16

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
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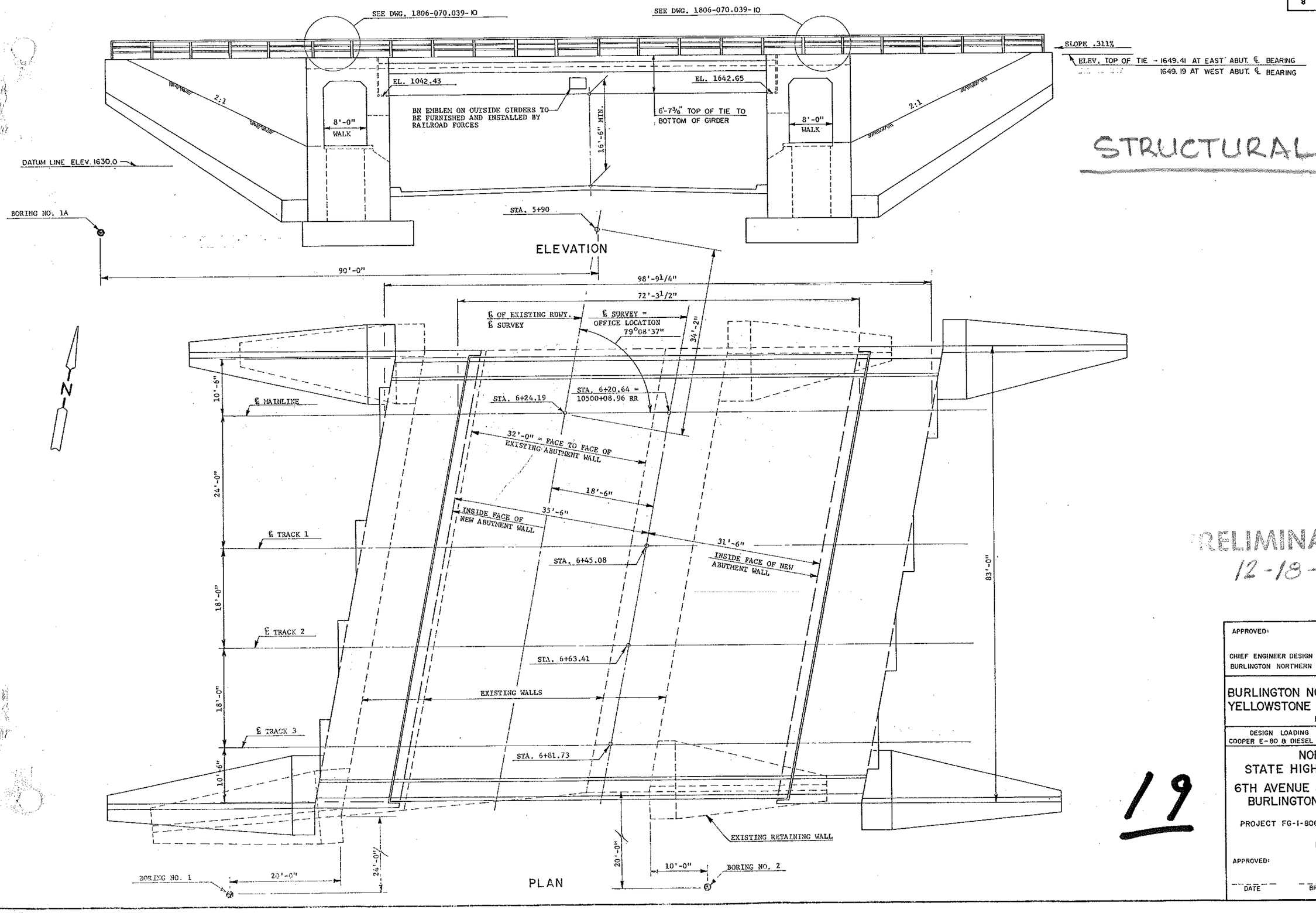

STRUCTURAL

PRELIMINARY PLAN
12-18-87

APPROVED:

CHIEF ENGINEER DESIGN
BURLINGTON NORTHERN RAILROAD

BURLINGTON NORTHERN RAILROAD CO.
YELLOWSTONE DIVISION, 1st SUB. DIV.
BRIDGE NO. 199.1

DESIGN LOADING	SCALE
COOPER E-80 & DIESEL IMPACT	1/8" = 1'-0"

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

6TH AVENUE S.E. UNDERPASS, MANDAN
BURLINGTON NORTHERN RAILWAY

PROJECT FG-1-806(015)069 STA. 6 + 20.64

MORTON COUNTY

APPROVED:

DATE BRIDGE ENGINEER

19

1806-070.039

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
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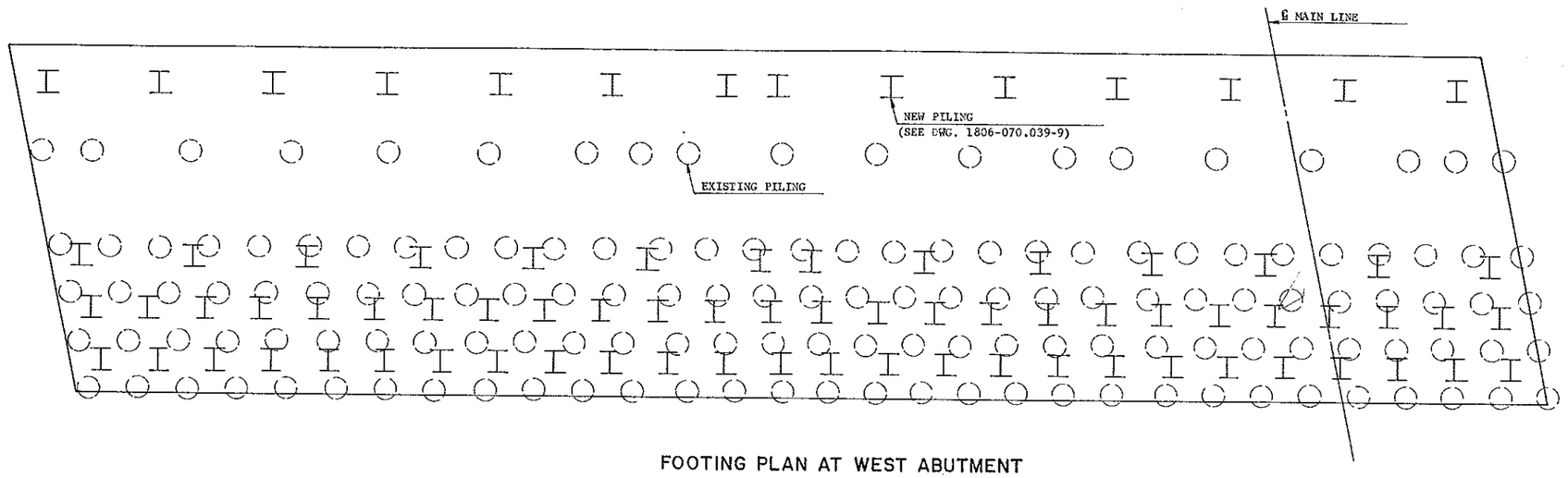

FOOTING PLAN AT WEST ABUTMENT

SHOWING NEW PILING AND EXISTING PILING

INDEX OF DRAWING

ESTIMATE OF QUANTITIES

LOCATION
BN UNDERPASS MANDAN

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
105	0100	CONTRACT BOND	L SUM	1.0
107	0100	RAILWAY PROTECTION INSURANCE	L SUM	1.0
202	0105	REMOVAL OF STRUCTURE	L SUM	1.0
210	0100	CLASS 1 EXCAVATION	CU YD	430.0
210	0110	CLASS 2 EXCAVATION	CU YD	20.0
210	0200	SELECT BACKFILL	CU YD	900.0
210	0201	FOUNDATION PREPARATION	EA	1.0
602	0130	CLASS AAE-3 CONCRETE	CU YD	32.0
602	1120	SUPERSTRUCTURE CONCRETE	CU YD	147.0
602	1123	SEAL SLAB CLASS YE-1 CONCRETE	CU.YD	3086.0
602	1124	SEAL SLAB CLASS AE-3 CONCRETE	CU.YD	1784.0
602	1129	CLASS AE-3 MODIFIED CONCRETE	CU YD	1898.0
602	1130	CLASS AE-3 CONCRETE	CU YD	571.0
604	9915	PRESTRESSED I-BEAM 54"	L FT	1792.0
612	0115	REINFORCING STEEL GRADE 60	LBS	296392.0
612	0116	REINFORCING STEEL GRADE 60 EPOXY	LBS	2403.0
612	0125	SEAL SLAB REBARS GRADE 60	LBS.	58521.0
612	0130	SEAL SLAB REBARS GRADE 60 EPOXY	LBS.	21534.0
616	0362	STRUCTURAL STEEL M183	LBS	4520.0
622	0016	STEEL H-PILE TIPS HP 14X73	EA	204.0
622	0060	STEEL PILING HP 14x73	L FT	17176.0
622	1900	STEEL TEST PILING HP 14x73	L FT	180.0
624	0123	PEDESTRIAN RAILING	L FT	1206.0
626	0100	COFFERDAM	EA	2.0
702	100	MOBILIZATION	L SUM	1.0
740	122	THREE PLY FABRIC WATERPROOFING	SQ YD	50.0
740	140	BUTYL RUB. MEMBRANE WATERPROOFING	SQ FT	7507.0
740	0160	SEAL SLAB WATERPROOFING MEMBRANE	SQ.YD	3743.0
740	0162	SEAL SLAB WATERSTOPS 6 IN.	L.F.	825.0
740	0163	SEAL SLAB WATERSTOPS 9 IN.	L.F.	146.0
930	8600	ELASTOMERIC BEARING PAD	SQ FT	92.9
930	9535	DECK DRAINAGE SYSTEM	L SUM	1.0
930	9930	ANTI-GRAFFITI COATING	SQ FT	7973.0

PILE LOADING

COMPUTED PILE LOADS - TONS PER PILE HP 14x73

	LOCATION	DEAD LOAD	LIVE LOAD	OVER TURNING	TOTAL
ABUTMENTS CASE I	ROW 1	19.1	14.4	42.0	75.5
	ROW 2	32.5	12.9	17.0	62.4
	ROW 3	45.9	11.3	8.0	49.2
	ROW 4	96.0	5.4	-101.7	-0.3
CASE II	ROW 1	19.1		42.0	61.1
	ROW 2	32.5		17.0	49.5
	ROW 3	45.9		-8.0	37.9
	ROW 4	96.0		-101.7	-5.7

ALL ABUTMENT AND WING WALL PILING(HP 14x73) SHALL BE DRIVEN TO A MINIMUM BEARING CAPACITY OF 75 TONS.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

EXISTING PILING
INDEX OF DRAWING
ESTIMATE OF QUANTITIES

1806-070.039-1

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
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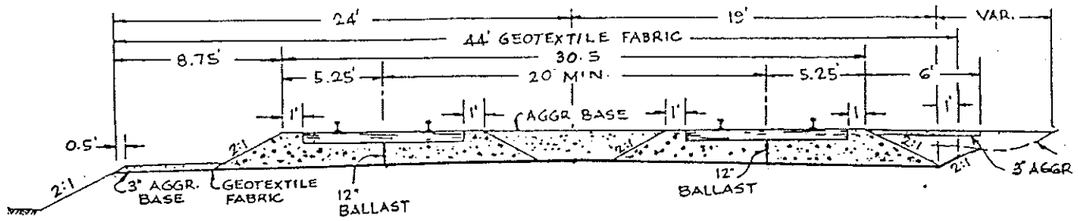
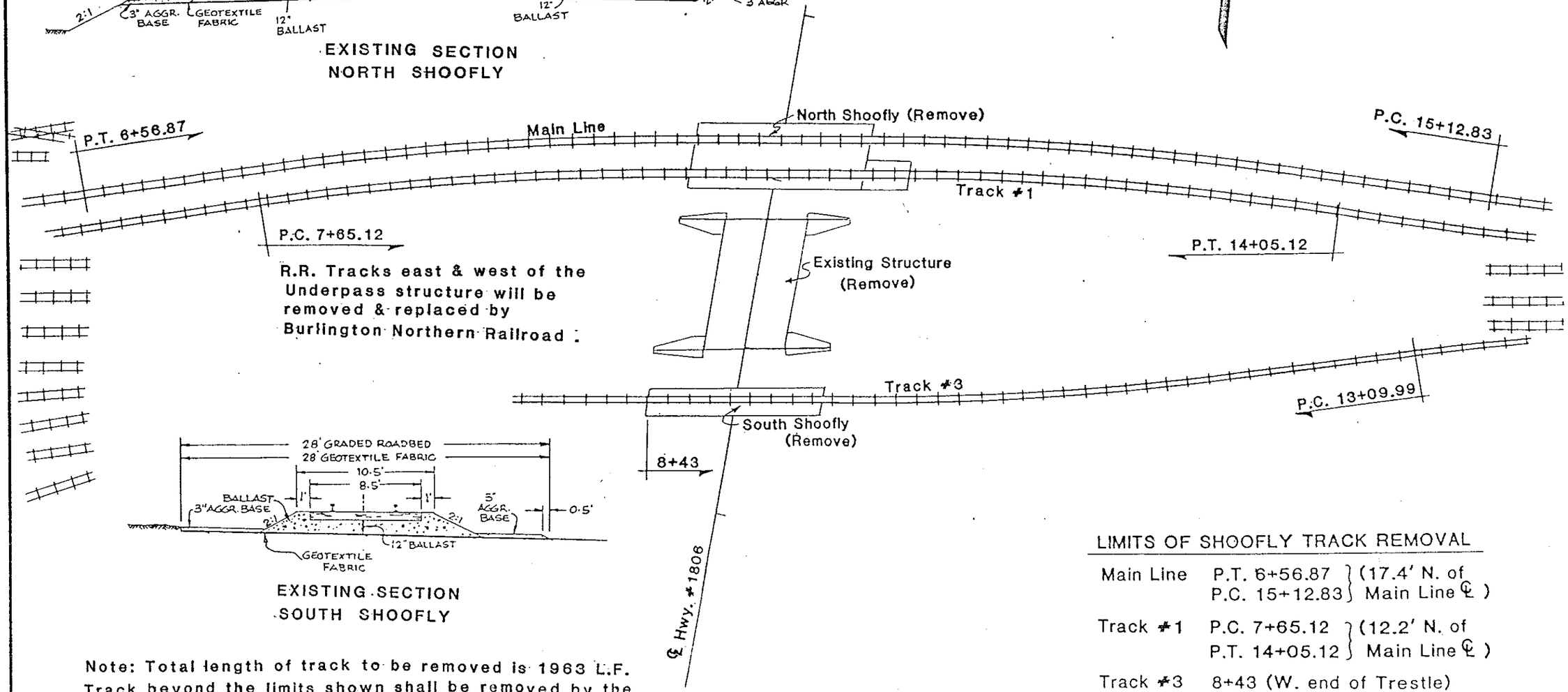
FG-1-806(015)069

LAYOUT SHOWING STRUCTURE & R.R. TRACK TO BE REMOVED



EXISTING SECTION
NORTH SHOOFLY



EXISTING SECTION
SOUTH SHOOFLY

Note: Total length of track to be removed is 1963 L.F. Track beyond the limits shown shall be removed by the B.N. Railroad. See Structural Note 202 "Removal of Structure".

LIMITS OF SHOOFLY TRACK REMOVAL

Main Line	P.T. 6+56.87 P.C. 15+12.83	(17.4' N. of Main Line ℄)
Track #1	P.C. 7+65.12 P.T. 14+05.12	(12.2' N. of Main Line ℄)
Track #3	8+43 (W. end of Trestle) P.C. 13+09.99 (16' S. of Tr. #3)	

1806-070.039-2

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
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MANDAN UNDERPASS

100 GENERAL WORK DESCRIPTION: Removal of the existing structure and timber trestles and the construction of a new railroad bridge, seal slab, and retaining walls.

100 GENERAL: The cost of furnishing and placing preformed expansion joint filler, gray rubber joint filler, concrete inserts, tie wire, bar spacers, bar supports, dampproofing, dowel bars, end caps, bituminous felt, and other miscellaneous items shall be included in the price bid for Class AE-3 Concrete, Class AE-3 Modified Concrete, and Superstructure Concrete.

202 REMOVAL OF STRUCTURE: The lump sum bid for "Removal of Structure" shall be full compensation for all labor, equipment, and materials necessary for removing the following items:

1. The existing railroad underpass structure. This structure is a single span with a railroad bridge with rolled beams 38 feet long with a concrete deck with a clear roadway of 30 feet. The substructures are made of concrete. Track rails will be removed by others.

2. The timber trestles located north and south of the railroad underpass structure. Information pertaining to these trestles (or the railroad underpass) can be obtained by contacting the Bridge Division in Bismarck, North Dakota. The telephone number is (701)224-2592.

3. The shoofly railroad tracks including the rails, ties, ballast, geotextile fabric, temporary embankment, and sheet piling. See detail sheet 1806-070.039-2 showing the layout of structure and railroad track to be removed for locations and quantities. After the removal, the ground shall be graded and leveled as directed by the Engineer. Seeding shall be measured and paid for at the unit price bid for "Seeding - Type B, Class V."

The existing east abutment timber piling and timber piling for the in place timber trestles shall be removed or cut down to an elevation of one foot below the seal slab section. The existing west abutment timber piling shall be removed or cut at the bottom elevation of the new abutment footing. The existing abutment footings have 143 timber piling at elevation 1625. Timber piling from the trestles and timber sheeting used when the existing underpass was constructed may have to be removed.

210 EXCAVATION: Class 1 excavation shall extend from the datum to the upper limits as designated on the plans. Payment for Class 1 excavation will be based on plan quantity.

210 EXCAVATION: Class 2 shall include all excavation below the datum line as designated on the plans. Payment for Class 2 excavation will be based on plan quantity.

210 BACKFILL: Select backfill shall be compacted in accordance with Section 203.02F except required density shall be 100% of AASHTO T-99 or 95% of AASHTO T-180. The coarse aggregate filter material and filter fabric shall be incidental to the price bid for "6" perforated PVC pipe."

602 SURFACE FINISH "D": Surface Finish "D" shall be required for the inside walls and ceiling of the pedestrian walkways, the inside area of the windows, the faces of the abutments around and above the walkways, and the exposed wing walls of the abutments. An Anti-Graffiti coating shall be applied to the above noted areas. The Anti-Graffiti coating shall be supplied by one of the following manufacturers:

Coatings For Industry, Inc.
319 Township Line Road
Souderton, PA 18964

ProSoCo, Inc.
P.O. Box 1578
Kansas City, KS 66117

Preco Industries, Ltd.
55 Skyline Drive
Plainview, NY 11803 9966

Anti-Graffiti coating shall be applied in accordance with the manufacturer's recommendations.

602 SUPERSTRUCTURE CONCRETE: Girders may 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 Superstructure Concrete. The Department will only pay for the plan quantity of Superstructure Concrete. Superstructure concrete shall have a minimum 28-day compression strength of 5,000 psi.

612 REINFORCING STEEL: Dimensions for bent bars are given out to out and to tangent intersections unless otherwise noted.

612 The bar fabricator shall add a prefix to all bar designations to differentiate between the several parts of the structure.

612 All reinforcing steel shall be Grade 60.

622 PILING: Piling shall be driven with a steam, air, or diesel hammer with a rated energy and ram weight not less than 63,854 foot-pound-tons, as computed by the formula W(E-15,167) + 0.842E 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 4,800 pounds.

The abutments and wing walls have a total of 204 H-piles which will require pile points. The pile points shall be carbon-steel castings with a minimum yield strength of 40,000 psi.

The unit price bid for pile points shall include material and installation. Piles shall be driven to elevation 1550 or below as required to obtain design bearing.

The plan drawing 1806-070.039-1 shows the expected location of existing timber piling for the west abutment with the piling for the new abutment. After the existing abutment has been removed and the area excavated to expose the true location of the timber piles, it may be necessary to shift some of the batter H-piles to avoid the timber piles in place, if these timber piling are not removed.

622 Test piles shall be driven to a bearing not less than 125% of the design load as determined by the dynamic formula in section 622.03 A.2.

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

1. Prestressed girders.
2. Deck drainage collection system.
3. Railing details.

DESIGN STRENGTH:	F'C	2,500 PSI Cl. YE-1 Concrete
	F'C	3,000 PSI Cl. AE-3 or AE-4 Concrete
	F'C	3,500 PSI Cl. AE-3 Modified Concrete
	F'C	5,000 PSI Superstructure Concrete
	F'C	5,500 PSI Prestressed Girder Concrete
	FY	36,000 PSI Structural Steel
	FY	60,000 PSI GR. 60 Reinforced Steel

DRAINAGE SYSTEM: Drainage system bottom pans, cover, corrugated metal pipes, reducers, collar, and all necessary connections and fasteners shall be galvanized and bituminous coated.

The item "Deck Drainage System" to include all material required for the complete drainage system including pipe clamps, deck drains, sleeves, and all underground pipe behind and through abutments.

Threaded bolt anchorages to be cinch-anchor type as manufactured by the National Lead Company, the rawl-anchor type as manufactured by the Rawlplug Company, or approved equal.

JOINT FILLER: Preformed expansion joint filler shall comply with AASHTO M33.

Gray rubber joint filler shall conform to the requirement of AASHTO M153, Type 1. Dimensions shall be as shown on the plans and tolerance of +1/16 inch in thickness ±1/8 inch in depth and +1/4 inch in length shall be permitted.

LEGEND: F.F. Denotes Front Face
B.F. Denotes Back Face
TYP. Denotes Typical

SOIL CONTAMINATION: During the soil survey, which was done in February 1986, some of the borings taken in an area west of the north trestle contained some hydrocarbon contaminated clay and sand. It is assumed this contamination is due to a gasoline spill or leak from the gasoline storage tanks in this area. This information is furnished to the contractor so that any appropriate action deemed necessary can be taken. Additional information concerning this contamination can be obtained by contacting the State Highway Department Materials and Research Division in Bismarck, North Dakota. The telephone number is (701)224-4382.

COFFERDAMS: Cofferdams shall be required for the construction of the abutments and wing walls. The contractor shall be responsible for the design, construction, dewatering, maintaining, and removal of the cofferdams as noted in Section 626 of the Standard Specifications . The sheet piling and the excavation inside the cofferdams shall be included in the price bid for "Cofferdams."

AMERICAN RAILWAY ENGINEERING ASSOCIATION SPECIFICATIONS: Inquiries pertaining to the A.R.E.A. Specifications can be directed to the Burlington Northern Division Engineer at Billings, Montana. The phone number is (406)256-4313.

BASE SLAB: Base slab construction shall conform to the provisions in Section 602, "Concrete Structures" of the Standard Specifications and the following additional requirement: Base slab concrete shall be Class AE-3 concrete. Base slab concrete shall be placed in the dry and need not be vibrated. Base slab concrete shall be cured by the wet cure method according to the provisions of Section 602.03 F.2.C. The surface of the base slab concrete shall be finished such that it will be free of angular breaks, sharp edges, and honeycomb and the finished surface will not vary more than 1/2 inch from a ten-foot straight edge placed in any direction on the surface. Any curing compound used shall be compatible to the waterproofing system.

No vehicular traffic that may damage the slab will be permitted on the base slab concrete.

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SEAL SLAB: Seal slab construction shall apply to the section between Station 6+00 and Station 8+30. Seal slab construction shall conform to the provisions in Section 602, "Concrete Structures" of the Standard Specifications and the following additional requirements: Seal slab concrete shall be Class YE-1 concrete.

Seal slab concrete placement between construction joints shall be completed in one continuous operation with a minimum concrete placement rate of 100 cubic yards per hour.

The cement shall conform to AASHTO M-85, Type IV, for low heat of hydration and for less shrinkage. Fly ash may be substituted on the basis of 20% fly ash for 15% cement. Fly ash shall conform to Section 820 of the Standard Specifications.

The surface of the seal slab shall be tined or raked to roughen the surface slightly to aid in the bonding of the roadway concrete section. the Work shall be in conformance with the provisions in Section 602.03 B.2, "Deck Finishing" of the Standard Specifications.

After mixing, the seal slab concrete temperature shall be maintained at not more than 60°F. until placed in the work. The amount of cooling of 1½" aggregate and water will depend on ambient air temperature and the temperature of the material in the stockpile.

Seal slab concrete shall be cured by the wet cure method according to the provisions of Section 602.03 F.2.C. of the Standard Specifications. The minimum time between placement of adjacent concrete slabs is 14 days.

ROADWAY SECTION: The roadway section between Station 5+55.75 to Station 9+05 shall be Class AE-3 concrete. Construction shall conform to the provisions in Section 550, "Portland Cement Concrete Pavement" of the Standard Specifications. The roadway section shall be paid for at the unit price bid for Seal Slab Class AE-3 Concrete and Seal Slab Reinforcing Steel Grade 60 Epoxy.

All seal slab retaining walls and walls A-1, A-2, A-3, B-1, B-2, C-1, C-2, D-1, and D-2 shall be given the special surface treatment as shown on sheet 1805-070.039-42 in the plans. Drain holes in the north retaining walls shall be provided with a filtering material so the weep hole remains clear.

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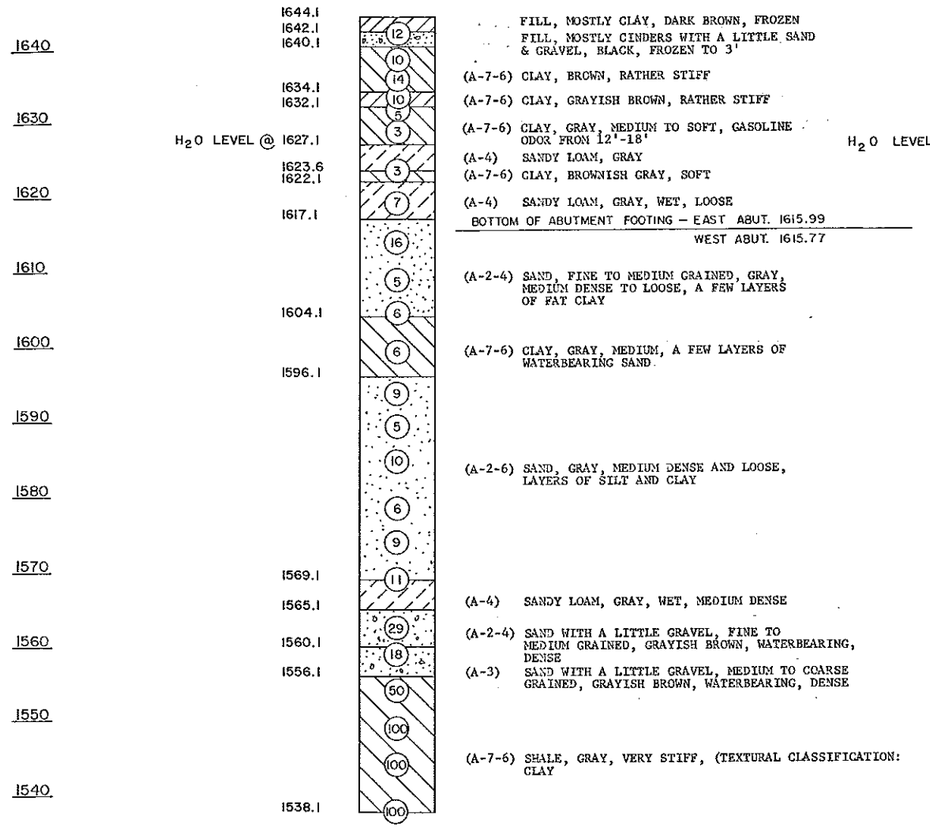
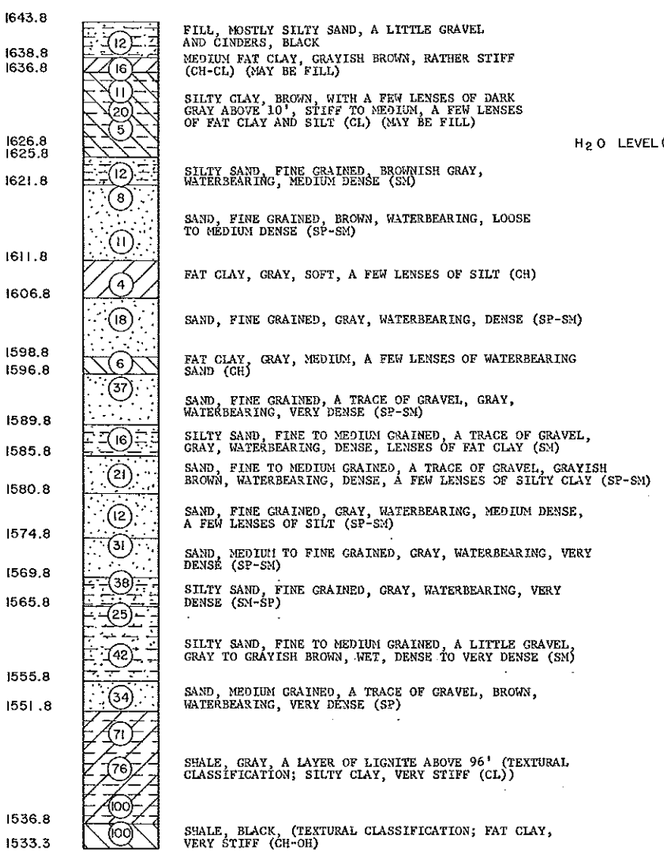


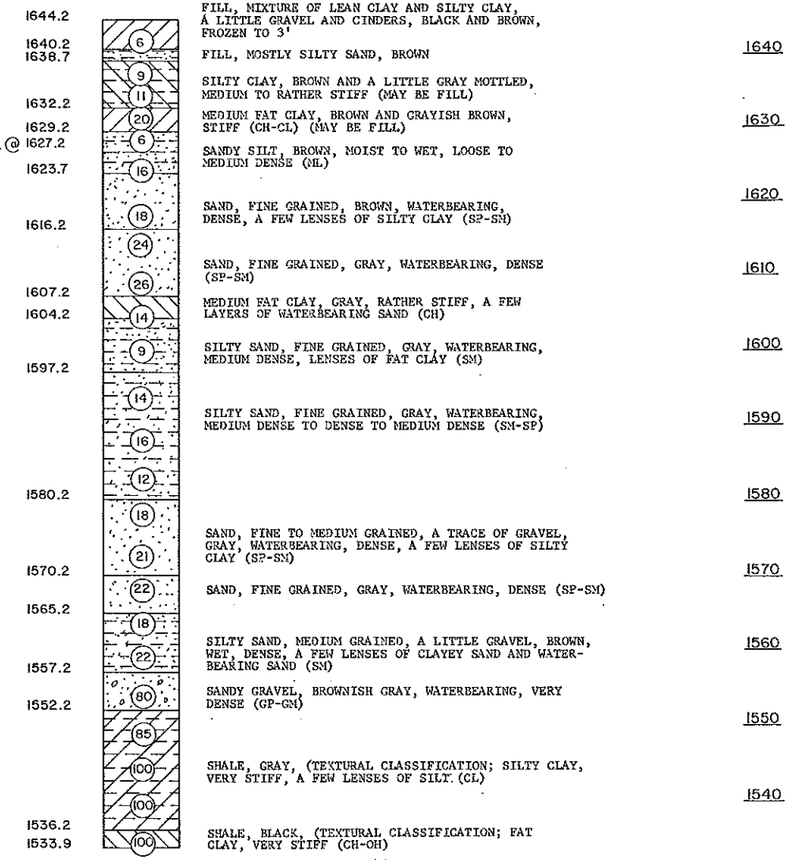
BORING NO. 1A

NORTHWEST EXISTING BRIDGE



BORING NO. 1

SOUTHWEST EXISTING BRIDGE



BORING NO. 2

SOUTHEAST EXISTING BRIDGE

CLASSIFICATION:

GP - POORLY GRADED GRAVELS AND GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
SP - POORLY GRADED SANDS AND GRAVELLY SANDS, LITTLE OR NO FINES.
SM - SILTY SANDS. SAND-SILT MIXTURES
ML - INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS.
CL - INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
CH - INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
OH - ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY.

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:

P - MAXIMUM LOAD (LBS. SQ. FT.)
Ø - ANGLE OF INTERNAL FRICTION (DEGREES)
C - COHESION (LBS. SQ. FT.)
M - MOISTURE (PERCENT)
W - DRY WEIGHT (LBS./CU. FT.)
* - TRIAXIAL

N.D. 1806
MANDAN

BORING LOG

1806-070.039-5

MATHISON 3M 8-77 63877

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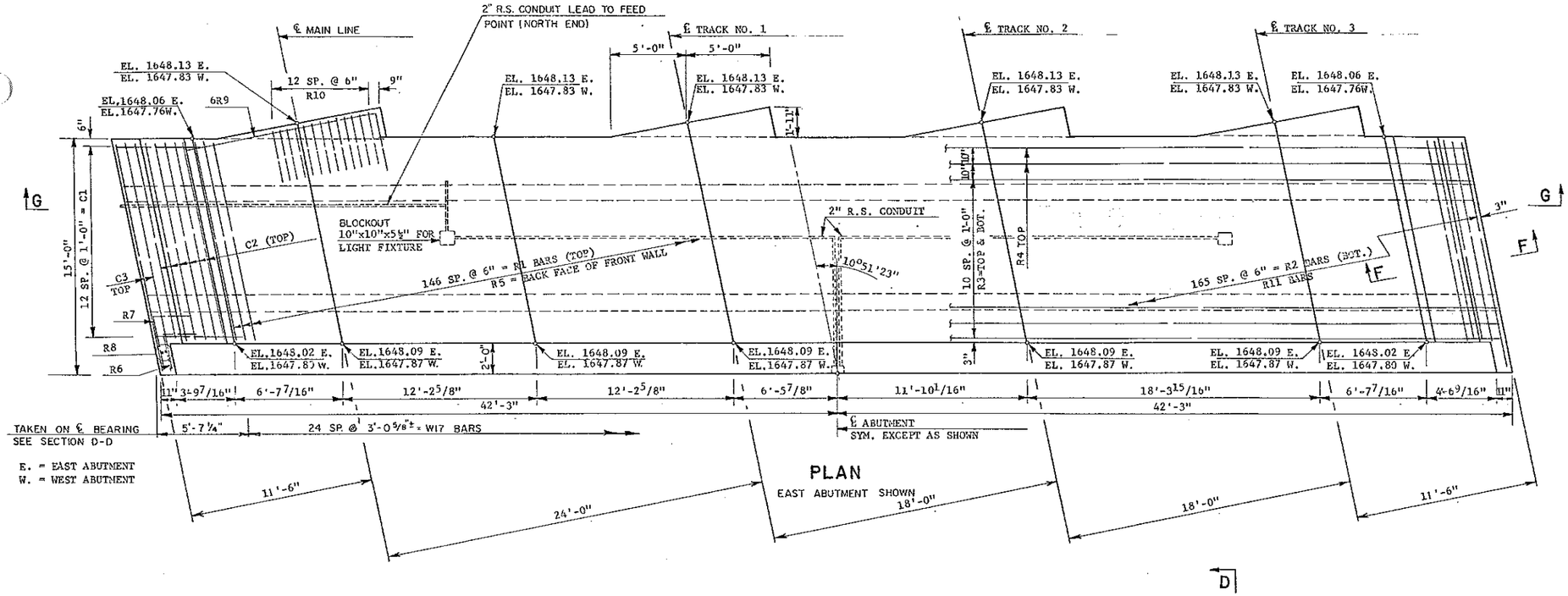
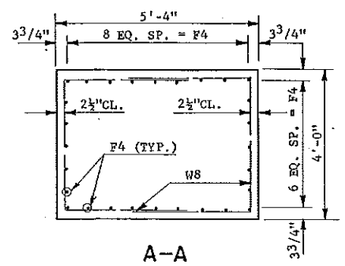
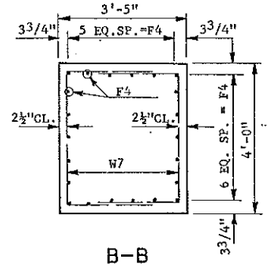
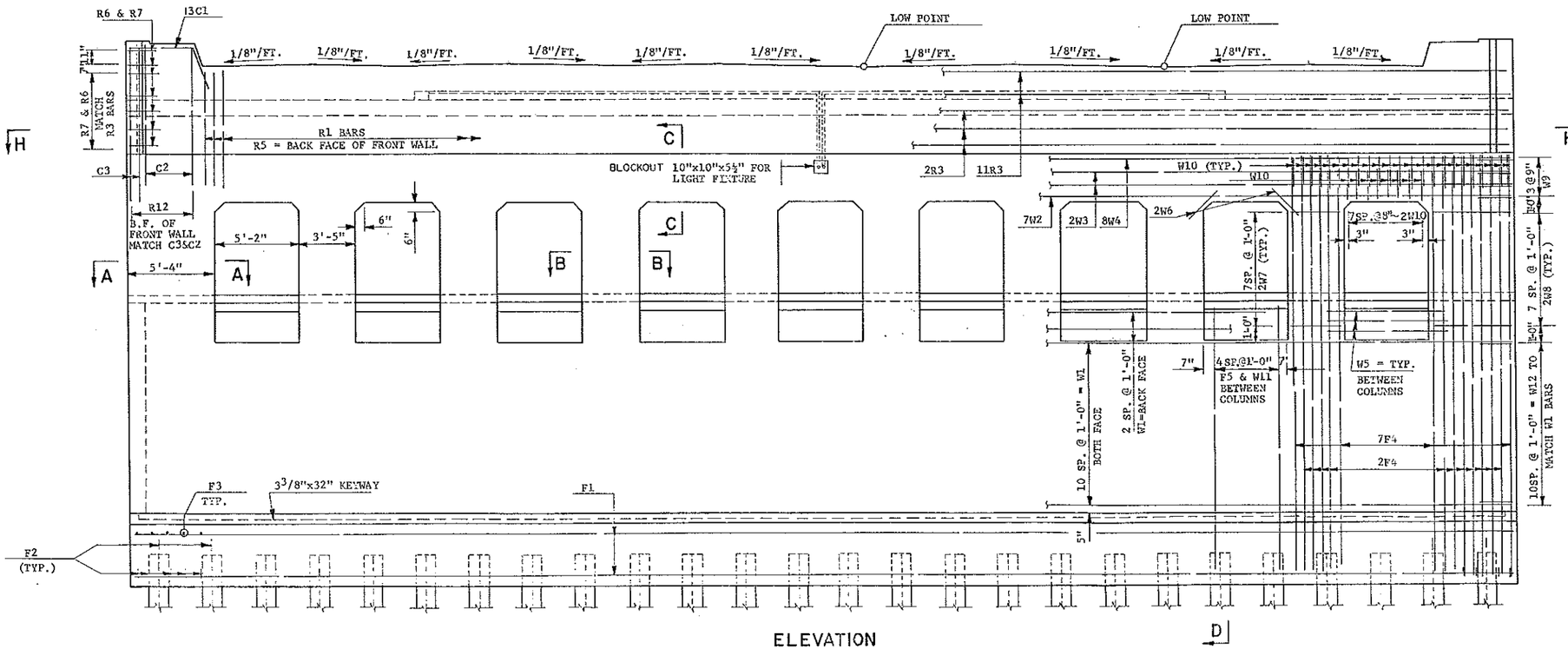




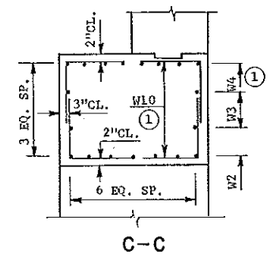
A-A



B-B



ELEVATION



C-C

① W1 & W10 BARS MAY NEED TO BE SHIFTED TO PROVIDE CLEARANCE FOR DRILLING ANCHOR BOLT HOLES.

SECTIONS D-D & FF SEE DWG. 1806-070.039-8

SECTION G-G & H-H SEE DWG. 1806-070.039-7

QUANTITIES

SEE DRAWING NO. 1806-070.039-9

6TH AVENUE S.E. UNDERPASS

MANDAN, N.D.

ABUTMENT DETAILS

1806-070.039-6

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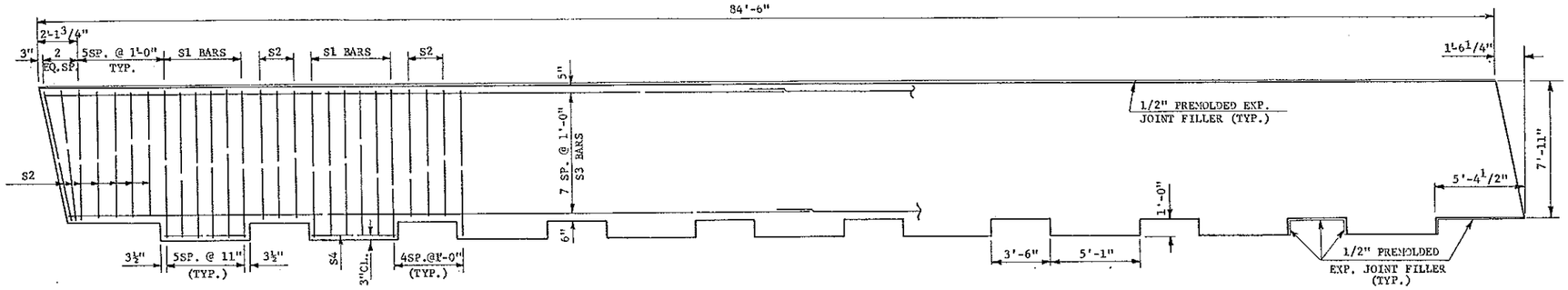
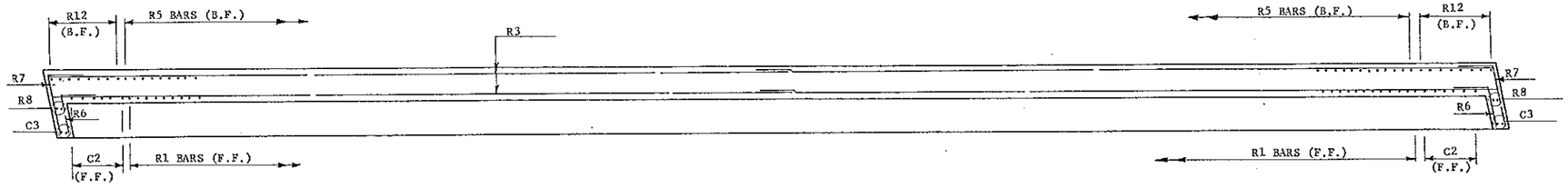
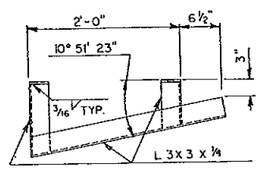


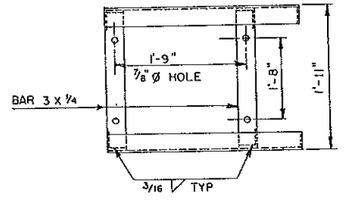
SIDEWALK PLAN



H-H
SECTION OF FRONT WALL ONLY

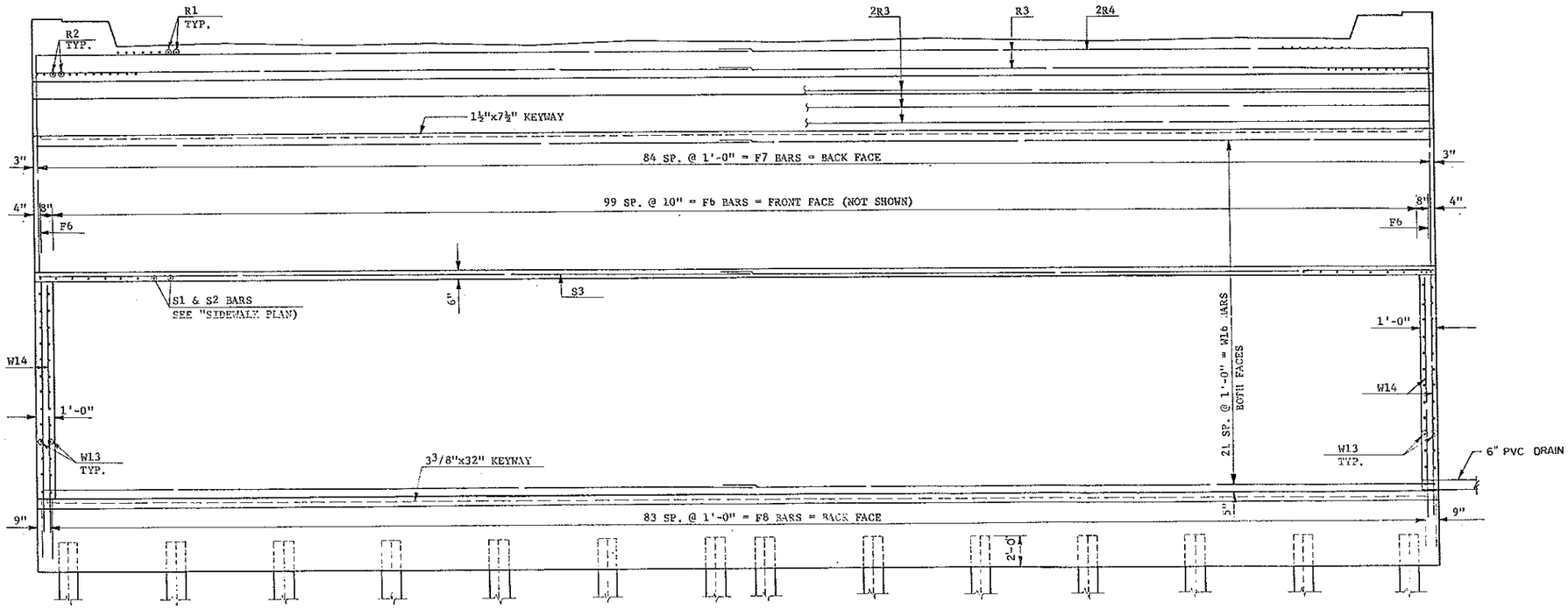


PLAN



BN SIGN BRACKET
(2 REQUIRED)

NOTE: STRUCTURAL STEEL FOR THE SIGN BRACKET SHALL BE INCLUDED IN THE BID ITEM AS PEDESTRIAN RAIL.
(INSERTS FURNISHED BY FABRICATOR)



G-G

QUANTITIES
SEE DRAWING 1806-070.039-9

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.
ABUTMENT DETAILS

1806-070.039-7

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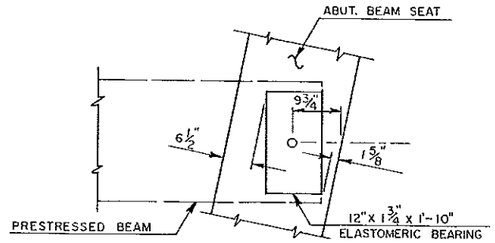
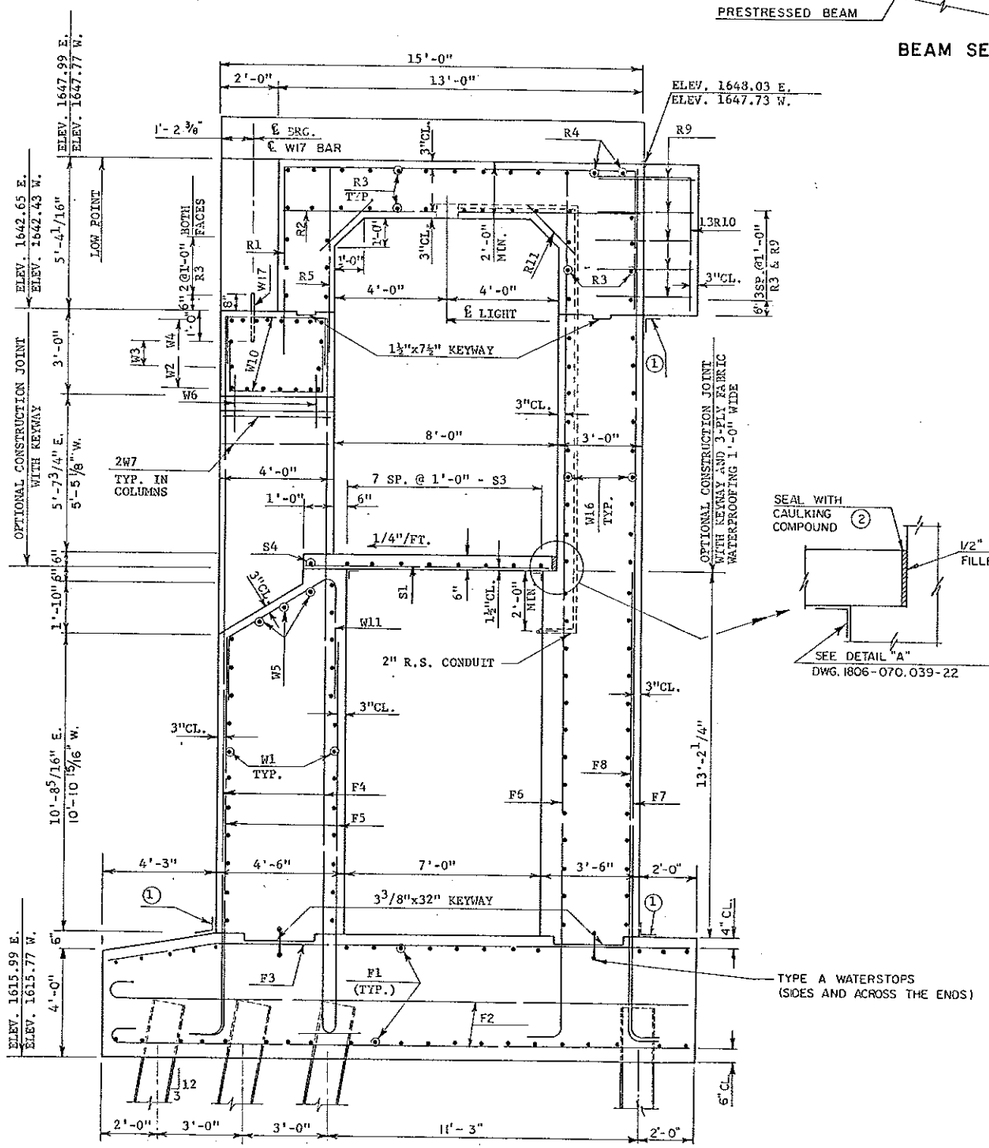
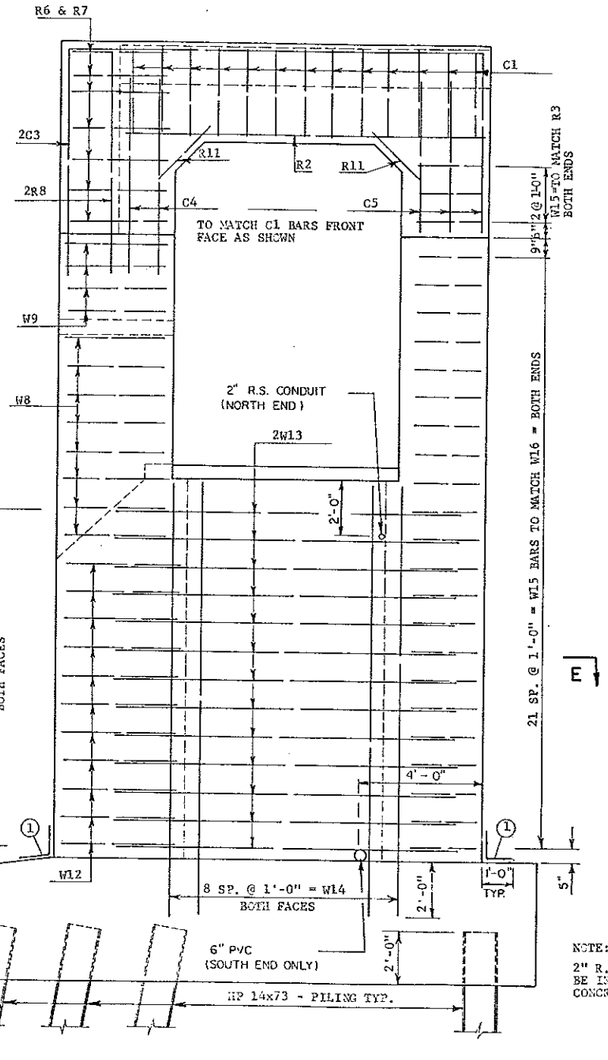


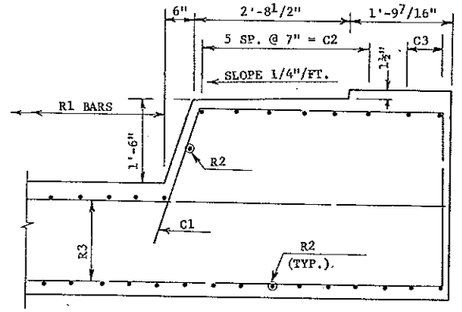
BEAM SEAT DETAIL



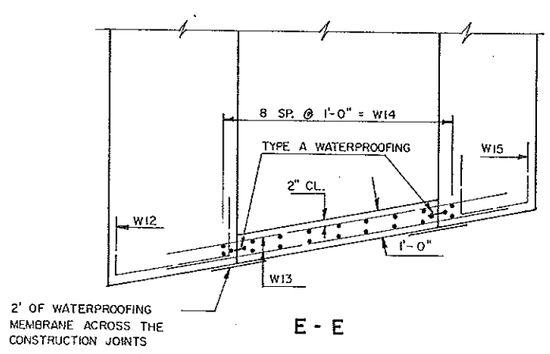
D-D



END VIEW



F-F



E - E

(1) WATERPROOFING MEMBRANE

(2) CAULKING COMPOUND -- SPEC. NO. TT-S-00227E CLASS A TYPE II.

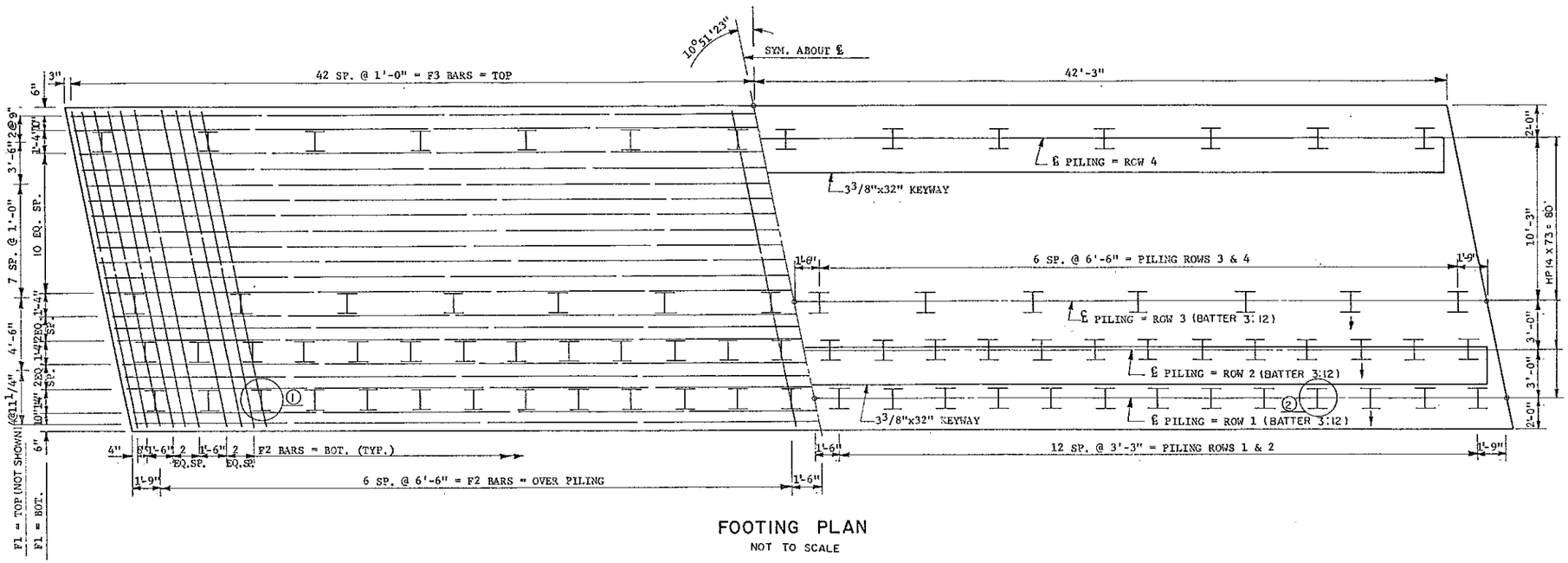
NOTE:
2" R.S.C.-COST OF LIGHTING CONDUIT SHALL BE INCIDENTAL TO CLASS AE-3 MODIFIED CONCRETE.

QUANTITIES
SEE DRAWING 1806-070.039-9

6TH AVENUE S.E. UNDERPASS
MANDAN, ND

ABUTMENT DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	

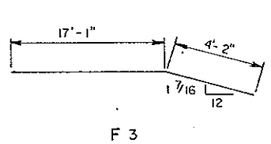


FOOTING PLAN

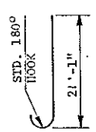
NOT TO SCALE

① TEST PILE FOR EAST ABUTMENT HP14 X 73 = 90°

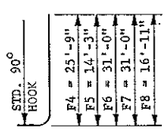
② TEST PILE FOR WEST ABUTMENT HP14 X 73 = 90°



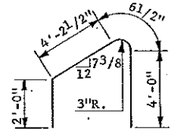
F 3



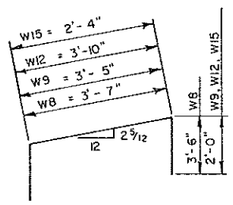
F2



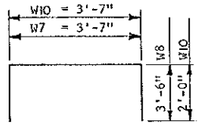
F4 – F8



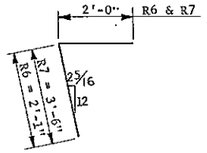
W11



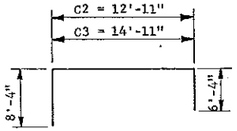
W8, W9, W12 & W15



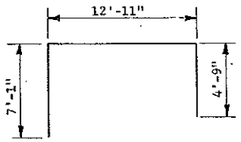
W7 – W10, W12, W15



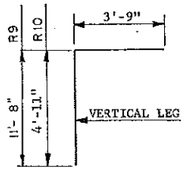
R6, R7



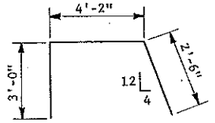
C2 & C3



R1



R9 & R10



C1

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST (ONE ABUT.)

MARK	NO.	SIZE	LENGTH	SHAPE
F1	74	5	43'-1"	STR.
F2	93	10	22'-6"	BENT
F3	85	6	21'-3"	"
F4	232	10	27'-7"	BENT
F5	90	5	15'-1"	"
F6	102	8	32'-4"	"
F7	85	10	32'-10"	"
F8	84	10	18'-9"	"
W1	48	6	43'-1"	STR.
W2	14	7	43'-3"	"
W3	8	5	43'-1"	"
W4	16	9	43'-7"	"
W5	27	5	7'-2"	"
W6	36	6	2'-6"	"
W7	128	5	8'-7"	BENT
W8	32	5	10'-7"	"
W9	8	5	7'-5"	"
W10	210	6	7'-7"	"
W11	45	5	10'-9"	"
W12	22	5	7'-10"	"
W13	52	5	12'-9"	STR.
W14	36	5	15'-0"	"
W15	52	5	6'-4"	BENT
W16	88	6	43'-1"	STR.
W17	25	10	1'-8"	"
S1	54	5	8'-4"	STR.
S2	38	5	7'-4"	STR.
S3	16	5	43'-1"	"
S4	9	5	4'-9"	"
R1	147	7	24'-9"	BENT
R2	166	7	12'-11"	STR.
R3	70	6	43'-1"	"
R4	4	8	43'-4"	"
R5	147	5	7'-1"	"
R6	14	5	4'-1"	BENT
R7	14	5	5'-6"	"
R8	4	5	8'-10"	STR.
R9	20	5	15'-5"	BENT
R10	52	7	8'-8"	"
R11	332	6	2'-6"	STR.
R12	16	5	9'-0"	"
C1	26	5	9'-8"	BENT
C2	12	6	27'-7"	"
C3	4	6	29'-7"	"
C4	4	5	6'-10"	"
C5	6	5	5'-4"	"

QUANTITIES (ONE ABUT.)

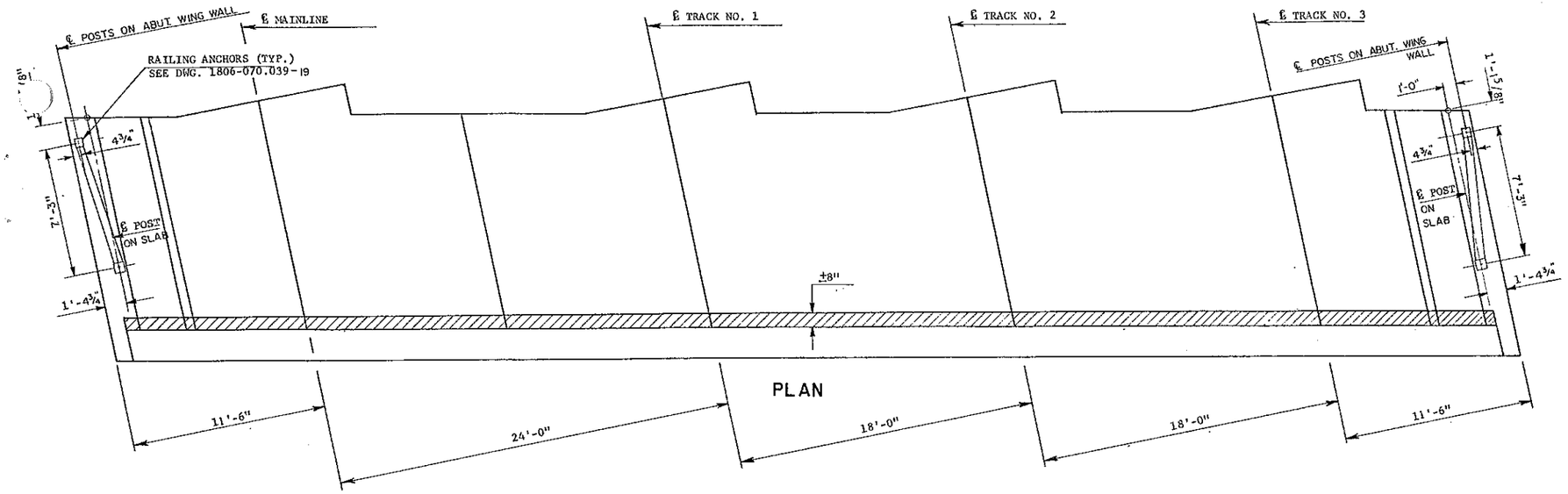
CLASS AE-3 MOD. CONC.	949	C.Y.
REINFORCING STEEL	114,344	LBS.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

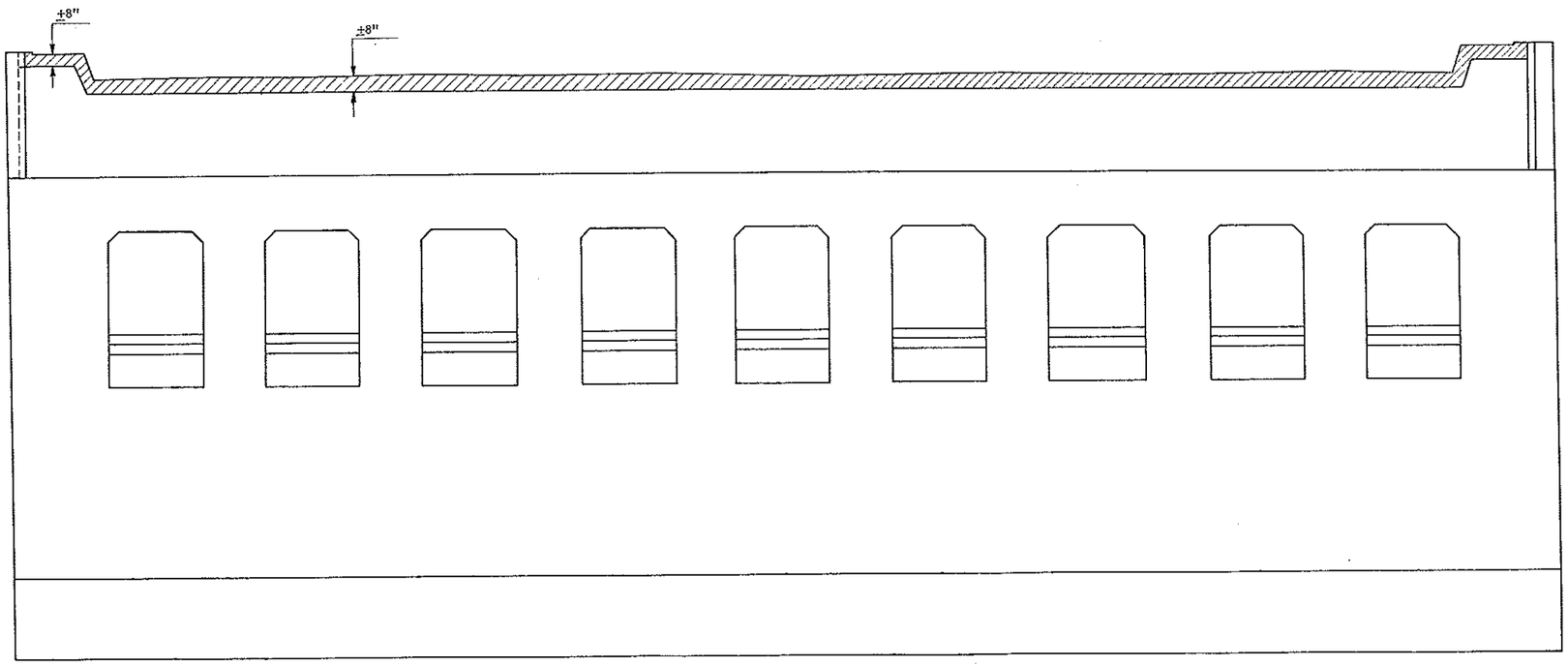
ABUTMENT DETAILS

1806-070.039-9

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	



PLAN

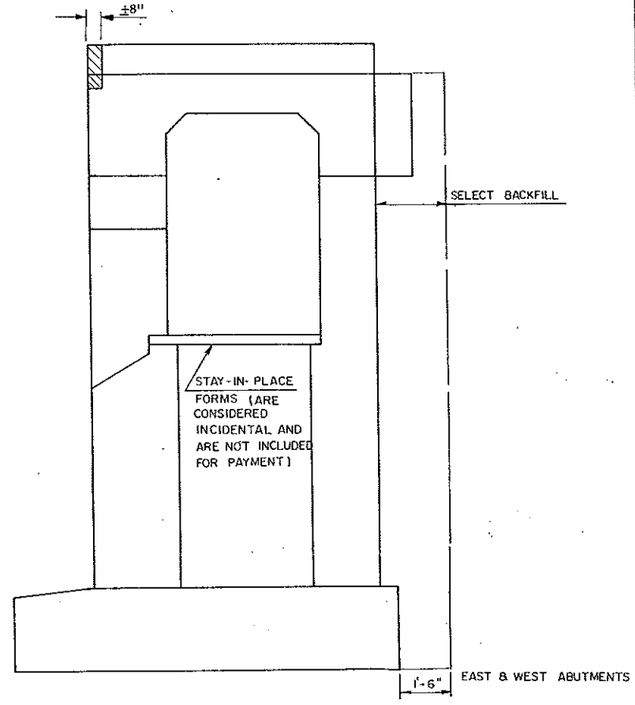


ELEVATION

NOTE:

CROSSHATCHED AREA SHALL BE BLOCKED OUT AND POURED AFTER THE ENTIRE EXPANSION JOINT ASSEMBLY HAS BEEN ADJUSTED TO FINAL POSITION.

FOR EXPANSION JOINT DETAILS, SEE DWG. 1806-070.039-18



TYPICAL SECTION

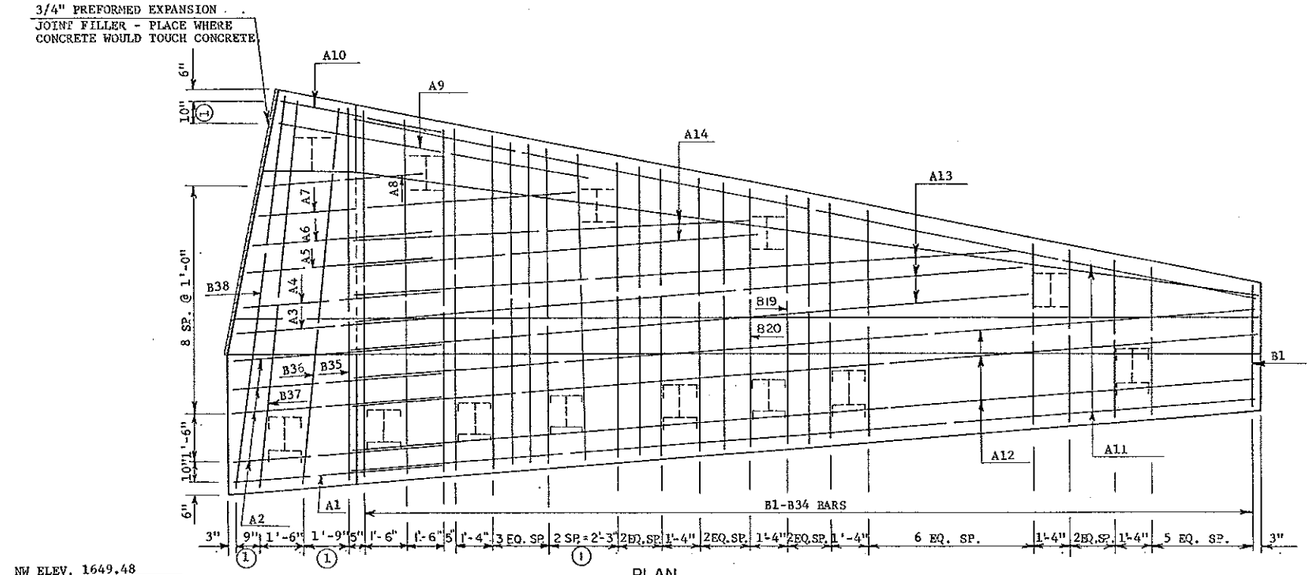
6TH AVENUE S.E. UNDERPASS

MANDAN, N.D.

MISC. ABUTMENT DETAILS

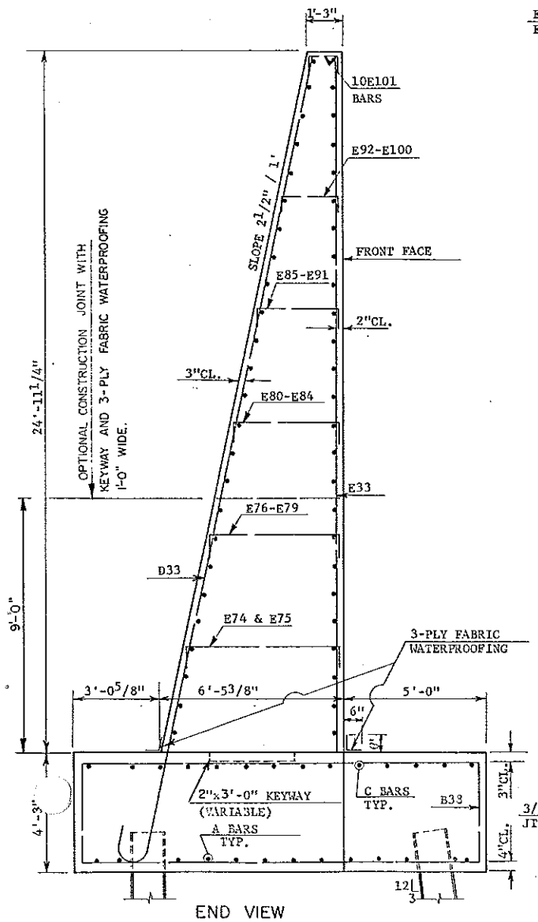
1806-070.039-10

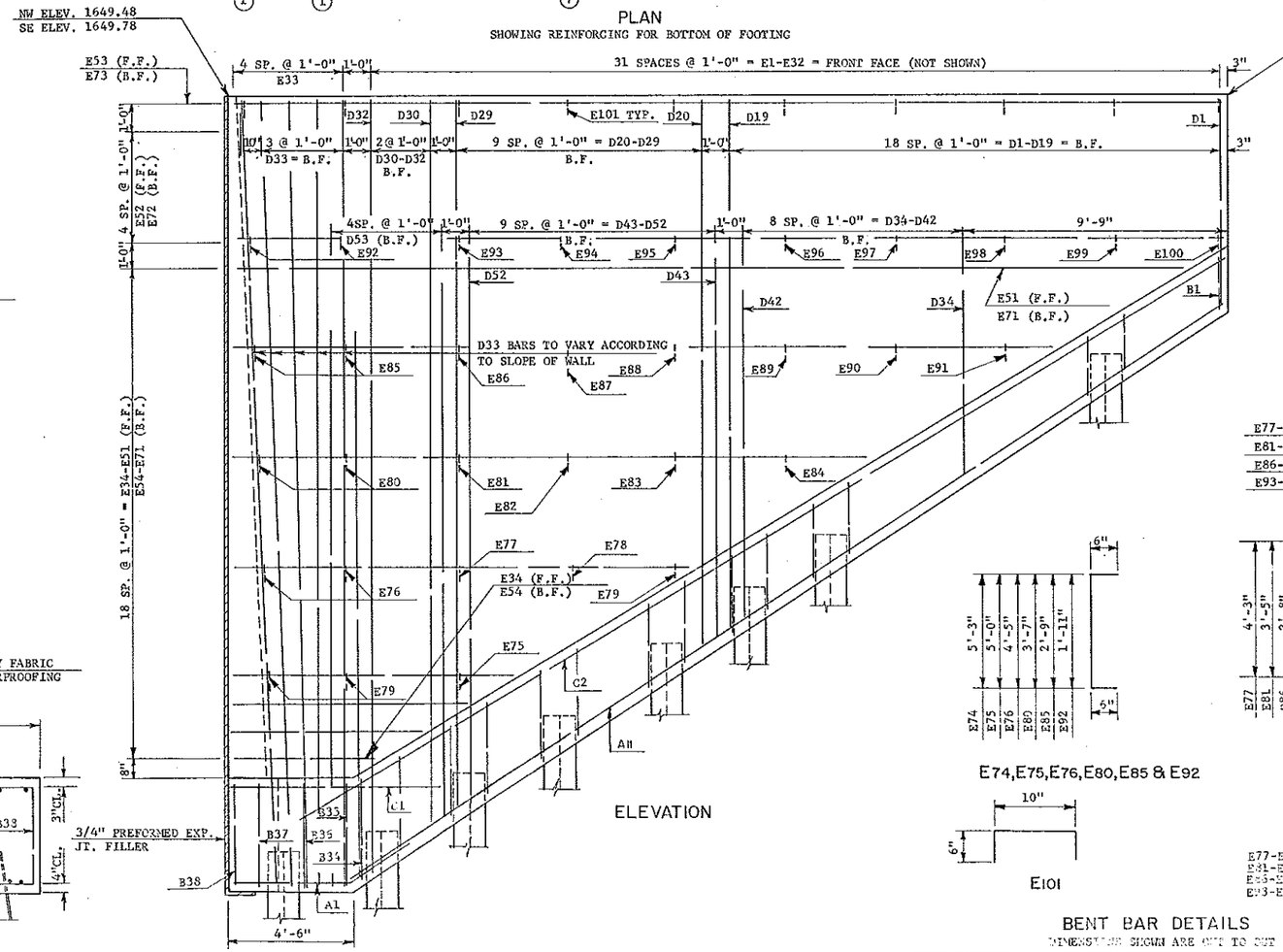
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N. D.	FG-1-806(15)	

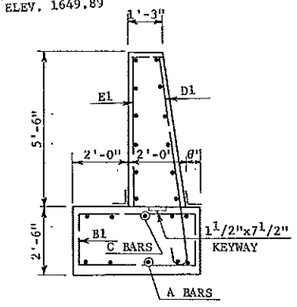


PLAN

SHOWING REINFORCING FOR BOTTOM OF FOOTING



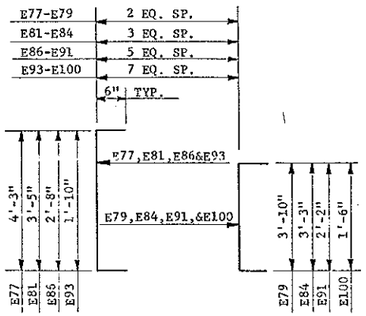




END VIEW

E74,E75,E76,E80,E85 & E92

E101



E77 - E79
E81 - E84
E86 - E91
E93 - E100

1 SET SHOWN
1 SET REQUIRED

E77-E79 = TOTAL LENGTH OF 1 SET = 15'-2"
E81-E84 = TOTAL LENGTH OF 1 SET = 17'-4"
E86-E91 = TOTAL LENGTH OF 1 SET = 21'-5"
E93-E100 = TOTAL LENGTH OF 1 SET = 21'-4"

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST (CONTINUED FROM DWG. NO. 1806-070.039-12)

MARK	NO.	SIZE	LENGTH	SHAPE
E74	2	4	6'-3"	BENT
E75	1	4	6'-0"	BENT
E76	2	4	5'-5"	BENT
E77-E79	1 SET	4	15'-2"	BENT
E80	2	4	4'-7"	BENT
E81-E84	1 SET	4	17'-4"	BENT
E85	2	4	3'-9"	BENT
E86-E91	1 SET	4	21'-5"	BENT
E92	2	4	2'-11"	BENT
E93-E100	1 SET	4	21'-4"	BENT
E101	10	4	1'-10"	BENT

QUANTITIES

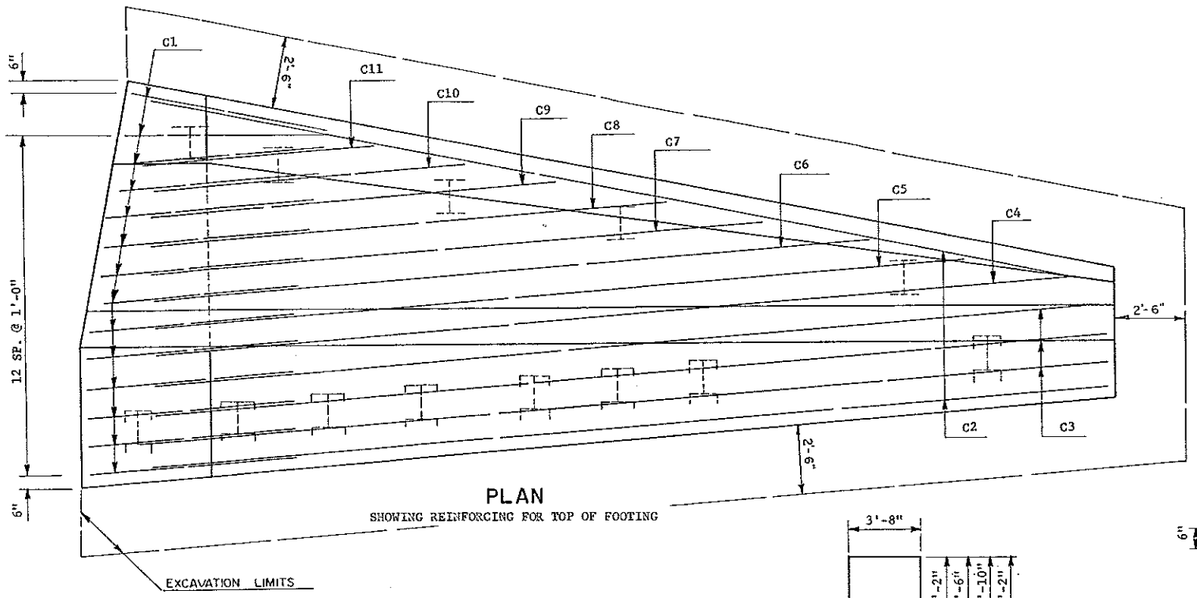
SEE DWG. 1806-070.039-12

6TH AVENUE S.E. UNDERPASS
MANDAN, ND

NW & SE WING WALLS

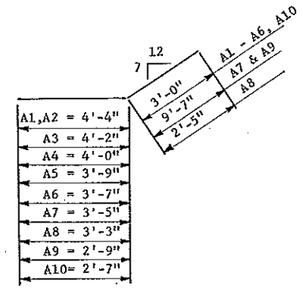
1806-070.039-11

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	

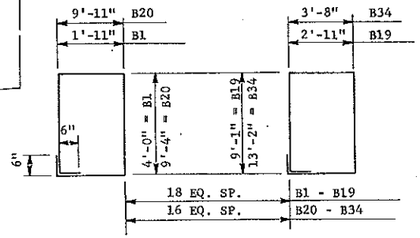


PLAN

SHOWING REINFORCING FOR TOP OF FOOTING



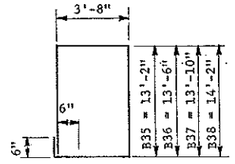
A1 – A10



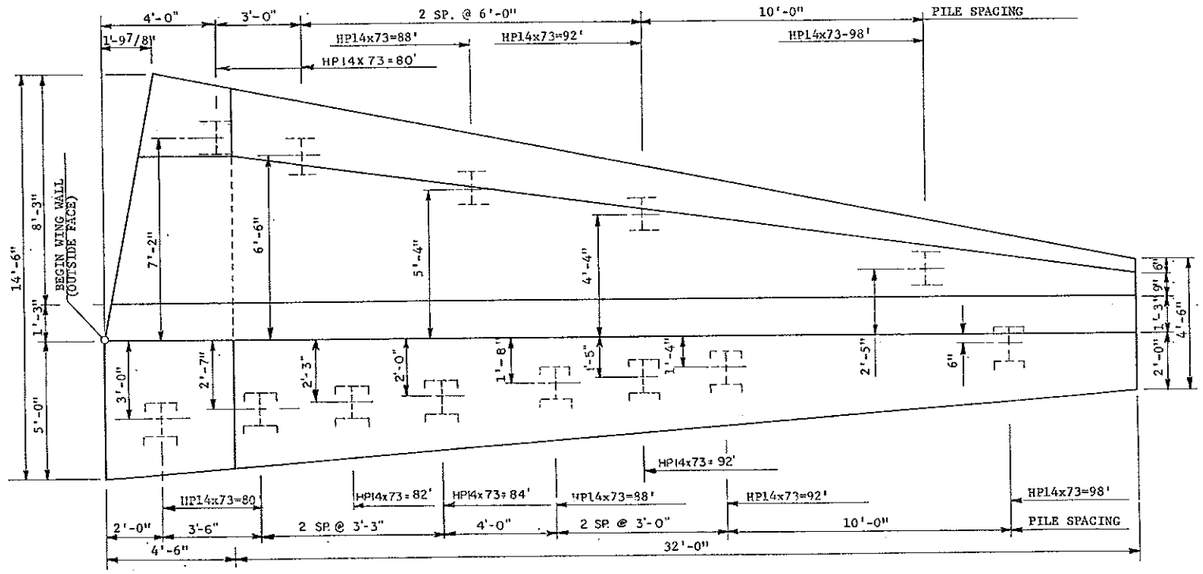
B1 – B19 & B20 – B34

ONE SET REQUIRED - ONE SET SHOWN

B1 - B19 - TOTAL LENGTH OF ONE SET = 359'-5"
B20 - B34 - TOTAL LENGTH OF ONE SET = 511'-5"

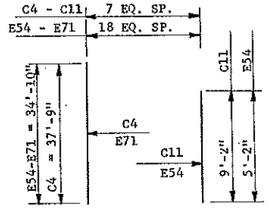


B35 – B38



PLAN

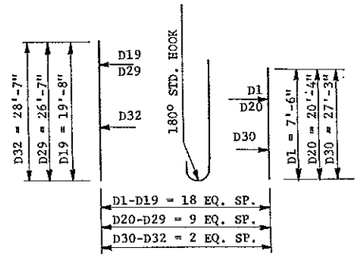
SHOWING PILING SPACES
SHOWING DIMENSIONS



C4 – C. & E – E11

1 SET SHOWN
1 SET REQUIRED

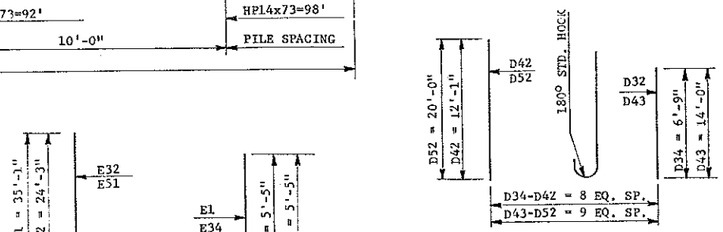
TOTAL LENGTH OF 1 SET = 187'-8"
TOTAL LENGTH OF 1 SET = 380'-0"



D1 – D19, D20 – D29 & D30 – D32

1 SET SHOWN
1 SET REQUIRED

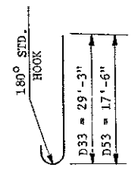
D1-D19 = TOTAL LENGTH OF 1 SET = 270'-9"
D20-D29 = TOTAL LENGTH OF 1 SET = 243'-9"
D30-D32 = TOTAL LENGTH OF 1 SET = 88'-0"



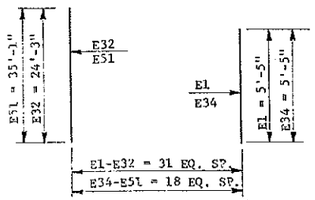
D34 – D42 & D43 – D52

1 SET SHOWN
1 SET REQUIRED

D34-D42 = TOTAL LENGTH OF 1 SET = 90'-9"
D43-D52 = TOTAL LENGTH OF 1 SET = 179'-2"



D33 & D53



E1 – E32 & E34 – E51

1 SET SHOWN
1 SET REQUIRED

E1-E32 = TOTAL LENGTH OF 1 SET = 474'-8"
E34-E51 = TOTAL LENGTH OF 1 SET = 384'-9"

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST (ONE WING)

MARK	NO.	SIZE	LENGTH	SHAPE
A1	1	7	7'-4"	BENT
A2	4	6	7'-4"	"
A3	1	6	7'-2"	"
A4	1	6	7'-0"	"
A5	1	6	6'-9"	"
A6	1	6	6'-7"	"
A7	1	6	13'-0"	"
A8	1	6	5'-8"	"
A9	1	6	12'-4"	"
A10	1	7	5'-7"	"
A11	2	7	38'-3"	STR.
A12	3	6	38'-3"	"
A13	3	6	28'-3"	"
A14	2	6	16'-5"	"
B1-B19	1 SET	6	359'-5"	BENT
B20-B34	1 SET	10	511'-5"	BENT
B35	1	11	34'-8"	"
B36	1	11	35'-4"	"
B37	1	11	36'-0"	"
B38	1	11	36'-8"	"
C1	14	6	7'-4"	STR.
C2	2	7	39'-3"	"
C3	3	6	39'-3"	"
C4-C11	1 SET	6	187'-8"	"
D1-D19	1 SET	6	270'-9"	BENT
D20-D29	1 SET	8	243'-9"	"
D30-D32	1 SET	10	88'-0"	"
D33	5	10	30'-8"	"
D34-D42	1 SET	6	90'-9"	"
D43-D52	1 SET	8	179'-2"	"
D53	5	10	18'-11"	"
E1-E32	1 SET	5	474'-8"	STR.
E33	5	5	24'-9"	"
E34-E51	1 SET	5	384'-9"	"
E52	5	5	36'-2"	"
E53	1	6	36'-2"	"
E54-E71	1 SET	5	380'-0"	"
E72	5	5	35'-11"	"
E73	1	6	36'-0"	STR.

NOTE:
ADDITIONAL BARS AND BENT BAR DETAILS ARE SHOWN ON DRWG. NO. 1806-039-11

QUANTITIES (ONE WING)

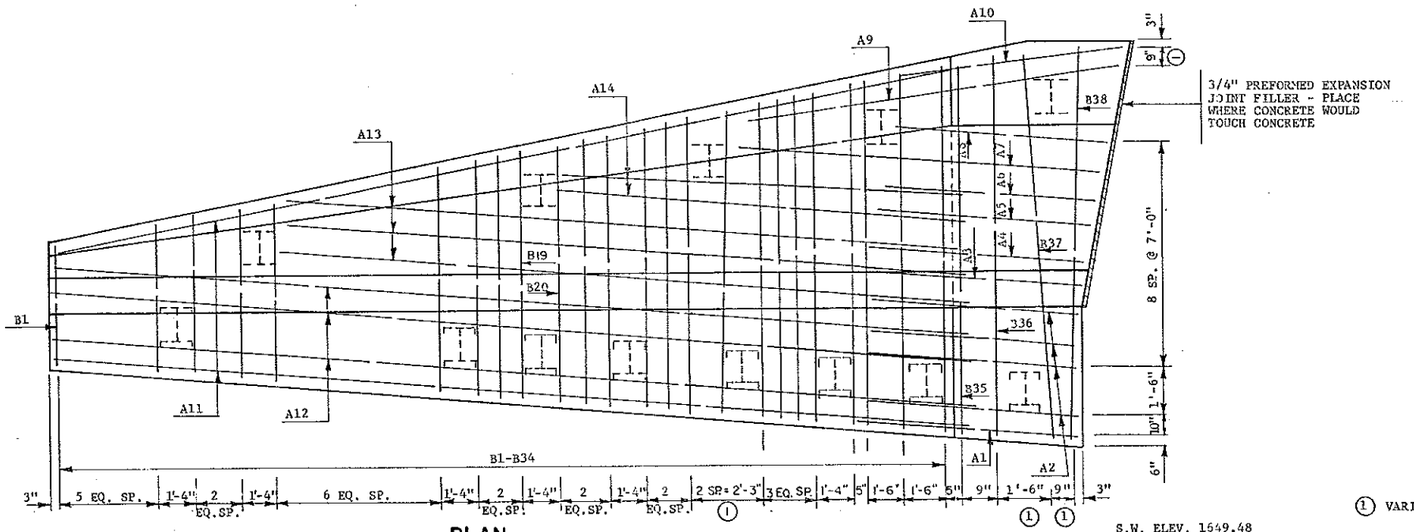
CLASS AE-3 CONCRETE	114.5	C.Y.
REINFORCING STEEL	10,056	LBS.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

N.W. & S.E. WING WALLS

1806-070.039-12

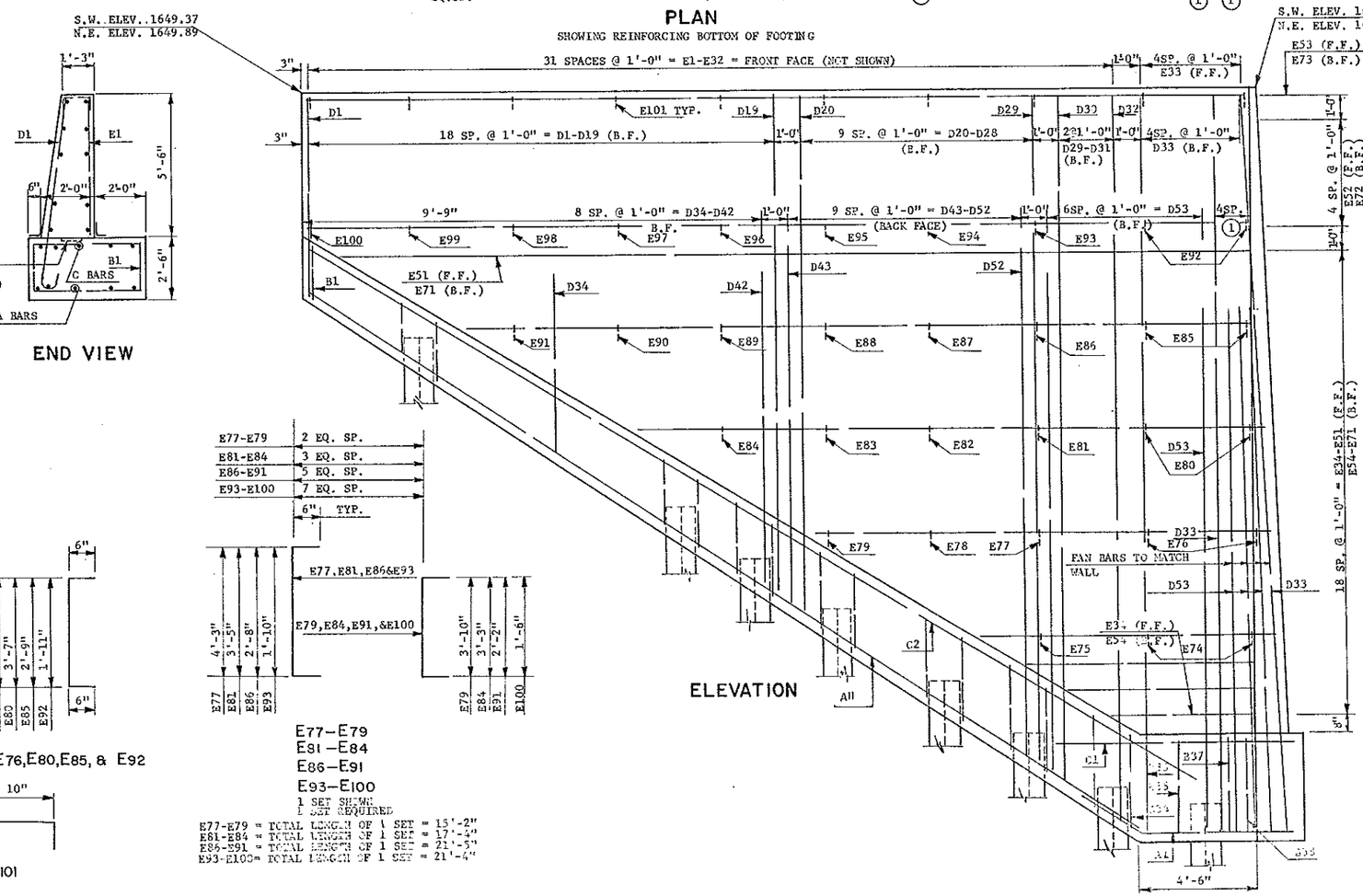
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	



PLAN

SHOWING REINFORCING BOTTOM OF FOOTING

1 VARIABLE SPACING



END VIEW

ELEVATION

END VIEW

BAR LIST (CONTINUED FROM DRWG. NO. 1806-070.039-12)

MARK	NO	SIZE	LENGTH	SHAPE
E 74	2	4	6'- 3"	BENT
E 75	1	4	6'- 0"	"
E 76	2	4	5'- 5"	"
E 77-E79	1SET	4	15'- 2"	"
E 80	2	4	4'- 7"	"
E 81-E84	1SET	4	17'- 4"	"
E 85	2	4	3'- 9"	"
E 86-E91	1SET	4	21'- 5"	"
E 92	2	4	2'-11"	"
E93-E100	1SET	4	21'- 4"	"
E101	10	4	1'-10"	"

QUANTITIES

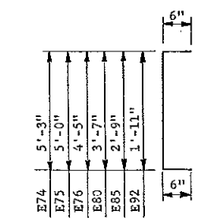
See Dwg. 1806-070.039-14

6TH AVENUE S.E. UNDERPASS
MANDAN, N. D.

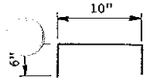
NE. & SW. WING WALLS

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT



E74, E75, E76, E80, E85, & E92



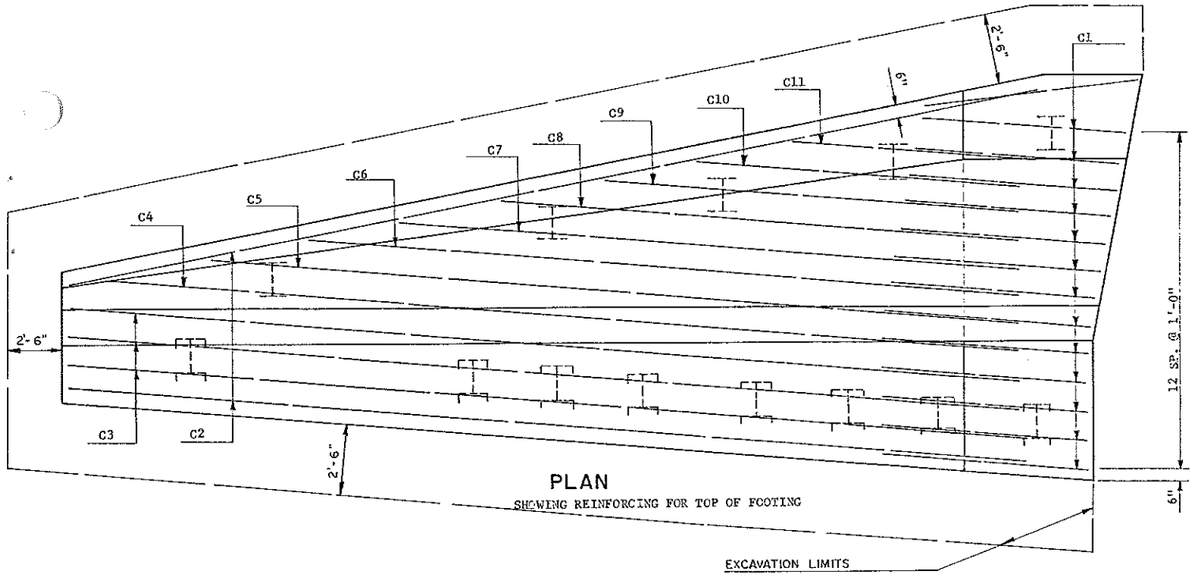
E 101

E77–E79
E81–E84
E86–E91
E93–E100
1 SET SHOWN
1 SET REQUIRED

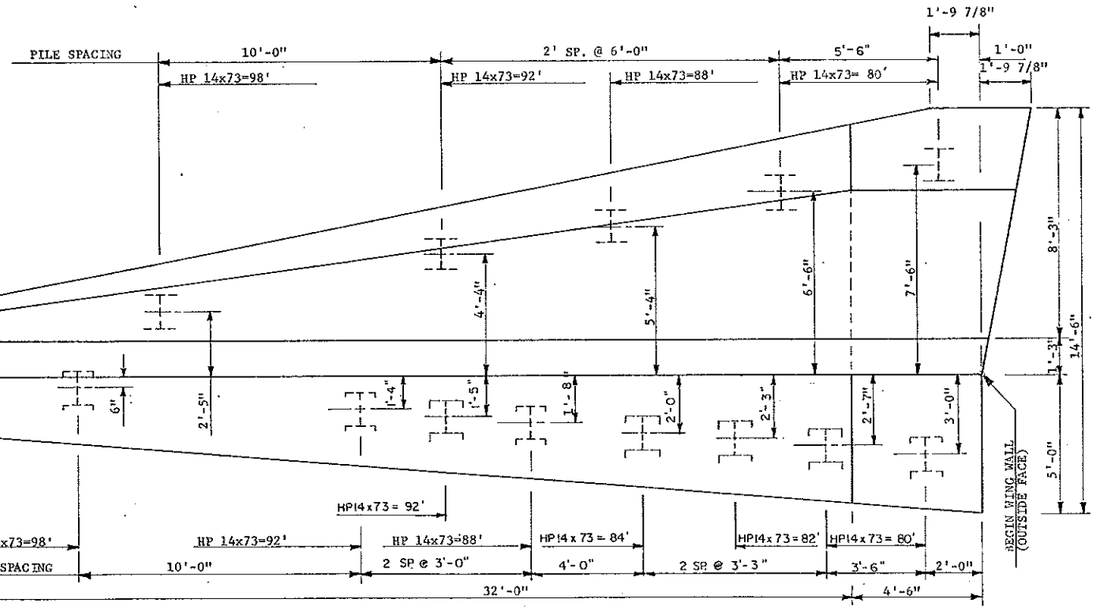
E77-E79 = TOTAL LENGTH OF 1 SET = 15'-2"
E81-E84 = TOTAL LENGTH OF 1 SET = 17'-4"
E86-E91 = TOTAL LENGTH OF 1 SET = 21'-5"
E93-E100 = TOTAL LENGTH OF 1 SET = 21'-4"

1806-070.039-13

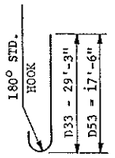
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	



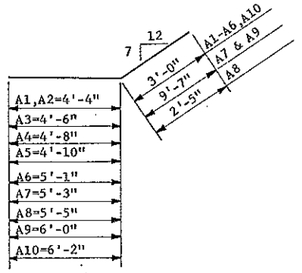
PLAN
SHOWING REINFORCING FOR TOP OF FOOTING



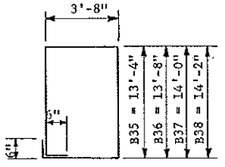
PLAN
SHOWING PILE SPACES
SHOWING DIMENSIONS



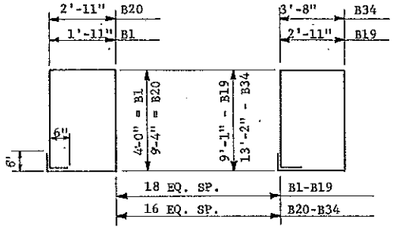
D33 & D53



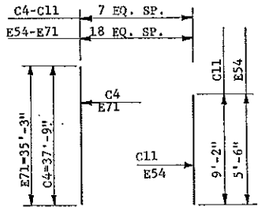
A1 - A10



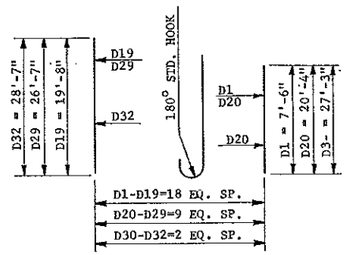
B35 - B38



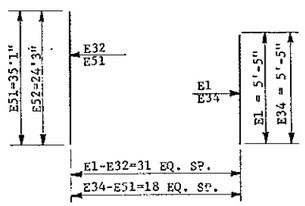
B1 - B19 & B20 - B34
ONE SET REQUIRED - ONE SET SHOWN
B1-B19=TOTAL LENGTH OF ONE SET= 27'-1 359'-5"
B20 -B34=TOTAL LENGTH OF ONE SET = 497'-3 511'-5"



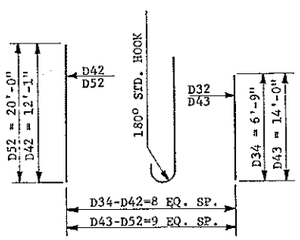
C4 - C11 & E54 - E71
1 SET SHOWN
1 SET REQUIRED
C4-C11 TOTAL LENGTH OF 1 SET = 187'-8"
E54-E71 TOTAL LENGTH OF 1 SET = 387'-2"



D1 - D19, D20 - D29 & D30 - D32
1 SET SHOWN
1 SET REQUIRED
D1-D19=TOTAL LENGTH OF 1 SET = 270'-9"
D20-D29=TOTAL LENGTH OF 1 SET = 243'-9"
D30-D32=TOTAL LENGTH OF 1 SET = 88'-0"



E1 - E32 & E34 - E51
1 SET SHOWN
1 SET REQUIRED
E1-E32=TOTAL LENGTH OF 1 SET = 474'-8"
E34-E51=TOTAL LENGTH OF 1 SET = 384'-9"



D34 - D42 & D43 - D52
1 SET SHOWN
1 SET REQUIRED
D34-D42=TOTAL LENGTH OF 1 SET=90'-9"
D43-D52=TOTAL LENGTH OF 1 SET=179'-2'

BENT BAR DETAILS
DIMENSION SHOWN ARE OUT TO OUT

BAR LIST (ONE WING)

MARK	NO.	SIZE	LENGTH	SHAPE
A1	1	7	7'-4"	BENT
A2	4	6	7'-4"	BENT
A3	1	6	7'-6"	BENT
A4	1	6	7'-8"	BENT
A5	1	6	7'-10"	BENT
A6	1	6	8'-1"	BENT
A7	1	6	14'-10"	BENT
A8	1	6	7'-10"	BENT
A9	1	6	15'-7"	BENT
A10	1	7	9'-2"	BENT
A11	2	7	38'-3"	BENT
A12	3	6	38'-3"	STR.
A13	3	6	28'-3"	STR.
A14	2	6	16'-5"	STR.
B1 B19	1 SET	6	359'-5"	BENT
B20 B34	1 SET	10	511'-5"	BENT
B35	1	11	35'-0"	BENT
B36	1	11	35'-8"	BENT
B37	1	11	36'-4"	BENT
B38	1	11	36'-6"	BENT
C1	14	6	8'-4"	STR.
C2	2	7	39'-3"	STR.
C3	3	6	39'-3"	STR.
C4-C11	1 SET	6	187'-8"	STR.
D1-D19	1 SET	6	270'-9"	BENT
D20-D29	1 SET	8	243'-9"	BENT
D30-D32	1 SET	10	88'-0"	BENT
D33	5	10	30'-8"	BENT
D34-D42	1 SET	6	90'-9"	BENT
D43-D52	1 SET	8	179'-2"	BENT
D53	10	10	18'-11"	BENT
E1-E32	1 SET	5	474'-8"	STR.
E33	5	5	24'-9"	STR.
E34-E51	1 SET	5	384'-9"	STR.
E52	5	5	36'-2"	STR.
E53	1	6	36'-2"	STR.
E54-E71	1 SET	5	387'-2"	STR.
E72	5	5	36'-4"	STR.
E73	1	6	36'-4"	STR.

NOTE:
ADDITIONAL BARS AND BENT BAR DETAILS ARE SHOWN ON DRWG. NO. 1806-070.039-13.

QUANTITIES (ONE WING)

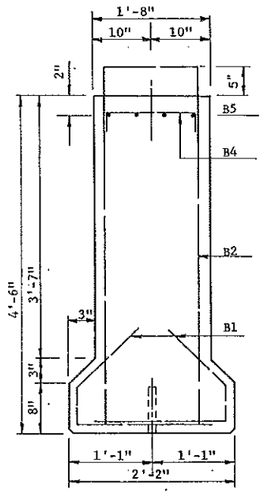
CLASS AE-3 CONCRETE	121.1	C.Y.
REINFORCING STEEL	10,523	LBS.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

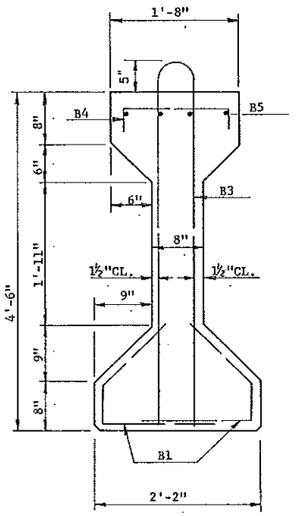
N.E. & S.W. WING WALLS

1806-070.039-14

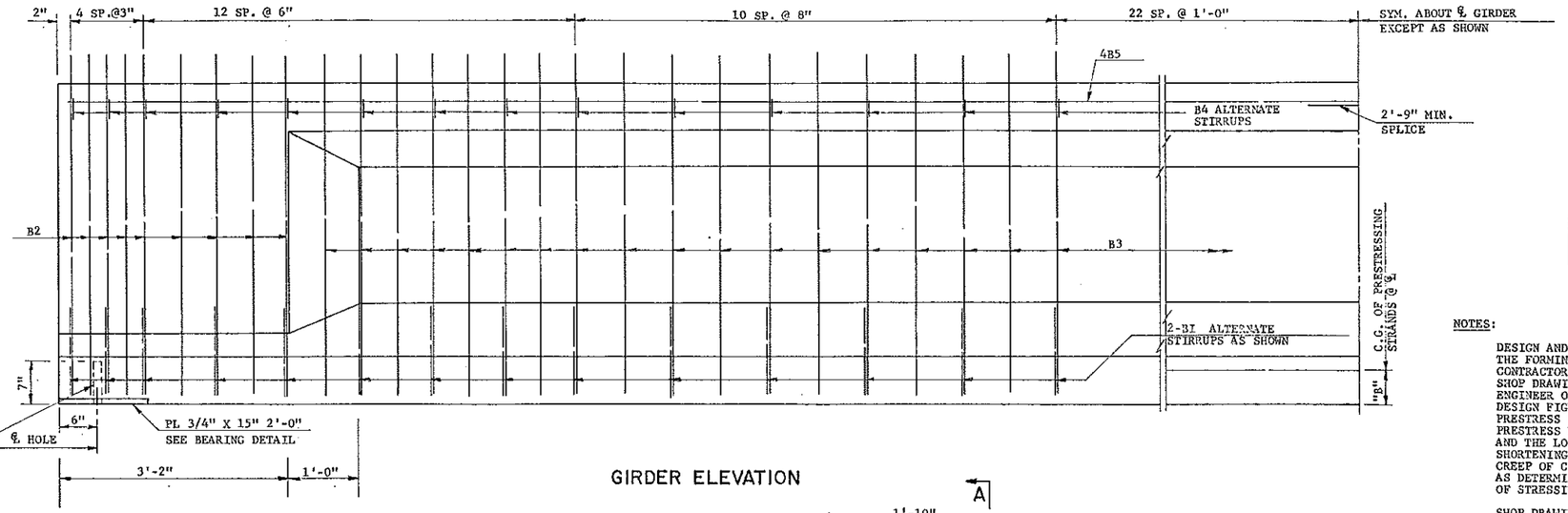
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	



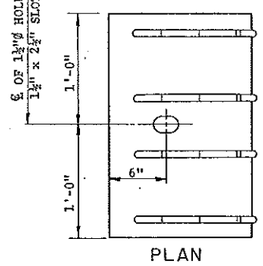
END VIEW



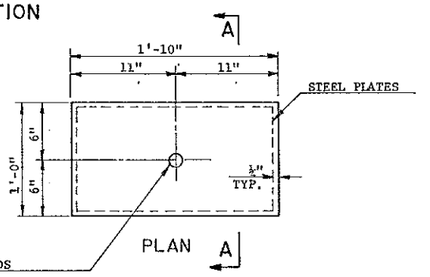
SECTION AT ℄ BEAM

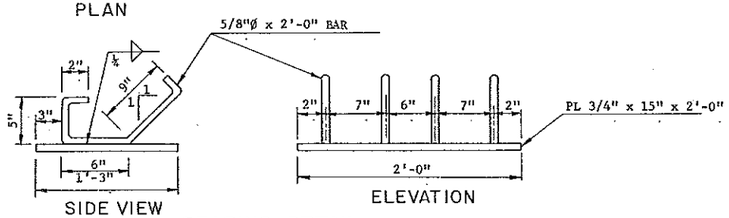


GIRDER ELEVATION

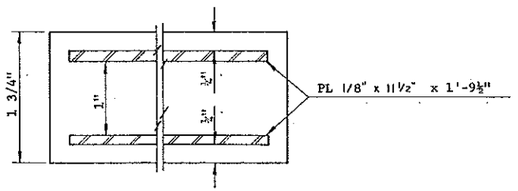


PLAN





BEARING DETAIL



A-A

ELASTOMERIC BEARING DETAIL

NOTE: BEARING SHALL BE DUROMETER 70.

BEAM SECTION DATA

WT./FT. = 877 LBS. (160 PCF)
AREA = 789 IN.^{2}
C.G. (FROM BOTTOM) = 24.73"
I = 260,730 IN.^{4}
S_B = 10,543 IN.^{3}

NOTES:

DESIGN AND SHOP DRAWINGS: AT LEAST 14 DAYS PRIOR TO THE FORMING AND POURING OF ANY GIRDERS, THE CONTRACTOR SHALL SUBMIT CHECKED DESIGN FIGURES AND SHOP DRAWINGS FOR THE APPROVAL OF THE BRIDGE ENGINEER OF THE STATE HIGHWAY DEPARTMENT. THE DESIGN FIGURES SHALL SHOW THE TOTAL INTIAL PRESTRESS FORCE REQUIRED AS THE SUM OF THE FINAL PRESTRESS FORCE TAKEN FROM THE CONTRACT DRAWINGS AND THE LOSSES IN PRESTRESS DUE TO ELASTIC SHORTENING OF CONCRETE, SHRINKAGE OF CONCRETE, CREEP OF CONCRETE, AND RELAXATION OF STEEL STRESS AS DETERMINED BY THE CONTRACTOR FOR HIS METHOD OF STRESSING.

SHOP DRAWINGS SHALL SHOW STRAND LAYOUT: PULL DOWN LOCATIONS, TENSIONING FORCES, ELONGATION AND ANY PROPOSED CHANGES IN REINFORCING STEEL.

THE FINAL PRESTRESS FORCE (REMAINING AFTER ALL LOSSES HAVE BEEN ACCOUNTED FOR) AND ITS CORRESPONDING DIMENSION "B" SHALL BE SELECTED FROM THOSE ON A CURVE DETERMINED BY THE THREE VALUES SHOWN IN THE PRESTRESSING DATA TABLE.

THE GIRDERS SHALL BE POURED IN ALL STEEL FORMS.

HOLES AND INSERTS TO ACCOMODATE THE DIAPHRAGM BARS SHALL BE PROVIDED IN THE GIRDERS AT LOCATIONS AS SHOWN ON THE SLAB SHEET.

ALL REINFORCING STEEL SHALL BE GRADE 60.

ALL REINFORCEMENT 1½" CLEAR UNLESS OTHERWISE NOTED.

MINOR CHANGES TO THE SHAPE OF THE GIRDER AND TO THE REINFORCING STEEL MAY BE MADE TO ACCOMODATE THE FORMS OF VARIOUS CONTRACTORS AND THEIR CONSTRUCTION METHODS WITH THE APPROVAL OF THE BRIDGE ENGINEER.

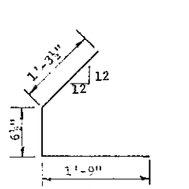
TOPS OF BEAMS SHALL BE ROUGH FLOATED AND BROOMED TRANSVERSELY FOR BOND.

PROVIDE HANDLING HOOKS FOR DEVICES AS REQUIRED BY THE CONTRACTOR. HOOKS OR DEVICES PROVIDED WILL BE SUBJECT TO APPROVAL OF ENGINEER AND SHALL BE INSTALLED WITHIN 4'-0" OF THE END OF BEAM

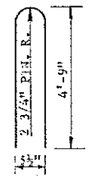
CONCRETE TEST CYLINDER STRENGTH AT TIME OF STRESS TRANSFER SHALL BE AS SHOWN ON THE BRIDGE PLANS.

PRESTRESSING DATA

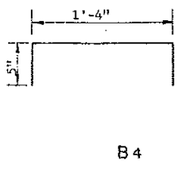
CG	FINAL FORCE	DETENSION STRENGTH	ACCEPTANCE STRENGTH	WEIGHT "TON"
4.5	937.6 K	5500 PSI	5500 PSI	32.82 T.
5.0	951.8 K			
5.5	966.4 K			



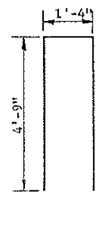
B1



B3



B4



B2

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST

MARK	NO.	SIZE	LENGTH	SHAPE
B1	98	4	3'-7"	BENT
B2	18	4	10'-10"	"
B3	79	4	9'-9"	"
B4	49	5	2'-2"	"
B5	8	8	37'-1"	STR

QUANTITIES (ONE GIRDER)

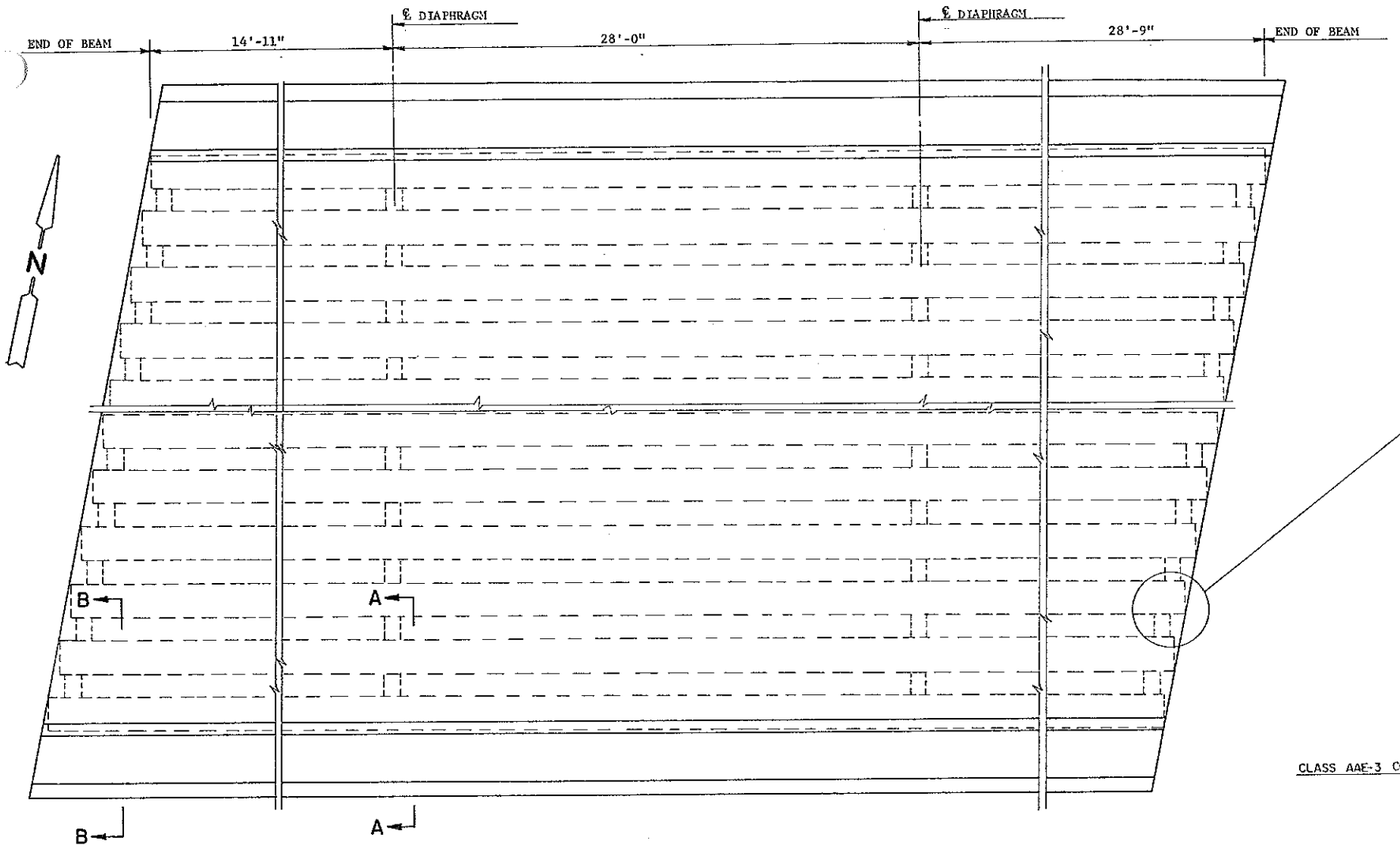
GIRDER LENGTH 71'-8" L.F.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

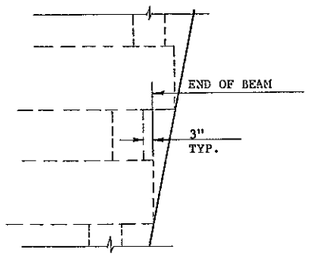
GIRDER DETAIL
ELASTOMERIC BEARING

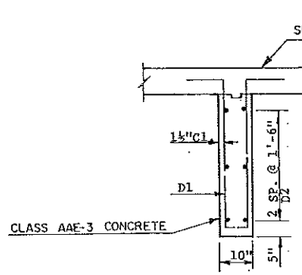
1806-070.039-15

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	

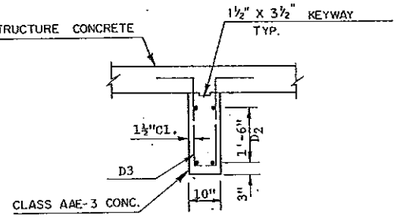


PLAN

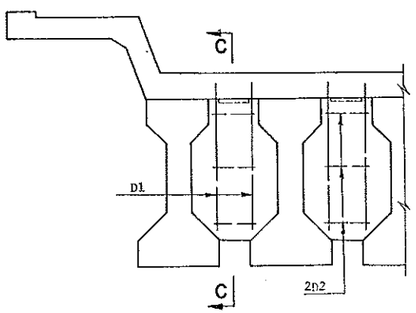




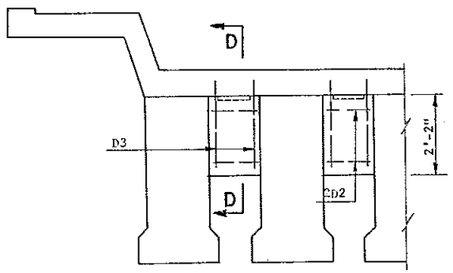
C-C



D-D



A-A



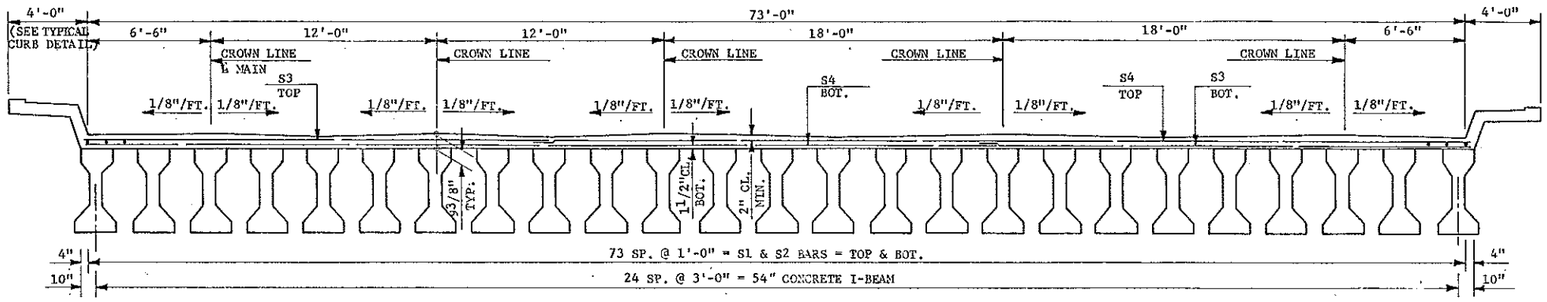
B-B

QUANTITIES
SEE DWG. 1806-070.039-17

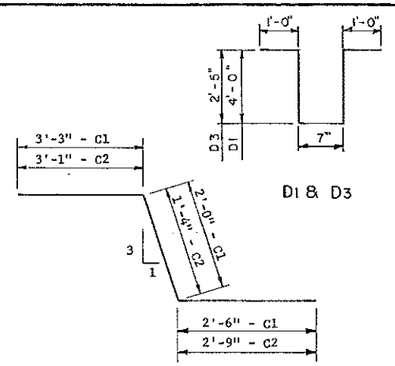
6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

DIAPHRAGM DETAILS

1806-070.039-16



TYPICAL SECTION



D1 & D3

C1 & C2

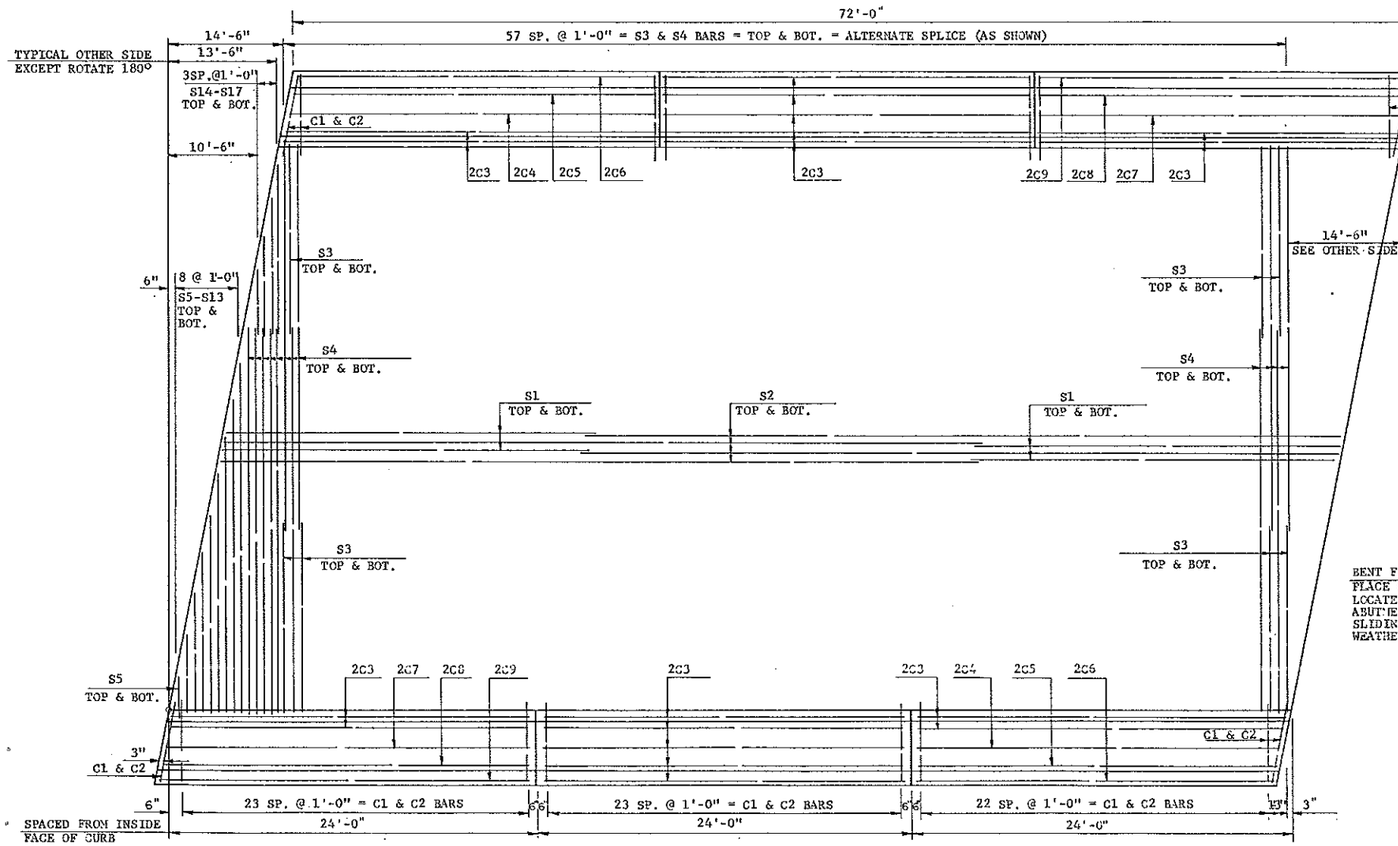
BENT BAR DETAIL

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	

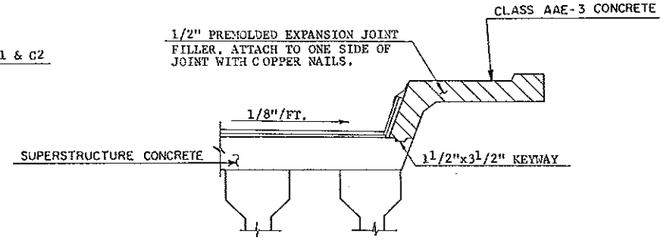
BAR LIST

	MARK	NO.	SIZE	LENGTH	SHAPE
①	C1	146	4	7'-9"	BENT
①	C2	146	4	7'-2"	"
①	C3	36	4	23'-8"	STR.
①	C4	4	4	23'-6"	"
①	C5	4	4	23'-3"	"
①	C6	4	4	23'-1"	"
①	C7	4	4	23'-10"	"
①	C8	4	4	24'-1"	"
①	C9	4	4	24'-3"	"
①	S1	148	4	25'-0"	STR.
①	S2	148	4	47'-6"	"
①	S3	116	4	25'-0"	"
①	S4	136	4	49'-4"	"
①	S5-S13	4 SETS	4	212'-8"	"
①	S14-S17	4 SETS	4	57'-8"	"
①	D1	96	6	10'-7"	BENT
①	D2	480	6	1'-0"	STR.
①	D3	96	6	7'-5"	BENT

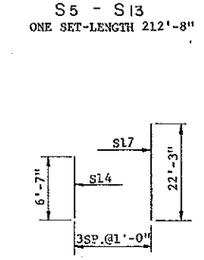
① REINFORCING STEEL BARS SHALL BE EPOXY COATED.



PLAN
(NOT TO SCALE)

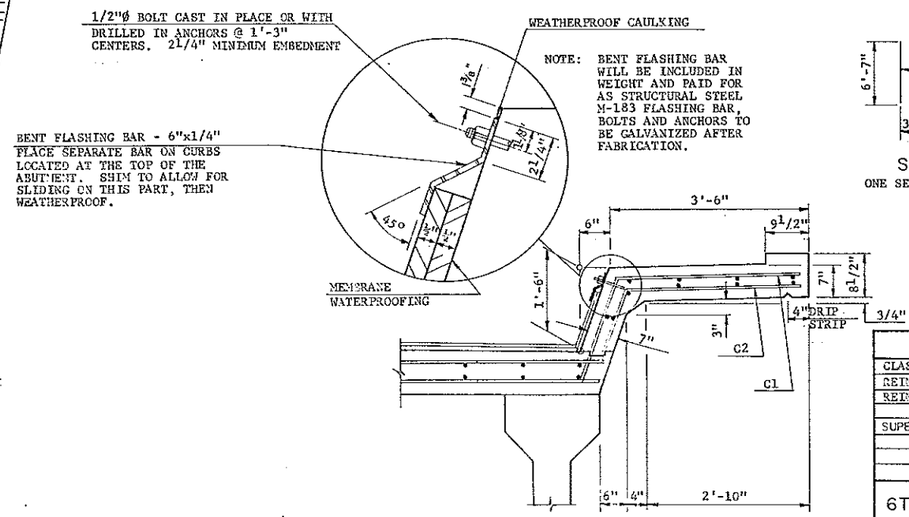


CURB DEFLECTION JOINT DETAIL



S5 - S13
ONE SET-LENGTH 212'-8"

S14 - S17
ONE SET-LENGTH 57'-8"



TYPICAL CURB DETAIL

QUANTITIES

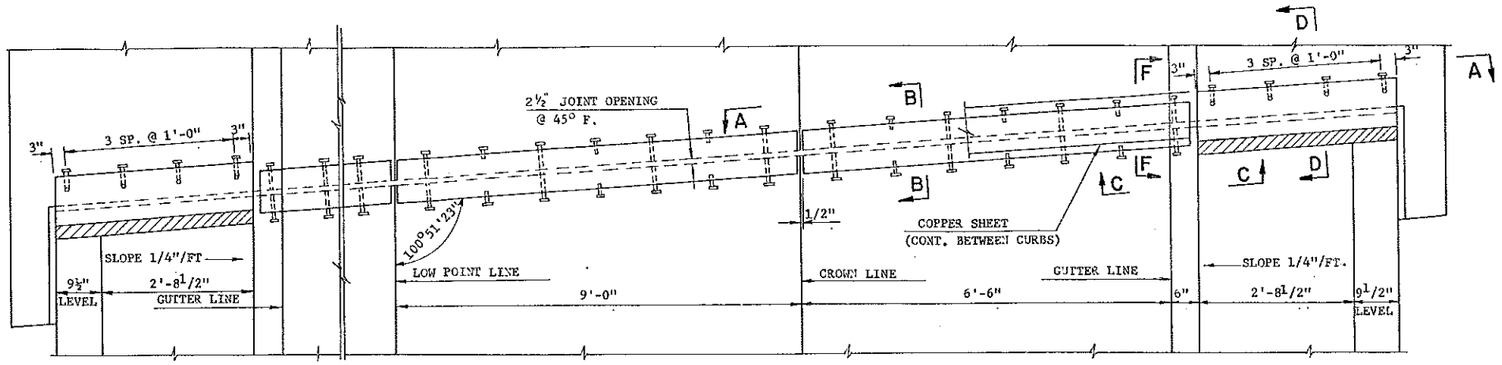
CLASS AAE-3 CONCRETE	32.0	C.Y.
REINFORCING STEEL	17,625	LBS.
REINFORCING STEEL (EPOXY)	2403	LBS.
SUPERSTRUCTURE CONCRETE	147	C.Y.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

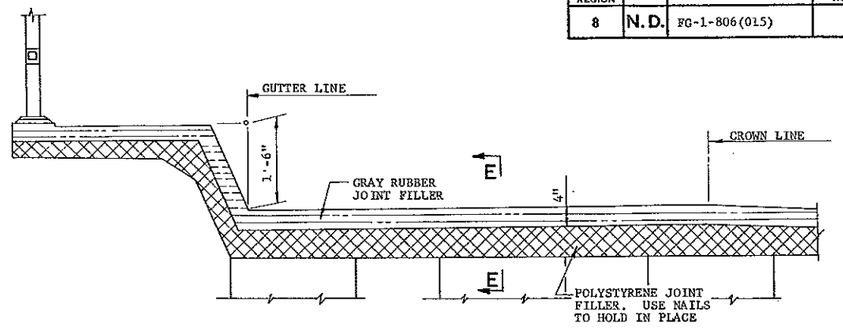
SLAB DETAILS

1806-070.039-17

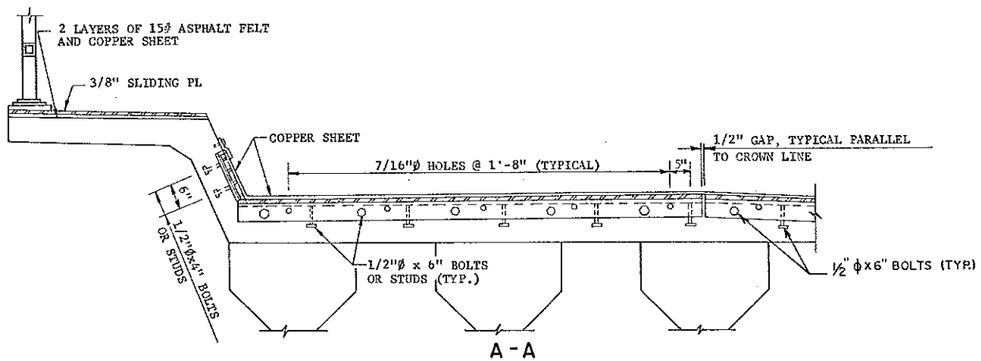
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



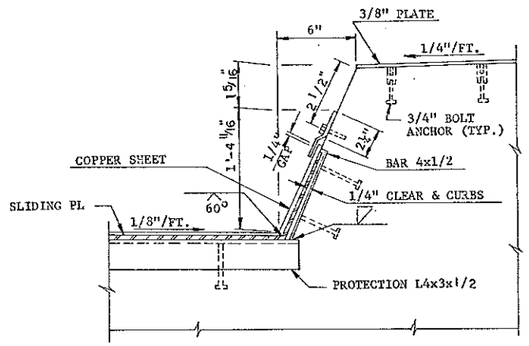
PART PLAN OF ABUTMENT NO. 2 EXPANSION JOINT



PART SECTION THRU ABUTMENT NO. 1 DEFLECTION JOINT



A-A



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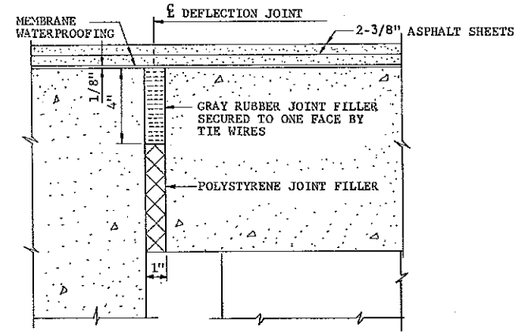

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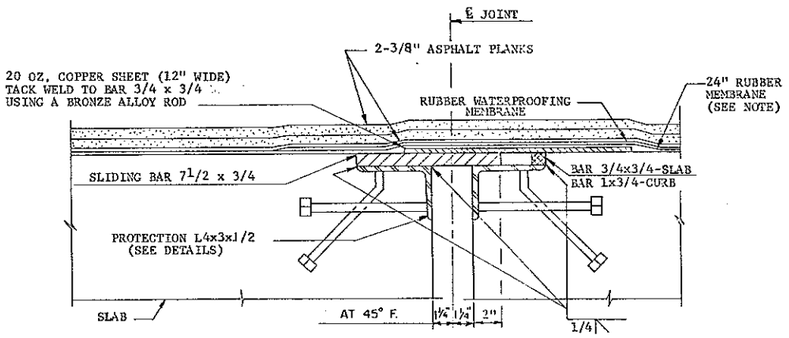
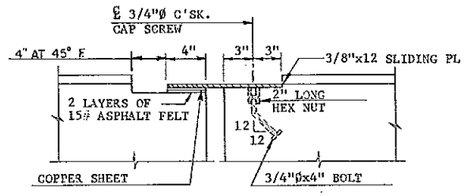


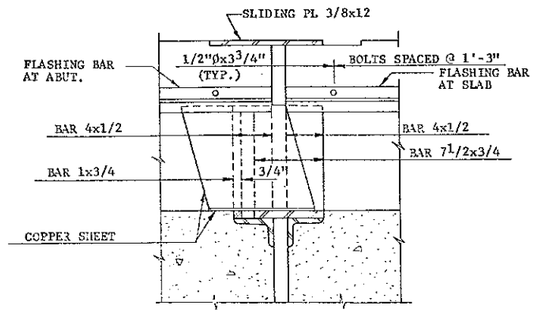
B-B

NOTE:

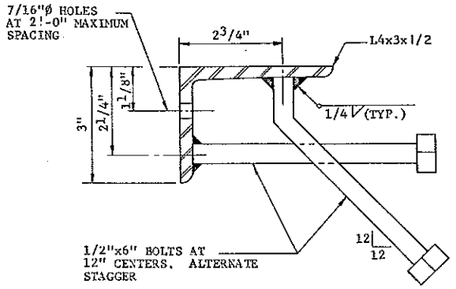
COVER TOP OF COPPER SHEET WITH 24" WIDE RUBBER MEMBRANE AND ATTACH TO THE SPAN SIDE OF THE COPPER SHEET WITH SUITABLE ADHESIVE.



D-D



F-F



PROTECTION ANGLE DETAIL

NOTE:

EXPANSION JOINT STEEL AND COPPER SHEET IS INCLUDED IN WEIGHT OF AND PAID FOR AS STRUCTURAL STEEL M-183.

THE DECK SURFACE SHALL BE GIVEN A MACHINE STEEL TROWEL FINISH.
GALVANIZE EXPANSION JOINT STEEL IN ACCORDANCE WITH ASTM A123 AFTER FABRICATION.

THE CONTRACTOR SHALL PLACE BALLAST AS SOON AS THE ASPHALT BOARD IS IN PLACE. B.N.R.R. TO FURNISH BALLAST IN RAILROAD CARS AT A MUTUALLY AGREEABLE LOCATION.

COST OF POLYSTYRENE JOINT FILLER AND GRAY RUBBER JOINT FILLER SHALL BE CONSIDERED INCIDENTAL AND INCLUDED IN THE PRICE BID FOR SUPERSTRUCTE CONCRETE.

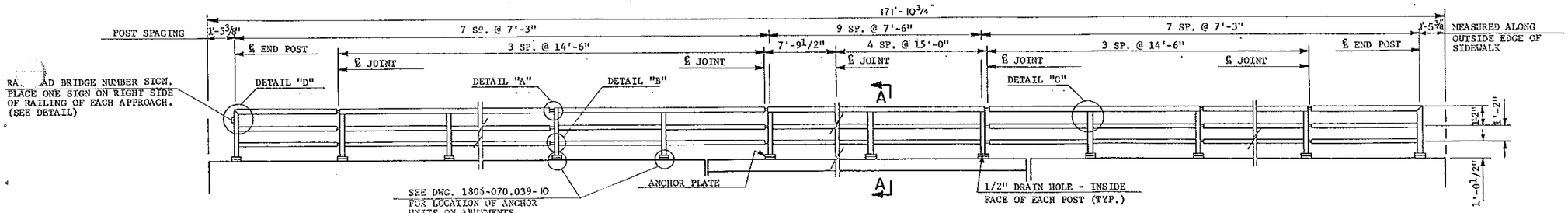
QUANTITIES		
STRUCTURAL STEEL (M-183)	4520	LBS.

6TH AVE. S.E. UNDERPASS
MANDAN, N.D.

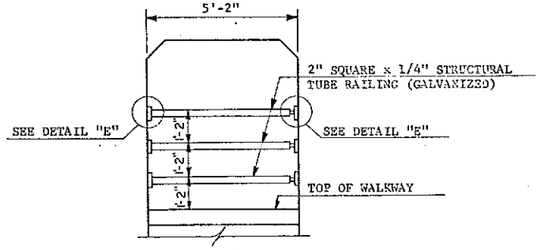
EXPANSION JOINT DETAILS

1806-070.039-18

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



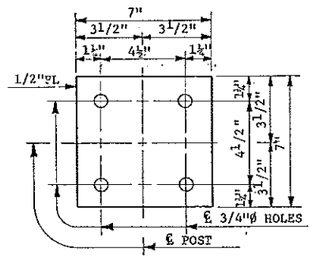
RAILING ELEVATION



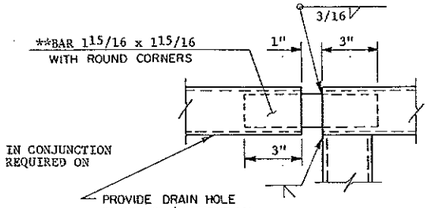
TYPICAL RAILING DETAIL
SIDEWALK CORRIDOR

18 LOCATIONS

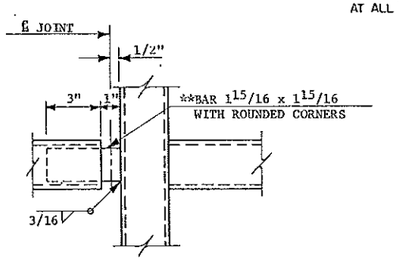
PRICE BID BY LINEAL FOOT PER WINDOW



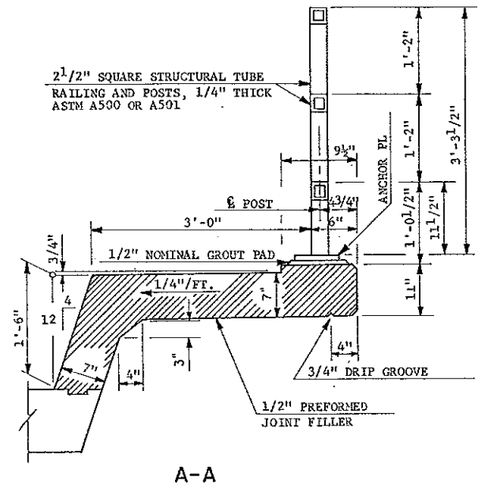
ANCHOR PLATE DETAIL



DETAIL A



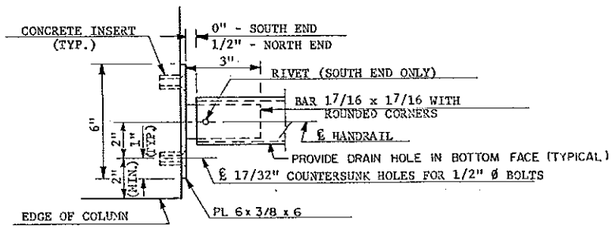
DETAIL B



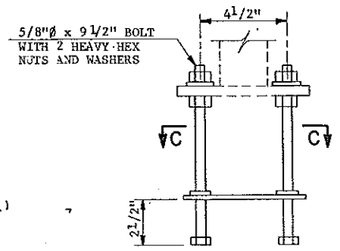
A-A

NOTE:

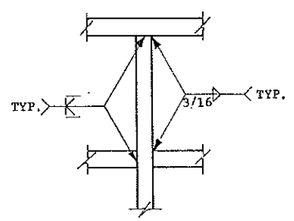
BRIDGE NUMBER SIGNS ARE OVERLAYS AND SHALL BE MADE OF 0.025" THICK 6L5-T6 SHEET ALUMINUM. AFTER DEGREASING AND TREATMENT OF ALUMINUM, APPLY BLACK SCOTCHAL NO. 655, OR APPROVED EQUAL, TO FACE OF SIGN. THEN APPLY 5" SERIES "D" FEDERAL HIGHWAY ADMINISTRATION STANDARD NUMERALS OF WIDE ANGLE SILVER NO. 2270 SCOTCHLITE, OR APPROVED EQUAL. SIGN OVERLAY TO BE BOLTED WITH GALVANIZED OR CADMIUM PLATED BOLTS TO A 4-GAGE GALVANIZED STEEL PLATE OF SAME SIZE, THE PLATE TO BE GIVEN TWO COATS OF JET BLACK ENAMEL TO BOTH SIDES. ALL SIGN BRACKETS, NUTS AND BOLTS, TO BE GALVANIZED AFTER FABRICATION.



DETAIL E



ANCHOR BOLT ASSEMBLY



DETAIL C

HANDRAIL NOTES: (SUPERSTRUCTURE RAILING)

RAILING SHALL BE FABRICATED IN PANEL LENGTHS AS SHOWN IN THE ELEVATION VIEW WITH EXPANSION JOINTS AS SHOWN IN DETAILS "A" AND "B" PROVIDED TO CONNECT ADJOINING FABRICATED LENGTHS.

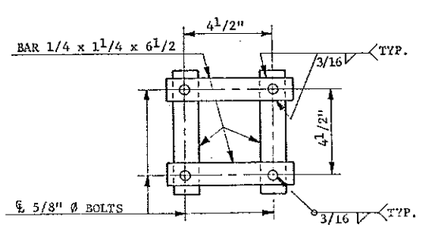
BOLTS AND NUTS SHALL MEET THE REQUIREMENTS OF A.S.T.M. A307. MATERIALS FOR BASE PLATES, ANCHOR BOLT ASSEMBLIES, AND RAIL EXPANSION JOINTS SHALL CONFORM TO STRUCTURAL STEEL (WELDABLE M-183).

ALL RAILING AND RAILING ANCHORAGE MATERIAL SHALL BE GALVANIZED IN ACCORDANCE WITH A.S.T.M. A123.

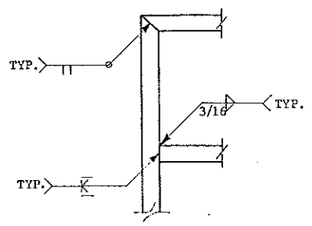
ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. RAILPOSTS SHALL BE FABRICATED NORMAL TO GRADE. ADJUST RAILPOSTS AS REQUIRED TO PROVIDE PROPER HORIZONTAL ALIGNMENT.

STRUCTURAL TUBING SHALL CONFORM TO A.S.T.M. DESIGNATION A500 OR A501.

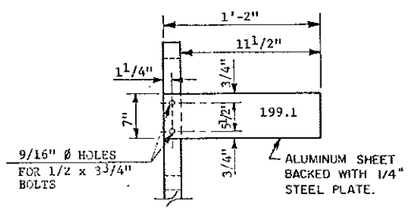
ALL STEEL MATERIAL AND BRIDGE NUMBER SIGNS REQUIRED FOR THE RAILING AND RAILING ANCHORAGES TO BE INCLUDED IN THE BID ITEM PEDESTRIAN RAIL.



C-C



DETAIL D



BRIDGE NUMBER SIGN DETAIL
(2 REQUIRED)

QUANTITIES

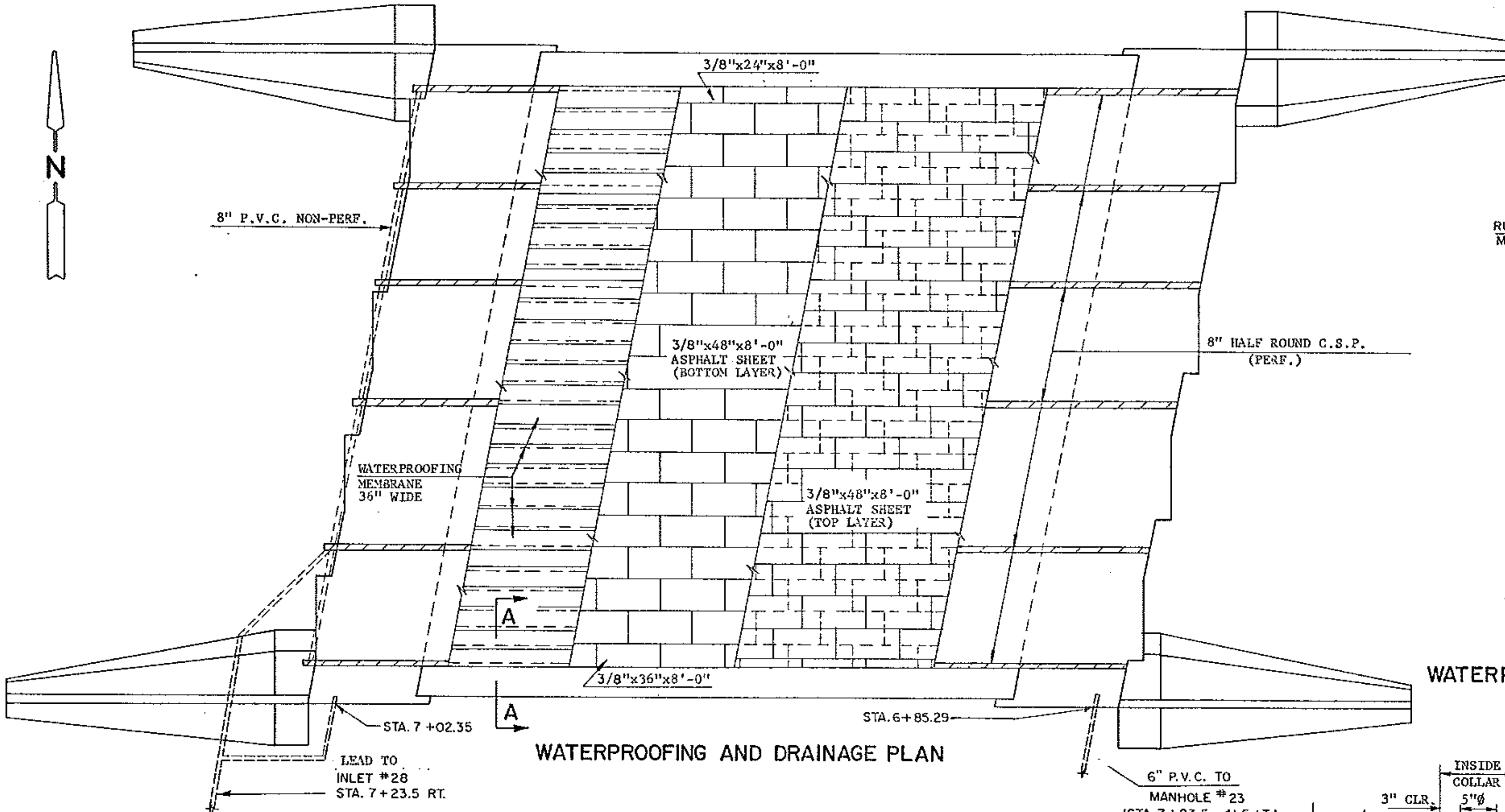
PEDESTRIAN RAIL (2 1/2" SQUARE x 1/4")	338	L.F.
PEDESTRIAN RAIL (2" SQUARE x 1/4")	93	L.F.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

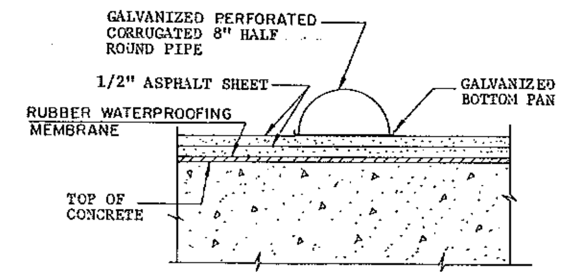
RAILING DETAILS

1806-070.039-19

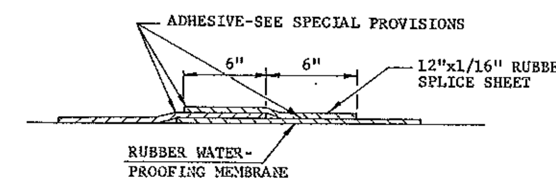
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	



WATERPROOFING AND DRAINAGE PLAN



WATERPROOFING AND DECK DRAIN DETAIL



WATERPROOFING MEMBRANE SPLICE DETAIL

QUANTITY SUMMARY FOR DRAINAGE SYSTEM

ITEM	UNIT	QUANTITY
8"Ø HALF ROUND C.S.P.	LIN. FT.	590
6"Ø C.S.P.	LIN. FT.	138
6"Ø P.V.C.	LIN. FT.	52
8"Ø P.V.C.	LIN. FT.	145
BOTTOM PAN	LIN. FT.	590
TEE CONNECTIONS (6" TO 8")	UNIT	3
DOUBLE TEE CONNECTION	UNIT	1
PIPE CLAMP ASSEMBLIES	UNIT	24
COLLAR	UNIT	6
END PLATE	UNIT	6
REDUCER	UNIT	6
90° ELBOW (6" TO 8")	UNIT	2
90° ELBOW (8" TO 8")	UNIT	1

DRAINAGE SYSTEM NOTES:

THE QUANTITY SUMMARY FOR DRAINAGE SYSTEM IS FOR THE CONTRACTORS CONVENIENCE ONLY AND PRICE BID FOR SYSTEM SHALL BE FOR THE COMPLETE SYSTEM AS SHOWN IN THE PLANS.

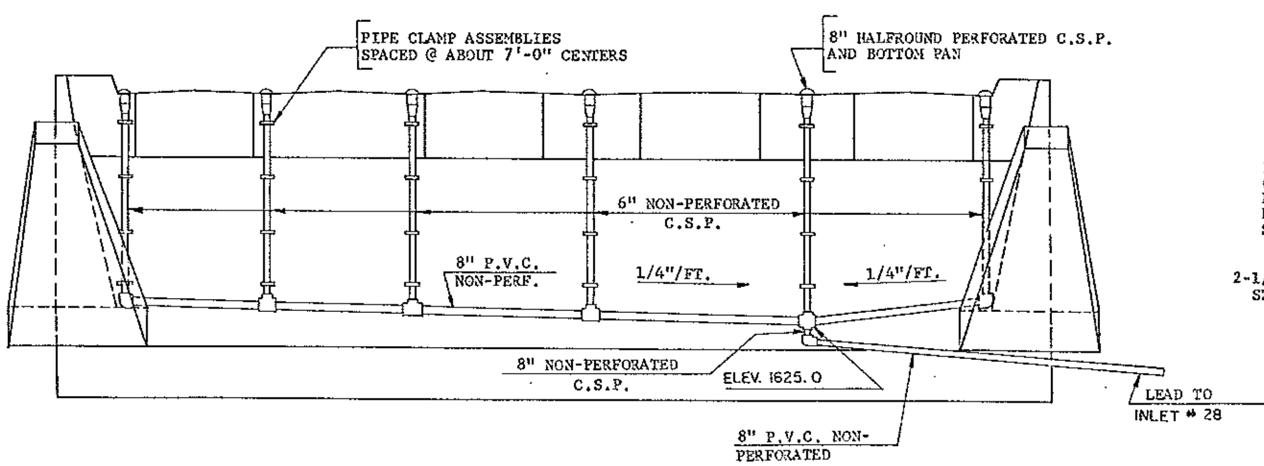
NUTS, CONCRETE INSERTS, PIPE, CLAMPS, BOTTOM PANS, COVERS, REDUCERS, AND COLLARS TO BE GALVANIZED AFTER FABRICATION.

BOTTOM PANS, COVERS, VERTICAL DRAIN PIPES, REDUCERS, COLLARS, AND ALL CONNECTIONS TO BE BITUMINOUS COATED.

DECK WATERPROOFING NOTES:

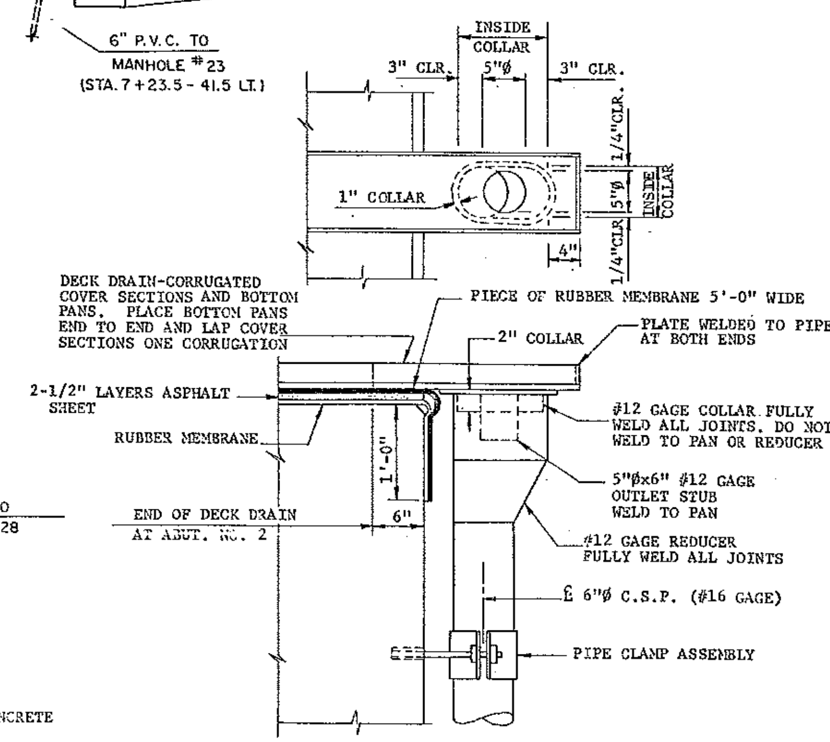
THE QUANTITY OF RUBBER MEMBRANE WATERPROOFING FOR PAYMENT SHALL BE BASED ON THE SURFACE AREA COVERED AND IS COMPUTED USING 1'-6" SLOPE LENGTHS AT CURBS. BEFORE COVERING MEMBRANE CHECK FOR RUPTURES AND MISALIGNED SEAMS AND PATCH THEM WITH MEMBRANE AND MASTIC. ASPHALT PANELS SHOULD BE PLACED AS SOON AS POSSIBLE OVER THE MEMBRANE AND SHALL BE PLACED IN TWO LAYERS WITH JOINTS STAGGERED. ALL PANELS SHALL BE BONDED TO EACH OTHER WITH A BEAD OF ADHESIVE MASTIC. ALL JOINTS BETWEEN PANELS SHALL BE CAULKED WITH MASTIC AND A TWO FEET WIDE STRIP OF LONGITUDINALLY ALONG THE PANEL EDGES AT EACH CURB.

PLACE BALLAST ON DECK AS SOON AS POSSIBLE AFTER ASPHALT SHEETS AND DECK DRAINS HAVE BEEN INSTALLED.

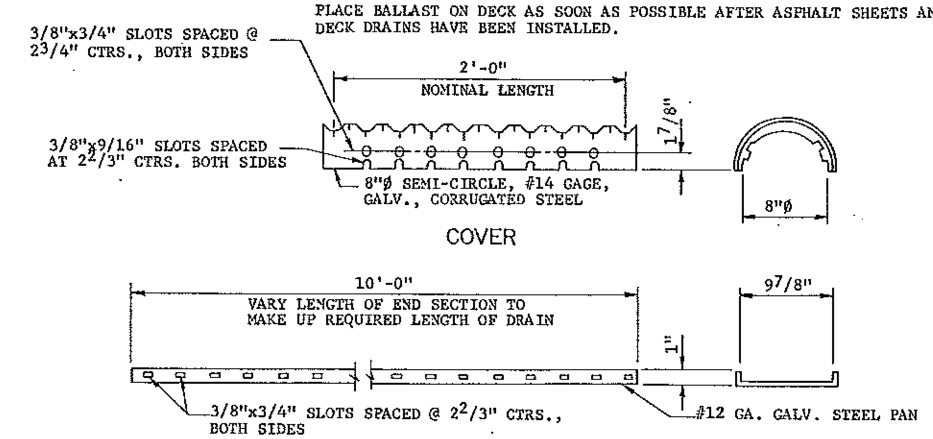


BACK ELEVATION = ABUTMENT NO. 1

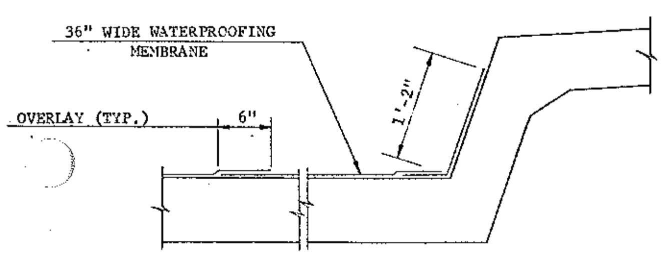
SHOWING DECK DRAINAGE ONLY



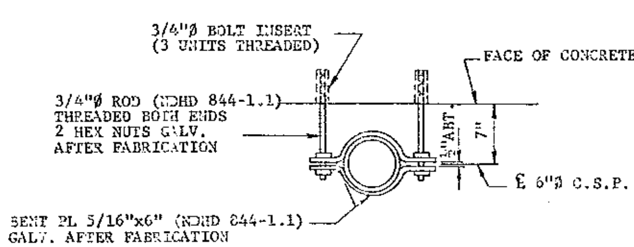
DOWNSPOUT DETAIL



DECK DRAIN DETAILS



A-A



PIPE CLAMP ASSEMBLY

WATERPROOFING MATERIALS:

BITUTHENE MEMBRANE 1/16" X 36" WIDE X 60' ROLL — W.R. GRACE CO. CHICAGO, IL. OR EQUAL
BITUTHENE PRIMER
BITUTHENE MASTIC

"[illegible]AFLEX" ASPHALT SHEET — W.R. MEADOWS ELGIN, IL. OR EQUAL
"[illegible]" ADHESIVE MASTIC

QUANTITIES

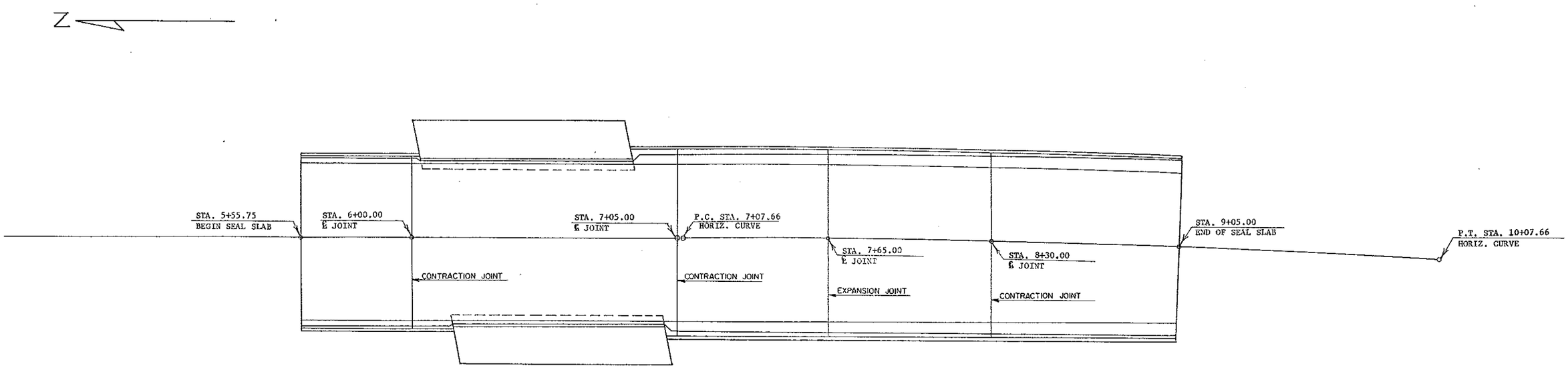
DECK DRAINAGE SYSTEM	1	LUMP SUM
BUTYL RUBBER MEMBRANE WATERPROOFING	7507	SQ.FT.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

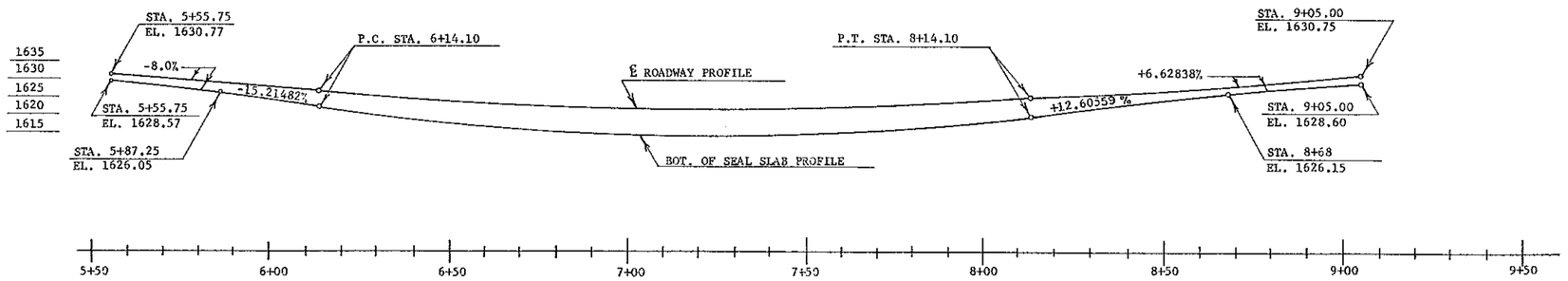
WATERPROOFING AND DRAINAGE DETAILS

1806-070.039-20

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



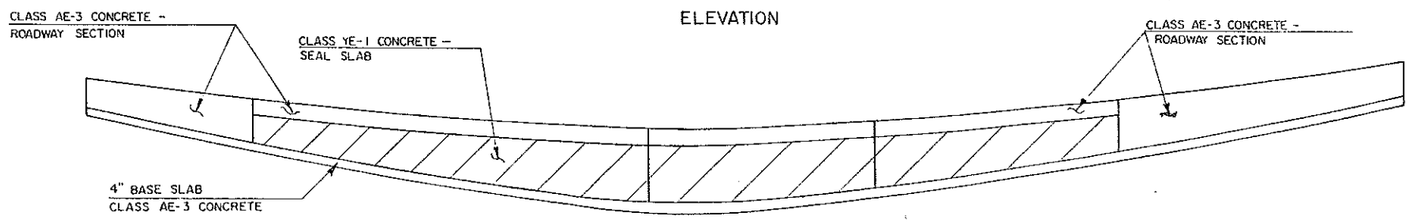
PLAN



VERTICAL CURVE DATA
℄ ROADWAY
P.I. STA. 7+14.10
EL. 1618.1
V.C. 200'

VERTICAL CURVE DATA
BOT. OF SEAL SLAB
P.I. STA. 7+14.10
EL. 1605.75
V.C. 200'

ELEVATION

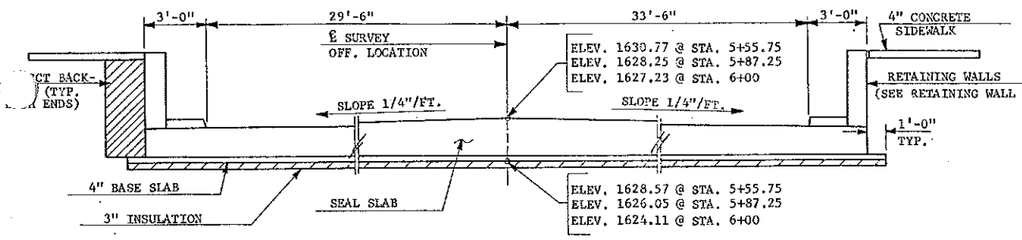


ROADWAY SECTION
SHOWING CLASS CLASSIFICATION

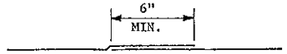
6TH AVENUE S.E UNDERPASS
MANDAN N.D
SEAL SLAB LAYOUT

1806-070.039-21

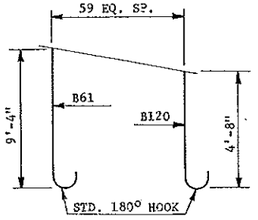
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



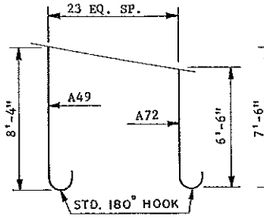
TYPICAL ROADWAY SECTION



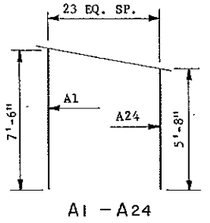
WATERPROOFING MEMBRANE SPLICE DETAIL



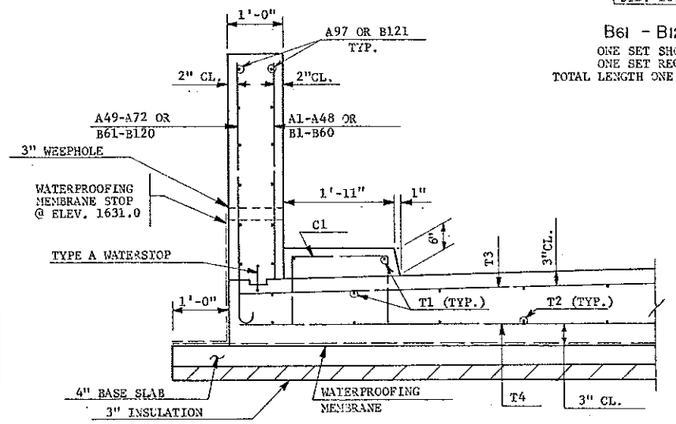
B61 - B120
ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 455'-0"



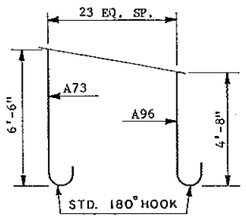
A49 - A72
ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 192'-0"



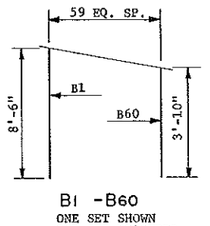
A1 - A24
ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 158'-0"



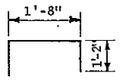
A - A



A73 - A96
ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 148'-0"



B1 - B60
ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 370'-0"

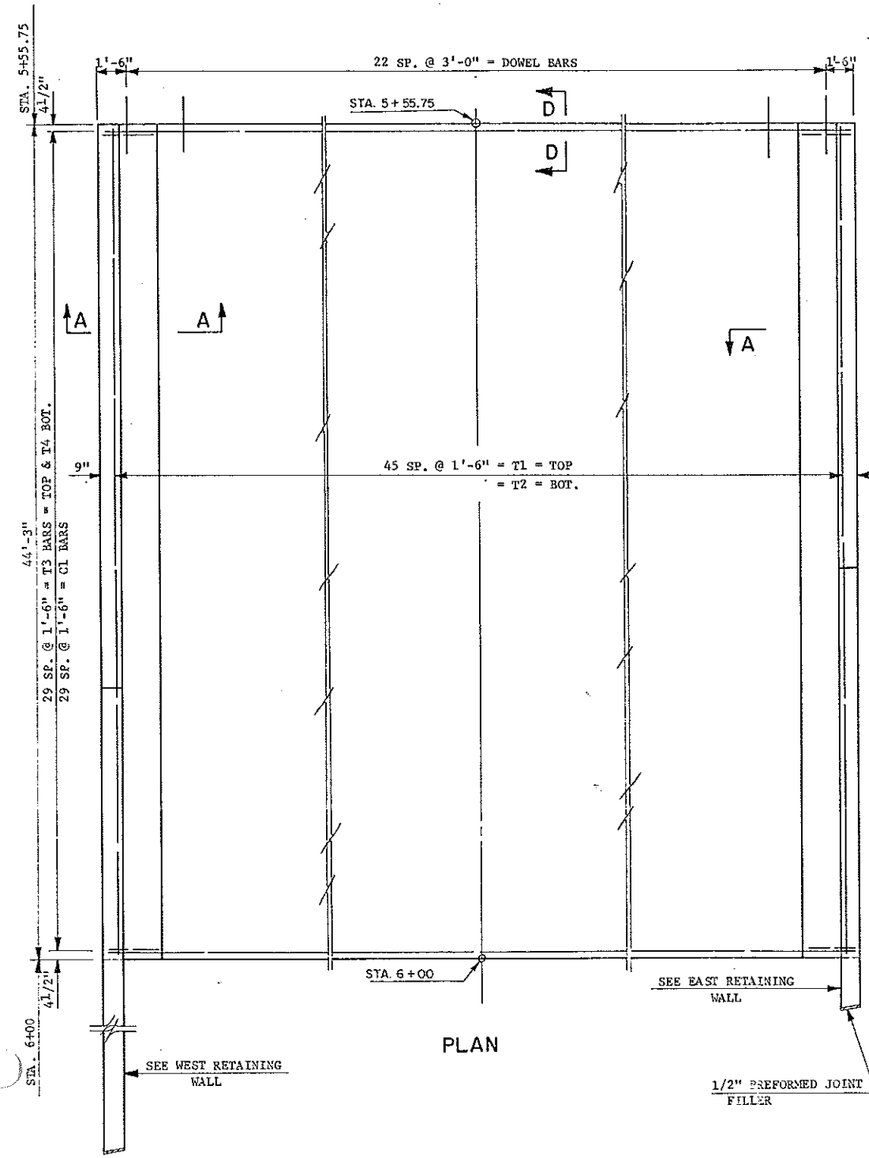


C1

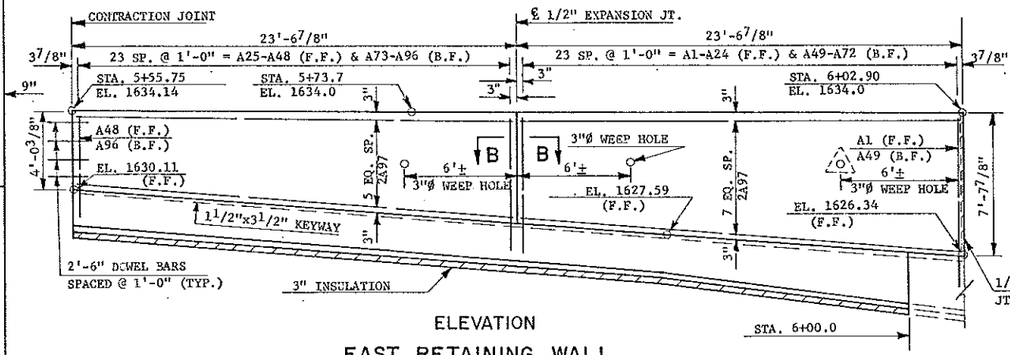
BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
A1-A24	1 SET	5	158'-0"	STR.
A25-A48	1 SET	5	114'-0"	"
A49-A72	1 SET	5	192'-0"	BENT
A73-A96	1 SET	5	148'-0"	BENT
A97	28	5	23'-4"	STR.
B1-B60	1 SET	5	370'-0"	STR.
B61-B120	1 SET	5	455'-0"	BENT
B121	30	5	29'-8"	"
(1) C1	60	4	4'-0"	BENT
(1) T1	50	4	43'-10"	STR.
T2	46	4	43'-10"	"
(1) T3	30	4	35'-1"	"
T4	30	4	35'-1"	"

(1) REINFORCING STEEL BARS SHALL BE EPOXY COATED.

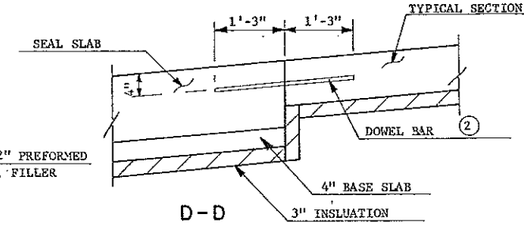
(2) THE COST OF DOWEL BARS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS AE-3 CONCRETE.



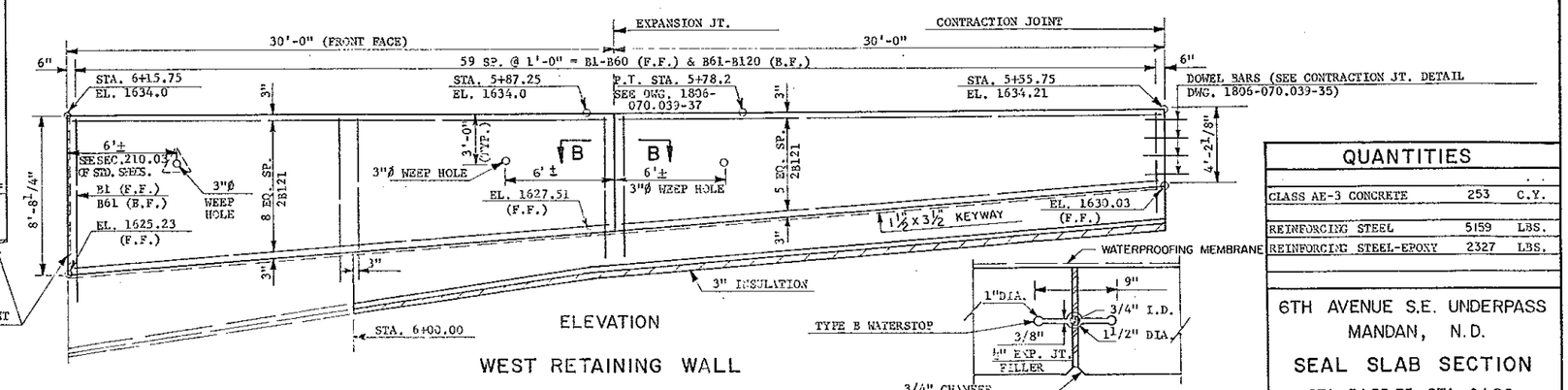
PLAN



ELEVATION
EAST RETAINING WALL



D - D



ELEVATION
WEST RETAINING WALL

B - B

QUANTITIES		
CLASS AE-3 CONCRETE	253	C.Y.
REINFORCING STEEL	5159	LBS.
REINFORCING STEEL-EPOXY	2327	LBS.

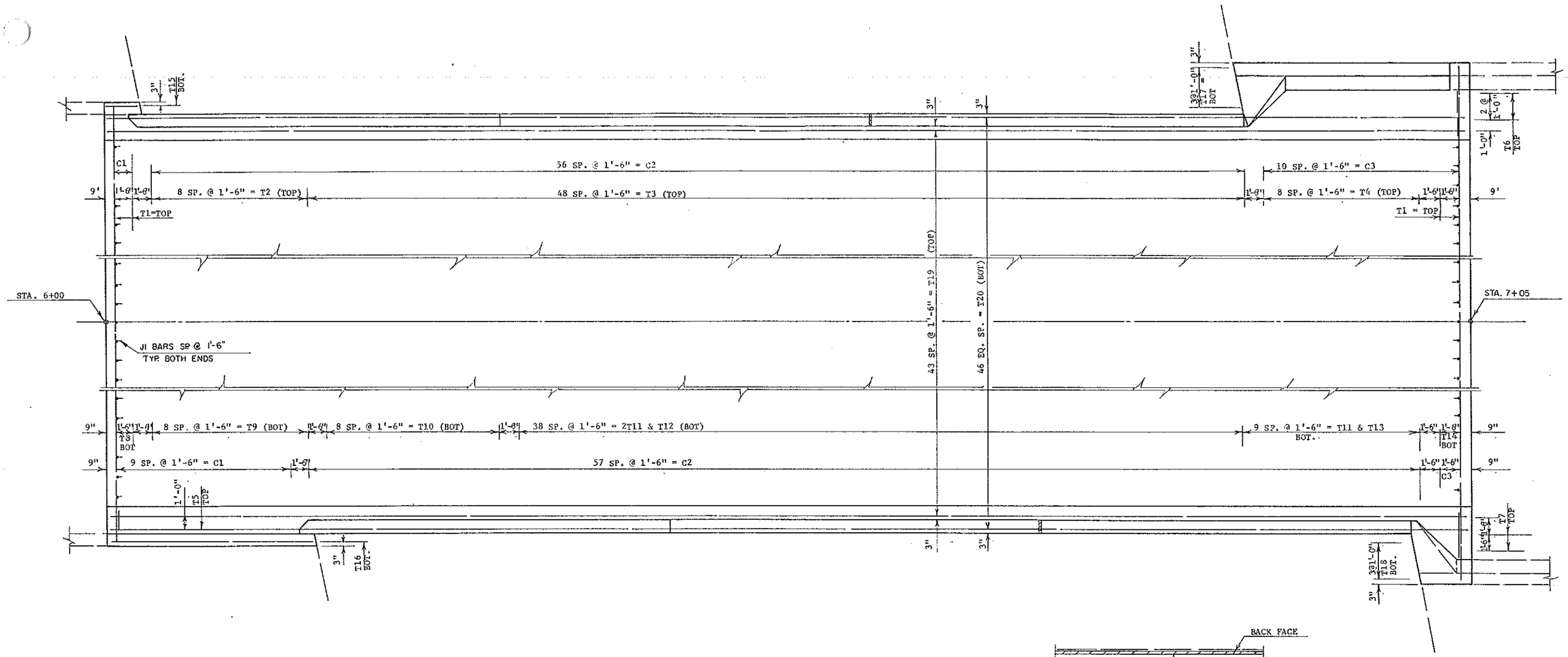
6TH AVENUE S.E. UNDERPASS
MANDAN, N. D.

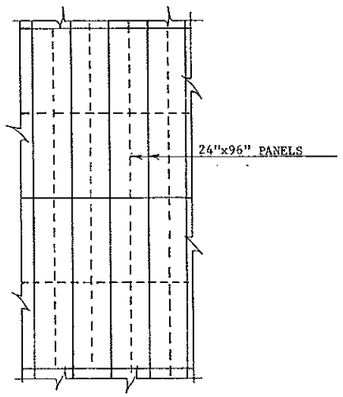
SEAL SLAB SECTION

STA. 5+55.75 - STA. 6+00

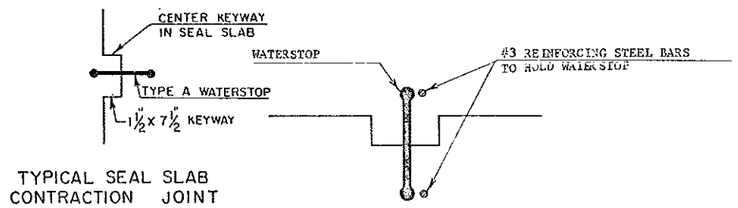
1806-070.039-22

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



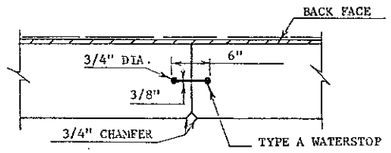


STYROFOAM PLACEMENT DETAIL



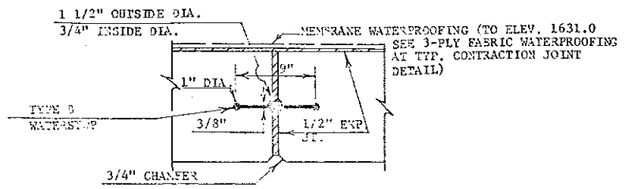
TYPICAL SEAL SLAB CONTRACTION JOINT

WATERSTOP HOLD DETAIL



TYPICAL CONTRACTION JOINT DETAIL

FOR RETAINING WALL UNDER BRIDGE



TYPICAL EXPANSION JOINT DETAIL

FOR RETAINING WALL UNDER BRIDGE

QUANTITIES
SEE DWG. 1806-070.039-27

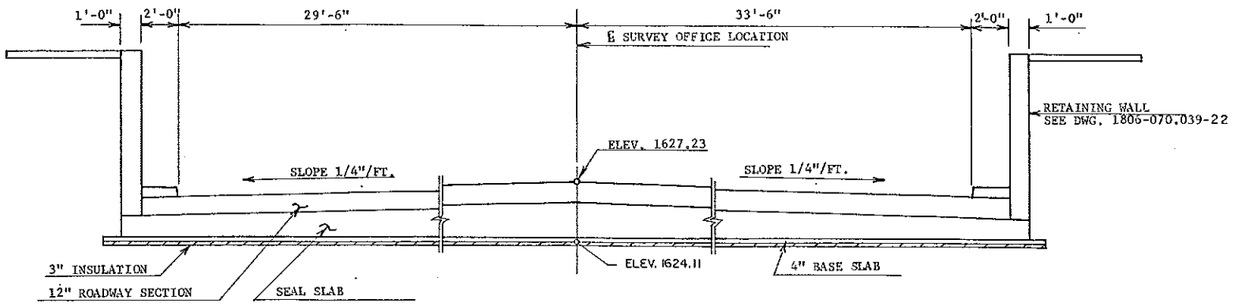
6TH AVENUE S.E. UNDERPASS
MANDAN N.D.

SEAL SLAB SECTION

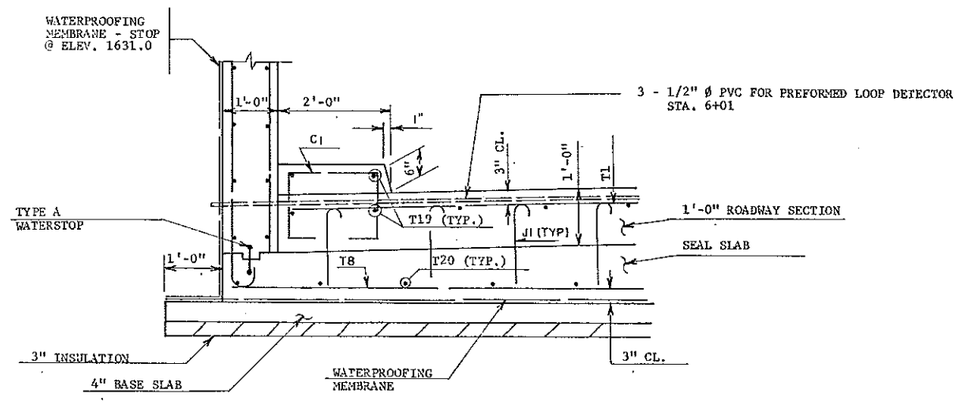
STA. 6+00 — STA. 7+05

1806-070.039-23

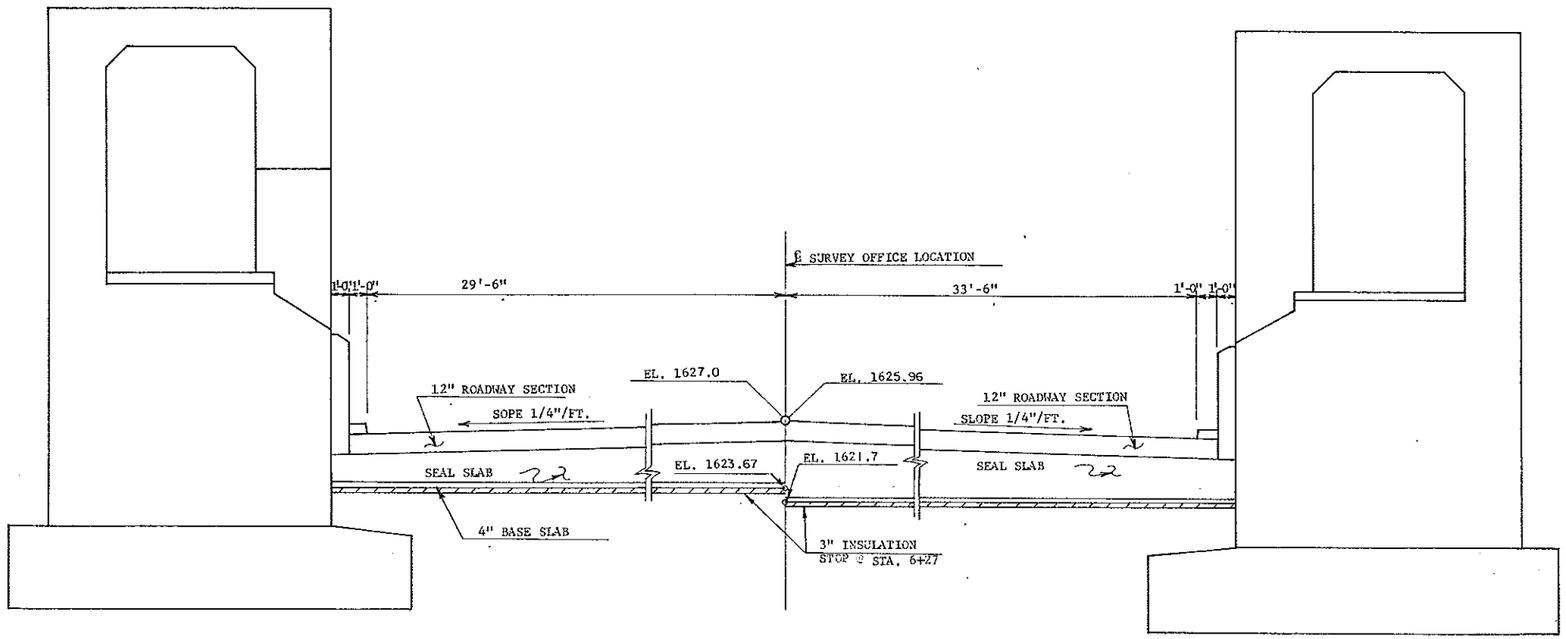
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



ROADWAY SECTION - STA 6+00
FACING SOUTH

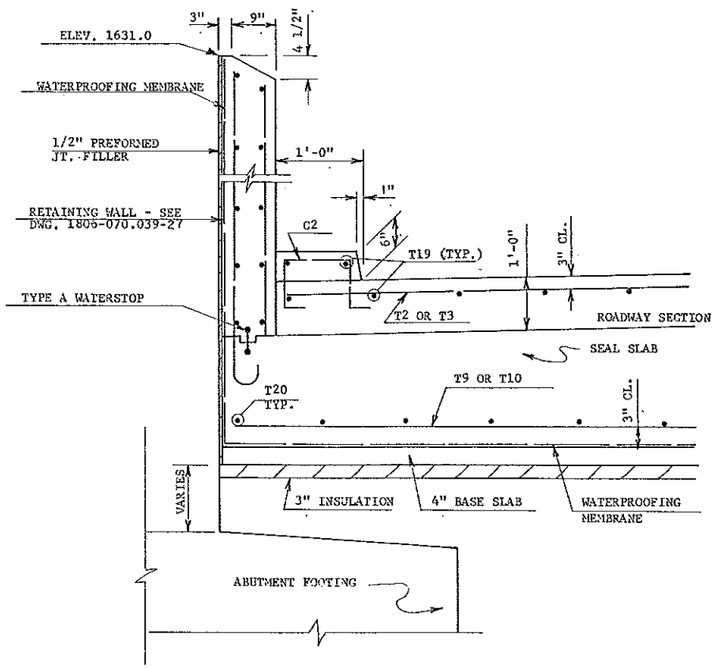


TYPICAL SECTION
STA. 6+00 - STA. 6+01.90 EAST SIDE
STA. 6+00 - STA. 6+14.75 WEST SIDE



EAST ROADWAY SECTION AT STA. 6+02.90

WEST ROADWAY SECTION AT STA. 6+ 15.75



TYPICAL SECTION
STA. 6+02.90 - STA. 6+25 EAST SIDE
STA. 6+15.75 - STA. 6+25 WEST SIDE

QUANTITIES

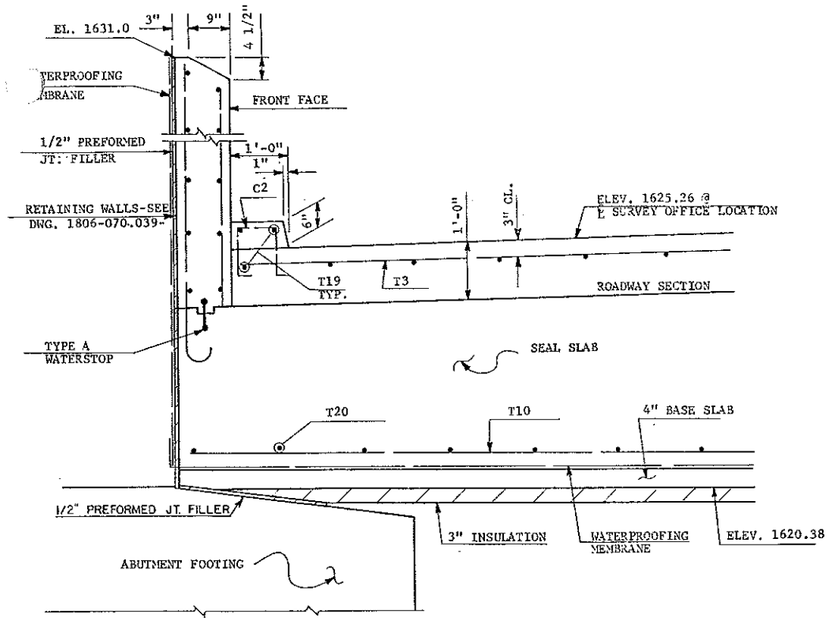
SEE DWG. 1806-070.039-27

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

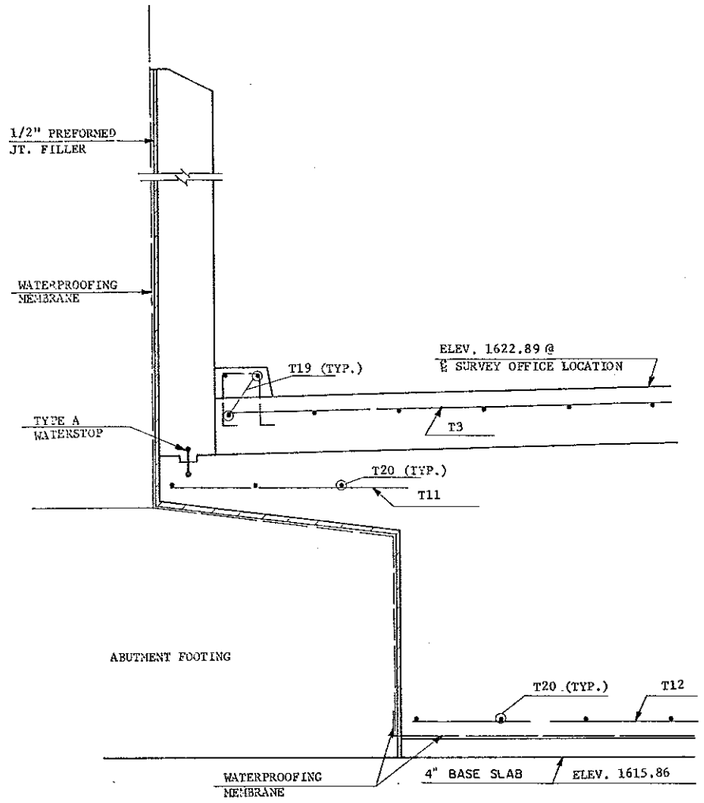
SEAL SLAB SECTION
STA. 6+00 - STA. 7+05

1806-070.039-24

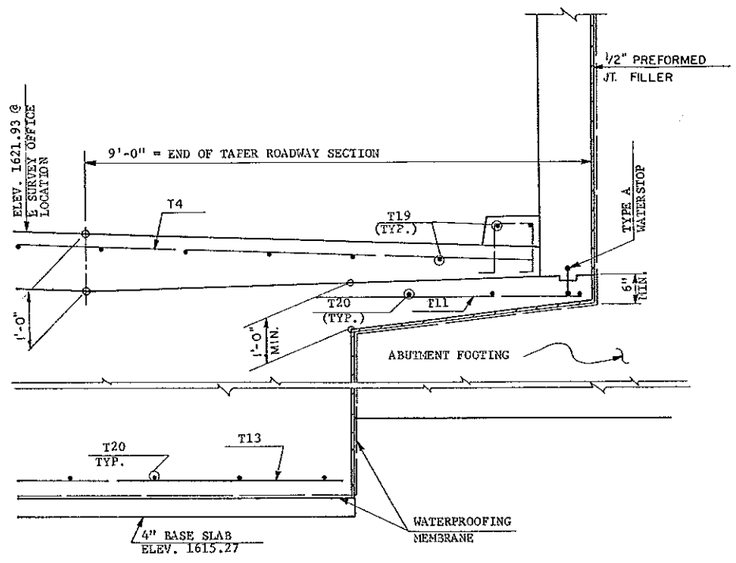
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



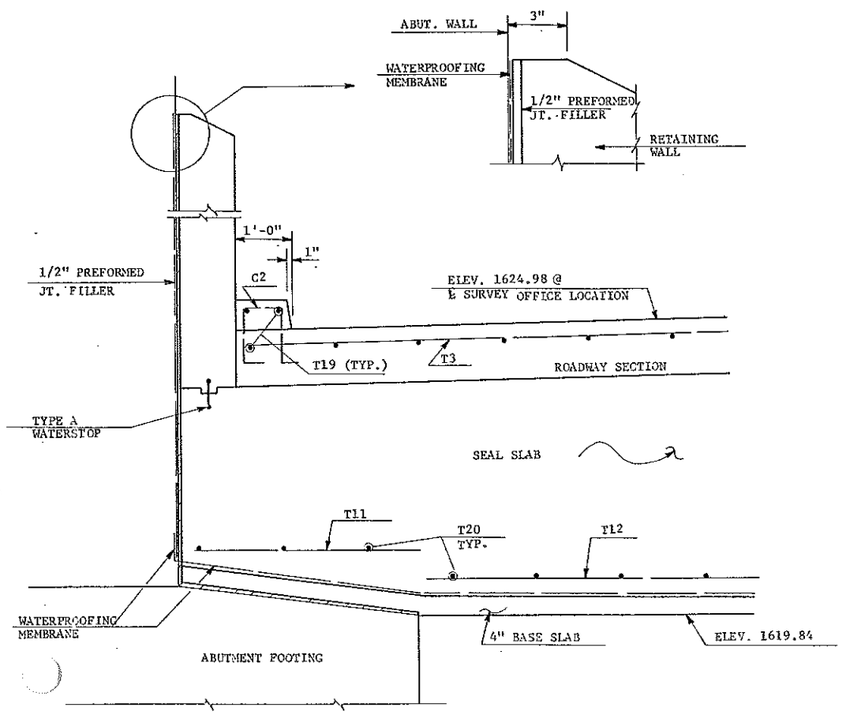
TYPICAL SECTION AT STA. 6+25



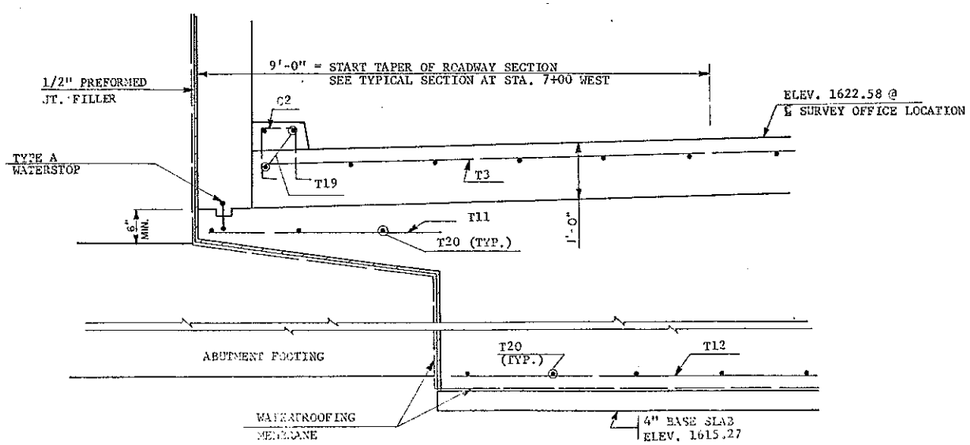
TYPICAL SECTION AT STA. 6+67



TYPICAL SECTION AT STA. 7+00



TYPICAL SECTION AT STA. 6+29



TYPICAL SECTION AT STA. 6+75

QUANTITIES
SEE DWG. 1806-070.039-26

6TH AVENUE S.E. UNDERPASS

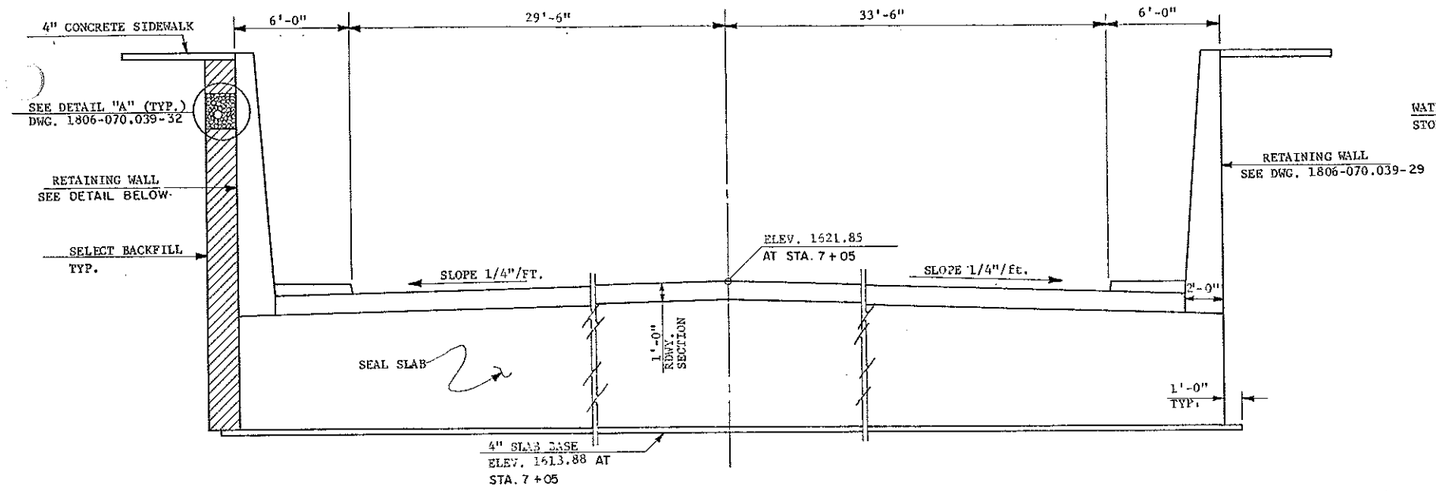
MANDAN, N.D.

SEAL SLAB SECTION

STA. 6+00 – STA. 7+05

1806-070.039-25

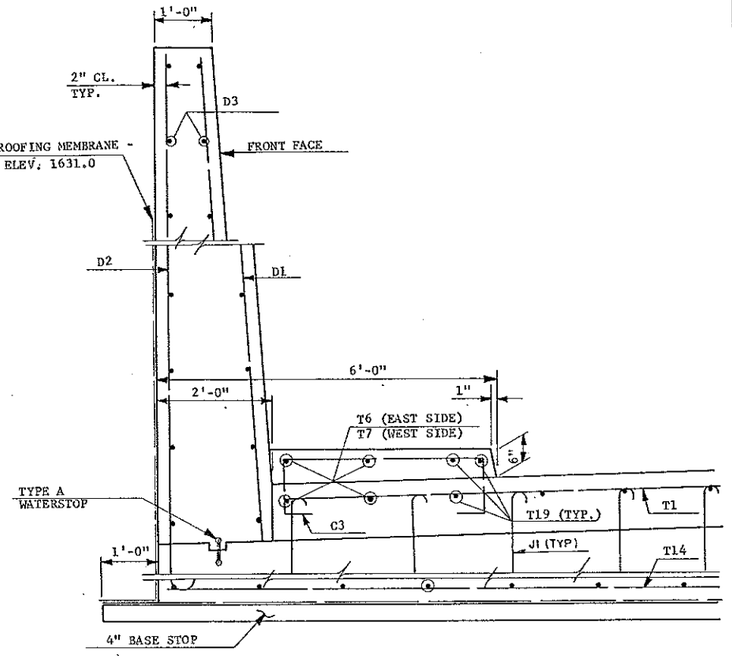
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



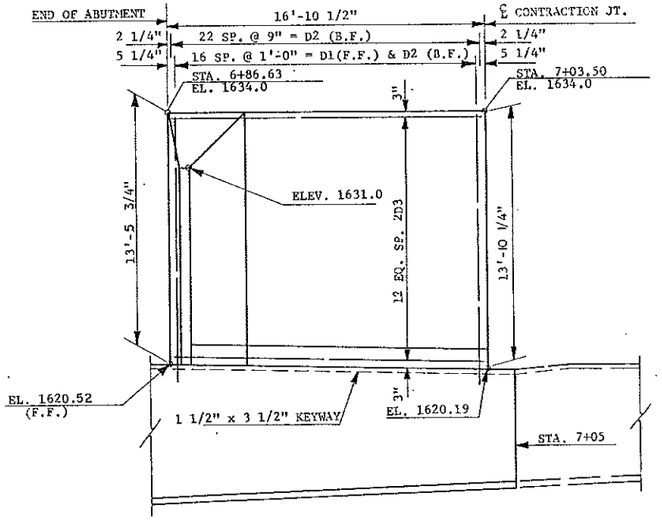
HALF SHOWING
STA. 6+87.40 - STA. 7+05

TYPICAL ROADWAY SECTION

HALF SHOWING
STA. 7+80.27 - STA. 7+05

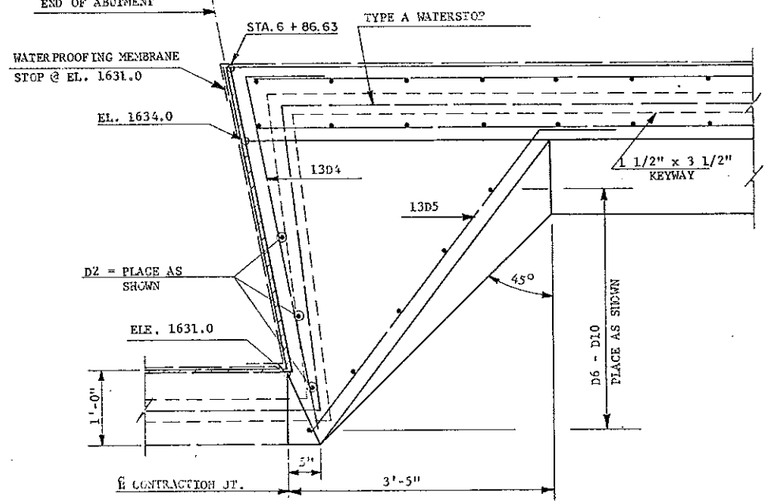


ROADWAY SECTION @ STA. 7+05



ELEVATION

EAST RETAINING WALL



PLAN VIEW @ STA. 6+86.63 EAST

QUANTITIES

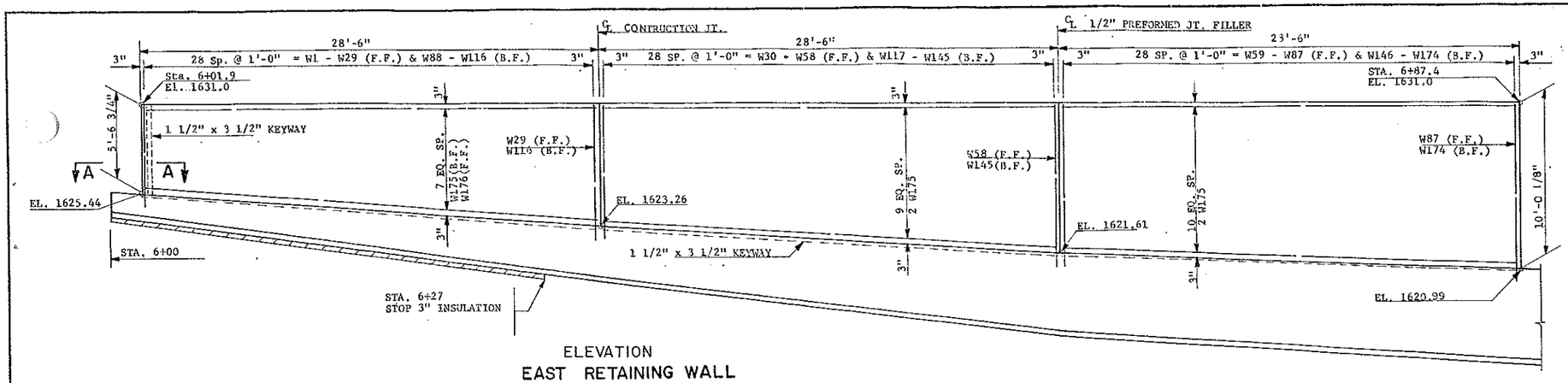
SEE DWG. 1806-070.039-27

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

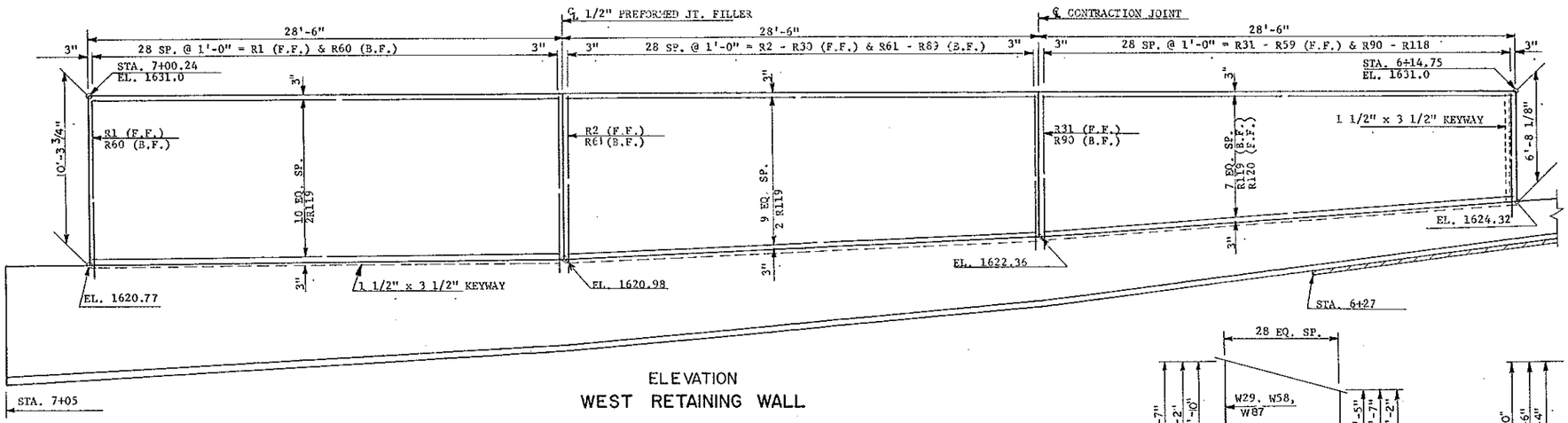
SEAL SLAB SECTION

STA. 6+00 – STA. 7+05

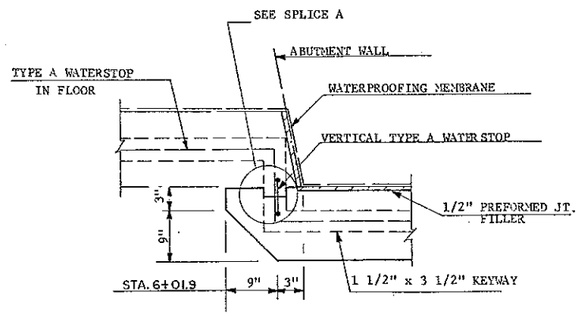
1806-070.039-26



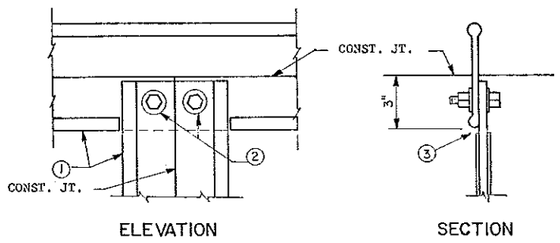
ELEVATION
EAST RETAINING WALL



ELEVATION
WEST RETAINING WALL



A-A

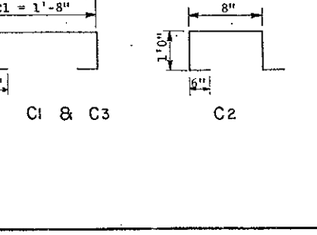


ELEVATION SECTION

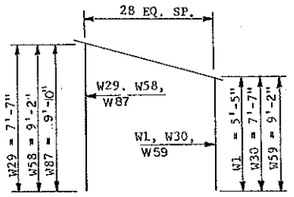
SPLICE A

NOTE:
1. TYPE A WATERSTOP.
2. 1/2" HEX. HEAD BOLT WITH HEX. NUT AND 2-1/8" x 1 1/2" DIA. WASHERS.
3. PLANE OFF BULBS ON ABUTTING SURFACES.

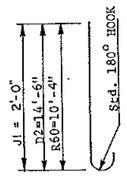
W88-W116, W117-W145 & W146-W174
ONE SET SHOWN
TOTAL LENGTH ONE SET = W88-W116 = 232'-0"
W117-W145 = 286'-6"
W146-W174 = 314'-2"



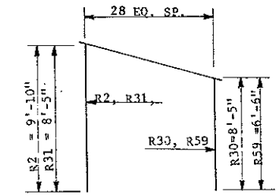
R61-R89 & R90-R118
ONE SET SHOWN
TOTAL LENGTH ONE SET = R61-R89 = 309'-4"
R90-R118 = 261'-0"



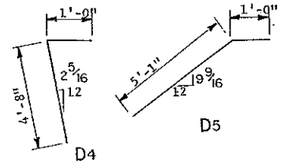
W1-W29, W30-W58 & W59-W87
ONE SET SHOWN
TOTAL LENGTH ONE SET = W1-W29 = 188'-6"
W30-W58 = 242'-11"
W59-W87 = 275'-6"

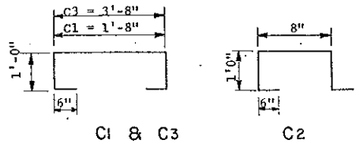


J1, D2 & R60



R2 - R30 & R31 - R59
ONE SET SHOWN
TOTAL LENGTH ONE SET = R2-R30 = 264'-7"
R31-R59 = 216'-3"





BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	

BAR LIST

	MARK	NO.	SIZE	LENGTH	SHAPE
(1)	C1	12	4	4'-8"	BENT
(1)	C2	115	4	3'-8"	BENT
(1)	C3	13	4	6'-8"	BENT
	D1	22	5	13'-8"	STR.
	B2	26	6	15'-2"	BENT
	D3	26	4	16'-5"	STR.
	D4	13	4	5'-8"	BENT
	D5	13	4	6'-1"	BENT
	J1	88	4	2'-6"	"
	R1	29	5	"	STR.
	R2-R30	1 SET	5	264'-7"	STR.
	R31-R59	1 SET	5	216'-3"	STR.
	R60	29	6	11'-0"	BENT
	R61-R89	1 SET	6	309'-4"	BENT
	R90-R118	1 SET	6	261'-0"	BENT
	R119	50	4	28'-2"	STR.
	R120	8	4	27'-6"	STR.
	W1-W29	1 SET	5	188'-6"	STR.
	W30-W58	1 SET	5	242'-11"	STR.
	W59-W87	1 SET	5	275'-6"	STR.
	W88-W116	1 SET	6	232'-0"	BENT
	W117-W145	1 SET	6	286'-6"	BENT
	W146-W174	1 SET	6	314'-2"	BENT
	W175	50	4	28'-2"	STR.
	W176	8	4	27'-6"	STR.
(1)	T1	8	4	34'-1"	STR.
(1)	T2	18	4	33'-1"	STR.
(1)	T3	98	4	32'-1"	STR.
(1)	T4	18	4	35'-1"	STR.
(1)	T5	1	4	15'-7"	STR.
(1)	T6	3	4	17'-3"	STR.
(1)	T7	2	4	3'-0"	STR.
	T8	4	4	35'-1"	STR.
	T9	18	4	34'-1"	STR.
	T10	22	4	33'-1"	STR.
	T11	88	4	4'-3"	STR.
	T12	78	4	29'-10"	STR.
	T13	20	4	31'-10"	STR.
	T14	4	4	38'-1"	STR.
	T15	1	4	2'-9"	STR.
	T16	1	4	15'-7"	STR.
	T17	4	4	17'-11"	STR.
	T18	4	4	4'-8"	STR.
	T19	144	4	35'-11"	STR.
	T 20	141	4	35'-11"	STR.

(1) REINFORCING STEEL SHALL BE EPOXY COATED

QUANTITIES

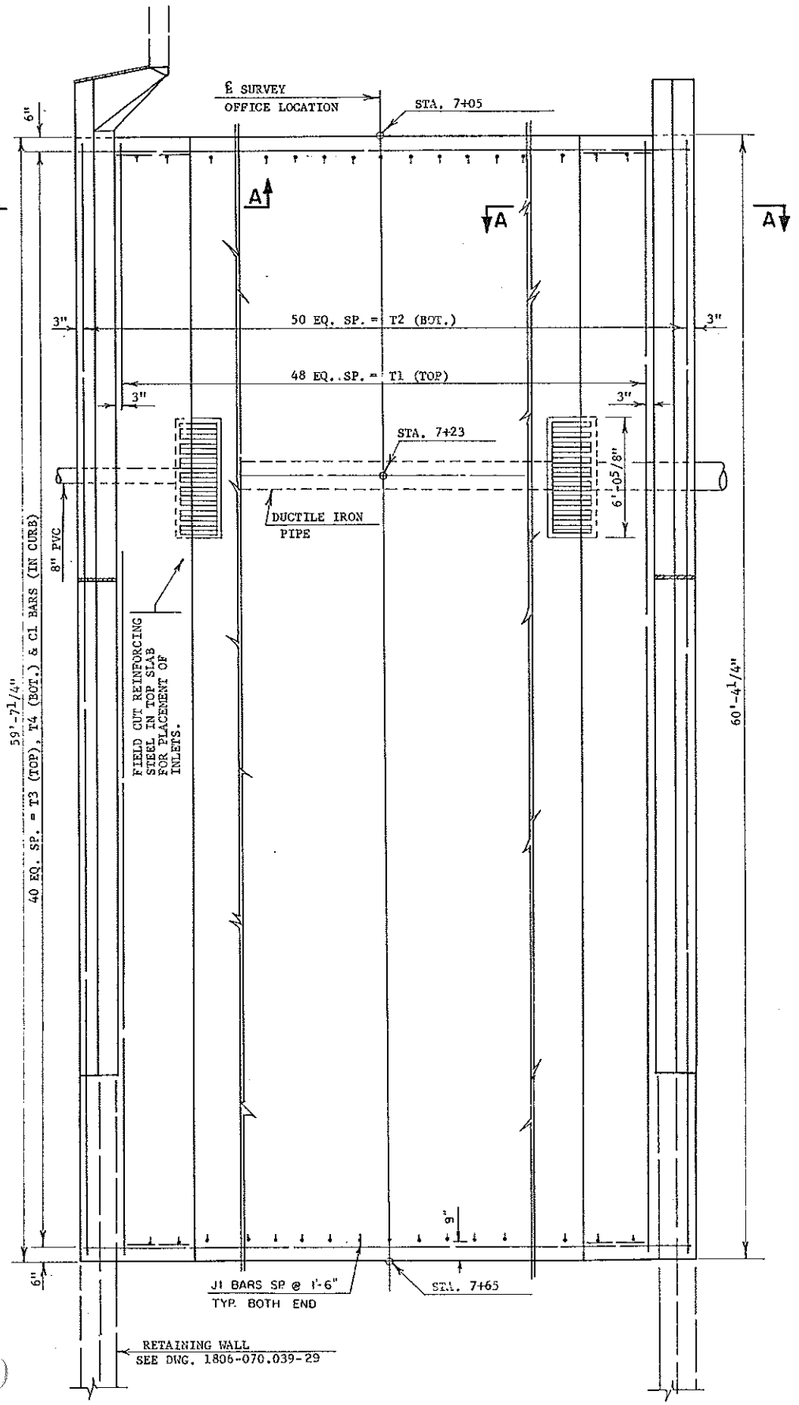
CLASS YE-1 CONCRETE	1115	C.Y.
CLASS AE-3 CONCRETE	415	C.Y.
REINFORCING STEEL	17,970	LBS.
REINFORCING STEEL-EPOXY	3528	LBS.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

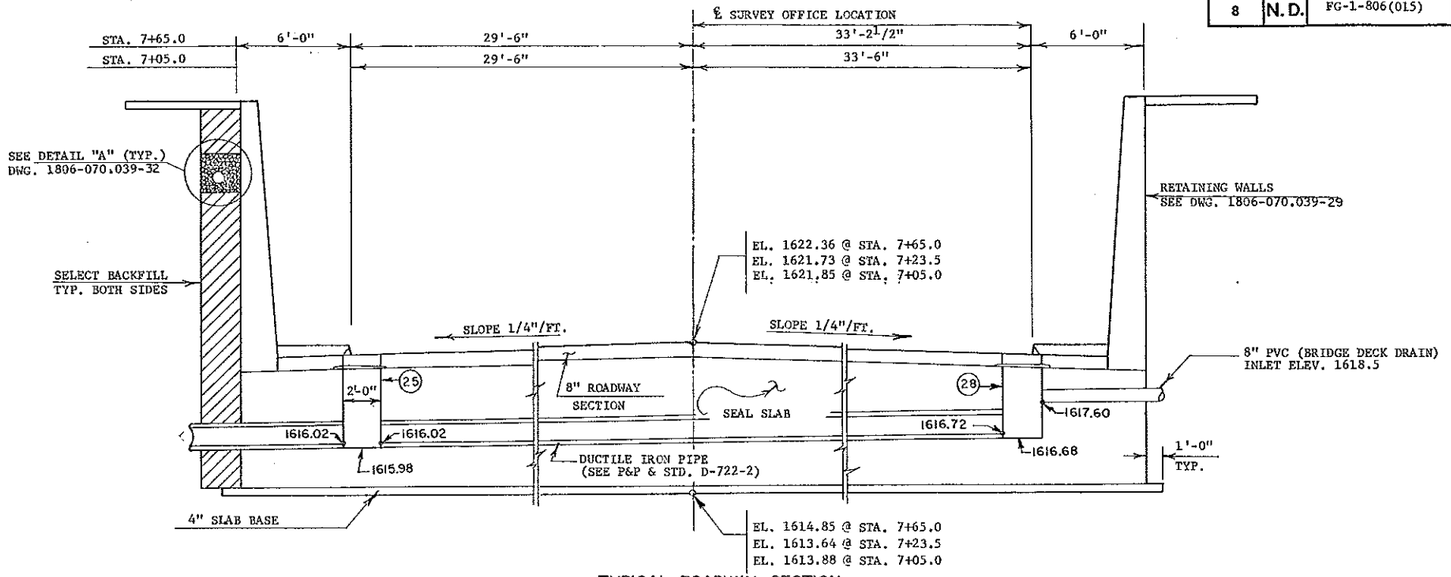
SEAL SLAB SECTION
STA. 6+00-STA. 7+05

1806-070.039-27

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	

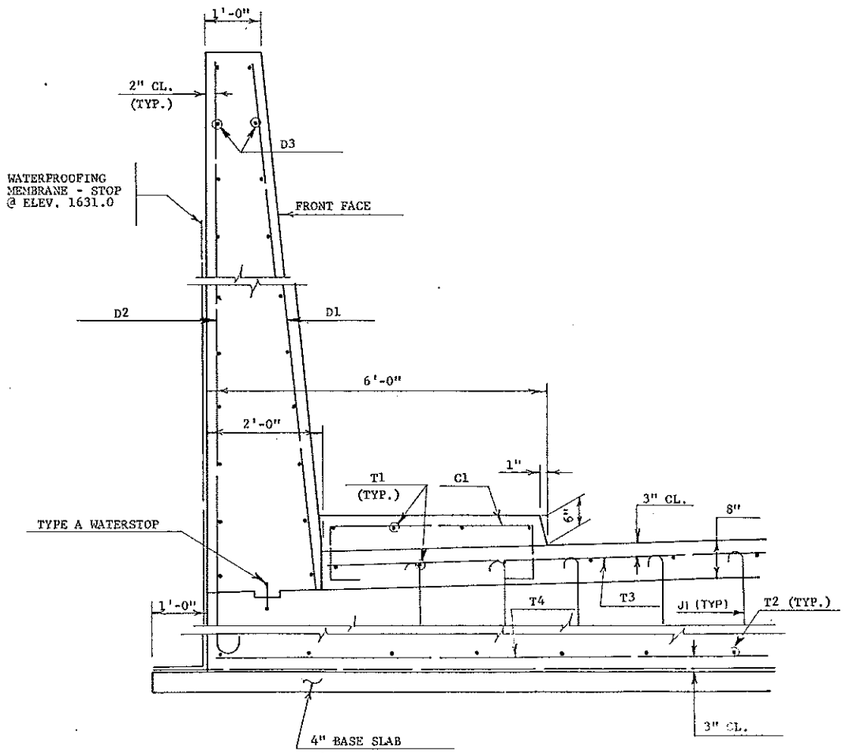


PLAN VEIW

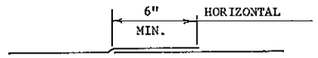


TYPICAL ROADWAY SECTION

STA. 7+05.0 THRU STA. 7+65.0



A-A



WATERPROOFING MEMBRANE
SPLICE DETAIL

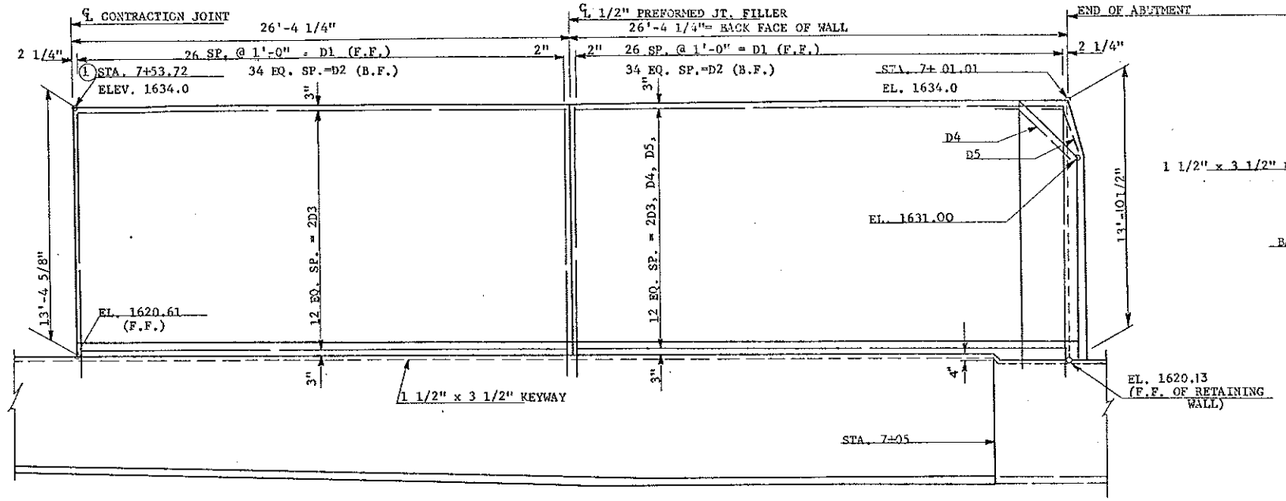
QUANTITIES
SEE DWG. 1806-070.039-29

6TH AVENUE S.E. UNDERPASS
MANDAN N.D.

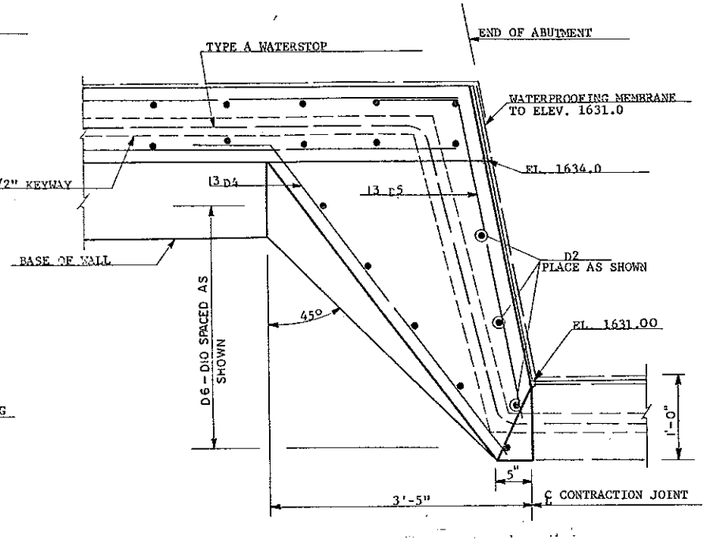
SEAL SLAB SECTION
STA. 7+05 - STA. 7+65

1806-070.039-28

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



ELEVATION
WEST RETAINING WALL



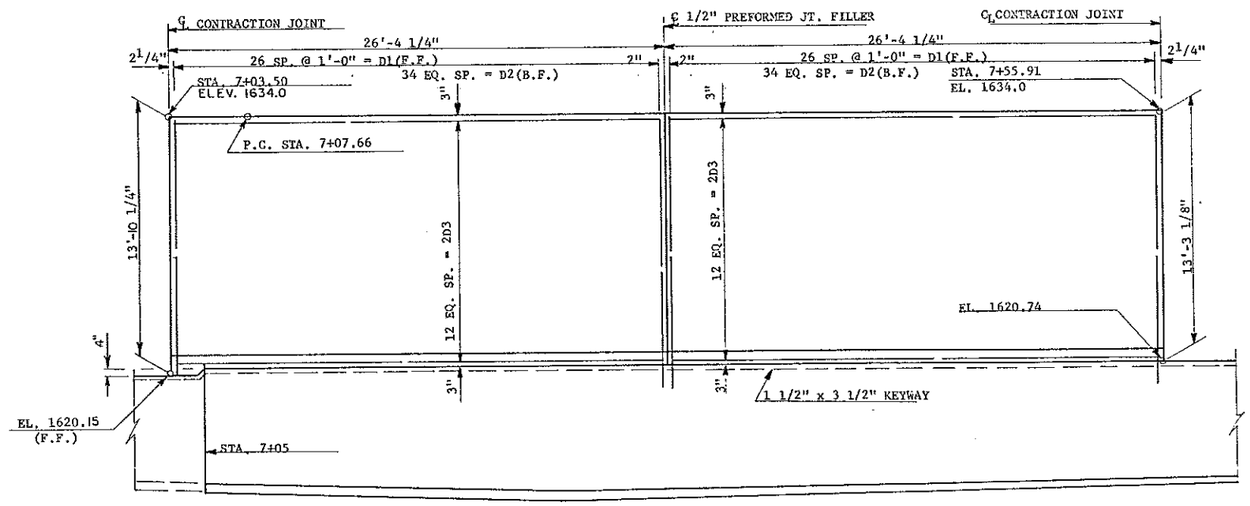
PLAN VIEW @ STA. 7+01.01

BAR LIST

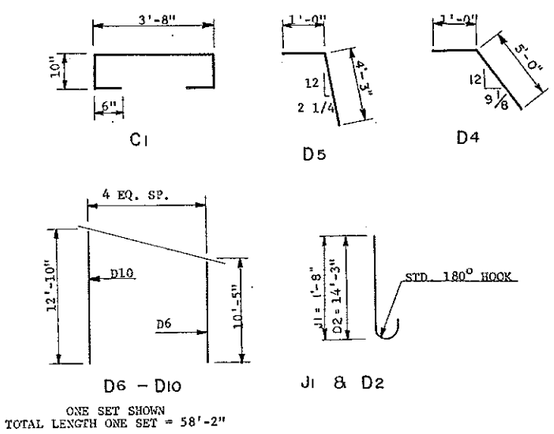
	MARK	NO.	SIZE	LENGTH	SHAPE
	D1	108	5	13'-1"	STR.
	D2	143	6	14'-11"	BENT
	D3	104	5	26'-0"	STR.
	D4	13	5	6'-0"	BENT
	D5	13	5	5'-3"	BENT
	D6-D10	1 SET	5	58'-2"	STR.
2	C1	82	4	6'-4"	BENT
2	T1	114	4	30'-5"	STR.
2	T2	102	4	30'-5"	STR.
2	T3	82	4	36'-1"	STR.
	T4	82	4	38'-1"	STR.
	J1	94	4	2'-2"	BENT

1 SURVEY OF EXISTING ROADWAY

2 REINFORCING STEEL BARS SHALL BE EPOXY COATED.



ELEVATION
EAST RETAINING WALL



ONE SET SHOWN
TOTAL LENGTH ONE SET = 58'-2"

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT

QUANTITIES

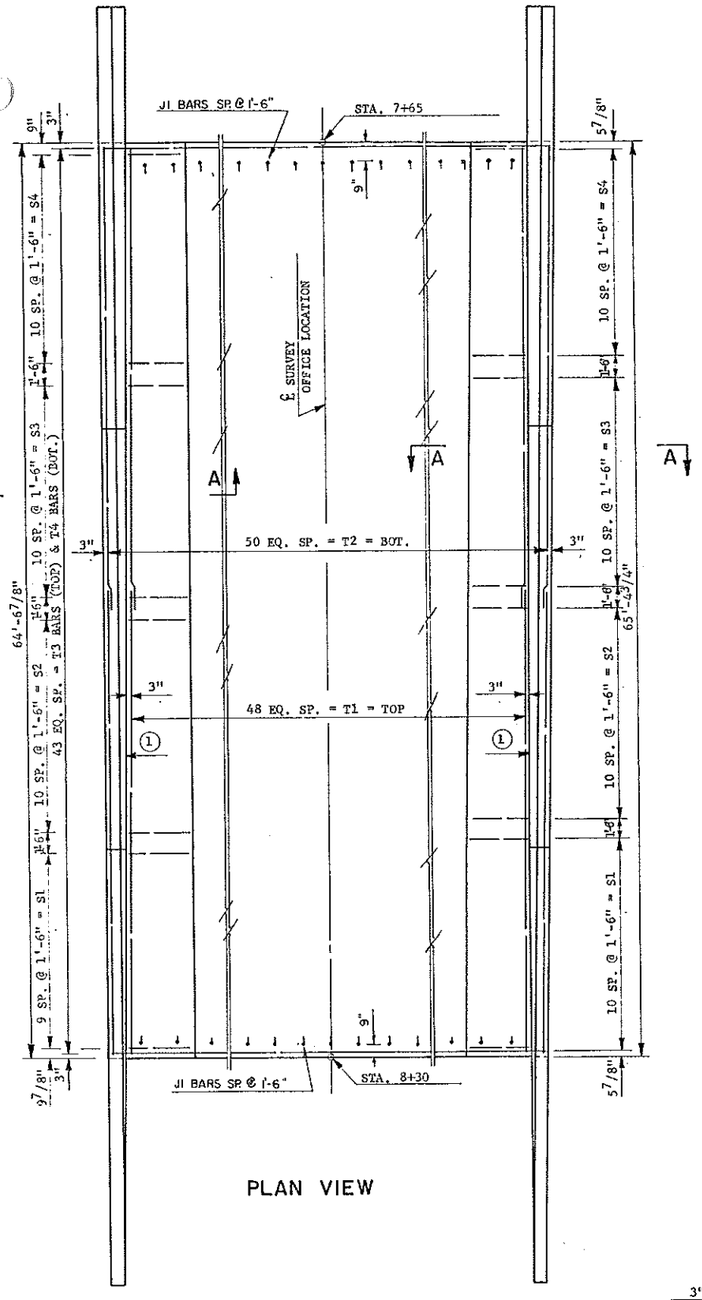
CLASS YE-1 CONCRETE	1088	C.Y.
CLASS AE-3 CONCRETE	253	C.Y.
REINFORCING STEEL	12006	LBS.
REINFORCING STEEL-EPOXY	4640	LBS.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

SEAL SLAB SECTION
STA. 7+05 - STA. 7+65

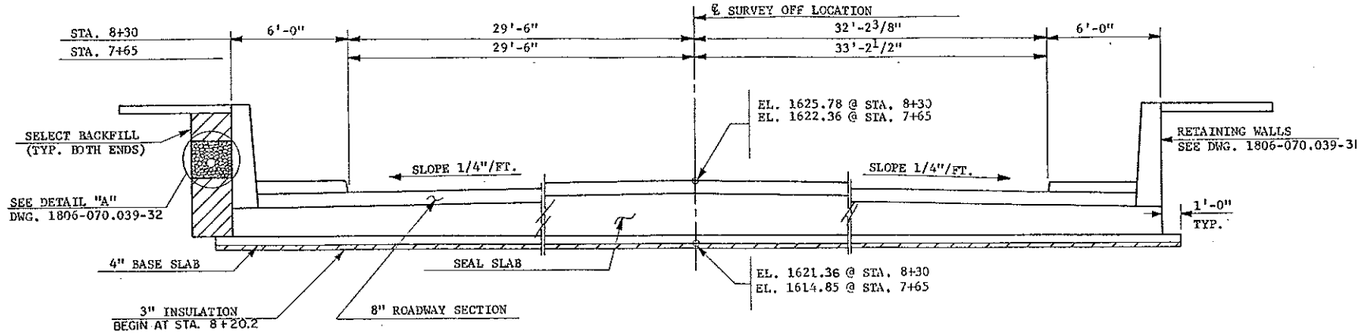
1806-070.039-29

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



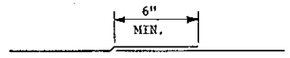
PLAN VIEW

① FRONT FACE OF THE RETAINING WALL AT THE BASE

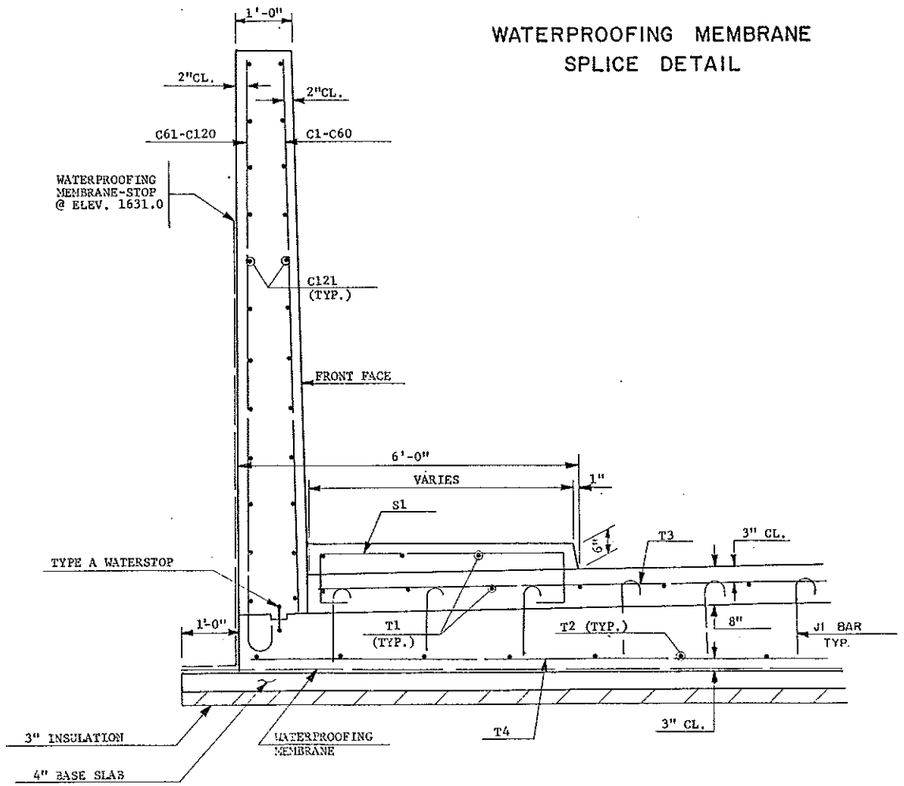


TYPICAL ROADWAY SECTION

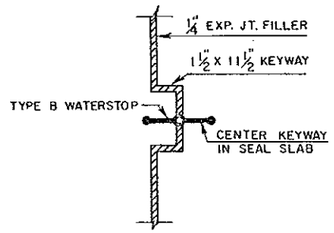
STA. 7+65 THRU STA. 8+30



WATERPROOFING MEMBRANE SPLICE DETAIL



A-A



EXPANSION JOINT SEAL SLAB

QUANTITIES
SEE DWG. 1806-070.039-31

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

SEAL SLAB SECTION

STA. 7+65 – STA. 8+30

1806-070.039-30

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	

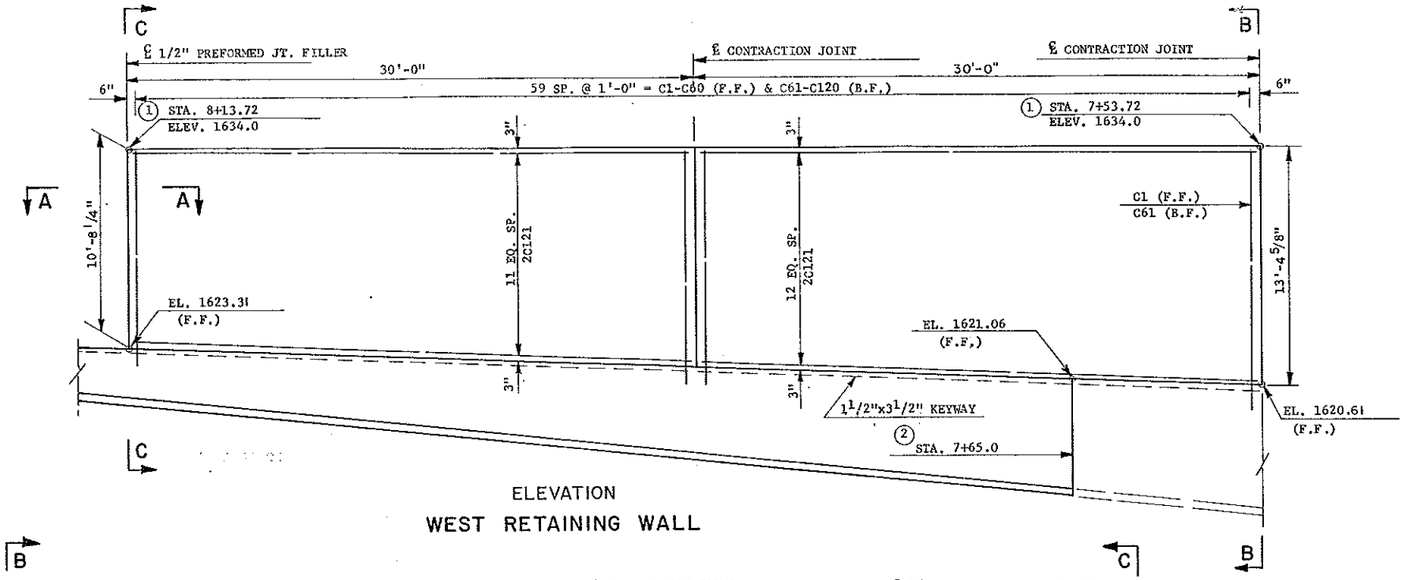
BAR LIST

MARK	NO.	SIZE	LENGTH	SHAPE
C1-C60	2 SETS	6	705'-0"	STR.
C61-C120	2 SETS	6	790'-0"	BENT
C121	100	5	29'-8"	STR.
J1	94	4	2'-2"	
(3) T1	114	4	33'-3"	STR.
T2	102	4	33'-3"	"
(3) T3	88	4	37'-3"	"
T4	88	4	38'-11"	"
(3) S1	21	4	6'-10"	BENT
(3) S2	22	4	6'-8"	"
(3) S3	22	4	6'-6"	"
(3) S4	22	4	6'-4"	"

(1) SURVEY OF EXISTING ROADWAY

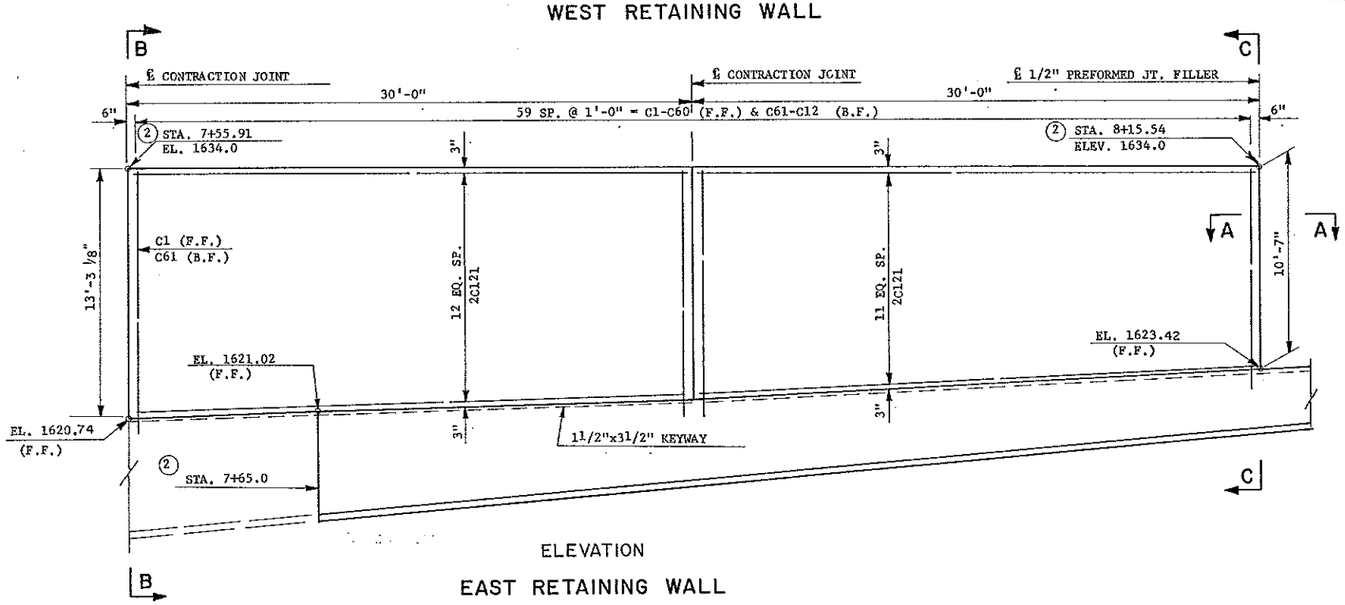
(2) SURVEY OF FINISH ROADWAY

(3) REINFORCING STEEL BARS SHALL BE EPOXY COATED



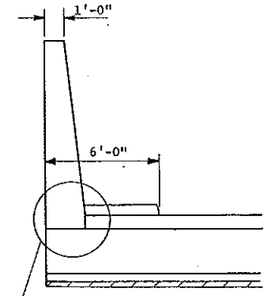
ELEVATION

WEST RETAINING WALL

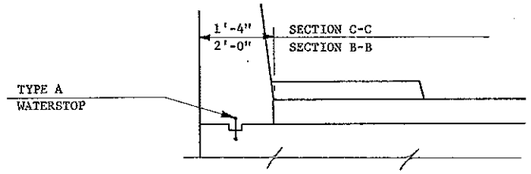


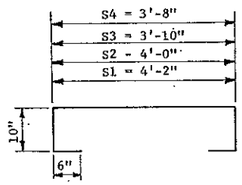
ELEVATION

EAST RETAINING WALL

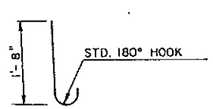


B-B & C-C

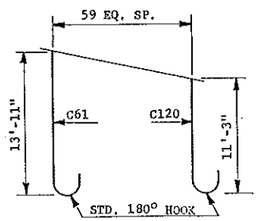




S1 - S4

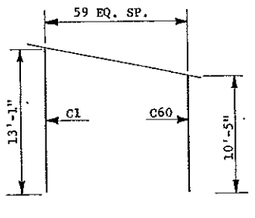


J1



C61 - C120

ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 790'-0"

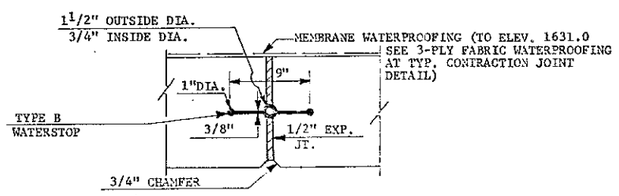


C1 - C60

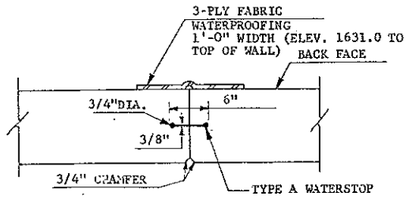
ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 705'-0"

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT



A-A



TYPICAL CONTRACTION JOINT DETAIL

QUANTITIES

CLASS YE-1 CONCRETE	823	C.Y.
CLASS AE-3 CONCRETE	257	C.Y.
REINFORCING STEEL	12260	LBS.
REINFORCING STEEL-EPOXY	5107	LBS.

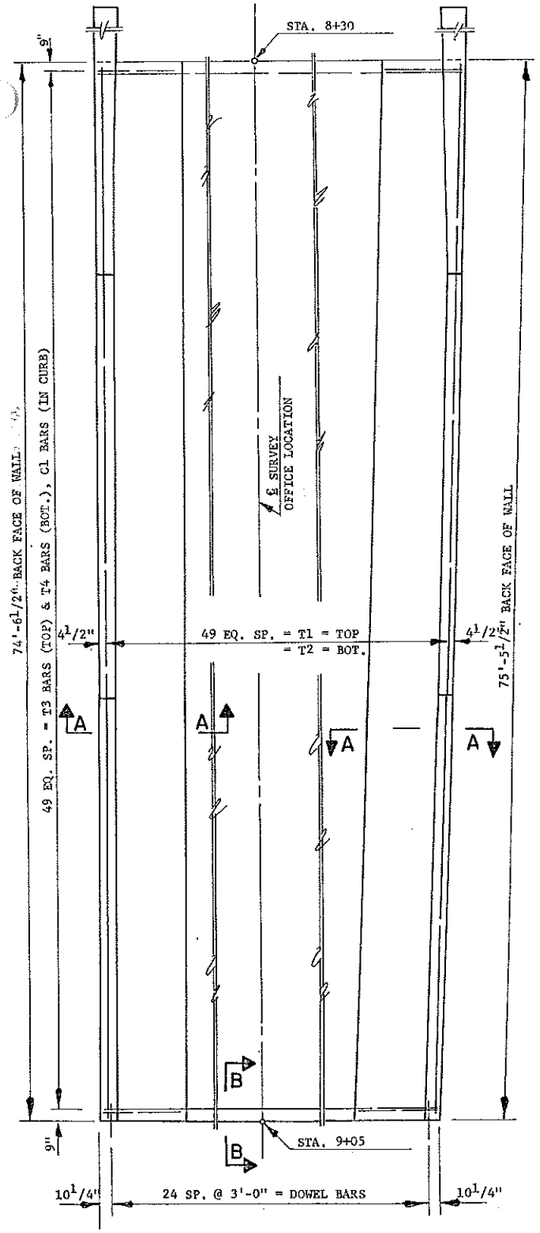
6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

SEAL SLAB SECTION

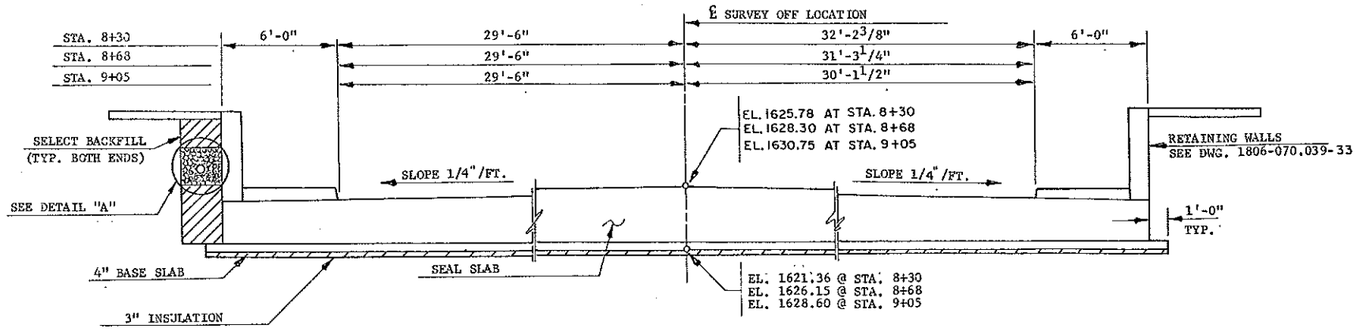
STA. 7+65 - STA. 8+30

1806-070.039-31

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	

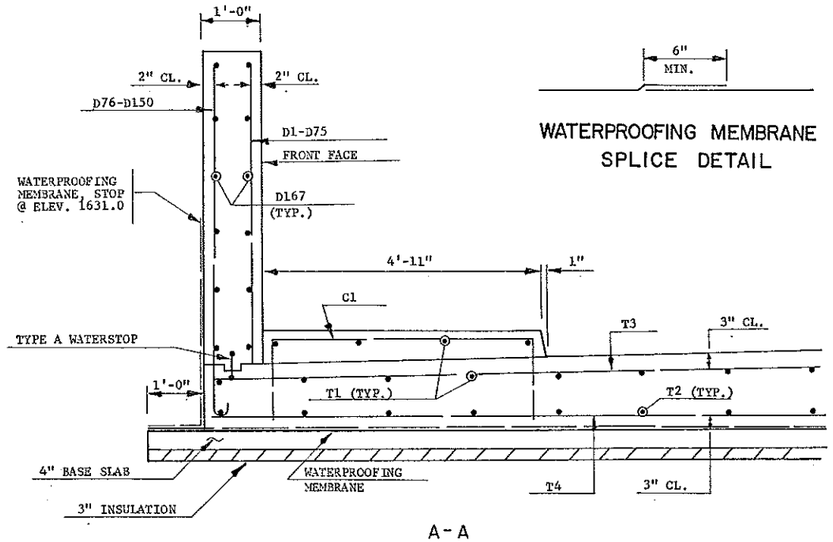


PLAN VIEW



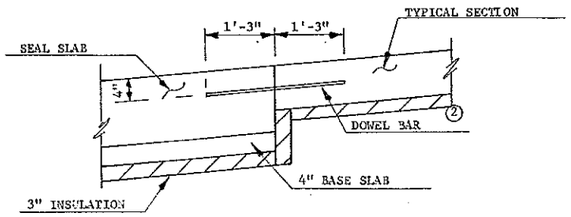
TYPICAL ROADWAY SECTION

STA. 8+30 THRU STA. 9+05

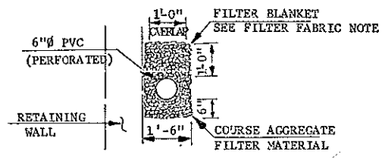


A-A

WATERPROOFING MEMBRANE SPLICE DETAIL



B-B



DETAIL "A"

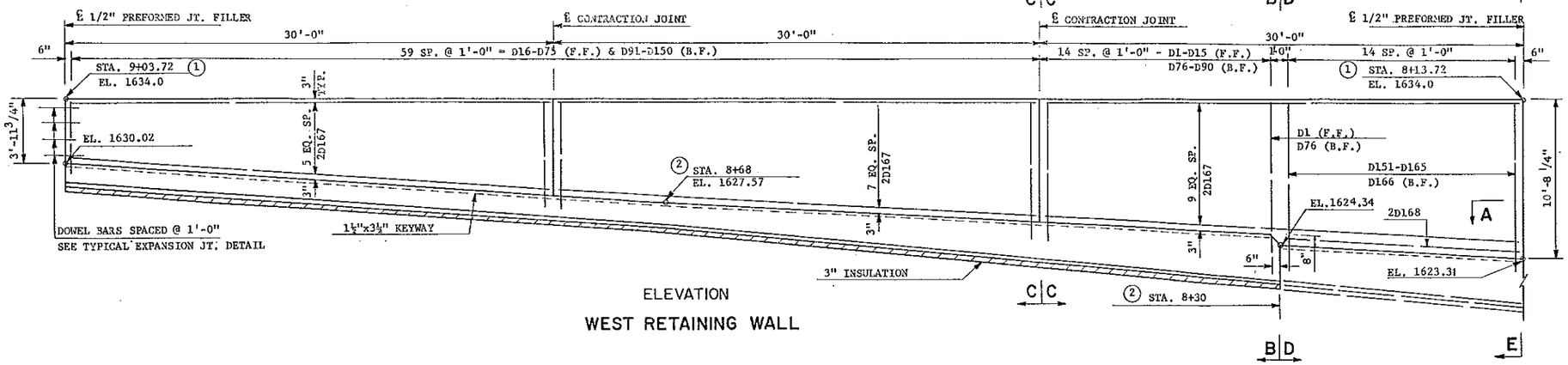
FILTER FABRIC: PERFORATED PVC UNDERDRAINS SHALL HAVE A NON-WOVEN FILTER FABRIC MADE OF MAN-MADE FILTERS DESIGNED TO FILTER OUT MATERIAL SMALLER THAN THE NUMBER 40 SIEVE SIZE WITH COEFFICIENTS OF PERMEABILITY RANGING FROM 10 TO 1.8 FT. PER MIN. THIS FABRIC SHALL BE PLACED IN THE TRENCH AS SHOWN. NOT A SEPARATE PAY ITEM, COST TO BE INCIDENTAL TO 6" PERFORATED PVC PIPE.

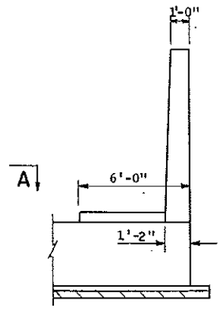
QUANTITIES
SEE DWG. 1806-070.039-33

6TH AVENUE S.E. UNDERPASS
MANDAN, N. D.

SEAL SLAB SECTION
STA. 8+30 - STA. 9+05

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



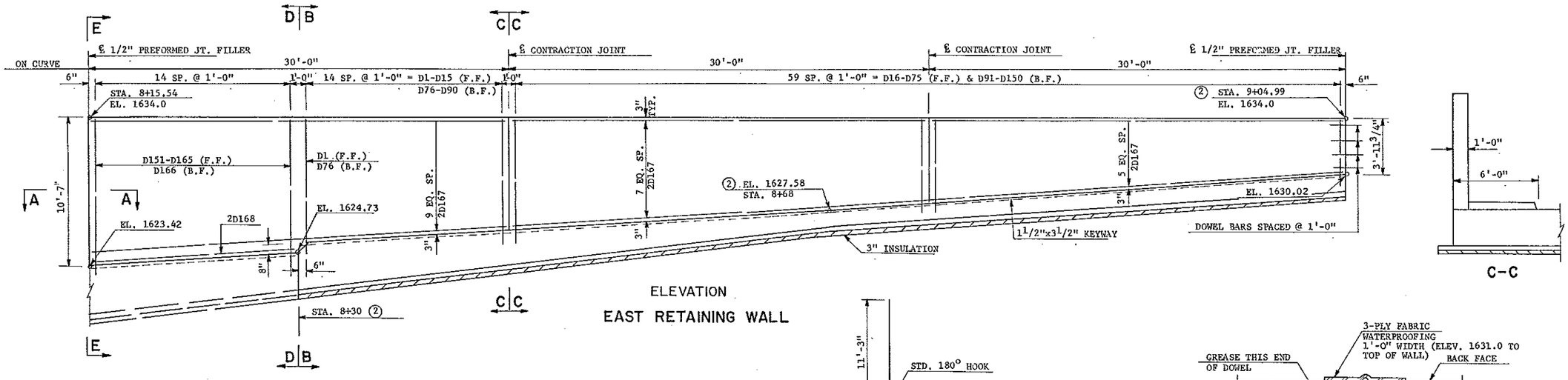


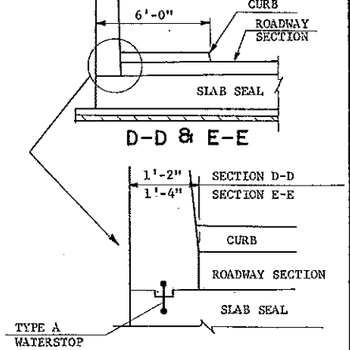
BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
D1-D15	2 SETS	5	123'-9"	STR.
D16-D75	2 SETS	5	347'-6"	STR.
D76-D90	2 SETS	6	145'-0"	BENT
D166	15	6	11'-10"	BENT
D91-D150	2 SETS	5	432'-6"	BENT
D151-D165	2 SETS	6	148'-9"	STR.
D167	96	5	29'-8"	STR.
D168	4	5	14'-8"	STR.
③ C1	100	4	6'-11"	BENT
③ T1	116	4	38'-4"	STR.
T2	100	4	38'-4"	STR.
③ T3	100	4	37'-5"	STR.
T4	100	4	37'-5"	STR.

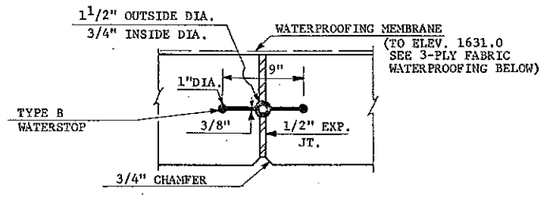
① SURVEY OF EXISTING ROADWAY.

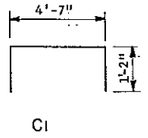
② SURVEY OFFICE LOCATION

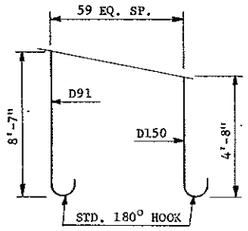
③ REINFORCING STEEL BARS SHALL BE EPOXY COATED

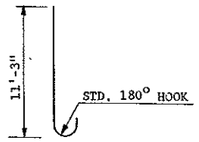


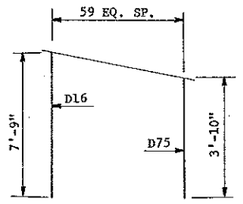


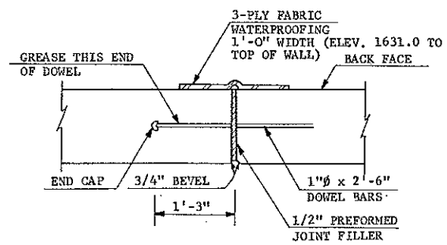




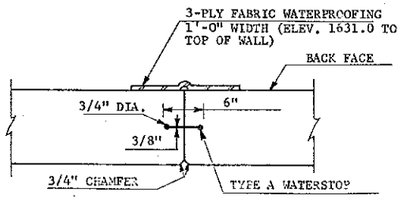






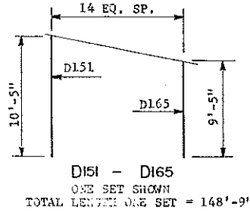


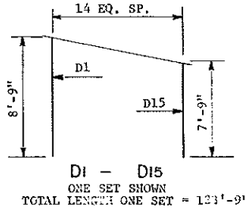
NOTE: PROVISIONS SHALL BE MADE TO HOLD DOWEL IN A TRUE HORIZONTAL POSITION AND IN A PLANE PARALLEL TO THE FRONT FACE WHILE CONCRETE IS POURED.

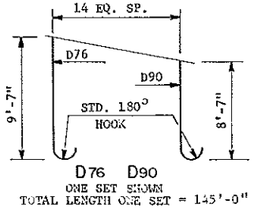


BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT







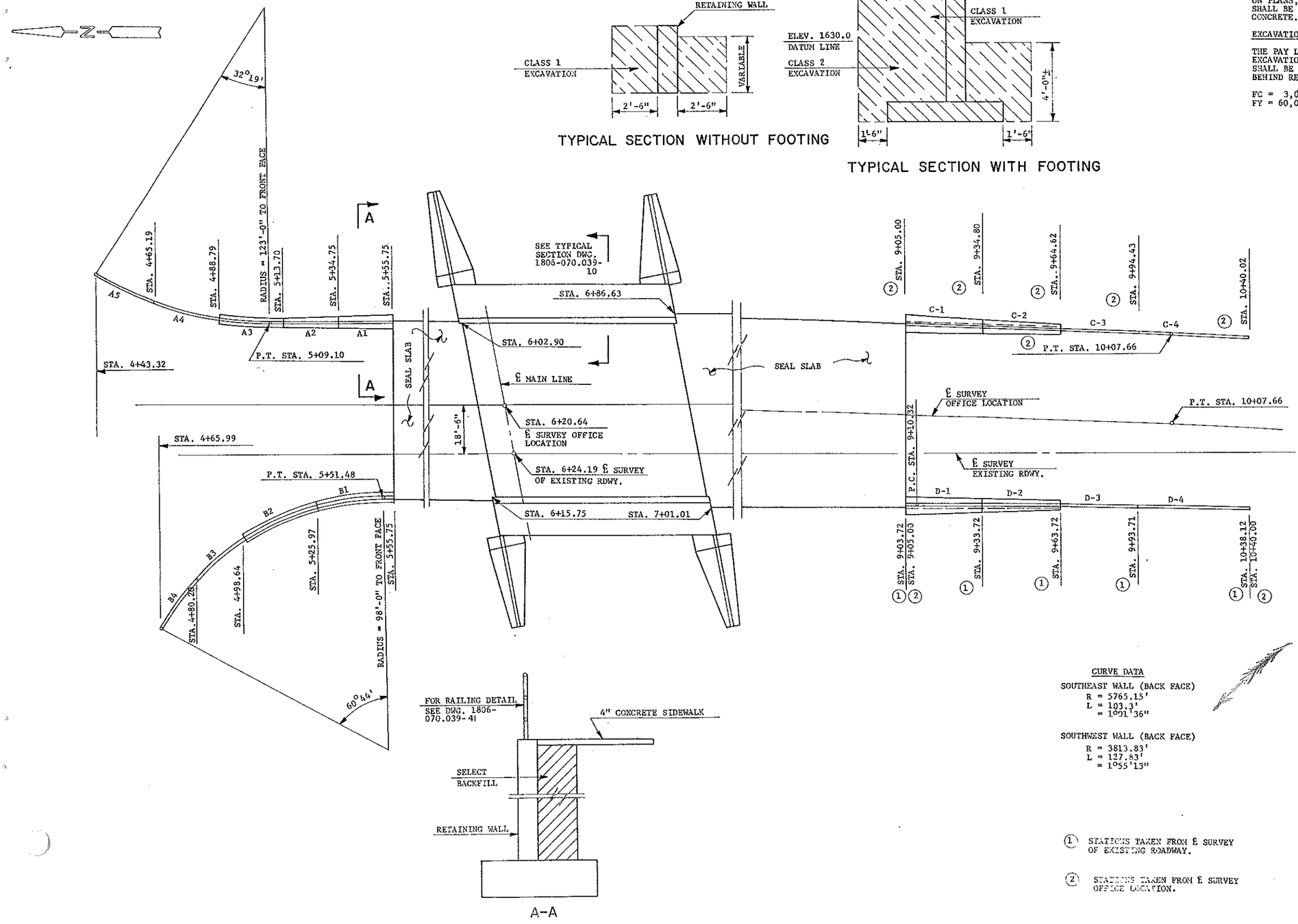
QUANTITIES

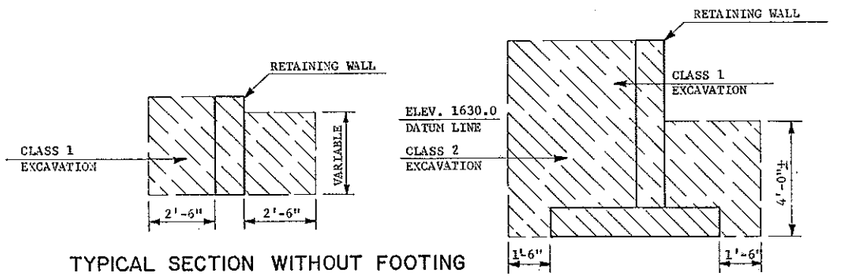
CLASS AE-3 CONCRETE	546	C.Y.
REINFORCING STEEL	11,126	LBS.
REINFORCING STEEL-EPOXY	5932	LBS.

6TH AVENUE S.E UNDERPASS
MANDAN, N.D.
SEAL SLAB SECTION
STA. 8+30 - STA. 9+05

1806-070.039-33

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	





TYPICAL SECTION WITHOUT FOOTING

TYPICAL SECTION WITH FOOTING

A-A

CURVE DATA

SOUTHEAST WALL (BACK FACE)
R = 5765.15'
L = 103.3'
= 1°01'36"

SOUTHWEST WALL (BACK FACE)
R = 3813.83'
L = 127.83'
= 1°55'13"

(1) STATIONS TAKEN FROM ℄ SURVEY OF EXISTING ROADWAY.

(2) STATIONS TAKEN FROM ℄ SURVEY OFFICE LOCATION.

NOTES:

GENERAL

THE COST OF INCIDENTAL ITEMS SUCH AS PREFORMED JOINT FILLER, DAMPPROOFING, DOWEL BARS, END CAPS, ETC. SHOWN ON PLANS, BUT NOT LISTED IN THE ESTIMATE OF QUANTITIES, SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS AE-3 CONCRETE.

EXCAVATION AND BACKFILL

THE PAY LIMITS AND QUANTITIES FOR CLASS 1 AND 2 EXCAVATION ARE SHOWN ON RETAINING WALL PLANS. BACKFILL SHALL BE PLACED ON TOE BEFORE ANY BACKFILL IS PLACED BEHIND RETAINING WALL.

FC = 3,000 PSI
FY = 60,000 PSI

NOTE:

STATIONS FOR NORTH END OF BRIDGE ARE TAKEN FROM FRONT FACE OF RETAINING WALL. STATIONS FOR SOUTH END OF BRIDGE ARE TAKEN FROM BACK FACE OF RETAINING WALL.

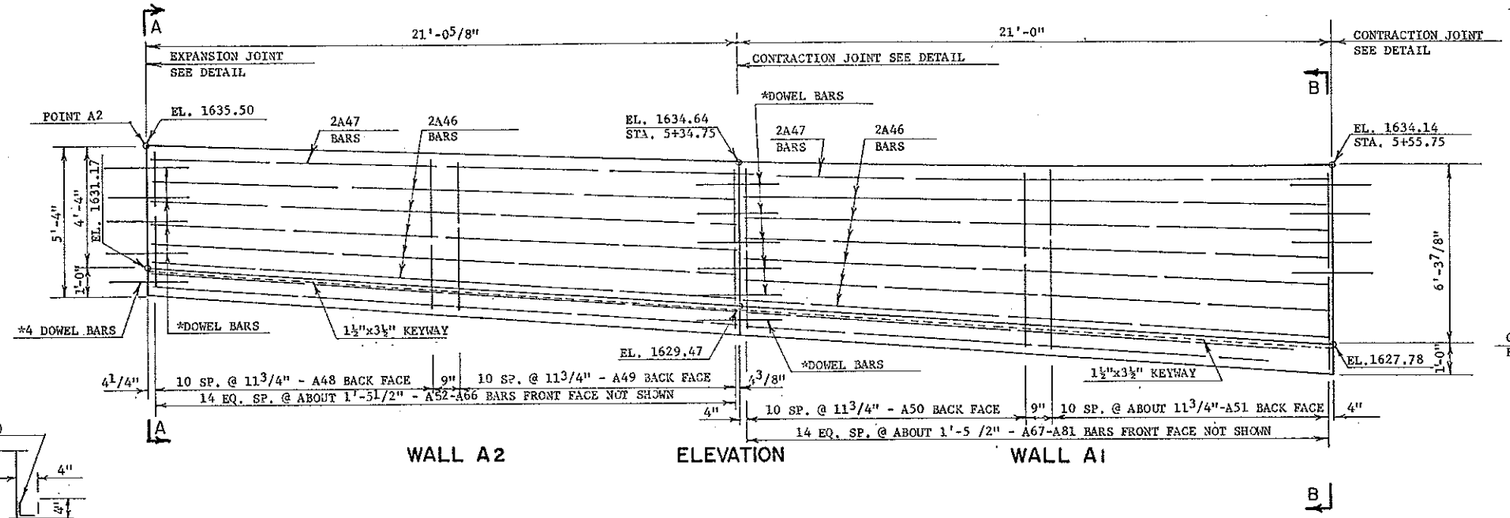
QUANTITIES

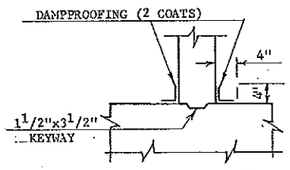
6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

RETAINING WALL LAYOUT

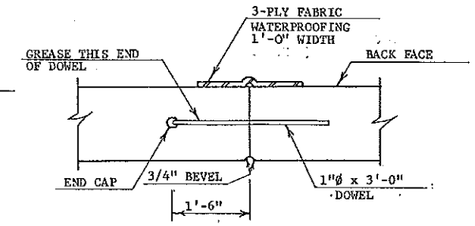
1806-070.039-34

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FC-1-806(015)	





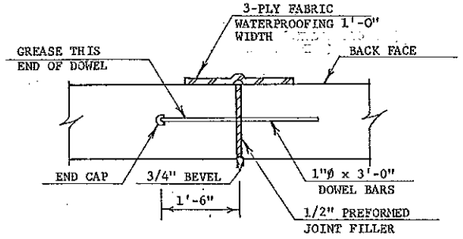
DETAIL "A"



TYPICAL CONTRACTION JOINT DETAIL

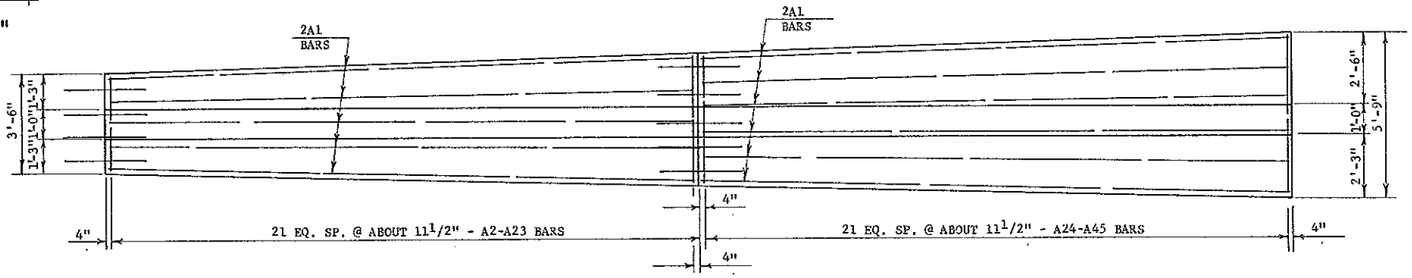
NOTE:

PROVISIONS SHALL BE MADE TO HOLD DOWEL IN A TRUE HORIZONTAL POSITION AND IN A PLANE PARALLEL TO THE FRONT FACE WHILE CONCRETE IS POURED.

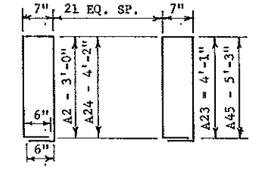


TYPICAL EXPANSION JOINT DETAILS

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
A1	22	5	20'-8"	STR.
A2-A23	1 SET	5	190'-8"	BENT
A24-A45	1 SET	5	242'-0"	BENT
A46	22	5	20'-8"	STR.
A47	4	6	20'-8"	STR.
A48	11	5	5'-7"	BENT
A49	11	5	6'-0"	BENT
A50	11	5	6'-5"	BENT
A51	11	5	7'-1"	BENT
A52-A66	1 SET	4	68'-9"	STR.
A67-A81	1 SET	4	83'-2"	STR.

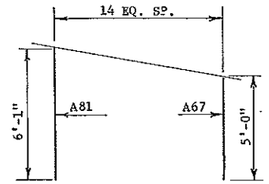


PLAN



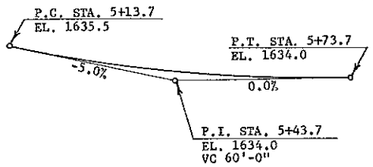
A2-A23 & A24-A45

TOTAL LENGTH OF ONE SET A2-A23 = 190'-8"
TOTAL LENGTH OF ONE SET A24-A45 = 242'-0"

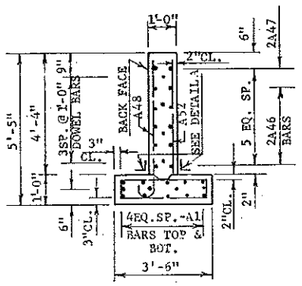


A67-A81

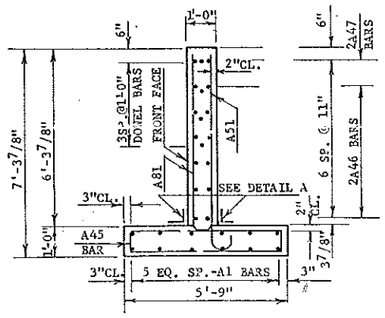
ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 83'-2"



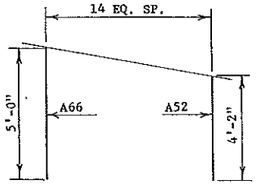
VERTICAL CURVE DATA



A-A

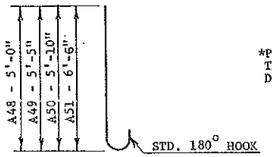


B-B

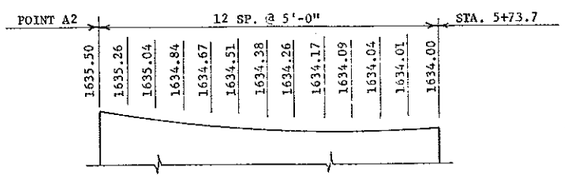


A52-A66

ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 68'-9"



*PLACE DOWEL BARS IN THE WALL THAT IS POURED FIRST. SEE DETAIL



ELEVATIONS TOP OF WALL

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT

QUANTITIES		
CLASS AE-3 CONCRETE	15.4	C.Y.
REINFORCING STEEL	1913	LBS.

6TH AVENUE S.E. UNDERPASS

MANDAN, N.D.

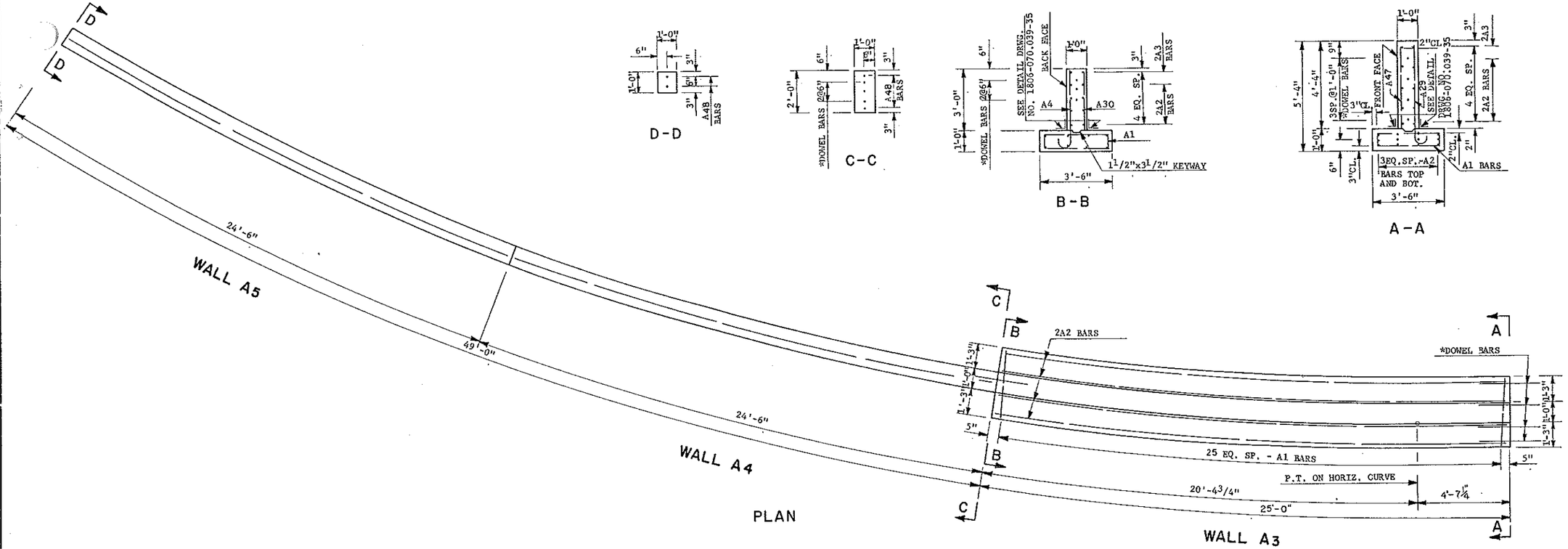
WALL A1 & A2 DETAILS

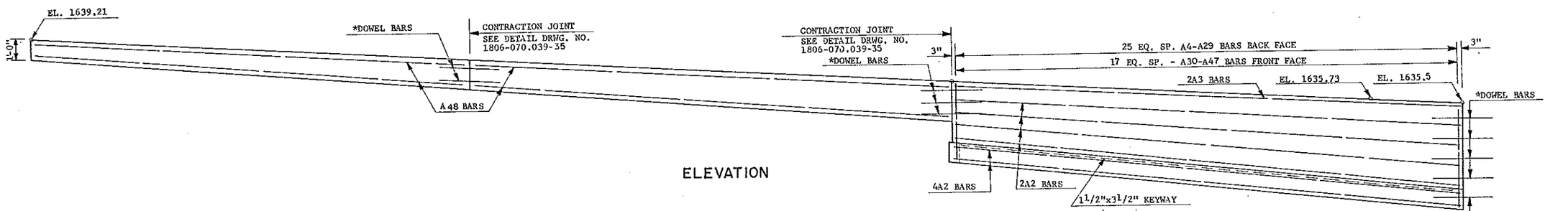
1806-070.039-35

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	

BAR LIST

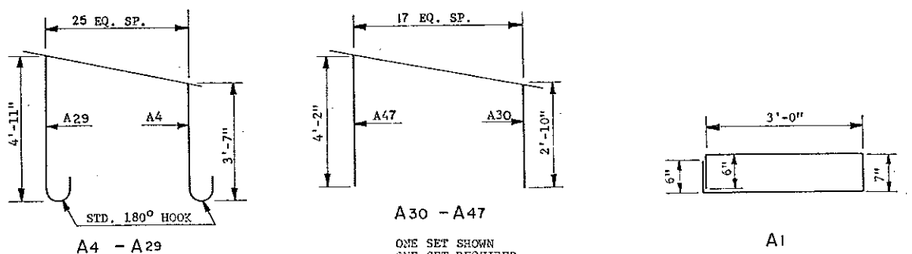
MARK	NO.	SIZE	LENGTH	SHAPE
A1	26	4	7'-7"	BENT
A2	16	4	24'-6"	STR.
A3	2	6	24'-6"	STR.
A4-A29	1 SET	4	123'-6"	BENT
A30-A47	1 SET	4	63'-0"	STR.
A48	4	4	24'-2"	STR.





ELEVATION

*PLACE DOWEL BARS IN THE WALL THAT IS POURED FIRST. SEE DRWG. NO. 1806-070.039-35



BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT

QUANTITIES

CLASS AE-3 CONCRETE	9.3	C.Y.
REINFORCING STEEL	656	LBS.

6TH AVENUE S.E. UNDERPASS

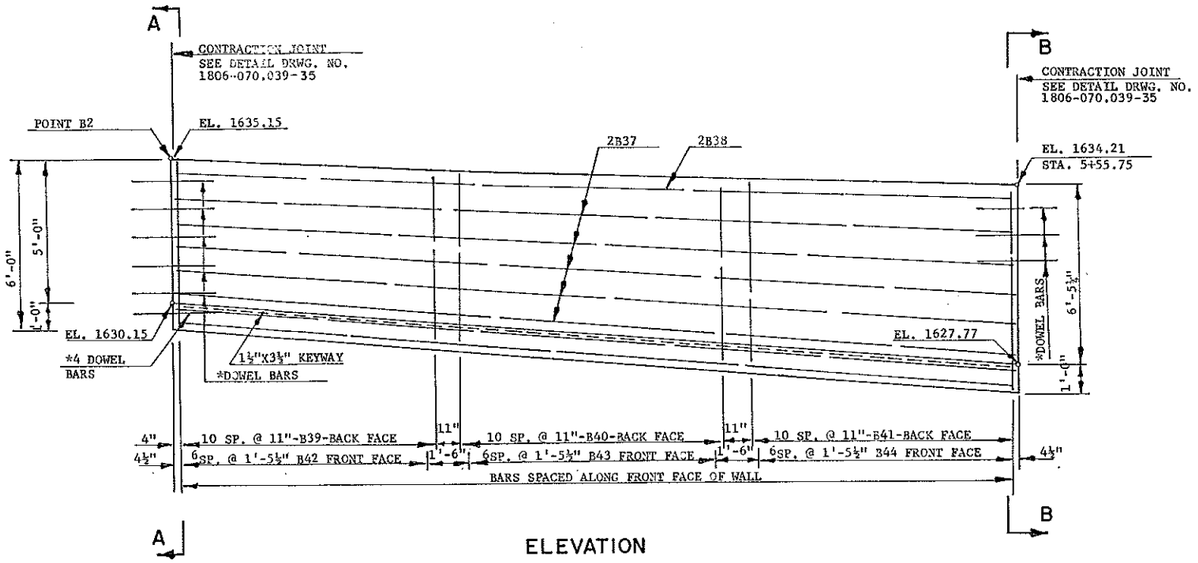
MANDAN, N.D.

WALL A3, A4 & A5

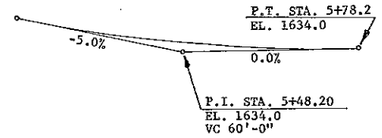
DETAILS

1806-070.039-36

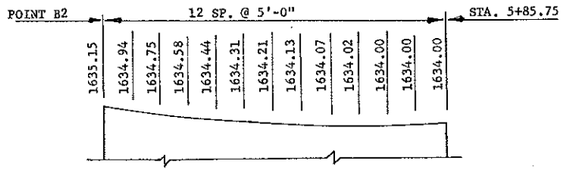
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



ELEVATION



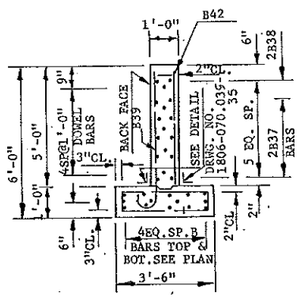
VERTICAL CURVE DATA



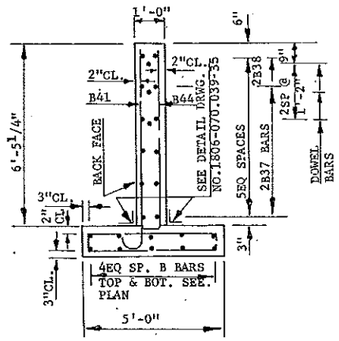
ELEVATIONS TOP OF WALL

BAR LIST				
MARK	NO	SIZE	LENGTH	SHAPE
B1	4	5	29'-3"	STR.
B2	2	5	29'-7"	"
B3	4	5	29'-10"	"
B4-B36	1 SET	5	299'-9"	BENT
B37	10	5	29'-7"	STR.
B38	2	6	29'-7"	"
B39	11	5	6'-2"	BENT
B40	11	5	6'-7"	"
B41	11	5	7'-1"	"
B42	7	4	4'-10"	STR.
B43	7	4	5'-3"	"
B44	7	4	5'-9"	"

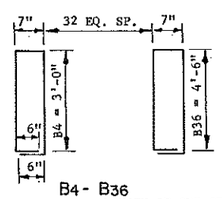
* PLACE DOWEL BARS IN WALL AND FOOTING THAT IS POURED FIRST. SEE DWRG. NO. 1806-070.039-35



A-A

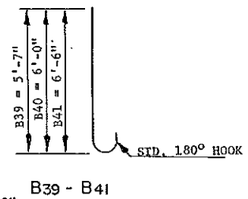


B-B



B4 - B36

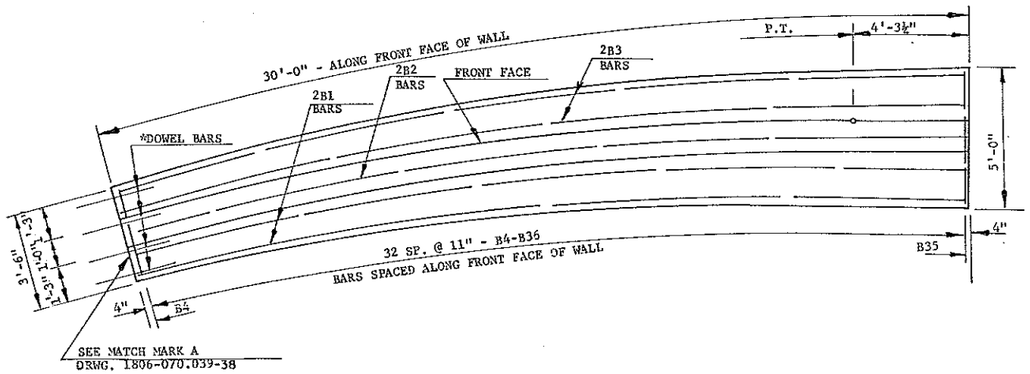
TOTAL LENGTH OF ONE SET = 299'-9"
ONE SET SHOWN
ONE SET REQUIRED



B39 - B41

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT



PLAN

QUANTITIES		
CLASS AE-3 CONCRETE	11.1	C.Y.
REINFORCING STEEL	1320	LBS.

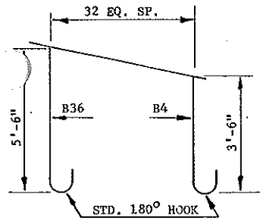
6TH AVENUE S.E. UNDERPASS

MANDAN, N.D.

WALL B1 DETAILS

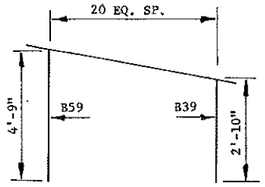
1806-070.039-37

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FC-1-806(015)	



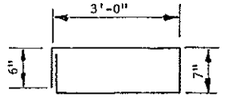
B4 - B36

ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 165'-0"



B 39 - B 59

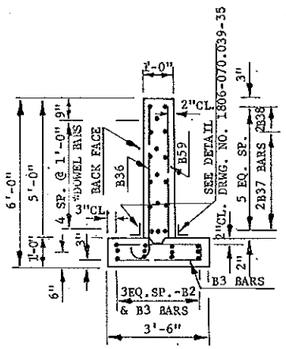
ONE SET SHOWN
ONE SET REQUIRED
TOTAL LENGTH ONE SET = 79'-8"



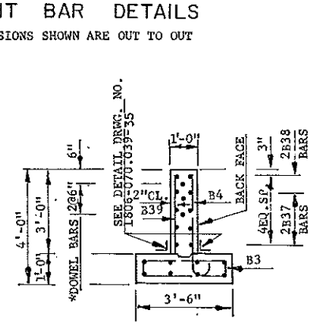
B-3

BENT BAR DETAILS

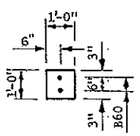
DIMENSIONS SHOWN ARE OUT TO OUT



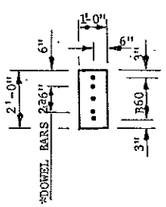
A-A



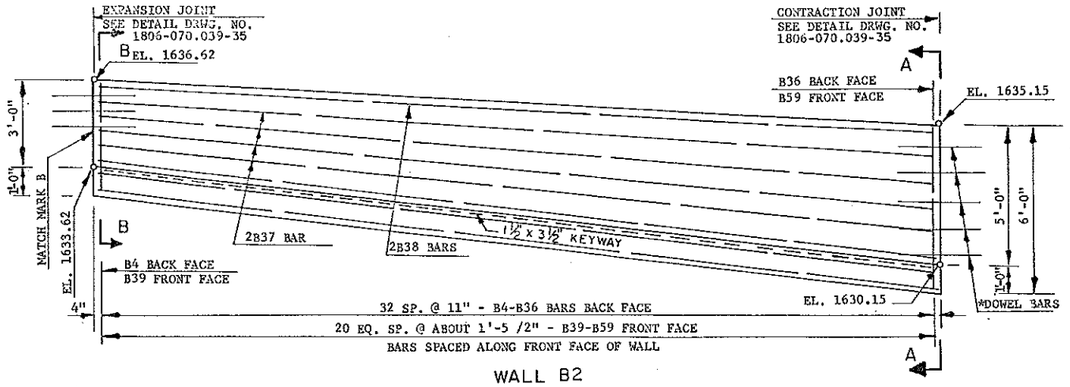
B-B



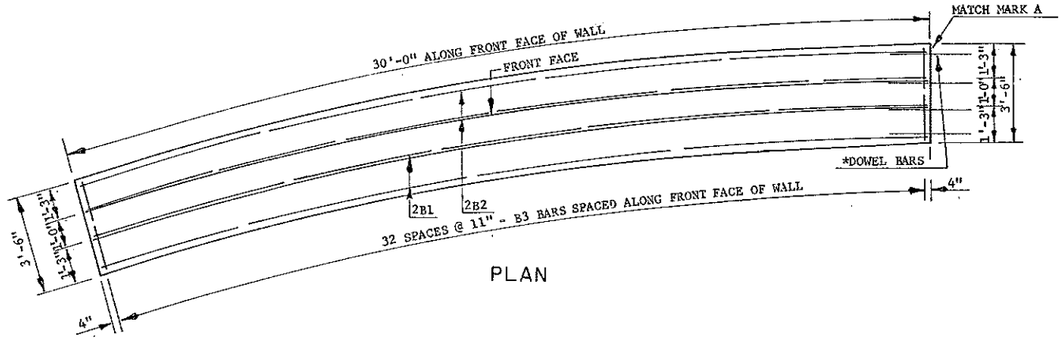
D-D



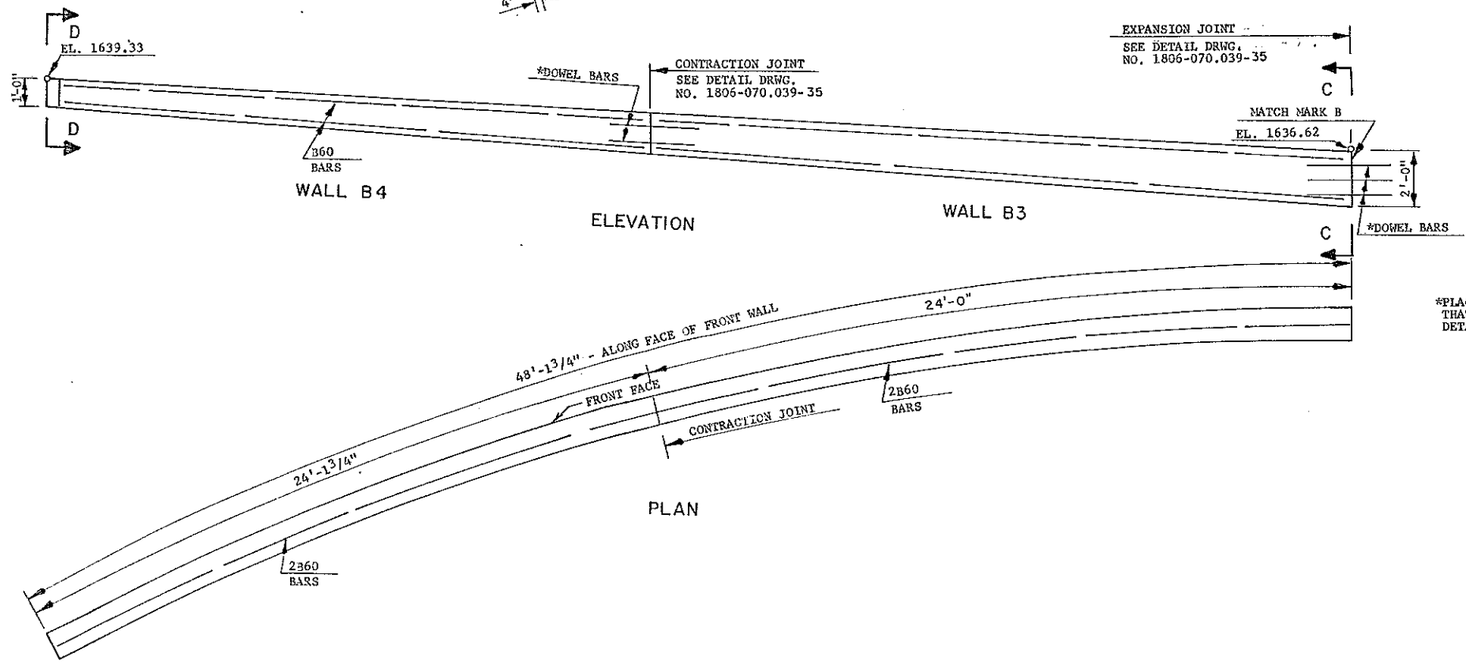
C-C



WALL B2
ELEVATION



PLAN



WALL B4 ELEVATION WALL B3

PLAN

*PLACE DOWEL BARS IN THE WALL THAT IS POURED FIRST. SEE DETAIL DRWG. NO. 1806-070.039-35

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
B1	4	4	29'-2"	STR.
B2	4	4	29'-9"	STR.
B3	33	4	7'-7"	BENT
B4-B36	1 SET	4	165'-0"	BENT
B37	10	4	29'-9"	STR.
B38	2	6	29'-9"	STR.
B39-B59	1 SET	4	79'-8"	STR.
B60	4	4	23'-9"	STR.

QUANTITIES		
CLASS AE-3 CONCRETE	11.0	C.Y.
REINFORCING STEEL	840	LBS.

6TH AVENUE S.E. UNDERPASS

MANDAN, N. D.

WALL B2, B3 & B4

DETAILS

1806-070.039-38

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	

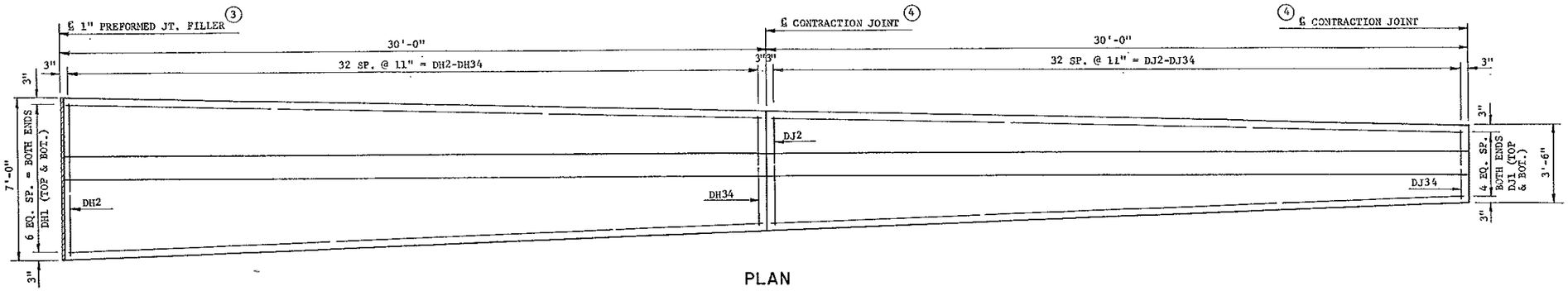
BAR LIST - WALL C1 or D1

MARK	NO.	SIZE	LENGTH	SHAPE
DH1	14	5	29'-8"	STR.
DH2-DH34	1 SET	5	434'-6"	BENT
DH35-DH67	1 SET	5	211'-9"	BENT
DH68-DH88	1 SET	5	106'-9"	STR.

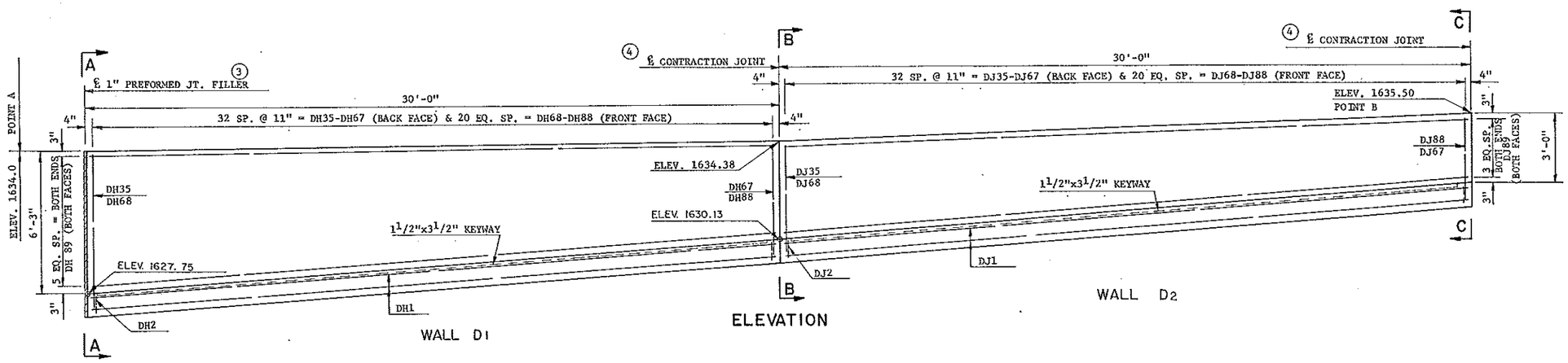
BAR LIST - WALL C2 or D2

MARK	NO.	SIZE	LENGTH	SHAPE
DJ1	10	5	29'-8"	STR.
DJ2-DJ34	1 SET	5	319'-0"	BENT
DJ35-DJ67	1 SET	4	130'-8"	BENT
DJ68-DJ88	1 SET	4	72'-7"	STR.

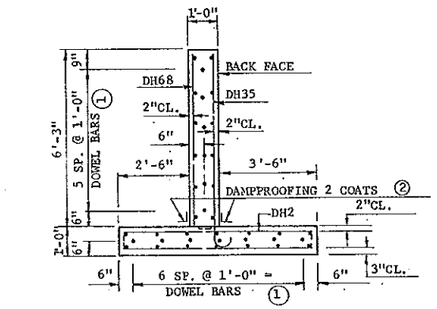
1. PLACE DOWEL BARS IN SECTION POURED FIRST.
2. SEE DETAIL "A" 1806-070.039-35
3. SEE TYPICAL EXPANSION JOINT DETAIL DWG. 1806-070.039-35
4. SEE TYPICAL CONTRACTION JOINT DETAIL DWG. 1806-070.039-35



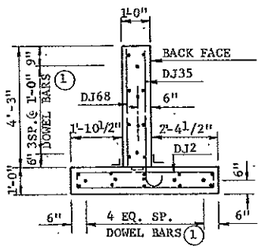
PLAN



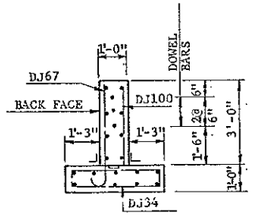
WALL D1 ELEVATION WALL D2



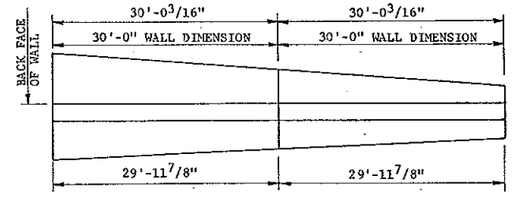
A-A



B-B



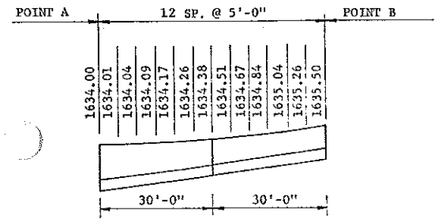
C-C



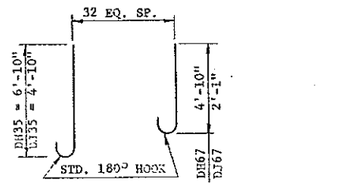
WALL C1 WALL C2

PLAN

WALLS C1, D1 AND C2, D2 ARE SYMMETRICAL EXCEPT AS SHOWN

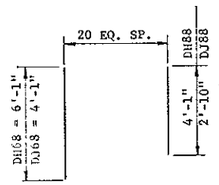


ELEVATIONS TOP OF WALL



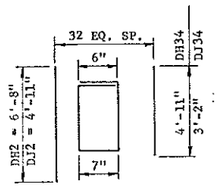
DH35-DH67 & DJ35-DJ67
ONE SET REQUIRED

TOTAL LENGTH ONE SET = DH35-DH67=211'-9"
TOTAL LENGTH ONE SET = DJ35-DJ67 = 130'-8"



DH68-DH88 & DJ68-DJ88
ONE SET REQUIRED

TOTAL LENGTH ONE SET = DH68-DH88 = 106'-9"
TOTAL LENGTH ONE SET = DJ68-DJ88 = 72'-7"



DH2-DH34 & DJ2-DJ34
SETS REQUIRED

TOTAL LENGTH ONE SET = DH2-DH34 = 434'-6"
TOTAL LENGTH ONE SET = DH2-DJ34 = 319'-0"

QUANTITIES (WALL C1 or D1)

CLASS AE-3 CONCRETE	12.6	C.Y.
REINFORCING STEEL	1219	LBS.
EXCAVATION & PILING (SEE QUANTITY LAYOUT)		

QUANTITIES (WALL C2 or D2)

CLASS AE-3 CONCRETE	8.9	C.Y.
REINFORCING STEEL	778	LBS.
EXCAVATION & PILING (SEE QUANTITY LAYOUT)		

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

RETAINING WALL C1, C2, D1 & D2

1806-070.034-39

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	

BAR LIST (WALL D3)

MARK	NO.	SIZE	LENGTH	SHAPE
DK1	2	4	29'-8"	STR.

BAR LIST (WALL C3)

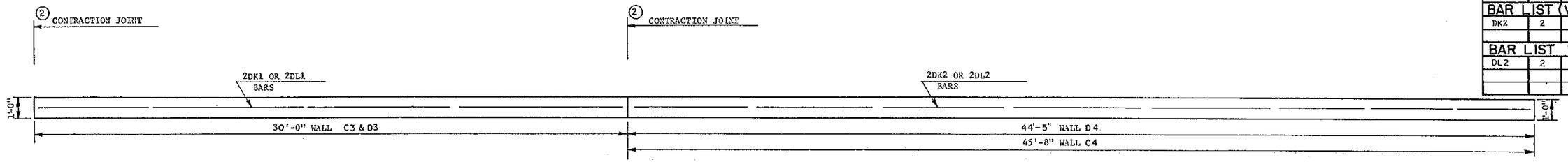
DL1	2	4	29'-8"	STR.

BAR LIST (WALL D4)

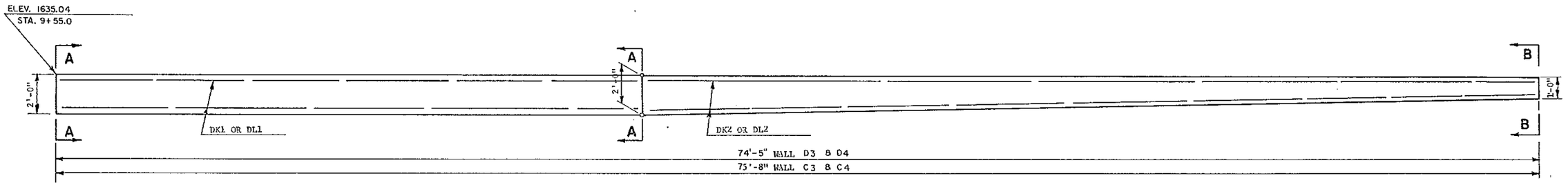
DK2	2	4	44'-1"	STR.

BAR LIST WALL C4)

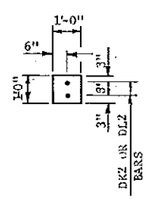
DL2	2	4	45'-4"	STR.



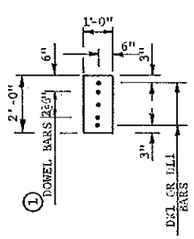
PLAN



ELEVATION



B-B



A-A

(1) PLACE DOWEL BARS IN SECTION POURED FIRST

(2) SEE TYPICAL CONTRACTION JOINT DETAIL DRWG. NO. 1806-070.039-35

QUANTITIES (WALL C3 OR D3)

CLASS AE-3 CONCRETE	2.2	C.Y.
REINFORCING STEEL	40	LBS.
EXCAVATION & FILING (SEE QUANTITY LAYOUT)		

QUANTITIES (WALL D4)

CLASS AE-3 CONCRETE	2.5	C.Y.
REINFORCING STEEL	57	LBS.
EXCAVATION & FILING (SEE QUANTITY LAYOUT)		

QUANTITIES (WALL C4)

CLASS AE-3 CONCRETE	2.5	C.Y.
REINFORCING STEEL	61	LBS.
EXCAVATION & FILING (SEE QUANTITY LAYOUT)		

6TH AVENUE S.E. UNDERPASS

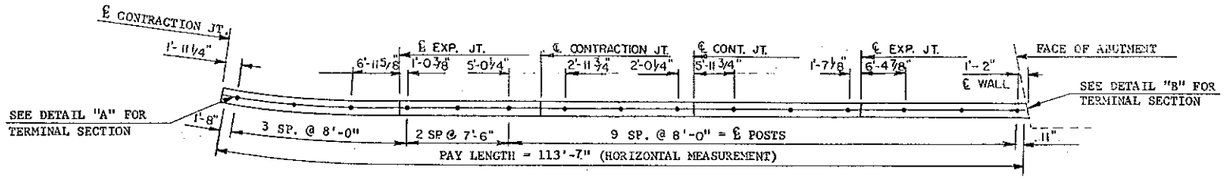
MANDAN, N.D.

RETAINING WALL

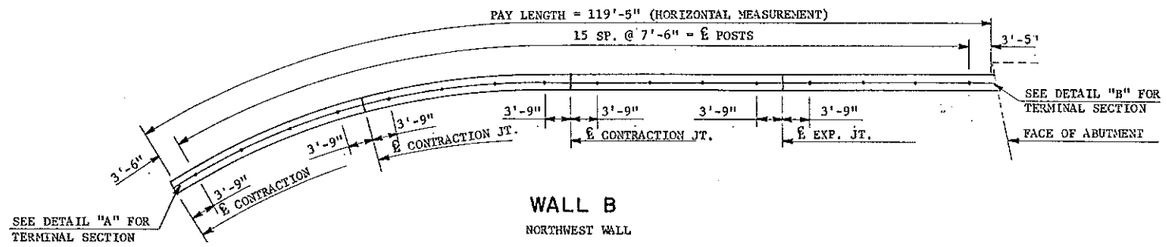
C3, C4, D3, & D4

1806-070.039-40

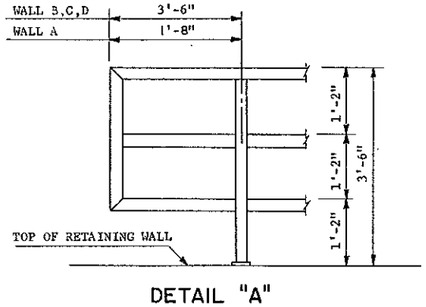
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(015)	



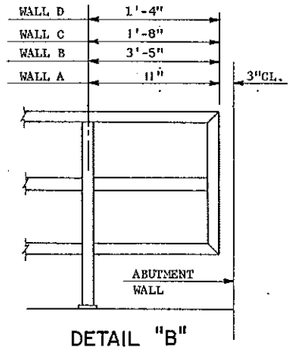
WALL A
NORTHEAST WALL



WALL B
NORTHWEST WALL



DETAIL "A"



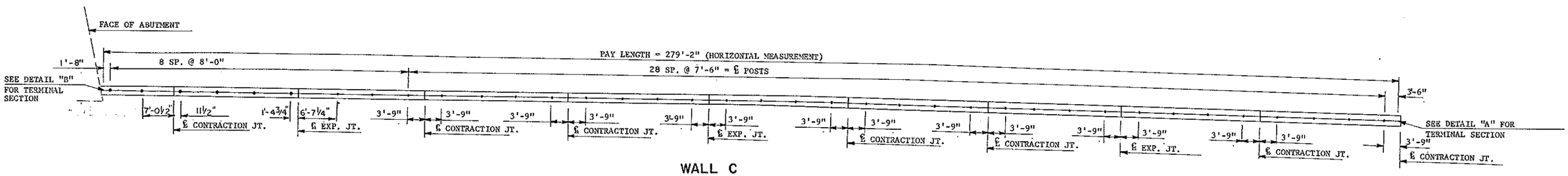
DETAIL "B"

NOTES:

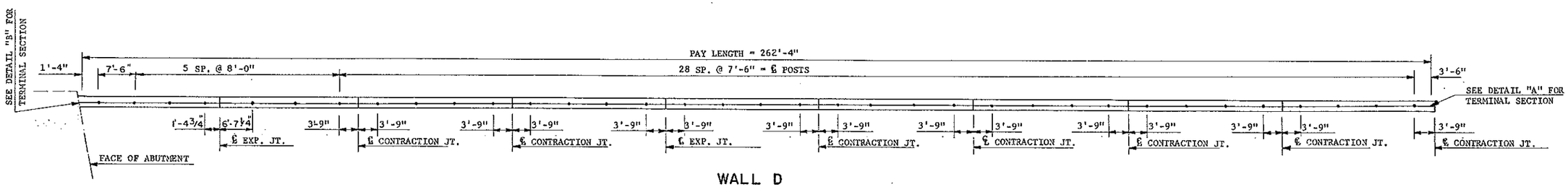
SEE DWG. 1806-070.039-19 FOR ANCHORAGE, WELDING AND FABRICATION DETAILS.

JOINTS IN THE RAILING SHALL BE LOCATED IN EACH SPAN WHERE A CONSTRUCTION JOINT OR AN EXPANSION JOINT OCCURS IN THE RETAINING WALLS. ADDITIONAL JOINTS MAY ALSO BE PROVIDED AT THE OPTION OF THE CONTRACTOR. SEE DETAILS A & B, DWG. 1806-070.039-19 FOR FABRICATION OF DEFLECTION OF JOINTS.

HANDRAIL NOTES FOR SUPERSTRUCTURE RAILING ON DWG. 1806-070.039-19 SHALL APPLY.



WALL C
SOUTHEAST WALL



WALL D
SOUTHWEST WALL

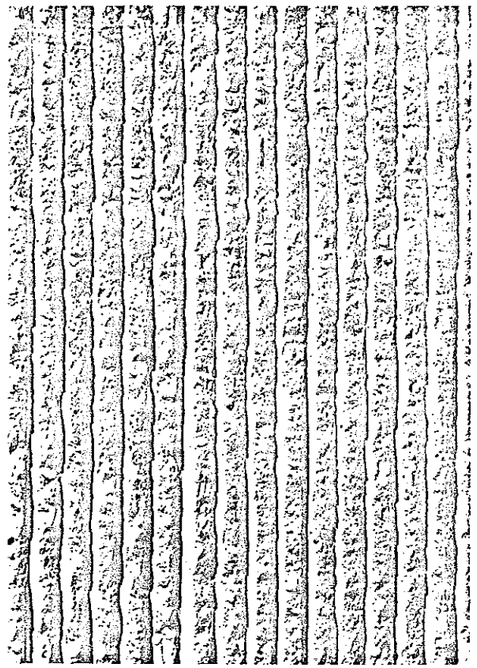
QUANTITIES		
PEDESTRIAN RAIL. (2" SQUARE x 1/4)	775	L.F.

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

PEDESTRIAN RAILING

1806-070.039-41

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	FG-1-806(15)	



fractured fin

SPECIAL SURFACE TREATMENT
(ROADWAY FACE ONLY)

SPECIAL SURFACE TREATMENT:

THIS TREATMENT SHALL CONSIST OF INSTALLING FORM LINERS ON THE EXPOSED ROADWAY FACE OF THE RETAINING WALLS LISTED BELOW. THE LINERS USED SHALL BE INSTALLED TO OBTAIN A VERTICAL ACCENT. THE MATERIAL IN THE LINER SHALL BE DURABLE ENOUGH TO BE USED OVER ABOUT 20 TIMES. THE CONTRACTOR SHALL PROVIDE A SUFFICIENT QUANTITY OF LINERS TO COMPLETE A POUR. THE LARGEST SINGLE POUR IS ABOUT 400 S.F. OF EXPOSED SURFACE AREA. STANDARD MANUFACTURED LENGTHS OF FORM LINER MAY BE USED.

IF THE THICKNESS OF THE FORM LINER IS GREATER THAN 3/4" THE CONCRETE RETAINING WALL THICKNESS WILL HAVE TO BE ADJUSTED TO MAINTAIN MIN. OF 1 1/4" CLEARANCE TO REINFORCING STEEL ON FRONT FACE.

WHERE FORM LINERS ARE USED THE CONTRACTOR WILL NOT BE REQUIRED TO USE ADDITIONAL FINISHING EXCEPT FOR LARGE HONEYCOMB AREAS.

THE LINERS SHOWN ARE SIMILAR TO DESIGNS MANUFACTURED BY THE FOLLOWING SUPPLIERS:

BURKE CONCRETE ACCESSORIES INC.
2655 CAMPUS DRIVE, P.O. BOX 5818
SAN MATEO, CA. 94402 TEL. (415) 349-7600

GREEN STREAK PLASTIC PRODUCTS
BOX 7139, ST. LOUIS, MISSOURI 63177
TEL. (314) 225-9400

SCOTT SYSTEM, INC.
4575 IOLICT STREET, DENVER, COLORADO 80239
TEL. (303) 371-9583

THE COST OF SPECIAL SURFACE TREATMENT LINERS SHALL BE INCLUDED IN THE PRICE BID FOR CLASS AE-3 CONCRETE.

TREATMENT SHALL BE GIVEN TO THE WALLS LISTED BELOW:

WALL A	SEGMENTS 1 AND 2
WALL B	SEGMENTS 1 AND 2
WALL C	SEGMENTS 1, 2, 2A, 3-9
WALL D	SEGMENTS 1-9

6TH AVENUE S.E. UNDERPASS
MANDAN, N.D.

SPECIAL SURFACE TREATMENT

1806 - 070.039-42