26

FED HIGHWAY DIV NO	STATE	FED AID PROJ NO	SHEET
8	N.D.	BRF-I-006(02)066	1

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

PLANS

FOR THE PROPOSED IMPROVEMENT OF A

STATE HIGHWAY

IN MORTON COUNTY

FEDERAL AID PROJECT NO. BRF-I-006(02)066

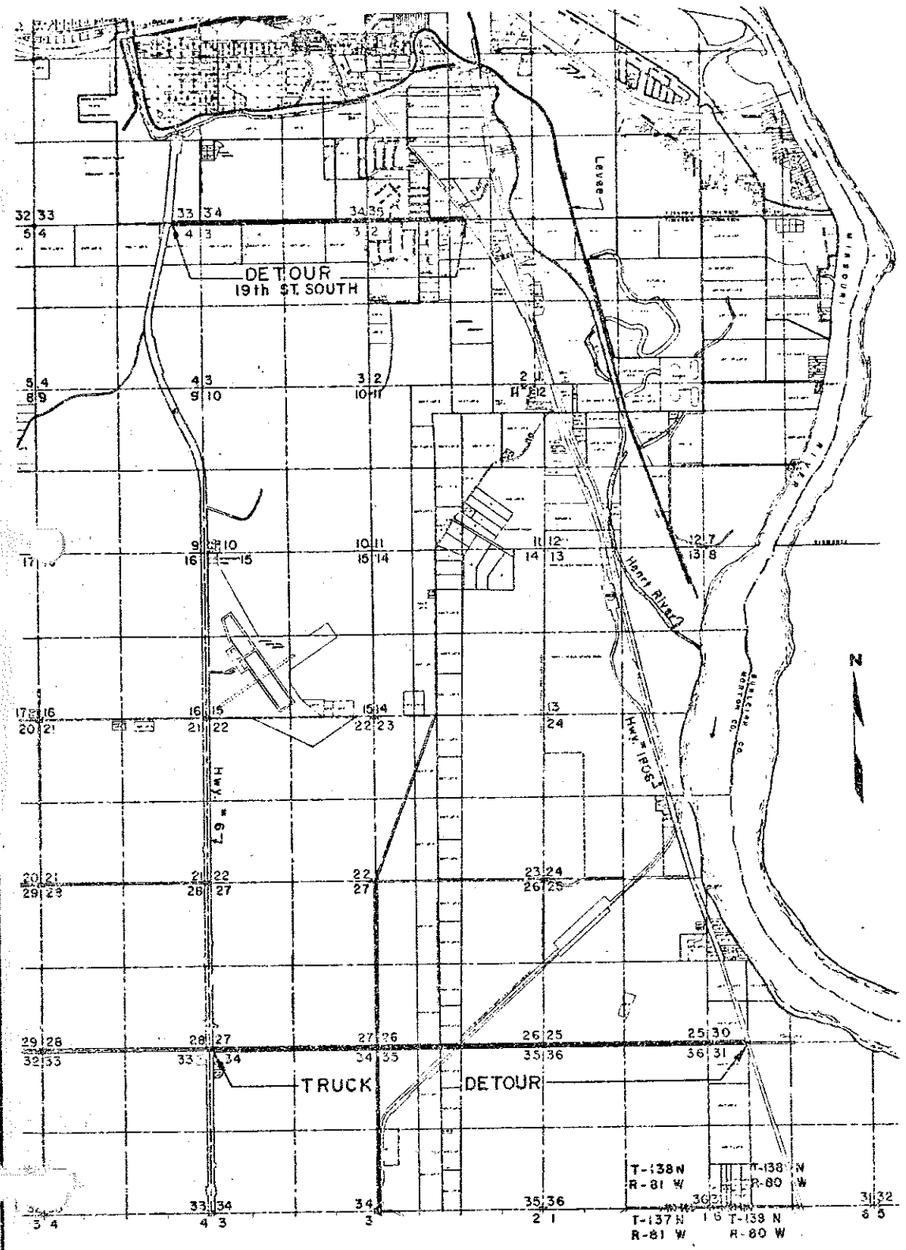
GRADING, SURFACING, STRUCTURE & STRUCTURE REMOVAL

LENGTH OF PROJECT		
PROJECT	MILES-GROSS	MILES-NET
BRF-I-006(02)	0.217	0.217
TOTALS	0.217	0.217

GOVERNING SPECIFICATIONS:

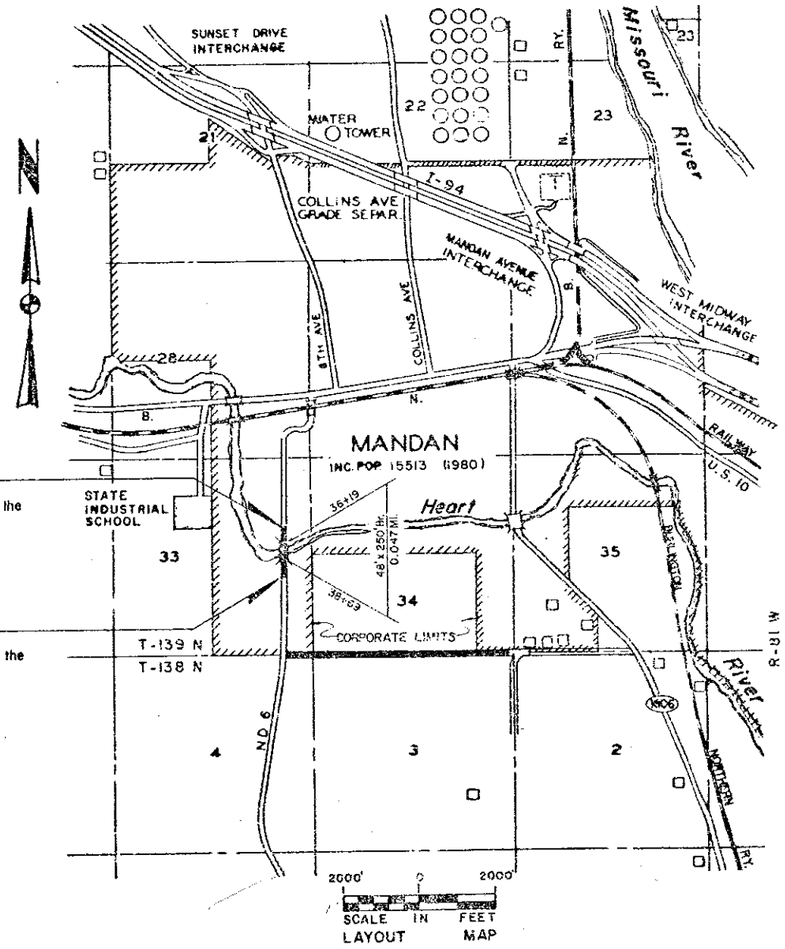
Standard Specifications adopted by the North Dakota State Highway Department, Oct. 1976, and approved by the Federal Highway Administration on December 17, 1976, and Supplemental Specifications thereto adopted July 1, 1983, and approved by the Federal Highway Administration and other Contract Provisions sumitted herewith.

SCALES { LAYOUT SHEET 1 IN = 2000 FT; PLAN AND PROFILE DRAWINGS (HOR. 1 IN = 30 FT, VERT. 1 IN = 5 FT); STRUCTURAL DRAWINGS - AS SHOWN; CROSS SECTION SHEETS - 1 IN = 5 FT.



BEG. BRF-I-006(02)066 STA. 32+00=
STA. 32+00 on F-251(15)
A point 719.62' West & 3383.2' North of the S.E. Cor. Sec. 33, T.139N., R.81W.

END BRF-I-006(02)066 STA. 43+50
STA. 43+50 on F-251(15)
A point 810.8' West & 2236.7' North of the S.E. Cor. Sec. 33, T.139N., R.81W.



DESIGN DATA

TRAFFIC	AVERAGE DAILY			EST. 30TH MAX. HR
CURRENT TRAFFIC (1983) 2275	PASS. 325	TRUCKS 2600	TOTAL	260
TRAFFIC FORECAST (2003) 5350	PASS. 650	TRUCKS 6000	TOTAL	600
DESIGN SPEED		40 MPH		
TRAFFIC CLASSIFICATION		M		
MINIMUM SIGHT DISTANCE (STOPPING)		275'		
MINIMUM SIGHT DISTANCE (SAFE PASSING)		5200'		
MINIMUM PASSING SIGHT DISTANCE FOR MARKING		1200'		

BRIDGE

STA	CLEAR RDWY WIDTH	DESIGN LOADING
37+44	40'+8' Sidewalk	HS 20

APPROVED DATE

CHIEF ENGINEER
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

13

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED

DIVISION ENGINEER DATE

BRF-I-006(02)066

TABLE OF CONTENTS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	2

GENERAL NOTES

100 011 GENERAL: The engineer will attend to the removal of existing fences to the highway right of way line and to the relocation or adjustment of utility facilities as shown on the plans. Equipment shall work around utility poles, within the area, that are not to be disturbed.

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

100 050 PROJECT ENGINEER RESPONSIBILITY:

(a) USC & G Bench Mark
As soon as it has been determined that a bench mark must be moved, consult your Construction Survey Manual (Sec. 150-4.9), for the proper steps needed to preserve the bench mark.

(b) All section corners must be monumented and a corner recordation form must be filed with the County Register of Deeds. See Appendix G of the Preliminary Survey Manual for instructions on how to fill out the form.

100 060 DETOURS: The contractor shall maintain the streets used as detours (streets to be designated by the engineer) and repair areas damaged by the detoured traffic. Upon completion of the project, the contractor shall restore the streets to a condition at least equal to that which existed at the time traffic was routed over them. Work shall be as deemed necessary by the engineer. The repair and maintenance of the detours will be paid for in accordance with SP-532 "Haul Road Maintenance." Necessary route markers will be furnished by the State Highway Department and erected and maintained by the contractor as an incidental item.

100 068 CONCRETE PROTECTION: Adjacent concrete shall be protected during the application of all bituminous and asphalt materials to prevent any discoloration of the concrete. Failure to comply will result in the contractor having to clean the concrete at his own expense.

100 120 Excavate, if necessary, where the new surfacing meets existing pavement, bridge ends, or railroad crossings to allow placement of the full depth of the surfacing course. The excavation is not a pay item but shall be considered incidental to other items.

100 130 TREES, SHRUBS, AND NATIVE GRASSES: The contractor shall exercise care in his construction operations to ensure that trees, shrubs, and native grasses within the right of way and outside the construction area are disturbed as little as possible.

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

100 140 HISTORICAL INFORMATION: If any scientific or historical information is encountered after construction is in progress, the Highway Department will immediately notify the Historical Society, and efforts will be made to protect the material until it has been examined by an archaeologist from the Historical Society. If future activities should result in the discovery of any cultural resources that are eligible for inclusion in the National Register of Historical Places, this will require compliance with Section 106 of the National Historic Preservation Act of 1966 and the Advisory Council on Historic Preservation "Procedures for the Protection of Historic and Cultural Properties" (36, CRF, Part 800).

100 160 UTILITY POLES: Equipment shall work around utility poles within the construction area that are not to be disturbed.

100 161 POLE LINES: Pole lines (power, telephone, etc.) interfering with construction of this project shall be removed or relocated by the utility companies.

200 010 SHRINKAGE: 25 percent additional volume in yardage computed by the end area method is allowed for shrinkage in earth embankment.

200 021 COMPACTION AND DENSITY CONTROL: Compaction and density controls shall be in accordance with Section 203-2.3.3 of the Standard Specifications, except that, if the subgrade is unstable (as evidenced by sponginess or rutting) when compacted to the required density, it will be necessary to dry the soils to obtain adequate stability. This may require drying below optimum moisture. The cost of such drying will be incidental to the price bid for "Common Excavation" (and/or "Borrow," if used).

200 290 INTERCEPTING DITCH: Intercepting ditches shall be constructed wherever considered necessary by the engineer.

200 250 WASTE EXCAVATION DISPOSAL: Disposal sites selected by the contractor shall be approved by the engineer. Disposal in wetland areas will not be approved.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRS-1-006(02)066	4

GENERAL NOTES

300 020 AGGREGATE BASE COURSE: The Class 11 material (clay binder) shall be weighed and paid for by the ton prior to blending this material with the aggregate base material at the plant site. No deduction in weight will be made for the Class 11 material at the time of weighing the aggregate base (Class 8) material for payment. The Class 11 material can be omitted by the Engineer if not required.

400 010 PRIME, FOG, OR TACK COAT: When directed by the engineer, emulsified asphalt for prime, fog, or tack coat shall be diluted with water prior to application in a 50-50 ratio or other approved proportions. Cost of water shall be included in the price bid for "Emulsified Asphalt for Prime, Fog, or Tack Coat."

400 028 HOT BITUMINOUS PAVEMENT: The contractor's operations shall be such that no segregation of the aggregate or hot mixed materials will occur. Any hot mix placed on road which has segregated shall be removed and replaced, with approved material, at the contractor's expense.

400 040 HOT BITUMINOUS PAVEMENT: The temperature of the mix at laydown shall not be less than 225°F, if the air temperature is above 60°F, and shall not be less than 240°F if the air temperature is below 60°F. The actual mixing temperature shall be adjusted as directed by the engineer within the allowable limitations to best suit construction conditions.

400 070 DIMENSIONS: Thicknesses shown on the typical sections for surfacing are approximate. It is intended that the plan tonnages provided for by the basis of estimate will be used uniformly throughout the project unless otherwise authorized by the engineer.

400 120 COMPACTION OF HOT BITUMINOUS PAVEMENT: The compaction equipment for mainline paving shall include not less than one approved steel roller or approved vibratory roller and one approved pneumatic tired roller. The specified density shall be obtained before the mat temperature drops below 170°F. The maximum speed of vibratory roller in the vibratory mode shall be 3 mph. The speed of nonvibratory rollers and vibratory rollers in the static mode shall not exceed 4 mph during initial and intermediate rolling prior to obtaining the required density.

406 014 BITUMINOUS PAVEMENT SLOUGHS: Bituminous pavement sloughs shall be compacted with rollers capable of providing a smooth finished compacted slough that is free of tire marks and uneveness or dropoff. No density tests will be required.

406 016 HOT BITUMINOUS PAVEMENT: The moisture of the hot bituminous pavement mixture shall not exceed 2 percent.

708 030 CLASS OF CONCRETE: The class of concrete used in the curb and gutter, sidewalks, and driveways shall be Class AE. The contractor shall have the option of using aggregate, Size No. 1, 3, 4, or 5 as defined in Section 806-2 of the Standard Specifications.

756 010 FIELD LABORATORY: If deemed unnecessary by the engineer in the field, the item "Field Laboratory" shall be delted.

CURB ENDS: Where the new curb and gutter ends, the end four (4) feet of the curb shall be tapered from 10" in height to 0". A 1/2" premolded expansion joint which is full depth and the same shape as the curb and gutter shall be installed just ahead of the taper. An 18" tie bar shall be installed across the joint.

TOPSOIL: 4" of topsoil shall be placed on all areas to be seeded or sodded.

REMOVE 4 CABLE GUARDRAIL AND POSTS: The lengths of 4 cable guardrail shown on the plan to be removed shall have the cable, posts, and end anchors removed. The removed cable, posts, and hardware shall be stockpiled on the right of way in the location designated by the engineer. The stockpiled material shall remain the property of the state. If, in the opinion of the engineer, the concrete end anchors and anchor rod will not interfere with the construction, they may be cut off 1' (one foot) below ground line and surface restored to match the surrounding area. Cost of removing and stockpiling the 4 cable guardrail, posts, and hardware shall be included in the price bid for item; "Remove 4 Cable Guardrail and Posts."

WORK SCHEDULE: The North Dakota State Game and Fish Department (G&F) will monitor the stream to determine water quality conditions both prior to and during construction. The purpose of the monitoring is to determine the effect that construction activities will have on fish spawning. The Contractor must give the Department a minimum of 21 days notice prior to commencing construction. The Department will inform the G&F Department so they can commence monitoring activities. The Contractor will not perform any construction activities that will affect the stream during this 21 day period.

EXISTING SURFACING: The contractor shall have the option of salvaging the existing surfacing for his own use. Should the contractor salvage the existing surfacing and the dirt run is short, he shall replace this material with an equal amount of excavation at his own expense.

FHWA REGION	STATE	FED. AID PROJ NO	SHEET NO
8	N.D.	BRF-1-006(02)066	5

GENERAL NOTES

If the contractor desires to haul across bridge, he will be limited to 60 Ton Gross vehicle with maximum of 30 ton on single axle. Single vehicle on the structure at one time. Approaches maintained to avoid bouncing of vehicle going onto the bridge. Concrete shall obtain a strength of 4000 psi before use.

LOAD LIMITATIONS: The city of Mandan will be posting 19th Street South to limit the vehicular weight thereon, to a maximum of 12,000 pounds per axle (No. 2 Load Restriction).

SEEDING: The following seed mixture will be used on this project.

Percent Pure Live Seed by Weight	Species	Minimum Percent Pure Live Seed (PLS)
32	Western Wheatgrass (Rosanna)	70
26	Thickspike Wheatgrass (Critana)	80
18	Green Needlegrass (Lodorm)	70
14	Little Bluestem (Blaze)	60
10	Switchgrass (NDG-98)	75

The amount of pure live seed to be applied per acre shall be 18 pounds.

SPECIAL PROVISIONS

SEQ. NO.	NAME	SP NO.
272	Fuel Cost Adjustment	SP 272
512	Bidding Requirements and Conditions	SP 102-18
532	Haul Road Maintenance	
000	Training Special Provision	

BASIS OF ESTIMATE

WATER FOR COMPACTION: 10 Gal. per C.Y. of Embankment.
20 Gal. per Ton of Aggregate Base Coarse

SEEDING: Entire right of way except roadbed, sidewalk, and sodded areas.

AGGREGATE BASE COARSE: Class 8 = 1.5 Ton/C.Y. +25%
Class 11 = 10% of Class 8

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	6

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	TOTAL
103	0100	Contract Bond	L. Sum	1
202	0105	Removal of Structure	L. Sum	1
203	0101	Common Excavation - Type A	Cu. Yd.	17,828
204	0100	Average Haul (not a pay item)	Cu. Yd. Sta.	6,711 2.67
208	0100	Class 1 Excavation	Cu. Yd.	180
208	0110	Class 2 Excavation	Cu. Yd.	300
208	0120	Class 3 Excavation	Cu. Yd.	5,820
208	0200	Foundation Preparation	L. Sum	1
216	0100	Water	M. Gal.	84
228	0100	Select Backfill	Cu. Yd.	450
302	0135	Aggregate Base Course Cl. 8	Ton	60
302	0150	Aggregate Base Course Cl. 11	Ton	6
401	0152	SS-1h or CSS-1h Emulsified Asphalt	Gal.	1,095
406	0185	Hot Bituminous Pavement Class 24	Ton	1,984
406	0320	120-150 Asphalt Cement	Ton	143
602	0130	Class AAE-3 Concrete	Cu. Yd.	552.3
602	1110	Class AE-1 Concrete	Cu. Yd.	331.1
602	7000	Special Surface Finish	Sq. Ft.	4,220
612	0115	Reinforcing Steel - Grade 60	Lb.	83,908
612	0116	Reinforcing Steel - Grade 60 (Epoxy Coated)	Lb.	72,575
616	5890	Structural Steel	L. Sum	1
622	0020	Steel Piling HP 10 x 42	L. Ft.	840
622	0040	Steel Piling HP 12 x 53	L. Ft.	1,350

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	7

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	TOTAL
622	0393	Steel Test Piling HP 10 x 42	L. Ft.	160
622	1200	Steel Test Piling HP 12 x 53	L. Ft.	110
624	0124	Pedestrian Fence	L. Ft.	329
630	0085	24 In. Corrugated Steel Pipe .064 in.	L. Ft.	52
630	0485	24 In. Corr. Steel End Section .064 in.	Ea.	2
702	0130	Loose Rock Riprap	Cu. Yd.	2,100
703	0100	Aggregate Cushion	Cu. Yd.	520
705	0100	Mobilization	L. Sum	1
708	0098	Curb Transition	Ea.	2
708	0301	Curb & Gutter Type I (Sec. B)	L. Ft.	90
712	0100	Concrete Sidewalk	Sq. Yd.	57
720	0110	Right of Way Markers	Ea.	7
722	0118	Box Beam Guardrail	L. Ft.	183
722	0600	Box Beam Guardrail - Flared End Treatment & Transition	Ea.	2
722	2040	Remove 4-Cable Guardrail & Posts	L. Ft.	60
726	0241	Seeding, Type C, Class V	Acre	4
726	0244	Seeding, Type C, Class VII	Acre	4
728	0100	Sodding	Sq. Yd.	2,376
*743	0102	Pvmt. Mkg. Drop on Beads - Type II (Line)	L. Ft.	2,878
746	0100	Flagging	M. Hr.	100
750	0100	Linseed Oil Treatment	Gal.	28
*754	0116	Flat Sheet for Signs-Type II Refl. Shtng.	Sq. Ft.	10
*754	0117	Flat Sheet for Signs-Type III & IV Refl. Sht.	Sq. Ft.	5

* Not a pay item. To be done by state forces.

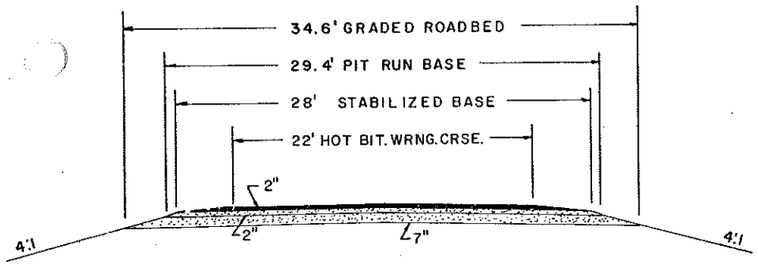
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	8

SUMMARY OF QUANTITIES

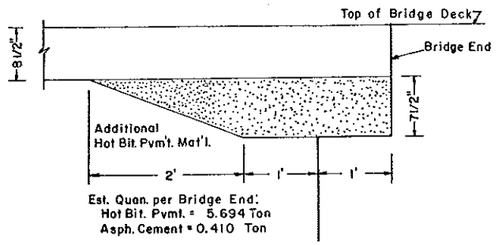
SPEC	CODE	ITEM DESCRIPTION	UNIT	TOTAL
756	0100	Field Laboratory - Type A	Ea.	1
762	3298	Traffic Control	L. Sum	1
772	0100	Wood Excelsior Fibermat	S.Y.	3,000
900	3000	Bridge Bench Marks	Set	1
900	8505	Trainee	M.Hr.	1,000

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)	

TYPICAL SECTIONS & DETAILS



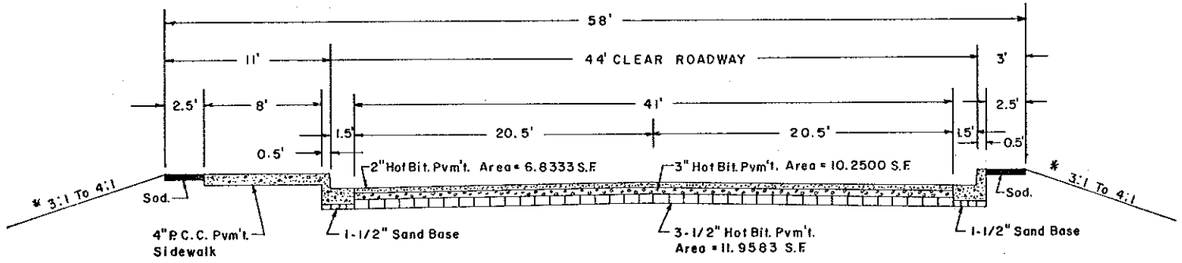
EXISTING TYPICAL SECTION HWY. #6



BITUMINOUS SURFACING DETAIL
AT BRIDGE ENDS

CURB & GUTTER SECTION		50' GRADED SECTION		BASIS OF ESTIMATE			
QUANTITY PER STA.	WIDTH	QUANTITY PER STA.	WIDTH	QUANTITY PER S.Y.	DEPTH	UNIT	DESCRIPTION
0.473		0.473				"M" GAL.	Water for Dust Palliative 25 "M" Gal./ Mi.
88.58	41	105.43	47.6	0.19444	3 1/2"	TON	Hot Bituminous Pavement (Base Course) @ 2.0 Ton / C.Y. Class 24
6.38		7.59		0.01400		TON	120-150 Asphalt Cement for Hot Bit. Pavement @ 7.2 % Hot Bit.
22.78	41	26.44	47.6	0.05		GAL.	SS-1H or CSS-1H Emuls. Asphalt for Tack Coat @ 0.05 Gal./S.Y.
75.92	41	86.11	45.4	0.16667	3"	TON	Hot Bituminous Pvmt(Base Crse.)@2.0 Ton/C.Y. Class 24
5.47		6.20		0.01200		TON	120-150 Asphalt Cement for Hot Bit. Pvm't. @ 7.2% Hot Bit. Pvm't.
22.78	41	25.22	45.4	0.05		GAL.	SS-1H or CSS-1H Asphalt for Tack Coat @ 0.05 Gal./S.Y.
50.62	41	55.18	44.0	0.11111	2"	TON	Hot Bit. Pavement (Surf. Crse.) @ 2.0 Ton/C.Y. Class 24
3.64		3.97		0.00800		TON	120-150 Asphalt Cement for Hot Bit. Pvm't. @ 7.2 % of Hot Bit. Pvm't.
				0.200		GAL.	SS-1H or CSS-1H Emuls Asph. for Dust Control a 0.20 Gal./S.Y. +

+ For detour west of Highway 1806 approx. 1/4 Mile (South 19th. Street)



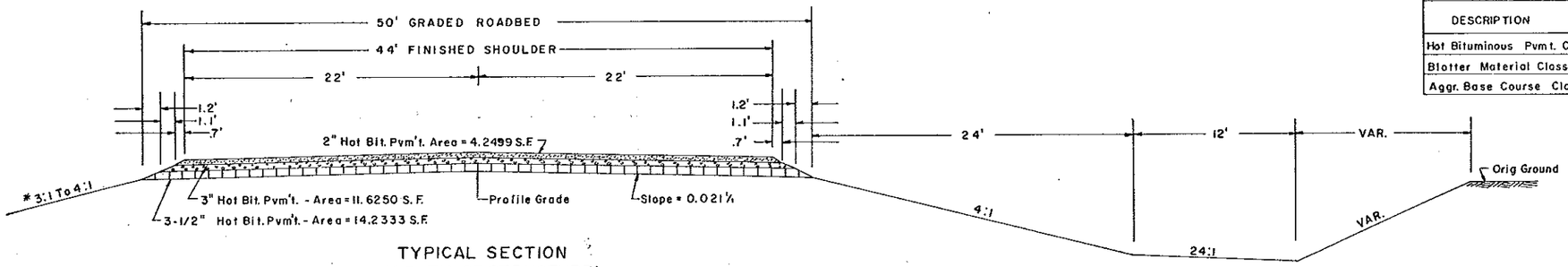
TYPICAL SECTION
(NORTH OF STRUCTURE)

* SEE CROSS SECTIONS

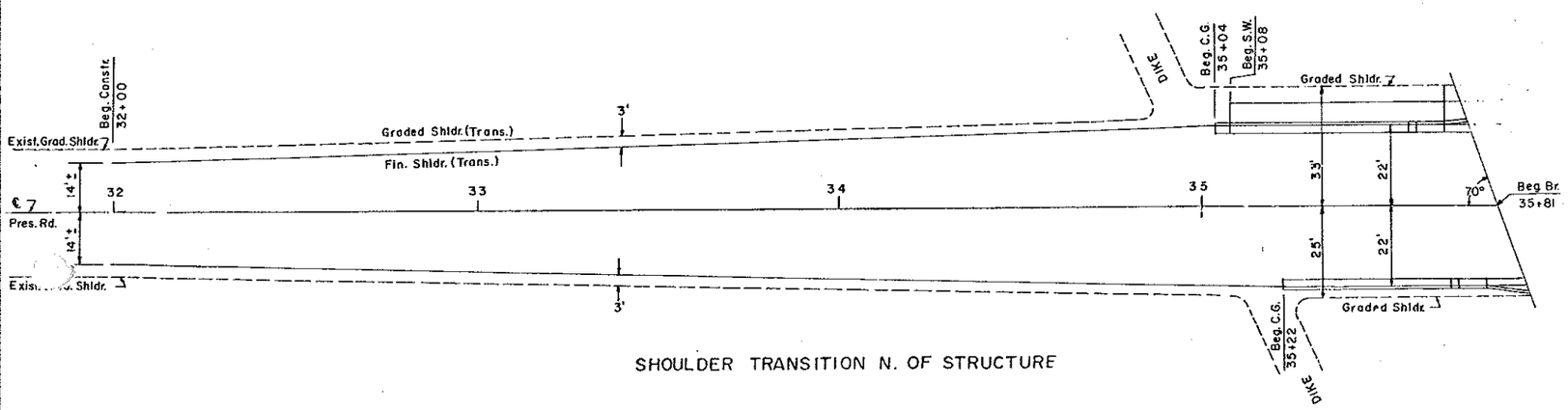
ESTIMATE OF QUANTITIES

SPEC. NO.	216	406		401
CODE NO.	0120	0185	0320	0152
DESCRIPTION	WATER	HOT BIT. PVMT. CL. 24	120-150 ASPH. CEMENT	SS-1H or CSS-1H EMULS. ASPH FOR TACK COAT
	"M" Gal.	Ton	Ton	Gal.
32+00 To 35+22 (Trans.)	1.5	659.9	47.5	138.0
35+22 To 35+81	0.3	126.9	9.1	26.9
38+96 To 40+60	0.8	390.9	28.1	82.5
40+60 To 42+70	1.0	515.2	37.1	108.0
42+70 To 43+50(Trans.)	0.4	163.7	11.8	34.2
P.O. Appr.		31.8	2.3	9.0
Add'l. Matl. for Bridge Ends		11.4	0.8	
Detour (South 19th. St.			/	66.7
Add'l. Matl. Btwn. Asph. Sidewalk & M.L.	0.8	53.8	3.9	15.5
38+88 To 40+51 Sidewalk	0.8	30.8	2.2	13.8
GRAND TOTAL	5.6	1984.4	142.8	494.6

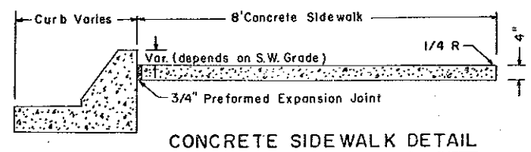
MAXIMUM SIZE OF AGGREGATE		
DESCRIPTION	TYPE OF AGGREGATE	MAXIMUM SIZE
Hot Bituminous Pvmt. Cl. 24	Crushed	3/4"
Blotter Material Class 44	Screened	5/8"
Aggr. Base Course Class 8	Crushed	3/4"



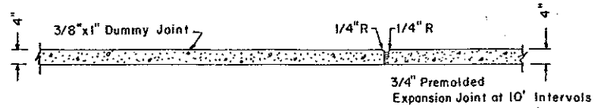
TYPICAL SECTION
(SOUTH OF STRUCTURE)



SHOULDER TRANSITION N. OF STRUCTURE

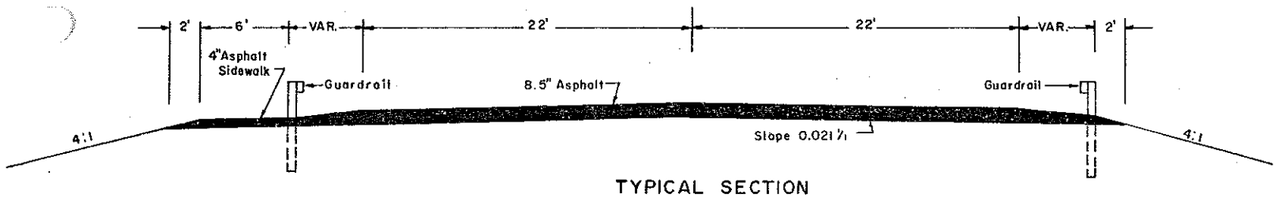


CONCRETE SIDEWALK DETAIL



LONGITUDINAL SIDEWALK DETAIL

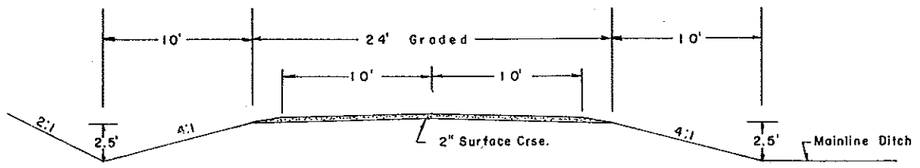
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-i-006(02)	



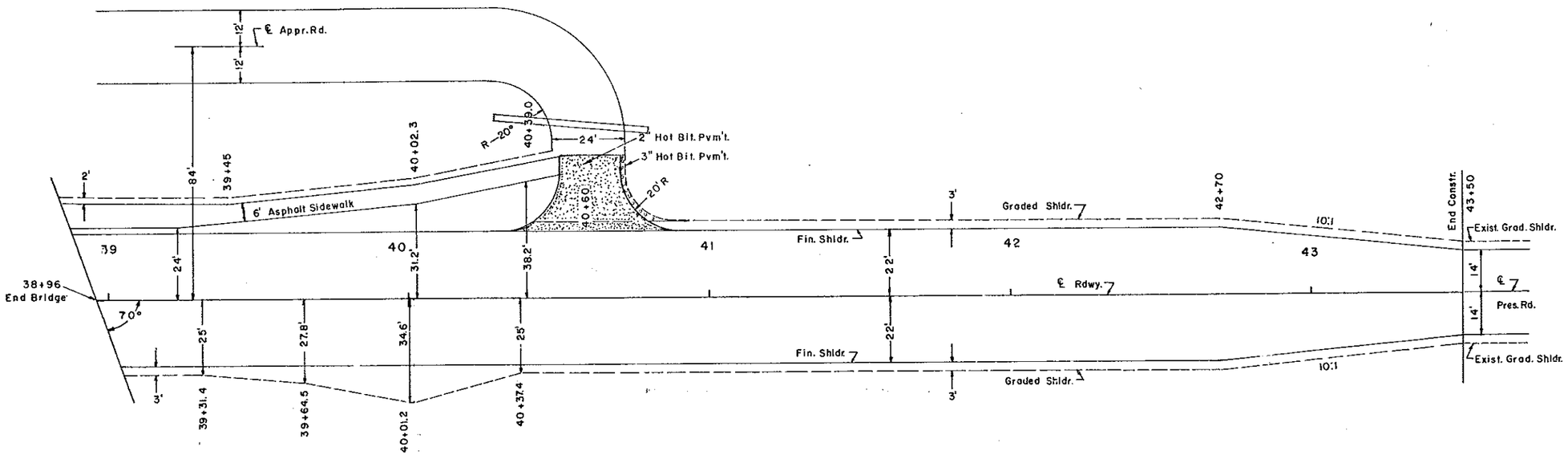
TYPICAL SECTION

38+96 to 40+39 Lt.

38+96 to 40+01.2 Rt.

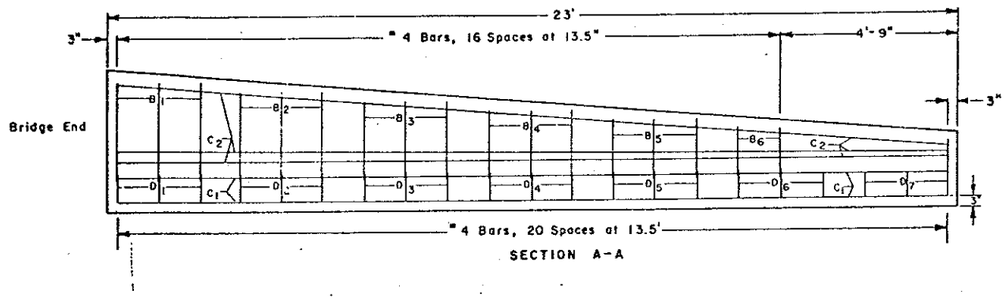


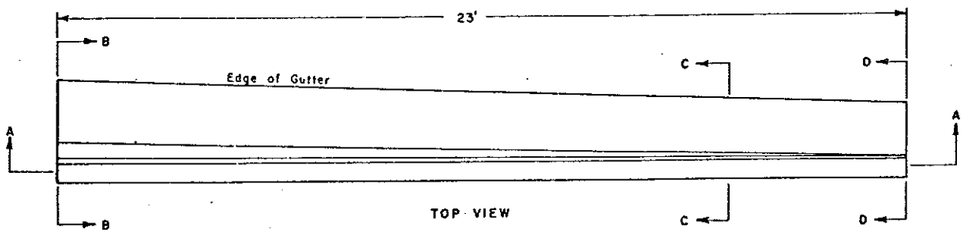
TYPICAL SECTION
APPR. ROAD

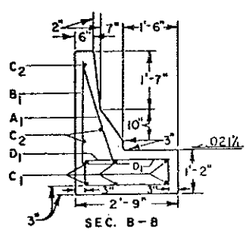


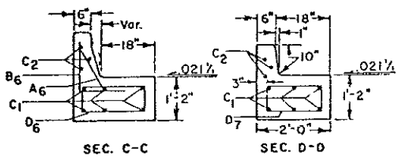
SOUTH END OF STRUCTURE

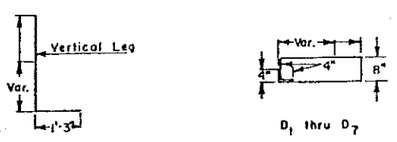
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-I-006(02)	











BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST				
MARK	QUANTITY	SIZE	LENGTH	SHAPE
A_1	3	4	2'-7"	Str.
A_2	3	4	2'-4"	Str.
A_3	3	4	2'-1"	Str.
A_4	3	4	1'-10"	Str.
A_5	3	4	1'-7"	Str.
A_6	2	4	1'-4"	Str.
B_1	3	4	3'-10"	Bent
B_2	3	4	3'-7"	Bent
B_3	3	4	3'-4"	Bent.
B_4	3	4	3'-1"	Bent.
B_5	3	4	2'-10"	Bent
B_6	2	4	2'-7"	Bent
C_1	6	4	22'-6"	Str.
C_2	3	4	22'-7"	Str.
D_1	3	4	6'-5"	Bent
D_2	3	4	6'-2"	Bent
D_3	3	4	6'-0"	Bent
D_4	3	4	5'-9"	Bent
D_5	3	4	5'-6"	Bent
D_6	3	4	5'-4"	Bent
D_7	3	4	5'-1"	Bent

Note: Curb Transitions as shown on this detail are not a seperate pay item. Costs to be included in prices bid for Curb and Gutter. Each curb transition consists of approximately 3.5 cu. yds. of concrete and 275 lbs. of reinforcing steel.

CURB TRANSITION

FROM A RISDOM	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-I-006(02)	

2-TYPE III BARRICADES

SIGNING

6-TYPE III BARRICADES

2-TYPE III BARRICADES

DETOUR 19th ST. SOUTH

LEVEE

STOP

TRUCK DETOUR

T-138 N R-80 W

T-137 N R-81 W

T-138 N R-80 W

HWY # 6Z

HWY # 1806

HEART RIVER

1 MILE

CONSTRUCTION SIGNING

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)	

MANDAN
INC. POP. 15,513(1980)

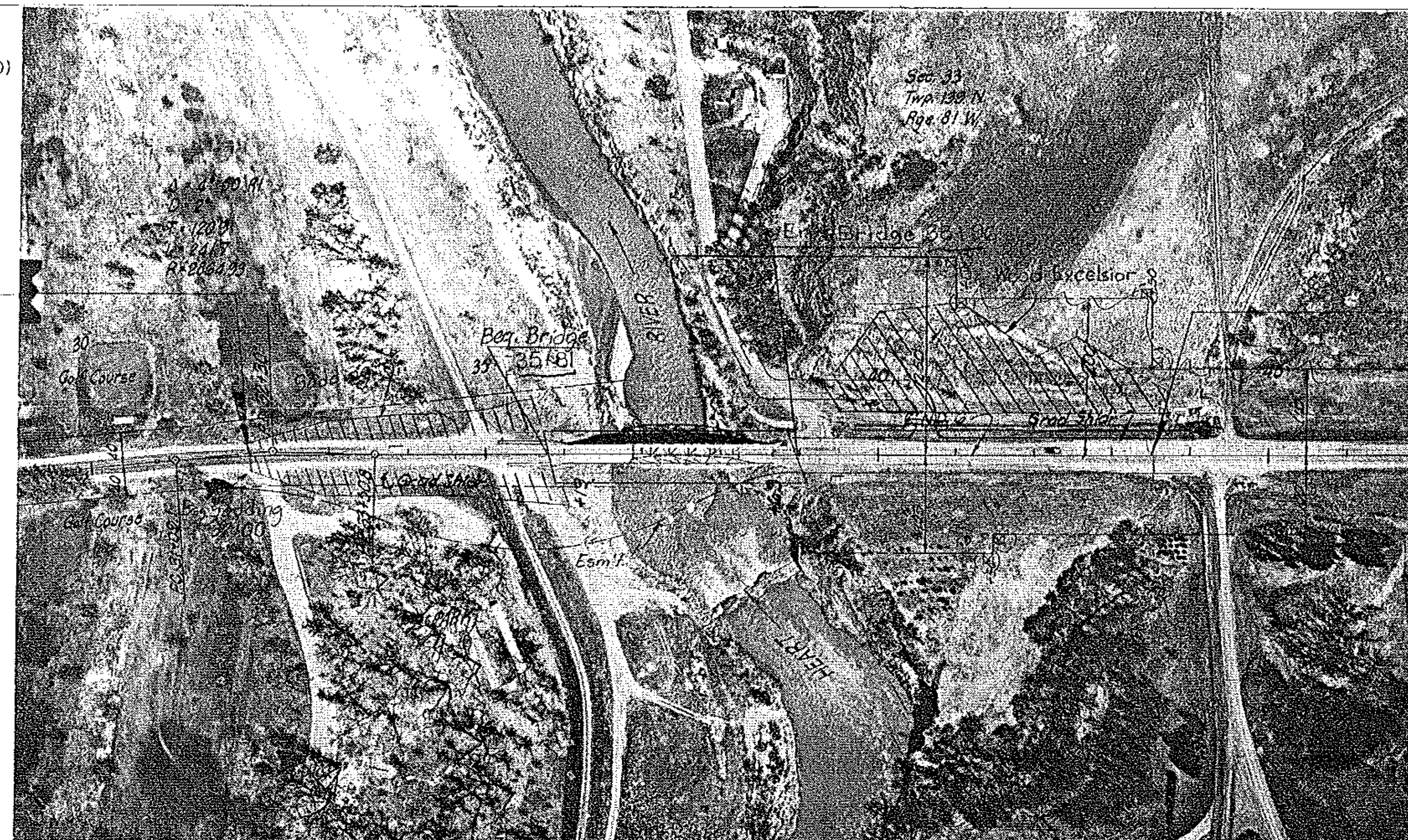
Beg BRF-1-006(02)066 Sta 32+00=
Sta. 32+00 on F-251(15)

INSTALL CURB & GUTTER TYPE 1(SEC B-10)
35+04 to 35+50 Lt. 46 L.F.
35+22 to 35+60 Rt. 44 L.F.

INSTALL CONCRETE SIDEWALK
35+08 to 35+72.8 Lt. 57 S.Y.

INSTALL CURB TRANSITION
35+50 to 35+73 Lt. 1 Ea.
35+66 to 35+89 Rt. 1 Ea.

INSTALL R/W MARKERS
41+00 Lt. 2
41+50 Rt. 2
43+50 Lt.& Rt. 3



BENCH MARKS

NO	DESCRIPTION	LOCATION	ELEV.
1	E Edge of Light Std Base	33+80 Rt	1648.17
2	Curb NW Cor of Bridge	36+04	1660.49
3	Curb SW Cor of Bridge	38+69	1662.38
4	Top of Pipe N End	44+36 48' Lt	1676.61

End BRF-1-006(02)066 Sta 43+50
Sta 43+50 on F-251(15)

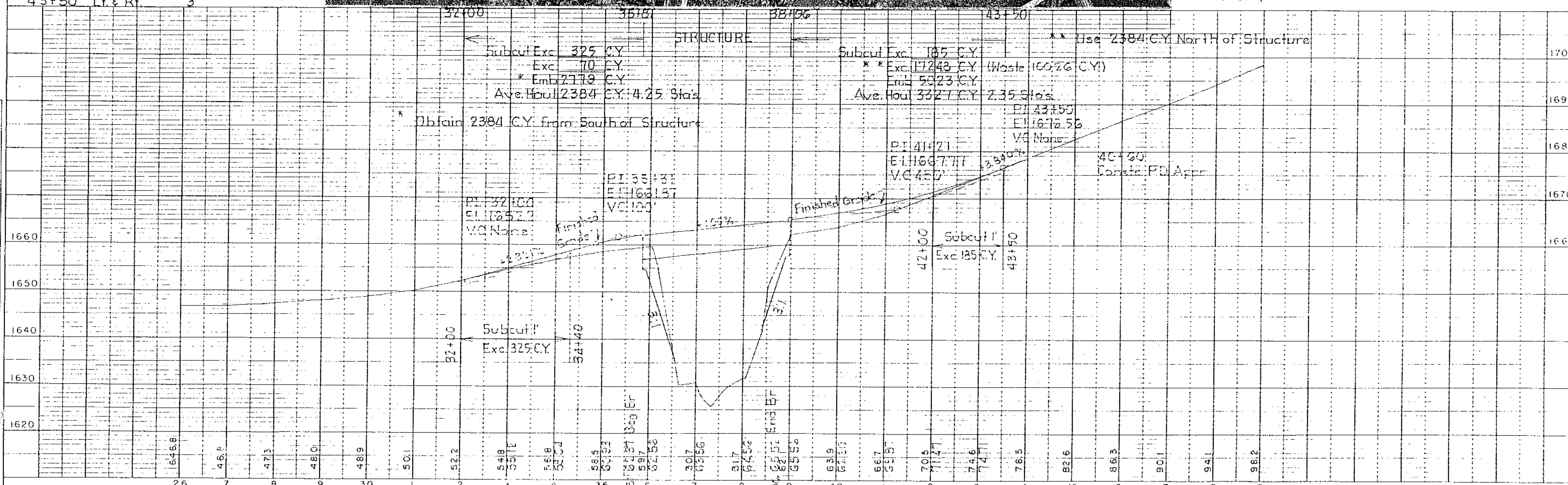
INSTALL PIPE CULVERT
40+60 Lt. 24"x52' C.S.P. (.064) 2-C.S.E.S. (.064)

INSTALL SODDING
32+00 to 35+83 Lt.& Rt. 2376 S.Y.

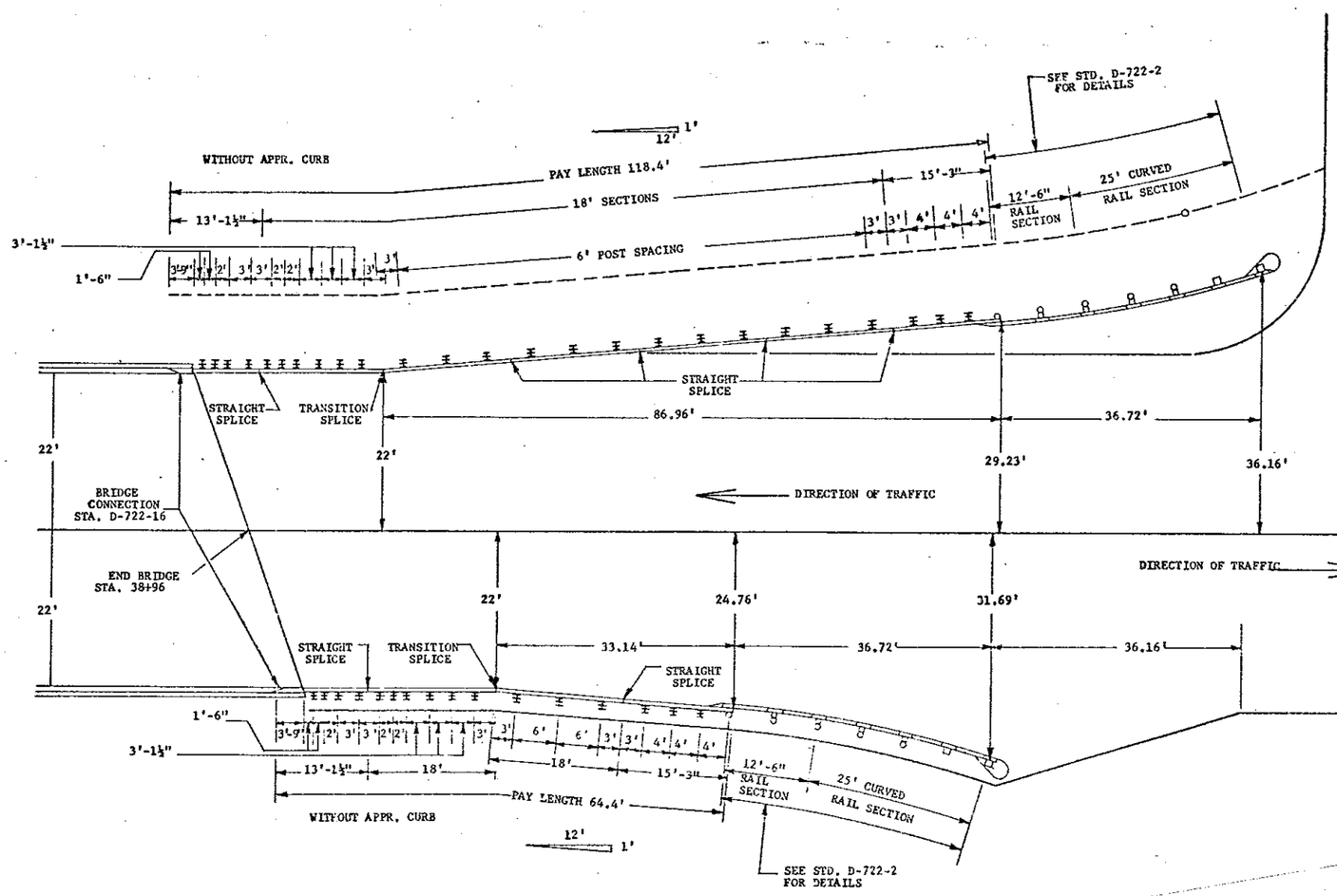
INSTALL WOOD EXCELSIOR FIBERMAT
38+96 to 41+00 Lt. Backslope 3000 S.Y.

Sta. 36+04.06 to Sta. 38+69.06
3-Span Bridge CL. Rdwy. 22.0
N. End Span - Conc. Slab Supported by Rolled Beams
S. End Span - Conc. Slab
Center Span - Steel Truss with Conc. Slab

39+15 LT.
24"x42' C.M.P.
Remove & Salv.



FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	



BOX BEAM GUARDRAIL LAYOUT

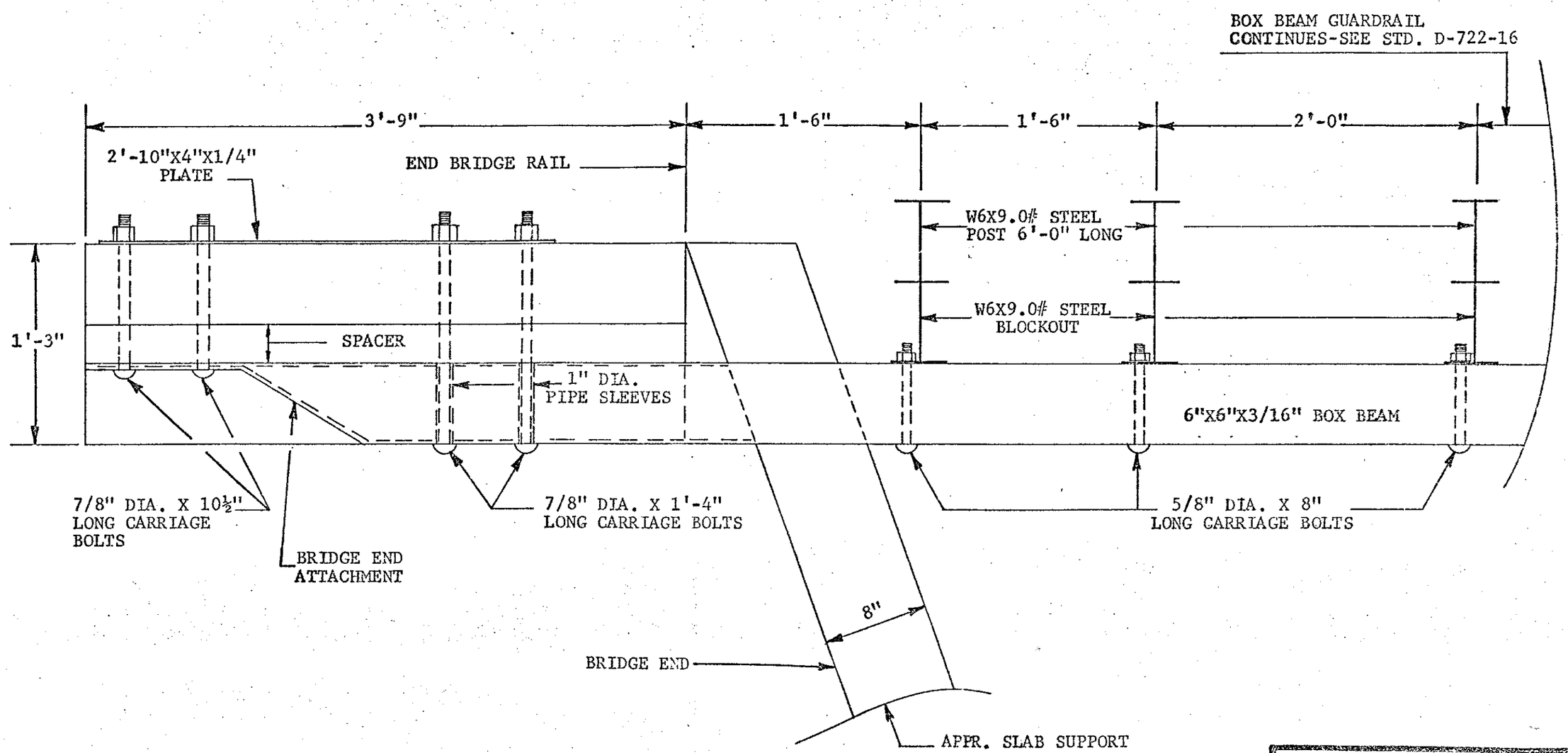
Sta. 38+96 ℄ - End Bridge

Heart River Bridge

Skew 20° Lt. & Bk.

Morton County
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)065	



BOX BEAM GUARDRAIL BRIDGE
CONNECTION DETAIL

STA. 38+96 ℄ - END BRIDGE
HEART RIVER BRIDGE
Skew 20° Lt.& Bk.

Morton County
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	

ESTIMATED GUARDRAIL QUANTITIES*

Box Beam Guardrail-Flared End Treatment & Transition

LOCATION	RAIL SECTION	CURVED RAIL SECTION	LINE POSTS	6"X8" WOOD ANCHOR POSTS	CONCRETE FOOTINGS	6"X6"X14" WOODEN OFFSET BLOCK	BACKING PLATE	ANCHOR PLATE AND CABLE ASSEMBLY	2'-6" SPECIAL END SHOE	BUFFER END SECTION	7/8" DIA. X 8" LONG CARRIAGE BOLTS	5/8" DIA. POST ATTACHMENT BOLTS	SPLICE BOLTS	REFLECTORIZED PLATES			
	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA			
39+64.66 to 40+02.16 Rt.	12.5	25	5	2	2	4	4	1	2	1	3	7	25	2			
40+03.10 to 40+40.60 Lt.	12.5	25	5	2	2	4	4	1	2	1	3	7	25	2			
TOTALS	25	50	10	4	4	8	8	2	4	2	6	14	50	4			

*These items are not to be bid separately but shall be included in the price bid for item; "Box Beam Guardrail-Flared End Treatment & Transition."

INSTALL BOX BEAM GUARDRAIL-FLARED END TREATMENT & TRANSITION

39+64.66 to 40+02.16 Rt. 1 EA
40+03.10 to 40+40.60 Lt. 1 EA

BOX BEAM GUARDRAIL QUANTITIES

HEART RIVER BRIDGE

Sta. 38+96 End Bridge

Morton County
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	

ESTIMATED GUARDRAIL QUANTITIES*

Box Beam Guardrail

LOCATION	W6X9.0# POSTS	W6X9.0# BLOCKOUTS	5/8" DIA. X 8" LONG CARRIAGE BOLTS	5/8" DIA. X 1-3/4" LONG HEX HEAD BOLTS	S3X5.7# POSTS	S3X5.7# ADJUSTMENT BLOCK	5/8" DIA. X 8" LONG HEX HEAD BOLTS	3/8" DIA. X 1-3/4" LONG HEX HEAD BOLTS	5"X3½"X7.0# BEAM ATTACHMENT ANGLE	TRANSITION SPLICE	STRAIGHT SPLICE	REFLECTORIZED PLATES	3'-9" LONG BRIDGE ATTACHMENT SPACER	2'-10" X 4" X 1/4" PLATE	7/8" DIA. X 1'-4" LONG CARRIAGE BOLTS	7/8" DIA. X 10½" LONG CARRIAGE BOLTS	1" DIA. PIPE SLEEVES				
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA.				
39+00.26 to 39+64.66 Rt.	5	5	5	10	11	11	11	44	11	1	2	2	1	1	2	2	6				
38+84.70 to 40+03.10 Lt.	5	5	5	10	20	20	20	80	20	1	5	5	1	1	2	2	6				
TOTALS	10	10	10	20	31	31	31	124	31	2	7	7	2	2	4	4	12				

*These items are not to be bid separately but shall be included in the price bid for item; "Box Beam Guardrail."

INSTALL BOX BEAM GUARDRAIL

39+00.26 to 39+64.66 Rt. 64.4 LF
38+84.70 to 40+03.10 Lt. 118.4 LF

REMOVE 4-CABLE GUARDRAIL & POSTS

35+89.06 to 36+04.06 Rt. & Lt. 30 LF
38+69.06 to 38+84.06 Rt. & Lt. 30 LF

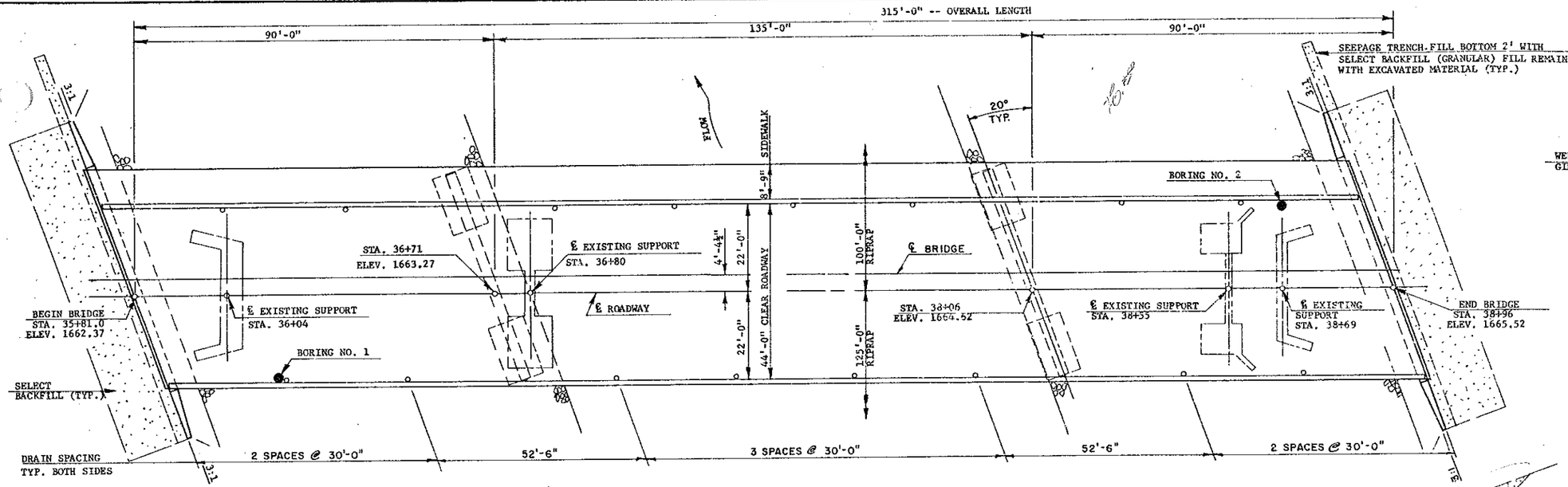
BOX BEAM GUARDRAIL QUANTITIES

HEART RIVER BRIDGE

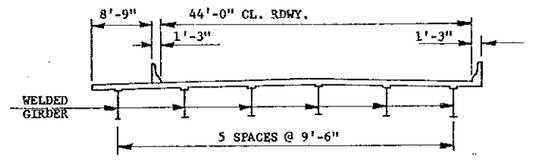
Sta. 38+96 End Bridge

Morton County
Mandan, ND

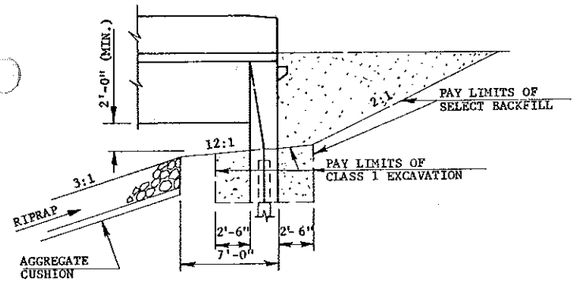
BRIDGE CODE	FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
X-071	8	N.D.	BRF-1-006( )	



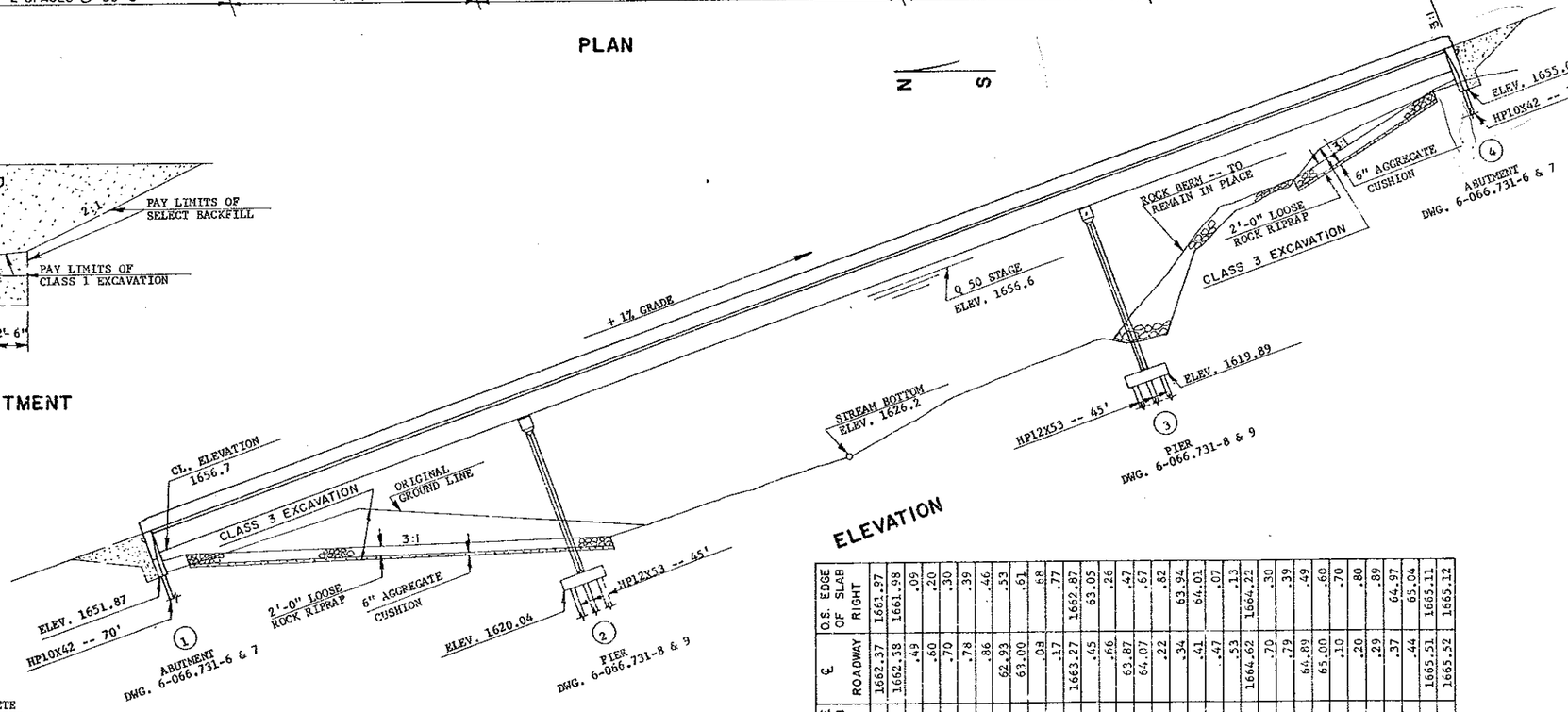
PLAN



DECK SECTION



DETAIL AT ABUTMENT



ELEVATION

	O.S. EDGE OF SLAB RIGHT	℄ ROADWAY	O.S. EDGE OF SLAB LEFT
	1661.97	1662.37	1661.59
	1661.98	1662.38	1661.60
1'-0 3/4" BEGIN BRIDGE	.09	.49	.71
	.20	.60	.82
	.30	.70	61.91
	.39	.78	62.00
	.46	.86	.08
	.53	62.93	.15
	.61	63.00	.22
	.68	.04	.30
	.77	.17	.39
10 EQ. SP.= 88'-11½" ℄ BRG. -- ABUT. 1	1662.87	1663.27	1662.49
	63.05	.45	.67
	.26	.66	62.88
	.47	63.87	63.09
	.67	64.07	.29
	.82	.22	.44
	63.94	.34	.56
	64.01	.41	.63
	.07	.47	.69
10 EQ. SP.= 135'-0" ℄ BRG. -- PIER 2	.13	.53	.75
	1664.22	1664.62	1665.84
	.30	.70	63.92
	.39	.79	64.01
	.49	64.89	.11
	.60	65.00	.21
	.70	.10	.32
	.80	.20	.42
	.89	.29	.51
10 EQ. SP.= 88'-11½" ℄ BRG. -- PIER 3	64.97	.37	.59
	65.04	.44	.66
℄ BRG. -- ABUT. 4	1665.11	1665.51	1664.73
1'-0 3/4" END BRIDGE	1665.12	1665.52	1664.74

SCREED ELEVATIONS

ELEVATIONS ARE TO TOP OF FINISHED CONCRETE

DESIGN STRENGTHS

f'c = 3,000 psi -- CLASS AE-1 CONCRETE
f'c = 4,000 psi -- CLASS AAE-3 CONCRETE
fy = 50,000 psi -- A572 STRUCTURAL STEEL
fy = 36,000 psi -- A36 STRUCTURAL STEEL
fy = 60,000 psi -- REINFORCING STEEL

LOAD FACTOR DESIGN

BENCH MARKS

NO.	DESCRIPTION	LOCATION	ELEV.
1	EAST EDGE OF LIGHT STANDARD	STA. 33+80 RT.	1648.17
2	CURB NW CORNER OF BRIDGE	STA. 36+04	1660.49
3	CURB SW CORNER OF BRIDGE	STA. 38+69	1662.38
4	TOP OF PIPE, NORTH END	STA. 44+36-48' LT.	1676.61

* BELOW BOTTOM CONCRETE ELEVATIONS

PILE LOADINGS

LOCATION	DEAD LOAD	LIVE LOAD	* MIN. PENETRA.	DESIGN LOAD	MAX. BEARING
ABUT. 1	26.3	6.1	45	32.4 T.	55 T.
PIER 2	50.3	11.8	15	62.1 T.	70 T.
PIER 3	50.3	11.8	15	62.1 T.	70 T.
ABUT. 4	26.3	6.1	45	32.4 T.	55 T.

SPECIAL PROVISIONS

NO.	NAME
388	404 PERMITS-EARTHWORK
102-18	BUY AMERICA-CEMENT AND STEEL

ESTIMATE OF QUANTITIES

SPEC. NO.	CODE NO.	BID ITEM	
202	0105	REMOVAL OF STRUCTURE	LUMP SUM
208	0100	CLASS 1 EXCAVATION	180 C.Y.
208	0110	CLASS 2 EXCAVATION	300 C.Y.
208	0120	CLASS 3 EXCAVATION	5820 C.Y.
208	0200	FOUNDATION PREPARATION	LUMP SUM
228	0100	SELECT BACKFILL	450 C.Y.
602	0130	CLASS AAE-3 CONCRETE	552.3 C.Y.
602	1110	CLASS AE-1 CONCRETE	331.1 C.Y.
602	7000	SPECIAL SURFACE FINISH	4220 S.F.
612	0115	REINFORCING STEEL-GRADE 60	83,908 LBS.
612	0116	REINF. STEEL -GR.60 (EPOXY COATED)	72,575 LBS.
616	5890	STRUCTURAL STEEL (ESTIMATED TOTAL-A572 & A36= 368,519 LBS.)	LUMP SUM
622	0020	STEEL PILING HP 10x42	840 L.F.
622	0040	STEEL PILING HP 12x53	1350 L.F.
622	0393	STEEL TEST PILING HP10x42	60 L.F.
622	1200	STEEL TEST PILING HP12x53	110 L.F.
624	0124	PEDESTRIAN FENCE	329 L.F.
702	0130	LOOSE ROCK RIPRAP	2100 C.Y.
703	0100	AGGREGATE CUSHION	520 C.Y.
750	0100	LINSEED OIL TREATMENT	29 GAL.
900	3000	BRIDGE BENCH MARKS	1 SET

STRUCTURAL DRAWINGS

GENERAL DRAWINGS (THIS SHEET), 6-066.731-1 THRU 5	
SUBSTRUCTURE 6-066.731-6 THRU 9, & H-0401	
SUPERSTRUCTURE 6-066.731-10 THRU 16 & C-900-1	
DESIGN LOADING (HS20 1944)	SCALE 1 INCH= 15 FEET

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

HEART RIVER, MANDAN

BRIDGE LAYOUT

PROJECT NO. BRF-1-006( )066 STA. 37+38.5
MORTON COUNTY

APPROVED:

STEVEN J. MILLER REGISTERED PROFESSIONAL ENGINEER

1-30-14
DATE

DESIGN ENGINEER

6-066.731

FHWA REGION	STATE	FED. AID PROJ. NO	SHEET NO.
8	N.D.	BRF-1-006(02)	

100 010 GENERAL: The cost of furnishing and placing preformed expansion joint filler, bar spacers, bar supports, screed chairs, threaded inserts, deck drains, and other miscellaneous items shall be included in the price bid for Class AE-1 and AAE-3 concrete.

100 017 Bearing areas shall be finished true to plan and elevation by grinding, if necessary, before bearing plates are set.

100 020 Dead load deflections have been accounted for in the screed elevations.

208 020 Excavation Class 1, at the abutments, shall extend from the bottom of the footing to the upper limits as shown on the bridge layout drawing.

228 010 BACKFILL: All backfilling shall be done according to Sections 203-2.3.2 and 228 of the Standard Specifications. Select backfill shall not be placed above the elevation of the berm until the superstructure has cured.

602 010 DECK-FINISHING MACHINE: In addition to the requirements of Section 602-3.6.2.2 of the Standard Specifications, the deck-finishing machine shall be self propelled, mounted on wheels which ride on a track, and have one or more power-driven, oscillating, rotating, or vibrating screeds.

602 110 CONCRETE BARRIER RAILING: The concrete barrier shall be formed for a minimum of three contiguous sections. Concrete shall be placed in alternate sections and shall have a curing period of three days between placement of adjacent sections. Provide adequate tie wires on the barrier forms to avoid any shifting during the placement. Form a 3/4" triangular groove at the midpoint of each barrier section. Groove both vertical faces and across the top. At the barrier deflection joints, use nails to hold the preformed joint filler in place. If an approved method of holding the joint filler in alignment is used, the contractor may pour the complete barrier wall at one time.

602 120 If the forms for the barrier railing are held in place by concrete inserts in the deck slab, the inserts shall be removed when the form removal has been completed and the cavities in the deck slab cleaned and filled flush with a nonshrink epoxy mortar approved by the engineer.

602 210 CURING AAE-3 CONCRETE: The method of curing the deck concrete shall be in accordance with Section 602-3.7.2.2. The intent is to place the covering as soon as possible without causing a significant amount of blemish to the surface. Once the covering operation has started, it shall be a continuous operation to keep pace with the finisher. The covered concrete shall be kept continuously moist by a fog spray for five days, and no waterproof material such as polyethylene shall be used to cover the canvas or burlap.

602 220 The concrete shall be protected during the interval between final finishing and placement of the covering with a linseed oil-based emulsion containing at least 50 percent linseed oil and meeting the requirements of AASHTO M-148. The minimum rate of application shall be 200 square feet per gallon. This emulsion shall not be applied to surfaces which are to receive the special surface finish.

602 310 SPECIAL SURFACE FINISH: Special surface finish shall be required for all exposed surfaces of barrier, and exposed edges of slab. The intent of the finish is to provide a uniform color and to provide an aesthetic appearance. All surfaces which are to receive the special surface finish should be cleaned to remove laitance, form oil, fins, etc., and roughened by brushing and sandblasting so that special surface finish material will develop adequate bond to the prepared concrete surface.

602 320 The special surface finish shall be applied in two applications as one of the last items of work and only after the ordinary surface finish and cure period are complete. A spray application of special surface finish is required, and the rate of application for the commercially-packaged mortar shall be as recommended by the manufacturer.

602 330 The method of cure shall be as stated in the Specifications except that liquid membrane curing compounds will not be allowed on surfaces that are to receive the special surface finish.

610 010 CONCRETE: All superstructure concrete shall be Class AAE-3 or AAE-4. Concrete for the substructure shall be Class AE-1, AE-3, or AE-4. The class of concrete paid for will be that class shown on the plans.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)	

610 020 Type I or Type II cement may be used.

610 If the depth of the concrete risers between the tops of the 040 girders and the bottom of the deck slab exceed the theoretical dimensions, the additional concrete required shall be furnished at no expense to the state.

610 050 The contractor will be expected to place the slab concrete for one bridge in one continuous operation. Minimum rate of placement shall be 40 cubic yards per hour.

612 010 REINFORCING STEEL: Dimensions for bent bars are given out to out and to tangent intersections unless otherwise noted. Bent bars shall be bent around AC1 standard size pins.

612 020 The bar fabricator shall add a prefix to all bar designations to differentiate between the several parts of the structure.

612 030 The top layer of transverse deck slab reinforcement shall be tied down with wire ties to the shear connectors of the beams. The ties shall be at intervals of five to six feet along the full length of all beams. Two wraps with 14-gauge plastic or epoxy-coated ties shall be used for this purpose.

612 040 All reinforcing steel shall be Grade 60.

616 011 Girder web, flanges, stiffeners, and splice plates are A-572, Grade 50. All other structural steel shall be A-36.

616 015 The girders shall be cambered in the shop as detailed on Drawing 6-066.371-12. The shop camber diagram represents the total rise, in inches, to be cut into the web plates of the girders.

616 020 A minimum of two (2) contiguous beam sections shall be placed in their correct relative positions before drilling the holes for the field splice between those sections. The proper alignment shall be maintained between sections while reaming the holes. Templates shall not be used in lieu of the above shop assembly. Wire rope slings shall not be used to handle the beams; they shall be handled with beam clamps designed for that purpose or other devices approved by the engineer.

616 025 Shear connector on splice plates shall be moved to clear bolt holes.

616 030 Shop-welded connections of diaphragm angles to gusset plates may be used in place of the bolted connections shown. Details shall be shown on shop drawings.

616 035 All field connections shall be made with 7/8 inch diameter, ASTM A325 high-strength bolts.

616 040 Temporary or permanent attachments or devices that are not shown on the plans as part of the structure shall not be welded to the structural steel members during the fabrication and construction process.

616 050 Swedge bolts shall be provided by the steel fabricator, and the cost shall be incidental to the total cost of structural steel.

616 110 STEEL ERECTION: Falsework with provisions for jacking must be provided at all splice points during erections. All splice points in each girder line shall be brought to their proper elevation and supported in this position before the bolts in any of the splices are tightened to the required tension.

622 110 PILING: Piling shall be driven with a steam, air, or diesel hammer with a rated energy and ram weight not less than 32,073 foot-pound-tons, as computed by the formula W (E-10,946) + .586E, where W is the weight of the ram in tons and E is the rated hammer energy as allowed in Section 622 of the Specifications. In no case shall the ram weight be less than 4,000 pounds.

622 115 Test piles shall be driven to a bearing not less than 125% of the design load as determined by the dynamic formula in section 622-3.3.

718 010 PAINT AND PAINTING: Paint shall conform to the Standard Specifications, Section 870-1.1 and 870-1.18. The finish coats shall be red color no. 31302 and shall meet Federal Standard No. 595 colors. The first coat shall be tinted to differentiate it from the second coat. The dry thickness of each finish and spot coat shall not be less than 1.5 mil for any reading. The dry thickness of the shop coat shall not be less than 1.5 mil for any reading.

750 010 LINSEED OIL TREATMENT: Linseed oil treatment shall not be started until all concrete work is completed and the asphalt curb seal is in place. Only one uniform application of .015 gallons per square yard shall be applied to the deck.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)	

900 The contractor shall submit the following shop drawings for
010 approval by the bridge engineer before fabrication;

1. Structural steel.

900 The rock berm around pier 3 shall remain. Only that portion
500 interfering with construction of the new pier shall be removed. The rock berm shall be restored to its original shape.

900 The existing structure is a three-span bridge with a clear
510 roadway of 22 feet. The north span is 76' in length and consists of a concrete slab supported by rolled beams. The center span is a 175-foot steel truss with a concrete slab. The south span is a 14-foot concrete slab.

The structural steel is to become the property of the contractor and shall be removed from the site. The concrete shall be broken up and disposed of at a landfill site approved by the engineer.

900 The contractor shall remove the existing bridge in a manner which
515 will minimize the entry of debris into the water course.

900 The telephone conduit and gas line on the existing bridge will be
520 removed by the owners by April 1, 1984.

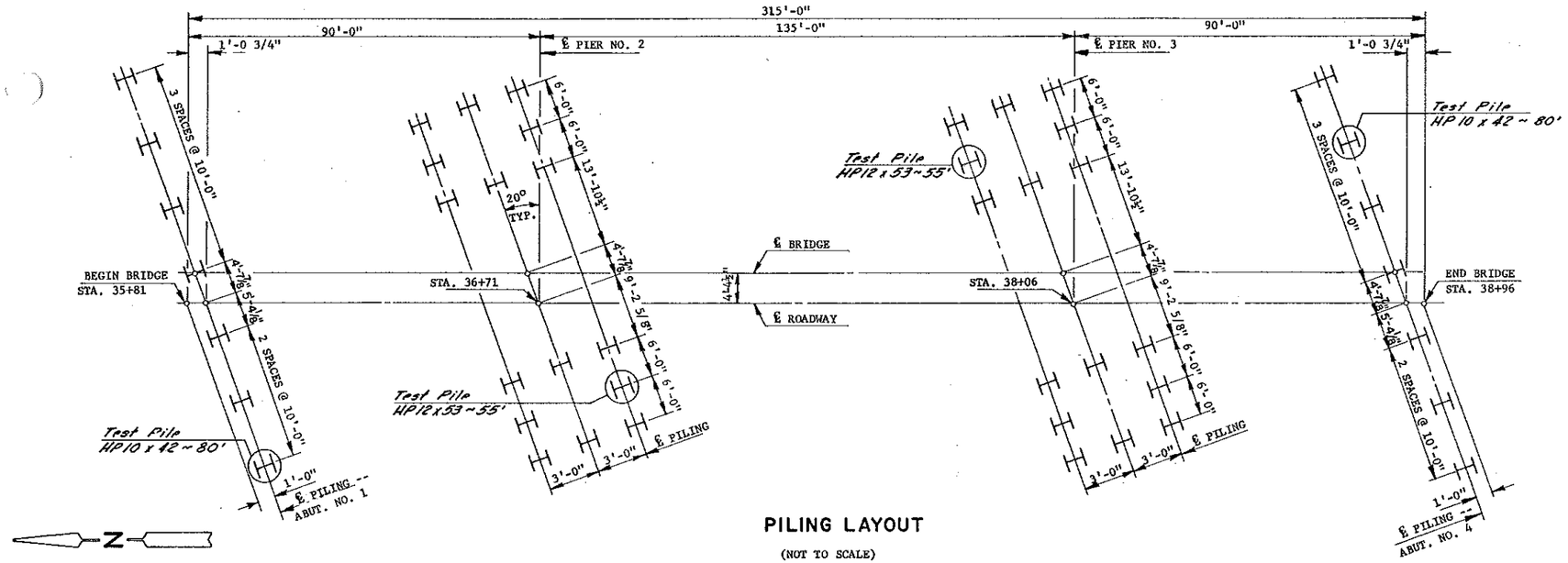
900 CONDUIT MATERIALS: The contractor shall notify Giles Jantzer
521 (222-7384) a minimum of 72 hours before the conduit is to be delivered to the project by Northwestern Bell Telephone Company.

Installation of conduit by contractor shall be incidental to AAE-3 Concrete.

900 ENVIRONMENTAL PROTECTION: This project has been classified as
400 a categorical exclusion; therefore, the following special conditions, if applicable, must be met.

1. Any discharge of dredged or fill material will not occur in the proximity of a public water supply intake.
2. Any discharge of dredged or fill material will not occur in areas of concentrated shellfish production, unless the discharge is directly related to a shellfish harvesting activity.
3. The activity will not jeopardize a threatened or endangered species as identified under the Endangered Species Act, or destroy or adversely modify the critical habitat of such species. In the case of federal agencies, it is the agency's responsibility to review its activities to determine if the action "may affect" any listed species or critical habitat. If so, the federal agency must consult with the Fish and Wildlife Service and/or National Marine Fisheries Service.
4. The activity will not significantly disrupt the movement of those species of aquatic life indigenous to the waterbody (unless the primary purpose of the fill is to impound water).
5. Any discharge of dredged or fill material will consist of suitable material free from toxic pollutants (see Section 307 of Clean Water Act) in toxic amounts.
6. Any structure or fill authorized will be properly maintained.
7. The activity will not occur in a component of the National Wild and Scenic River System.
8. The activity will not cause an unacceptable interference with navigation.
9. The best management practices listed below shall be followed to the maximum extent practicable.

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

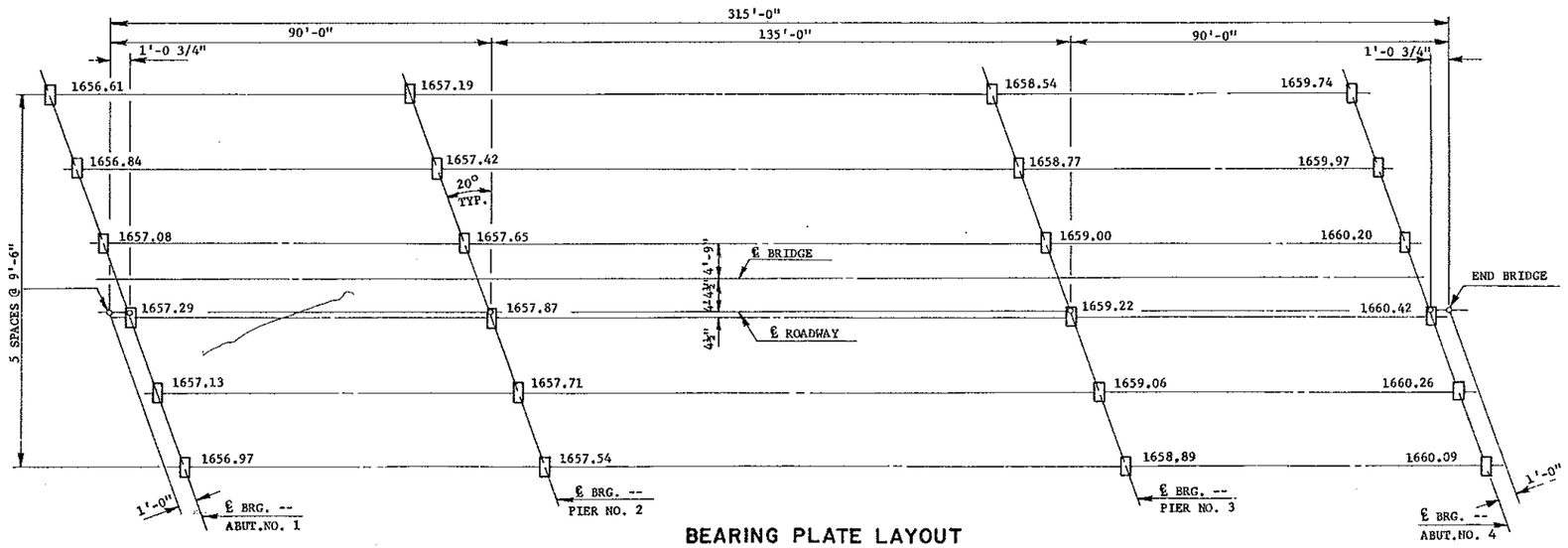


PILING LAYOUT

(NOT TO SCALE)

HYDRAULIC DESIGN DATA

DRAINAGE AREA	3,330	SQ.MI.
DESIGN FREQUENCY	50	- YEAR
DESIGN DISCHARGE	42,825	C.F.S.
DESIGN STAGE	1656.6	M.S.L.
STREAM GRADIENT	0.0005	FT/FT
WATERWAY PROVIDED BELOW DESIGN STAGE	5,706	SQ.FT.
WATERWAY PROVIDED BELOW CLEARANCE	5,736	SQ.FT.
AVERAGE VELOCITY OF FLOW IN NATURAL CHANNEL	7.6	F.P.S.
DEPTH OF FLOW	31.1	FT.
VELOCITY OF FLOW UNDER BRIDGE	7.5	F.P.S.
FREEBOARD PROVIDED	0.1	FT.
100-YEAR FREQUENCY DISCHARGE	52,575	C.F.S.
100-YEAR FREQUENCY STAGE	1658.1	M.S.L.
MAXIMUM RECORDED STAGE (1952)	1656.5	M.S.L.
MAXIMUM RECORDED DISCHARGE (1950)	30,500	C.F.S.
FREQUENCY OF MAXIMUM FLOOD	UNKNOWN	
MINIMUM WATER ELEVATION	1627.5	±



BEARING PLATE LAYOUT

(NOT TO SCALE)
ELEVATIONS SHOWN ARE TO TOP OF FINISHED CONCRETE

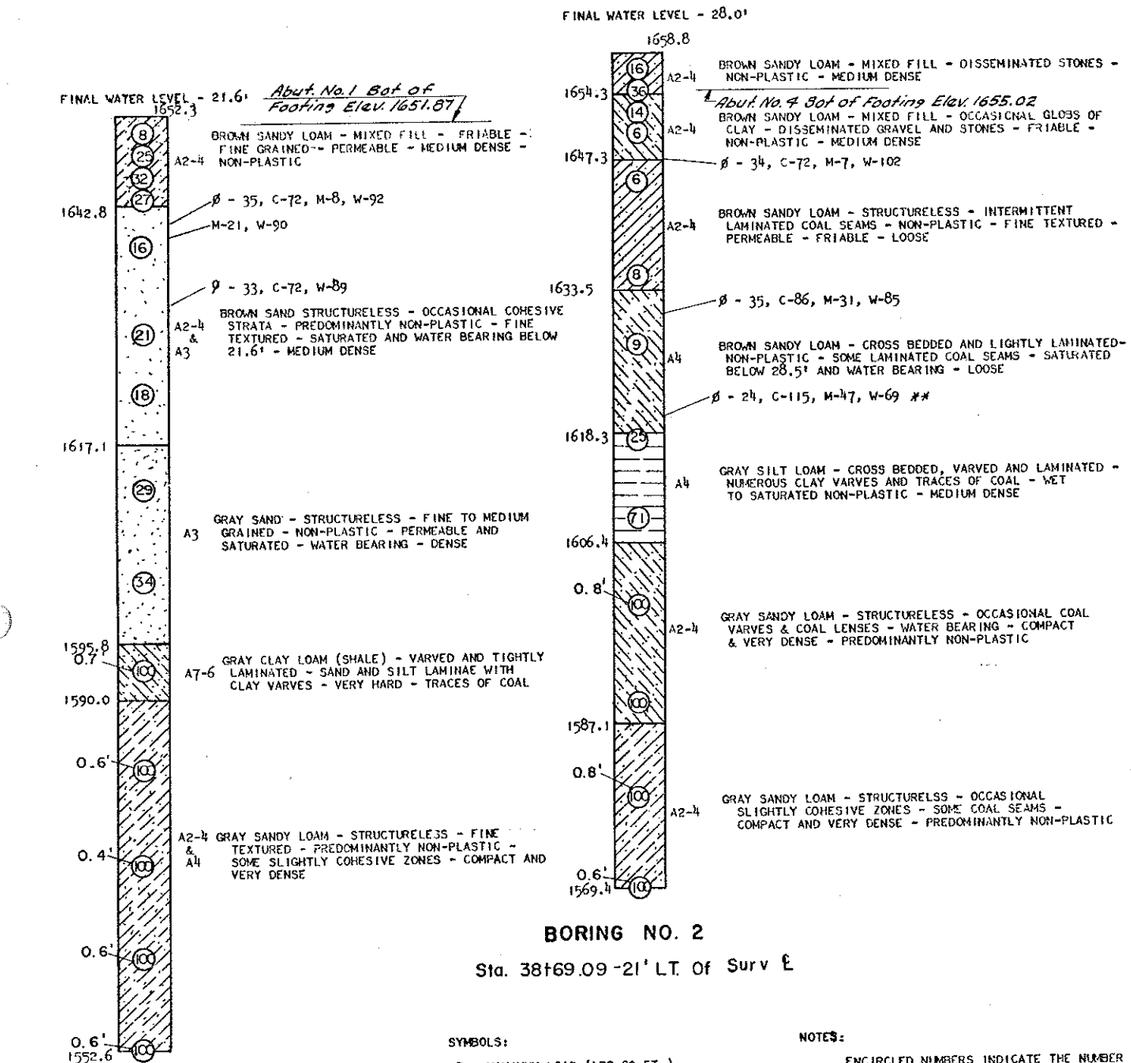
HEART RIVER BRIDGE

PILING LAYOUT

BEARING PLATE LAYOUT

6-066.731-1

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	N. D.	BRF-1-006( )		



BORING NO. 1

Sta. 36+17 -21' Rt of Surv. ℄

BORING NO. 2

Sta. 38+69.09 -21' LT. Of Surv ℄

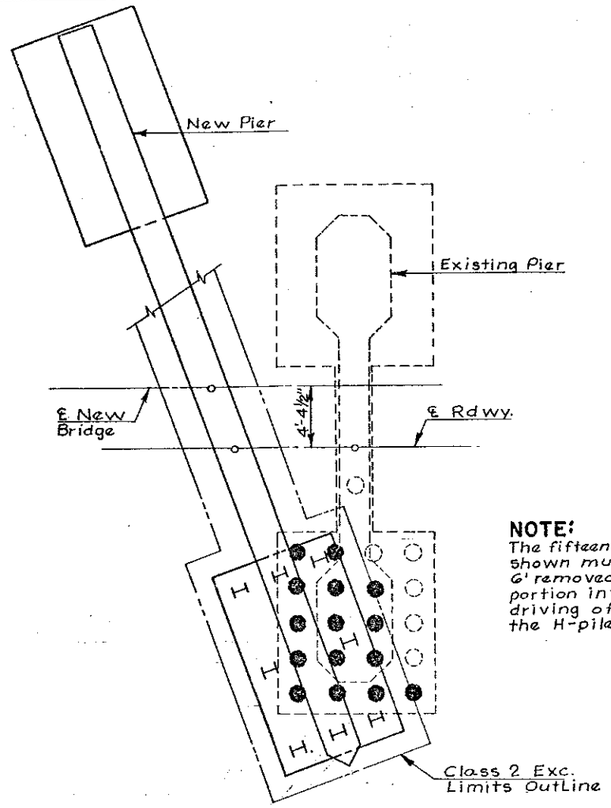
SYMBOLS:

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

NOTES:

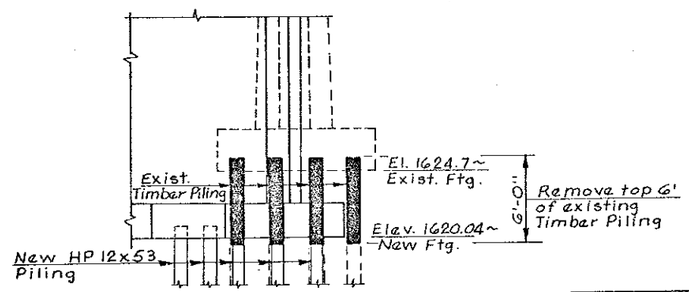
ENCIRCLED NUMBERS INDICATE THE NUMBER OF BLOWS DELIVERED BY A 140 LB. HAMMER FROM A HEIGHT OF 30" TO DRIVE CORE TUBE 1.0'.

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.



PLAN
PIER NO. 2

NOTE:
The fifteen (15) shaded piling shown must have the top 6' removed. If the remaining portion interferes with the driving of the H-piles, shift the H-piles if necessary.



ELEVATION
PIER NO. 2

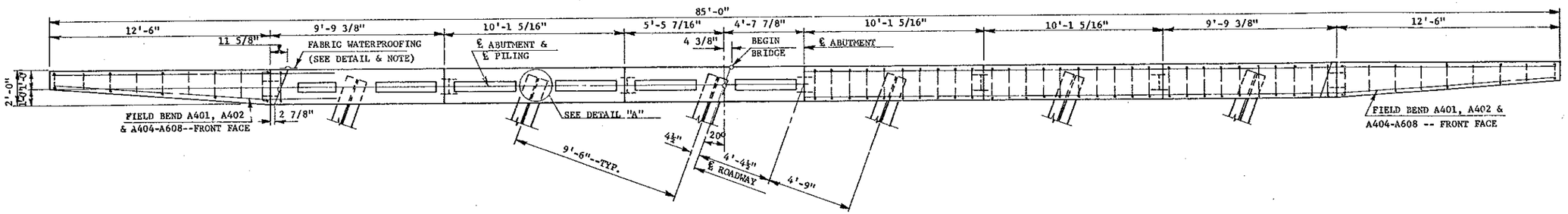
QUANTITIES

HEART RIVER BRIDGE

BORING LOG
PILING DETAIL

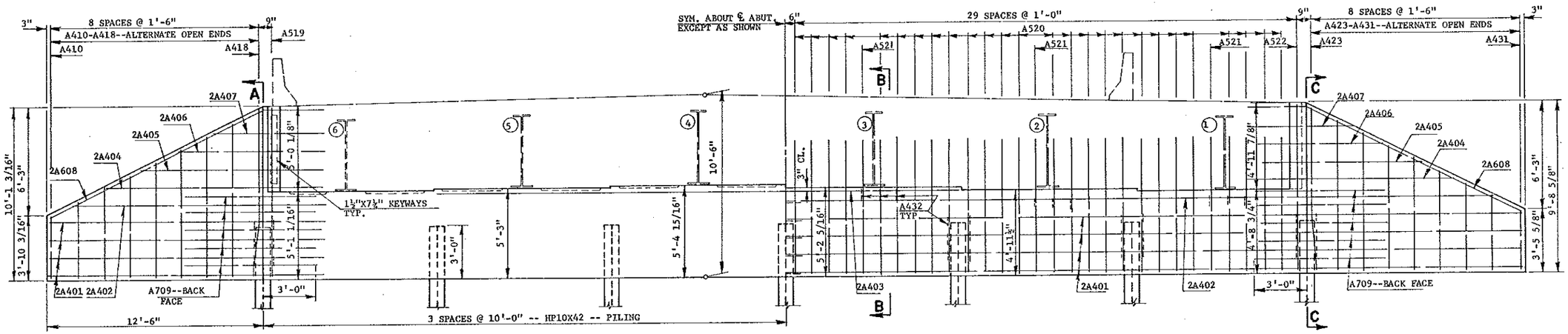
6-066.731-2

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-005( )	



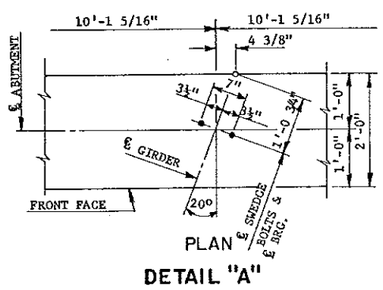
PLAN

ABUTMENT NO. 1 SHOWN



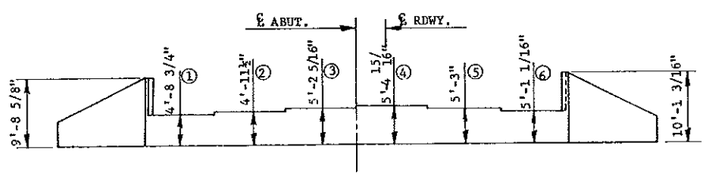
ELEVATION

ABUT. NO. 1 SHOWN



PLAN

DETAIL "A"



ELEVATION

ABUT NO. 4 -- FRONT FACE SHOWN

TWO-PLY FABRIC WATERPROOFING DETAIL

ALL MATERIALS AND WORK SHALL BE CONSIDERED INCIDENTAL TO THE PAY ITEM FOR CLASS AE-1 CONCRETE.

SEE DWG. 6-066.731-7 FOR SECTIONS A-A, B-B, C-C.

QUANTITIES

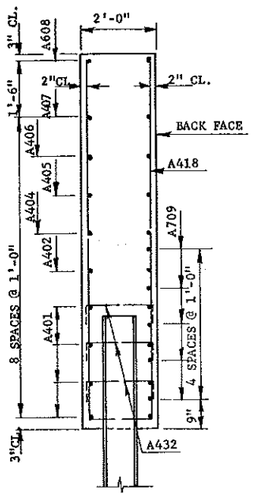
SEE DWG. 6-066.731-7

HEART RIVER BRIDGE

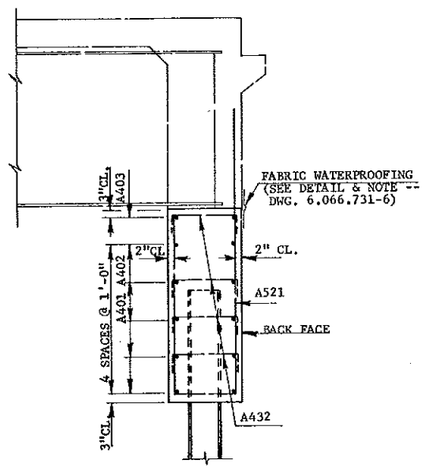
ABUTMENT DETAILS

6-066.731-6

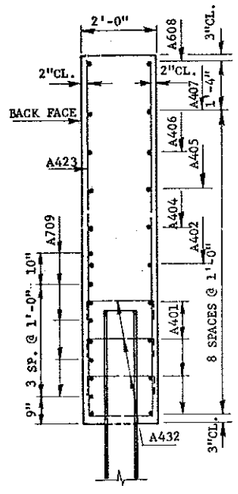
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-I-006( )	



A-A

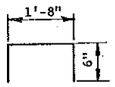


B-B

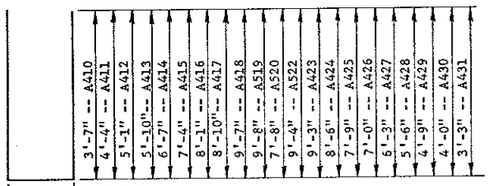


C-C

BAR LIST (ONE ABUT.)				
MARK	NO.	SIZE	LENGTH	SHAPE
A401	16	4	43'-2"	STR.
A402	4	4	42'-2"	"
A403	2	4	30'-0"	"
A404	4	4	12'-6"	"
A405	4	4	10'-6"	"
A406	4	4	8'-6"	"
A407	4	4	6'-6"	STR.
A608	4	6	17'-3"	SEE DET.
A709	10	7	7'-6"	STR.
A410	1	4	7'-10"	BENT
A411	1	4	9'-5"	"
A412	1	4	11'-1"	"
A413	1	4	12'-8"	"
A414	1	4	14'-4"	"
A415	1	4	15'-11"	"
A416	1	4	17'-7"	"
A417	1	4	19'-2"	"
A418	1	4	20'-10"	"
A519	1	5	21'-0"	"
A520	52	5	17'-0"	"
A521	6	5	13'-8"	"
A522	1	5	20'-4"	"
A423	1	4	20'-2"	"
A424	1	4	18'-6"	"
A425	1	4	16'-11"	"
A426	1	4	15'-3"	"
A427	1	4	13'-8"	"
A428	1	4	12'-0"	"
A429	1	4	10'-5"	"
A430	1	4	8'-9"	"
A431	1	4	7'-2"	"
A432	60	4	2'-8"	SEE DET.



A 432

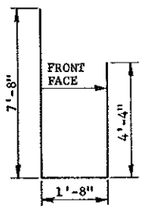


8"	A410 & A431
9"	A411 & A430
11"	A412 & A429
1'-0"	A413 & A428
1'-2"	A414 & A427
1'-3"	A415 & A426
1'-5"	A416 & A425
1'-6"	A417 & A424
1'-8"	A418, A519, A520, A522 & A423

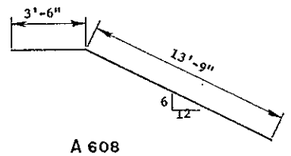
A410-A520 & A522-A431

BENT BAR DETAILS

DIMENSIONS SHOWN ARE OUT TO OUT



A 521



A 608

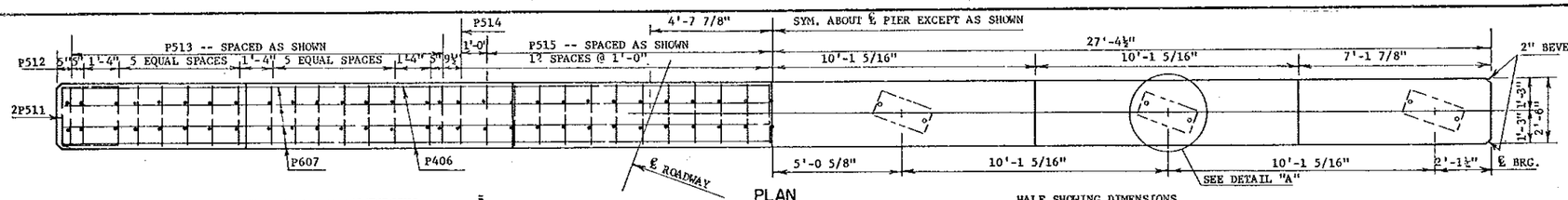
QUANTITIES (ONE ABUT.)	
CLASS AE-1 CONCRETE	33.1 C.Y.
REINFORCING STEEL	2298 LBS.
EXCAVATION (SEE LAYOUT)	
PILING (SEE LAYOUT)	

HEART RIVER BRIDGE

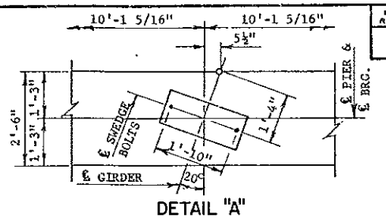
ABUTMENT DETAILS

6-066.731-7

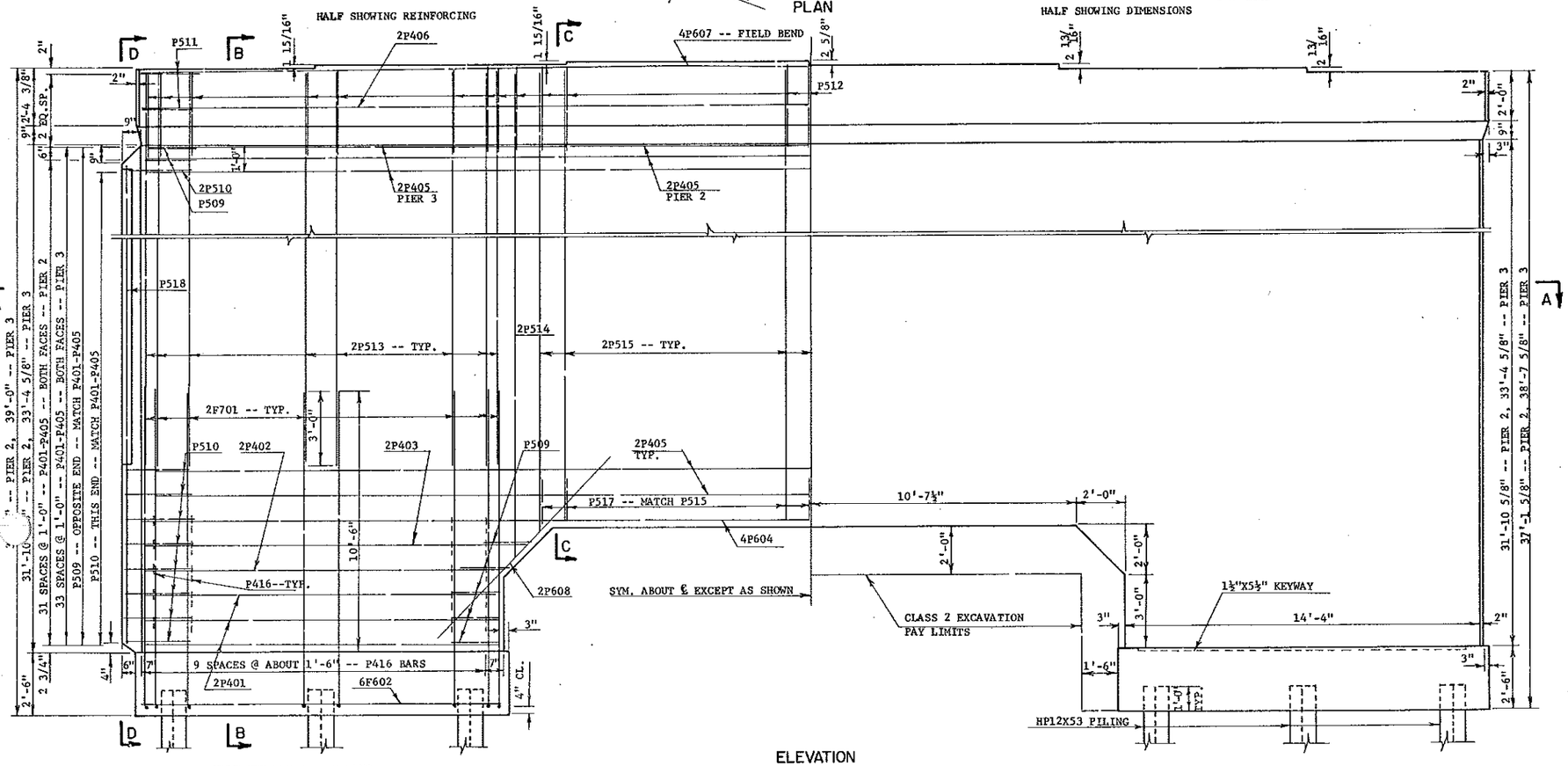
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006( )	



PLAN



DETAIL "A"

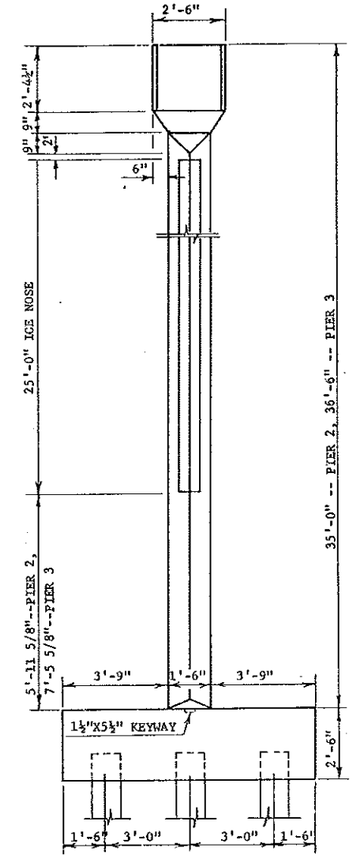


ELEVATION

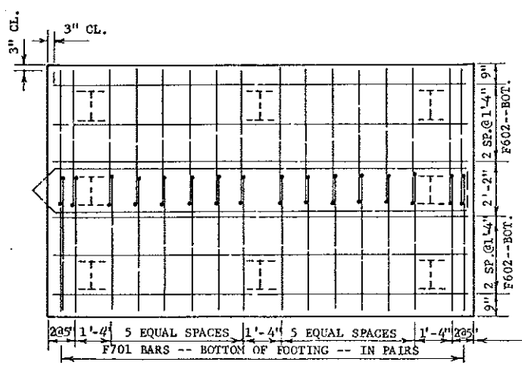
LOOKING NORTH

HALF SHOWING REINFORCING

HALF SHOWING DIMENSIONS

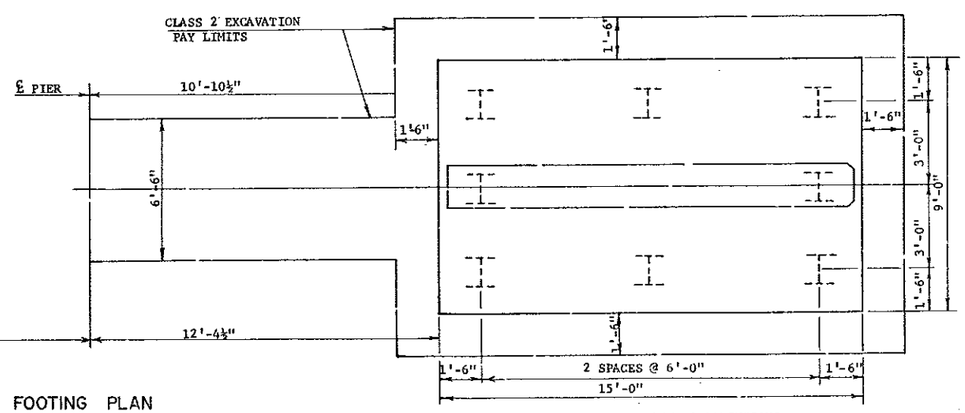


D-D



HALF SHOWING REINFORCING

FOOTING PLAN



HALF SHOWING PILING & DIMENSIONS

SEE DWG. 6-066.731-9 FOR SECTIONS A-A, B-B, & C-C.

QUANTITIES

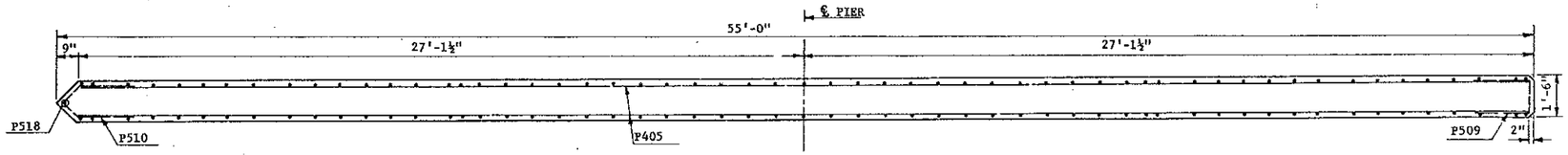
SEE DWG. 6-066.731-9

HEART RIVER BRIDGE

PIER 2&3 DETAILS

6-066.731-8

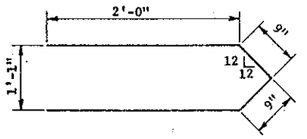
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006( )	



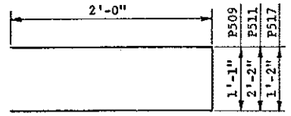
A-A

BAR LIST

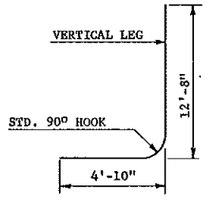
MARK	NUMBER PIER 2	NUMBER PIER 3	SIZE	LENGTH	SHAPE
F701	64	64	7	17'-6"	BENT
F602	12	12	6	14'-6"	STR.
P401	12	12	4	14'-2"	STR.
P402	4	4	4	14'-5"	"
P403	4	4	4	15'-5"	"
P604	4	4	6	53'-11"	"
P405	54	56	4	53'-11"	"
P406	2	2	4	54'-5"	"
P607	4	4	6	54'-5"	"
P608	4	4	6	10'-0"	STR.
P509	45	46	5	5'-1"	BENT
P510	31	33	5	5'-6"	"
P511	4	4	5	6'-2"	"
P512	57	57	5	9'-0"	BENT
P513	64		5	27'-4"	STR.
		64	5	28'-10"	STR.
P514	4		5	31'-0"	STR.
		4	5	32'-6"	STR.
P515	46		5	29'-5"	STR.
		46	5	31'-2"	STR.
P416	100	100	4	2'-2"	BENT
P517	23	23	5	5'-2"	STR.
P518	1		5	30'-9"	STR.
		1	5	32'-3"	STR.



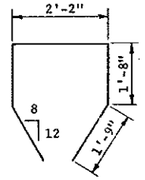
P510



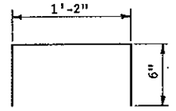
P509, P511 & P517



F701



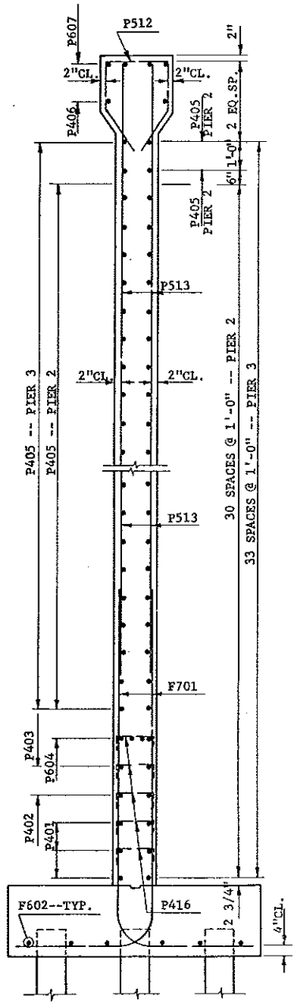
P512



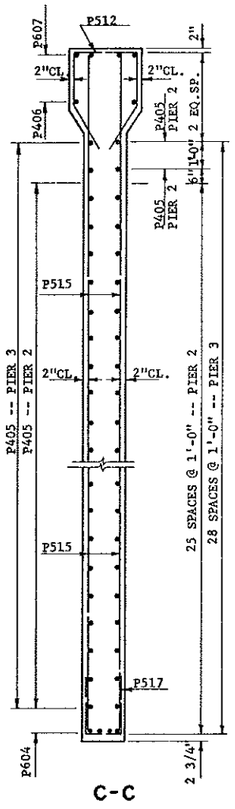
P416

BENT BAR DETAILS

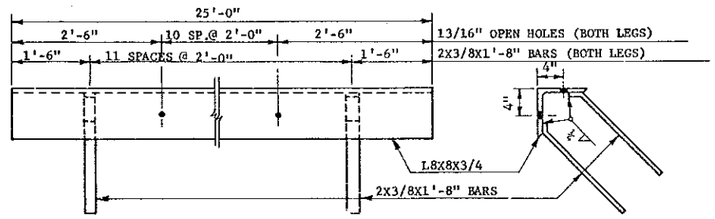
DIMENSIONS SHOWN ARE OUT TO OUT



B-B



C-C



ICE NOSE ANGLE

QUANTITIES

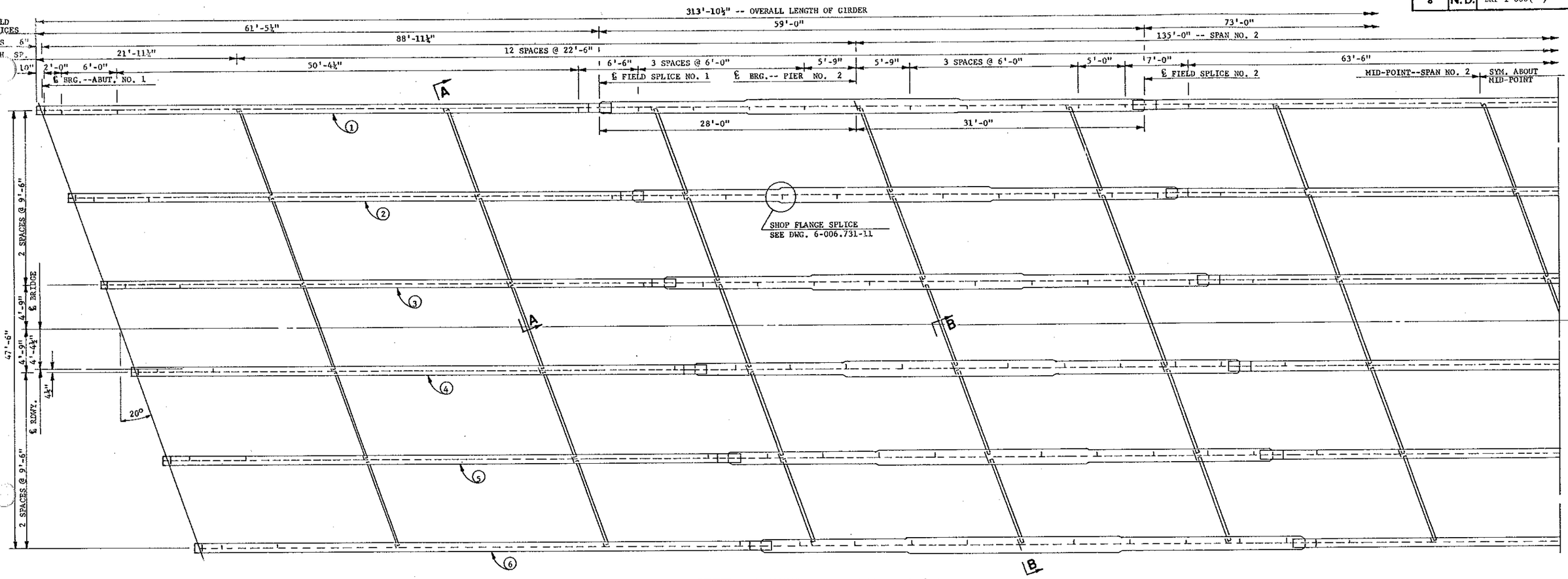
PIER 2	
CLASS AE-1 CONCRETE	130.2 CY
REINFORCING STEEL	9948 LB
STRUCTURAL STEEL (A36)	2150 LB
PIER 3	
CLASS AE-1 CONCRETE	134.7 CY
REINFORCING STEEL	10,396 LB
STRUCTURAL STEEL (A36)	2150 LB

HEART RIVER BRIDGE

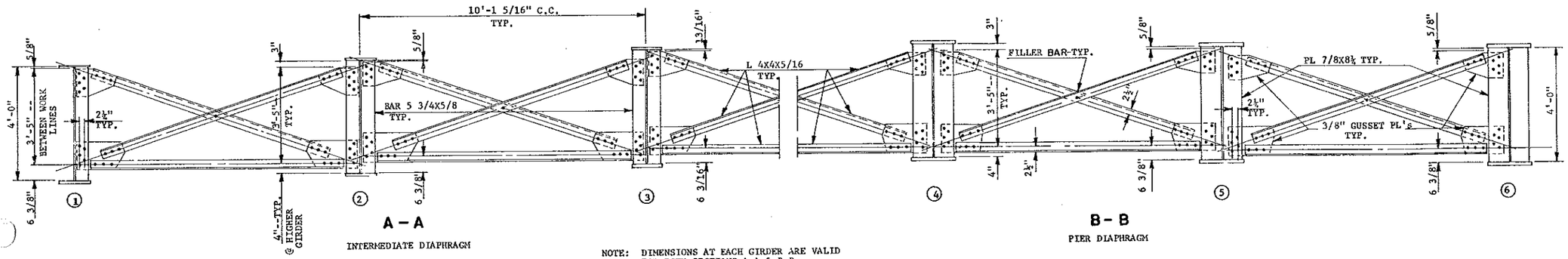
PIER 2&3 DETAILS

6-066.731-9

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



STEEL LAYOUT – HALF PLAN



A – A
INTERMEDIATE DIAPHRAGM

B – B
PIER DIAPHRAGM

NOTE: DIMENSIONS AT EACH GIRDER ARE VALID FOR BOTH SECTIONS A-A & B-B.

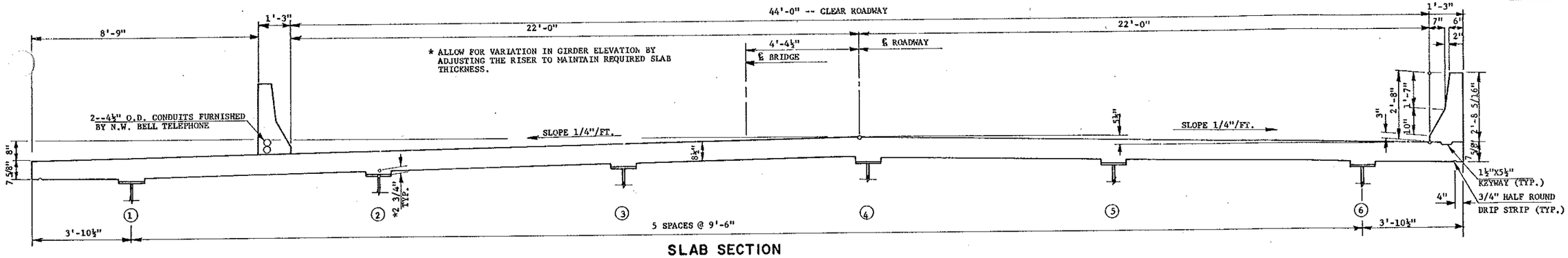
QUANTITIES
SEE DWG. 6-066.731-12

HEART RIVER BRIDGE

WELDED GIRDER DETAILS

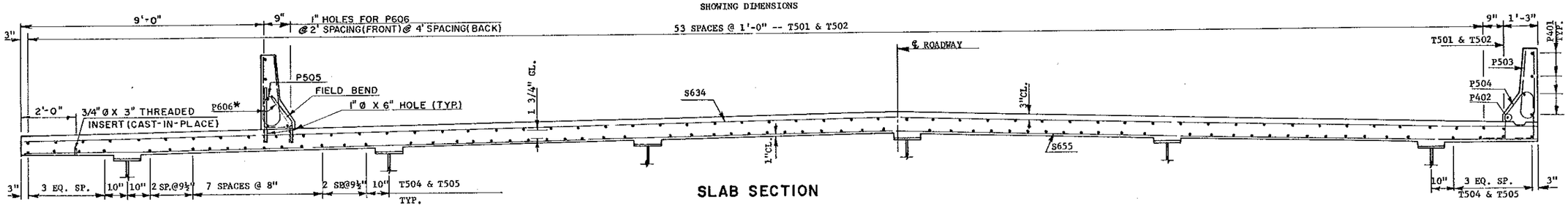
6-066.731-10

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



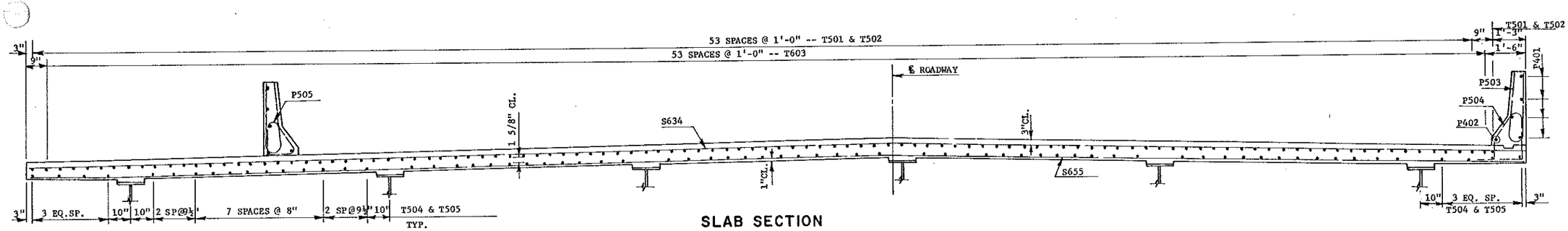
SLAB SECTION

SHOWING DIMENSIONS



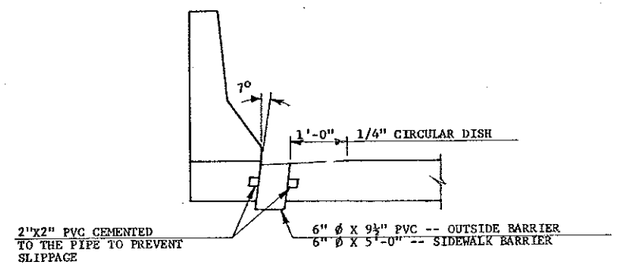
SLAB SECTION

SHOWING REINFORCING BETWEEN SUPPORTS



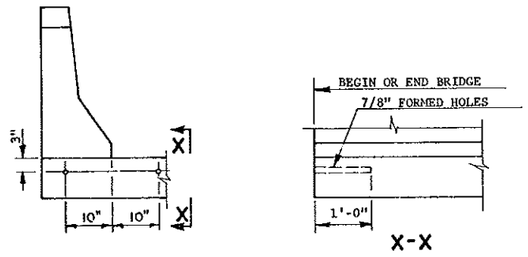
SLAB SECTION

SHOWING REINFORCING OVER SUPPORTS



8 OF EACH REQUIRED
(SEE LAYOUT FOR SPACING)

DECK DRAIN DETAIL



CURB SLEEVE DETAILS

NOTE:

THE TIE WIRES CONNECTING THE REINFORCING MAT TO THE SHEAR CONNECTORS SHALL BE WRAPPED AT LEAST TWICE WITH 14 GAUGE WIRE (MIN.).

FORM A 3/4" TRIANGULAR GROOVE AT THE CENTER OF EACH BARRIER SECTION. GROOVE BOTH VERTICAL FACES AND ACROSS THE TOP.

FIELD BEND P401's & P503's TO CONFORM TO THE SHAPE OF THE BARRIERS AT THE ENDS OF THE BRIDGE.

THE BARRIER QUANTITIES ARE INCLUDED IN THE SLAB QUANTITIES.

*P606 BARS SHALL BE INSTALLED WITH A HIGH STRENGTH ADHESIVE SPECIFICALLY INTENDED FOR CONCRETE ANCHORAGE (HILTI HBP OR APPROVED EQUAL).

QUANTITIES

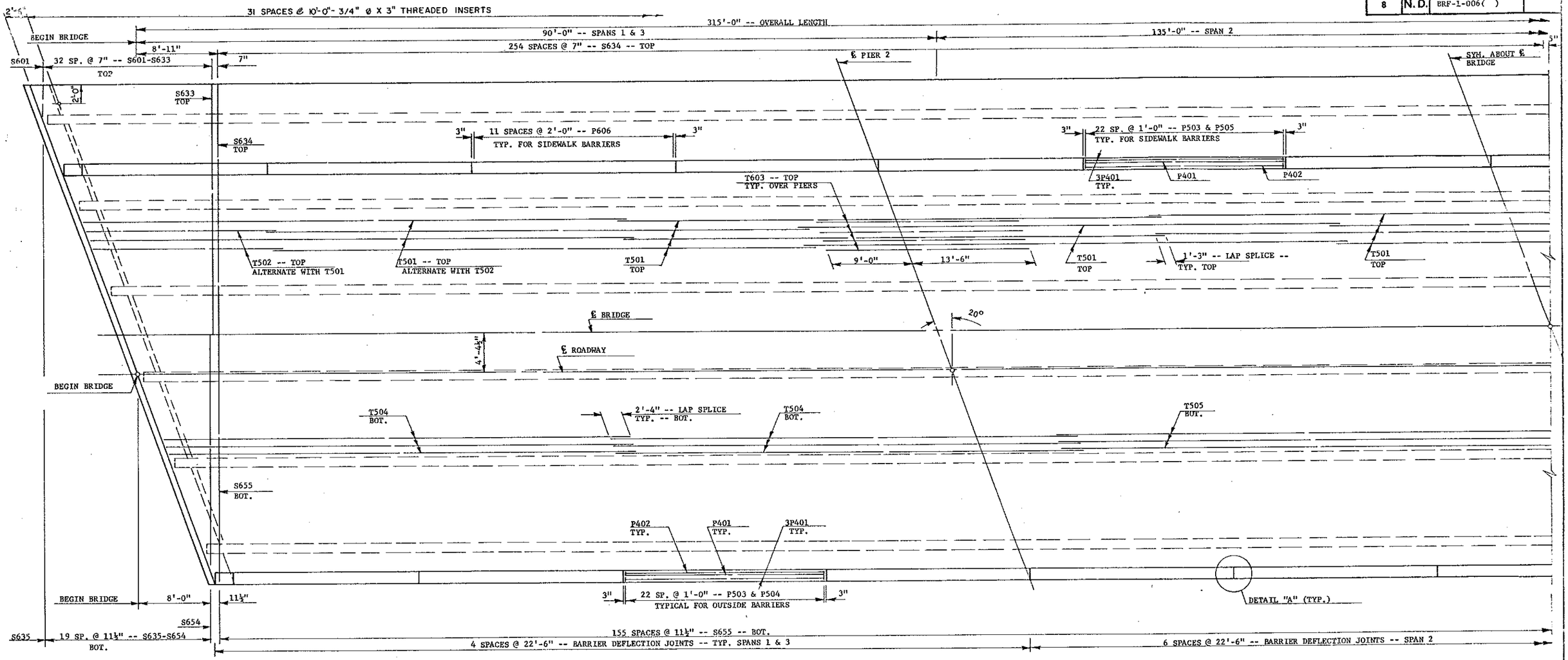
SEE DWG. 6-066.731-15

HEART RIVER BRIDGE

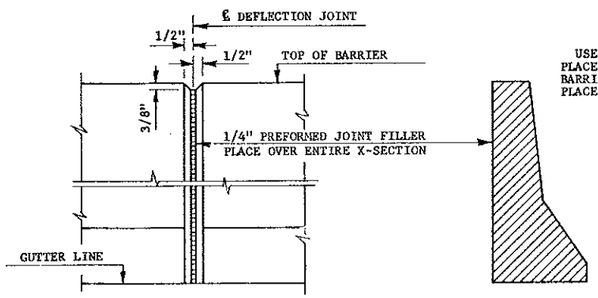
SLAB DETAILS

6-066.731-13

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



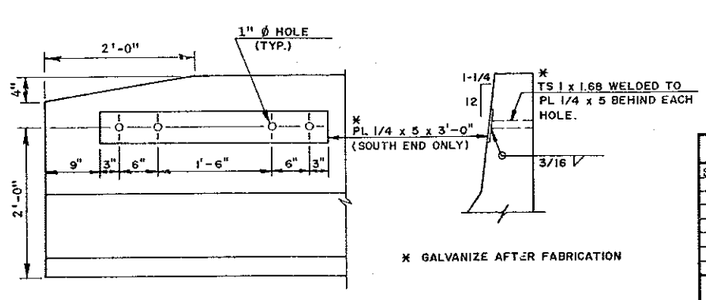
PLAN



USE NAILS TO HOLD PREFORMED JOINT FILLER IN PLACE. PROVIDE ADEQUATE TIE WIRES ON THE BARRIER FORMS TO AVOID ANY SHIFTING DURING PLACEMENT.

BARRIER DEFLECTION JOINT

DETAIL "A"



(SEE ALSO GUARDRAIL DETAILS)

* GALVANIZE AFTER FABRICATION

BARRIER END DETAILS

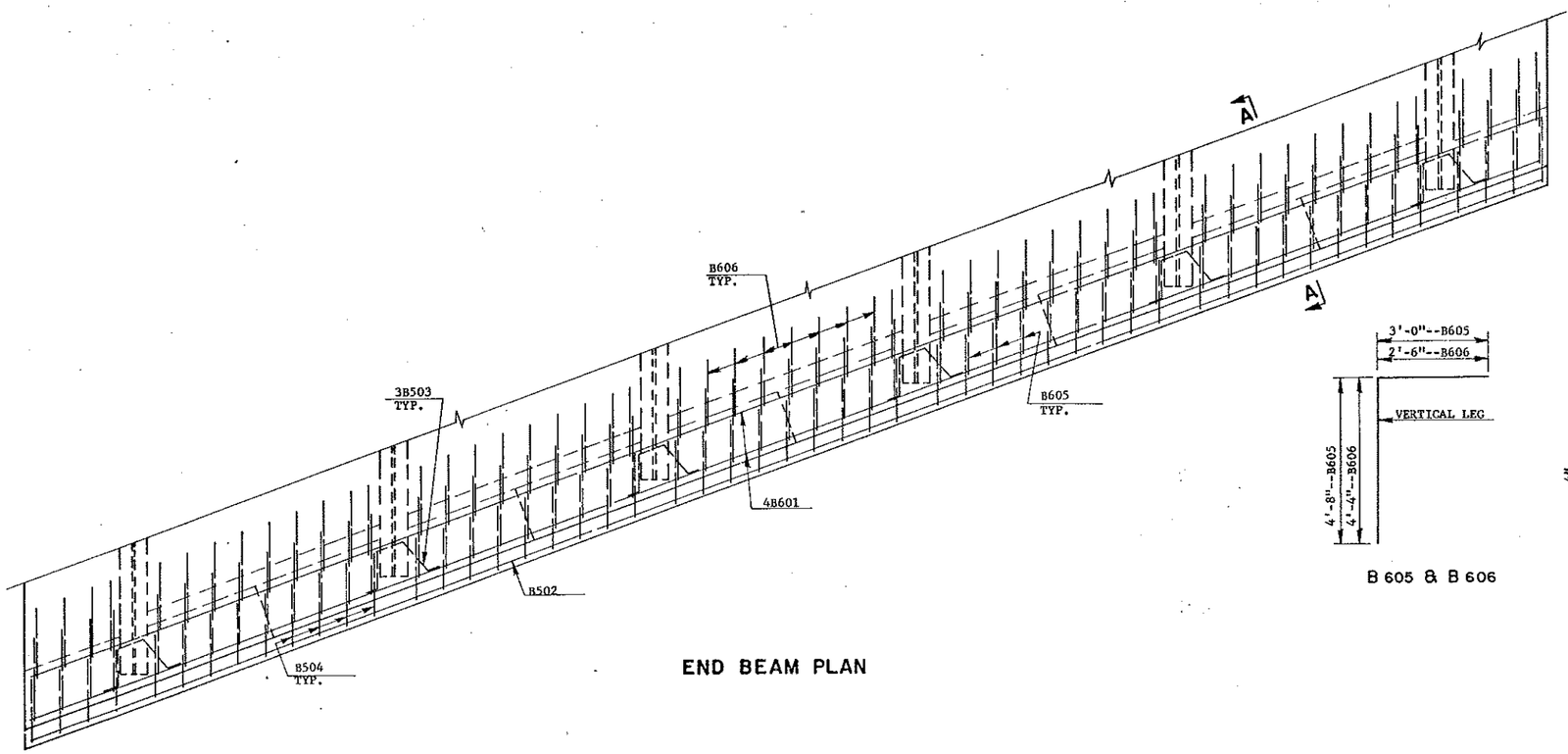
QUANTITIES

SEE DWG. 6-066.731-15

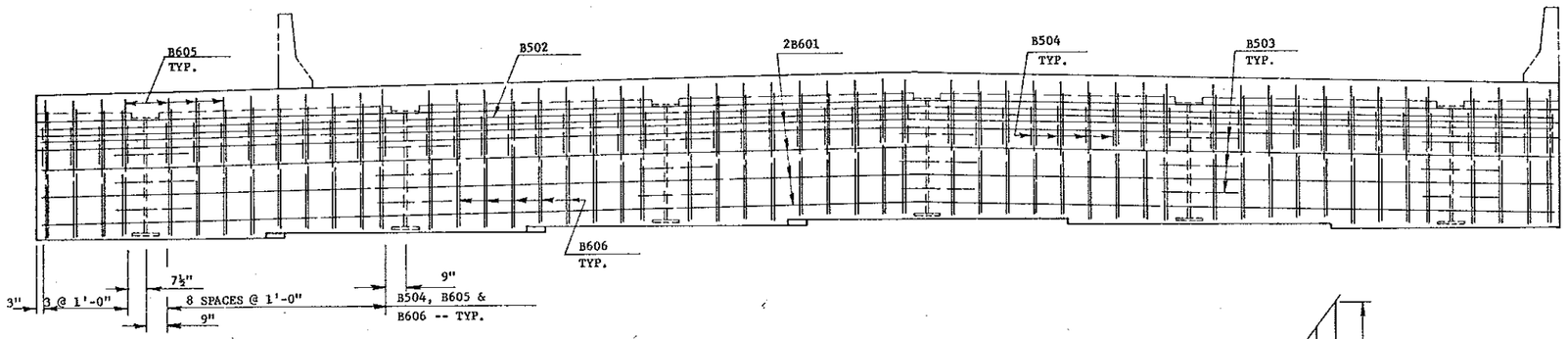
HEART RIVER BRIDGE

SLAB LAYOUT

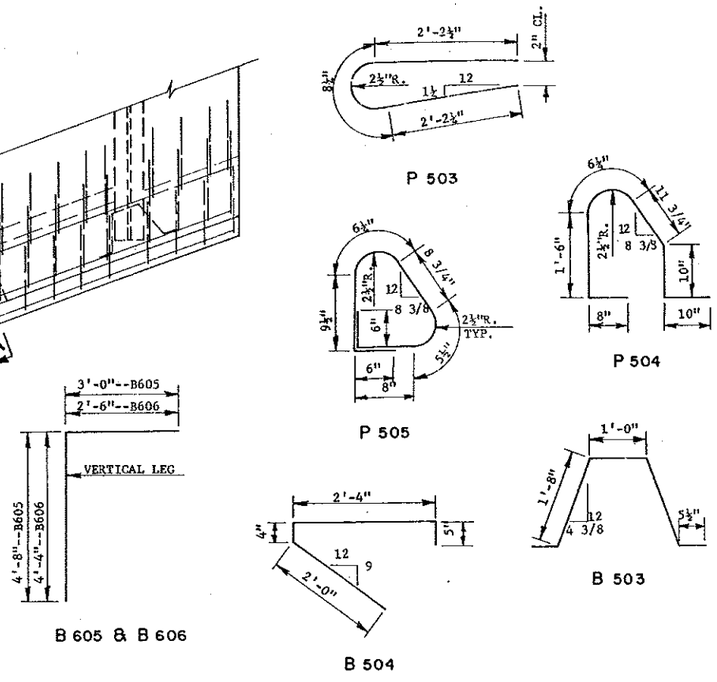
6-066.731-14



END BEAM PLAN



END BEAM ELEVATION



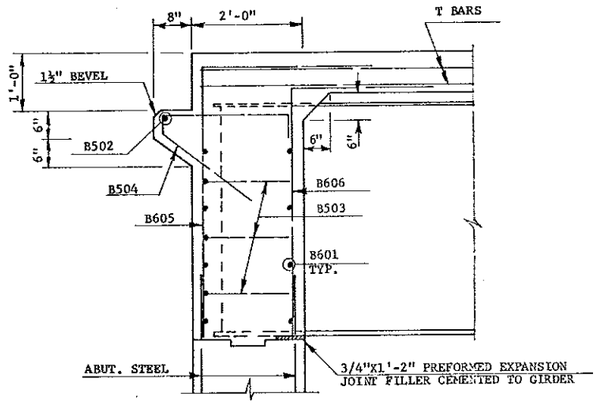
BENT BAR DETAILS

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

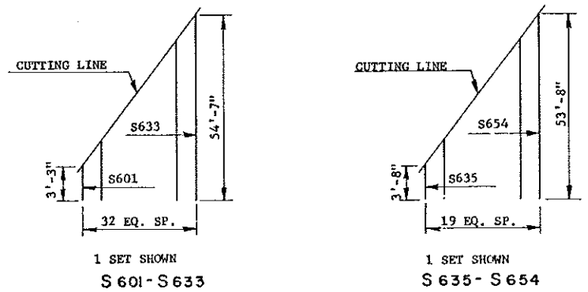
BAR LIST

	MARK	NUMBER	SIZE	LENGTH	SHAPE
	B601	16	6	58'-6"	STR.
	B502	2	5	58'-6"	STR.
	B503	36	5	5'-3"	BENT
	B504	106	5	5'-1"	"
*	B605	106	6	7'-8"	"
	B606	106	6	6'-10"	BENT
	P401	112	4	22'-2"	STR.
*	P402	28	4	22'-2"	STR.
	P503	644	5	5'-1"	BENT
*	P504	322	5	5'-4"	"
*	P505	322	5	4'-2"	"
*	P606	252	6	2'-0"	STR.
*	S601-33	2 sets	6	954'-3"	"
*	S634	510	6	54'-11"	"
	S635-54	2 sets	6	573'-4"	"
	S655	311	6	54'-11"	STR.
*	T501	275	5	60'-0"	STR.
*	T502	55	5	20'-11"	"
*	T603	108	6	22'-6"	"
	T504	272	5	51'-7"	"
	T505	136	5	60'-0"	STR.

* EPOXY COATED REINFORCING STEEL



A-A



BAR CUTTING DIAGRAMS

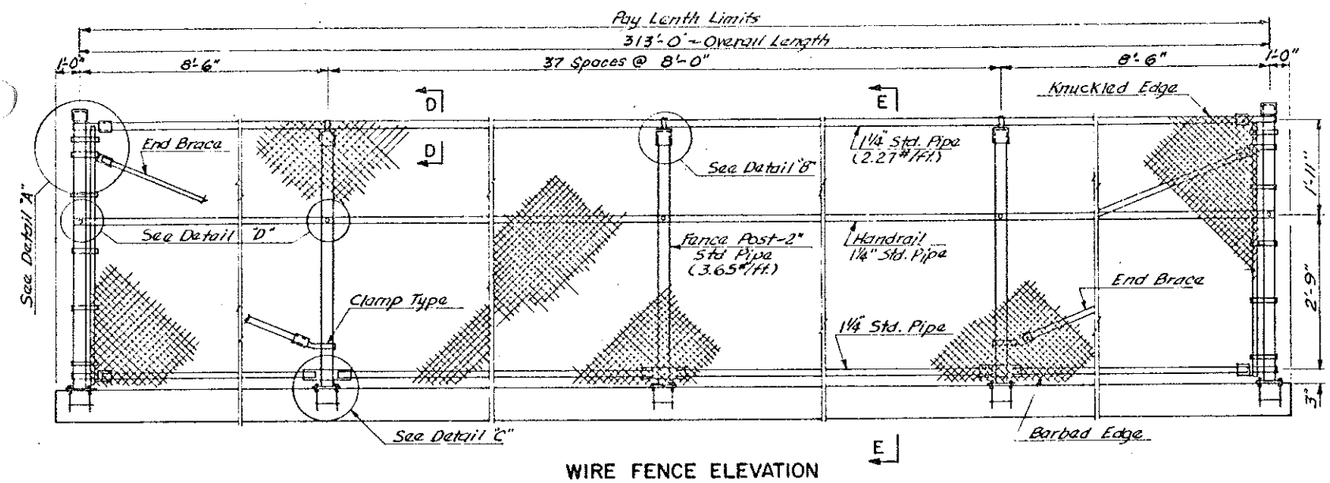
QUANTITIES	
CLASS AAE-3 CONCRETE	552.3 CY
REINFORCING STEEL	58,968 LBS
REINFORCING STEEL (EPOXY)	72,575 LBS

HEART RIVER BRIDGE

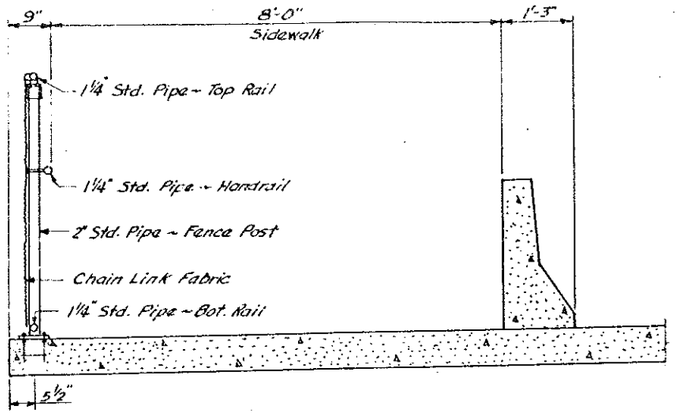
SLAB DETAILS

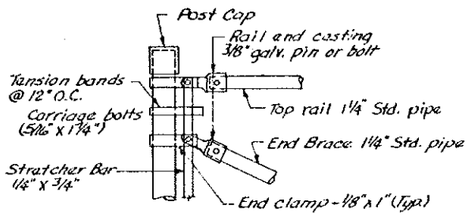
6-066.731-15

FROM A REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006( )	

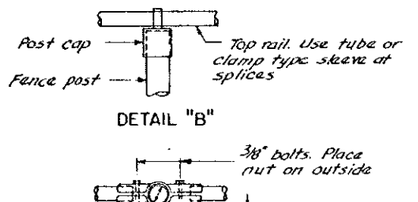


WIRE FENCE ELEVATION

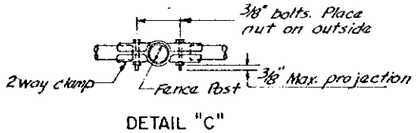




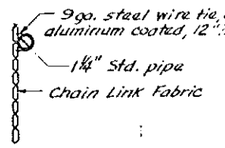
DETAIL "A"



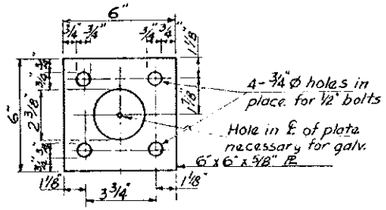
DETAIL "B"



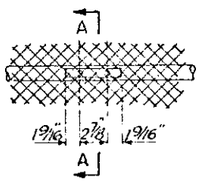
DETAIL "C"



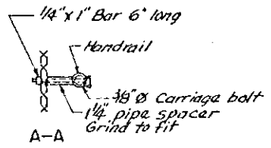
D-D

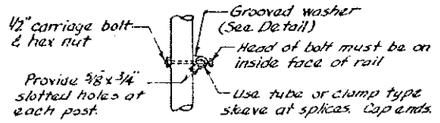


FENCE POST BASE PLATE

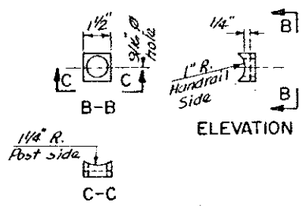


PART ELEVATION @ ℄ BAY

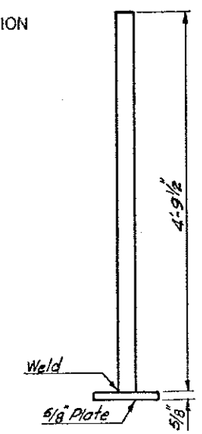




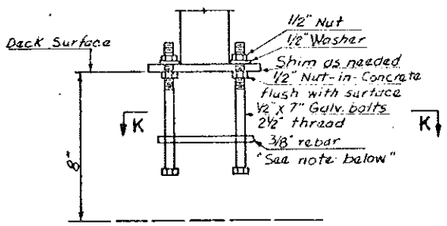
DETAIL "D"

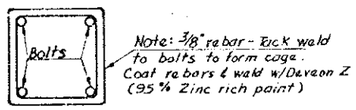


GROOVED WASHER DETAIL



2" FENCE POST



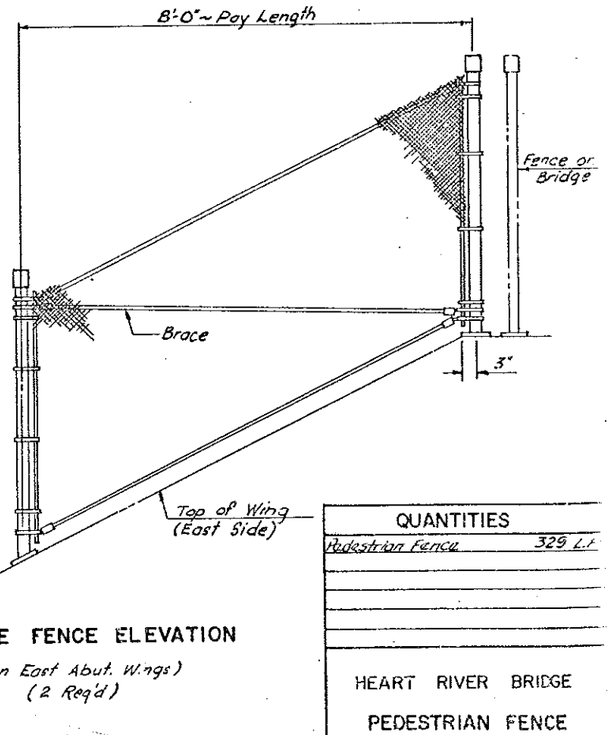


K-K

POST ANCHORAGE

NOTE:

ALL POSTS, FITTINGS AND CHAIN LINK FENCE SHALL CONFORM TO SECTION 886 OF THE STANDARD SPECIFICATIONS.
CHAIN LINK FABRIC SHALL BE ZINC COATED STEEL, 9-GAGE WIRE, 2" MESH, 60" HIGH, TOP EDGE KNUCKLED AND BOTTOM EDGE BARBED. ALL POSTS, FITTINGS AND HARDWARE SHALL BE GALVANIZED STEEL IN CONFORMANCE WITH AASHTO M 181.



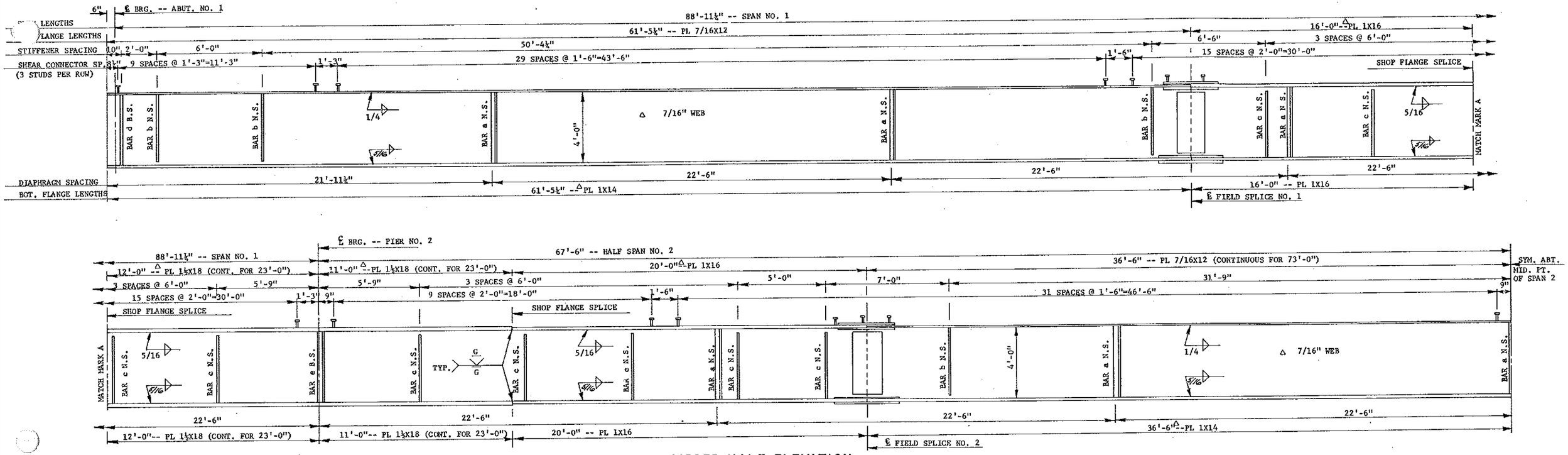
WIRE FENCE ELEVATION
(On East Abut. Wings)
(2 Req'd)

QUANTITIES	
Pedestrian Fence	329 L.f.

HEART RIVER BRIDGE
PEDESTRIAN FENCE

6-66.731-16

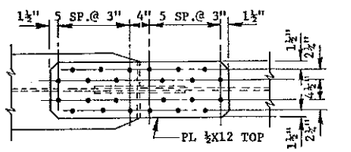
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006( )	

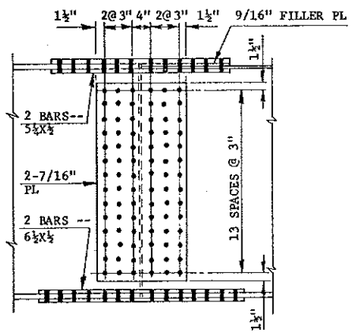


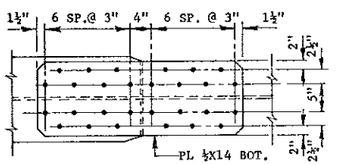
GIRDER HALF ELEVATION

NOTE: THE ELEVATION DETAILS SHOWN REPRESENT GIRDER NO. 1 IN A SIX GIRDER BRIDGE. OTHER GIRDERS ARE SIMILAR AND SHALL BE FABRICATED IN ACCORDANCE WITH DRAWINGS 6-066.371-10 THRU 6-066.371-12.

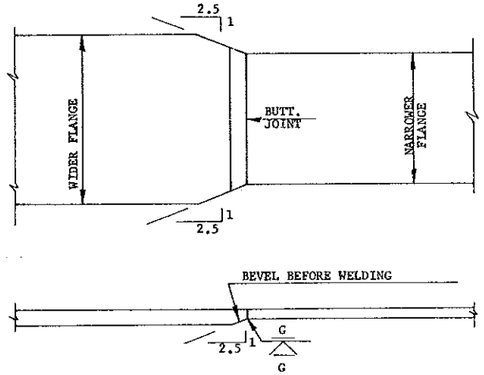
△ ALL PLATES DESIGNATED SHALL MEET THE "LONGITUDINAL CHARPY V-NOTCH" TEST FOR 15 FT.-LBS. AT 40°F. SAMPLING AND TESTING PROCEDURES SHALL BE IN ACCORDANCE WITH ASTM A673, THE (H) FREQUENCY OF HEAT TESTING SHALL BE USED.





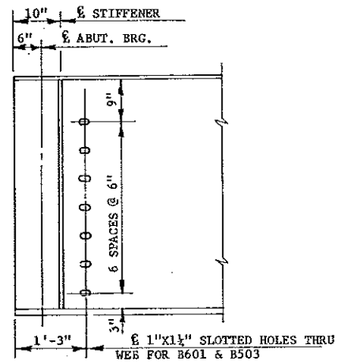


FIELD SPLICE DETAIL



TYPICAL SHOP FLANGE SPLICE

BOTTOM FLANGE SPLICE -- TOP FLANGE SIMILAR



GIRDER DETAIL

NOMENCLATURE:

N.S. = NEAR SIDE
B.S. = BOTH SIDES

QUANTITIES

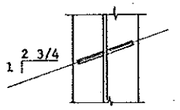
SEE DWG. 6-066.371-12

HEART RIVER BRIDGE

WELDED GIRDER DETAILS

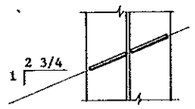
6-066.371-11

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

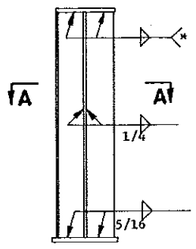


A-A

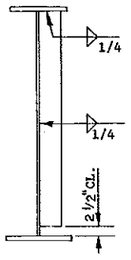
NOTE: BARS b, c, & d WELDED PERPENDICULAR TO WEB.



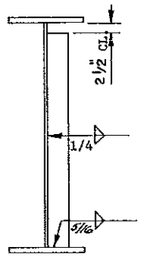
B-B



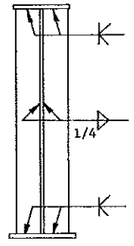
BAR a (5 3/4X5/8)
@ INTERMEDIATE DIAPHRAGM
CONNECTIONS



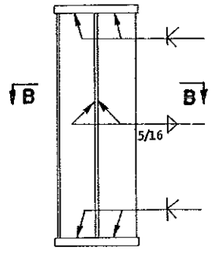
BAR b (4½X⅜)



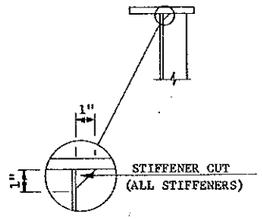
BAR c (4½X⅜)



BAR d (5½X5/8)
@ ABUTS.

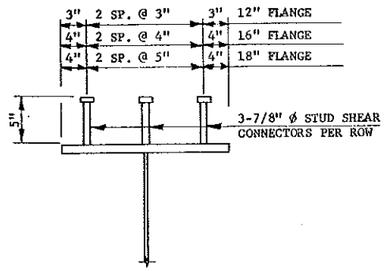


BAR e (7/8X8½)
@ PIER DIAPHRAGM
CONNECTIONS



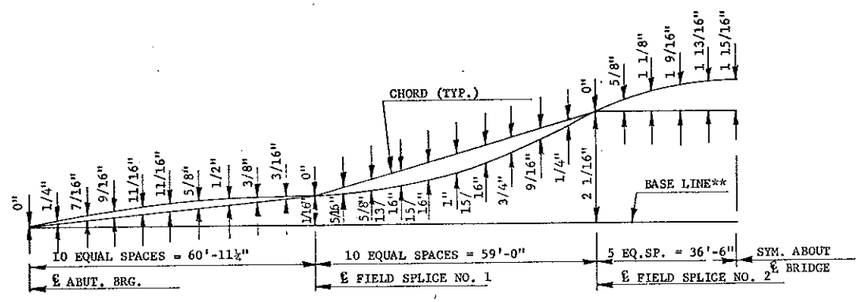
WEB STIFFENER DETAILS

TERMINATE STIFFENER TO WEB FILLET WELDS ¼" FROM
THE END OF THE STIFFENERS



SHEAR CONNECTOR DETAIL

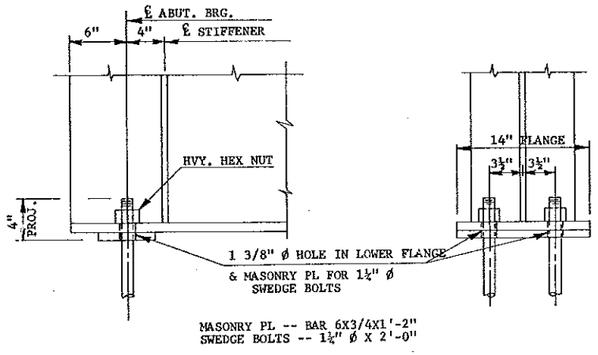
THE WEIGHT OF STUD SHEAR CONNECTORS IS INCLUDED
WITH A36 STEEL



SHOP CAMBER DIAGRAM

**BASE LINE REPRESENTS A CHORD BETWEEN
ABUTMENT BEARINGS.

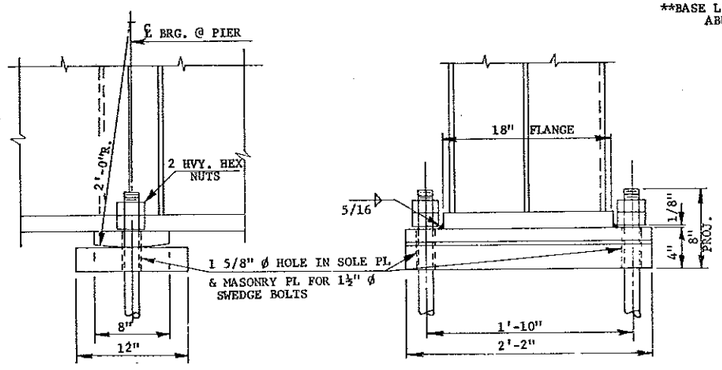
* WELD SIZE	FLANGE THICKNESS
1/4	7/16"
5/16	1" & 1½"



MASONRY PL -- BAR 6X3/4X1'-2"
SWEDGE BOLTS -- 1½" ø X 2'-0"

NOTE: SWEDGE BOLTS TO BE DRILLED AND ANCHORED IN QUICK-SETTING ANCHOR GROUT.

ABUTMENT BEARING DETAILS



SOLE PL -- BAR 8X1½X2'-2"
MASONRY PL -- PL 2½X12X2'-2"
SWEDGE BOLTS -- 1½" ø X2'-0"

PIER BEARING DETAILS

QUANTITIES

STRUCTURAL STEEL A572	338,103 LBS
STRUCTURAL STEEL A36	26,116 LBS

HEART RIVER BRIDGE

WELDED GIRDER
DETAILS

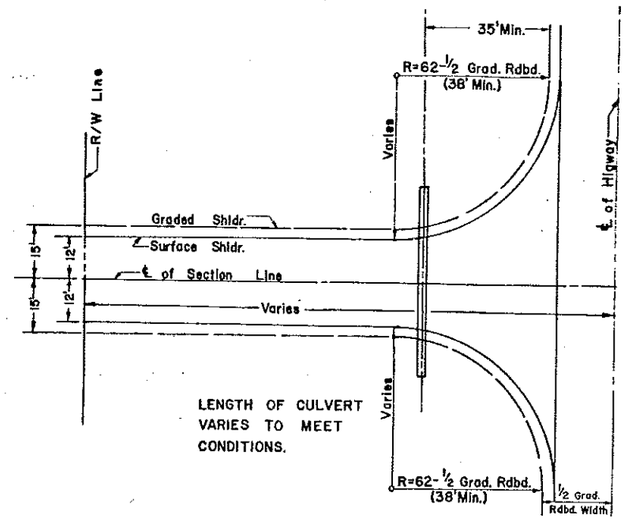
6-066.371-12

BRF-1-006(02)066

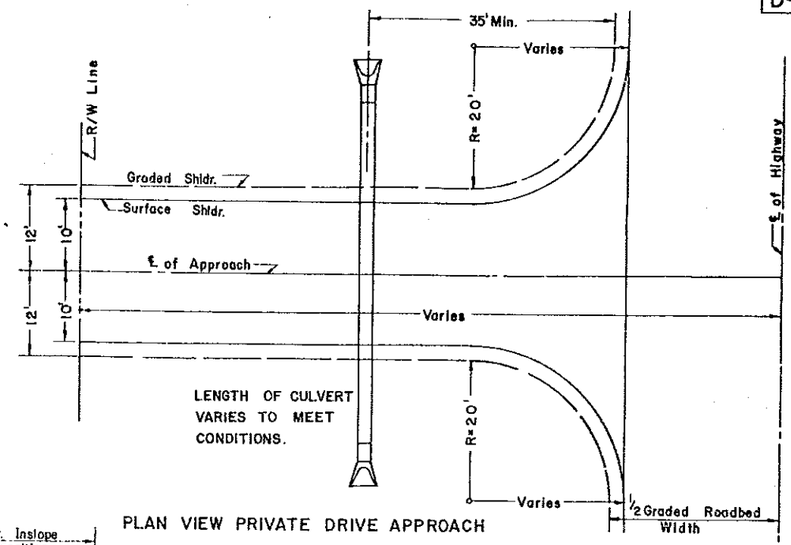
FHWA Region	State	FAS AID Proj. No.	Sheet No.
8	N.D.		

D-203-8

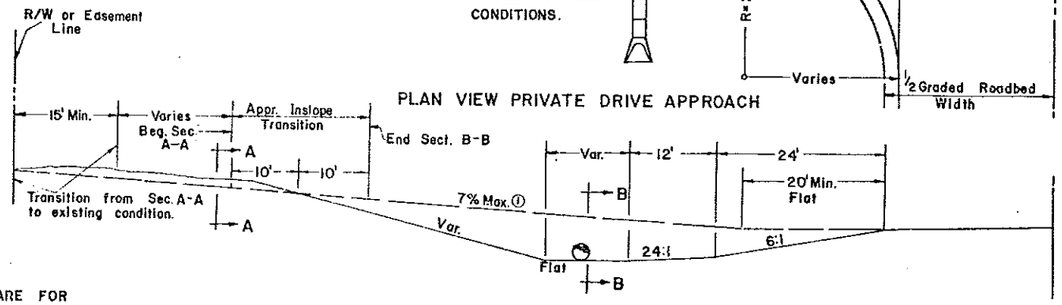
SECTION LINE & PRIVATE DRIVE APPROACHES
(RURAL)



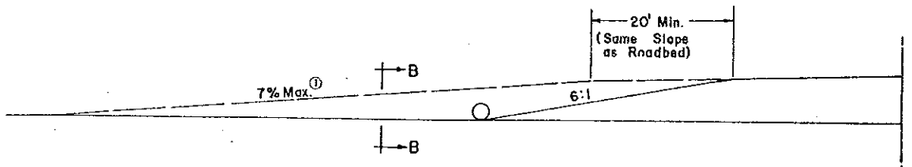
PLAN VIEW SECTION LINE APPROACH (WITHOUT SKEW)



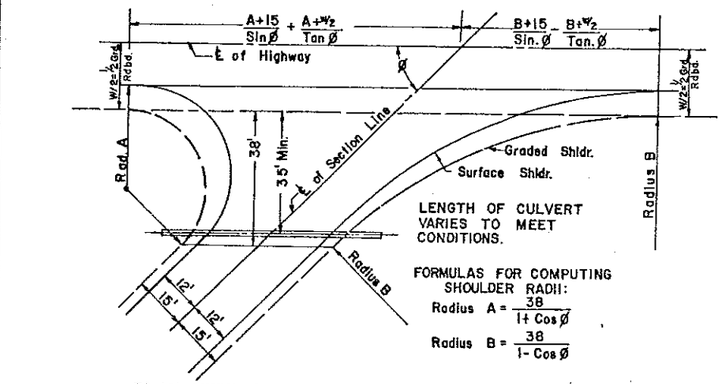
PLAN VIEW PRIVATE DRIVE APPROACH



APPROACH GRADE ON CUT SECTION



APPROACH GRADE ON FILL SECTION 12 FEET OR LESS



PLAN VIEW SECTION LINE APPROACH (SKEWED)

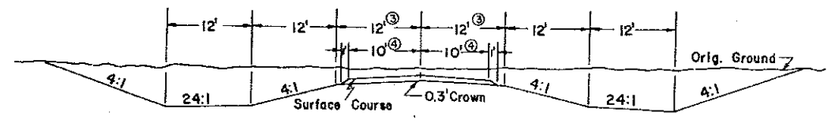
NOTE:

DIMENSIONS SHOWN FOR SURFACING ARE FOR AGGREGATE SURFACE COURSE OR BITUMINOUS SURFACE CONSTRUCTED WITH GRADING CONTRACT.

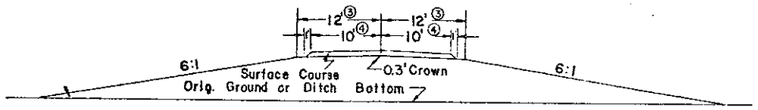
APPR. GRADES AND TYPICAL SECTIONS APPLY TO BOTH PRIVATE DRIVES AND SECTION LINE APPROACHES.

FOOT NOTES

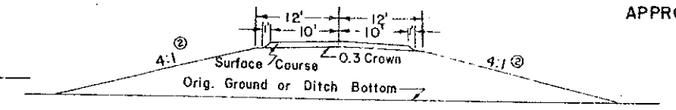
① 10% Max. on Field Drives
② 3:1 Slope - 20' to 30' Fill
2:1 Slope on Fills over 30'
③ 15' on Sec. Line Appr's.
④ 12' on Sec. Line Appr's



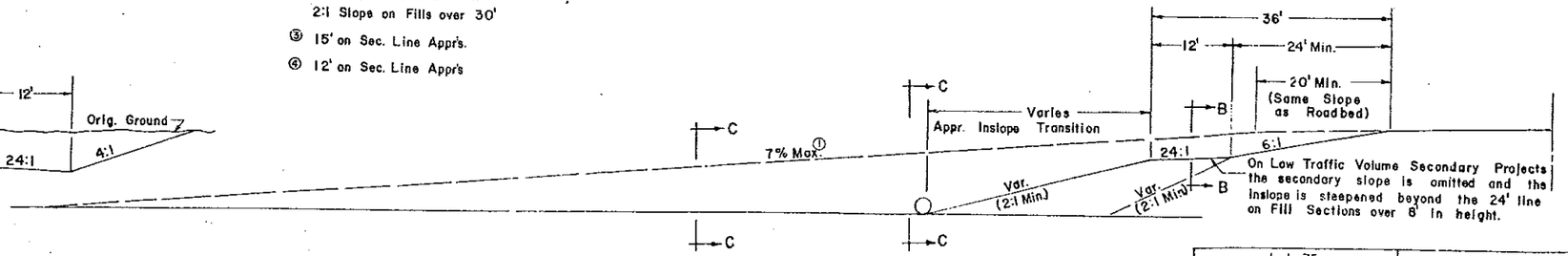
SECTION A-A



SECTION B-B



SECTION C-C



APPROACH GRADE ON FILL SECTION OVER 12 FEET

REVISIONS	
DATE	CHANGE
1-1-75	

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Submitted: _____ Design Engineer

Recommended: _____ Asst. Chief Engineer Pre-Construction

Approved: _____ Chief Engineer

BRF-1-006(02)066

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

D-630-4

CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

(ROUND PIPE)

NOTES:

Pipe and Connecting Bands shall conform to applicable sections of I'DSHD Standard Specifications and to AASHO M-36.

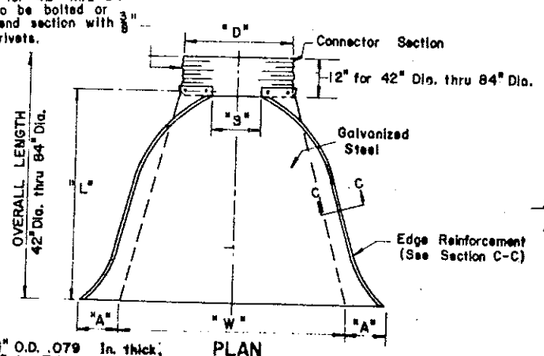
Top edge of all End Sections to have tubing reinforcement or rolled tubed reinforcement (See Section A-A). The tubing is to be supplemented with 2"x2"x 1/8" Galv. Angle for 30" thru 72" Dia. and 2 1/2"x2 1/2"x 1/8" Galv. Angle for 78" and 84" Dia. Angles to be attached by Gal. 3/8 Ø bolts and nuts. Angles are to extend from Pipe to the corner wing bend.

Elongated pipe shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.

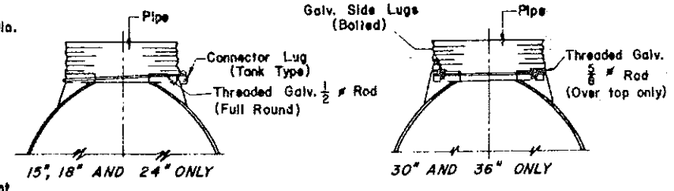
Fill Height Tables are based on the following criteria:

1. Embankment weight = 120 lb/ft³
2. Max. pipe deflection = 5%
3. Bedding - Class C
4. Compaction = 95% Proctor Density
5. Modulus of passive soil resistance (E') = 1400 psi
6. H-20 Live Load

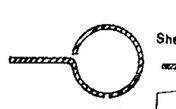
This connection for 42" thru 84" diameter pipe to be bolted or riveted to the end section with 3/8" Galv. bolts or rivets.

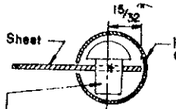


PLAN



ROD CONNECTION DETAILS

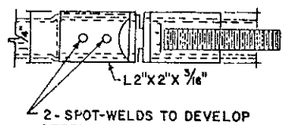


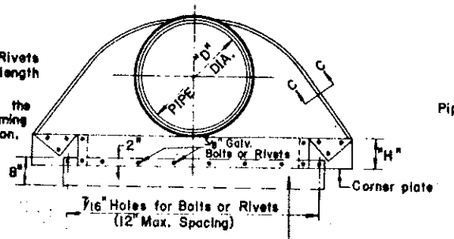


3/8" x 1/2" Galv. Buttonhead Rivets spaced 6" C. to C. Overall length of rivets = 0.78".

NOTE: Tubing is slipped over the sheet and rivets prior to forming operations of the End Section.

SECTION C-C

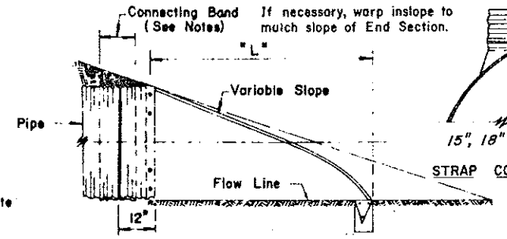




ELEVATION

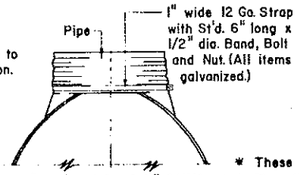
Galv. Toe Plate required on End Sections for pipe of 30" dia. or larger. Plate to be fastened to End Section in field. Thickness of Toe Plate to be same as End Section.

Where Toe Plate is needed the Toe Plate, Bolts and Nuts are to be included in price bid for End Sections.



TYPICAL CROSS-SECTION

(Showing Connector Section)



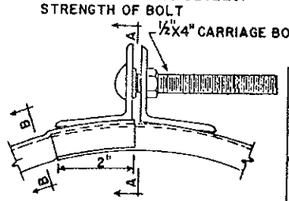
STRAP CONNECTION DETAILS

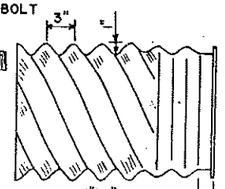
END SECTIONS

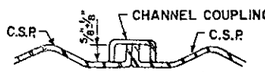
** PIPE DIA. (In.)	GALV. THICK.	DIMENSIONS A	B	H	L	W	Approx. Slope	Body Piece
		In.	In.	In.	In.	In.	Rate	
15	.064	7	8	6	26	30	2-1/2:1	1
18	.064	8	10	6	31	36	2-1/2:1	1
24	.064	10	13	6	41	48	2-1/2:1	1
30	.079	12	16	8	51	60	2-1/2:1	1
36	.079	14	19	9	60	72	2-1/2:1	2
42	.109	16	22	11	69	84	2-1/2:1	2
48	.109	18	27	12	78	90	2-1/4:1	2
54	.109	18	30	12	84	102	2:1	2
*60	.109	18	33	12	87	114	1-3/4:1	3
*66	.109	18	36	12	87	120	1-1/2:1	3
*72	.109	18	39	12	87	126	1-1/3:1	3
*78	.109	18	42	12	87	132	1-1/4:1	3
*84	.109	18	45	12	87	138	1-1/6:1	3

* These sizes have 0.138 in. center panels.

** Pipe diameter is equal to dimension "D" of end section. Manufacturers tolerances of above dimensions will be allowed. Splices to be the lap riveted type. Multiple panel bodies shall have lap seams which are to be tightly joined with 3/8" ø galv. bolts or rivets. Nuts to be torqued to 25 lbs. ±.

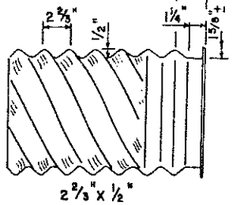






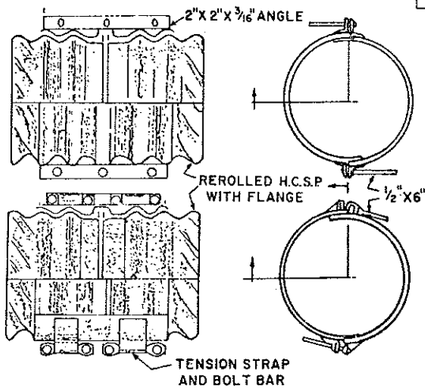
SECTION "B-B"

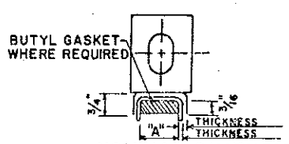
CHANNEL COUPLING BAND FOR USE ON FLANGED END C.S.P. (CHANNEL COUPLING BANDS SHALL BE TWO PIECE)



SPIRAL C.S.P

REFORMED TO ACCEPT FLANGE, ANNULAR, DIMPLE AND HUGGER COUPLERS



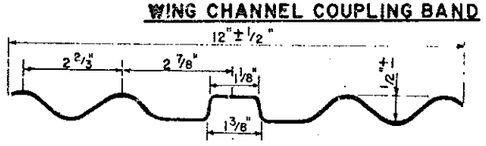


NOMINAL DIMENSIONS

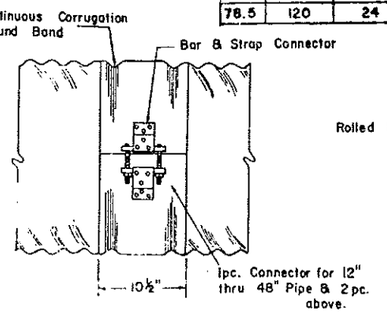
THICKNESS	"A"	FOR USE WITH C.S.P.
0.079"	3/4	0.09" THICK OR LIGHTER
0.109"	1"	0.138" THICK OR HEAVIER

SECTION "A-A"

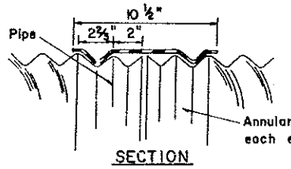
WING CHANNEL COUPLING BAND



CROSS SECTION OF WING CHANNEL COUPLING BAND



CONNECTING BAND DETAILS FOR HELICAL, WELDED - SEAM CULVERT



SECTION

FILL HEIGHT TABLES

RIVETED, WELDED OR HELICAL FABRICATION

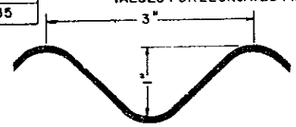
3" BY 1" CORRUGATIONS

WATERWAY AREA SQ. FT.	PIPE DIA. (IN.)	MIN. COVER (IN.)	MAX. FILL HEIGHTS OVER TOP OF PIPE — GALV. METAL THICKNESS (IN.) .064	.079	.109	.138	.168
7.1	36	12	48	60	78 (88)	89 (106)	101 (118)
9.6	42	12	41	51	64 (76)	71 (91)	79 (101)
12.6	48	12	36	45	57 (66)	61 (80)	66 (88)
15.9	54	12	32	40	52 (59)	55 (71)	59 (79)
19.6	60	12	29	36	49 (53)	51 (64)	54 (71)
23.8	66	12	26	33	47	49 (58)	51 (64)
28.3	72	12	24	30	44	47 (53)	49 (59)
33.2	78	12	22	28	41	46 (49)	47 (54)
38.5	84	12	21	26	38	45	46 (51)
44.2	90	12	19	24	35	43	45
50.3	96	12	18	22	33	40	44
56.7	102	24	17	21	31	38	42
63.6	108	24		20	30	35	39
70.9	114	24		19	28	34	37
78.5	120	24			27	32	35

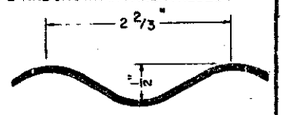
2 2/3" BY 1/2" CORRUGATIONS

WATERWAY AREA SQ. FT.	PIPE DIA. (IN.)	MIN. COVER (IN.)	MAX. FILL HEIGHTS OVER TOP OF PIPE — GALV. METAL THICKNESS (IN.) .064	.079	.109	.138	.168
1.2	15	12	67	73			
1.8	18	12	56	61			
3.1	24	12	42	46	59		
4.9	30	12	34	36	47		
7.1	36	12	28	30	39	41	
9.6	42	12	31	43	46 (67)	48 (70)	50 (73)
12.6	48	12	27	37	45 (58)	46 (61)	47 (64)
15.9	54	12		33	43 (52)	44 (54)	45 (57)
19.6	60	12			43 (47)	43 (49)	44 (51)
23.8	66	12			42	43	43 (47)
28.3	72	12				41	43
33.2	78	12					39
38.5	84	12					35

VALUES FOR ELONGATED PIPE ARE SHOWN IN PARENTHESES



3" BY 1" CORRUGATIONS



2 2/3" BY 1/2" CORRUGATIONS

REVISIONS	
DATE	CHANGE
1-1-75	Connecting Band
3-16-77	Connecting Strap
5-1-78	Flange Band Details

6-1-74

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

Submitted: _____ Design Engineer

Recommended: _____ Asst. Chief Engineer Pre-Construction

Approved: _____ Chief Engineer

CORRUGATED STEEL PIPE FLANGE BAND DETAILS

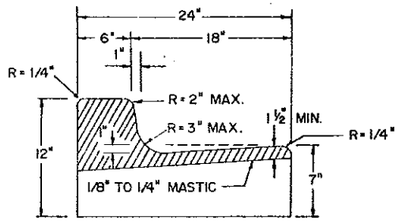
WING CHANNEL COUPLING BAND FOR ANNULAR C.S.P. OR REFORMED H.C.S.P.

BRF -1- 006(02)066

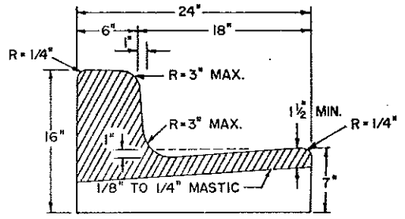
FHWA REGION	STATE	PROJECT	SHEET NO.
8	N.D.		

D-708-1

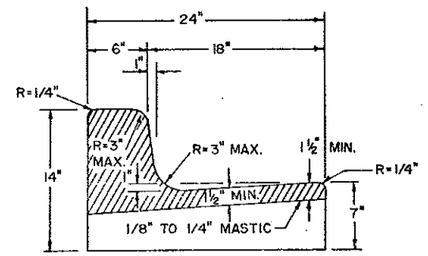
VALLEY GUTTER AND CURB & GUTTER



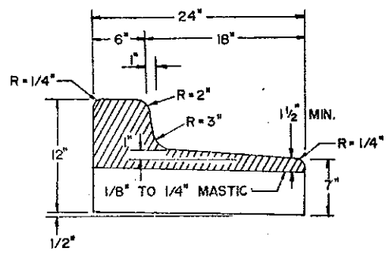
CURB & GUTTER TYPE I (SEC. A)



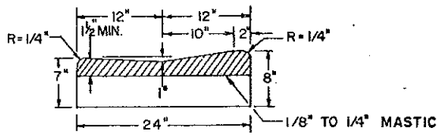
CURB & GUTTER TYPE I (SEC. B)



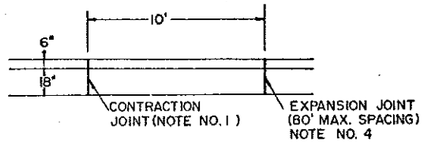
CURB & GUTTER TYPE I (SEC. C)



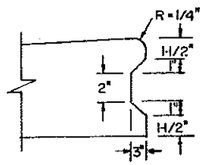
CURB & GUTTER TYPE I (SEC. D)



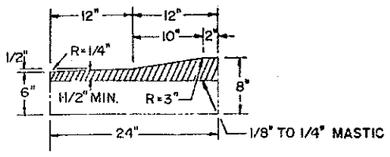
MOUNTABLE CURB & GUTTER TYPE I (SEC. A)



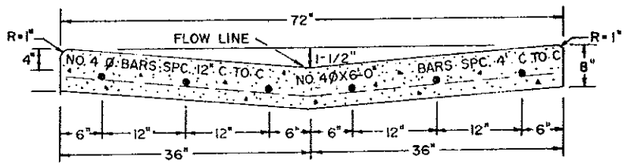
EXPANSION JOINT DETAIL



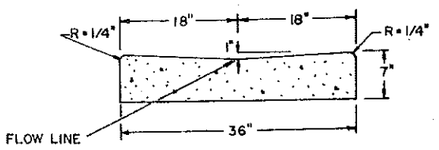
KEYWAY DETAIL FOR CURB & GUTTER
(TO BE USED WITH P.C.C. PAVEMENT)



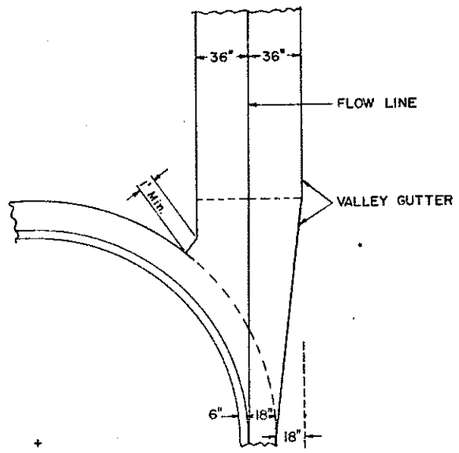
MOUNTABLE CURB & GUTTER TYPE I (SEC. B)



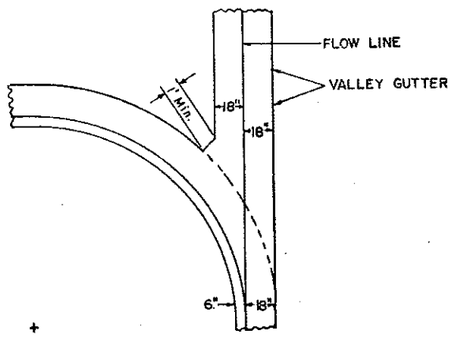
72" CONCRETE VALLEY GUTTER



36" CONCRETE VALLEY GUTTER



72" CONCRETE VALLEY GUTTER



36" CONCRETE VALLEY GUTTER

NOTES:

1. CONTRACTION JOINTS: USE 1/8"-1/4" ASPHALTIC MASTIC BOARD EMBEDDED 1-1/2" INTO THE GUTTER AND THROUGH THE CURB. THE CONTRACTOR MAY SCORE THE CURB AND GUTTER TO A DEPTH OF 2" AS AN ALTERNATE TO USING ASPHALTIC MASTIC BOARD UPON APPROVAL OF THE ENGINEER. CONTRACTION JOINTS SPACING SHALL BE AS SHOWN IN ABOVE DETAIL OR MATCH JOINTS ON PCC PVM'T.
2. THE CONTRACTOR MAY USE A 5" TOP OF CURB IN PLACE OF A 6" TOP. THE FACE OF THE CURB WILL BE MEASURED 6" FROM THE BACK OF THE CURB IN ALL CASES.
3. CURB & GUTTER TYPE I (SEC. A) TO BE USED UNLESS OTHERWISE SPECIFIED.
4. CURB AND GUTTER EXPANSION JOINT MATERIAL SHALL BE OF 3/4" PREMOLDED EXPANSION JOINT FULL DEPTH AND THE SAME SHAPE AS THE CURB AND GUTTER CONFORMING TO SECTION 824-5 OF THE STANDARD SPECIFICATIONS. ALL JOINTS SHALL BE SEALED WITH A PARA PLASTIC HOT POURED JOINT FILLER MEETING THE REQUIREMENTS OF AASHTO M-173 CONCRETE JOINT SEALER, HOT POURED ELASTIC TYPE. THE COST OF ALL LABOR AND MATERIAL NECESSARY TO CONSTRUCT EXPANSION JOINTS SHALL BE INCLUDED IN THE PRICE BID FOR CURB AND GUTTER.

7-26-77 REVISIONS	
DATE	CHANGE
8-21-80	ADDED NOTE NO. 4.
6-24-82	NOTE REVISED
9-30-82	REVISED VALLEY GUTTER

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

Submitted: _____ Design Engineer

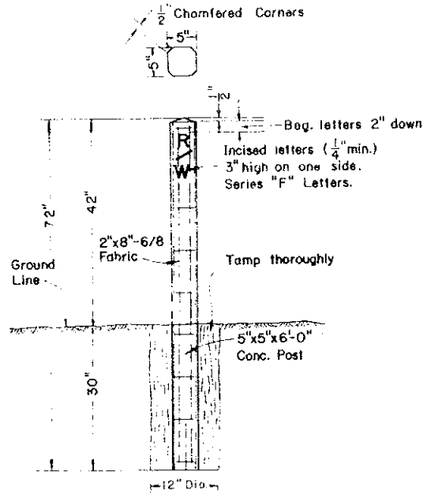
Recommended: _____ Asst. Chief Engineer Pre-Construction

Approved: _____ Chief Engineer

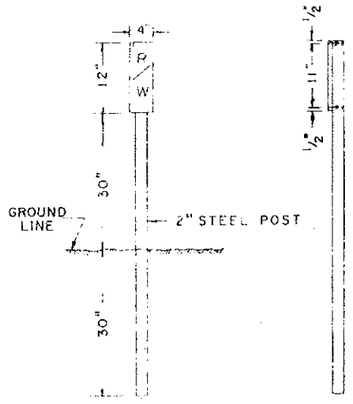
FHWA REGION	STATE	FED AID PROJ. NO.	SHEET NO.
8	N.D.	BR -I- 006(02)066	

D-720-1

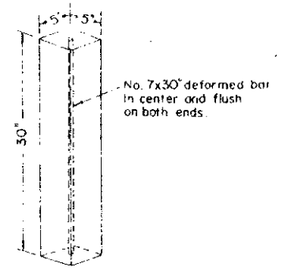
STANDARD RIGHT-OF-WAY MARKERS AND MONUMENTS



POST DETAIL



POST DETAIL



CONCRETE MONUMENT

NOTES

GENERAL:

CONTRACTOR SHALL USE CCC-C, POSTS UNLESS OTHERWISE SHOWN ON THE PLANS.

INSTALL POSTS 12" FROM MONUMENTS. IRON MONUMENTS AND POSTS SHALL BE INSTALLED ON RIGHT-OF-WAY LINE.

ALL POSTS SHALL BE INSTALLED WITH THE LETTER SIDE FACING THE PROJECT ROADWAY.

STANDARD R/W MARKERS SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH, COMPLETE IN PLACE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL EXCAVATION, BACK-FILLING, MATERIALS, LABOR, TOOLS, EQUIPMENT AND INCIDENTALS NECESSARY TO INSTALL THIS UNIT AS SHOWN ON THIS STANDARD DRAWING AT THE LOCATIONS DESIGNATED ON THE PLANS.

CONCRETE POSTS:

CONCRETE POST TO BE CLASS A CONCRETE.

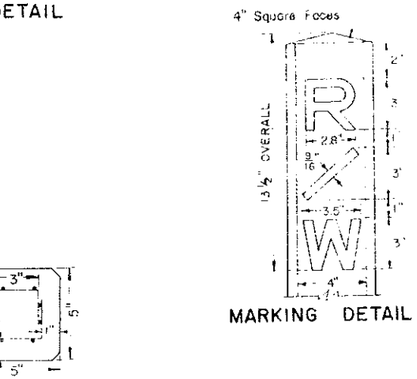
STEEL POSTS:

THE RIGHT OF WAY MARKER SHALL HAVE AN ALUMINUM OR STEEL BACKING CONFORMING TO THE REQUIREMENTS OF SECTION 894-2 OF THE STANDARD SPECIFICATIONS. THE RIGHT OF WAY MARKER SHALL BE PAINTED OR HAVE REFLECTIVE SHEETING APPLIED. THE BACKING SHALL BE CUT TO SHAPE AND SHALL BE DEGREASED, ETCHED AND COATED AS SPECIFIED IN SECTION 754 OF THE STANDARD SPECIFICATIONS. THE PAINT SHALL CONFORM TO THE REQUIREMENTS OF SECTION 870 OF THE STANDARD SPECIFICATIONS AND SHALL BE WHITE AND BLACK ENAMEL. THE REFLECTIVE SHEETING SHALL MEET THE REQUIREMENTS OF SECTION 884 OF THE STANDARD SPECIFICATIONS, Type II. THE LEGEND SHALL BE PAINTED ON PAINTED BACKGROUND OR SCREENED OR DIRECT APPLIED ON REFLECTIVE SHEETING IN ACCORDANCE WITH SECTION 894 OF THE STANDARD SPECIFICATIONS.

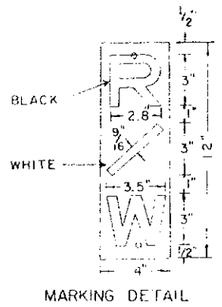
THE POST, ANCHOR AND REINFORCING SLEEVE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 894-7.6 OF THE STANDARD SPECIFICATIONS.

IRON MONUMENTS:

IRON MONUMENTS (1"X24") TO BE FURNISHED AND PLACED BY STATE HIGHWAY DEPARTMENT OR COUNTY HIGHWAY DEPARTMENT PERSONNEL AT SECTION LINES, RIGHT OF WAY BREAKS, CURVE POINTS, AND NEAR THE MID POINT OF EACH MILE. THE MONUMENTS AT THE MID POINT CAN BE ELIMINATED IF CURVE POINTS OR R/W BREAKS ARE IN THE IMMEDIATE VICINITY.



MARKING DETAIL



MARKING DETAIL

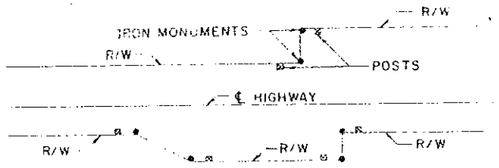
NOTE: ALL HOLES SHALL BE PUNCHED ROUND FOR 5/8" DIAMETER BOLTS

CONCRETE POST DETAILS

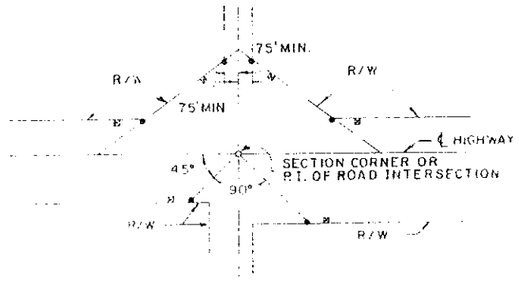
STEEL POST DETAILS

VARIOUS POST PLACEMENTS

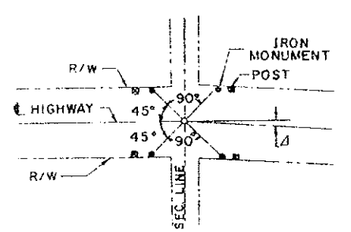
MID POINT OF MILE



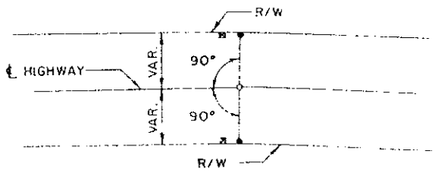
POSTS AT R/W BREAKS



FLARED R/W BREAKS



SECTION CORNERS



CURVE POINTS

3-29-77 REVISIONS	
DATE	CHANGE
5-26-77	Conc. Post Details Added
6-23-80	Notes on Steel Post
11-16-83	Note Added - Steel Post Dimensions Changed

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Submitted: _____
Design Engineer

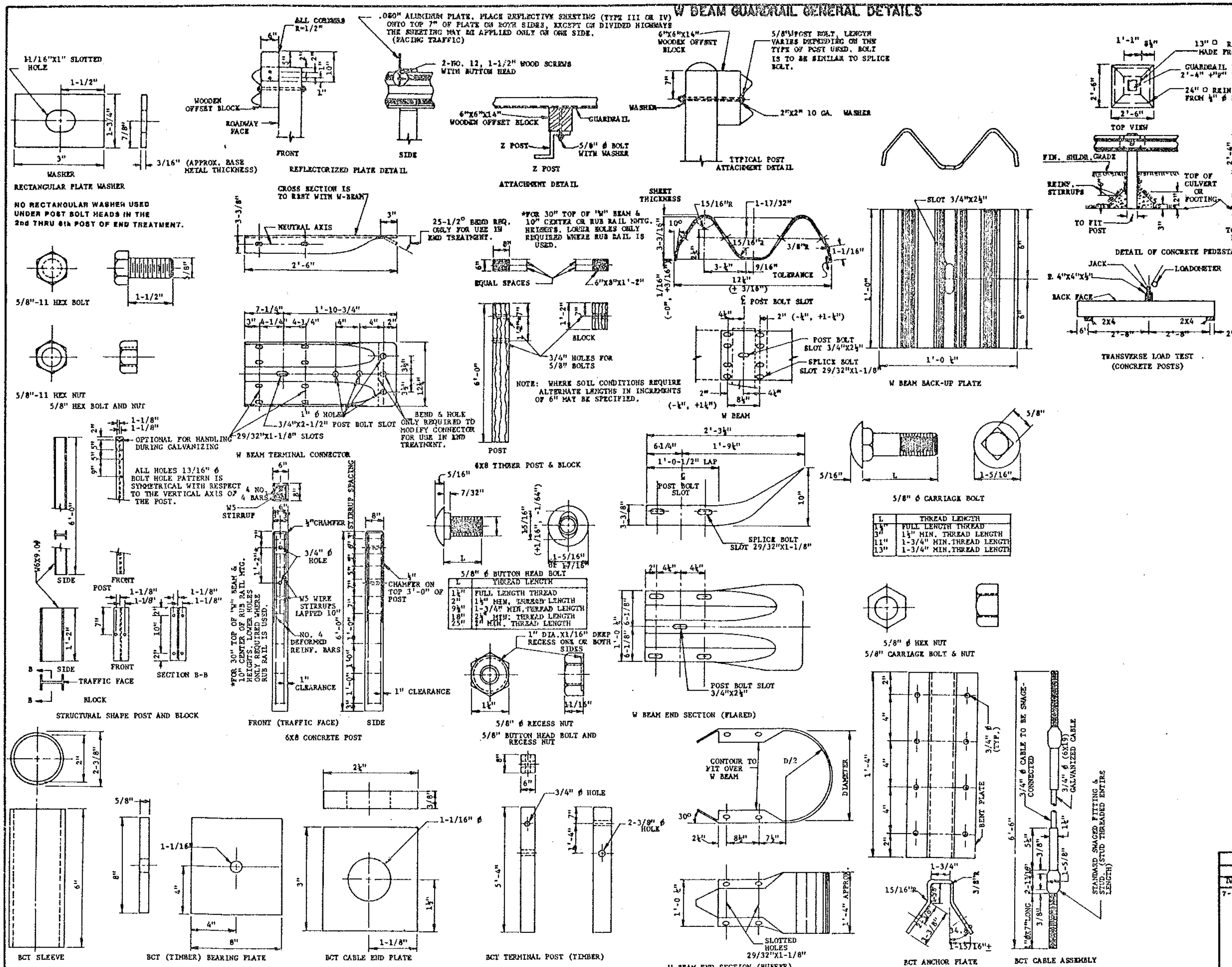
Recommended: _____
Asst. Chief Engineer
Pre-Construction

Approved _____
Chief Engineer

FHWA REGION	STATE	FED AID PROJ NO	SHEET
8	N.D.	BRF-1-006(02)066	40

D-722-1

W BEAM GUARDRAIL GENERAL DETAILS

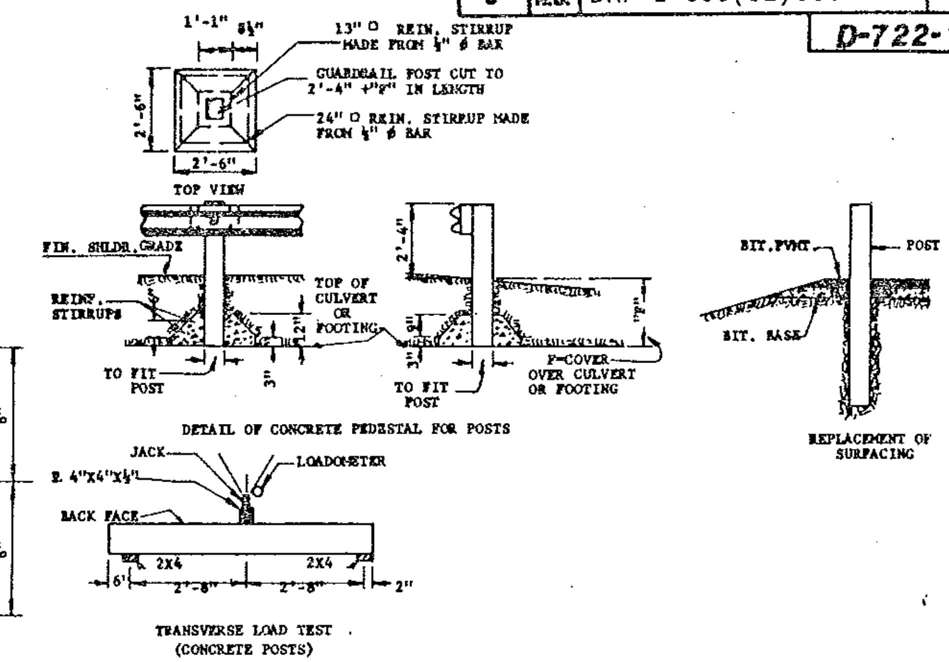


5/8" ⌀ BUTTON HEAD BOLT

L	THREAD LENGTH
1¼"	FULL LENGTH THREAD
2"	1½" MIN. THREAD LENGTH
9½"	1-3/4" MIN. THREAD LENGTH
18"	2½" MIN. THREAD LENGTH
25"	3" MIN. THREAD LENGTH

5/8" ⌀ CARRIAGE BOLT

L	THREAD LENGTH
1½"	FULL LENGTH THREAD
3"	1½" MIN. THREAD LENGTH
11"	1-3/4" MIN. THREAD LENGTH
13"	1-3/4" MIN. THREAD LENGTH



NOTE: REFLECTORS: THE REFLECTOR SHALL BE THE SAME COLOR AS THE PAVEMENT MARKING ADJACENT TO THE REFLECTOR UNLESS NOTED OTHERWISE ON THE PLANS.

ALTERNATE FOR CONCRETE FOOTINGS: A STEEL TUBE WITH A SOIL PLATE MAY BE USED AS AN ALTERNATE FOR CONCRETE FOOTINGS END TREATMENT. THE BREAKAWAY WOOD POST SHALL BE 6"X8"X42½" LONG.

DETAIL OF CONCRETE PEDESTAL FOR POSTS: TO BE USED OVER CULVERTS OR FOOTINGS WHEN DIMENSION "F" IS LESS THAN 3'-8". WHEN Z OR ROUND POSTS ARE USED AND THE PEDESTAL IS REQUIRED THE POST HOLE IN THE PEDESTAL SHALL BE VARIED AS REQUIRED BY THE POST SHAPE.

MANNER OF REPLACING BIT. MATERIAL AT GUARDRAIL POST: ALL EXCESS EARTH FROM EXCAVATIONS FOR GUARD POSTS SHALL BE DISPOSED OF AS DIRECTED BY THE ENGINEER. REPLACE BIT. MATERIAL WHEREVER GUARDRAIL IS INSTALLED AFTER MAT HAS BEEN LAID. COST OF EXCAVATION AND REPLACING OF BIT. MATERIAL TO BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS.

4-1-83

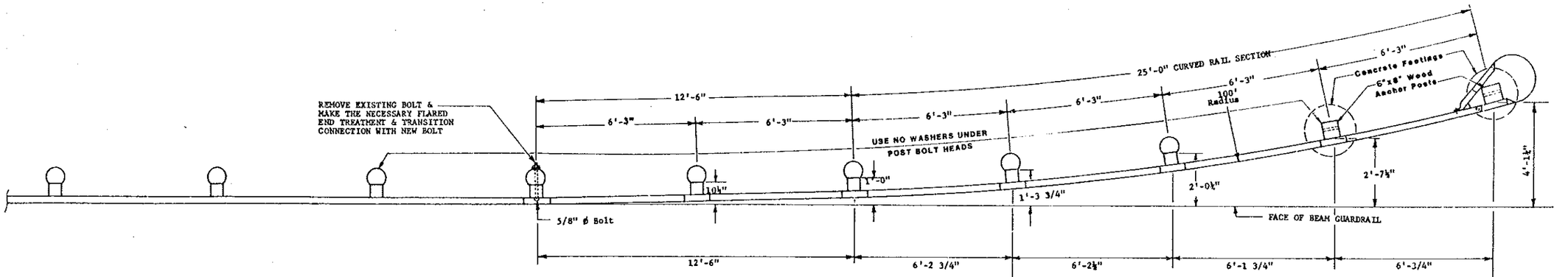
REVISIONS	
DATE	CHANGE
7-19-83	NOTE CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
SUBMITTED: [signature] DESIGN ENGINEER

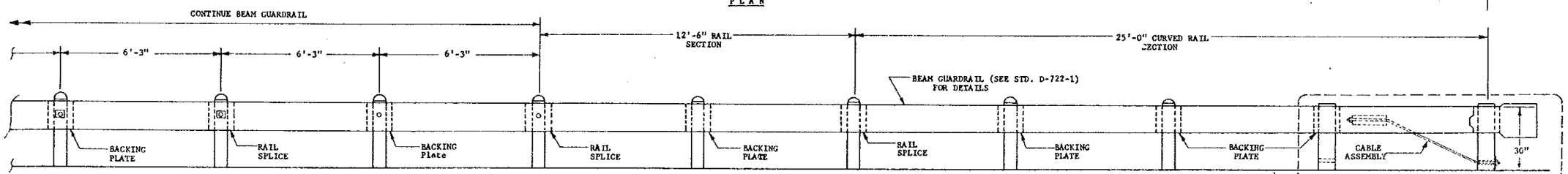
BEAM GUARDRAIL-FLARED END TREATMENT AND TRANSITION

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	

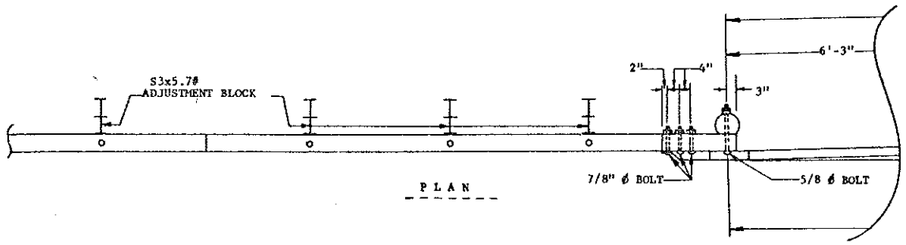
D-722-2



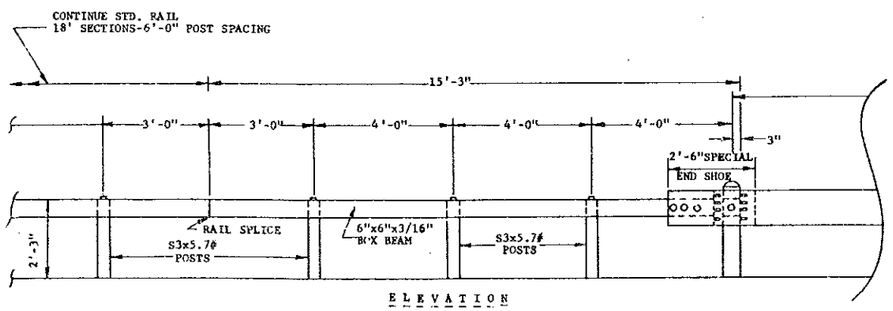
PLAN



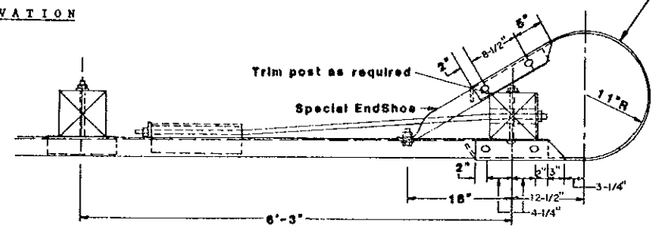
ELEVATION



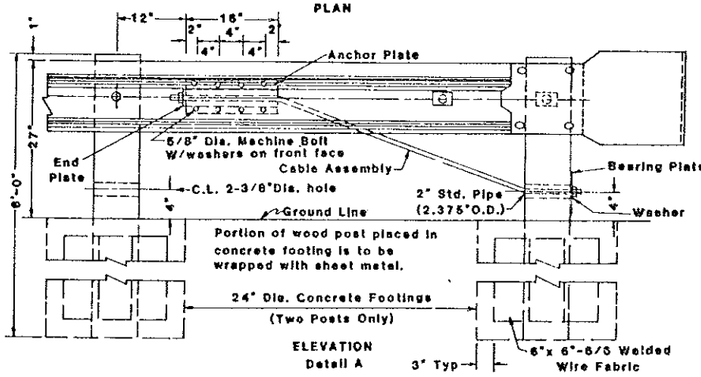
PLAN



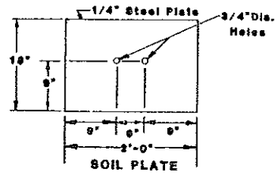
ELEVATION



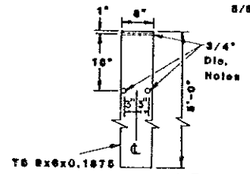
PLAN



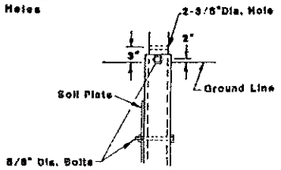
END TREATMENT



SOIL PLATE



STEEL TUBE



ALTERNATE FOUNDATION ASSEMBLY

REVISIONS	
DATE	CHANGE
6-21-83	ANCHOR POST SIZE
7-19-83	ADD NOTE

4-15-83

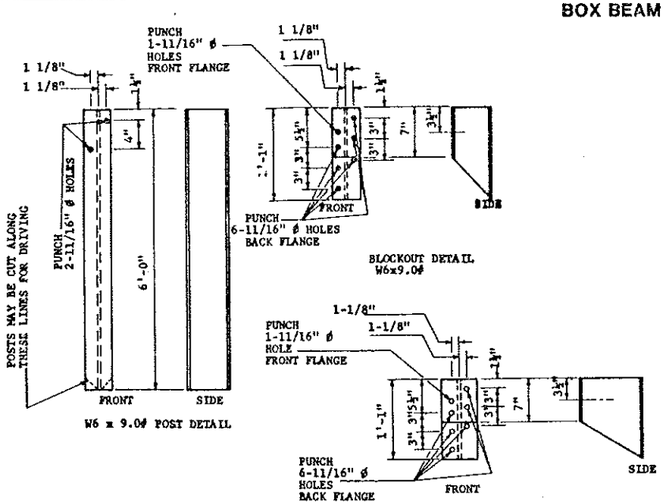
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

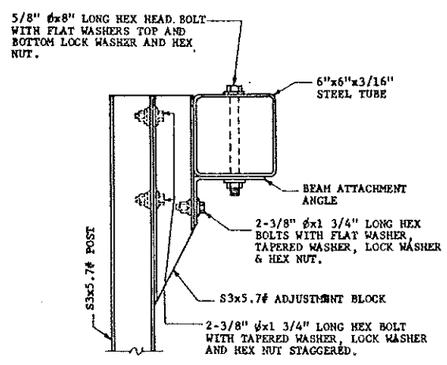
Submitted: _____ Design Engineer

BOX BEAM GUARDRAIL AT BRIDGE ENDS

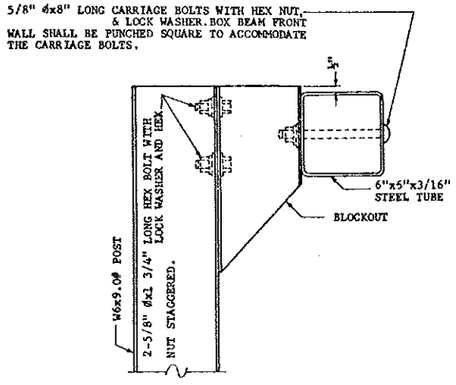
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
		BRF-1-006(02)066	

D-722-3



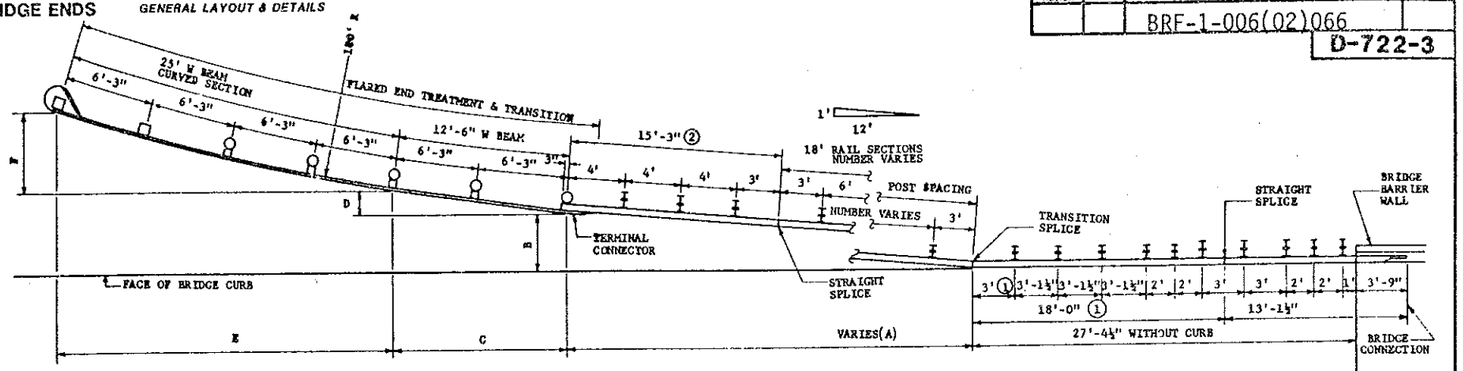


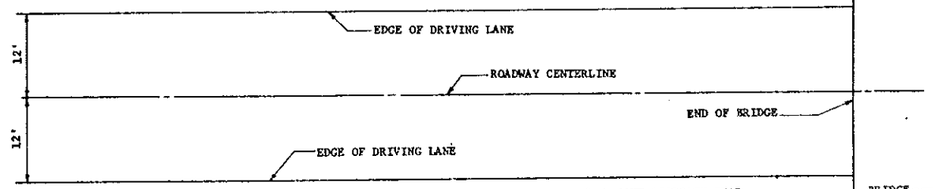
ASSEMBLY DETAIL S3x5.7# POST

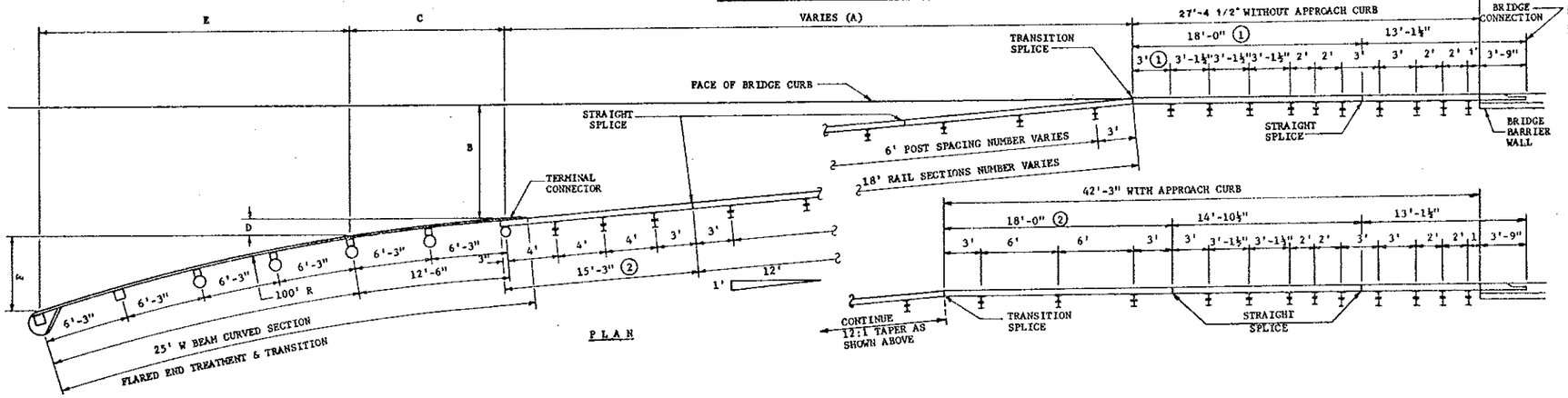


ASSEMBLY DETAIL W6x9.0# POST

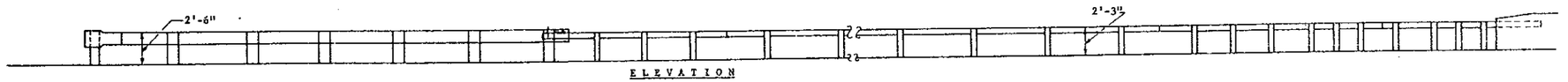
GENERAL LAYOUT & DETAILS







PLAN



ELEVATION

NOTE: POST AND BLOCKOUTS

THE POST AND BLOCKOUTS SHALL CONFORM TO THE REQUIREMENTS SECTION 850 OF THE STANDARD SPECIFICATION.

BOX BEAM GUARDRAIL.

BOX BEAM SHALL CONFORM TO THE REQUIREMENT OF SECTION 722 OF THE STANDARD SPECIFICATION.

(1) THE 18' SECTION SHALL BE REPLACED WITH A 15'-3" SECTION WITH THE LAST 3' SPACE REDUCED TO 3" AND HAVE THE TERMINAL CONNECTOR ATTACHED AND 12'-6" W BEAM SECTION AS SHOWN ON STD. D-722-2 THE FLARED END TREATMENT. INSTALLED ACCORDINGLY.

(2) THE 18' SECTION SHALL BE REPLACED WITH 15'-3" SECTION AND POST SPACING AS SHOWN FOR THE 15'-3" SECTION AND HAVE THE TERMINAL CONNECTOR ATTACHED AND 12'-6" W BEAM GUARDRAIL SECTION ON STD. D-722-2 . THE FLARED END TREATMENT INSTALLED ACCORDINGLY.

12-1-82	
REVISIONS	
DATE	CHANGE
7-19-83	ADD DISTANCE

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

Submitted: David K. Olson
Design Engineer

FHWA REGION	STATE	FED. AID PROJ. NO.	ALT. NO.
		BRF-1-006(02)066	

D-722-4

BOX BEAM GUARDRAIL AT BRIDGE ENDS

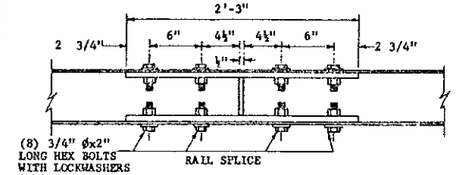
DIMENSIONS AND DETAILS

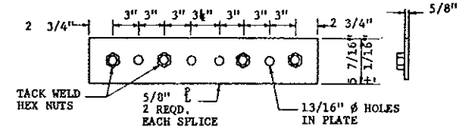
BOX BEAM DIMENSION TABLE

DESIGN TRAFFIC VOLUME (ADT)

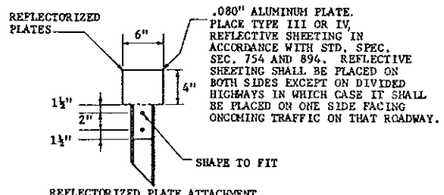
	CLEAR ROWY. WIDTH OF BRIDGE	APPROACH SIDE													OPPOSITE SIDE											
		WITHOUT APPROACH CURB							WITH APPROACH CURB							WITHOUT APPROACH CURB							WITH APPROACH CURB						
		A FT.	B FT.	C FT.	D FT.	E FT.	F FT.	GUARD RAIL ① LF	A FT.	B FT.	C FT.	D FT.	E FT.	F FT.	GUARD RAIL ① LF	A FT.	B FT.	C FT.	D FT.	E FT.	F FT.	GUARD RAIL ① LF	A FT.	B FT.	C FT.	D FT.	E FT.	F FT.	GUARD RAIL ① LF
UNDER 250	44	33.14	2.76	12.43	1.29	24.29	5.64	64.4	15.20	1.27	12.43	1.29	24.29	5.64	61.3	0	0	12.49	0.25	24.67	3.60	28.4	0	0	12.49	0.25	24.67	3.60	43.3
	42	33.14	2.76					64.4	15.20	1.27					61.3	0	0					28.4	0	0					43.3
	40	33.14	2.76					64.4	33.14	2.76					79.3	0	0					28.5	0	0					43.3
	38	51.08	4.25					82.4	33.14	2.76					79.3	0	0					28.5	0	0					43.3
	36	51.08	4.25					82.4	33.14	2.76					79.3	0	0					28.5	0	0					43.3
	34	51.08	4.25					82.4	51.08	4.25					97.3	0	0					28.5	0	0					43.3
	32	69.02	5.74					100.4	51.08	4.25					97.3	0	0					28.5	0	0					43.3
	30	69.02	5.74					100.4	51.08	4.25					97.3	0	0					28.5	0	0					43.3
	28	69.02	5.74					100.4	69.02	5.74					115.3	15.20	1.27					46.4	0	0					43.3
	26	86.96	7.23					118.4	69.02	5.74					115.3	15.20	1.27					46.4	0	0					43.3
	24	86.96	7.23					118.4	69.02	5.74					115.3	15.20	1.27					46.4	15.20	1.27	12.43	1.29	24.29	5.64	61.3
800-250	44	51.08	4.25	12.43	1.29	24.29	5.64	82.4	33.14	2.76	12.43	1.29	24.29	5.64	79.3	0	0	12.49	0.25	24.67	3.60	28.4	0	0	12.49	0.25	24.67	3.60	43.3
	42	51.08	4.25					82.4	33.14	2.76					79.3	0	0					28.4	0	0					43.3
	40	51.08	4.25					82.4	51.08	4.25					97.3	0	0					28.4	0	0					43.3
	38	69.02	5.74					100.4	51.08	4.25					97.3	0	0					28.4	0	0					43.3
	36	69.02	5.74					100.4	51.08	4.25					97.3	0	0					28.4	0	0					43.3
	34	69.02	5.74					100.4	69.02	5.74					115.3	15.02	1.27					46.4	0	0					43.3
	32	86.96	7.23					118.4	69.02	5.74					115.3	15.02	1.27					46.4	0	0					43.3
	30	86.96	7.23					118.4	69.02	5.74					115.3	15.02	1.27					46.4	15.20	1.27					61.3
	28	86.96	7.23					118.4	86.96	7.23					133.3	33.14	2.76					64.4	15.20	1.27					61.3
	26	86.96	7.23					118.4	86.96	7.23					133.3	33.14	2.76					64.4	15.20	1.27					61.3
	24	104.90	8.72					136.4	86.96	7.23					133.3	33.14	2.76					64.4	15.20	1.27					61.3
2000-800	44	51.08	4.25	12.43	1.29	24.29	5.64	82.4	51.08	4.25	12.43	1.29	24.29	5.64	97.3	0	0	12.49	0.25	24.67	3.60	28.4	0	0	12.49	0.25	24.67	3.60	43.3
	42	69.02	5.74					100.4	51.08	4.25					97.3	0	0					28.4	0	0					43.3
	40	69.02	5.74					100.4	51.08	4.25					97.3	0	0					28.4	0	0					43.3
	38	86.96	7.23					100.4	69.02	5.74					115.3	15.02	1.27					46.4	0	0					43.3
	36	86.96	7.23					118.4	69.02	5.74					115.3	15.02	1.27					46.4	0	0					43.3
	34	86.96	7.23					118.4	69.02	5.74					115.3	15.02	1.27					46.4	15.20	1.27					61.3
	32	86.96	7.23					118.4	86.96	7.23					133.3	33.14	2.76					64.4	15.20	1.27					61.3
	30	104.90	8.72					136.4	86.96	7.23					133.3	33.14	2.76					64.4	15.20	1.27					61.3
	28	104.90	8.72					136.4	86.96	7.23					133.3	33.14	2.76					64.4	33.14	2.76					79.3
	26	104.90	8.72					136.4	104.90	8.72					151.3	51.08	4.25					82.4	33.14	2.76					79.3
	24	122.84	10.21					154.4	104.90	8.72					151.3	51.08	4.25					82.4	33.14	2.76					79.3
6000-2000	44	69.02	5.74	12.43	1.29	24.29	5.64	100.4	69.02	5.74	12.43	1.29	24.29	5.64	115.3	15.08	1.27	12.49	0.25	24.67	3.60	46.4	0	0	12.49	0.25	24.67	3.60	43.3
	42	86.96	7.23					118.4	69.02	5.74					115.3	15.08	1.27					46.4	0	0					43.3
	40	86.96	7.23					118.4	69.02	5.74					115.3	15.08	1.27					46.4	15.20	1.27					61.3
	38	86.96	7.23					118.4	86.96	7.23					133.3	33.14	2.76					64.4	15.20	1.27					61.3
	36	104.90	8.72					136.4	86.96	7.23					133.3	33.14	2.76					64.4	15.20	1.27					61.3
	34	104.90	8.72					136.4	86.96	7.23					133.3	33.14	2.76					64.4	15.20	1.27					61.3
	32	104.90	8.72					136.4	104.90	8.72					151.3	51.08	4.25					82.4	33.14	2.76					79.3
	30	122.84	10.21					154.4	104.90	8.72					151.3	51.08	4.25					82.4	33.14	2.76					79.3
	28	122.84	10.21					154.4	104.90	8.72					151.3	51.08	4.25					82.4	51.08	4.25					97.3
	26	122.84	10.21					154.4	122.84	10.21					169.3	51.08	4.25					82.4	51.08	4.25					97.3
	24	122.84	10.21					154.4	122.84	10.21					169.3	69.02	5.74					100.4	51.08	4.25					97.3
OVER 6000	44	86.96	7.23	12.43	1.29	24.29	5.64	118.4	86.96	7.23	12.43	1.29	24.29	5.64	133.3	33.14	2.76	12.43	1.29	24.29	5.64	64.4	15.20	1.27	12.43	1.29	24.29	5.64	61.3
	42	104.90	8.72					136.4	86.96	7.23					133.3	33.14	2.76					64.4	33.14	2.76					79.3
	40	104.90	8.72					136.4	86.96	7.23					133.3	33.14	2.76					64.4	33.14	2.76					79.3
	38	104.90	8.72					136.4	104.90	8.72					151.3	51.08	4.25					82.4	33.14	2.76					79.3
	36	122.84	10.21					154.4	104.90	8.72					151.3	51.08	4.25					82.4	33.14	2.76					79.3
	34	122.84	10.21					154.4	104.90	8.72					151.3	51.08	4.25					82.4	51.08	4.25					97.3
	32	122.84	10.21					154.4	122.84	10.21					169.3	69.02	5.74					100.4	51.08	4.25					97.3
	30	140.78	11.70					172.4	122.84	10.21					169.3	69.02	5.74					100.4	51.08	4.25					97.3
	28	140.78	11.70					172.4	122.84	10.21					169.3	69.02	5.74					100.4	69.02	4.25					115.3
	26	140.78	11.70					172.4	140.78	11.70					187.3	86.96	7.23					118.4	69.02	5.74					115.3
	24	140.78	11.70					172.4	140.78	11.70					187.3	86.96	7.23					118.4	69.02	5.74					115.3

① THE GUARDRAIL LENGTH DOES NOT INCLUDE THE END TREATMENT & TRANSITION 37.5' W-BEAM.

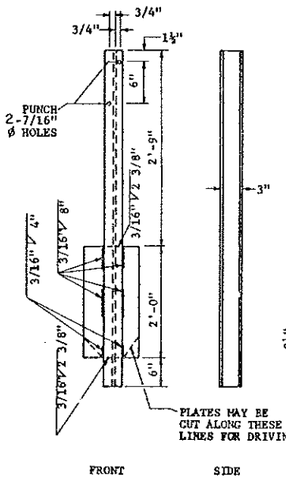




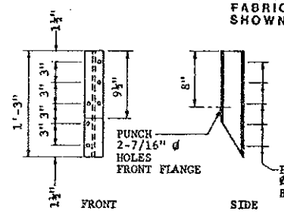
STRAIGHT SPLICE
USE ON TANGENT SECTIONS



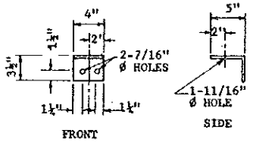
REFLECTORIZED PLATE ATTACHMENT DETAIL SPACED @ 24' CENTERS ON GUARDRAIL LESS THAN 250' IN LENGTH AND 48' CENTERS FOR GUARDRAIL OVER 250' IN LENGTH. THE REFLECTOR SHALL BE THE SAME COLOR AS THE PAVEMENT MARKING ADJACENT TO THAT REFLECTOR UNLESS NOTED OTHERWISE ON THE PLANS.



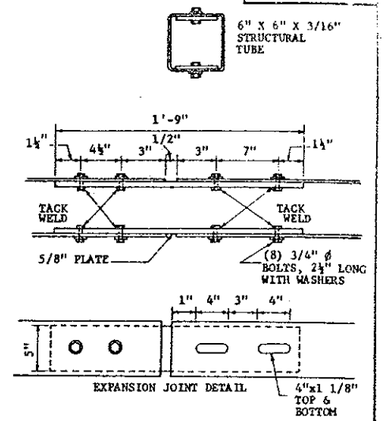
S 3 x 5.7# POST DETAIL



ADJUSTMENT BLOCK DETAIL
S3 x 5.7#



5" x 3½" L 10.4# BEAM ATTACHMENT DETAIL



NOTE: THE TRANSITION SPLICE PLATE SHALL BE FABRICATED FROM A PLATE BY CUTTING TO SHAPE SHOWN. NO WELDING WILL BE ALLOWED TO FABRICATED PLATE TO THE SHAPE SHOWN.

NOTE: SPLICE PLATES IN LIEU OF TACK WELDING 3/4" HEX NUTS TO STRAIGHT AND TRANSITION SPLICE PLATE THE CONTRACTOR MAY CHOOSE TO TAP THE PLATE FOR A 3/4" DIAMETER BOLT.

12-1-82	
REVISIONS	
DATE	CHANGE
6-21-83	POST & ADJUST. BLK. HOLE PUNCHING
7-19-83	NOTE CHANGE
9-7-83	Add Note

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED: David K. Sean

DESIGN ENGINEER

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	

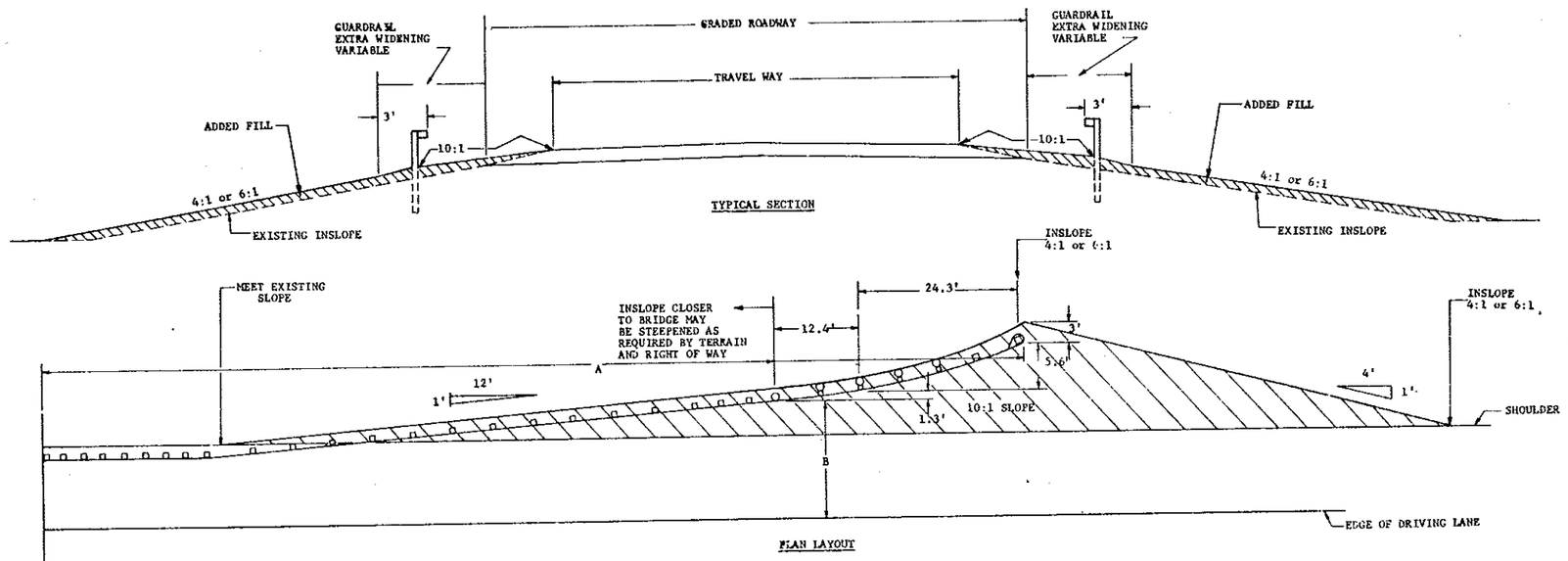
D-722-5

TYPICAL GRADING AT BRIDGE ENDS

With Breakaway Cable Terminal

BOX BEAM DIMENSION TABLE

DESIGN TRAFFIC VOLUME (ADT)	CLEAR RDWY. WIDTH OF BRIDGE	APPROACH SIDE: WITHOUT APPROACH CURB A FT.	APPROACH SIDE: WITHOUT APPROACH CURB B FT.	APPROACH SIDE: WITH APPROACH CURB A FT.	APPROACH SIDE: WITH APPROACH CURB B FT.	OPPOSITE SIDE: WITHOUT APPROACH CURB A FT.	OPPOSITE SIDE: WITHOUT APPROACH CURB B FT.	OPPOSITE SIDE: WITH APPROACH CURB A FT.	OPPOSITE SIDE: WITH APPROACH CURB B FT.
UNDER 250	44	60.5	12.8	57.5	11.3	30.1	10.0	39.5	10.0
	42	60.5	11.8	57.5	10.3	30.1	9.0	39.5	9.0
	40	60.5	10.8	75.4	10.8	30.1	8.0	39.5	8.0
	38	78.5	11.3	75.4	9.8	30.1	7.0	39.5	7.0
	36	78.5	10.3	75.4	8.8	30.1	6.0	39.5	6.0
	34	78.5	9.3	93.3	9.3	30.1	5.0	39.5	5.0
	32	96.4	9.7	93.3	8.3	30.1	4.0	39.5	4.0
	30	96.4	8.7	93.3	7.3	30.1	3.0	39.5	3.0
	28	96.4	7.7	111.3	7.7	42.6	3.3	39.5	2.0
	26	114.3	8.2	111.3	6.7	42.6	2.3	39.5	1.0
	24	114.3	7.2	111.3	5.7	42.6	1.3	57.5	1.3
800-250	44	78.5	14.3	75.4	12.3	30.1	10.0	39.5	10.0
	42	78.5	13.3	75.4	11.8	30.1	9.0	39.5	9.0
	40	78.5	12.3	93.3	12.3	30.1	8.0	39.5	8.0
	38	96.4	12.7	93.3	11.3	30.1	7.0	39.5	7.0
	36	96.4	11.7	93.3	10.3	30.1	6.8	39.5	6.0
	34	96.4	10.7	111.3	10.7	42.6	6.3	39.5	5.0
	32	114.3	11.2	111.3	9.7	42.6	5.3	39.5	4.0
	30	114.3	10.2	111.3	8.7	42.6	4.3	57.5	4.3
	28	114.3	9.2	129.2	9.2	60.5	4.8	57.5	3.3
	26	114.3	8.2	129.2	8.2	60.5	3.8	57.5	2.3
	24	132.3	8.7	129.2	7.2	60.5	2.8	57.5	1.3
2000-800	44	78.5	14.3	93.3	14.3	30.1	10.0	39.5	10.0
	42	96.4	14.7	93.3	13.3	30.1	9.0	39.5	9.0
	40	96.4	13.7	93.3	12.3	30.1	8.0	39.5	8.0
	38	96.4	12.7	111.3	12.7	42.6	8.3	39.5	7.0
	36	114.3	13.2	111.3	11.7	42.6	7.3	39.5	6.0
	34	114.3	12.2	111.3	10.7	42.6	6.3	57.5	6.3
	32	114.3	11.2	129.2	11.2	60.5	6.8	57.5	5.3
	30	132.3	11.7	129.2	10.2	60.5	5.8	57.5	4.3
	28	132.3	10.7	129.2	9.2	60.5	4.8	75.4	4.8
	26	132.3	9.7	147.2	9.7	78.5	5.3	75.4	3.8
	24	132.3	8.7	147.2	8.7	78.5	4.3	75.4	2.8
6000-2000	44	96.4	15.7	111.3	15.7	42.6	11.3	39.5	10.0
	42	114.3	16.2	111.3	14.7	42.6	10.3	39.5	9.0
	40	114.3	15.2	111.3	13.7	42.6	9.3	57.5	9.3
	38	114.3	14.2	129.2	14.2	60.5	9.8	57.5	8.3
	36	132.3	14.7	129.2	13.2	60.5	8.8	57.5	7.3
	34	132.3	13.7	129.2	12.2	60.5	7.8	57.5	6.3
	32	132.3	12.7	147.2	12.7	78.5	8.3	75.4	6.8
	30	150.2	13.2	147.2	11.7	78.5	7.3	75.4	5.8
	28	150.2	12.2	147.2	10.7	78.5	6.3	93.3	6.3
	26	150.2	11.2	165.1	11.2	78.5	5.3	93.3	5.3
	24	150.2	10.2	165.1	10.2	96.4	5.7	93.3	4.3
OVER 6000	44	114.3	17.2	129.2	17.2	60.5	12.8	57.5	11.3
	42	132.3	17.7	129.2	16.2	60.5	11.8	75.4	11.8
	40	132.3	16.7	129.2	15.2	60.5	10.8	75.4	10.8
	38	132.3	15.7	147.2	15.7	78.5	11.2	75.4	9.8
	36	150.2	16.2	147.2	14.7	78.5	10.2	75.4	8.8
	34	150.2	15.2	147.2	13.7	78.5	9.2	93.3	9.3
	32	150.2	14.2	165.1	14.2	96.4	9.7	93.3	8.3
	30	168.2	14.7	165.1	13.2	96.4	8.7	93.3	7.3
	28	168.2	13.7	165.1	12.2	96.4	7.7	111.3	7.7
	26	168.2	12.7	183.0	12.7	114.4	8.2	111.3	6.7
	24	168.2	11.7	183.0	11.7	114.4	7.2	111.3	5.7



NOTE: THE DESIGN TRAFFIC VOLUMES (ADT) SHALL BE AS SHOWN ON TITLE SHEET UNDER TRAFFIC-FORECAST. THE "WITH APPROACH CURB" LENGTH SHALL BE USED WHERE BRIDGE APPROACH DRAINS ARE INSTALLED. ON DIVIDED HIGHWAYS THE MEDIAN SIDE SHALL USE THE LENGTHS AS SHOWN ON THE PLAN LAYOUTS.

WHERE NORMAL INSLOPE IS 4:1 THE ADDED FILL SHALL BE 4:1.

WHERE NORMAL INSLOPE IS 6:1 THE ADDED FILL SHALL BE 6:1.

REVISIONS	
DATE	CHANGE
7-26-83	NOTE CHANGE

12-1-82

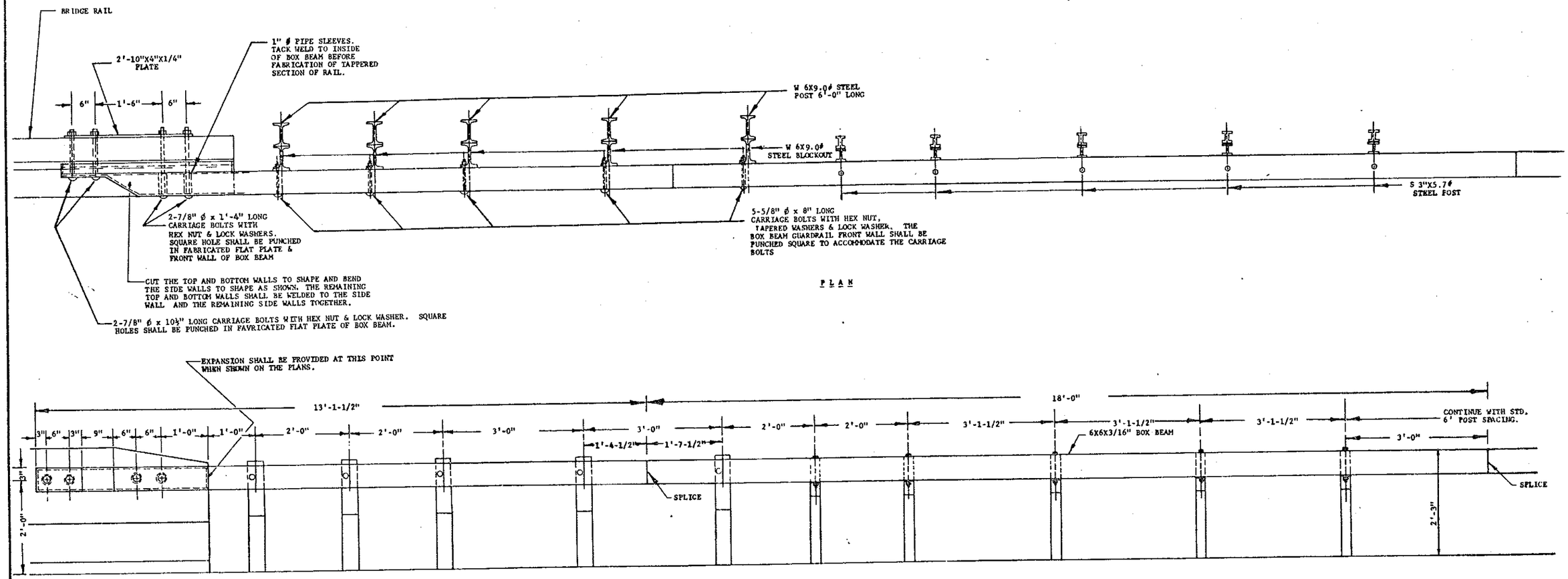
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED: _____ DESIGN ENGINEER

BOX BEAM GUARD RAIL AT BRIDGE ENDS ATTACHMENT DETAIL
WITHOUT CURB

FHWA REGION	STATE	FED. AID PROJ. NO.
8	N.D.	BRF-1-006(02)066

D-722-16



REVISIONS	
DATE	CHANGE
7-28-81	GUARDRAIL HEIGHT
10-13-81	BLOCKOUT SIZE AND WEIGHT
6-24-82	ELEV. & SPACER DETAIL
9-27-82	ADD NOTE & BOLT LENGTH
12-15-80	

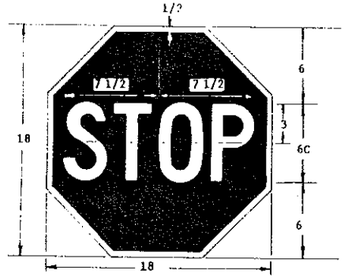
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

SUBMITTED: _____ DESIGN ENGINEER

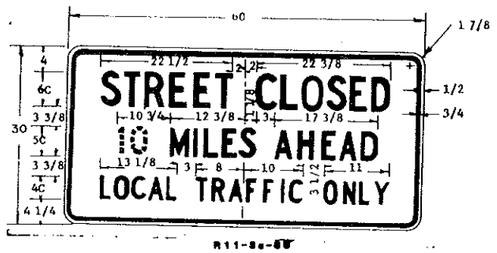
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-I-006(02)066	

D754-I

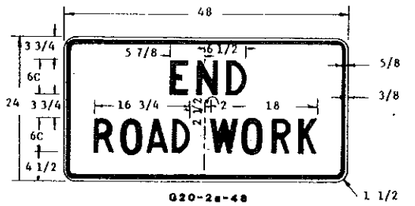
CONSTRUCTION SIGN DETAILS



STOP-SLOW PADDLE
RED & WHITE
FLAGPERSON PADDLE

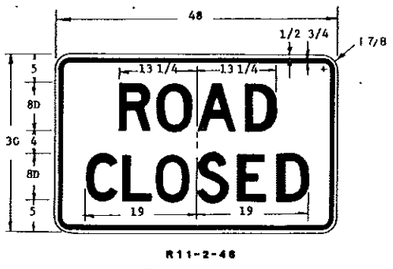


R11-8a-60
BLACK & WHITE

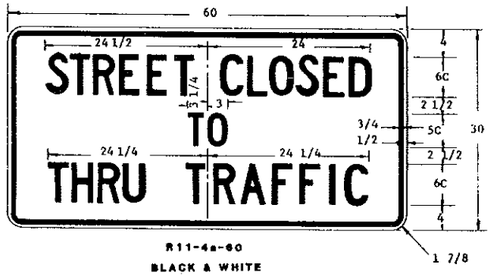


G20-2a-48
BLACK & ORANGE

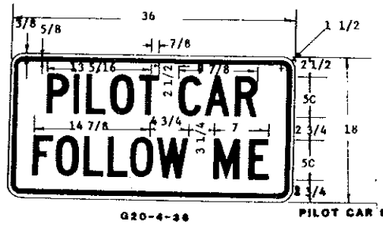
G20-8-48
BLACK & ORANGE



R11-2-48
BLACK & WHITE

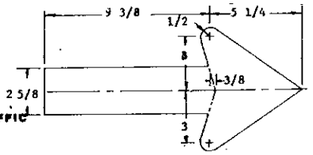


R11-4a-60
BLACK & WHITE



G20-4-36
BLACK & ORANGE

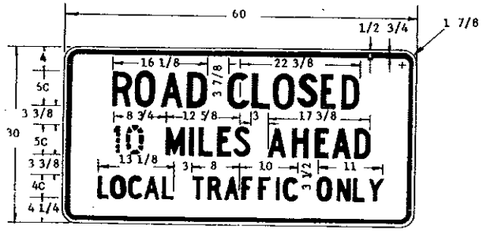
PILOT CAR SIGN SHALL BE MOUNTED ON REAR OF A VEHICLE USED FOR GUIDING CONTROLLED ONE-WAY TRAFFIC THROUGH A CONSTRUCTION AREA.



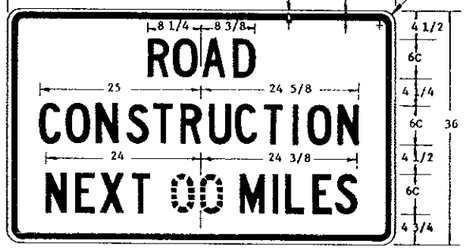
ARROW DETAIL FOR SIGN NO'S.
G20-60-72 & G20-62-72

MESSAGES AND BORDERS: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 804-3.5 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTER GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS.
THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.

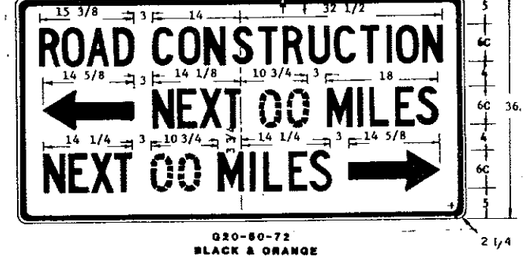
NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGE BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORIZED.



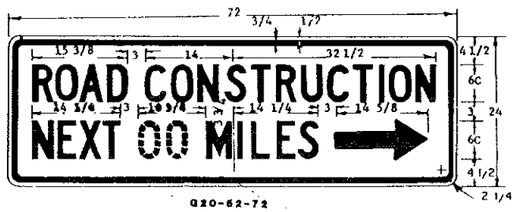
R11-3a-60
BLACK & WHITE



G20-1-60
BLACK & ORANGE

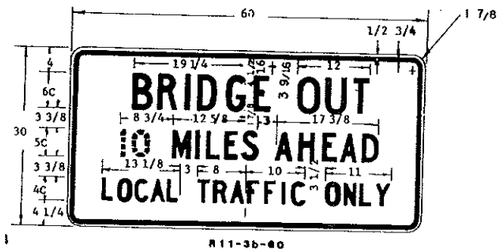


G20-60-72
BLACK & ORANGE

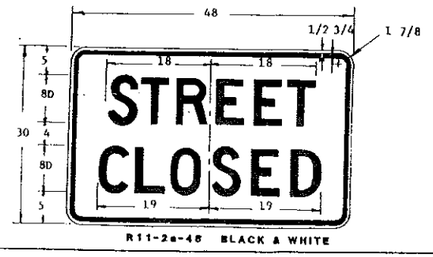


G20-62-72
BLACK & ORANGE

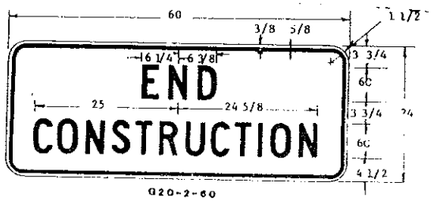
ARROW MAY BE TO RIGHT OR LEFT OF LEGEND TO INDICATE CONSTRUCTION TO THE RIGHT OR LEFT.



R11-3b-60
BLACK & WHITE



R11-2a-48 BLACK & WHITE



G20-2-60
BLACK & ORANGE

G20-54-48
BLACK & ORANGE

2-17-78	
REVISIONS	
DATE	CHANGE
12-18-78	TITLE ADDED
2-21-80	SIGN COLOR
6-23-80	SIGN NUMBERS
[illegible]	SIGN COLOR
2-19-81	SIGN NUMBERS
6-1-81	[illegible]

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Submitted [illegible]
Design Engineer

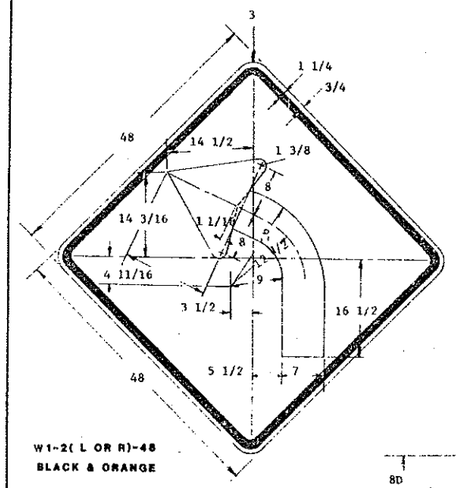
Recommended
Assistant Engineer, [illegible]

Approved [illegible]

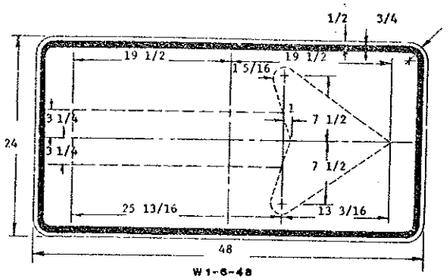
CONSTRUCTION SIGN DETAILS

FHWA REGION	STATE	FED. PROJ. NO.
8	N.D.	BRF-I-006(02)066

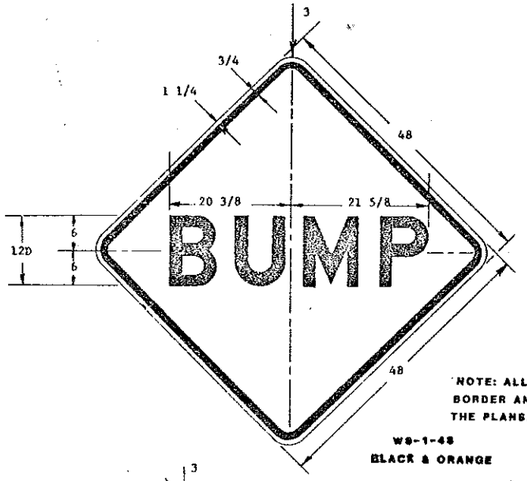
D-754-2



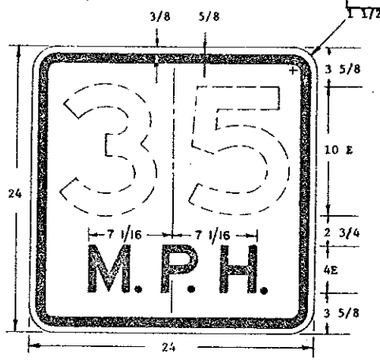
W1-2(L OR R)-48
BLACK & ORANGE



W1-6-48
BLACK & ORANGE

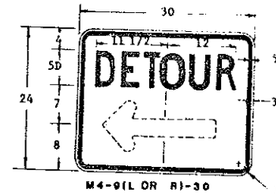


W9-1-48
BLACK & ORANGE

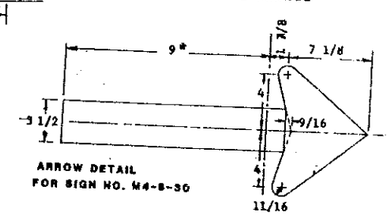


W13-1-24
BLACK & ORANGE

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



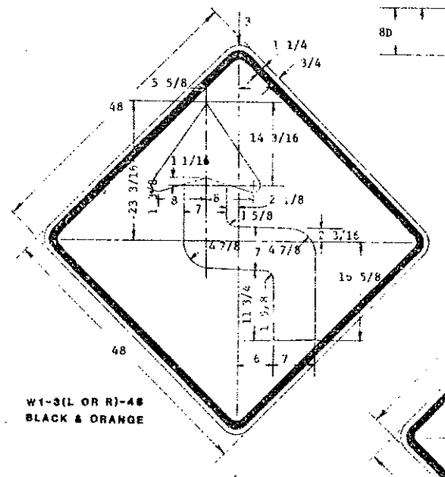
M4-9(L OR R)-30
BLACK & ORANGE



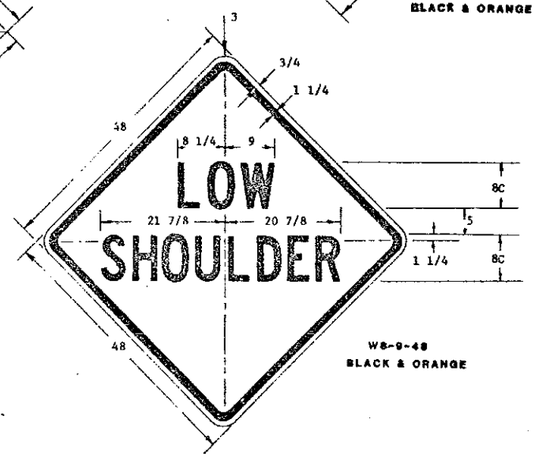
ARROW DETAIL
FOR SIGN NO. M4-8-30

MESSAGE AND BORDER: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 604-3.8 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTER GUIDE OF THE HEIGHT AND SERIES SHOWN ONTHE PLANS. THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.

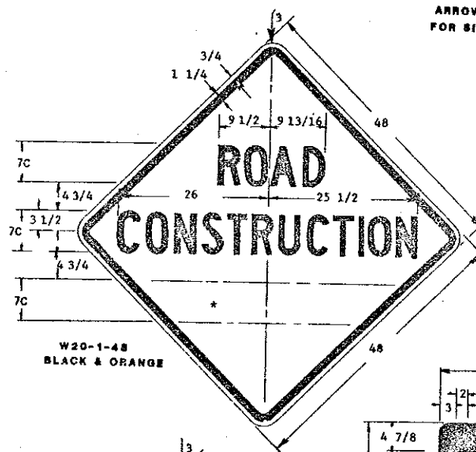
*DIMENSION SHALL BE 3" WHEN ARROW IS PLACED VERTICALLY.



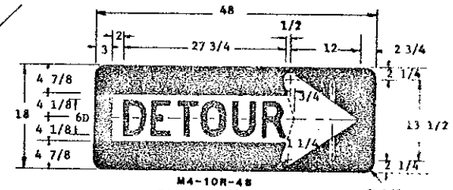
W1-3(L OR R)-48
BLACK & ORANGE



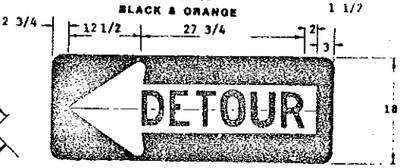
W8-9-48
BLACK & ORANGE



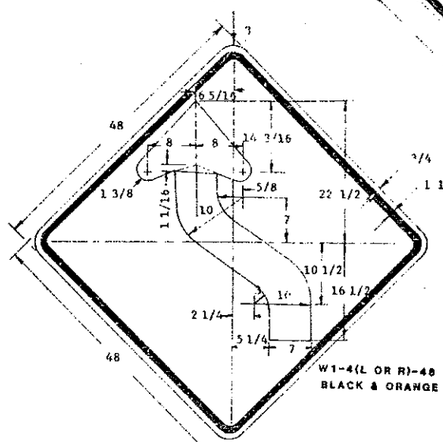
W20-1-48
BLACK & ORANGE



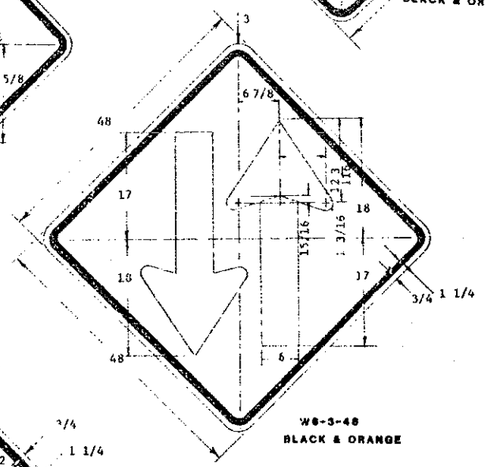
M4-10R-48
BLACK & ORANGE



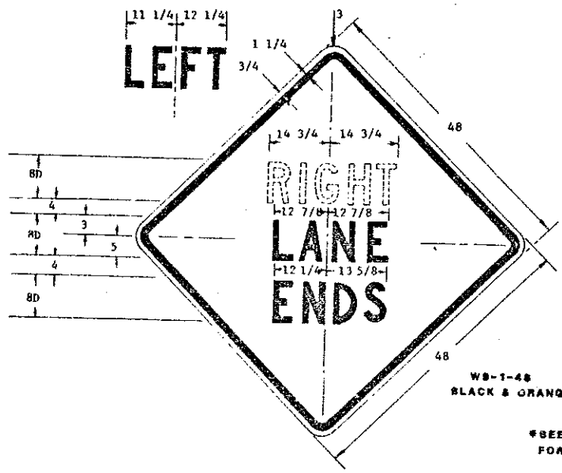
M4-10R-48
BLACK & ORANGE



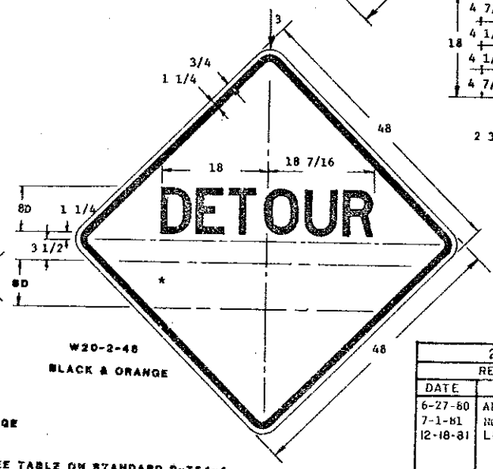
W1-4(L OR R)-48
BLACK & ORANGE



W6-3-48
BLACK & ORANGE



W9-1-48
BLACK & ORANGE



W20-2-48
BLACK & ORANGE

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

2-17-78	
REVISIONS	
DATE	CHANGE
6-27-80	ADDED NOTE
7-1-81	IN TE ADDITION
12-18-81	LETTERING

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

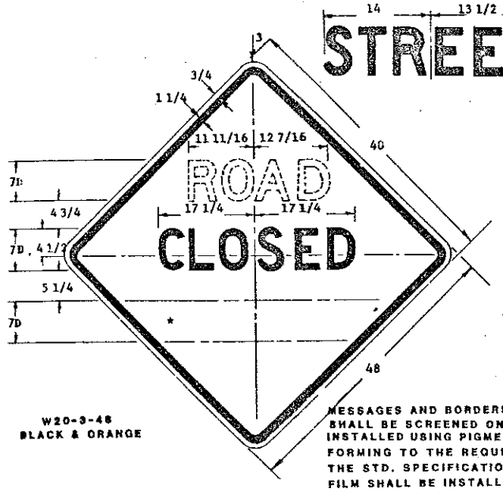
Submitted: _____ Design Engineer

Recommended: _____ Asst. Chief Engineer, Pre - Constr

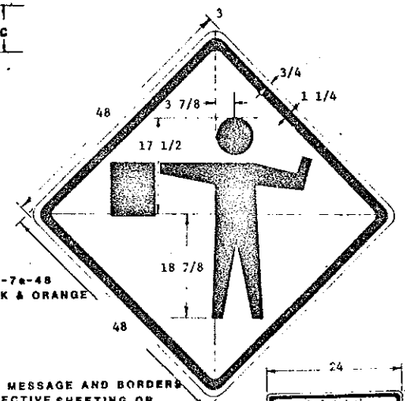
Approved: _____ Chief Engineer

CONSTRUCTION SIGN DETAILS

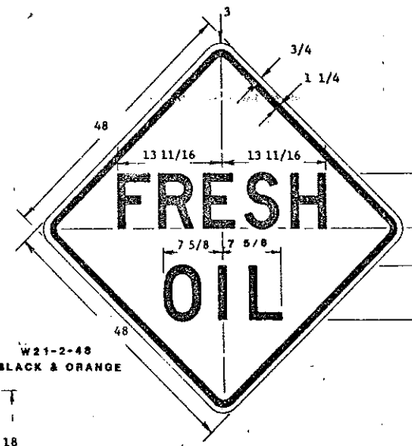
FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	BRF-1-006(02)006	
		D 754 - 3	



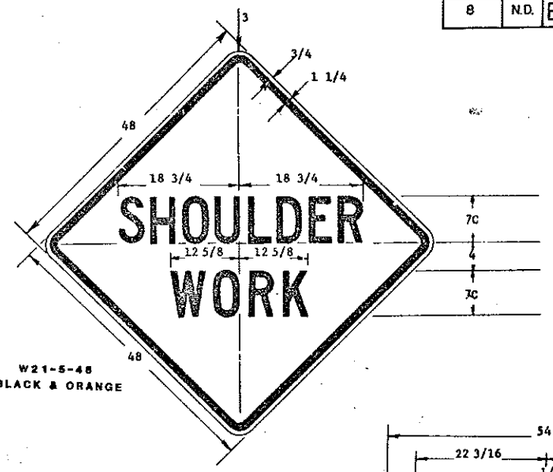
W20-3-48
BLACK & ORANGE



W20-7a-48
BLACK & ORANGE



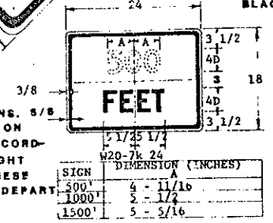
W21-2-48
BLACK & ORANGE



W21-5-48
BLACK & ORANGE

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

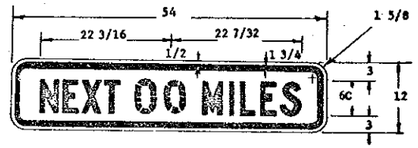
MESSAGES AND BORDERS: THE MESSAGE AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 894-3.5 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTERS GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS. THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPART -MENT OR THE SHEETING MANUFACTURER.



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

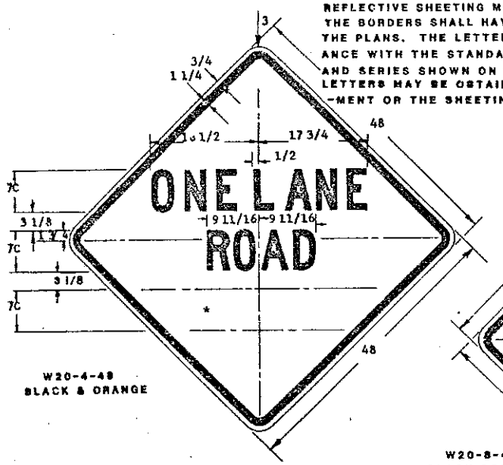
FOR USE WITH W20-7a-48 & W21-1a-48

BLACK & ORANGE

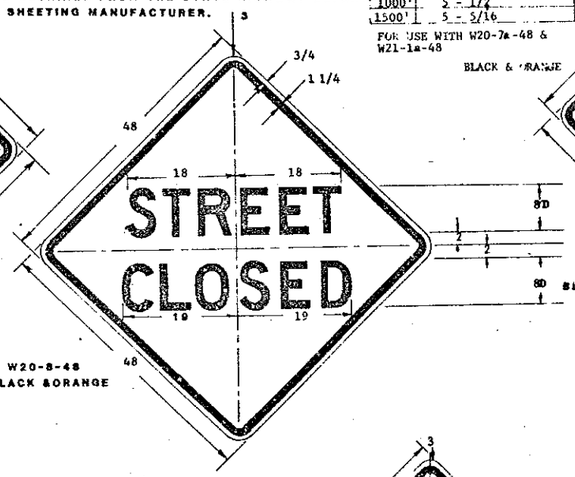


W20-52-54
BLACK & ORANGE

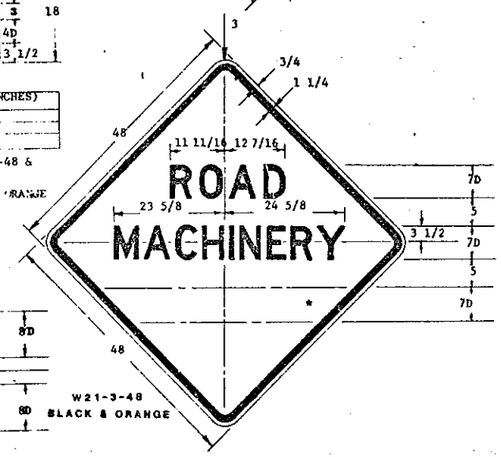
NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGES, BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORNZED.



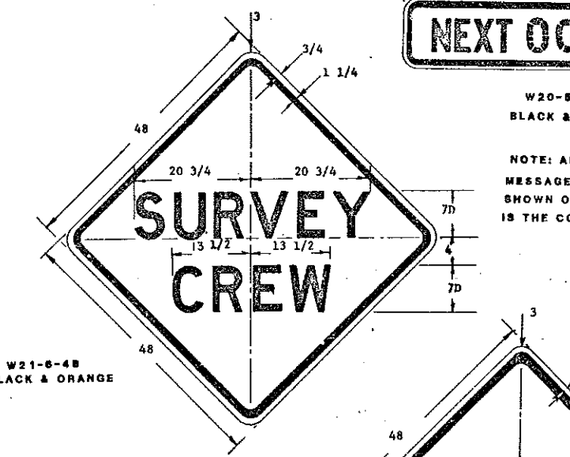
W20-4-48
BLACK & ORANGE



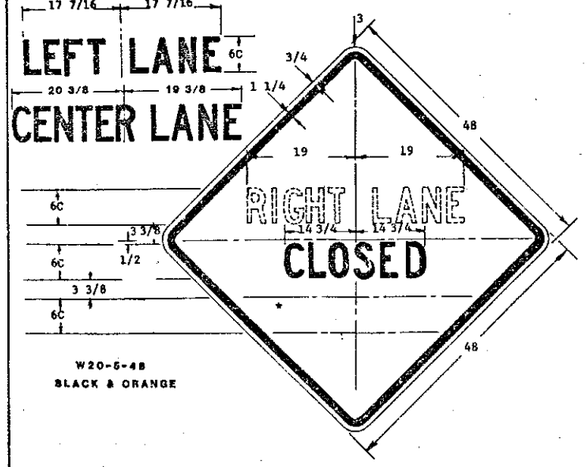
W20-8-48
BLACK &ORANGE



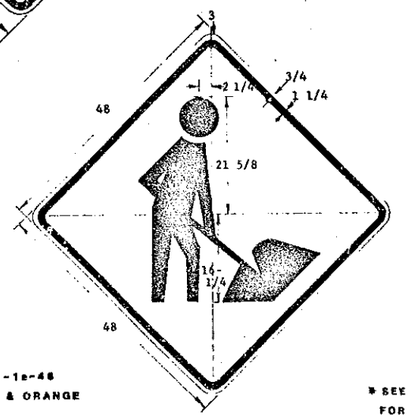
W21-3-48
BLACK & ORANGE



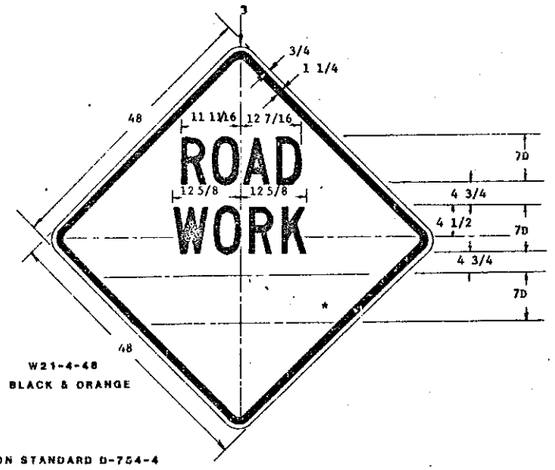
W21-6-48
BLACK & ORANGE



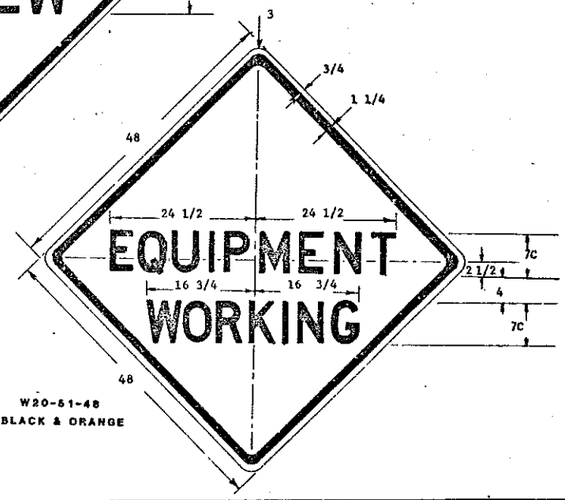
W20-5-48
BLACK & ORANGE



W21-1a-48
BLACK & ORANGE



W21-4-48
BLACK & ORANGE



W20-51-48
BLACK & ORANGE

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

2-17-78 REVISIONS	
DATE	CHANGE
5-14-79	Symbols Added
1-16-80	ADD DIMENSION
6-27-80	REVISED SIGN NO.'S
9-1-81	LETTERING
4-12-82	ADD LEGEND

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Submitted: _____ Design Engineer

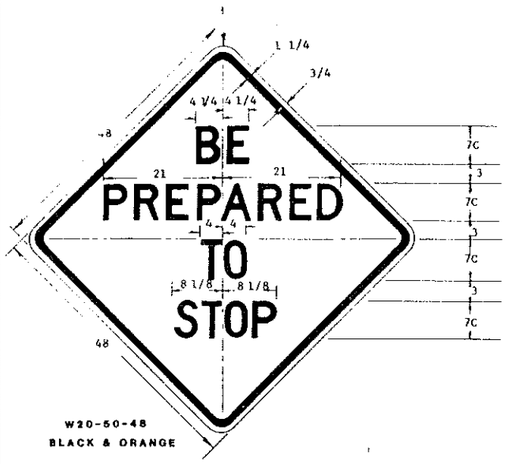
Recommended: _____ Asst. Chief Engineer, Pre - Constr.

Approved: _____ Chief Engineer

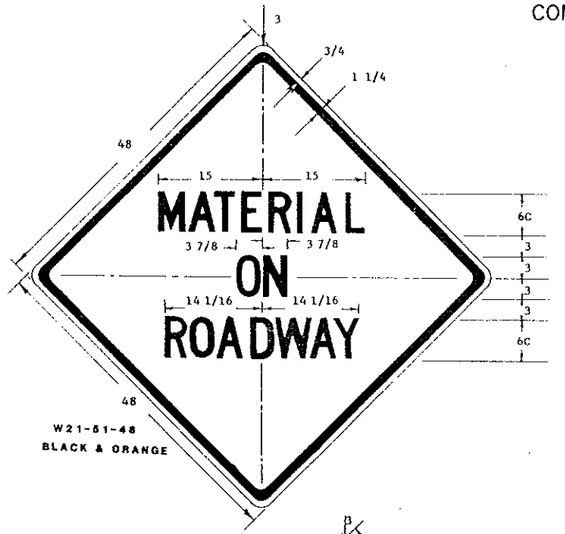
CONSTRUCTION SIGN DETAILS

STATE REGION		
8	N.D.	BRF-1-006(02)066

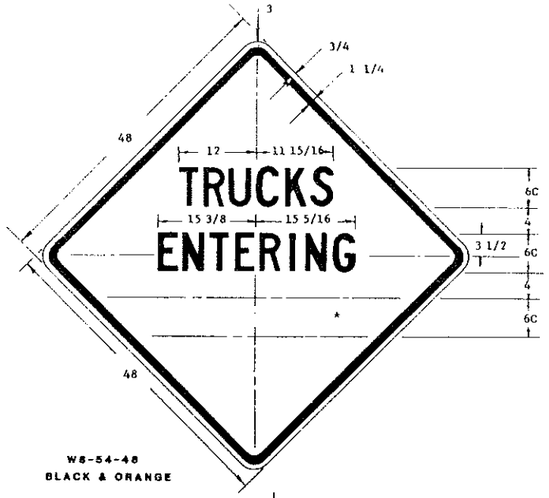
D 754-4



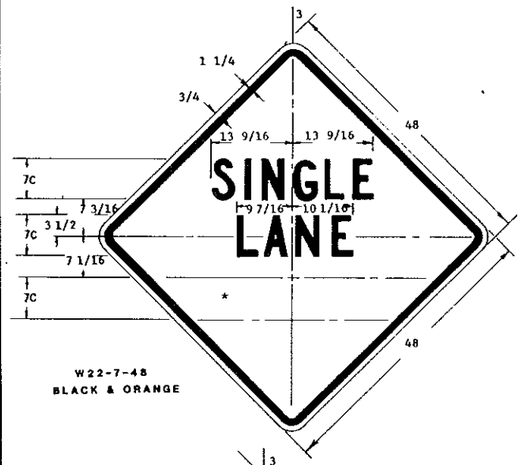
W20-50-48
BLACK & ORANGE



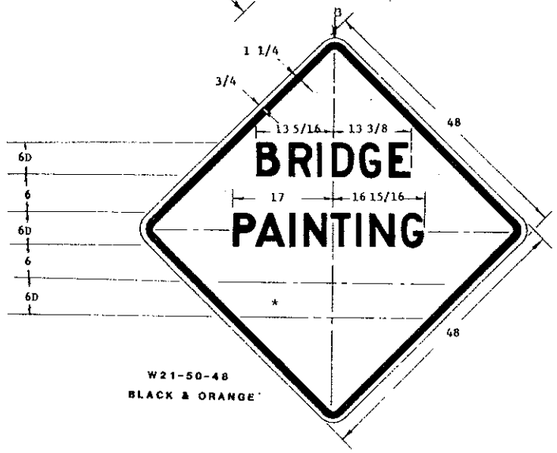
W21-51-48
BLACK & ORANGE



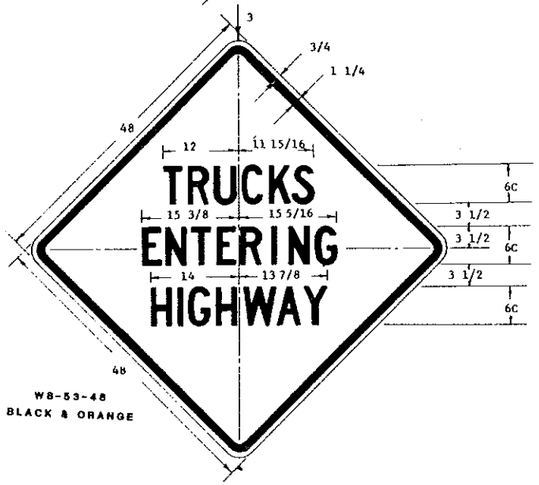
W8-54-48
BLACK & ORANGE



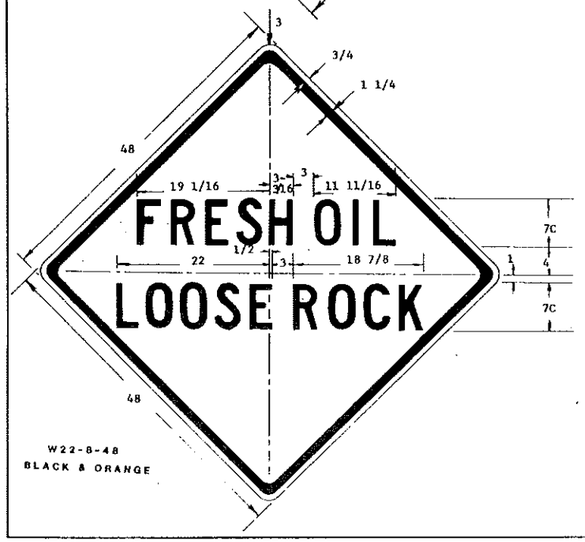
W22-7-48
BLACK & ORANGE



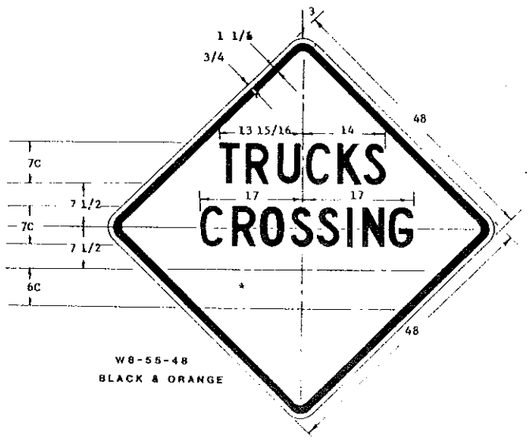
W21-50-48
BLACK & ORANGE



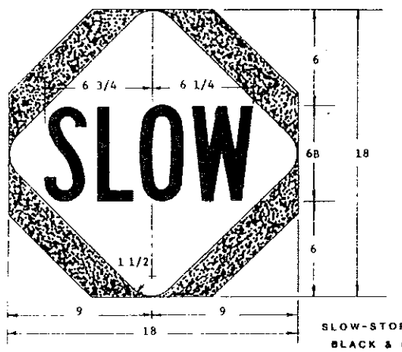
W8-53-48
BLACK & ORANGE



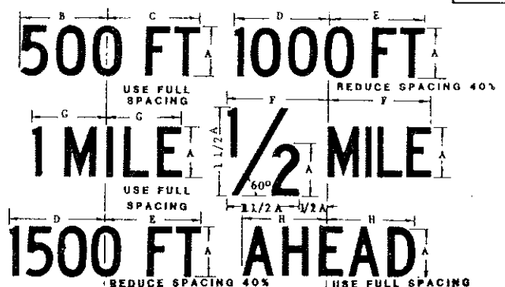
W22-8-48
BLACK & ORANGE



W8-55-48
BLACK & ORANGE



SLOW-STOP PADDLE
BLACK & ORANGE
FLAGPERSON PADDLE



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

MESSAGES AND BORDERS: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 894-3.6 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENETION.

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

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

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

2-17-78	
REVISIONS	
DATE	CHANGE
6-27-80	REVISED SIGN [illegible]S
12-17-81	Notes

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Submitted _____ Design Engineer

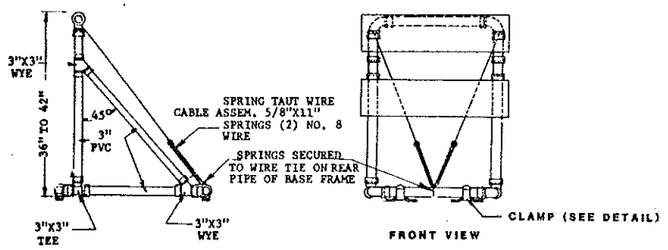
Recommended _____ Asst Chief Engineer, Pre-Constr

Approved _____ Chief Engineer

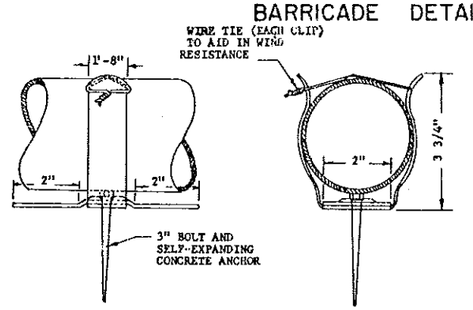
BARRICADE DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET
8	N.D.	SRF-I-006(02)066	

D 754-5



SIDE VIEW FRONT VIEW

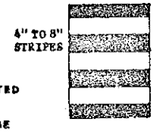


TYPICAL CLAMP DETAIL

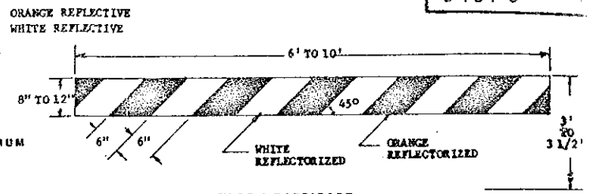
(SINGLE FIRE EXTINGUISHER CLIPS, 3 1/2" DIA.)

DELINEATOR DRUMS

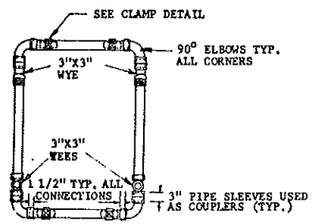
THE MARKINGS ON DRUMS SHALL BE ORANGE AND WHITE STRIPES 4 TO 8 INCHES WIDE. THERE SHALL BE AT LEAST THREE ORANGE AND TWO WHITE STRIPES. WHERE DRUMS HAVE RIBS OR INDENTATION THERE SHALL BE NO REFLECTORIZED SHEETING IN THIS AREA. THIS SPACE SHALL BE PAINTED ORANGE AND SHALL BE NO MORE THAN 2 INCHES WIDE.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



DELINEATOR DRUM



TYPE I BARRICADE



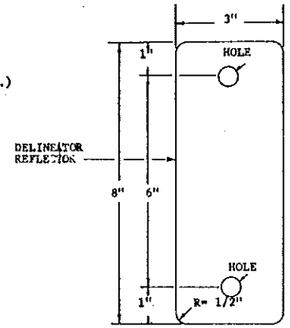
BASE

BREAKAWAY BARRICADE ASSEMBLY

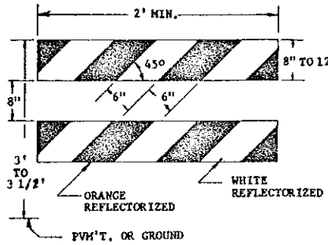
NOTE: THE PIPE, WYES, TEES ANDD ELBOWS USED TO CONSTRUCT TYPE II BARRICADES (SPECIAL) SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION: D2241 FOR PVC 1120 OR 1220, SDR 21, PRESSURE RATING 200 P.S.I. THE WYES, TEES, AND ELBOWS SHALL SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION : D-2466,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

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

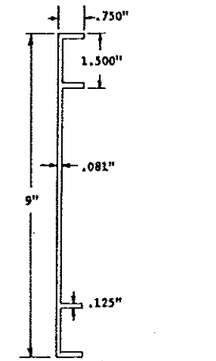
THE 9" X 48" BARRICADE RAIL SHALL BE FABRICATED FROM 0.025" ANODIZED ALUMINUM AND SHALL BE ATTACHED WITH 1 INCH NO. 14 PAN BEAD METAL SCREWS. COLORS: REFLECTIVE ORANGE AND REFLECTIVE WHITE.



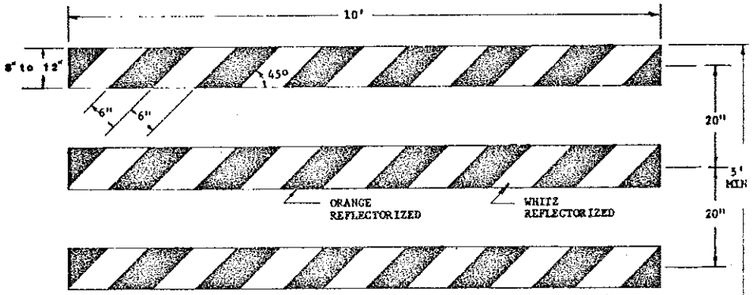
3" x 8" - 18 GUAGE GALVANIZED STEEL SHEETS, OR OR .080" ALUMINUM PLATE WITH WHITE REFLECTIVE SHEETING (TYPE III OR IV) AS SPECIFIED IN SECTION 894 OF THE STANDARD SPECIFICATIONS.



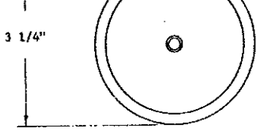
TYPE II BARRICADE



EXTRUDED ALUMINUM BARRICADE BAR DETAIL.

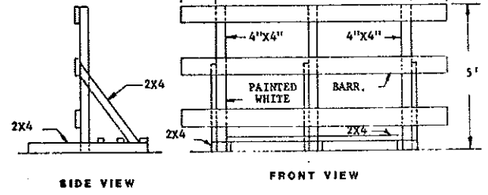


TYPE III BARRICADE



ACRYLIC PLASTIC REFLECTOR

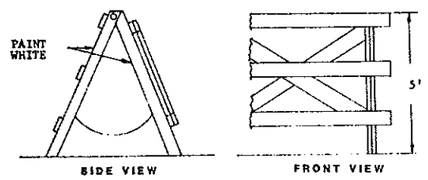
DELINEATOR REFLECTOR SHALL MEET THE REQUIREMENTS OF SECTION 894.



SIDE VIEW FRONT VIEW

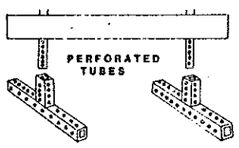
MOVABLE BARRICADE ASSEMBLY

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

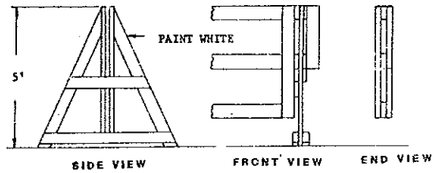


SIDE VIEW FRONT VIEW

HINGED BARRICADE ASSEMBLY

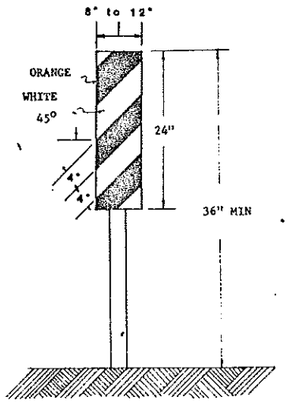


SECTIONAL BARRICADE

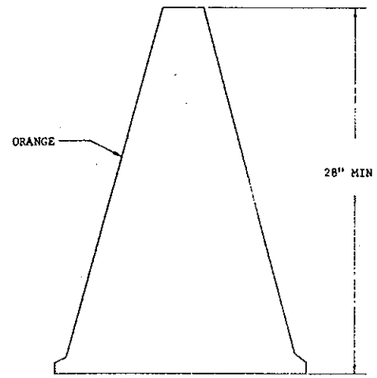


SIDE VIEW FRONT VIEW END VIEW

DEMOUNTABLE BARRICADE ASSEMBLY



VERTICAL PANEL



CONE

2-17-78 REVISIONS	
DATE	CHANGE
5-14-79	Delineator Drum Removed
5 12 81	NOTE CHANGE
9-1-81	NOTES
1-18-82	Dimensions
4-8-82	HEADING & PANEL

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

Submitted: _____ Design Engineer

Recommended: _____ Asst. Chief Engineer, Pre-Constr

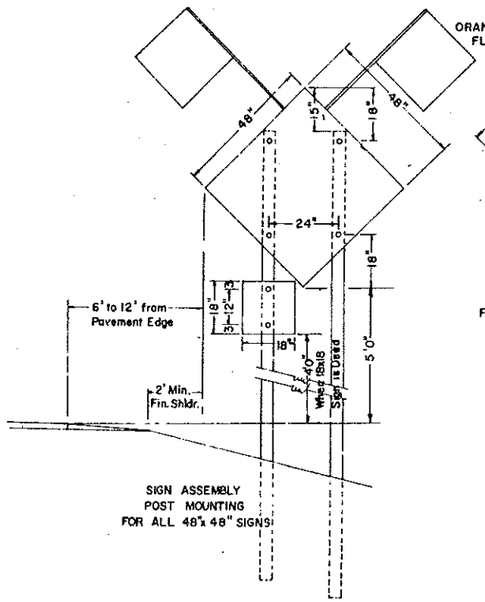
Approved: _____ Chief Engineer

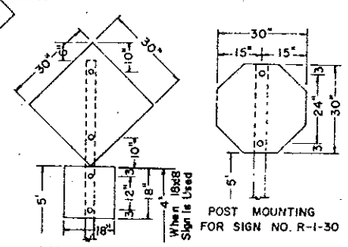
BRF-I-006(02)066

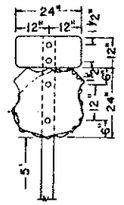
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS

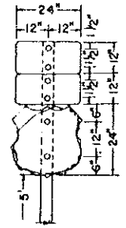
FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.		

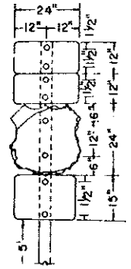
D-754-5-A

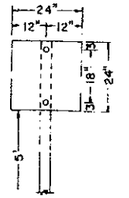


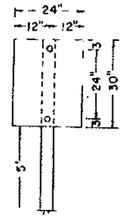


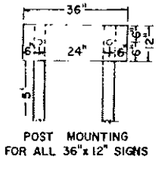


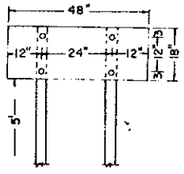


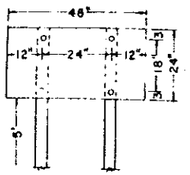


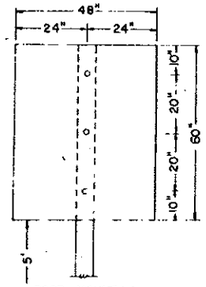


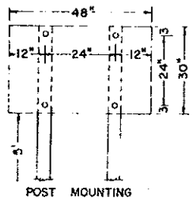


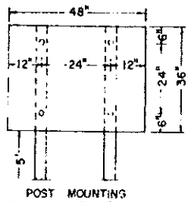


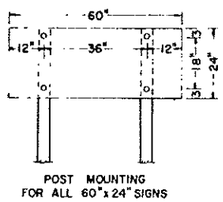


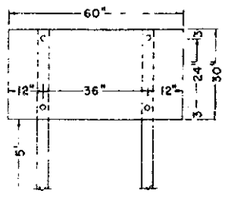


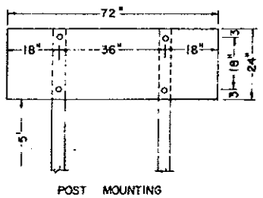


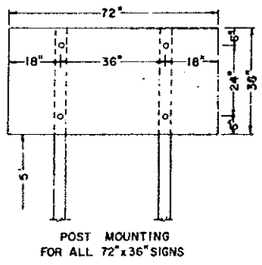


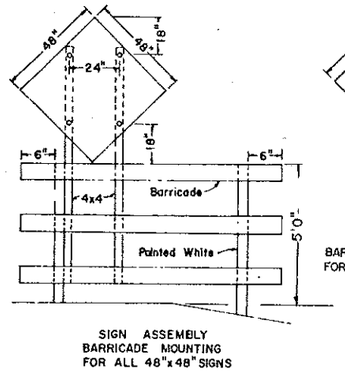


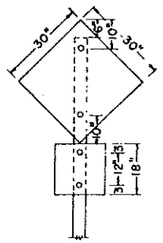


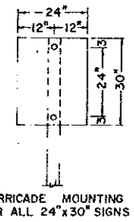


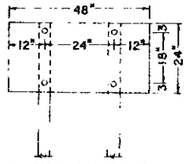


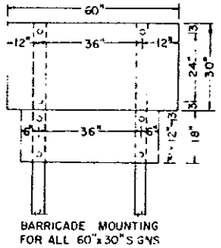


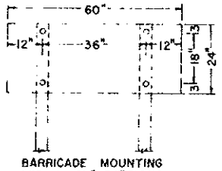


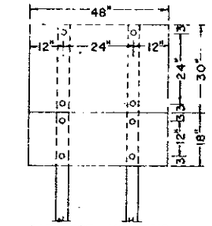


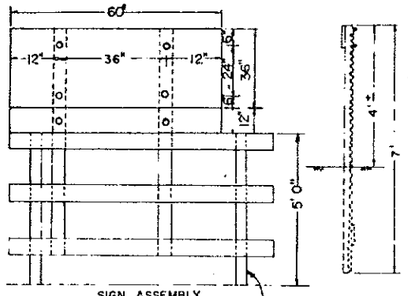




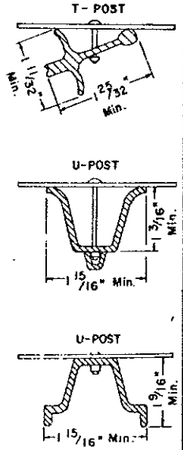


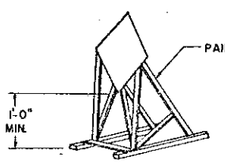




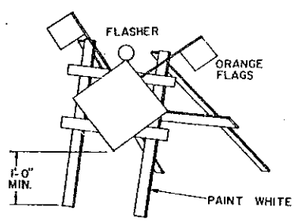


DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS





PORTABLE SIGN MOUNTING



PORTABLE SIGN MOUNTING

NOTES:
Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.

NOTES:

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

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

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

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

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

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

2-17-78

REVISIONS	
DATE	CHANGE
8-21-78	DETAIL ADDED
4-16-79	SIGN NO. CORRECTION
2-6-81	NOTE ADDED

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Submitted: Design Engineer

Recommended: Asst. Chief Engineer, Pre-Constr.

Approved: Chief Engineer

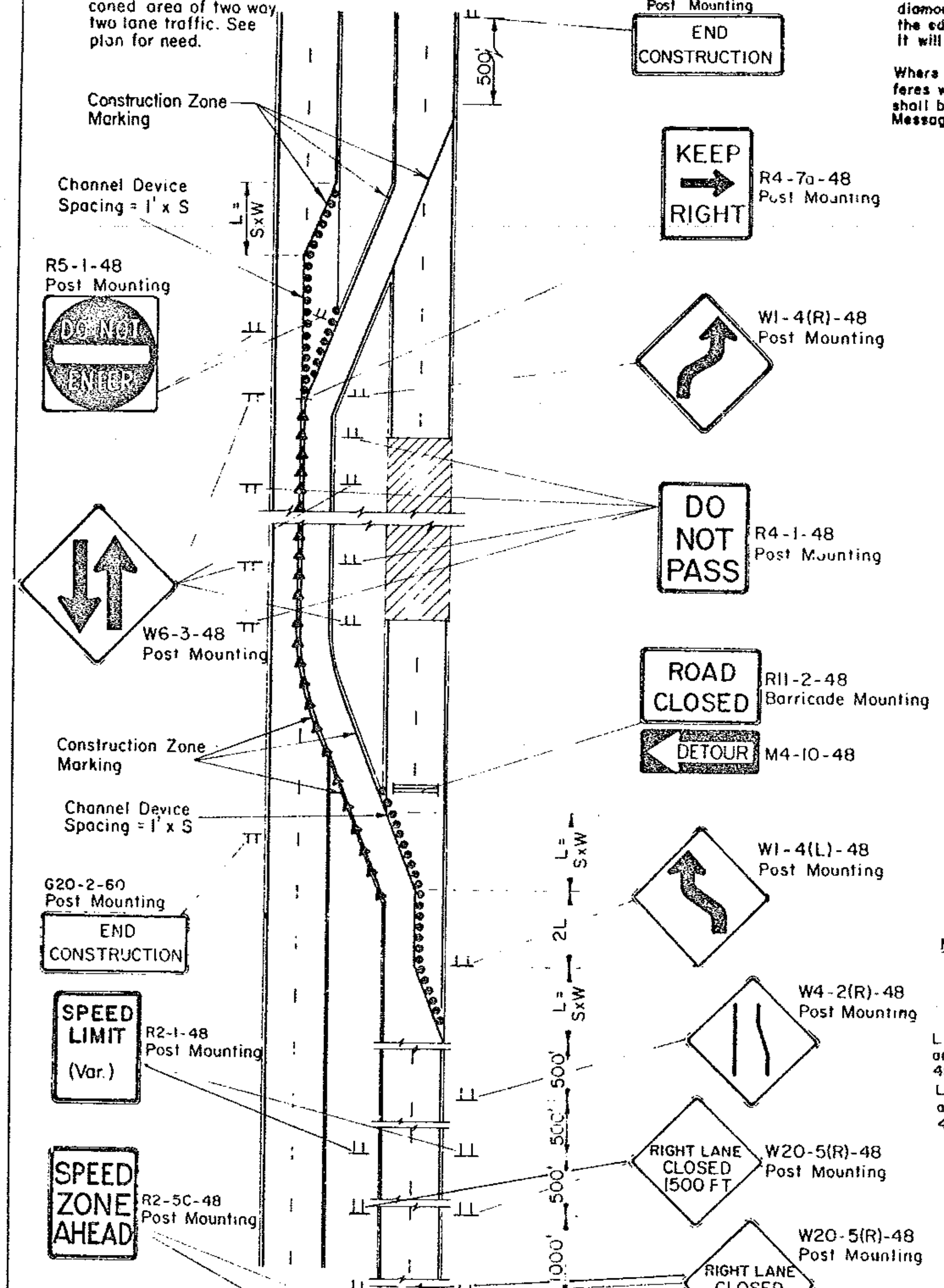
5c

FHWA REGION	STATE	
8	N.D.	BRF-1-006(02)066

D-754-7

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

Note: Positive Barriers may be needed in the coned area of two way two lane traffic. See plan for need.



TYPE D
CONSTRUCTION SIGN LAYOUT

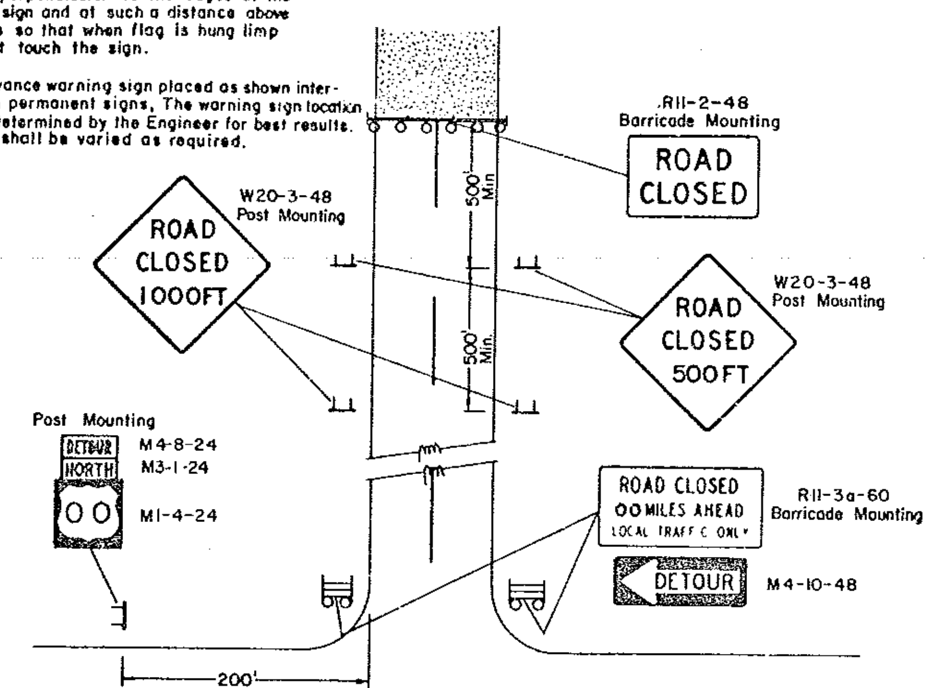
4 Lane Divided Highway With one roadway closed.

(Sign shown for one direction of travel only).

Longer than one day or outside of major work area

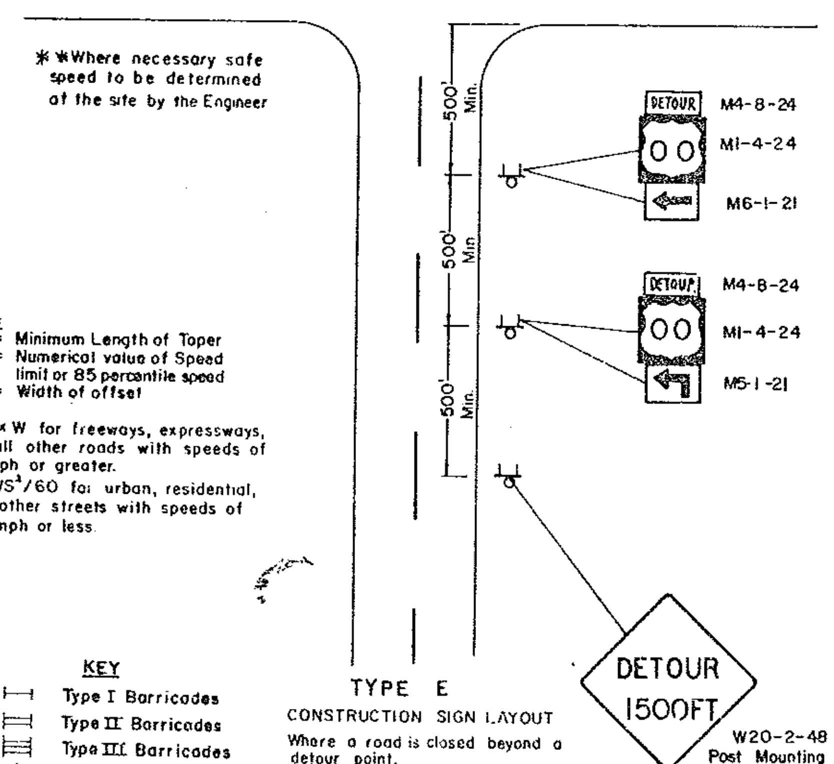
NOTE:
FLAGS: All warning signs shall have two orange warning flags 24" square mounted perpendicular to the edges of the diamond sign and at such a distance above the edges so that when flag is hung limp it will not touch the sign.

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



Note: Regulating traffic control devices to be modified as needed for the duration of the detour.

** Where necessary safe speed to be determined at the site by the Engineer



Note:
L = Minimum Length of Taper
S = Numerical value of Speed limit or 85 percentile speed
W = Width of offset

L = S×W for freeways, expressways, and all other roads with speeds of 45 mph or greater.
L = $WS^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.

KEY

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

TYPE E
CONSTRUCTION SIGN LAYOUT

Where a road is closed beyond a detour point.

(Sign shown for one direction of travel only)

Sign not shown on detour shall be shown in plans and installed and maintained by the contractor.

Longer than one day or outside of major work area

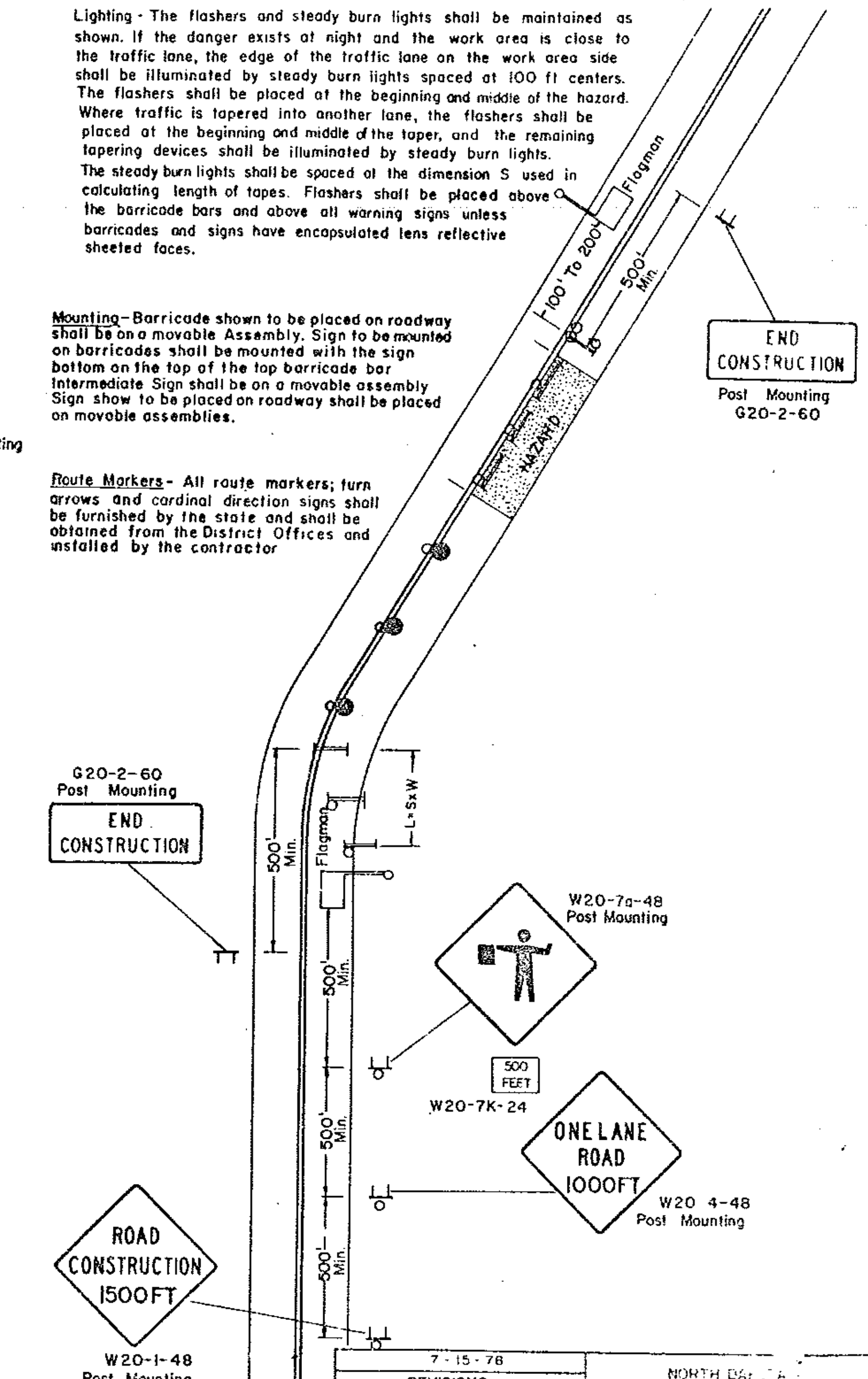
Delineator drums, Barricades or Cones used for tapering traffic shall be spaced at the demention "S".

"S" = Numerical value of speed limit or 85 percentile speed

Lighting - The flashers and steady burn lights shall be maintained as shown. If the danger exists at night and the work area is close to the traffic lane, the edge of the traffic lane on the work area side shall be illuminated by steady burn lights spaced at 100 ft centers. The flashers shall be placed at the beginning and middle of the hazard. Where traffic is tapered into another lane, the flashers shall be placed at the beginning and middle of the taper, and the remaining tapering devices shall be illuminated by steady burn lights. The steady burn lights shall be spaced at the dimension S used in calculating length of tapes. Flashers shall be placed above the barricade bars and above all warning signs unless barricades and signs have encapsulated lens reflective sheeted faces.

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

Route Markers - All route markers; turn arrows and cardinal direction signs shall be furnished by the state and shall be obtained from the District Offices and installed by the contractor.



TYPE F
CONSTRUCTION SIGN LAYOUT

2 Lane Highway with one lane closed. Barricading is at a point where it is visible to approaching traffic

Warning sign sequence in opposite direction — same as one shown.

7-15-78

REVISIONS	
DATE	CHANGE
8-21-78	Note Change
1-2-79	General Revisions
3-6-79	Note Revisions
6-27-80	Added Sign Note
1-19-81	Note Change
2-1-83	Type D Layout
6-29-83	Marking Notation
7-?-83	Add Median Signs

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Submitted ______ Design Engineer

Recommended ______ Asst. Chief Engineer, Pre-Constr.

Approved ______ Chief Engineer

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-I-006(02)066	D-754-9

Lighting - The flashers and steady burn lights shall be maintained as shown. If the danger exists at night and the work area is close to the traffic lane, the edge of the traffic lane on the work area side shall be illuminated by steady burn lights spaced at 100 ft. centers. The flashers shall be placed at the beginning and middle of the hazard. Where traffic is tapered into another lane, the flashers shall be placed at the beginning and middle of the taper, and the remaining tapering devices shall be illuminated by steady burn lights. The steady burn lamps shall be spaced at the dimension S used in calculating length of taper. Flashers shall be placed above the barricade bars and above all warning signs unless barricades and signs have encapsulated lens reflective sheeted faces.

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

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

Route Markers

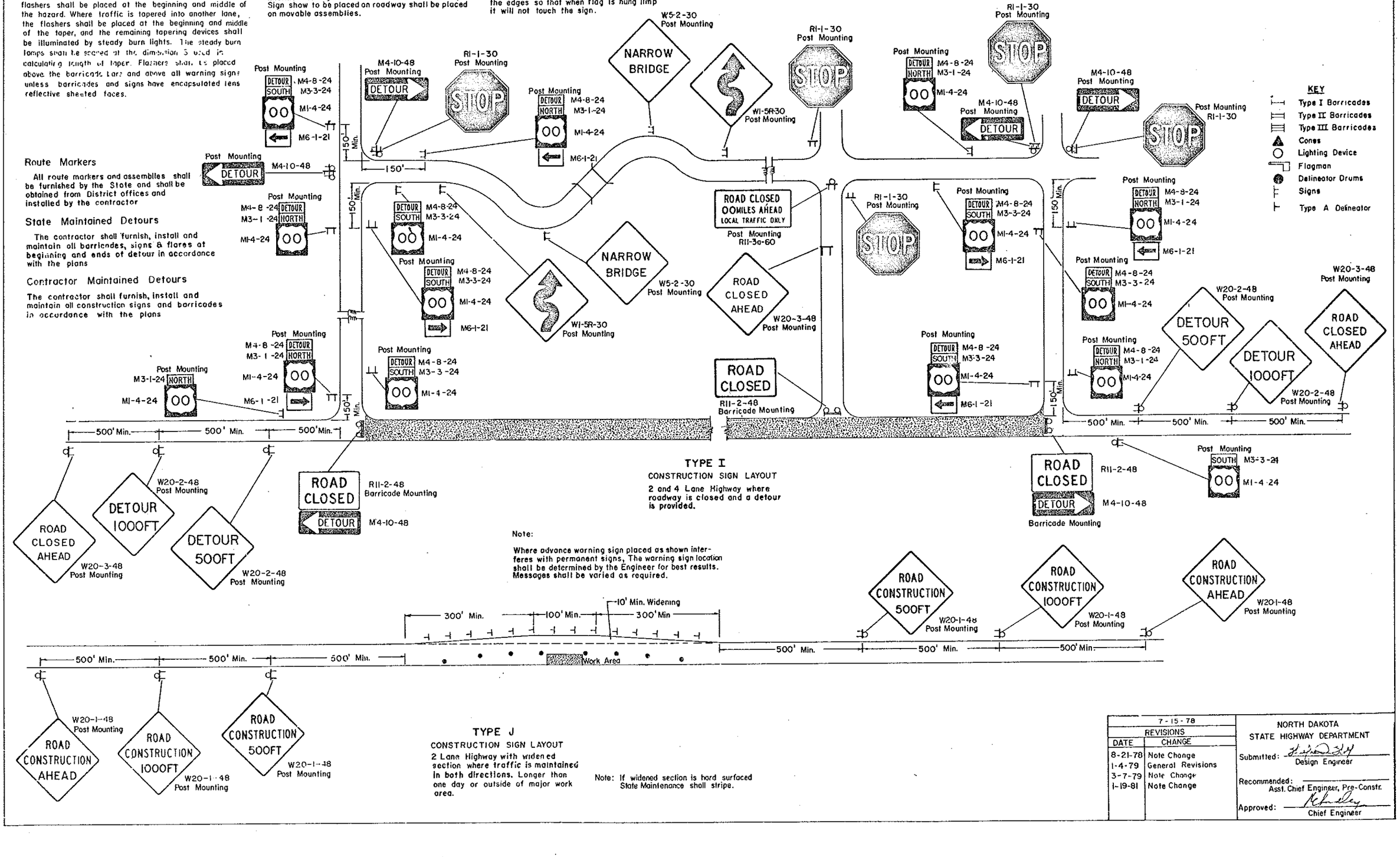
All route markers and assemblies shall be furnished by the State and shall be obtained from District offices and installed by the contractor

State Maintained Detours

The contractor shall furnish, install and maintain all barricades, signs & flares at beginning and ends of detour in accordance with the plans

Contractor Maintained Detours

The contractor shall furnish, install and maintain all construction signs and barricades in accordance with the plans



TYPE I
CONSTRUCTION SIGN LAYOUT

2 and 4 Lane Highway where roadway is closed and a detour is provided.

Note:

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

TYPE J
CONSTRUCTION SIGN LAYOUT

2 Lane Highway with widened section where traffic is maintained in both directions. Longer than one day or outside of major work area.

Note: If widened section is hard surfaced State Maintenance shall stripe.

7-15-78	
REVISIONS	
DATE	CHANGE
8-21-78	Note Change
1-4-79	General Revisions
3-7-79	Note Change
1-19-81	Note Change

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

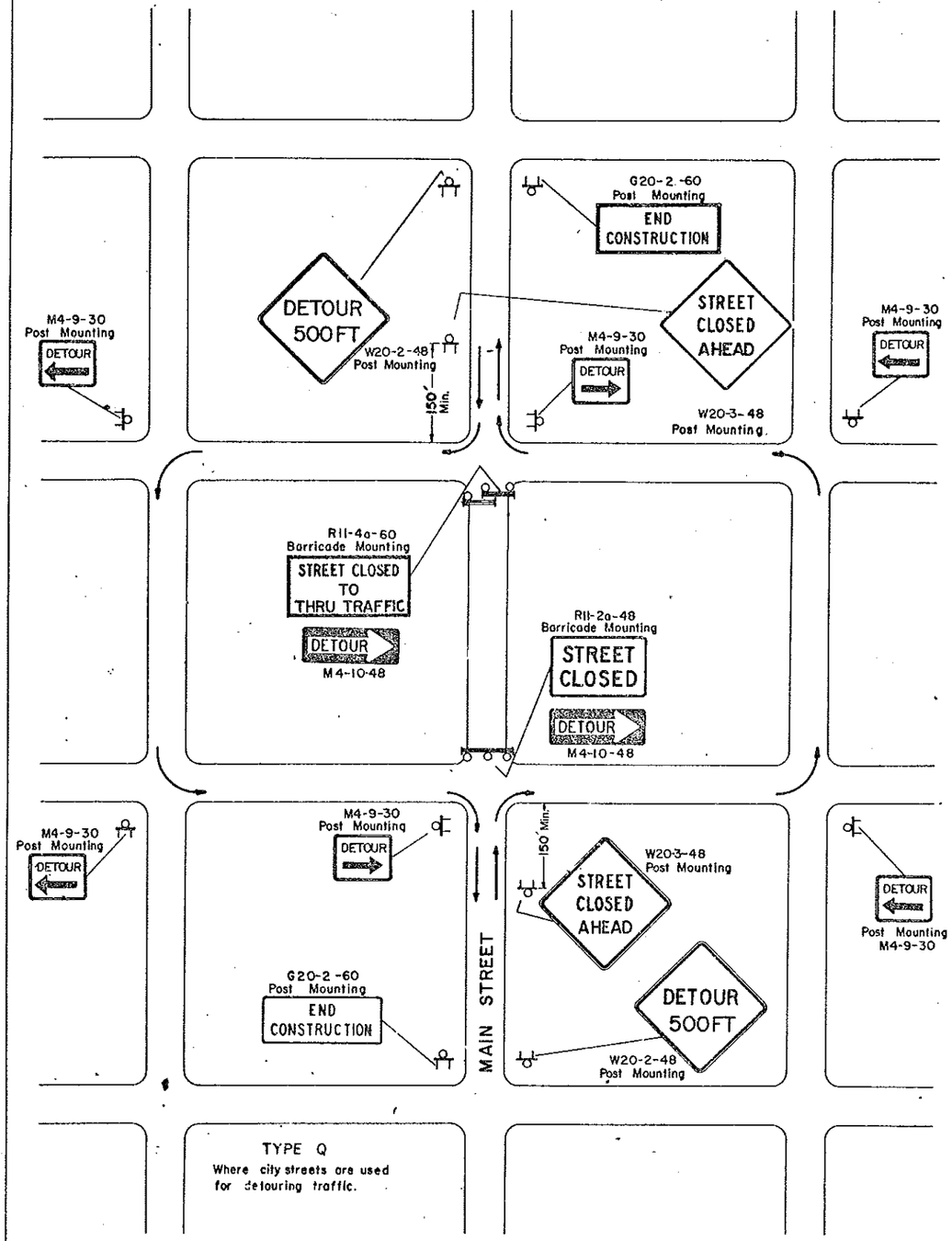
Submitted: _____ Design Engineer

Recommended: _____ Asst. Chief Engineer, Pre-Constr.

Approved: _____ Chief Engineer

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-I-006(02)066	
		D-754-11	

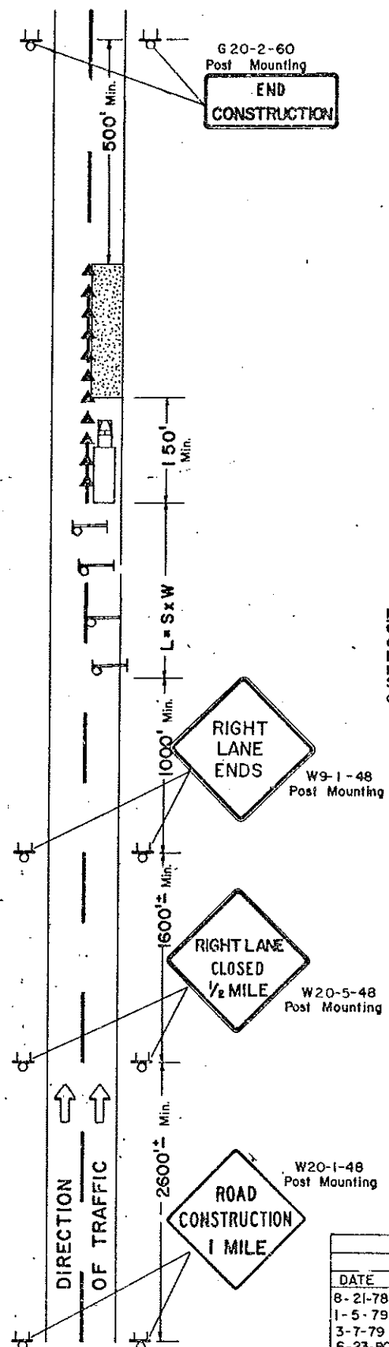


TYPE Q

Where city streets are used for detouring traffic.

KEY

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



NOTES:

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

Lighting - The flashers and steady burn lights shall be maintained as shown. If the danger exists at night and and the work area is close to the traffic lane, the edge of the traffic lane on the work area side shall be illuminated by steady burn lights spaced at 100 ft. centers. The flashers shall be placed at the beginning and middle of the hazard. Where traffic is tapered into another lane, the flashers shall be placed at the beginning and middle of the taper, and the remaining tapering devices shall be illuminated by steady burn lights. The steady beam light shall be spaced at the dimension S used in calculating length of tapes. Flashers shall be placed above the barricade bars and above all warning signs unless barricades and signs have encapsulated lens reflective sheeted faces.

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

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

Note:
L = Minimum Length of Taper
S = Numerical value of Speed, limit or 85 percentile speed
W = Width of offset
L = S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater.
L = WS²/60 for urban, residential, and other streets with speeds of 40 mph or less.

TYPE P

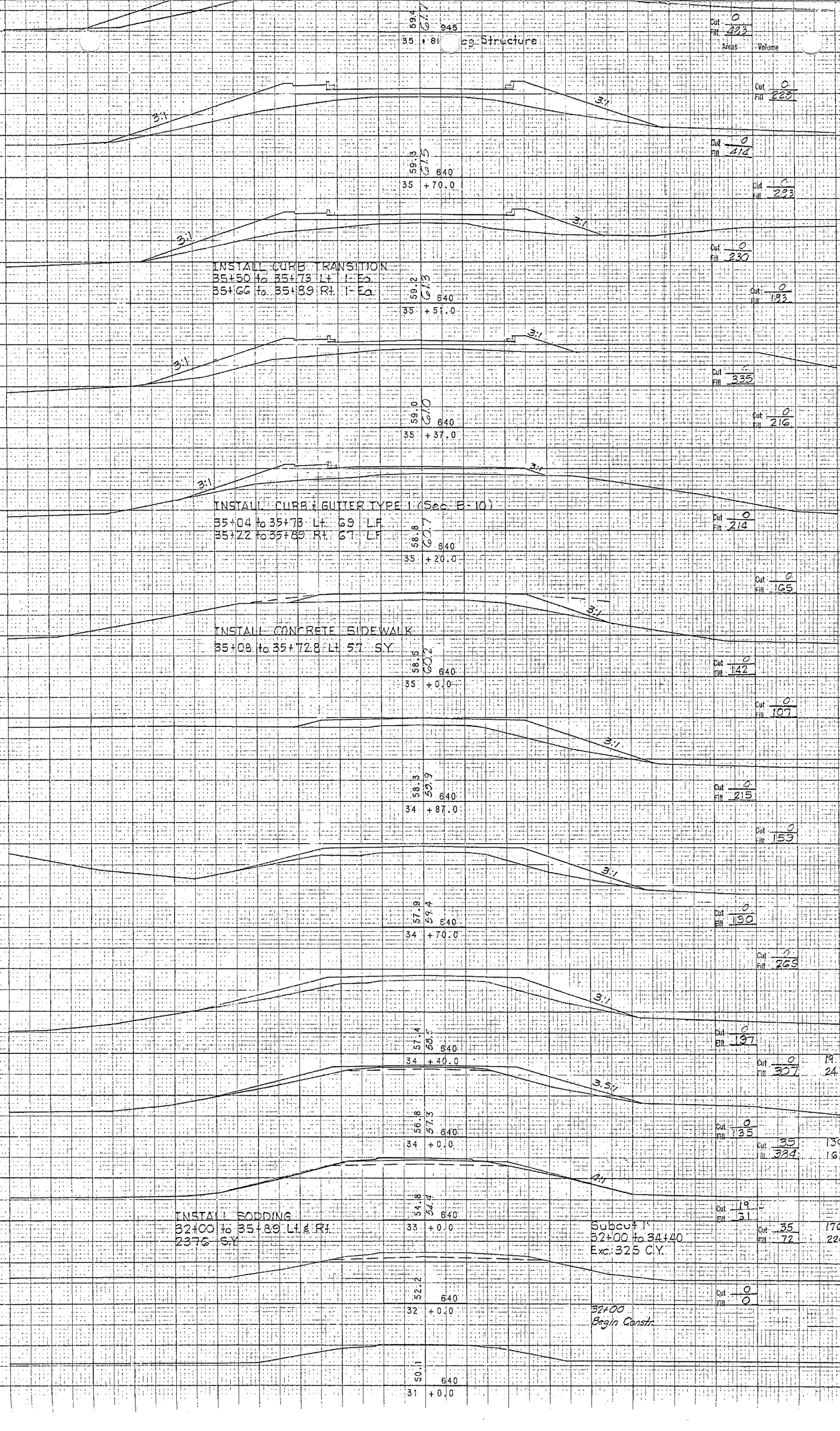
4 Lane Divided Roadway where half of roadway is closed. Longer than one day or outside of major work area.

7-15-78

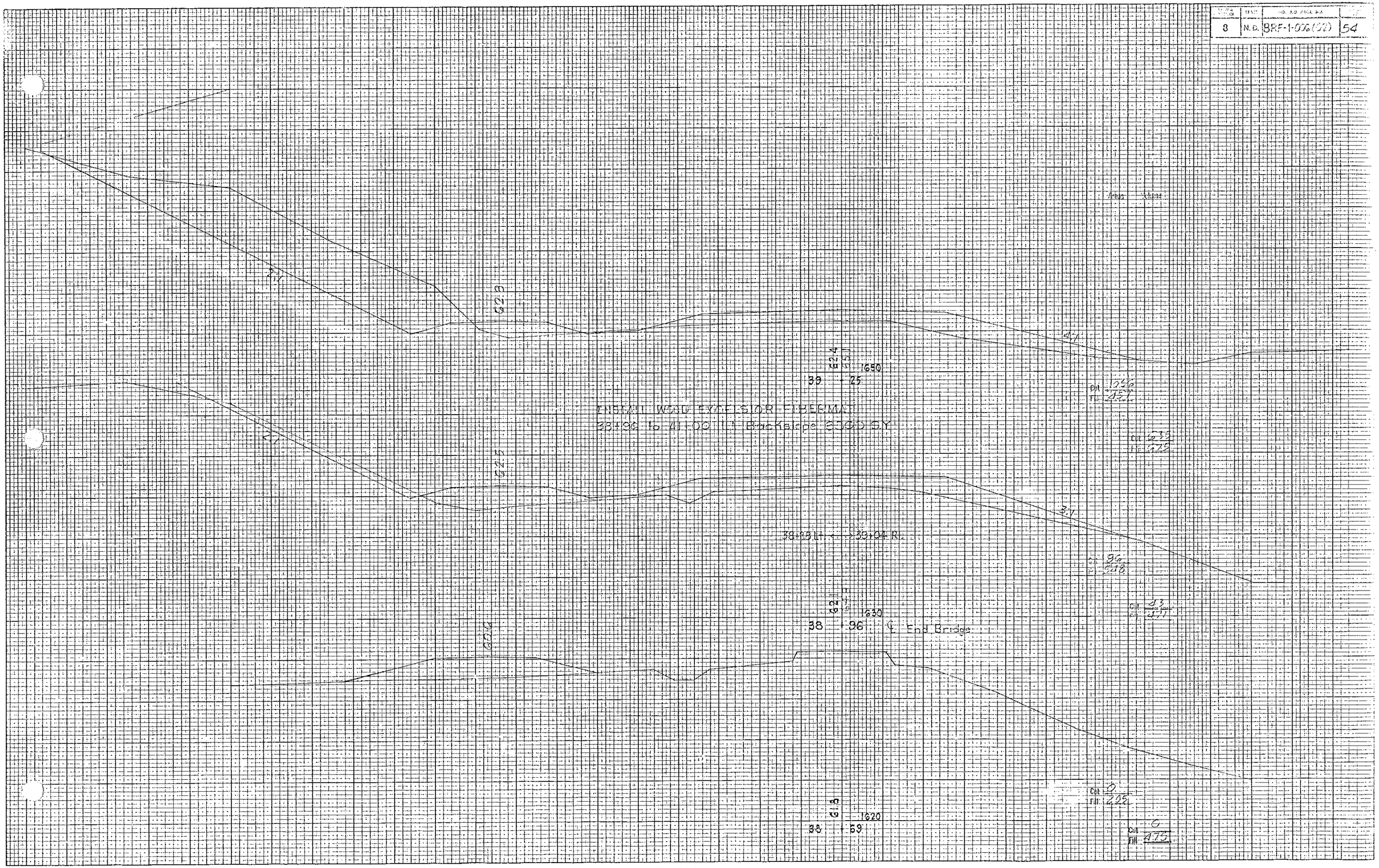
REVISIONS	
DATE	CHANGE
8-21-78	Note Change
1-5-79	General Revisions
3-7-79	Note Change
6-23-80	Sign Std. Numbers

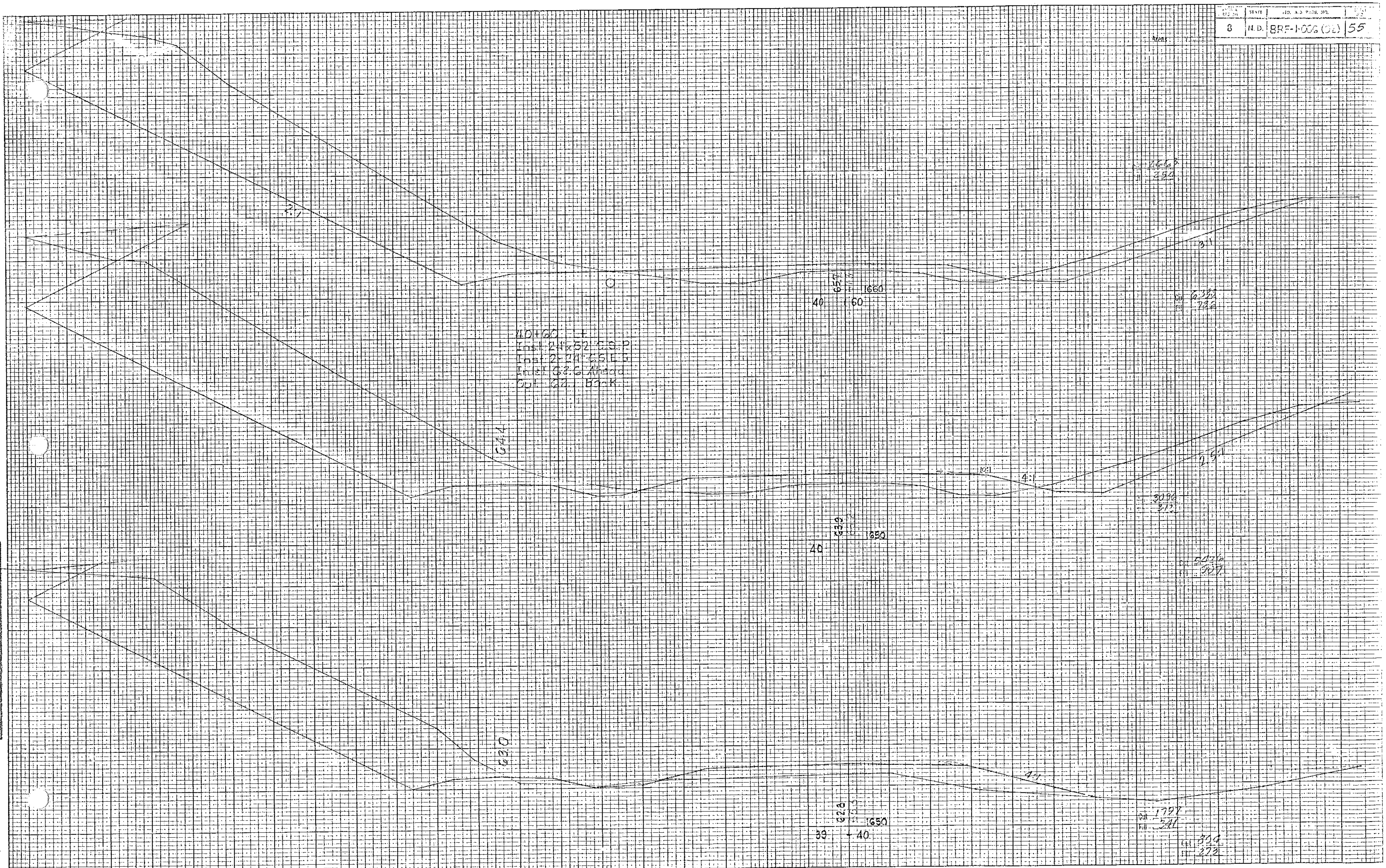
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Approved: _____
Design Engineer


59.4
67.1
945
35 + 81
eg. Structure
Cut 0
Fill 493
Areas - Volume
3:1
3:1
Cut 0
Fill 228
Cut 0
Fill 414
59.3
67.5
640
35 + 70.0
Cut 0
Fill 293
3:1
3:1
Cut 0
Fill 230
INSTALL CURB TRANSITION
35+50 to 35+73 Lt 1-Ea
35+66 to 35+89 Rt 1-Ea
59.2
67.3
640
35 + 51.0
Cut 0
Fill 183
3:1
3:1
Cut 0
Fill 335
59.0
67.0
640
35 + 37.0
Cut 0
Fill 216
3:1
3:1
INSTALL CURB & GUTTER TYPE 1 (Sec. B-10)
35+04 to 35+73 Lt. 69 L.F.
35+22 to 35+80 Rt. 67 L.F.
58.8
66.7
640
35 + 20.0
Cut 0
Fill 214
Cut 0
Fill 165
3:1
INSTALL CONCRETE SIDEWALK
35+08 to 35+72.8 Lt 57 S.Y.
58.5
66.2
640
35 + 0.0
Cut 0
Fill 142
Cut 0
Fill 107
3:1
58.3
65.9
640
34 + 87.0
Cut 0
Fill 215
Cut 0
Fill 159
3:1
57.8
65.4
640
34 + 70.0
Cut 0
Fill 190
Cut 0
Fill 269
3:1
57.4
65.5
640
34 + 40.0
Cut 0
Fill 197
Cut 0
Fill 307
19 T.S. Exc.
24 T.S. Emb.
3.5:1
56.8
57.3
640
34 + 0.0
Cut 0
Fill 135
Cut 35
Fill 384
130 T.S. Exc.
162 T.S. Emb.
4:1
54.8
54.4
640
33 + 0.0
INSTALL SODDING
32+00 to 35+89 Lt & Rt
2376 S.Y.
Cut 19
Fill 31
Subcut 1':
32+00 to 34+40
Exc. 325 C.Y.
Cut 35
Fill 72
176 T.S. Exc.
220 T.S. Emb.
52.2
640
32 + 0.0
Cut 0
Fill 0
32+00
Begin Constr.
50.1
640
31 + 0.0

3	N.D.	BRF-1-076(32)	54





FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET
8	N.D.	BRF 1-006(02)	56

Subcut 1'
42+27 to 43+50
Exc. 135 C.Y.

REGION	STATE	[illegible]	[illegible]
8	N.D.	BRF-1-006(02)	57

Areas Volume

SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED

SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED

Cut 149 56 T.S. Exc.
Fill 5 70 T.S. Emb.

Cut 157
Fill 4

Cut 352 62 T.S. Exc.
Fill 29 73 T.S. Emb.

Cut 223
Fill 21

Cut 365 TS 67
Fill 127 TS 94

K+E PLATE 3, CROSS SECTION
KEUFFEL & ESSER CO

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	

SIGN SUMMARY - PERFORATED TUBE

STATION	ASSEMBLY NUMBER	SIGN FLAT TYPE 2	AREA SHEET TYPE 3 OR 4	SUPPORT LENGTHS 1ST	2ND	3RD	4TH	SIZE	SLEEVE LENGTH 1ST	2ND	3RD	4TH	SIZE	ANCHOR LNG.	SIZE	NO	TOTAL SUPPORT WEIGHT	RESET SIGN PAN.	RESET SIGN SUP.	MAX. LNG. FOR SUP. SIZE
40+60 LT	1 RS		5.18	12.1				2.19						4.0	2.19	1	55.13			12.1
42+23 LT	9 RS	5.00		12.0				2.19						4.0	2.19	1	54.91			12.5
42+40 RT	9 RS	5.00		12.0				2.19						4.0	2.19	1	54.91			12.5
SUBTOTAL NO.	1	10.00	5.18														164.95	0	0	
SUBTOTAL NO.	1	10.00	5.18														164.95	0	0	
TOTAL		10.00	5.18														164.95	0	0	

BASIS OF ESTIMATE
Sign Support Lengths

The sign support lengths have been calculated using the following information:

Ultimate Pavement Depth . 12"

Inslopes
- Lt. 3:1
- Rt. 3:1

Vertical Clearance

- Signs viewed from mainline . 60"
- Signs viewed from crossings . 60"

Graded Roadway Widths

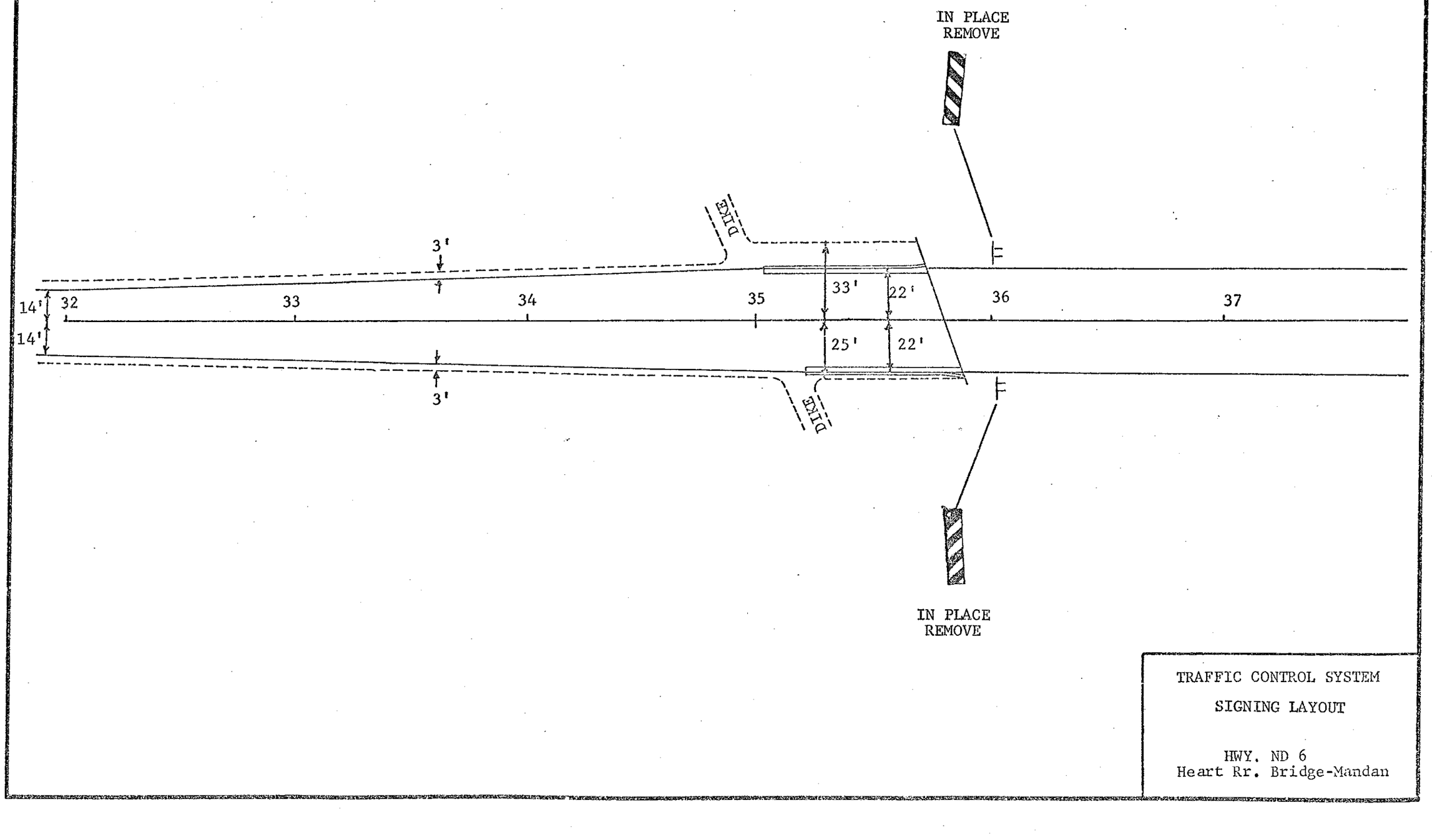
- Mainline 50'
- Crossing roadways 50'

TRAFFIC CONTROL SYSTEM

SIGN SUMMARY

HWY. ND 6
Heart Rr. Bridge-Mandan

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	

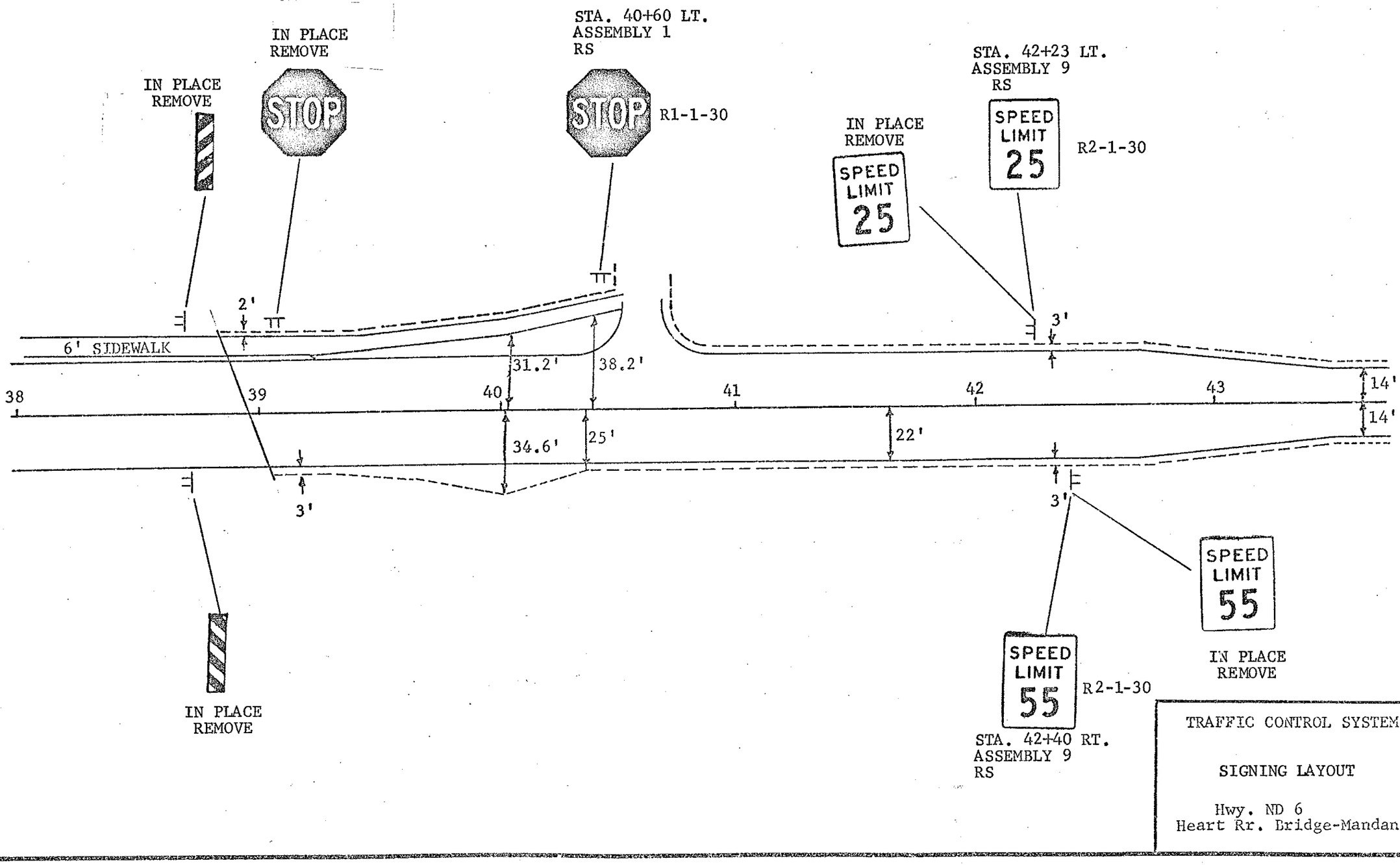


TRAFFIC CONTROL SYSTEM

SIGNING LAYOUT

HWY. ND 6
Heart Rr. Bridge-Mandan

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	



TRAFFIC CONTROL SYSTEM

SIGNING LAYOUT

Hwy. ND 6
Heart Rr. Bridge-Mandan

ASSEMBLY DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	

D 754-23

MINIMUM HORIZONTAL CLEARANCE

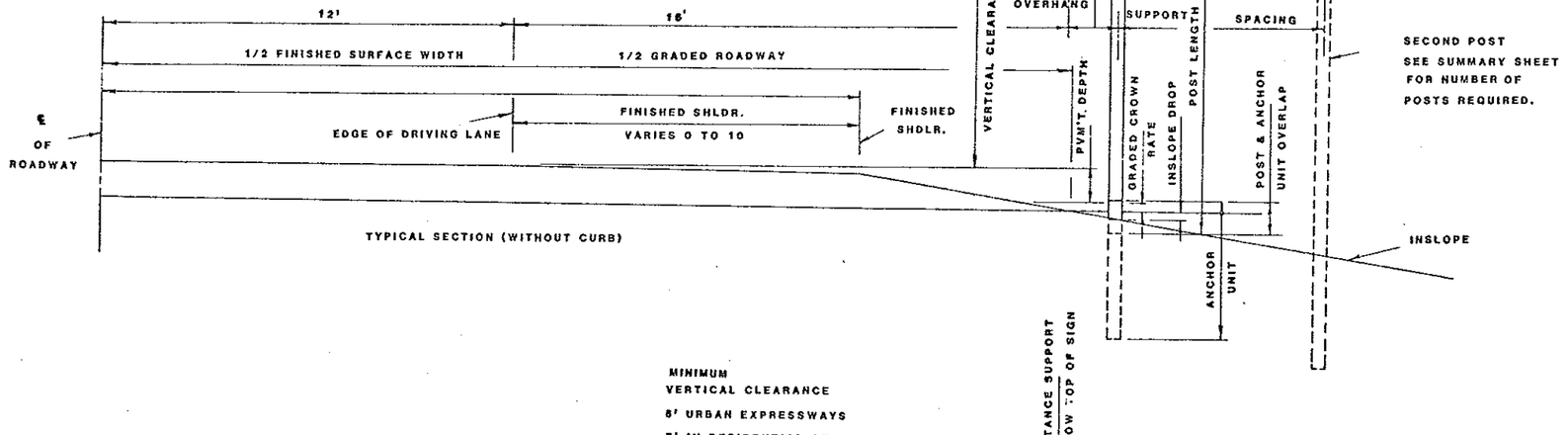
THE 16' CLEARANCE FROM THE EDGE OF THE DRIVING LANE TO THE EDGE OF THE SIGN SHALL BE FOR ALL ROADWAYS WITHOUT CURBS. ALL CURBED ROADWAYS SHALL HAVE 3' HORIZONTAL CLEARANCE FROM THE FACE OF THE CURB TO THE EDGE OF THE SIGN UNLESS NOTED OTHERWISE ON THE PLANS.

ALL BIKE ROUTE SHALL HAVE A 3' MINIMUM HORIZONTAL CLEARANCE FROM THE EDGE OF THE BIKE ROUTE TO THE EDGE OF THE SIGN.

MINIMUM VERTICAL CLEARANCE

5' RURAL ROADWAYS

6' ON RURAL OR URBAN EXPRESSWAYS

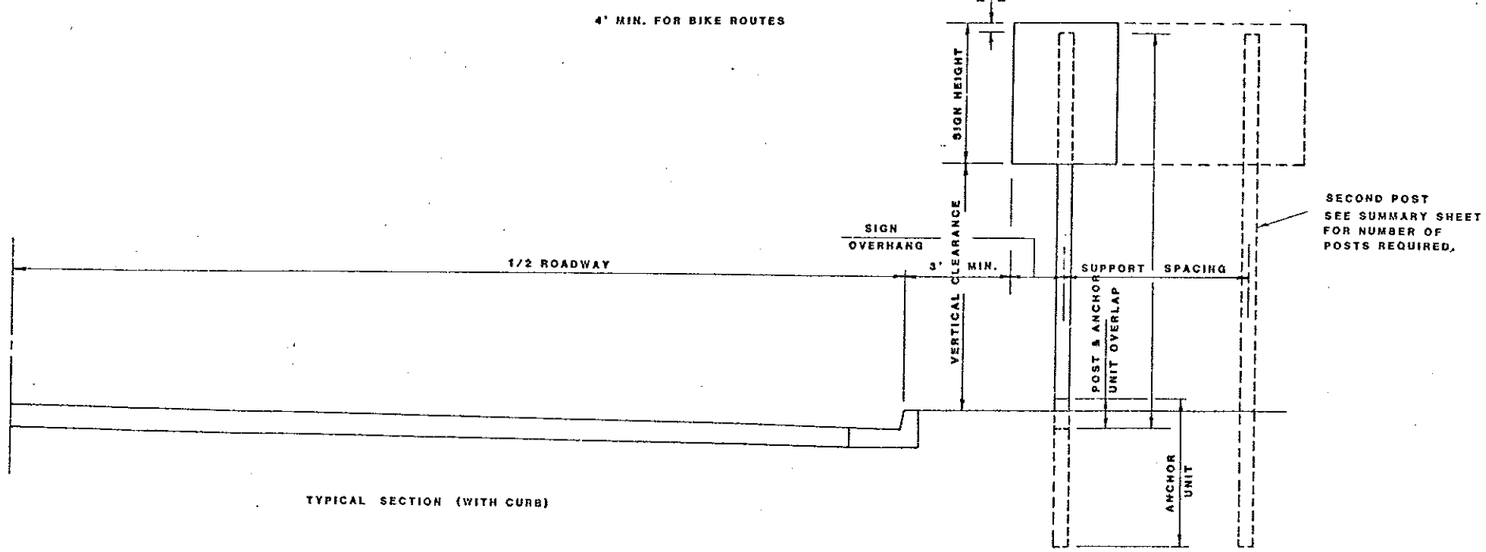


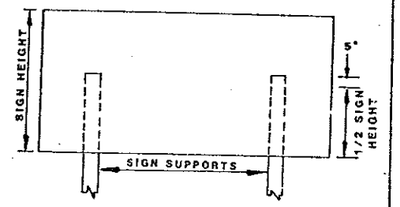
MINIMUM VERTICAL CLEARANCE

8' URBAN EXPRESSWAYS

7' IN RESIDENTIAL AND BUSINESS DISTRICTS WHERE PARKING WILL OCCUR

4' MIN. FOR BIKE ROUTES





HINGE LOCATION DETAIL

FOR 2 OR MORE POSTS ASSEMBLIES - WITH SLIP BASES.

NOTE

PAVEMENT DEPTH-THE PAVEMENT DEPTH USED TO DEVELOP SUMMARY SHEETS SHOULD BE THE ULTIMATE PAVEMENT DEPTH.

SEE PLANS FOR SIGN NUMBERS AND ASSEMBLY NUMBERS.

SIGN PUNCHING AND STRINGERS SHALL BE AS SHOWN ON STANDARDS.

HORIZONTAL CLEARANCE:

THE POST LENGTHS HAVE BEEN COMPUTED USING A HORIZONTAL CLEARANCE OF 16 FEET BETWEEN THE EDGE OF THE DRIVING LANE AND THE EDGE OF THE SIGN.

FOR AN ULTIMATE SHOULDER WIDTH OF 10 FEET, THE DISTRICTS HAVE THE OPTION OF SETTING THE SIGNS OUT TO 18 FEET CLEARANCE. IF THE CLEARANCE IS TO BE INCREASED TO 18 FEET, THE NECESSARY ADJUSTMENT IN SUPPORT LENGTH SHALL BE MADE IN THE FIELD.

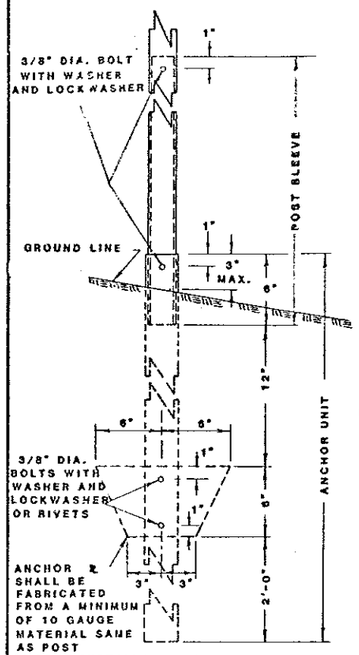
REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

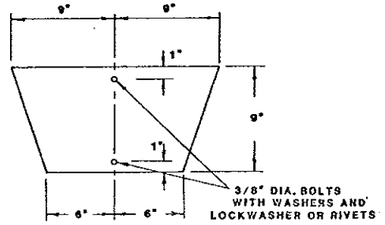
APPROVED: _____
Design Engineer

MOUNTING DETAILS PERFORATED TUBE

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	
D-754-24			



ANCHOR UNIT AND POST SLEEVE ASSEMBLY



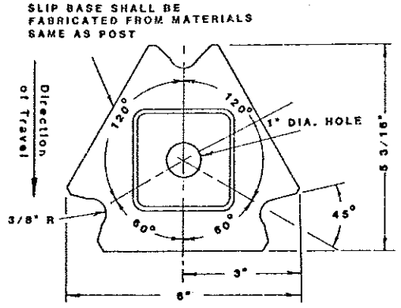
ANCHOR ℄ SHALL BE FABRICATED FROM A MINIMUM OF 10 GAUGE MATERIAL SAME AS POST

ANCHOR PLATE DETAIL
(2 OR MORE POST INSTALLATIONS)

THE 2 3/16" SIZE 10 GAUGE IS SHOWN AS 2.19" SIZE ON THE PLANS. THE 2 1/2" SIZE 10 GAUGE IS SHOWN AS 2.51" SIZE ON THE PLANS.

THE SLIP BASE WILL NOT BE MEASURED AND THE COST OF THE SLIP BASES SHALL BE INCLUDED IN THE PRICE BID FOR POSTS.

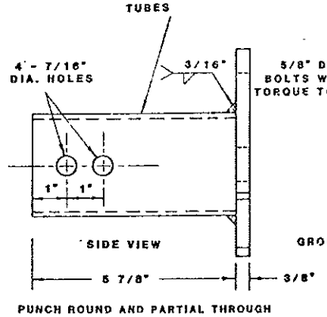
SLIP BASE SHALL BE FABRICATED FROM MATERIALS SAME AS POST



TOP VIEW

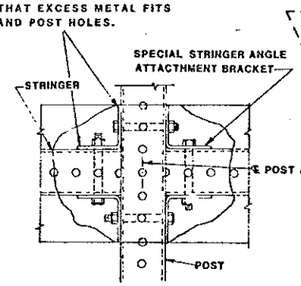
SLIP BASE DETAIL
REQUIRED ON ALL 2 1/2" (12 GA.), 2 3/16" (10 GA.), 2 1/2" (10 GA.) POSTS & ALL THREE OR MORE POST ASSEMBLIES

2 1/2" x .105"
2 3/16" x .135"
2 1/2" x .135"
2 7/8" x .165"
TUBES

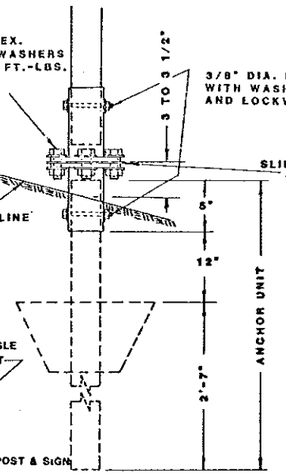


SIDE VIEW

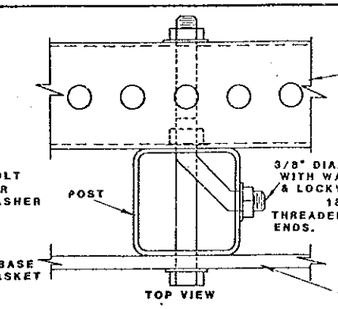
PUNCH ROUND AND PARTIAL THROUGH ANGLE SO THAT EXCESS METAL FITS STRINGER AND POST HOLES.

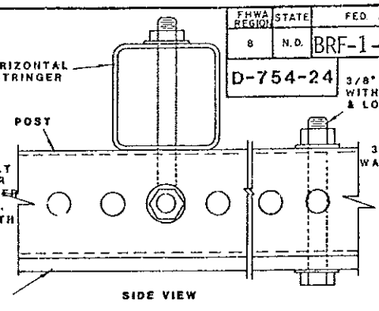


FOR SINGLE POST ASSEMBLIES HAVING ONLY ONE STRINGER, OR WITH BACK TO BACK SIGNS.

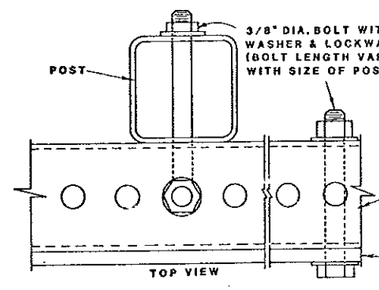


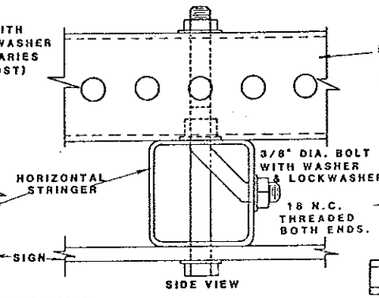
SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY

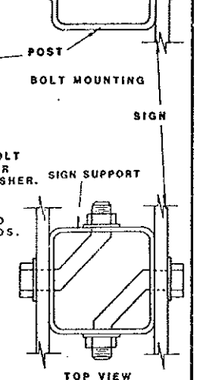




STRINGER MOUNTING
(WITH POST IN FRONT OF STRINGER)



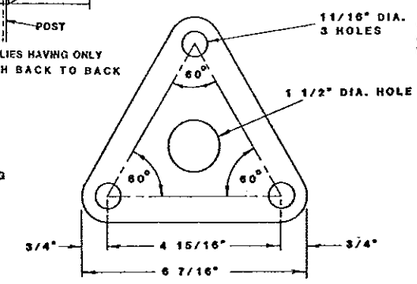




3/8" DIA. BOLT WITH WASHER & LOCKWASHER (BOLT LENGTH VARIES WITH SIZE OF POST)

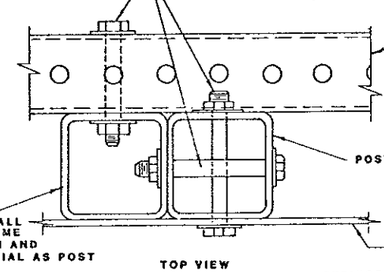
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)
ALTERNATE A

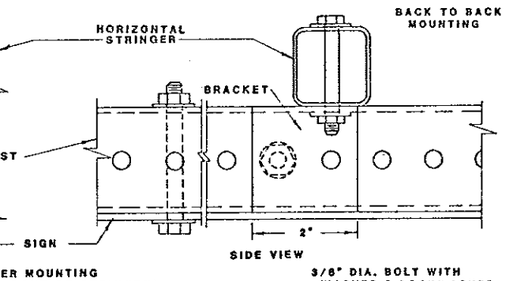
BACK TO BACK MOUNTING



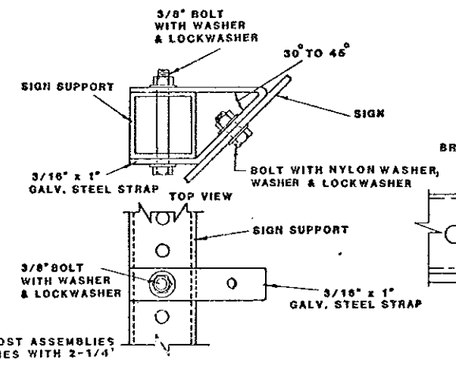
SLIP BASE GASKET

NOTE: THE SLIP BASE GASKET SHALL BE FABRICATED FROM POLYPROPYLENE (BLACK) COPOLYMER, THICKNESS: 0.060" ±.010"

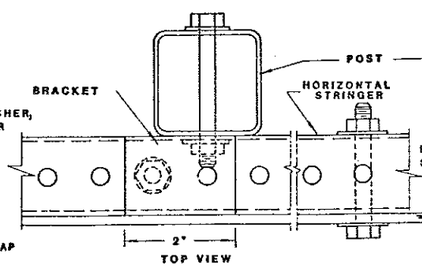


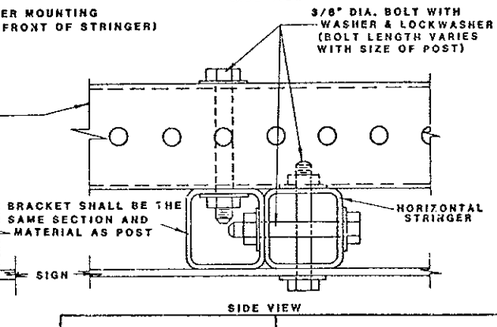


STRINGER MOUNTING
(WITH POST IN FRONT OF STRINGER)

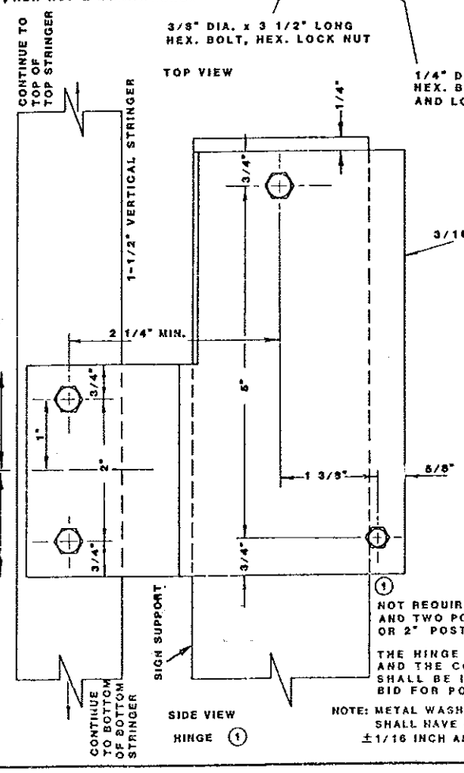


STRAP DETAIL





STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)
ALTERNATE B



TOP VIEW

(1) NOT REQUIRED ON ONE POST ASSEMBLIES AND TWO POST ASSEMBLIES WITH 2-1/4" OR 2" POSTS.

THE HINGE WILL NOT BE MEASURED AND THE COST OF THE HINGES SHALL BE INCLUDED IN THE PRICE BID FOR POSTS.

NOTE: METAL WASHER AND NYLON WASHERS USED ON SIGN FACE SHALL HAVE A MINIMUM OUTSIDE DIAMETER OF 15/16 INCH ±1/16 INCH AND 10 GAUGE THICKNESS.

NO PARKING SIGNS: ALL NO PARKING SIGNS THAT HAVE DIRECTIONAL ARROWS PLACED ON THEIR FACES SHALL BE PLACED AT 30 TO 45 DEGREE ANGLE WITH ONCOMING TRAFFIC. NO PARKING SIGNS PLACED AT THE ABOVE ANGLES MAY HAVE THE SUPPORT TURNED AT THE CORRECT ANGLE UNLESS THE NO PARKING SIGN IS PLACED WITH ANOTHER SIGN THAT HAS TO BE PLACED AT 90 DEGREE ANGLE WITH ONCOMING TRAFFIC. IN WHICH CASE THE DETAILED ANGLE STRAP SHOULD BE USED TO MOUNT THE NO PARKING SIGN. MATERIAL USED FOR THE ATTACHMENT STRAPS SHALL BE INCLUDED IN THE PRICE BID FOR FLAT SHEET SIGNS. FLAT WASHERS & LOCKWASHERS SHALL BE USED WITH ALL NYLON WASHERS

TELESCOPING PERFORATED TUBES

TUBE SIZE IN.	WALL THICKNESS IN.	U.S. STANDARD GAUGE	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN.⁴	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN.³
1 1/2 x 1 1/2	.105	12	1.705	.129	.380	.172
2 x 2	.105	12	2.416	.372	.590	.372
2 1/4 x 2 1/4	.105	12	2.773	.561	.695	.499
2 3/16 x 2 3/16	.135	10	3.432	.605	.841	.596
2 1/2 x 2 1/2	.105	12	3.141	.804	.803	.643
2 1/2 x 2 1/2	.135	10	4.006	.979	1.010	.785

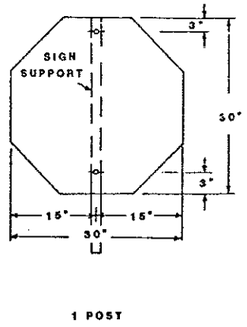
REVISIONS	
DATE	CHANGE

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

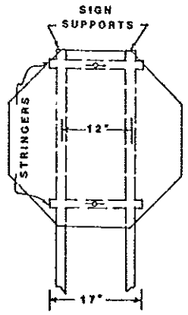
APPROVED _____
DESIGN ENGINEER

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS

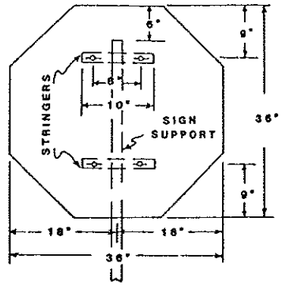
FHWA REGION	STATE	FED. AID PROJECT NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	
		D-754-26	



1 POST

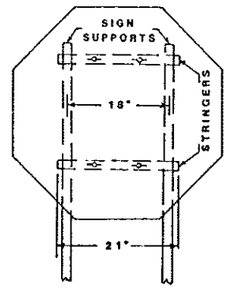


2 POSTS

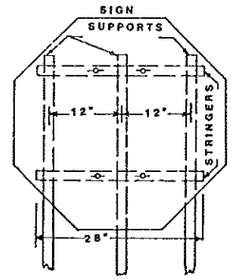


1 POST

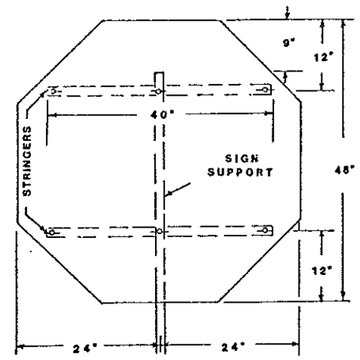
ASSEMBLY NO. 1



2 POSTS

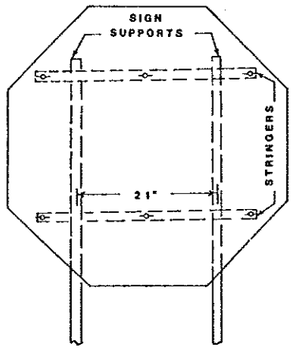


3 POSTS

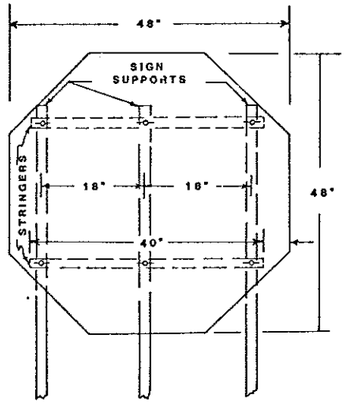


1 POST

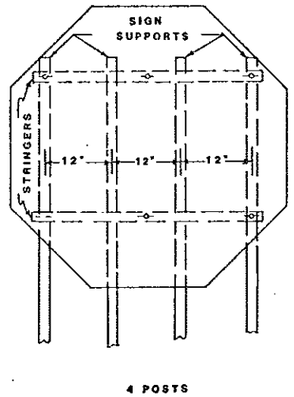
ASSEMBLY NO. 2



2 POSTS

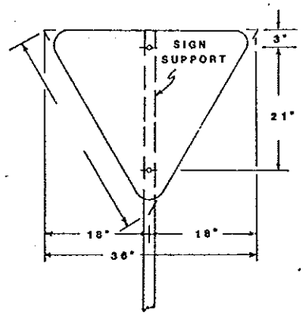


3 POSTS

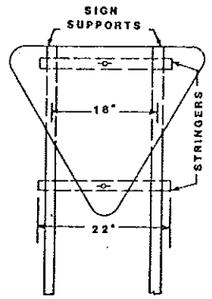


4 POSTS

ASSEMBLY NO. 3

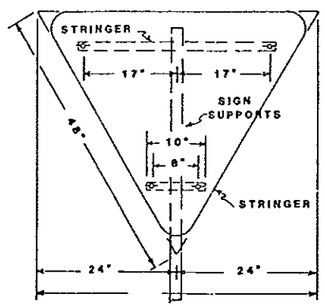


1 POST

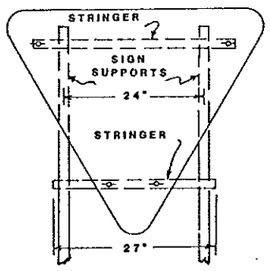


2 POSTS

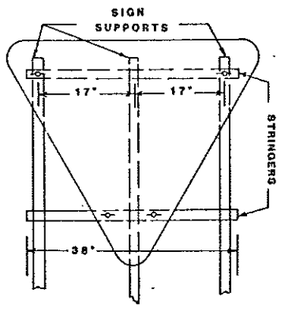
ASSEMBLY NO. 4



1 POST



2 POSTS



3 POSTS

ASSEMBLY NO. 5

NOTE:

Material:

Signing Backing: The sign backing material thickness shall be as follows.
Steel: Signs having a width of less than 30" shall use 14 gauge material. Signs 30" or more shall use 12 gauge material.

Aluminum: Aluminum Alloy 6061-T6 and 5052 -H38 shall have the following minimum thickness: All signs shall be 0.100 inch.

Stringers:

Flange Channel : All stringers shall be flange channel 1.12# per foot and of the length shown.

Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2"X1 1/2" and of the length shown.

Holes:

Flange Channel: All holes shall be punched round for 3/8" diameter bolts.

Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

General:

See plans for sign numbers to be used at each location.
See Std. D-754-24 square tube , perforated mounting details.
See Std. D-754-25 for flange channel mounting details.

REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

SUBMITTED: _____
DESIGN ENGINEER

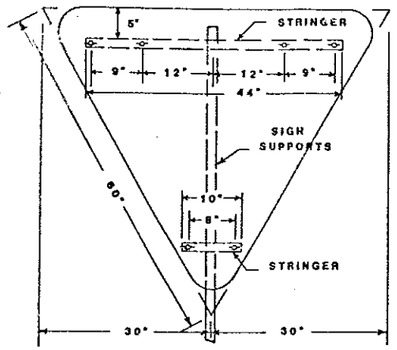
RECOMMENDED: _____
ASS'T. CHIEF ENGINEER
PRE-CONSTRUCTION

APPROVED: _____
CHIEF ENGINEER

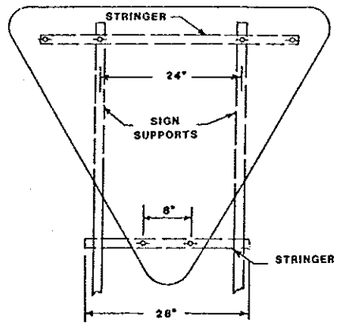
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS

FHWA REGION	STATE	FED. AID PROJECT NO.	SHEET NO.
8	N.D.	BRF-1-006(02)066	

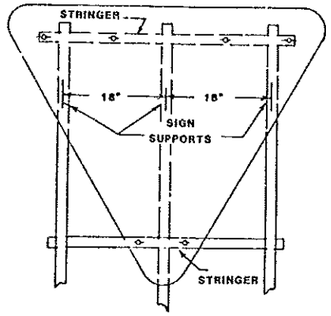
D-754-27



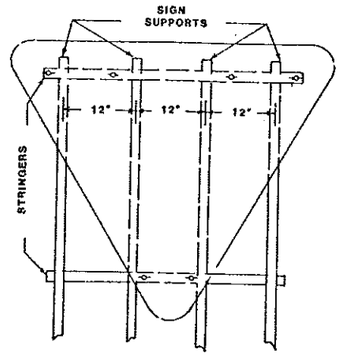
1 POST



2 POSTS

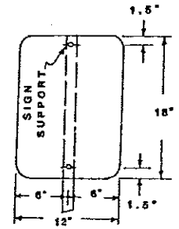


3 POSTS



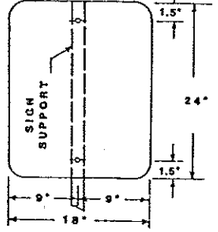
4 POSTS

ASSEMBLY NO. 6



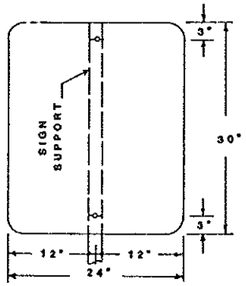
1 POST

ASSEMBLY NO. 7

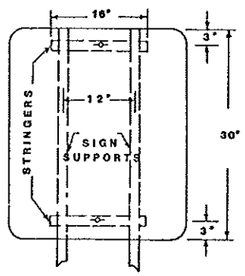


1 POST

ASSEMBLY NO. 8

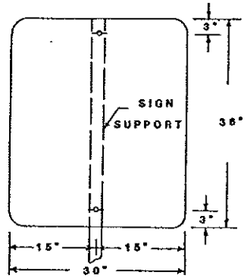


1 POST

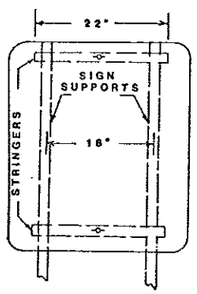


2 POSTS

ASSEMBLY NO. 9

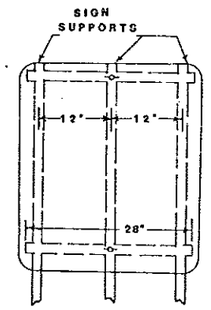


1 POST



2 POSTS

ASSEMBLY NO. 10



3 POSTS

NOTE:

Material:

Sign Backing: The sign backing material thickness shall be as follows.
Steel: Signs having a width of less than 30" shall use 14 gauge material. Signs 30" or more shall use 12 gauge material.
Aluminum: Alumium Alloy 6061-T6 and 5052-H38 shall have the following minimum thickness: All signs shall be 0.100 inch.

Stringers:

Flange Channel: All stringers shall be flange channel 1.12# per foot and of the length shown.

Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2"X1 1/2" and of the length shown.

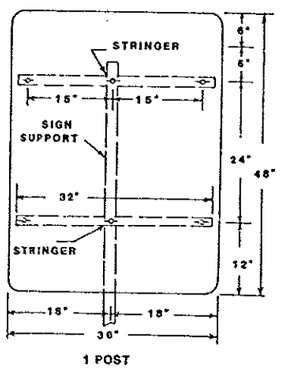
Holes:

Flange Channel: All holes shall be punched round for 3/8" diameter bolts.

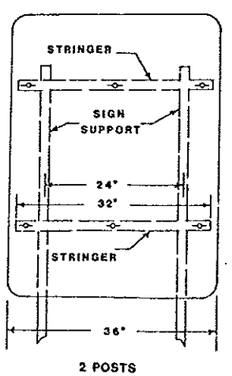
Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

General:

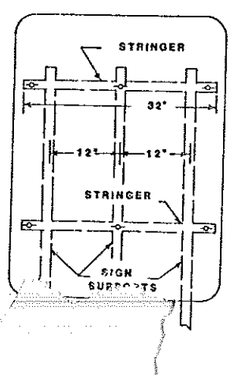
See plans for sign numbers to be used at each location.
See Std. D-754-24 for square tube, perforated mounting details.
See Std. D-754-25 for flange channel mounting details.

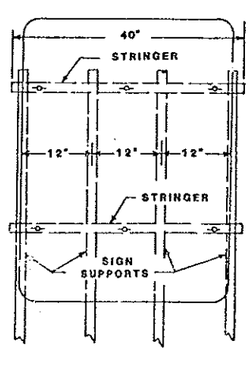


1 POST



2 POSTS





4 POSTS

ASSEMBLY NO. 11

REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

APPROVED: _____
DESIGN ENGINEER