### ESTIMATE OF STRUCTURE QUANTITIES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>UNIT</th>
<th>REMARKS</th>
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<tbody>
<tr>
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<tr>
<td>Concrete Penetrating Sealer</td>
<td>530.0</td>
<td>CuYd</td>
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<tr>
<td>Membrane Seawall Expansion Joint</td>
<td>83.8</td>
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<td>HP 10x42 Steel Bearing Pile, Furnish and Drive</td>
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<td>Class C Riprap</td>
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**GENERAL CONSTRUCTION**

1. All mild reinforcing steel shall conform to ASTM A615, Grade 60.
2. All exposed concrete corners and edges shall be chamfered 3/4" unless noted otherwise.
3. Use 2" clear cover on all reinforcing steel except as shown.
4. Contractor shall imprint on the structure the date of new construction as specified and detailed on Standard Plate No. 460.02.
5. Barrier Curbs and End blocks shall be built normal to the grade.
6. Request for construction joints or re-steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of re-steel.
7. The elevation of the bridge deck is 18" above subgrade elevation.

**INCIDENTAL WORK, STRUCTURE**

1. In place centerline Sta. 100+96.23 to centerline Sta. 101+66.69 is a 71'-4" span continuous concrete bridge with a 30'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete pier column hole railing faced with steel W-beam continuous across the bridge. The deck has been overlaid with 2 inches of asphalt. The substructure consists of 4 columns reinforced concrete bent and reinforced concrete vertical abutments, all of which are supported on timber piling.
2. Break down and remove the existing bridge, and approach sleeper slabs if applicable, to 1 foot below finished groundline, or as required to construct the new structure in accordance with Section 110 of the Specifications. All portions of the existing bridge shall be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with the Environmental Commitments found in Section A.
3. During demolition of the structure, efforts shall be taken to prevent material from falling into the creek. Under no circumstances is asphalt allowed to fall into the creek.
4. The foregoing is a general description of the in-place bridge and should not be construed to be complete in all details. Before preparing the bid it shall be the responsibility of the Contractor to make a visual inspection of the structure to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.
5. It is anticipated that at least sixteen (16) existing timber piers will interfere with piling for this new structure. Any existing timber piers that interfere with piling for the new structure shall be extracted. Payment for the extracting piling shall be contract unit prices per each for Extract Pile and shall be full compensation for extracting piling including materials, labor, and equipment necessary or incidental to the satisfactory completion of this work.

**DESIGN MIX OF CONCRETE**

1. All structural concrete shall be Class A45 unless otherwise indicated.
2. Type II cement is required.

**ABUTMENTS**

1. Pre-boring piling at each abutment is required to whichever is greater, ten feet or to natural ground.
2. The HP 10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling shall develop a field verified nominal bearing resistance of 152 tons per pile.
3. The contractor shall have sufficient pile splice material on hand before piling driving is started. Eco Standard Plate No. 610.40.
4. Piles shall not be driven out of position by more than three inches in the direction normal to the abutment centerline. A pile-driving template shall be used to insure this accuracy.
5. One test pile shall be driven at each abutment and will become part of the pile group.
6. Each finished abutment shall include a Bridge Survey Marker. See Standard Plate No. 460.05.

**PILE DRIVING**

1. A drivability analysis was performed using the wave equation analysis program (GRLWEAP). The following pile hammers were evaluated and found to produce acceptable driving stresses:
   - SPI D-30
   - APE D30-32
   - APE D30-52
2. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity.

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**SPECIFICATIONS FOR BRIDGE**


**BRIDGE DESIGN LOADING**

1. AASHTO HL-93.
2. Dead Load includes 22 psf for future wearing surface on the roadway.

**DESIGN MATERIAL STRENGTHS**

- Concrete: \( f_c = 4,500 \) psi
- Reinforcing Steel: \( f_y = 60,000 \) psi
- Piling (ASTM A572 Grade 50): \( f_y = 50,000 \) psi

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**ESTIMATE OF STRUCTURE QUANTITIES AND NOTES**

For

119' - 0 3/4" CONT. CONCRETE BRIDGE

STR. NO. 63-176-170

MARCH 2017

DESIGNED BY: D. OC. DRENNAN
DRAWN BY: B. MCQUILLIN
DRAFTED BY: B. MCQUILLIN
1. The HP 10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling shall develop a field verified nominal bearing resistance of 192 tons per pile.

2. One test pile shall be driven at each bent and will become part of the pile group.

3. The contractor shall have sufficient pile splice material on hand before pile driving is started. See Plate No. 510.40

4. Spiral reinforcement may be fabricated from cold drawn wire conforming to ASTM A1064 or hot rolled plain or deformed bars conforming to the strength requirements of ASTM A615, Grade 60.

5. It is anticipated that cofferdams will be necessary. Cofferdams shall be designed and constructed in accordance with Section 423 of the Specifications.

SUPERSTRUCTURE

1. Preplanned construction joints may be used in accordance with Section 460.3 of the Specifications. Contact the Office of Bridge Design for joint configuration and allowable location. Emergency slab construction joints shall be as shown with the superstructure details. If an emergency slab joint is used, contact the Office of Bridge Design before proceeding with deck pour.

2. The deck-finishing machine shall be adjusted and operated in such a manner that the roller screed or screeds are parallel with the centerline of the bridge and the finish machine is parallel to the skew of the bridge. Concrete placement in front of the finish machine shall be kept parallel to the machine.

3. Barrier curbs shall be poured after all the slab has been poured. Superstructure falsework shall not be removed until bridge deck concrete, including barrier curbs, has attained a strength of 2400 psi.

4. The bridge deck must be placed and finished continuously at a minimum rate of 49 ft. of deck per hour measured along centerline roadway. If concrete cannot be placed and finished at this rate, the Engineer shall order a header installed and operations stopped. Notify the Bridge Construction Engineer if deck pour operations are stopped. Operations may resume only when the Engineer is satisfied that a minimum rate of 49 ft. of deck per hour can be achieved and the concrete in the previous pour has attained a minimum compressive strength of 2000 psi.

5. Snap ties, if used in barrier curb formwork, shall be epoxy coated. The epoxy coating shall be inert in concrete and compatible with the coating applied to the new epoxy coated reinforcing steel.

CLASS A4S CONCRETE, BRIDGE DECK

1. Concrete used in the bridge deck slab and barrier curbs shall be in accordance with the requirements for bridge deck concrete as specified in Section 460.3A of the Specifications.

2. See Special Provision for Concrete Penetrating Sealer.

CLASS B COMMERCIAL TEXTURE FINISH

1. A Class B commercial texture finish shall be applied to the following areas:
   a) Barrier Rail: all exposed surfaces (front, top and back).
   b) Slab: edge of slab.

2. The Class B commercial texture finish shall be applied in accordance with Section 460.3 L.1.c of the Specifications.

3. Where the Class B commercial texture finish is to be applied, concrete curing shall be accomplished with cotton or burlap mats and polyethylene sheeting. Curing shall continue for not less than seven days after placing concrete before the commercial texture finish is applied. The commercial texture finish shall be applied in accordance with the manufacturer’s recommendations. The commercial texture finish itself does not require a specific cure except for drying.

AS - BUILT ELEVATION SURVEY

The Contractor shall be responsible for recording the As-built deck elevators and bridge survey marker elevations at the locations shown in the Table of As-Built Elevations shown in the plans. All costs associated with obtaining the elevations including all equipment, labor and any incidentals required shall be incidental to the contract lump sum price for Bridge Elevation Survey.

APPROACH SLABS

1. Sleeper slab riser shall be cast with the approach slab or cast after the approach slab is placed. Care shall be taken to ensure the correct grade is maintained across the joint.

2. The use of an approved finishing machine will be required during placement of Class A4S Concrete for the approach slabs. Concrete placement in front of the machine shall be kept parallel to the screed.

3. The concrete in the approach slab shall be tined normal to centerline roadway.

4. Concrete Approach Sleeper Slab for Bridge, whether cast-in-place or precast, will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete and reinforcing steel; for disposal of all excavated material and surplus materials; and for labor, tools, equipment and any incidental needed to complete this item of work.

5. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, asphalt paint or 6 mil polyethylene sheeting, elastic joint sealer and reinforcing steel; for disposal of all excavated material and surplus materials and for labor, tools, equipment and any incidentals necessary to complete this item of work.

REQUIRED LIST

1. Title Block
2. Project Block
3. Notes
Carilile Shale is a marine shale with a textural classification that varies from silt-clay to sandy clay. Color varies from dark-gray to black. The formation contains large fossiliferous concretions, interbedded layers of buff colored sandstone and sandy calcareous marl.

The Geotechnical Engineering Activity has all of the boring logs and laboratory test results available for review at the Central Office in Pierre.

LEGEND

- Penetration Test
- Water Zone
- Sample Test
- Drive Test
- Auger Test
- North Arrow
- Plan View (Piling Layout)

Drive tests are conducted by dropping a 490 pound hammer 30 inches to drive a 2 ½ inch diameter hollow stem auger. Penetration tests are conducted by dropping a 140 pound hammer 30 inches to obtain 2 inch nominal diameter samples and to measure the resistance to penetration of the soil.

All auger holes are drilled with a 4 ½ inch diameter continuous flight auger.

GROUND WATER ELEVATIONS

as of APRIL/MAY 2015

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<th>D1</th>
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<th>D3</th>
<th>D4</th>
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<td>1246.2</td>
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MEASURED SKIN FRICTION

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<td>D3</td>
<td>1122.8</td>
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<td>1147.8</td>
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SUBSURFACE INVESTIGATION AND PILING LAYOUT

FOR

119° - 0 3/4 CONT. CONCRETE BRIDGE
OVER HURLEY CREEK
15° RHF SKEW
STA. 100 + 73.48 TO 101 + 92.56
SEC. 136 T97N R53W
STR. NO. 63-179-173
NH-PH 0018(16)420
HL-93

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2017

DESIGNED BY
DK. DES. BY
DRAFTED BY
NOTE: This sheet is to be used in conjunction with the SUBSURFACE INVESTIGATION AND PILING LAYOUT sheet.

NOTE: Existing timber pile to be excavated.

**PILING LAYOUT DETAILS**

FOR 119° - 0 ¾° CONT. CONCRETE BRIDGE
OVER HURLEY CREEK 15° RHF SKEW STA. 100 + 73.48 TO 101 + 92.56 SEC. 1/36-T97/98N-R53W NH-PH 0018(180)420 Turner County S. D. DEPT. OF TRANSPORTATION MARCH 2017

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<th>ITEM</th>
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**ESTIMATED QUANTITIES**

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**REQUIRED LIST**

1. Title Block
2. North Arrow
3. Project Block
4. Plan View (Piling Layout)
Camber for Dead Load Deflection Plus Plastic Flow have been included in the elevations shown above. Elevations indicated with ▲ are Top of Finished Slab at Left Curb Line, with ▼ are Top of Finished Slab at Centerline Roadway and with △ are Top of Finished at Right Curb Line.

Elevations indicated with ▲ are Top of Finished Slab at Left Curb line, with ▼ are Top of Finished Slab at Centerline Roadway and with △ are Top of Finished at Right Curb Line. Camber for Dead Load Deflection Plus Plastic Flow have been included in the elevations shown above.

Center is calculated for steel load deflection plus plastic flow and shall be added to the proposed grade elevations at the respective stations to establish the elevations of the top of the finished roadway slab.
Bridge End Embankment

Limits of Bridge End Embankment

Top of Subgrade

SEC. A - A (at E Roadway)

Details of Bridge End Backfill (B)

FOR

119° - 0 3/4 CONT. CONCRETE BRIDGE

OVER HURLEY CREEK

15° RHF SKEW

STA. 100 + 73.48 TO 101 + 92.56 SEC. 1/36-T97/98N-R53W

NH-PH 0018(180)420

TURNER COUNTY

S. D. DEPT. OF TRANSPORTATION

MARCH 2017

DESIGNED BY

DK. DES. BY

GRAFTED BY

PROJECT

SHEET

TOTAL

0.6

SEC. C - C

SEC. C - C

SEC. B - B

SEC. B - B

SEC. D - D

SEC. D - D
GENERAL NOTES

1. The Membrane Sealant shall be on the approved product list for Membrane Sealant Expansion Joints.

2. The manufacturer shall supply the membrane sealant in packaging that precompresses the membrane sealant. The precompressed dimension shall be as recommended by the sealant manufacturer to provide a water tight seal throughout a joint movement range of + 25% (minimum) from the specified joint opening dimension. In no case shall the precompressed dimension exceed 75% of the joint opening dimension. The foam sealant shall be slowly self expanding to permit workers ample time to install the membrane sealant before the membrane sealant exceeds the joint opening width.

3. The membrane sealant shall be supplied in pieces 5 feet in length or longer. The foam sealant shall be ultra-violet and ozone resistant.

4. The bonding adhesive used to attach the membrane sealant to the adjacent concrete shall be approved by the membrane sealant manufacturer.

5. Adhesive used to join adjacent pieces of the membrane sealant shall be as recommended by the manufacturer.

6. If Shotcrete (precast) material is used in the construction, it shall be closed cell and water tight as approved by the Engineer.

7. The minimum ambient air temperature at the time of joint installation and adhesive curing shall be 40°F.

8. A technical representative of the membrane sealant manufacturer shall be present at the construction site during the installation of the joint material to ensure correct procedures for the preparation and installation of the joint material are in place. Payment for this item shall be full compensation for furnishing all the required equipment and labor for this work.

9. Concrete surfaces that will be in contact with the membrane sealant shall be thoroughly cleaned by abrasive blasting to remove all laitance and contaminants (such as oil, curing compounds, etc.) from the concrete surface. At a minimum two passes of abrasive blasting with the nozzle held at an angle to within 1 to 2 inches of the concrete surface will be required. Cleaning of the concrete surface with solvents, wire brushing, or grouting shall not be permitted.

10. After abrasive blasting, but immediately prior to membrane joint installation, the entire joint contact surface shall be air blocked. The air compressor used for joint cleaning shall be equipped with nozzles capable of providing moisture free and clean air at a recommended minimum pressure of 90 psi. To obtain complete bonding with the adhesive, the adjacent concrete surfaces must be dry and clean. The contact surfaces for the joint shall be visually inspected by the inspector and clean.

11. Individual sealant sections shall be installed as per the manufacturers recommendations. The membrane joint sealant manufacturer shall submit a detailed installation procedure to the Engineer at least 5 days prior to joint installation for his review.

12. Traffic shall not be allowed on the joint for a minimum of 3 hours unless otherwise directed by the Engineer.

13. Use plywood or other material to protect concrete adjacent to the joint from spalling before and after installation of the membrane sealant. The foam sealant shall be Installation shall be made in two or more lifts as required to prevent the sealant from exceeding the opening width. The foam sealant shall be placed with a bonding adhesive continuous throughout the joint contact surface.

14. The Membrane Sealant Expansion Joint will be measured in feet to the nearest one-tenth foot, complete in place. Measurement shall be made of the overall horizontal length. The Membrane Sealant Expansion Joint will be paid for as per the contract unit price per foot complete in place. Payment for this item shall be full compensation for furnishing all the required materials in place, including labor, equipment and incidentals necessary to complete the work in accordance with the plans and the foregoing specifications.

PLAN OF APPROACH SLAB JOINT

ITEM ESTIMATED QUANTITY
Membrane Sealant Expansion Joint 1.65 L

ESTIMATED QUANTITIES

FOR TWO APPROACH SLABS
FOR 119° - 0 1/2° CONT. CONCRETE BRIDGE
OVER HURLEY CREEK
15° RHF SKEW
STA. 100 + 73.48 TO 101 + 92.56  SEC. 1/36-T97-98N-R53W
STR. NO. 63-179-170
NH-PH 0018(180)420
HL-93

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION
MARCH 2017

DESIGNED BY
DKN, DES. BY
PIW
GRANTED BY
BR
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

**Notes as Required**

**REQUIRED LIST**

1. Title Block
2. Project Block
3. Survey Datum Box
4. North Arrow
5. Plan View
6. Estimated Quantities
7. Table for Shot Elevations
8. Bridge Survey Marker Table
9. Notes as Required

**Table of As-Built Elevations - Bridge Deck**

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<th>Location</th>
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**Table of As-Built Elevations - Approach Roadway**

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**Table of Elevations - Bridge Survey Markers**

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**AS-BUILT ELEVATION SURVEY**

FOR

**119° - 0 ¼° CONT. CONCRETE BRIDGE**

OVER HURLEY CREEK

ST. 100 + 73.48 TO 101 + 92.56 SEC. 1/36 T97S R53W

NH-PH 0018(160)420

MARCH 2017

TURNER COUNTY
S. D. DEPT. OF TRANSPORTATION

DESIRED BY

DK DES BY

DRAWN BY

NOTE -
The Contractor shall be responsible for producing the As-Built Elevation Survey plan after construction is complete and before the bridge is opened to traffic. The As-Built Elevations of the Bridge shall be taken and recorded at the locations shown by the tables on this sheet. The completed tables shall be given to the Engineer who will forward a copy to the Office of Bridge Design and the Region Office.
GENERAL NOTES:
The concrete shall be Class M6. The concrete shall conform to the requirements of Section 462 of the Specifications. It is estimated that each unit weighs approximately 210 pounds.

All reinforcing steel shall be conform to ASTM A615 Grade 60 and shall be epoxy coated. The reinforcing steel shall be securely retained to prevent displacement during placement of concrete. It is estimated that 7.5 pounds of reinforcing steel is required for each unit. The pipe shall be placed in the concrete headwall with the pipe and flush with the concrete surface adjacent to the rodent screen.

The rodent screen shall be galvanized 13 ga. steel with a diamond-shaped flattened mesh pattern. The size shall be 1/2". The size refers to the measurement across the smallest diamond-shaped opening measured from the center of the wires.

The retaining rod shall be galvanized in accordance with ASTM A4123 after all shop welding has been completed.

The drawing indicates using 1/2" fillets however, 3/8" chamfers may be substituted for the 1/2" fillets.

All costs for furnishing and installing the concrete headwall including equipment, labor, and materials including concrete, reinforcing steel, retaining rod, and rodent screen shall be incidental to the contract and price per each for "Precast Concrete Headwall for Drain".

June 26, 2019

REQUIRED LIST:
1. Title Block
2. Insert required standard plate sheets as needed
3. Project Block

June 26, 2019
**ABUTMENT WITH “SWEPT BACK” WINGS**

- Center survey marker on top, level portion of abutment wing
- Survey marker
- Begin or End bridge

**GENERAL NOTES:**

1. Survey markers shall be located at each abutment on the same side of the bridge as the year plate. Place survey markers on abutment wings as shown. Two survey markers will be required at each abutment.

2. Survey markers shall be of a type intended for installation in concrete, e.g., rods of solid brass or bronze, have a domed top and be either 3" top diameter (with a 2 1/2" long ribbed shank), or a US Army Corps of Engineers Type C Disc with a 3 1/4" top diameter.

3. There will be no separate measurement or payment made for survey markers. All costs for this work shall be incidental to the other contract items.

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**COMPLETE JOINT PENETRATION WELD DETAIL**

**GENERAL NOTES:**

1. Steel for backing plates shall conform to ASTM A709 Grade 50.
2. Welding and weld inspection shall be in accordance with AWS D1.5 (Current Year) Bridge Welding Code - Steel.
3. Welder must be certified and registered with the SDDOT.
4. Backing plate shall be a minimum be as thick as the web of the pile being spliced.
5. Web must be coped with a 1 inch radius.
6. Submit Welding Procedure Specification (WPS) to Bridge Construction Engineer for approval prior to pile driving.

**TABLE 1 (BACKING PLATES)**

<table>
<thead>
<tr>
<th>PILE</th>
<th>10&quot;</th>
<th>12&quot;</th>
<th>14&quot;</th>
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<tbody>
<tr>
<td>&quot;W&quot; FLANGE</td>
<td>8 1/2&quot;</td>
<td>8 1/2&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>&quot;W&quot; WEB</td>
<td>4 1/4&quot;</td>
<td>6 1/2&quot;</td>
<td>7 1/2&quot;</td>
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</tbody>
</table>

**Published Date:** 1st Qtr. 2019

**SHEET NUMBER:** 460.05

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**REQUIRED LIST**

1. Title Block
2. Insert Required Standard Plate Sheets as Needed
3. Project Block
GENERAL NOTES:
1. The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
2. Eyebolts shall be placed on all of the bridge abutment wings.
3. Eyebolts shall be 3/8" diameter and shall conform to ASTM A307.
4. Eyebolts, nuts, and concrete inserts shall be galvanized in accordance with AASHTO M22 (A312). Concrete inserts of corrosion resistant material need not be galvanized.
5. Cast-in-place eyebolts shall have a set attached to be 4 1/2" inches (Min.) in length and shall be embedded such that the eye of the bolt is flush with the concrete surface. (See Eyebolt Details). As an alternate, cast-in-place concrete inserts, capable of developing the full strength of the 1/2" hole, shall be used. The concrete inserts shall be cast in place. Every effort shall be made to install concrete inserts in accordance with the manufacturer’s recommendations. The eyebolt shall be of sufficient length to develop its full strength. The eye of the eyebolt shall be flush with the concrete surface.
6. The cost for furnishing and installing eyebolts and/or concrete inserts shall be included in various contract items.

December 23, 2019

Published Date: 1st Qtr. 2019
FENCING ANCHORS FOR BRIDGE ABUTMENT WINGS (WINGS 6' AND SHORTER)

PLATE NUMBER 620.1B
Sheet 1 of 1

REQUIRED LIST
1. Title Block
2. Project Block
3. Insert Required Standard Plate Sheets as Needed

119' - 0 1/2" CONT. CONCRETE BRIDGE
STR. NO. 63-179-170
MARCH 2017

December 23, 2019

Published Date: 1st Qtr. 2019
5 BOLT INSERT PLATE ASSEMBLY

PLATE NUMBER 630.92
Sheet 1 of 1