

Legend

Interstate Highway	
Primary Highway-Divided	
Primary Highway	
Portland Cement Concrete Road	
Asphalt Road	
Bituminous Road	
Gravel Road	
Earthen Road	
Interstate Highway	
United States Highway	
State Highway	
County Highway	
Railroad	
Pipeline	
Airport	
Hydrology	
Bridge	
State Boundary	
County Boundary	
Corporate Boundary	
Township Line	
Section Line	
Road Names	
Unincorporated Place	



Highway Division

Plans of Proposed Improvements on the

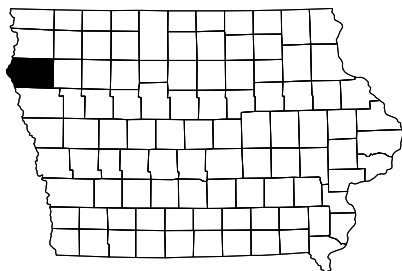
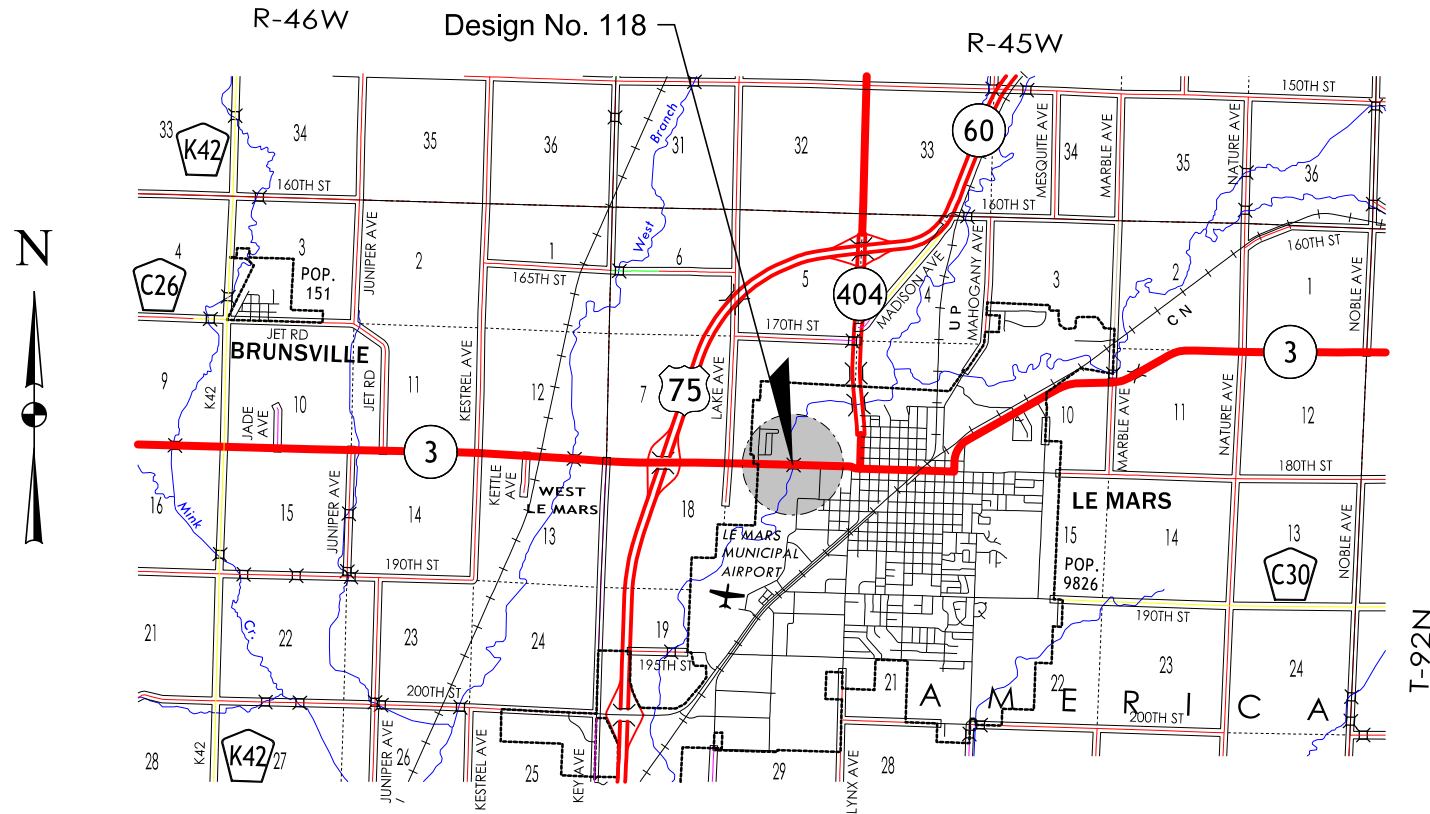
PRIMARY ROAD SYSTEM

Plymouth County

Deck Joint Repair

IA 3 Over Floyd River 1.0 Miles East of
US 75 in Le Mars

The Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, Series 2015, plus applicable general Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions shall apply to construction work on this project.



Location Map

Project Directory Name: 7500301016

Revisions



1-800-292-8989

www.iowaonecall.com



Standard Road Plans

Standard Road Plans are listed on Sheet Number C.1

Design Data Rural

2016 AADT 4460 V.P.D.

Trucks 5 %
Total
Design ESALs 700,000

Index of Seals

Sheet No.	Name	Type
1	Dean G. Bierwagen	Structural Design
C.1	Dung T. Ta	Roadway Design

STRUCTURAL DESIGN



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Signature: *Dean G. Bierwagen* Date: 01-02-2018
Printed or Typed Name: **Dean G. Bierwagen**

My license renewal date is December 31, 2018

Pages or sheets covered by this seal: Sheets 1 thru 7 of 9

ESTIMATED BRIDGE REPAIR QUANTITIES					
ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL	AS BUILT QUAN.
1	2401-6750001	REMOVALS, AS PER PLAN	LS	1.00	
2	2413-1200100	NEOPRENE GLAND INSTALLATION AND TESTING	LF	91.5	
3	2426-6772013	REPAIR BEAM ENDS	EACH	1	
4	2426-6772120	BRIDGE REPAIR	LS	1.00	
5	2499-6000200	SEALER COAT FOR PRESTRESSED CONCRETE BEAM ENDS	EACH	14	
6	2533-4980005	MOBILIZATION	LS	1.00	

ESTIMATE REFERENCE INFORMATION		
ITEM NO.	ITEM CODE	DESCRIPTION
1	2401-6750001	REMOVALS, AS PER PLAN INCLUDES ALL WORK FOR REMOVAL AND OFF-SITE DISPOSAL OF EXISTING NEOPRENE GLANDS. REMOVAL OF SCHEDULED ITEMS SHALL BE IN ACCORDANCE WITH SECTION 2401, OF THE STANDARD SPECIFICATIONS. ANY DAMAGE TO MATERIAL NOT TO BE REMOVED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND REPAIRED AT NO EXTRA COST TO THE STATE.
2	2413-1200100	NEOPRENE GLAND INSTALLATION AND TESTING INCLUDES COST OF MATERIALS AND LABOR FOR FURNISHING AND INSTALLING REPLACEMENT NEOPRENE GLANDS AS NOTED AND AS SHOWN. INCLUDES COST OF MATERIALS AND LABOR FOR WATER TESTING OF JOINTS. INCLUDES COST OF CLEANING OF THE EXISTING EXPANSION JOINT EXTRUSION PER MANUFACTURES RECOMMENDATIONS FOR GLAND REPLACEMENT.
3	2426-6772013	REPAIR BEAM ENDS - -
4	2426-6772120	BRIDGE REPAIR INCLUDES THE COST OF CLEANING, FURNISHING SEALER AND SEALING THE EXISTING ABUTMENT BACKWALLS, ABUTMENT SEATS, TOP AND TRAFFIC FACE OF BARRIER RAIL, AND DECK GUTTER.
5	2499-6000200	SEALER COAT FOR PRESTRESSED CONCRETE BEAM ENDS INCLUDES COST OF MATERIALS CLEANING AND LABOR FOR PLACEMENT OF EPOXY RESIN AT BEAM ENDS AS NOTED AND AS SHOWN. EPOXY RESIN MATERIALS TO BE IN ACCORDANCE WITH MATERIALS IM-491.19
6	2533-4980005	MOBILIZATION - -

Note:
Roadway quantities shown
elsewhere in these plans.

Deck Repair for 0° Skew

343'-6 x 44' Pretensioned
Prestressed Concrete Beam Bridge

68'-3 End Spans3 - 69'-0 Interior Span

Estimate Quantities

Sta. 500-50.00 (1/4 IA 3)January 2018

Plymouth County

Iowa Department of Transportation - Highway Division

Design Sheet No. 1 of 6File No. 31165Design No. 118

General Notes:

This design is for repairs to the existing 343'-6 x 44' pretensioned prestressed concrete beam bridge.

Electronic copies of original design plans will be made available to the contractor as part of the e-files supplied with the contract documents. Dimensions shown on these plans are based on the original design plans (Design 578).

Repair shall consist of:

- 1. Replace West abutment and East abutment glands.
- 2. Seal all exposed prestressed beam ends at the expansion joint locations and repair beam ends as required.
- 3. Reseal the abutments seats.
- 4. Seal the existing barrier rail.

All dimensions and details shown on these plans pertinent to new construction shall be verified in the field by the contractor before starting construction.

Construction shall be done in stages with at least one lane traffic maintained at all times in accordance with "Traffic Control Plan" note.

The Bridge Contractor will be the only contractor at the site and is responsible for the completion of all work as detailed and noted in these plans.

The bid item "REMOVALS AS PER PLAN" shall include all costs associated with removal and off-site disposal of the existing neoprene expansion joint glands. Any damage to other portions of existing structure not noted for removal shall be the responsibility of the Bridge Contractor and shall be repaired at no extra cost to the State.

Neoprene Gland Notes:

It is the intent of this design to reuse the existing steel extrusions at West abutment and East abutment. Refer to details elsewhere in this plan set for existing steel extrusion type.

The contractor shall remove the existing neoprene gland and clean the steel extrusion per the manufacturer's gland installation recommendations. The contractor shall provide the engineer with a copy of the manufacturer's instructions for gland removal, steel extrusion cleaning, and new gland installation. Methods of cleaning may be comprised of a combination of compressed air, wire brushing, and light sandblasting with fine grit sand. Care shall be taken in the cleaning operations to minimize removal of the galvanized zinc coating on the steel extrusion.

The new neoprene gland is to be placed as one continuous piece from end to end of the steel extrusion.

The neoprene gland shall conform to ASTM-2628 modified to exclude recover test and compression set.

The contractor shall install the gland only when the joint opening is greater than 1¾ and the temperature is greater than 40°F to allow proper installation of the gland.

The quantity of neoprene gland installed shall be paid for at the contract price per foot based on plan quantities. The price bid for "NEOPRENE GLAND INSTALLATION AND TESTING" shall be full compensation for furnishing, installing and watertight integrity testing (including leak repairs as directed by the engineer and subsequent retesting) of the new neoprene glands.

Watertight Integrity Testing & Repair Notes

After installation of each neoprene gland, the contractor shall perform watertight integrity tests at the deck level to detect any leakage. The tests are to check for leakage at the upturned ends of the expansion device and for leakage along the expansion device across the deck and any medians or sidewalks. The contractor may conduct a single test of the entire device including upturned ends or may conduct separate tests of upturned ends and one or more tests of overlapping lengths between the upturned ends.

At each upturned end of the expansion device, the contractor shall block out on the deck at least 3 feet of the expansion device leading to the upturned end and flood the area. A minimum water depth of 3" shall be maintained at the gutterline for at least 30 minutes. During the test, the inspector shall observe for any overflow at the upturned end. At the conclusion of the test the inspector will examine the underside of the joint for leakage. The expansion device is considered watertight if the inspector observes no overflow during the test and if no dripping water or water droplets are visible in the underdeck areas near the upturned end.

The contractor shall test the expansion device between upturned ends by blocking out and covering the device with ponded or flowing water to a depth of at least 1" at all points, for at least 30 minutes. Vertical curb surfaces may be tested with an unnozzled hose delivering approximately one gallon per minute directed to flow over the entire curb height for 30 minutes. At the conclusion of the test, the inspector will examine the underside of the joint for leakage. The expansion device is considered watertight if no dripping water or water droplets are visible in the underdeck areas along the full length of the expansion joint. Damp concrete that does not show dripping water or water droplets is not considered a sign of leakage.

If the expansion device leaks at an upturned end or along its length, the contractor shall locate the leak(s) and take repair measures to stop the leakage. The repair measures shall be as recommended by the manufacturer and approved by the engineer prior to beginning corrective work.

If measures to eliminate leakage are taken, the contractor shall perform subsequent watertight integrity tests subject to the same conditions as the original test.

SPECIFICATIONS:

Design: AASHTO Series of 2002.
Construction: Iowa Department of Transportation Standard Specifications For Highway and Bridge Construction, Series 2015, plus applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions shall apply to construction work on this project.

Design Stresses:

Design stresses for the following materials are in accordance with the AASHTO Standard Specifications for Highway Bridges, Series of 2002.
Reinforcing steel in accordance with Section 8, Grade 60.
Concrete in accordance with Section 8, f'c = 4.0 ksi.
Structural steel in accordance with Section 10 ASTM A709 Grade 36, Grade 50, and Grade 50W (AASHTO M270 Grade 36, Grade 50, and Grade 50W).

Location

IA 3 Over Floyd River
T-92N R-45W
Section 8
America Township
Plymouth County
FHWA No. 039851
Bridge Maint. No. 7526.9S003
Latitude 42.79324995°
Longitude -96.18477864°

Traffic Control Plan

Note: The roadway will be open to thru traffic. Refer to the traffic control plan shown elsewhere in these plans.

Design History at this Site (Includes this design)	
Des. No.	Type of Work
578	Original Design
118	Deck Joint Repair

Deck Repair for 0° Skew

343'-6 x 44' Pretensioned Prestressed Concrete Beam Bridge

68'-3 End Spans3 - 69'-0 Interior Span

General Notes

Sta. 500-50.00 (0+ IA 3)January 2018

Plymouth County

Iowa Department of Transportation - Highway Division

Design Sheet No. 2 of 6File No. 31165Design No. 118

Beam End Repair Notes:

It is estimated that one beam end will be repaired. The final quantity and limits of beam end areas shall be determined by the engineer.

The contractor shall notify the engineer when concrete removals are complete by each location to allow inspection by the engineer prior to placement of concrete or repair mortar.

The contractor shall report tendon or reinforcing bar section loss, exposed during removal work, to the engineer prior to performing any repair work. The engineer shall be given adequate time (7 days max.) to determine whether beam reinforcing is required. The contractor shall incorporate this time into the construction schedule with work in other areas of the project in order to not delay the project.

Removal tools shall be limited to 15 lb. chipping hammers and to hand tools without power.

The contractor shall perform the concrete repair work in accordance with the following procedures and/or as directed by the engineer:

1. Not cross cut at corners. Stop saw cuts short of corners and remove concrete by hand. Adjust depth of saw cut as required to prevent cutting of existing reinforcing steel or strands. Extreme care shall be exercised during concrete removal so that exposed strands and reinforcing bars are not damaged. Any damage done to the strands or bars by the contractor shall be repaired by the contractor at no additional cost to the state.
2. Remove deteriorated areas to sound concrete and chip square. Boundaries to be square with no feathered edges. Sandblast concrete surfaces in the repair area and the exposed steel to bare metal. Remove all dust and debris resulting from chipping and blasting by using clean compressed air.
3. If concrete removal results in more than half the diameter of any reinforcing bar or prestressing strand being exposed, then removal shall removals could exceed the 5" maximum horizontal depth, contact the engineer prior to removal.
4. Report to the engineer, prior to repair, section loss of tendons or reinforcing steel exposed during removals.
5. Apply two coats of protective coating/bonding agent (products are listed in the table on this sheet) to exposed prestressing strands and reinforcing bars according to manufacturer's recommendations.
6. Apply patching material. Type of material and application of material depends upon the extent of concrete removal and the two types of repair are to be as follows:

A. Shallow Repair:

Shallow repair areas are those where concrete removal did not result in reinforcing bars or prestressing strands being exposed for more than half their diameters. patching material shall be as listed in the table on this sheet. Patching materials contain corrosion inhibitors. Apply patching material to match original beam surface. patch need not be formed. Follow manufacturer's instructions and recommendations for mixing, placing and curing.

B. Regular Repair:

Regular repair areas are those where concrete removal extended behind the reinforcing bars and/or prestressing strands. These areas are to be placed using forms to match the original beam surface. Patching material shall be one of the grouts as listed in the table on this sheet. Patching materials contain corrosion inhibitors. follow manufacturer's instructions and recommendations for mixing, placing and curing. forms are to remain in place for seven days.

7. Sandblast 6 feet of the ends of the repaired beams as shown on this sheet. The sandblasting shall be a light blast just enough to expose the fine aggregates. do not sandblast patching material. All costs associated with sandblasting are to be included in the price bid for "REPAIR BEAM ENDS".

8. Apply concrete sealer to sandblasted portions of beams ends. Do not seal patching material.
- All costs include equipment and materials required to repair deteriorated beam ends as detailed in these plans. These details shall be included in the price bid for "REPAIR BEAM ENDS". The engineer will count each end of each beam properly repaired, and the contractor will be paid the contract unit price per each repair.
- The diagrams illustrate the repair areas and beam section details. The first diagram shows 'Shallow Repair Areas' and 'Regular Repair Areas' on a cross-section of a beam, with 'Patching Material' and 'Limits of Removal' indicated. The second diagram shows a 'Beam Section' with dimensions: 1'-4" top flange, 1'-8" bottom flange, 3 1/2" web thickness, 9" total width, 5 1/2" top flange width, 3/4" bottom flange width, 1'-8" total width, 3'-3" total height, and 1'-8" total width. The third diagram shows 'Limits of Sandblasting' with dimensions: 6' total length, 3' total width, and 3' total height.
- Note: The repair areas shown are schematic only. The actual area to be repaired will be determined by the engineer. For location of beam ends to be repaired see beam layout below.
- The Beam Layout diagram shows a grid of beam lines (1-7) and pier locations (W. Abut. brg., Pier 1, Pier 2, Pier 3, Pier 4, E. Abut. brg.). A red 'S' indicates a shallow beam end repair location at the end of Beam Line No. 7. A north arrow is shown on the right.
- - Regular beam end repair locations.
S - Shallow beam end repair locations.
- Beam Layout
- | Table of Manufacturers | | | |
|------------------------|-------------------------|----------------------|---------------------|
| Manufacturer | Bonding Agent | Shallow Repair | Regular Repair |
| BASF | MASTEREMACO P 124 | MASTEREMACO N 350 CI | MASTEREMACO S 477CI |
| EUCLID | DURALPREP A.C. | VERTICOAT SUPREME | EUCOREPAIR SCC |
| SIKA | SIKA ARMATEC 110 EPOCEM | SIKATOP 123 PLUS | SIKATOP 111 PLUS |
- Deck Repair for 0° Skew

343'-6 x 44' Pretensioned
Prestressed Concrete Beam Bridge

68'-3 End Spans3 - 69'-0 Interior Span

Beam Repair Details

Sta. 500-50.00 (¢ IA 3)January 2018

Plymouth County

Iowa Department of Transportation - Highway Division

Design Sheet No. 3 of 6File No. 31165Design No. 118
- ENGLISHREPAIRRETROFITBRIDGES.DGN 1055 - THIS SHEET ISSUED 03-01-2017.
- Design Team : TWE - DGB
- Plymouth County
- Project Number : MB-003-3(500)27--77-75
- Sheet Number 4
- 1/1/2018 1:52:50 PM dbierwa pw:\projectwise.dot.int.lan:PWMain\Documents\Projects\7500301016\BRFina\BRG-750033500.dgn 760118S003 11x17_.pdf.pltcf

Concrete Sealer Notes

Concrete sealer shall be applied to abutment backwalls, abutment seats, sides and traffic face of barrier rail, and deck gutter. All costs of material and labor for application of concrete sealer shall be included in the price bid for "BRIDGE REPAIR".

Application of concrete sealer shall be in accordance with Article 2403.03.P.3 of the Standard Specifications. The contractor shall note that the approved list of sealing compounds differs for traffic areas and non-traffic areas of the structure. Refer to Materials I.M. 491.12.

Epoxy Resin Notes

Exposed surfaces of beam ends below deck expansion joints shall recieve application of approved gray or clear epoxy resin listed in Materials 1.M 491.12, Appendix A.

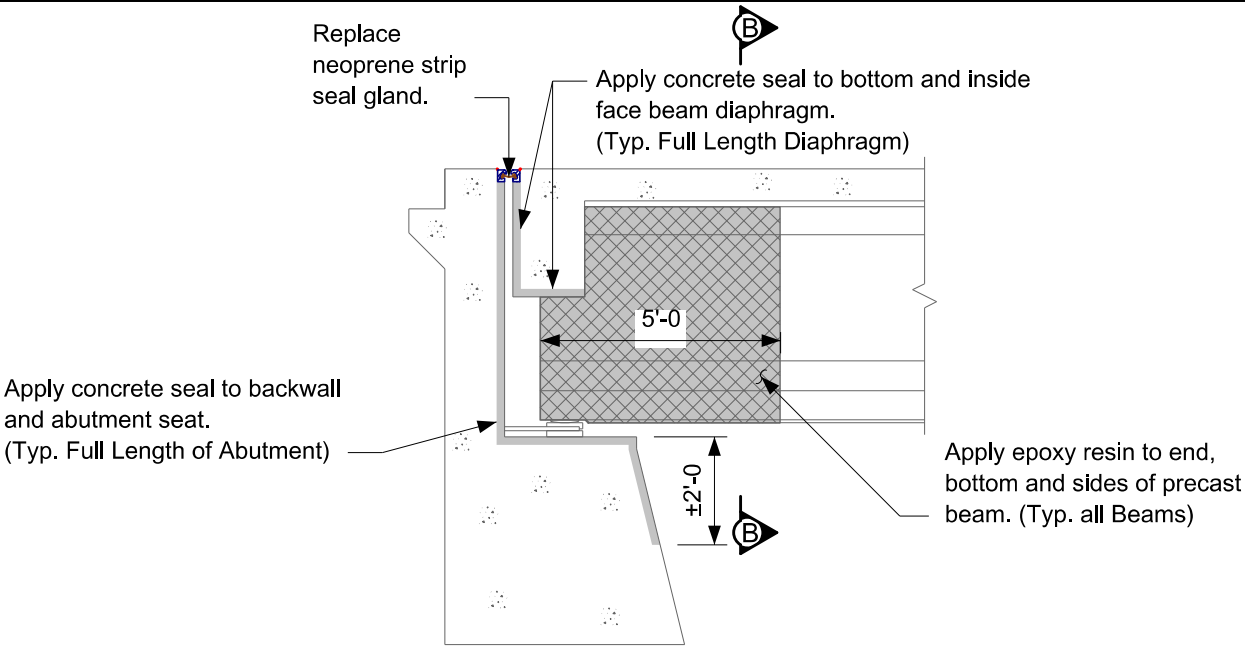
Surfaces to recieve epoxy resin shall be sound and dry. Prior to application of epoxy resin, beam ends shall be cleaned sufficiently to remove road film and contamination from existing concrete.

All costs of material and labor for application of the epoxy sealer shall be included in the price bid per each for "SEALER COAT FOR PRESTRESSED CONCRETE BEAM ENDS".

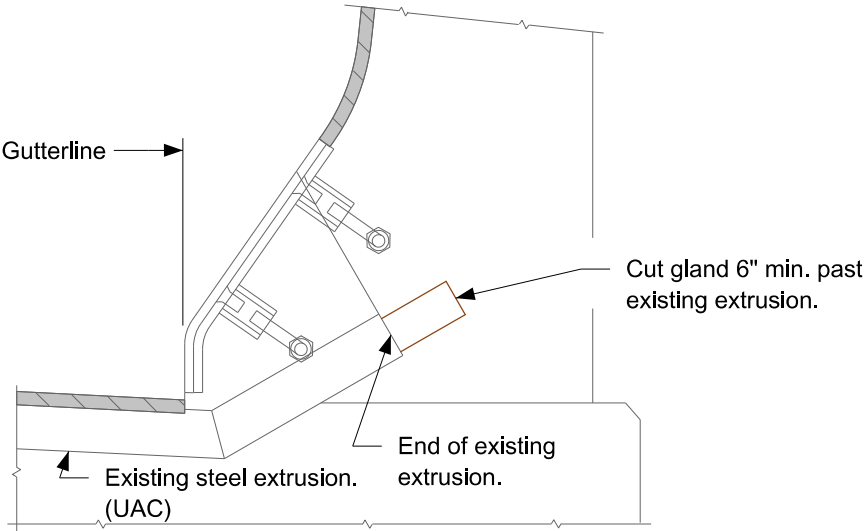
Bearing Cleaning Notes

Existing beam bearings shall be cleaned below deck expansion joints. Cleaning shall be in accordance with Section 2427 of the Standard Specification.

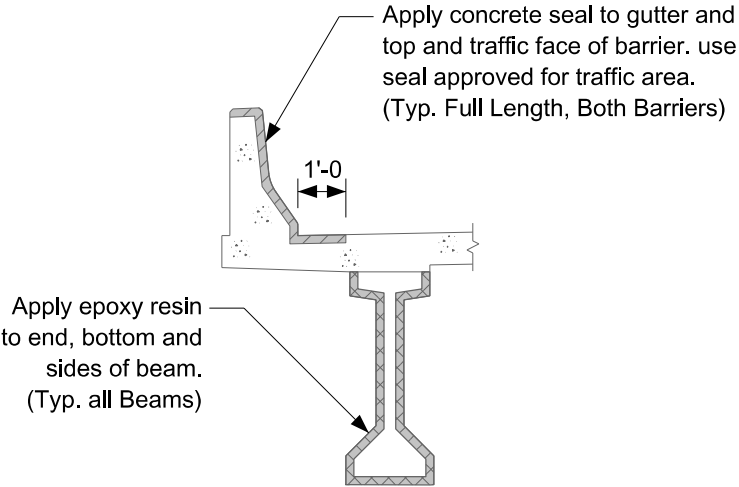
Table of Expansion Joints			
Design No.	Location	Exist. Extrusion	Replacement Gland
118	West Abutment	Waston-Bowman A2	S-400
118	East Abutment	Waston-Bowman A2	S-400



Part Section through Abut. (Typ.)



Typical Barrier Rail Section



Section B-B

Legend

Indicates concrete sealer. (non-traffic area)

Indicates concrete sealer. (traffic area)

Indicates epoxy resin

Deck Repair for 0° Skew

343'-6 x 44' Prestressed

Prestressed Concrete Beam Bridge

68'-3 End Spans3 - 69'-0 Interior Span

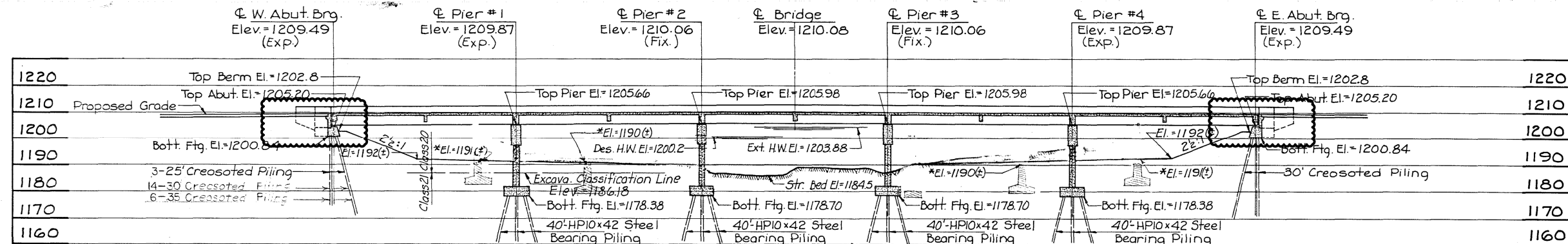
Repair Details

Sta. 500-50.00 (3) IA 3January 2018

Plymouth County

Iowa Department of Transportation - Highway Division

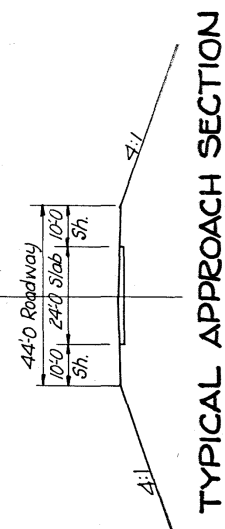
Design Sheet No. 4 of 6File No. 31165Design No. 118



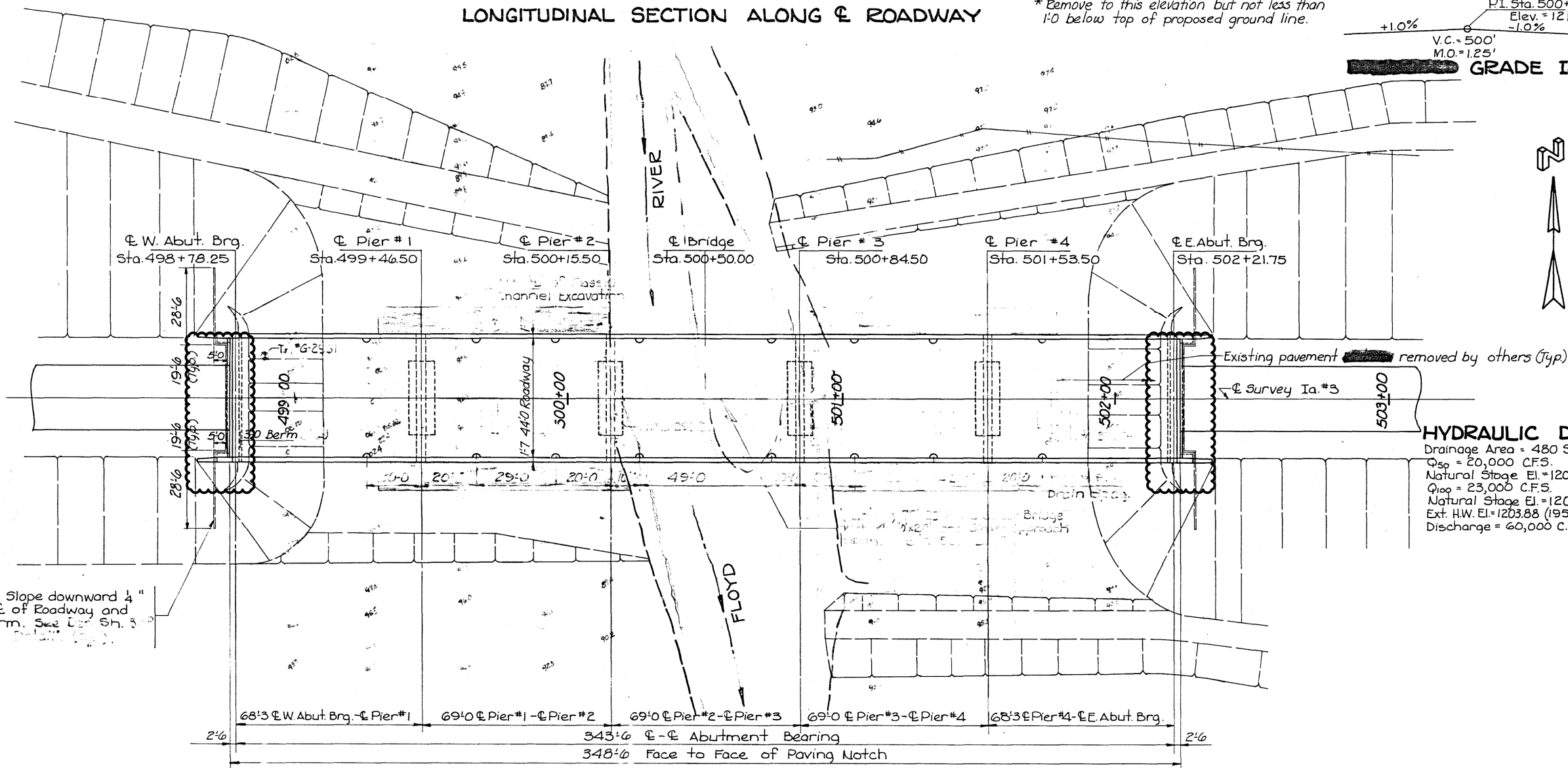
LONGITUDINAL SECTION ALONG E ROADWAY

* Remove to this elevation but not less than 1'-0" below top of proposed ground line.

PI. Sta. 500+50
Elev. = 1211.33
+1.0%
V.C. = 500'
M.O. = 1.25'
GRADE Ia #3



Note: Subdrain. Slope downward 4" per foot from E of Roadway and extend thru berm. See Det. 3-14 for details.



SITUATION PLAN

Scale: 1" = 20'-0"

HYDRAULIC DATA:

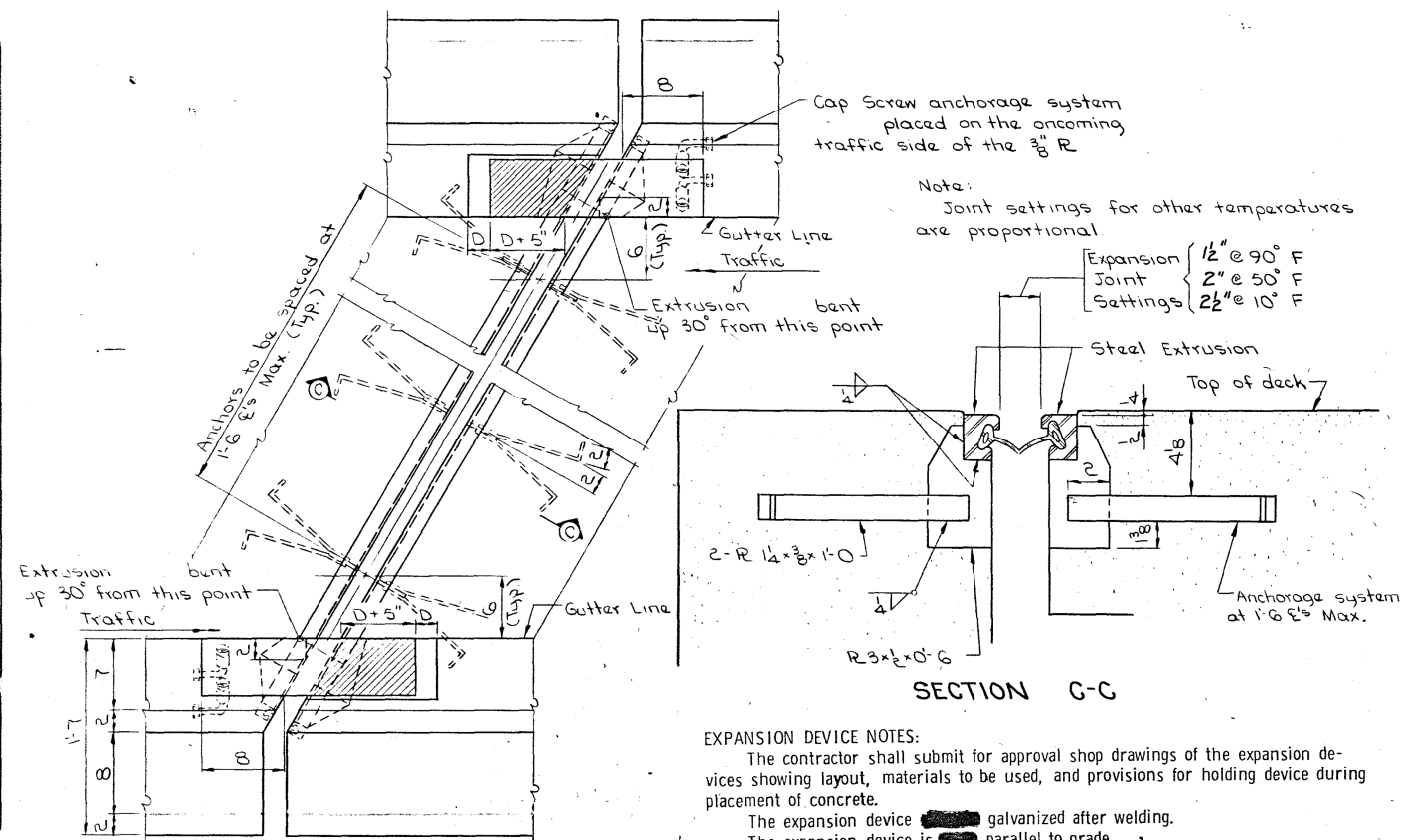
Drainage Area = 480 Sq. Mi. R-H
Q₅₀ = 20,000 C.F.S.
Natural Stage El. = 1200.2
Q₁₀₀ = 23,000 C.F.S.
Natural Stage El. = 1200.8
Ext. H.W. El. = 1203.88 (1953) From USGS
Discharge = 60,000 C.F.S.

Deck Repair for 0° Skew
**343'-6 x 44' Pretensioned
Prestressed Concrete Beam Bridge**
68'-3 End Spans 3 - 69'-0 Interior Span
Situation Plan (Design 578)
Sta. 500-50.00 (E IA 3) January 2018
Plymouth County
Iowa Department of Transportation - Highway Division
Design Sheet No. 5 of 6 File No. 31165 Design No. 118

This sheet from original design plans is included for information only.

[illegible]

SECTION B-B



SECTION C-C

PART PLAN VIEW OF
EXPANSION DEVICE
(SHOWN FOR SKEWED BRIDGE)
DETAILS FOR 0° SKEW ARE SIMILAR
SEE PART PLAN VIEW

EXPANSION DEVICE NOTES:

The contractor shall submit for approval shop drawings of the expansion devices showing layout, materials to be used, and provisions for holding device during placement of concrete.

The expansion device  galvanized after welding.

The expansion device is parallel to grade.

Cap screws [REDACTED] countersunk 1/16" below top of the plate.

One permissible shop or field splice may be made in the steel extrusions providing the pieces are joined with a prequalified single groove weld, and all surfaces not in contact with concrete are ground flush. No weld is permitted in the internal section of the extrusion where the neoprene gland is located.

The neoprene gland is placed as one continuous piece from end to end of the steel extrusions.

The minimum grade of Structural Steel for the expansion device ~~shall~~ be ASTM A-36.

The neoprene gland [REDACTED] conform to ASTM D-2628 modified to exclude recovery tests.

Blockout details may be altered from those shown provided the gland may be installed and removed if necessary.

The contract unit price bid for "Steel Extrusion Joint with Neoprene" be full compensation for furnishing and installing the expansion joints. This work will consist of furnishing all required materials and the installation and adjustment of the expansion joints in accordance with the details shown on the plans and as directed by the engineer. The furnishing and installation of all necessary hardware and accessories as supplied by the expansion joint manufacturer are included in this work, including the anchorage system and any temporary erection material. All work and materials for the installation of the expansion joints comply with the written recommendations of the expansion joint manufacturer.

The following devices are approved for use.

1. Watson-Bowman Co., Type A-2 extrusion with S-400 gland.
2. ACME, Type A extrusion with AS400 gland.
3. Approved equal.

This sheet from original design plans is included for information only.

Deck Repair for 0° Skew

343'-6 x 44' Pretensioned Prestressed Concrete Beam Bridge

68'-3 End Spans 3 - 69'-0 Interior Span

Expansion Jt. Details (Design 578)

Sta. 500-50.00 (♻ IA 3) January 2018

Plymouth County

Iowa Department of Transportation - Highway Division

Design Sheet No. 6 of 6 File No. 31165 Design No. 118

100-0A
10-28-97

[illegible]

100-4A
10-29-02

Item No.	Item Code	Description
1	2527-9263109	PAINTED PAVEMENT MARKING, WATERBORNE OR SOLVENT-BASED
2	2527-9263180	PAVEMENT MARKINGS REMOVED
-	-	Refer to Tab. 108-22 in the C sheets for details.
-	-	-
3	2528-8400256	TEMPORARY TRAFFIC SIGNALS
-	-	Refer to Tab. 108-28 for details.
-	-	-
4	2528-8445110	TRAFFIC CONTROL
-	-	Refer to J sheet for details.
-	-	-
5	2528-8445113	FLAGGERS
-	-	- -
-	-	-

108-28
08-01-08

No.	Location Station	Type			Remarks
		One Lane Traffic	Haul Road	Intersection	
1	497+78.25	x			
2	504+01.75	x			

105-4
10-18-11

The following Standard Road Plans apply to construction work on this project.		
Number	Date	Title
SI-881	10-17-17	Special Signs for Workzones
TC-1	04-16-13	Work Not Affecting Traffic (Two-Lane or Multi-Lane)
TC-202	04-21-15	Work Within 15 ft of Traveled Way
TC-213	04-17-12	Lane Closure with Flaggers
TC-216	10-18-16	Lane Closure with Signals

262-6
10-18-05

This is NOT a POINT 25 project and is not subject to the provisions of IAC 761-115.25.

108-22
04-16-13

***MNY4 - Factor of 1.00 as value includes number of 4-inch passes to cover median nose area.

**NPY4 - For estimating purposes only. No Passing Zone Lines will be located in the field.

ELW4: Edge Line Right (White) @ 1.00

[illegible]

A circular professional engineer seal for the State of Iowa. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "IOWA" at the bottom, separated by two small stars. The center of the seal contains the name "Dung T. Ta" and the license number "21117".

My license renewal date is December 31, 20 17

108-23A
08-01-08

TRAFFIC CONTROL PLAN

Traffic on IA 3 will be maintained at all times.

Traffic Control on this project shall be found in accordance with the TC series of Standard Road Plans found in Tab.105-4 on sheet C.1.

511 TRAVEL RESTRICTIONS												108-25 10-21-14
Route	Direction	County	Location Description	Feature Crossed	Object Type	Maint. Bridge No., Structure ID, or FHWA No.	Type of Restriction	Existing Measurement	Construction Measurement	Construction Measurement as Signed	Projected As Built Measurement	Remarks
IA 3	EB/WB	Plymouth	The Bridge on IA 3 over Floy River, 1.0 miles East of US 75 in Le Mars	No Travel Restriction Expected								