooner, the stockpile must be utilized. Upon completion of utilizing the material, reshape the stockpile to a clean, safe condition.

East Borrow Source

The east borrow source is a clay stockpile owned by the City of Fargo. It is estimated that 40,000 CY of material is available. Upon removal of all borrow material, grade the site to a uniform surface that surface drains storm water to surrounding inlets and natural outlets using BMPs. Include all costs to grade the site in the unit price bid for "Mandatory Borrow".

After site is graded, spread a minimum of 6" of topsoil throughout the disturbed area. If adequate topsoil is not available, utilize topsoil from other areas within the project (east and west of I-29) to provide a minimum of 6" over the entire disturbed area.

If adequate topsoil is available, strip topsoil within the delineated area and stockpile within the right of way in an area approved by the Engineer, and respread upon grading the site to as stated above. Topsoil stripping and respreading within the East Borrow Source will be paid at the contract unit price for "Topsoil Mandatory Borrow Area".

203-P03 CLAY EXCAVATION: Upon completion of the 180-day waiting period, remove the surcharge to the elevation as shown in the plans. All removed material must be reincorporated into the project. The material must be placed in accordance with Section 203.04.E.2.b of the Standard Specifications. Include all costs associated with removing the surcharge and reincorporating the material back into the project in the unit price bid for "Clay Excavation". This material will be quantified per Section 203.05 A of the Standard Specifications. Additional payment will not be made to move the material multiple times.

203-P04 BORROW PAYMENT: During the 2021 construction season only mandatory borrow for the construction of the surcharge from sta 116+90.9 to sta 140+33.96 and the mandatory borrow required for the relocation of the DMS sign will be measured for payment. Any borrow brought on site to be permanently incorporated into the project outside of those two work items will not be eligible for payment unless approved by the Engineer. All excavated material generated as a result of removing the surcharge must be reincorporated into the project prior to any additional mandatory borrow utilization and payment.

203-P05 PROOF ROLLING: In addition to density/moisture testing, perform a proof roll test to verify the uniformity of support and to identify unstable areas which will require correction. Perform a proof roll test on the finished subgrade located under the roadway. Complete proof rolling by using a fully loaded tandem truck. Offset each trip of the proof roller by no more than one tire width. If the grade shows no signs of pumping, cracking, or rutting, the grade being tested is considered acceptable. Correct any defective areas discovered during proof rolling and proof roll again. Include all costs associated with performing the proof roll test and any corrective work in price bid for "Mandatory Borrow".

203-P05 CONTRACTOR FURNISHED PROCTORS: Determine the optimum moisture and density, as specified in ND T 99, for each type of earth material encountered that requires compaction control. In addition, determine the optimum moisture and density, as specified in ND T 180, for granular material to be used as pipe backfill. Perform a multi-point test using a minimum of 4 points. Submit the results to the Engineer along with a split sample of each material. The Engineer will perform comparison tests using the same procedure on the split sample. Use the Engineer's results for determining in place density of material.

This document was originally issued and sealed by Scott Middaugh Registration Number PE- 7499, on 11/9/20 and the original document is stored at the North Dakota Department of Transportation

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SU-8-984(153)156	6	10

NOTES

770-P07 CONCRETE FOUNDATION-HIGHWAY LIGHTING: Verify bolt circle and projection with the light standard manufacturer specifications.

Once the concrete base is poured and set, maintain at all times a cover (such as a traffic barrel, cone or similar item) over the top of the base until the street light has been installed to protect the anchor bolts, ground rod, conduit, and exposed conductor. Include cost to provide these covers in the unit price for "Lighting System – A"

Use Hydro-vac excavation for concrete bases where standard auger method is not possible. Verify base locations in the field after locates with the Engineer. Method of base excavation is incidental to bid.

770-P08 LIGHT STANDARD 40FT MT HT (NO MAST ARM) – TYPE A: Provide either aluminum light standards with breakaway transformer bases or stainless steel light standards with breakaway H-bases that have a 40' mounting height, no mast arm, and frost finish. Provide 2" pipe tenon horizontal adapter with a frost finish and 12" arm. Include all costs associated with light standards in the bid price for "Lighting System A".

770-P09 ORNAMENTAL LIGHT STANDARD – TYPE B: Provide light standard that comes with the LED LUMINAIRE – TYPE B (140 WATT). The catalog number for the LED Luminaire – TYPE B contains the information for ordering the light standard.

770-P10 LED LUMINAIRE – TYPE A (210 WATT): Provide the luminaire below:
Leotek, GC2 G-Series, 209W LED, 700mA Drive Current, 26,700 Lumens, Multi-volt 120-277V, Type 3R distribution, 4000K, Grey, No Photocontrol Receptacle
Catalog No: GC2-96G-MV-NW-3R-GY-700-FFA-SC.

Or approved equal: AEL Autobahn ATBL or Phillips RoadFocus RFL Series (minimum of 26,500 Lumens). Equivalent manufacturers must submit an exact electronic ".ies" file for review.

770-P11 LED LUMINAIRE – TYPE B (140 WATT): Provide the luminaire below:
Lumec by Signify, Solecity, 138W LED, 350mA Drive Current, 17,690 Lumens, 240V, Type 3 distribution, 4000K, Color BKTXT, No Photocontrol Receptacle
Catalog No: ULM100-145W128LED4K-G2-LE3-240-CDMGP-PH9-UBM100-1A-UPM100-22-BXTX

770-P12 UNDERPASS LIGHT UNIT CEILING MTD – 50 WATT: Furnish and install pedestrian underpass luminaires as shown in plan. Use the luminaire listed below or approved equal. Approved equal luminaires must be rated vandal resistant with a minimum polycarbonate lens thickness of 0.375", and has the ability to be ceiling mounted with the power source coming in the side. The manufacturer of the product listed below has indicated they can modify the luminaire listed below to meet these requirements.

Luminaire Manufacturer	Catalog Number
Kenall	SDA-4-0/0-1-45L40K-DCC-DV-2/9-1-WL-KO-SP

770-P13 PULL BOX: Furnish and install a PVC Pull Box with metal frame and cover with dimensions of 24" dia x 36" deep. Install 24" of pea rock for drainage below the pull box and extend 6" beyond the outside edge of the pull box. Flush mount the top of the pull box in concrete areas and level with final grade and sloped to match in areas of topsoil. Provide enough slack to pull conductor and splices a minimum of 4 feet above finished grade.

Include all costs associated with pull boxes in the bid price for "Lighting System A".

772-P01 2IN DIAMETER RIGID CONDUIT: Install the 2" future fiber conduit 24 inches below finished grade. Conduit is to be ORANGE HDPE conduit meeting the requirements of Section 896.01.B.2 of the Standard Specifications. Do not install HDPE conduit when either the conduit temperature or ambient temperature is below -10 F. Backfill all trenched or backhoed areas under sidewalks or roads with Class 3 gravel compacted to 90% of ND T 180. Include an ORANGE No. 12 Copper Clad Tracer Wire with HDPE insulation, rated at a minimum 250 pound breaking load, running the full length.

SECTION 160

754-P01 EMBANKMENT, SEEDING & MULCHING: Seed the entire area disturbed from trenching and embankment construction. Quantities for seeding and mulching for the DMS sign relocation have been included in the plans.

754-P02 DYNAMIC MESSAGE SIGN STRUCTURE: Post mount on a butterfly support with a concrete foundation the existing sign and supporting structure.

Install the supporting structure with the vertical and horizontal dimensions to the roadway as shown in the plans.

The existing DMS sign weighs approximately 5200 pounds. The existing pole shaft weighs approximately 1726 pounds.

754-P03 REVISE DYNAMIC MESSAGE SIGN COMMUNICATIONS: A single-mode fiber optic cable will be the communications link between the DMS Sign Controller and the DMS network connection located in the Fargo District office. The DMS Sign Controller will connect to the state network as an Ethernet device using a 19" rack mounted optical Ethernet transceiver located at the Fargo District. Move the existing IT Pullbox at Sta 3129+27 ~137' Rt to Sta 3132+00 ~ 143' Rt (Pullbox 4). Coil extra fiber in reset pull box. A 36 fiber optic cable shall be installed from the reset IT Pullbox at Sta 3132+00 –143' Rt to proposed Pullbox 1 at Sta 3102+98 ~ 136' Rt. Fusion splice the fibers as directed in notes on Section 160 Sheet 3. Fusion splice the 6 fiber breaked out cable t Pullbox 1 (Sta 3102+98 ~ 136' Rt) with a splice enclosure. Terminate the 6 fiber breakout cable inside the DMS controller cabinet using a 6 count Fiber Distribution Panel using ST connectors. Label the terminals.. Include all costs to furnish fiber optic communications to the sign, including cable and conduit, 6 fiber breakout cable, splice connections, 6 fiber patch panel, fiber optic jumpers, and optical Ethernet transceivers as described above and as shown on the plans, in the bid price for "Revise Dynamic Message Sign"

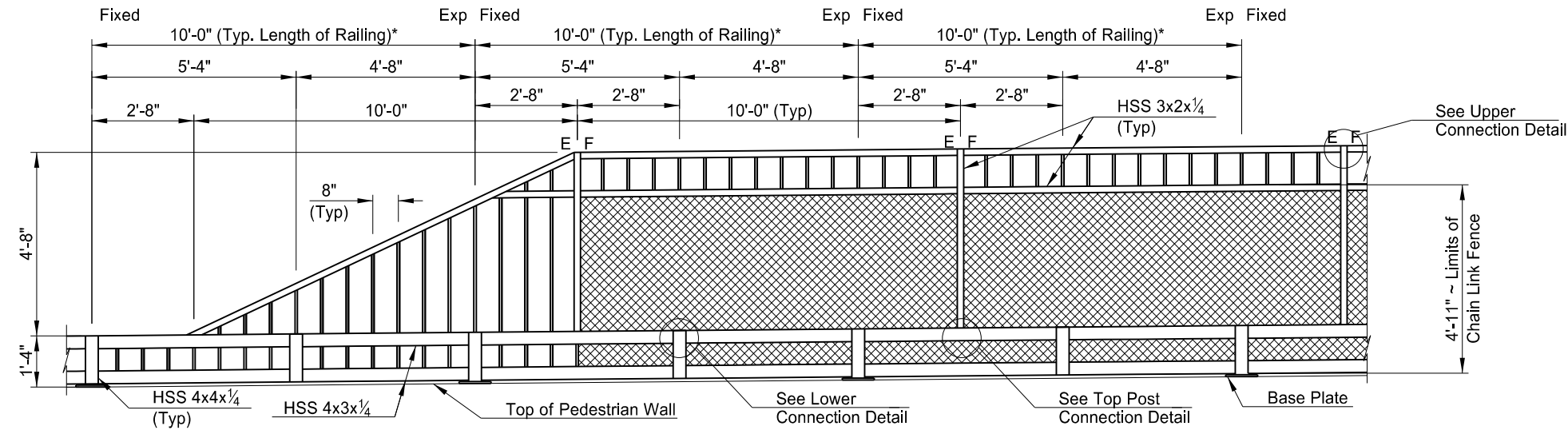
772-P01 DYNAMIC MESSAGE SIGN RODENT PROTECTION: Follow all provisions for rodent protection as found in Section 772.04 G.5 of the Standard Specifications.

This document was originally issued and sealed by Traci K. Sletmoe, Registration Number PE- 28350, on 11/09/20 and the original document is stored at the North Dakota Department of Transportation

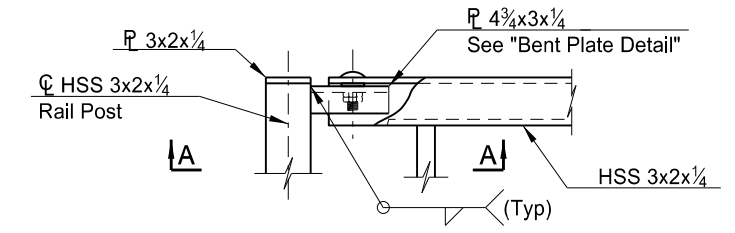
* A Single 5'-4" Post Space is Located at Pier 2

23 U.S.C. 409
NDDOT Reserves All Objections

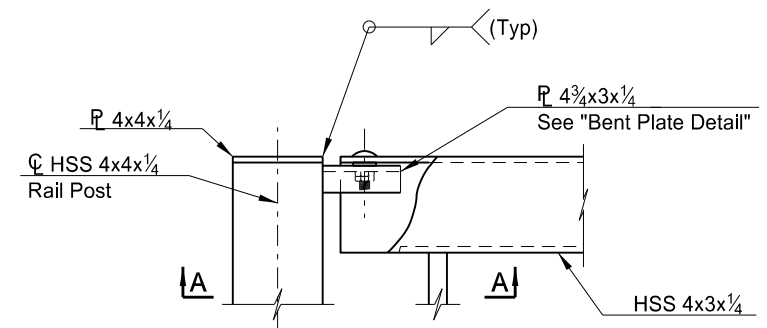
Revised	11/9/20	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
		ND	SU-8-974(153)156	170	28



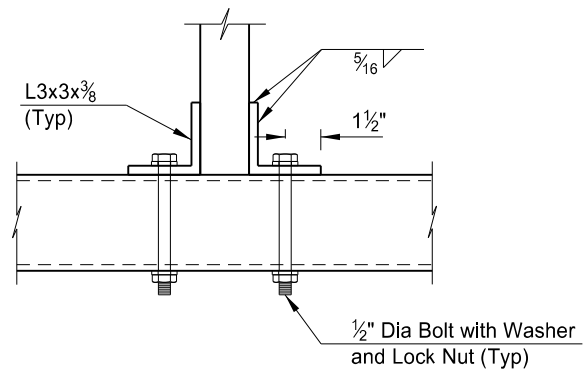
(Showing Typical Dimensions)
OUTSIDE ELEVATION OF PEDESTRIAN FENCE



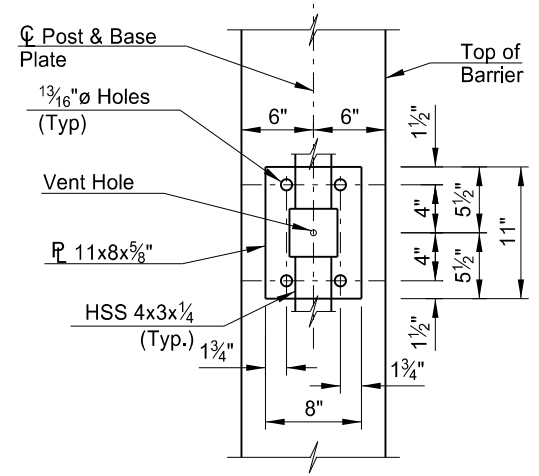
UPPER CONNECTION DETAIL



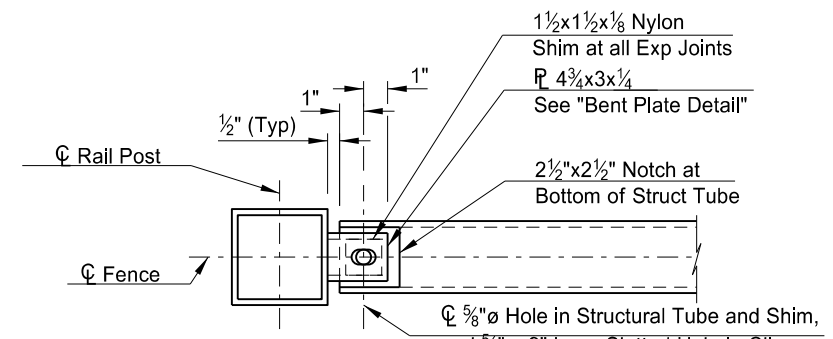
LOWER CONNECTION DETAIL



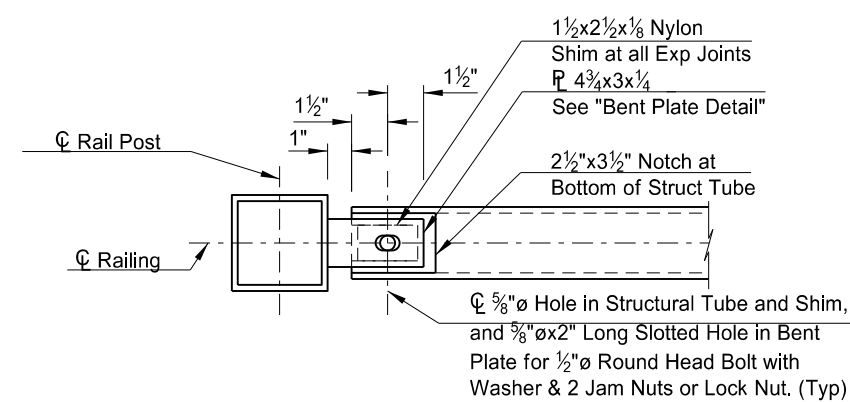
TOP POST CONNECTION DETAIL



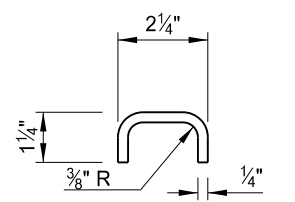
BASE PLATE PLAN



A-A

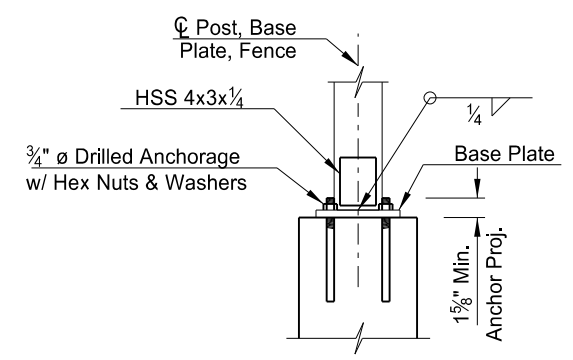


A-A @ EXPANSION JOINT



BENT PLATE DETAIL

- NOTES:**
1. Provide anchorage, post, and rail plates that meet ASTM A 36. Provide posts and rails that meet ASTM A500 Grade B. Galvanize all steel elements after fabrication according to Section 854 of the Standard Specifications and then paint according to Special Provisions 70(20). Use Brown finish coat, color number 10076 Specification (AMS) Standard 595A. Galvanize the anchor bolts and field paint the exposed top of bolt.
 2. Epoxy in 3/4" Dia. Anchor bolts or place them in the concrete at the time of pouring. Provide a minimum pullout capacity of 12,000 pounds and a minimum embedment of 6" for each anchor bolt. Use anchor bolts meeting ASTM F1554, Grade 36.
 3. Fabricate horizontal railing to be parallel to the slope of the top of the pedestrian wall and abutment wing. Fabricate posts and pickets to be vertical.
 4. Install a Black Vinyl Chain Link Fence (2" Mesh) on the interior side of the pedestrian fence.
 5. Include all pieces required for the fabrication and connection of the railing in the unit price bid "Pedestrian Fence".



ANCHOR DETAIL

This document was originally issued and sealed by Joshua R Schroeder, Registration Number PE 5824, on 11/9/20 and the original document is stored at the North Dakota Department of Transportation

QUANTITIES
SEE DWG 29-059.264-27
64TH AVE SOUTH OVERPASS CITY OF FARGO, NORTH DAKOTA
PEDESTRIAN FENCE LAYOUT