

PLOT SCALE - 8500.0000001.1.000000

PLOTTED FROM - TRAB17882

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED

PROJECT 020-168
SD HIGHWAY 20
CODINGTON COUNTY

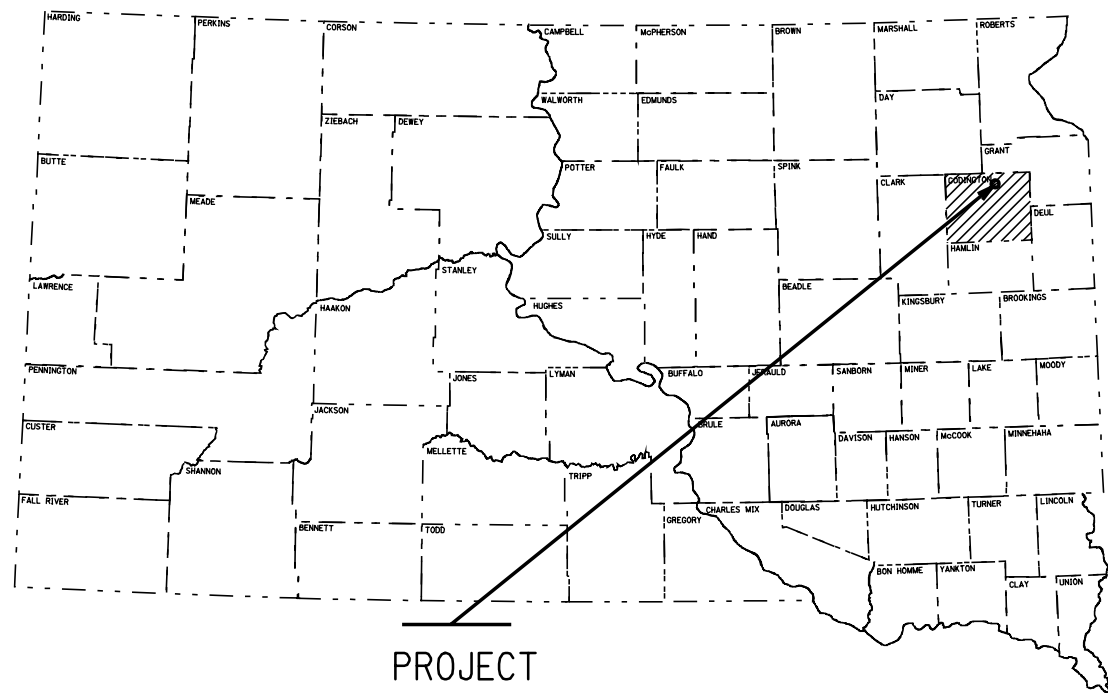
BRIDGE COLUMN REPAIR
PCN 124n

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	020-168	1	10

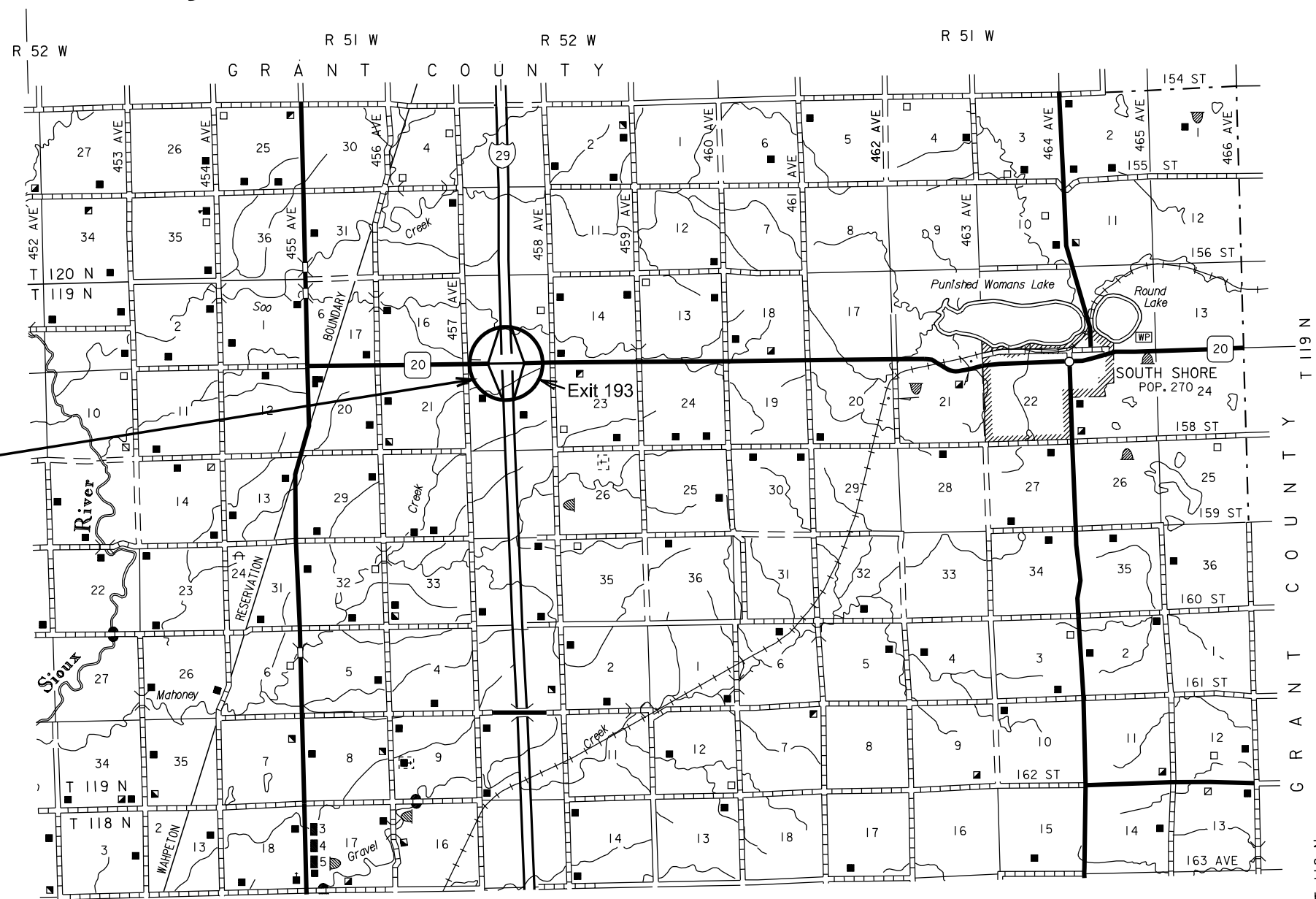
Plotting Date: 06-MAY-2011

INDEX OF SHEETS

Sheet No. 1	Title Sheet and Layout Map
Sheet No. 2	Estimate of Quantities and General Notes
Sheet No. 3-8	Column Repair Details Str. No. 15-215-030
Sheet No. 9-10	Original Construction Plans Str. No. 15-215-030



PROJECT



Project 020-168

Str. No. 15-215-030
I 29 - MRM 193.02
SD20 - MRM 418.77

DESIGN DESIGNATION I-29

ADT (2010)	6070
ADT (2030)	6755
DHV	790
D	50%
T DHV	10.3%
T ADT	22.7%
V	75 M.P.H.

STORM WATER PERMIT
(None Required)



PLOT NAME - I24N_COVER_SHEET

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STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	020-168	2	10

ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
460E0070	Class A45 Concrete, Bridge Repair	0.1	CuYd
460E0300	Breakout Structural Concrete	0.1	CuYd
460E8000	Column Fiber Wrap	3	Each
480E5000	Galvanic Anode	1	Each

SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

TRAFFIC CONTROL AND COORDINATION OF WORK

During the 2011 construction season the north bound lanes of I-29 will be closed to traffic to allow for replacement of the surfacing on the north bound lanes of I-29. During that time north bound traffic will be placed head to head with south bound traffic on the south bound lanes of I-29.

The Contractor will not be allowed to interfere with the head to head traffic that is operating on the south bound lanes of I-29. The Contractor will need to gain access to the project site from the north bound lanes that are under construction and closed to traffic.

The Contractor shall cooperate with and coordinate column repair work with the Contractor performing the surfacing replacement on the north bound lanes of I-29. That Contractor is PCi Roads LLC of St. Michael, MN 55376. Phone 763-497-6100.

HISTORICAL PRESERVATION OFFICE CLEARANCES

To obtain State Historical Preservation Office (SHPO) clearance, a cultural resources survey may need to be conducted by a qualified archaeologist. In lieu of a cultural resources survey, the Contractor could request a records search from Jim Donohue, State Archaeological Research Center (SARC). Provide SARC with the following: a topographical map or aerial view on which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that no artifacts have been found on the site. The Contractor shall arrange and pay for the cultural resource survey and/or records search.

If any earth disturbing activities occur within the current geographical or historic boundaries of any South Dakota reservation, the Contractor shall obtain Tribal Historical Preservation Office (THPO) clearance. If no THPO exists, the required SHPO clearance shall suffice, with documentation of Tribal contact efforts provided to SHPO.

To facilitate SHPO or THPO responses, the Contractor should submit a records search or cultural resources survey report to the DOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3268). Allow 30 days from the date this information is submitted to the Environmental Engineer for SHPO/THPO approval. The Contractor is responsible for obtaining all required permits and clearances for staging areas, borrow sites, waste disposal sites, and all material processing sites. The Contractor shall provide the required permits and clearances to the Engineer at the preconstruction meeting.

WASTE DISPOSAL SITE

The Contractor will be required to furnish a site(s) for the disposal of construction/demolition debris generated by this project.

Construction/demolition debris may not be disposed of within the State ROW.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Highway, Road, and Railway Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) shall not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements shall apply:

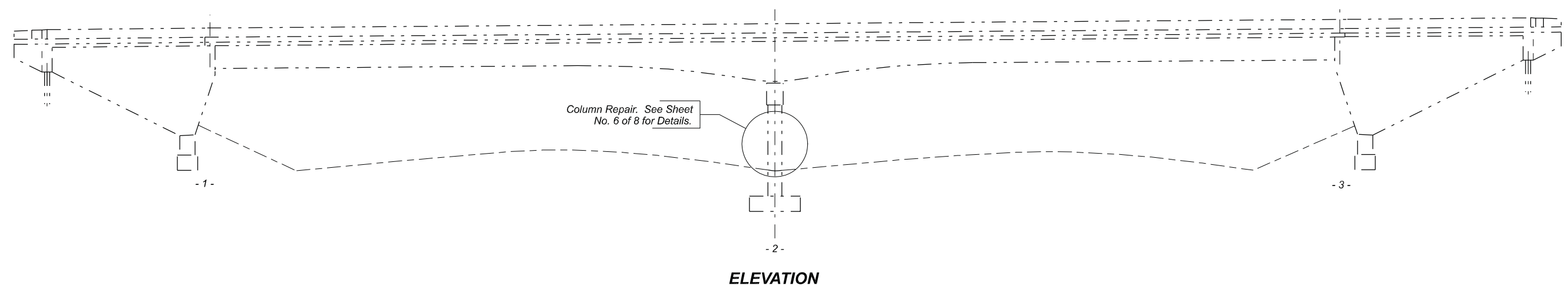
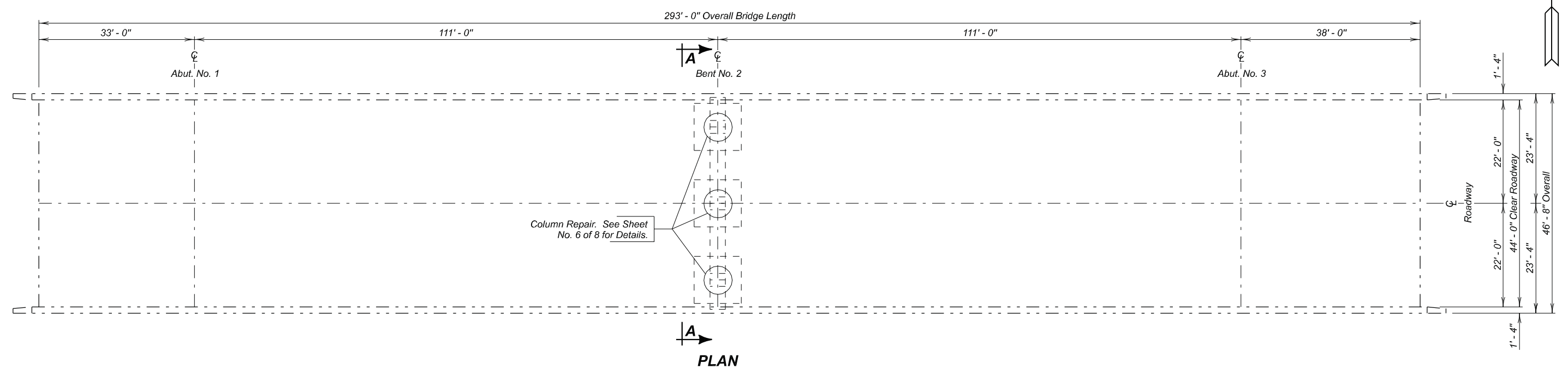
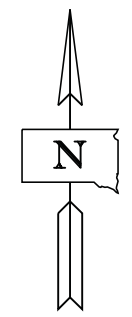
1. Construction/demolition debris consisting of concrete, asphalt concrete, or other similar materials shall be buried in a trench completely separate from wood debris. The final cover over the construction/demolition debris shall consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the State ROW shall be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor shall control the access to waste disposal sites not within the State ROW through the use of fences, gates, and placement of a sign or signs at the entrance to the site stating "No Dumping Allowed".
2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) shall be incidental to the various contract items.

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	020-168	3	10



INDEX OF BRIDGE SHEETS -

- Sheet No. 1 - Layout for Upgrading
- Sheet No. 2 - Estimate of Structure Quantities and Notes
- Sheet No. 3 - Notes (Continued)
- Sheet No. 4 - Notes (Continued)
- Sheet No. 5 - Notes (Continued)
- Sheet No. 6 - Column Repair Details at Bent No. 2
- Sheet Nos. 7 & 8 - Original Construction Plans

LAYOUT FOR UPGRADING
FOR
293' - 0" CONT. COMP. GIRDER BRIDGE
44' - 0" ROADWAY 0° SKEW
OVER INTERSTATE 29 SEC. 15/22-T119N-R52W
STR. NO. 15-215-030 020-168

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2011

DESIGNED BY DJS CODNI24N	DRAWN BY JWL I24NLA01	CHECKED BY EJA	Kevin N. Coeden BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	020-168	4	10

ESTIMATE OF STRUCTURE QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
460E0070	Class A45 Concrete, Bridge Repair	0.1	Cuyd
460E0300	Breakout Structural Concrete	0.1	CuYd
460E8000	Column Fiber Wrap	3	Each
480E5000	Galvanic Anode	1	Each

SPECIFICATIONS

- Design Specifications: AASHTO Standard Specifications for Highway Bridges 2002 Edition with 2003 Interim Specifications using Working StressDesign.
- Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

SCOPE OF BRIDGE WORK & SEQUENCE OF OPERATIONS

All work on this structure shall be accomplished with the traffic control shown in the plans. The following is a summary of the work required with this project:

- Repair column damage on column number 2 at Bent No. 2.
- Place the column fiber wrap at the locations shown in the plans for column numbers 1, 2 and 3 at Bent No. 2.

COLUMN REPAIR

Concrete used in the repair of Column No. 2 shall consist of one of the following products, or equal as approved by the Bridge Construction Engineer.

Vertical Patch
Nox-Crete Products Group
1444 S. 20th Street
Omaha, NE 68108
Phone: (402) 341-1976
<http://www.nox-crete.com>

Akona Pre-Mixed Concrete Patch
Akona Manufacturing, LLC.
2025 Centre Pointe Boulevard
Suite 300
Mendota Heights, MN 55120
Phone: (651) 905-8137
<http://www.akonallc.com/about/helpline.html>

COLUMN REPAIR (CONTINUED)

Thorite Rapid Vertical
BASF Construction Chemicals – Building Systems
889 Valley Park Drive
Shakopee, MN 55379
Phone: (952) 496-6000
<http://www.buildingsystems.basf.com/index.asp>

Speed Crete Red Line
Euclid Chemical
19218 Redwood
Cleveland, OH 44110
Phone: (800) 321-7628
<http://www.tamms.com/default.asp>

The concrete patch material shall be applied and cured as recommended by the Manufacturer and as approved by the Engineer. The Contractor shall furnish the Engineer a copy of the manufacturer's recommendations for mixing, installation and curing prior to use.

CONCRETE BREAKOUT

- Column No. 2 shall be broken out to the limits shown on the plans. Breakout limits shall be defined with a 3/4" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. Removal of concrete shall be accomplished with chipping hammers no heavier than 15 pounds. Reinforcing steel that is exposed and is scheduled for use in the new construction shall be cleaned to the satisfaction of the Engineer. Care shall be taken not to damage the existing reinforcing steel that is to be reused in the new construction during concrete breakout. Any reinforcing steel that is damaged during concrete breakout shall be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.
- It is not anticipated that the unsound concrete will extend into the column deeper than what is shown on the plans. If the concrete past the removal limits appears to be unsound, the Bridge Construction Engineer shall be immediately notified prior to any further concrete removal.
- All broken out concrete shall be disposed of by the Contractor. Any disposal of discarded material shall be in accordance with the Waste Disposal Notes, as shown in the traffic control notes.
- The contract unit price per cubic yard for "Breakout Structural Concrete" shall include concrete removal at column indicated, cleaning existing reinforcing steel and disposal of all broken out material.

GALVANIC ANODE

- The Contractor shall place the galvanic anode in the patched area of the column. Galvashield XP+, or an approved equivalent as approved by the Bridge Construction Engineer, shall be used. Galvashield XP+ is manufactured by:

Vector Corrosion Technologies
474 Dovercourt Drive
Winnipeg, MB, Canada R3Y 1G4
Phone: (204) 489-6300

- The anode shall be placed in accordance with manufacturer's recommendations and as approved by the Engineer. The anode shall provide the corrosion prevention level of protection. The anode has not been shown on the drawings. The Contractor shall provide shop drawings of the galvanic anode installation including locations of the individual anode.
- The anode shall be placed with a minimum 3/4" cover and shall be set in Galvashield Embedding Mortar per the manufacturer's recommendations. The anode shall be fully encased in the concrete repair material. Where adequate cover does not exist, a concrete pocket shall be chipped out behind the anode to provide sufficient cover. The Contractor may need to chip around the reinforcing bar locally at the anode installation to make the electrical connection. The reinforcing steel at the connection location shall be cleaned per the manufacturer's recommendations to provide sufficient electrical connection and mechanical bond.
- The electrical continuity of the electrical connections and reinforcing steel shall be confirmed per the manufacturer's recommendations.
- The Contractor shall provide manufacturer's product literature, shop drawings and installation instructions.
- All costs associated with placing the anode including labor, equipment, materials and incidentals shall be included in the contract unit price per each for "Galvanic Anode".

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES FOR 293' – 0" CONT. COMP. GIRDER BRIDGE

44'-0" ROADWAY OVER INTERSTATE 29 STR. NO. 15-215-030
0° SKEW SEC. 15/22 – T119N – R52W 020-168

CODINGTON COUNTY
S.D. DEPARTMENT OF TRANSPORTATION

APRIL 2011

2 OF 8

DESIGNED BY: DJS CODNI24N	DRAWN BY: DJS I24NNOTA	CHECKED BY: EJA	<i>Kevin M. Coeden</i> BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	020-168	5	10

FIBER REINFORCED EPOXY COMPOSITE COLUMN WRAP

A. GENERAL

1. A Fiber Reinforcing Polymer (FRP) column wrap shall be applied to Column Nos. 1, 2 and 3 in conformance with the following notes.
2. The Fiber Reinforcing Polymer (FRP) shall be installed by a Contractor certified by the manufacturer in writing. Certified applicator shall have a minimum of three years experience in performing FRP composite retrofits. The Department shall have the right to approve or reject the personnel qualifications as submitted. The Engineer may suspend the work if the Contractor substitutes an unauthorized composite system or unauthorized personnel for authorized personnel during construction.
3. Reference Standards:

The publications listed below form a part of this specification to the extent referenced. Where a date is given for referenced standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of the Notice of Invitation to Bid shall be used.

A. International Code Council (ICC)

1. ICC AC125, Acceptance Criteria for Concrete and Reinforced and Unreinforced Masonry Strengthening Using Externally Bonded Fiber Reinforced Polymer (FRP) Composite Systems.
2. ICC AC178, Interim Criteria for Inspection and Verification of Concrete and Reinforced and Unreinforced Masonry Strengthening Using Externally Bonded Fiber Reinforced (FRP) Composite Systems.

B. American Standard for Testing and Materials (ASTM)

1. ASTM D3039, Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials.
2. ASTM D4541, Standard Test Method for Pull-off Strength of Coating Using Portable Adhesive-Testers

B. MATERIALS

1. The FRP shall be installed by a Contractor certified by the manufacturer in writing. Certified applicator shall have a minimum of three years experience in performing FRP composite retrofits. The Department shall have the right to approve or reject the personnel qualifications as submitted. The Engineer may suspend the work if the Contractor substitutes an unauthorized composite system or unauthorized personnel for authorized personnel during construction.

FIBER REINFORCED EPOXY COMPOSITE COLUMN WRAP (CONTINUED)

2. Materials for the FRP system have been pre-qualified and shall be supplied by Fyfe Co. LLC (Nancy Ridge Technology Center, 6310 Nancy Ridge Drive, Suite 103, San Diego, CA 92121. Tel: 858-642-0694, email: info@fyfeco.com) or an approved alternate. Alternate systems must provide all items listed in the Quality Control and Quality Assurance section of this specification and be submitted two-weeks prior to the project bid date to the Bridge Construction Engineer for approval.
3. Approved TYFO® Fibrwrap® System to be supplied by Fyfe Company LLC, Nancy Ridge Technology Center, 6310 Nancy Ridge Drive, Suite 103, San Diego, CA 92121. Tel: 858-642-0694, Fax: 858-642-0947. Products include:
 - a. Composite fabric:
 - SCH fiber – primary carbon fiber, unidirectional.
 - SEH fiber – primary glass fiber, unidirectional.
 - b. Epoxy saturant/primer: Tyfo® S epoxy is used as a primer and is also combined with the fiber to form the Tyfo® Fibrwrap® System.
 - c. Epoxy saturant/primer for underwater application: Tyfo® SW-1 epoxy is used as a primer and is also combined with the fiber to form the Tyfo® Fibrwrap® System.
 - d. Primer/Filler: Thickened Tyfo® S, WS, WP or TC thickened epoxy for protective seal coat, filling voids and primer where needed.
 - e. Finishes: Tyfo® RR, Tyfo® FC/F, Tyfo® 4HFL, Tyfo® AFP for any applicable fire resistant finish. Alternate finishes must be approved by the owner.
 - f. Field thickened epoxy matrix, which is compatible with composite system's resin matrix, may be used to patch "bugholes" up to 1.5" (40mm) in depth and to fill voids.
 - g. Epoxies other than the pre-qualified materials above can be evaluated prior to the tender closing; materials meeting the requirements will be allowed by written addendum.
 - h. The manufacturer shall provide specific information on physical, mechanical and chemical properties of fiber, epoxy resin and FRP composite.
 - i. Contractor to provide compatible primer, filler and other materials recommended by the manufacturer as needed for the proper installation of the complete surface bonded FRP composite system

FIBER REINFORCED EPOXY COMPOSITE COLUMN WRAP (CONTINUED)

4. Deliver epoxy materials in factory sealed containers with the manufacturer's labels intact and legible with verification of date of manufacture and shelf life.
5. Store materials in a protected area at a temperature between 40°F (4°C) and 100°F (38°C).
6. Products shall be stored according to the manufacturer's requirements and shall avoid contact with soil and moisture. Products shall be stored to avoid UV exposure

C. SUBMITTALS

1. Working drawings (shop drawings)
 - a. The submitted working drawings shall detail the type, locations, numbers of layers, and orientation of all FRP materials and coatings to be installed.
 - b. A list of at least two different qualified testing laboratories that perform the required ASTM D3039 required as part of this specification.
2. Product information (data sheets)

All of the following product information shall be supplied in a written format to the Engineer and the Bridge Construction Engineer, through the proper channels, at least 30 days prior to Construction for review and approval.

 - a. Provide approved UL assembly data for any required fire resistant finishes (e.g. 2-hour beam slab assembly).
 - b. Properties of the composite materials as determined by independent laboratory testing in accordance with ASTM D3039 (tensile modulus, stress and strain).

NOTES (CONTINUED)
FOR
293' – 0" CONT. COMP. GIRDER BRIDGE

44'-0" ROADWAY OVER INTERSTATE 29 STR. NO. 15-215-030 **0° SKEW SEC. 15/22 – T119N – R52W 020-168**

CODINGTON COUNTY
S.D. DEPARTMENT OF TRANSPORTATION

DESIGNED BY: DJS CODNI24N	DRAWN BY: DJS I24NNOTA	CHECKED BY: EJA	<i>Kevin M. Coeden</i> BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	020-168	6	10

FIBER REINFORCED EPOXY COMPOSITE COLUMN WRAP (CONTINUED)

- c. Installation procedures, maintenance instructions, and general recommendations regarding each material to be used.
- d. Manufacturer's Material Safety Data Sheets (MSDS) for all materials to be used.
- e. Manufacturer's product data sheet indicating physical, mechanical and chemical characteristics of all materials used in the FRP system.
- f. Written verification from the manufacturer that their applicator has received the required certifications and training.
- g. Certification by the manufacturer that supplied products comply with local regulations controlling use of volatile organic compounds (VOC's).

3. Quality Control and Quality Assurance

All of the following quality control and quality assurance information shall be supplied in a written format to the Engineer and the Bridge Construction Engineer, through the proper channels, at least 30 days prior to Construction for review and approval.

- a. Submit product data indicating product standards, physical and chemical characteristics, technical specifications, limitations, installation instructions, maintenance instructions and general recommendations regarding each individual material. Only epoxy resins will be accepted for construction of FRP systems referenced in this specification. Other resins, such as polyesters/vinyl esters, are not allowed as substitutes. The manufacturer shall clearly define the epoxy resin working time. Any batch that exceeds the batch life shall not be used.
- b. Submit FRP system durability and structural testing information provided by FRP composite system manufacturer to demonstrate system properties of material to be used. Systems shall provide equivalent environmental durability testing to that defined in ICC AC125 or provide an approved ICC Evaluation Service Report for the proposed FRP system(s). A System without the required environmental durability testing will not be allowed.
- c. Submit a list of completed surface bonded FRP composite strengthening projects completed with the manufacturer's FRP composite system in the past 3 years. The list should include at a minimum 25 projects with proposed FRP system, the dates of work, type, description and amount of work performed.
- d. Surface bonded FRP composite system shall be installed by certified applicator with written consent from manufacturer that the contractor has been trained. Certified applicator shall have a minimum of 3 years experience in performing FRP composite retrofits.

FIBER REINFORCED EPOXY COMPOSITE COLUMN WRAP (CONTINUED)

- e. The Engineer may suspend the work if the Contractor substitutes an unapproved fiber reinforced composite system or unapproved personnel during construction

D. CONSTRUCTION REQUIREMENTS

1. Surface Preparation

- a. The surface to receive the composite shall be free from fins, sharp edges and protrusions that will cause voids behind the installed casing or that, in the opinion of the Engineer, will damage the fibers. Existing uneven surfaces to receive composite shall be filled with the system epoxy filler or other material approved by the Engineer. Filling of large voids in surfaces to receive composite shall be paid as an extra to the contract work of installing the composite system (small pinholes or micro bubbles in the concrete surface or resin do not require special detailing). The contact surfaces shall have no free moisture on them at the time of application. If moisture is present, use the manufacturer suggested wet prime epoxy, if available.
- b. Repair all damaged concrete, spalls, and irregular surfaces to create a flat or slightly convex surface. Sack, or fill with thickened epoxy, surfaces as necessary to eliminate large air surface voids, greater than 0.5" (12mm) diameter. Well adhered paint and concrete do not require removal.
- c. Round off sharp and chamfered corners to a minimum radius of 0.75" (20mm) by means of grinding or forming with the system's thickened epoxy. Variations in the radius along the vertical edge shall not exceed 0.5" (12mm) for each 12" (300mm) of column height.

2. Installation

- a. Fiber wrap material shall not be applied until all surface preparation work is complete and all patching materials have cured for a minimum of 10 days.
- b. Verify ambient and concrete temperatures. No work shall proceed if the temperature of the concrete surface is less than 40°F (4°C) or greater than 100°F (38°C) or as specified on the epoxy component labels. The ambient temperature and temperature of the components shall be between 40°F (4°C) and 100°F (38°C), unless provisions have been made to ensure components' temperature is maintained within this range or the range specified by the manufacturer.

FIBER REINFORCED EPOXY COMPOSITE COLUMN WRAP (CONTINUED)

- c. Prepare the epoxy matrix by combining components at a weight (or volume) ratio specified by the manufacturer. The components of epoxy resin shall be mixed with a mechanical mixer until uniformly mixed, typically 5 minutes at 400-600 rpm.
- d. Components that have exceeded their shelf life shall not be used.
- e. Saturation of the fabric shall be performed and monitored according to the manufacturer's specified fiber epoxy resin ratio. Fabric shall be completely saturated prior to application to contact surface in order to ensure complete impregnation. Saturation shall be supervised and checked by the certified installer. Both the epoxy resin and fabric shall be measured accurately, combined, and applied uniformly at the rates shown on the approved working drawings and per manufacturer's recommendations.
- f. All cutting of fabrics, mixing of epoxy and combination thereof shall take place in a protected area away from critical structure functions and any electrical equipment.
- g. Prepare surfaces as required, including corner preparation.
- h. Remove dust and debris by hand or with compressed air as per specification.
- i. Protect area adjacent to element where FRP composite is being applied from splatter, drips and over runs.
- j. Using a roller or trowel, apply one prime coat of epoxy resin to the substrate (2 mil min). Allow primer to become tacky to the touch.
- k. Fill any uneven surfaces or recesses with thickened epoxy.

**NOTES (CONTINUED)
FOR
293' - 0" CONT. COMP. GIRDER BRIDGE**

44'-0" ROADWAY OVER INTERSTATE 29 STR. NO. 15-215-030 **0° SKEW SEC. 15/22 - T119N - R52W 020-168**

**CODINGTON COUNTY
S.D. DEPARTMENT OF TRANSPORTATION**

APRIL 2011

4 OF 8

DESIGNED BY: DJS CODNI24N	DRAWN BY: DJS I24NNOTA	CHECKED BY: EJA	<i>Kevin N. Coeden</i> BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	020-168	7	10

FIBER REINFORCED EPOXY COMPOSITE COLUMN WRAP (CONTINUED)

- l. Apply saturated fabric to substrate surface by hand lay up, using methods that produce a uniform, constant tensile force that is distributed across the entire width of the fabric, and ensure proper orientation of the fabric. Under certain application conditions, the system may be placed entirely by hand methods assuring a uniform, even final appearance. Gaps between composite bands may not exceed 0.5" (12mm) width in the fabric's transverse joint unless otherwise noted on project drawings. A lap length of at least 6" (150mm) is required at all necessary overlaps in the primary fiber direction of the fabric.
- m. Apply subsequent layers, continuously or spliced, until designed number of layers is achieved, per project drawings.
- n. Using a roller or hand pressure, release or roll out entrapped air, and ensure that each individual layer is firmly embedded and adhered to the preceding layer or substrate.
- o. Detail all fabric edges, including termination points and edges, with thickened epoxy.
- p. Finish: All edges and seams must be feathered. Use system as directed by the manufacturer. Finish as specified between 24 and 72 hours after final application of epoxy. If after 72 hours the epoxy is cured, the surface must be roughened by hand sanding or brush blasting, prior to finishing.
- q. System may incorporate structural fasteners but limitations and detailing must be verified with composite system manufacturer.
- r. The completed installation shall be allowed to cure in ambient conditions. Epoxy curing temperatures shall be maintained in the temperature range designated for the formulation used. The temperature cure ranges and times will be supplied by the manufacturer. The composite system shall be protected from contact by moisture, damage and debris for a minimum of 24 hours after placement.
- s. Paint the finished surfaces of the FRP system with a paint system approved by the manufacturer and the Office of Bridge Design. Paint shall not be applied within the first 24 hours of placement. After the 24 hour cure period paint can be applied when the FRP system achieves a tacky surface where a light finger touch results in no transfer of epoxy to the finger but still exhibits a tacky feeling. From this time, until 72 hours later, two finish coats of the approved paint system shall be applied. If the paint system is applied after 72 hours, the surface must be roughened by hand sanding or brush blasting to break the gloss finish for the application of the paint system. Dust and residue shall be removed prior to application of paint coats. The color of the finished coat of paint shall match the color of the adjacent concrete as approved by the Engineer.

FIBER REINFORCED EPOXY COMPOSITE COLUMN WRAP (CONTINUED)

- t. The certified installer shall record batch numbers for fabric and epoxy used each day, and note locations of installation. Measurement shall be in square footage for the fabric and volume of epoxy used each day. The completed information shall be submitted to the Engineer and the Bridge Construction Engineer through the proper channels.
- u. All defects (including bubbles, delaminations, and fabric tears) spanning more than 5% of the surface area shall be repaired. Small defects (on the order of 6" diameter) shall be injected or back filled with epoxy. Bubbles less than 12" in diameter shall be repaired by injecting with epoxy. Two small holes shall be drilled into the bubble to allow injection of the epoxy and escape of entrapped air. Bubbles and delaminations greater than 12" in diameter shall be repaired by removing and re-applying the required number of layers of the composite and the required finish coatings. All repair procedures shall be subject to the approval of the Engineer.
- v. The completed installation shall be photographed by the Engineer prior to paint application. Photos of the completed surface taken by the Engineer shall be transmitted to the Bridge Construction Engineer for his consideration. The paint shall not be applied to the finished surface until the photos have been viewed by the Bridge Construction Engineer and he approves the finished installation condition.

E. METHOD OF MEASUREMENT

Measurement will not be made for Column Fiber Wrap. Plans quantity shall be used for payment.

F. BASIS OF PAYMENT

Column Fiber Wrap will be paid for at the contract unit price per each. Payment will be full compensation for labor, equipment, materials, and all incidental work required.

**NOTES (CONTINUED)
FOR
293' – 0" CONT. COMP. GIRDER BRIDGE**

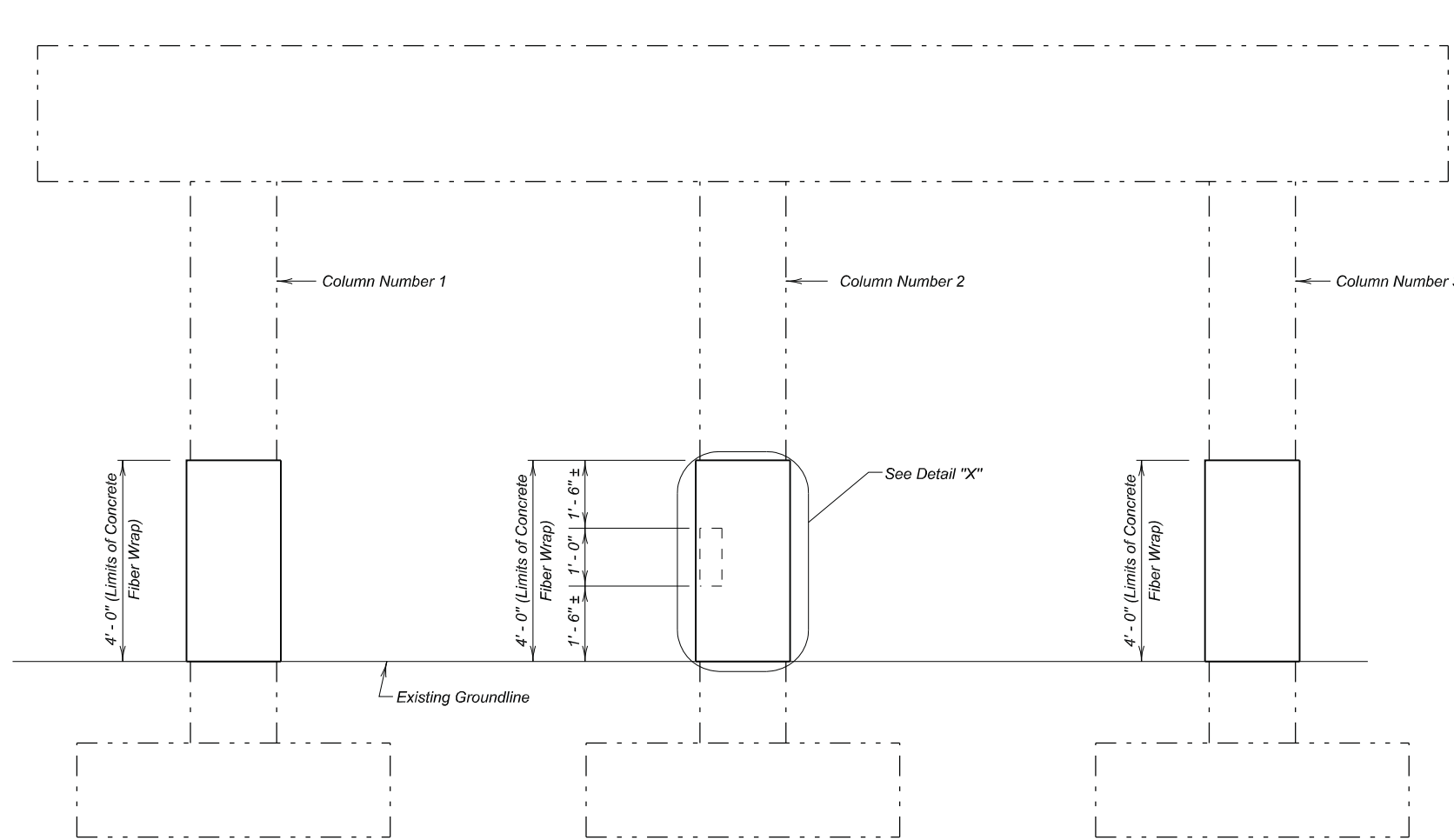
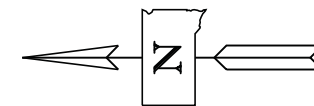
44'-0" ROADWAY OVER INTERSTATE 29 STR. NO. 15-215-030 0° SKEW SEC. 15/22 – T119N – R52W 020-168

**CODINGTON COUNTY
S.D. DEPARTMENT OF TRANSPORTATION**

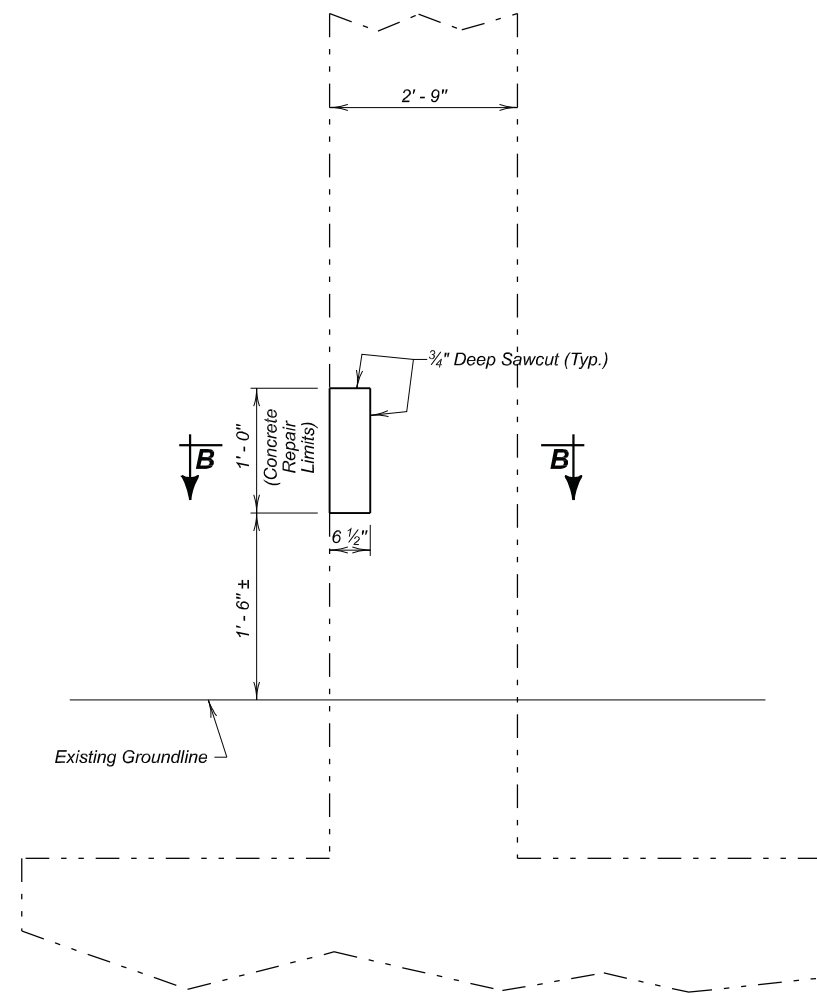
APRIL 2011

5 OF 8

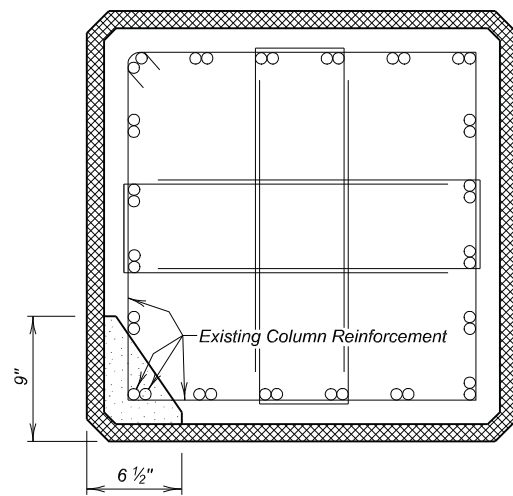
DESIGNED BY: DJS CODNI24N	DRAWN BY: DJS I24NNOTA	CHECKED BY: EJA	<i>Kevin M. Coeden</i> BRIDGE ENGINEER
---------------------------------	------------------------------	--------------------	---



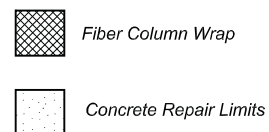
SECTION A - A
(Bent No. 2)



DETAIL "X"
(Concrete Repair Details for Column No. 2 only)
(Showing column repair prior to fiber wrap placement)



SECTION B - B



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Breakout Structural Concrete	CuYd	0.1
Class A45 Concrete, Bridge Repair	CuYd	0.1
Column Fiber Wrap	Each	3
Galvanic Anode	Each	1

NOTE:
This sheet is to be used in conjunction with the Notes.

COLUMN REPAIR DETAILS AT BENT NO. 2
FOR
293' - 0" CONT. COMP. GIRDER BRIDGE
44' - 0" ROADWAY
OVER INTERSTATE 29
STR. NO. 15-215-030

0° SKEW
SEC. 15/22-T119N-R52W
020-168

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
APRIL 2011

INDEX OF BRIDGE SHEETS

SHt. No.	TITLE	SHt. No.	TITLE	SHt. No.	TITLE
1	General Drawing And Quantities	10	Slab & Diaphragm Details	18	Details of Approach Slab Adjacent to Bridge
2	Subsurface Investigations	11	Girder Layout & Details	19	Compression Seal Details
3	Details Of Abutment No.1	12	Girder Splice, Framing Diagram & Erection Data	20	Drop Inlet and Pipe Installation Sheet
4	Details Of Abutment No.1	13	Details Of Expansion Devices		
5	Details Of Abutment No.3	14	Details Of Bearings		
6	Details Of Abutment No.3	15	RT-4 Steel Rolling & Curb Details		
7	Details Of Abutments	16	Bridge End Backfill		
8	Wing Wall Details	17	Pile Shoe & Pile Splice Details		
9	Details Of Bent No. 2				

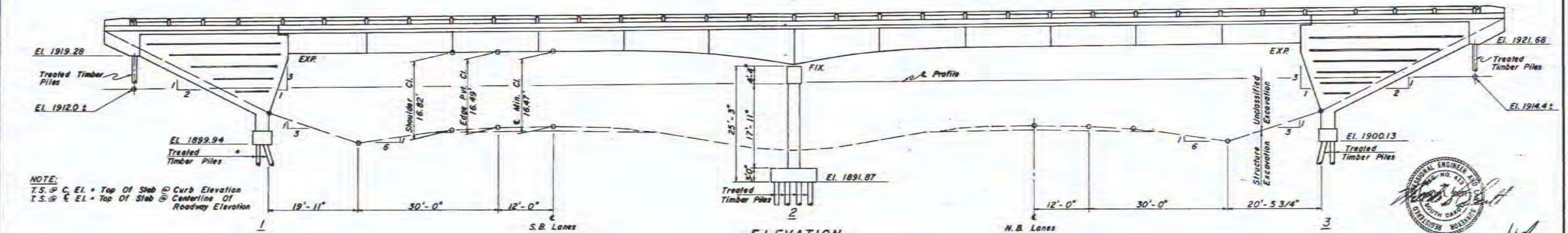
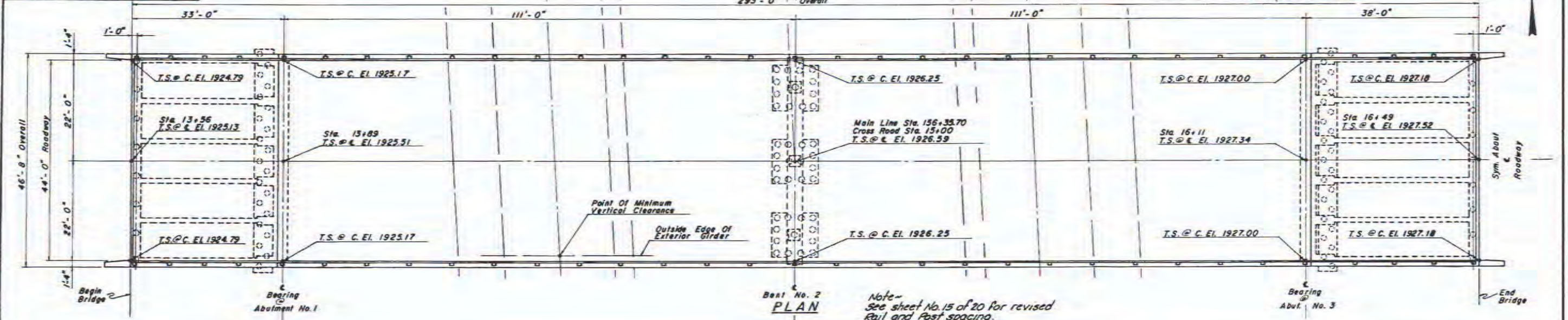
B.M. No. 55 Elev. 1908.57
Iron Pin
224' Rt. Sta. 155+55

B.M. No. 56 Elev. 1896.11
Iron Pin
250' Rt. Sta. 159+98

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	020-168	9	10

Sta.	F. Elev.	Dr. Elev.	Test Elev.	Rel. Elev.	Rel. Elev.
1	112.2	112.2	112.2	15.0	127.2
2	120.0	120.0	120.0	25.0	145.0
3	118.6	118.6	118.6	20.0	138.6
Totals	346.8	346.8	346.8	60.0	386.8

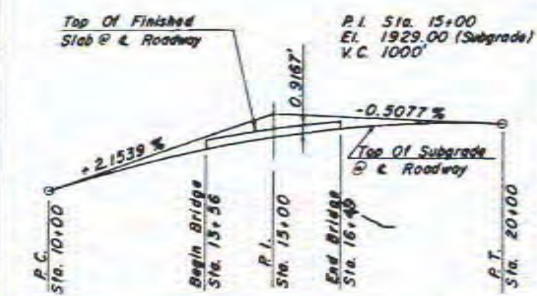
Finald
10-27-75



NOTE:
T.S. @ C. EL. = Top Of Slab @ Curb Elevation
T.S. @ EL. = Top Of Slab @ Centerline Of Roadway Elevation



Finald
10-27-75



CROSS ROAD VERTICAL CURVE DATA

Item	Clays & Concrete Bridge Yds.	Steel Rebar for Conc. Massing Cu. Yds.	Steel Rolling Type RT-4 Kln. Ft.	Timber Piling (Lip Ft.)		Excavation		Preboring Piling Ljn. Ft.	Bridge End Backfill Lump/Sum	Pile Shoes Steel Each
				Treated Timber Furnish/Driving	Uncl. Timber Furnish/Driving	Structure Bridge Unclassified Cu. Yds.	Unclassified Cu. Yds.			
Superstructure	285.5	67,420	271,940	586.0						
Abutment No. 1	164.2	33,826	58	7140 = 280 20x25 = 800	7440 = 280 20x28 = 800	1445 = 45 1x30 = 30	141	58.2		
Bent No. 2	71.3	11,082		2920 = 280 20x25 = 800	3920 = 280 20x28 = 800	1625 = 25 1x25 = 25	132			
Abutment No. 3	173.1	38,757	58	2820 = 440 20x40 = 800	2820 = 440 20x40 = 800	1625 = 25 1x25 = 25	144	65.5		32
Total	679.1	150,785	272,052	886.0	2320	2320	178	123.7	1/4 Ldn Sum	32

Two Treated Timber Test Piles Shall Be Driven At Abutments No. 1 And No. 3, And One Treated Timber Test Pile Shall Be Driven At Bent No. 2 Before The Remaining Piles Are Ordered.
All Unclassified Excavation To Be Done By Others
For Information Only, The Approximate Amount Of Granular Backfill Required Will Be 180 Cu. Yds. In Place And The Length Of 6" Perforated And Nonperforated Metal Pipe Will Be 125' Lin. Ft. See Notes On Sheet No. 16 Of 17.

GENERAL NOTES

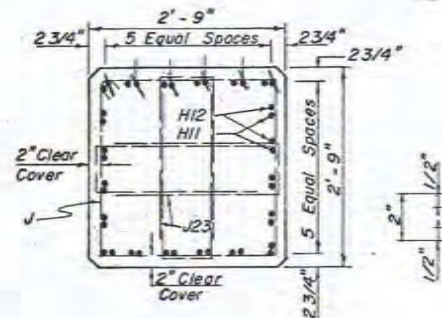
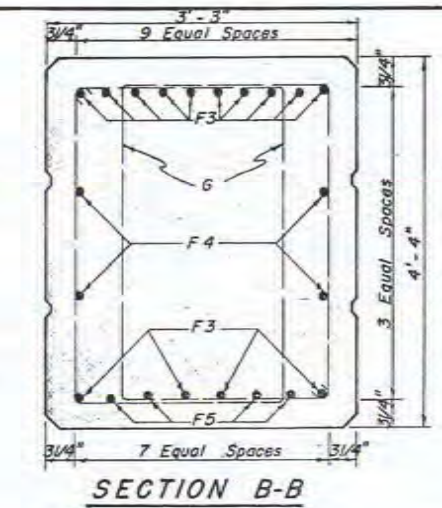
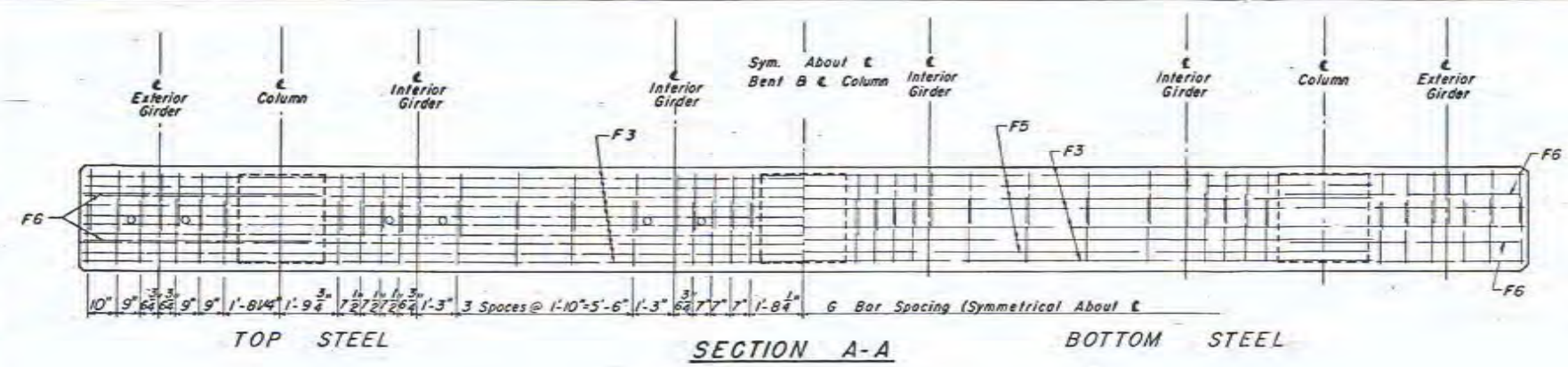
- Design Specifications: A.A.S.H.O. Specifications For Highway Bridges, 1963 Edition & Interim Specification, 1970 & 1971.
- See Notes On Sheet No. 2 Through Sheet No. 20
- Longitudinal Elements Of The Slab Shall Conform To The Cross Road Vertical Curve.
- Rail Posts Shall Be Built Normal To The Grade.
- All Reinforcing Steel Shall Conform To A.S.T.M. Specifications A615, Grade 40.
- Unit Stresses: Concrete Slab - fc 1350 p.s.i., Abutments & Bent - fc 1600 p.s.i., Reinforcing Steel - fs = 20,000 p.s.i.
- Design Loading: HS 20-44 A.A.S.H.O.
- The Contractor Shall Have Sufficient Pile Splice Material On Hand Before Pile Driving Is Started. For Details See Standard Plate No. 303.1.
- For Steel Pile Shoes See Standard Plate No. 301.
- Elevation Of Top Of Slab At Roadway Is 0.9167 Feet Above Subgrade Elevation.
- Prebored Holes For Piles At Abutments Shall Be Backfilled With Granular Material Acceptable To The Engineer And Compacted As Specified By The Engineer. The Cost Of Granular Material In Place Shall Be Included In The Unit Price Bid For Preboring Piling.
- The Contractor Shall Imprint On The Structure The Date Of Construction As Specified And Detailed On Standard Plate No. 308, Which Is On File With The Engineer.
- Standard Plates Referred To In These Plans Are The Plates Printed On Sheet No. 17 Of These Plans And Are Not Intended To Be Referred To The Standard Plates Manual.
- Abutment Piling Are To Be Prebored To The Natural Ground.
- Type "DS" Gutter Called For On These Plans Shall Be Constructed In accordance with details shown on sheet No. 18 of these plans.

SPECIFICATION NOTE

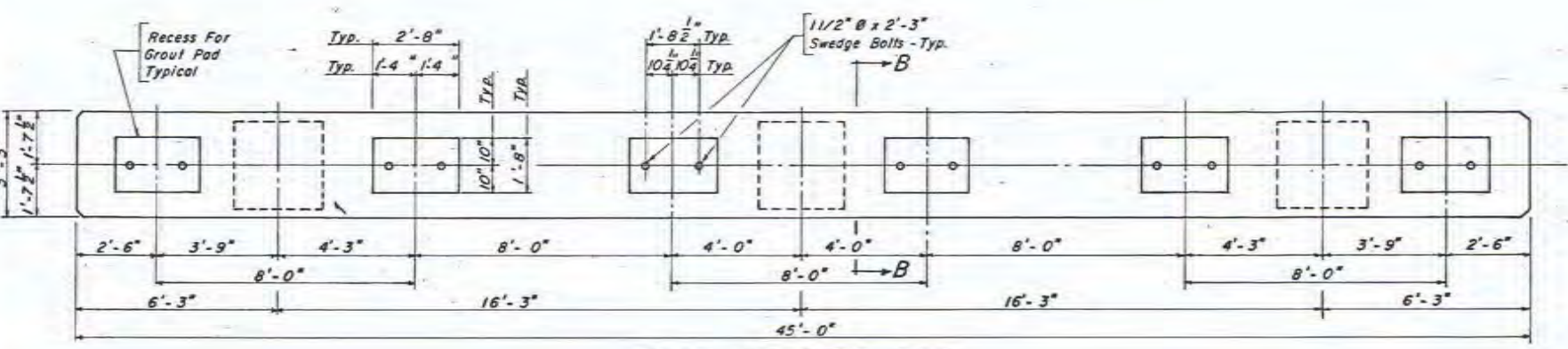
Use South Dakota Standard Specifications For Roads And Bridges, 1969 Edition, And Required Provisions, Supplemental Specifications And/Or Special Provisions As Included In The Proposal. All Concrete Shall Be Class "A", Type II Cement Is Required.

GENERAL DRAWING AND QUANTITIES FOR
293'-0" CONT. COMP. GIRDER VIADUCT
44'-0" ROADWAY OVER I29-7(9)1186
M.L. STA. 156+35.70
SEC. 15 & 22 - T119N-R52W
CODINGTON COUNTY HS 20-44
SOUTH DAKOTA DEPARTMENT OF HIGHWAYS
-X771- STR. NO. 15-215-030

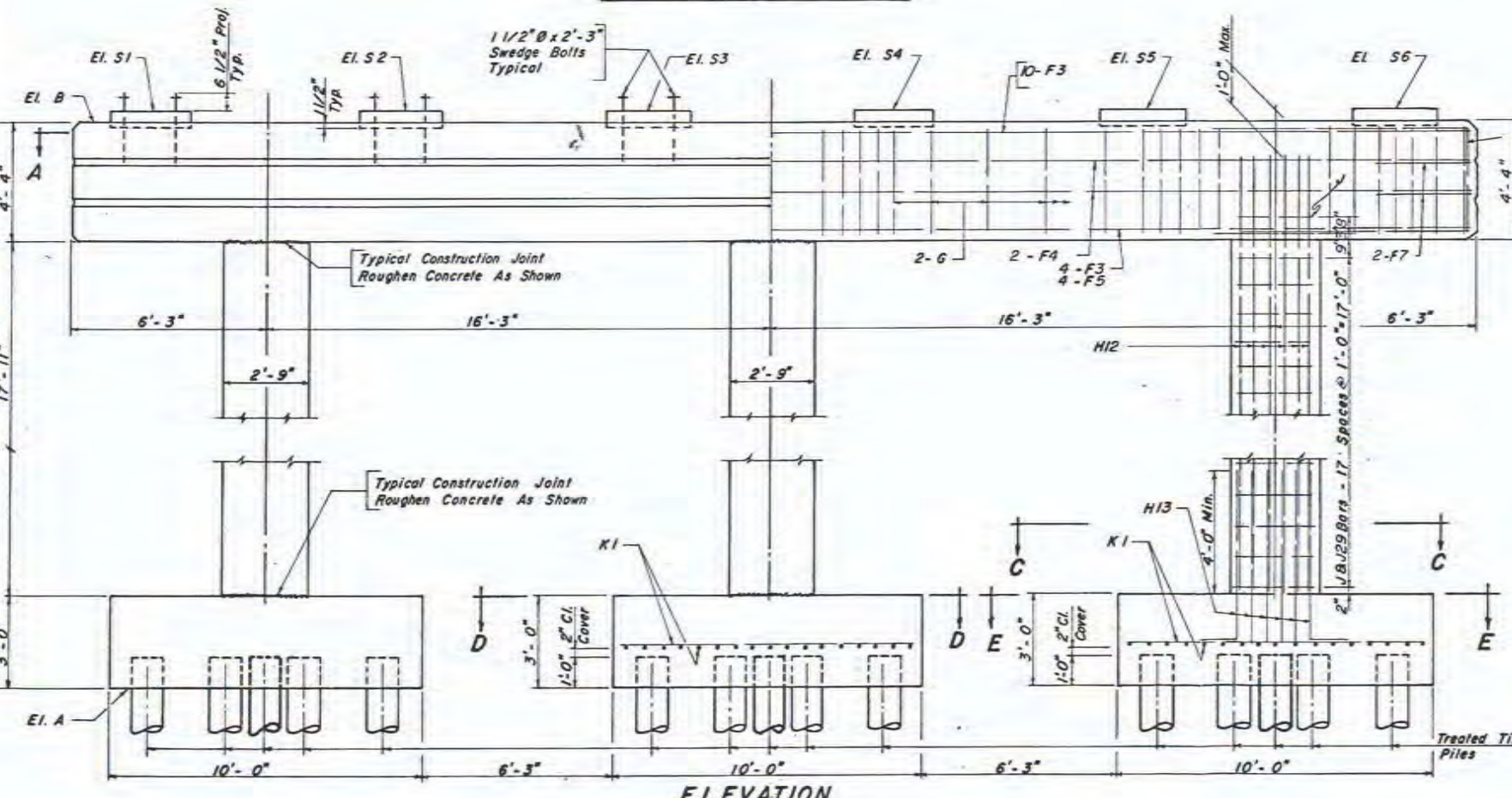
SOUTH DAKOTA DEPARTMENT OF HIGHWAYS
Codington County, South Dakota
Approved By _____
SCOTT ENGINEERING COMPANY
Watertown, South Dakota
BY DATE
Designed W.L.S. 1-1970
Drawn J.D.W. 3-26-70
Revised W.L.S. 2-1972
Sheet No. 7 OF 8



SECTION C-C



PLAN OF BENT CAP



ELEVATION

ELEVATIONS							
A	B	S1	S2	S3	S4	S5	S6
1891.87	1917.12	1917.184	1917.309	1917.434	1917.434	1917.309	1917.184

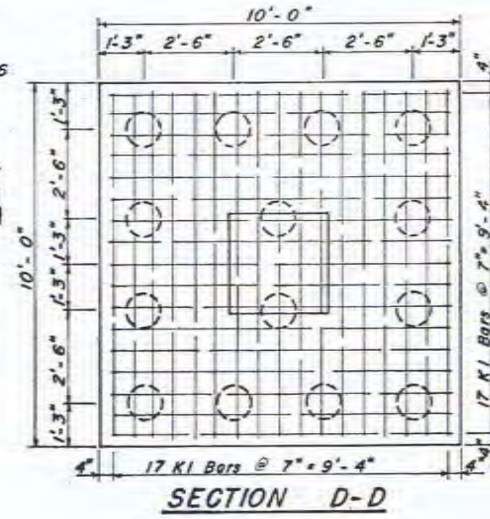
REINFORCING STEEL SCHEDULE				BENDING DETAILS	
Mr. No.	Size	Length	Type		
F3	14	8	44'-8"	Str.	
F4	4	6	44'-8"	Str.	
F5	4	8	35'-6"	Str.	
F6	4	8	20'-0"	S10	
F7	4	6	8'-9"	S10	
G	84	6	13'-5"	TI	
H12	60	7	21'-3"	Str.	
H13	60	7	7'-6"	2A	
J	60	3	10'-4"	TI	
J23	240	3	5'-1"	S10	
K1	102	8	9'-6"	Str.	

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Class "A" Concrete	Cu. Yds.	71.3
Reinforcing Steel	Lbs.	11082
Structure Excavation	Cu. Yds.	132
Treated Timber Piles	Np.	40

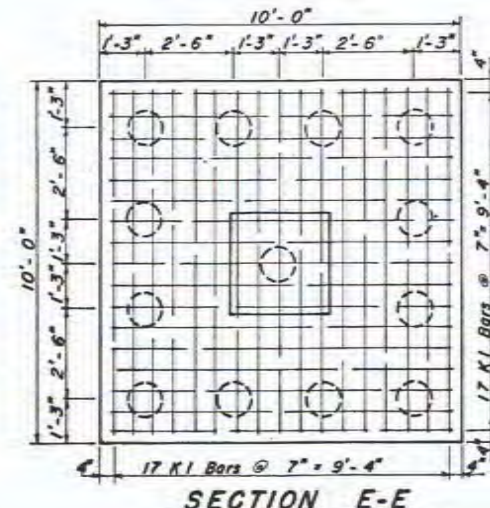
∅ Includes 0.2 Cu. Yds. For Grout.

RUSTICATION DETAILS

- GENERAL NOTES**
- Design Specifications: A.A.S.H.O. Specifications For Highway Bridges, 1969 Edition And Interim Specification, 1970.
 - Design Loading: HS 20-44, A.A.S.H.O.
 - Unit Stresses: Reinforcing Steel - $f_s = 20,000$ p.s.i.
Concrete - $f_c = 1,600$ p.s.i.
 - All Reinforcing Steel Bars Shall Conform To A.S.T.M. Specification A 615, Grade 40.
 - All Swedge Bolts Shall Be $1\frac{1}{2}$ " ϕ x 2'-3" Long With Heavy Hex Nut And Cut Washer (Listed & Included In Structural Steel In Superstructure).
 - Use 2" Clear Cover On All Reinforcing Steel Except As Otherwise Shown.
 - All Exposed Edges Shall Be Chamfered 1" Except As Otherwise Shown.
 - Chamfer Grout Pads 3/4"
 - The Quantity Of Grout Is Included In, And Shall Be Paid For, As Class "A" Concrete.
 - Piling Shall Develop A Minimum Bearing Value Of 24 Tons Per Pile.
 - See General Drawing For Lengths Of Treated Timber Piles.



SECTION D-D



SECTION E-E

ORIGINAL CONSTRUCTION PLANS

DETAILS OF BENT NO. 2 FOR
 293'-0" CONT. COMP. GIRDER VIADUCT
 44'-0" ROADWAY OVER I 29-7(9)186
 M.L. STA. 156+35.70
 SEC. 15 & 22 T119N - R 52W
 STR. NO. 15-215-030
 CODINGTON COUNTY HS 20-44
 SOUTH DAKOTA DEPARTMENT OF HIGHWAYS

SOUTH DAKOTA DEPARTMENT OF HIGHWAYS
 Codington County, South Dakota

Approved By

SCOTT ENGINEERING COMPANY
 Watertown, South Dakota

Designed	W.L.S.	1-1970	Sheet No (8) OF (8)
Drawn	J.D.W.	3-1970	
Revised	W.L.S.	2-1972	