NORTH DAKOTA STATE HIGHWAY DEPARTMENT

608 East Boulevard Avenue
Bismarck, North Dakota
58505-0700

INFORMATION: (701) 224-2500

George A. Sinner, Governor
Richard J. Backes, Commissioner
Ray Zink, Chief Engineer

FAX MAIL: (701) 224-0426

December 11, 1989

A D D E N D U M

TO: All prospective bidders and suppliers on Project No. RRS-1-006(004)067, Job No. 1, scheduled for the December 20, 1989, bid opening.

The first paragraph of Section 630.03 B.3.a of the Supplemental Specifications is hereby deleted in its entirety and replaced with the following:

> PRIME COAT: All surfaces of the structural steel including the shear connectors and the upper surface of the top flange shall be primed in the shop. The shop applied prime coat shall be an inorganic zinc prime coat. Application shall be according to SSPC PA-1 and shall be sprayed.

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

Francis G. Ziegler
Construction Engineer

FGZ/lmf

JOB # 1

FHWA REGION	STATE	PROJECT	SHEET NO.
8	N.D.	RRS-1-006 (004)067	1

NORTH DAKOTA

STATE HIGHWAY DEPARTMENT

MORTON COUNTY
RRS-1-006(004)067
STRUCTURE & INCIDENTALS

DESIGN DATA

Traffic	Average Daily			Est. 30th Max. Hr.
Current Traffic(1990)	5820 Pass.	280 Trucks	6100 Total	610
Traffic Forecast(2010)	7630 Pass.	370 Trucks	8000 Total	800

Design Speed 35 MPH

Traffic Classification "M"

Minimum Sight Distance (Stopping) 250'

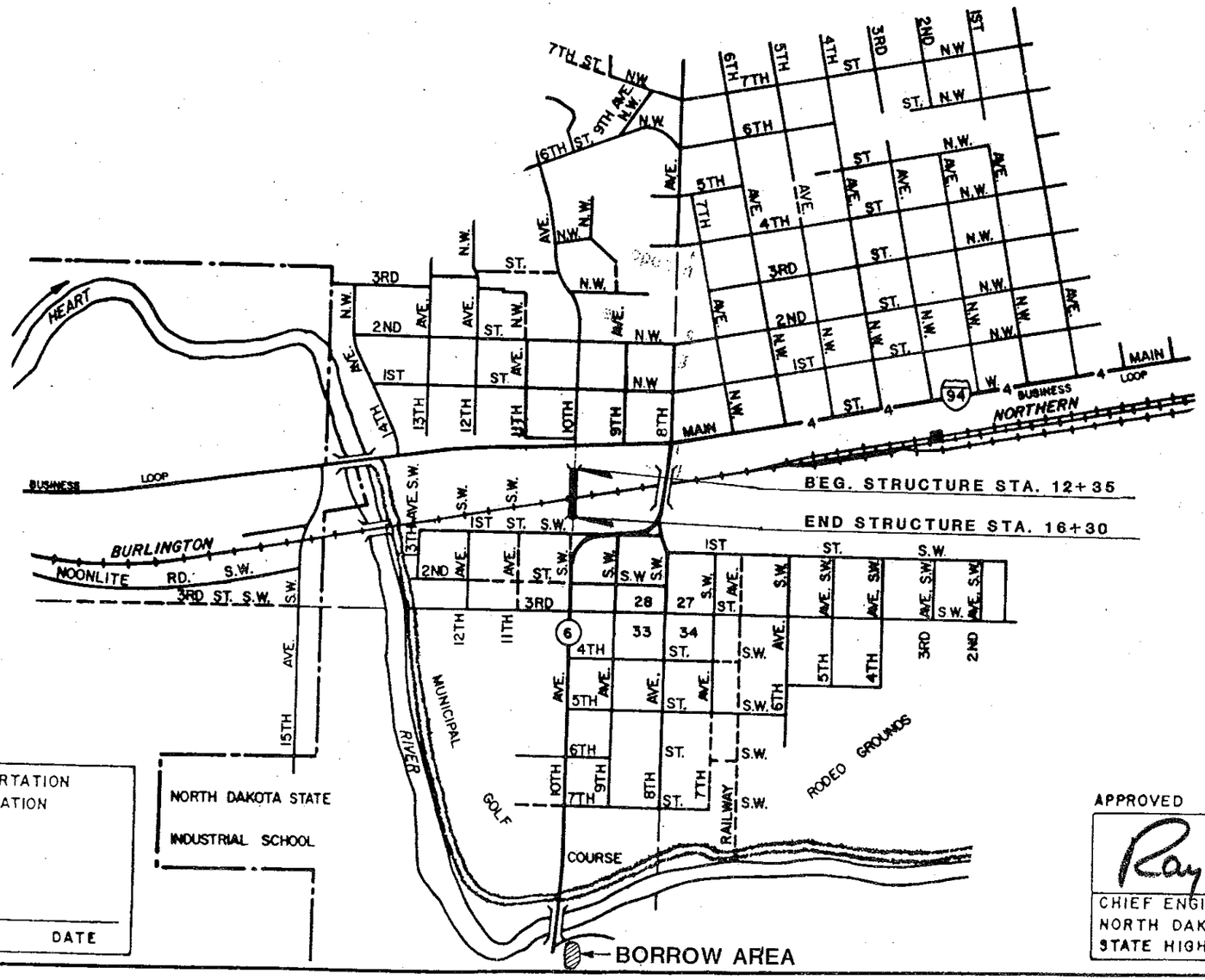
Bridge Hs 25

GOVERNING SPECIFICATIONS

Standard Specifications adopted by the North Dakota State Highway Department, November 1986. Standard Drawings currently in effect, and other Contract Provisions submitted herein.

LENGTH OF PROJECT

Miles-Gross	Miles-Net
0.0748	0.0748



MANDAN

N W E S

Section 28,
Twp. 139 N.
Rge. 81 W.

22

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED

DIVISION ADMINISTRATOR DATE

APPROVED DATE 09-05-89

Ray Zink

CHIEF ENGINEER
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

RAY ZINK REGISTERED PROFESSIONAL P.E. 972 ENGINEER NORTH DAKOTA

RRS-1-006(004)067

SYMBOLS

STATE & NATIONAL LINES

COUNTY LINE

TOWNSHIP & RANGE LINES

SECTION LINE

QUARTER SECTION LINE

SECTION CORNER

QUARTER SECTION CORNER

OLD RIGHT OF WAY LINE

NEW RIGHT OF WAY LINE

GRADE LINE

CENTERLINE OF CONSTRUCTION — 500

RAILROAD RIGHT OF WAY LINE

CITY OR VILLAGE CORPORATE LIMITS

PROPERTY LINE

EASEMENT LINE

FENCES

SNOW FENCE

DRAINAGE

WATERS EDGE

MARSH OR SWAMP

RIPRAP

DRAINAGE DITCH

APPROACH

TRAVELED WAY — 502 + 00

RAILROADS

GUARD RAIL

GUIDE POSTS

DELINEATORS

HEDGES AND TREES

INTERCHANGE

HIGHWAY GRADE SEPARATION - NO CONNECTION

OTHER BRIDGE

SERVICE ROAD

TERMINATED CROSS-ROAD

BUILDINGS

TELEGRAPH LINES

TELEPHONE LINES

POWER LINES

CULVERTS (In Place)

CULVERTS (Install)

CONCRETE BOX CULVERTS (Install)

BRIDGES (Install)

CONCRETE CURB

CONCRETE CURB AND GUTTER

CONCRETE WALK

CATCH BASIN (Existing)

CATCH BASIN (New)

MANHOLE (Existing)

MANHOLE (New)

CURB INLET (Existing)

CURB INLET (New)

GROUND MOUNTED SIGNS

OVERHEAD SIGNS

HYDRANT

LIGHT STANDARDS

TRAFFIC SIGNALS (Plan & Profile Sheets)

HIGH MAST LIGHTING ASSEMBLY

GROUND ELEVATION — 643.0 / 641.0

GRADE — 245

CENTERLINE

SECTION LINE

DEFLECTION ANGLE (Delta)

SOD OR JUTE MESH

POLES TO BE MOVED

POLES TO BE LOWERED

CONCRETE FOUNDATION

CONDUIT

CONDUCTOR

CONCRETE PULL BOX

FEED POINT

250 WATT LIGHT STANDARDS

400 WATT LIGHT STANDARDS

700 WATT LIGHT STANDARDS

1000 WATT LIGHT STANDARDS

FLASHING BEACON

TRAFFIC SIGNAL - MAST ARM MOUNTED

TRAFFIC SIGNAL - POST MOUNTED

SIGNAL HEAD

PEDESTRIAN PUSHBUTTON POST

TRAFFIC SIGNAL CONTROLLER

FEED POINT - PAD MOUNTED

ABBREVIATIONS

Aggr	Aggregate
Ahd	Ahead
Alt	Alternate
Approx	Approximate or Approximately
Appr	Approach
Asph Cem or A C	Asphalt Cement
Asph Conc.	Asphaltic Concrete
Bit	Bituminous or Bitumen
Bk	Back
B M	Bench Mark
Bldg.	Building
Br	Bridge
C A E.S.	Corrugated Aluminum End Section
C A P	Corrugated Aluminum Pipe
C B	Catch Basin
C & G	Curb and Gutter
Ch Blk	Channel Block
Ch Ch	Channel Change
C.I	Curb Inlet
C I P	Cast Iron Pipe
Cl	Class
C.S.E S	Corrugated Steel End Section
C.S.P.	Corrugated Steel Pipe
CMS	Cationic Medium Setting
Comp	Compression
Const	Construction
Conc	Concrete
Cont. Reinf Conc Pvmt	Continuously Reinforced Concrete Pavement
Contr	Contraction
Crn	Crown
CRS	Cationic Rapid Setting
Crse	Course
C S.	Curve to Spiral
C. to C.	Center to Center
C.Y	Cubic Yard
D	Degree of Curvature
D-Load	Dead Load
D.B.	Ditch Block
Def	Deformed
Del	Deliver
D G.	Ditch Grade
El. or Elev	Elevation
Elliptl	Elliptical
Emb	Embankment
Emul.	Emulsified
Engr.	Engineer
Eq	Equation
E R	East Roadway
E S	End Section
Esmt	Easement
Exc	Excavation
Exp.	Expansion
F D	Field Drive
Found	Foundation
F P	Fence Post
Furn	Furnish
Ga	Gage or Gauge
Gr	Gravel
Grd	Graded
G V.	Gate Valve
Hel	Helical
Hyd	Hydrant
Ident	Identification
Inchg	Interchange
I M	Iron Monument
Inst	Install
Inter	Intersection
Inv	Invert
Jt	Joint
L	Length of Curve
Lc	Length of Spiral
Levg	Leveling
L F	Linear or Lineal Foot
Liq	Liquid
Long	Longitudinal
L P	Light Pole
Lt	Left
"M"	One Thousand
Matl	Material
Max	Maximum
MC	Medium Curing
M H	Manhole
Min	Minimum
M L	Main Line
N R	North Roadway
Off Loc	Office Location
O to O	Out to Out
P & P	Plan and Profile
P C	Point of Curvature
P C C	Point of Compound Curve
P C C Pvmt	Portland Cement Concrete Pavement
P D	Private Drive
Pen	Penetration
Perf	Perforated
P I	Point of Intersection
P O C	Point on Curve
P O T	Point on Tangent
P P	Power Pole
P R C	Point of Reverse Curvature
Pref	Preformed
P S D	Passing Sight Distance
P T	Point of Tangency
P V C	Polyvinyl Chloride Sewer Pipe
Quant	Quantity or Quantities
R	Radius
R or Rge	Range
RC	Rapid Curing
R C E S	Reinforced Concrete End Section
R C P	Reinforced Concrete Pipe
R C P S	Reinforced Concrete Pipe Sewer
Rd	Road
Rdbd	Roadbed
Rdwy	Roadway
Refl	Reflectorized
R R	Railroad
Rt	Right
R/W	Right of Way
Salv	Salvage
San	Sanitary
S C	Spiral to Curve
SC	Slow Curing
Sc	Spiral Deflection Angle
S D	Sight Distance
S E	Superelevation
Sec	Section
Sec Line Appr	Section Line Approach
Sep	Separation
Serv	Service
Sgr Prep	Subgrade Preparation
Shldr	Shoulder
SP	Special Provision
S P P	Structural Plate Pipe
S P P A	Structural Plate Pipe Arch
S R	South Roadway
SS	Slow Setting or Supplement Specification
S S D	Stopping Sight Distance
S T	Spiral to Tangent
Sta.	Station
Std	Standard
Std. Specs	Standard Specifications
Struct.	Structure
Surf	Surface or Surfacing
Surv	Survey
S W	Sidewalk
S Y	Square Yard
T	Tangent Length (circular curve)
T or Twp	Township
Tel	Telephone
Temp	Temporary
T P	Telephone Pole
Tr	Traffic
Trans	Transverse or Transition
Trtd	Treated
Ts	Tangent Length (curve with spirals)
T S	Tangent to Spiral
U S C & G S	United States Coast and Geodetic Survey
V C	Vertical Curve
V C P	Vitrified Clay Pipe
W M	Water Main
W M V	Water Main Valve
W R	West Roadway
Wrng	Wearing
W S V	Water Service Valve
X-Sec	Cross Section
Xc	Spiral Coordinate
Yc	Spiral Coordinate

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	2

TABLE OF CONTENTS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	3

NOTES

100 010 GENERAL: The engineer will see to the removal of existing fences to the highway right of way line and to the relocation or adjustment of utility facilities as shown on the plans. All privately-owned light poles, guard posts, signs, etc., within the right of way limits shall be removed by the owners.

100 P01 The contractor will be required to notify the following individuals at least 48 hours prior to starting any work on this project:

Rudy Almaguer
Supt. of Mtnce. & Engr.
51 Broadway Street North
Suite 201
Fargo, ND 58120
Telphone (701)280-7230

P.A. Yauney
Roadmaster, Dakota Division
P.O. Box 1205
Mandan, ND 58554
Telephone (701)667-2235

100 P02 WORK HOURS: The contractors construction operations will be limited to the hours of 7:00 a.m. to 10:00 p.m.

100 020 WORK SCHEDULE: In order to minimize interference with traffic operations, a detailed schedule shall be agreed to prior to beginning work, between the engineer, utility companies, and the contractor and subcontractors, if any.

100 030 UNDERGROUND UTILITIES: The contractor shall notify the local utility companies prior to the beginning of construction, so they may determine the location of all utilities in the project area. Subcutting or scarifying over utility lines may be eliminated if, in the opinion of the engineer, a hazardous situation exists. Separate plans, if any, showing relocation or adjustment work to be performed by utility companies to accommodate highway construction will be made available to the contractor, upon request to the engineer.

100 133 The contractor will be required to conduct the construction activities in such a manner as to comply with the Air Pollution Control Regulations of the state of North Dakota. Water will be used to control dust on the construction site.

107 100 RAILWAY PROTECTION INSURANCE: Insurance policies for Railway Protection Insurance and for Public Liability Insurance as required by Section 107.06 of the Standard Specifications and Supplemental Specification 107.07 shall be obtained by the Contractor at Station(s) 11+20 to 16+40 for protection of Burlington Northern Railroad.

200 010 SHRINKAGE: 20 percent additional volume in yardage computed by the end area method is allowed for shrinkage in earth embankment.

200 P01 REMOVAL OF TREES AND BRUSH: All existing trees and brush within the right of way limits shall be removed and disposed of in accordance with Section 201 of the Standard Specifications. Removal of the stumps will not be required. This removal and disposal shall be paid for at the unit price bid for "Clearing and Grubbing."

200 P02 PLUG MANHOLE: The contractor shall remove the casting from the manhole located at Sta. 12+06-14' Lt. and deliver it to the city shop at 6th Street, SW. The manhole shall be thoroughly filled with compacted earth. Cost for this work shall be included in the price bid for other items.

200 P03 WATER: The cost of water required for compaction, for the aggregate surface course and for use as a dust palliative has been included in the quantities and shall be paid for at the unit price bid for water.

202 P04 REMOVAL OF FOUNDATIONS - ALL SIZES: The existing building located at approximately Sta. 12+66 on centerline, the 3 residences located at approximately Stations 18+45-75' Lt., 19+00-62' Lt. and 21+04-52' Lt., and the garage located at Sta. 19+84-58' Lt. will be removed by others prior to March 1, 1990. The contractor on this project will be required to complete the following work:

1. Remove and dispose of a small building located at approximatlely Sta. 12+60-45' Lt.
2. Remove and dispose of the concrete foundation for the building at Sta. 12+66 centerline as required for the installation of the new water and sewer lines and for a minimum of 12 feet below the relocated roadway under the structure.
3. At the location of the 3 houses and the garage (see sheet 15), the contractor shall remove and dispose of the basement foundations, steps, sidewalk, and fences still remaining on the property. The foundations shall be removed to a minimum of 2 feet below the ground line. The basements and cavities left by these removals shall be filled to the level of the existing ground and the entire area graded and smoothed.

In the event the existing building at Sta. 12+66 has not been removed prior to the start of construction on this project, the contractor shall remove and dispose of it. The cost of this removal and disposal will be paid as provided under Section 109.04 of the Standard Specifications "Extra Work and Force Account."

The price bid for "Removal of Foundations - All Sizes" will be full compensation for all labor equipment, and materials necessary to complete the work in paragraphs 1, 2, and 3 above. This work and the removal of the building at Sta. 12+66 if necessary, shall be done in accordance with Section 202 of the Standard Specifications.

NOTES

200 252 WASTE DISPOSAL: All excess excavation and old concrete sidewalks, driveways, curb and gutter, pavement, bituminous surfacing, etc., shall be disposed of off the highway right of way at a site selected by the contractor and approved by the Engineer. Disposal in wetland areas will not be approved. The cost of disposal (and obtaining of the disposal area) shall be included in the price bid for other items.

200 360 COMPACTION AND DENSITY CONTROL: Compaction and density controls shall be in accordance with Section 203.02 F of the Standard Specifications T-180.

200 421 RAILROAD FLAGGING: The contractor shall coordinate the need for railroad flagging with the Burlington Northern Railroad. The railroad requires a 48-hour advance notice when flagging is needed. Payment for this flagging will be made directly to the railroad by the North Dakota State Highway Department. There will be no charge to the contractor.

203 P01 MANDATORY BORROW AREA: The contractor will be required to obtain the necessary borrow (estimated 28,607 cubic yards) from the designated borrow area located south of the Heart River and east of Highway 6. The location, typical section, and gradients for the borrow area are shown on sheet 15A. The excavation for the borrow shall start at the south end of the borrow area (Station 43+50) and proceed north to approximately Station 41+00 or until the required quantity has been obtained. The contractor shall excavate to the dimension and elevation shown on the plan sheet and cross section sheets. The transition from the new 4:1 backslope to the existing 2:1 backslope shall be neat in appearance. Special care shall be taken to prevent any damage to the existing telephone and television cables. The cost of repairing any damage to the cables caused by the construction activities will be the responsibility of the contractor. This mandatory borrow area is furnished at no cost to the contractor.

203 P02 TOPSOIL BORROW AREA: The existing topsoil from that portion of the borrow area used on this project shall be removed and stockpiled prior to excavation of the borrow material. The topsoil shall be stockpiled at approximately Station 42+50 - 350 feet left of centerline or at a nearby location designated by the engineer. The contractor will not be required to replace the topsoil and the seeding will be included in a future project. The quantity shown is based on the removal of 4" of topsoil but the actual depth shall be determined in the field and the quantity adjusted accordingly. The price bid for "Topsoil - Borrow Area" shall be full compensation for all labor, equipment, and materials necessary for removing and stockpiling the topsoil.

402 P01 COLD BITUMINOUS PAVEMENT: The gradation of the cold bituminous pavement and the type and grade of bitumen to be used shall be approved by the engineer. The unit price bid for "Cold Bituminous Pavement" will be full compensation for all labor, equipment, and materials (including bitumen) necessary for surfacing the temporary access road and temporary walkway south of the structure.

704 P01 TRAFFIC CONTROL: Traffic shall be maintained on Highway 6 at all times during construction of this project. The temporary access road and sidewalk that connects First Street, SW, and Highway 6 near the south end of the structure shall be completed before the existing street is blocked off. This temporary road shall be kept open and maintained by the contractor during construction of this project. The roadway and sidewalk shall remain in place when the project is completed.

724 P01 SALVAGE SIX INCH HYDRANT: The contractor shall excavate as required and carefully disconnect and remove the existing hydrant at Sta. 11+83-35' Rt. The salvaged hydrant shall be delivered to the city shop located on Sixth Street, SW. The price bid for "Salvage Six Inch Hydrant" shall be full compensation for all labor and equipment necessary to complete the work as specified.

724 P02 U.S. SPRINT CABLE: A U.S. Sprint transcontinental fiber optic cable crosses the survey centerline at approximately Sta. 16+10. The exact location of this cable will be determined by a representative of U.S. Sprint prior to any work in this area. The contractor will be required to install the new water main under this cable at two locations and extreme care shall be taken to avoid any disturbance or damage to the cable. The cost of repairing any damage to the cable shall be the responsibility of the contractor. The method of installing the water main under the cable shall be approved by the Engineer. Any additional cost for installing the water main under the sprint cable shall be included in the price bid for "Watermain, 8 In. P.V.C."

724 P03 SANITARY SEWER PIPE: The sanitary sewer pipe shall be Polyvinyl Chloride Sewer Pipe and shall be equal to SDR-35. The pipe shall conform to the requirements of ASTM D-3034 for type PSM, PVC Sewer Pipe and Fittings. The PVC sewer pipe shall have the elastomeric gasket-type joint providing a watertight seal. A solvent cement-type joint will not be allowed.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	4A

NOTES

724 P04 WATERMAINS: The Polyvinyl Chloride Pipe used for the new watermains shall meet the requirements of American Water Works Association (AWWA) C900 with latest revisions thereof and shall be furnished in cast iron pipe equivalent outside diameters with elastomeic joints. The PVC pipe shall be SDR-18, Class 150. The cost of furnishing any adaptors necessary to adapt from the existing watermain to the new watermain shall be included in the price bid for the watermains.

724 P05 CAST IRON FITTINGS: Fittings shall be manufactured in accordance with A.S.A. Specifications A21.10 and shall be furnished with either Standardized Mechanical Joints or Push-on Joints in accordance with A.S.A. Specifications A21-11. Cast Iron Fittings for sizes up to and including 12 inches shall have a working pressure of 250 pounds per square inch conforming with A.S.A. Specifications A21-10. Fitting larger than 12 inches shall have a working pressure of 150 pounds per square inch conforming with A.S.A. Specifications A21-11. A variation of five (5) percent above or below the specified weight shall be allowed for irregularities in castings. The fittings shall be cement mortar lined with a bituminous seal conforming with the latest A.S.A. Specifications A21.4 for cement mortar lining except that the minimum thickness of cement mortar lining shall be 1/16 inch.

752 P01 SAFETY FENCE: A temporary safety fence shall be installed (and maintained) by the contractor at locations designated by the engineer as needed for pedestrian control. The safety fence shall be orange in color, four feet high, and constructed of high density polyethylene and shall be installed in accordance with manufacturer's recommendations. Tensor Corporation fence Product No. UX 4050 or equal can be used. The quantity of fencing shown is advisory only and the actual amount needed shall be determined in the field as required for the construction sequencing.

The price bid for "Safety Fence" shall be full compensation for all labor, equipment, and materials necessary to complete the work as required.

752 P02 BARBED WIRE FENCE: The existing fence in the borrow area east of Highway 6 is a 4-strand barbed wire fence with wood and steel posts spaced at approximately 20' intervals. The contractor shall remove this fence from Station 39+92 - 400' Lt. to Station 43+50 - 110'± Lt. and reset it at the location shown on plan sheet 15A. Approximately 106 feet of new 4-strand barb wire fence has been provided to complete the fencing enclosure as shown on the layout sheet.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	5

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
103	0100	Contract Bond	L. Sum	1
107	0100	Railway Protection Insurance	L. Sum	1
201	0330	Clearing and Grubbing	L. Sum	1
202	0112	Removal of Concrete	Sq. Yd.	21
202	0130	Removal of Curb and Gutter	L. Ft.	63
202	0286	Removal of Foundations - All Sizes	L. Sum	1
203	0101	Common Excavation - Type A	Cu. Yd.	380
203	0108	Topsoil, Borrow Area	Cu. Yd.	596
203	0140	Borrow	Cu. Yd.	28,607
210	0100	Class I Excavation	Cu. Yd.	750
210	0200	Select Backfill	Cu. Yd.	770
210	0201	Foundation Preparation	Ea.	1
216	0100	Water	"M" Gal.	325
302	0320	Aggregate Surface Course Cl. 5	Ton	470
402	0110	Cold Bituminous Pavement	Ton	130
550	0215	Concrete Bridge Approach Slab	Sq. Yd.	246
602	0130	Class AAE-3 Concrete	Cu. Yd.	643
602	1130	Class AE-3 Concrete	Cu. Yd.	521
602	1250	Penetrating Water Repellent Treatment	Sq. Yd.	1,915
612	0115	Reinforcing Steel - Grade 60	Lb.	145,469
612	0116	Reinforcing Steel - Grade 60 (Epoxy Coated)	Lb.	95,890
616	5890	Structural Steel	L. Sum	1
622	0020	Steel Piling HP 10x42	L. Ft.	2,865
622	0040	Steel Piling HP 12x53	L. Ft.	3,920
624	0124	Pedestrian Fence	L. Ft.	45

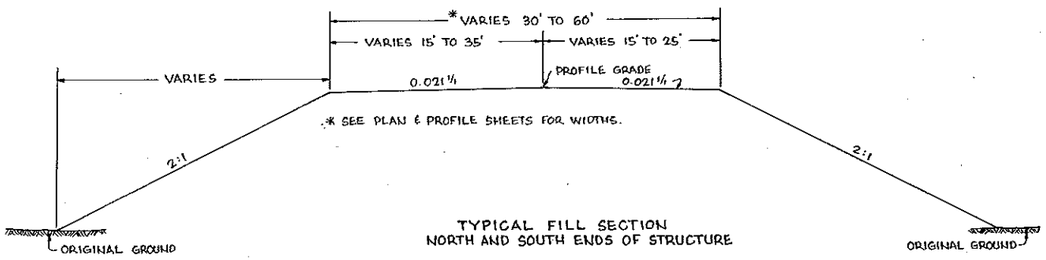
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	6

SUMMARY OF QUANTITIES

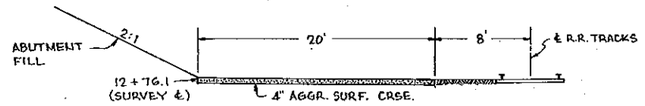
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
624	0126	Pedestrian Canopy	L. Ft.	388
624	0140	Pipe Rail	L. Ft.	55
702	0100	Mobilization	L. Sum	1
704	0100	Flagging	M. Hr.	300
704	1000	Traffic Control Signs	Unit	538
704	1052	Type III Barricade	Ea.	24
704	1060	Delineator Drums	Ea.	10
706	0300	Field Laboratory - Type C	Ea.	1
708	1100	Slope Protection, Concrete	Sq. Yd.	530
722	0100	Manhole - 48 In.	Ea.	4
722	1100	Manhole Riser - 48 In.	L. Ft.	56
724	0200	Fittings, Cast Iron	Lbs.	1,180
724	0402	Hydrant - 6 In. Salvage	Ea.	1
724	0810	Watermain - 6 In. P.V.C.	L. Ft.	416
724	0830	Watermain - 8 In. P.V.C.	L. Ft.	491
724	1115	Sanitary Sewer Pipe - 10 In.	L. Ft.	412
752	0320	Fence, Barbed Wire, 4-Strand Steel Posts	L. Ft.	106
752	0910	Safety Fence	L. Ft.	400
752	0922	Fence, Remove and Reset	L. Ft.	544
752	3160	Corner Assembly, Barbed Wire Steel Posts	Ea.	3
930	3000	Bridge Bench Marks	Set	1
930	8600	Elastomeric Bearing Pad	Sq. Ft.	24
930	8680	Expansion Joint Strip Seal	L. Ft.	113
930	9930	Anti-Graffiti Coating	Sq. Ft.	4,020
950	0100	Trainee	M. Hr.	2,000

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRS-1-006(004)067	7

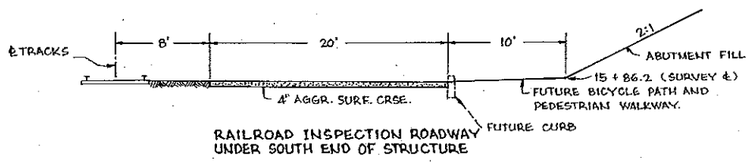
TYPICAL SECTIONS



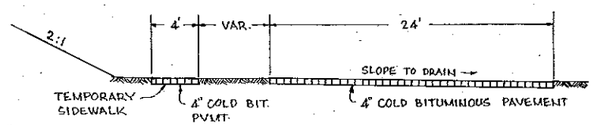
TYPICAL FILL SECTION
NORTH AND SOUTH ENDS OF STRUCTURE



RAILROAD INSPECTION ROAD
UNDER NORTH END OF STRUCTURE



RAILROAD INSPECTION ROADWAY
UNDER SOUTH END OF STRUCTURE



NOTE:
GRADIENTS ON THE SIDEWALK AND ROADWAY TO BE ESTABLISHED IN THE FIELD AS REQUIRED FOR DRAINAGE AND TO MATCH THE EXISTING ROADWAYS.

TEMPORARY ACCESS ROAD
1ST STREET S.W.
(SOUTH OF STRUCTURE)

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	8

BASIS OF ESTIMATE (SURFACING)

Description	Unit	Quantity/S.Y./In.
Aggregate Surface Course - CL. 5 @ 1.5 Ton/C.Y. + 25%	Ton	0.05208
Water for Aggregate Base @ 20 Gal./Ton for Aggr. Base	M. Gal.	0.00104
Cold Bituminous Pvmt. @ 2 Ton/C.Y.	Ton	0.05556

BASIS OF ESTIMATE (GRADING)

WATER: 10 Gals./C.Y. of estimated embankment quantities. Additional water has been included in the quantities and shall be used as a dust palliative as directed by the engineer.

LIST OF STANDARD DRAWINGS

STANDARD NO.

D-622-1 Pipe Splice Details

D-706-1 Type C Field Laboratory

D-708-1 Standard Slope Protection Under Bridges

D-722-5 Manhole Details

D-724-1 Water Works

D-752-1 Standard Barbed Wire Fence

D-754-1 Construction Sign Details

D-754-2 Construction Sign Details

D-754-3 Construction Sign Details

D-754-4 Construction Sign Details

D-754-5 Barricade Details

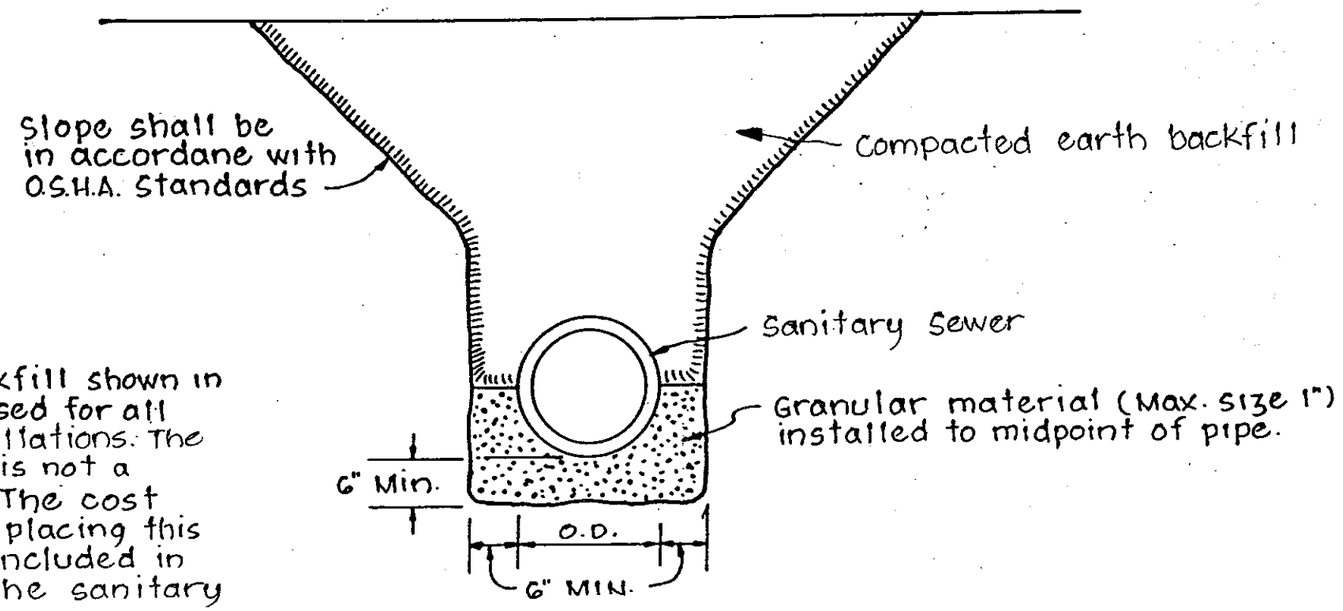
D-754-5A Construction Sign and Barricade Assembly Details

D-754-10 Construction Sign and Barricade Location Details

D-900-1 Bridge Bench Marks

NOTE: THE Standard Drawings are located at the end of the plans.

FHWA REGION	STATE	FED. AID PROJ. NO	SHEET NO
8	N.D.	RRS-1-006(004)067	9



BEDDING AND BACKFILL DETAIL

The bedding and backfill shown in the detail shall be used for all sanitary sewer installations. The granular material is not a separate pay item. The cost of furnishing and placing this material shall be included in the price bid for the sanitary sewer pipe.

See Std. D-724-1 for trench backfill detail for water main installations.

8-23-89 PROJECT NO F-1-006(004)067

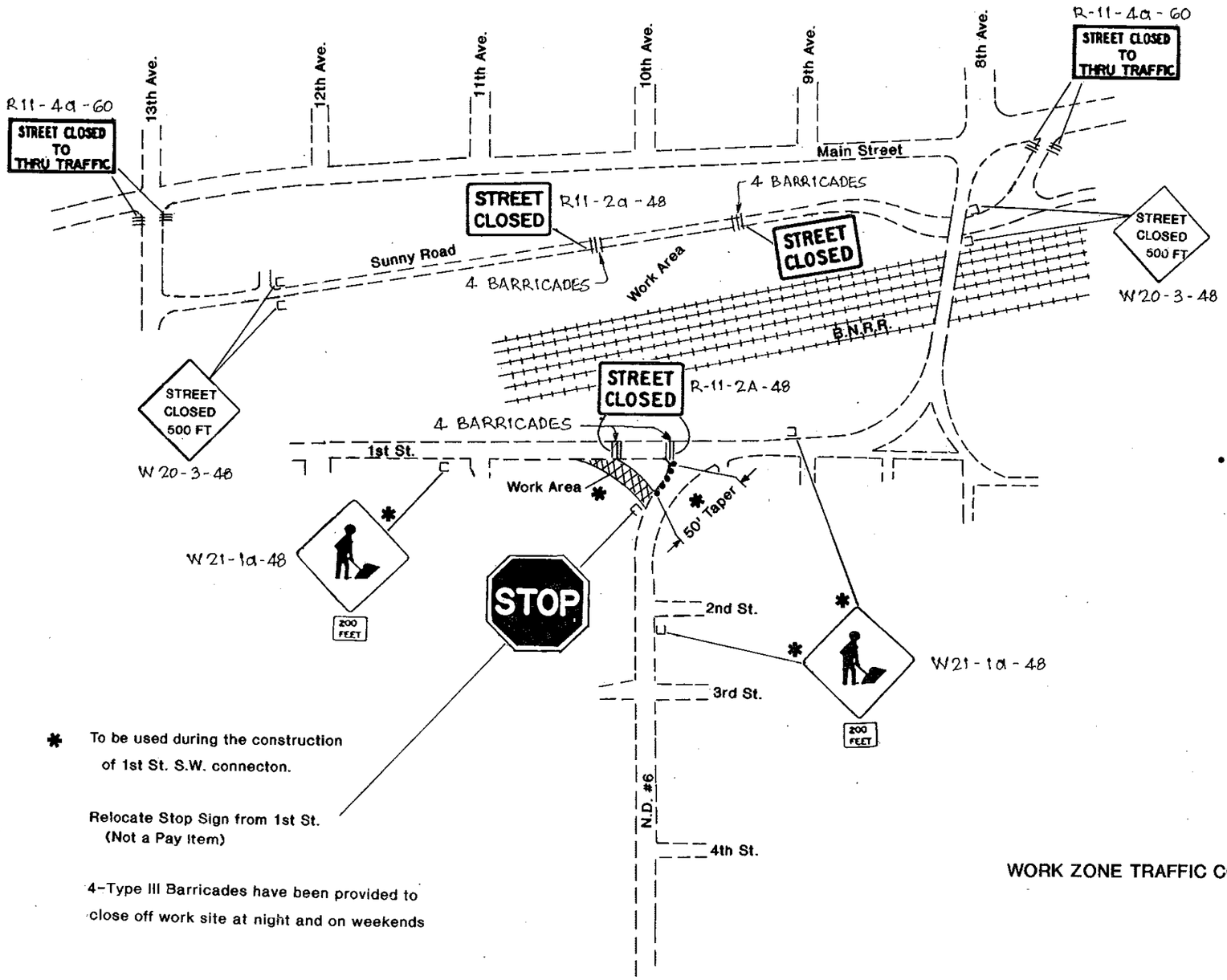
SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB-TOTAL
R1-1-30	30"x 30"	STOP	4	17	68
R1-1-48	48"x 48"	STOP		34	0
R1-2-48	48"x48"& 36"x 30"	YIELD & TO ONCOMING TRAFFIC		45	0
R2-1-48	48"x 60"	SPEED LIMIT		40	0
R2-5c-48	48"x 60"	SPEED ZONE AHEAD		40	0
R4-1-48	48"x 60"	DO NOT PASS		40	0
R4-2-48	48"x 60"	PASS WITH CARE		40	0
R4-7-48	48"x 60"	KEEP RIGHT SYMBOL		40	0
R4-8-48	48"x 60"	KEEP LEFT SYMBOL		40	0
R10-6-48	48"x 72"	STOP HERE ON RED		44	0
R11-2-48	48"x 30"	ROAD CLOSED		26	0
R11-3a-60	60"x 30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-3b-60	60"x 30"	BRIDGE OUT __ MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-2a-48	48"x 30"	STREET CLOSED	3	26	78
R11-3c-48	60"x 30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-4a-60	60"x 30"	STREET CLOSED TO THRU TRAFFIC	4	30	120
G20-1-60	60"x 36"	ROAD CONSTRUCTION NEXT __ MILES		34	0
G20-2-60	60"x 24"	END CONSTRUCTION		28	0
G20-2a-48	48"x 24"	END ROAD WORK		24	0
G20-4-36	36"x 18"	PILOT CAR FOLLOW ME		10	0
G20-50-72	72"x 36"	ROAD CONSTRUCTION NEXT __ MILES RT & LT ARROWS		38	0
G20-52-72	72"x 24"	ROAD CONSTRUCTION NEXT __ MILES RT or LT ARROW		30	0
G20-54-48	48"x 36"	OVERHEAD BRIDGE PAINTING		30	0
G20-8-48	48"x 36"	TEMPORARY SURFACE NEXT __ MILES		30	0
M1-4-24	24"x 24"	ROUTE MARKER (POST AND INSTALLATION ONLY)		8	0
M3-1-24	24"x 12"	NORTH (MOUNTED ON ROUTE MARKER POST)		6	0
M3-2-24	24"x 12"	EAST (MOUNTED ON ROUTE MARKER POST)		6	0
M3-3-24	24"x 12"	SOUTH (MOUNTED ON ROUTE MARKER POST)		6	0
M3-4-24	24"x 12"	WEST (MOUNTED ON ROUTE MARKER POST)		6	0
M4-8-24	24"x 12"	DETOUR (MOUNTED ON ROUTE MARKER POST)		6	0
M4-10-48	48"x 18"	DETOUR ARROW RIGHT or LEFT		22	0
M5-1-21	21"x 15"	ARROW AHD AND RT or LT(MTD ON ROUTE MKR POST)		6	0
M6-1-21	21"x 15"	ARROW RT or LT (MOUNTED ON ROUTE MARKER POST)		6	0
W1-1-48	48"x 48"	RIGHT or LEFT SHARP CURVE ARROW		34	0
W1-2-48	48"x 48"	RIGHT or LEFT CURVE ARROW		34	0
W1-3-48	48"x 48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		34	0
W1-4-48	48"x 48"	RIGHT or LEFT REVERSE CURVE ARROW		34	0
W1-6-48	48"x 24"	LARGE ARROW		26	0
W3-1a-48	48"x 48"	STOP AHEAD SYMBOL		34	0
W3-2a-48	48"x 48"	YIELD AHEAD SYMBOL		34	0
W3-3-48	48"x 48"	SIGNAL AHEAD SYMBOL		34	0
W4-2-48	48"x 48"	LANE TRANSITION SYMBOL		34	0
W5-1-48	48"x 48"	ROAD NARROWS		34	0
W6-3-48	48"x 48"	TWO WAY TRAFFIC SYMBOL		34	0
W8-1-48	48"x 48"	BUMP		34	0
W8-3a-48	48"x 48"	PAVEMENT ENDS SYMBOL		40	0
W8-3a-24	24"x 18"	PAVEMENT END PLAQUE			
W8-9-48	48"x 48"	LOW SHOULDER		34	0
W8-51-48	48"x 48"	UNEVEN PAVEMENT		34	0
W8-53-48	48"x 48"	TRUCKS ENTERING HIGHWAY		34	0
W8-54-48	48"x 48"	TRUCKS ENTERING AHEAD OR __ FT.	2	34	68
W8-55-48	48"x 48"	TRUCKS CROSSING AHEAD or __ FT.	2	34	68
W12-2-48	48"x 48"	LOW CLEARANCE SYMBOL			
W13-1-24	24"x 24"	MPH ADVISORY SPEED PLATE		10	0
W13-4-48	48"x 60"	RAMP ARROW		40	0
W14-3-64	64"x 48"	NO PASSING ZONE		27	0
W20-1-48	48"x 48"	ROAD CONSTRUCTION - AHEAD, 1/2 MILE, or FT.		34	0
W20-2-48	48"x 48"	DETOUR FT.		34	0
W20-3-48	48"x 48"	ROAD or STREET CLOSED AHEAD or __ FT.	2	34	68
W20-4-48	48"x 48"	ONE LANE ROAD AHEAD or __ FT.		34	0
W20-50-48	48"x 48"	BE PREPARED TO STOP		34	0
W20-51-48	48"x 48"	EQUIPMENT WORKING		34	0
W20-52-54	54"x 12"	NEXT __ MILES		10	0
W20-5-48	48"x 48"	RIGHT or LEFT LANE CLOSED AHEAD or __ FT.		34	0
W20-7a-48	48"x 48"	FLAGGING SYMBOL		34	0
W20-7k-24	24"x 18"	FEET		8	0
W20-8-48	48"x 48"	STREET CLOSED		34	0
W21-1a-48	48"x 48"	MEN WORKING SYMBOL	2	34	68
W21-2-48	48"x 48"	FRESH OIL		34	0
W21-50-48	48"x 48"	BRIDGE PAINTING AHEAD or __ FT.		34	0
W21-51-48	48"x 48"	MATERIAL ON ROADWAY		34	0
W21-5-48	48"x 48"	SHOULDER WORK		34	0
W22-7-48	48"x 48"	SINGLE LANE AHEAD or __ FT.		34	0
W22-8-48	48"x 48"	FRESH OIL LOOSE ROCK		34	0
R1-1a-18	18"x 18"	STOP and SLOW PADDLE Back to Back		8	0
W22-14-18				SPEC&CODE	
		TOTAL UNITS		704-1000	538

TYPE III	8' LONG	BARRICADES	EACH	704-1052	24
TYPE II	2' MIN.	BARRICADES	EACH	704-1051	
TYPE I	6'to 10'	BARRICADES	EACH	704-1050	
18"x 36"	MIN.	DELINEATOR DRUMS	EACH	704-1060	10
28" MIN.		TRAFFIC CONES	EACH	704-1065	
8" to 12"	x 24"	VERTICAL PANELS	EACH	704-1080	
	3"x 8"	DELINEATOR	EACH	704-1070	
		SEQUENCING ARROW PANEL TYPE C	EACH	704-1087	

TRAFFIC CONTROL
Construction Zone
Device List
Highway 6 Via Duct
Mandan, N D

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(004)067	10

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	11



✱ To be used during the construction of 1st St. S.W. connecton.

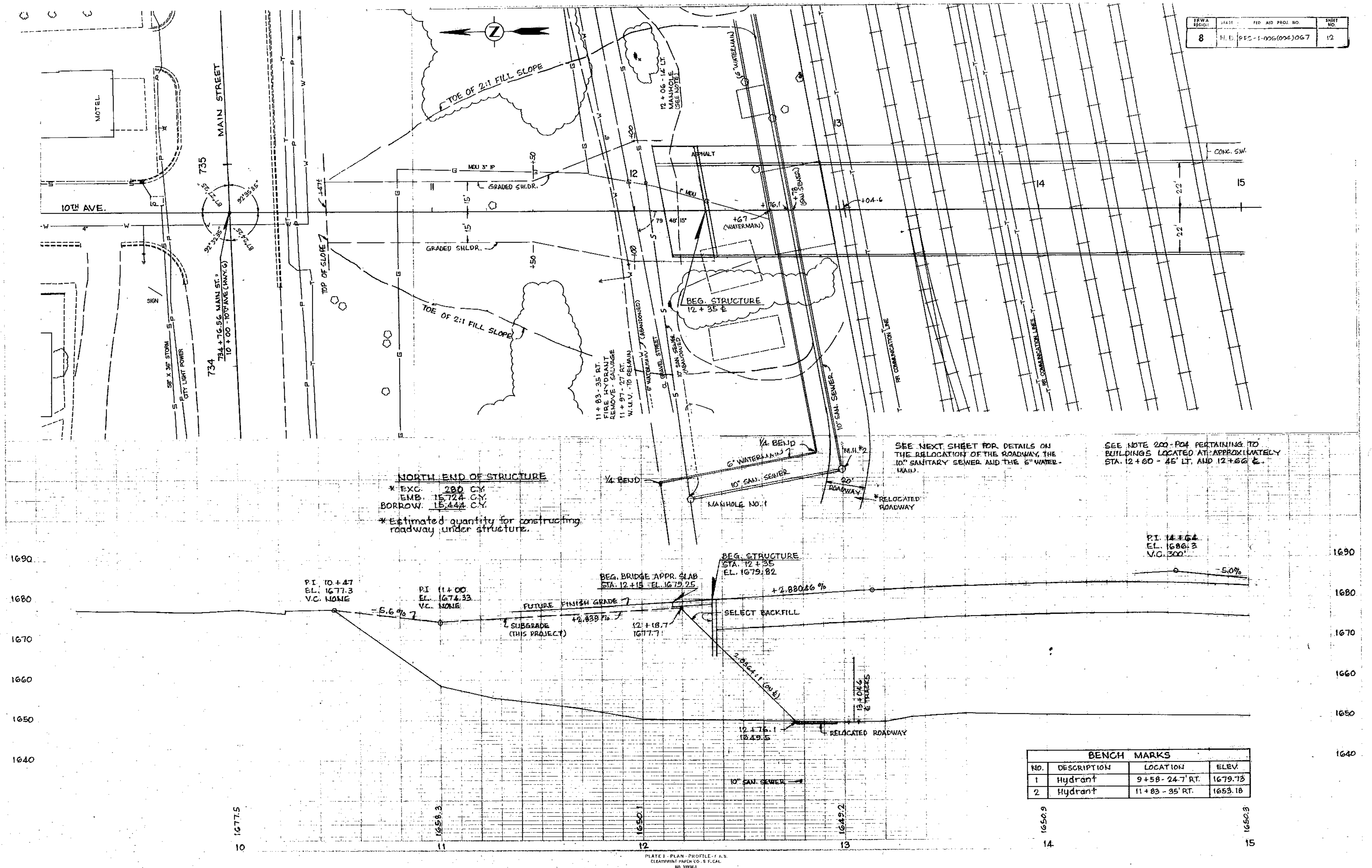
Relocate Stop Sign from 1st St. (Not a Pay Item)

4-Type III Barricades have been provided to close off work site at night and on weekends

WORK ZONE TRAFFIC CONTROL

012045

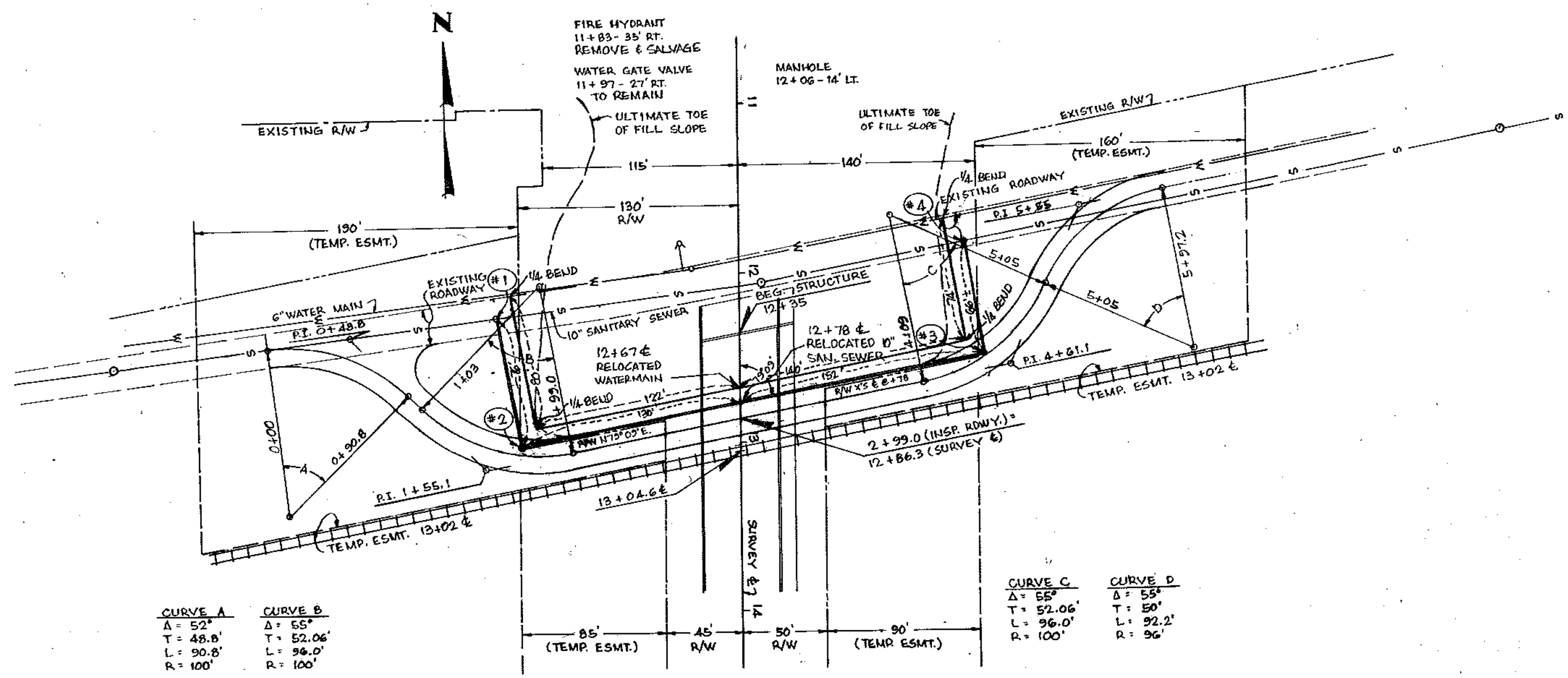
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RFS-1-006(004)067	12



MOTEL
MAIN STREET
10TH AVE.
735
734
734 + 76.56 MAIN ST. = 10 + 00 - 10TH AVE (ANY. G)
58" X 36" STORM
CITY LIGHT POWER
SIGN
TOE OF 2:1 FILL SLOPE
TOP OF SLOPE
GRADED SHLDR.
MDU 3" IP
12 + 06 - 14' LT. MANHOLE (SEE NOTE)
6" WATERMAIN
ASPHALT
CONC. S.W.
+67 (WATERMAIN)
+78 (SAN. SEWER)
+04.6
79° 48' 15"
BEG. STRUCTURE 12 + 35 ℄
11 + 83 - 35' RT. FIRE HYDRANT REMOVE - SALVAGE
11 + 97 - 27' RT. W.V.U. - TO REMAIN
6" WATERMAIN (ABANDONED)
CL GRAVEL STREET
10" SAN. SEWER (ABANDONED)
10" SAN. SEWER
RR COMMUNICATION LINE
RR COMMUNICATION LINES
12
13
14
15
1/4 BEND
M.H. #2
6" WATERMAIN
10" SAN. SEWER
MANHOLE NO. 1
ROADWAY
RELOCATED ROADWAY
SEE NEXT SHEET FOR DETAILS ON THE RELOCATION OF THE ROADWAY, THE 10" SANITARY SEWER AND THE 6" WATERMAIN.
SEE NOTE 200-P04 PERTAINING TO BUILDINGS LOCATED AT APPROXIMATELY STA. 12+60 - 45' LT. AND 12+66 ℄.
NORTH END OF STRUCTURE
* EXC. 280 C.Y.
EMB. 15,724 C.Y.
BORROW 15,444 C.Y.
* Estimated quantity for constructing roadway under structure.
P.I. 10 + 47 EL. 1677.3 V.C. NONE
-5.6%
P.I. 11 + 00 EL. 1674.33 V.C. NONE
FUTURE FINISH GRADE
℄ SUBGRADE (THIS PROJECT)
+2.838%
BEG. BRIDGE APPR. SLAB STA. 12 + 15 - EL. 1679.25
BEG. STRUCTURE STA. 12 + 35 EL. 1679.82
+2.88046%
SELECT BACKFILL
12 + 18.7 1677.7
2.0564:1 (ON ℄)
P.I. 14 + 64 EL. 1686.3 V.C. 300'
-5.0%
12 + 76.1 1649.5
13 + 04.6 ℄ TRACKS
RELOCATED ROADWAY
10" SAN. SEWER
1690
1680
1670
1660
1650
1640
1677.5
1658.3
1650.1
1649.2
1650.9
1650.3
10
11
12
13
14
15
PLATE I - PLAN - PROFILE - F.A.S.

BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.
1	Hydrant	9+58 - 24.7' RT.	1679.73
2	Hydrant	11+83 - 35' RT.	1653.18

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	13



MANHOLE 48"
- #1 - 1 EA.
- #2 - 1 EA.
- #3 - 1 EA.
- #4 - 1 EA.

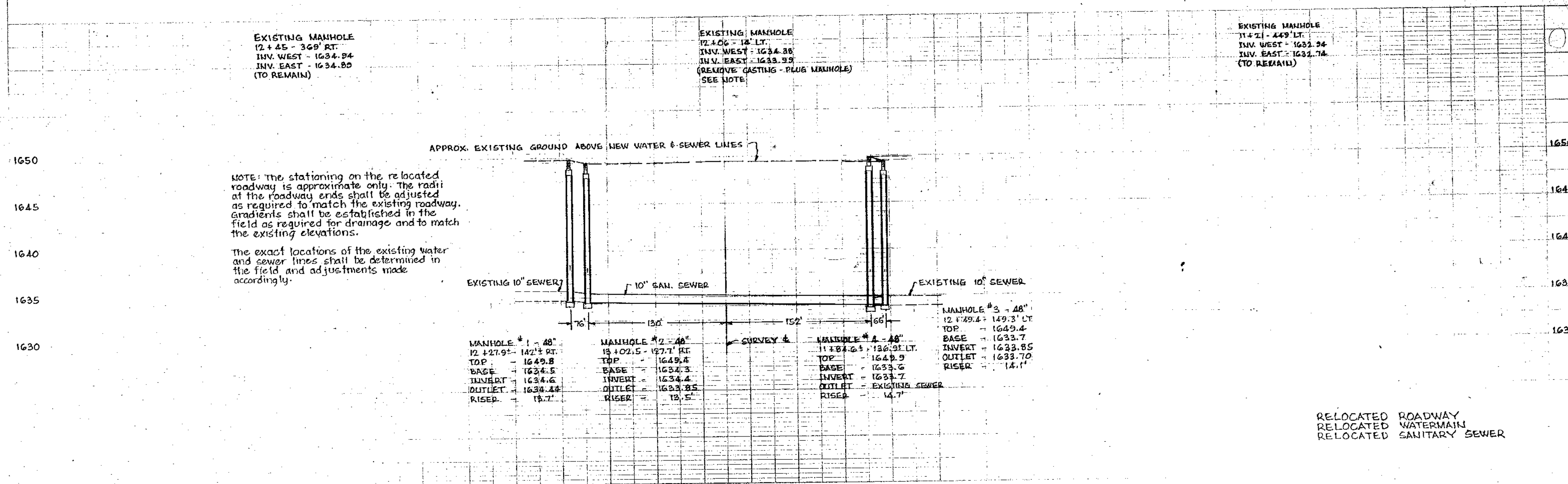
MANHOLE RISER - 48"
- #1 - 48" × 13.7 L.F.
- #2 - 48" × 13.5 L.F.
- #3 - 48" × 14.1 L.F.
- #4 - 48" × 14.7 L.F.

10" SANITARY SEWER PIPE
- #1 TO #2 - 10" × 72 L.F.
- #2 TO #3 - 10" × 278 L.F.
- #3 TO #4 - 10" × 62 L.F.

WATERMAIN 6" PVC
AS SHOWN AT LT. - 6" × 416' L.F.

SALVAGE 6" HYDRANT
11 + 83 - 35' RT.

FITTINGS, CAST IRON
4 LOCATIONS AS SHOWN - 6" · 1/4 BENDS (4 EA.) 340 Lbs.



NOTE: The stationing on the relocated roadway is approximate only. The radii at the roadway ends shall be adjusted as required to match the existing roadway. Gradients shall be established in the field as required for drainage and to match the existing elevations.

The exact locations of the existing water and sewer lines shall be determined in the field and adjustments made accordingly.

RELOCATED ROADWAY
RELOCATED WATERMAIN
RELOCATED SANITARY SEWER

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRS-1-006(004)067	14

WATERMAIN 8" PVC

15 + 81 ℄ TO 16 + 97± RT. ℄ LT. - 491 L.F.
(AS SHOWN IN LAYOUTS)

FITTINGS, CAST IRON

15 + 58 - 120' LT. - 8" 1/8 BEND - 110 LBS.
8" 1/32 BEND - 110 LBS.
15 + 83.6 - 145' LT. - 8" 1/8 BEND - 110 LBS.
16 + 97 - 145' LT. - 8" x 4" 1/4 REDUCING BEND - 90 LBS.
16 + 05 - 125' RT. - 8" 1/32 BEND - 110 LBS.
8" 1/16 BEND - 110 LBS.
8" 1/8 BEND - 110 LBS.
16 + 97 - 125' RT. - 8" x 4" 1/4 REDUCING BEND - 90 LBS.

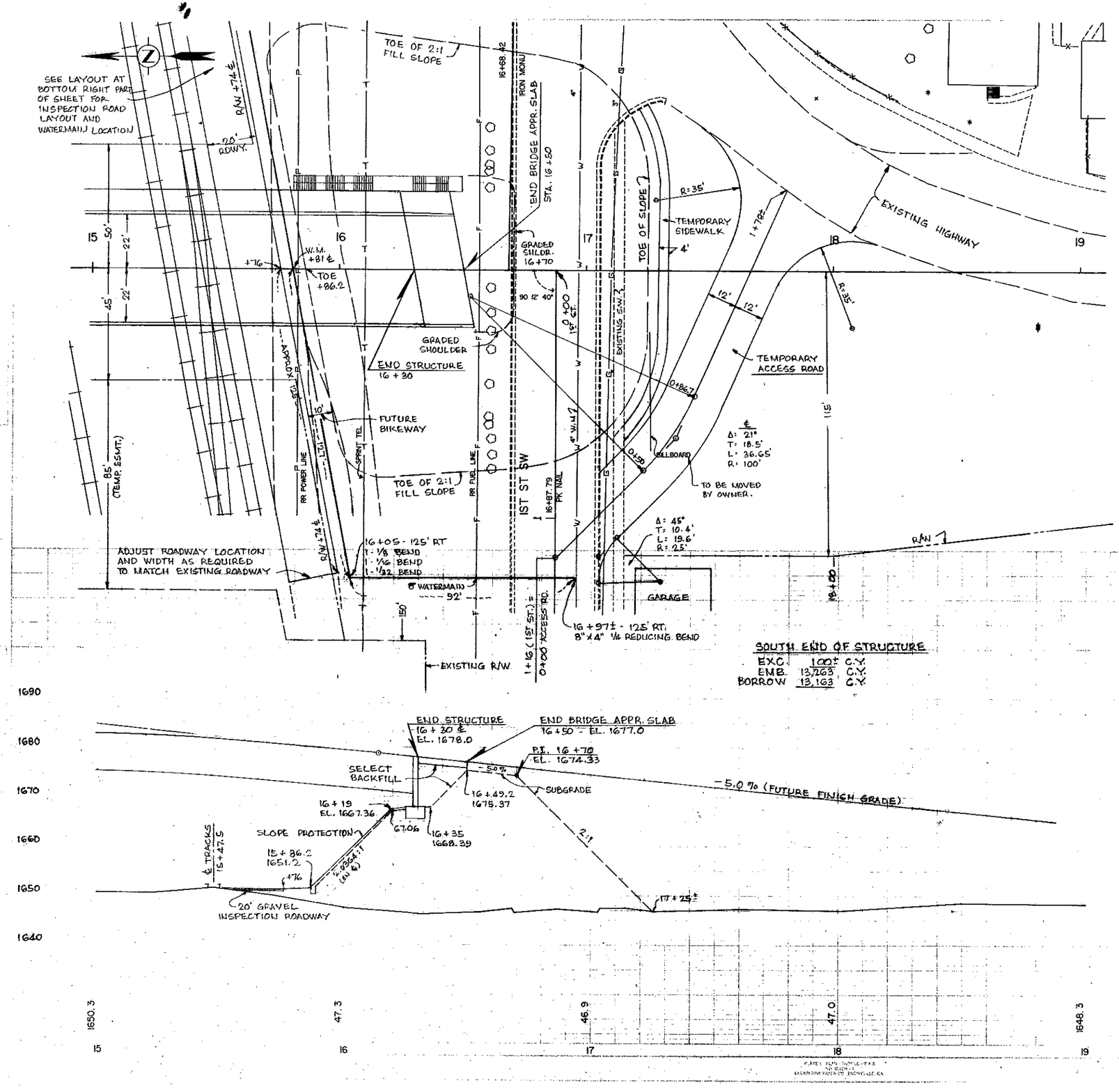
REMOVAL OF CONCRETE

* 0 + 65 TO 1 + 06 LT. - 21 S.Y.

REMOVAL OF CURB & GUTTER

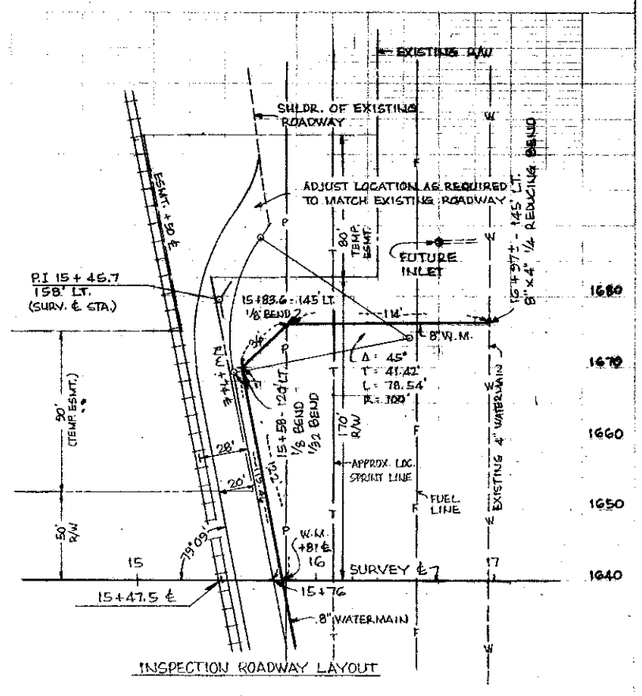
* 0 + 65 TO 1 + 28 LT. - 63 L.F.

* 1ST STREET STATIONING



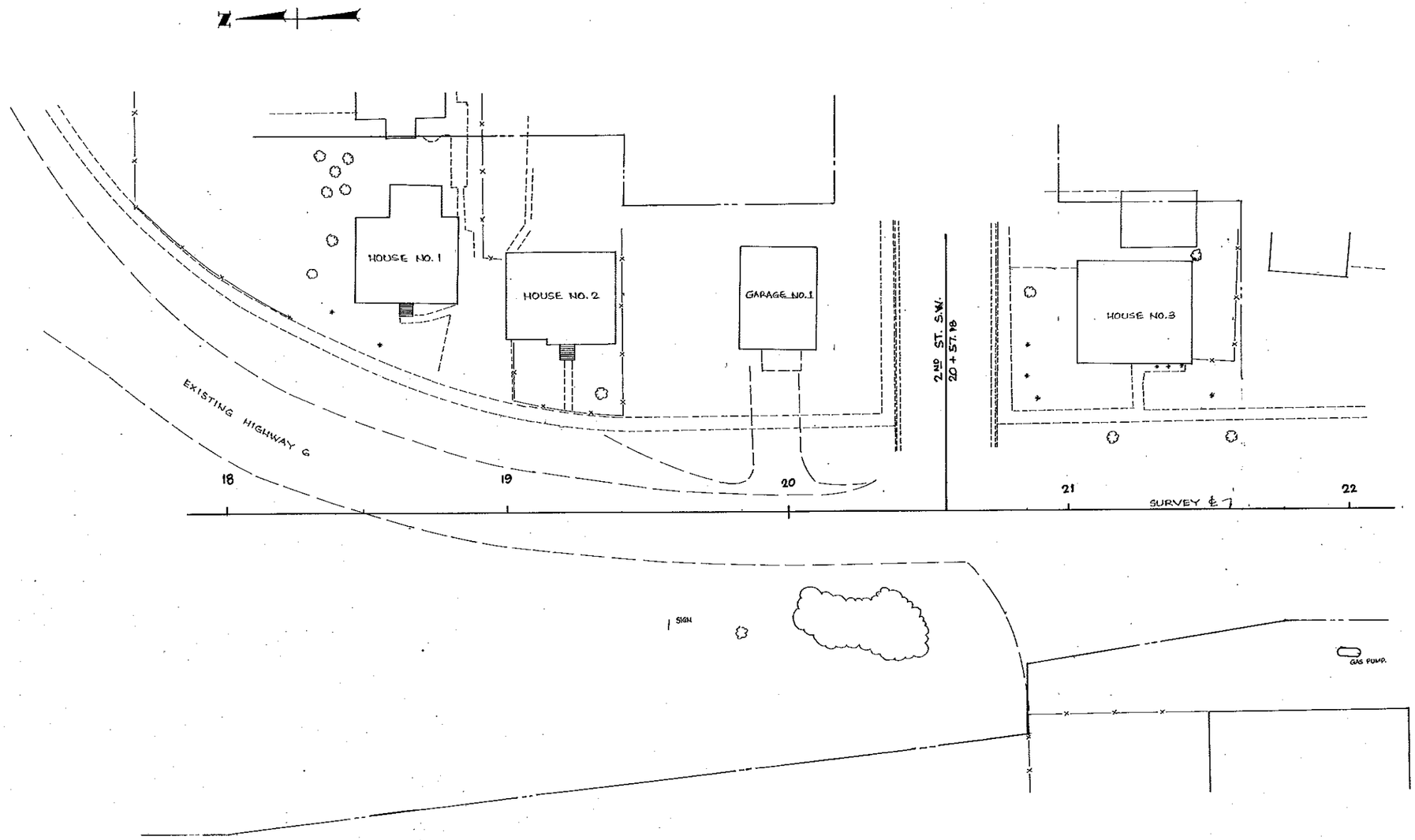
SOUTH END OF STRUCTURE

EXC.	100±	C.Y.
EMB.	13,263	C.Y.
BORROW	13,163	C.Y.



INSPECTION ROADWAY LAYOUT

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	15

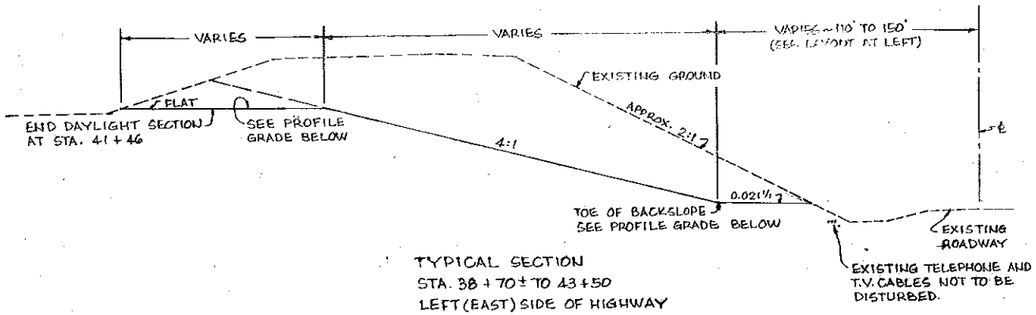


See Note 200 - P04 "Removal of Foundations - All Sizes" pertaining to house No. 1, 2 & 3 and garage No. 1.

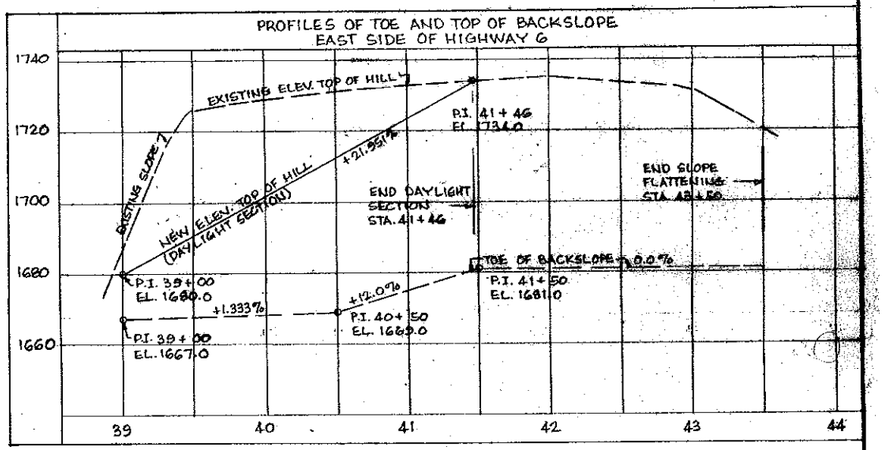
BENCH MARKS			
NO.	DESCRIPTION	LOCATION	ELEV.
3	Hydrant	22+25 - 31' LT.	1652.00

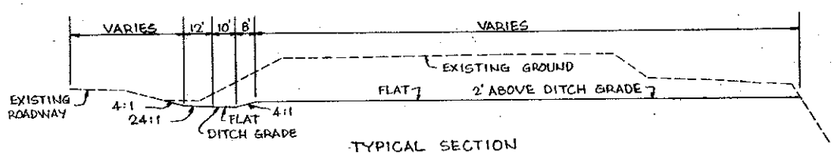
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(004)067	15 A

BORROW AREA DETAILS

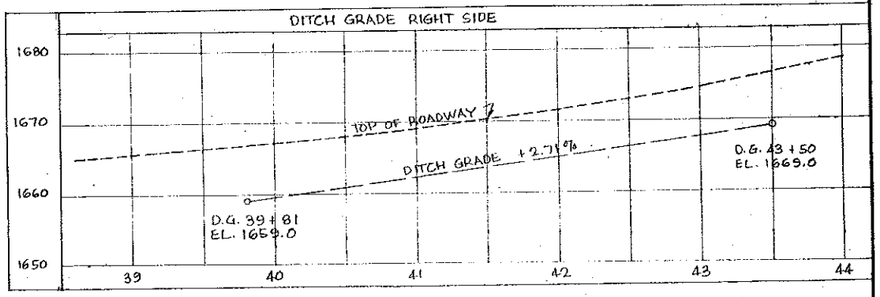


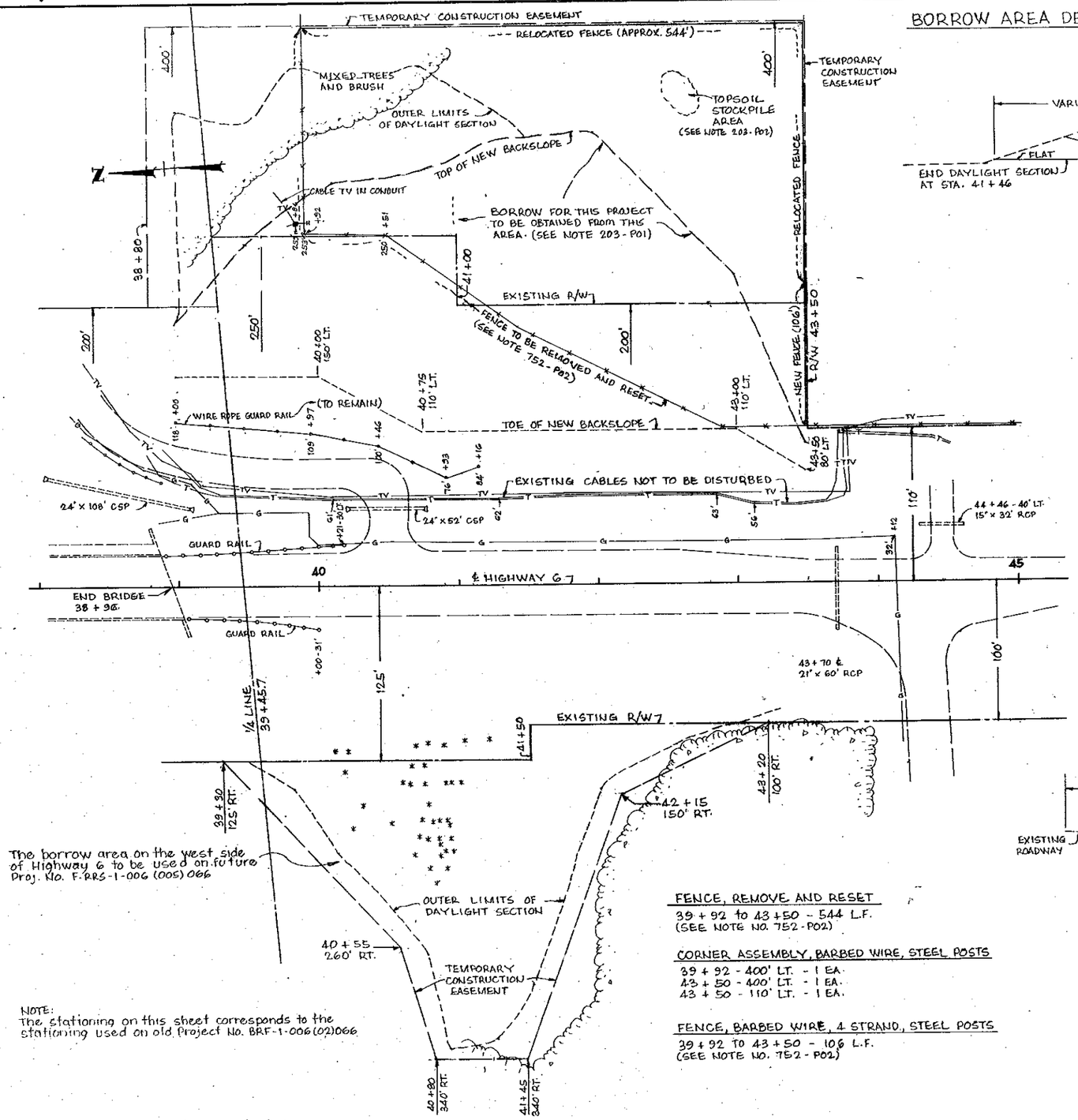
TYPICAL SECTION
STA. 38 + 70± TO 43+50
LEFT (EAST) SIDE OF HIGHWAY





TYPICAL SECTION
STA. 39 + 65± TO 43 + 50
RIGHT (WEST) SIDE OF HIGHWAY (FUTURE PROJECT)





The borrow area on the west side of Highway 6 to be used on future Proj. No. F-BRS-1-006 (005) 066

NOTE:
The stationing on this sheet corresponds to the stationing used on old Project No. BRF-1-006(02)066

FENCE, REMOVE AND RESET

39 + 92 to 43 + 50 - 544 L.F.
(SEE NOTE NO. 752-P02)

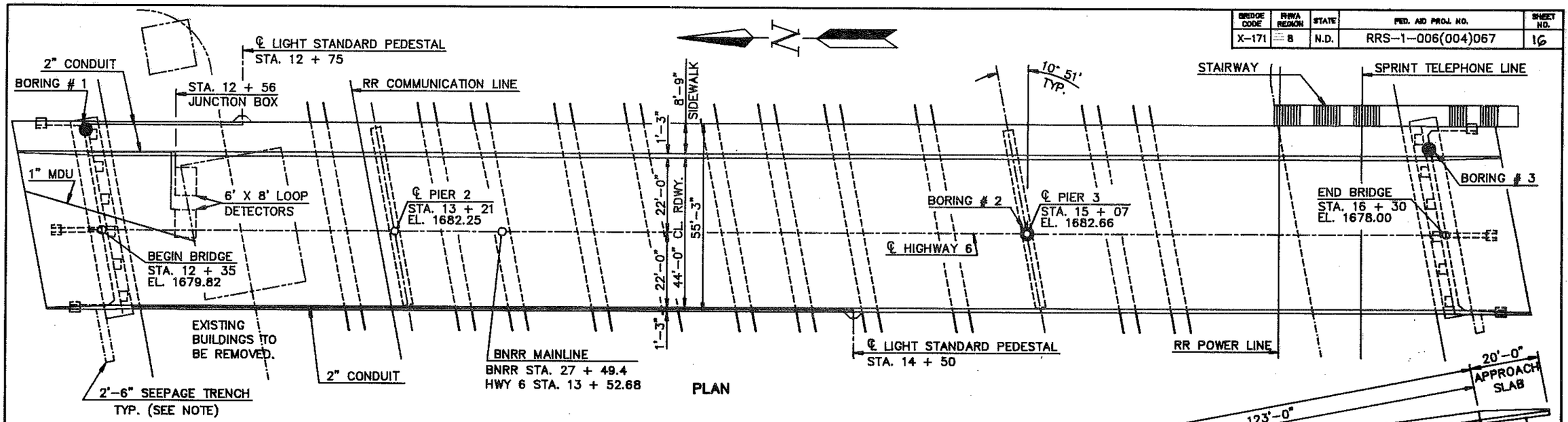
CORNER ASSEMBLY, BARBED WIRE, STEEL POSTS

39 + 92 - 400' LT. - 1 EA.
43 + 50 - 400' LT. - 1 EA.
43 + 50 - 110' LT. - 1 EA.

FENCE, BARBED WIRE, 4 STRAND, STEEL POSTS

39 + 92 TO 43 + 50 - 106 L.F.
(SEE NOTE NO. 752-P02)

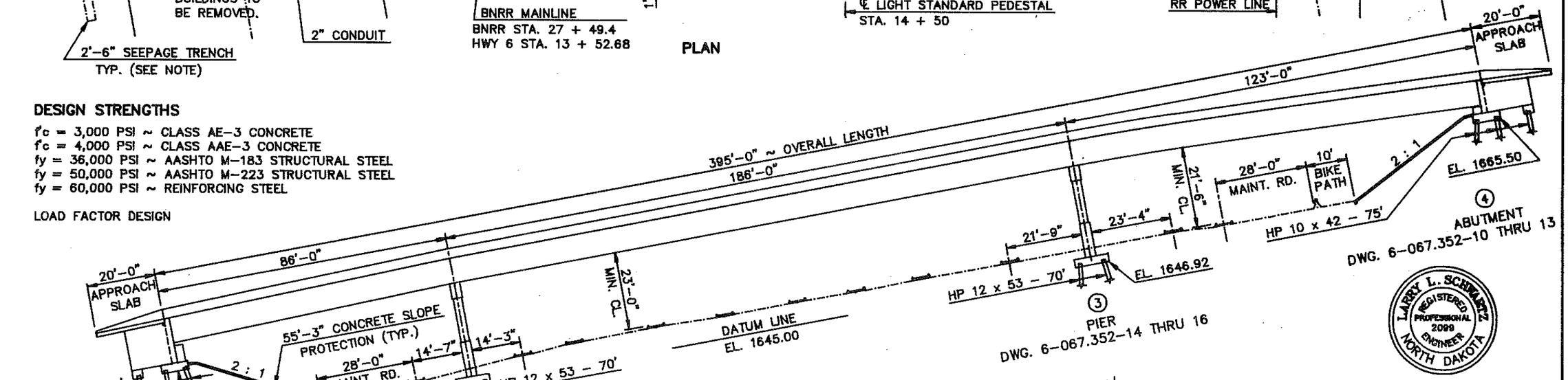
BRIDGE CODE	FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
X-171	8	N.D.	RRS-1-006(004)067	16



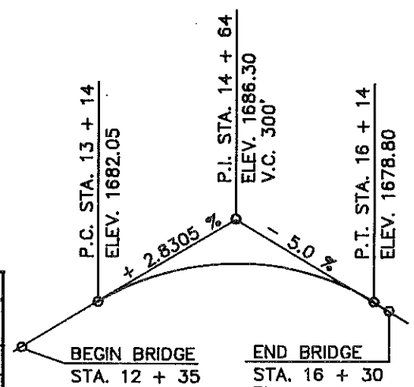
DESIGN STRENGTHS

f'c = 3,000 PSI ~ CLASS AE-3 CONCRETE
f'c = 4,000 PSI ~ CLASS AAE-3 CONCRETE
fy = 36,000 PSI ~ AASHTO M-183 STRUCTURAL STEEL
fy = 50,000 PSI ~ AASHTO M-223 STRUCTURAL STEEL
fy = 60,000 PSI ~ REINFORCING STEEL

LOAD FACTOR DESIGN



ELEVATION



VERTICAL CURVE DATA

ALL ABUTMENT PILE SHALL BE DRIVEN TO 55 TON DESIGN LOAD.
ALL PIER PILE SHALL BE DRIVEN TO 70 TON DESIGN LOAD.

* BELOW BOTTOM OF CONCRETE ELEVATIONS.

PILE LOADING

LOCATION	DEAD LOAD	EARTH	TEMP.	LIVE LOAD	GROUP	DESIGN LOAD	* MIN. PEN.
ABUTMENT 1	25.2 T.	11.4 T.	–	15.5 T	I	52.1 T.	40'
PIER 2	29.5 T	1.6 T	25.7 T	12.3 T	IV	69.1 T	25'
PIER 3	32.2 T	1.6 T	21.4 T	13.0 T	IV	68.2 T.	25'
ABUTMENT 4	31.2 T	7.3 T	–	14.1 T.	I	52.6 T.	55'

BENCH MARKS

NO.	DESCRIPTION	LOCATION	ELEV.
1	HYDRANT	NW COR. 10th & MAIN	
		STA. 9 + 58 – 24' RT.	1679.73
2	HYDRANT	STA. 11 + 83 – 35' RT.	1653.18

STANDARD DRAWINGS

D-822-1, D-900-1 & D-708-1

HS 25 DESIGN LOADING

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

HIGHWAY 6 VIADUCT, MANDAN

BRIDGE LAYOUT

RRS-1-006(004)067
STATION 14 + 32.5

MORTON COUNTY

APPROVED

23 AUG 89
DATE

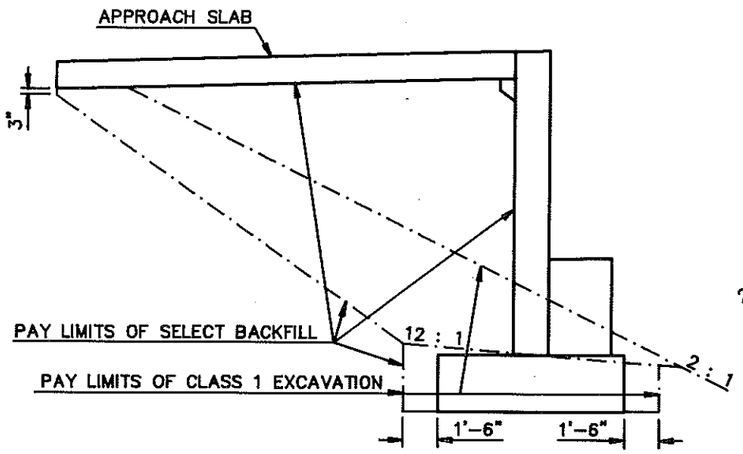
BRIDGE DESIGN ENGINEER

LARRY L. SCHWARTZ
REGISTERED PROFESSIONAL 2099 ENGINEER
NORTH DAKOTA

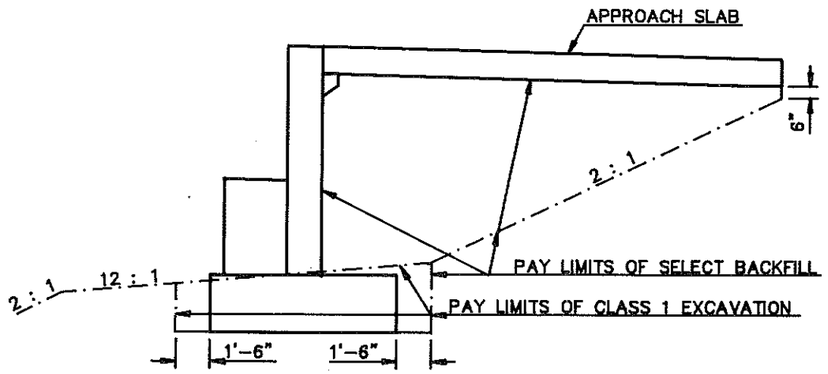
88DLSB: JUNE 89

6-067.352

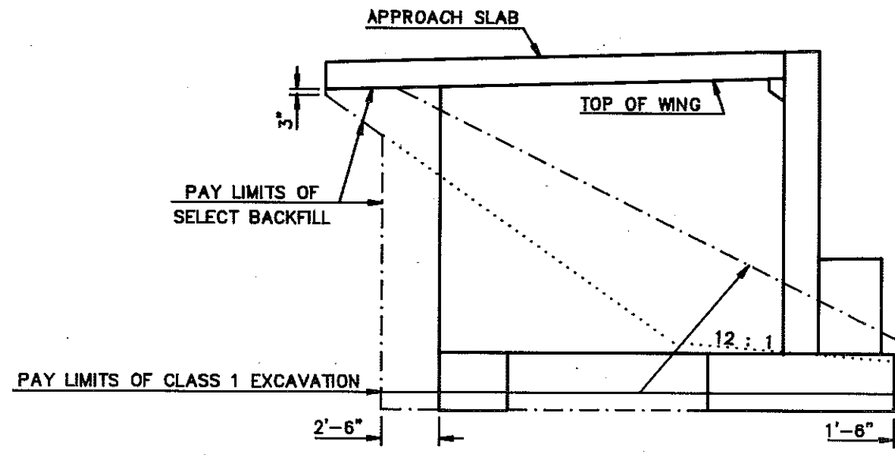
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	17



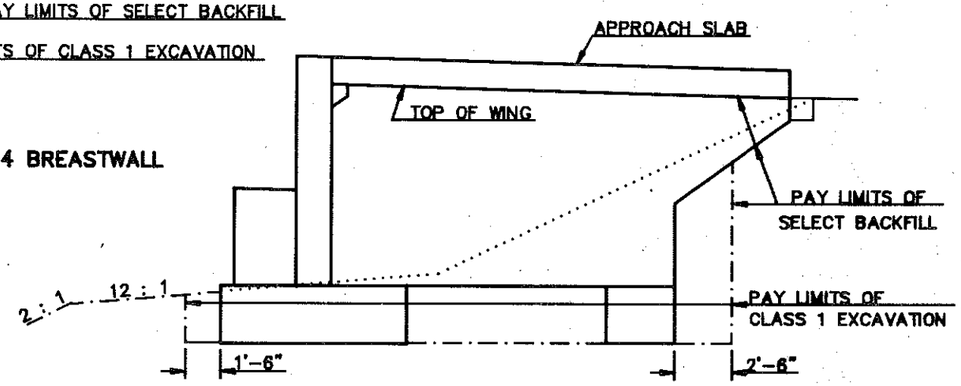
DETAIL AT ABUTMENT 1 BREASTWALL



DETAIL AT ABUTMENT 4 BREASTWALL



DETAIL AT ABUTMENT 1 WINGS



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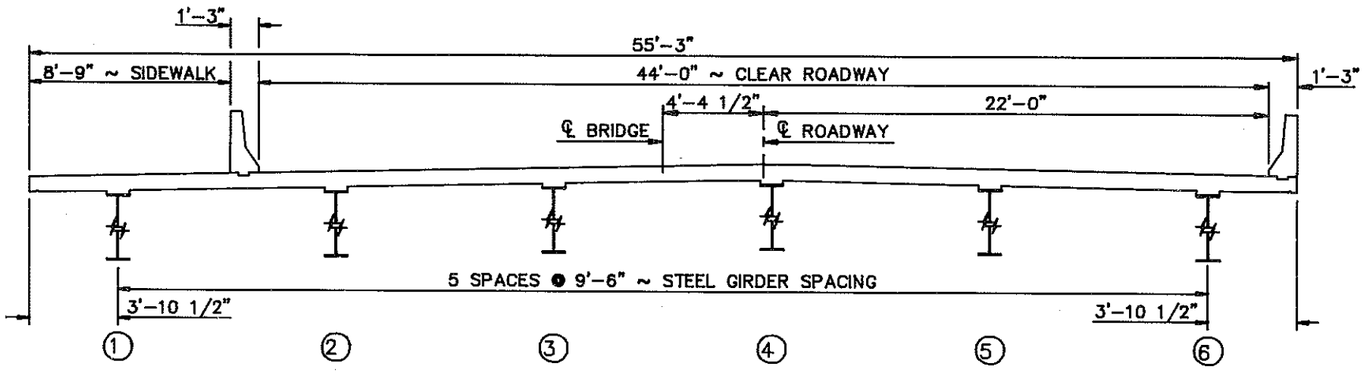


TYPICAL DECK SECTION

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
107	0100	RAILWAY PROTECTION INSURANCE	L. SUM	1
210	0100	CLASS 1 EXCAVATION	CU. YD.	750
210	0200	SELECT BACKFILL	CU. YD.	770
210	0201	FOUNDATION PREPARATION	EA.	1
550	0215	CONCRETE BRIDGE APPROACH SLAB	SQ. YD.	246
602	0130	CLASS AAE-3 CONCRETE	CU. YD.	643.3
602	1130	CLASS AE-3 CONCRETE	CU. YD.	520.6
602	1250	PENETRATING WATER REPELLENT TR.	SQ. YD.	1915
612	0115	REINFORCING STEEL GRADE 60	LBS.	145,469
612	0116	REINFORCING STEEL GRADE 60 EC	LBS.	95,890
616	5890	STRUCTURAL STEEL (APPROXIMATELY 683,214 LBS.)	L. SUM	1
622	0020	STEEL PILING HP 10x42	L. FT.	2865
622	0040	STEEL PILING HP 12x53	L. FT.	3920
624	0140	PIPE RAILING	L. FT.	55
624	0124	PEDESTRIAN FENCE	L. FT.	45
624	0126	PEDESTRIAN CANOPY	L. FT.	388
708	1100	SLOPE PROTECTION, CONC.	SQ. YD.	530
930	3000	BRIDGE BENCH MARKS	SET	1
930	8600	ELASTOMERIC BEARING PAD	SQ. FT.	24
930	8680	EXPANSION JOINT STRIP SEAL	L. FT.	113
930	9930	ANTI-GRAFFITI COATING	SQ. FT.	4020

HIGHWAY 6 VIADUCT
MANDAN

BID ITEMS
DETAILS AT ABUTMENT
TYPICAL DECK SECTION

89DLS33

100 SCOPE OF WORK: This project consists of building a new bridge connecting Highway 6 and 10th Avenue, N.W., Mandan, North Dakota. The bridge spans the B.N.R.R. yard and will be 395 feet long and have a 44-foot clear roadway with an 8-foot sidewalk. The existing bridge spanning the B.N.R.R. yard is at 8th Avenue and shall be removed later under a separate contract.

100 GENERAL: The cost of furnishing and placing preformed expansion joint filler, concrete inserts, tie wire, bar spacers, bar supports, conduit, and other miscellaneous items shall be included in the price bid for Class AE-3 and AAE-3 concrete.

203 EMBANKMENT: The embankment at the abutments shall be in place for a minimum of 30 days before piling are driven.

The contractor will be required to bore through the fill at the abutments before driving piling. All pilot holes not completely filled by the piles shall be backfilled with sand or fine gravel before the substructure is placed.

In lieu of the above waiting period, the contractor may begin pile driving operations as soon as the embankment is in place, but all pilot holes shall be extended to a depth of 15 feet into the original ground.

210 CLASS 1 EXCAVATION: The Class 1 Excavation shall extend from the bottom of the footings to surface within the limits shown on the plans. Shoring shall be required to protect the railroad tracks during the construction of the footing for Pier #2. The cost of the shoring shall be incidental to the "Class 1 Excavation."

210 BACKFILL: Select backfill shall meet the requirements of Section 816.03, Class 5, except maximum size shall be 3". Select backfill shall be compacted in accordance with Section 203.02F except required dry density shall be 95% of AASHTO T-180.

210 FOUNDATION PREPARATION: In preparing the site for construction and building the structure, the contractor shall conduct his work in such a manner so as not to damage the underground utilities at the site. The 1" gas line in the vicinity of Abutment #1 will be abandoned and/or removed by M.D.U. The underground railroad communication lines near Pier #2 will be moved by B.N.R.R. The railroad power line and the Sprint telephone line in the vicinity of Abutment #4 shall remain in place.

550 BRIDGE APPROACH SLABS: Mechanical finishing of the approach slabs shall be required. A mechanical or hand-held transverse metal tine finish shall be applied. A surface tolerance of 3/16" in 10 feet is also required.

Contractor has the option of placing the concrete in one continuous operation or two pours with the split determined by a centerline joint.

602 SURFACE FINISH "D": Surface Finish "D" shall be required for the inside, top, and back surfaces of the barrier.

602 DECK CONCRETE: Beams and girders have slight variations in the anticipated camber. To build the deck to the designated thickness will require slight adjustments in deck elevation and/or riser dimensions. These adjustments result in minor concrete quantity discrepancies. The contractor shall consider this quantity discrepancy when he bids the unit price for Class AAE-3 Concrete. The Department will only pay for the plan quantity of Class AAE-3 Concrete.

602 Deflection of the deck shoring shall be computed using the total dead load plus the weight of the finishing machine. The forming shall be adjusted properly to accommodate the deflection and thereby maintain the total slab thickness specified in the plans.

602 CONCRETE PLACING SEQUENCE: The deck shall be placed in one continuous operation from Abutment 4 to Abutment 1 at a minimum rate of 50 cubic yards per hour.

602 PENETRATING WATER REPELLENT TREATMENT: Penetrating water repellent shall be applied to the driving surface of the concrete deck.

602 BARRIERS: Barriers shall be constructed according to the provisions of Section 602.03 B.4. V-groove contraction joints shall be added at approximately 10-foot spacing in all faces of the barriers.

616 STRUCTURAL STEEL: Structural steel shall be AASHTO M 183 or M 223. Requirements for Charpy V-Notch tests are designated on the girder detail sheets.

616 The main girders, connection plates, stiffeners, end beam, and splice plates shall be AASHTO M-223 (est. total 632,128 lbs.). The diaphragms and bearing plates shall be AASHTO M-183 (est. total 51,086 lbs.). The total estimated weight is 683,214 lbs.

616 Shear connector on splice plates shall be moved to clear bolt holes.

616 Shop-welded connections of diaphragm angles to gusset plates may be used in place of the bolted connections shown. Details shall be shown on shop drawings.

616 Field connections shall be made with 7/8 inch diameter, AASHTO M 164 high-strength bolts unless otherwise shown.

616 Temporary or permanent attachments or devices that are not shown on the plans as part of the structure shall not be welded to the structural steel members during the fabrication and construction process.

616 The cost of swedge bolts shall be included in the total cost of structural steel.

616 The anchor bolts used at Abutment 1 shall have minimum tensile pullout capacity of 14 tons/bolt. These bolts shall be installed before the deck is placed. If the bolts are not installed before the deck is placed, uplift of the girders will occur at Abutment 1.

622 PILING: Piling shall be driven with a steam, air, or diesel hammer with a rated energy and ram weight not less than 25,181 foot-pound-tons, as computed by the formula W(E-8,820) + .57E, where W is the weight of the ram in tons and E is the rated hammer energy. In no case shall the ram weight be less than 2,700 pounds.

630 PAINT AND PAINTING: The structural steel shall be painted according to the supplemental specifications. The finish coats shall be green color no. 34138 and shall meet Federal Standard No. 595 colors.

708 SLOPE PROTECTION: The concrete slope protection will be limited to the cast-in-place type shown on Standard D-708-1.

772 LOOP DETECTORS: The materials and labor used to install the conduit and loop detectors on the bridge are incidental to the bid item "Class AAE-3 Concrete."

930 ELASTOMERIC BEARING PAD: The reinforced elastomeric bearing pads shall meet the requirements of Section 25 of Division II of the AASHTO Standard Specifications for Highway Bridges. The elastomeric material shall have a hardness of 60 durometers. The bearings shall be installed before the deck is placed.

930 WORK OVER RAILWAY TRACKS: The contractor shall submit his plan of action, together with falsework plans, and shoring plans for Pier No. 2, to the engineer and to the railway for approval before any work is done in these areas.

Because of the railroad's concerns for the safety of their employees and damage to their tracks, the contractor shall not be allowed to drop any debris or materials onto the railroad yard. The railroad will not allow any track blockage except for short phases of construction such as placing of the girders.

In accordance with the agreement with the railroad, some work items must be performed by the railroad. The contractor shall be responsible for coordinating his work with the railroad work schedule; and, apart from an extension of time, no payment or claim for damages shall be made to the contractor as compensation for "Delay Caused by Railroad Work," notwithstanding whether such delay be avoidable or unavoidable.

The contractor shall coordinate their work with the Burlington Northern Railroad by contacting the Superintendent of Maintenance and Engineering, Rudy Almaguer, at Fargo (280-7230) and the Mandan Trainmaster, A.E. Fry (667-2200).

During construction of the overhead bridge, clearances may be restricted to not less than eight and one-half (8 1/2) feet horizontally, measured from the centerline of track, and twenty-two (22) feet vertically, measured from top of rail, provided, however, that the contractor shall first obtain railway's permission for said restricted clearances.

930 TEMPORARY RAILROAD TRACK CROSSINGS: Before the contractor can move equipment across the railroad tracks, crossings need to be installed. The Department has entered into an agreement with BNRR which requires the BNRR to construct up to 11 such track crossings. The contractor shall give notice to BNRR of their need for such crossings at least 45 days before the crossings are needed. The notice shall be given to Rudy Almaguer (701-280-7230) and P.A. Yauney (701-667-2235).

930 ANTI-GRAFFITI COATING: All exposed surfaces of the abutments and the piers shall receive a "C" surface finish as per Section 602-03 I of the Standard Specifications. After the completion of the "C" surface finish, all exposed surfaces of the abutments and all exposed surfaces of the pier bumper blocks shall receive an anti-graffiti coating. The anti-graffiti coating shall be one of the following or an approved equal:

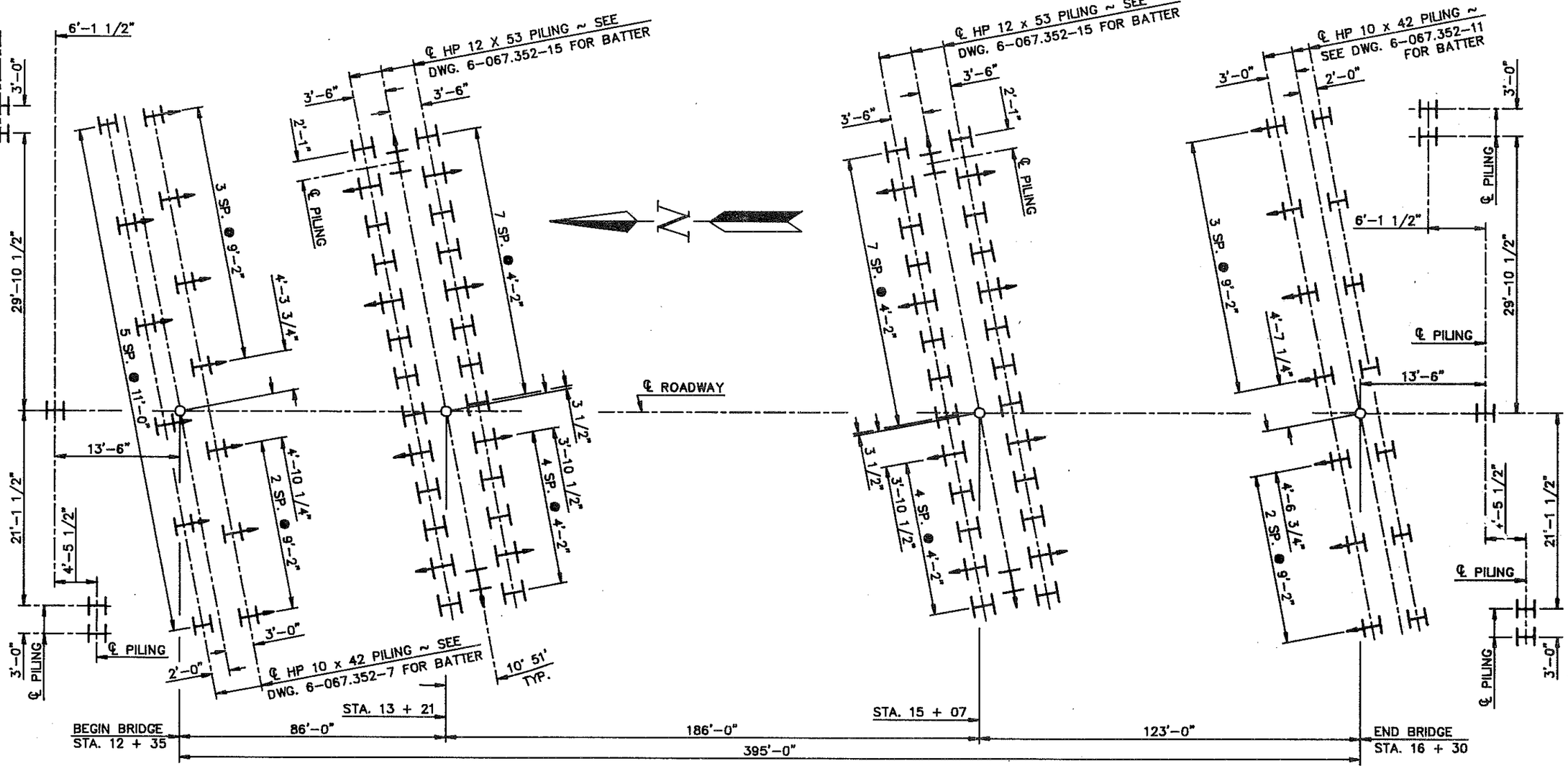
Preco Graffiti Guard - Preco Industries Limited
Graffiti Guard - Rexnord Chemical
Graffiti-Protect - Arcal Chemicals Inc.

SHOP DRAWINGS: The contractor shall submit the following shop drawings to the Construction office for approval;

1. Structural Steel
2. Elastomeric Bearings
3. Expansion Joint Strip Seal

DESIGN STRENGTH:	F'C	3,000 PSI Cl. AE-3 or AE-4 Concrete
	F'C	4,000 PSI Cl. AAE-3 or AAE-4 Concrete
	FY	60,000 PSI GR. 60 Reinforced Steel
	FY	36,000 PSI Structural Steel M-183
	FY	50,000 PSI Structural Steel M-223

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	20



NOTE:

SEE ABUTMENT & PIER DRAWINGS FOR PILE BATTER.

QUANTITIES

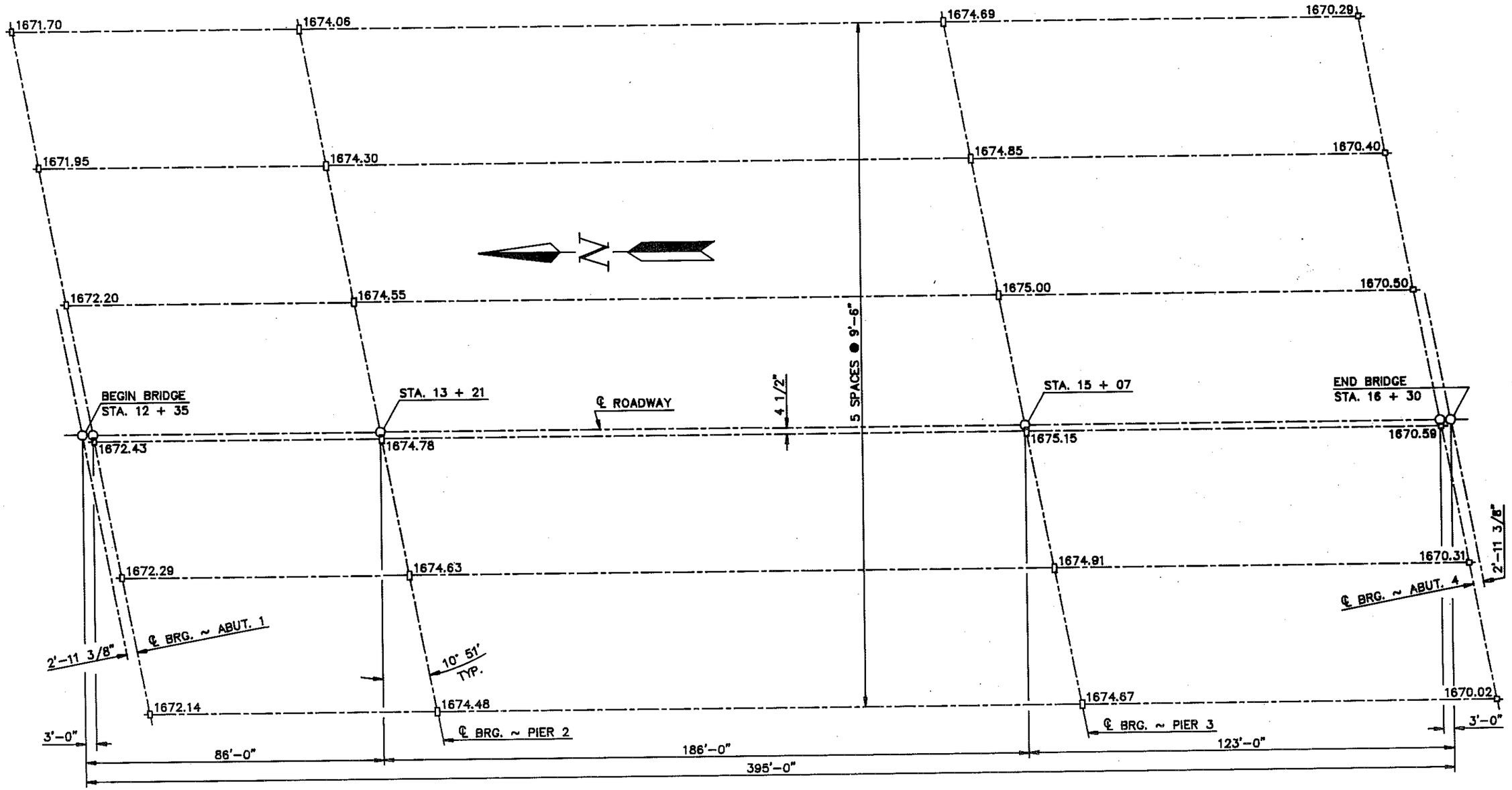
HIGHWAY 6 VIADUCT
MANDAN

PILING LAYOUT

89DLS31

6-067.352-3

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	21



(NOT TO SCALE)

BEARING PLATE LAYOUT

ELEVATIONS SHOWN ARE TO TOP OF FINISHED CONCRETE.

QUANTITIES

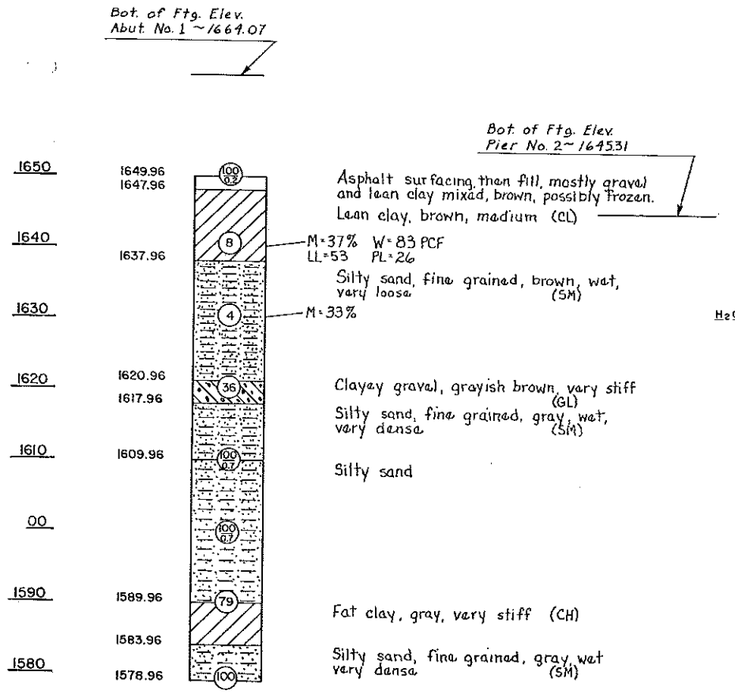
HIGHWAY 6 VIADUCT
MANDAN

BEARING ELEVATIONS

6-067.352-4

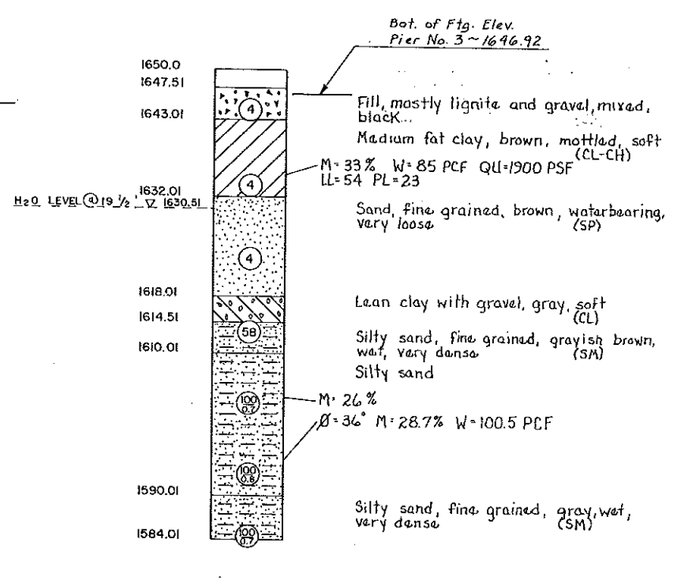
89DLS32

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N. D.	RRS-1-006(004)067	22



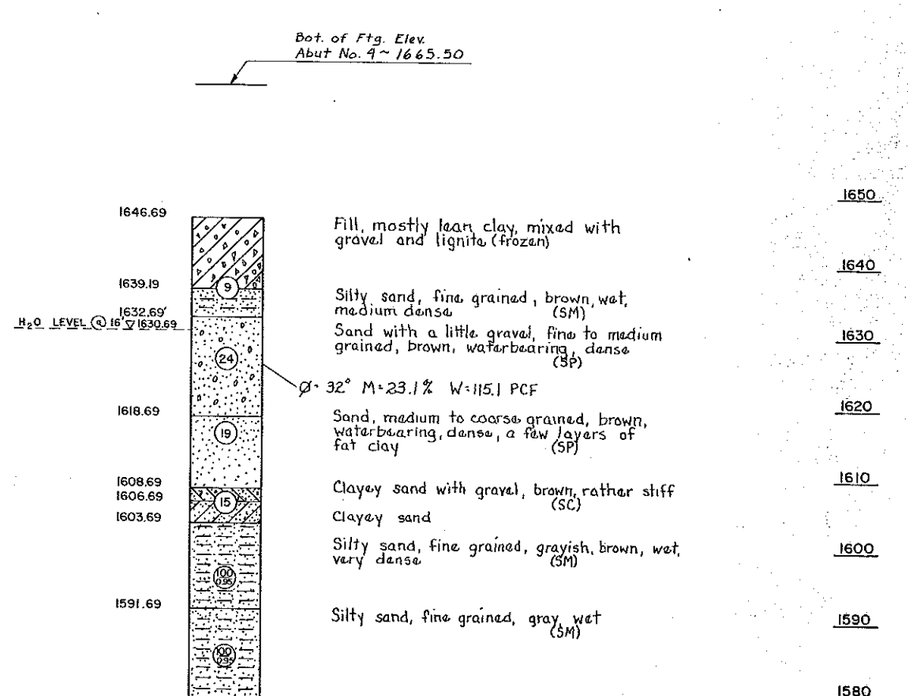
BORING NO. 1

STA. 12+29 – 30' LT.
OF SURVEY ℄



BORING NO. 2

STA. 15+07
ON ℄



BORING NO. 3

STA. 16+26–20' LT.
OF SURVEY ℄

NOTES: Encircled numbers indicate the number of blows delivered by a 140 lb. hammer from a height of 30" to drive a core tube 1'-0"

The boring log data shown is for design purposes only. The state assumes no responsibility if soil conditions encountered during construction differ from those shown.

SYMBOLS:

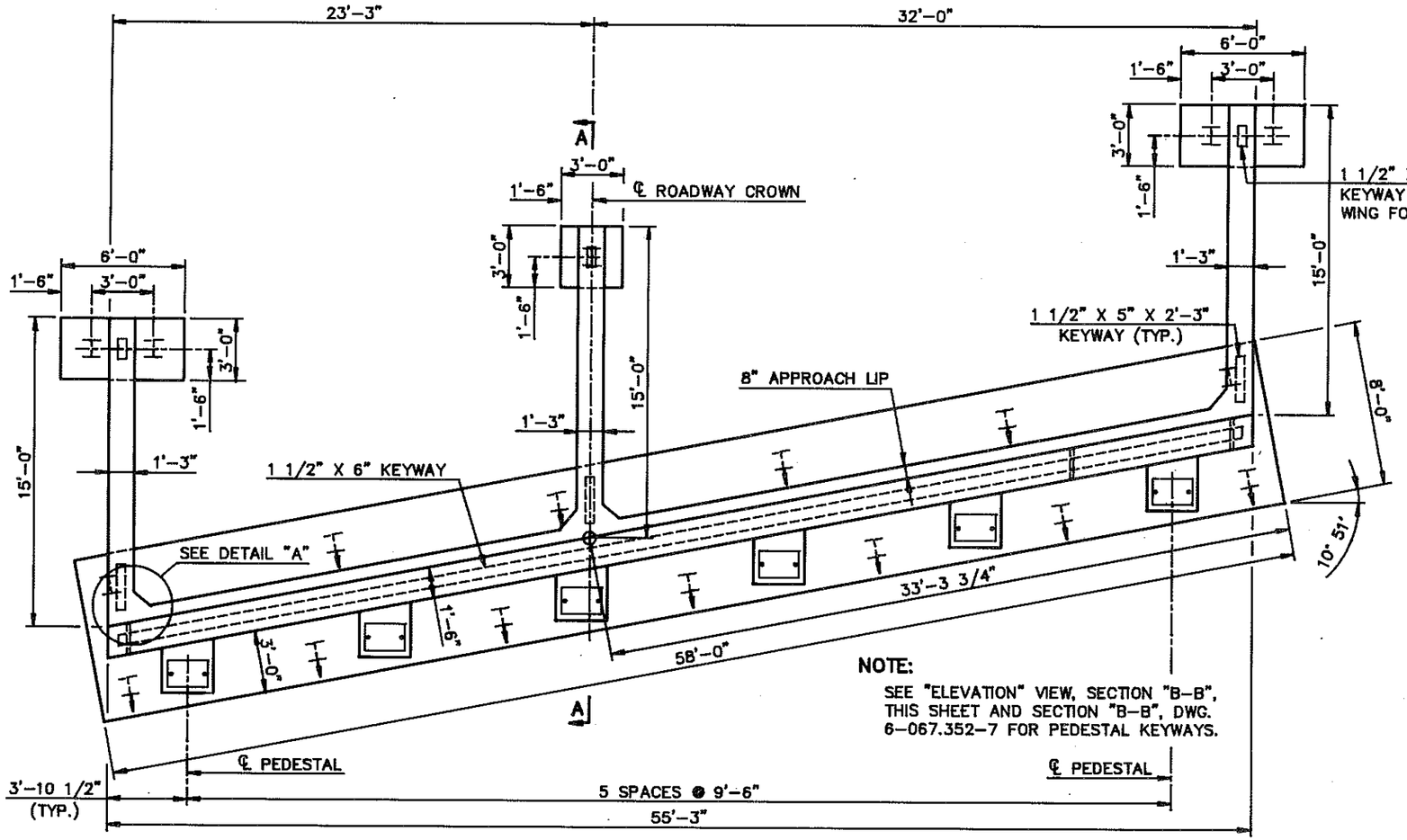
QU = Unconfined compressive strength (Lbs. Sq. Ft.)
Ø = Angle of internal friction (Degrees)
C = Cohesion (Lbs. Sq. Ft.)
M = Moisture - Percent
W = Dry weight (Lbs./Cu. Ft.)
* = Triaxial
LL = Liquid limit
PL = Plastic limit

HIGHWAY 6 VIADUCT
MANDAN

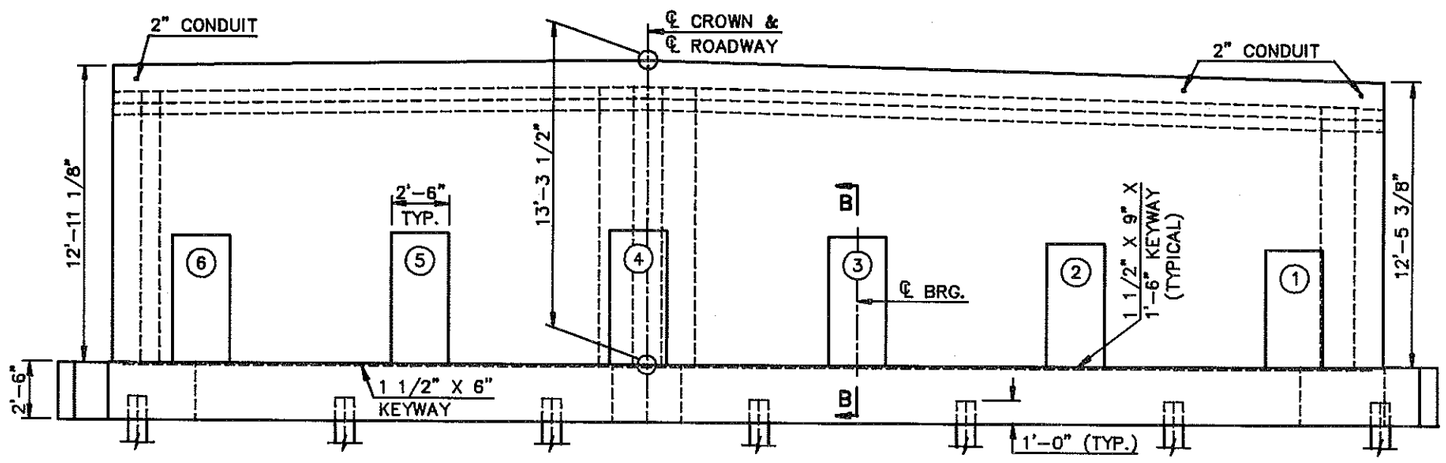
BORING LOG

MORTON COUNTY

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	23



PLAN



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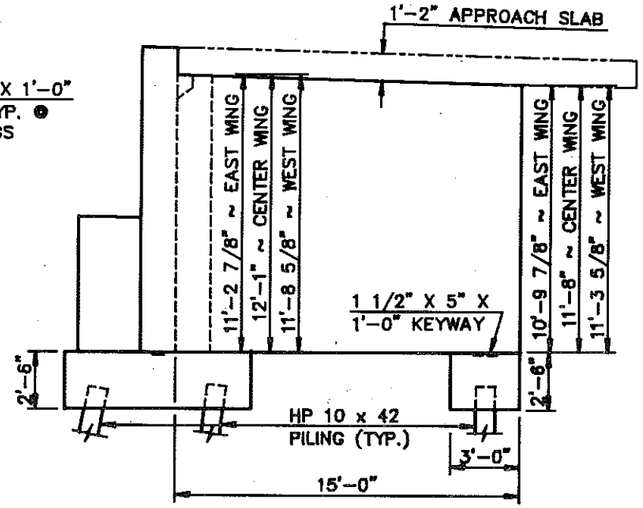

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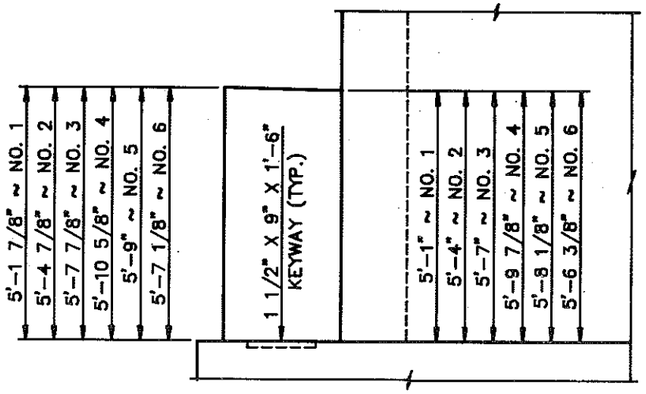
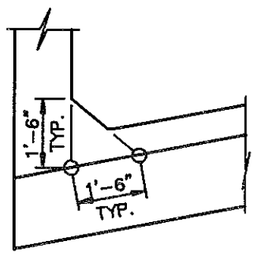


PEDESTAL HEIGHTS @ ℄ BEARINGS

B-B



DETAIL A

QUANTITIES

SEE DWG. 6-067.352-9

HIGHWAY 6 VIADUCT
MANDAN

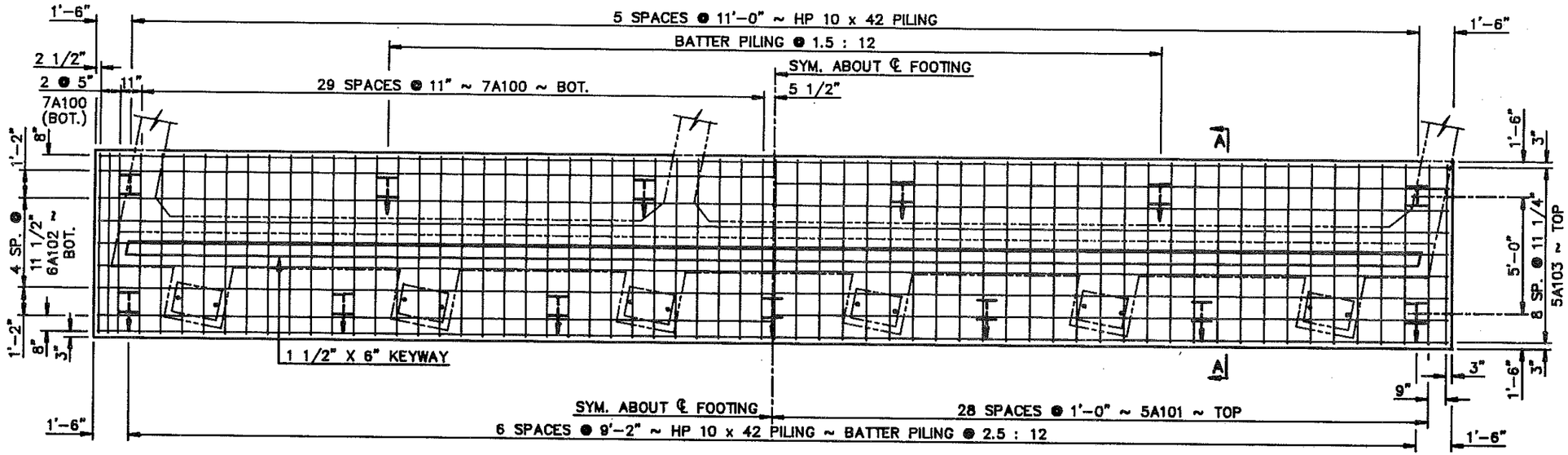
SHOWING DIMENSIONS

ABUTMENT 1 DETAILS

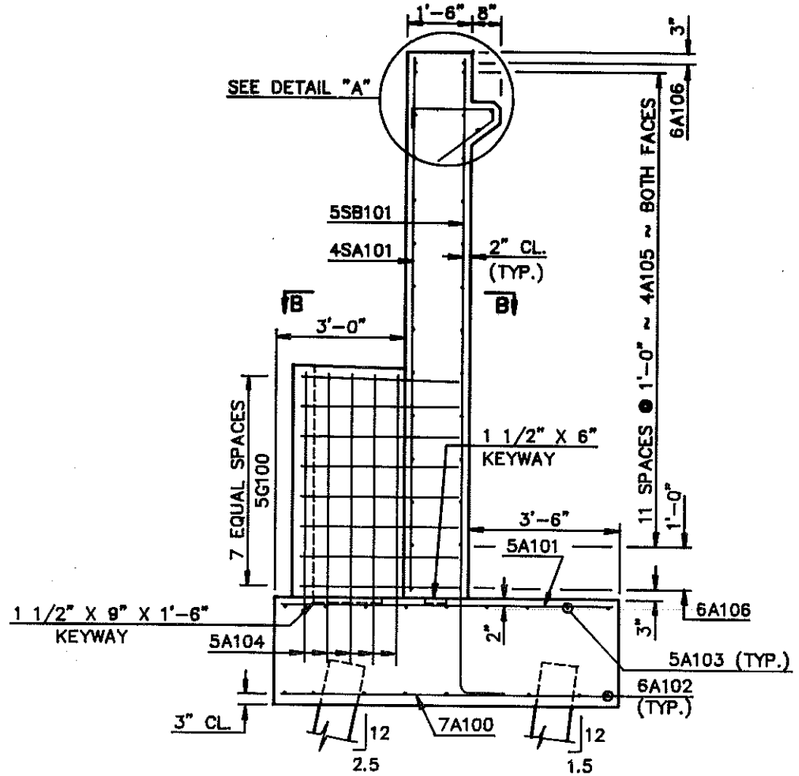
39DLS19

6-067.352-6

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	24



FOOTING PLAN



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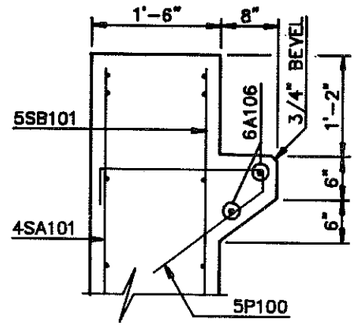
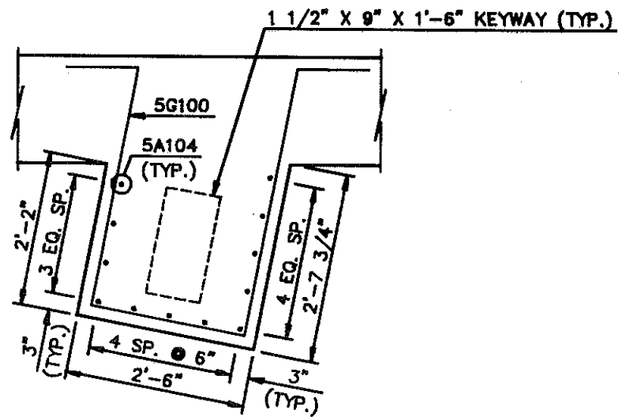


DETAIL A



B–B

QUANTITIES
SEE DWG. 6-067.352-9

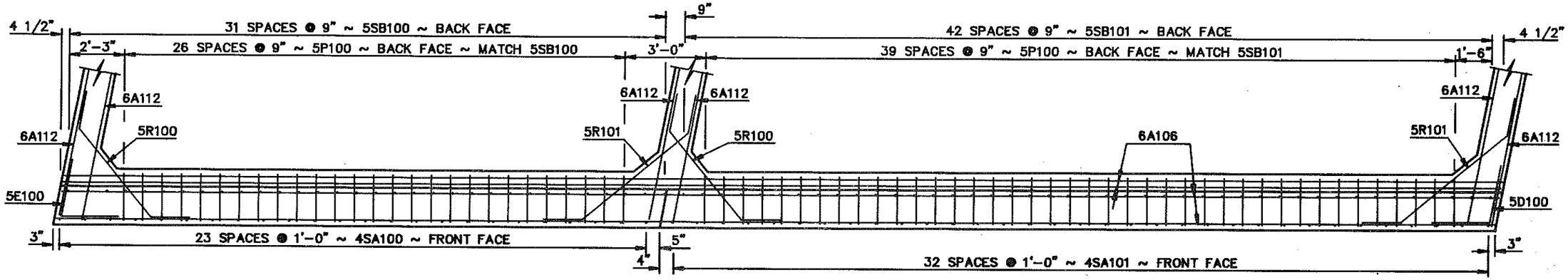
HIGHWAY 6 VIADUCT
MANDAN

SHOWING REINFORCING

ABUTMENT 1 DETAILS

89DLS20

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	25



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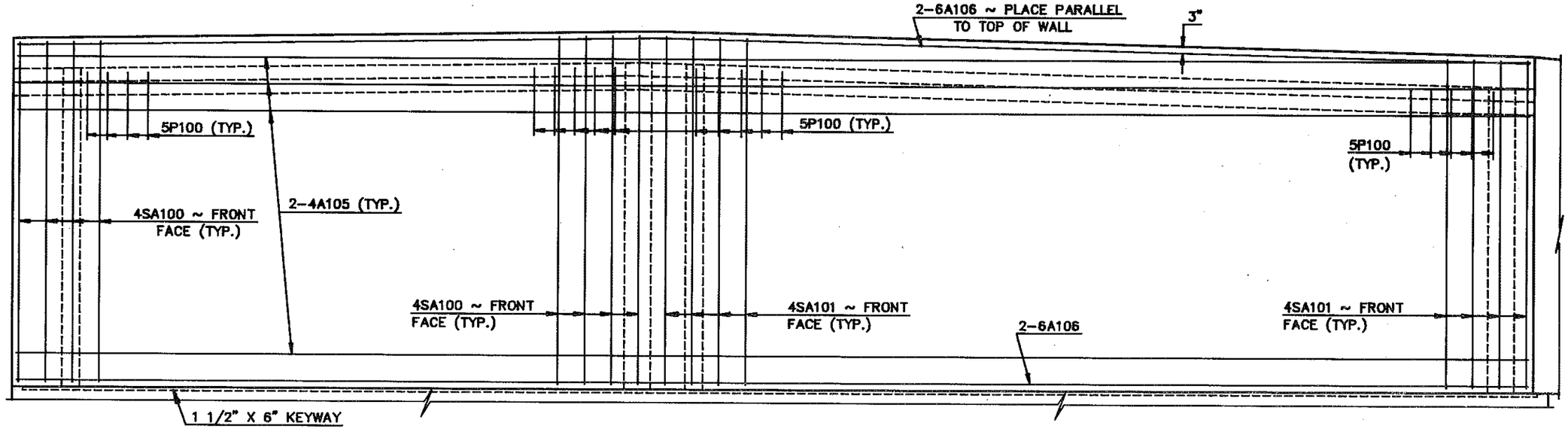
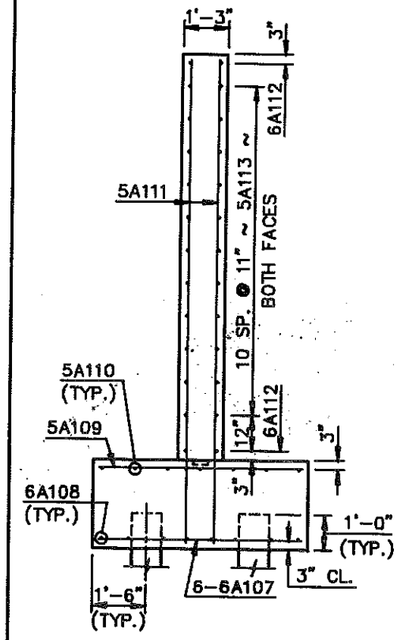


(BACK FACE NOT SHOWN)

ELEVATION

QUANTITIES
SEE DWG. 6-067.352-9
HIGHWAY 6 VIADUCT MANDAN
SHOWING REINFORCING
ABUTMENT 1 DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	26



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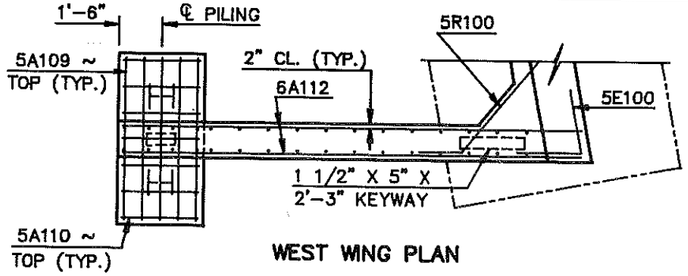
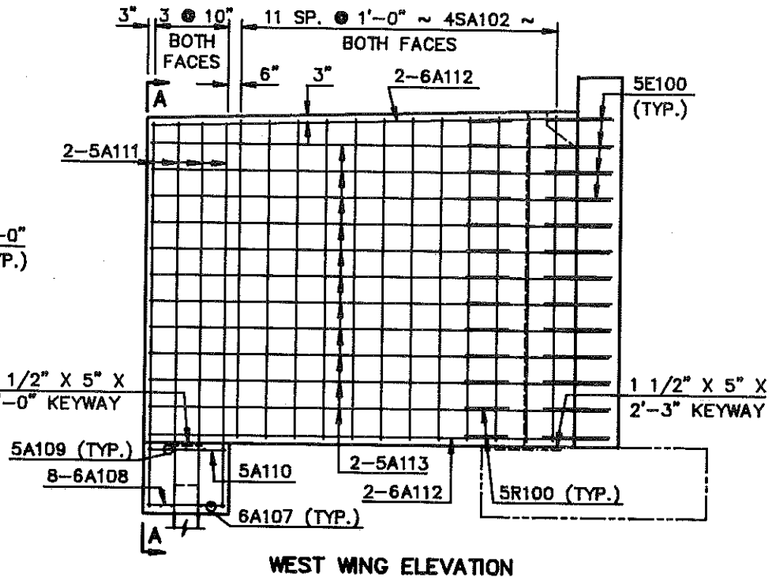
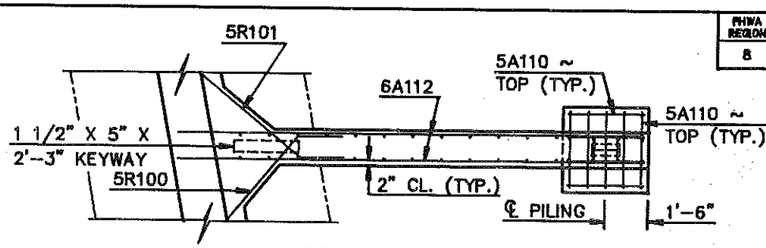


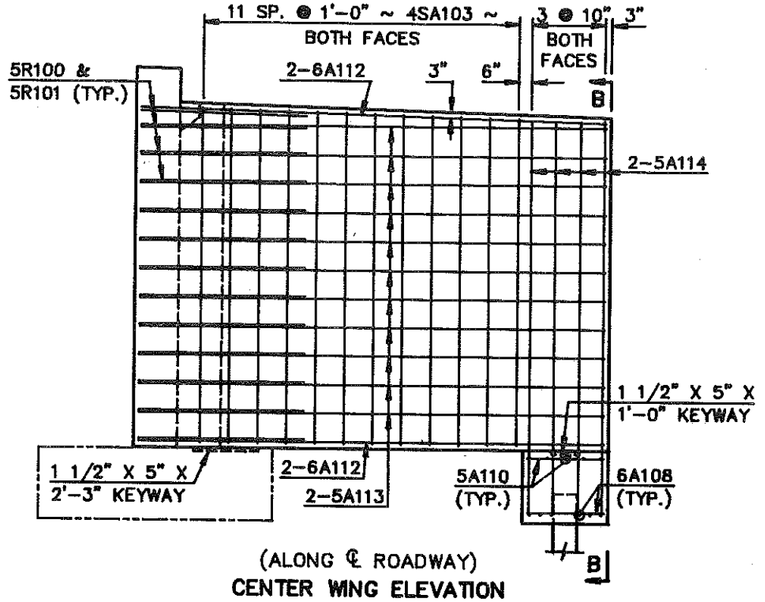
WEST WING PLAN



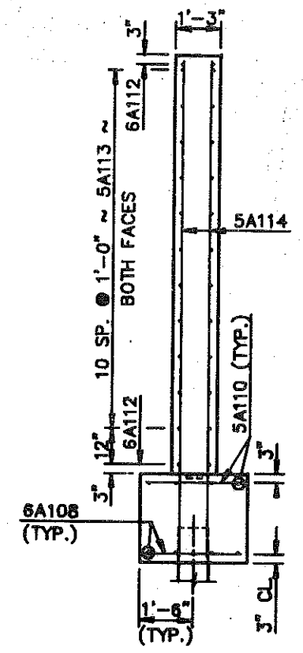
WEST WING ELEVATION



CENTER WING PLAN



(ALONG ℄ ROADWAY)
CENTER WING ELEVATION



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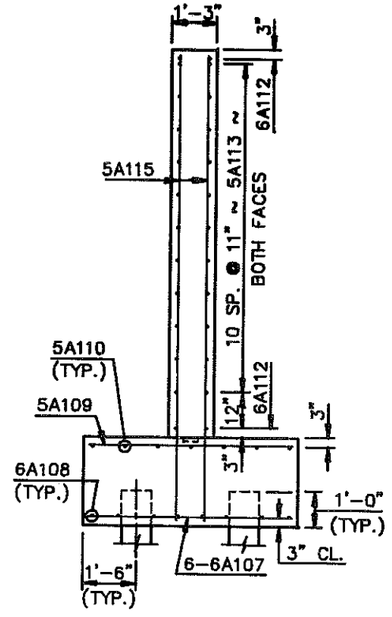
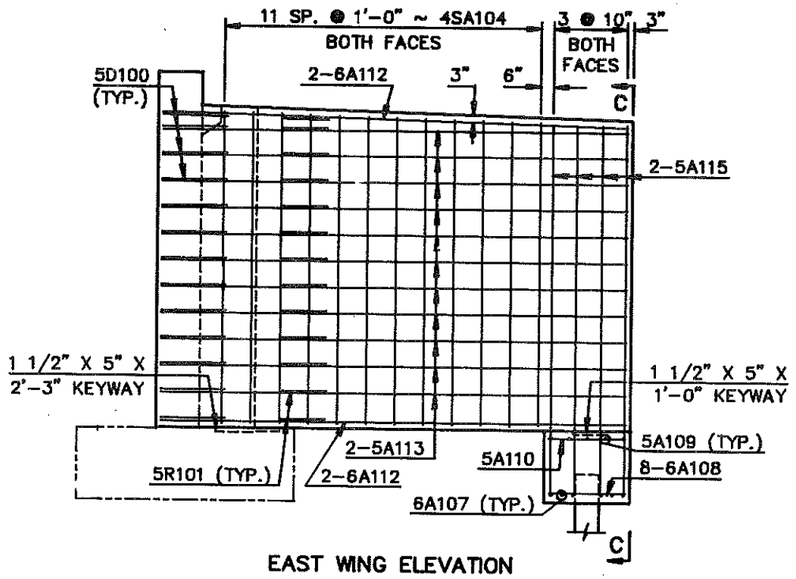
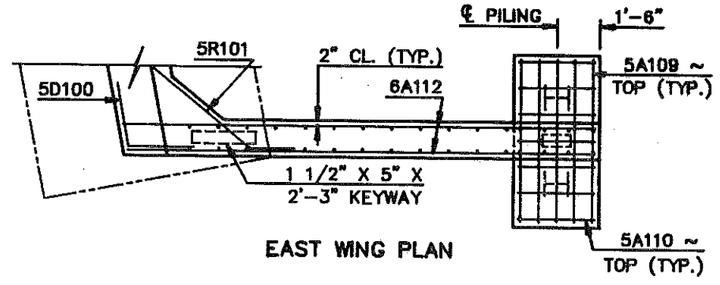


C–C



EAST WING ELEVATION



EAST WING PLAN

QUANTITIES	
CLASS AE-3 CONCRETE	121.7 C.Y.
REINFORCING STEEL	10,495 LBS.
PILING (SEE LAYOUT)	
EXCAVATION (SEE LAYOUT)	

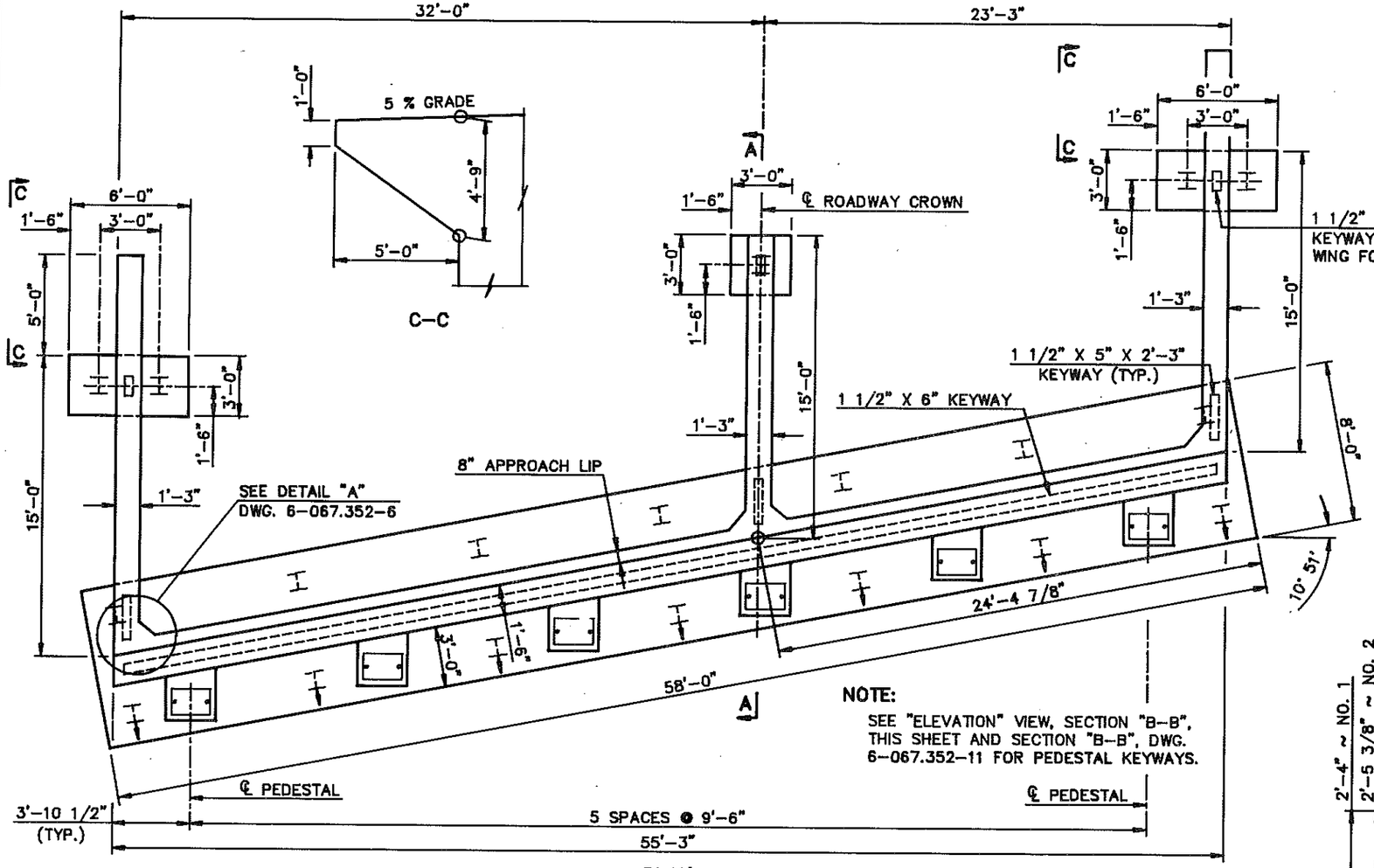
HIGHWAY 6 VIADUCT
MANDAN

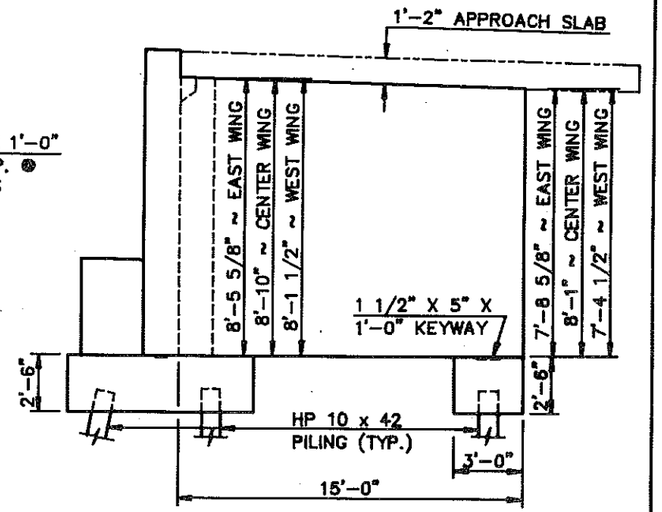
SHOWING REINFORCING

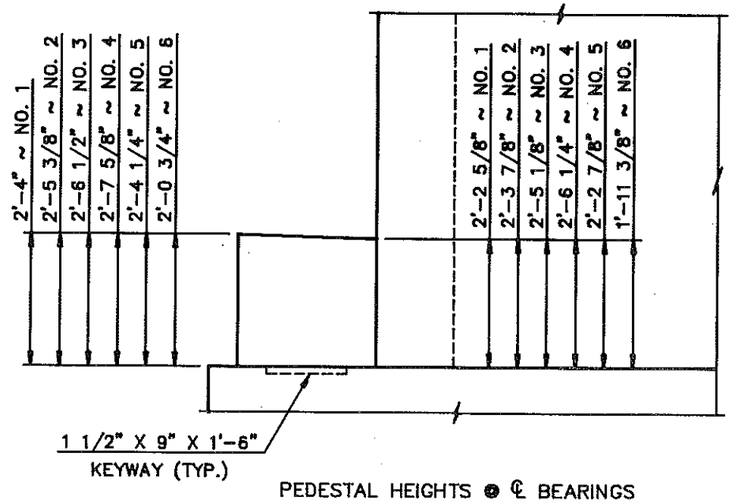
ABUTMENT 1 DETAILS

89DLS22

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	27







QUANTITIES
SEE DWG. 6-067.352-13

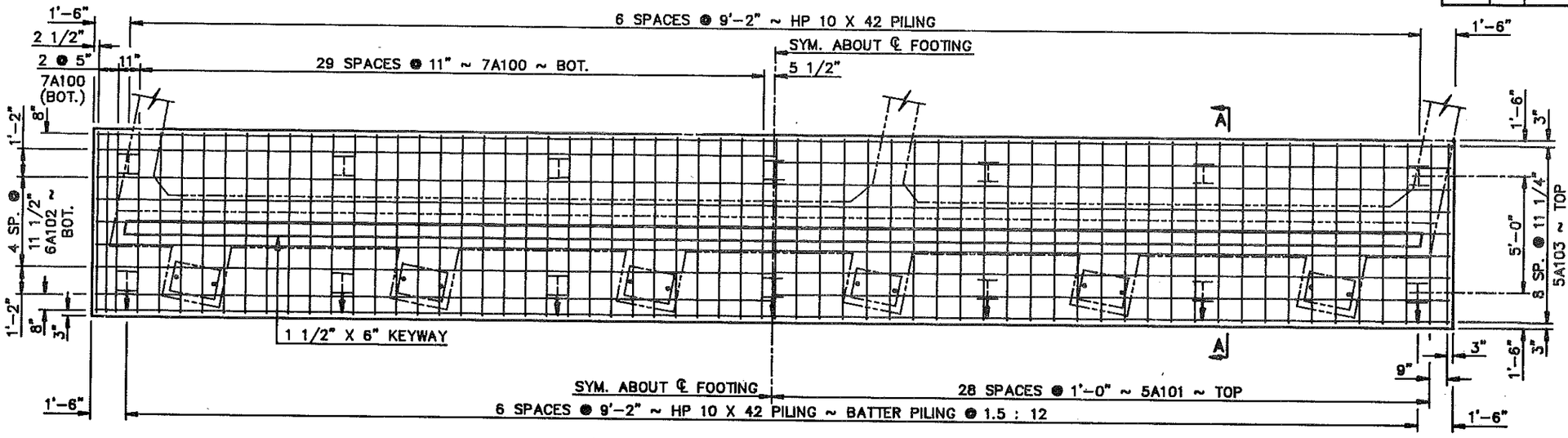
HIGHWAY 6 VIADUCT
MANDAN

SHOWING DIMENSIONS

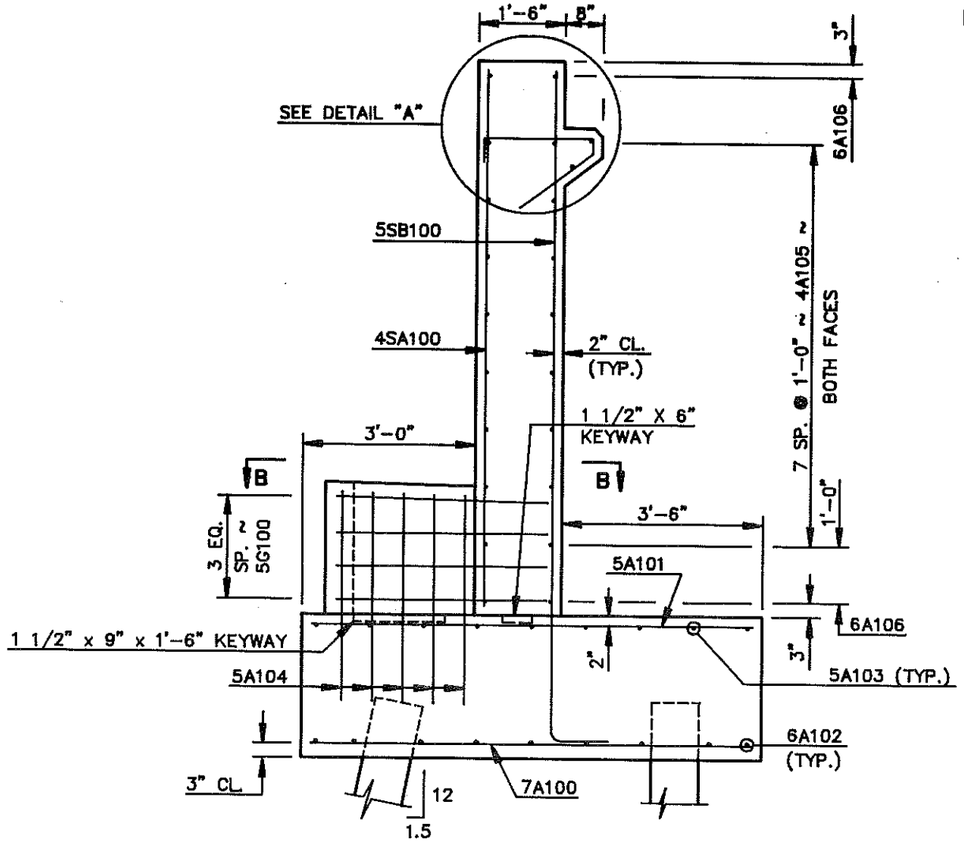
ABUTMENT 4 DETAILS

89DLS23 MAY 89

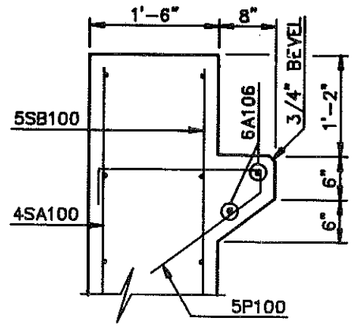
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	28



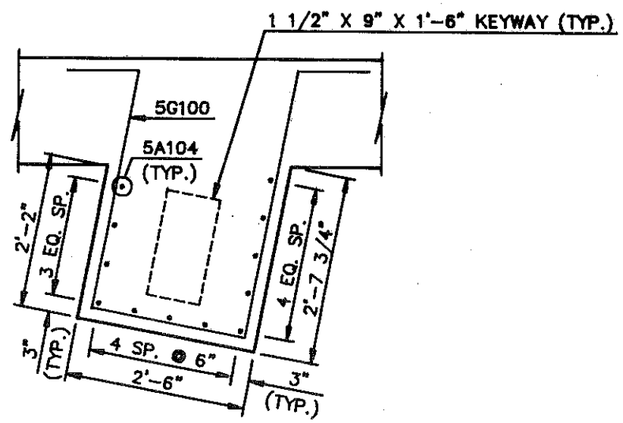
FOOTING PLAN



A–A



DETAIL A



B–B

QUANTITIES
SEE DWG. 6-067.352-13

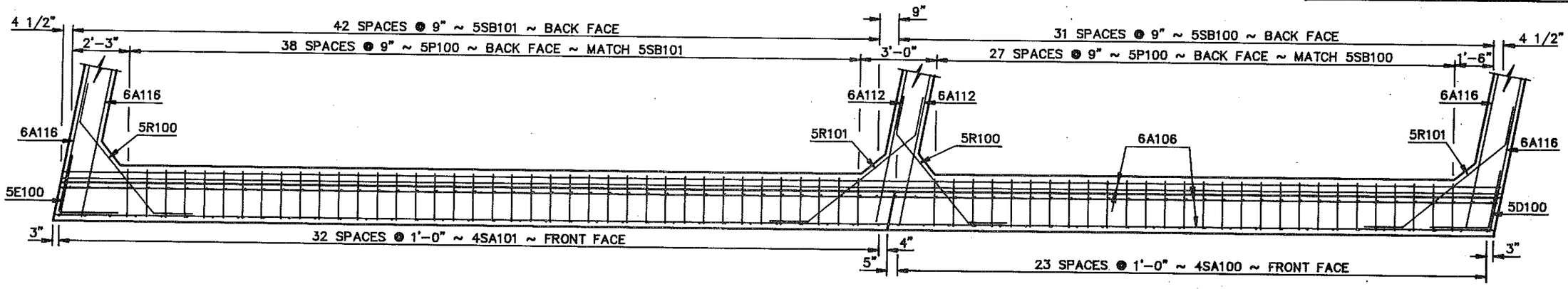
HIGHWAY 6 VIADUCT
MANDAN

SHOWING REINFORCING

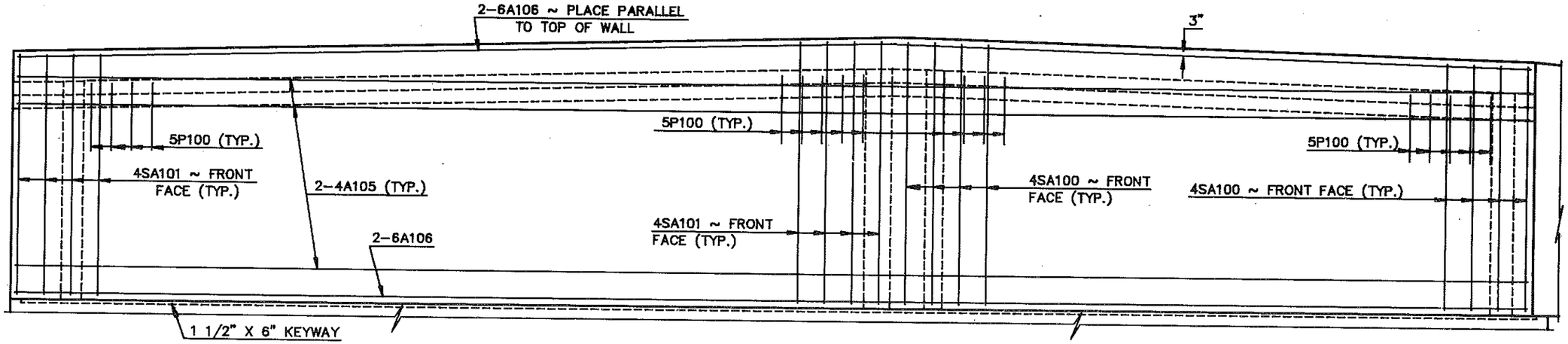
ABUTMENT 4 DETAILS

89DLS24 [illegible]89

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	29



PLAN



(BACK FACE NOT SHOWN)

ELEVATION

QUANTITIES

SEE DWG. 6-067.352-13

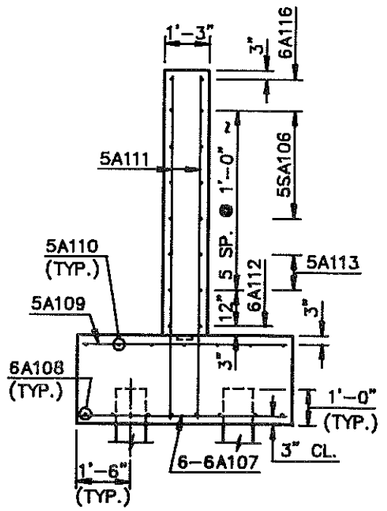
HIGHWAY 6 VIADUCT
MANDAN

SHOWING REINFORCING

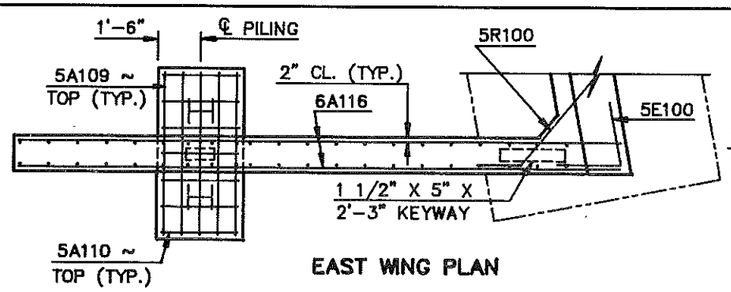
ABUTMENT 4 DETAILS

89DLS25 MAY 89

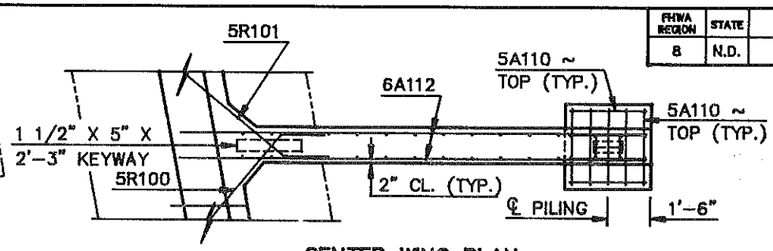
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	30



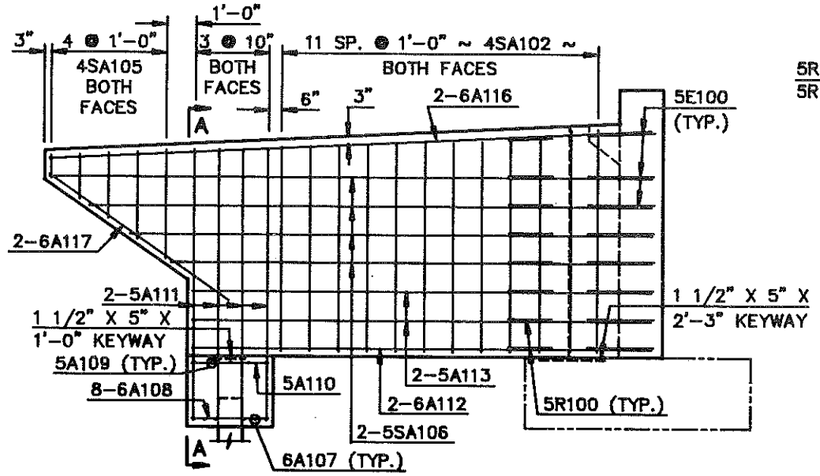
A–A



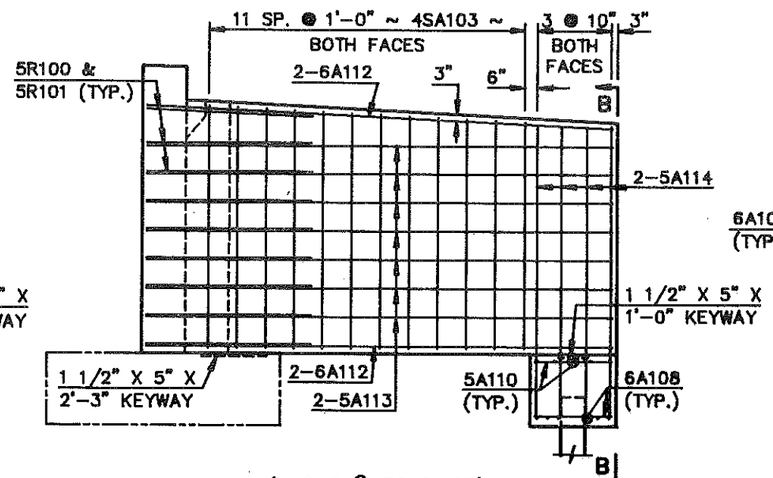
EAST WING PLAN



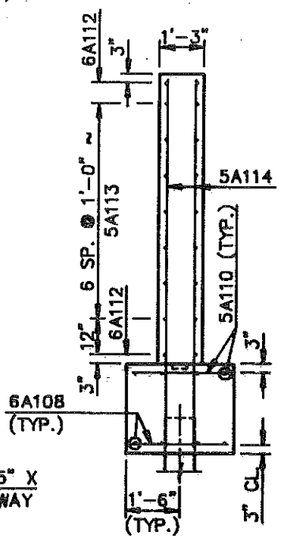
CENTER WING PLAN



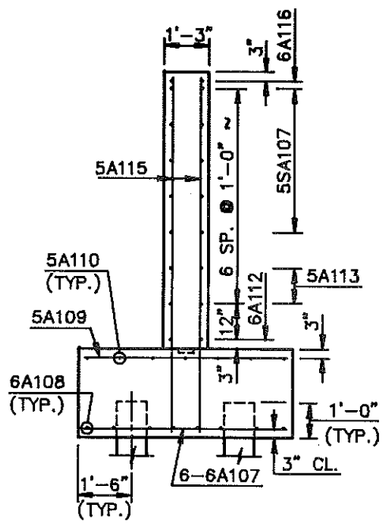
EAST WING ELEVATION



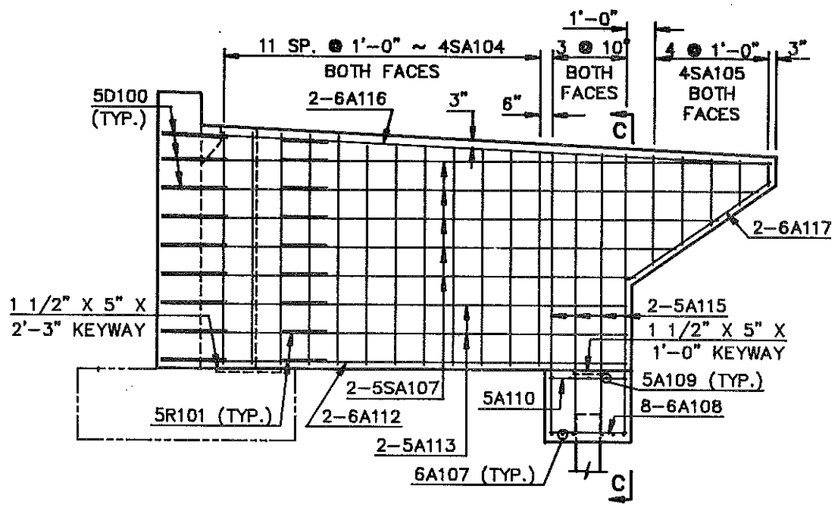
(ALONG ℄ ROADWAY)
CENTER WING ELEVATION



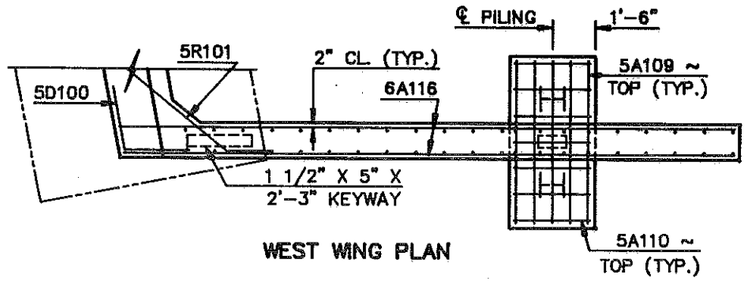
B–B



C–C



WEST WING ELEVATION



WEST WING PLAN

QUANTITIES	
CLASS AE-3 CONCRETE	100.7 C.Y.
REINFORCING STEEL	8598 LBS.
PILING (SEE LAYOUT)	
EXCAVATION (SEE LAYOUT)	

HIGHWAY 6 VIADUCT
MANDAN

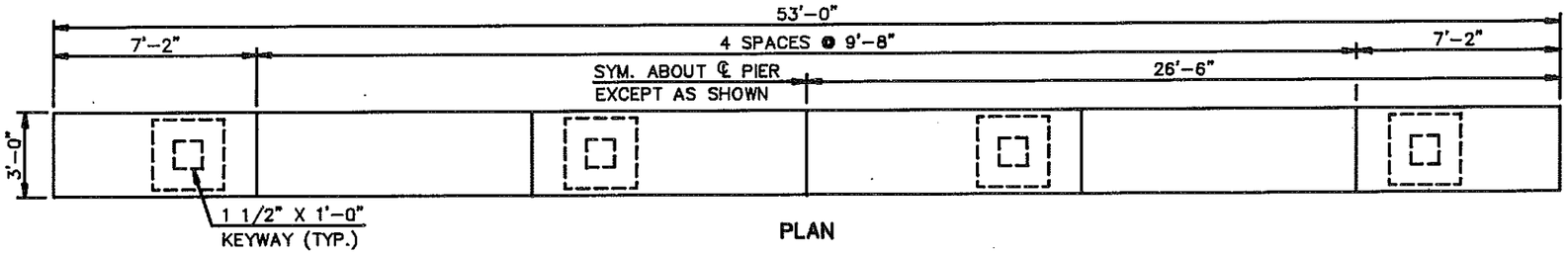
SHOWING REINFORCING

ABUTMENT 4 DETAILS

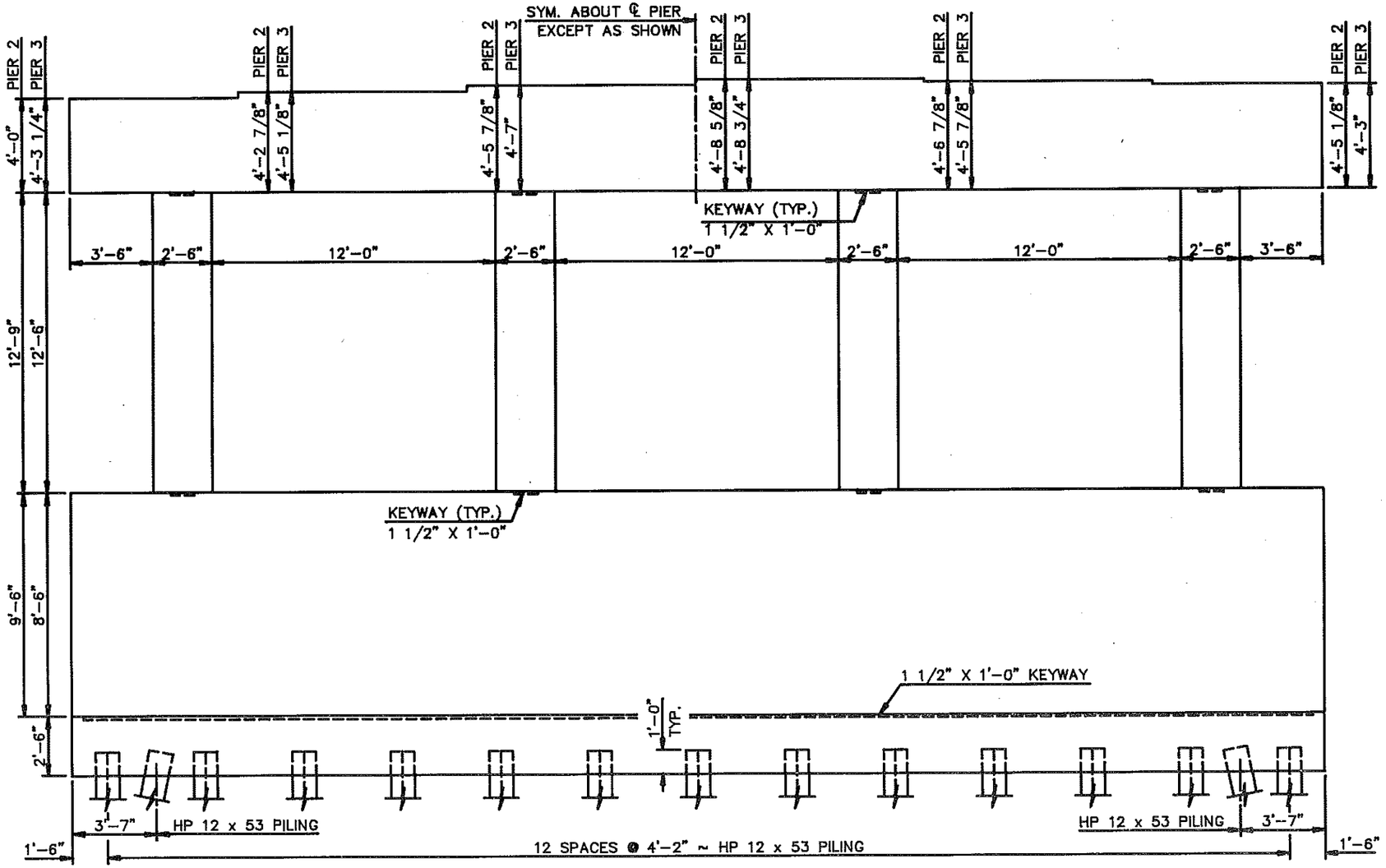
89DLS26 M1 6-89

6-067 352 17

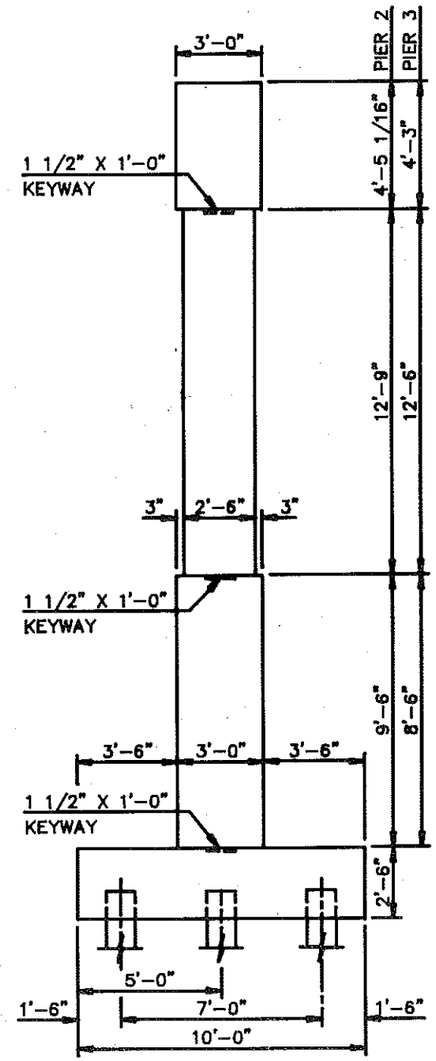
FHWA DIVISION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	31



PLAN



ELEVATION



END VIEW

QUANTITIES

SEE DWG. 6-067.352-16

HIGHWAY 6 VIADUCT
MANDAN

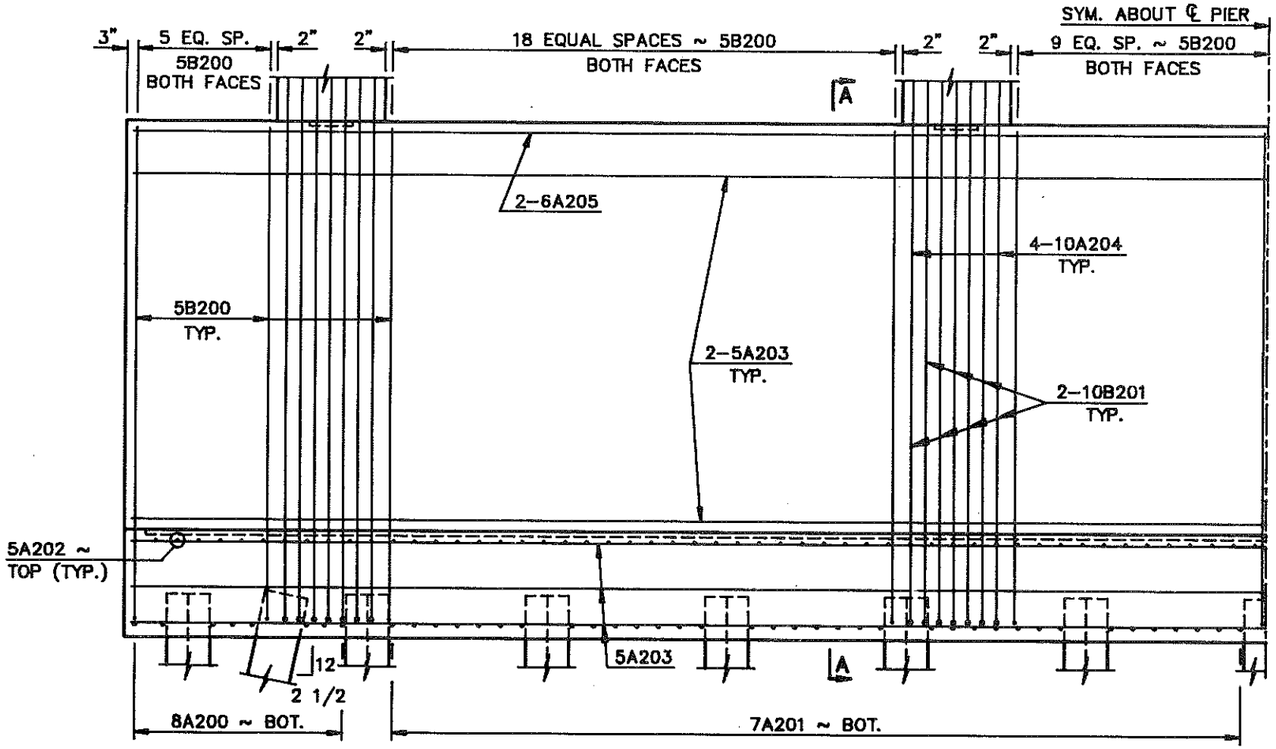
(SHOWING DIMENSIONS)

PIER DETAILS

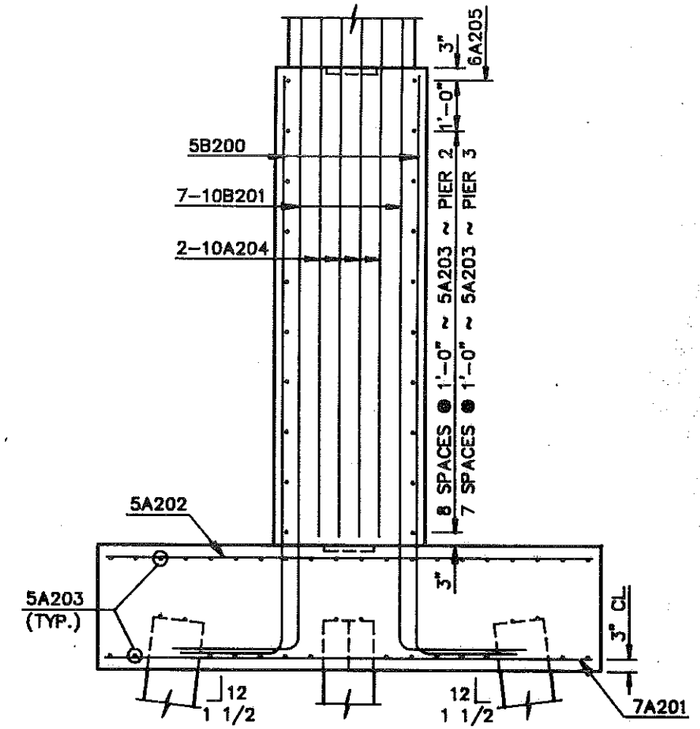
6-067.352-14

3-DLS28

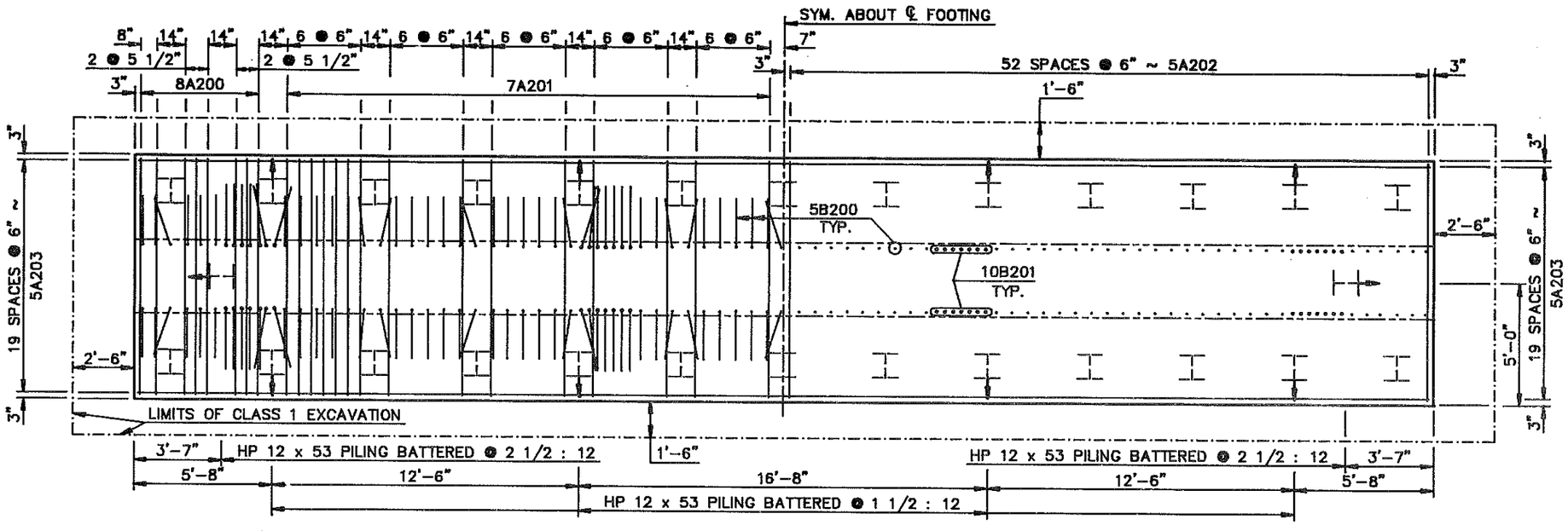
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	32



HALF ELEVATION



A-A



(HALF SHOWING BOTTOM REINFORCING) FOOTING PLAN (HALF SHOWING TOP REINFORCING)

QUANTITIES

SEE DWG. 6-067.352-16

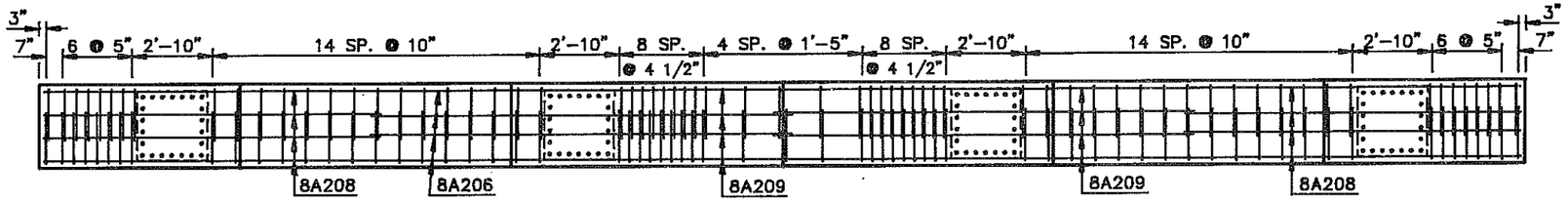
HIGHWAY 6 VIADUCT
MANDAN
(SHOWING REINFORCING)

PIER BUMPER BLOCK & FOOTING DETAILS

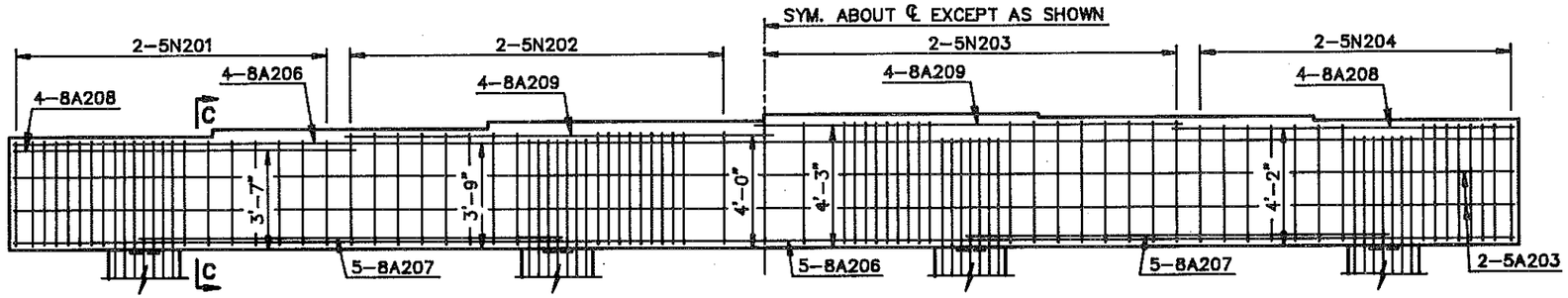
89DLS29

6-067.352-15

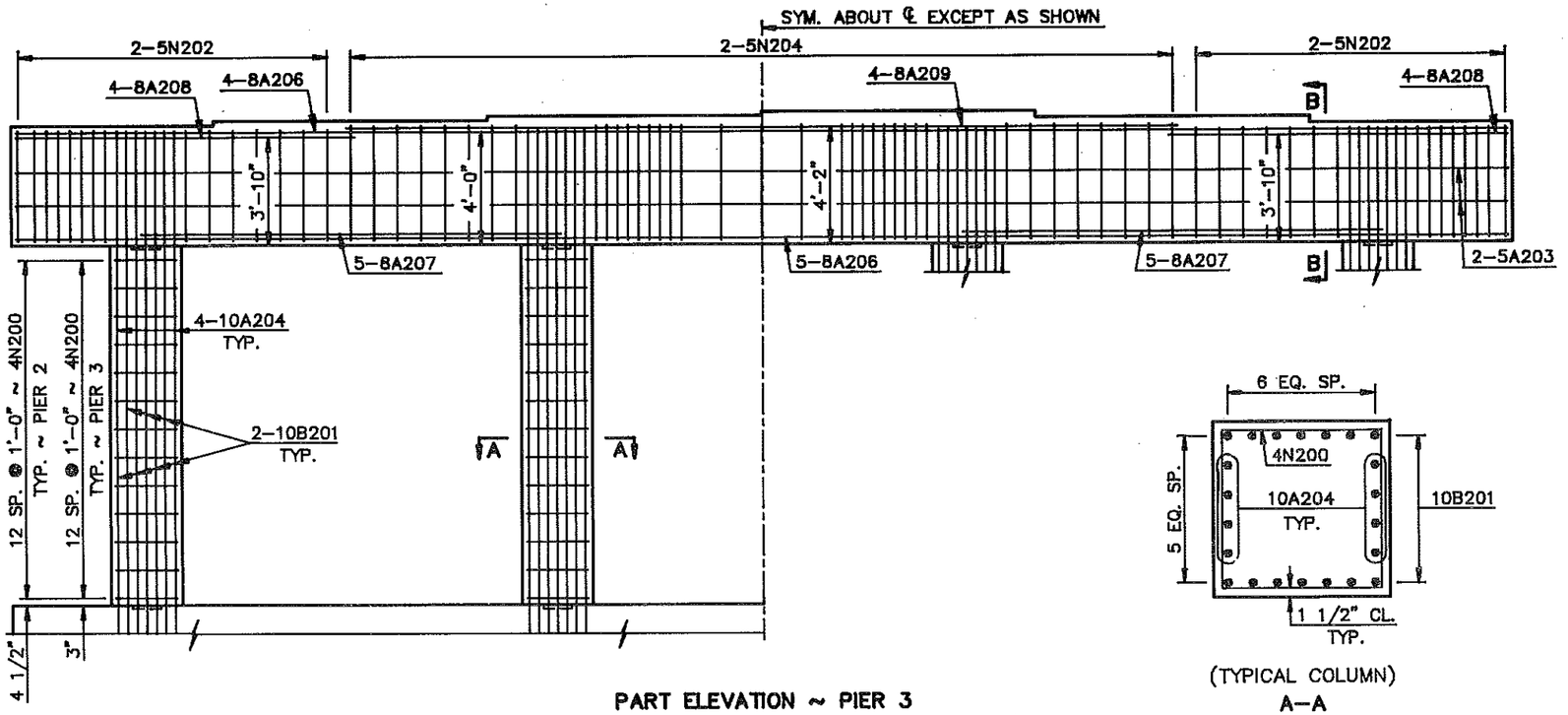
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	33



CAP PLAN

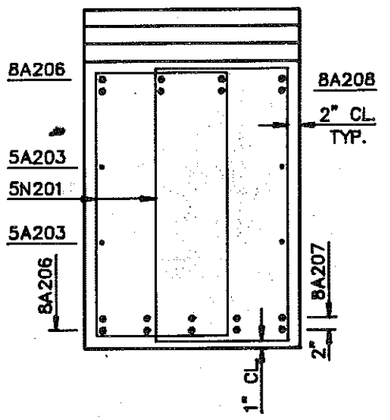


CAP ELEVATION ~ PIER 2

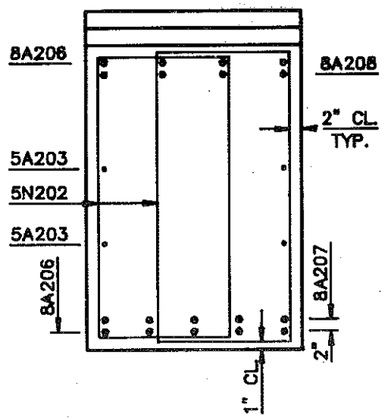


PART ELEVATION ~ PIER 3

(TYPICAL COLUMN)
A-A



C-C



B-B

	QUANTITIES	
PIER 2	CLASS AE-3 CONCRETE	142.9 C.Y.
	REINFORCING STEEL	23,741 LBS.
PIER 3	CLASS AE-3 CONCRETE	137.1 C.Y.
	REINFORCING STEEL	23,108 LBS.
	EXCAVATION (SEE LAYOUT)	
	PILING (SEE LAYOUT)	

HIGHWAY 6 VIADUCT
MANDAN

PIER COLUMN & CAP DETAILS

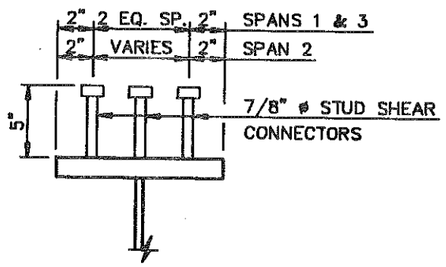
6-067.352-16

890LS30

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	34

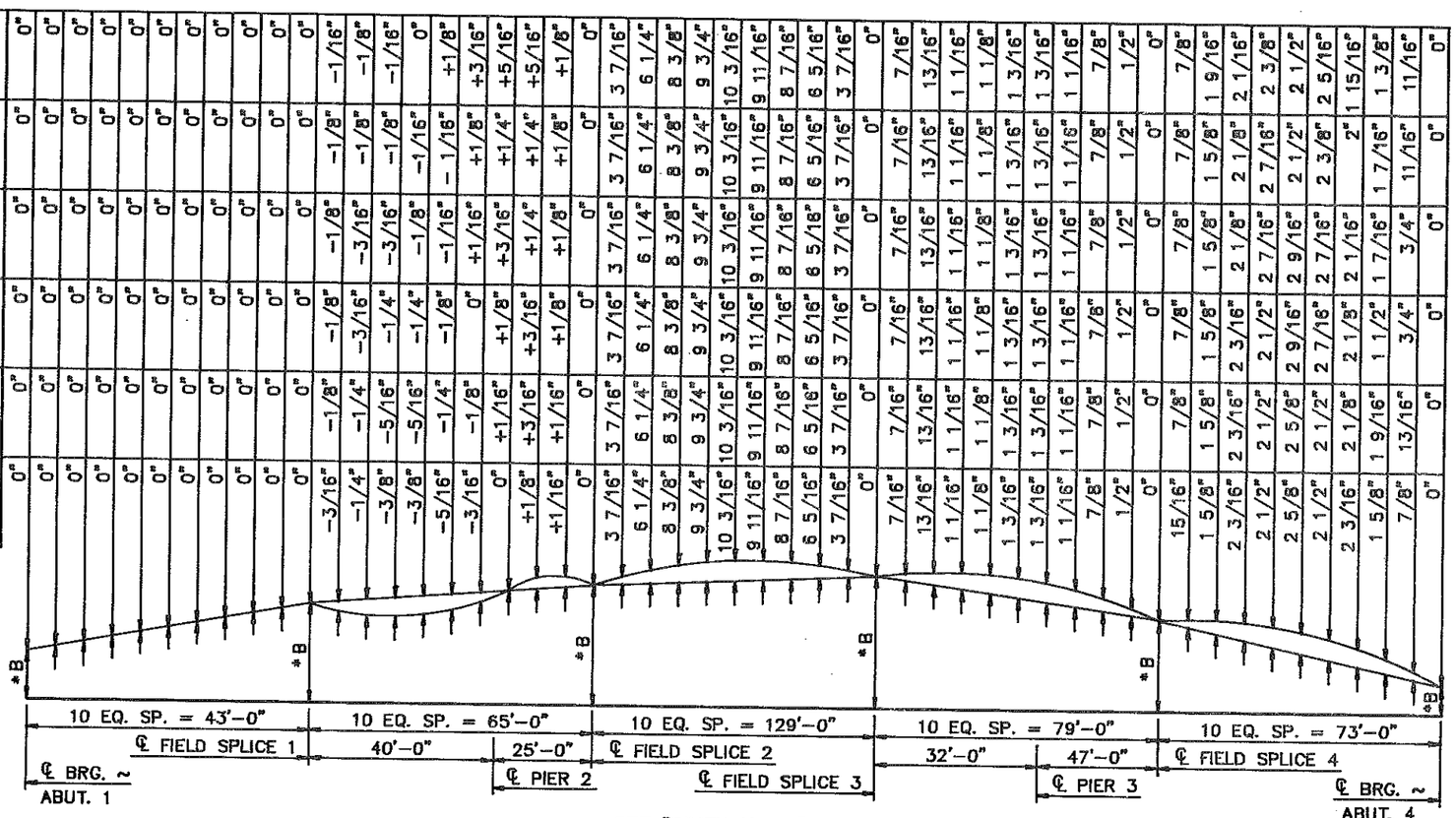
LOCATION	FEET					
	ABUT. 1	FIELD SPLICE 1	FIELD SPLICE 2	FIELD SPLICE 3	FIELD SPLICE 4	ABUT. 4
GIRDER NO. 1	2.165	3.331	5.277	5.890	3.923	0.835
GIRDER NO. 2	2.415	3.580	5.513	6.064	4.061	0.941
GIRDER NO. 3	2.664	3.829	5.748	6.238	4.197	1.048
GIRDER NO. 4	2.897	4.062	5.967	6.396	4.317	1.139
GIRDER NO. 5	2.751	3.916	5.805	6.173	4.056	0.850
GIRDER NO. 6	2.605	3.770	5.643	5.949	3.795	0.561

DIMENSION "B"



SHEAR CONNECTOR DETAIL

GIRDER NO. 1	GIRDER NO. 2	GIRDER NO. 3	GIRDER NO. 4	GIRDER NO. 5	GIRDER NO. 6
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
0"	0"	0"	0"	0"	0"
-3/16"	-1/8"	-1/8"	-1/8"	-1/8"	-1/16"
-1/4"	-1/4"	-3/16"	-3/16"	-1/8"	-1/16"
-3/8"	-5/16"	-1/4"	-3/16"	-1/8"	-1/16"
-5/16"	-1/4"	-1/8"	-1/16"	-1/16"	-1/16"
-3/16"	-1/8"	0"	+1/16"	+1/8"	0"
0"	+1/16"	+1/8"	+3/16"	+1/4"	+1/8"
+1/8"	+3/16"	+3/16"	+3/16"	+1/4"	+1/8"
+1/16"	+1/16"	+1/8"	+1/8"	+1/4"	+1/8"
0"	0"	0"	0"	0"	0"
3 7/16"	3 7/16"	3 7/16"	3 7/16"	3 7/16"	3 7/16"
6 1/4"	6 1/4"	6 1/4"	6 1/4"	6 1/4"	6 1/4"
8 3/8"	8 3/8"	8 3/8"	8 3/8"	8 3/8"	8 3/8"
9 3/4"	9 3/4"	9 3/4"	9 3/4"	9 3/4"	9 3/4"
10 3/16"	10 3/16"	10 3/16"	10 3/16"	10 3/16"	10 3/16"
9 11/16"	9 11/16"	9 11/16"	9 11/16"	9 11/16"	9 11/16"
8 7/16"	8 7/16"	8 7/16"	8 7/16"	8 7/16"	8 7/16"
6 5/16"	6 5/16"	6 5/16"	6 5/16"	6 5/16"	6 5/16"
3 7/16"	3 7/16"	3 7/16"	3 7/16"	3 7/16"	3 7/16"
0"	0"	0"	0"	0"	0"
7/16"	7/16"	7/16"	7/16"	7/16"	7/16"
13/16"	13/16"	13/16"	13/16"	13/16"	13/16"
1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"
1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"
1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"
1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"
7/8"	7/8"	7/8"	7/8"	7/8"	7/8"
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
0"	0"	0"	0"	0"	0"
15/16"	7/8"	7/8"	7/8"	7/8"	7/8"
1 5/8"	1 5/8"	1 5/8"	1 5/8"	1 5/8"	1 9/16"
2 3/16"	2 3/16"	2 1/8"	2 1/8"	2 1/8"	2 1/16"
2 1/2"	2 1/2"	2 1/2"	2 7/16"	2 7/16"	2 3/8"
2 5/8"	2 5/8"	2 9/16"	2 9/16"	2 7/16"	2 1/2"
2 3/16"	2 1/2"	2 7/16"	2 7/16"	2 1/16"	2 5/16"
1 5/8"	1 5/8"	1 5/8"	1 5/8"	1 1/16"	1 15/16"
7/8"	1 9/16"	2 1/16"	2 1/16"	1 7/16"	1 3/8"
13/16"	13/16"	3/4"	3/4"	11/16"	11/16"
0"	0"	0"	0"	0"	0"



* SEE "DIMENSION B" CHART

SHOP CAMBER DIAGRAM

* ℄ GIRDER 1	℄ GIRDER 2	℄ GIRDER 3	℄ GIRDER 4	℄ GIRDER 5	℄ GIRDER 6
BEGIN BRIDGE 3'-0"					
1679.08	1679.33	1679.58	1679.81	1679.67	1679.52
1679.17	1679.42	1679.66	1679.90	1679.75	1679.61
.39	.64	.89	1680.12	.98	.83
.62	.87	1680.12	.35	1680.21	1680.06
.85	1680.09	.34	.58	.43	.29
1680.07	.32	.57	.80	.66	.51
.30	.55	.80	1681.03	.89	.74
.53	.78	1681.03	.27	1681.12	.97
.77	1681.02	.27	.50	.36	1681.21
1681.01	.26	.51	.74	.60	.45
.26	.51	.76	.99	.85	.70
1681.51	1681.76	1682.01	1682.24	1682.09	1681.94
1682.06	1682.30	.54	.76	.60	1682.45
.55	.78	1683.01	1683.22	1683.05	.88
.94	1683.16	.38	.58	.41	1683.23
1683.21	.42	.63	.82	.64	.45
.34	.54	.74	.93	.74	.54
.33	.52	.72	.89	.69	.49
.19	.37	.56	.73	.52	.30
1682.93	.11	.29	.45	.22	1683.00
.59	1682.76	1682.93	.08	1682.85	1682.62
1682.19	1682.35	1682.50	1682.65	1682.41	1682.17
1681.90	.05	.21	.34	.10	1681.86
.59	1681.74	1681.89	.02	1681.77	.52
.26	.40	.54	1681.67	.41	.15
1680.89	.03	.17	.28	.02	1680.76
.49	1680.63	1680.76	1680.87	1680.60	.34
.05	.18	.30	.41	.14	1679.87
1679.57	1679.69	1679.81	1679.91	1679.63	.35
.03	.15	1679.26	.36	.07	1678.79
1678.45	1678.56	1678.67	1678.76	1678.47	.18
1677.84	1677.94	1678.05	1678.14	1677.85	1677.56
1677.69	1677.79	1677.90	1677.99	1677.70	1677.41
END BRIDGE 3'-0"					

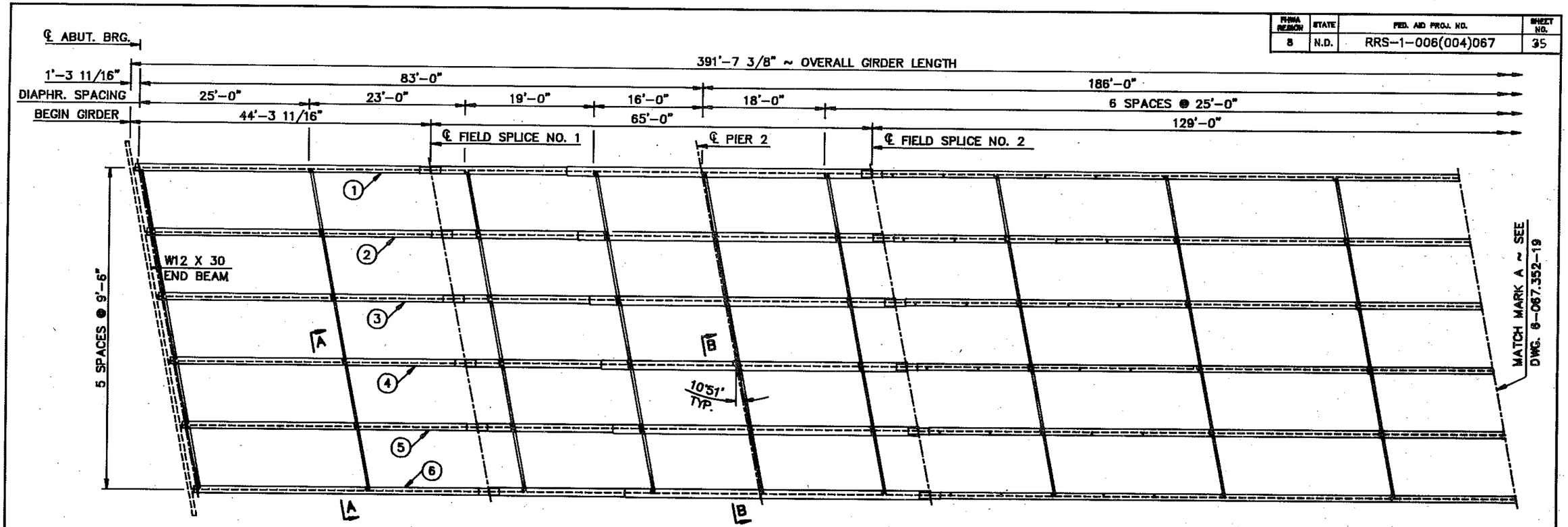
℄ BRG. ABUT. 1 — 10 EQ. SP. = 83'-0"
℄ BRG. PIER 2 — 10 EQ. SP. = 186'-0"
℄ BRG. PIER 3 — 10 EQ. SP. = 120'-0"
℄ BRG. ABUT. 4

* GIRDER NO. 1 IS THE EAST GIRDER

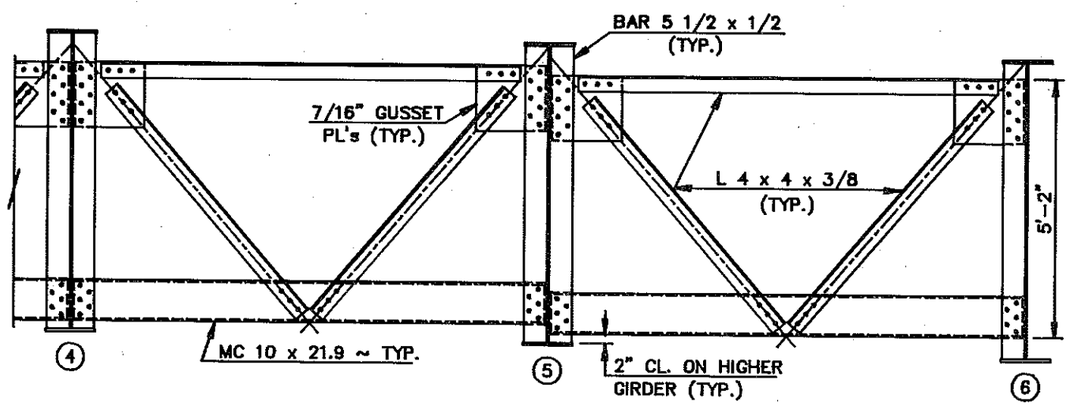
SCREED ELEVATIONS

QUANTITIES
HIGHWAY 6 VIADUCT MANDAN
SHOP CAMBER DIAGRAM SCREED ELEVATIONS & SHEAR CONNECTOR DETAIL

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	35

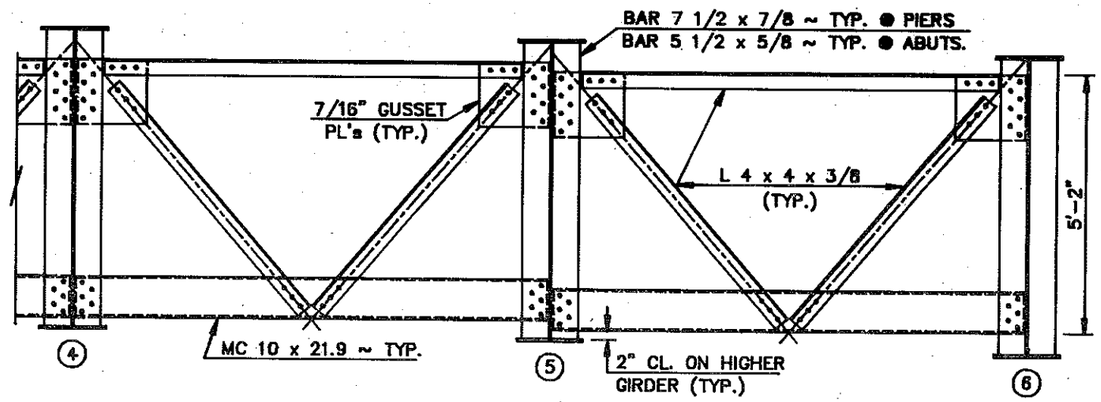


PLAN



INTERMEDIATE DIAPHRAGM DETAIL

A-A



ABUTMENT & PIER DIAPHRAGM DETAIL

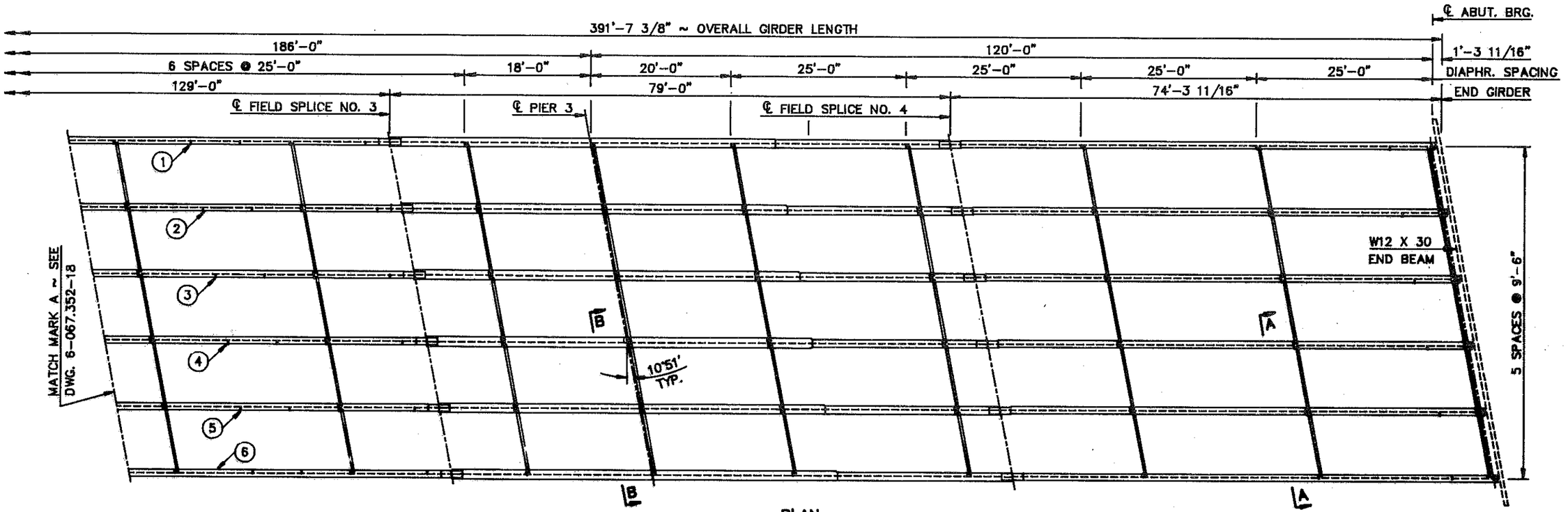
B-B

QUANTITIES

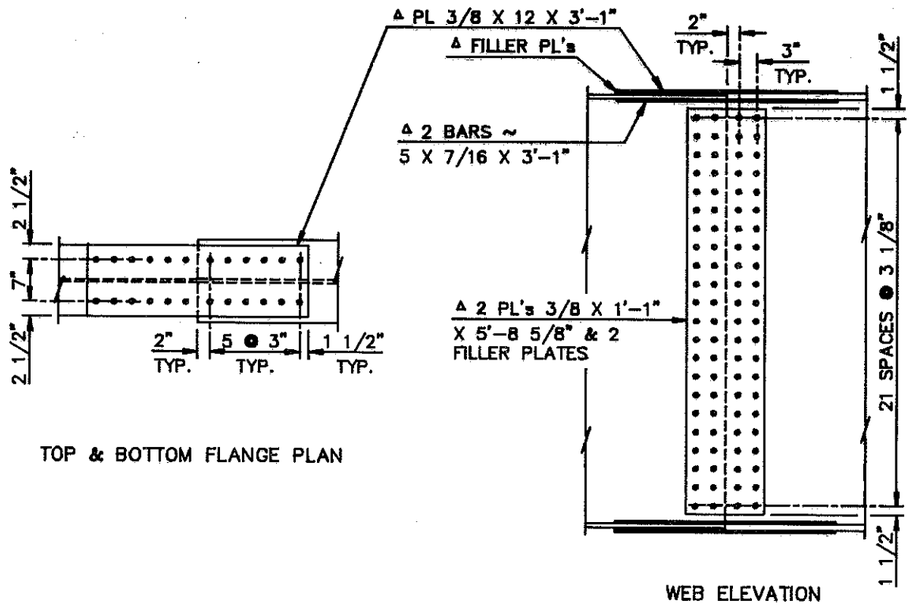
HIGHWAY 6 VIADUCT
MANDAN

GIRDER DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	36



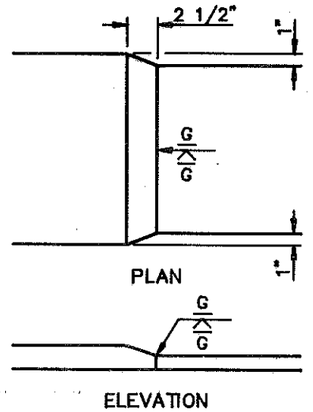
PLAN



TOP & BOTTOM FLANGE PLAN

WEB ELEVATION

FIELD SPLICE DETAILS



TYPICAL SHOP FLANGE SPLICE

NOTE:

SEE DWG. 6-067.352-18 FOR SECTIONS "A-A" & "B-B". SECTION "A-A" IS TYPICAL FOR ALL INTERMEDIATE DIAPHRAGMS. SECTION "B-B" IS TYPICAL FOR ALL ABUTMENT & PIER DIAPHRAGMS.

△ ALL DESIGNATED MATERIALS SHALL MEET THE LONGITUDINAL CHARPY V-NOTCH TEST REQUIREMENTS FOR ZONE 2.

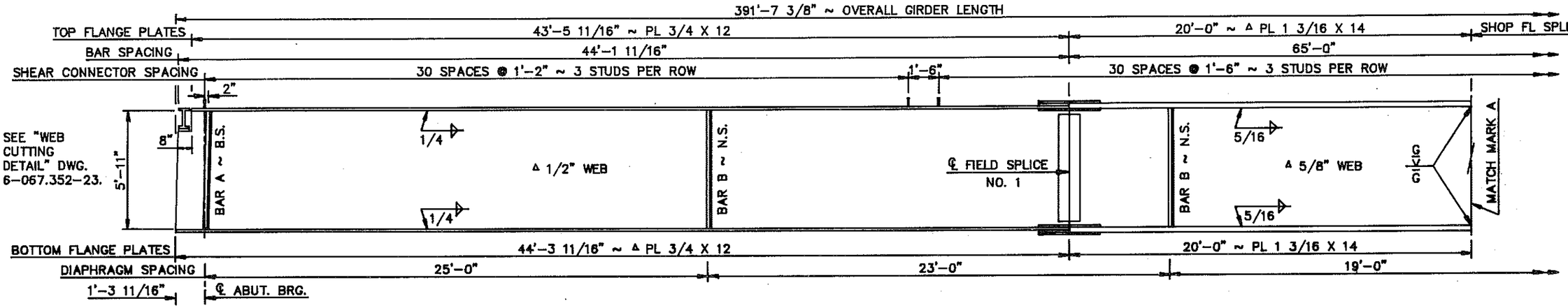
QUANTITIES

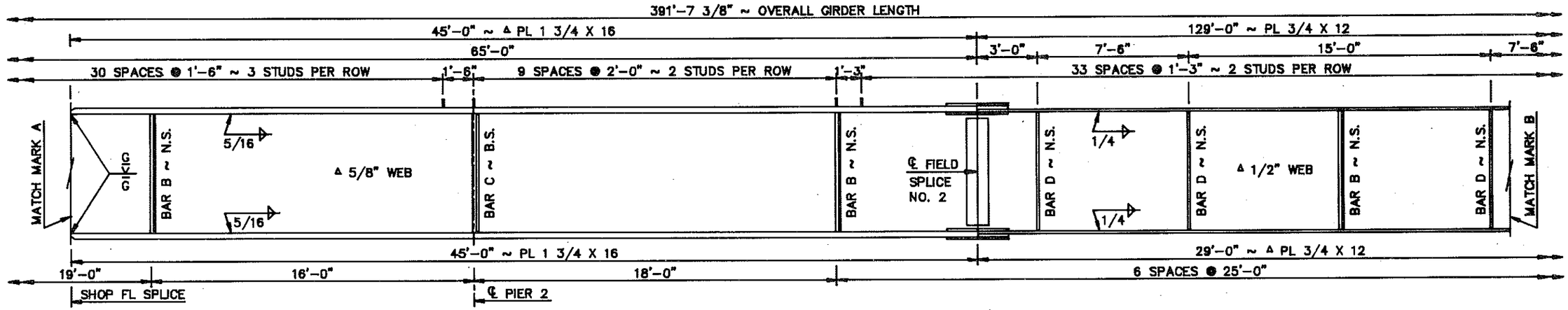
HIGHWAY 6 VIADUCT
MANDAN

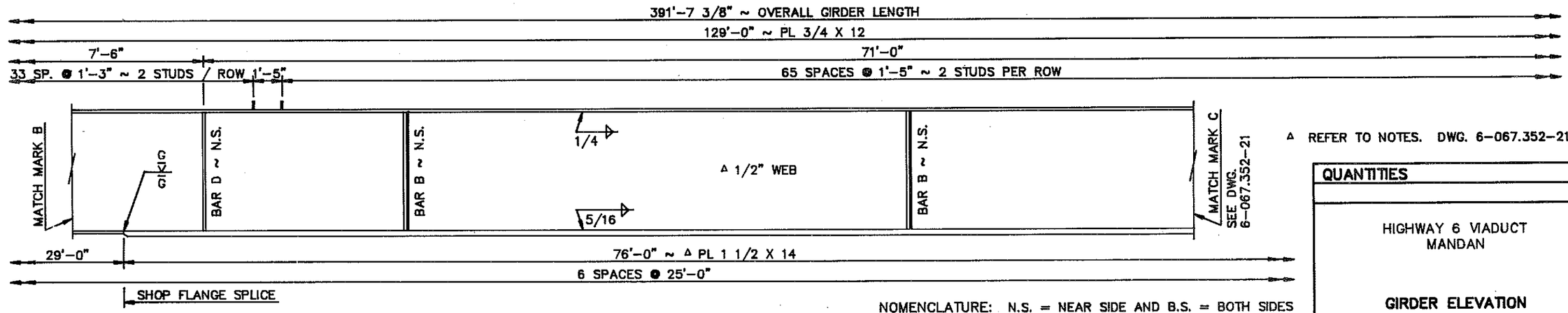
GIRDER DETAILS

6-067.352-18

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	37







NOMENCLATURE: N.S. = NEAR SIDE AND B.S. = BOTH SIDES

Δ REFER TO NOTES. DWG. 6-067.352-21.

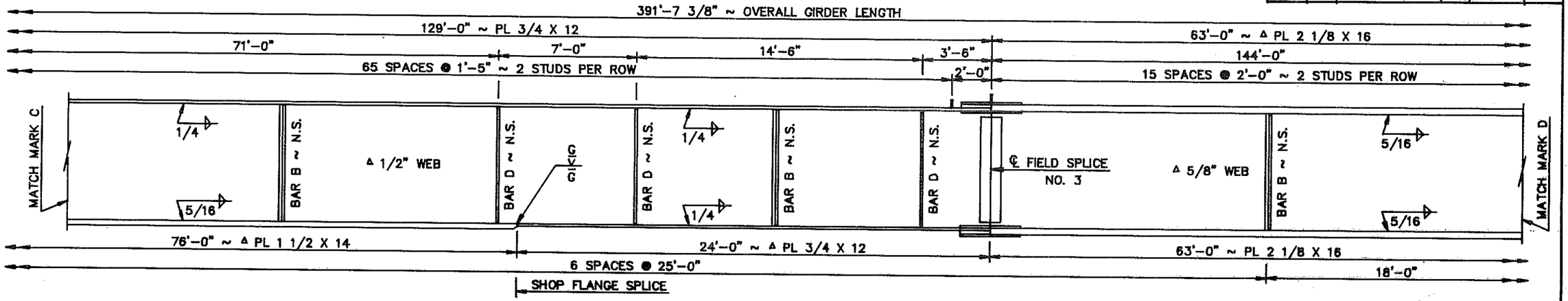
QUANTITIES

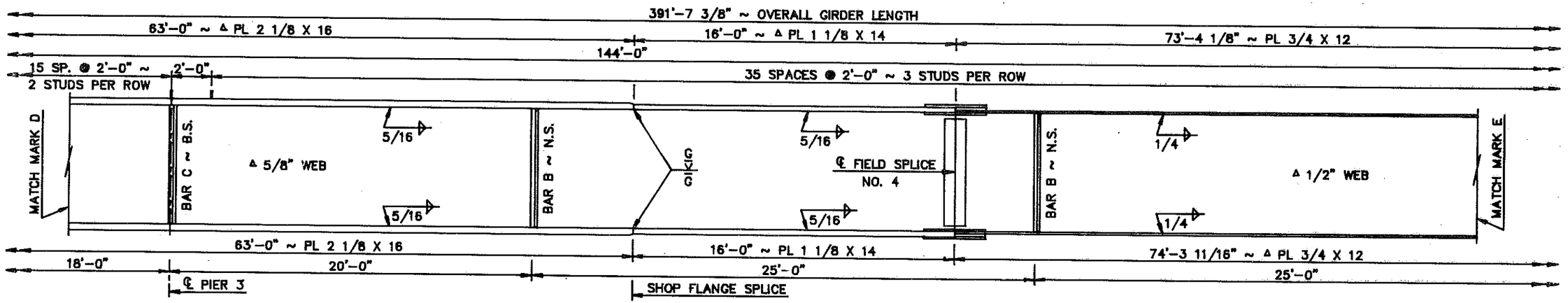
HIGHWAY 6 VIADUCT
MANDAN

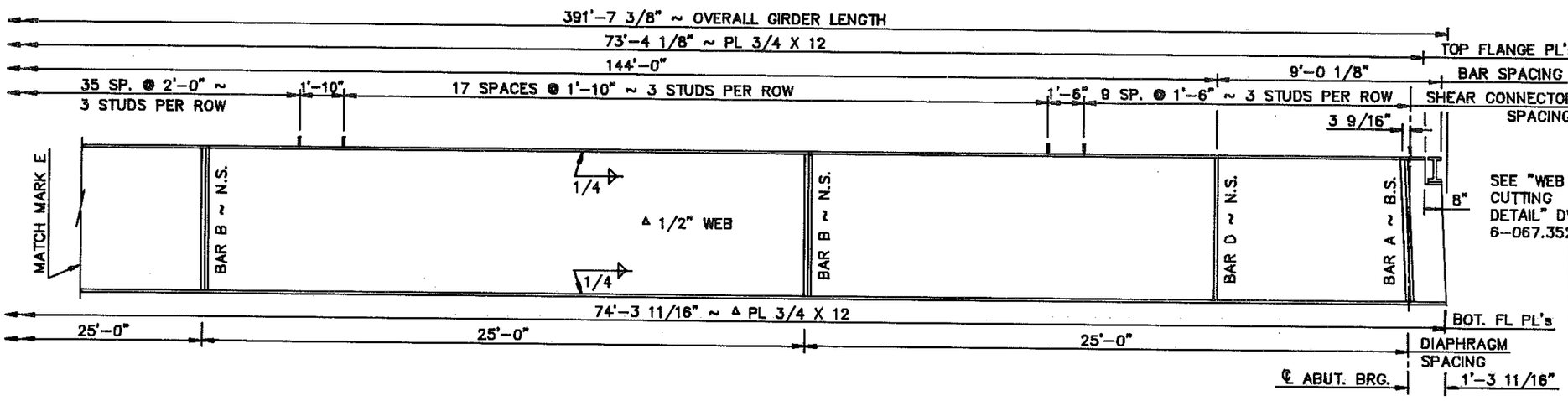
GIRDER ELEVATION

6-067.352-20

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	38







NOTE:

THE GIRDER ELEVATION DETAILS SHOWN REPRESENT GIRDER NO. 1 IN A SIX GIRDER BRIDGE. OTHER GIRDERS ARE SIMILAR AND SHALL BE FABRICATED IN ACCORDANCE WITH DWGS. 6-067.352-18 THRU 6-067.352-23.

Δ ALL DESIGNATED MATERIALS SHALL MEET THE LONGITUDINAL CHARPY V-NOTCH TEST REQUIREMENTS FOR ZONE 2.

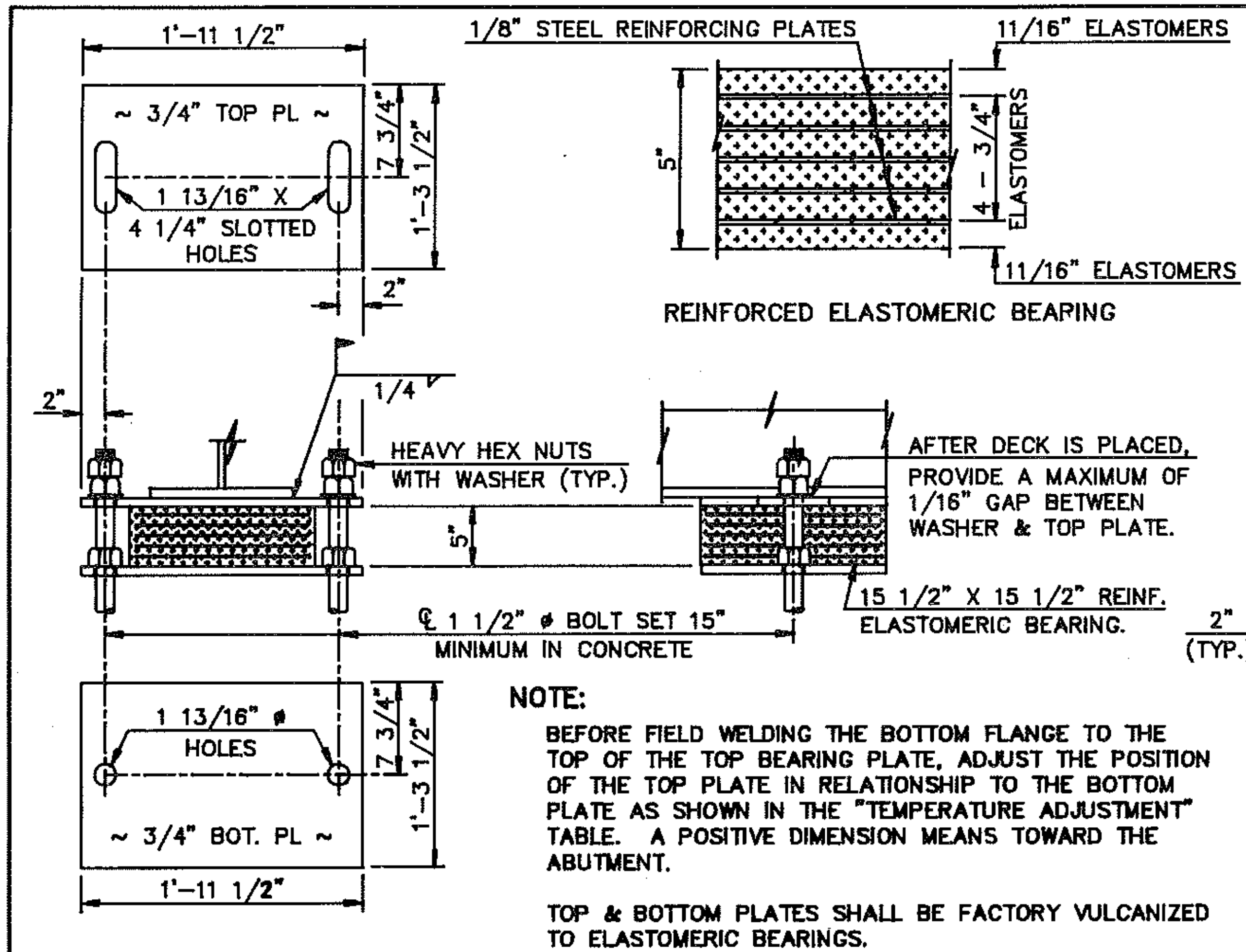
NOMENCLATURE: N.S. = NEAR SIDE AND B.S. = BOTH SIDES

QUANTITIES

HIGHWAY 6 VIADUCT
MANDAN

GIRDER ELEVATION

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	39

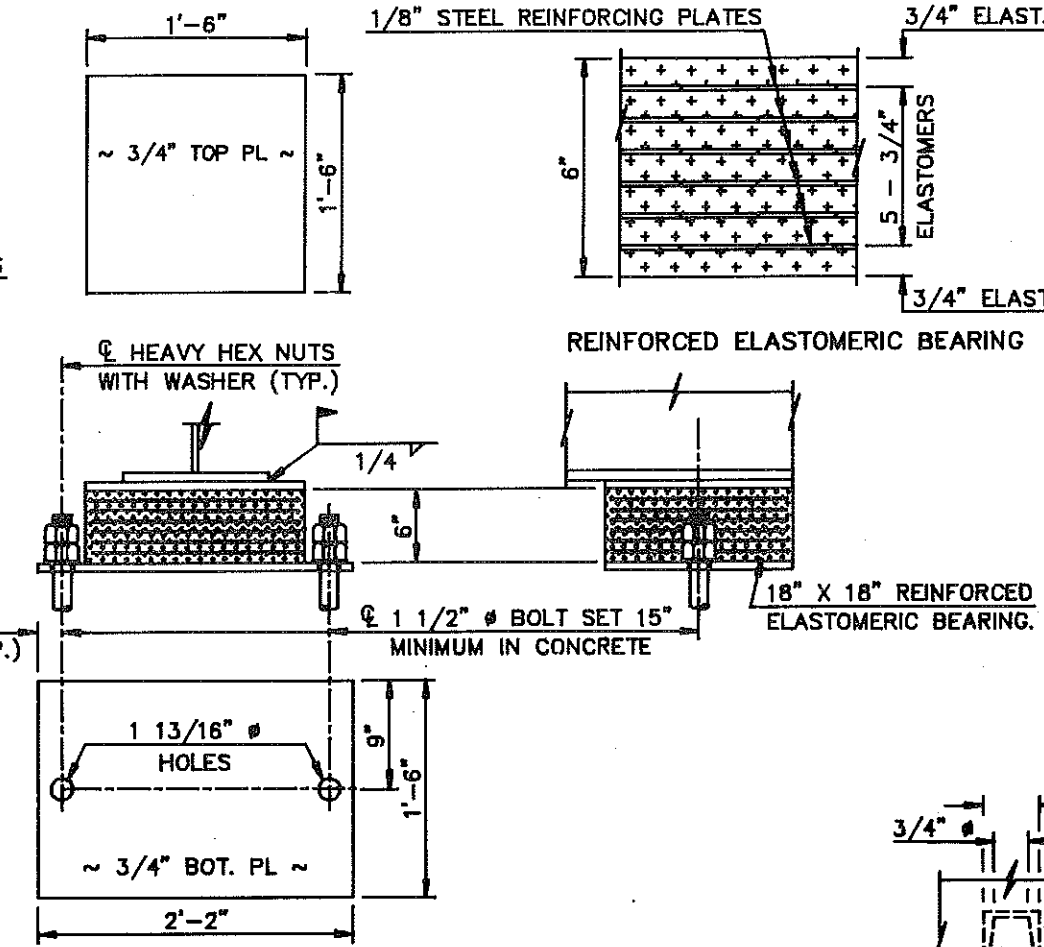


NOTE:

BEFORE FIELD WELDING THE BOTTOM FLANGE TO THE TOP OF THE TOP BEARING PLATE, ADJUST THE POSITION OF THE TOP PLATE IN RELATIONSHIP TO THE BOTTOM PLATE AS SHOWN IN THE "TEMPERATURE ADJUSTMENT" TABLE. A POSITIVE DIMENSION MEANS TOWARD THE ABUTMENT.

TOP & BOTTOM PLATES SHALL BE FACTORY VULCANIZED TO ELASTOMERIC BEARINGS.

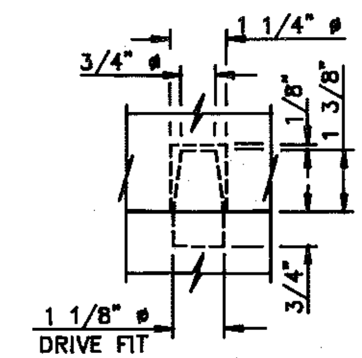
ABUTMENT 1 BEARING DETAILS



ABUTMENT 4 BEARING DETAILS

TEMPERATURE ADJUSTMENTS

TEMP. °F.	INCHES ABUT. 1	INCHES ABUT. 4
-40	-1 1/8	-1 1/4
-30	-15/16	-1 1/8
-20	-13/16	-15/16
-10	-11/16	-13/16
0	-9/16	-5/8
10	-7/16	-1/2
20	-1/4	-5/16
30	-1/8	-3/16
40	0	0
50	1/8	3/16
60	1/4	5/16
70	7/16	1/2
80	9/16	5/8
90	11/16	13/16
100	13/16	15/16
110	15/16	1 1/8
120	1 1/8	1 1/4

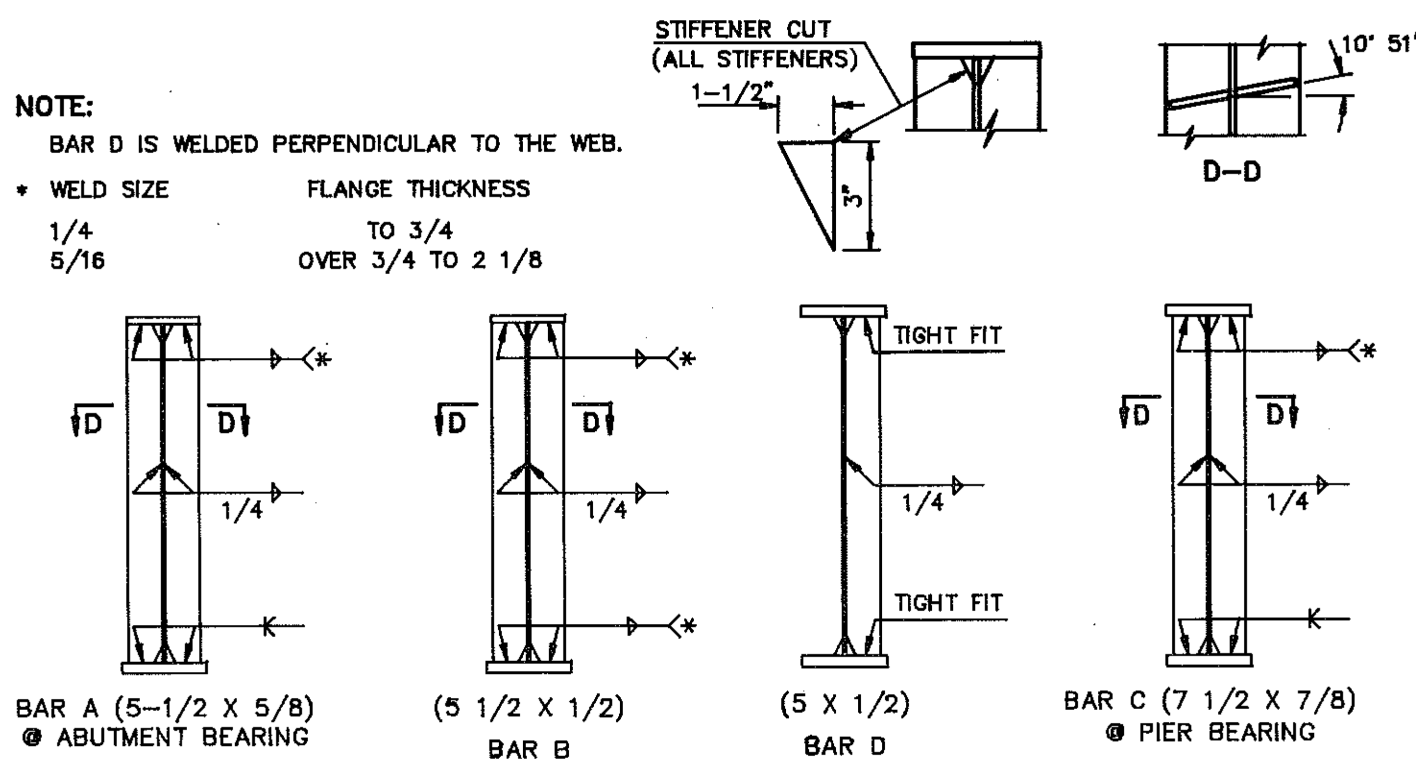


PINTLE DETAIL

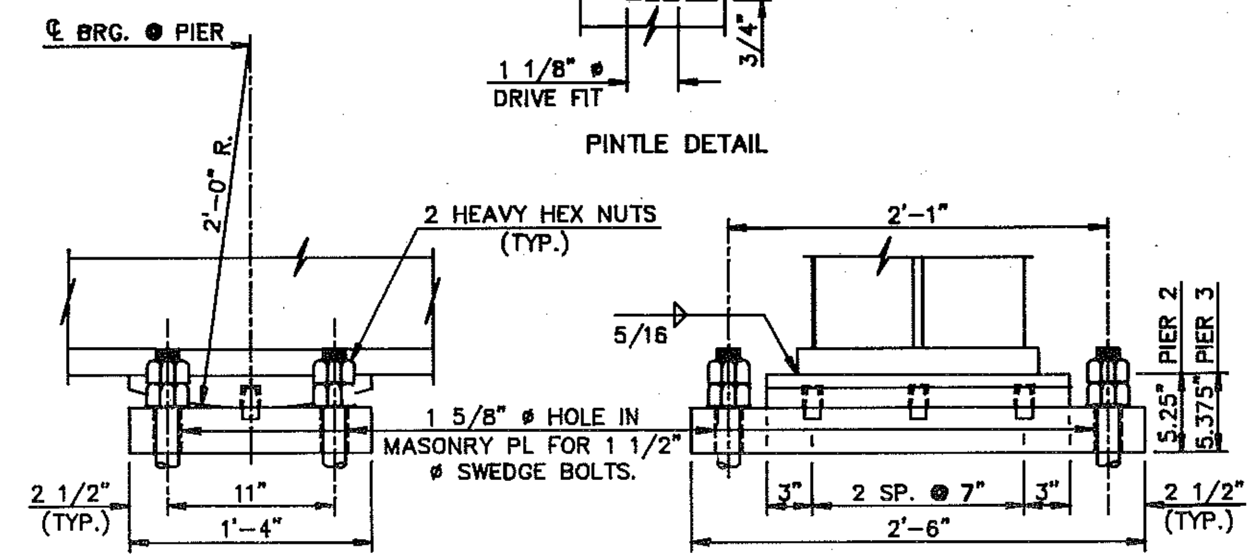
NOTE:

BAR D IS WELDED PERPENDICULAR TO THE WEB.

* WELD SIZE	FLANGE THICKNESS
1/4	TO 3/4
5/16	OVER 3/4 TO 2 1/8



WEB STIFFENER DETAILS



PIER BEARING DETAILS

NOTE:

PLACE ALL SWEDGE BOLTS A MINIMUM OF 1'-3" INTO CONCRETE.

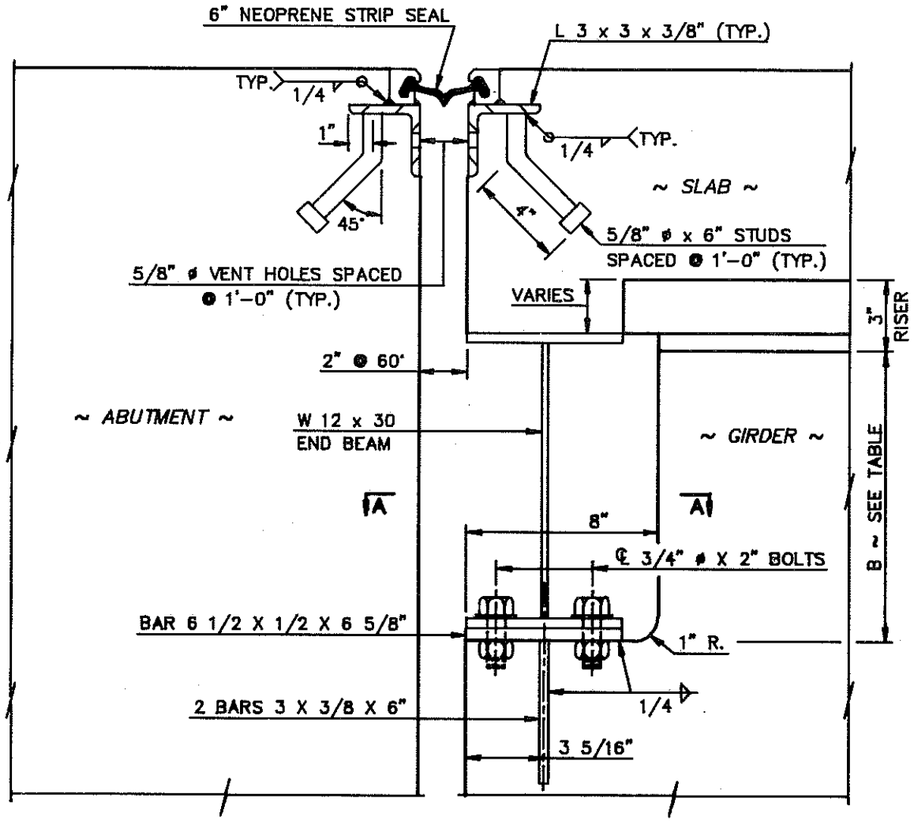
SOLE PL ~ PL 2 1/4 X 16 X 1'-8"
MASONRY PL ~ PIER 2 ~ PL 3 X 16 X 2'-6"
MASONRY PL ~ PIER 3 ~ PL 3 1/8 X 16 X 2'-6"
SWEDGE BOLTS ~ 1 1/2" ⌀ X 2'-0"

HIGHWAY 6 VIADUCT
MANDAN

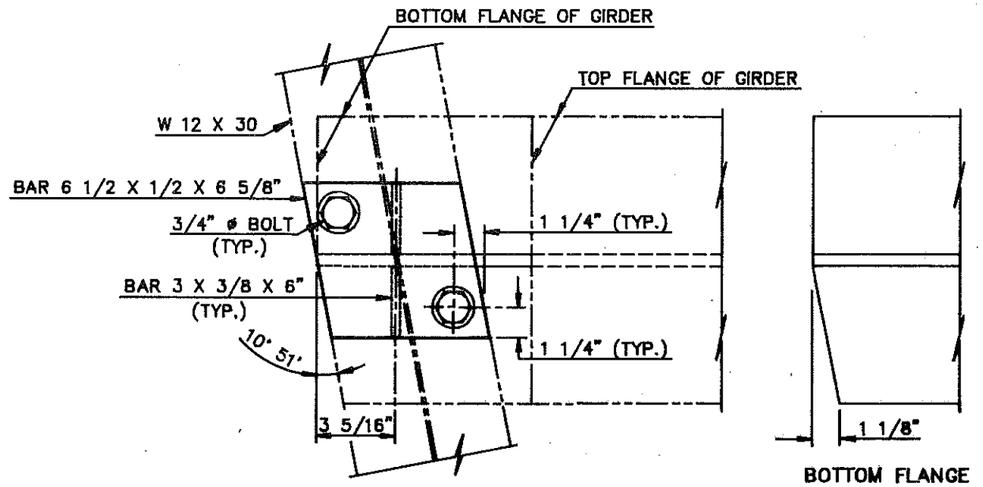
**WEB STIFFENER DETAILS
ABUTMENT AND PIER
BEARING DETAILS**

NDI S17 MAY 89

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	40



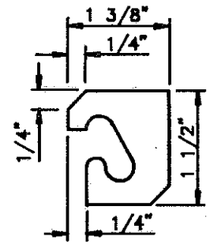
TYPICAL SECTION
EXPANSION JOINT AND END BEAM DETAIL



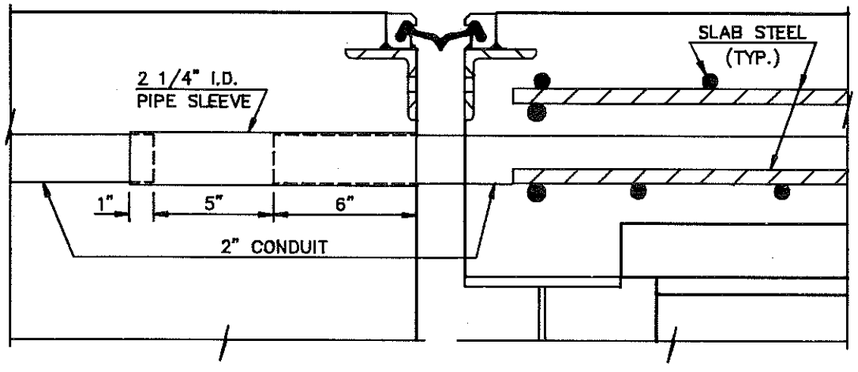
BAR 6 1/2 X 1/2 X 6 5/8" PLAN
A-A

GIRDER NO.	DIMENSION "B"	
	ABUT. 1	ABUT. 4
1	1'-0 1/8"	1'-3 3/8"
2	1'-3 1/16"	1'-4 5/8"
3	1'-6 1/16"	1'-5 15/16"
4	1'-8 7/8"	1'-7"
5	1'-7 1/8"	1'-3 9/16"
6	1'-5 3/8"	1'-0 1/8"

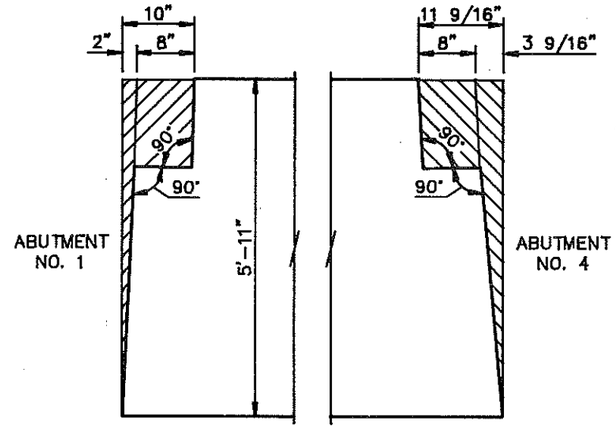
DIMENSION "B"



STEEL EXTRUSION DETAIL



CONDUIT AT EXPANSION JOINT IN SLAB



WEB CUTTING DETAIL

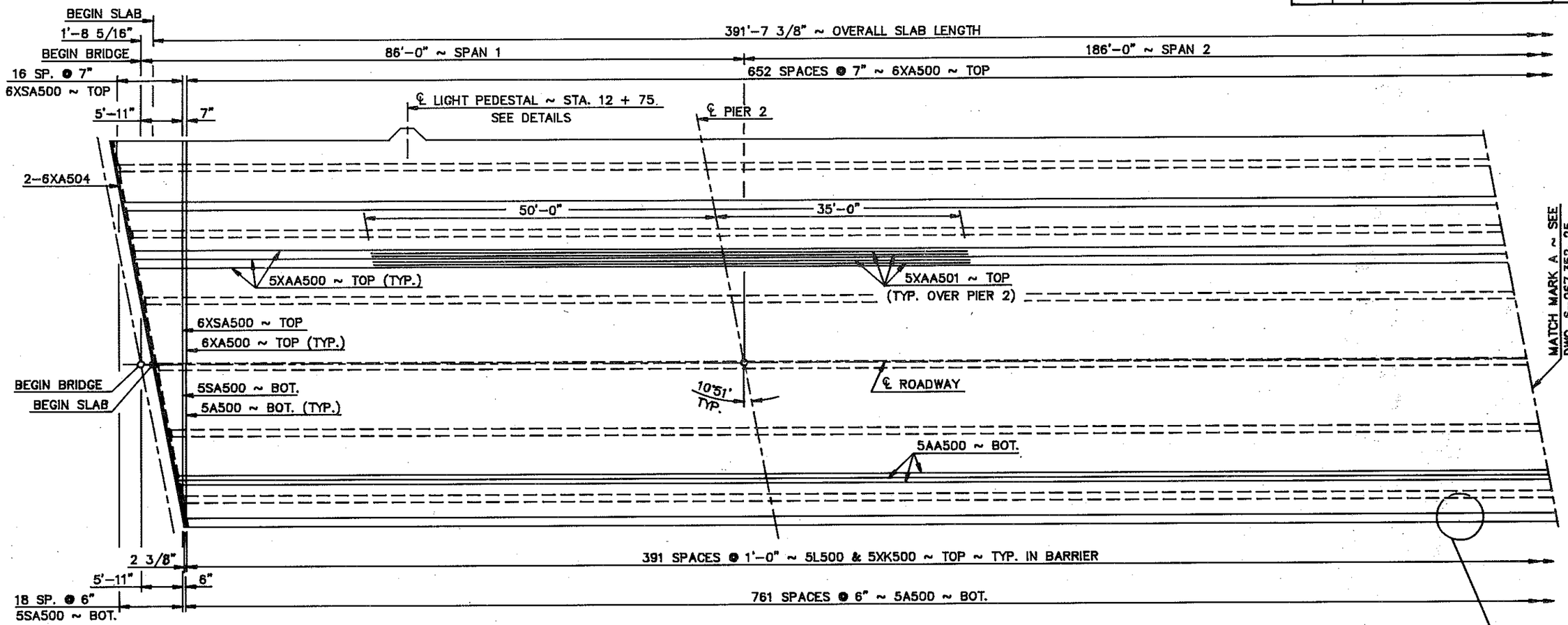
QUANTITIES	
EXPANSION JOINT STRIP SEAL	113 L.F.

HIGHWAY 6 VIADUCT
MANDAN

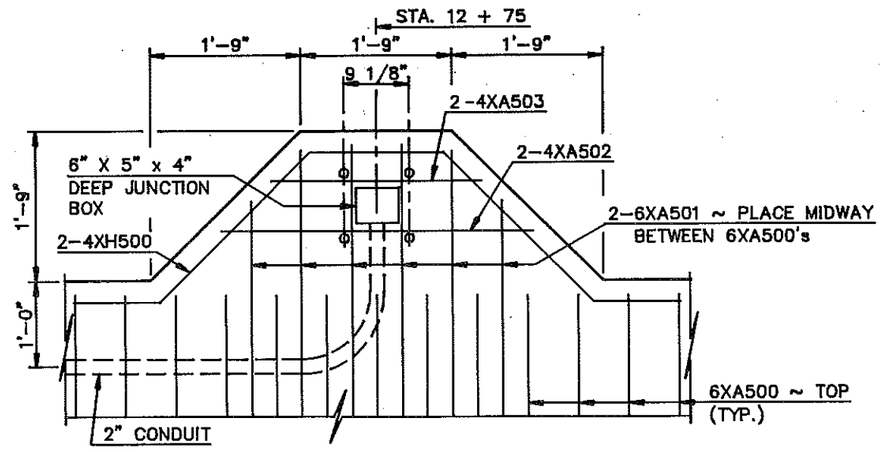
EXPANSION JOINT & ENDBEAM DETAILS

6-067 352 23

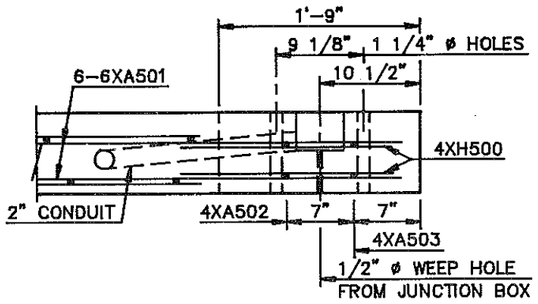
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	4.1



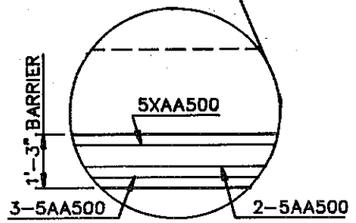
PLAN



PLAN



ELEVATION



LIGHT PEDESTAL DETAILS @ STA. 12 + 75

QUANTITIES
SEE DWG. 6-067.352-26

HIGHWAY 6 VIADUCT
MANDAN

SLAB LAYOUT

89DLS9 MAY 89

6-067.352-24

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	42

391'-7 3/8" ~ OVERALL SLAB LENGTH

186'-0" ~ SPAN 2

123'-0" ~ SPAN 3

652 SPACES @ 7" ~ 6XA500 ~ TOP

℄ PIER 3

END SLAB

1'-8 5/16"

END BRIDGE

16 SP. @ 7"

6XSA500 ~ TOP

7"

7'-7"

5XAA502 ~ TOP
(TYP. OVER PIER 3)

40'-0"

55'-0"

5XAA500 ~ TOP (TYP.)

MATCH MARK A ~ SEE DWG. 6-067.352-24

6XSA500 ~ TOP

6XA500 ~ TOP (TYP.)

END BRIDGE

END SLAB

℄ ROADWAY

10'51" TYP.

5SA500 ~ BOT.

5A500 ~ BOT. (TYP.)

℄ LIGHT PEDESTAL ~ STA. 14 + 50
SEE DETAILS

5AA500 ~ BOT.

2-6XA504

391 SPACES @ 1'-0" ~ 5L500 & 5XK500 ~ TOP ~ TYP. IN BARRIER

5"

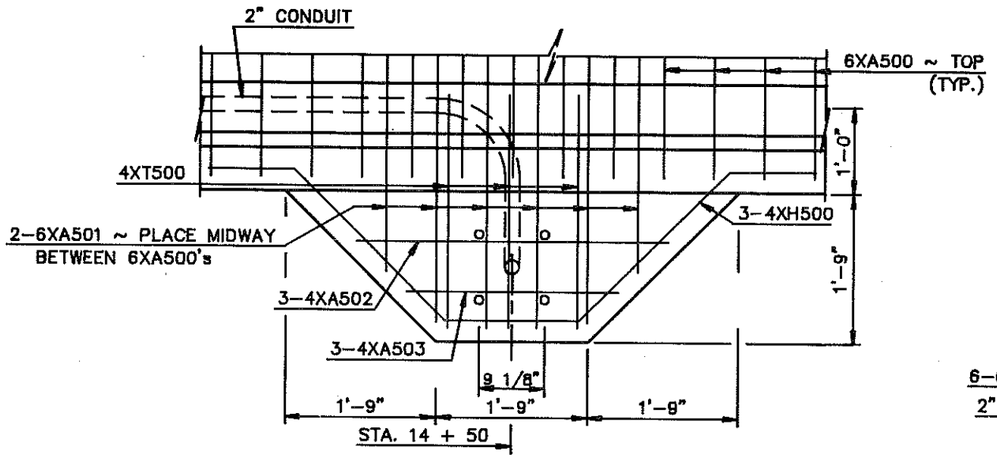
6"

7'-7"

761 SPACES @ 6" ~ 5A500 ~ BOT.

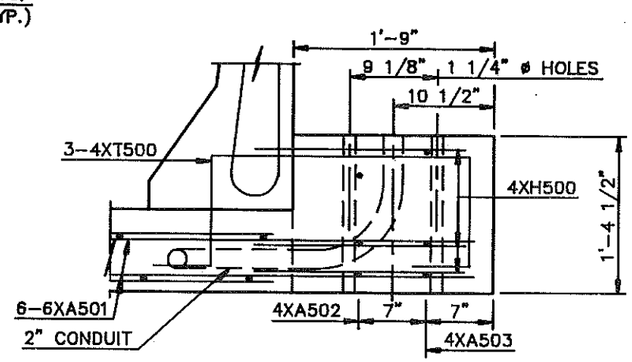
18 SP. @ 6"

5SA500 ~ BOT.



PLAN

PLAN



ELEVATION

LIGHT PEDESTAL DETAILS @ STA. 14 + 50

NOTE:

THE BARRIER QUANTITIES ARE INCLUDED IN THE SLAB QUANTITIES.

QUANTITIES
SEE DWG. 6-067.352-26

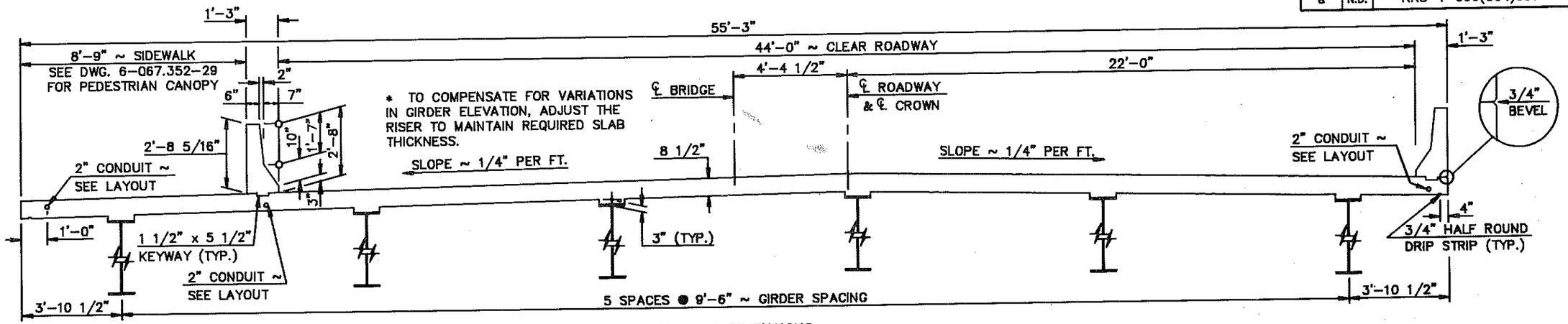
HIGHWAY 6 VIADUCT
MANDAN

SLAB LAYOUT

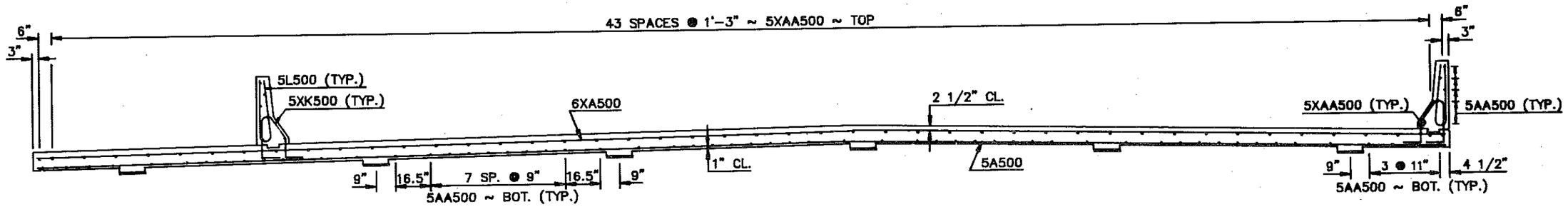
89DLS10 MAY 89

6-067.352-25

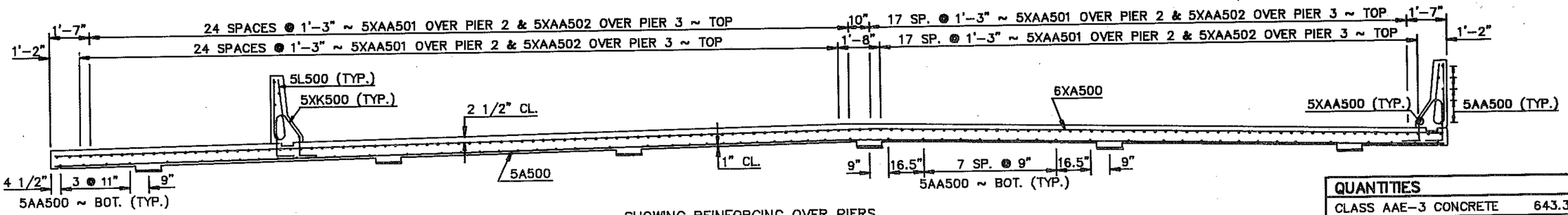
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	43



SHOWING DIMENSIONS
SLAB SECTION



SHOWING REINFORCING BETWEEN SUPPORTS
SLAB SECTION



SHOWING REINFORCING OVER PIERS
SLAB SECTION

QUANTITIES	
CLASS AAE-3 CONCRETE	643.3 C.Y.
REINFORCING STEEL	77,359 LBS.
REINFORCING STEEL (EPOXY)	95,890 LBS.

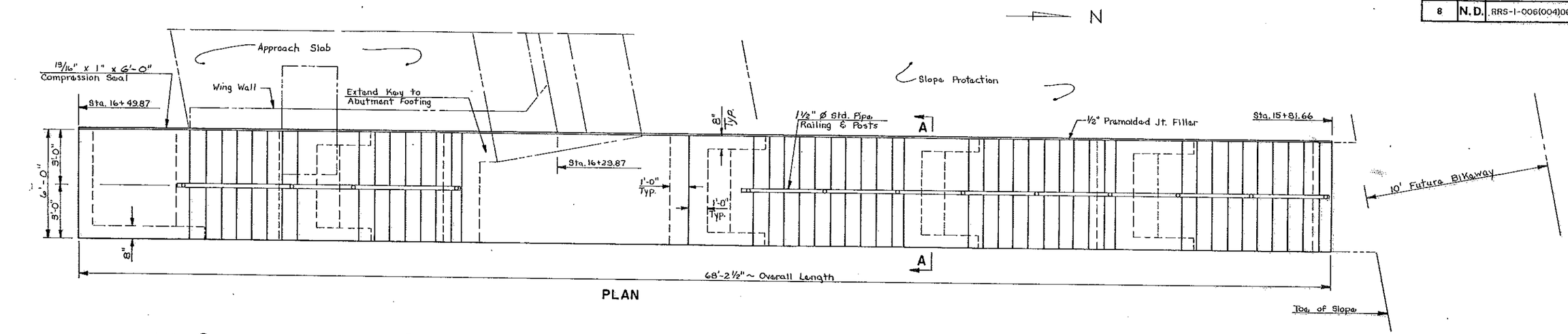
HIGHWAY 6 VIADUCT
MANDAN

SLAB SECTIONS

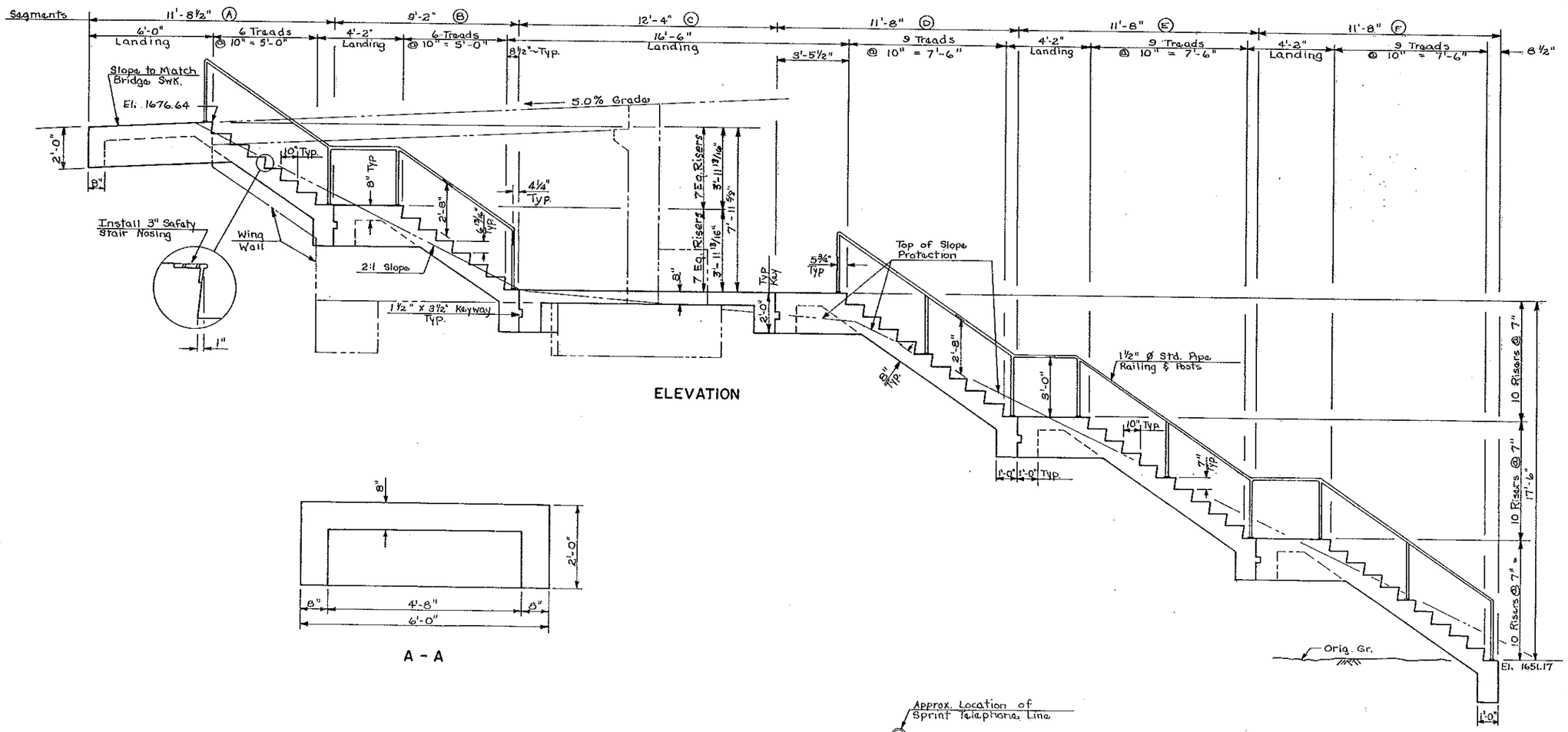
6-067.352-26

89DLS8 MAY 89

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	44



PLAN



ELEVATION

A - A

Approx. Location of Sprint Telephone Line

NOTE
The cost of furnishing and placing the premolded joint filler, the compression seal and safety stair nosings shall be incidental to Class AE-3 concrete.

The pipe railing may either have treaded or welded connections. The posts may either have anchor plates or be cast in the concrete.

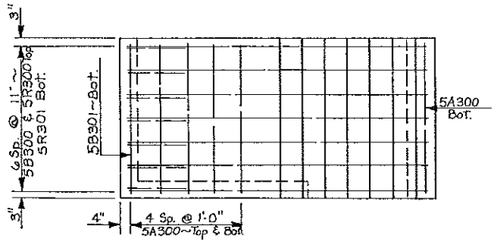
QUANTITIES
See Dwg. 6-067.352.-28

HIGHWAY 6 VIADUCT
MANDAN

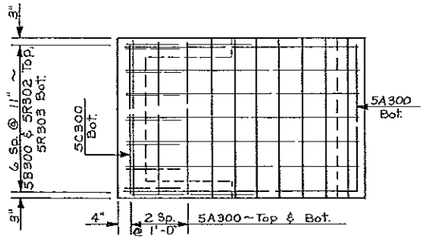
STAIRWAY LAYOUT
AT ABUT. 4

C-067352-27

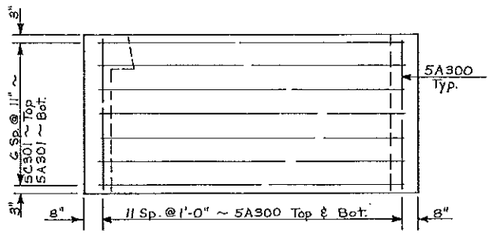
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-I-006(004)067	45



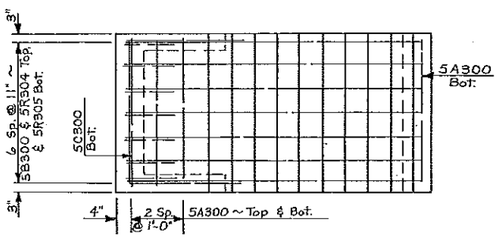
PLAN



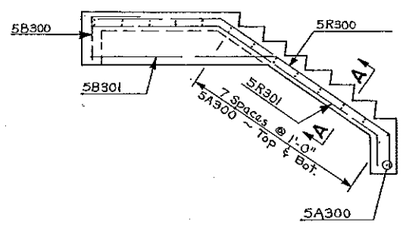
PLAN



PLAN

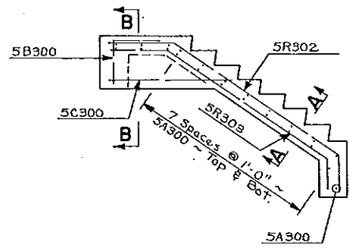


PLAN



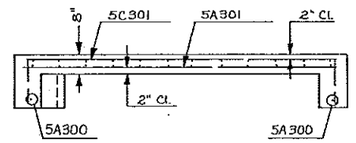
ELEVATION

Ⓐ



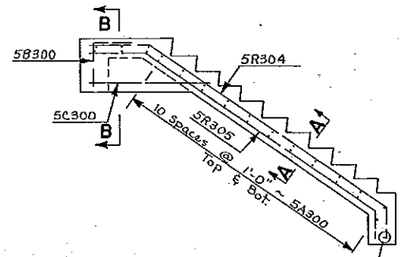
ELEVATION

Ⓑ



ELEVATION

Ⓒ

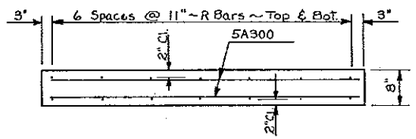


ELEVATION

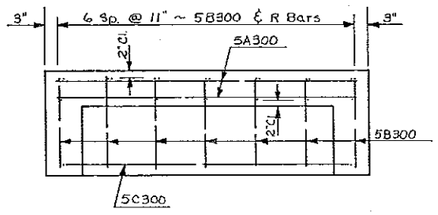
Ⓓ Ⓔ Ⓕ

STAIRWAY DETAILS

Showing Reinforcing



A-A



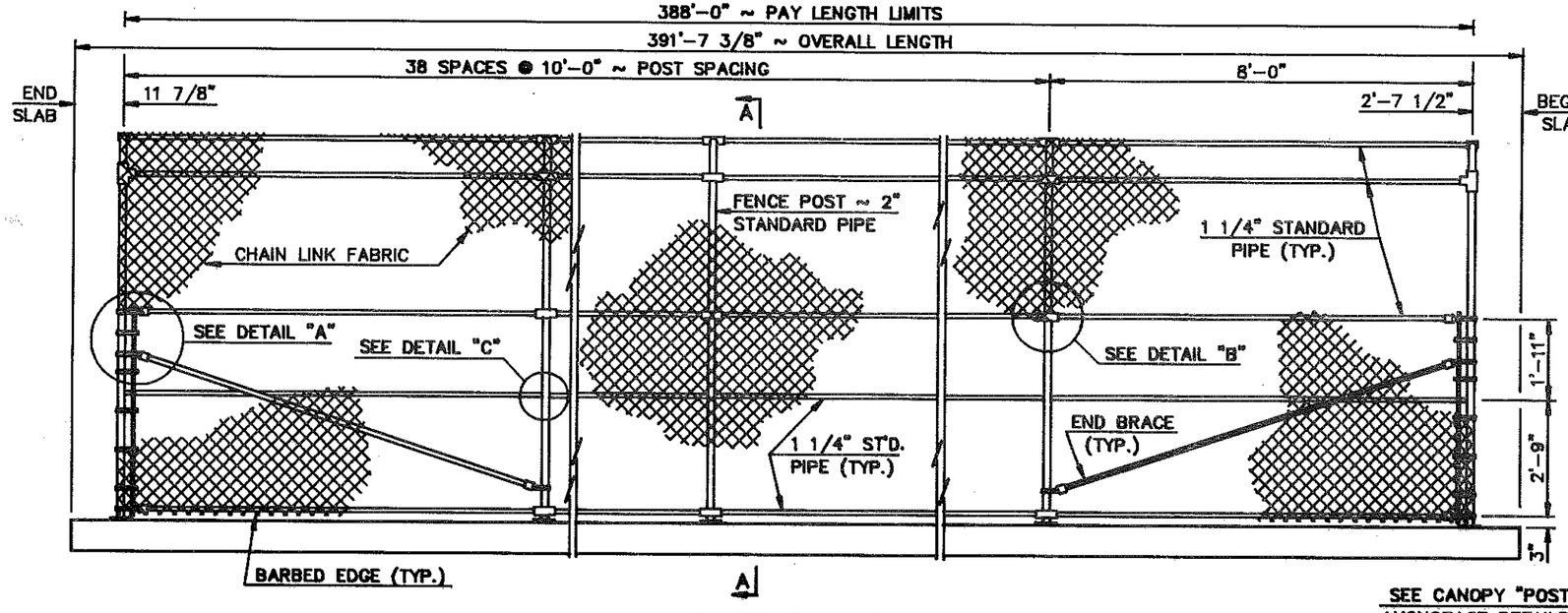
B-B

QUANTITIES	
Class AE-3 Concrete	18.2 C.Y.
Reinforcing Steel	2328 Lbs.
Pipe Railing	55 L.F.

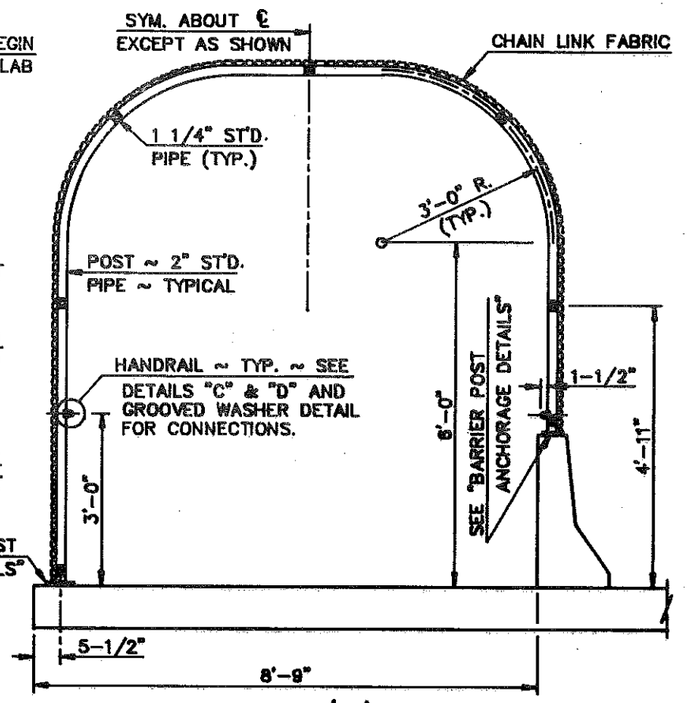
HIGHWAY 6 VIADUCT
MANDAN

STAIRWAY DETAILS
AT ABUT. 4

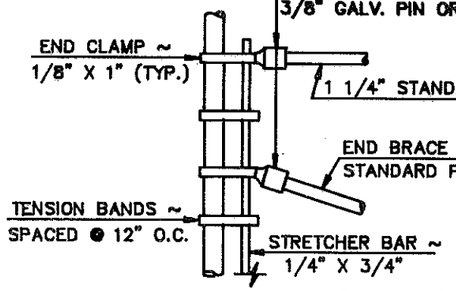
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	46



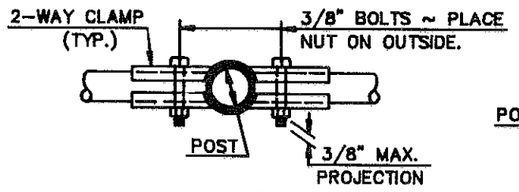
CANOPY ELEVATION



A-A



DETAIL "A"



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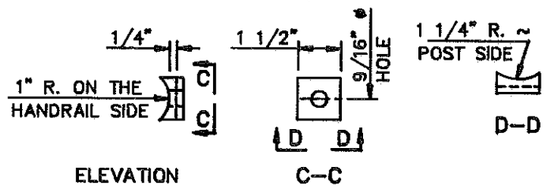
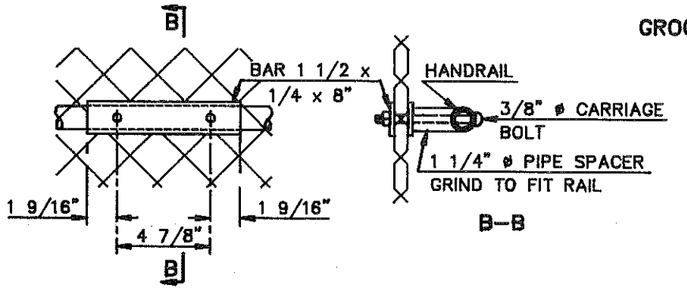
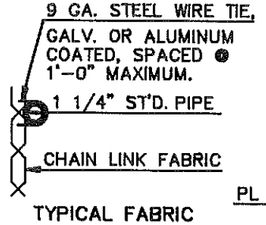


GROOVED WASHER DETAILS



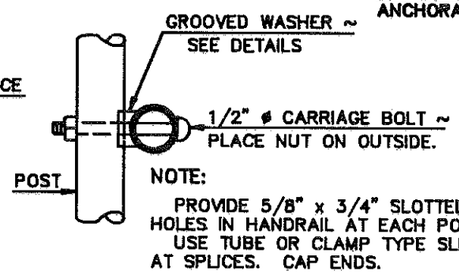
HANDRAIL CONNECTION DETAILS CENTERED BETWEEN POSTS

DETAIL "D"



TYPICAL FABRIC ATTACHMENT

DETAIL "E"

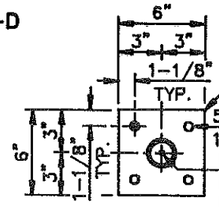


NOTE:

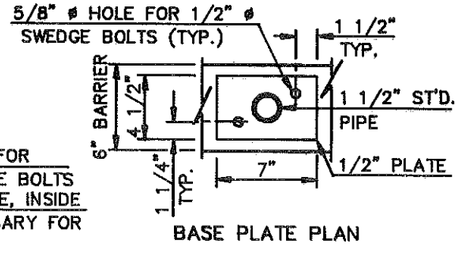
PROVIDE 5/8" x 3/4" SLOTTED HOLES IN HANDRAIL AT EACH POST. USE TUBE OR CLAMP TYPE SLEEVE AT SPLICES. CAP ENDS.

HANDRAIL CONNECTION AT POSTS

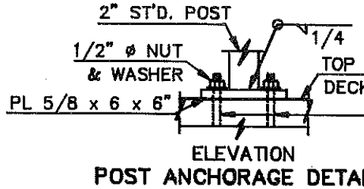
DETAIL "C"



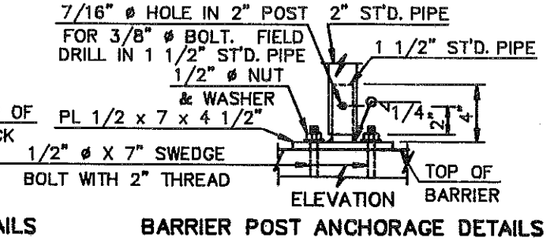
BASE PLATE PLAN



BASE PLATE PLAN



POST ANCHORAGE DETAILS



BARRIER POST ANCHORAGE DETAILS

NOTE:

FABRIC SHALL BE AASHTO M181, TYPE 1 AND SHALL BE 9 GAGE WIRE, 2 INCH MESH WITH THE BOTTOM SELVAGE BARBED.

POSTS AND FITTINGS SHALL BE AASHTO M181, CLASS 1.

ANCHORAGE PLATES SHALL BE AASHTO M183 AND SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH AASHTO M232.

TO ANCHOR BASE PLATES, THE CONTRACTOR HAS THE OPTION TO EITHER DRILL IN 1/2" ø SWEDGE BOLTS OR PLACE THEM IN THE CONCRETE AT THE TIME OF POURING. IF THE CONTRACTOR ELECTS TO DRILL THE BOLT HOLES, EXTREME CAUTION SHALL BE EXERCISED NOT TO DAMAGE THE CONCRETE BARRIERS AND SHALL PLACE THE BASE PLATES LONGITUDINALLY ALONG THE BARRIERS AS SHOWN ON THE "BASE PLATE PLAN" VIEW.

QUANTITIES	
PEDESTRIAN CANOPY	388 L.F.

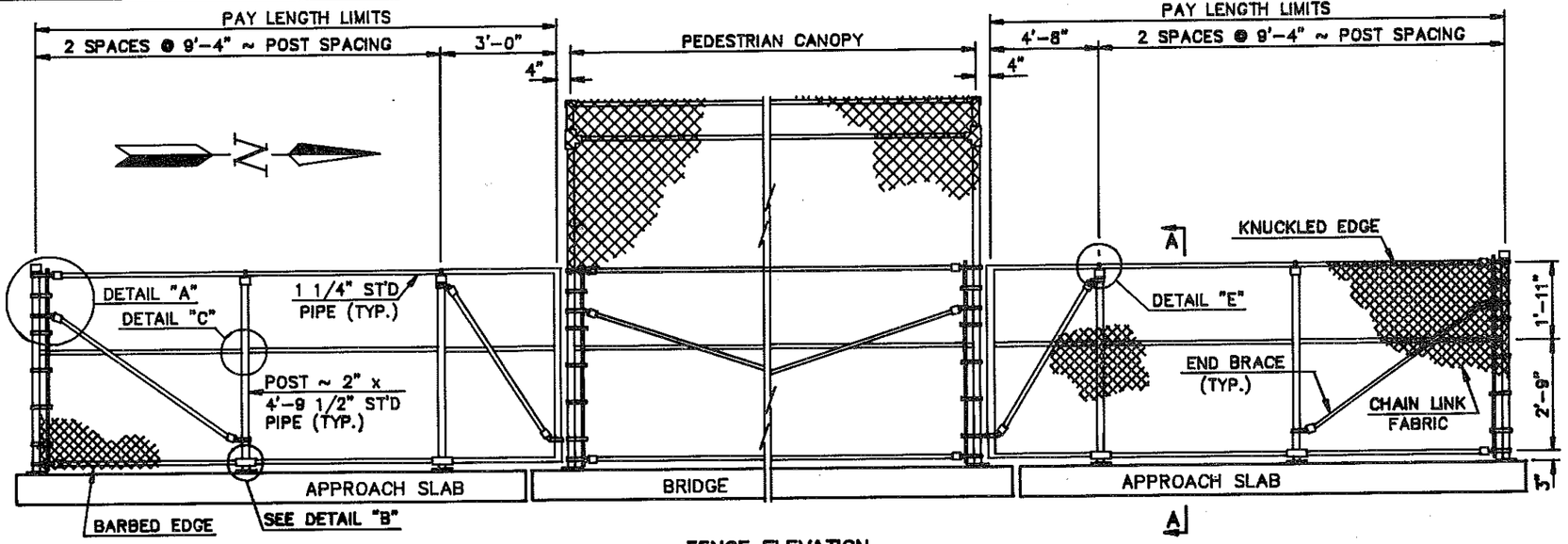
HIGHWAY 6 VIADUCT
MANDAN

PEDESTRIAN CANOPY DETAILS

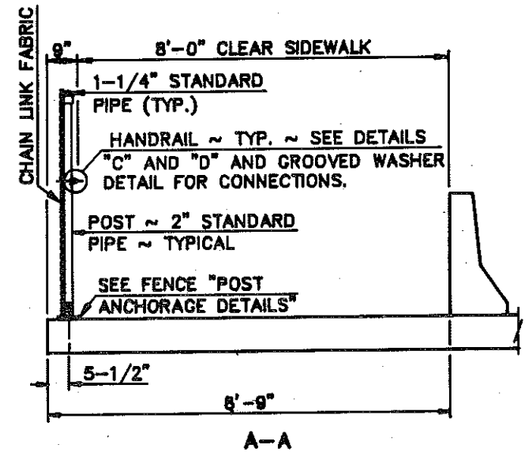
89DLS3 MAY 89

6-067.352-29

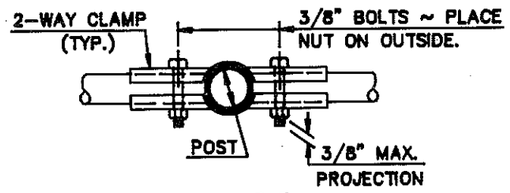
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	4-7



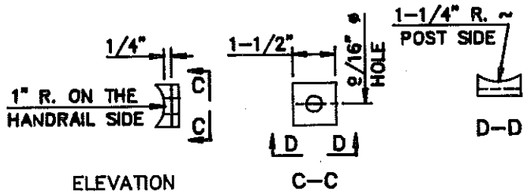
FENCE ELEVATION



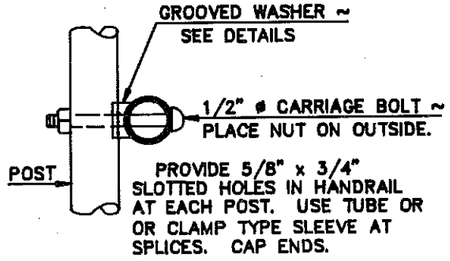
A-A



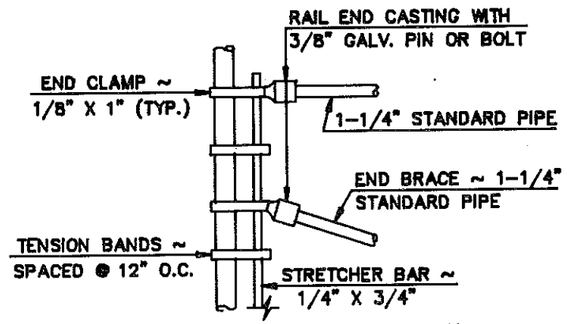
DETAIL "B"



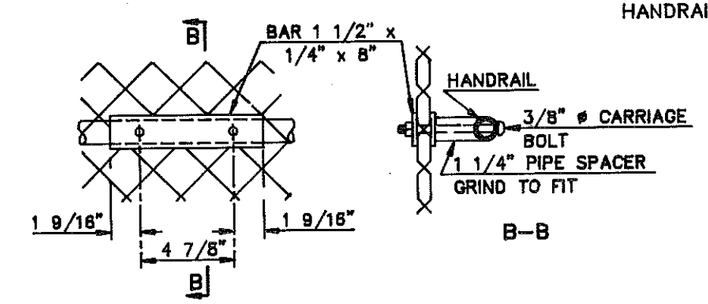
GROOVED WASHER DETAILS



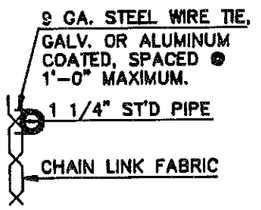
HANDRAIL CONNECTION AT POSTS
DETAIL "C"



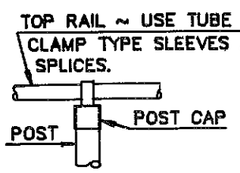
DETAIL "A"



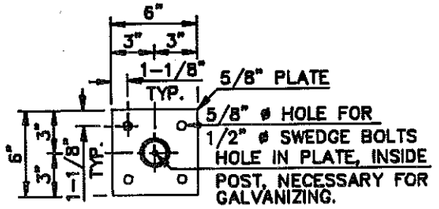
HANDRAIL CONNECTION DETAILS CENTERED BETWEEN POSTS
DETAIL "D"



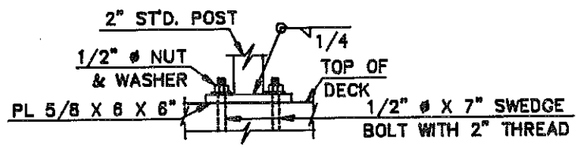
TYPICAL
FABRIC ATTACHMENT



DETAIL "E"



BASE PLATE PLAN



ELEVATION
POST ANCHORAGE DETAILS

NOTE:

FABRIC SHALL BE AASHTO M181, TYPE I AND SHALL BE OF 9 GAGE WIRE, 2 INCH MESH, TOP SELVAGE KNUCKLED AND BOTTOM SELVAGE BARBED.

POSTS AND FITTINGS SHALL BE AASHTO M181, CLASS 1.

ANCHORAGE PLATES SHALL BE AASHTO M183 AND SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH M232.

TO ANCHOR BASE PLATES, THE CONTRACTOR HAS THE OPTION TO EITHER DRILL IN 1/2" ø SWEDGE BOLTS OR PLACE THEM IN THE CONCRETE AT THE TIME OF POURING.

QUANTITIES	
PEDESTRIAN FENCE	45 L.F.

HIGHWAY 6 VIADUCT
MANDAN

PEDESTRAIN FENCE DETAILS

6-067.352-30

89DLS35

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	40

ABUTMENT 1

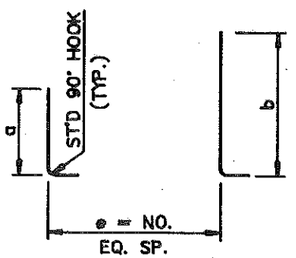
SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
7	A100	66	7'-8"		7'-8"							
5	A101	59	7'-8"		7'-8"							
6	A102	9	57'-8"		57'-8"							
5	A103	9	57'-8"		57'-8"							
5	A104-1	72	7'-0"		7'-0"							
4	A105	24	55'-11"		55'-11"							
6	A106	6	55'-11"		55'-11"							
6	A107	12	5'-8"		5'-8"							
6	A108	26	2'-8"		2'-8"							
5	A109	10	5'-8"		5'-8"							
5	A110	23	2'-8"		2'-8"							
5	A111-1	8	13'-4"		13'-4"							
6	A112	12	16'-2"		16'-2"							
5	A113	66	16'-2"		16'-2"							
5	A114-1	8	13'-8"		13'-8"							
5	A115-1	8	12'-10"		12'-10"							
5	D100	13	4'-6"		2'-3"	2'-3"					2.3	12
5	E100	13	4'-6"		2'-3"	2'-3"					2.3	12
5	G100	48	11'-3"	3'-4"	2'-2"	3'-9"	1'-0"				12	2.3
5	P100	67	4'-2"	4"	1'-10"	1'-7"	5"				12	9
5	R100	26	7'-8"	1'-6"	4'-8"	1'-6"		9.9		12	9.9	12
5	R101	26	8'-7"	1'-6"	5'-7"	1'-6"		12		9.9	12	9.9
4	SA100-1	1	310'-0"	12'-9"	13'-1"			23				
4	SA101-1	1	418'-0"	12'-3"	13'-1"			32				
4	SA102-1	2	134'-6"	11'-1"	11'-4"			11				
4	SA103-1	2	139'-0"	11'-5"	11'-9"			11				
4	SA104-1	2	129'-0"	10'-7"	10'-11"			11				
5	SB100-1	1	510'-8"	15'-0"	15'-3"			31				
5	SB101-1	1	673'-8"	14'-5"	15'-3"			42				

ABUTMENT 4

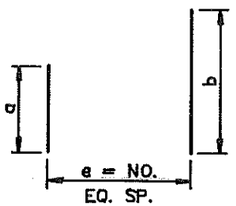
SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
7	A100	66	7'-8"		7'-8"							
5	A101	59	7'-8"		7'-8"							
6	A102	9	57'-8"		57'-8"							
5	A103	9	57'-8"		57'-8"							
5	A104-4	72	3'-10"		3'-10"							
4	A105	16	55'-11"		55'-11"							
6	A106	6	55'-11"		55'-11"							
6	A107	12	5'-8"		5'-8"							
6	A108	26	2'-8"		2'-8"							
5	A109	10	5'-8"		5'-8"							
5	A110	23	2'-8"		2'-8"							
5	A111-4	8	9'-5"		9'-5"							
6	A112	8	16'-2"		16'-2"							
5	A113	22	16'-2"		16'-2"							
5	A114-4	8	10'-2"		10'-2"							
5	A115-4	8	9'-9"		9'-9"							
6	A116	4	21'-2"		21'-2"							
6	A117	4	7'-8"		7'-8"							
5	D100	9	4'-6"		2'-3"	2'-3"					2.3	12
5	E100	8	4'-6"		2'-3"	2'-3"					2.3	12
5	G100	24	11'-3"	3'-4"	2'-2"	3'-9"	1'-0"				12	2.3
5	P100	67	4'-2"	4"	1'-10"	1'-7"	5"				12	9
5	R100	17	7'-8"	1'-6"	4'-8"	1'-6"		9.9		12	9.9	12
5	R101	18	8'-7"	1'-6"	5'-7"	1'-6"		12		9.9	12	9.9
4	SA100-4	1	229'-0"	9'-2"	9'-11"			23				
4	SA101-4	1	320'-5"	9'-6"	9'-11"			32				
4	SA102-4	2	94'-6"	7'-7"	8'-2"			11				
4	SA103-4	2	98'-6"	7'-11"	8'-6"			11				
4	SA104-4	2	90'-6"	7'-3"	7'-10"			11				
4	SA105	4	11'-8"	10"	3'-10"			4				
5	SA106	2	75'-6"	16'-9"	21'-0"			3				
5	SA107	2	94'-2"	16'-6"	21'-2"			4				
5	SB100-4	1	401'-4"	11'-4"	12'-1"			31				
5	SB101-4	1	546'-6"	11'-8"	12'-1"			42				

NOTES:

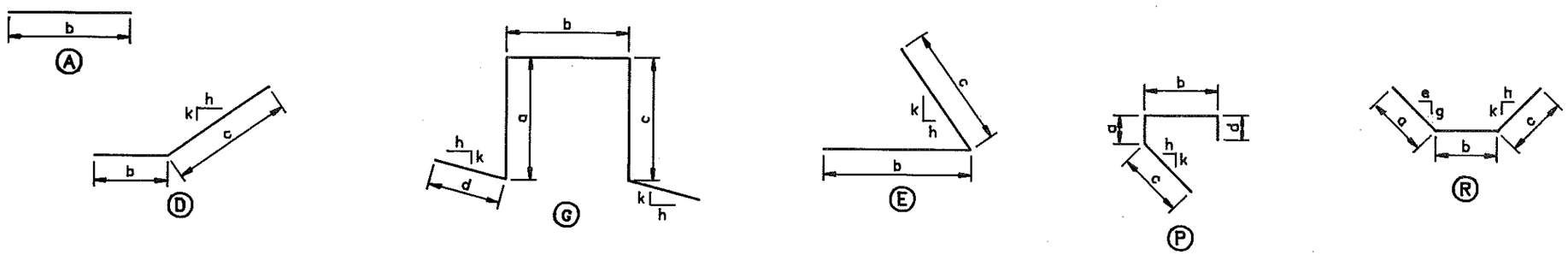
1. FABRICATION AND TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE.
2. ALL DIMENSIONS ARE OUT TO OUT OF BARS.
3. NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR, UNLESS OTHERWISE NOTED.
4. ADJACENT AA BARS SHALL BE TURNED END FOR END SO THAT THE SPLICE LOCATIONS ARE STAGGERED.
5. THE "r" DIMENSION INDICATES THE RADIUS.
6. AN "X" PRECEDING A BAR DESIGNATION INDICATES AN EPOXY COATED BAR.
7. THE NUMBER FOLLOWING THE "DASH" IN THE MARK INDICATES THE ABUT. FOR THAT BAR. EXAMPLE: "A101-6" INDICATES ABUT. 6.



(SB)



(SA)



HIGHWAY 6 VIADUCT
MANDAN

ABUTMENTS 1 & 4
REINFORCING BAR LIST
& DETAILS

89DLS34

6-067 352-31

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

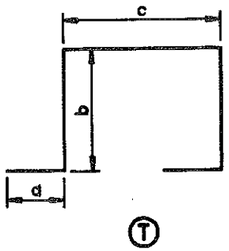
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
STAIRWAY	5	A300	163	5'-8"		5'-8"							
	5	A301	7	11'-10"		11'-10"							
	5	B300	35	3'-4"		1'-8"	1'-8"						
	5	B301	1	12'-6"		7'-0"	5'-6"						
	5	C300	4	14'-6"		4'-6"	5'-6"	4'-6"					
	5	C301	7	14'-8"		1'-8"	11'-4"	1'-8"					
	5	R300	7	13'-11"	1'-3"	7'-10"	4'-10"		8.2		12	12	9.1
	5	R301	7	13'-1"	1'-2"	7'-2"	4'-9"		8.2		12	12	9.1
	5	R302	7	11'-5"	1'-3"	7'-10"	2'-4"		8.2		12	12	8.2
	5	R303	7	10'-6"	1'-2"	7'-2"	2'-2"		8.2		12	12	8.2
	5	R304	21	14'-7"	1'-3"	11'-0"	2'-4"		8.4		12	12	8.4
	5	R305	21	13'-8"	1'-2"	10'-4"	2'-2"		8.4		12	12	8.4
PIERS	8	A200	32	9'-8"		9'-8"							
	7	A201	140	9'-8"		9'-8"							
	5	A202	212	9'-8"		9'-8"							
	5	A203-2	62	52'-8"		52'-8"							
	5	A203-3	60	52'-8"		52'-8"							
	10	A204-2	32	26'-1"		26'-1"							
	10	A204-3	32	25'-1"		25'-1"							
	6	A205	4	52'-8"		52'-8"							
	8	A206	18	52'-8"		52'-8"							
	8	A207	20	14'-6"		14'-6"							
	8	A208	16	12'-0"		12'-0"							
	8	A209-2	8	15'-0"		15'-0"							
	8	A209-3	4	29'-6"		29'-6"							
	5	B200-2	138	13'-6"		11'-6"	2'-0"						
	5	B200-3	138	12'-6"		10'-6"	2'-0"						
	10	B201-2	56	30'-9"		28'-3"	2'-6"						
	10	B201-3	56	29'-9"		27'-3"	2'-6"						
	4	N200	104	10'-0"	2'-3"	2'-3"	6"					12	0
	5	N201-2	30	12'-2"	1'-10"	3'-9"	6"					12	0
	5	N202-2	36	12'-8"	1'-10"	4'-0"	6"					12	0
	5	N202-3	60	12'-8"	1'-10"	4'-0"	6"					12	0
	5	N203-2	38	13'-4"	1'-10"	4'-4"	6"					12	0
	5	N204-2	30	13'-0"	1'-10"	4'-2"	6"					12	0
	5	N204-3	74	13'-0"	1'-10"	4'-2"	6"					12	0

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
SUPERSTRUCTURE REGULAR	5	A500	762	54'-11"		54'-11"							
	5	AA500	68	401'-3"		60'-0"	1'-8"	41'-3"	6		391'-3"		
	5	L500	784	5'-0"		2'-2"	8"	2'-2"		2.5"		1	12
	5	SA500	2	558'-11"	5'-11"	52'-11"			18				
SUPERSTRUCTURE EPOXY COATED	5	XAA500	46	401'-3"		60'-0"	1'-8"	41'-3"	6		391'-3"		
	5	XAA501	86	86'-8"		60'-0"	1'-8"	26'-8"	1		85'-0"		
	5	XAA502	86	96'-8"		60'-0"	1'-8"	36'-8"	1		95'-0"		
	6	XA500	853	54'-11"		54'-11"							
	6	XA501	24	7'-0"		7'-0"							
	4	XA502	5	3'-7"		3'-7"							
	4	XA503	5	2'-5"		2'-5"							
	8	XA504	4	55'-11"		55'-11"							
	4	XH500	5	8'-7"	1'-0"	2'-6"	1'-7"					12	12
	5	XK500	784	5'-2"	1'-6"	6"	1'-0"	10"		2.5"	8"	8.5	12
	6	XSA500	2	485'-11"	4'-3"	52'-11"			16				
	4	XT500	3	5'-3"	6"	1'-0"	2'-3"						

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	49

NOTES:

1. FABRICATION AND TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE.
2. ALL DIMENSIONS ARE OUT TO OUT OF BARS.
3. NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR, UNLESS OTHERWISE NOTED.
4. ADJACENT AA BARS SHALL BE TURNED END FOR END SO THAT THE SPLICE LOCATIONS ARE STAGGERED.
5. THE "f" DIMENSION INDICATES THE RADIUS.
6. AN "X" PRECEDING A BAR DESIGNATION INDICATES AN EPOXY COATED BAR.
7. THE NUMBER FOLLOWING THE "DASH" IN THE MARK INDICATES THE PIER FOR THAT BAR. EXAMPLE: "A101-3" INDICATES PIER 3.



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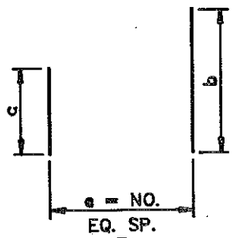

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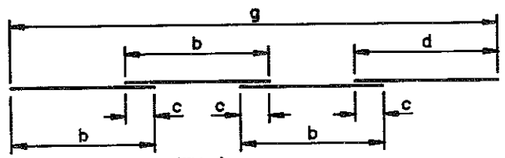
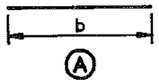


c = LAP SPLICE (TYP.)
e = NO. OF "b" LENGTH PIECES IN A SET
TOTAL LENGTH PER SET = e x b + d

AA



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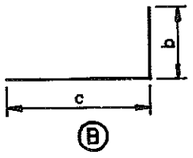

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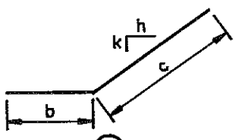

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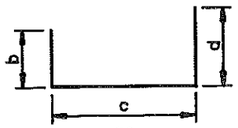

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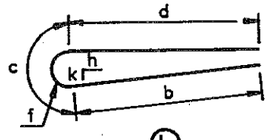

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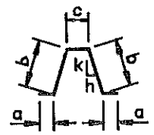

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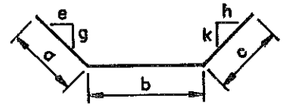

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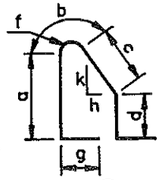

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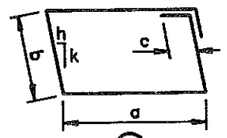


N

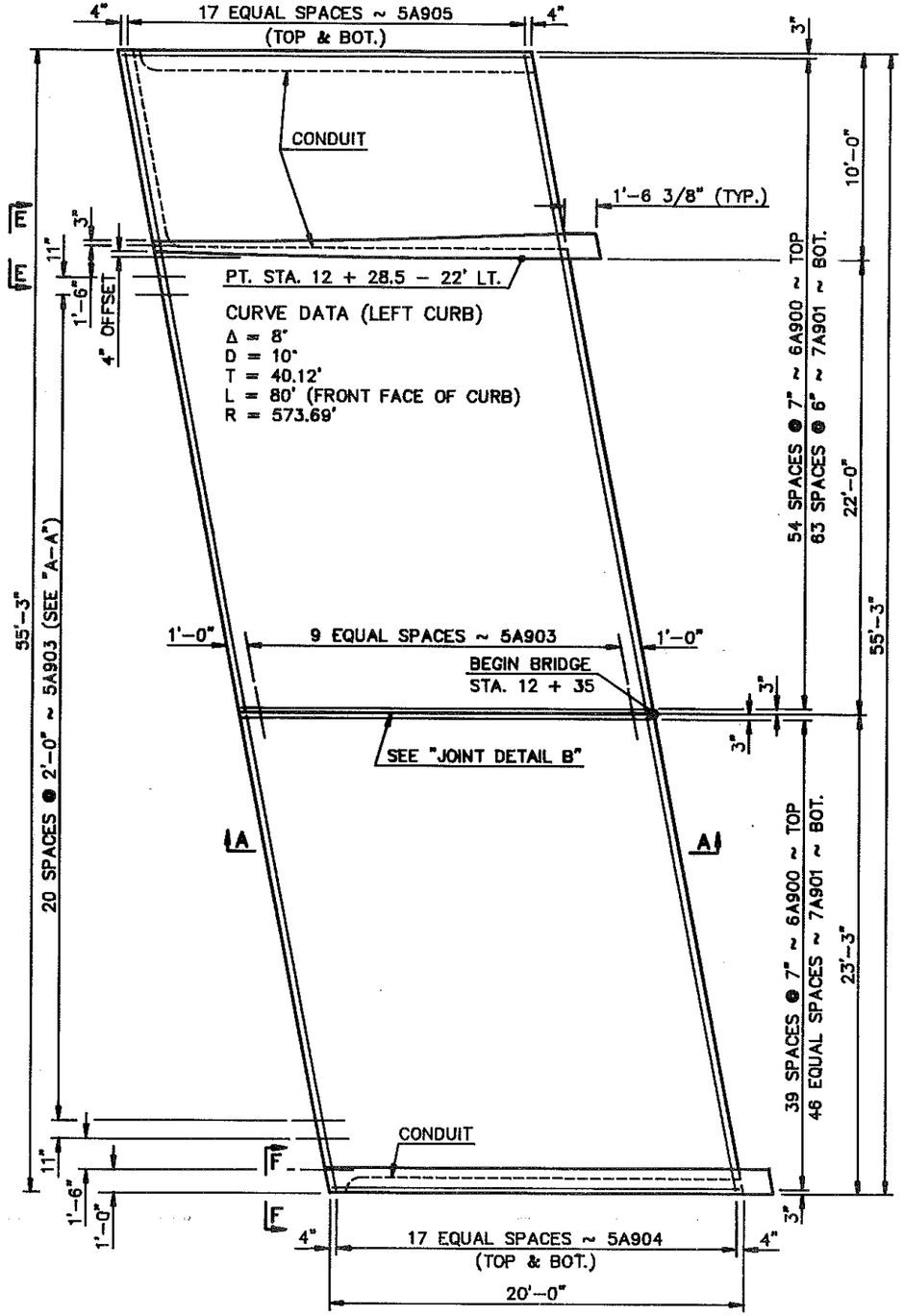
HIGHWAY 6 VIADUCT
MANDAN

SLAB, PIERS & STAIRWAY REINFORCING BAR LIST & DETAILS

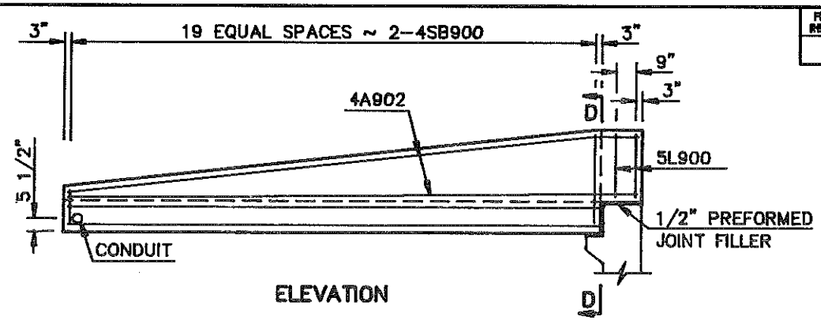
6-067.352-32

89DLS36

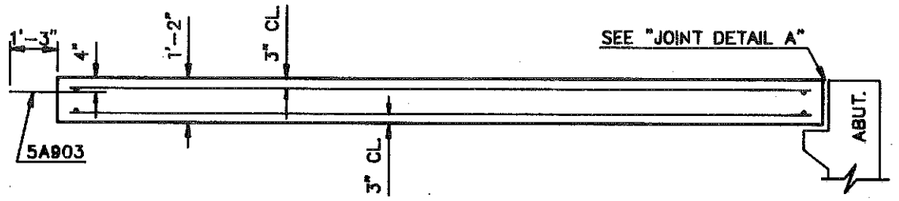
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	50

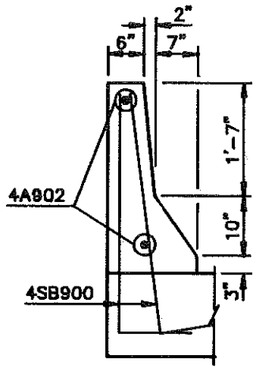


PLAN



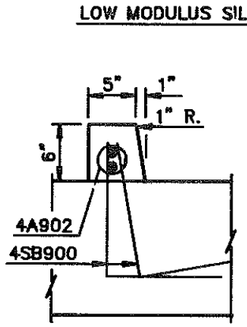
ELEVATION



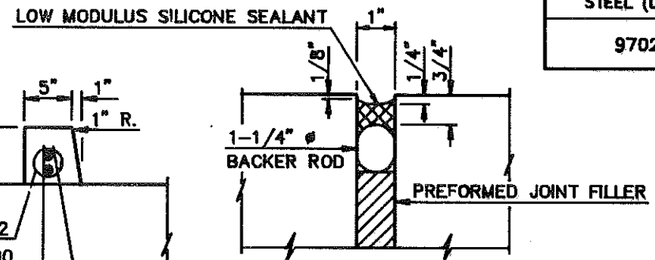


D-D

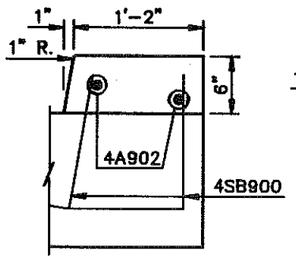
A-A



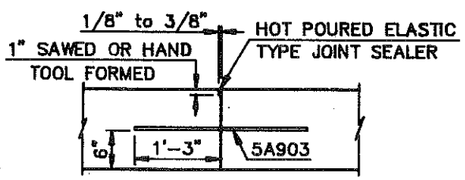
E-E



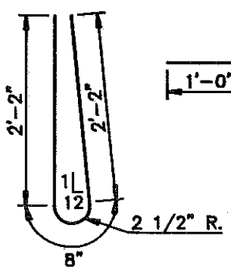
JOINT DETAIL A



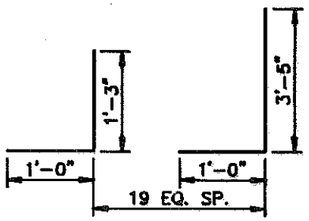
F-F



JOINT DETAIL B



L900



SB900

NOTE:

THE ABOVE ESTIMATED MATERIAL QUANTITIES ARE FOR INFORMATIONAL PURPOSES ONLY. ALL MATERIALS INCLUDING CONCRETE, REINFORCING BARS, SUB-BASE AGGREGATE, BACKER ROD, SILICON SEALANT, PREFORMED JOINT FILLER, CONDUIT AND LABOR REQUIRED TO BUILD THE APPROACH SLABS AND APPROACH SLAB BARRIERS SHALL BE INCIDENTAL TO THE PAY ITEM, "CONCRETE BRIDGE APPROACH SLAB".

THE CONCRETE SHALL BE CLASS AE-3 AND THE REINFORCING STEEL SHALL BE GRADE 60.

WIDTH = 55'-3"

SKEW ANGLE = 10° 51'

BAR LIST - ONE SLAB

SIZE	MARK	NO.	LENGTH
6	A900	95	19'-8"
7	A901	111	19'-8"
4	A902	4	21'-2"
5	A903	35	2'-6"
5	A904	36	23'-4"
5	A905	36	32'-3"
4	SB900	4	66'-8"
5	L900	4	5'-0"

ESTIMATED MATERIAL QUANTITIES

REINFORCING STEEL (LBS.)	CONCRETE (C.Y.)
9702	49.7

QUANTITIES	(ONE SLAB)
APPROACH SLAB	123 S.Y.

HIGHWAY 6 VIADUCT
MANDAN

(AT BEGIN BRIDGE)

APPROACH SLAB

89DLS7

6-067.352-33

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	51

WIDTH = 55'-3"

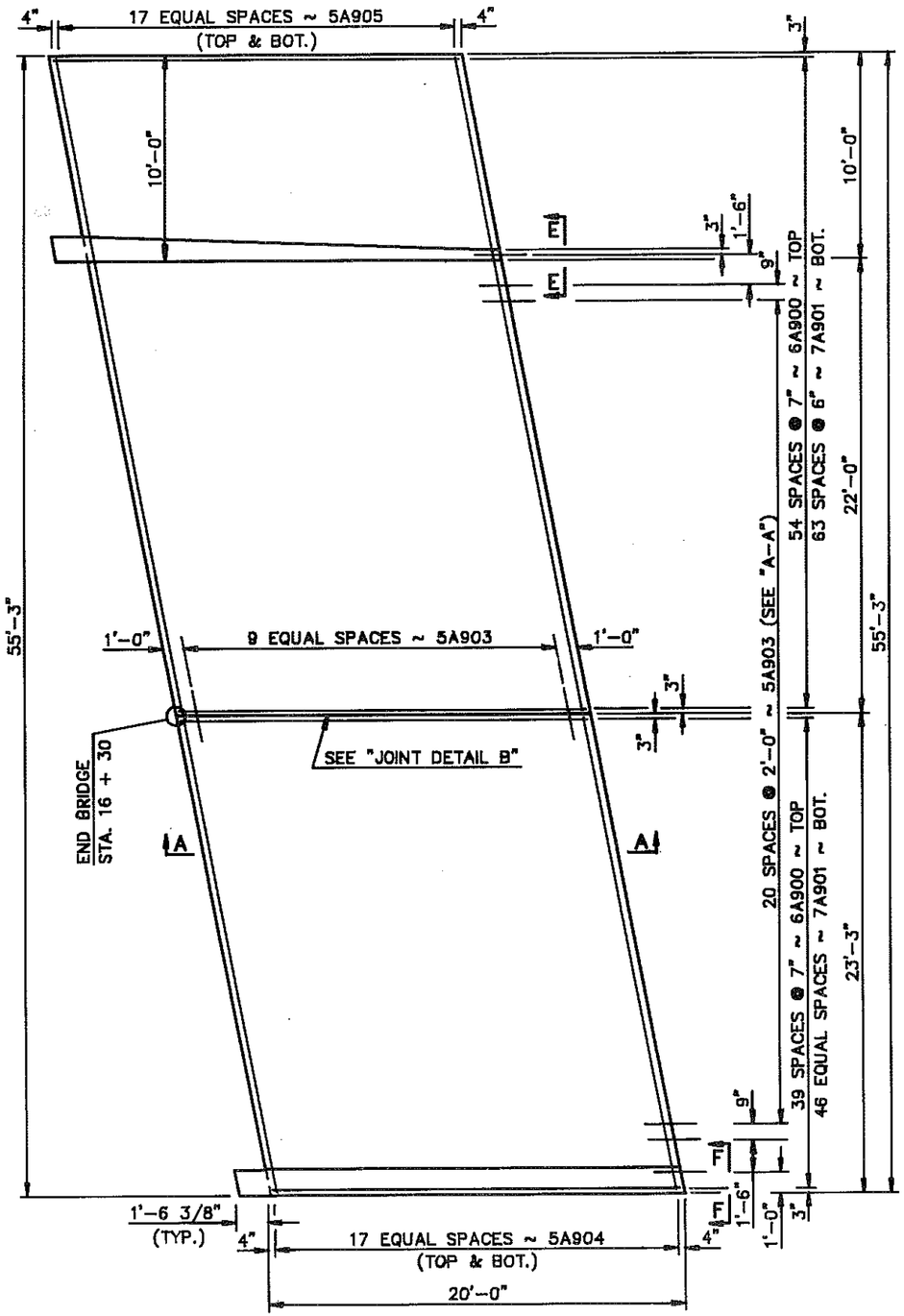
SKEW ANGLE = 10° 51'

BAR LIST - ONE SLAB

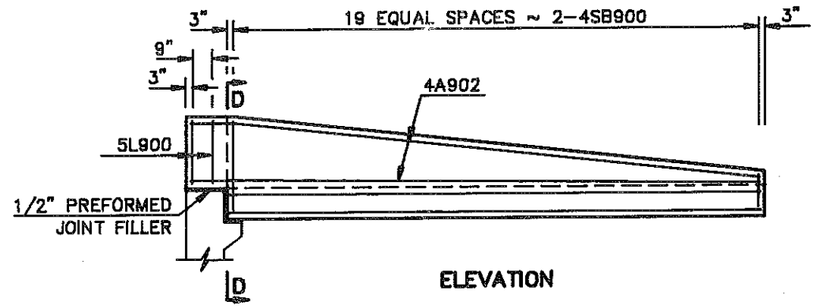
SIZE	MARK	NO.	LENGTH
6	A900	95	19'-8"
7	A901	111	19'-8"
4	A902	4	21'-2"
5	A903	35	2'-6"
5	A904	36	23'-4"
5	A905	36	32'-3"
4	SB900	4	66'-8"
5	L900	4	5'-0"

ESTIMATED MATERIAL QUANTITIES

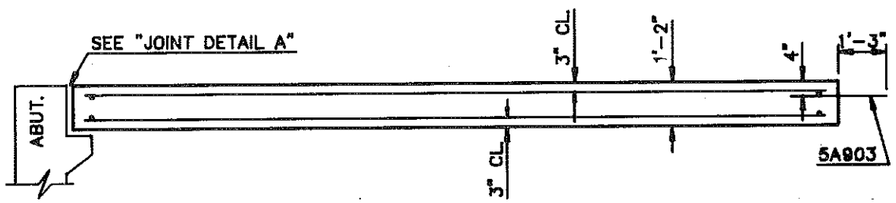
REINFORCING STEEL (LBS.)	CONCRETE (C.Y.)
9702	49.7



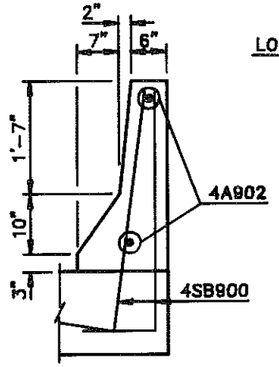
PLAN



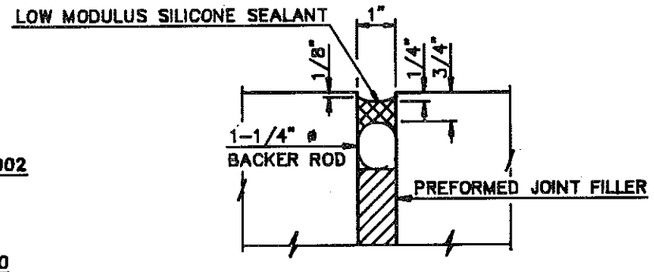
ELEVATION



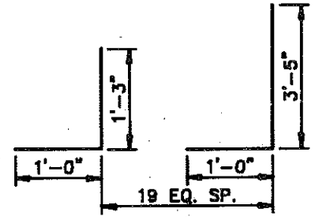
A-A



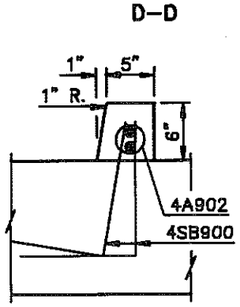
D-D



JOINT DETAIL A



SB900



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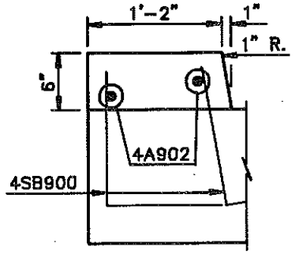

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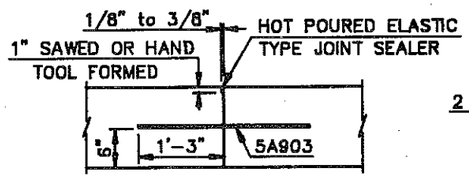
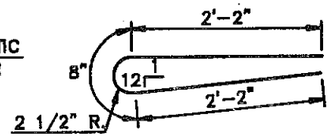


JOINT DETAIL B



L900

NOTE:

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THE CONCRETE SHALL BE CLASS AE-3 AND THE REINFORCING STEEL SHALL BE GRADE 60.

QUANTITIES	(ONE SLAB)
APPROACH SLAB	123 S.Y.

HIGHWAY 6 VIADUCT
MANDAN

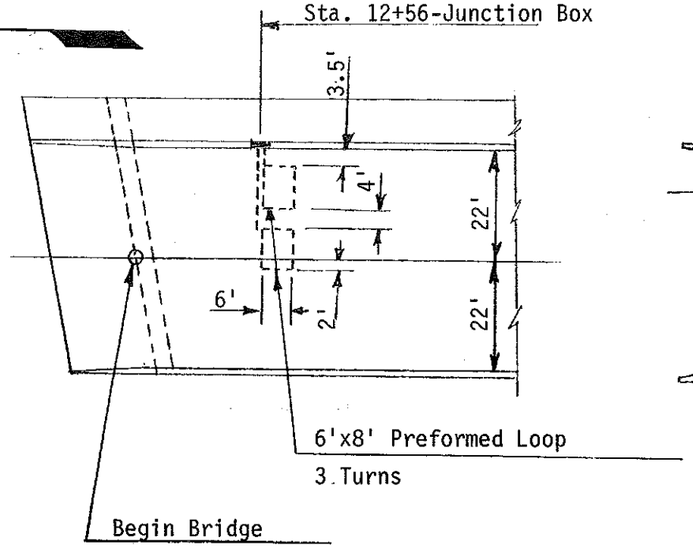
(AT END BRIDGE)

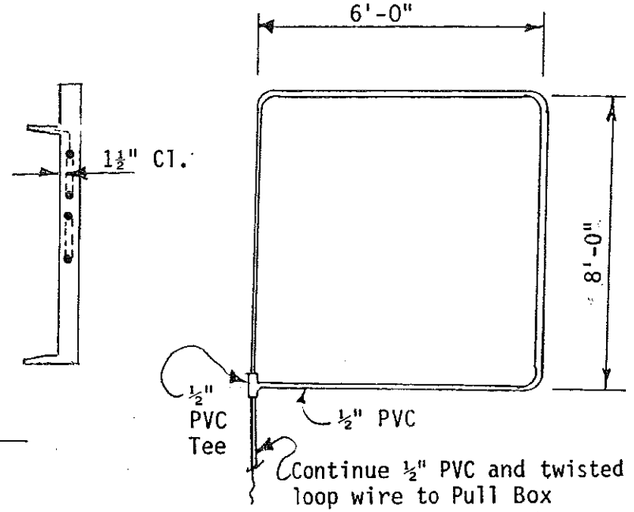
APPROACH SLAB

89DLS4

6-067.352-34

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	52

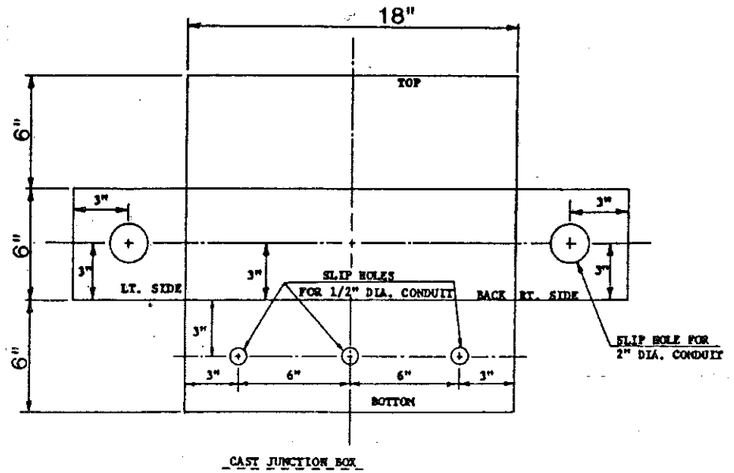




PREFORMED LOOP DETECTOR LAYOUT

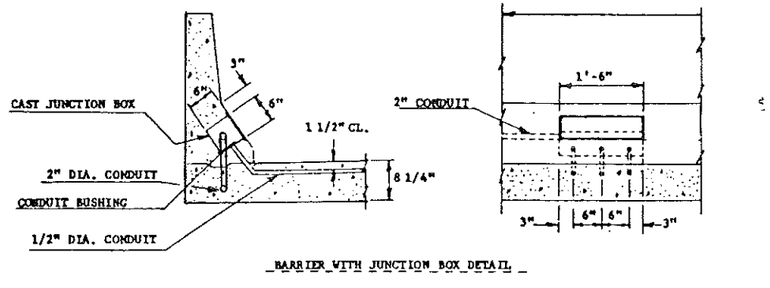
PERFORMED LOOP DETECTOR: The Preformed Loop Detector shall be constructed of PVC and loop conductor. The loop detector shall be totally encased in ½" schedule 40 PVC, (sprinkler pipe, heavy wall construction) with pipe fittings and glue. One corner shall be terminated with a ½" PVC tee fitting to provide an exit to the pull box conduit. The PVC is to be sealed at the joints with water pipe fitting flue to prevent water entrenchment. The wire shall be No. 14 AWG, Type XHHW or RHHN/ THWN, 600 V stranded single conductor. The wire loop shall be constructed from a continuous piece of wire with no splices throughout the entire length to the pull box. Three (3) turns shall be placed in the preformed loop. The wire from the loop to the junction box shall be twisted to provide a minimum of two to five turns per foot. A minimum of 6 feet of loop wire slack shall be coiled and left in the junction box. The junction box end of the conduit shall be sealed to protect against water entrenchment.

Loop detectors shall be tied down.



CAST JUNCTION BOX

DIMENSIONS ARE INSIDE MEASUREMENTS.
TYPE "YR" CAST IRON
VIEW LOOKING INTO BOX-SIDES LAID DOWN.



BARRIER WITH JUNCTION BOX DETAIL

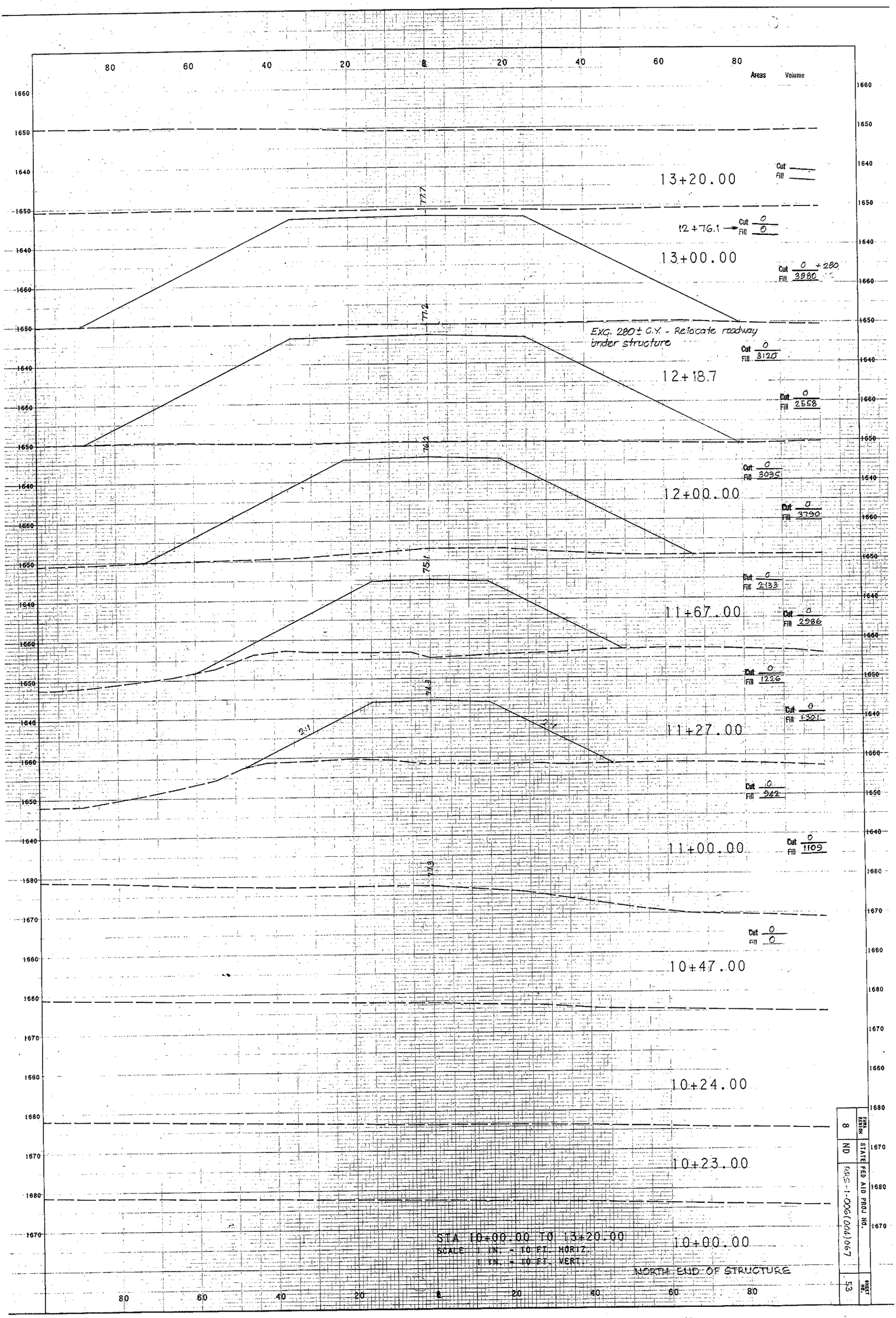
THE JUNCTION BOX: Shall be a flush mounted watertight (NEMA-4)-rain tight cast iron - Type "YR." The type "YR" recessed cover box shall be listed by the Underwriters Laboratories, Inc. The box shall be designed especially for flush mounting and the steel cover shall be suitable for vehicle traffic. The cover shall be provided with a neopreme gasket. The box and cover shall be hot dip galvanized.

The conduit and cast iron junction box shall be installed in the bridge barrier wall. The conduit leading to the loops shall be installed in the deck of the bridge at the barrier prior to installation of the barrier. The conduit shall extend a sufficent distance into the wider portion of the barrier wall with a coupling so that the remaining conduit can be installed and sealed. Before the loops are covered with concrete, the contractor shall test the loop in accordance with section 772.03 F.7 of the Std. Sepc. and the results shall be recorded and reported as specified in the section 772.03 F.9 of the Std. Spec.

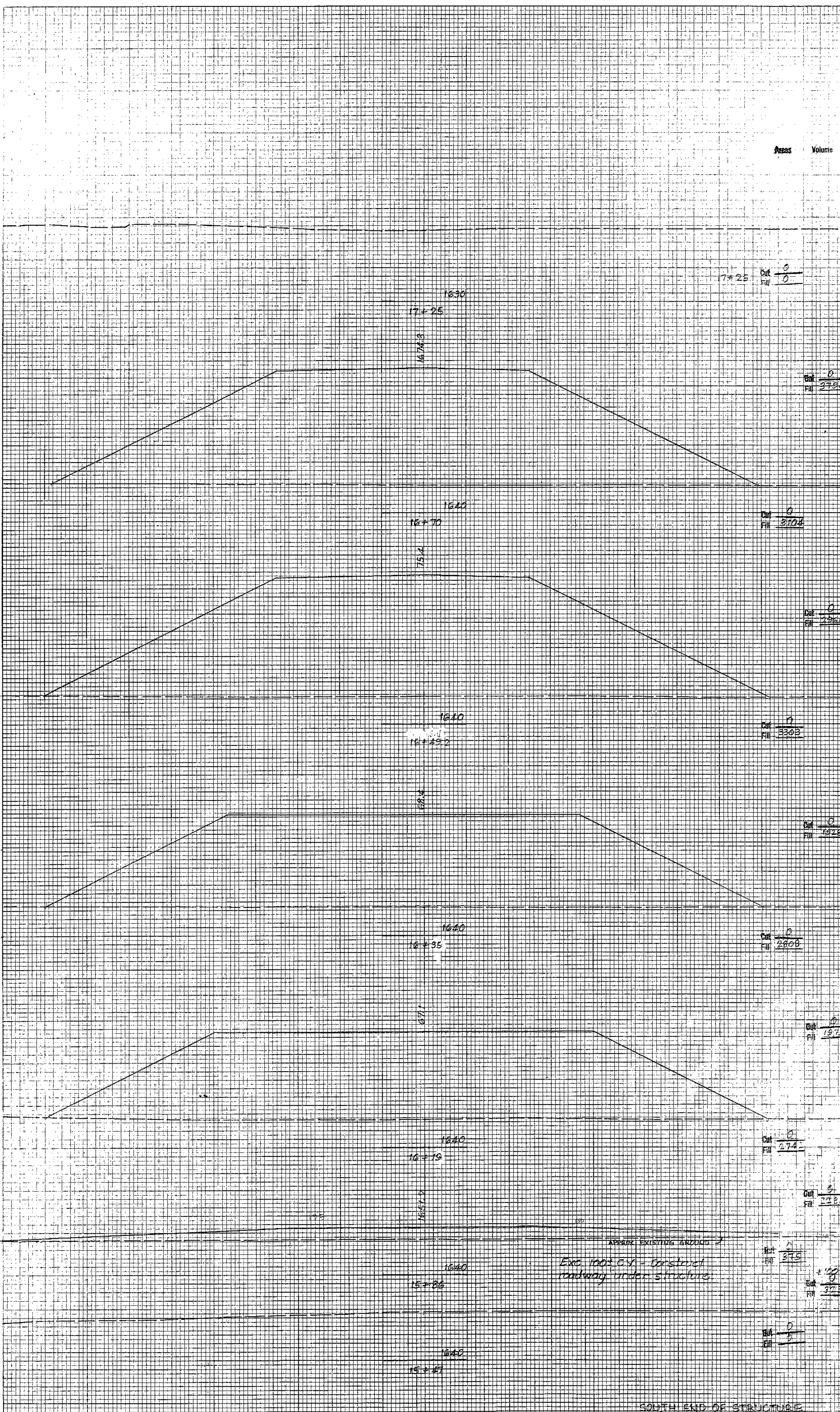
See Structural Note No. 772

TRAFFIC CONTROL SYSTEM
Loop Detector Layouts

Highway 6 (10th Ave.) Structure
Mandan, ND



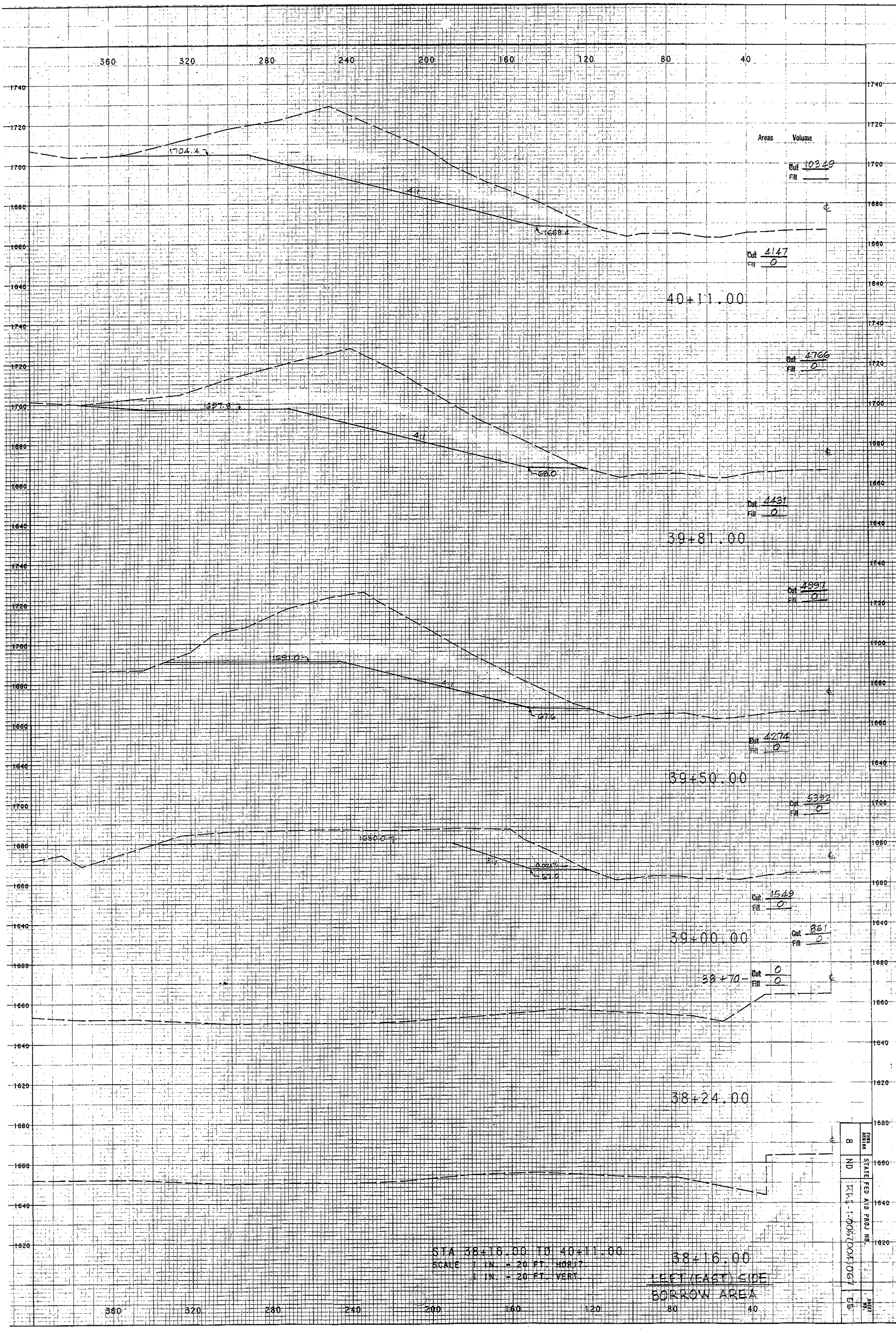
FORM REVISION	STATE	FED AID PROJ NO.	SHEET NO.
8	ND	BRS-1-006(004)067	33

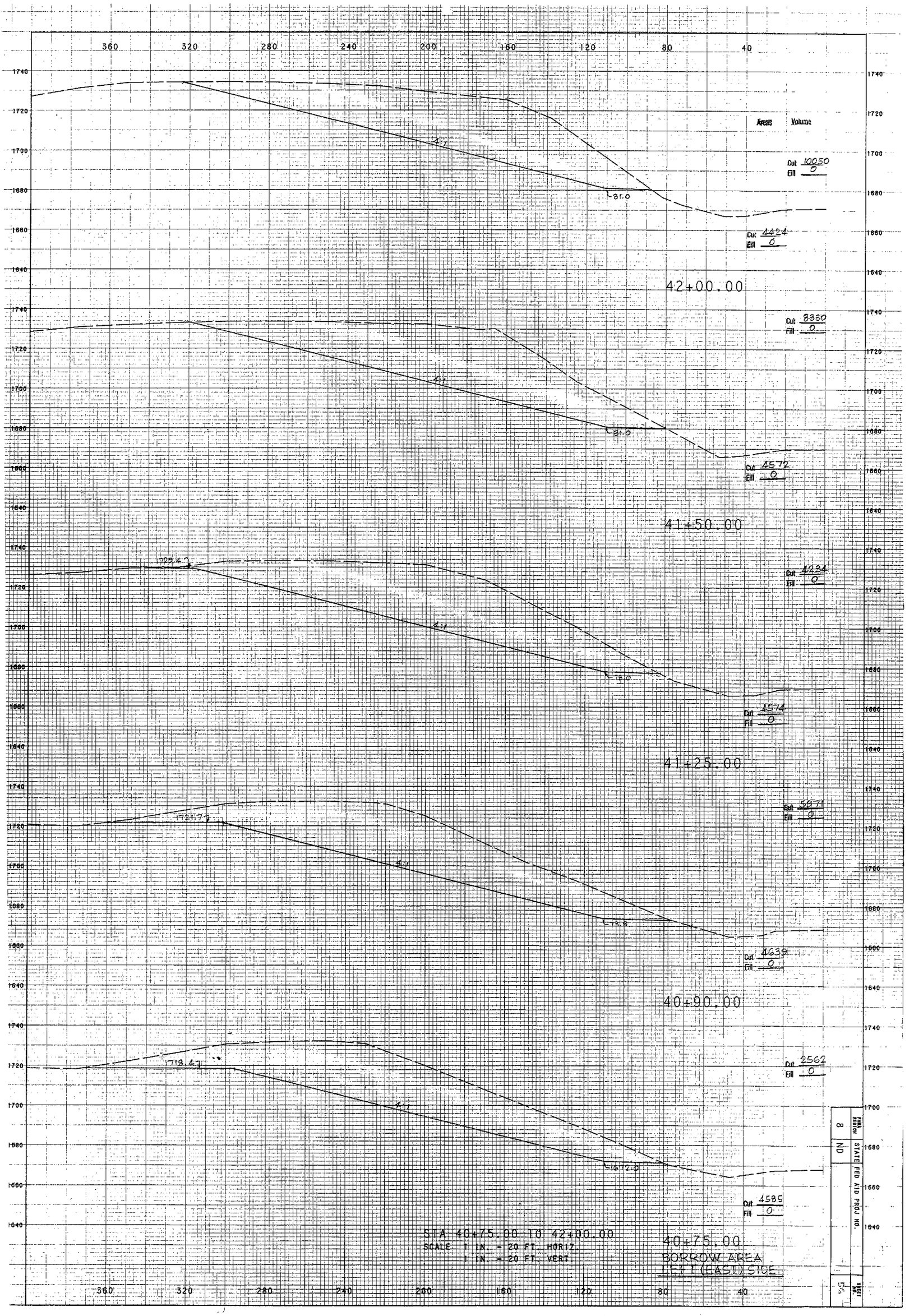


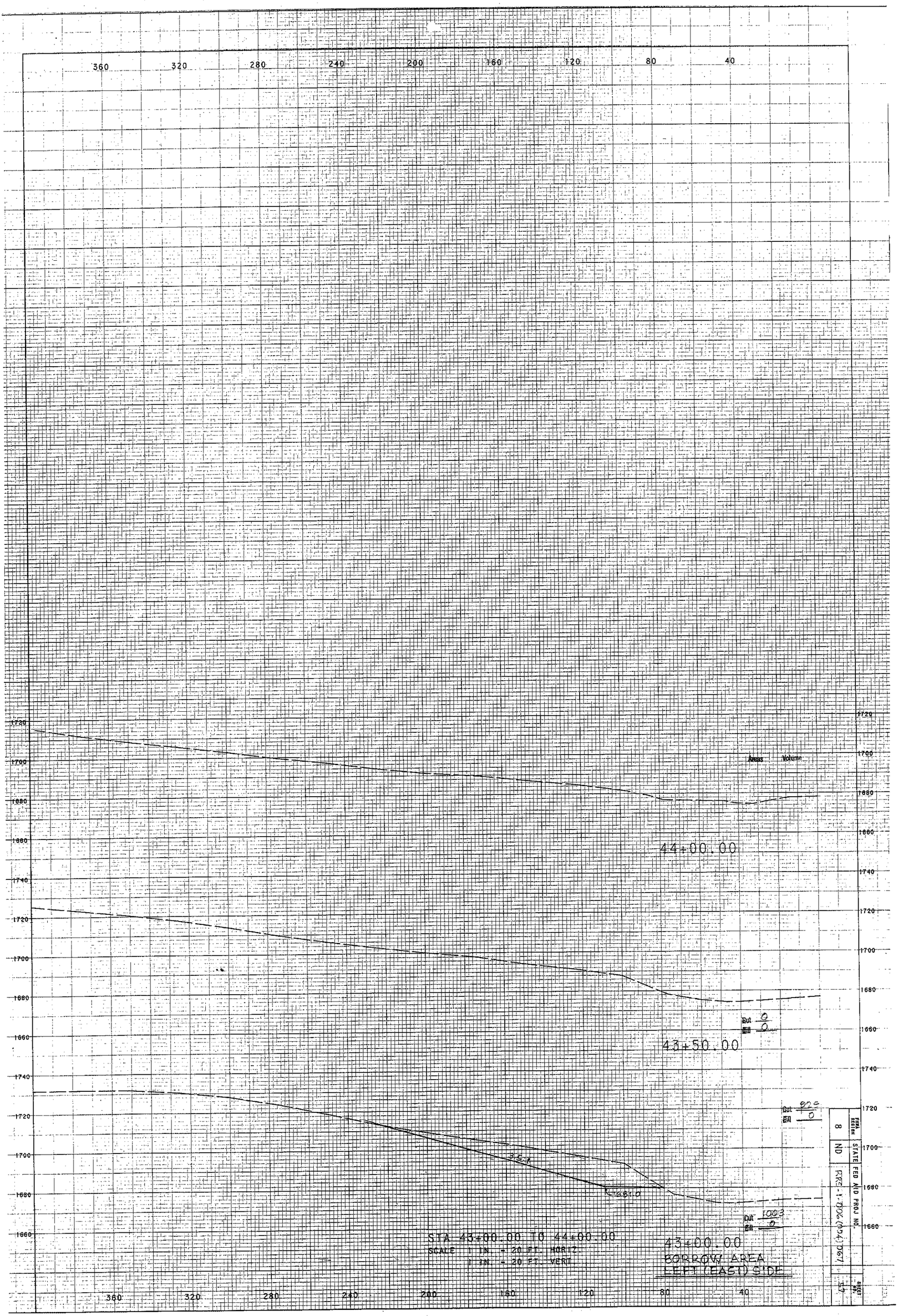
Areas
Volume
17+25
Cut 0
Fill 0
1630
17+25
1674.3
Cut 0
Fill 2734
1640
16+70
75.4
Cut 0
Fill 3104
Cut 0
Fill 2961
1640
16+49.2
68.4
Cut 0
Fill 3303
Cut 0
Fill 1928
1640
16+35
71.0
Cut 0
Fill 2808
Cut 0
Fill 1973
1640
16+19
1665.0
Cut 0
Fill 274
Cut 0
Fill 226
APPROX. EXISTING GROUND
Exc. 100± C.Y. - Construct roadway under structure.
1640
15+86
Cut 0
Fill 3715
± 100
Cut 0
Fill 3775
Cut 0
Fill 0
1640
15+47
SOUTH END OF STRUCTURE

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	[illegible] 026(004)067	54

Keuffel & Esser Company PLATE 3, CROSS SECTION 487052 Made in U.S.A.


FHWA REGION 8
STATE ND
FED AID PROJ NO. RRS-1-006(004)067
SHEET NO. 65
Areas
Volume
Cut 10349
Fill
Cut 4147
Fill 0
40+11.00
Cut 4766
Fill 0
Cut 4431
Fill 0
39+81.00
Cut 4997
Fill 0
Cut 4274
Fill 0
39+50.00
Cut 5392
Fill 0
Cut 1549
Fill 0
39+00.00
Cut 861
Fill 0
38+70
Cut 0
Fill 0
38+24.00
38+16.00
STA 38+16.00 TO 40+11.00
SCALE 1 IN. = 20 FT. HORIZ.
1 IN. = 20 FT. VERT.
LEFT (EAST) SIDE
BORROW AREA


360
320
280
240
200
160
120
80
40
1740
1720
1700
1680
1660
1640
Areas
Volume
Cut 10050
Fill 0
4:1
81.0
Cut 4424
Fill 0
42+00.00
Cut 8330
Fill 0
4:1
81.0
Cut 4572
Fill 0
41+50.00
1703.4
Cut 4234
Fill 0
4:1
15.0
Cut 4574
Fill 0
41+25.00
1721.7
Cut 5871
Fill 0
4:1
15.8
Cut 4639
Fill 0
40+90.00
1719.47
Cut 2562
Fill 0
4:1
16.2
Cut 4585
Fill 0
STA 40+75.00 TO 42+00.00
SCALE 1 IN = 20 FT. HORIZ.
1 IN = 20 FT. VERT.
40+75.00
BORROW AREA
LEFT (EAST) SIDE
8
ND
STATE
FED AID PROJ NO.
SHEET NO.
15a

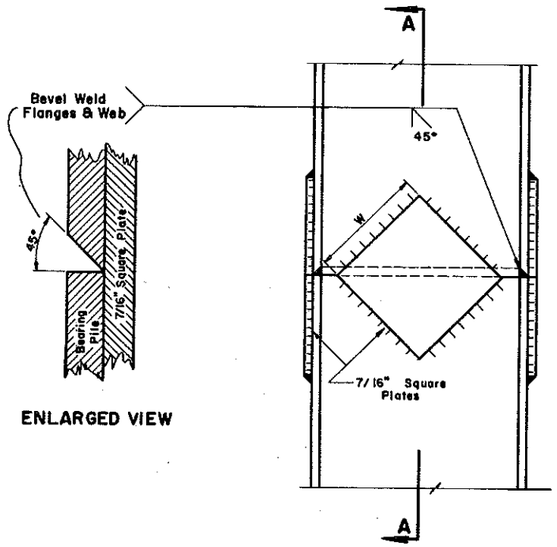


8	FED. REGION		
ND	STATE		
RRS-1-006(004)067	FED. AID PROJ. NO.		
17	SHEET NO.		

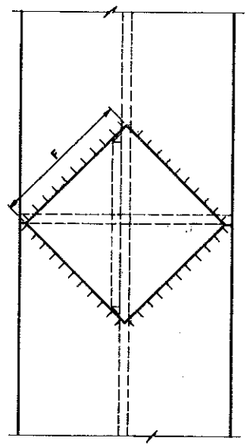
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEETS
8	N.D.		

D-622-1

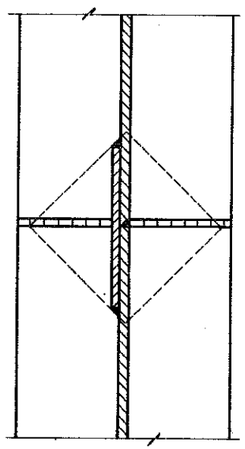
RRS-1-006(004)067



ENLARGED VIEW



Flame Scarf Inside Of Both Flanges And One Side Of Web Of Upper Section



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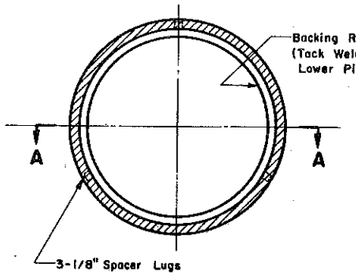
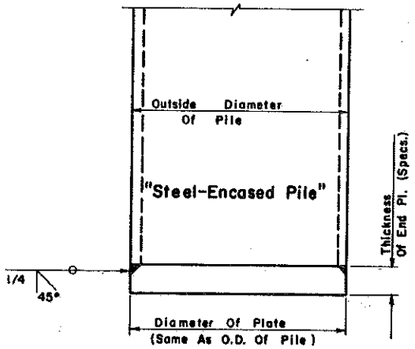
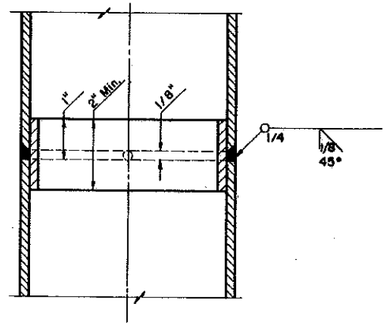


Backing Ring may be made from pile cut-offs or other material of a like quality.



END PLATE DETAIL



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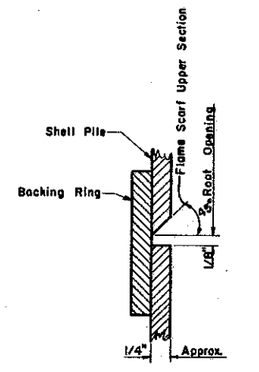
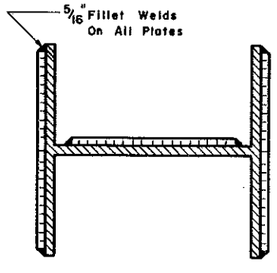


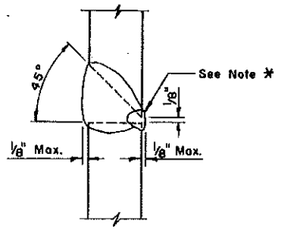
ENLARGED VIEW

SHELL PILE SPLICE DETAIL



PILE	8"	10"	12"	14"
F FLANGE	5"	6½"	8"	10"
W WEB	4"	5½"	6½"	8"

H-PILE SPLICE DETAIL



ALTERNATE H-PILE SPLICE DETAIL

Steel H-Pile may be spliced with complete penetration groove welds in both flanges and web in lieu of using the 7/16" reinforcing plates.

AWS classification E70XX low hydrogen electrodes shall be used.

*Welds made without the use of backing material shall have the root gouged to sound metal and welded from the second side.

All welding shall conform to the current specification for "Welded Highway and Railway Bridges of the American Welding Society."

10-1-86	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: [signature] BRIDGE ENGINEER

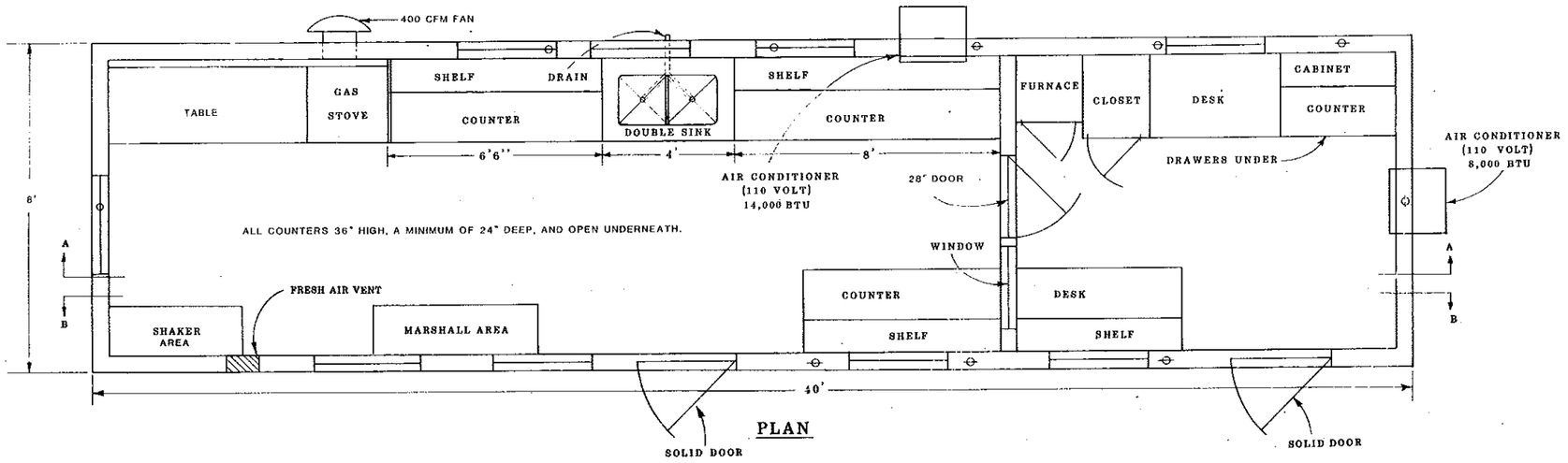
PILE SPLICE DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		

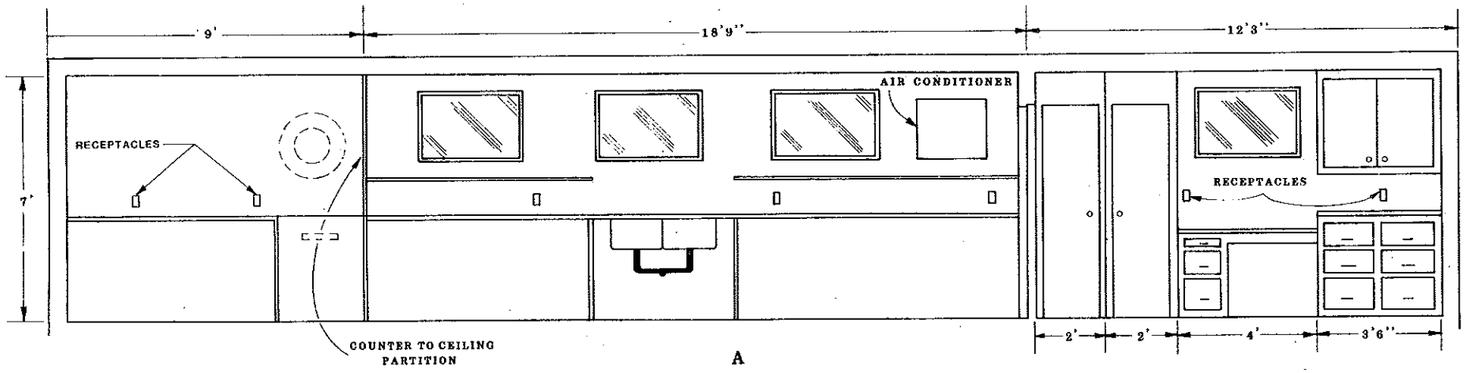
D-706-1

RRS-1-006(004)067

TYPE C FIELD LABORATORY



PLAN



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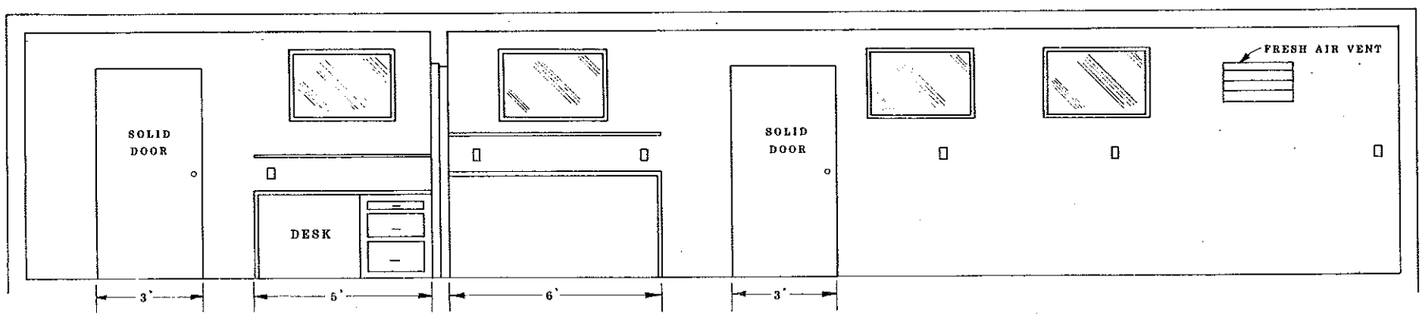


B

LONGITUDINAL SECTIONS

NOTES:

There shall be a minimum of 6 exterior ventilated casement or double hung windows. The minimum total area of opening shall be 34 square feet. The number, size, and location of windows may be adjusted to fit conditions. Suggested locations are shown on drawing.

The sink shall be double compartment stainless steel. Each compartment shall be a minimum of 16"x14"x10" deep. The sink shall be drained to an outside wasteline. A trap is not required. Water service lines shall be copper or plastic having a diameter of 1/2 inch.

The lab shall be equipped with an exhaust fan capable of removing inside air at a rate of 400 CFM.

The fresh air vent shall be hinged to open or close manually.

24" x 48" table shall be provided capable of holding a 200 lb. masonry saw. The table shall have a minimum clearance of 36" overhead.

The water supply tank shall have a capacity of 500 gallons.

Steps shall be provided for each of two entrance doors. Steps for each area shall be made of, or covered with, a material providing for a non-slip surface. They shall be heavy duty steps that are capable withstanding heavy loadings and extensive use.

The pressure tank on the pump shall be 20 gallon capacity.

Locks, latches and hinges for main doors shall be heavy duty type to withstand the intense use in service

The wall between the office and the work area shall be properly insulated to prevent the transmission of heat & noise.

The floor beneath the marshall area shall be heavily reinforced.

The lab shall be equipped with steel cable tie downs and ground anchors at each corner of the lab.

Electrical service entrance shall be wired for 100 amps, and have seperate circuits for air conditioners. Convenience outlets shall have a minimum spacing of 4 feet in counter areas.

10-1-86	
REVISIONS	
DATE	CHANGE
5/5/88	Drawing and Notes

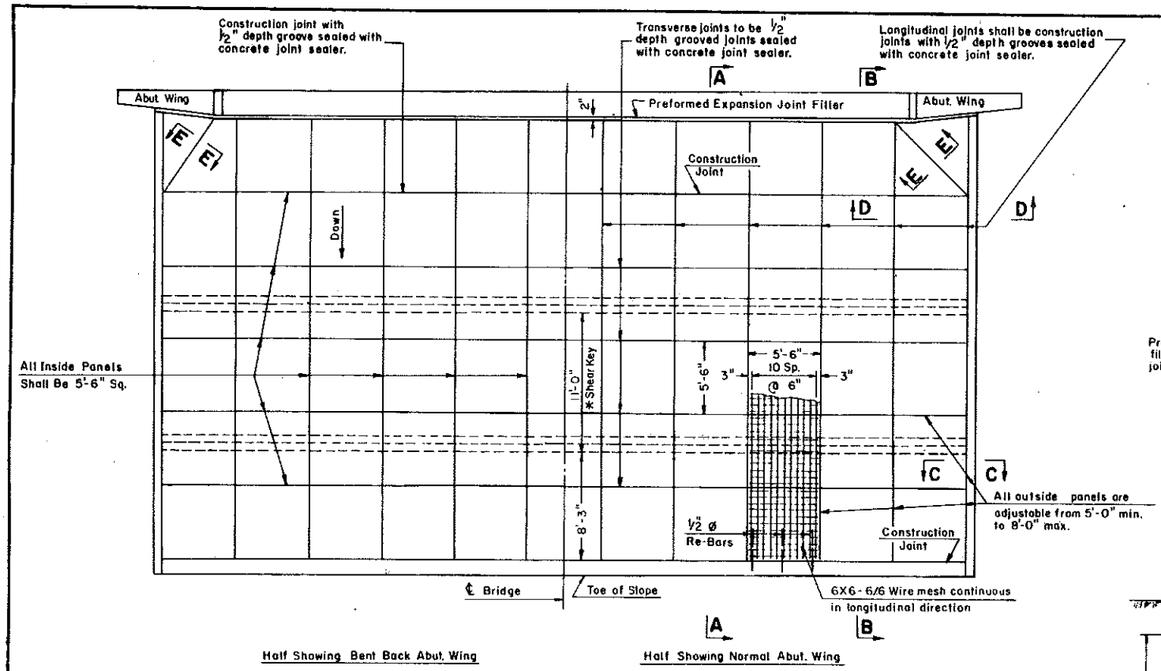
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
Design Engineer

STANDARD SLOPE PROTECTION UNDER BRIDGES

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		

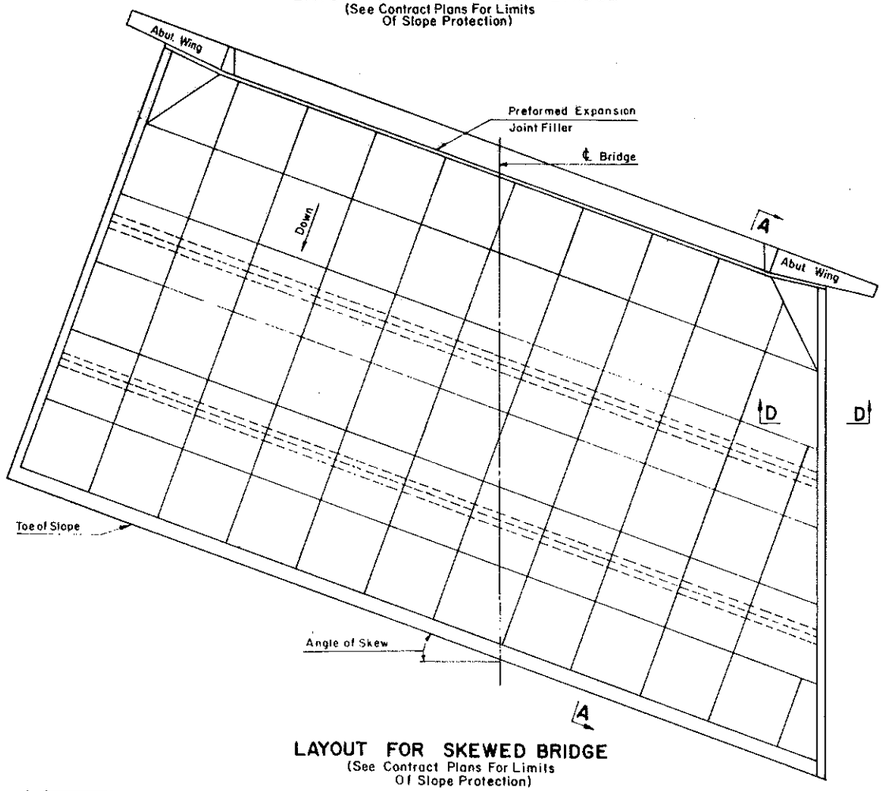
D-708-1

RRS-1-006(004)067



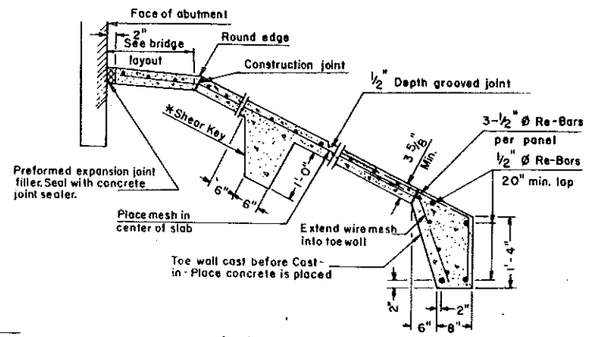
LAYOUT FOR 90° RIGHT BRIDGE

(See Contract Plans For Limits Of Slope Protection)

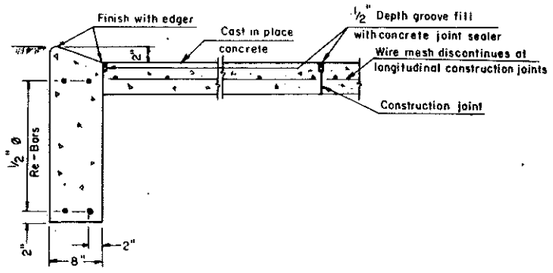


LAYOUT FOR SKEWED BRIDGE

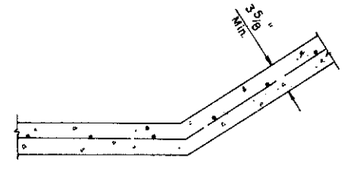
(See Contract Plans For Limits Of Slope Protection)



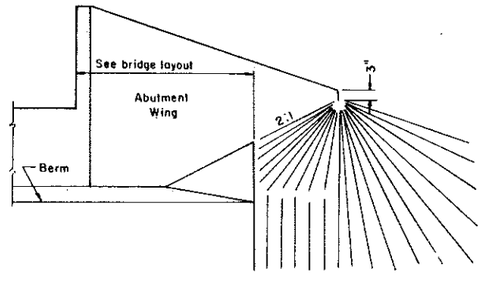
A-A



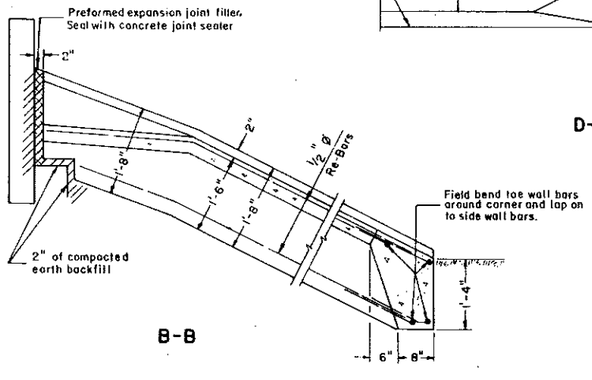
C-C



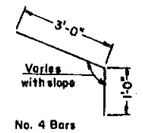
E-E



D-D



B-B



No. 4 Bars

BENT BAR DETAIL

NOTES:

Wherever parts of a structure, such as pier columns, walls, ect., are contacted by the slope protection, preformed expansion joint filler shall be installed between contact area as shown.

* Shear Keys shall be placed in every other panel on the slope, as shown. Do not install Shear Key on berm.

All construction joints shall be sealed with concrete concrete joint sealer as well as all cracks that develor before the project has been accepted. See paragraph 826.02 for concrete joint sealer.

10-1-86 REVISIONS	
DATE	CHANGE
8-3-87	Joint Filler Note Removed

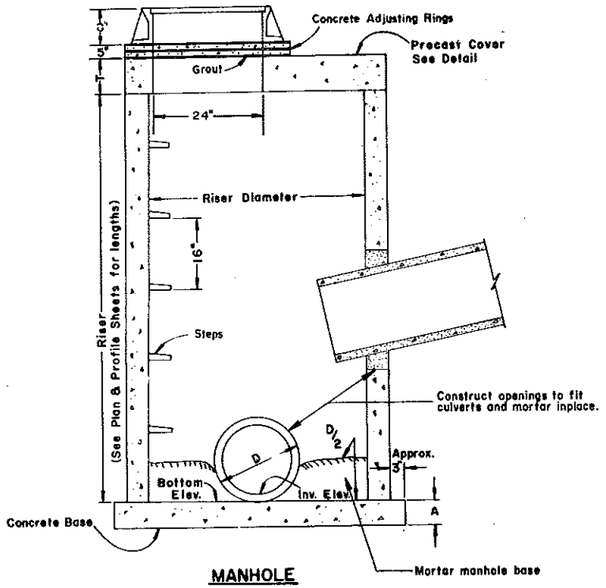
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED: David K. O. Leer
DESIGN ENGINEER

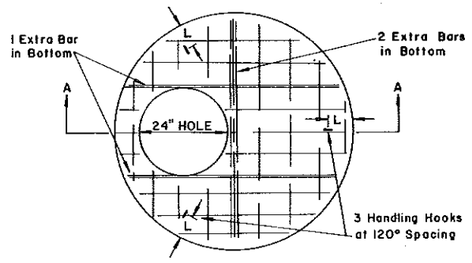
FED. AID REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	

D-722-5

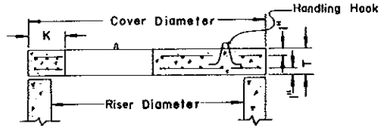
MANHOLE DETAILS



MANHOLE



TOP VIEW



SECTION A-A

PRECAST COVER

PRECAST MANHOLE COVERS

PIPE DIAMETER	COVER DIAMETER	WEIGHT OF SECTION	T	K	L	BOTTOM BARS	TOP BARS
42"	51"	800#	6"	6"	7"	#4 AT 6"	———
48"	58"	1110#	6"	6"	8"	#4 AT 6"	———
54"	65"	1950#	8"	6"	8"	#4 AT 6"	———
60"	72"	2470#	8"	7"	9"	#4 AT 6"	#3 AT 6"
66"	79"	3050#	8"	7"	9"	#4 AT 6"	#3 AT 6"
72"	86"	3680#	8"	8"	10"	#4 AT 6"	#3 AT 6"
78"	93"	4360#	8"	8"	10"	#4 AT 4"	#3AT 4"
84"	100"	5100#	8"	9"	11"	#4 AT 4"	#3 AT 4"
90"	107"	5890#	8"	9"	11"	#4 AT 4"	#3 AT 4"
96"	114"	6730#	8"	9"	11"	#4 AT 4"	#3AT 4"
102"	121"	7630#	8"	9"	12"	#4 AT 4"	#3AT 4"
108"	128"	12460#	12"	10"	12"	#4 AT 4"	#3 AT 4"
120"	140"	15500#	12"	11"	13"	#4 AT 4"	#3 AT 4"

Top and Bottom Bars run in both directions.

MANHOLE BASES

PIPE DIAMETER	BASE DIAMETER	WEIGHT OF SECTION	A	BARS
42"	58"	1380#	6"	#3 AT 6"
48"	66"	1785 #	6"	#3 AT 6"
54"	72"	2125 #	6"	#3 AT 6"
60"	78"	3320 #	8"	#3 AT 6"
66"	86"	4030 #	8"	#3 AT 6"
72"	92"	4610 #	8"	#3 AT 6"
78"	100"	5460 #	8"	#3 AT 6"
84"	107	6230 #	8"	#3 AT 6"
90"	114	7070 #	8"	#3 AT 6"
96"	120	7850 #	8"	#3 AT 6"
102"	127	13200 #	12"	#3 AT 6"
108"	132	14270 #	12"	#3 AT 6"
120"	148	17925 #	12"	#3 AT 6"

NOTES: BOTTOMS OF MANHOLES SHALL BE CUT OR PRECAST SQUARE TO FIT THE BASE GROUT JOINT BETWEEN BASE AND WALL WITH CEMENT MORTAR. THE CONTRACTOR MAY, IF HE SO DESIRES, CONSTRUCT THE MANHOLES LOWER THAN PLAN GRADE AND BRING THE CASTING TO GRADE USING PRECAST ADJUSTING RINGS IN A MANNER SATISFACTORY TO THE ENGINEER IN THE FIELD.

THE CONTRACTOR SHALL HAVE THE OPTION OF USING PRE-CAST OR POURED IN PLACE BASES.

PRECAST BASES SHALL BE REINFORCED AS SHOWN IN LISTING FOR EACH SIZE BASE.

THE AGGREGATE SIZE SHALL BE APPROVED BY THE ENGINEER.

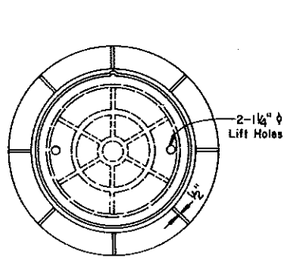
PRECAST BARRELS AND RISERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M-199.

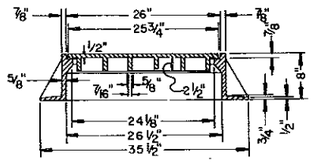
NOTE: METHOD OF MEASUREMENT FOR MANHOLES SHALL BE AS FOLLOWS. THE CONTRACT UNIT PRICE BID FOR MANHOLES SHALL INCLUDE THE FURNISHING AND INSTALLING THE FOLLOWING:

1. CAST IRON RING AND COVER OR BEEHIVE CASTING & COVER
2. PRECAST COVER
3. CONCRETE BASE
4. CONCRETE ADJUSTING RINGS

THE ITEM "MANHOLE RISER" SHALL INCLUDE THE FURNISHING & INSTALLING OF THE REQUIRED LENGTH OF RISER & CAST IRON STEPS.

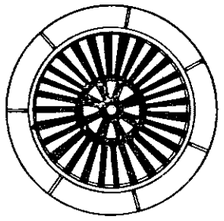
MORTAR TO BE INCLUDED IN THE PRICE BID FOR MANHOLES.

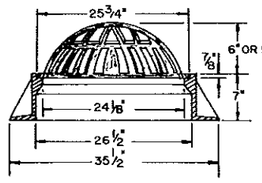




MANHOLE CAST IRON RING & COVER

Weight 460 Lbs.



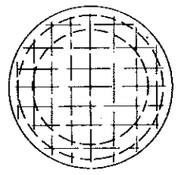


BEEHIVE CASTING & COVER

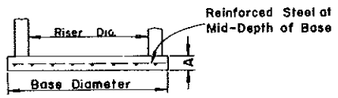
(To be used when noted on plans)

6" Beehive Weight 285 Lbs.

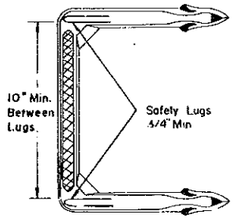
9" Beehive Weight 300 Lbs.



TOP VIEW



PRECAST MANHOLE BASE



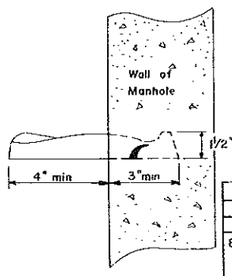
STEP DETAIL

MANHOLE STEP SHALL BE CORROSION RESISTANT AND SHALL HAVE A MINIMUM VERTICAL LOAD RESISTANCE OF 400 POUNDS AND A PULL-OUT RESISTANCE OF UP TO 1000 POUNDS. CONFIGURATION OF THE STEPS SHALL BE APPROVED BY THE ENGINEER.

THE CONTRACTOR MAY, IF HE SO ELECTS, CONSTRUCT MANHOLES OF SOLID CONCRETE BLOCK OR BRICK. THE MATERIALS SHALL BE APPROVED BY THE ENGINEER IN WRITING. THE TYPE OF CONSTRUCTION SHALL BE AS SPECIFIED IN SECTION 722 OF THE STANDARD SPECIFICATIONS.

OTHER CASTINGS, SIMILAR IN DIMENSION AND OF EQUAL OR GREATER WEIGHT THAN THAT SHOWN MAY BE USED IF ACCEPTED BY THE ENGINEER IN WRITING.

METAL USED IN THE MANUFACTURE OF CASTINGS SHALL CONFORM TO AASHTO M-105, CLASS 35 B.



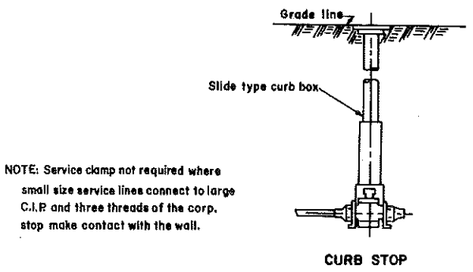
10-1-86	
REVISIONS	
DATE	CHANGE
8-3-87	NOTE

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

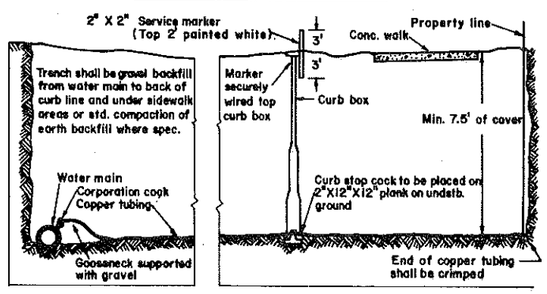
APPROVED: David K.D. Leer
DESIGN ENGINEER

FHWA REGION	STATE	FED. AID PROJ. NO	SHEET NO.
8	N.D.	RRS-1-006(004)067	

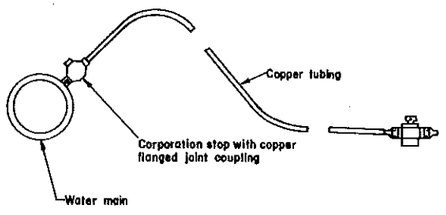
D-724-1



WATER CURB CONNECTION

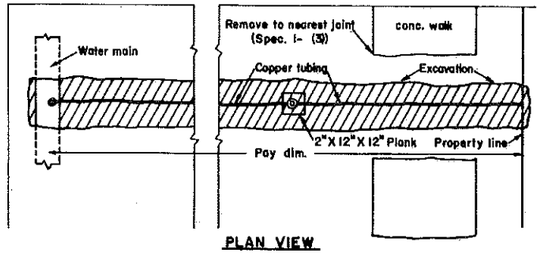


SECTIONAL ELEVATION

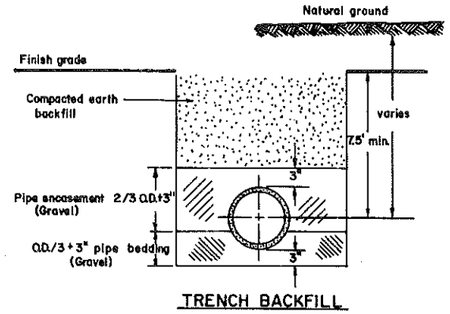


TYPICAL CORPORATION STOP AND CURB STOP

No Scale

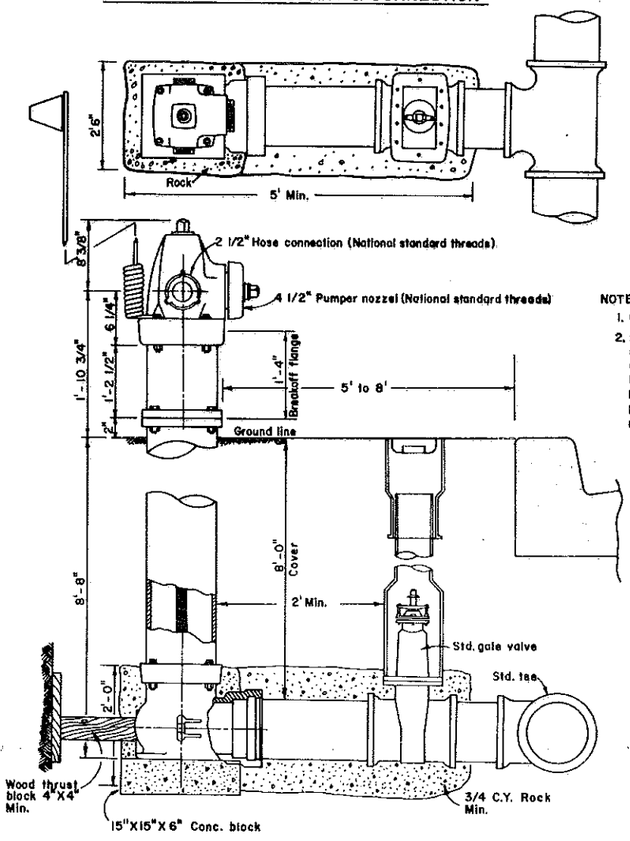


PLAN VIEW



TRENCH BACKFILL

STANDARD FIRE HYDRANT & CONNECTION

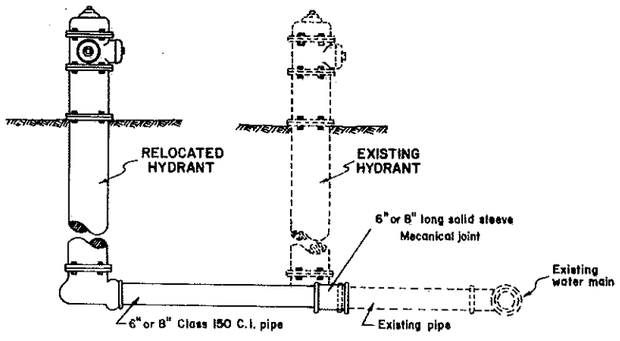


NOTES:

1. Operating & Cap nuts: city standards
2. Supplier will furnish and install hydrant marker. Cost will be included with the unit bid price for the hydrant. The hydrant marker shall be the Nordic Flexi-Flag as manufactured by Nordic Fiberglass, Inc. or approved equal. marker will be rust resistant.

Concrete thrust blocking to be placed as directed.

Hydrant to be set on a precast concrete pad 6" thick by 18" sq. The hydrant shall be surrounded by 1/2 C.Y. course conc. aggr.



LAYOUT FOR RELOCATION OF HYDRANTS

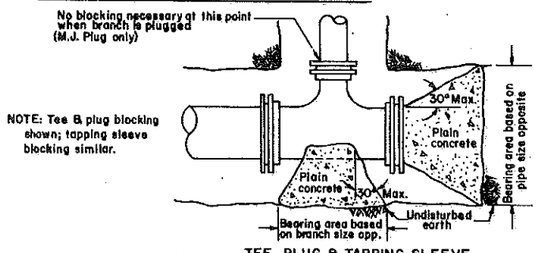
TYPICAL SEQUENCE OF INSTALLATION

1. Remove existing hydrant.
2. Install long solid sleeve mech. joint, Cl.150 C.I.P.
3. Install 6"or 8" Cl. 150 C.I. Pipe (length as needed).
4. Install salvaged hydrant at new location.

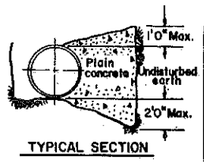
All materials necessary for the Relocation of the Hydrant to be included in price bid for "Relocate Hydrant."

Existing water main valve to be adjusted as necessary and paid for as "Adjusted Utility Appurtenances."

WATERMAIN THRUST BLOCK DETAILS



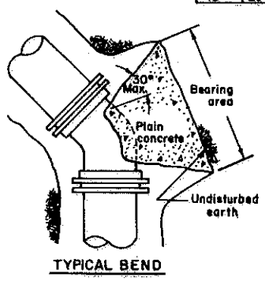
TEE, PLUG & TAPPING SLEEVE



TYPICAL SECTION

TABLE OF REQUIRED BEARING AREAS					
SIZE OF PIPE	90° BEND	45° BEND	22.5° BEND	11.25° BEND	TEES, PLUGS & TAPPING SLEEVE
4"	2' SQ.	2' SQ.	2' SQ.	2' SQ.	2' SQ.
6"	3' SQ.	2' SQ.	2' SQ.	2' SQ.	3' SQ.
8"	5' SQ.	3' SQ.	2' SQ.	2' SQ.	4' SQ.
10"	8' SQ.	4' SQ.	3' SQ.	2' SQ.	6' SQ.
12"	11' SQ.	6' SQ.	3' SQ.	2' SQ.	8' SQ.
16"	20SQ.	11' SQ.	6' SQ.	4' SQ.	15' SQ.
18"	25SQ.	14' SQ.	7' SQ.	4' SQ.	18' SQ.

NOTE: Concrete blocking to be poured against undisturbed earth, Keep bolts and bolts free of concrete. Concrete in place to be included in price bid for water main.



TYPICAL BEND

THRUST BLOCK DETAIL

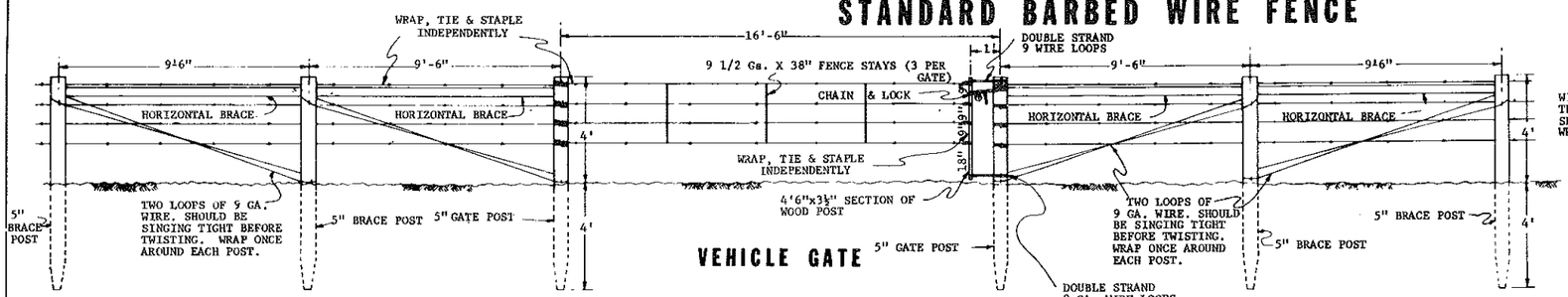
No Scale

10-1-86	NORTH DAKOTA STATE HIGHWAY DEPARTMENT
REVISIONS	
DATE / CHANGE	APPROVED: David K.O. Leer, DESIGN ENGINEER

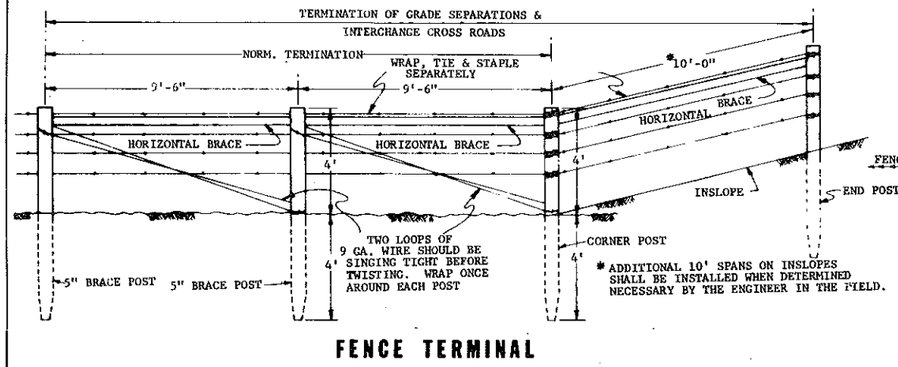
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	

D-752-1

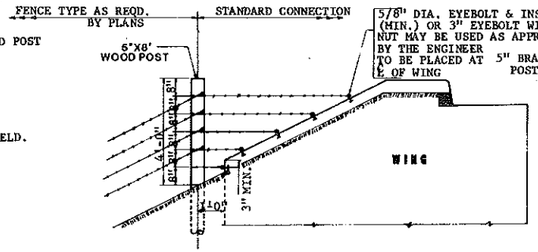
STANDARD BARBED WIRE FENCE



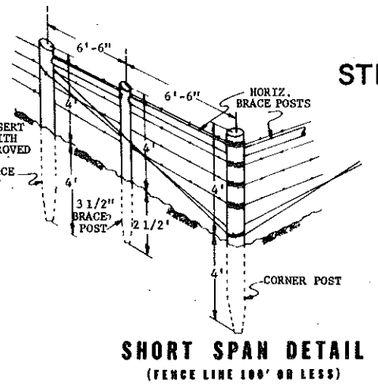
VEHICLE GATE



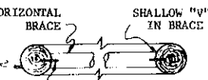
FENCE TERMINAL



DETAIL FOR TYING FENCE TO WINGS OF ABUTMENTS

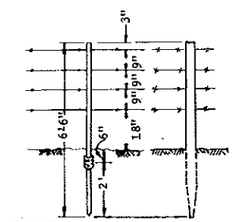


SHORT SPAN DETAIL
(FENCE LINE 100' OR LESS)



TWO LOOPS OF 9 GA. WIRE SHALL BE SINGING TIGHT THEN WRAPPED AROUND POST & SECURELY STAPLED AS SHOWN IN PLAN VIEW WRAPAROUND DETAIL.

HORIZONTAL BRACE DETAIL



STEEL OR WOOD LINE POSTS
16'-6" SPACING

NOTES:

CORNER ASSEMBLY POSTS SHALL BE ROUND-BACK ANGLE STEEL OR TREATED WOOD. THE TYPE OF POST USED UNDER THE ABOVE OPTIONS SHALL BE DETERMINED BY THE CONTRACTOR. TREATED WOOD POSTS SHALL BE USED FOR GATES, DOUBLE BRACE ASSEMBLIES AND FENCE TERMINAL. TYPE OF LINE POST TO BE INDICATED ON PLANS.

NO DEDUCTION IN MEASURED PAY LENGTH OF WIRE FENCE WILL BE MADE FOR GATES, CORNER ASSEMBLIES, DOUBLE BRACE ASSEMBLIES, FENCE TERMINALS OR DEPRESSION FENCING. DEPRESSION FENCING AND ABUTMENT FENCING SHALL BE INCLUDED IN THE PRICE BID FOR FENCING.

ALL MATERIALS SHALL BE IN ACCORDANCE WITH SEC. 762 OF THE STANDARD SPECIFICATIONS. POSTS AND BRACES SHALL BE GALVANIZED IN ACCORDANCE WITH REQUIREMENTS OF AASHTO M-111 OR PAINTED WITH PAINT CONFORMING TO SECTION 852 OF THE STANDARD SPECIFICATIONS.

UNLESS OTHERWISE SHOWN ON THE PLANS THE BARB WIRE SHALL BE 12 1/2 GAGE WIRE WITH 2 POINT BARBS.

DOUBLE BRACE ASSEMBLIES SHALL BE INSTALLED AT LOCATIONS SHOWN ON THE PLANS OR ESTABLISHED BY THE ENGINEER. THE DISTANCE BETWEEN ADJACENT FENCE TERMINALS, CORNER ASSEMBLIES, OR DOUBLE BRACE ASSEMBLIES SHALL NOT EXCEED 1320 FEET.

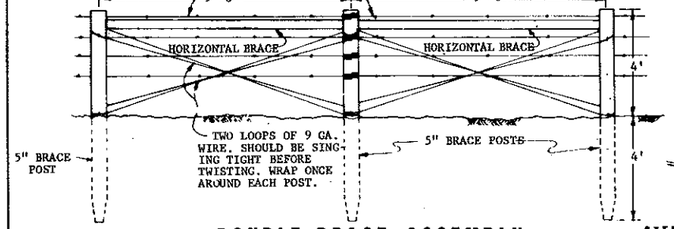
ADDITIONAL MATERIALS AND LABOR FOR EACH FENCE TERMINAL WILL BE PAID FOR AT THE PRICE BID FOR DOUBLE BRACE ASSEMBLY.

PRIVATE FENCES SHALL NOT BE CONNECTED TO THE HIGHWAY FENCE.

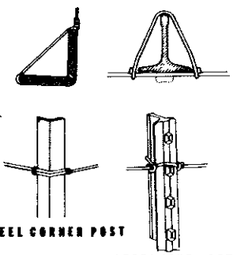
COST OF FURNISHING AND INSTALLING INSERTS AND EYEBOLTS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR FENCING. EYEBOLTS SHALL BE GALVANIZED ACCORDING TO AASHTO DESIGNATION: M-30, INSERTS OF CORROSION RESISTANT MATERIAL NEED NOT BE GALVANIZED. CONCRETE INSERTS SHALL BE OF SUCH DESIGN THAT, WHEN INSTALLED IN THE CONCRETE, WILL BE CAPABLE OF DEVELOPING THE FULL STRENGTH OF THE 5/8" DIA. THREADED EYE BOLT.

POST SIZES

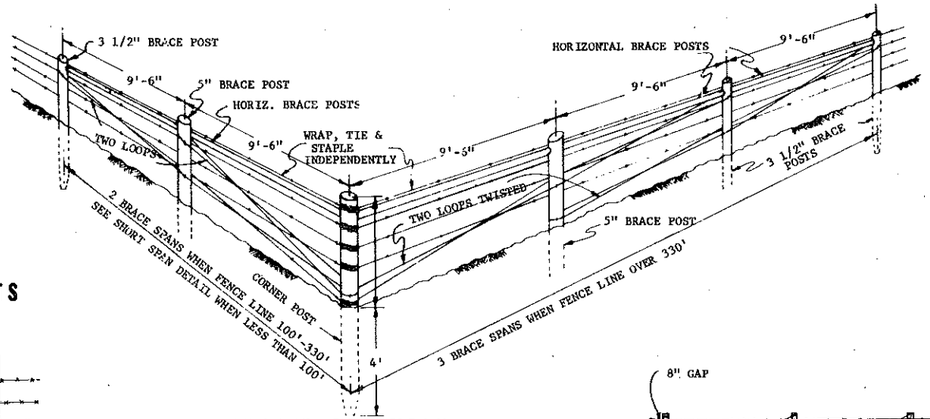
USE OF POST	TREATED WOOD		STEEL		
	Post Dia.	Post Length	Post Length	Post Wt. Lbs./Ft.	Anchor Wt. Lbs.
Line Post	3 1/2"	6'-6"	6'-6"	1.33	0.67
Corner Post	8"	8'	7'	4.10	(CONC.)
End Post	5"	8'			
Brace Post	5" / 3 1/2"	8'	7'	3.19	(CONC.)
Gate Post	5"	8'			
Horizontal Brace	3 1/2"	VAR.			



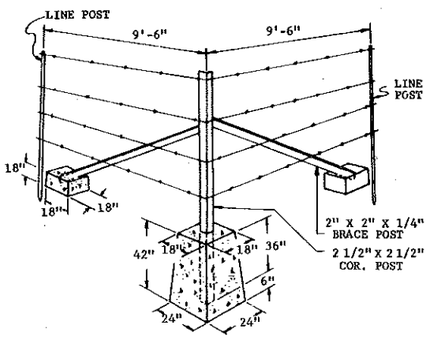
DOUBLE BRACE ASSEMBLY



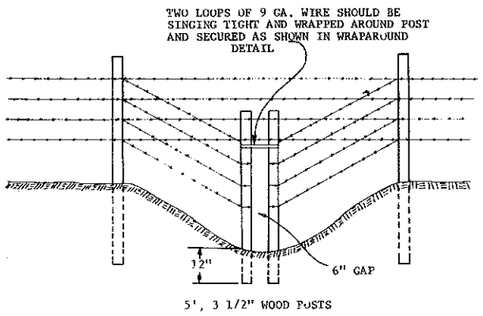
WIRE FASTENING TO POSTS



CORNER ASSEMBLY WOOD POSTS

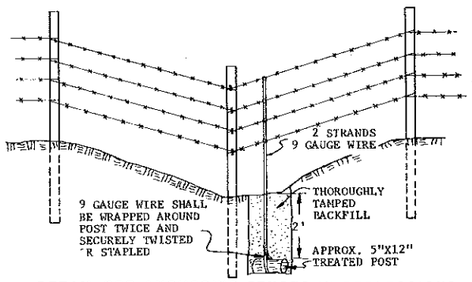


CORNER ASSEMBLY - STEEL POSTS



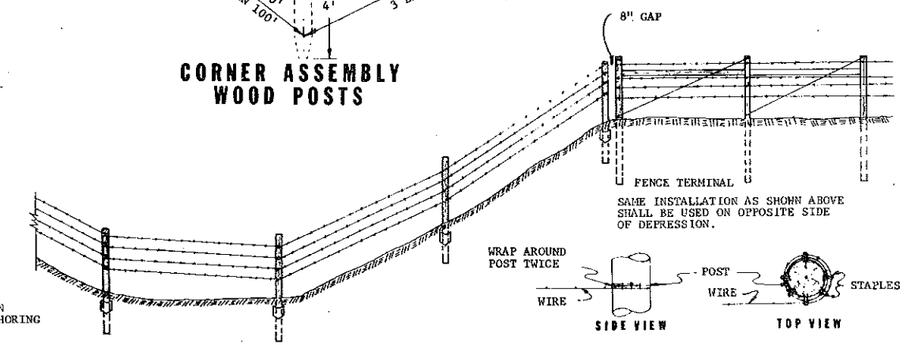
5', 3 1/2" WOOD POSTS

BREAK-AWAY FENCE FOR NARROW DEPRESSIONS SUBJECT TO FLOODING



DETAIL FOR ANCHORING FENCES IN DEPRESSIONS

THE NUMBER OF FENCE ANCHORS SHOWN IN THE PLANS IS APPROXIMATE ONLY. THE EXACT NUMBER (AND LOCATIONS) SHALL BE DETERMINED IN THE FIELD AND PAYMENT MADE ACCORDINGLY. OTHER METHODS OF ANCHORING THE FENCE MAY BE USED IF APPROVED BY THE ENGINEER.



FENCING FOR WIDE DEPRESSIONS

WRAP-AROUND DETAIL

REVISIONS	
DATE	CHANGE
10-1-86	
2-4-87	Gate Post
6-1-89	Note Wire Gage

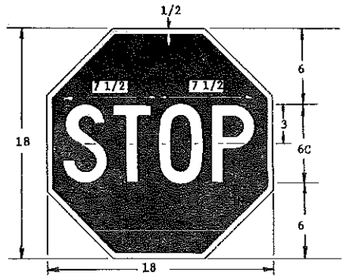
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED: David K. O'Leary
DESIGN ENGINEER

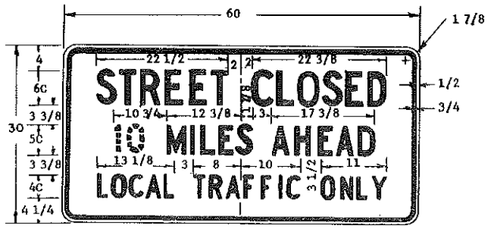
CONSTRUCTION SIGN DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO
8	N.D.	RRS-1-006(004)067	

D754-1

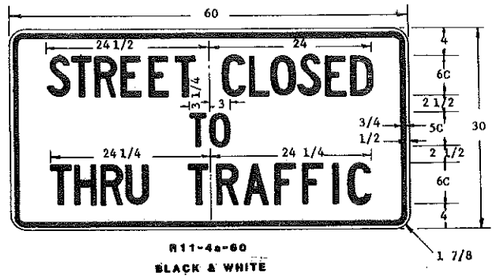


STOP-SLOW PADDLE
RED & WHITE
FLAGPERSON PADDLE

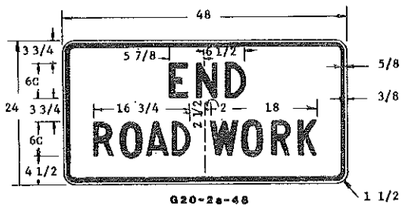


R11-3c-60
BLACK & WHITE

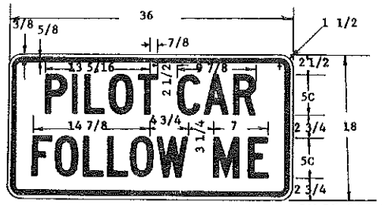
R11-2-48
BLACK & WHITE



R11-4a-60
BLACK & WHITE

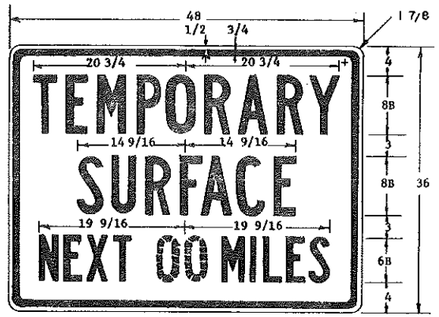


G20-2a-48
BLACK & ORANGE

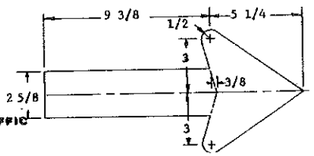


G20-4-36
BLACK & ORANGE

PILOT CAR SIGN SHALL BE MOUNTED ON REAR OF A VEHICLE USED FOR GUIDING CONTROLLED ONE-WAY TRAFFIC THROUGH A CONSTRUCTION AREA.



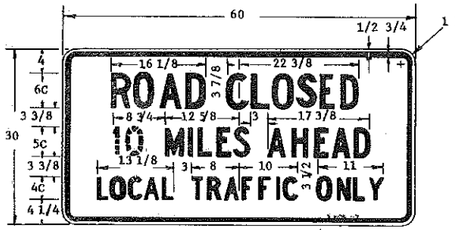
G20-6-48
BLACK & ORANGE



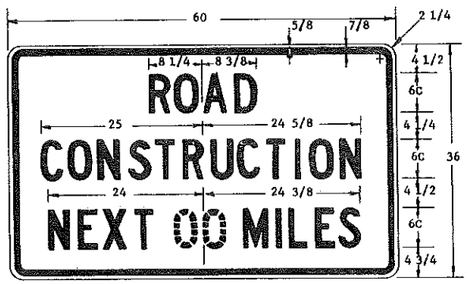
ARROW DETAIL FOR SIGN NO'S.
G20-50-72 & G20-52-72

MESSAGES AND BORDERS: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 854-3.5 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTER GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS.
THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.

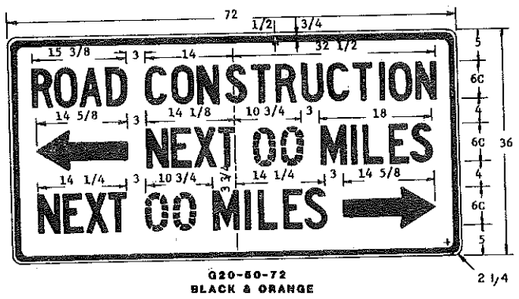
NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGE BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORIZED.



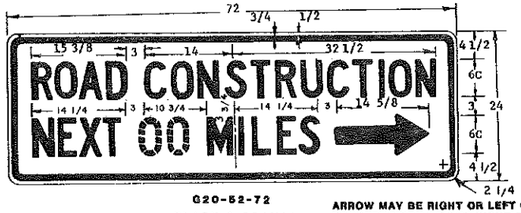
R11-3a-60
BLACK & WHITE



G20-1-60
BLACK & ORANGE

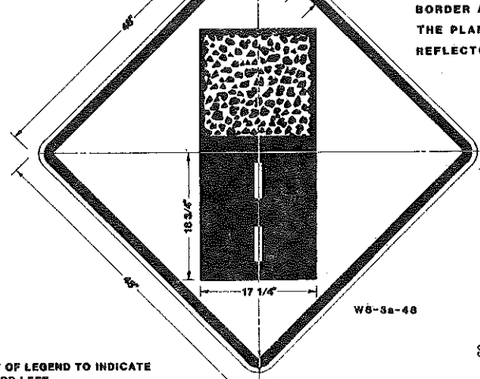


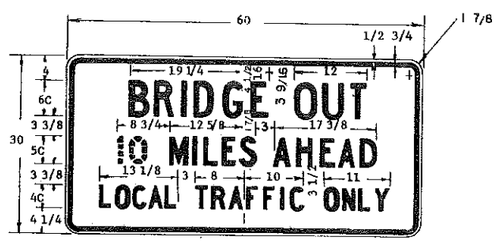
G20-50-72
BLACK & ORANGE



G20-52-72
BLACK & ORANGE

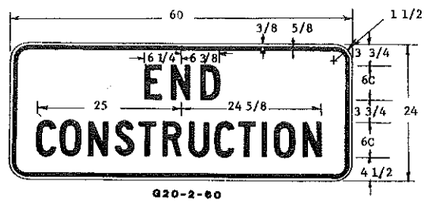
ARROW MAY BE RIGHT OR LEFT OF LEGEND TO INDICATE CONSTRUCTION TO THE RIGHT OR LEFT.



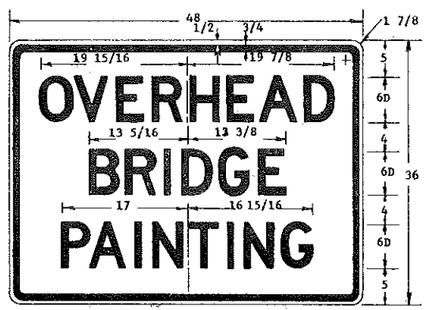


R11-3b-60
BLACK & WHITE

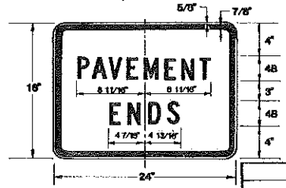
R11-2a-48 BLACK & WHITE



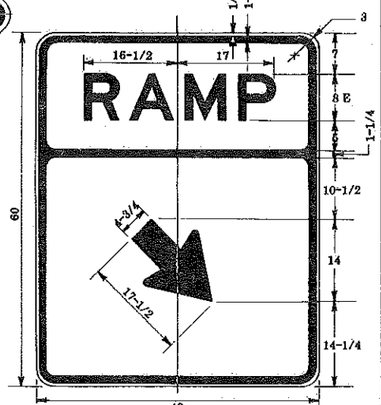
G20-2-60
BLACK & ORANGE



G20-54-48
BLACK & ORANGE



W8-3a-24
BLACK & ORANGE



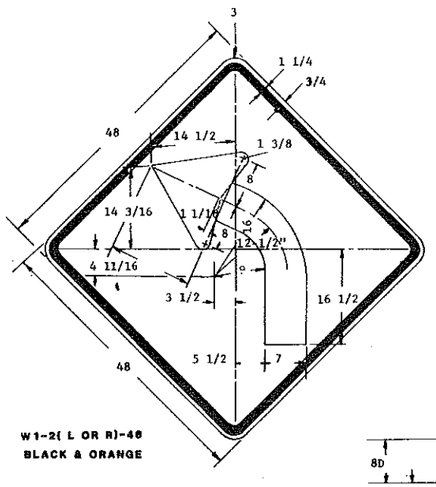
W13-4-48 BLACK & ORANGE

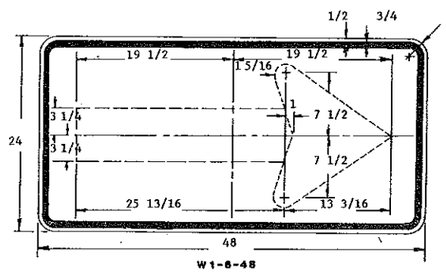
10-1-86	
REVISIONS	
DATE	CHANGE

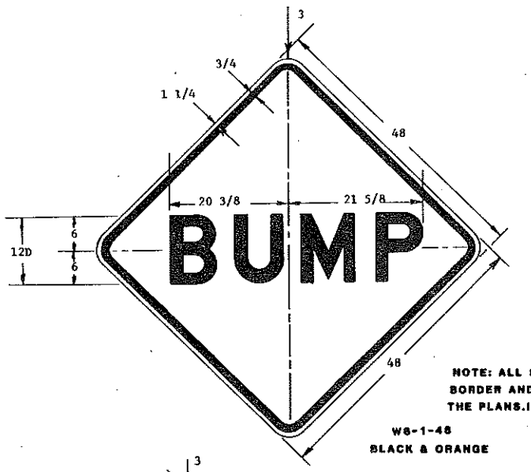
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

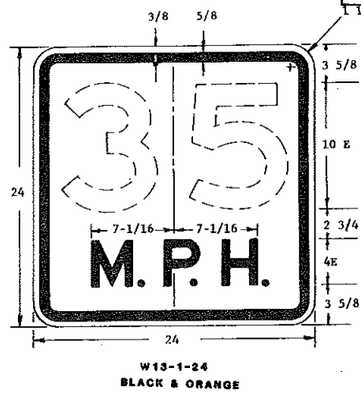
CONSTRUCTION SIGN DETAILS

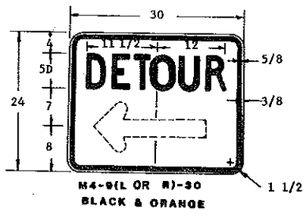
FHWA REGION	STATE	FED. AID PROJECT NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	
		D-754-2	

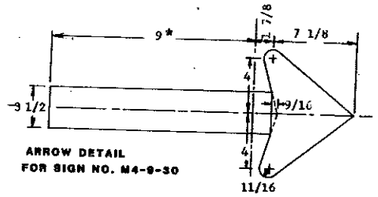




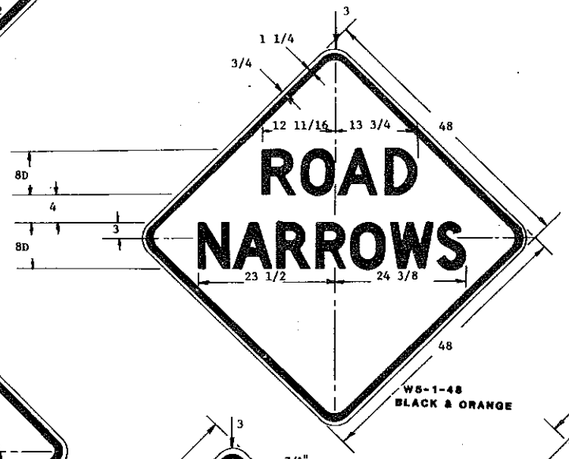


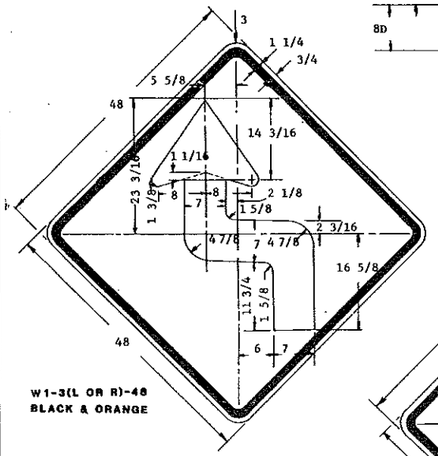


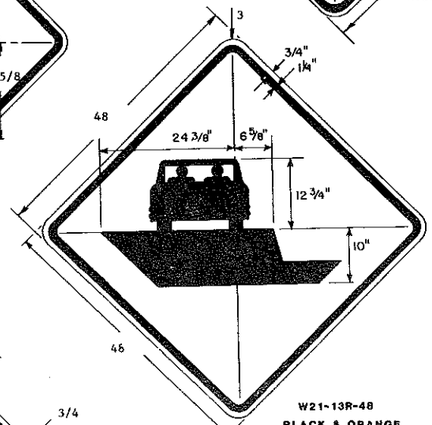


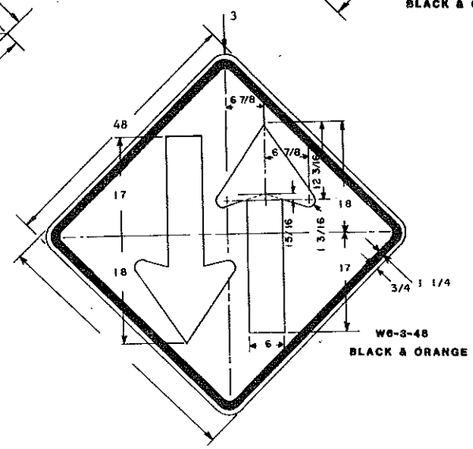


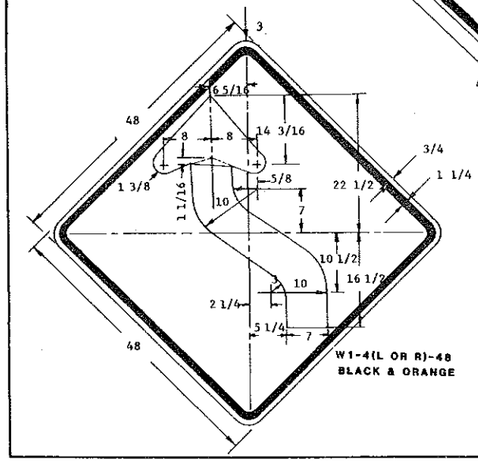
NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGE BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORIZED.

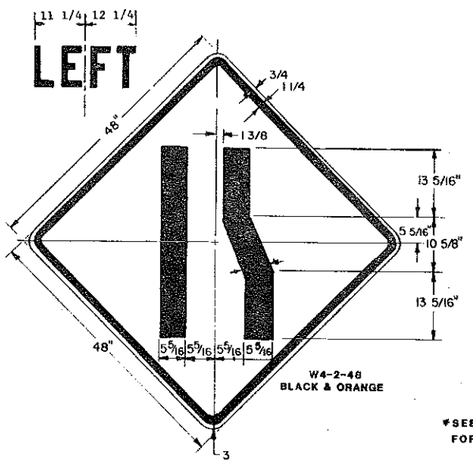


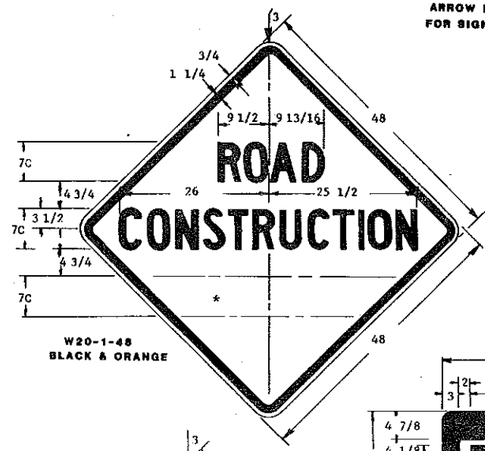


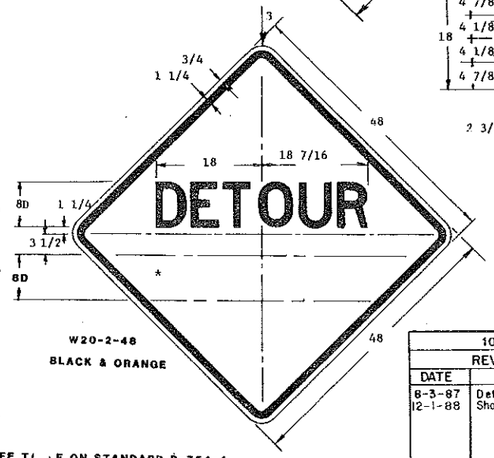








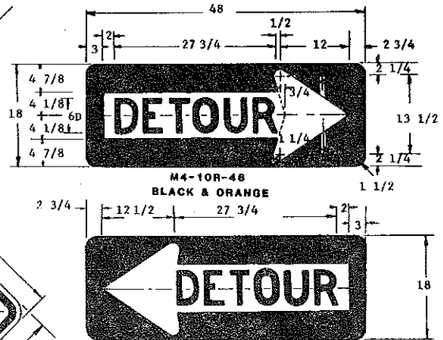




*SEE TABLE ON STANDARD D-754-4 FOR MESSAGE AND DIMENSIONS.

MESSAGE AND BORDER: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 856.03 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTER GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS. THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.

*DIMENSION SHALL BE 3" WHEN ARROW IS PLACED VERTICALLY.



REVISIONS	
DATE	CHANGE
8-3-87	Detour No.
12-1-88	Shoulder Drop Off

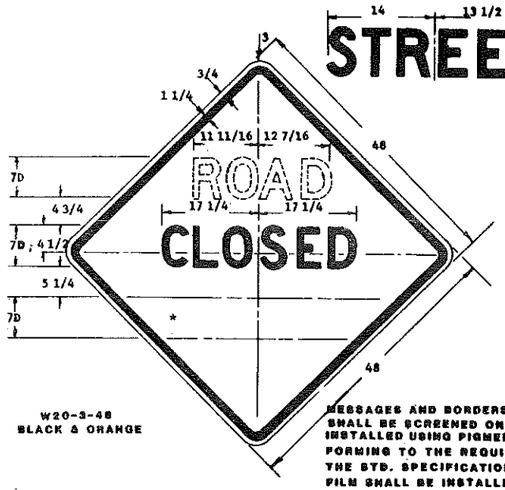
10-1-86

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED David K.O. Leer
DESIGN ENGINEER

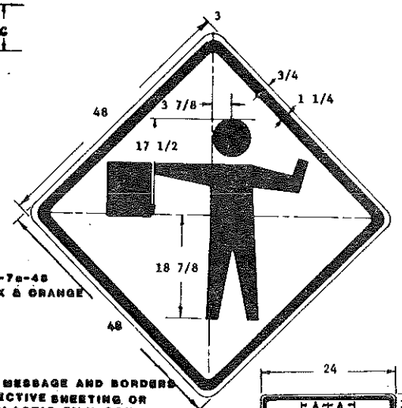
CONSTRUCTION SIGN DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	

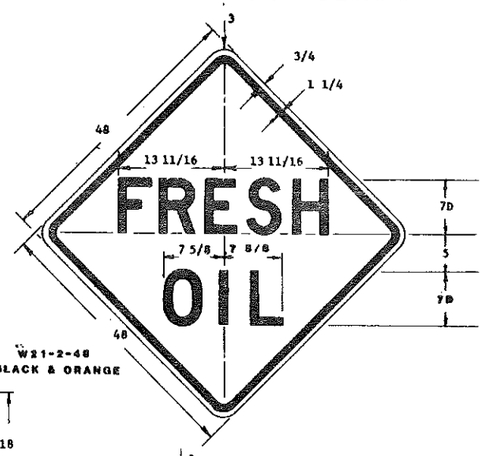
D 754-3



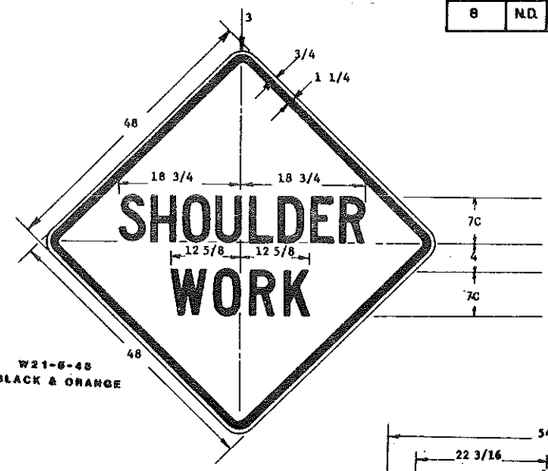
W20-3-48
BLACK & ORANGE



W20-7a-48
BLACK & ORANGE



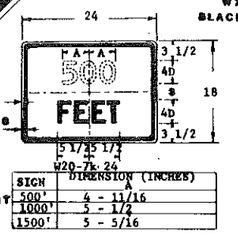
W21-2-48
BLACK & ORANGE



W21-6-48
BLACK & ORANGE

NOTE: EXISTING INVENTORY OF FLAGMAN & MEN WORKING SIGNS WITH WORD MESSAGES MAY BE USED UNTIL THEY NEED REPLACEMENT.

MESSAGES AND BORDERS: THE MESSAGE AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 8040.03 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTERS GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS. THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.

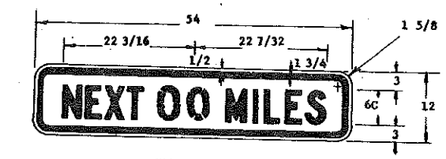


W20-7a-24

SIGN	DIMENSION (INCHES)
500'	4 - 11/16
1000'	5 - 1/2
1500'	5 - 5/16

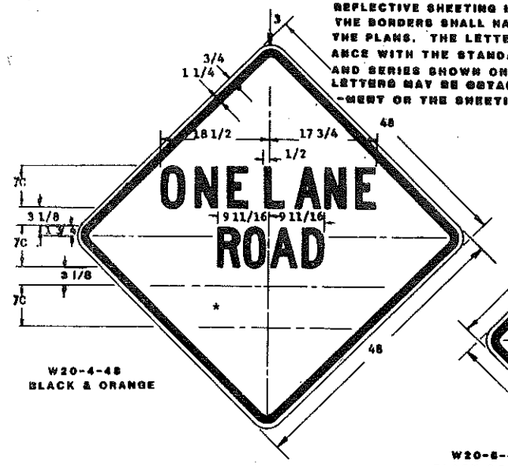
FOR USE WITH W20-7a-48 & W21-1a-48

BLACK & ORANGE

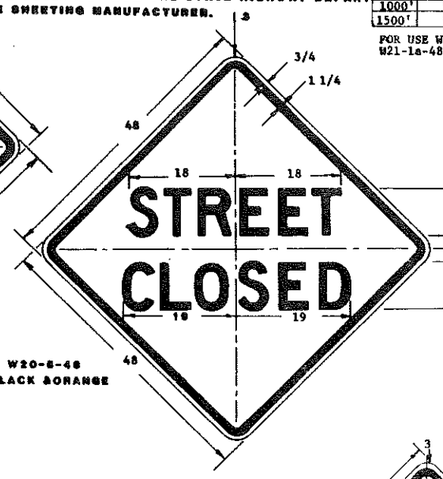


W20-52-54
BLACK & ORANGE

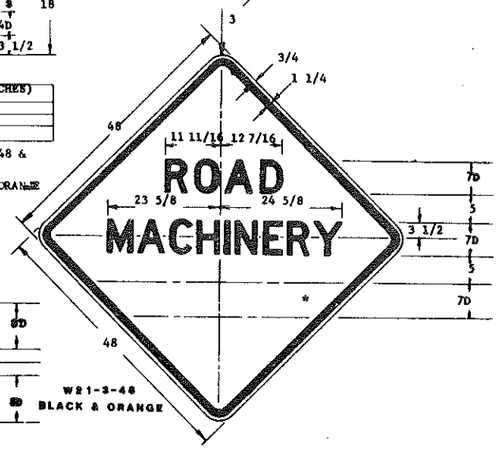
NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGES, BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORIZED.



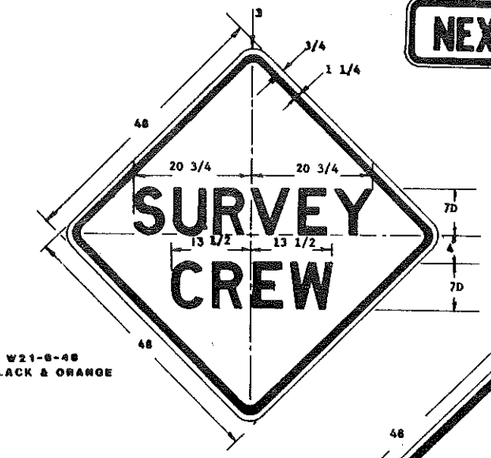
W20-4-48
BLACK & ORANGE



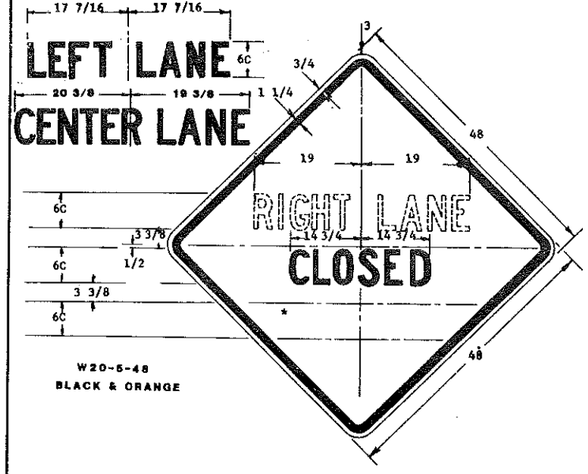
W20-6-48
BLACK &ORANGE



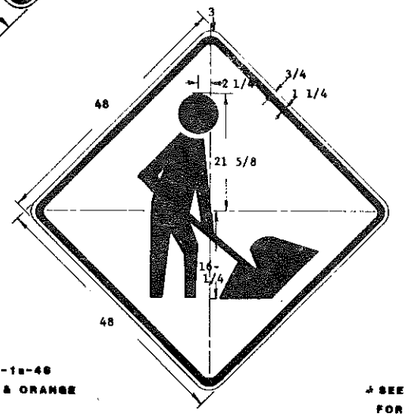
W21-3-48
BLACK & ORANGE



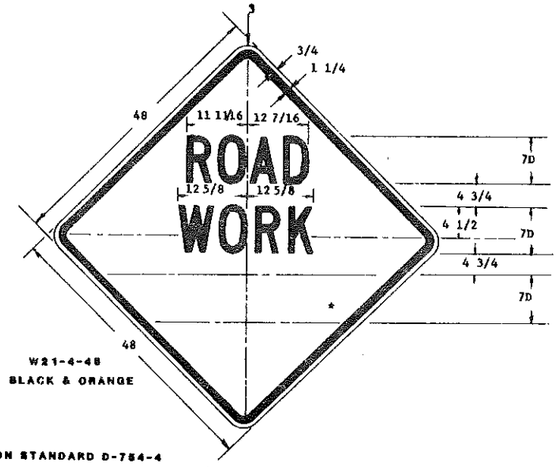
W21-6-48
BLACK & ORANGE



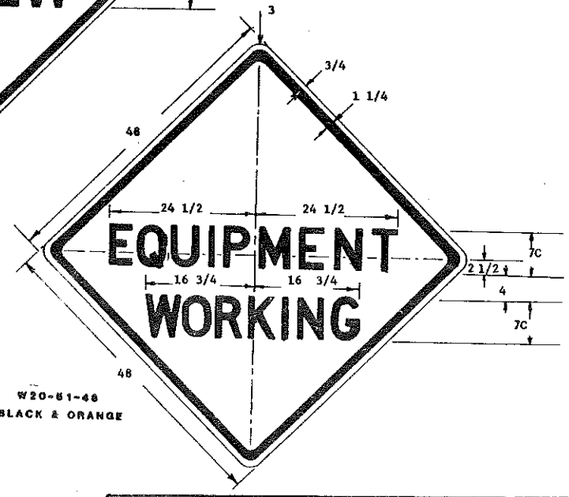
W20-5-48
BLACK & ORANGE



W21-1a-48
BLACK & ORANGE



W21-4-48
BLACK & ORANGE



W20-51-48
BLACK & ORANGE

* SEE TABLE ON STANDARD D-754-4 FOR MESSAGES AND DIMENSIONS.

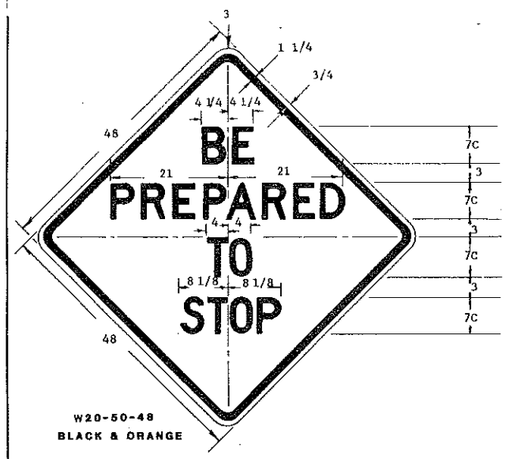
10-1-86	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

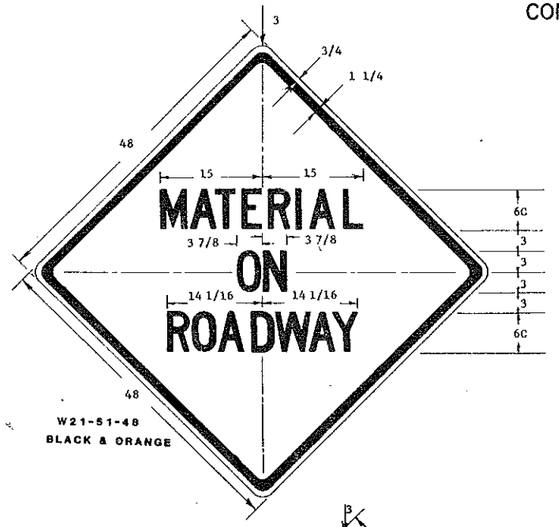
CONSTRUCTION SIGN DETAILS

FHWA REGION		FED. AID PROJECT NO.	SHEET NO
8	N.D.	ARS-1-006(004)067	

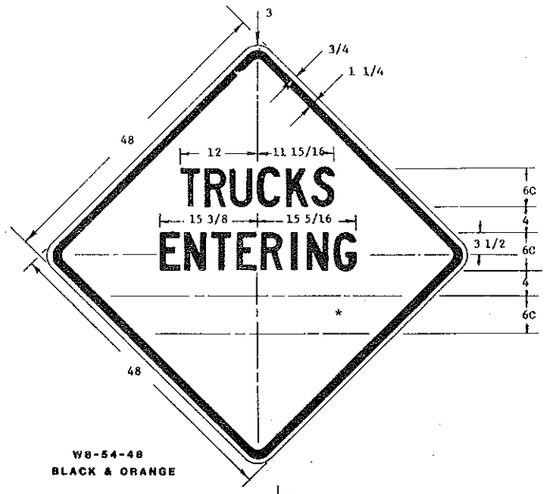
D 754-4



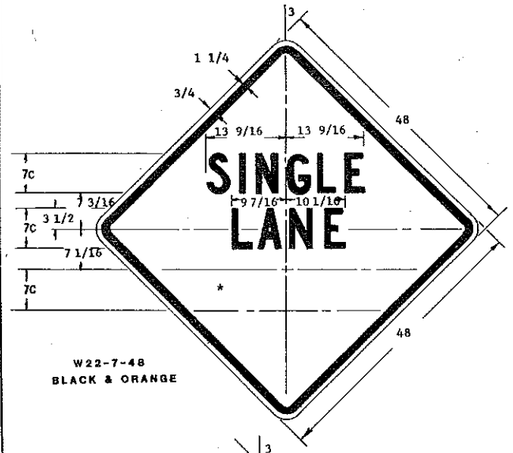
W20-50-48
BLACK & ORANGE



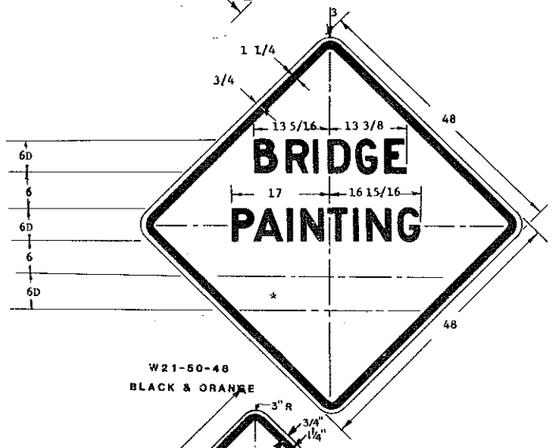
W21-51-48
BLACK & ORANGE



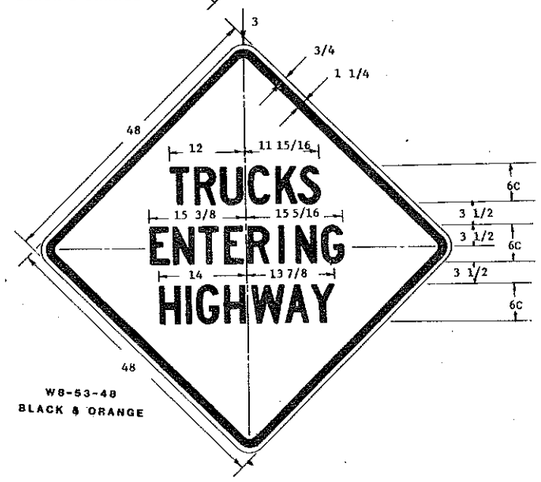
W8-54-48
BLACK & ORANGE



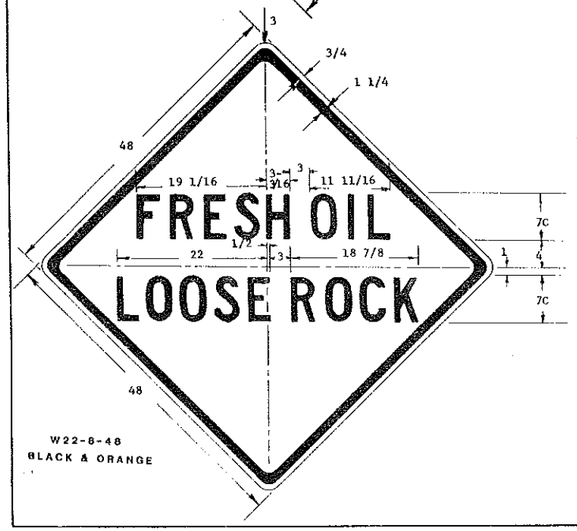
W22-7-48
BLACK & ORANGE



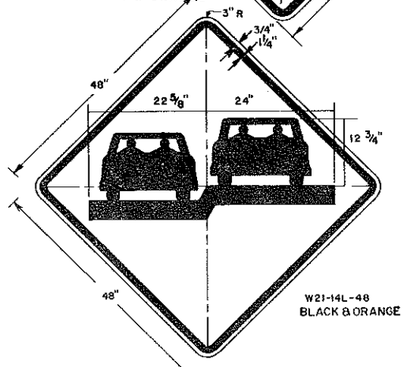
W21-50-48
BLACK & ORANGE



W8-53-48
BLACK & ORANGE

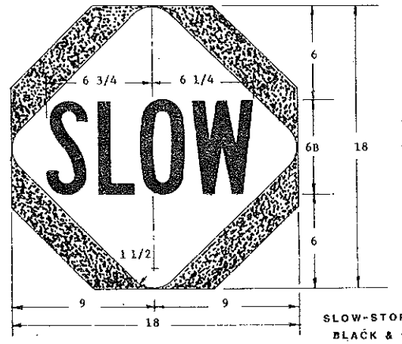


W22-8-48
BLACK & ORANGE

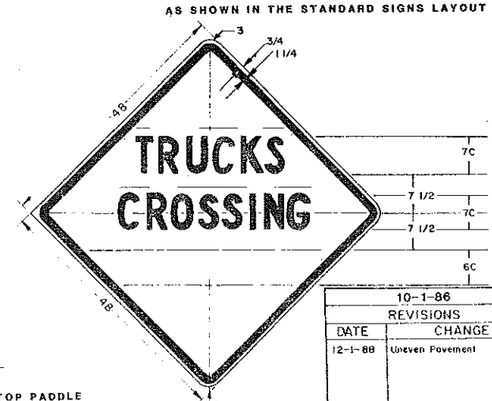


W21-14L-48
BLACK & ORANGE

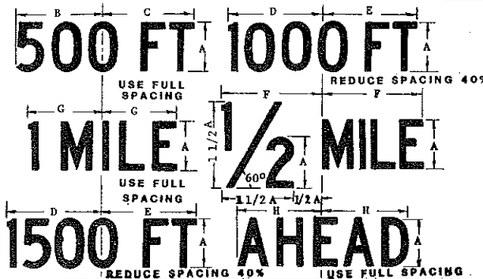
24"X18"
BLACK & ORANGE



SLOW-STOP PADDLE
BLACK & ORANGE
FLAGPERSON PADDLE



W8-55-48
BLACK & ORANGE



DIMENSIONS (INCHES)							
A	B	C	D	E	F	G	H
4C	6-7/8	7	7-1/2	8	8-5/16	6-1/16	7
5C	8-3/4	8-13/16	9-3/8	10	10-7/16	7-5/8	8-3/4
6C	10-3/8	10-1/2	11-1/4	12	12-1/2	9-1/8	10-1/2
7C	12	12-3/16	13-1/8	14	14-9/16	10-5/8	12-1/4
8C	13-3/4	14	15	16	16-5/8	12-1/8	14
4D	8-1/8	8-5/8	8-1/2	9	9	7-3/16	8-11/16
5D	10-3/16	10-13/16	11-5/8	11-1/4	11-1/4	9-1/2	10-7/8
6D	12-3/16	12-15/16	12-3/4	13-1/2	13-1/2	11-13/16	13-1/8
7D	14-1/4	15-1/8	14-7/8	15-3/4	15-3/4	13-1/16	15-1/2
8D	16-1/4	17-1/4	17	18	18	14-3/8	17-7/16

MESSAGES AND BORDERS: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 854.03 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENETION.

THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTER GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS. THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.

NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGE BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORIZED.

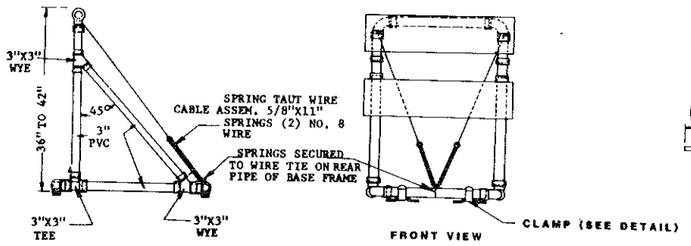
STANDARD SIGNS THAT ARE SHOWN IN THE CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS SHALL BE FABRICATED IN THE SHAPE, COLOR AND DIMENSIONS AS SHOWN IN THE STANDARD SIGNS LAYOUT BOOKLET.

10-1-86 REVISIONS	
DATE	CHANGE
12-1-88	Uneven Pavement

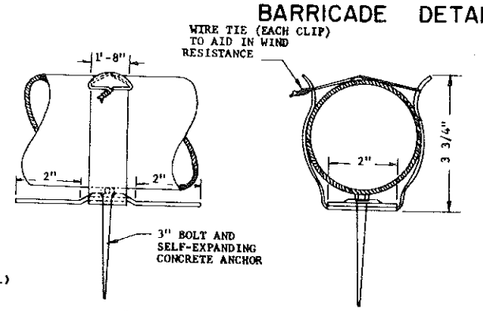
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
STATE ENGINEER

BARRICADE DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	
		D 754-5	



SIDE VIEW FRONT VIEW

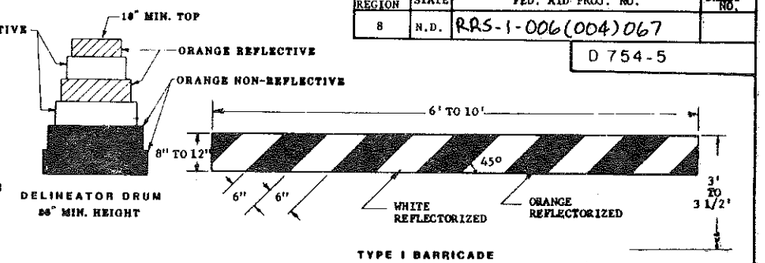


TYPICAL CLAMP DETAIL

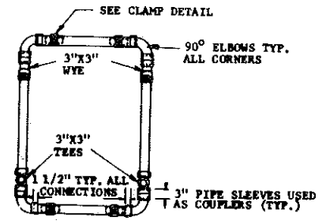
(SINGLE FIRE EXTINGUISHER CLIPS, 3 1/2" DIA.)

DELINEATOR DRUMS

THE MARKINGS ON DRUMS SHALL BE ORANGE AND WHITE STRIPES 4 TO 8 INCHES WIDE. THERE SHALL BE AT LEAST TWO ORANGE AND TWO WHITE STRIPES. WHERE DRUMS HAVE RIBS OR INDENTATION THERE SHALL BE NO REFLECTORIZED SHEETING IN THIS AREA. THIS SPACE SHALL BE NO MORE THAN 2 INCHES WIDE. THE DRUM SURFACE SHALL BE PREPARED AS RECOMMENDED BY THE SHEETING MANUFACTURER BEFORE REFLECTIVE SHEETING IS APPLIED.



TYPE I BARRICADE



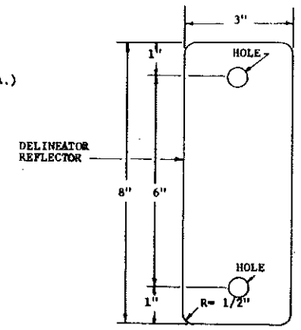
BASE

BREAKAWAY BARRICADE ASSEMBLY

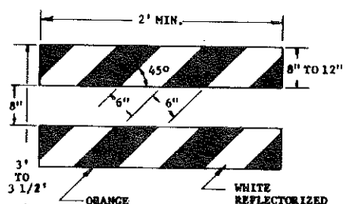
NOTE: THE PIPE, WYES, TEES AND ELBOWS USED TO CONSTRUCT TYPE II BARRICADES (SPECIAL) SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION: D2241 FOR PVC 1120 OR 1220, SDR 21, PRESSURE RATING 200 P.S.I. THE WYES, TEES, AND ELBOWS SHALL SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION: D-2466, TYPE II, GRADE 1. ALL JOINTS SHALL BE SLIP-FIT AND SHALL NOT BE THEADED OR CEMENTED.

3" PVC PIPE CONFORMING TO ASTM D2665-DWV OR ASTM D2729 MAY BE USED AS AN ALTERNATE TO ASTM D2241-SDR 21.

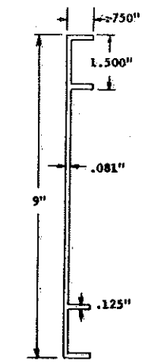
THE 9" X 48" BARRICADE RAIL SHALL BE FABRICATED FROM 0.025" ANODIZED ALUMINUM AND SHALL BE ATTACHED WITH 1 INCH NO. 14 PAN BEAD METAL SCREWS. COLORS: REFLECTIVE ORANGE AND REFLECTIVE WHITE.



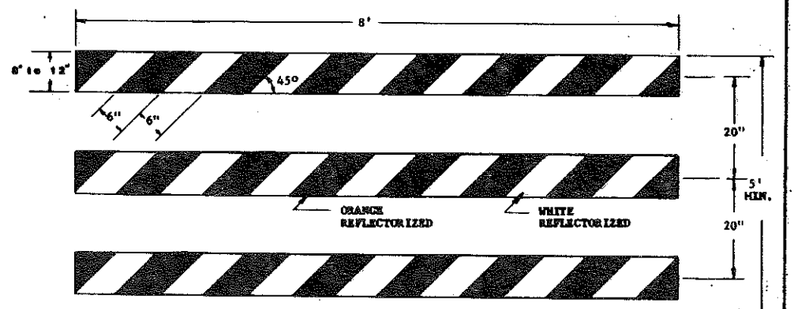
3" x 8" - 18 GUAGE GALVANIZED STEEL SHEETS, OR OR .060" ALUMINUM PLATE WITH WHITE REFLECTIVE SHEETING (TYPE 3A OR 3B) AS SPECIFIED IN SECTION 804 OF THE STANDARD SPECIFICATIONS.



TYPE II BARRICADE

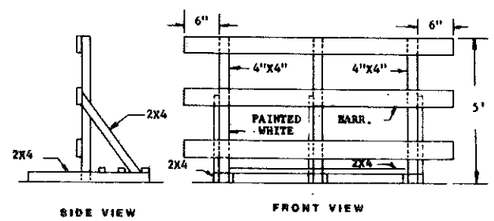


EXTRUDED ALUMINUM BARRICADE BAR DETAIL



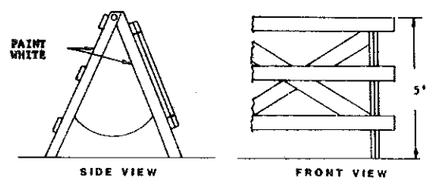
TYPE III BARRICADE

NOTE: EACH MOVABLE BARRICADE SHALL BE WEIGHTED DOWN BY A SUFFICIENT NUMBER OF SAND BAGS OR OTHER SUITABLE WEIGHT SO THAT IT WILL NOT BE BLOWN OVER BY THE WIND UNLESS THE MOVABLE SUPPORTING STRUCTURE IS CONSTRUCTED IN SUCH A MANNER THAT THE WIND CANNOT BLOW IT OVER. WEIGHT USED SHALL BE APPROVED BY THE ENGINEER IN THE FIELD. THE STRIPES SHALL SLANT DOWNWARD TOWARD THE SIDE WHICH TRAFFIC IS TO PASS. BARRICADES USED AT THE BEGINNING OF A PROJECT SHALL FACE TRAFFIC ENTERING THAT PROJECT.



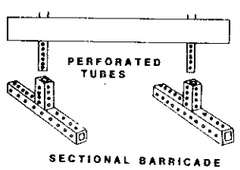
SIDE VIEW FRONT VIEW

MOVABLE BARRICADE ASSEMBLY

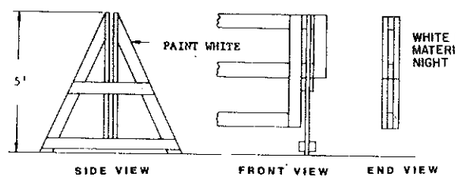


SIDE VIEW FRONT VIEW

HINGED BARRICADE ASSEMBLY

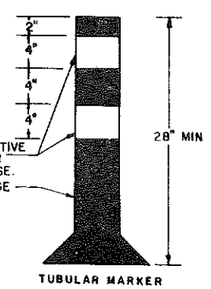


SECTIONAL BARRICADE

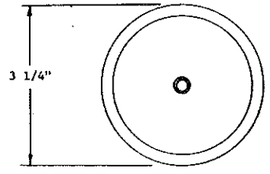


SIDE VIEW FRONT VIEW END VIEW

DEMOUNTABLE BARRICADE ASSEMBLY

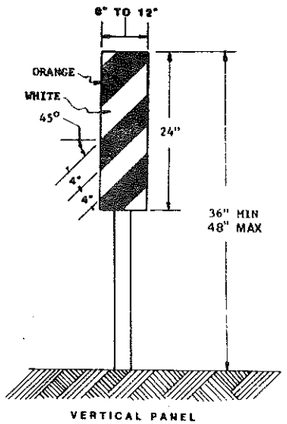


TUBULAR MARKER

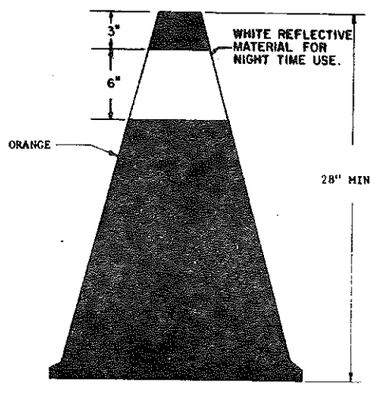


ACRYLIC PLASTIC REFLECTOR

DELINEATOR REFLECTOR SHALL MEET THE REQUIREMENTS OF SECTION 804.



VERTICAL PANEL



CONE

BARRICADES: Number Of Reflectorized Rail Faces

TYPE I	TYPE II	TYPE III
2(One Each Direction)	4(Two Each Direction)	6(Facing in two Directions)

BARRICADE RAIL MATERIAL MAY BE 1" NOMINAL THICKNESS STANDARD LUMBER OR 3/4" PLYWOOD AND PREPARED AS RECOMMENDED BY THE SHEETING MANUFACTURER BEFORE REFLECTIVE SHEETING IS APPLIED.

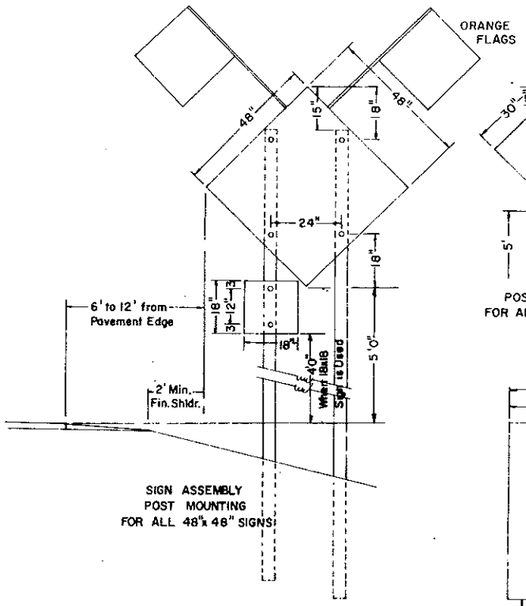
10-1-86	
REVISIONS	
DATE	CHANGE
8-3-87	Type Sheeting
10-1-87	Delineator Drum Note
6-9-88	Barricades Type III

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

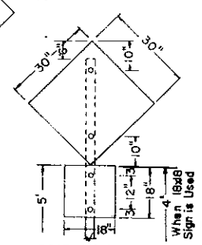
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS

FHWA REGION	STATE	FED AID PROJ. NO.	SHEET NO
8	N.D.	RRS-1-006(004)067	

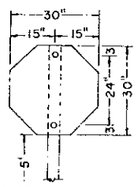
D-754-5-A



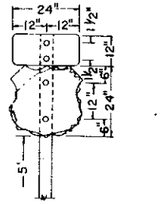
SIGN ASSEMBLY
POST MOUNTING
FOR ALL 48"x48" SIGNS



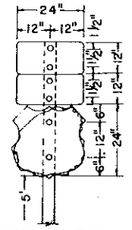
POST MOUNTING
FOR ALL 30"x30" SIGNS



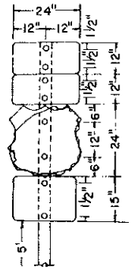
POST MOUNTING
FOR SIGN NO. R-1-30



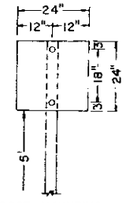
POST MOUNTING
FOR ASSEMBLIES WITH
ONE CARDINAL DIRECTION
SIGN & ONE ROUTE MARKER



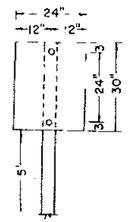
POST MOUNTING
FOR ASSEMBLIES WITH
ONE CARDINAL DIRECTION
SIGN, ONE DETOUR SIGN
& ONE ROUTE MARKER



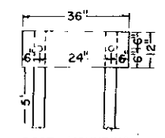
POST MOUNTING
FOR ASSEMBLIES WITH ONE
CARDINAL DIRECTION SIGN, ONE
DETOUR SIGN, ONE ROUTE MARKER
& ONE DIRECTIONAL ARROW



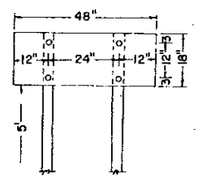
POST MOUNTING
FOR ALL 24"x24" SIGNS



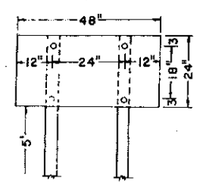
POST MOUNTING
FOR ALL 24"x30" SIGNS



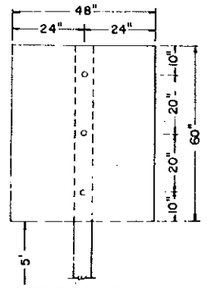
POST MOUNTING
FOR ALL 36"x12" SIGNS



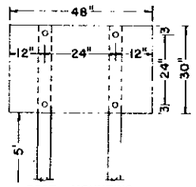
POST MOUNTING
FOR ALL 48"x18" SIGNS



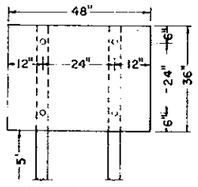
POST MOUNTING
FOR ALL 48"x24" SIGNS



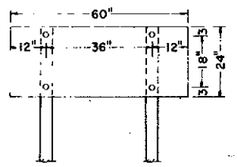
POST MOUNTING
FOR ALL 48"x60" SIGNS



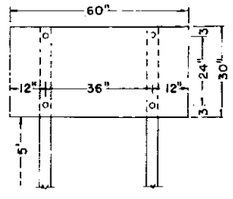
POST MOUNTING
FOR ALL 48"x30" SIGNS



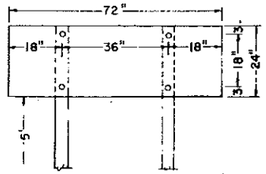
POST MOUNTING
FOR ALL 48"x36" SIGNS



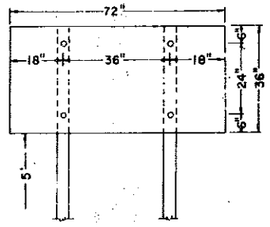
POST MOUNTING
FOR ALL 60"x24" SIGNS



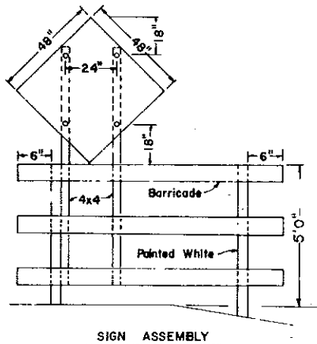
POST MOUNTING
FOR ALL 60"x30" SIGNS



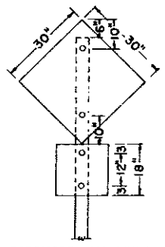
POST MOUNTING
FOR ALL 72"x24" SIGNS



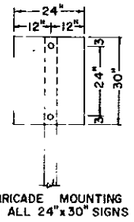
POST MOUNTING
FOR ALL 72"x36" SIGNS



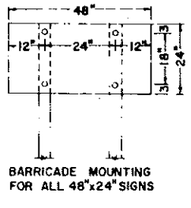
SIGN ASSEMBLY
BARRICADE MOUNTING
FOR ALL 48"x48" SIGNS



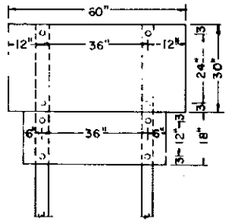
BARRICADE MOUNTING
FOR ALL 30"x30" SIGNS



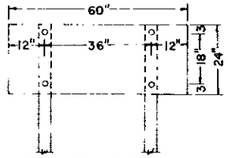
BARRICADE MOUNTING
FOR ALL 24"x30" SIGNS



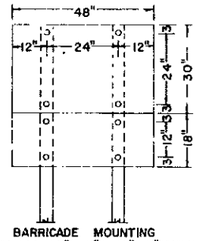
BARRICADE MOUNTING
FOR ALL 48"x24" SIGNS



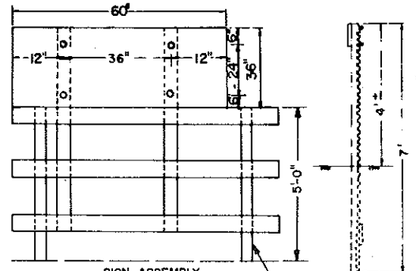
BARRICADE MOUNTING
FOR ALL 60"x30" SIGNS



BARRICADE MOUNTING
FOR ALL 60"x24" SIGNS



BARRICADE MOUNTING
FOR ALL 48"x30" & 48"x18" SIGNS

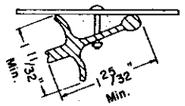


SIGN ASSEMBLY
BARRICADE MOUNTING
FOR ALL G20-1-60 SIGNS

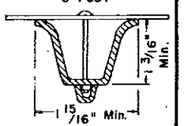
NOTE:
In Urban Areas the vertical clearance shall be increased to 7 feet on all signs, except when supplemental signs are placed below main signs.
The supplemental signs shall be placed at a 6'-0" minimum clearance.

DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS

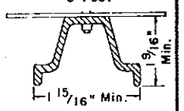
T- POST

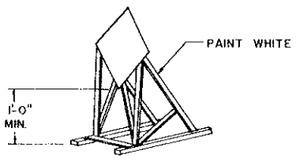


U-POST

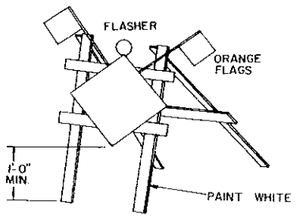


U-POST





PORTABLE SIGN MOUNTING



PORTABLE SIGN MOUNTING

NOTES:
Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANELS: The minimum mounting height shall be 7 feet above the roadway to the bottom of the panel, except on vehicle mounted panels which shall be as high as practicable.

NOTES:
DELINEATOR POSTS: Typical fence post sections are shown in Attachment Details. Other types of metal fence posts may be substituted upon approval of the engineer. These substituted posts shall have reflectors attached similar to the ones shown.

BARRICADE MOUNTING SIGNS: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4x4 min. SFS or equivalent steel posts. See Stds. D-754-5 thru D-754-9 for construction sign and barricade location details. All barricades and barricade mounted signs shall be assembled with 3/8" bolts.

SIGN SUPPORTS: The sign supports shall be imbeded to a sufficient depth so that the signs will remain plumb throughout duration of the project. It is suggested that the min. depth of imbedment be 5'-0".

MATERIAL: All signs shall be .100" aluminum, 12 gage galv. steel, 1/2" plywood or other approved mat'l.

HOLES: All holes to be punched round for 3/8" bolts.

ALTERNATE MESSAGES: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate without a border and this plate installed and removed as required.

10-1-86

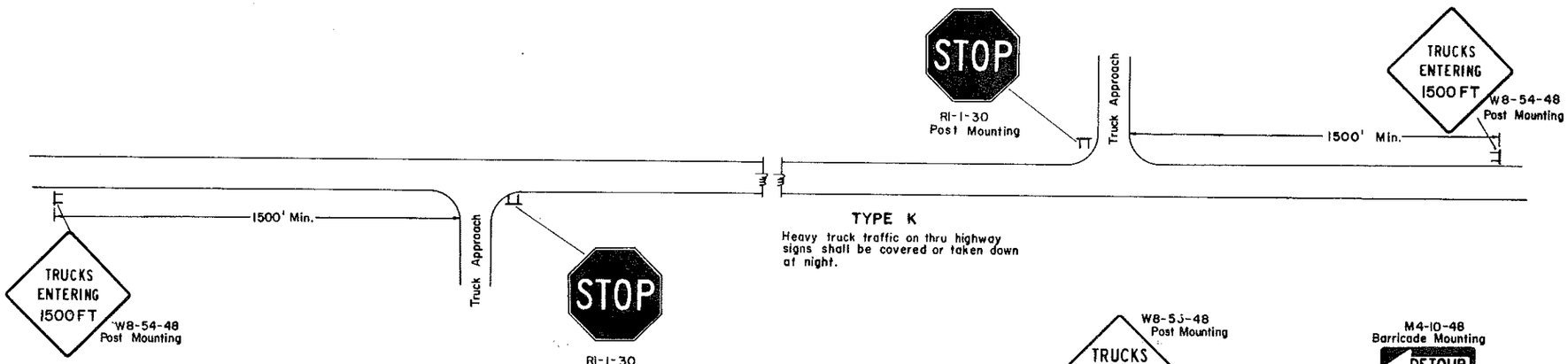
REVISIONS	
DATE	CHANGE
8-1-88	SIGN ASSEMBLY

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED David K.O. Leer
DESIGN ENGINEER

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

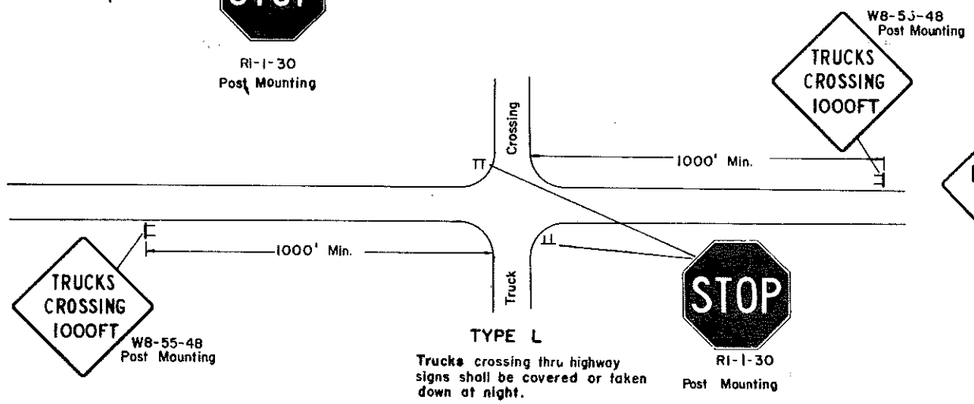
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004) 067	

D-754-10



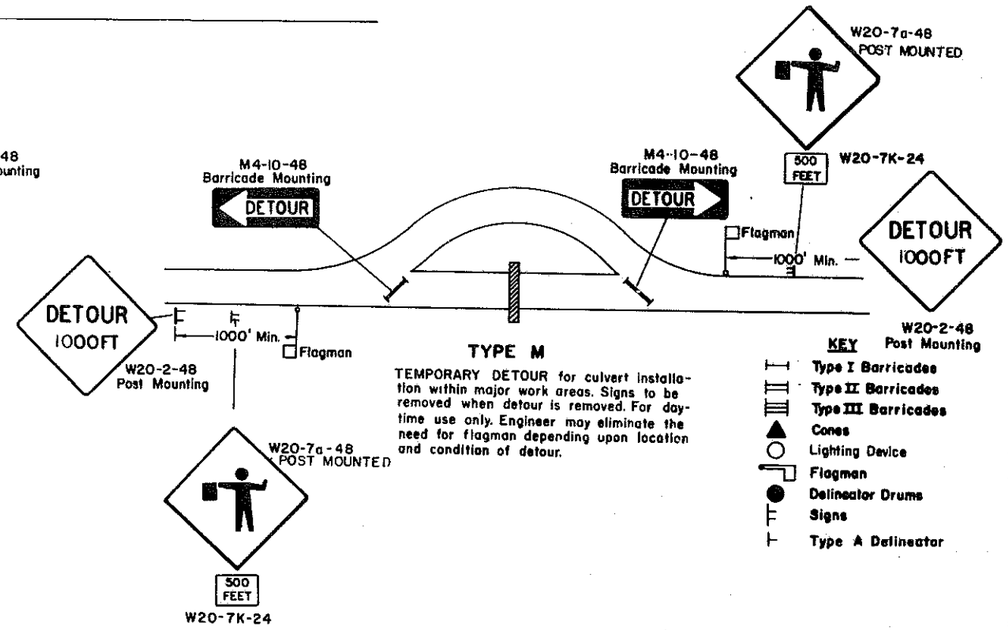
TYPE K

Heavy truck traffic on thru highway signs shall be covered or taken down at night.



TYPE L

Trucks crossing thru highway signs shall be covered or taken down at night.

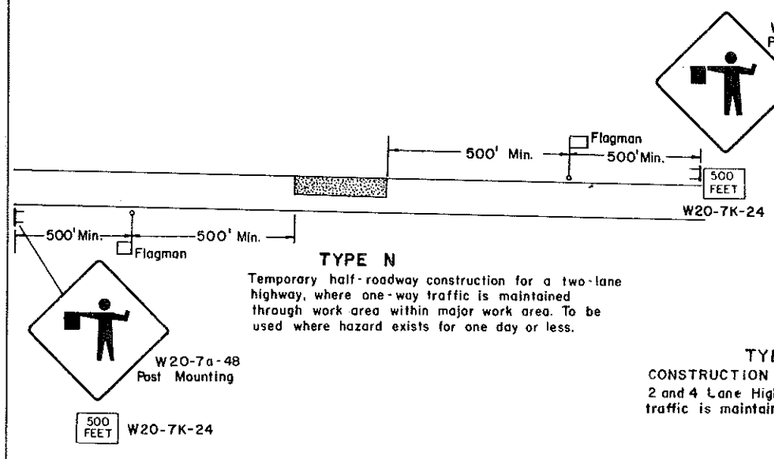


TYPE M

TEMPORARY DETOUR for culvert installation within major work areas. Signs to be removed when detour is removed. For daytime use only. Engineer may eliminate the need for flagman depending upon location and condition of detour.

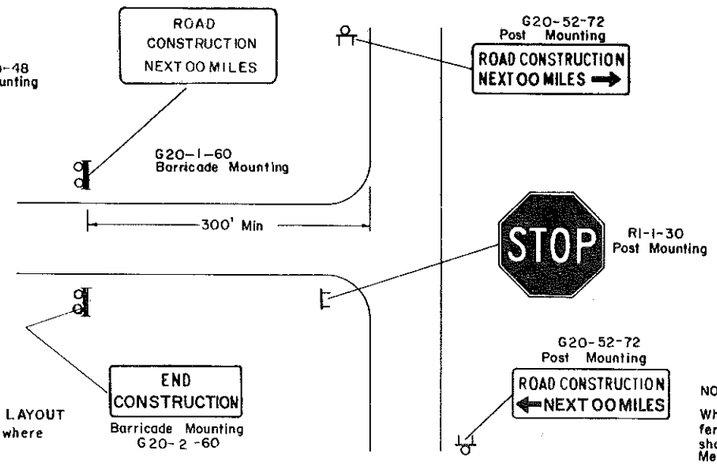
KEY

- Type I Barricades
- Type II Barricades
- Type III Barricades
- Cones
- Lighting Device
- Flagman
- Delineator Drums
- Signs
- Type A Delineator



TYPE N

Temporary half-roadway construction for a two-lane highway, where one-way traffic is maintained through work area within major work area. To be used where hazard exists for one day or less.



TYPE O

CONSTRUCTION SIGN LAYOUT
2 and 4 Lane Highways where traffic is maintained.

Lighting- Flashers shall be placed above the barricade bars and above all warning signs unless barricades and signs have Type 3A or 3B reflective sheeted faces.

Mounting- Barricade shown to be placed on roadway shall be on a movable Assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar Intermediate Sign shall be on a movable assembly Sign show to be placed on roadway shall be placed on movable assemblies.

NOTE:

Where advance warning sign placed as shown interferes with permanent signs, The warning sign location shall be determined by the Engineer for best results. Messages shall be varied as required.

FLAGS: All diamond warning signs shall have two orange warning flags 24" square mounted perpendicular to the edges of the diamond sign end at such a distance above the edges so that when flag is hung limp it will not touch the sign.

10-1-86

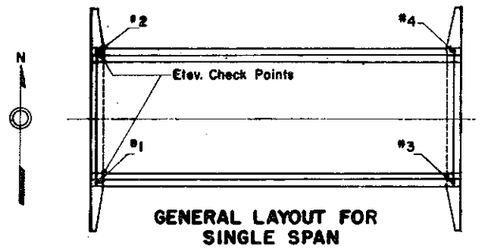
REVISIONS	
DATE	CHANGE
8-3-87	NOTE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

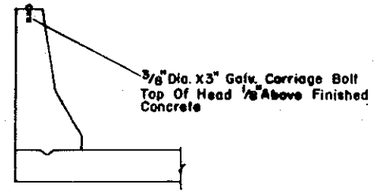
		PROJ. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(004)067	

D-900-1

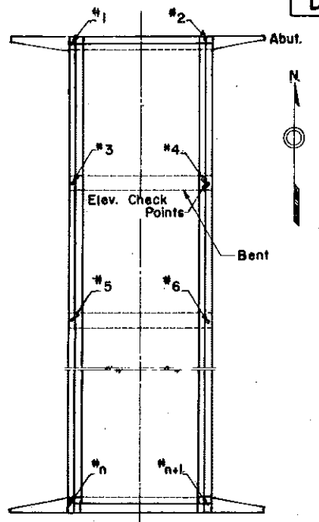
BRIDGE BENCH MARKS



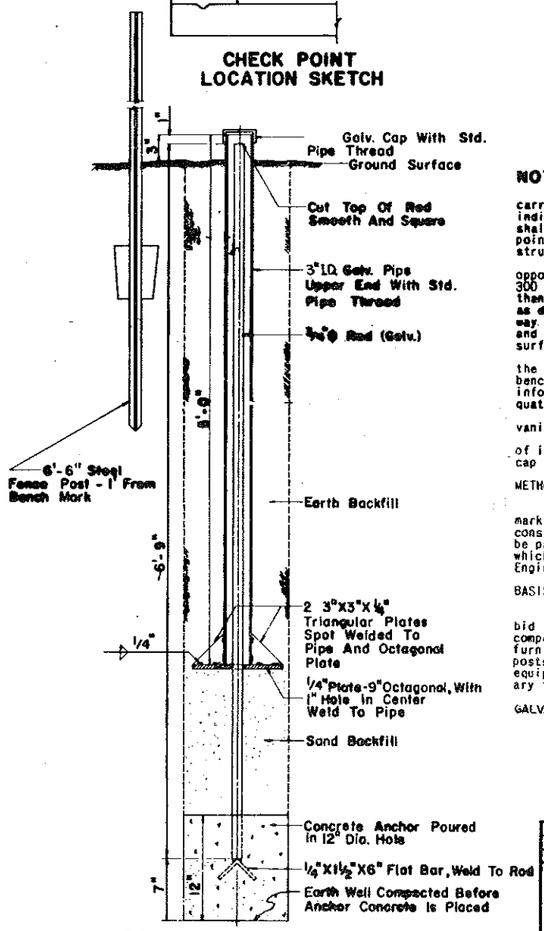
GENERAL LAYOUT FOR SINGLE SPAN



CHECK POINT LOCATION SKETCH



GENERAL LAYOUT FOR MULTIPLE SPAN



BENCH MARK DETAIL

NOTES:

Elevation check points shall consist of 3/8"x 3" galvanized carriage bolts (or equal) set in the concrete curb at the points indicated on the General Layout Sketches. The top of bolt head shall project above the finished concrete 1/8". Elevation check points shall be placed on each curb over each unit of the substructure for each bridge at a structural location.

Two bench marks as detailed hereon shall be set at diagonal opposite positions away from the structure location and at least 300 feet from the nearest point on the bridge or bridges (if more than one at a location). These bench marks shall be constructed as detailed on this sheet and located near the Highway Right-of-way lines. The steel fence post shall extend 4'-0" above ground and be painted with two coats of white paint suitable for steel surfaces.

The Project Engineer shall run a set of levels determining the elevation of each check point on the structure and the two bench marks immediately after the completion of the bridge. This information shall be submitted to the Bridge Engineer with adequate information locating each check point and bench mark.

Except for fence posts, all metal parts to be hot dip galvanized after punching, shearing, welding, and fabrication.

Threads of cap and pipe are not to be galvanized. At time of installation these threads are to be coated with grease and cap screwed to snug fit.

METHOD OF MEASUEMENT:

Each set of Bridge Bench Marks consisting of two bench marks and the required number of elevation check points shall be considered as one unit for bidding purposes and the quantity to be paid for shall be the number of sets of bridge bench marks which have been installed complete in place and accepted by the Engineer.

BASIS OF PAYMENT:

Bridge Bench Marks shall be paid for at the contract price bid for each set of Bridge Bench Marks, which price shall be full compensation for all excavation, backfill and clean-up, and for furnishing, hauling and placing all elevation check points, fence posts, galvanized pipe, caps, rods, sand backfill, concrete, rock equipment, tools and incidentals, including galvanizing, necessary to complete this item.

GALVANIZING:

After fabrication the complete assembly shall be Hot Dip Galvanized.

REVISIONS	
DATE	CHANGE
10-1-84	

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED: David K. O'Leary
DESIGN ENGINEER

76