

**STATE OF NEBRASKA
DEPARTMENT OF ROADS
PLANS FOR CONSTRUCTION
FRIEND SOUTH
SALINE COUNTY**



PROJECT NO.	SHEET NO.
BRO-7076(18)	1
▲ CONTROL NO.	12850
▲ CONTROL NO.	
■ CONTROL NO.	

INDEX OF SHEETS

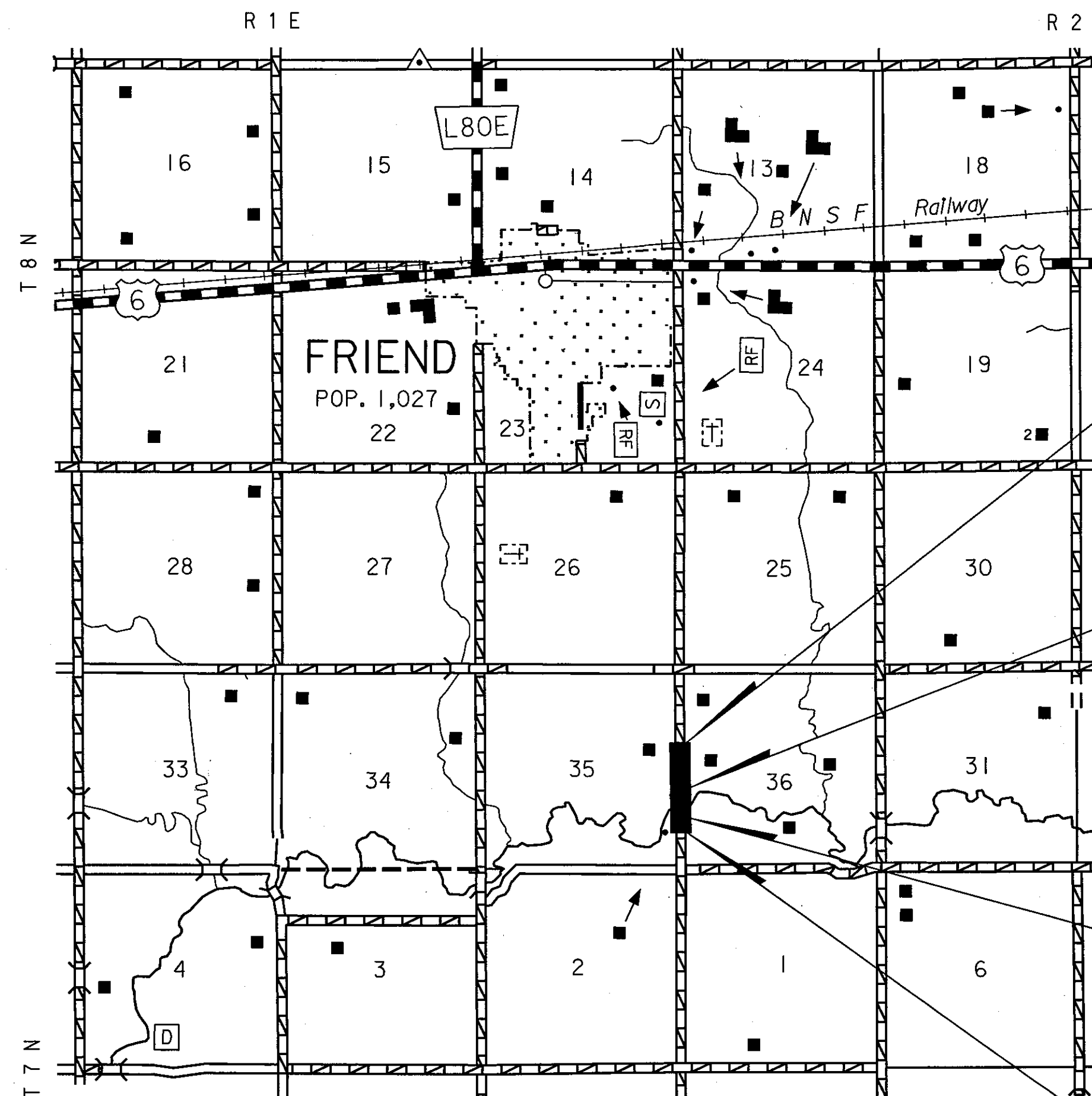
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WORK ON THIS PROJECT IN THE VICINITY OF STATION 16+25.00 AUTHORIZED PURSUANT TO THE CONDITIONS STIPULATED IN THE ARMY CORP OF ENGINEERS NATION WIDE PERMIT

MEETS OR EXCEEDS MINIMUM DESIGN STANDARDS OF THE BOARD OF PUBLIC ROADS CLASSIFICATION AND STANDARDS, EXCEPT FOR APPROVED RELAXATION OF STANDARDS.



STA. 29+00.00
END PROJECT BRO-7076(18)
END CONSTRUCTION
END 2" X 25' CRUSHED
ROCK SURFACE COURSE

STA. 17+18.60
RESUME 2" X 25' CRUSHED
ROCK SURFACE COURSE

STA. 15+31.40
STOP 2" X 25' CRUSHED
ROCK SURFACE COURSE

STA. 7+00.00
BEGIN PROJECT BRO-7076(18)
BEGIN CONSTRUCTION
BEGIN 2" X 25' CRUSHED
ROCK SURFACE COURSE

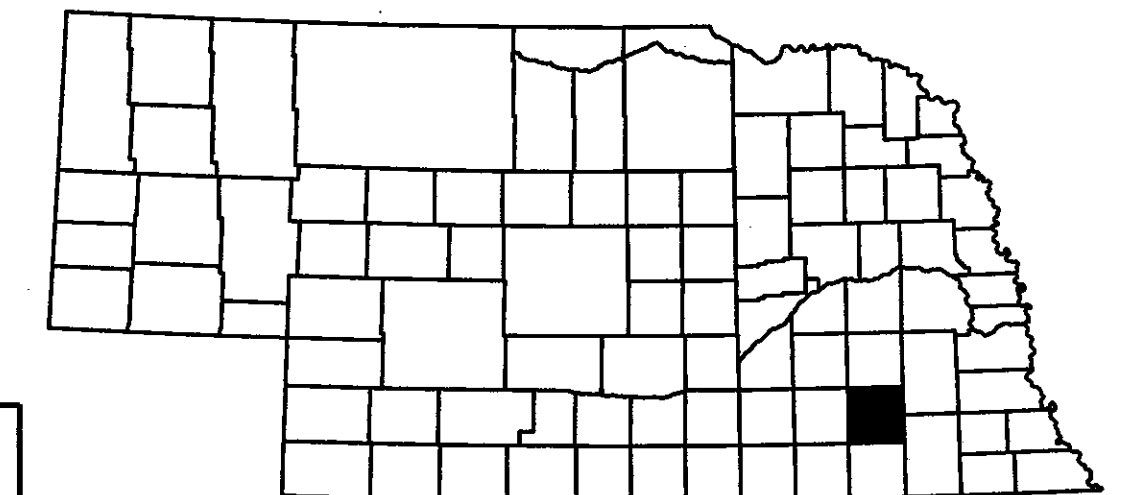
THE WORK ON THIS PROJECT CONSISTS OF GROUPS

1-GRADING, 4-CULVERTS, 6-BRIDGES,
7-GUARDRAIL, & 10-GENERAL

▲ GROUPS 1,4,6,7, & 10	ARE INCLUDED
IN THE LETTING OF	JUNE 27, 2013
▲ GROUPS	ARE INCLUDED
IN THE LETTING OF	
■ GROUPS	ARE INCLUDED
IN THE LETTING OF	

DESIGN DESIGNATION	
YEAR:	2013 2033
ADT:	40 50
DHV:	10 11
T=	15 %
D=	___ %
DESIGN NO.	RL-2
N.F.C.	RURAL LOCAL

PLANS PREPARED BY:



SALINE COUNTY

APPROVED: *Mark A. Schultz* 5/1/13
CHAIRMAN OF BOARD DATE

CONVENTIONAL SIGNS

FENCE R.O.W. OR WIRE	— — — — —
GUARDRAIL	— — — — —
TRAVELED WAY	— — — — —
DIKE	— — — — —
CULVERT	— — — — —
POWER POLE	— — — — —
TELEPHONE POLE	— — — — —
MAILBOX	— — — — —
RAILROAD TRACKS	— — — — —
MARSH	— — — — —
TREE - CONIFEROUS	— — — — —
TREE - DECIDUOUS	— — — — —

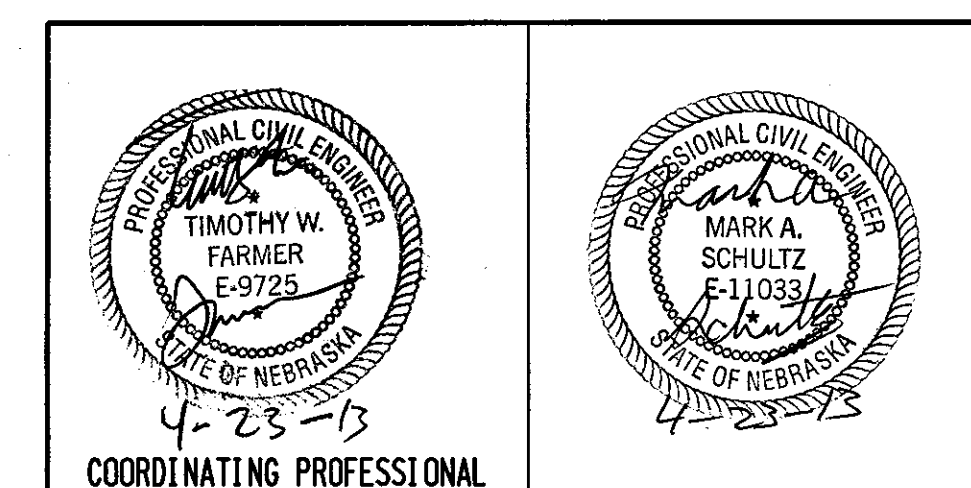
R.O.W. LEGEND

NEW CONTROLLED ACCESS	— — — — —
PREVIOUS CONTROLLED ACCESS	— — — — —
LIMITS OF CONSTRUCTION	— — — — —
PREVIOUS R.O.W.	— — — — —
NEW R.O.W.	— — — — —
EXISTING PERMANENT EASEMENT	— — — — —
TEMPORARY EASEMENT	— — — — —
EXCESS TAKING	— — — — —
PERMANENT EASEMENT	— — — — —
EXISTING RAILROAD EASEMENT	— — — — —
NEW RAILROAD PERMANENT EASEMENT	— — — — —
NEW RAILROAD TEMPORARY EASEMENT	— — — — —

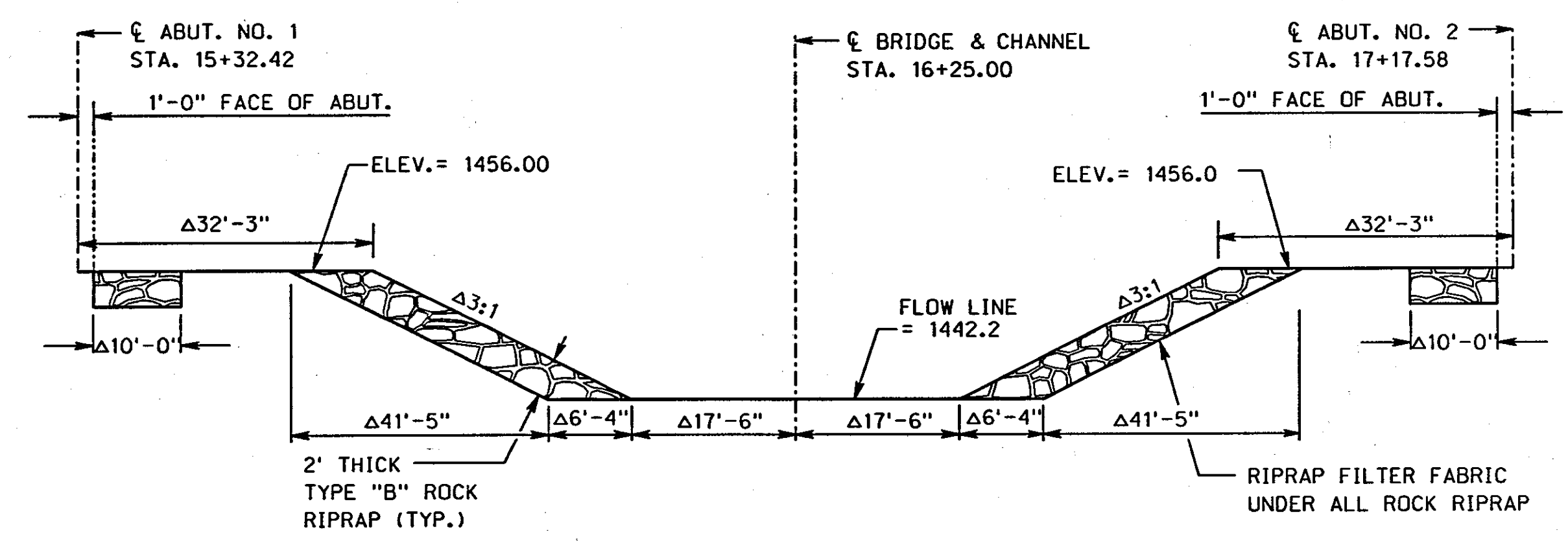
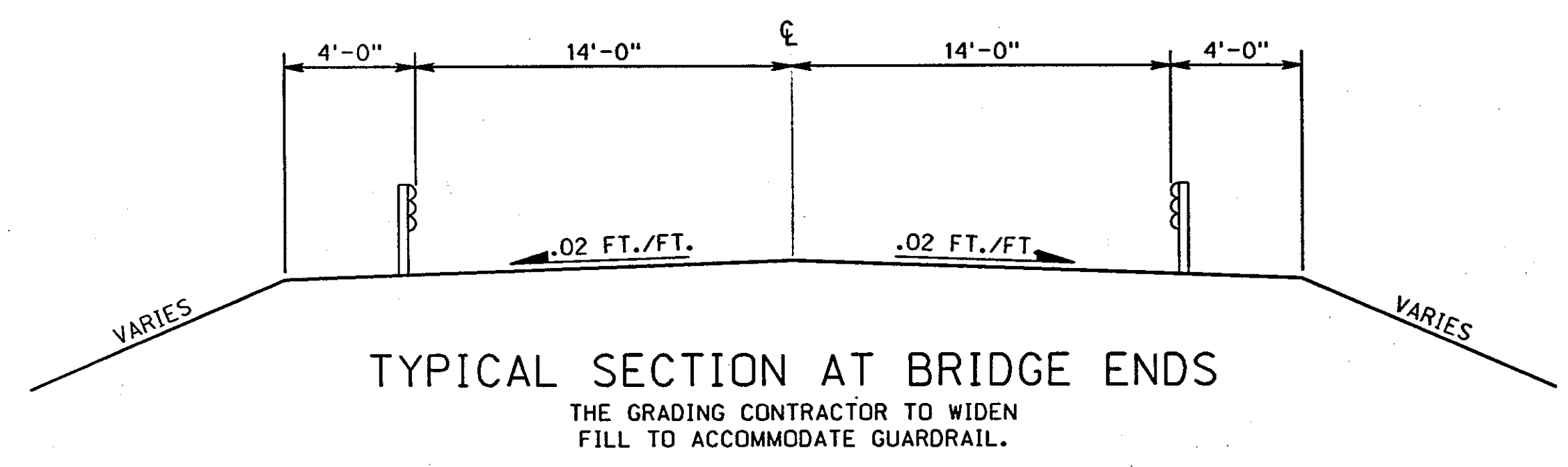
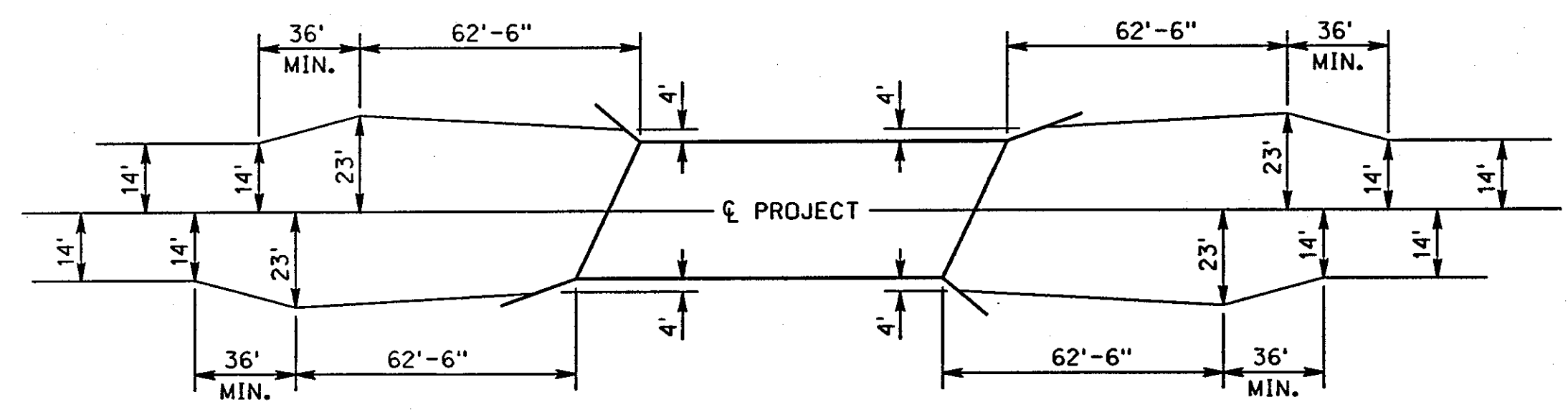
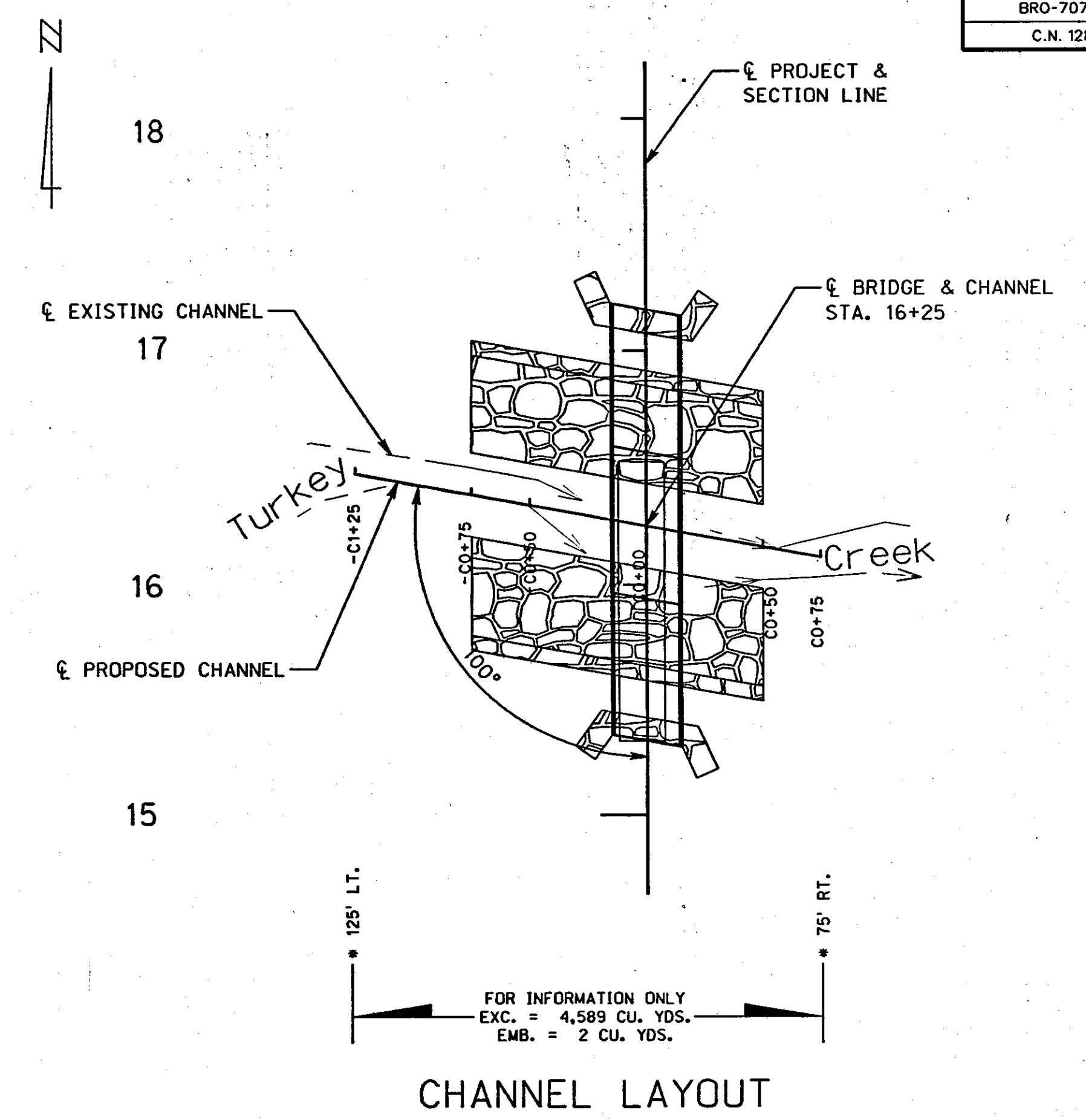
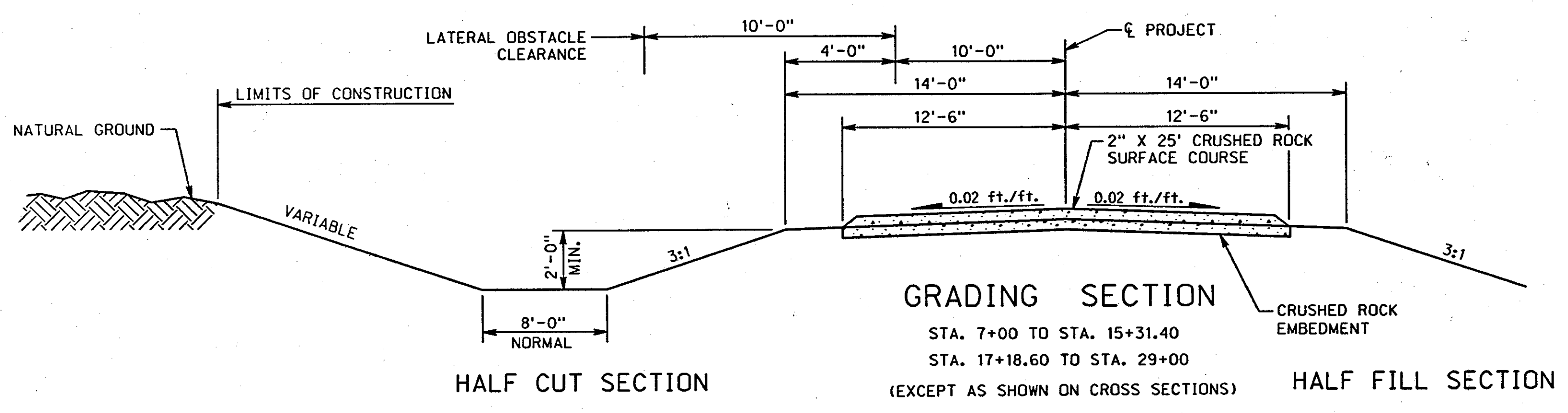
REFERENCE POST NO. TO REFERENCE POST NO.

EXCEPTIONS: FROM STA. TO STA.

TOTAL NET LENGTH OF PROJECT: 2,200.00 FEET 0.417 MILES



TYPICAL CROSS SECTIONS OF IMPROVEMENT



Δ - MEASURED PERPENDICULAR TO ϵ CHANNEL
* - MEASURED PERPENDICULAR TO ϵ OF PROJECT

LIMITS OF GRADING THROUGH THE BRIDGE WHICH SHALL BE DONE BY THE GRADING CONTRACTOR BEFORE THE BRIDGE IS BUILT. (*125' LT. & *75' RT.)

CHANNEL EXCAVATION SHALL BE INCLUDED IN THE ITEM EARTHWORK MEASURED IN EMBANKMENT.

SEE CHANNEL CROSS SECTIONS AND BRIDGE PLANS FOR ADDITIONAL DETAILS.

TYPICAL CHANNEL SECTION

SUMMARY OF QUANTITIES

PROJECT NO.	SHEET NO.
BRO-7076(18)	2-S

C.N. 12850

GRADING ITEMS GROUP 1

ITEM	QUANTITY	UNITS
MOBILIZATION	1.000	LS
LARGE TREE REMOVAL	44.000	EACH
GENERAL CLEARING AND GRUBBING	1.000	LS
WATER	152.000	MGAL
EARTHWORK MEASURED IN EMBANKMENT	10,878.000	CY
REMOVE SLAB	1.000	EACH
24" DRIVEWAY CULVERT PIPE, TYPE 2,3,4,5,6,7 OR 8	126.000	LF
30" DRIVEWAY CULVERT PIPE, TYPE 2,3,4,5,6,7 OR 8	40.000	LF
36" ROUND EQUIVALENT DRIVEWAY CULVERT PIPE, TYPE 2,3,4 OR 5	40.000	LF
CRUSHED ROCK EMBEDMENT	20.128	STA
CRUSHED ROCK SURFACE COURSE	777.000	TON
SPECIAL SURFACE COURSE FOR MAILBOX TURNOUTS	18.000	SY
MAILBOX POST	1.000	EACH
SEEDING, TYPE A	6.000	ACRE
COVER CROP SEEDING	6.000	ACRE
EROSION CONTROL, CLASS 1D	5,675.000	SY
EROSION CHECKS, TYPE 1D	120.000	BALE
FABRIC SILT FENCE-LOW POROSITY	491.000	LF
MULCH	14.000	TON

BRIDGE ITEMS GROUP 6

ITEM	QUANTITY	UNITS
MOBILIZATION	1.000	LS
RIPRAP FILTER FABRIC	1,600.000	SY
ABUTMENT NO.1 EXCAVATION	1.000	LS
ABUTMENT NO.2 EXCAVATION	1.000	LS
BENT NO.1 EXCAVATION	1.000	LS
BENT NO.2 EXCAVATION	1.000	LS
CLASS 47B-3000 CONCRETE FOR BRIDGE	244.100	CY
CLASS 47BD-4000 CONCRETE FOR BRIDGE	148.300	CY
PRECAST/PRESTRESSED CONCRETE SUPERSTRUCTURE AT STATION AT STA 16+25	1.000	LS
REINFORCING STEEL FOR BRIDGE	48,860.000	LB
REMOVE STRUCTURE AT STA 15+91	1.000	EACH
ACCESS CROSSING	1.000	LS
STRUCTURAL STEEL FOR SUBSTRUCTURE	2,780.000	LB
ROCK RIPRAP, TYPE B	1,260.000	TON
SALVAGING AND PLACING TOPSOIL ON RIPRAP	1,600.000	SY
PIPE PILING	2,630.000	LF

GENERAL ITEMS GROUP 10

ITEM	QUANTITY	UNITS
BARRICADE, TYPE III	1,920.000	B DAY
SIGN DAY	2,560.000	EACH
CONTRACTOR FURNISHED SIGN DAY	640.000	EACH
MOBILIZATION	1.000	LS
RENTAL OF LOADER, FULLY OPERATED	10.000	HOURL
RENTAL OF DUMP TRUCK, FULLY OPERATED	10.000	HOURL
RENTAL OF SKID LOADER, FULLY OPERATED	10.000	HOURL
RENTAL OF CRAWLER MOUNTED HYDRAULIC EXCAVATOR, FULLY OPERATED	10.000	HOURL
TEMPORARY SILT CHECK	500.000	LF
TEMPORARY SILT FENCE	500.000	LF
TEMPORARY EARTH CHECK	500.000	LF
TEMPORARY MULCH	2.000	TON

CULVERT ITEMS GROUP 4

ITEM	QUANTITY	UNITS
MOBILIZATION	1.000	LS
REMOVE HEADWALLS FROM CULVERTS	2.000	EACH
REMOVE CULVERT PIPE	24.000	LF
EXCAVATION FOR PIPE, PIPE-ARCH CULVERTS, AND HEADWALLS	350.000	CY
24" METAL FLARED-END SECTION	1.000	EACH
42" METAL FLARED-END SECTION	1.000	EACH
60" METAL FLARED-END SECTION	2.000	EACH
42" CULVERT PIPE, TYPE 3,4 OR 5	184.000	LF
60" CULVERT PIPE, TYPE 3,4 OR 5	60.000	LF
24" CULVERT PIPE, TYPE 3,4,5 OR 6	90.000	LF

GUARDRAIL ITEMS GROUP 7

ITEM	QUANTITY	UNITS
MOBILIZATION	1.000	LS
BRIDGE APPROACH SECTIONS	4.000	EACH
GUARDRAIL END TREATMENT, TYPE II	4.000	EACH

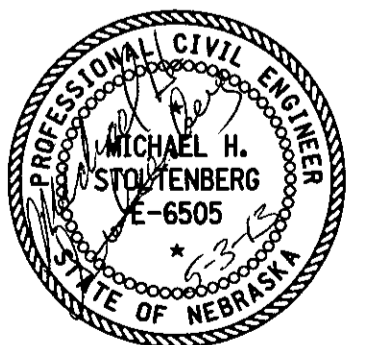
CONSTRUCTION DIVISION

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SEC. 35-T8N-R1E

PROJECT NO.
BRO-7076(1B)
C.N. 12850

SHEET NO.

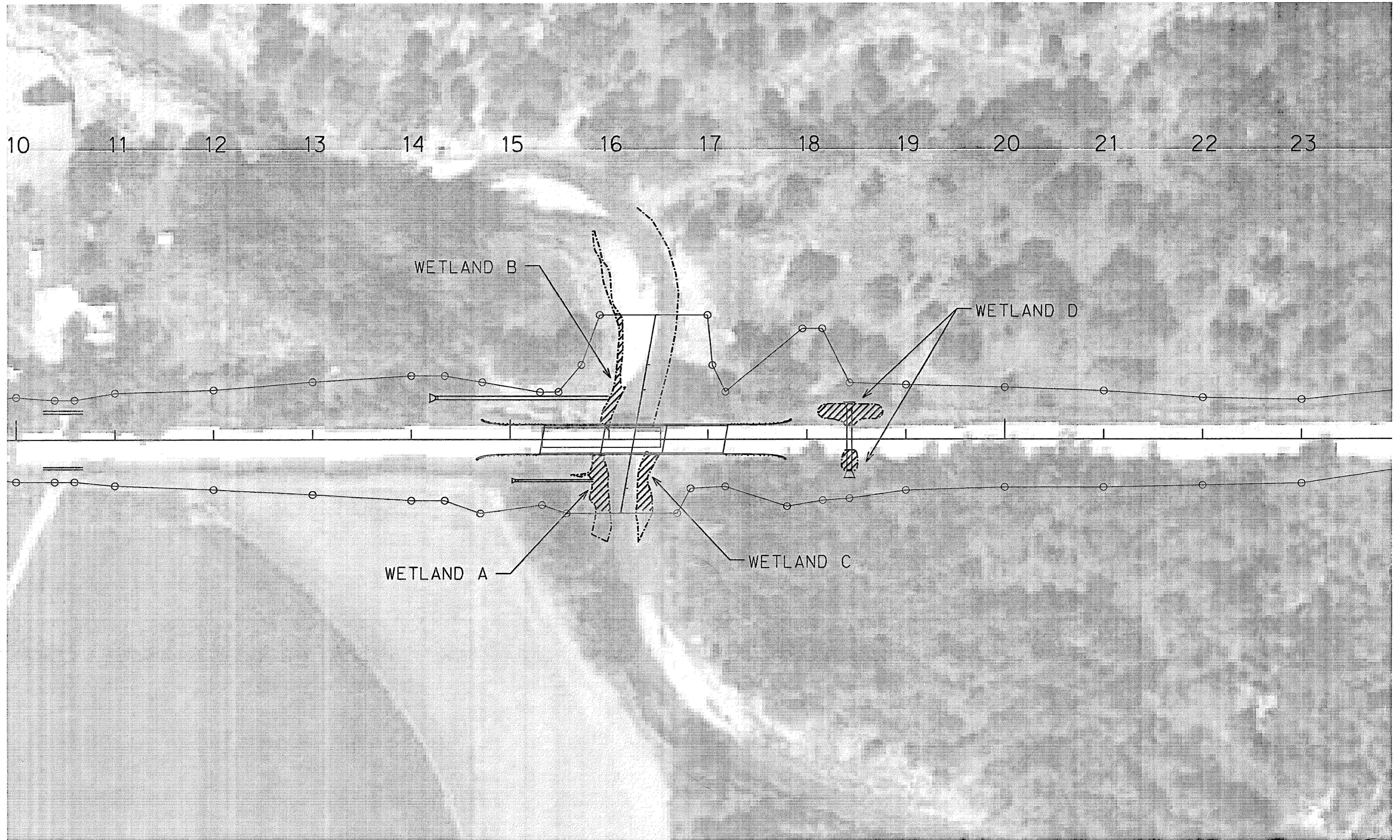
2-W

WETLANDS

FRIEND SOUTH

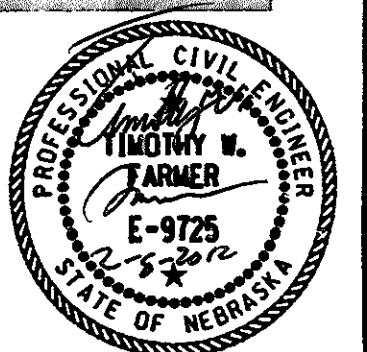
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LINCOLN, NE 68510
(402)483-5466
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SPEECE LEWIS
ENGINEERS



LEGEND

- LIMITS OF CONSTRUCTION
- WETLANDS - DO NOT DISTURB
- IMPACTED WETLANDS
- TEMPORARY IMPACTED WETLANDS

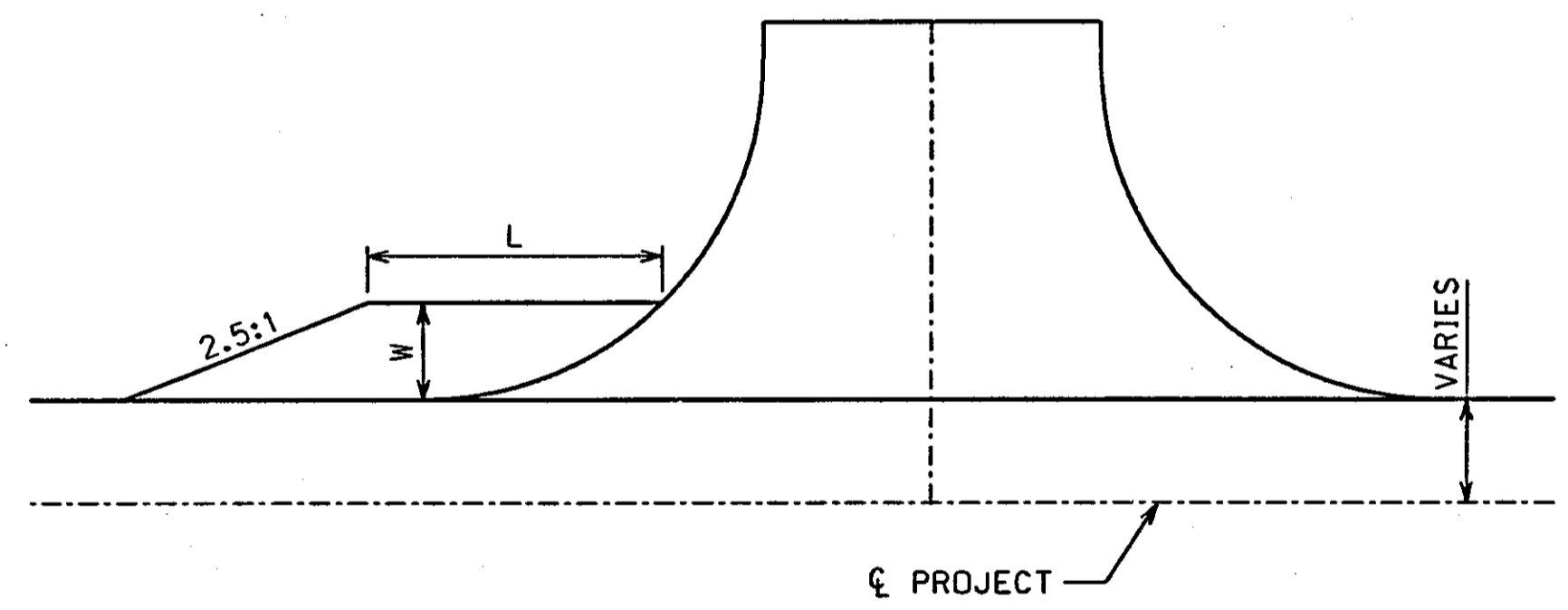


SEC. 36-T8N-R1E

COMPACTION REQUIREMENTS	
ROADWAY EMBANKMENT	CLASS II
EMBANKMENT FOR INTERSECTING PUBLIC ROADS	CLASS II
PRIVATE DRIVES	CLASS I
(SEE SEC. 205 IN THE 2007 SPECIFICATIONS)	

EARTHWORK QUANTITIES				
STATION TO STATION		DESCRIPTION	EXCAVATION AVAILABLE (cu. yds.)	EARTHWORK MEASURED IN EMBANKMENT (cu. yds.)
7+00	29+00	ROADWAY	5,051	10,533
125', LT.	75', RT.	CHANNEL	4,589	2
		DRIVES	0	343
TOTALS			9,640	10,878

SUMMARY OF QUANTITIES AND LOCATION OF MAILBOX TURNOUT AND POSTS
SEE PLAN NO. 308-R1 & 309.



STATION	SIDE	W FEET	L FEET	AREA (SQ. YDS.)	POSTS	NO. MAILBOXES
10+86	RT.	6	24.0	18	1	2

THE LOCATIONS OF ALL AERIAL AND UNDERGROUND UTILITY FACILITIES MAY NOT BE INDICATED IN THESE PLANS. UNDERGROUND UTILITIES, WHETHER INDICATED OR NOT WILL BE LOCATED AND FLAGGED BY THE UTILITIES AT THE REQUEST OF THE CONTRACTOR.

NO EXCAVATION WILL BE PERMITTED IN THE AREA OF THE UNDERGROUND UTILITY FACILITIES UNTIL ALL SUCH FACILITIES HAVE BEEN LOCATED AND IDENTIFIED TO THE SATISFACTION OF ALL PARTIES. THE EXCAVATION MUST BE ACCOMPLISHED WITH EXTREME CARE IN ORDER TO AVOID ANY POSSIBILITY OF DAMAGE TO THE UTILITY FACILITY.

UPON COMPLETION OF THE GRADING OPERATIONS PERMANENT SEEDING OF THE DISTURBED AREAS CREATED BY THE GRADING OPERATIONS AND PERMANENT SEEDING OF A 50' WIDE BUFFER STRIP ALONG EACH SIDE OF THE NEW CHANNEL WILL BE PERFORMED BY THE CONTRACTOR AS DIRECTED BY THE PROJECT MANAGER.

BACKFILL AT ABUTMENTS SHALL BE MADE AND COMPACTED BY THE GRADING CONTRACTOR, TO THE LIMITS INDICATED, AS PRESCRIBED IN PARAGRAPH 3 OF SUBSECTION 702.03 IN THE 2007 STANDARD SPECIFICATIONS AFTER THE BRIDGE HAS BEEN BUILT.

ALL SIGNING AND PAVEMENT MARKING WILL BE IN CONFORMANCE WITH THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES."

THE CONTRACTOR WILL BE REQUIRED TO FURNISH BORROW ON THIS PROJECT.

THE CONTRACTOR MAY CLOSE THE ROAD TO ALL BUT LOCAL TRAFFIC SUBJECT TO THE CONDITIONS PRESCRIBED IN THE 2007 STANDARD SPECIFICATIONS.

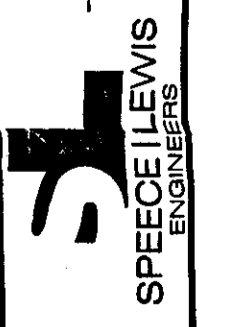
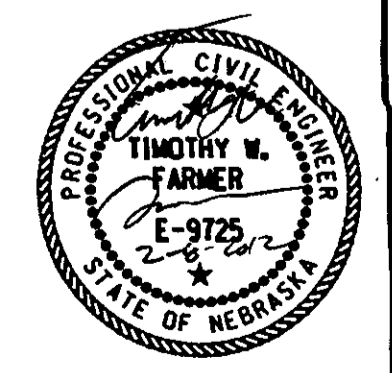
THE COUNTY SHALL PROVIDE ROUTING THROUGH TRAFFIC AROUND THE PROJECT IF DEEMED NECESSARY.

CULVERT PIPE LEGEND		
TYPE	DESCRIPTION	
1	RCSP	Reinforced Concrete Sewer Pipe
2	RCP	Reinforced Concrete Pipe
3	GCCMP	Galvanized (zinc) Coated Corrugated Metal Pipe
4	ACCMP	Aluminum Coated Corrugated Metal Pipe
5	PCCMP	Polymer Coated Corrugated Metal Pipe
6	HDPE-CI	High Density Polyethylene (corrugated Interior)
7	HDPE-SI	High Density Polyethylene (smooth Interior)
8	PVC	Polyvinyl Chloride Pipe

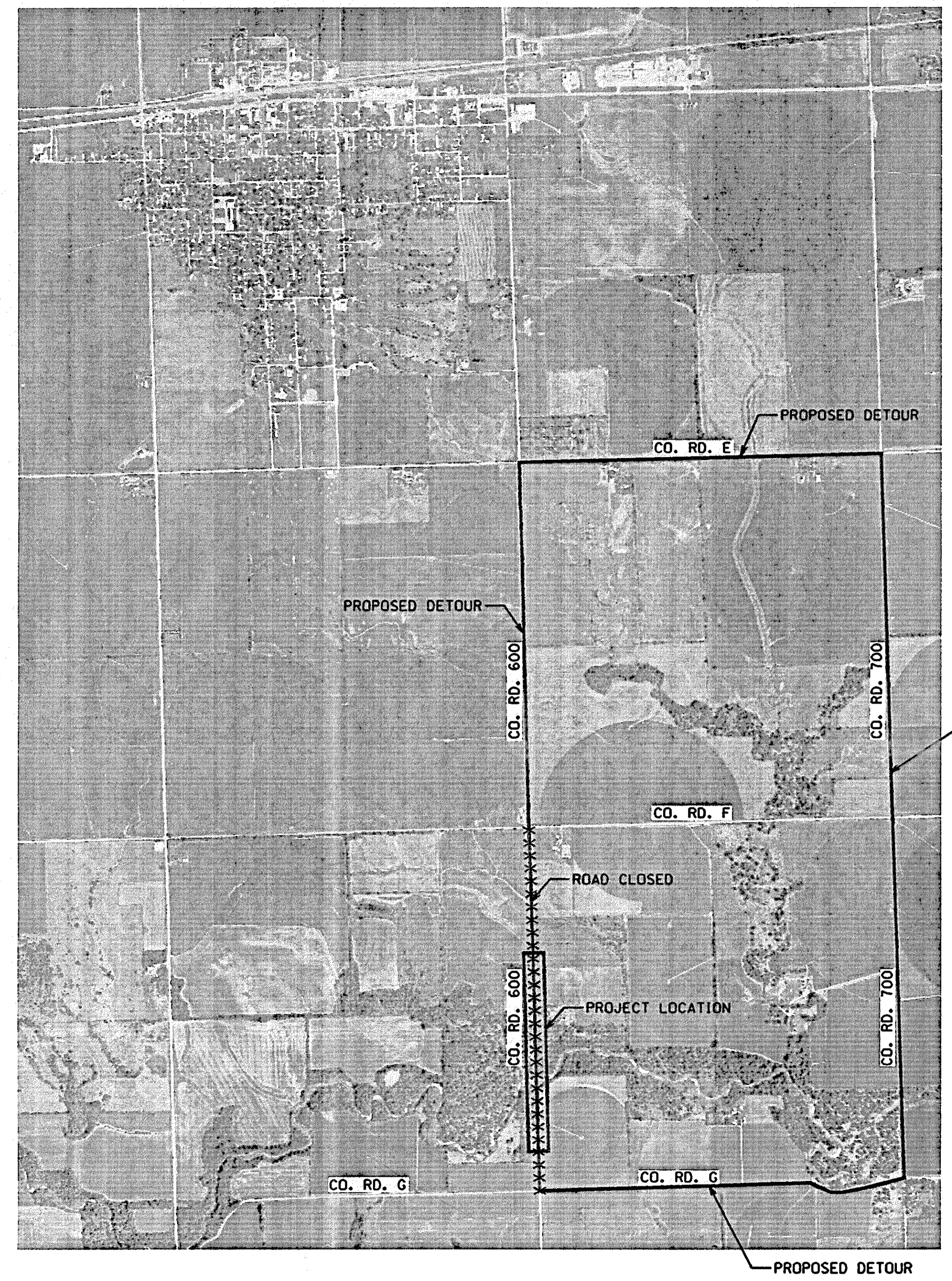
GENERAL INFORMATION

FRIEND SOUTH

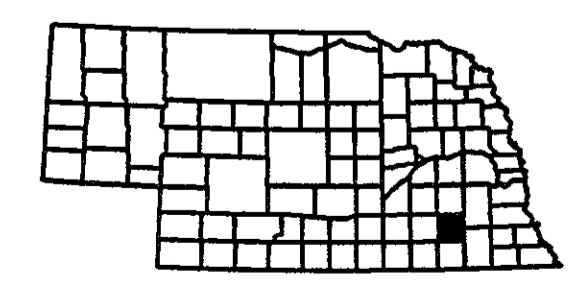
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DETOUR MAP - FRIEND SOUTH SALINE COUNTY

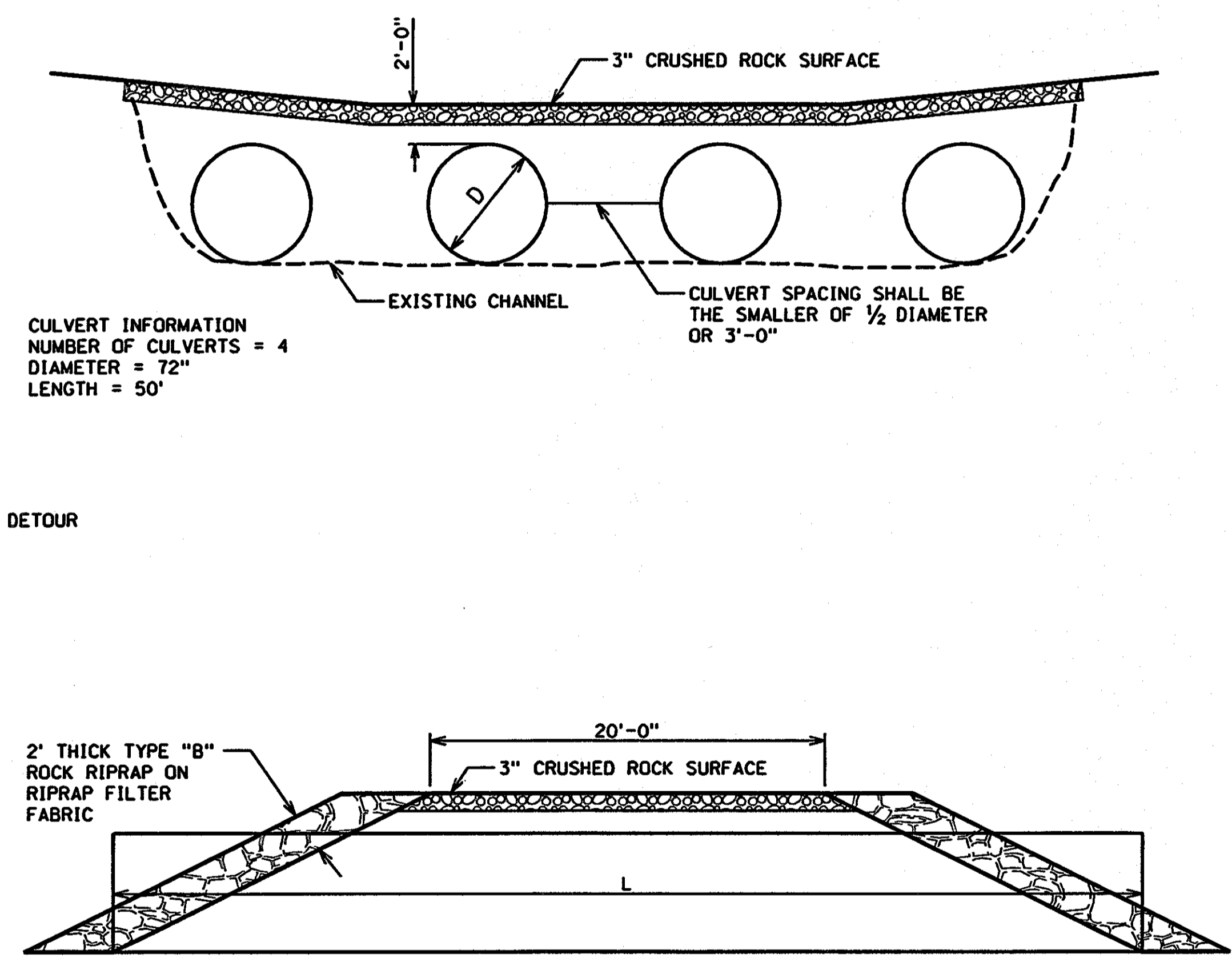


PROPOSED DETOUR
 ROAD CLOSED



ACCESS CROSSING STA. 16+25

THE CONTRACTOR, AT HIS OPTION, MAY CONSTRUCT A CONTRACTORS ACCESS CROSSING FOR USE DURING CONSTRUCTION OF THE BRIDGE. IF THE CONTRACTOR CHOOSES TO BUILD THE ACCESS CROSSING, IT MUST BE CONSTRUCTED ON THE UPSTREAM SIDE OF THE BRIDGE AS SHOWN IN THE DETAIL BELOW. THE ACCESS CROSSING HAS BEEN DESIGNED TO ACCOMMODATE THE BASE FLOW. UPON COMPLETION OF THE PROJECT, THE ACCESS CROSSING SHALL BE REMOVED ENTIRELY AND THE CHANNEL SHAPED AS SHOWN IN THE PLANS. TYPE 'B' ROCK RIPRAP MAY BE SALVAGED AND INCORPORATED INTO THE PROJECT. ALL OTHER MATERIALS REQUIRED TO BUILD THE ACCESS CROSSING SHALL BE REMOVED FROM THE PROJECT BY THE CONTRACTOR AND SHALL BECOME THE PROPERTY OF THE CONTRACTOR.

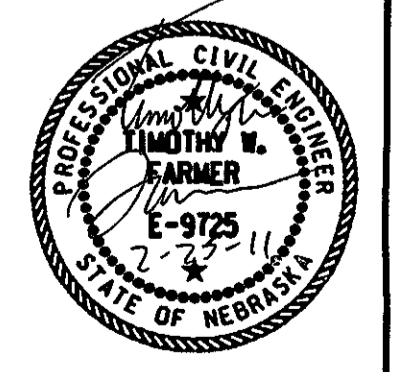


CULVERT INFORMATION
 NUMBER OF CULVERTS = 4
 DIAMETER = 72"
 LENGTH = 50'

GENERAL INFORMATION

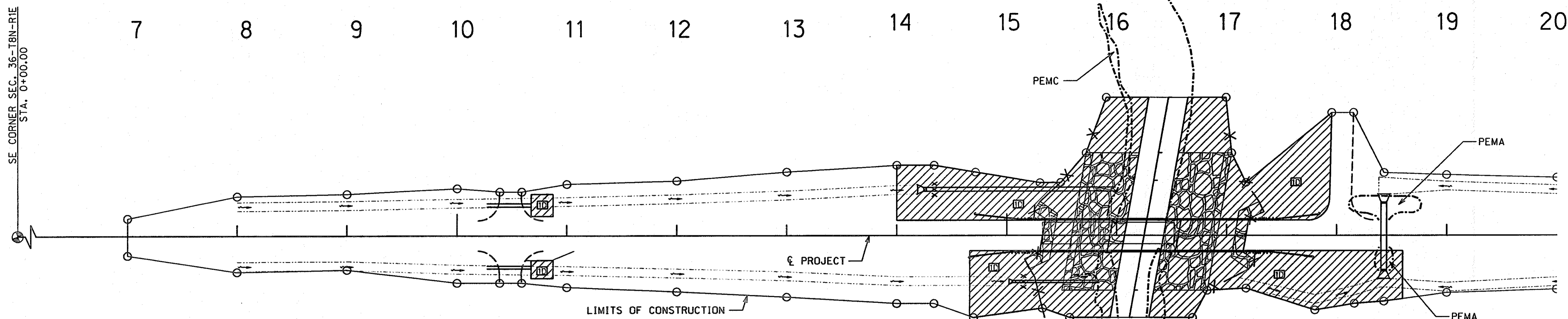
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SEC. 35-T8N-R1E

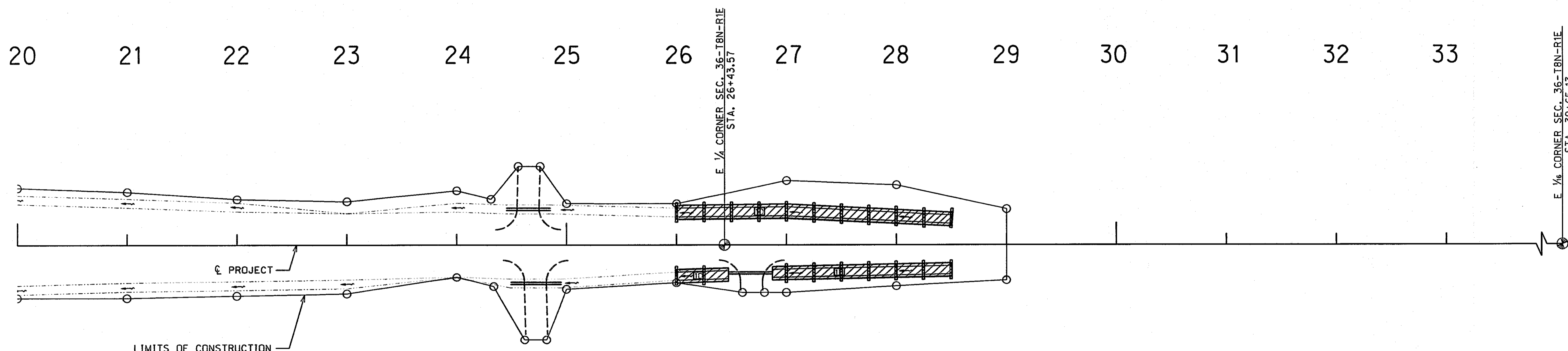
PROJECT NO.	BRO-7076(1B)	SHEET NO.
C.N.	12850	2-L
SCALE	1:50	



BUILD EROSION CONTROL-CLASS 1D, PLAN 501-R5					
STATION TO	STATION	SIDE	DESCRIPTION	WIDTH	SQ. YDS.
10+67	10+87	LT.	CULVERT OUTLET	VARIES	45
10+67	10+87	RT.	CULVERT OUTLET	VARIES	40
14+00	15+34.40	LT.	GUARDRAIL SLOPE	VARIES	617
14+69.90	15+34.40	RT.	GUARDRAIL SLOPE	VARIES	427
17+17.60	17+80.10	LT.	GUARDRAIL SLOPE	VARIES	208
17+17.60	18+60	RT.	GUARDRAIL SLOPE & CULVERT	VARIES	1,045
-C1+25	C0+75	*	SOUTH CHANNEL BANK	VARIES	1,168
-C1+25	C0+75	*	NORTH CHANNEL BANK	VARIES	1,460

BUILD FABRIC SILT FENCE-LOW POROSITY, PLAN 502				
STATION TO	STATION	SIDE	DESCRIPTION	LIN. FT.
15+56	15+92	LT./RT	ALONG CHANNEL BANK	240
16+67	17+00	LT./RT	ALONG CHANNEL BANK	251

SEC. 36-T8N-R1E
SEC. 35-T8N-R1E



BUILD EROSION CHECKS-TYPE 1D, SPECIAL PLAN 1C					
STATION TO	STATION	SIDE	SPACING	BALES EACH	BALES TOTAL
26+00	28+00	LT.	25'	6	66
26+00	26+25	RT.	25'	6	12
27+00	28+00	RT.	25'	6	42

BUILD EROSION CONTROL-CLASS 1D, PLAN 501-R5					
STATION TO	STATION	SIDE	DESCRIPTION	WIDTH	SQ. YDS.
26+00	28+50	LT.	DITCH BOTTOM	13'	362
26+00	26+47	RT.	DITCH BOTTOM	13'	68
26+87	28+50	RT.	DITCH BOTTOM	13'	235

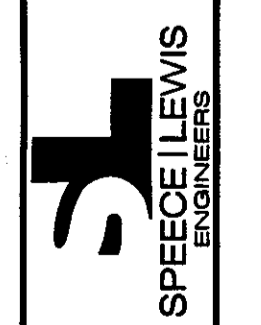
LEGEND
 ○—○ LIMITS OF CONSTRUCTION
 ○—○ WETLANDS - DO NOT DISTURB UNIMPACTED
 WETLANDS, SEE SHEET 2-W

SEC. 36-T8N-R1E

EROSION CONTROL

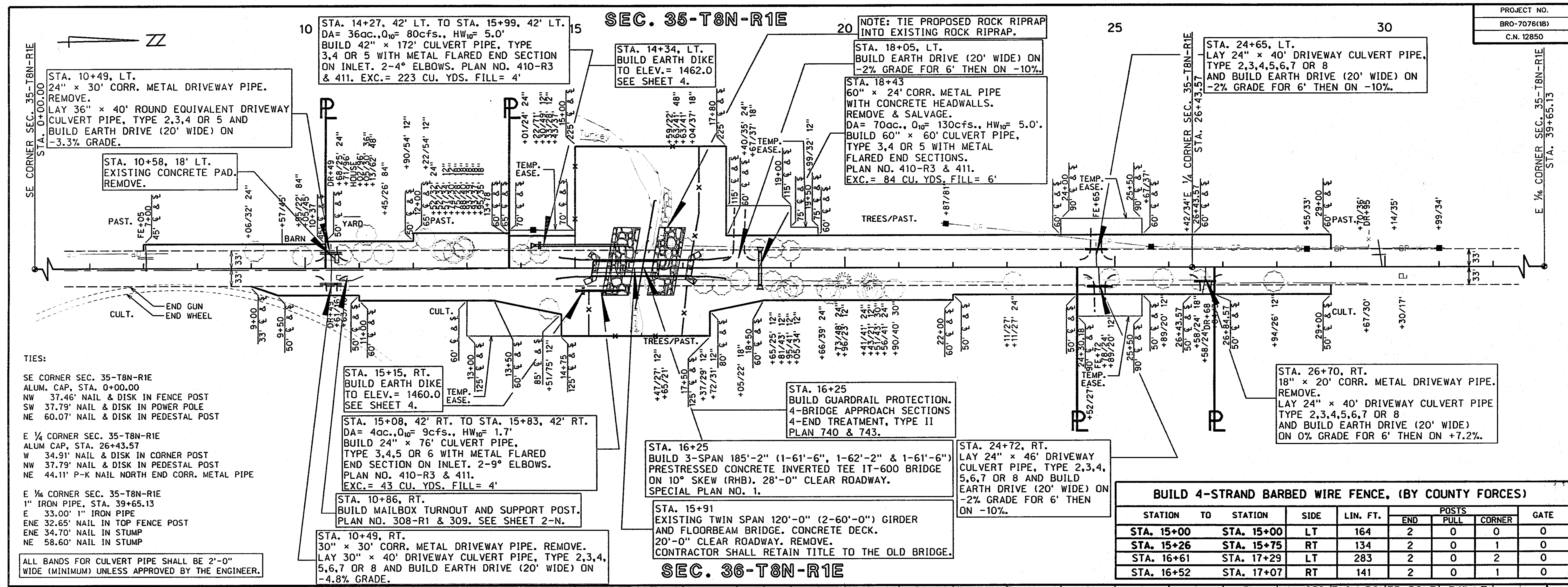
FRIEND SOUTH

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DATE	
BY	
NO.	
DATE	
BY	
NO.	

DATE	
BY	
NO.	
DATE	
BY	
NO.	



TIES:

SE CORNER SEC. 35-T8N-R1E
ALUM. CAP. STA. 0+00.00
NW 37.46' NAIL & DISK IN FENCE POST
SW 37.79' NAIL & DISK IN POWER POLE
NE 60.07' NAIL & DISK IN PEDESTAL POST

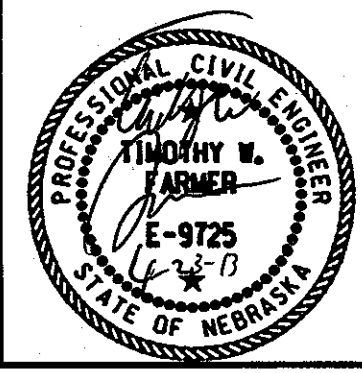
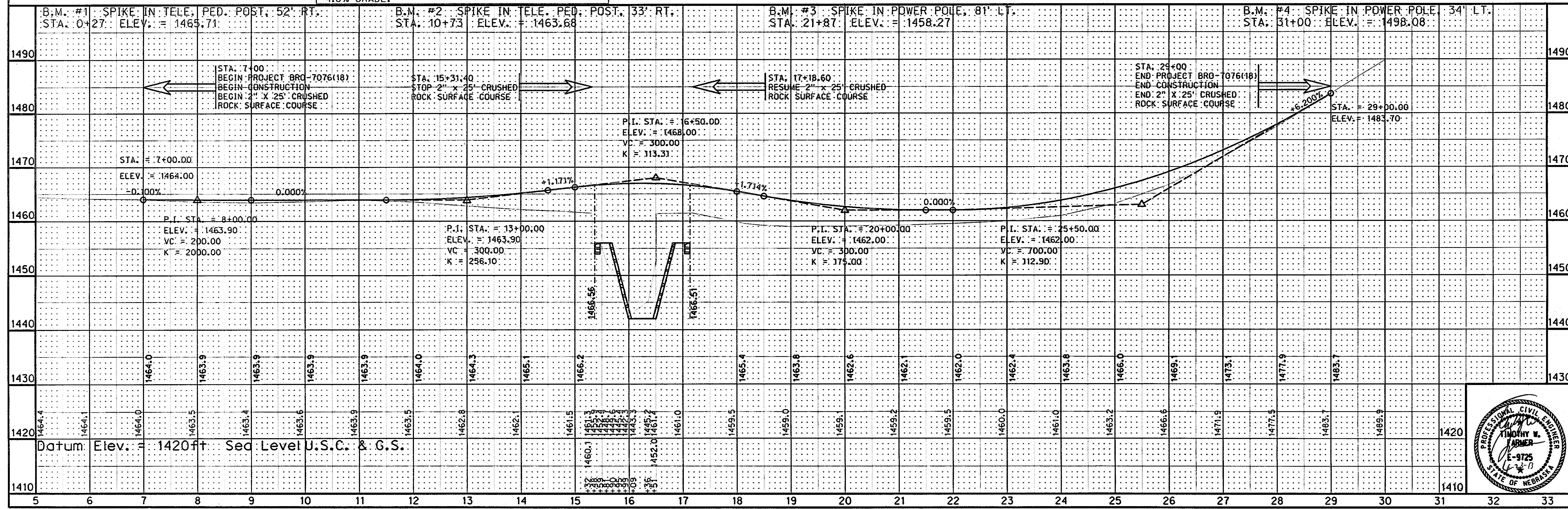
E 1/4 CORNER SEC. 35-T8N-R1E
ALUM. CAP. STA. 26+43.57
W 34.91' NAIL & DISK IN CORNER POST
NW 37.79' NAIL & DISK IN PEDESTAL POST
NE 44.11' P-K NAIL NORTH END CORR. METAL PIPE

E 1/4 CORNER SEC. 35-T8N-R1E
1" IRON PIPE, STA. 39+65.13
E 33.00' 1" IRON PIPE
ENE 32.65' NAIL IN TOP FENCE POST
ENE 34.70' NAIL IN STUMP
NE 58.60' NAIL IN STUMP

ALL BANDS FOR CULVERT PIPE SHALL BE 2'-0" WIDE (MINIMUM) UNLESS APPROVED BY THE ENGINEER.

BUILD 4-STRAND BARBED WIRE FENCE, (BY COUNTY FORCES)

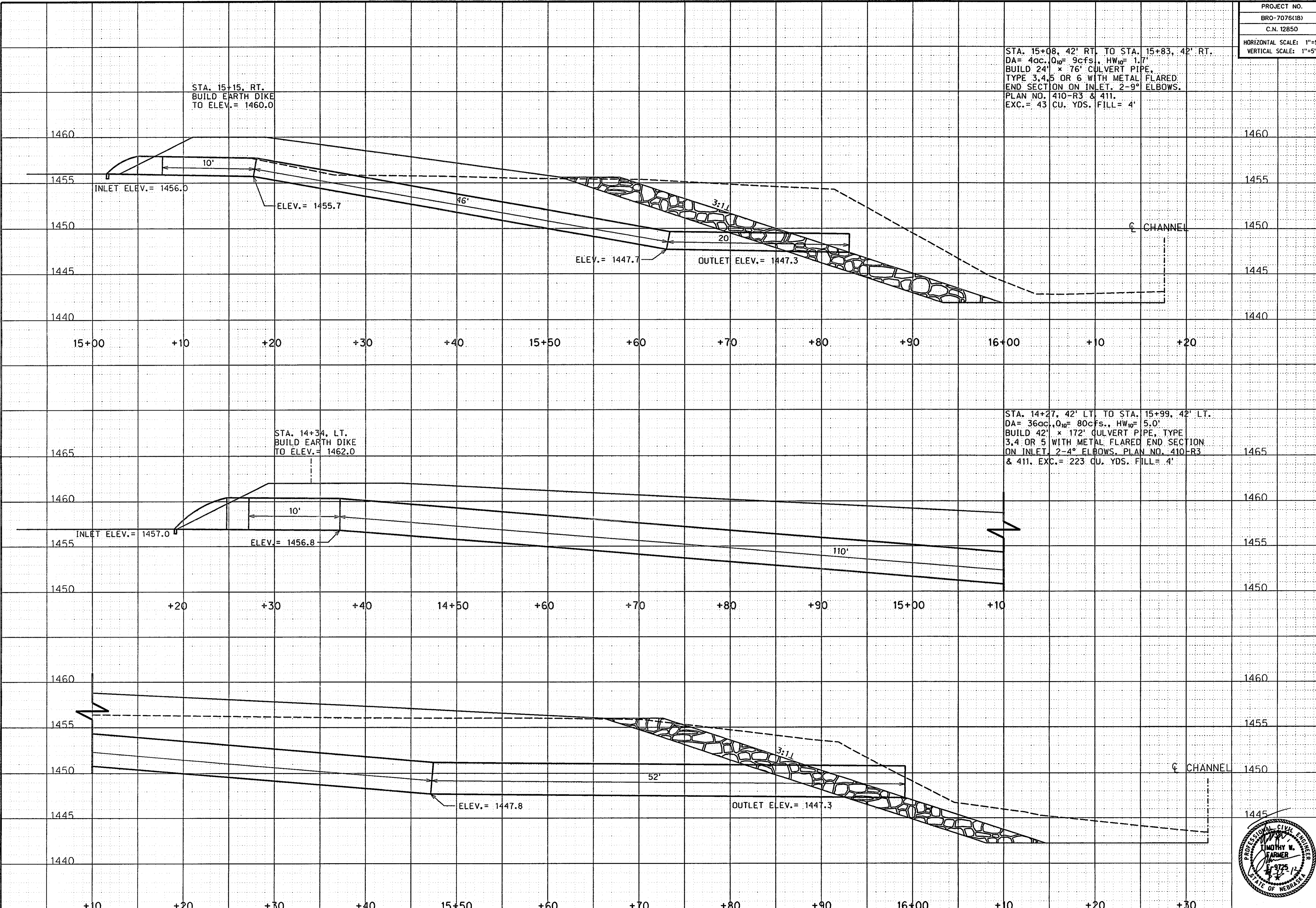
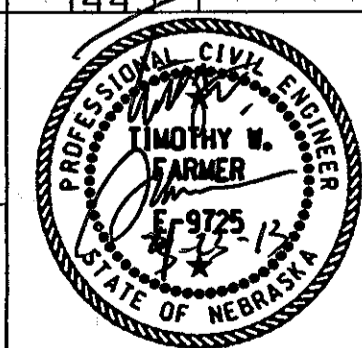
STATION TO	STATION	SIDE	LIN. FT.	POSTS			
				END	PULL	CORNER	GATE
STA. 15+00	STA. 15+00	LT	164	2	0	0	0
STA. 15+26	STA. 15+75	RT	134	2	0	1	0
STA. 16+61	STA. 17+29	LT	283	2	0	2	0
STA. 16+52	STA. 17+07	RT	141	2	0	1	0



**DRAINAGE STRUCTURE
CROSS SECTIONS**

FRIEND SOUTH

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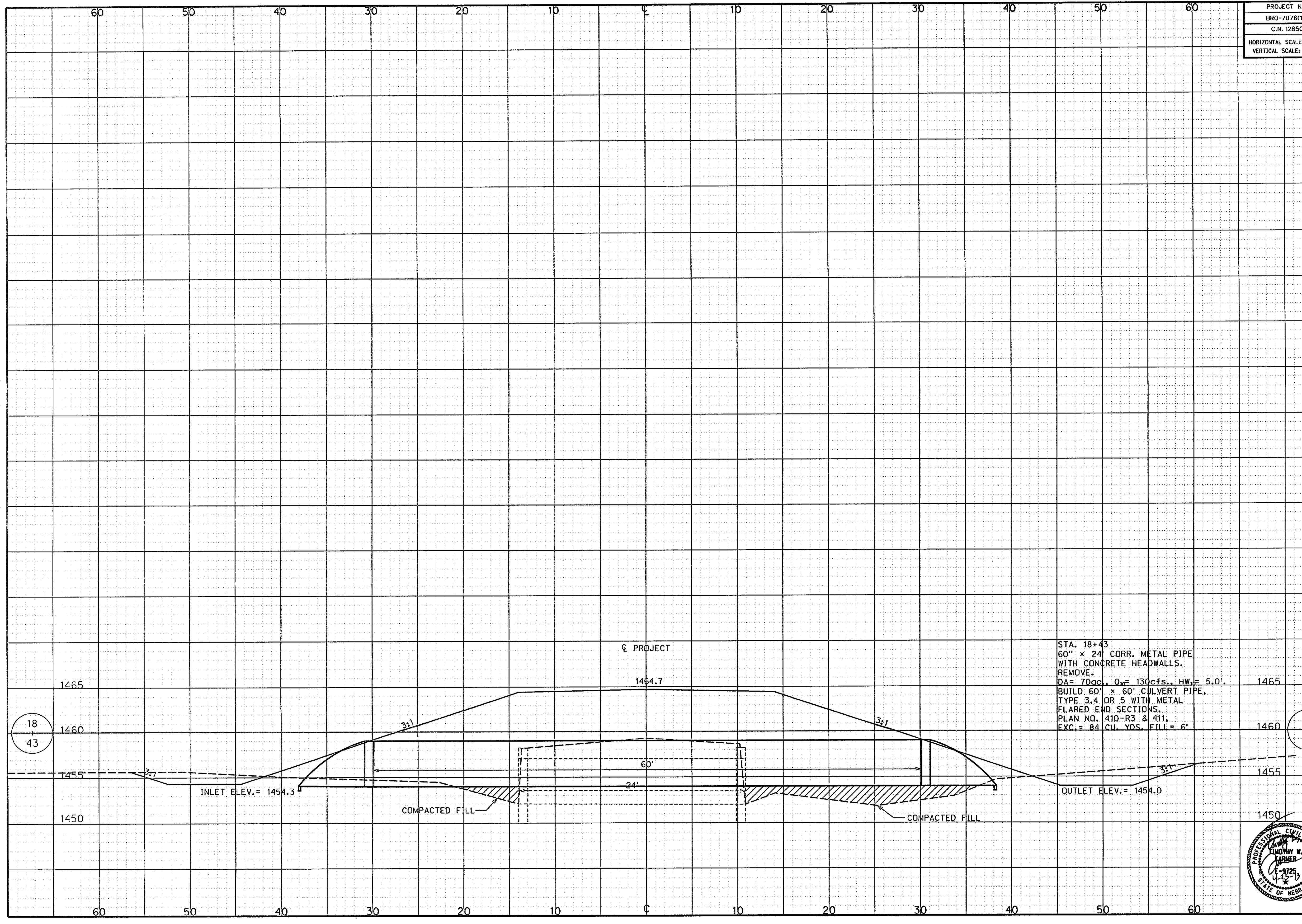
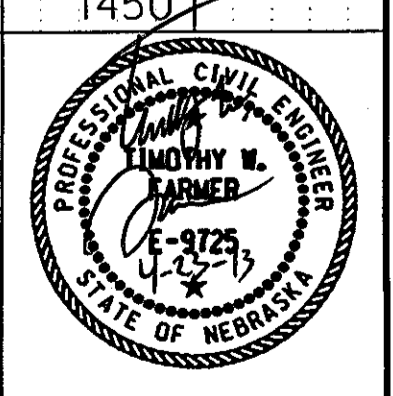
PROJECT NO.	BRO-7076(18)
C.N.	12850
HORIZONTAL SCALE:	1"=5'
VERTICAL SCALE:	1"=5'

5

**DRAINAGE STRUCTURE
CROSS SECTIONS**

FRIEND SOUTH

906 SOUTH 26th ST.
LINCOLN, NE 68510
(402) 483-5466
www.speclewis.com



18
43

18
43

FRIEND-SOUTH BRO-7076(18)

- NOTES -

This structure is designed in accordance with the 17th edition of the AASHTO "Standard Specifications for Highway Bridges", including subsequent Interims.

The superstructure of this bridge is designed by the Load Factor Design Method. The girders and substructure are designed for a future wearing surface of 20 psf.

Concrete for slab, diaphragms and rails shall be Class "47BD" with a minimum 28-day strength of 4,000 psi.

All other cast-in-place concrete shall be Class "47B" concrete, with a 28-day strength of 3,000 psi.

All exposed edges of concrete shall be chamfered.

The minimum clearance, measured from the face of the concrete to the surface of any reinforcing bar, shall be 3", except where otherwise noted.

All reinforcing steel shall conform to the requirements of ASTM A615, Grade 60 steel.

All structural steel shall conform to the requirements of ASTM A709, Grade 36.

Tie Rods shall conform to ASTM A709, Grade 36 Steel. Turnbuckles shall conform to ASTM A668 Class C.

Prestressed concrete girders must be at least 9 days old before they can set on the bridge substructure. Surveying for shim shots, forming deck or diaphragms and placing construction material on the girder is not allowed until the girders are at least 30 days old.

Girder shims that will be provided to the contractor account for the dead load deflection due to the weight of the slab and rail or barrier only. The contractor is responsible for making the necessary adjustments for the particular forming system used to achieve the slab grades and elevations shown on the plans.

Contractor shall submit the proposed slab pouring sequence to the Project Manager three weeks before placing the slab concrete.

All dimensions shown are in horizontal plane only. No allowances have been made for vertical curve or roadway cross slope.

The item, "STRUCTURAL STEEL FOR SUBSTRUCTURE", shall include tie rods and hardware, turnbuckles, nose angles at bents and armor angles at end of floor.

As an alternate, after fabrication, nose angles and armor angles may be galvanized according to ASTM A123, in lieu of painting as per 2007 NDOR Standard Specification 709.03.

All drawings are not to scale unless otherwise noted.

The prestressed girders have been designed assuming 100% continuity at the interior supports for live load.

The girders for this bridge are not designed to resist any torsional or lateral forces due to temporary construction loads. The contractor must provide any temporary bracing necessary to support the girder web and flanges against all torsional or lateral forces resulting from construction loads.

The contractor must provide any temporary intermediate diaphragms and/or bracing necessary to provide lateral and torsional stability for the girders during construction of the concrete slab. The temporary intermediate diaphragms/bracing shall be removed after the concrete slab has attained 75% of its design strength. The cost for furnishing, installing and removing the temporary intermediate diaphragms and/or bracing shall be subsidiary to the pay item "Class 47BD-4000 Concrete for Bridges".

The contractor may substitute any one of the alternate designs shown on the plans for the original design. All quantities are based on the original design and no additions or deductions will be allowed for the use of an alternate design.

- QUANTITIES -

ABUTMENT NO. 1 EXCAVATION	-----	1 Lump Sum
BENT NO. 1 EXCAVATION	-----	1 Lump Sum
BENT NO. 2 EXCAVATION	-----	1 Lump Sum
ABUTMENT NO. 2 EXCAVATION	-----	1 Lump Sum
CLASS 47B-3000 CONCRETE FOR BRIDGE	-----	244.1 Cu. Yd.
ABUTMENTS	134.3 Cu. Yd.	
BENTS	109.8 Cu. Yd.	
CLASS 47BD-4000 CONCRETE FOR BRIDGE	-----	148.3 Cu. Yd.
SLAB	122.3 Cu. Yd.	
CONCRETE RAILS	26.0 Cu. Yd.	
PRECAST/PRESTRESSED CONCRETE SUPERSTRUCTURE AT STATION 16+25.00	-----	1 Lump Sum
GIRDERS	144.1 Cu. Yd.	
REINFORCING STEEL FOR BRIDGE	-----	48860 Lbs.
SLAB	29330 Lbs.	
CONCRETE RAILS	6145 Lbs.	
ABUTMENTS	6375 Lbs.	
BENTS	7010 Lbs.	
STRUCTURAL STEEL FOR SUBSTRUCTURE	-----	2780 Lbs.
PIPE PILING	-----	2630 Lin. Ft.
ROCK RIPRAP, TYPE B	-----	1260 Tons
RIPRAP FILTER FABRIC	-----	1600 Sq. Yd.
SALVAGING AND PLACING TOPSOIL COVER ON RIPRAP	-----	1600 Sq. Yd.
ACCESS CROSSING AT STA. 16+25.00	-----	1 Lump Sum

- INDEX -

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GEOLOGICAL PROFILE AND PILE LAYOUT	-----	3
ABUTMENT PLAN AND ELEVATION	-----	4
BENT PLAN AND ELEVATION	-----	5
GIRDER LAYOUT	-----	6
GIRDER DATA	-----	7
CROSS SECTION OF ROADWAY	-----	8
CONCRETE RAIL ON BRIDGE, PLAN OF ROCK RIPRAP AND RIPRAP FILTER FABRIC	-----	9
BILL OF BARS	-----	10

185'-2 1/2'-SPAN
PRESTRESSED CONCRETE T-600 GIRDER BRIDGE
GENERAL NOTES, QUANTITIES AND INDEX

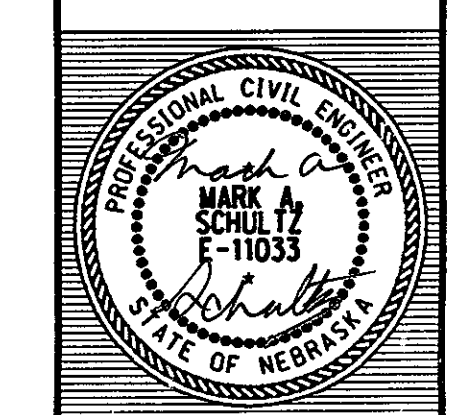
DATE: MARCH 2011

LOCATION FRIEND-SOUTH
SKEW 10° RHB
CLEAR ROADWAY 28'-0"
DESIGN LIVE LOAD HS20
DESIGNED BY: MS
CHECKED BY: GH

LINCOLN, NEBRASKA

SPEECE-LEWIS ENGINEERS

Speece Lewis engineers



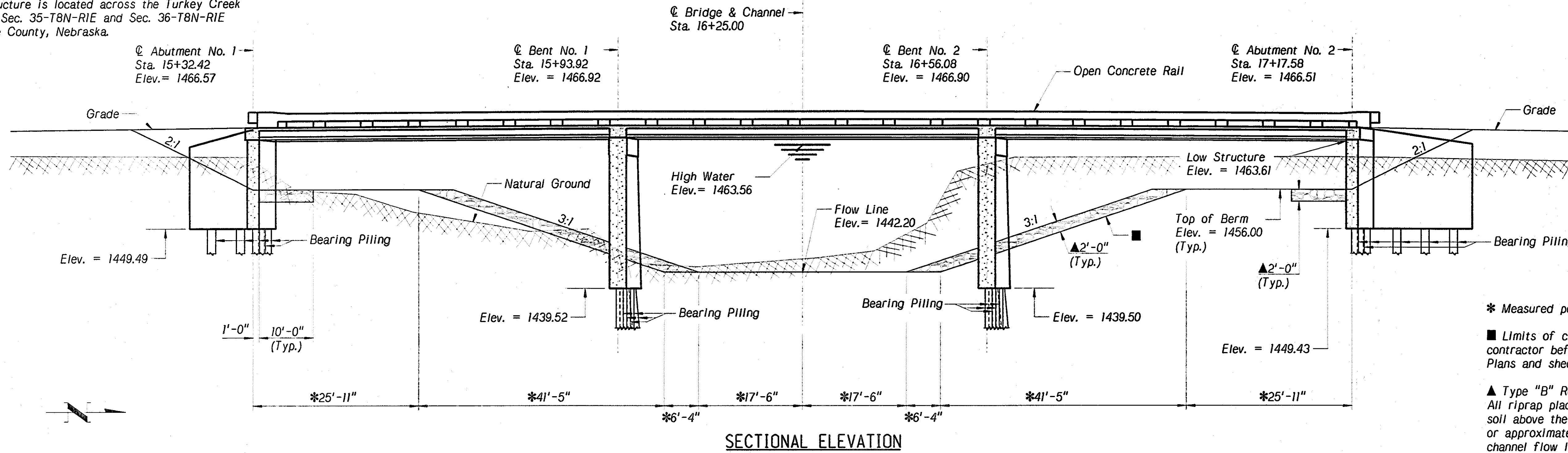
NOTE:
Grade Elevations shown are profile grade elevations at \odot Project.

This structure is located across the Turkey Creek between Sec. 35-T8N-R1E and Sec. 36-T8N-R1E in Saline County, Nebraska.

PROJECT NUMBER
BR0-7076(18)

SHEET NO.
7

C.N. 12850
STRUCTURE NUMBER
C007601115

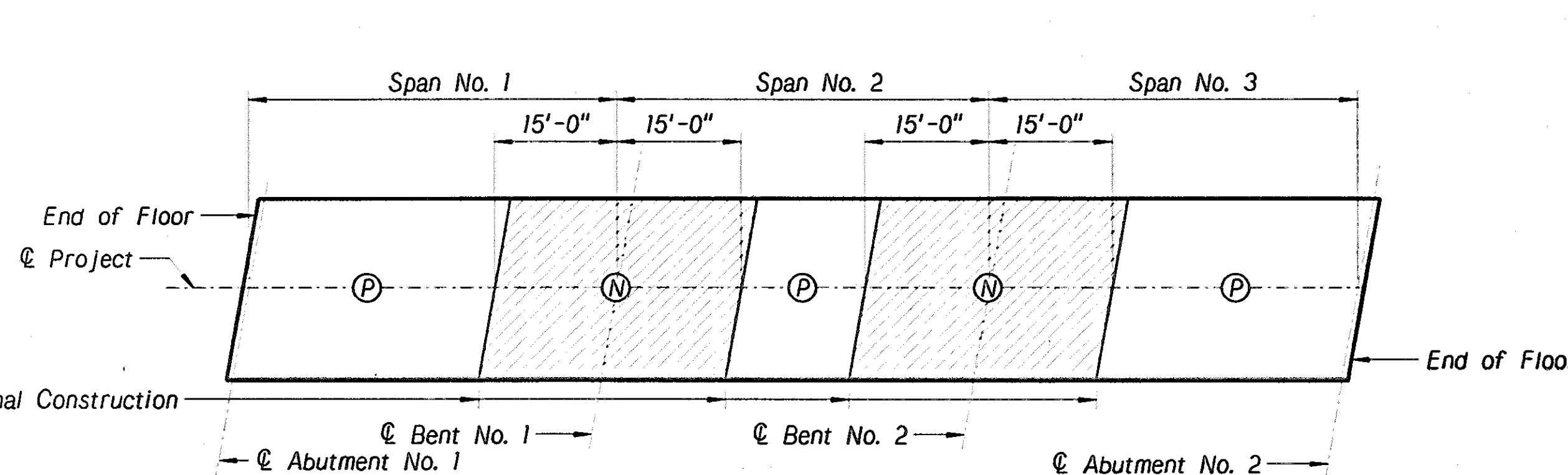
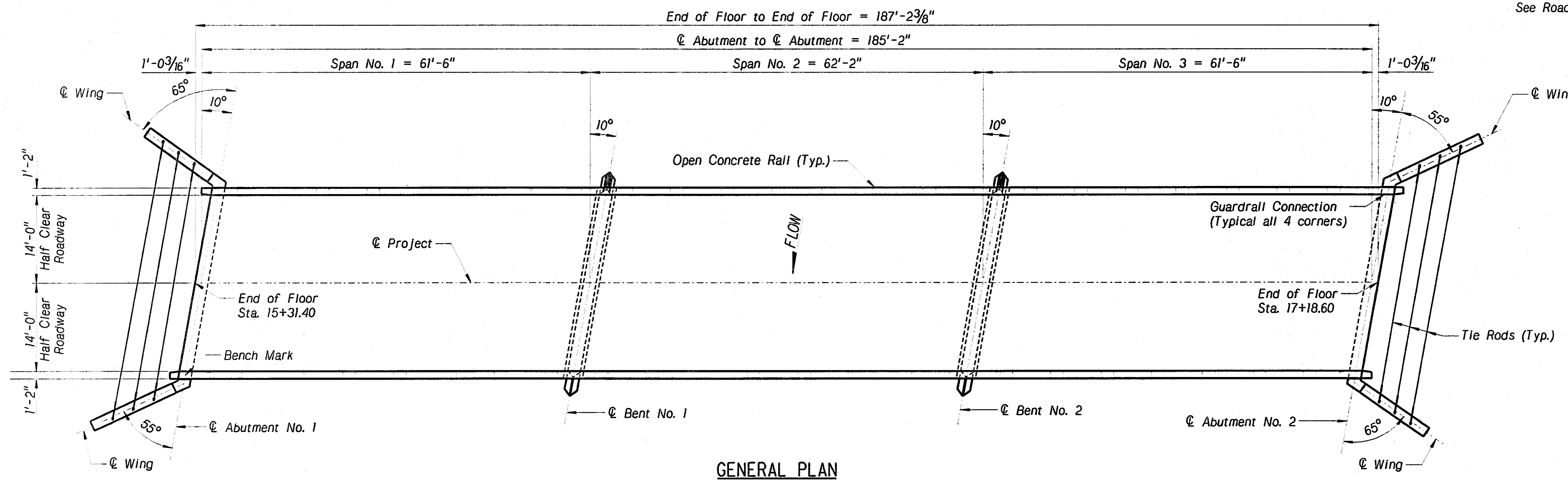


* Measured perpendicular to \odot Channel.

■ Limits of channel excavation to be done by the contractor before the bridge is built. See Roadway Plans and sheet 9 of 10 for additional details.

▲ Type "B" Rock Riprap and Riprap Filter Fabric. All riprap placed will be covered with 6" of native soil above the historical ordinary high water mark or approximately three (3) feet above the existing channel flow line, whichever is greater.

See Roadway Plans for Contractor's Access Crossing.



P.I. Sta. 13+00.00 Elev. = 1463.90 V.C. = 300'

P.I. Sta. 16+50.00 Elev. = 1468.00 V.C. = 300'

P.I. Sta. 20+00.00 Elev. = 1462.00 V.C. = 300'



TRAFFIC DATA		
YEAR	2013	2033
ADT	40	50
DHV	10	11
HEAVY TRUCKS	15 %	15 %

BRIDGE HYDRAULIC INFORMATION

Stream: Turkey Creek
D.A. = 303.8 sq. mi.
Q100 = 15,000 cfs (Base Flood)
Q100 = 12,654 cfs (Bridge-Base Flood)
H.W. Elev. = 1463.56 ft.(D.S.)
W.W.A. Below H.W. = 2,360 sq. ft.
Q20 = 8,550 cfs (Overtopping Flood)
Low Road Elev. = 1462.00 ft.
Q(OHW) = 70 cfs.
Ordinary High Water Elev. = 1445.00 ft.
Q100 General Scour = 14.3 ft.
Q100 Local Scour = 4.6 ft.
Q500 Scour Elev. = 1423.3 ft.

POURING SEQUENCE:
The entire slab shall be poured starting at one end and proceeding to the other end, stopping at the completion of any "p" section.

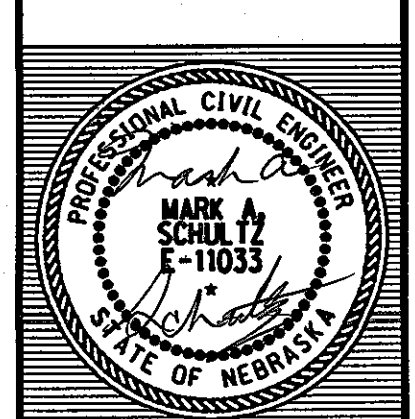
P = Positive Section
N = Negative Section

185'-2" 3-SPAN
PRESTRESSED CONCRETE T-600 GIRDER BRIDGE
GENERAL PLAN AND ELEVATION

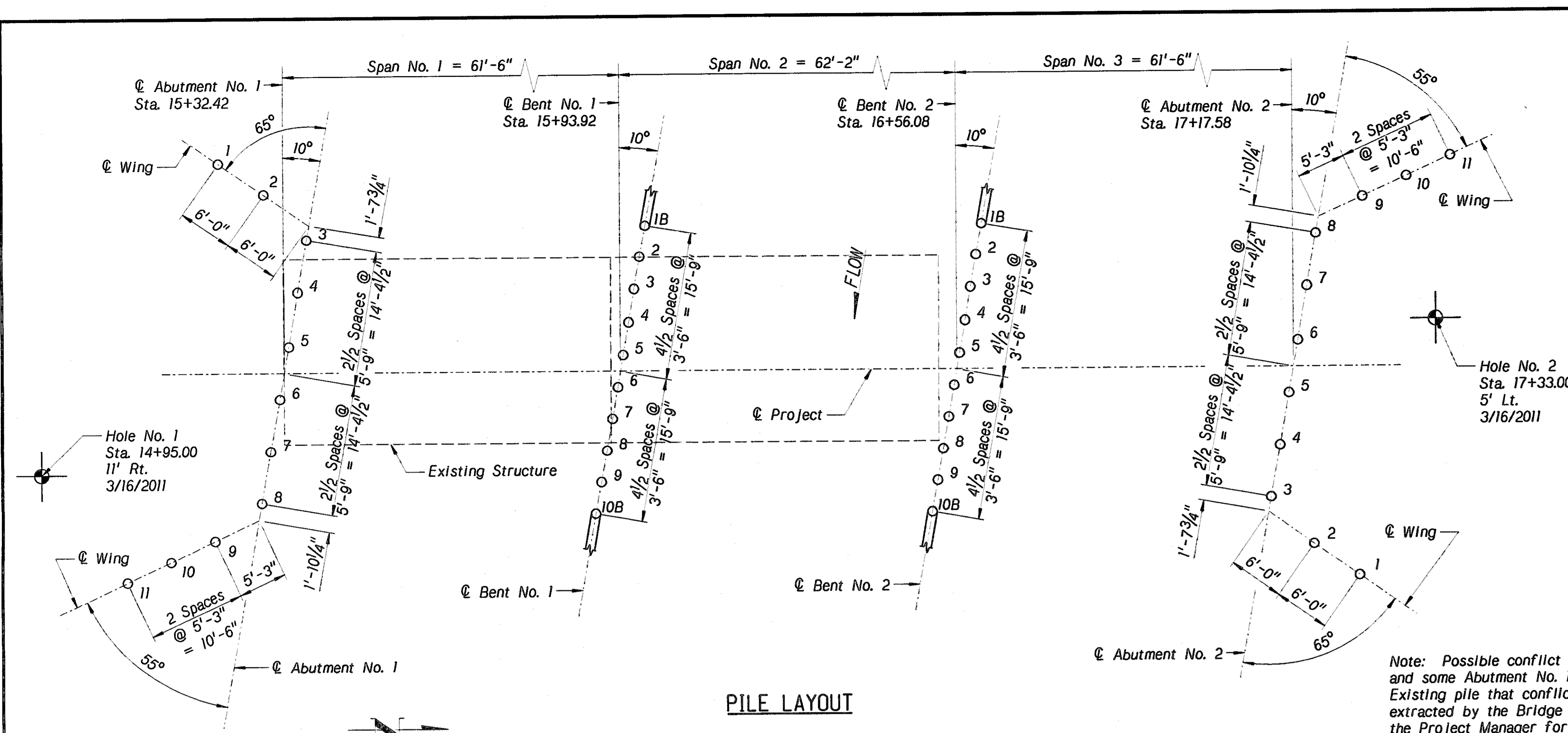
COUNTY SALINE
LOCATION FRIEND-SOUTH
HWY. NO. 10 RHB
CLEAR ROADWAY 28'-0"
DESIGN LIVE LOAD HS20

DESIGNED BY: MS
CHECKED BY: GH
DATE: APRIL 2013

Speece Lewis engineers



4-23-2013
SPECIAL PLAN NO. 2
1 / 10



PILE LAYOUT

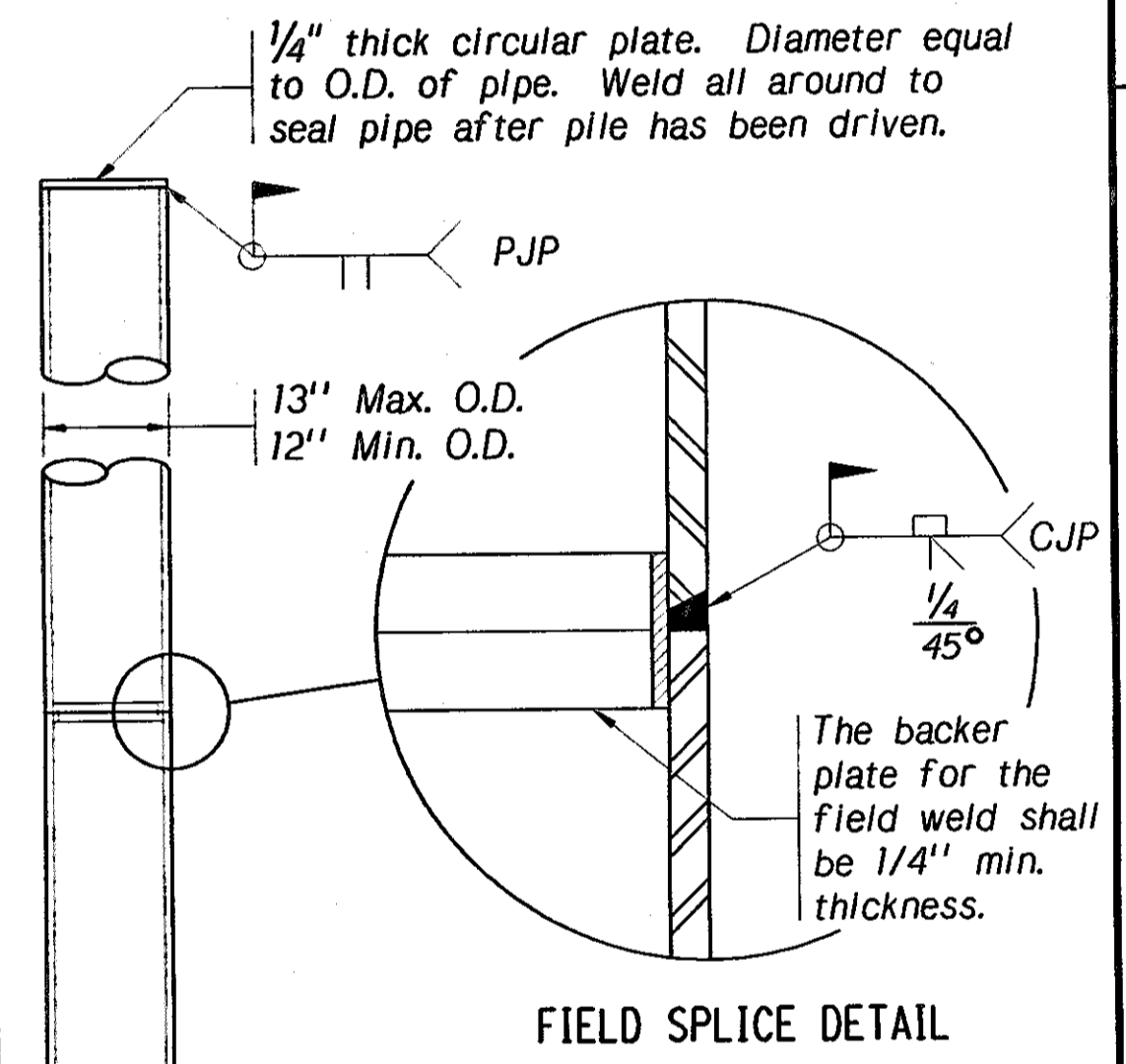
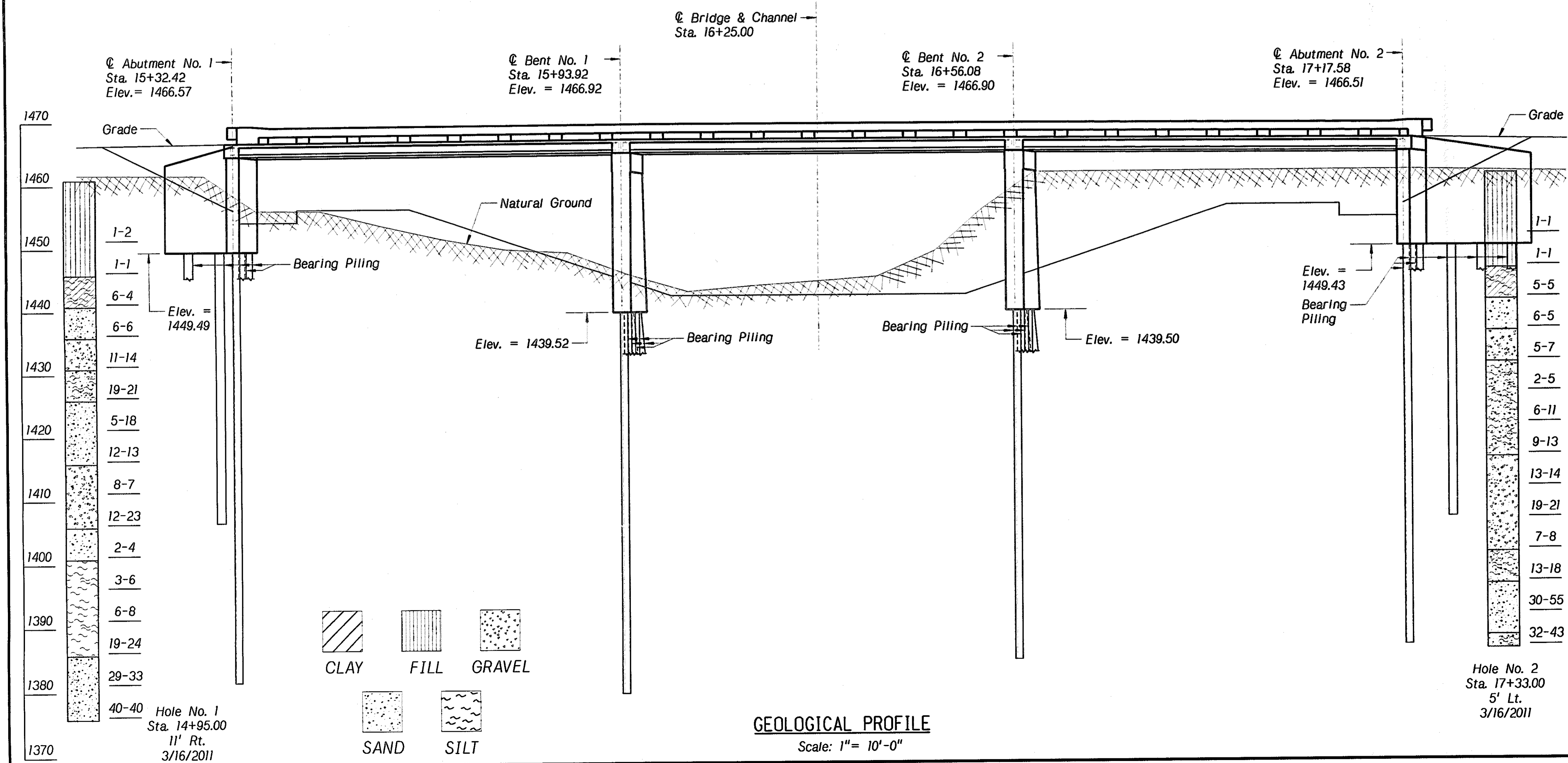
PILE DATA						PROJECT NUMBER	SHEET NO.
						BRO-7076(18)	8
LOCATION	PILE NUMBER	CUT-OFF ELEVATION	MINIMUM PENETRATION BELOW CUT-OFF (feet)	PILE ORDER LENGTH (feet)	DESIGN PILE BEARING (tons/PILE)	PILE TYPE	C.N. 12850
						STRUCTURE NUMBER	
						C00760115	
Abutment No. 1	1&2	1451.49	40	45	20	Pipe	
	3,4,5,6,7&8	1451.49	60	70	45	Pipe	
	9,10&11	1451.49	40	45	20	Pipe	
Bent No. 1	1B,4,7&10B	1459.52	70	80	45	Pipe	
	2,3,5,6,8&9	1444.52	55	65	45	Pipe	
Bent No. 2	1B,4,7&10B	1459.50	65	75	45	Pipe	
	2,3,5,6,8&9	1444.50	50	60	45	Pipe	
Abutment No. 2	1&2	1451.43	40	45	20	Pipe	
	3,4,5,6,7&8	1451.43	55	65	45	Pipe	
	9,10&11	1451.43	40	45	20	Pipe	

Bent pile lengths are designed for scour to elevation 1423.3 ft. for 100-Year Flood. Bent pile lengths are checked for scour to elevation 1423.3 ft. for 500-Year Flood.

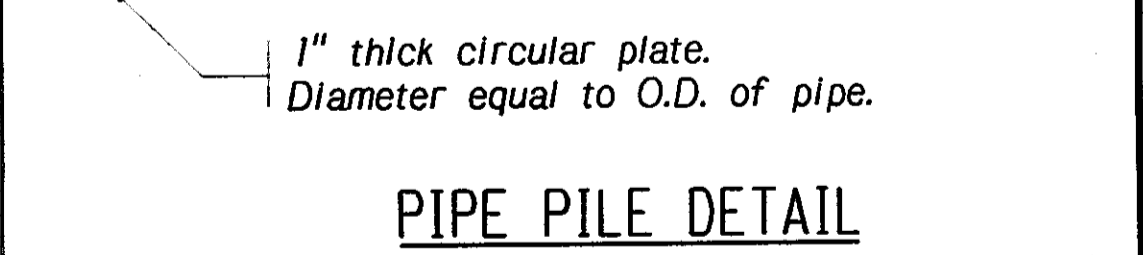
Pile spacing is measured at bottom of concrete at abutments and bents.

Bent pile followed by the letter "B" shall be battered 1/2:12.

Note: Possible conflict exists between existing bearing piles and some Abutment No. 1, Bent No. 1, and Bent No. 2 piling. Existing pile that conflict with new pile placement shall be extracted by the Bridge Contractor. If this falls, contact the Project Manager for alternate solutions.



NOTE: Pipe for piles shall conform to the requirements of ASTM A252, Grade 2. Nominal shell thickness shall be not less than 3/8".



The borings, as logged on the plans, represent the character of the subsoil at the location indicated. No guarantee is made that subsoil conditions vary uniformly between or outside the given location.

Figures beside the column of borings indicate the number of blows required to drive a standard penetrometer, of 2" O.D., the second and third six inches using a 140 Lbs. weight falling 30 in., in accordance with ASTM D1586 procedures.

185'-2" 3-SPAN PRESTRESSED CONCRETE T-GIRDER BRIDGE GEOLOGICAL PROFILE AND PILE LAYOUT

DATE: MARCH 2011

CHECKED BY: R.H. DESIGNED BY: M.S.

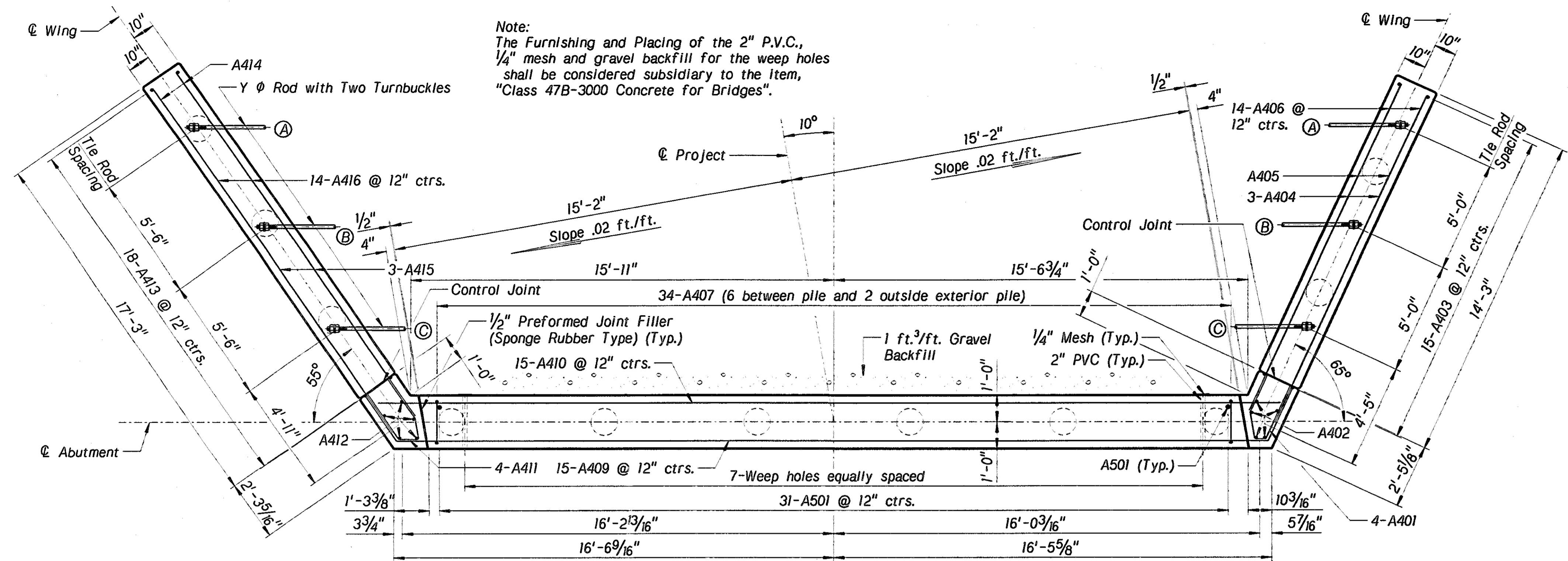
COUNTY SALINE HWY. NO. 10 REF. POST. STA. 16+25.00 LOCATION FRIEND-SOUTH SKEW 10° RHB CLEAR ROADWAY 28'-0" DESIGN LIVE LOAD HS20

SPEECE-LEWIS ENGINEERS

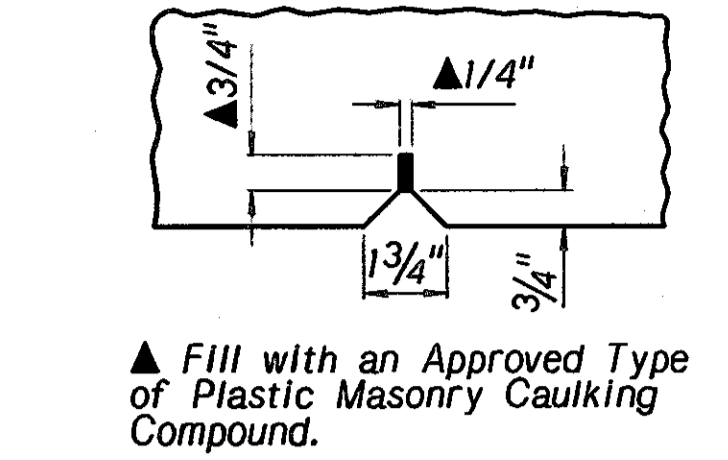
PROFESSIONAL CIVIL ENGINEER MARCH 14 2011 STATE OF NEBRASKA

3-31-2011 SPECIAL PLAN NO. 3 10

Note:
The Furnishing and Placing of the 2" P.V.C.,
1/4" mesh and gravel backfill for the weep holes
shall be considered subsidiary to the Item,
"Class 47B-3000 Concrete for Bridges".



PLAN OF ABUTMENT



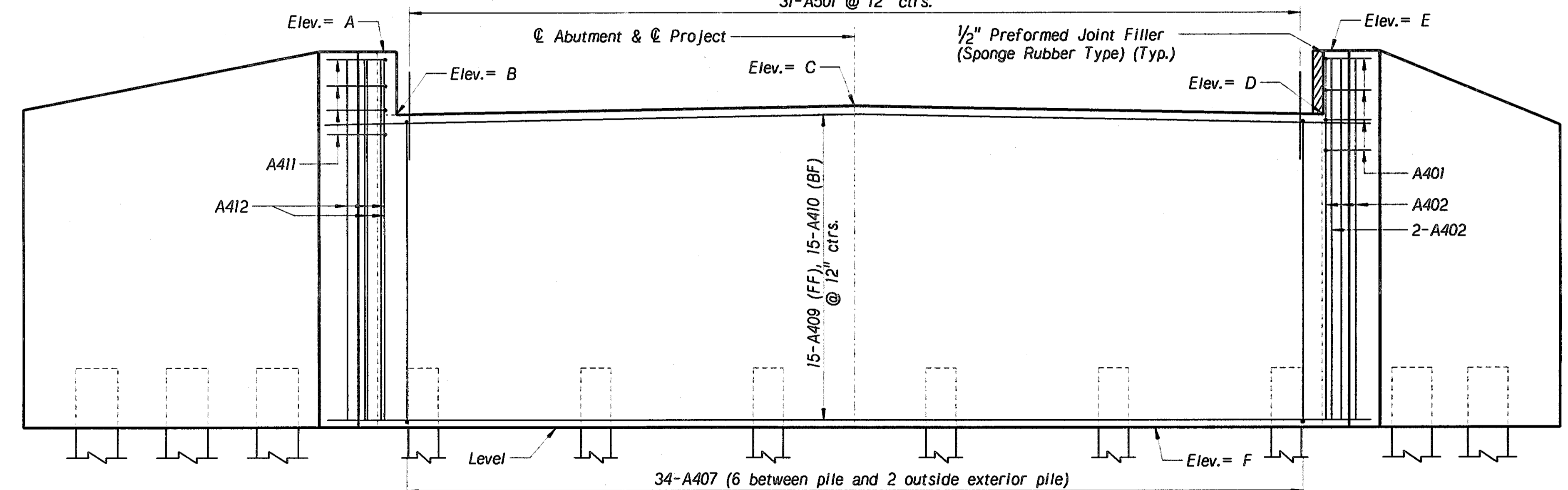
DETAIL OF CONTROL JOINT

▲ Fill with an Approved Type of Plastic Masonry Caulking Compound.

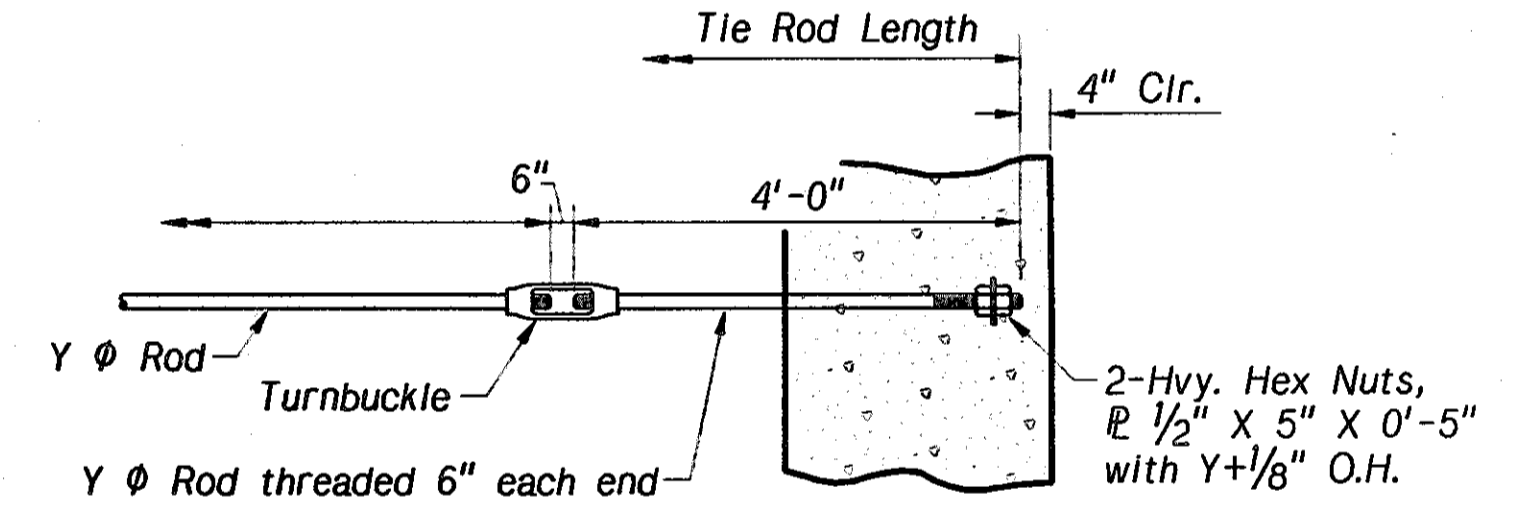
TIE ROD	Y	LENGTH
A	1 1/2"	48'-7"
B	1 1/4"	43'-4"
C	1 1/4"	38'-1"

Note:
Tie rods shall be Y φ with Two Turnbuckles.

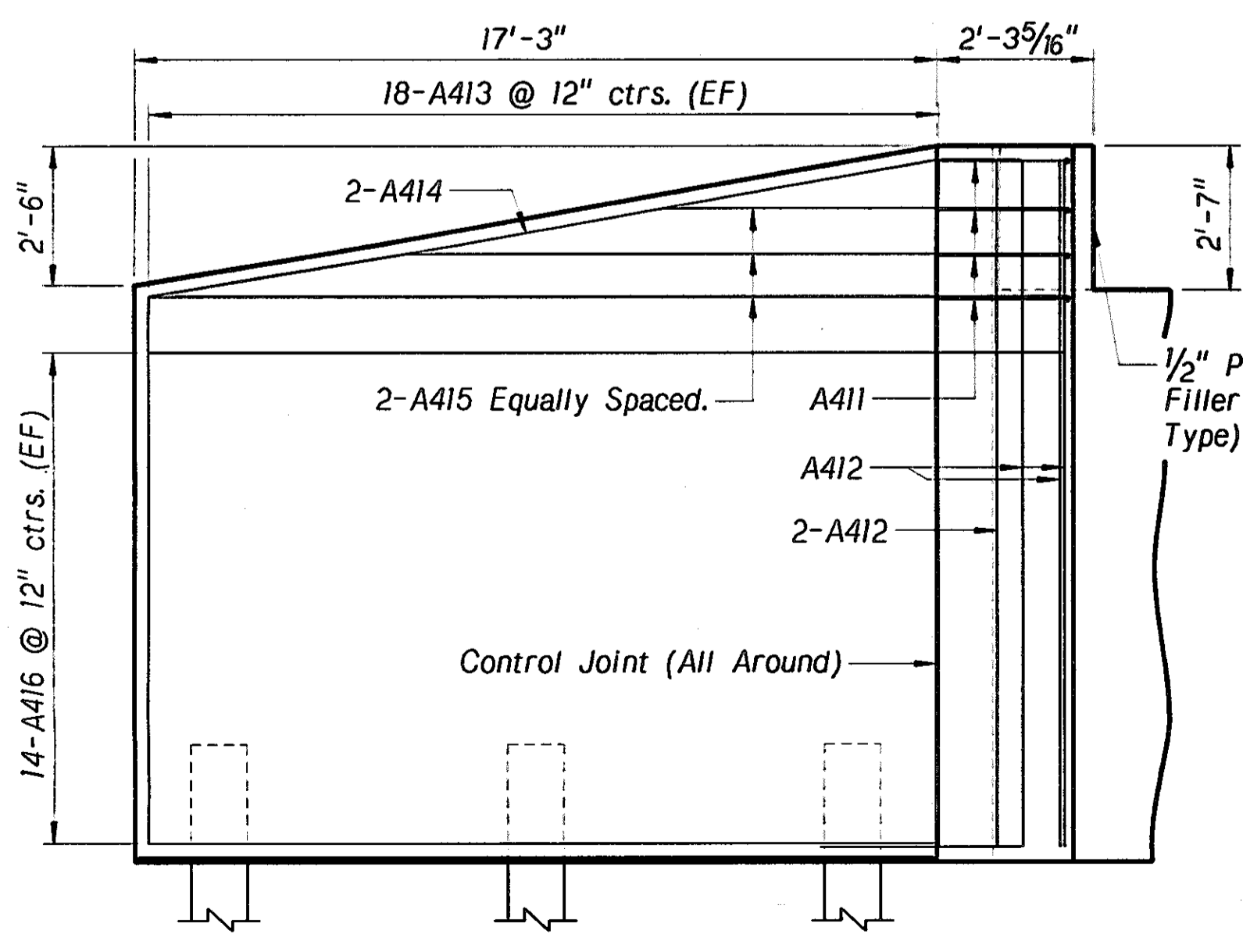
LOCATION	ABUTMENT ELEVATIONS					
	A	B	C	D	E	F
ABUTMENT NO. 1	1466.24	1463.66	1463.99	1463.71	1466.29	1449.49
ABUTMENT NO. 2	1466.19	1463.60	1463.93	1463.65	1466.24	1449.43



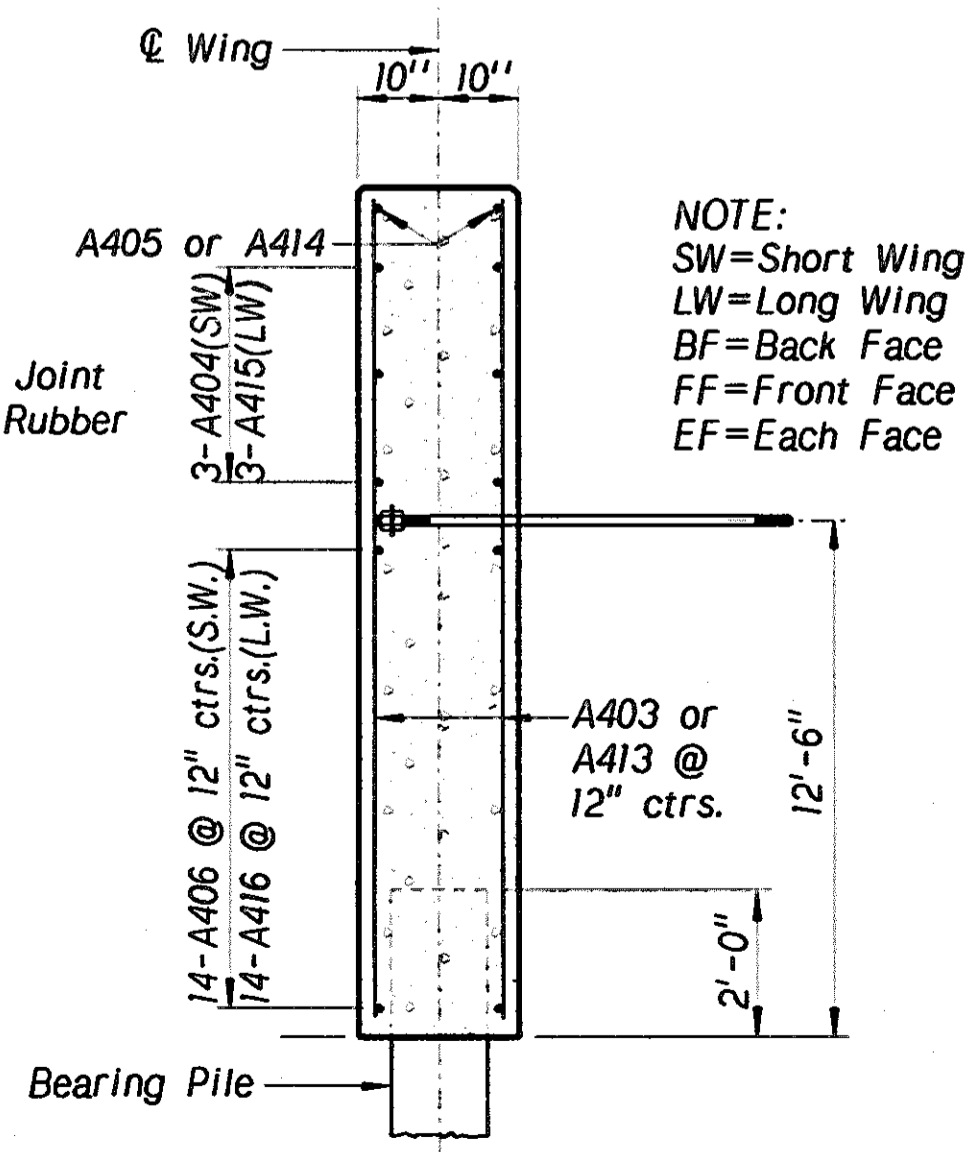
ELEVATION OF ABUTMENT



DETAIL FOR TURNBUCKLE

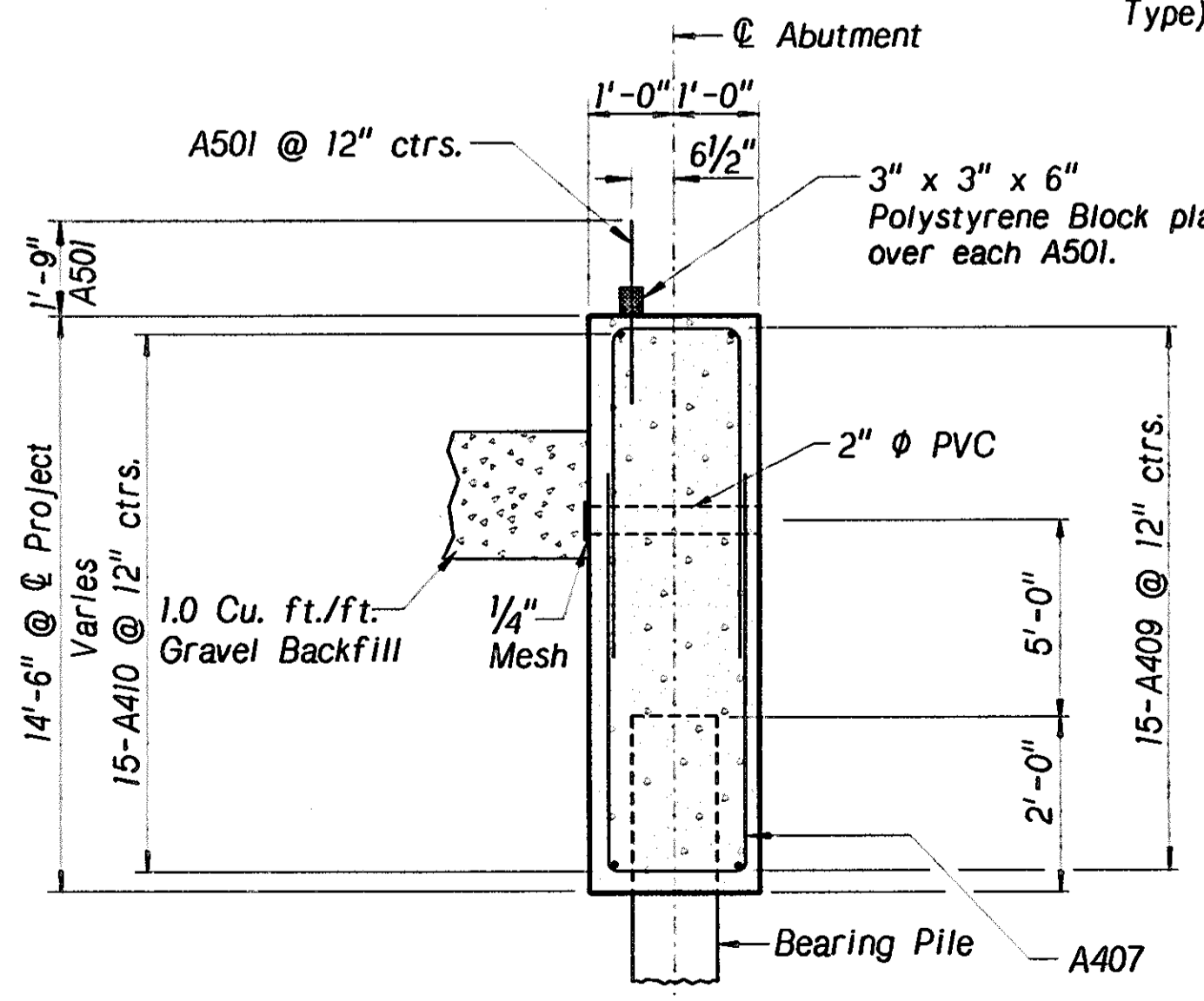


ELEVATION OF LONG WING

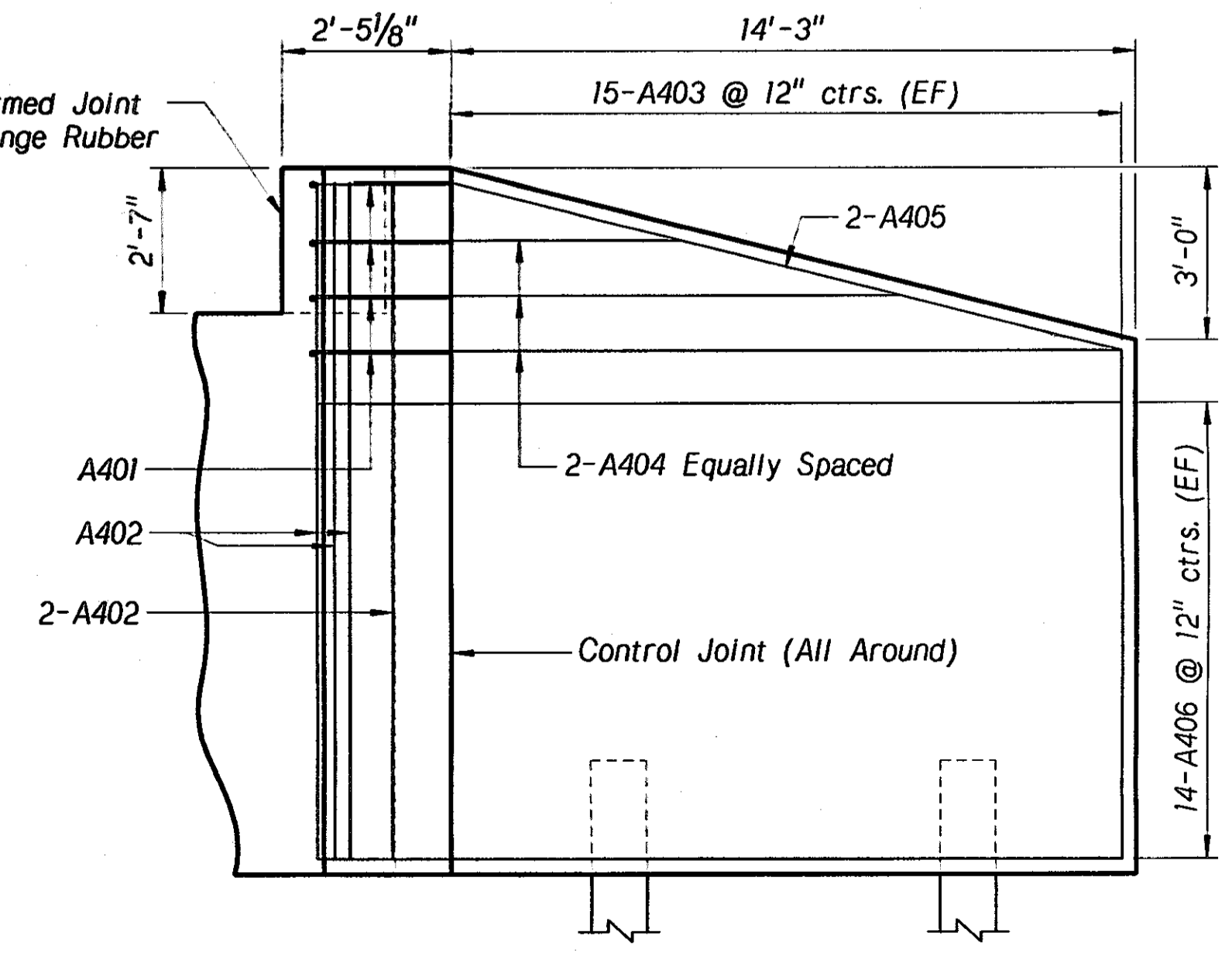


SECTION OF WING

NOTE:
SW=Short Wing
LW=Long Wing
BF=Back Face
FF=Front Face
EF=Each Face



ABUTMENT SECTION



ELEVATION OF SHORT WING

C.N. 12850

STRUCTURE NUMBER
C007601115

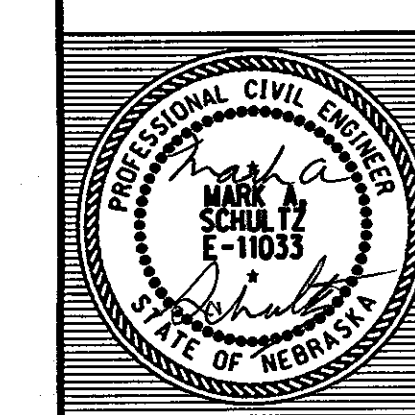
185'-2'-3-SPAN
PRESTRESSED CONCRETE T-600 GIRDER BRIDGE
BENT PLAN AND ELEVATION
DATE: MARCH 2008

LINCOLN, NEBRASKA

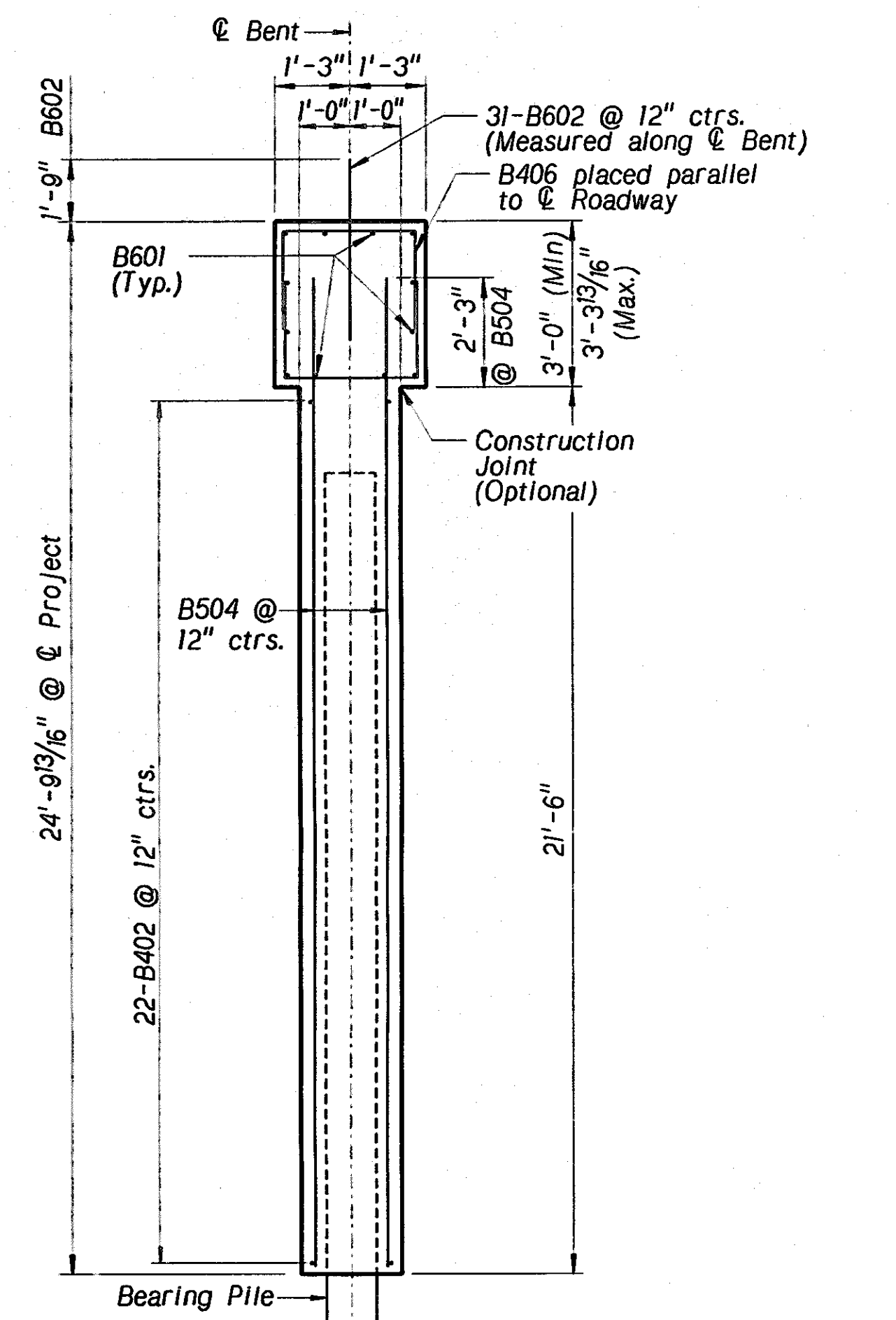
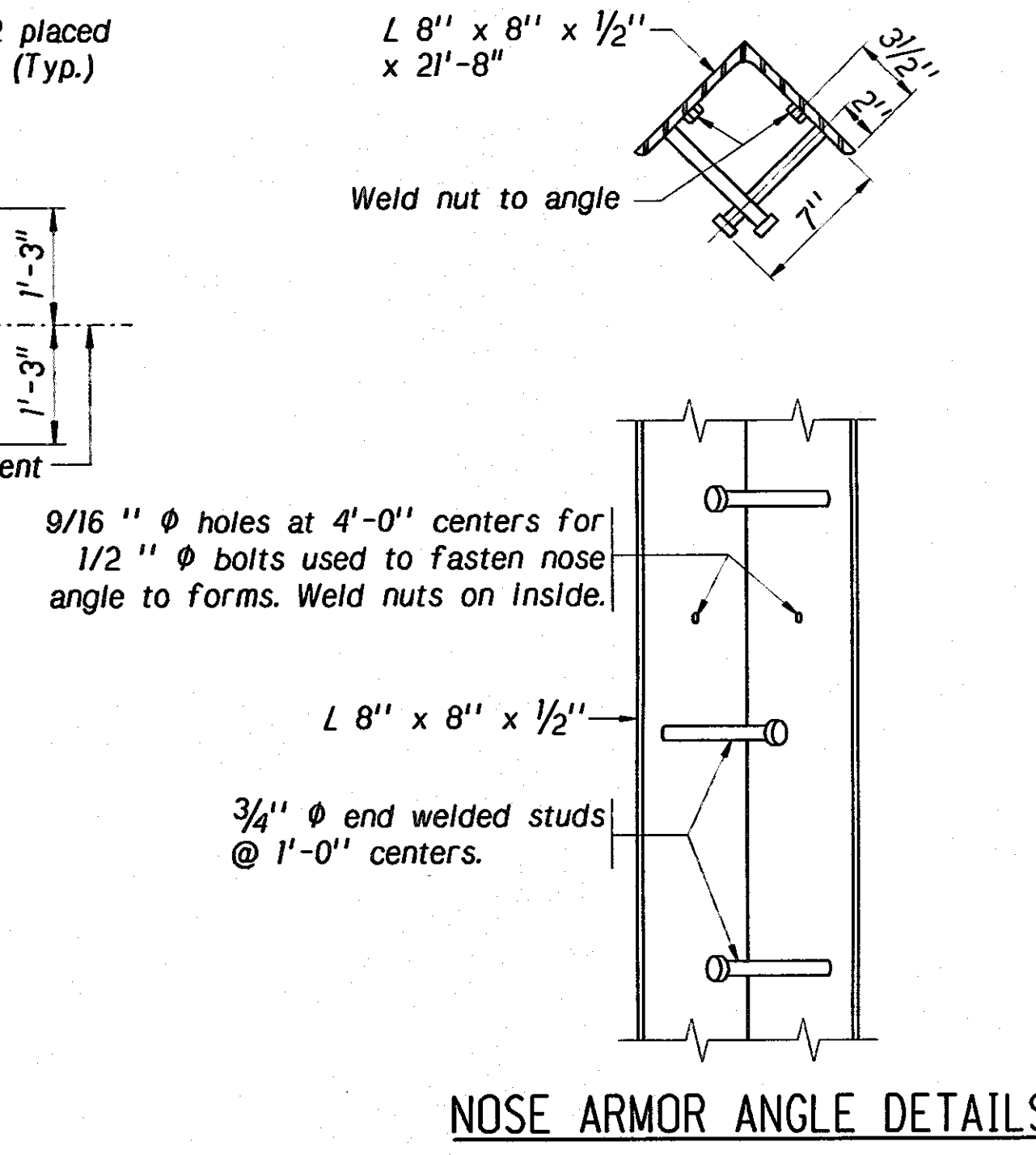
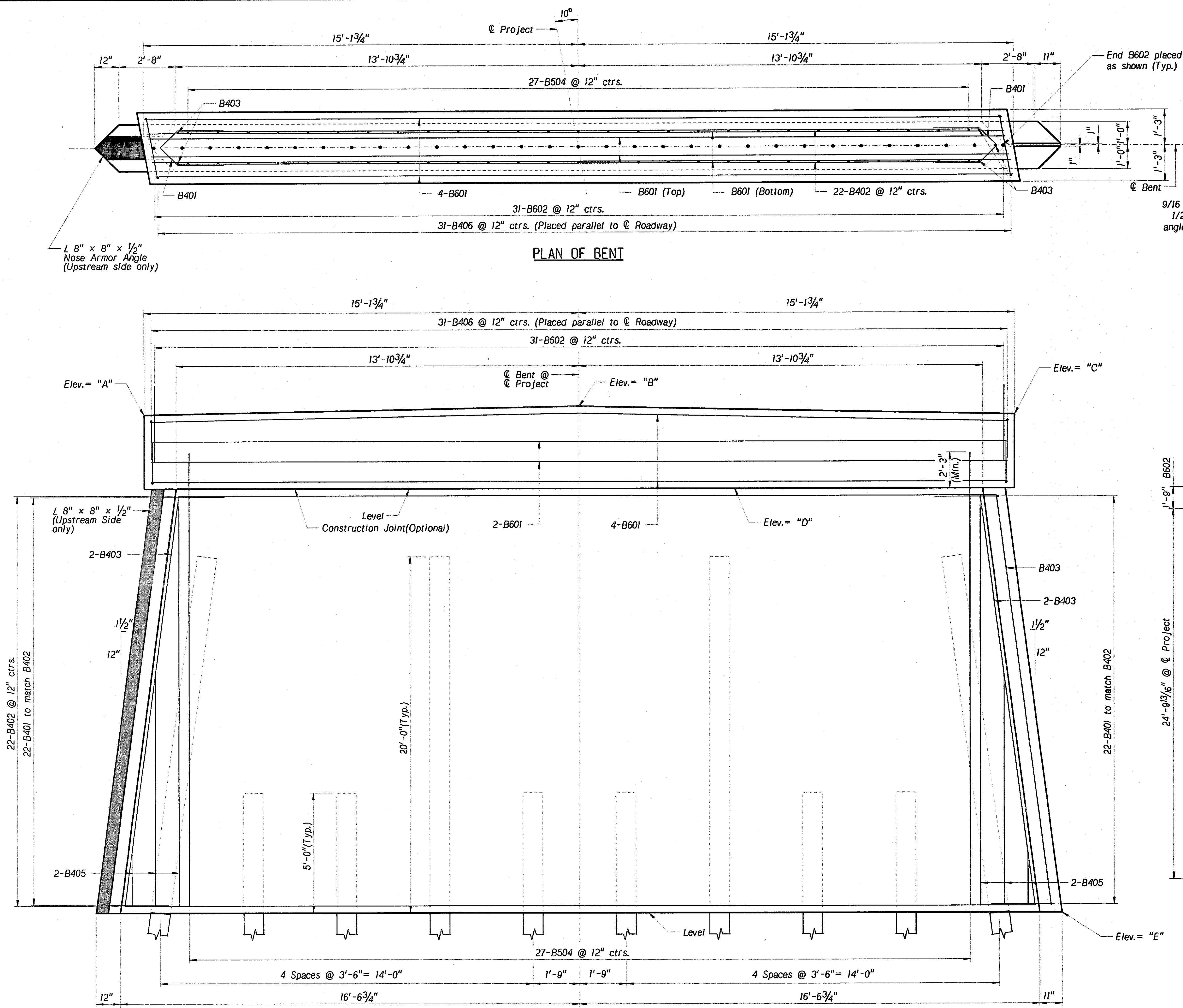
SPEECE-LEWIS ENGINEERS

COUNTY SALINE
LOCATION FRIEND-SOUTH
HWY. NO. 10
RFB. POST. 28'-0"
STA. 16+25.00
DESIGNED BY: MS
CHECKED BY: RH
DETAILED BY: GH

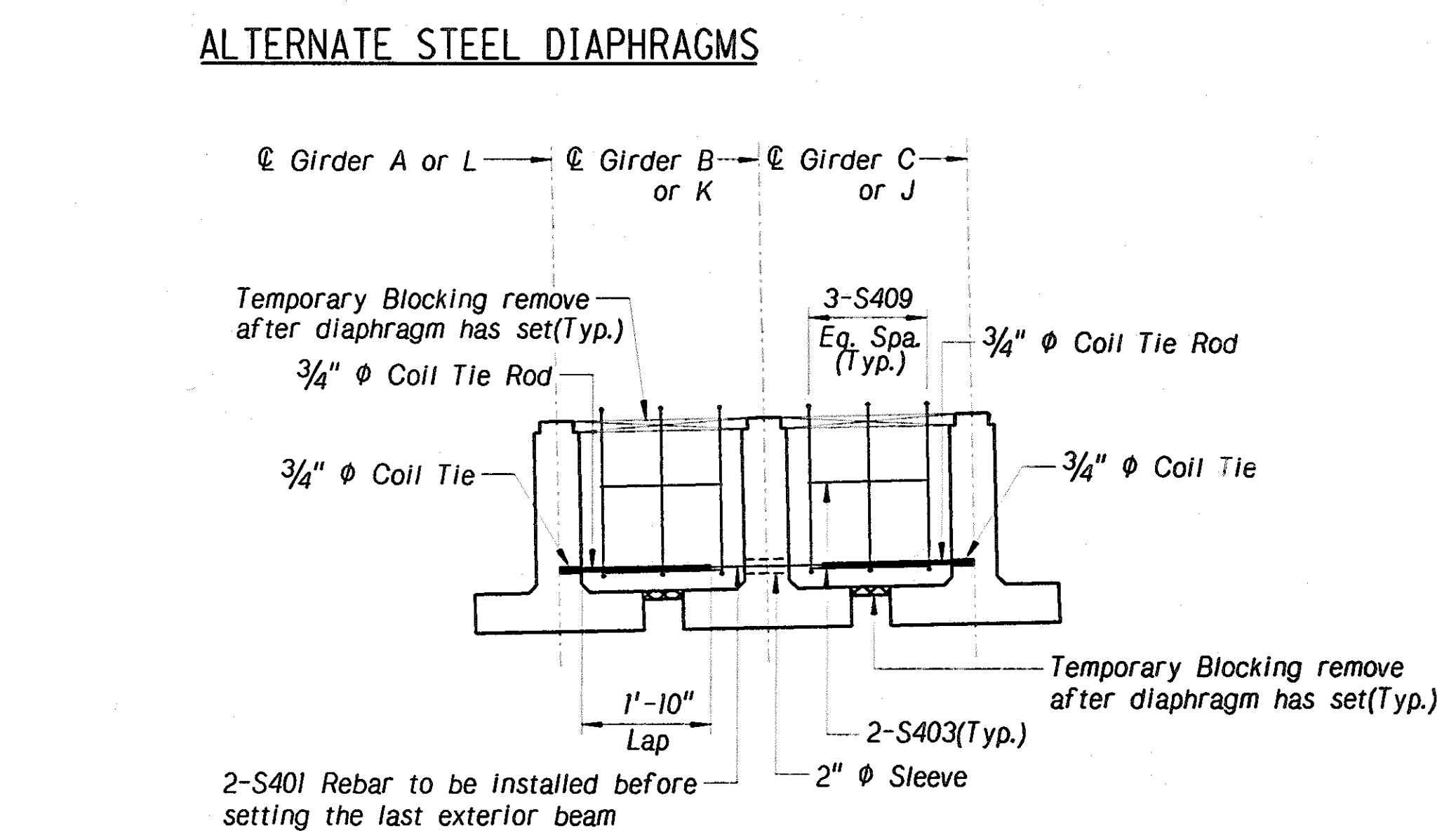
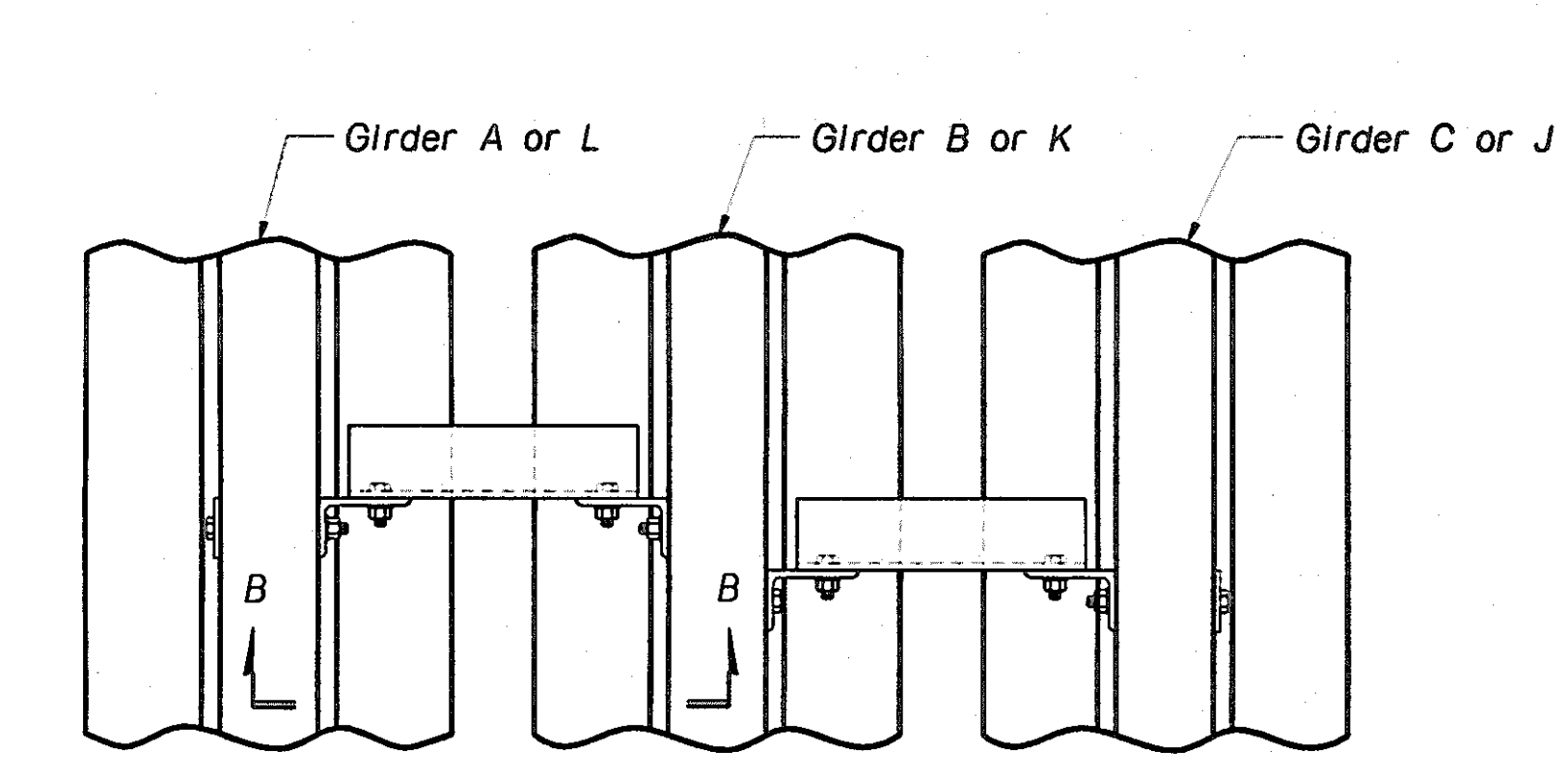
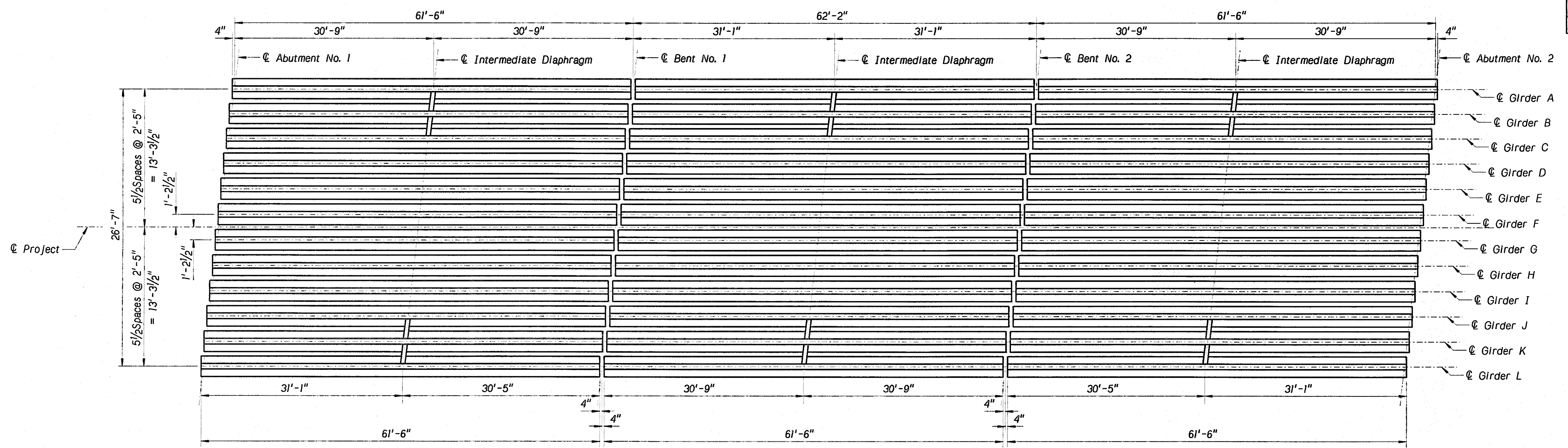
Speece Lewis engineers



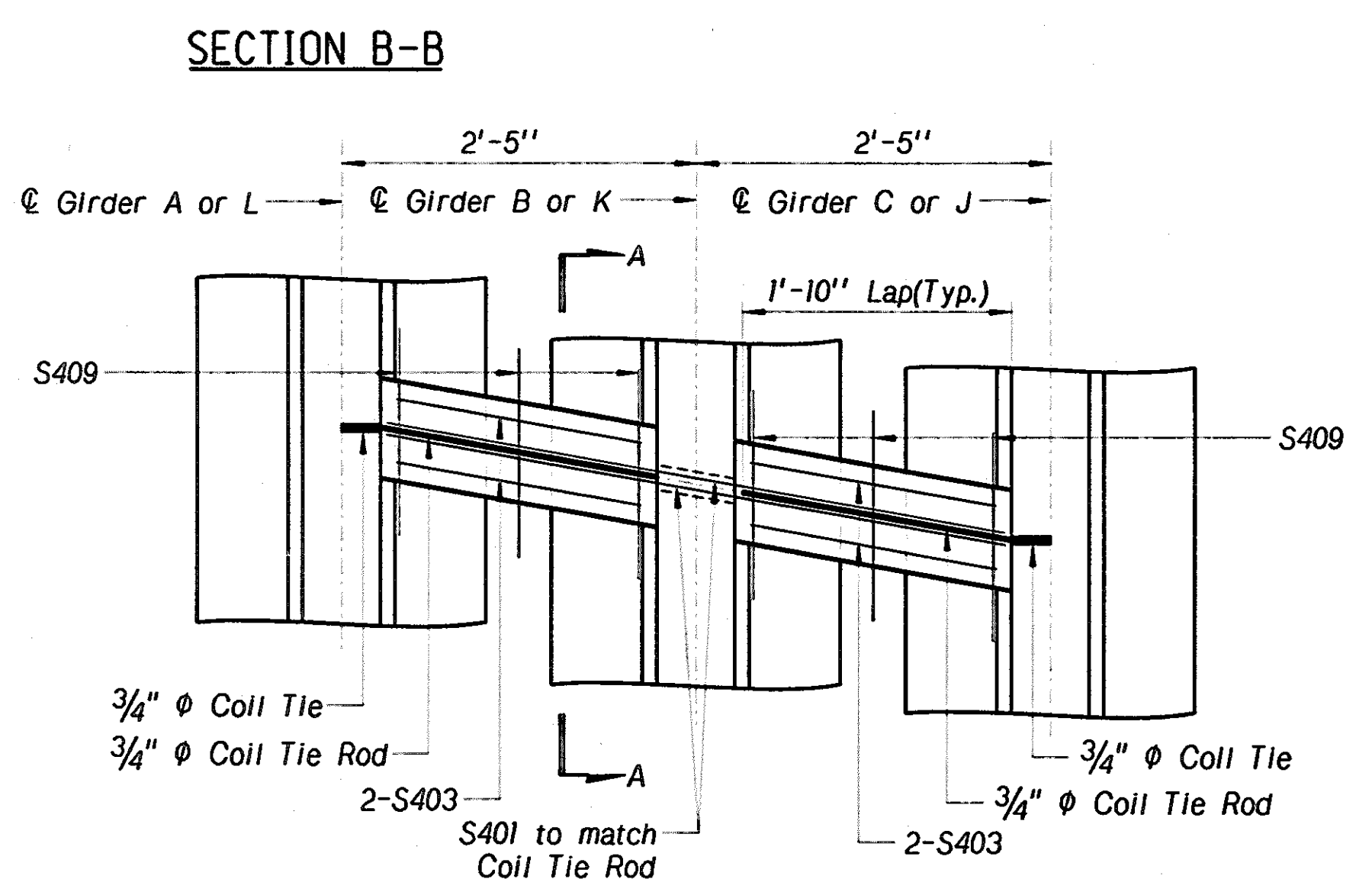
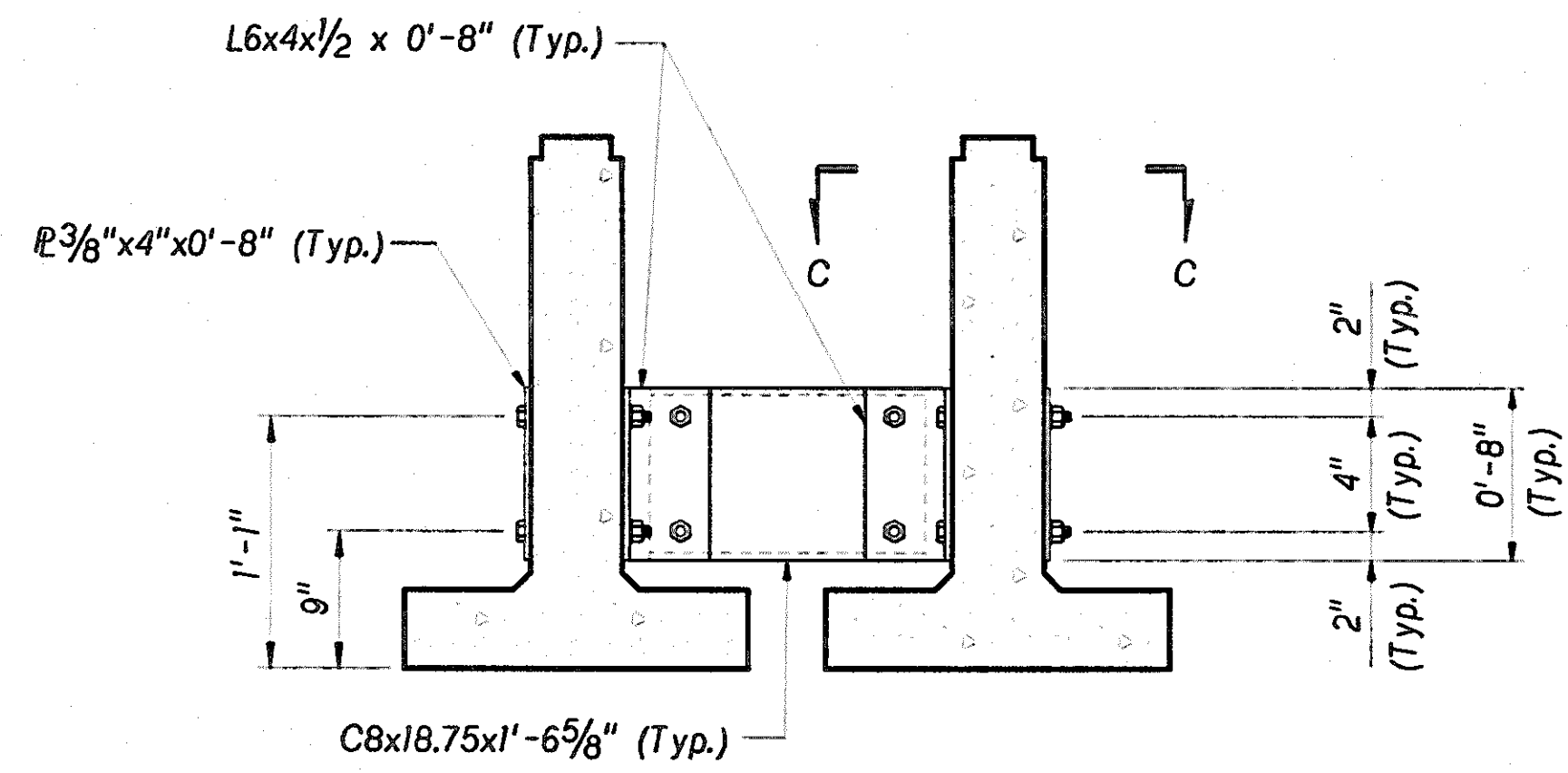
3-31-2011
SPECIAL PLAN NO. 5
1 / 10



LOCATION	BENT ELEVATIONS				
	A	B	C	D	E
BENT NO. 1	1464.04	1464.34	1464.02	1461.02	1439.52
BENT NO. 2	1464.00	1464.32	1464.02	1461.00	1439.50



PARTIAL ELEVATION OF INTERMEDIATE DIAPHRAGM



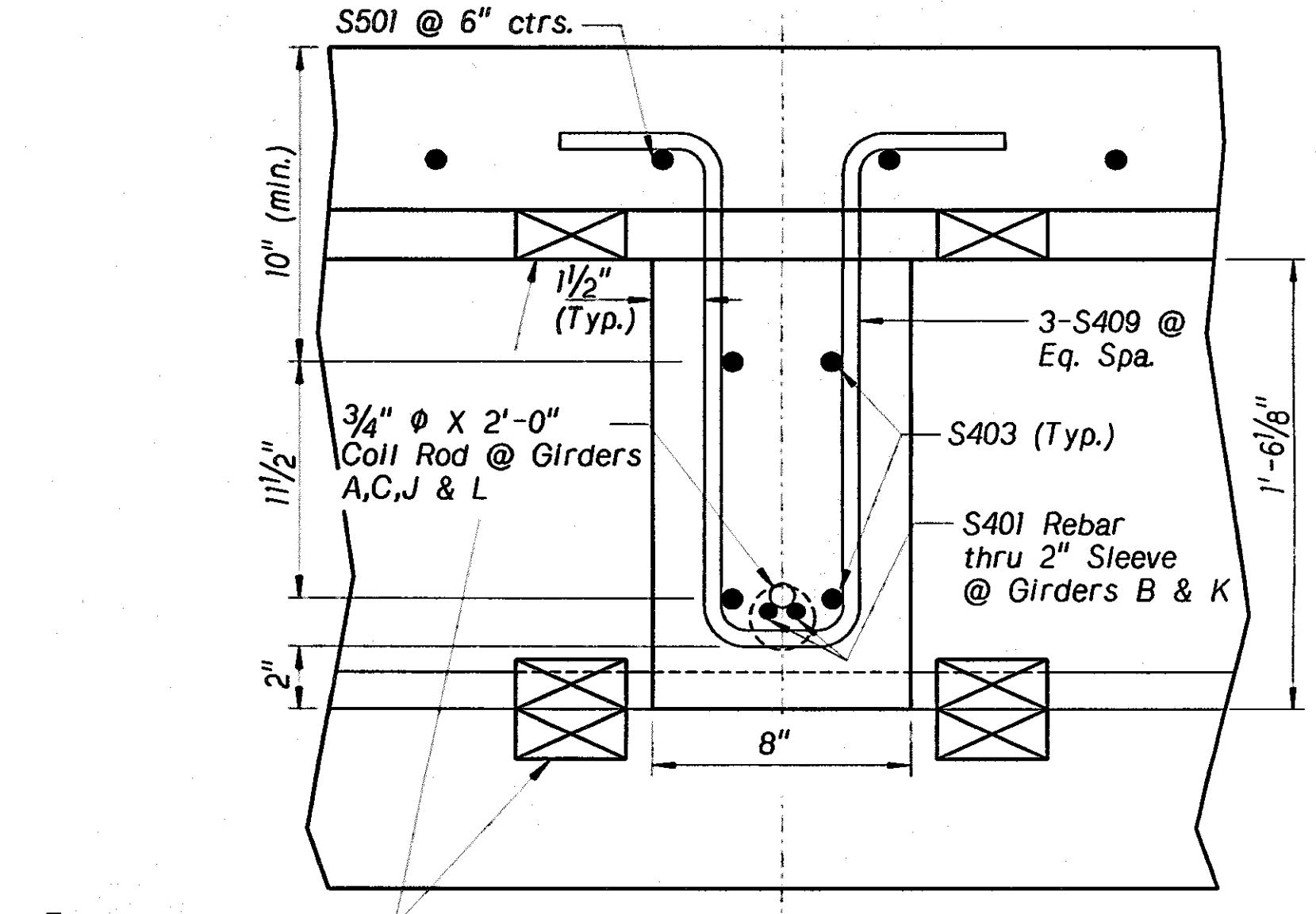
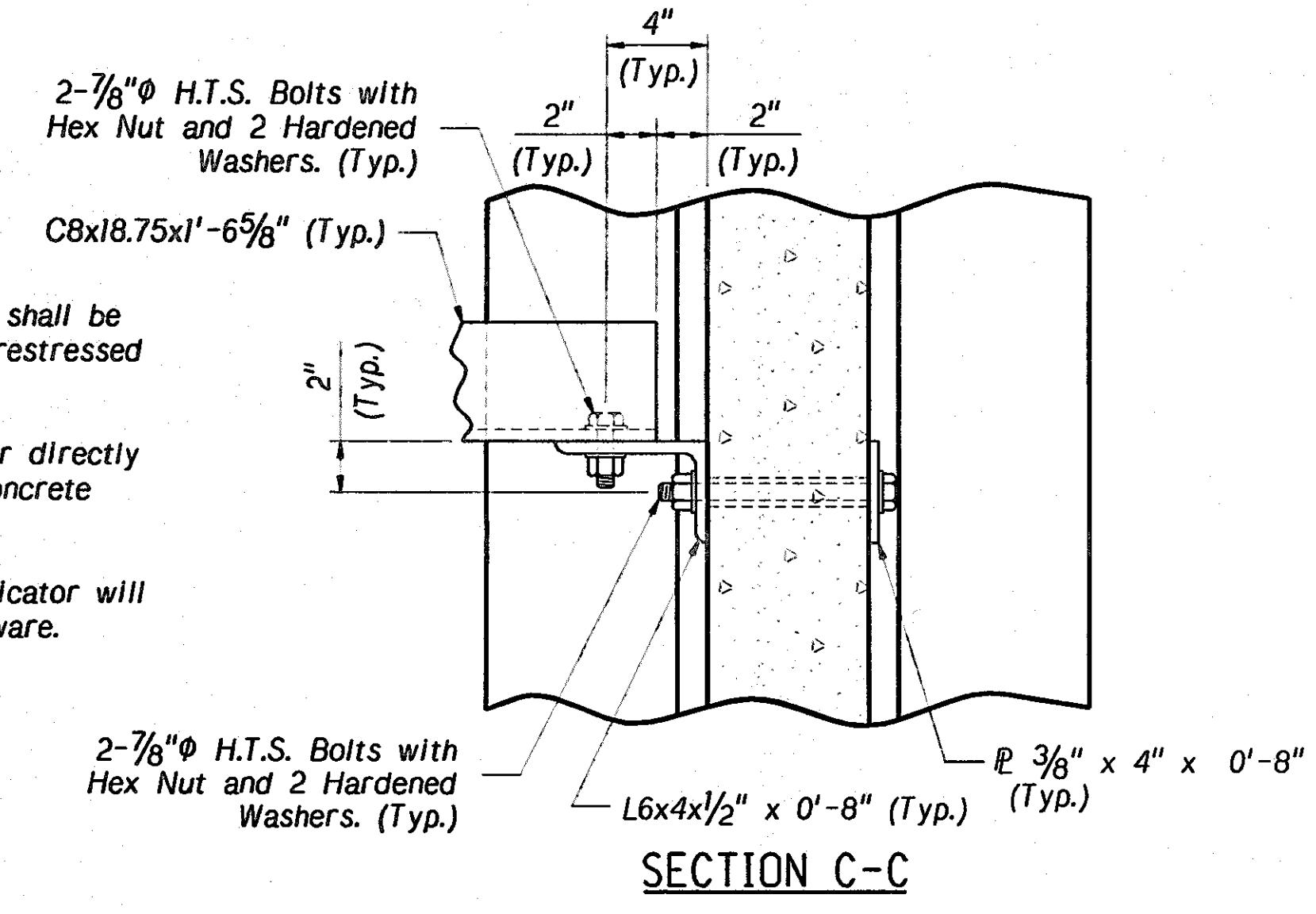
PARTIAL PLAN OF INTERMEDIATE DIAPHRAGM

NOTES:
Contractor shall be responsible for temporary bracing to prevent girder separation while pouring diaphragms.

Coil bolts shall not be paid for directly, but shall be considered subsidiary to the Item "Precast/Prestressed Concrete Superstructure at Sta. 16+25.00".

Intermediate Diaphragms shall not be paid for directly but are included in the slab quantities for concrete and reinforcing steel.

If Alternate Steel Diaphragms are used, Fabricator will detail necessary offsets for attachment hardware.



Temporary blocking to be removed after diaphragm concrete has set

SECTION A-A

IT-600 GIRDER DESIGN

SPAN NO.	GIRDER CASTING LENGTH (Feet)	CONCRETE STRENGTH (PSI)		NO. OF STRANDS PER GIRDER	STRANDS PER ROW AT MIDSPAN			NUMBER OF DEBONDED STRANDS	STRAND CENTROID MIDSPAN YM
		AT RELEASE	28 DAYS		R1	R2	R3		
1	61'-6"	4000	8000	13	11	0	2	4.77	
2	61'-6"	4000	8000	13	11	0	2	4.77	
3	61'-6"	4000	8000	13	11	0	2	4.77	

NON-COMPOSITE PROPERTIES

GIRDER MASS (lbs./ft.)	GIRDER AREA (in ²)	GIRDER CENTROID YNC	MOMENT OF INERTIA (in ⁴)	MIDSPAN CAMBER (in.)		DEFLECTION FOR SHIMS (Due to Slab) (in.)				
				AT RELEASE	30 DAYS	Span Tenth Points (Sym.)				
263.5	253.0	8.73	13773	1.05	1.81	.1	.2	.3	.4	.5
263.5	253.0	8.73	13773	1.05	1.81	0.28	0.50	0.66	0.75	0.78
263.5	253.0	8.73	13773	1.05	1.81	0.27	0.48	0.63	0.72	0.75

COMPOSITE PROPERTIES

WHEEL FACTOR	LANE FACTOR	SLAB 28 DAY Strength (PSI)	SLAB Design DEPTH (in)	Midspan Transformed Concrete Section			*SUPER-IMPOSED DEAD LOADS (lbs./ft.)
				SLAB Eff. WIDTH (n x b _e)	SECTION AREA (in ²)	SECTION CENTROID YC	
0.440	0.220	4000	5 1/2"	2'-5"	365.8	14.63	45.0
0.440	0.220	4000	5 1/2"	2'-5"	365.8	14.63	45.0
0.440	0.220	4000	5 1/2"	2'-5"	365.8	14.63	45.0

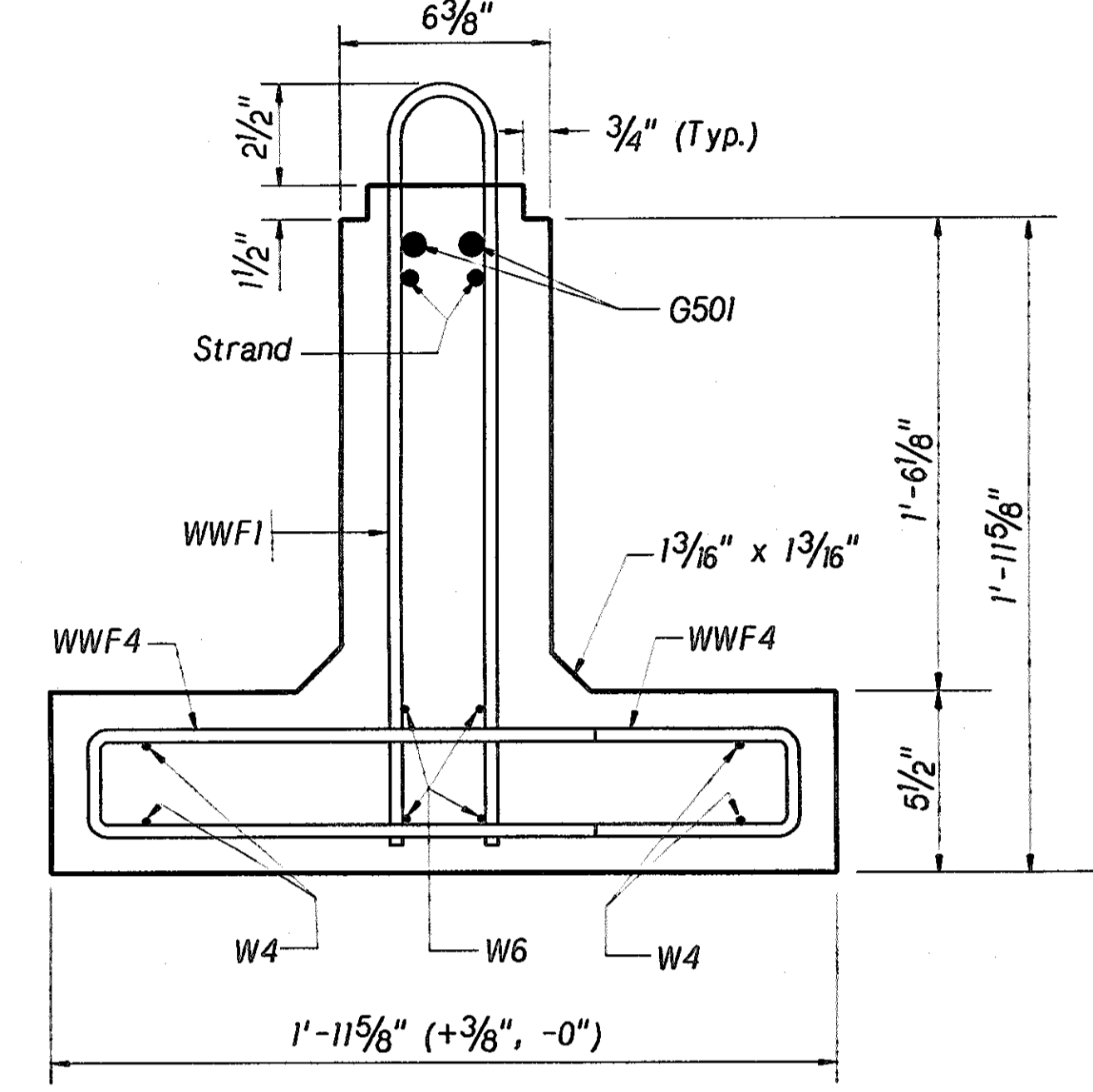
DEBONDED STRAND

SPAN NUMBER	LOCATION		DEBOND LENGTH
	ROW	COLUMN	
1 & 3	3	2	30'-0"
	3	2	30'-0"

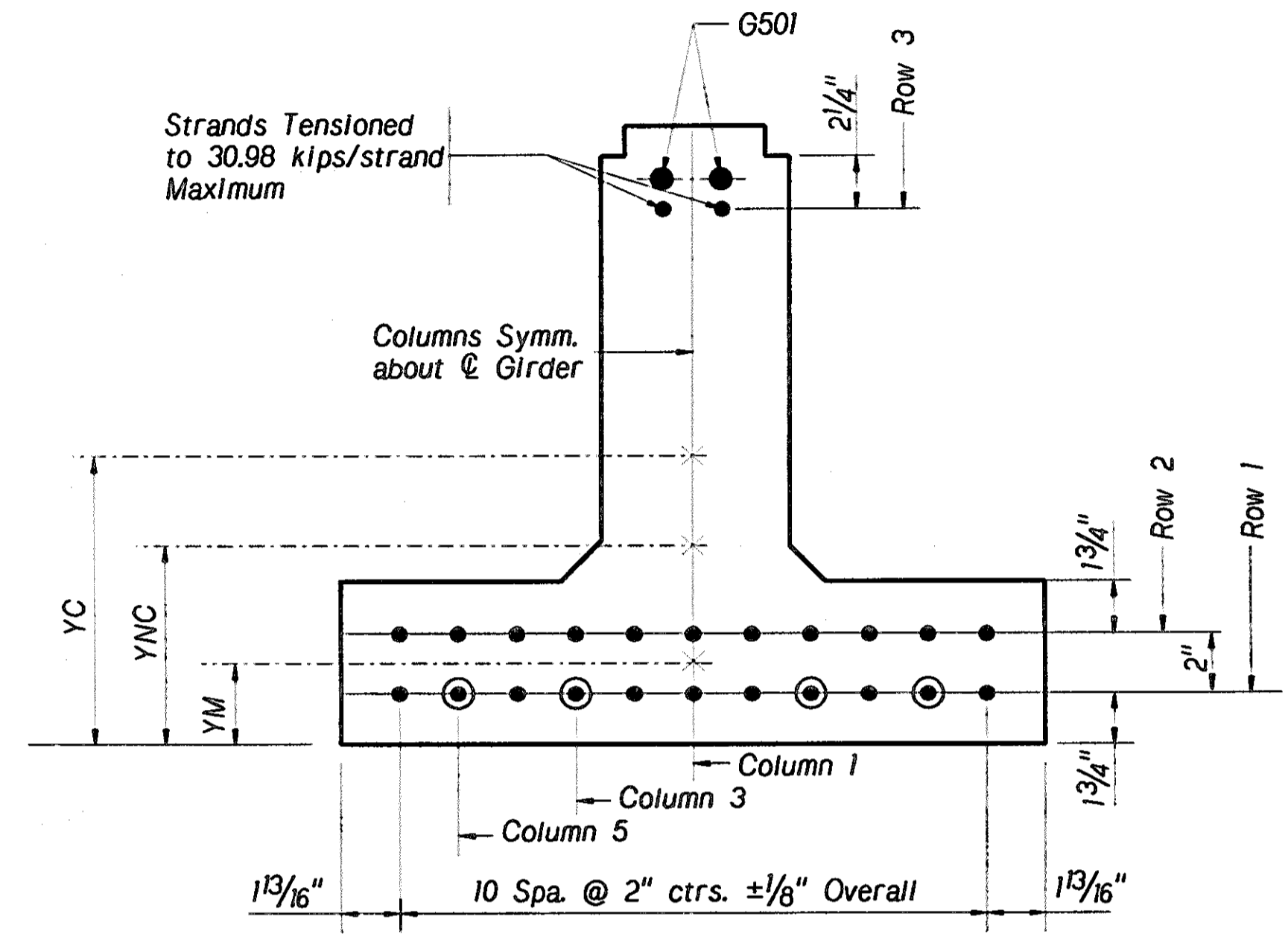
Note: Mid debonding length is centered in the girder casting length. One half mid debonded length should be measured each way from mid span.

▲ Top strands are mid debonded and to be cut after stripping.

Composite properties assume 1/2" loss due to wear.



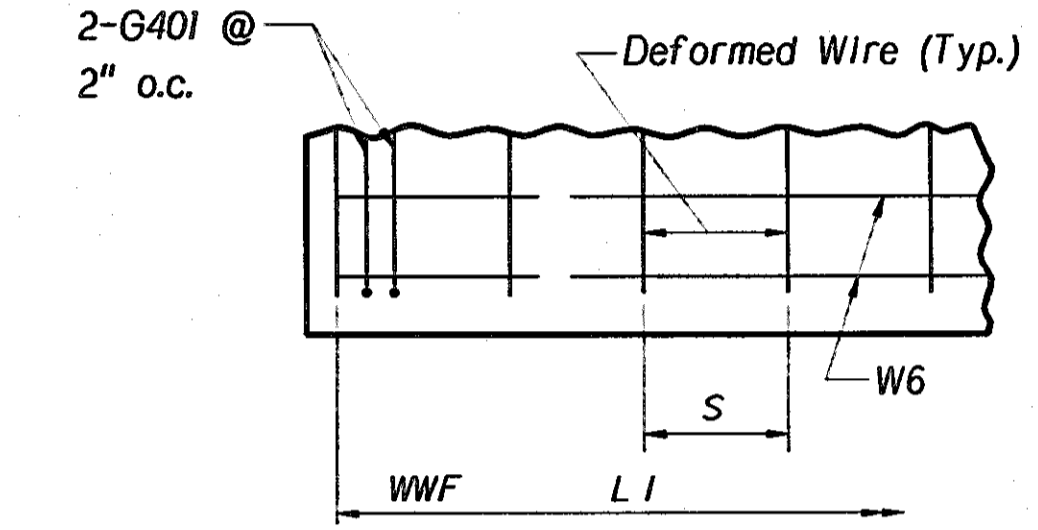
DIMENSIONS AND REINFORCING



STRAND SPACINGS

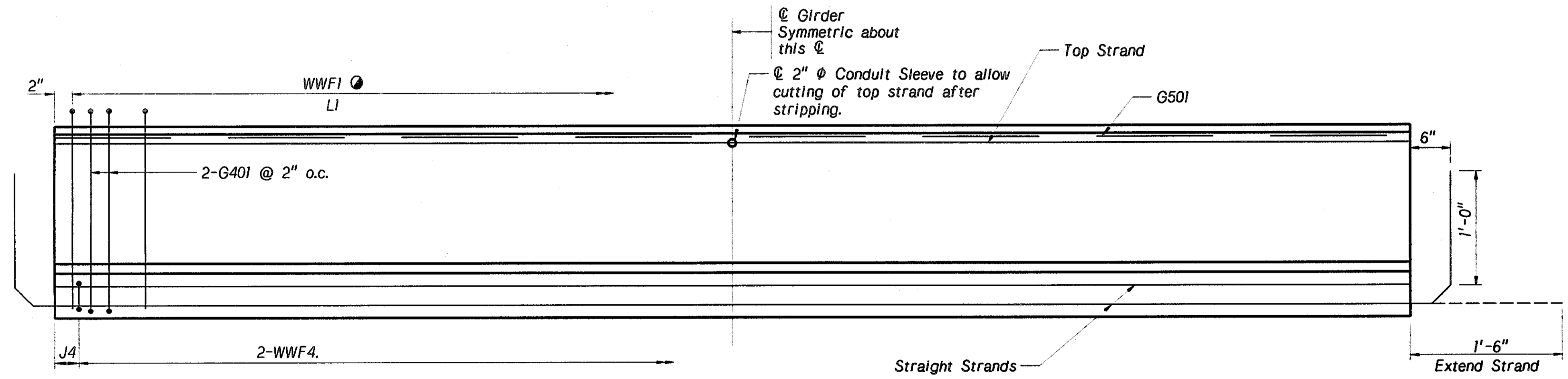
WELDED WIRE FABRICS

SPAN NO.	BAR SIZE	WWF1			WWF4			G501 BAR LENGTH	
		S1	L1	J4	S4	L4	J4		
1 & 3	D14	12"	61'-2"		D10	12"	61'-2"	2"	★62'-5"
2	D14	12"	61'-2"		D10	12"	61'-2"	2"	★62'-5"



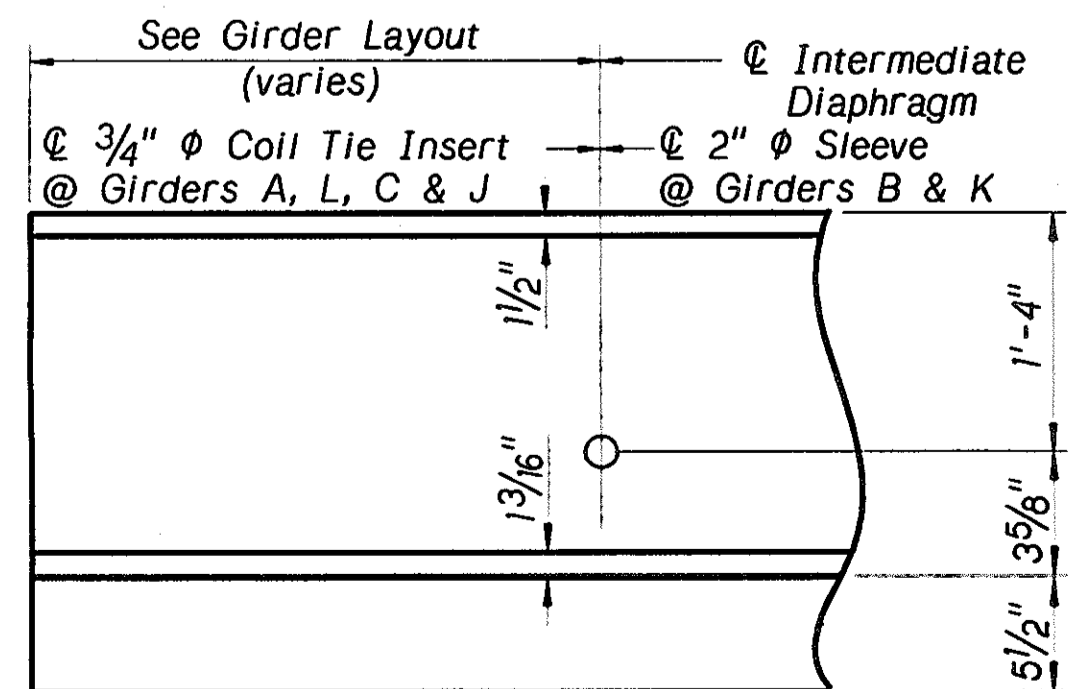
FABRIC PLACEMENT DETAIL

Note: Extend circled strands (Typical at Both ends)



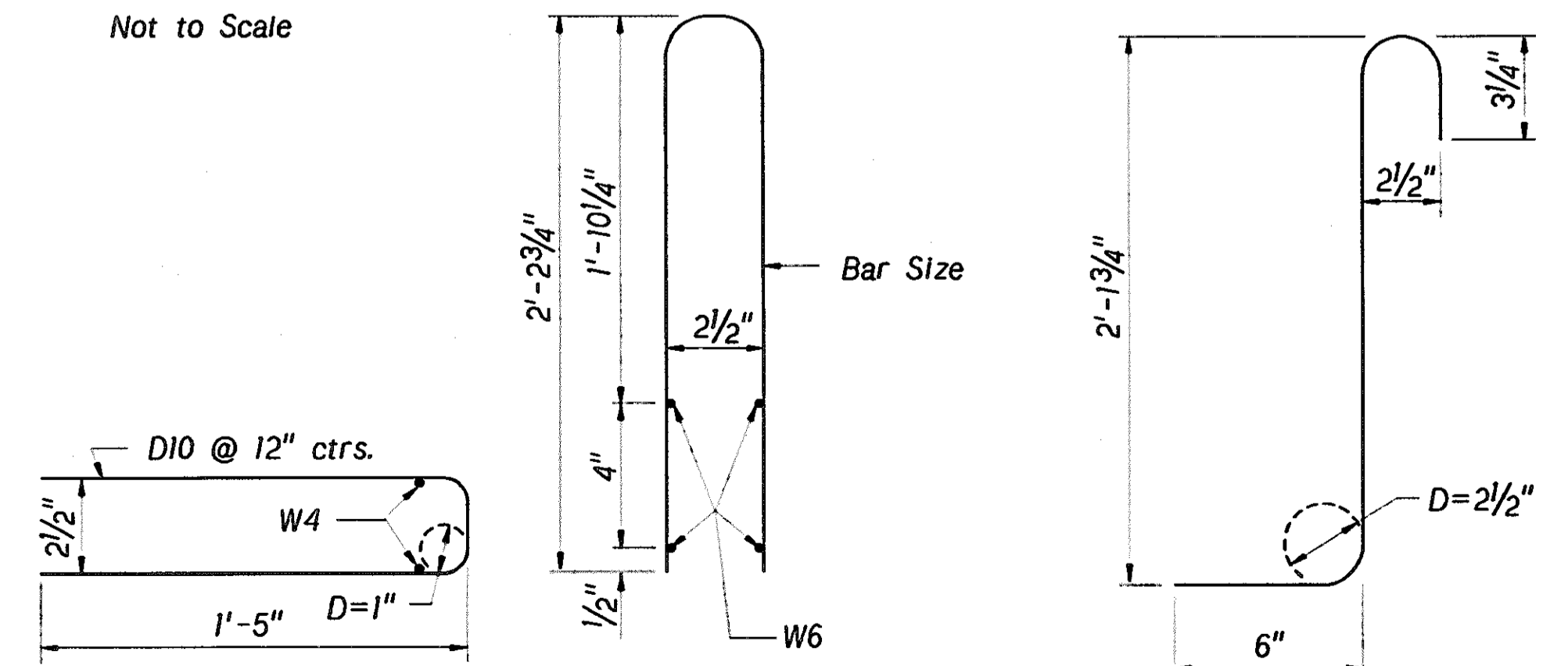
GIRDER ELEVATION

Not to Scale



INSERT OR SLEEVE DETAIL @ DIAPHRAGM

Not to Scale See Sheet 6 of 10 for Alternate Steel Diaphragm Sleeve locations.



BENDING DETAILS

PRESTRESSED GIRDER NOTES:

FABRICATOR shall be responsible for exercising extreme care in lifting, handling, storing and transportation of the prestressed girders to prevent cracking or damage. Girders shall be maintained in an upright position and supported near the ends at all times. Proper support bearings shall be used to avoid twisting of the girders. Girders shall be lifted by devices designed by the fabricator.

PRESTRESSING STRAND shall be uncoated, seven-wire, low-relaxation steel strand of 0.5" nominal diameter, and shall conform to the requirements of ASTM A416, Grade 270. Strands shall be tensioned to 30.98 kips before release, unless specified otherwise. All methods employed and procedures to be followed in tensioning the strands shall be subject to the Engineer's approval. The method chosen shall be executed in a manner to assure that both ends of all strands in the girder are uniformly tensioned. The prestressed strand shall be released in a manner that will minimize eccentricity.

CONCRETE in the girders shall have the strength at release and at 28 days (design strength) as shown in the data table. No bond stress shall be transferred to the concrete nor the end anchorage released until the concrete has attained the specified strength. All exposed edges of girders, except at top and ends, shall be chamfered 3/4".

TOP OF THE STEM shall be rough finished by scarifying the surface transversely with a wire brush, and no laitance shall remain on the surface.

REINFORCING STEEL shall conform to the requirements of ASTM designation A615/A615M, Grade 60. Welded Wire Fabric (WWF) shall conform to the requirements of ASTM A497. As an alternate for WWF, an equivalent rebar area is substituted, the reinforcement must be detailed to develop the full shear capacity of the bar. Details shall be submitted to the Engineer for approval.

TOLERANCES shall be in accordance with the Prestressed Concrete Institute manual.

Fabricator to provide Project Engineer with a plan for strand detensioning on the Shop Plans prior to fabrication.

- * For rating purpose only, superimposed dead loads do not include future wearing surface.
- * Includes 1'-3" Lap Splice.

C.N. 12850

STRUCTURE NUMBER
C007601115

185'-2'-3" SPAN
PRESTRESSED CONCRETE IT-600 GIRDER BRIDGE
GIRDER DATA

DATE: MARCH 2011
CHECKED BY: RH
DESIGNED BY: MS

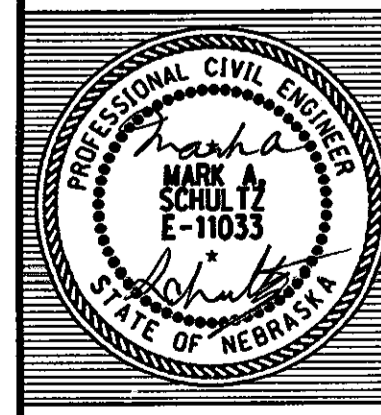
LOCATION: FRIEND-SOUTH
SKEW: 10° RHB
CLEAR ROADWAY: 28'-0"
DESIGN LIVE LOAD: HS20

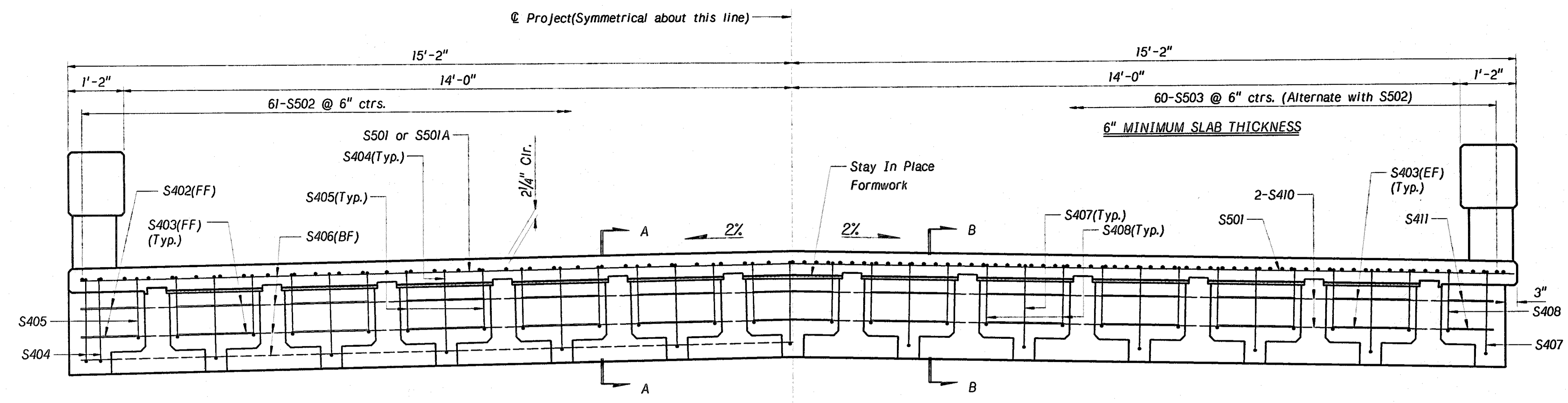
COUNTY: SALINE
HWY. NO.:
REF. POST. STA.: 16+25.00

SPEECE-LEWIS ENGINEERS
LINCOLN, NEBRASKA

3-31-2011

SPECIAL PLAN NO. 7
1 / 10



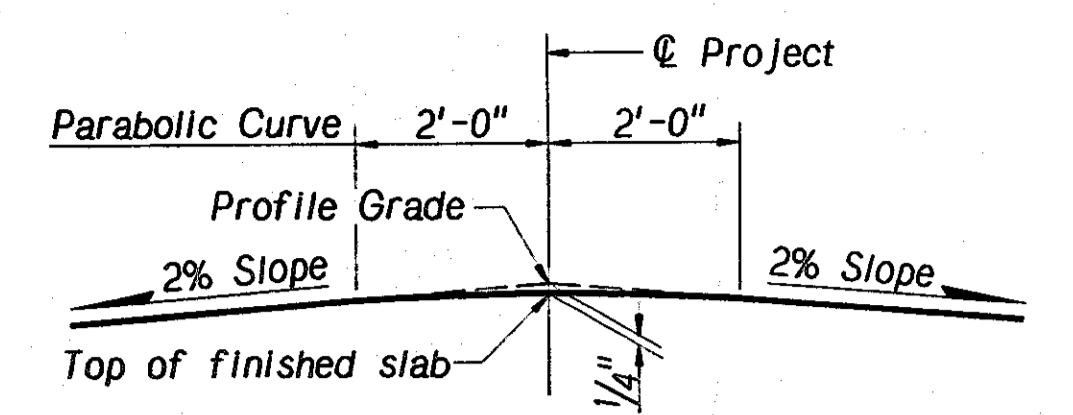


SHOWN NEAR ABUTMENT

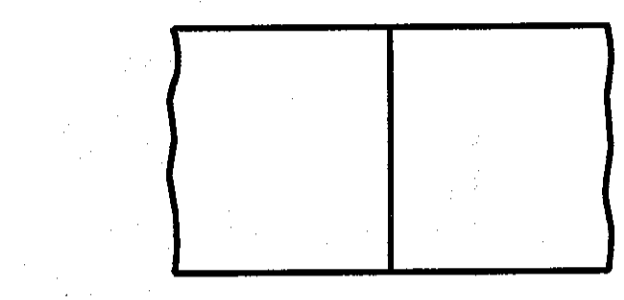
GENERAL CROSS SECTION OF ROADWAY

SHOWN NEAR BENT

See Sheet 6 of 10 for Intermediate Diaphragm Details.

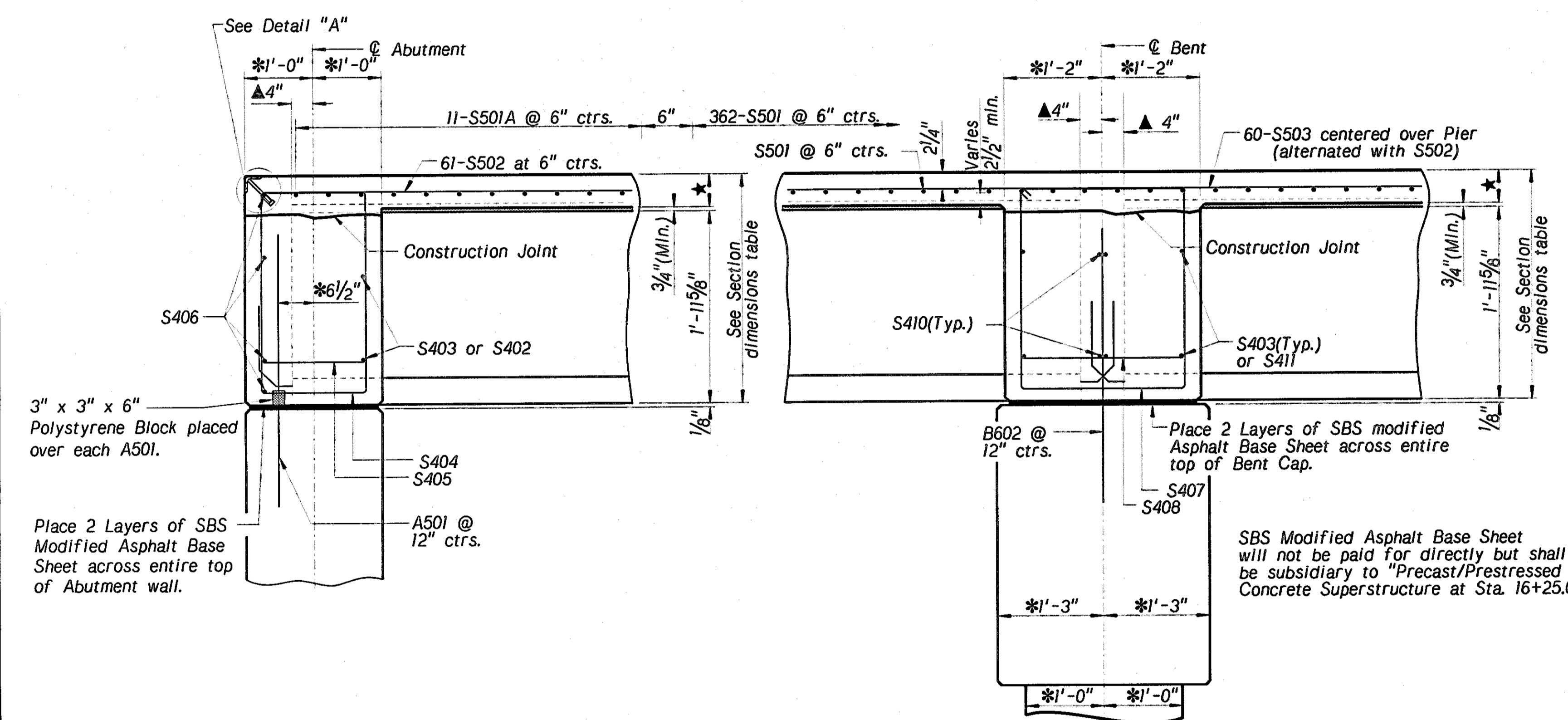


CROWN TEMPLATE



SLAB CONSTRUCTION JOINT

FF=Front Face
BF=Back Face
EF=Each Face



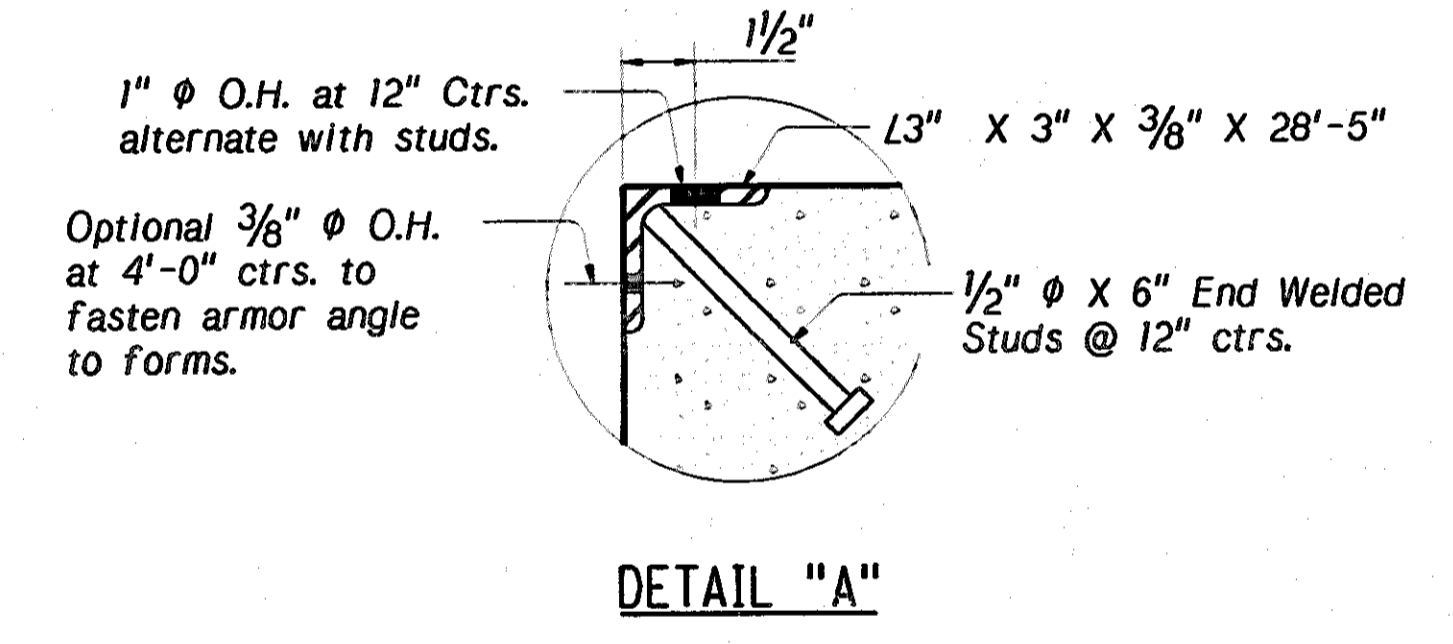
SECTION A-A

SECTION B-B

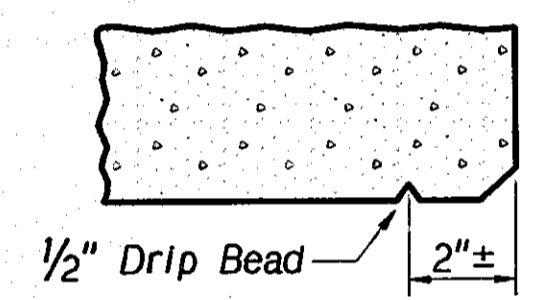
- * Measured perpendicular to C of support
- ★ Slab thickness varies. 6" (Min.)
- ▲ Measured parallel to C of Project.

PARTIAL LONGITUDINAL SECTION

SECTION DIMENSIONS	
Abutment No. 1	2'-6 7/8"
Bent No. 1	2'-6 7/8"
Midspan (1,2 & 3)	2'-6 3/8"
Bent No. 2	2'-6 7/8"
Abutment No. 2	2'-6 7/8"

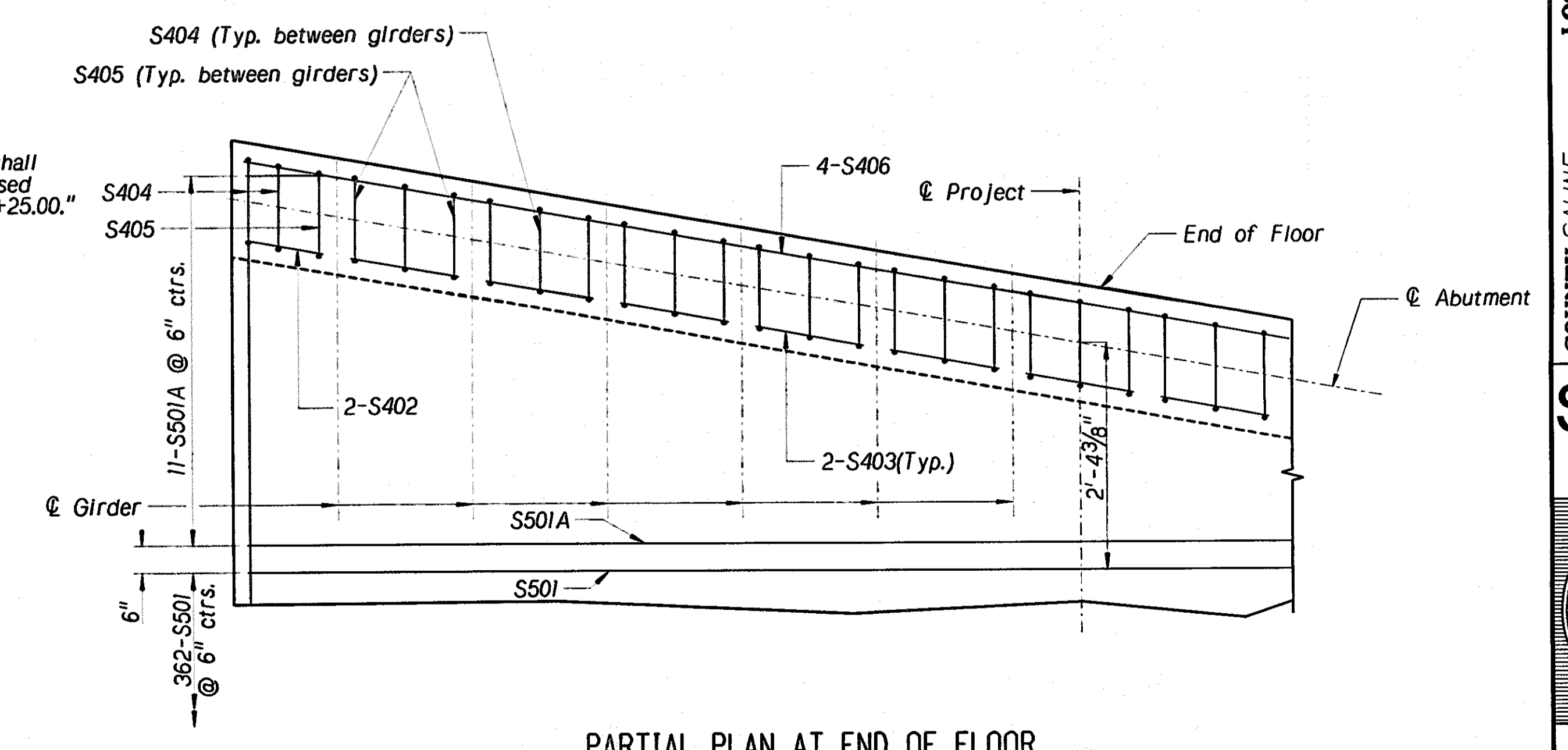


DETAIL "A"



DRIP BEAD DETAIL

Stop Drip Bead 1'-0" from face of Abutment.



PARTIAL PLAN AT END OF FLOOR

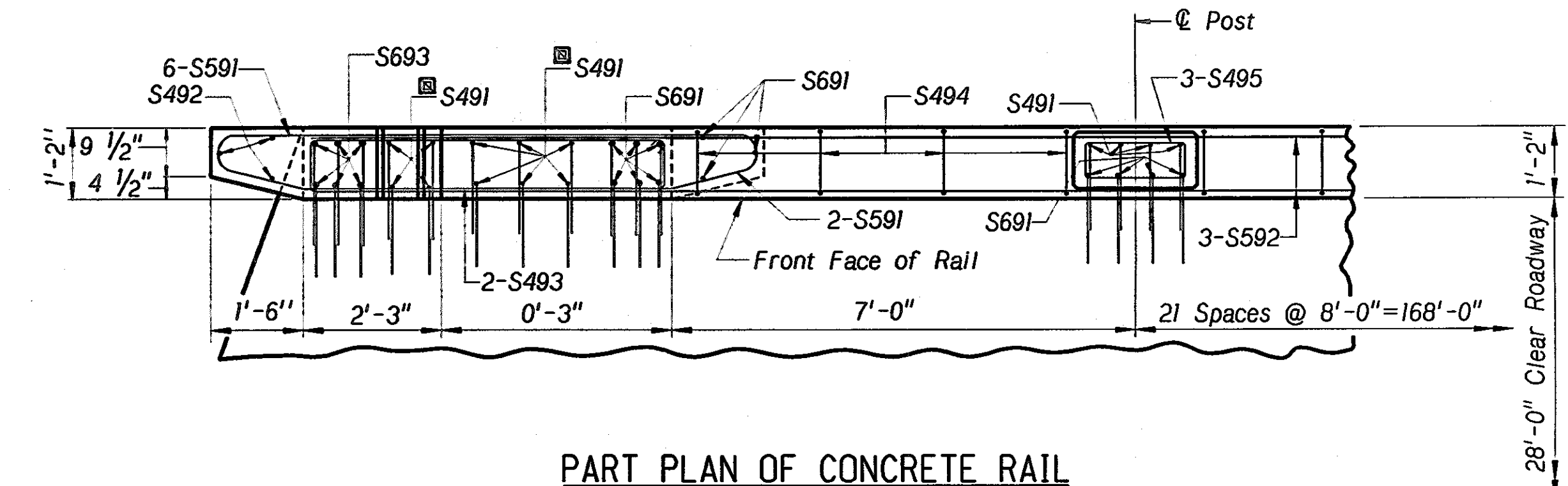
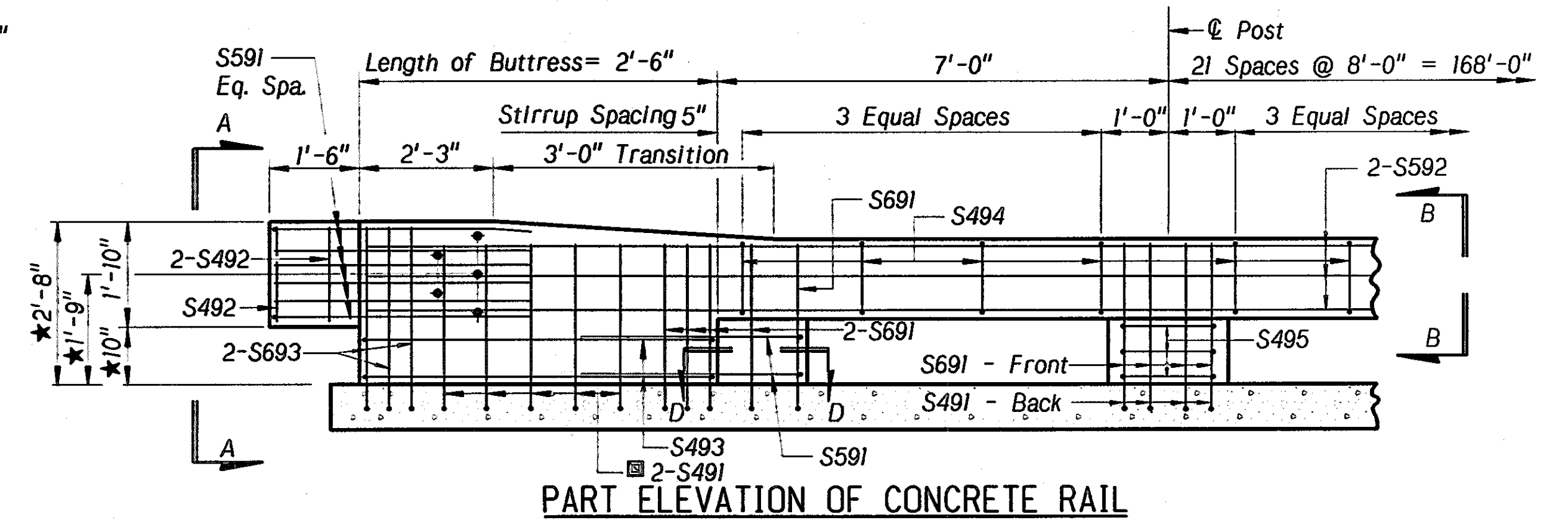
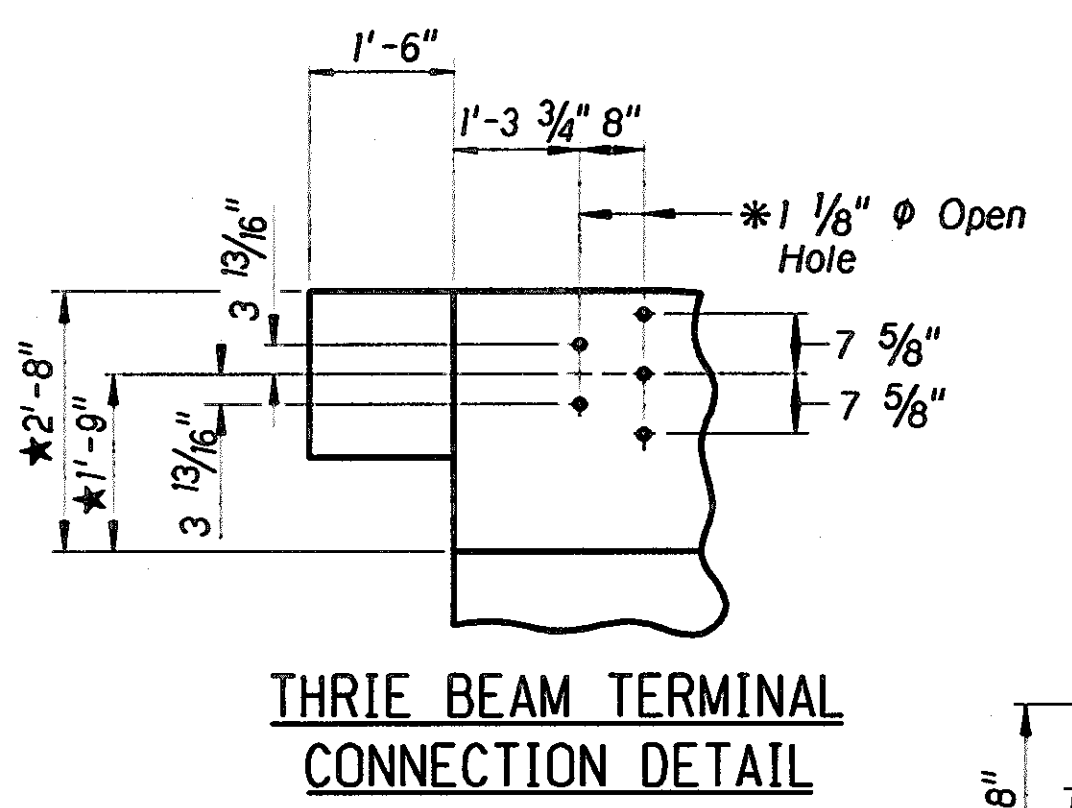
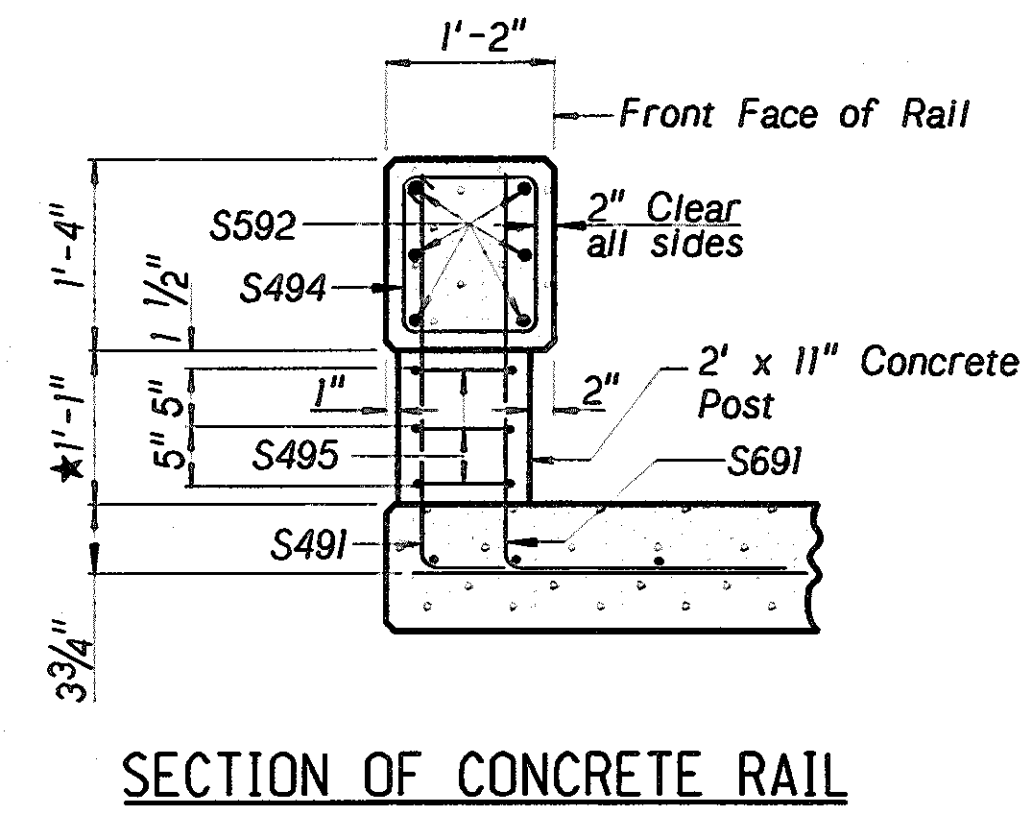
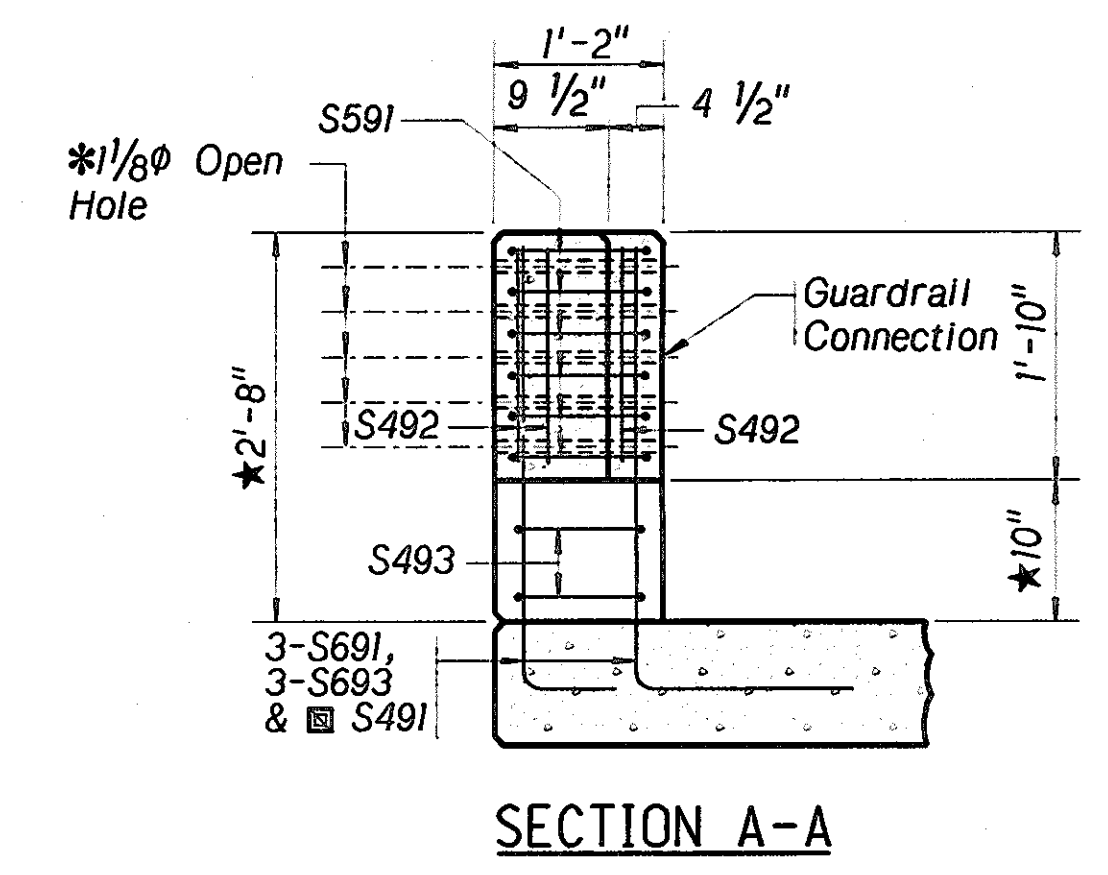
NOTE: Rail, Longitudinal slab bars, and Armor Angles are Not Shown.

* As an alternate method, the contractor may furnish and cast into the concrete an approved welded assembly consisting of 5 threaded Inserts held accurately to the template of the holes shown. Inserts to be complete with galvanized plate washers and galvanized 7/8" ϕ X 2" cap screws. The insert assembly shall be a standard product of a reputable manufacturer of such items and be capable of resisting a shear load of 80,000 lbs.

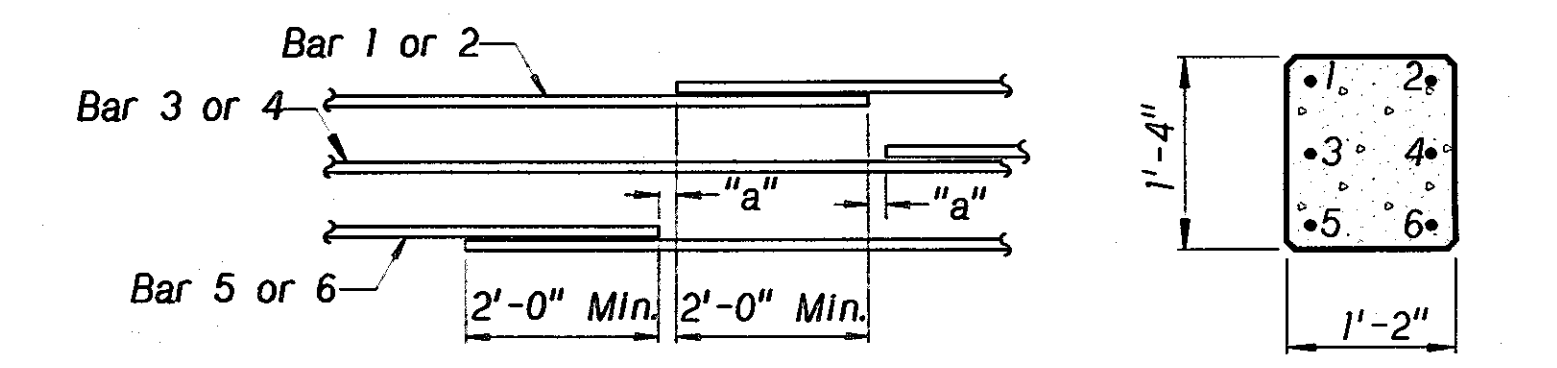
* All dimensions marked thus are measured at Front Face of Rail.

The Number of S491 Bars will depend on the length of the Buttrass.

- 2'-3" to 3'-0"-0 Rows
- 3'-1" to 4'-0"-2 Rows
- 4'-1" to 5'-0"-3 Rows
- 5'-1" to 6'-6"-5 Rows



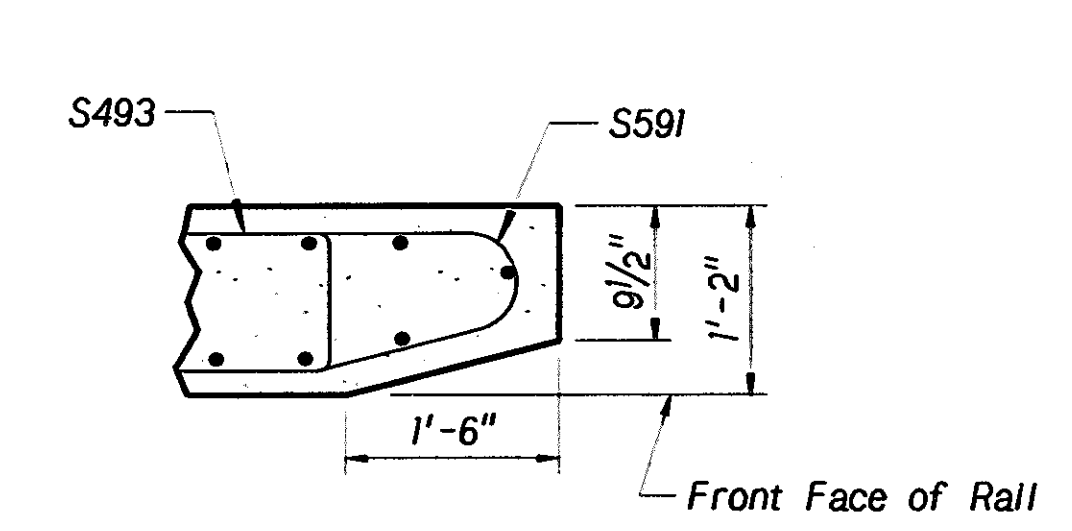
PART PLAN OF CONCRETE RAIL



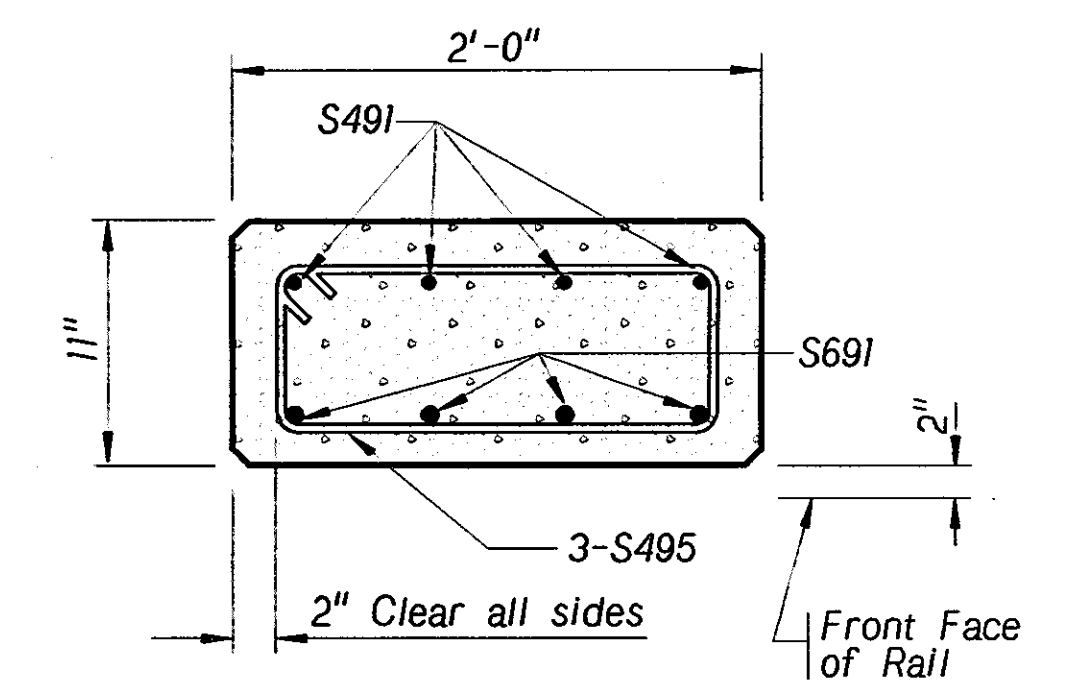
LAP DETAIL

SECTION B-B

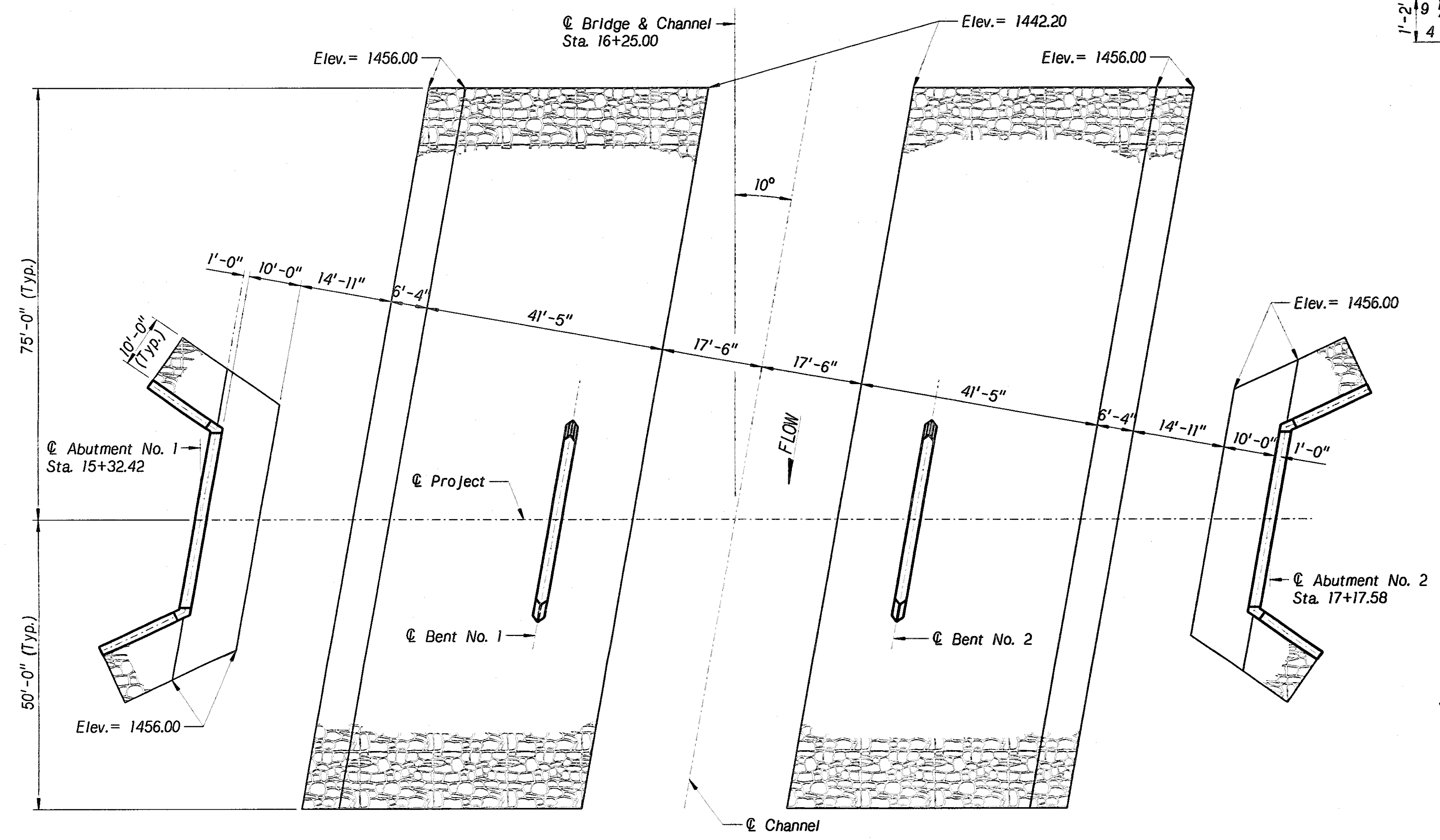
▲ Laps for Bars 1 & 5 shall be staggered
Laps for Bars 2 & 6 shall be staggered
Bar 3 to be continuous through laps for Bars 1 & 5
Bar 4 to be continuous through laps for Bars 2 & 6
"a" \geq Zero



SECTION D-D



SECTION OF 24" X 11" POST



All riprap placed will be covered with 6" of native soil and seeded above the historical ordinary high water mark or approximately three (3) feet above the existing channel flow line, whichever is greater.

PLAN OF ROCK RIPRAP TYPE "B" AND RIPRAP FILTER FABRIC

B I L L O F B A R S

MARK	NO.	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"	⊕ PIN	HOOK
A501	62	3'-6"	Str.								
A401	8	5'-4"	127	2'-3"	0'-5"	1'-2"	1'-6"	1'-1"	0'-2 ⁵ / ₁₆ "	2"	
A402	10	16'-3"	Str.								
A403	60	14'-10" Avg.	Str.								
A404	12	10'-10" Avg.	Str.								
A405	4	15'-10"	105	14'-4"	1'-6"	1'-5 ⁵ / ₈ "	0'-3 ⁵ / ₈ "			2"	
A406	56	15'-6"	Str.								
A407	68	34'-4"	108	7'-10"	1'-6"	7'-10"	Varies			2"	
A409	30	37'-1"	106	2'-3"	32'-8"	2'-0 ⁷ / ₁₆ "	1'-9 ¹ / ₄ "	2'-2"		2"	
A410	30	34'-4"	Str.								
A411	8	5'-9"	109	2'-2"	0'-10"	1'-0"	1'-9"	1'-1"	0'-5 ¹ / ₁₆ "	2"	
A412	10	16'-3"	Str.								
A413	72	15'-0" Avg.	Str.								
A414	4	18'-10"	105	17'-2"	1'-8"	1'-7 ³ / ₄ "	0'-2 ⁷ / ₈ "			2"	
A415	12	13'-1" Avg.	Str.								
A416	56	18'-9"	Str.								
B601	24	29'-9"	Str.								
B602	62	3'-6"	Str.								
B504	108	23'-6"	Str.								
B401	88	5'-2"	122	1'-6"	1'-1"	1'-1"	0'-9"	0'-9"		2"	
B402	88	30'-2" Avg.	Str.								
B403	10	21'-2"	Str.								
B405	24	13'-0" Avg.	Str.								
B406	62	13'-0"	108	2'-3"	2'-0"	2'-3"	Varies			2"	

B I L L O F B A R S

MARK	NO.	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"	⊕ PIN	HOOK
S691	212	5'-0"	104	2'-6"	2'-6"					4 ¹ / ₂ "	
S693	24	5'-3"	104	2'-6"	2'-9"					4 ¹ / ₂ "	
S591	32	8'-7"	124	2'-8"	1'-6"	4'-1"	0'-10"	1'-5"		5 ¹ / ₄ "	
S592	12	(Z)194'-8"	Str.								
S491	176	5'-0"	104	2'-6"	2'-6"					3"	
S492	12	1'-6"	Str.								
S493	8	6'-9"	107	0'-10"	2'-2"					2"	4 ¹ / ₂ "
S494	184	4'-5"	107	1'-0"	0'-10"					2"	4 ¹ / ₂ "
S495	132	5'-3"	107	1'-8"	0'-7"					2"	4 ¹ / ₂ "

S L A B B I L L O F B A R S

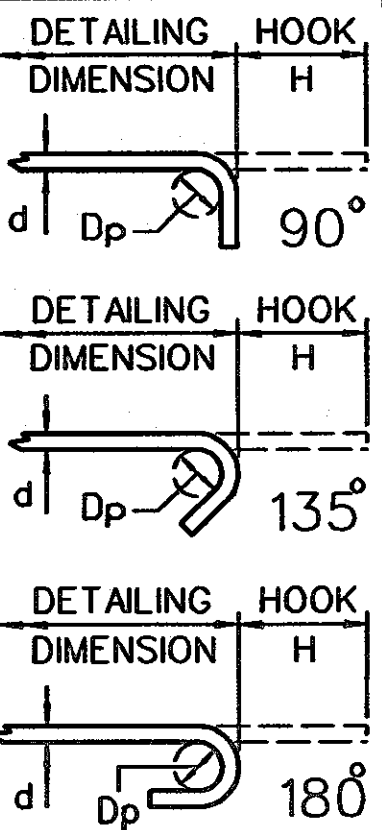
MARK	NO.	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	⊕ PIN	HOOK
S501	362	29'-10"	Str.							
S501A	22	15'-8" Avg.	Str.							
S502	61	(Y)195'-4"	Str.							
S503	120	30'-0"	Str.							
S401	12	4'-4"	Str.							
S402	8	1'-3"	Str.							
S403	180	1'-8"	Str.							
S404	30	8'-1"	107	2'-2"	1'-6"				2"	4 ¹ / ₂ "
S405	48	7'-3"	107	1'-9"	1'-6"				2"	4 ¹ / ₂ "
S406	8	30'-4"	Str.							
S407	26	8'-9"	107	2'-2"	1'-10"				2"	4 ¹ / ₂ "
S408	48	7'-11"	107	1'-9"	1'-10"				2"	4 ¹ / ₂ "
S409	36	5'-9"	128	1'-8"	0'-5"	1'-0"			2"	
S410	8	29'-9"	Str.							
S411	8	3'-9"	129	1'-0"	1'-9"	0'-2"			2"	

(Z) Includes 4-2'-0" Laps.
(Y) Includes 4-2'-2" Laps.

BAR SETS					BAR SETS					BAR SETS					BAR SETS				
MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET	MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET	MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET	MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET
A403	16'-4"	13'-4"	4	15	B402	32'-10"	27'-6"	4	22	S501A	29'-10"	1'-6"	2	11					
A404	15'-6"	6'-2"	4	3	B405	21'-0"	5'-0"	8	3										
A413	16'-3"	13'-9"	4	18															
A415	18'-9"	7'-5"	4	3															

P I N D I A M E T E R

BAR SIZE	Dp	BAR SIZE	Dp
4	3"	3	1 1/2"
5	3 3/4"	4	2"
6	4 1/2"	5	2 1/2"
7	5 1/4"	6	4 1/2"
8	6"	7	5 1/4"
9	9/2"	8	6"
10	11"		
11	12"		



S T A N D A R D H O O K L E N G T H

P R I M A R Y S T R E S S B A R S

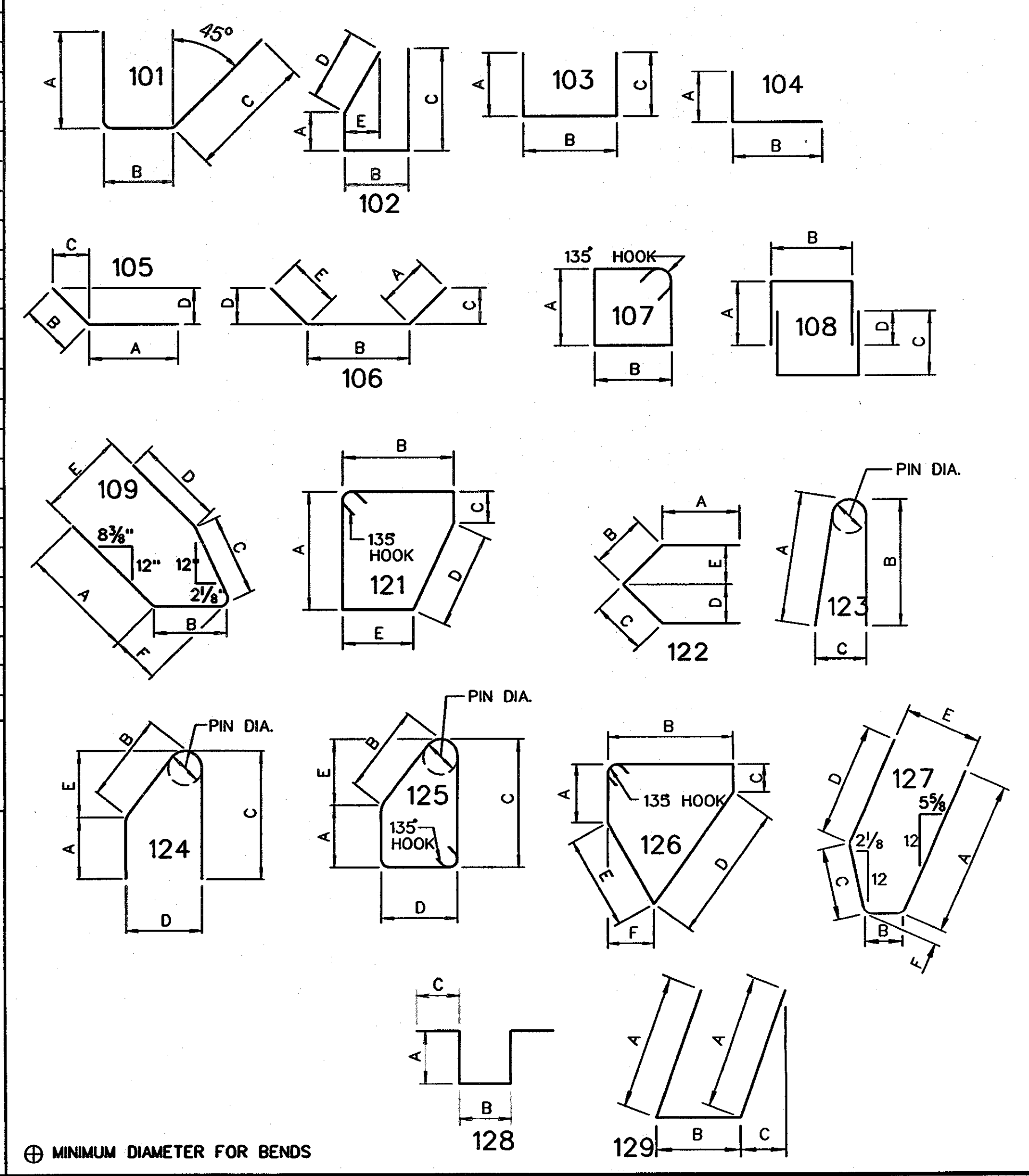
BAR SIZE	HOOK H	
	90°	180°
4	8"	6"
5	10"	7"
6	12"	8"
7	15"	10"
8	17"	11"
9	19"	15"
10	23"	17"
11	24"	19"

S T I R R U P S A N D T I E S

BAR SIZE	HOOK H	
	90°	135°
3	4"	4"
4	4 1/2"	4 1/2"
5	6"	5 1/2"
6	12"	8"
7	14"	9"
8	16"	10 1/2"

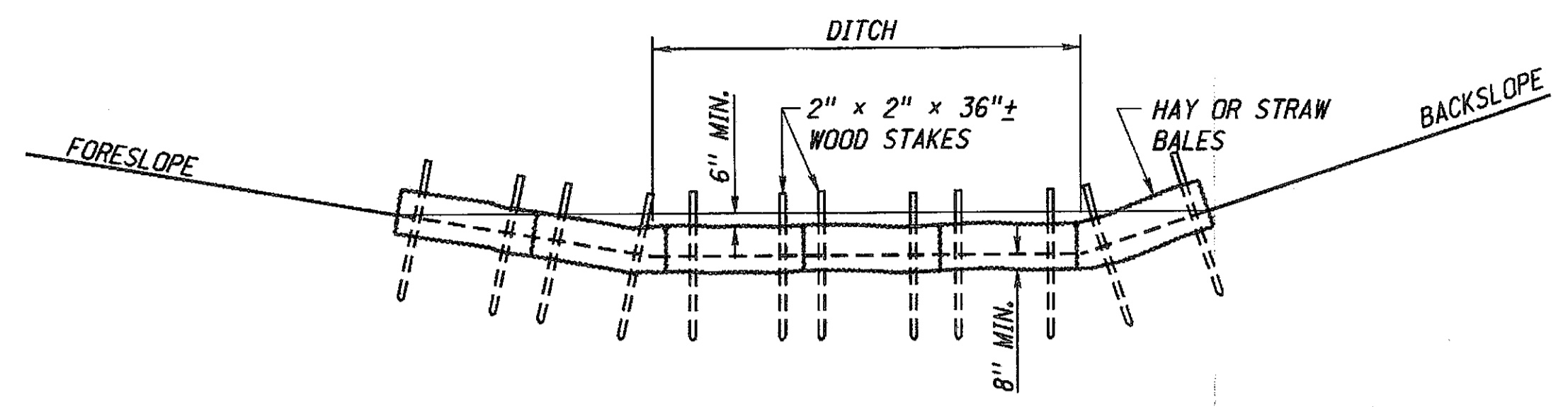
B E N D I N G D I A G R A M S

ALL DIMENSIONS ARE OUT TO OUT NOT TO SCALE

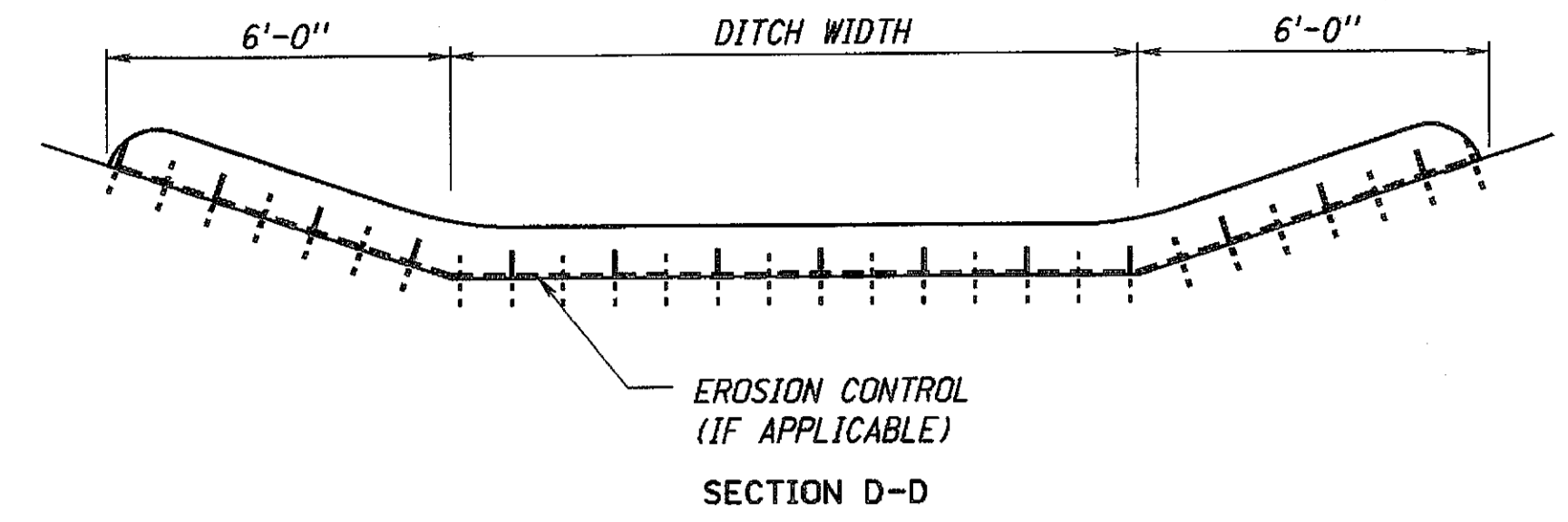


⊕ MINIMUM DIAMETER FOR BENDS

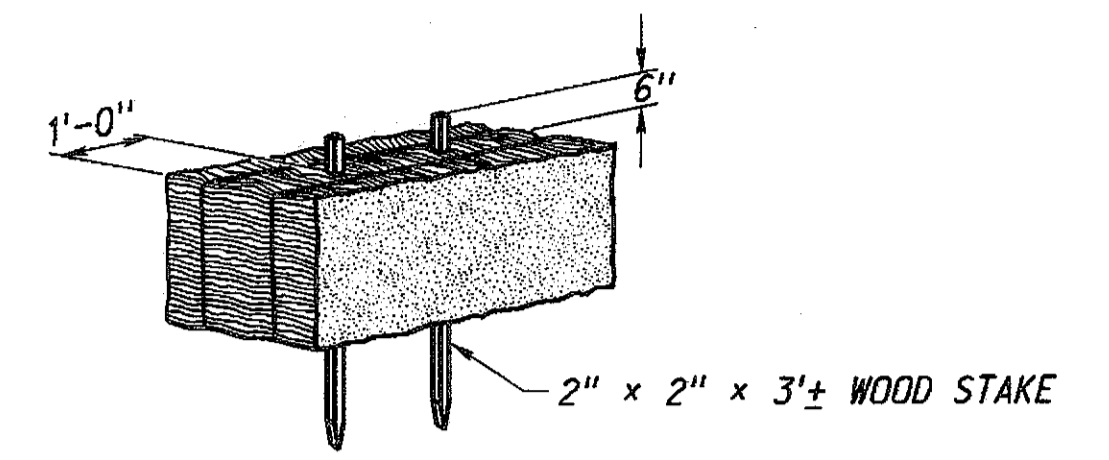
ROADWAY DESIGN DIVISION
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 User: dor13017
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 Scale: 1:100
 SHEET 1 OF 1



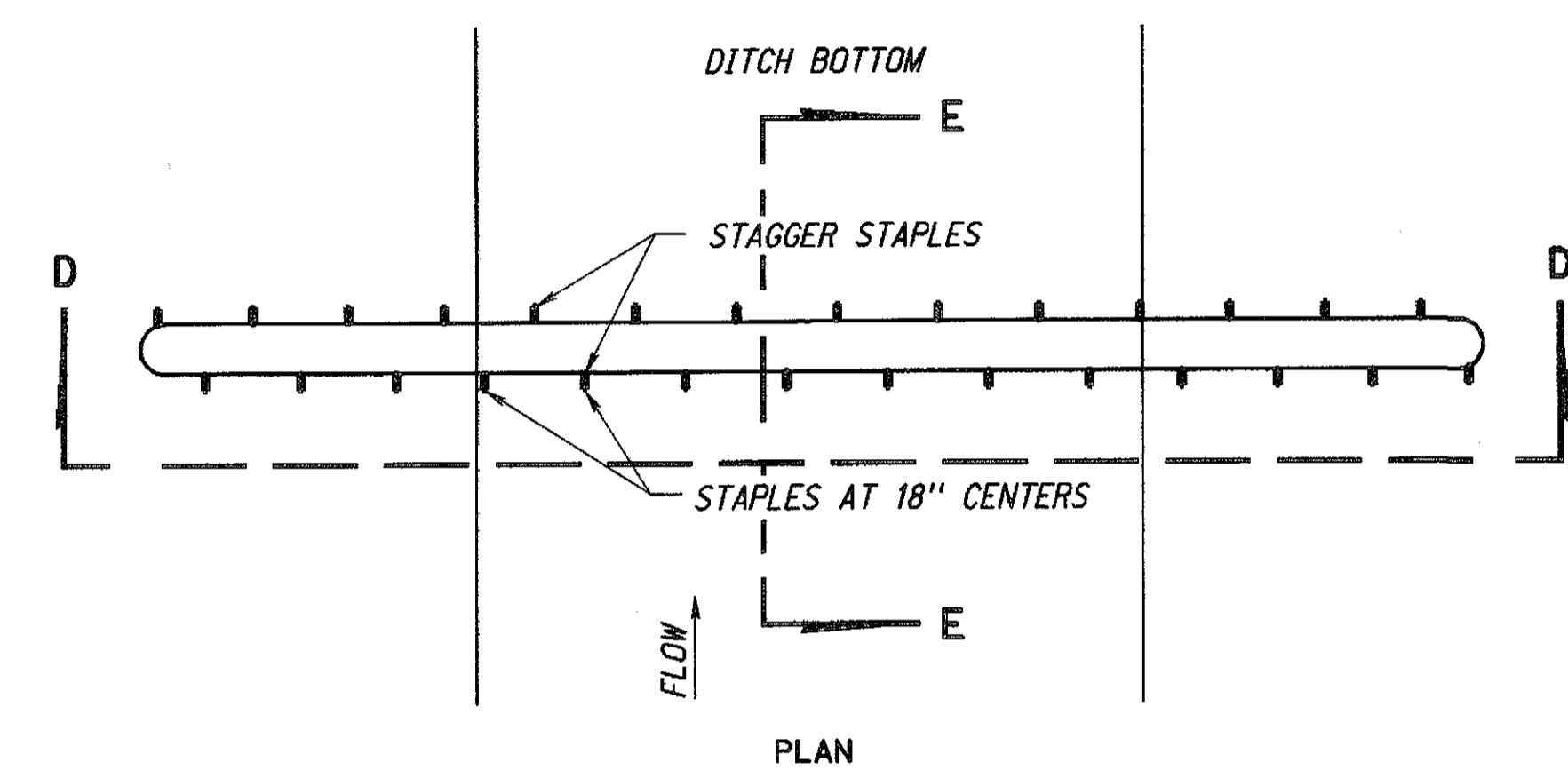
SECTION B-B
EROSION CHECKS (ALL TYPES)



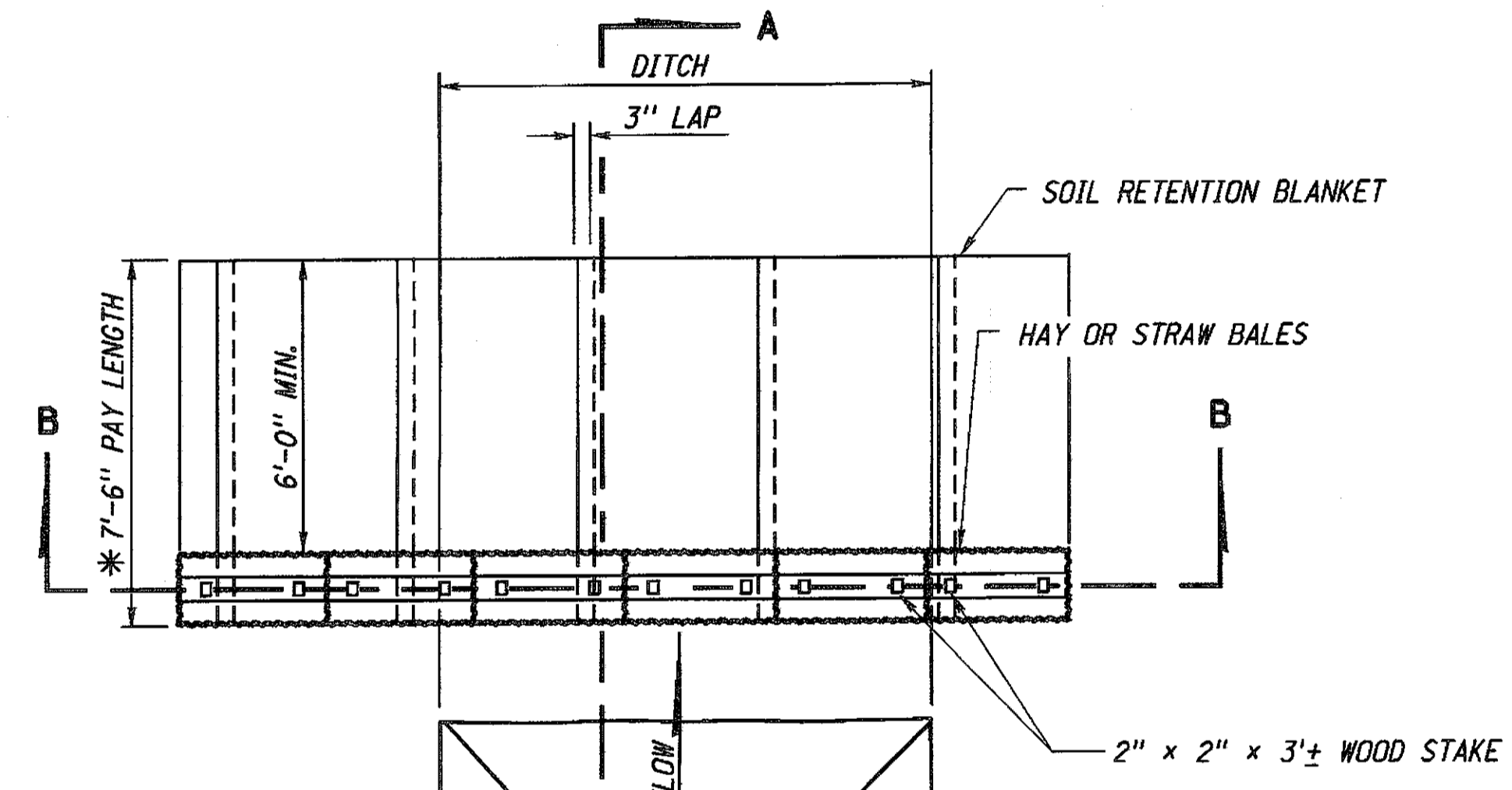
SECTION D-D
EROSION CONTROL (IF APPLICABLE)



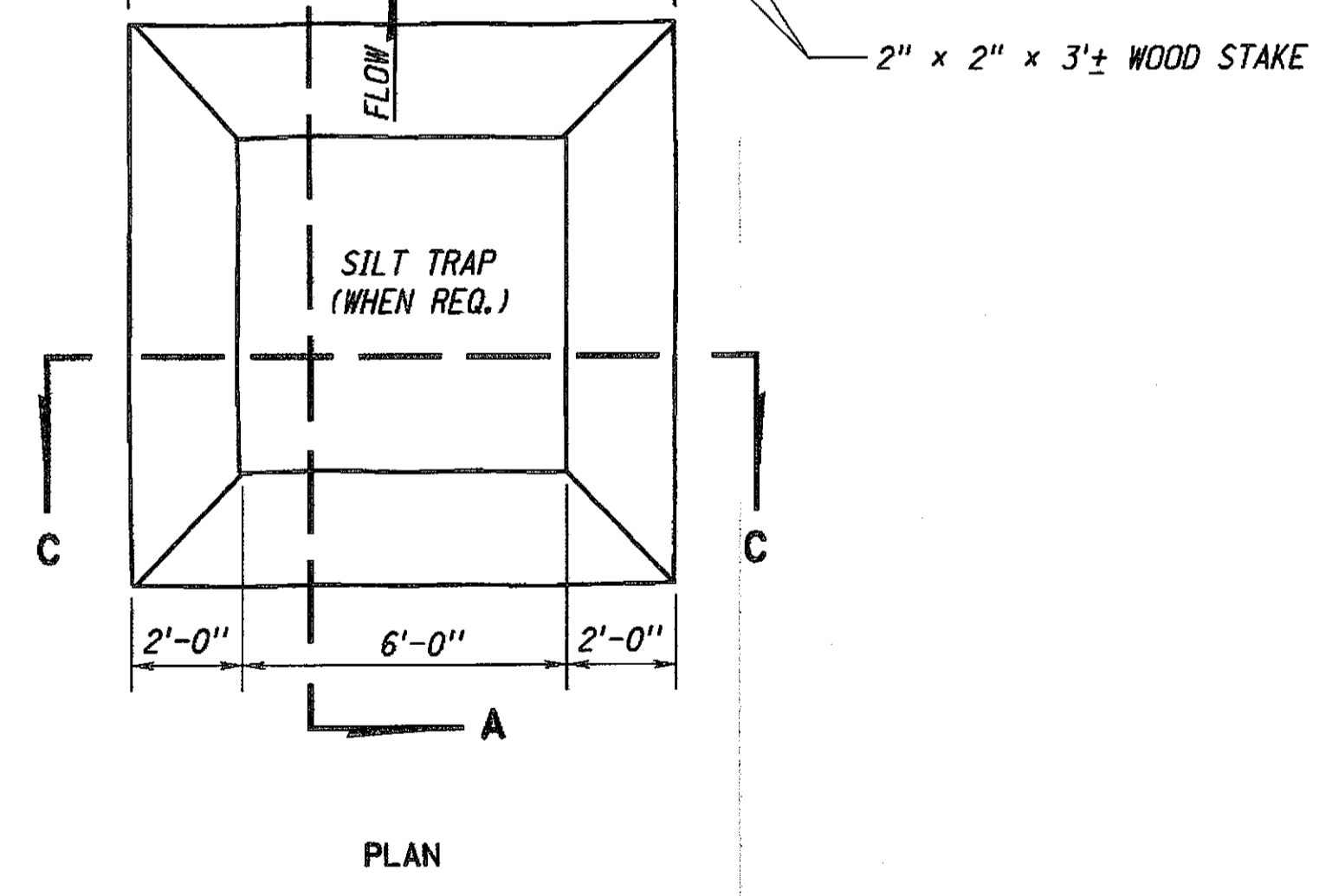
ADDITIONAL BALES MAY BE ADDED TO PREVENT EROSION AT ENDS OF CHECKS.
HAY BALE STAKING DETAIL



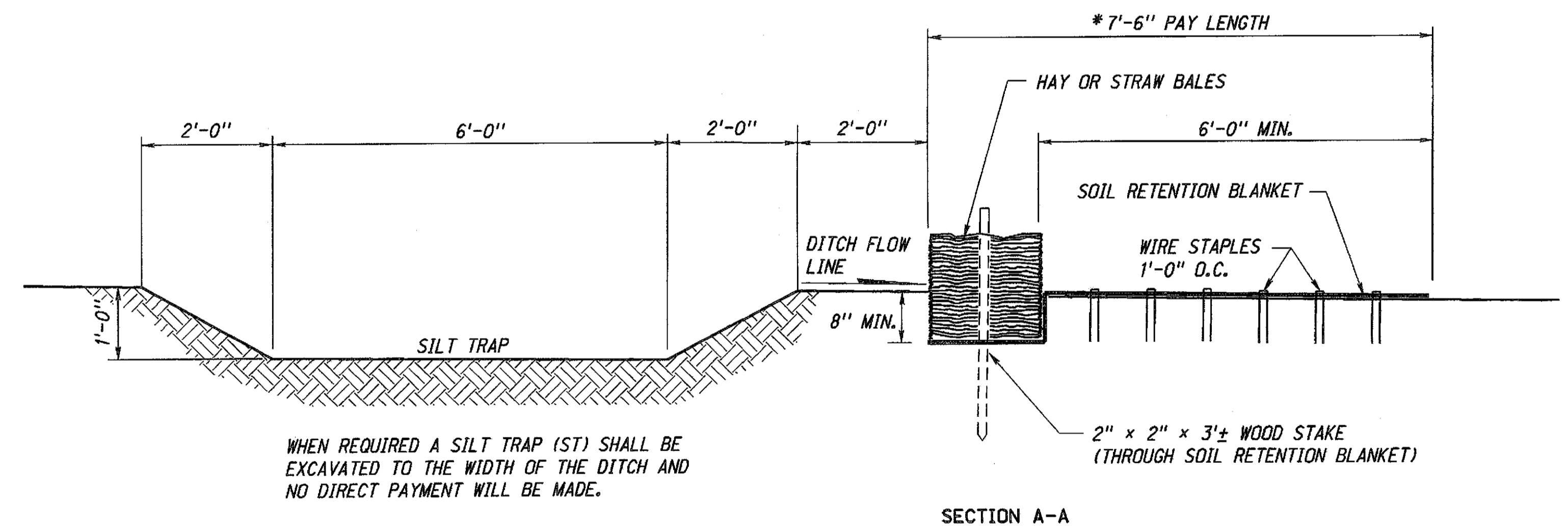
FABRIC SILT CHECKS



* REMOVE 7'-6" OF PAY LENGTH OF EROSION CONTROL FOR EACH EROSION CHECK.

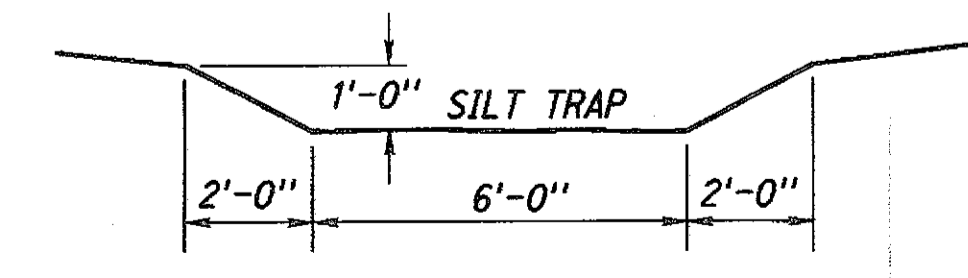


PLAN

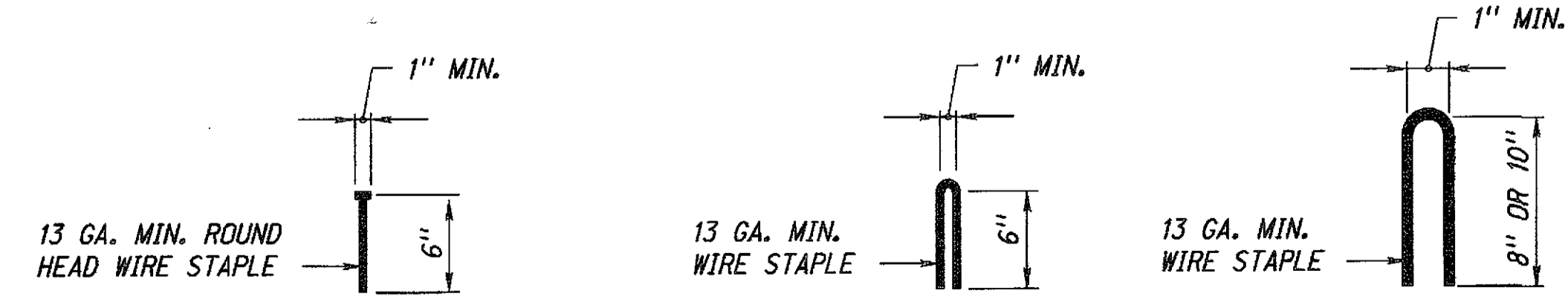


WHEN REQUIRED A SILT TRAP (ST) SHALL BE EXCAVATED TO THE WIDTH OF THE DITCH AND NO DIRECT PAYMENT WILL BE MADE.

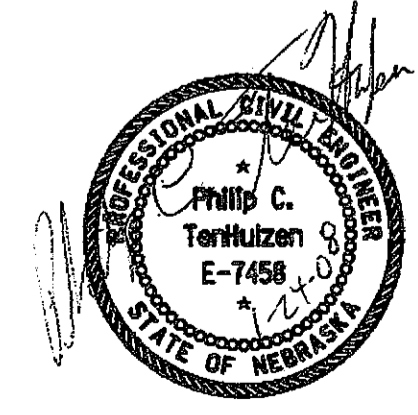
SECTION A-A



SECTION C-C



STAPLE DETAIL



EROSION CHECKS (ALL TYPES) AND FABRIC SILT CHECKS

SHEET 1 OF 1

SPECIAL PLAN IC

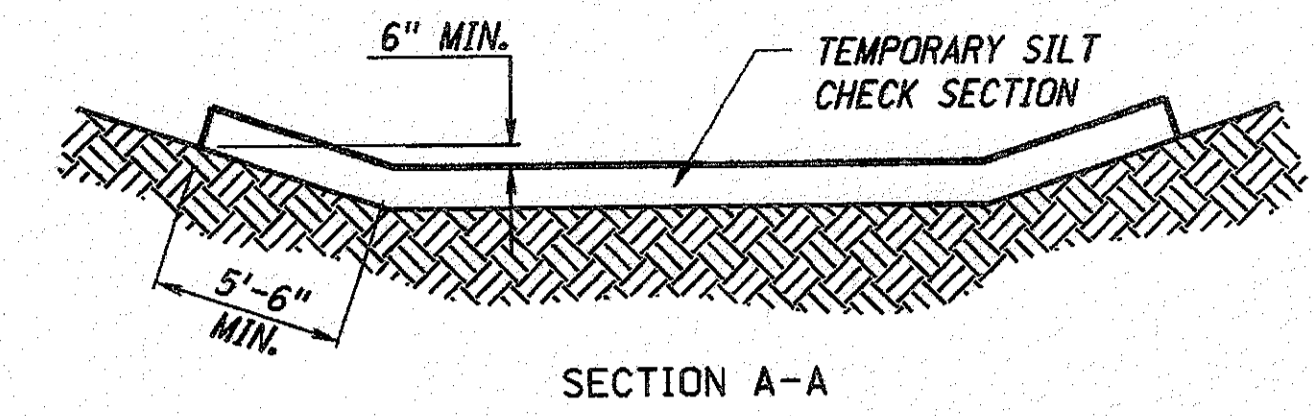
ROADWAY DESIGN DIVISION

Computer: DRDESIGN5

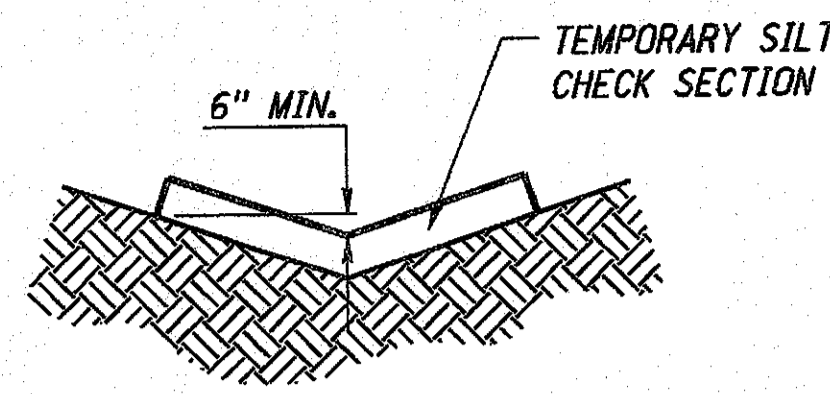
User: dor13017

Date: 01-FEB-2013 11:31

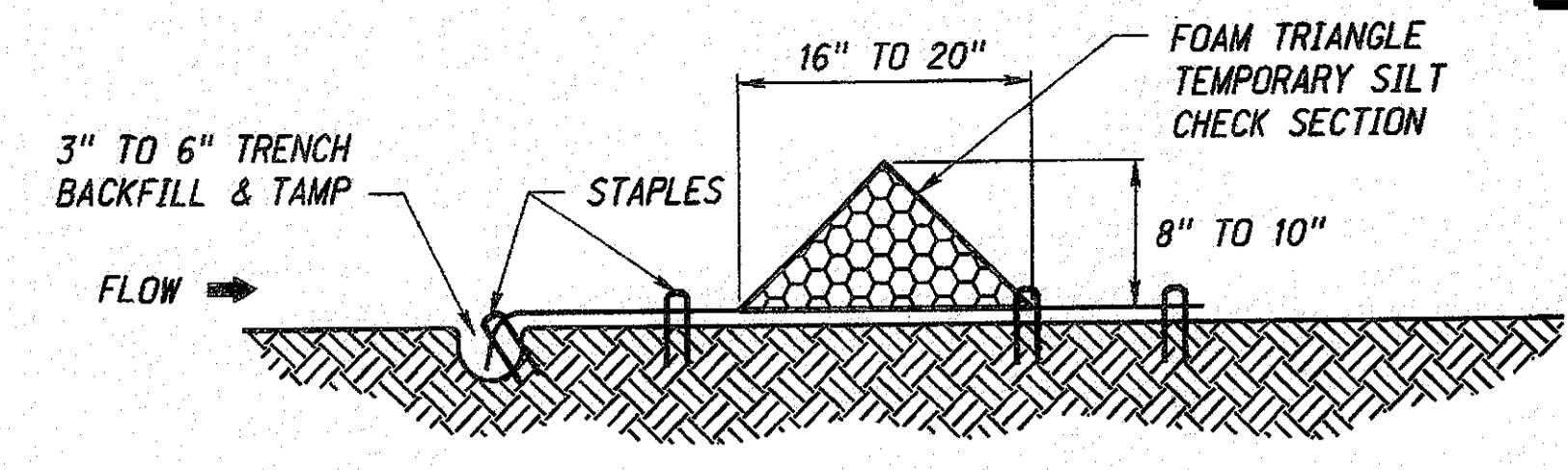
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SHEET 1 OF 2



SECTION A-A

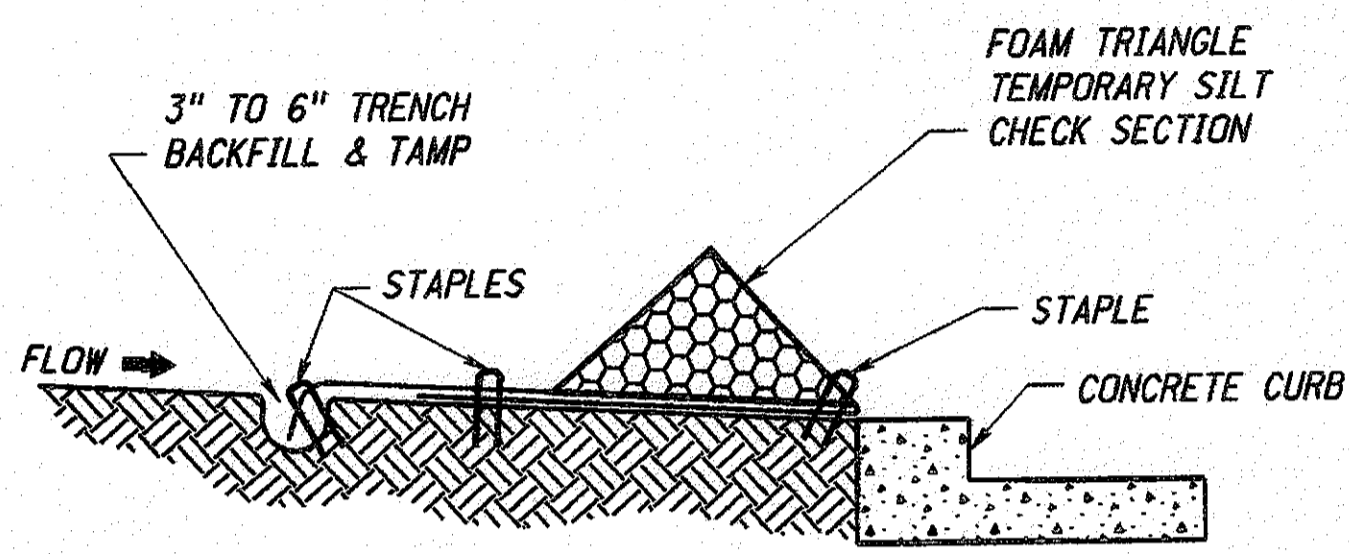


SECTION B-B

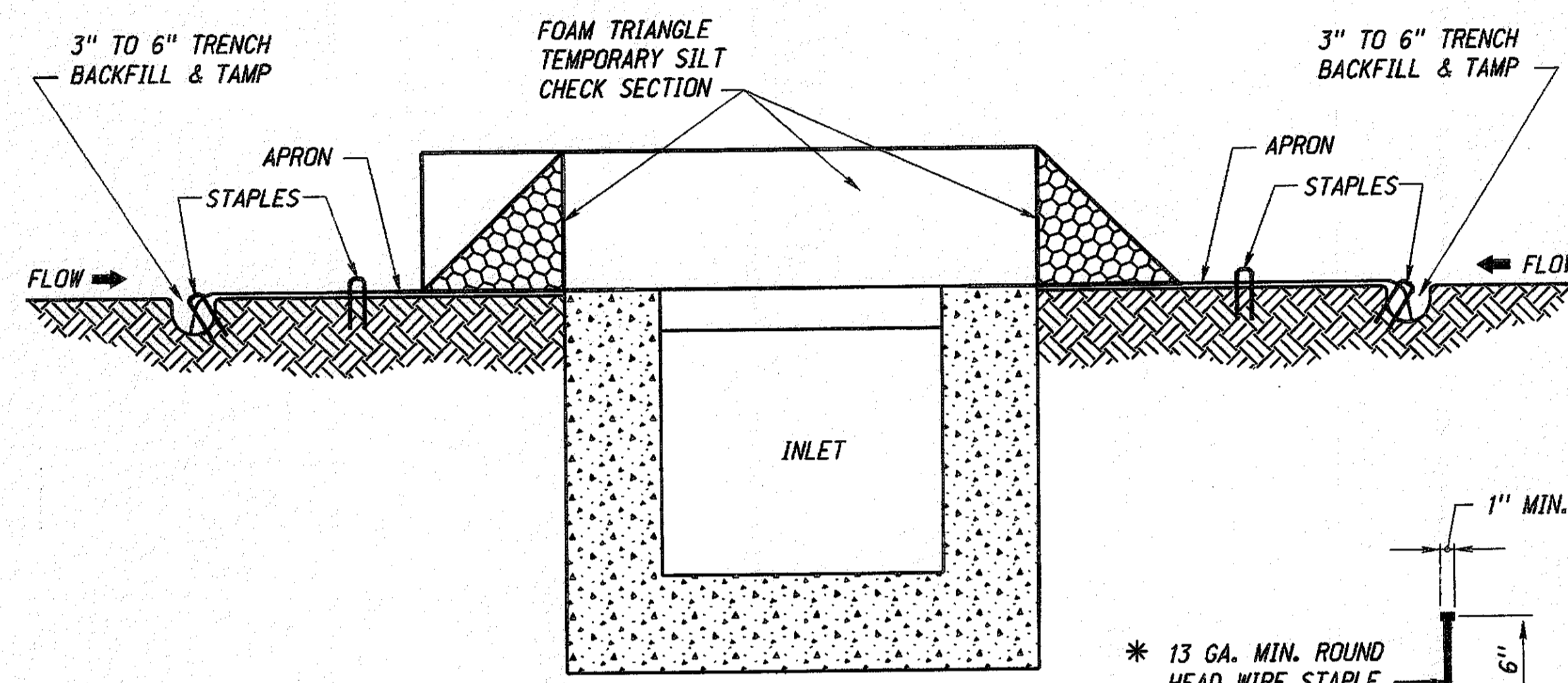


SECTION C-C

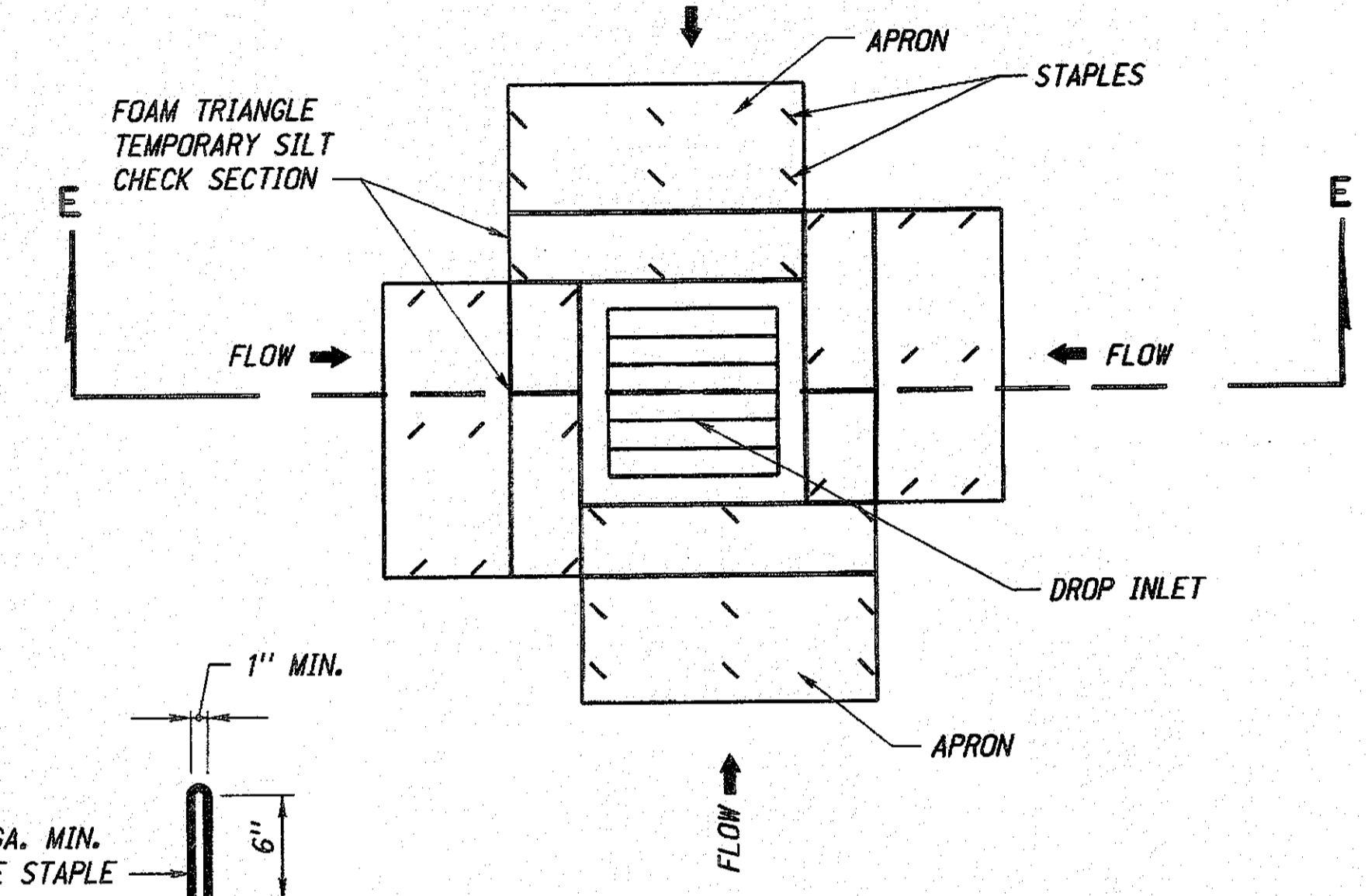
NOTE:
SECTION A-A & B-B ARE TYPICAL FOR FOAM TRIANGLE, WATTLE & RIGID PLASTIC TRIANGLE TEMPORARY SILT CHECKS.



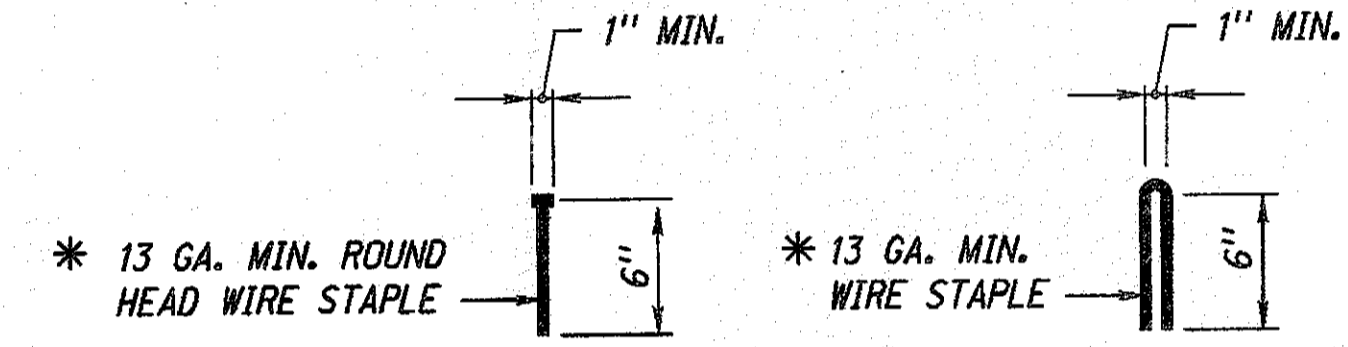
SECTION D-D



SECTION E-E

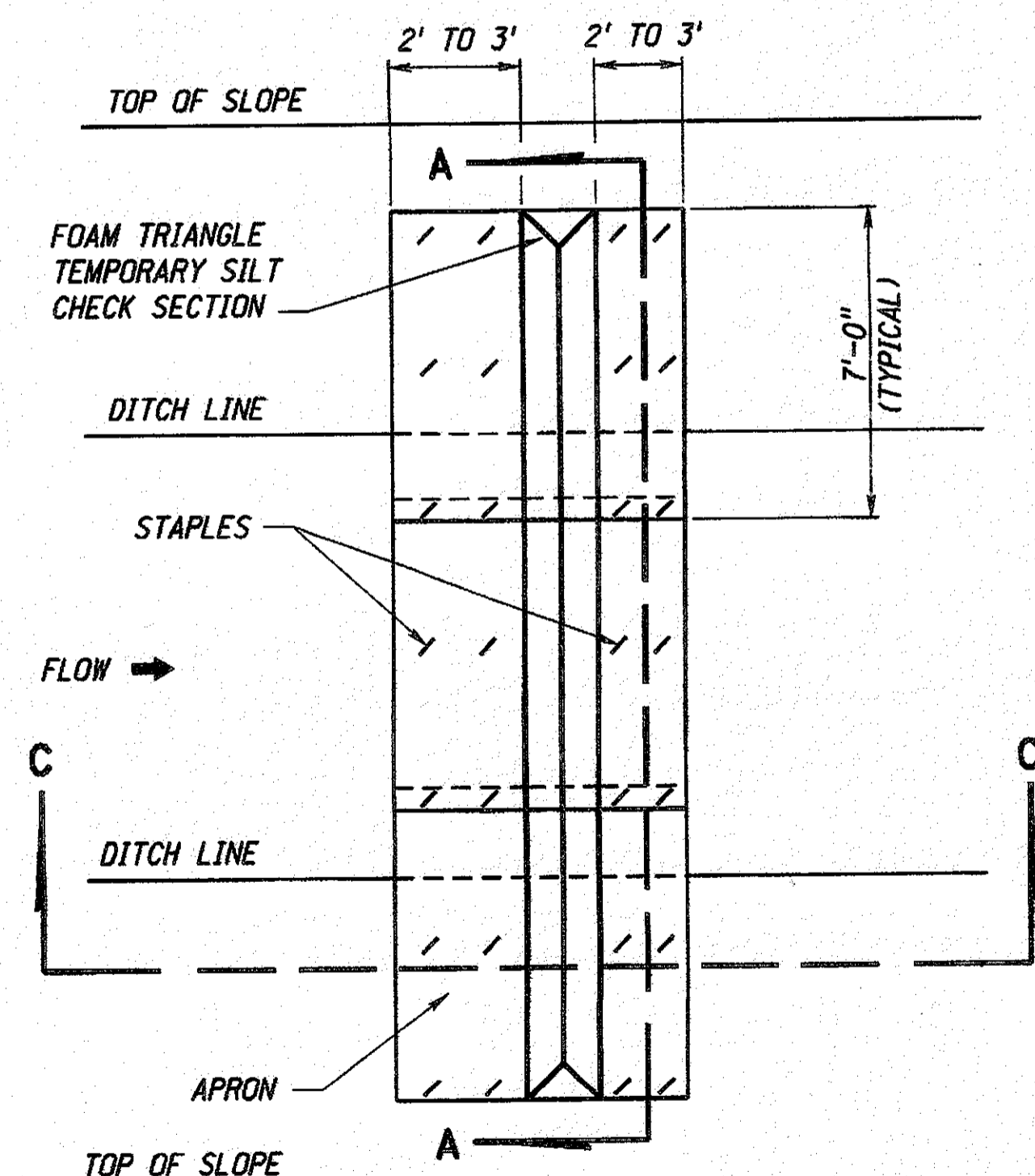


PLAN VIEW FOR INLETS

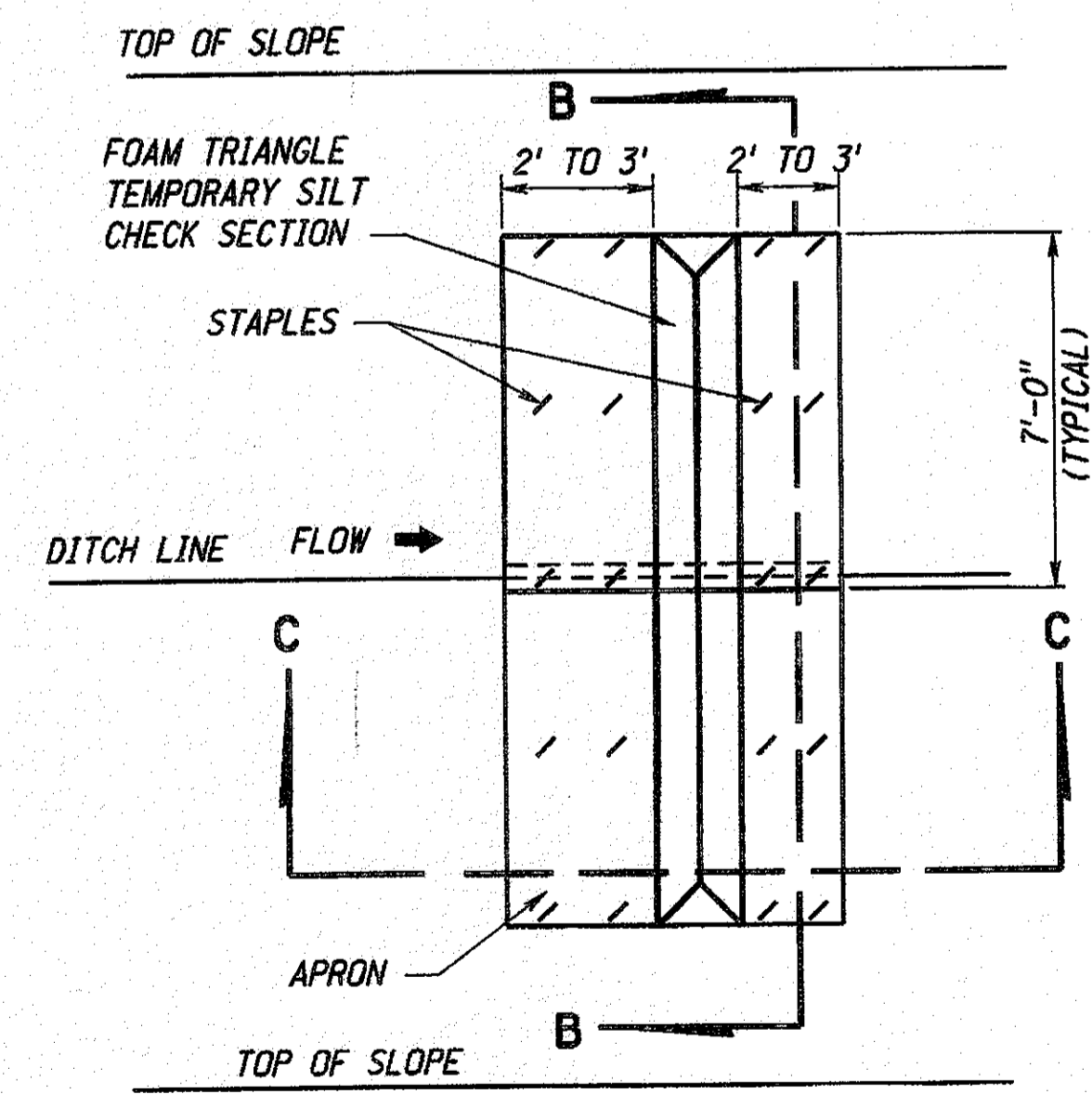


STAPLE DETAIL

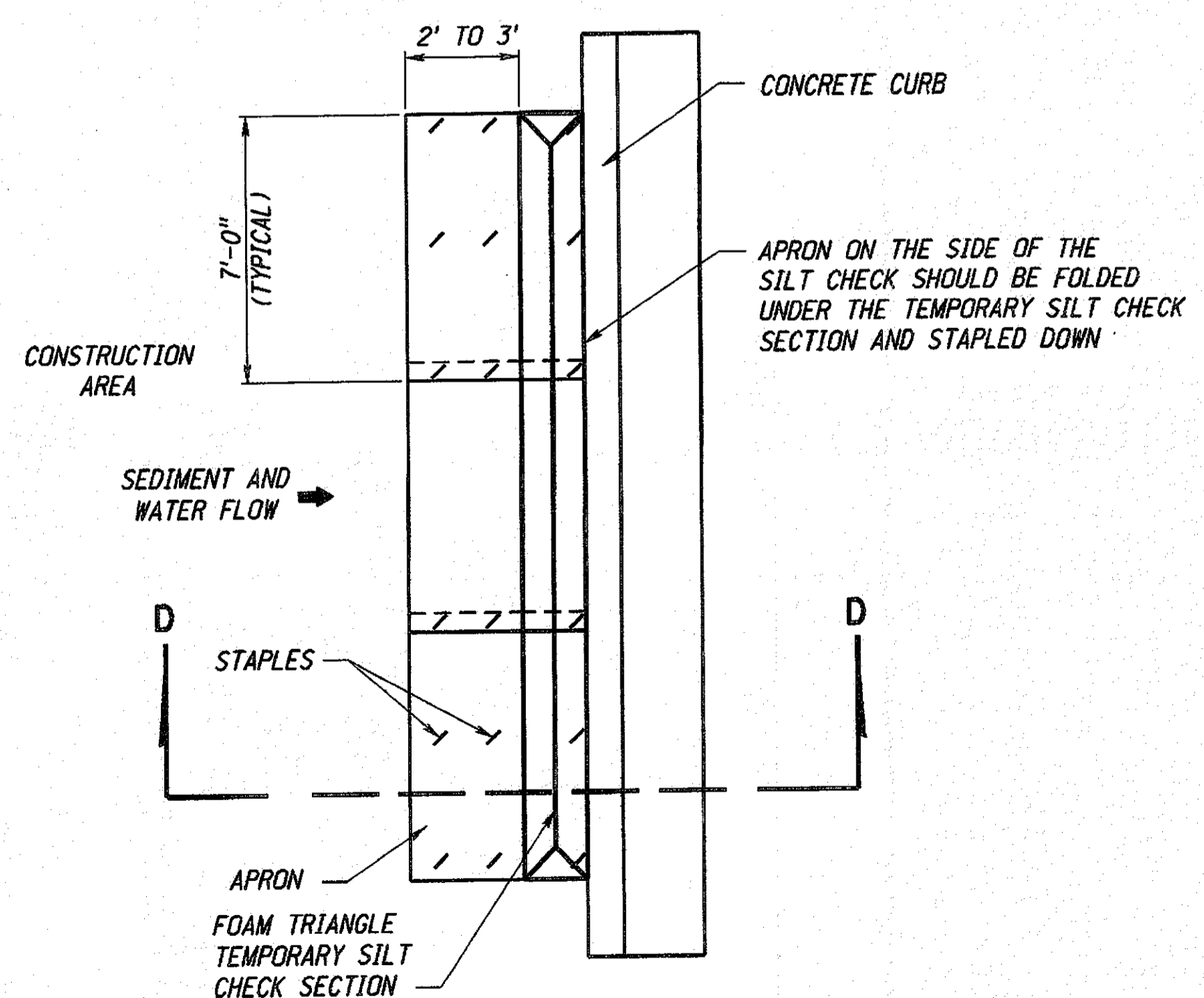
NOTE:
* 6" - 13 GAGE MINIMUM WIRE STAPLE OR ROUND HEAD WIRE STAPLE MAY BE USED IF 1/3 MORE STAPLES ARE USED.



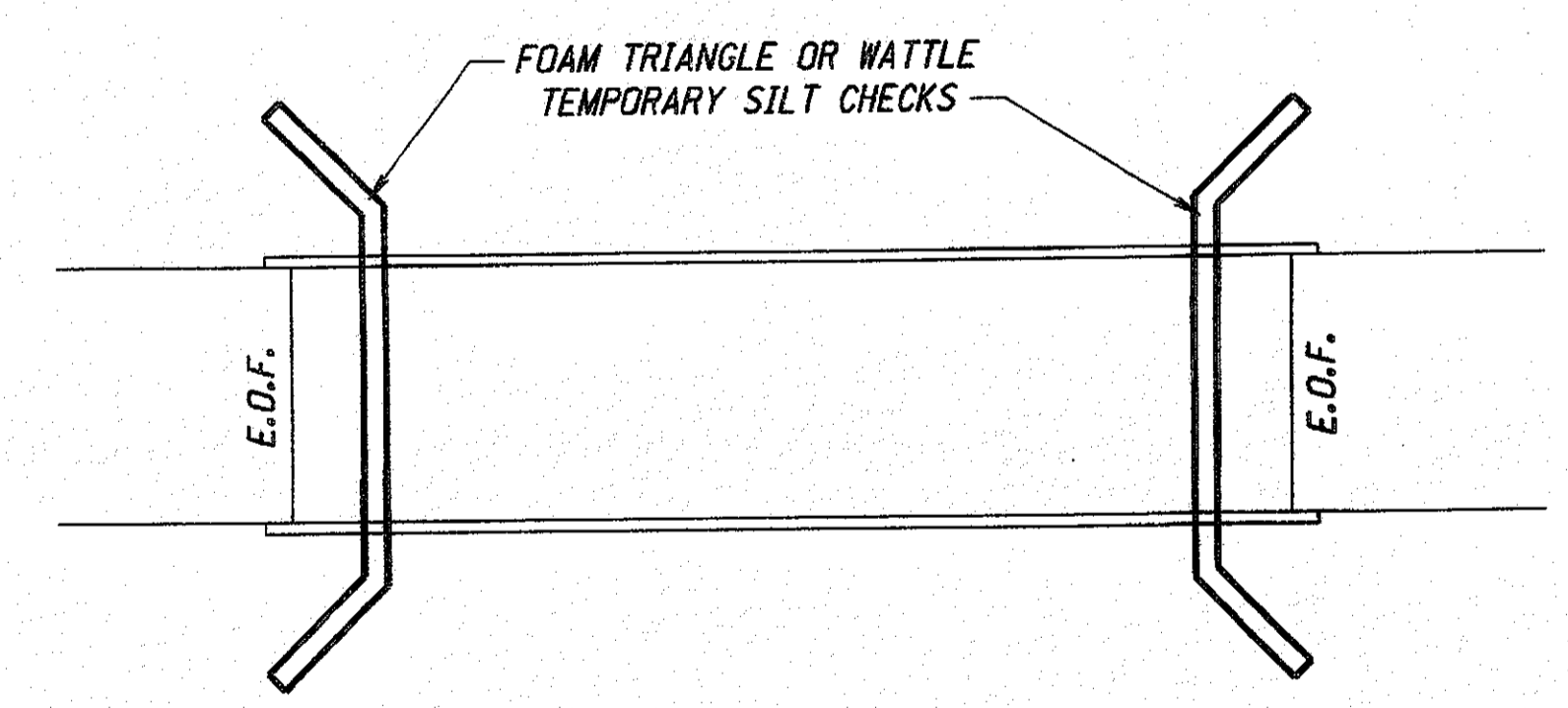
PLAN VIEW FOR FLAT BOTTOM DITCH



PLAN VIEW FOR V - DITCH

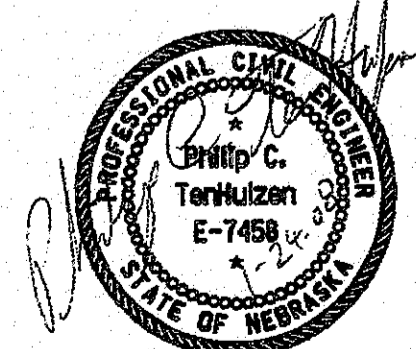


PLAN VIEW FOR CONTINUOUS BARRIER



UNDER BRIDGE

NOTES:
THE MANUFACTURER'S RECOMMENDATIONS FOR STAPLING PATTERNS SHALL BE FOLLOWED.



TEMPORARY SILT CHECKS
SHEET 1 OF 2
SPECIAL PLAN 2C

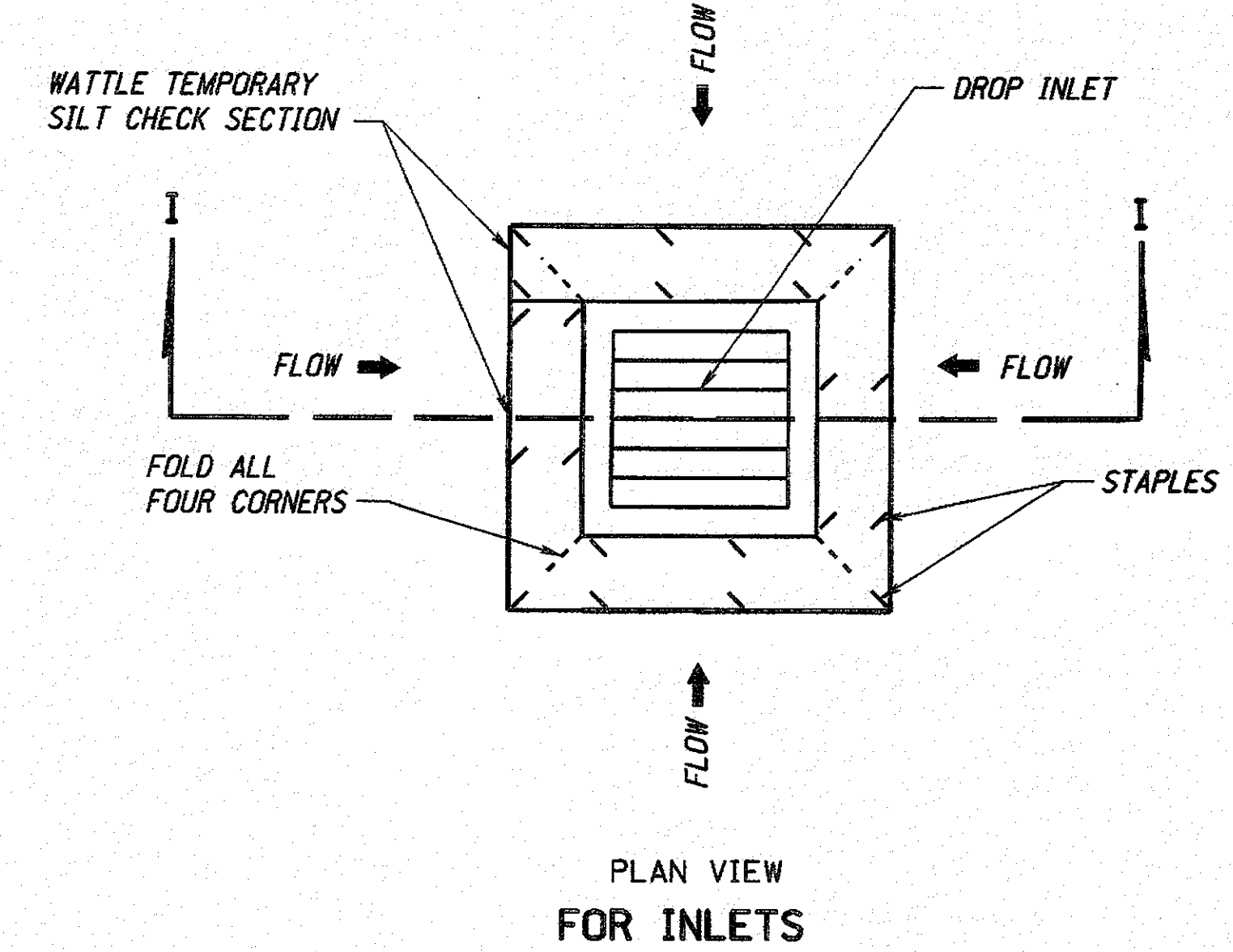
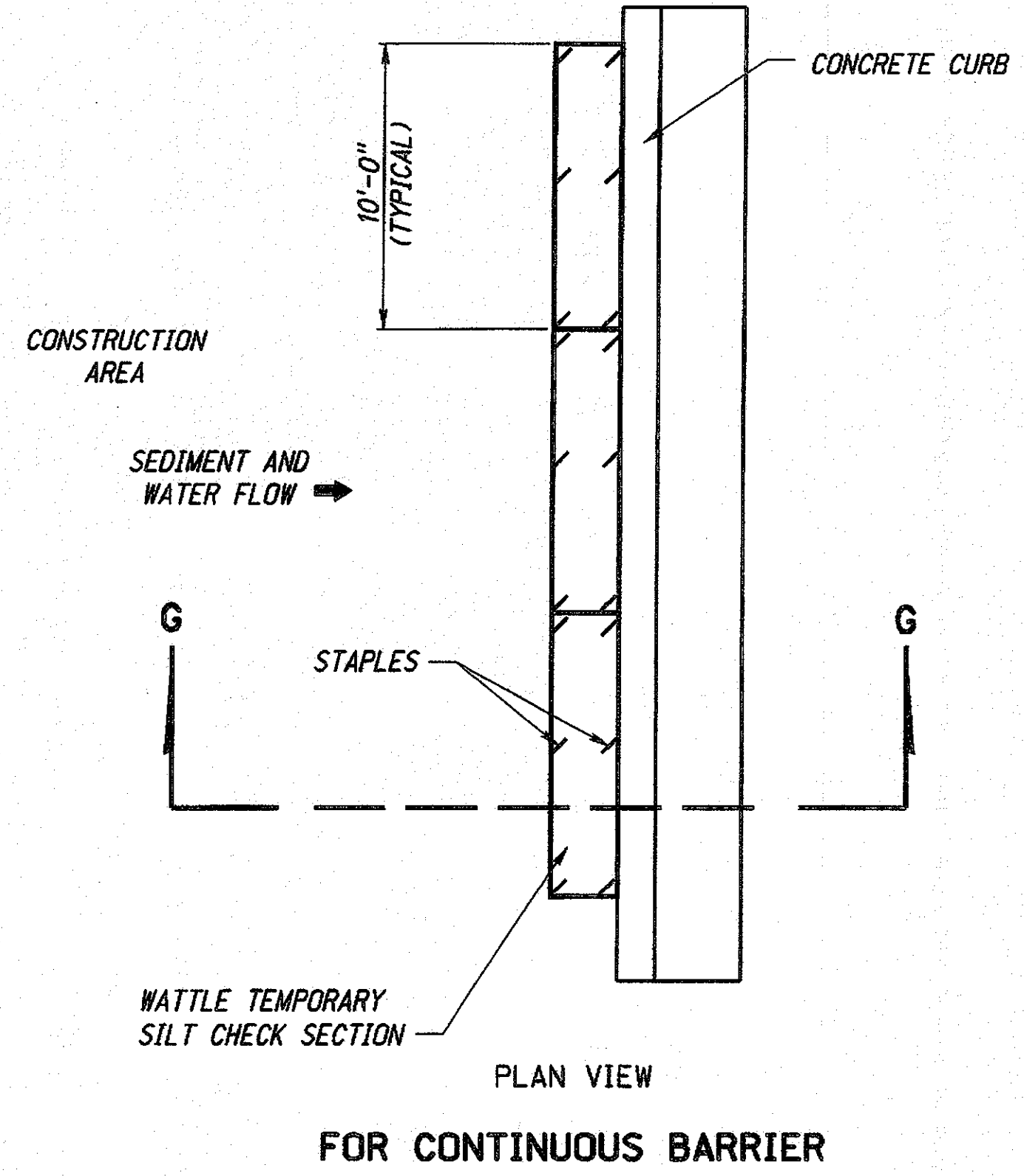
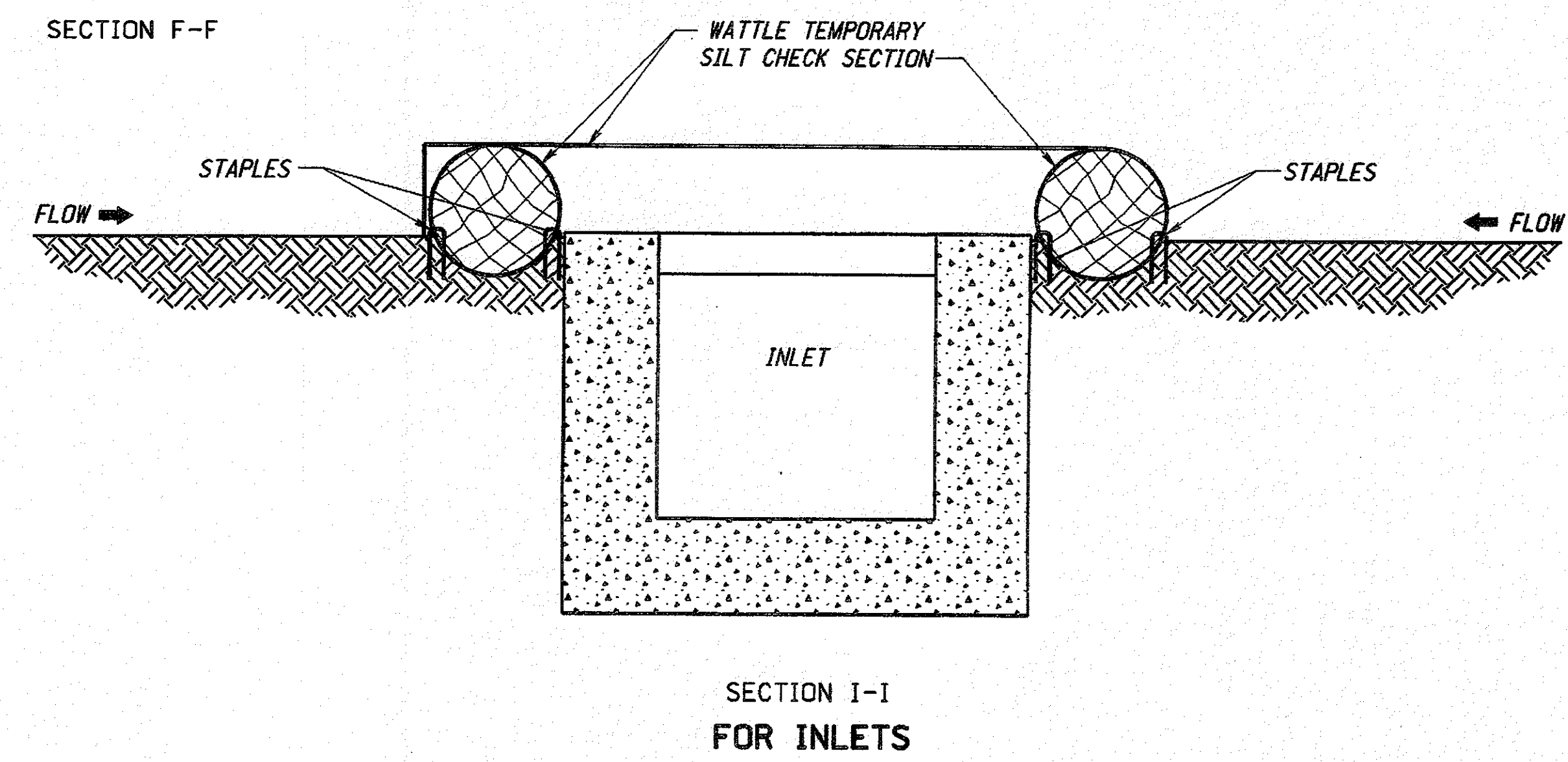
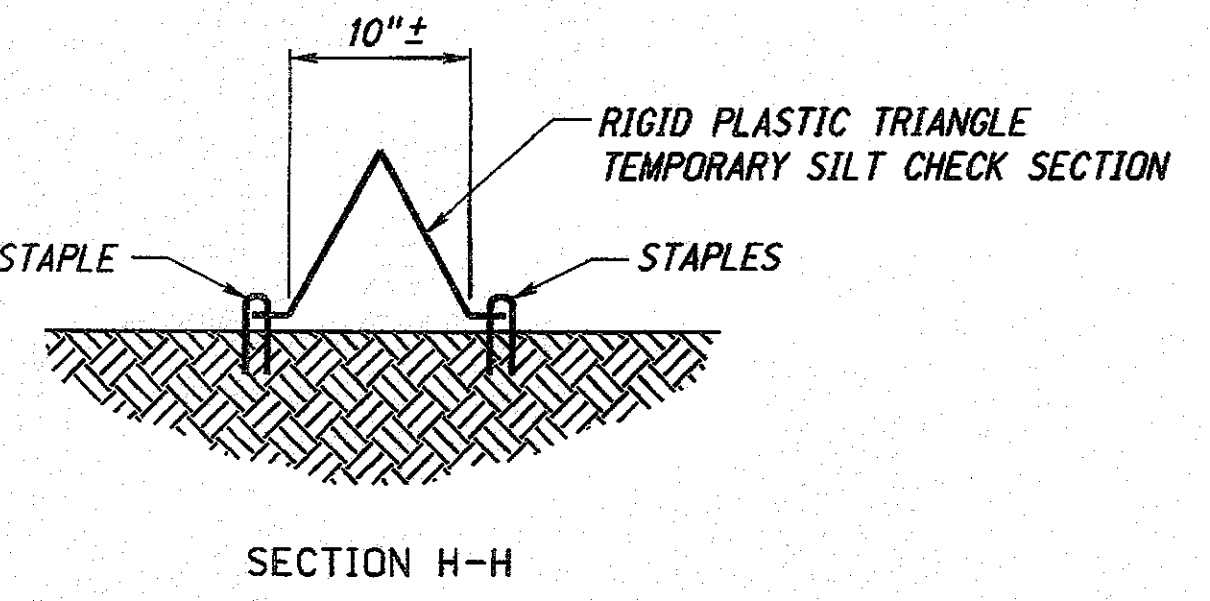
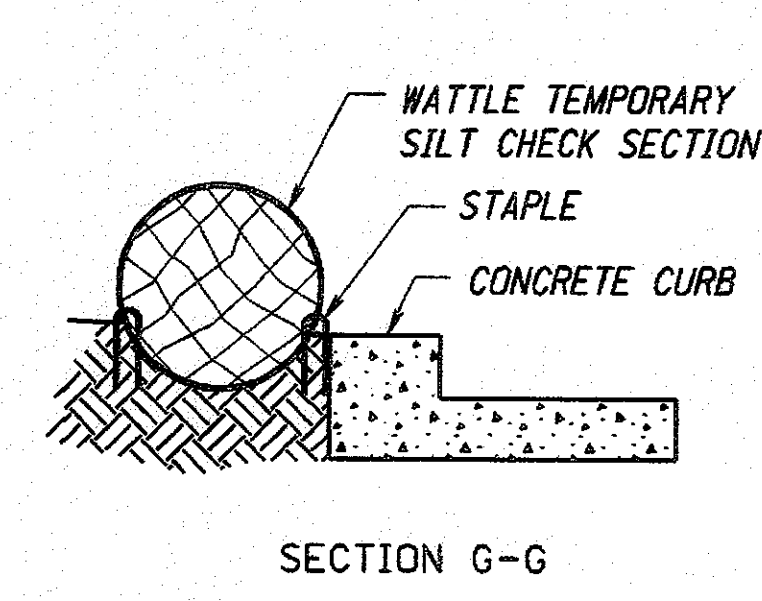
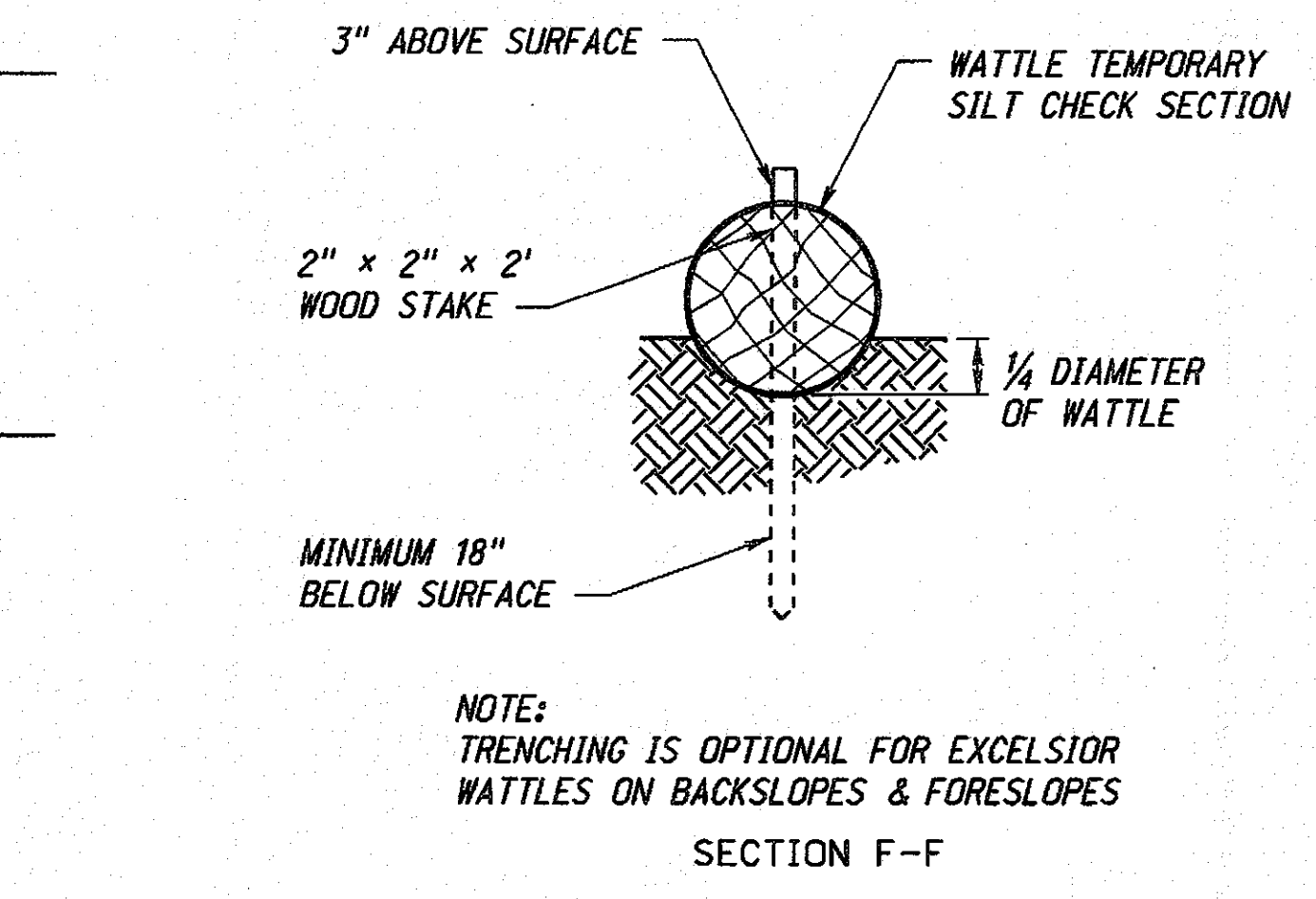
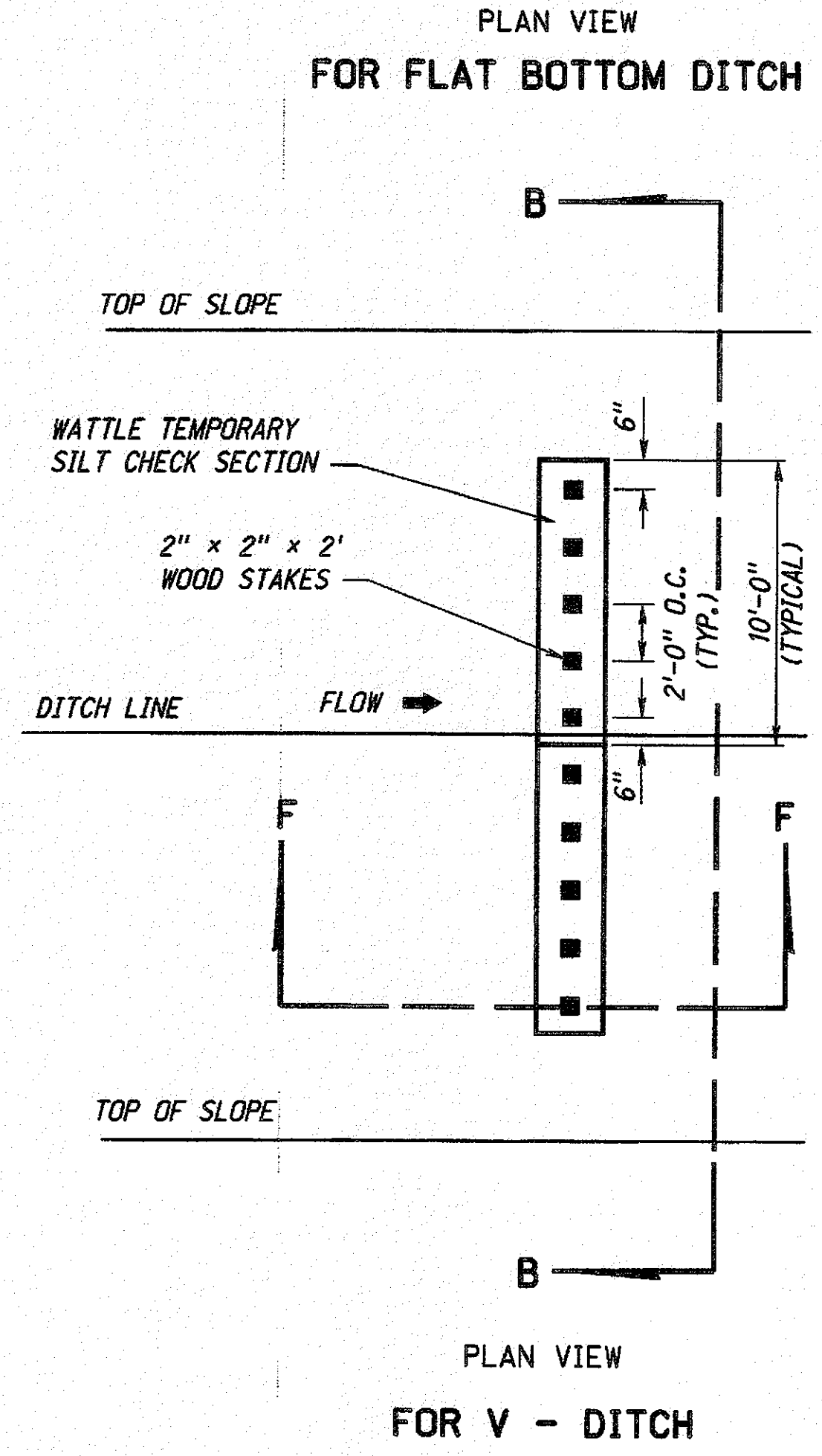
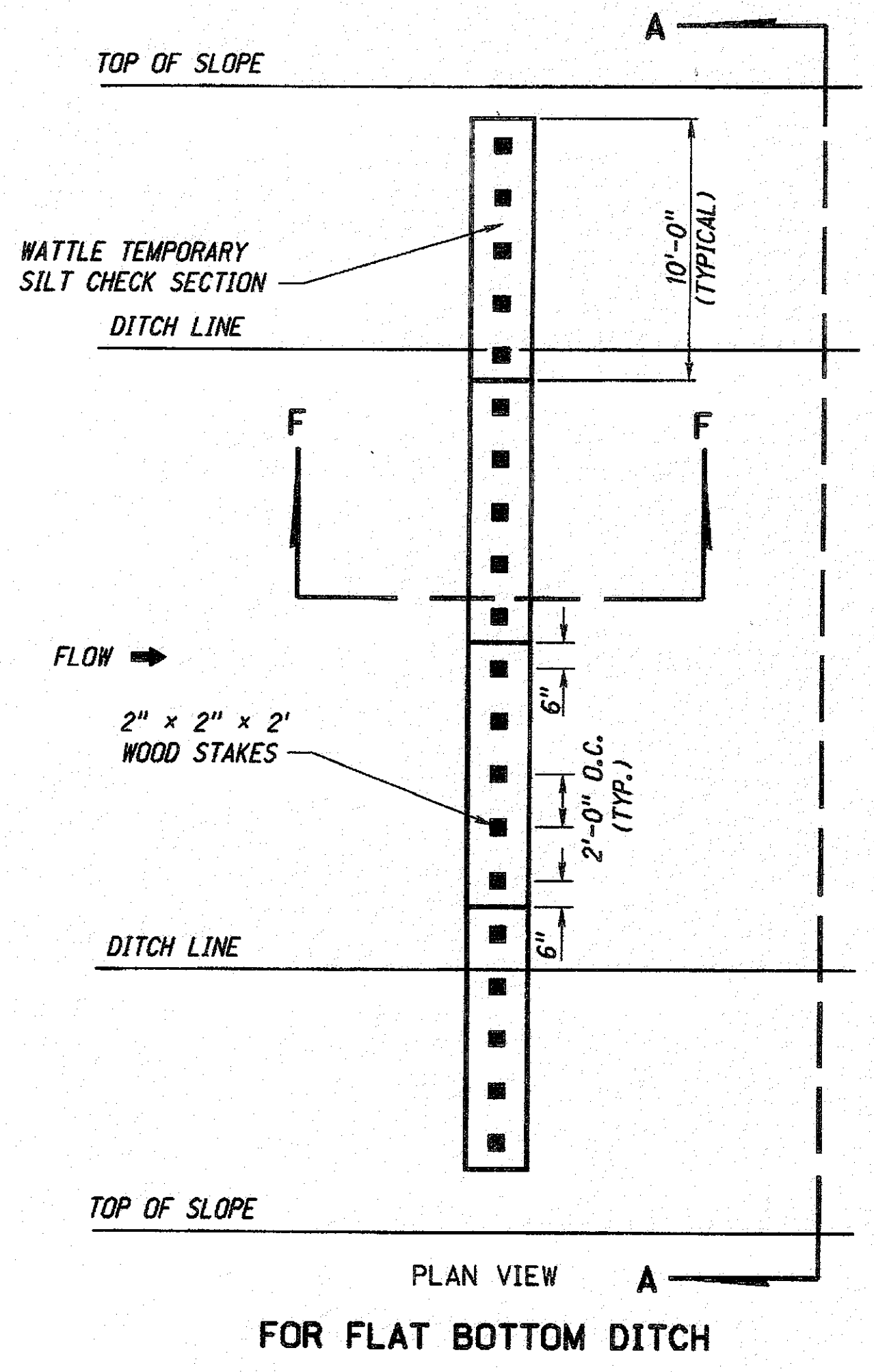
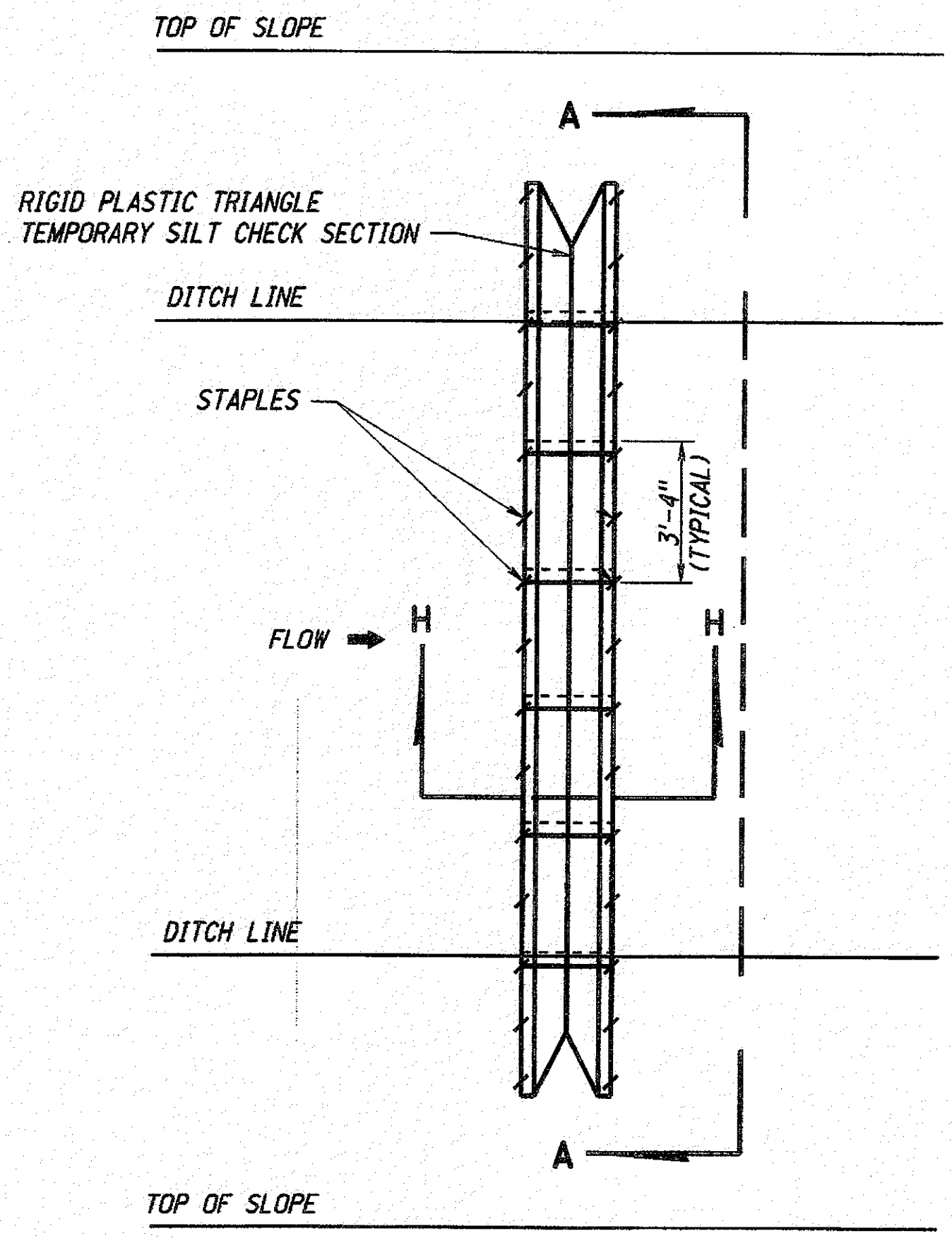
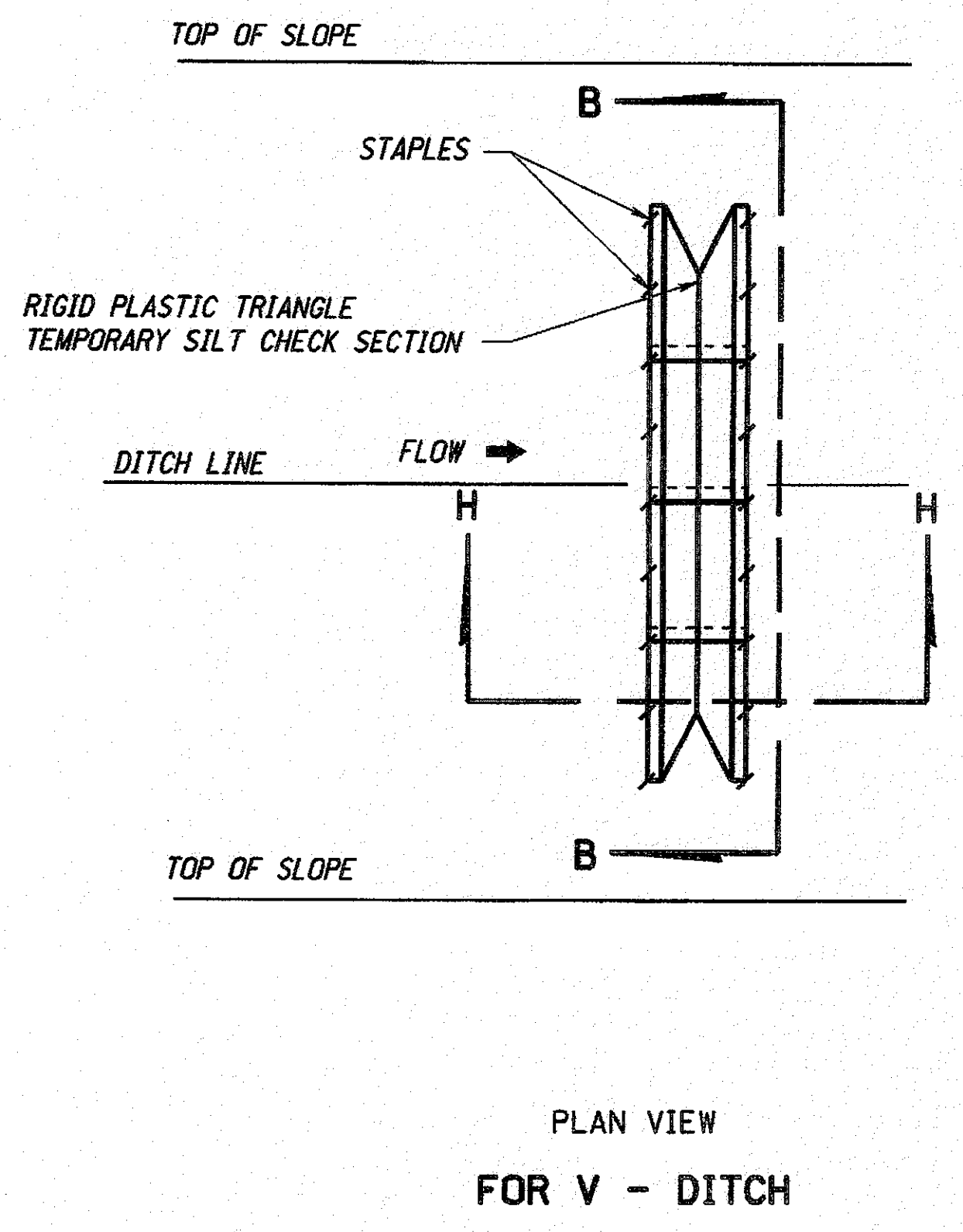
ROADWAY DESIGN DIVISION

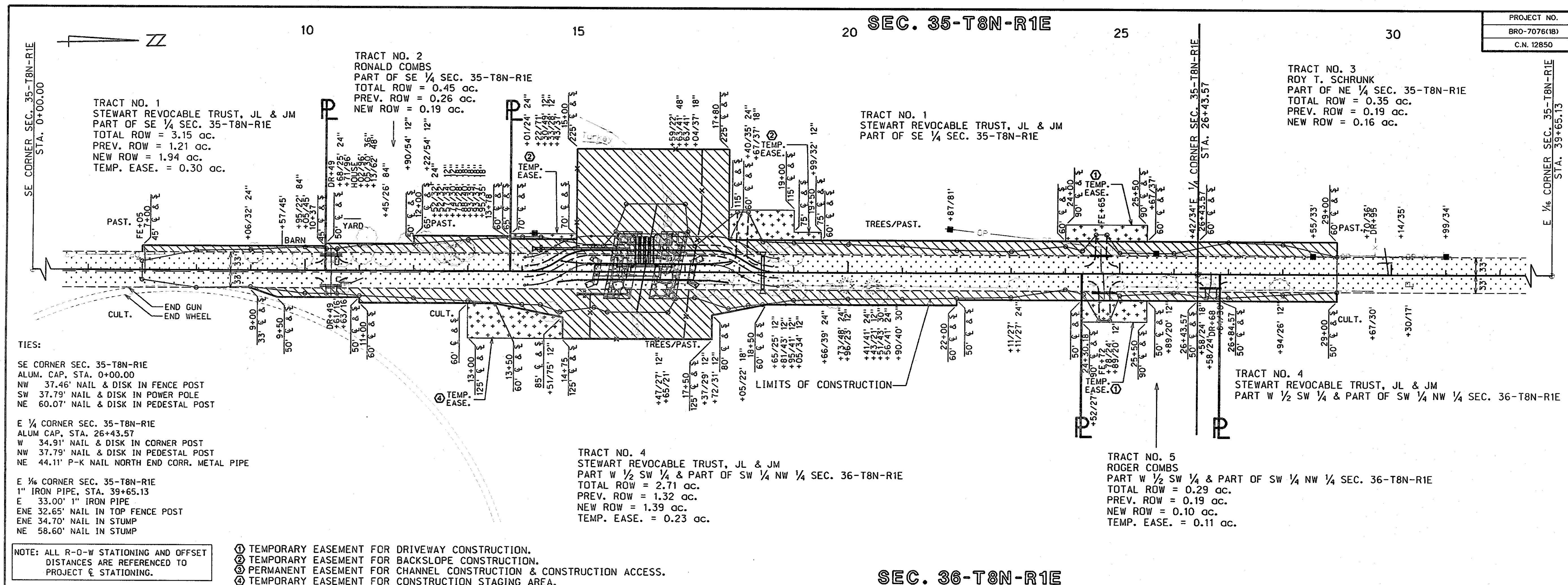
Computer: DRDESIGN65

User: dor13017

Date: 01-FEB-2013 12:43

File: 51081602_dsp.dgn
 SHEET 2 OF 2 1:100 5108.1.e.02





TIES:

SE CORNER SEC. 35-T8N-R1E
ALUM. CAP. STA. 0+00.00
NW 37.46' NAIL & DISK IN FENCE POST
SW 37.79' NAIL & DISK IN POWER POLE
NE 60.07' NAIL & DISK IN PEDESTAL POST

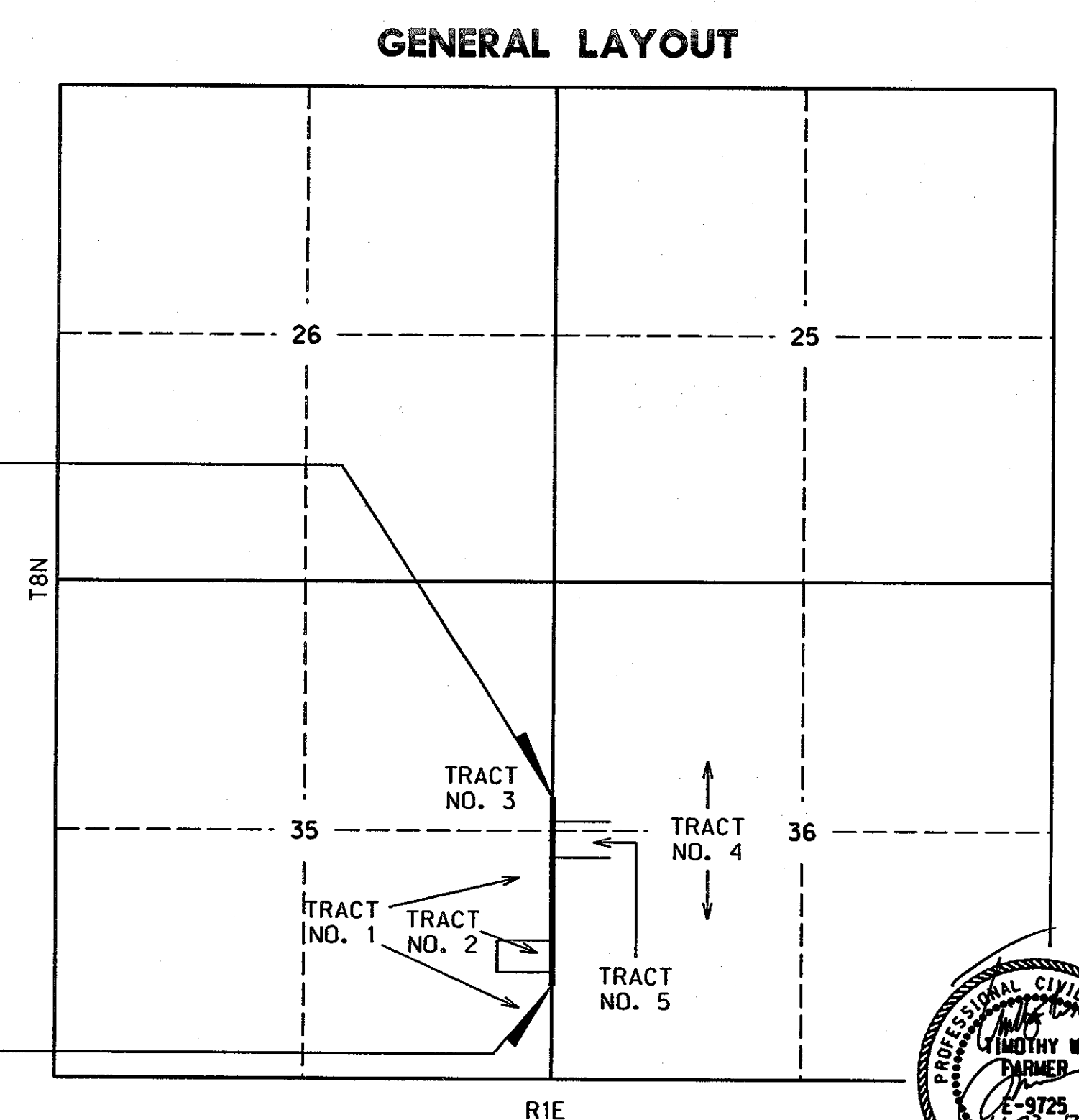
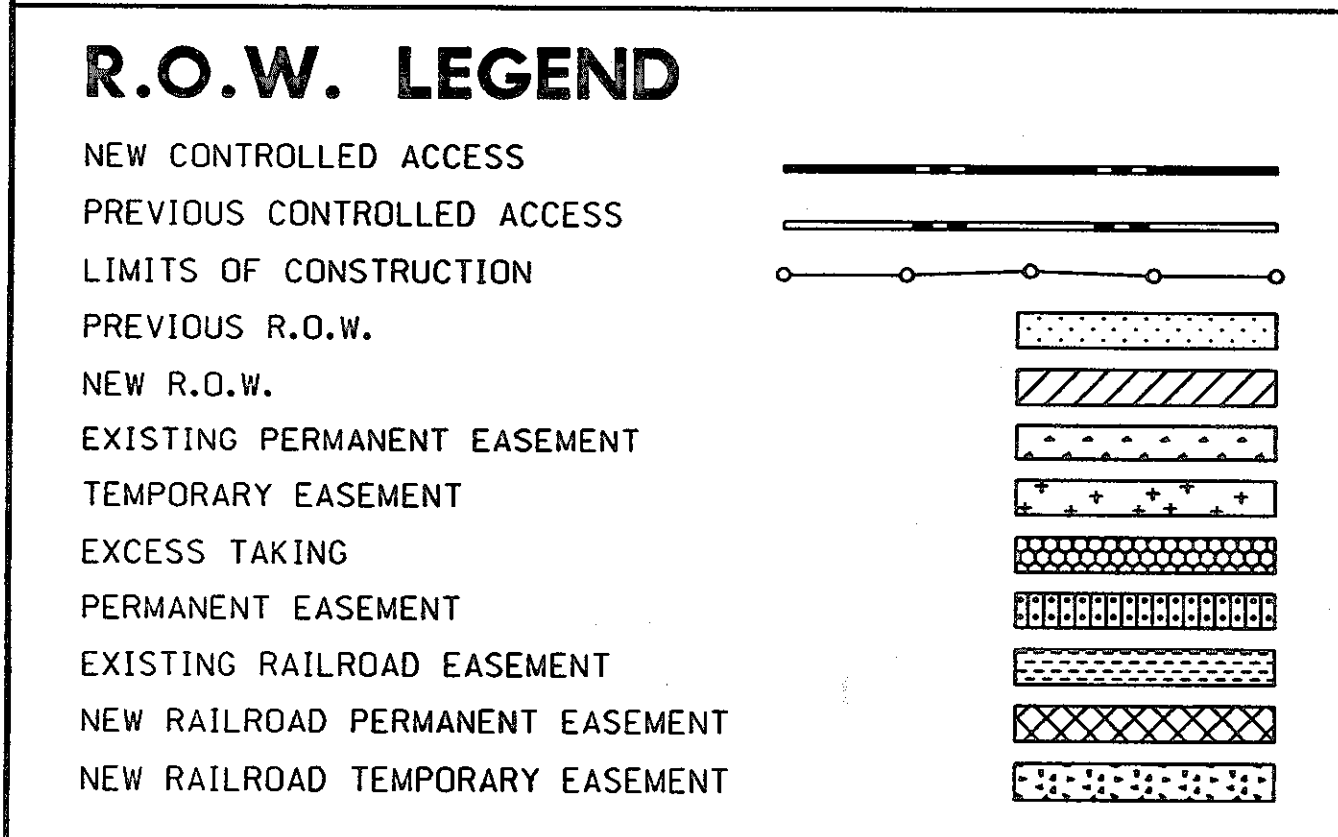
E 1/4 CORNER SEC. 35-T8N-R1E
ALUM. CAP. STA. 26+43.57
W 34.91' NAIL & DISK IN CORNER POST
NW 37.79' NAIL & DISK IN PEDESTAL POST
NE 44.11' P-K NAIL NORTH END CORR. METAL PIPE

E 1/2 CORNER SEC. 35-T8N-R1E
1" IRON PIPE, STA. 39+65.13
E 33.00' 1" IRON PIPE
ENE 32.65' NAIL IN TOP FENCE POST
ENE 34.70' NAIL IN STUMP
NE 58.60' NAIL IN STUMP

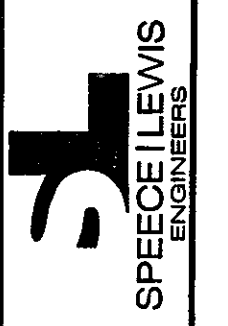
NOTE: ALL R-O-W STATIONING AND OFFSET DISTANCES ARE REFERENCED TO PROJECT & STATIONING.

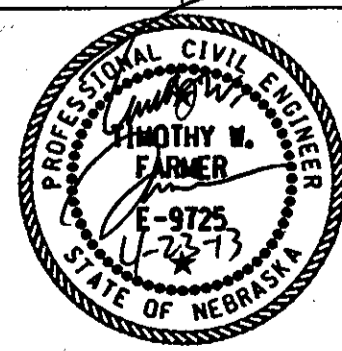
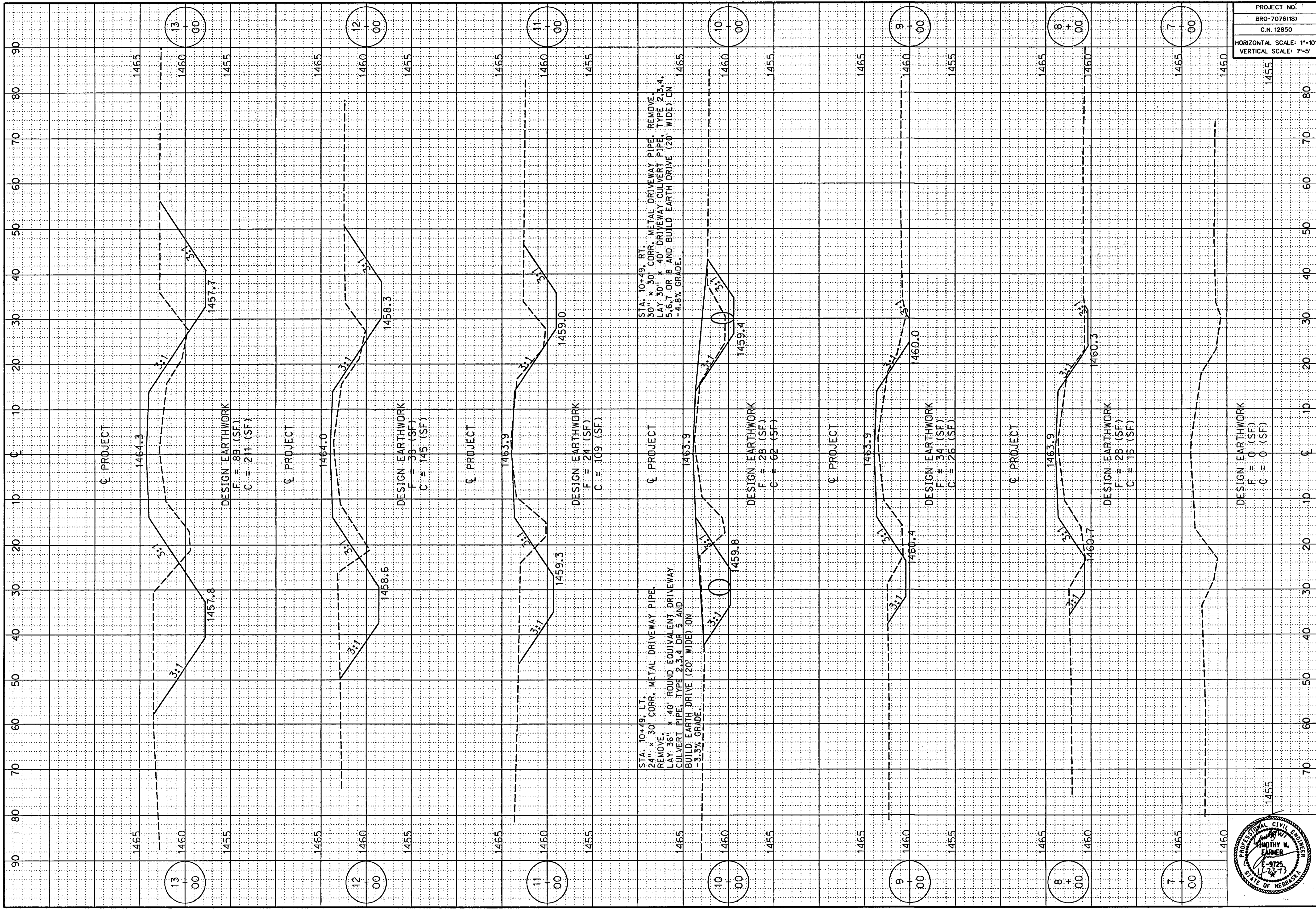
① TEMPORARY EASEMENT FOR DRIVEWAY CONSTRUCTION.
② TEMPORARY EASEMENT FOR BACKSLOPE CONSTRUCTION.
③ PERMANENT EASEMENT FOR CHANNEL CONSTRUCTION & CONSTRUCTION ACCESS.
④ TEMPORARY EASEMENT FOR CONSTRUCTION STAGING AREA.

TRACT NO.	OWNER	DESCRIPTION	TOTAL TAKING	NEW TAKING	EXCESS LAND	EASEMENT		REMAINDER	
						PERM.	TEMP.	LT.	RT.
1	STEWART REVOCABLE TRUST, JL & JM	PART OF SE 1/4 SEC. 35-T8N-R1E	3.15ac.	1.94ac.			0.30ac.		
2	RONALD COMBS	PART OF SE 1/4 SEC. 35-T8N-R1E	0.45ac.	0.19ac.					
3	ROY T. SCHRUNK	PART OF NE 1/4 SEC. 35-T8N-R1E	0.35ac.	0.16ac.					
4	STEWART REVOCABLE TRUST, JL & JM	PART W 1/2 SW 1/4 & PART OF SW 1/4 NW 1/4 SEC. 36-T8N-R1E	2.71ac.	1.39ac.			0.23ac.		
5	ROGER COMBS	PART W 1/2 SW 1/4 & PART OF SW 1/4 NW 1/4 SEC. 36-T8N-R1E	0.29ac.	0.10ac.			0.11ac.		



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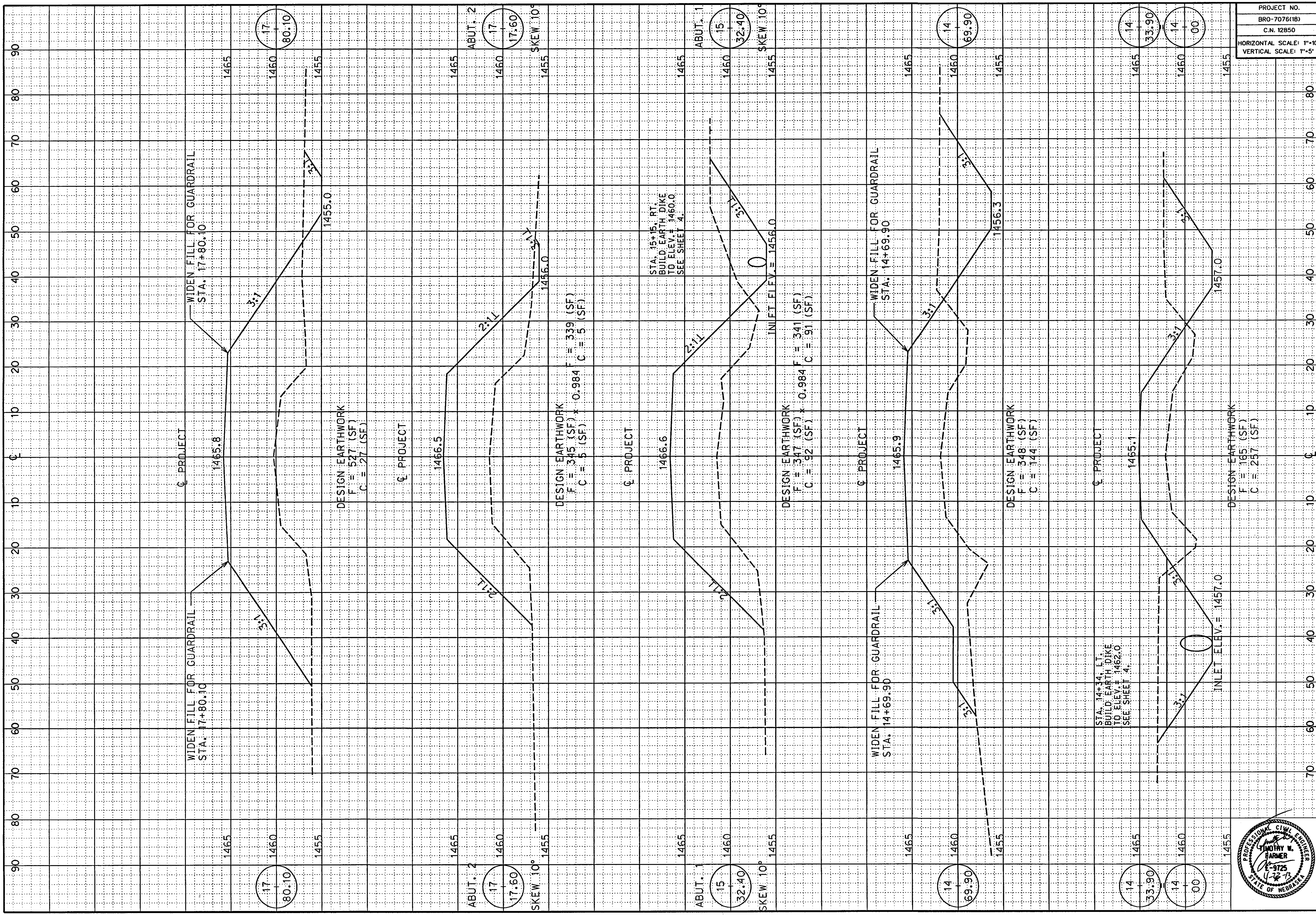


FRIEND SOUTH

CROSS SECTIONS

PROJECT NO.
BRO-7076(1B)
C.N. 12850
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

SHEET NO.
XI



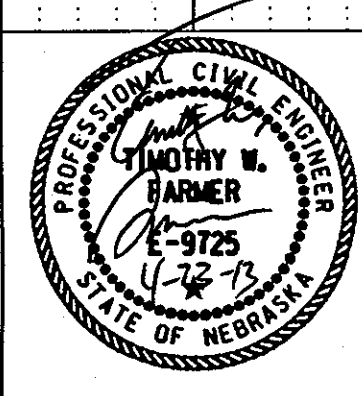
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BRO-7076(1B)
C.N. 12850
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

SHEET NO.
X2

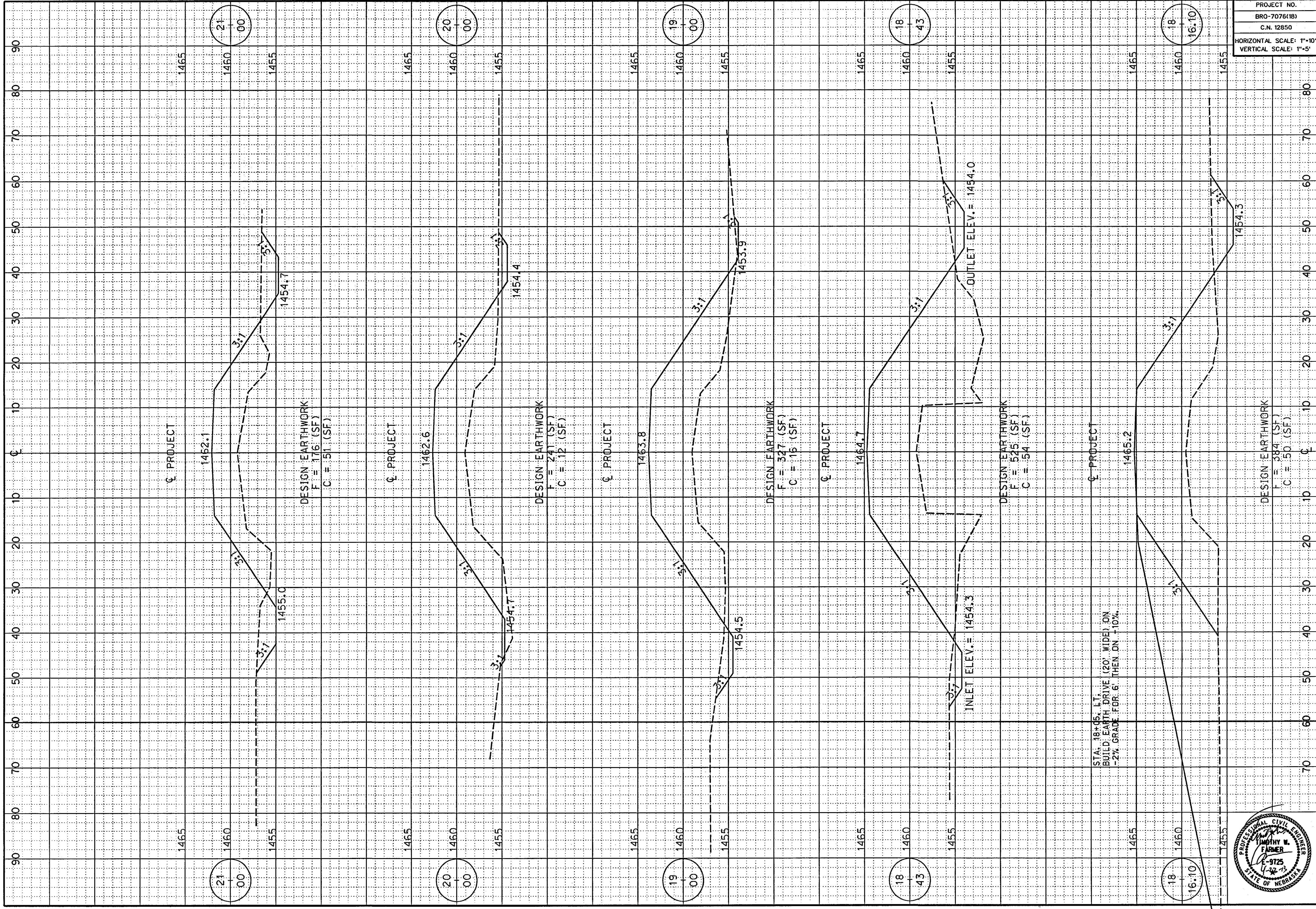
CROSS SECTIONS

FRIEND SOUTH

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SPEECE LEWIS
ENGINEERS



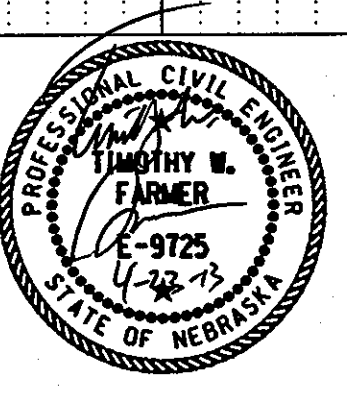
PROJECT NO.
 BRO-7076(18)
 C.N. 12850
 HORIZONTAL SCALE: 1"=10'
 VERTICAL SCALE: 1"=5'

SHEET NO.
X3

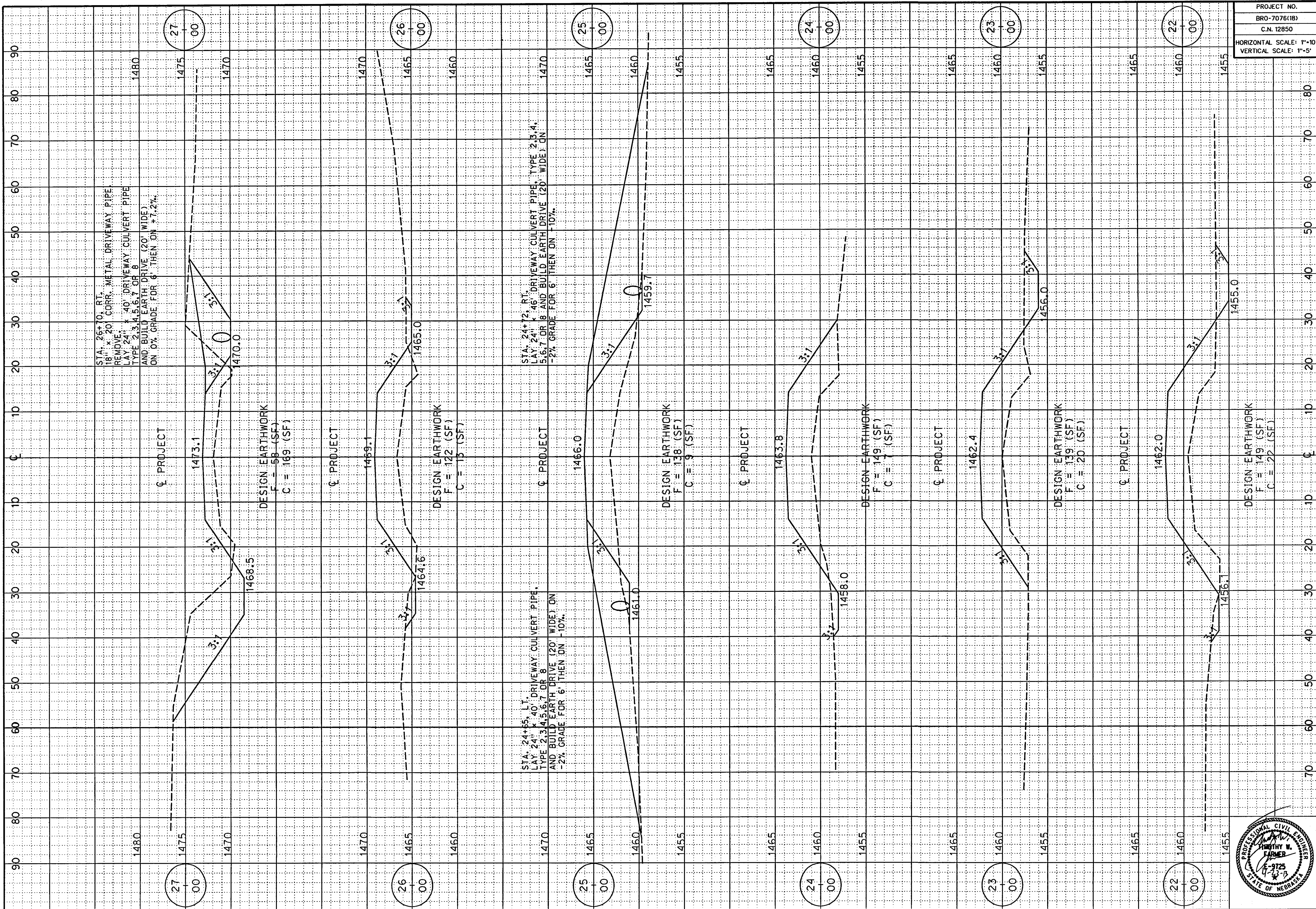
CROSS SECTIONS

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SPECELEWIS ENGINEERS



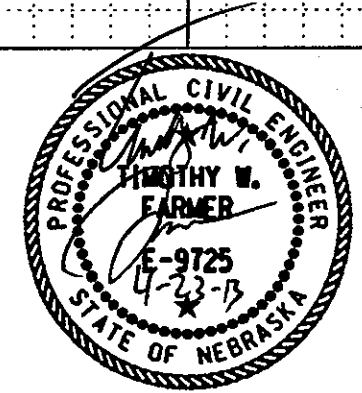
PROJECT NO.
BRO-7076(18)
C.N. 12850
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

SHEET NO.
X4

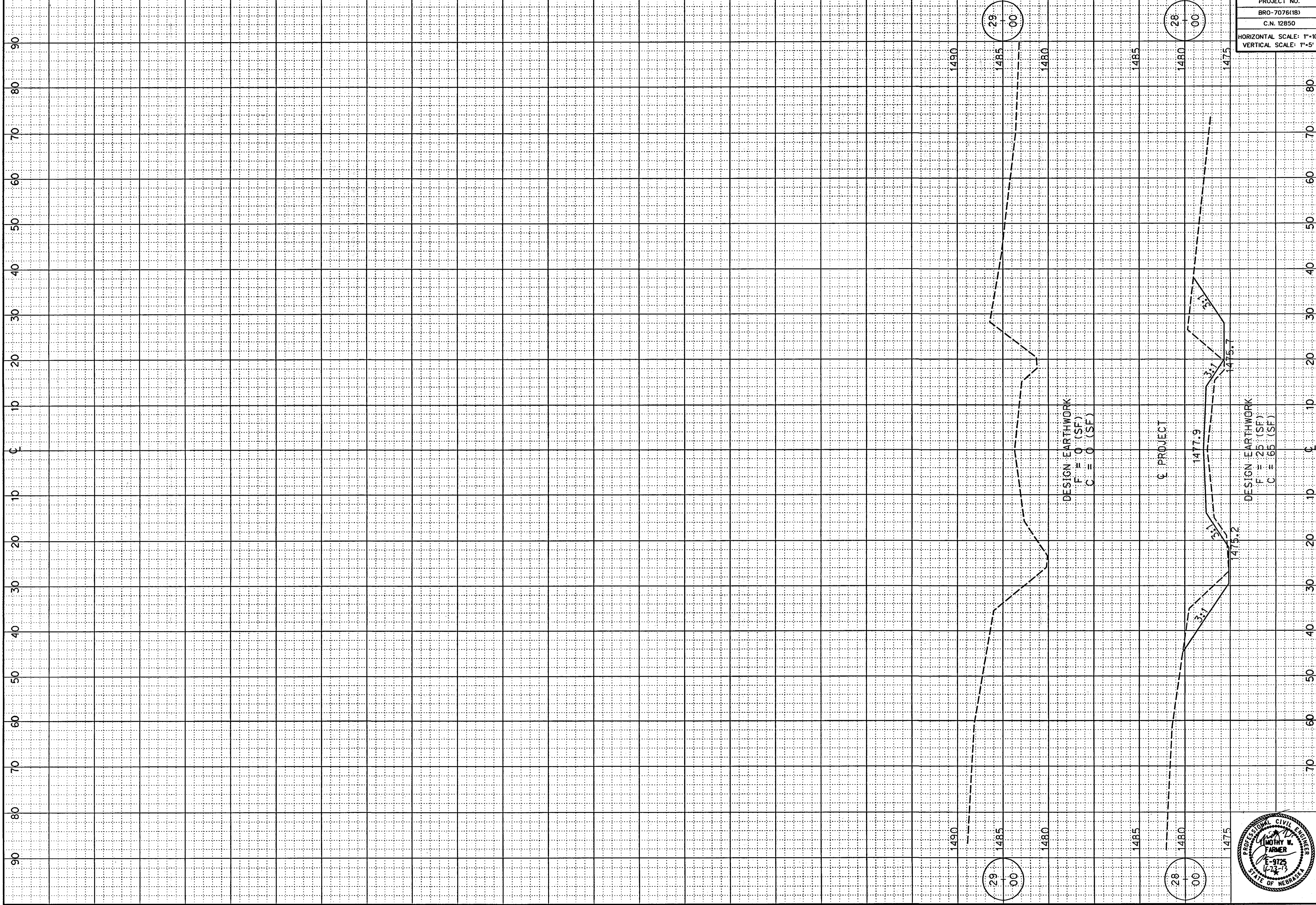
CROSS SECTIONS

FRIEND SOUTH

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SPEECE LEWIS ENGINEERS



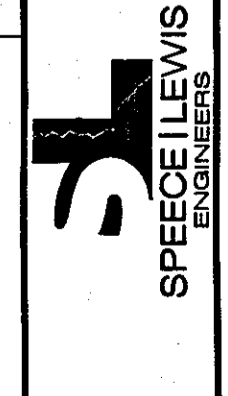
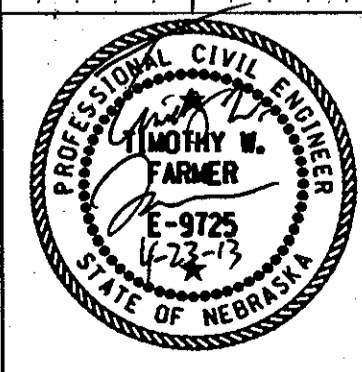
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 BRO-7076(1B)
 C.N. 12850
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 VERTICAL SCALE: 1"=5'

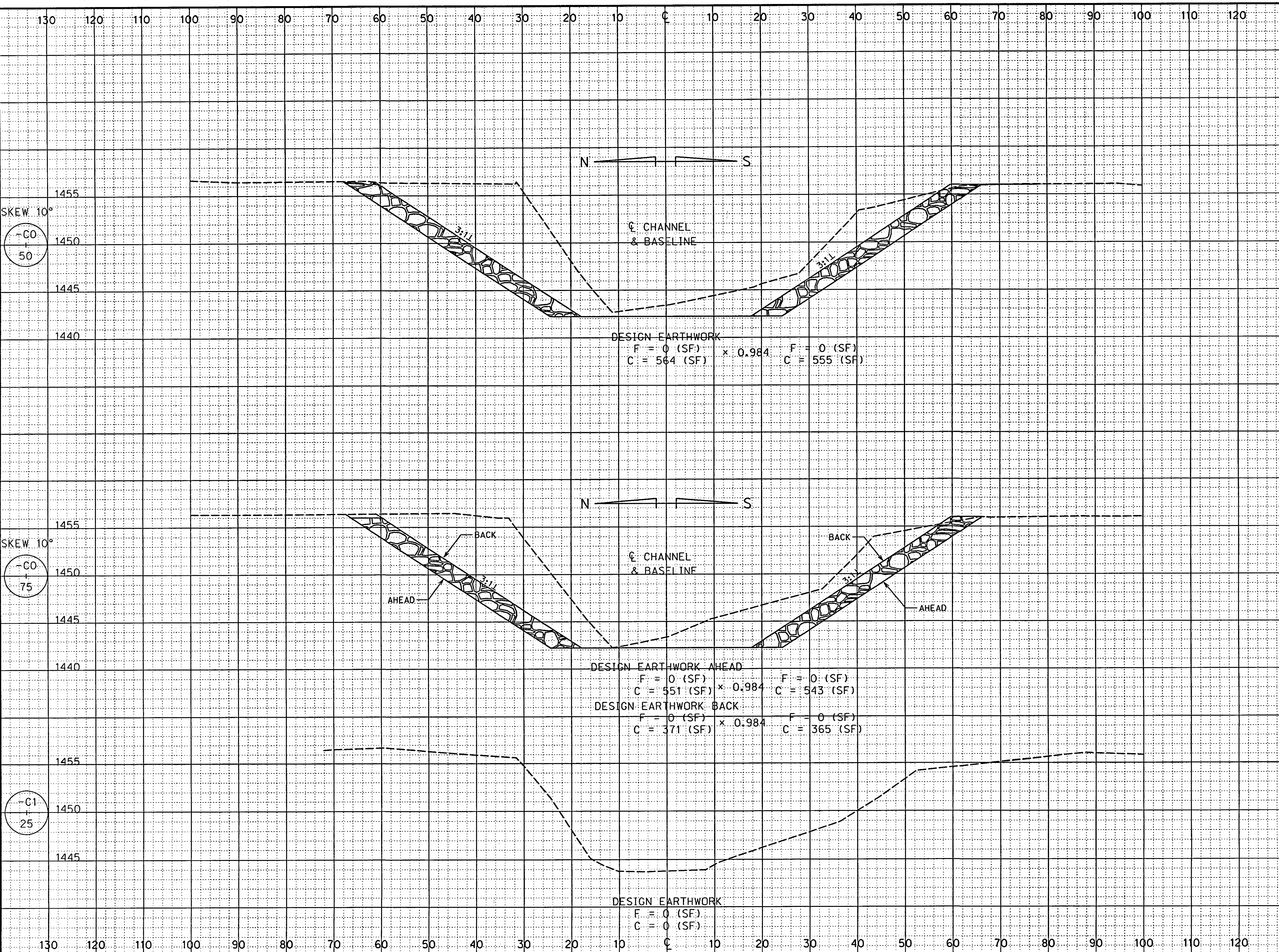
SHEET NO.
X5

CROSS SECTIONS

FRIEND SOUTH

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SKEW 10°
-C0
50

SKEW 10°
-C0
50

SKEW 10°
-C0
75

SKEW 10°
-C0
75

-C1
25

-C1
25

N ——— S

N ——— S

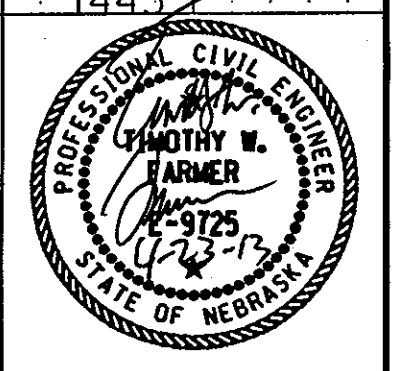
CHANNEL
& BASELINE

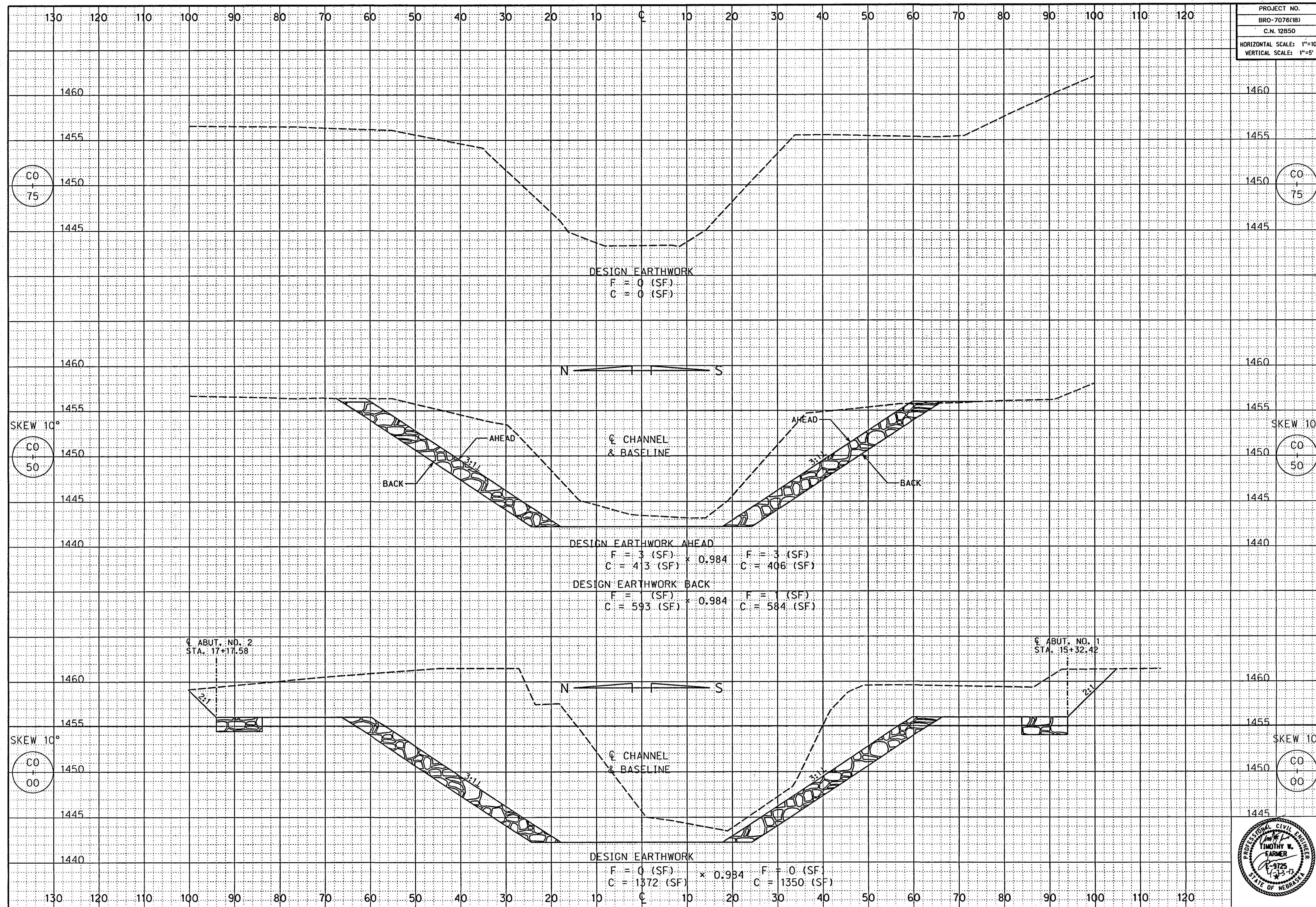
CHANNEL
& BASELINE

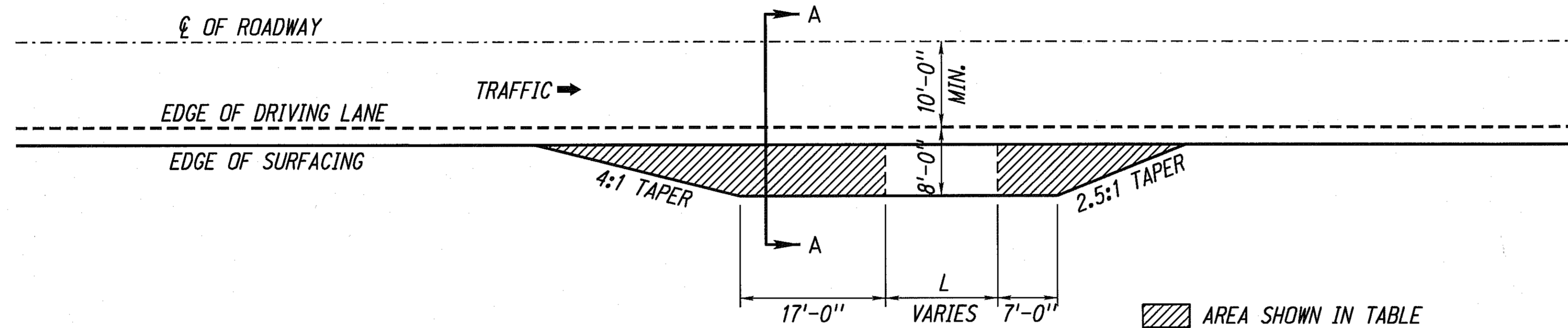
DESIGN EARTHWORK
F = 0 (SF) F = 0 (SF)
C = 564 (SF) × 0.984 C = 555 (SF)

DESIGN EARTHWORK AHEAD
F = 0 (SF) F = 0 (SF)
C = 551 (SF) × 0.984 C = 543 (SF)
DESIGN EARTHWORK BACK
F = 0 (SF) F = 0 (SF)
C = 371 (SF) × 0.984 C = 365 (SF)

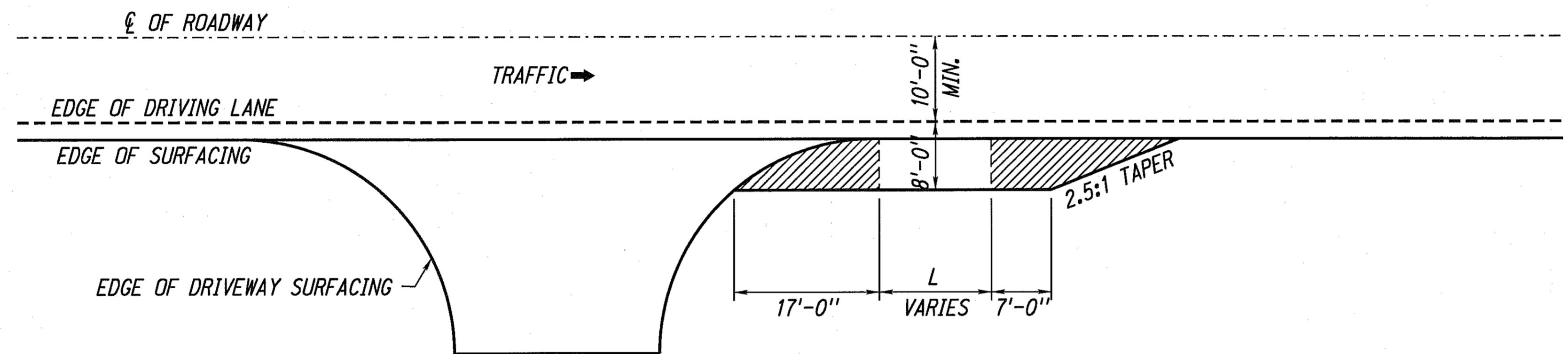
DESIGN EARTHWORK
F = 0 (SF)
C = 0 (SF)



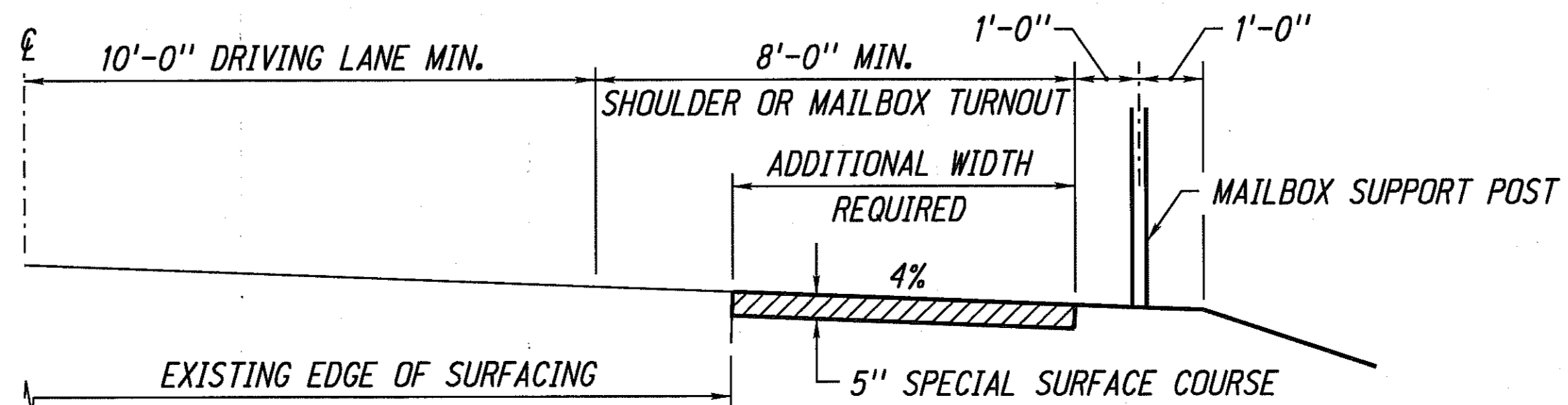




PLAN
MAILBOX TURNOUT



PLAN
MAILBOX TURNOUT AT DRIVEWAY



SECTION A-A

FOR SPECIAL MAILBOX SURFACING		
ADDED WIDTH FOR 8' TURNOUT	WITHOUT DRIVEWAY (SQ. YDS.)	WITH DRIVEWAY (SQ. YDS.)
2'	7	5
3'	11	8
4'	16	11
5'	22	14
6'	29	18
7'	36	22
8'	44	25

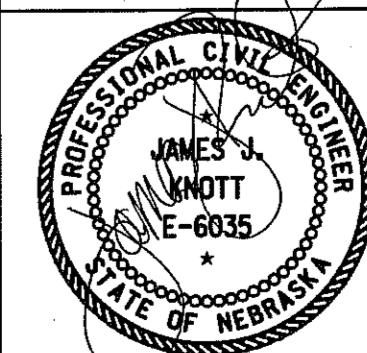
NOTE:
QUANTITIES ARE BASED ON DRIVEWAY WITH 24' WIDTH AND 25' RADII.

NOTE:
 $L = (\text{NUMBER OF SUPPORT POSTS} - 1) \times 3'-6"$

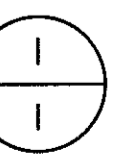
REV. NO.	DATE	DESCRIPTION OF REVISION
RI	FEB. 09	CHANGE 0.04%/FT TO 4%

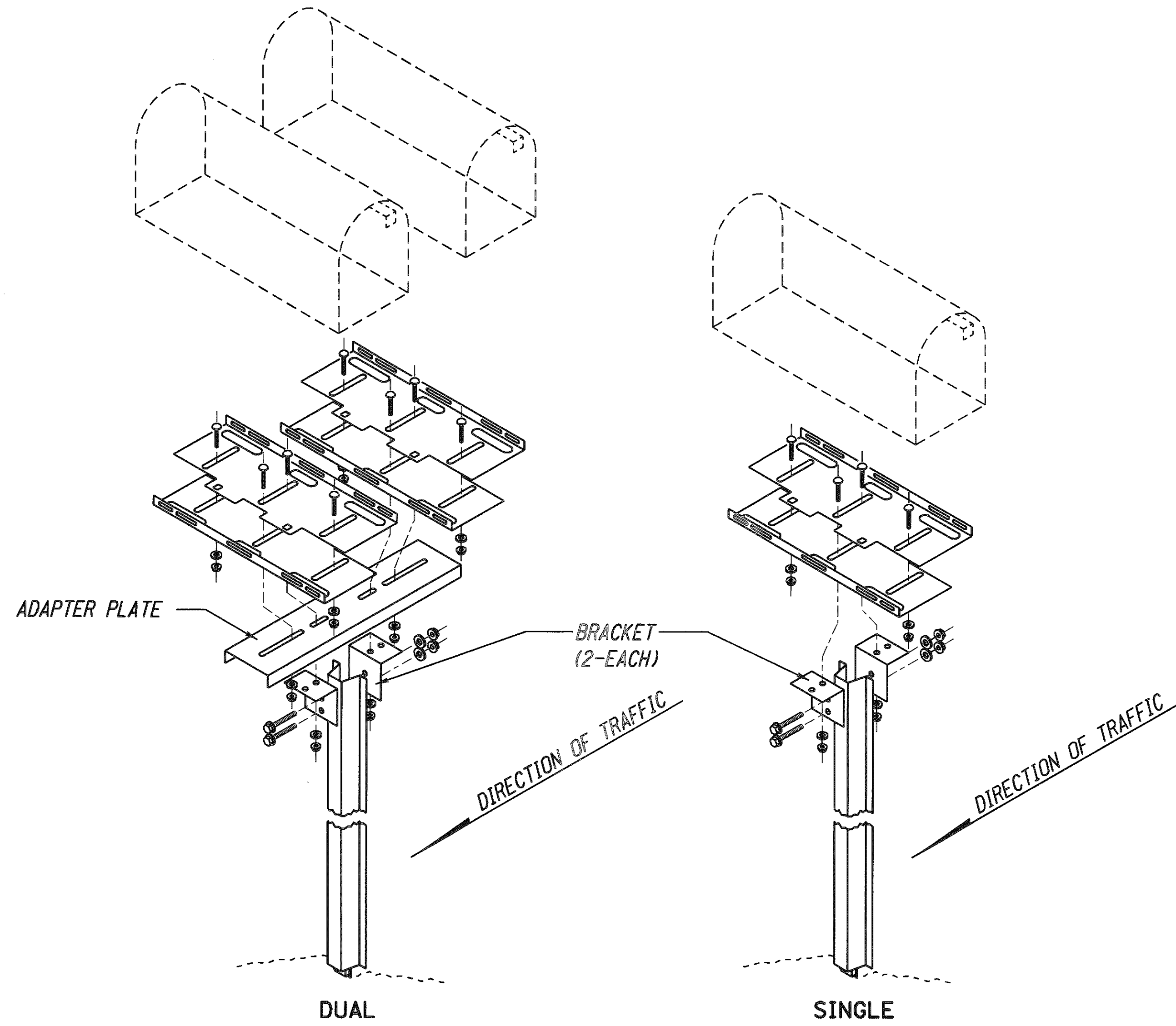
NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 308-R1

LOCAL ROADS
MAILBOX TURNOUT

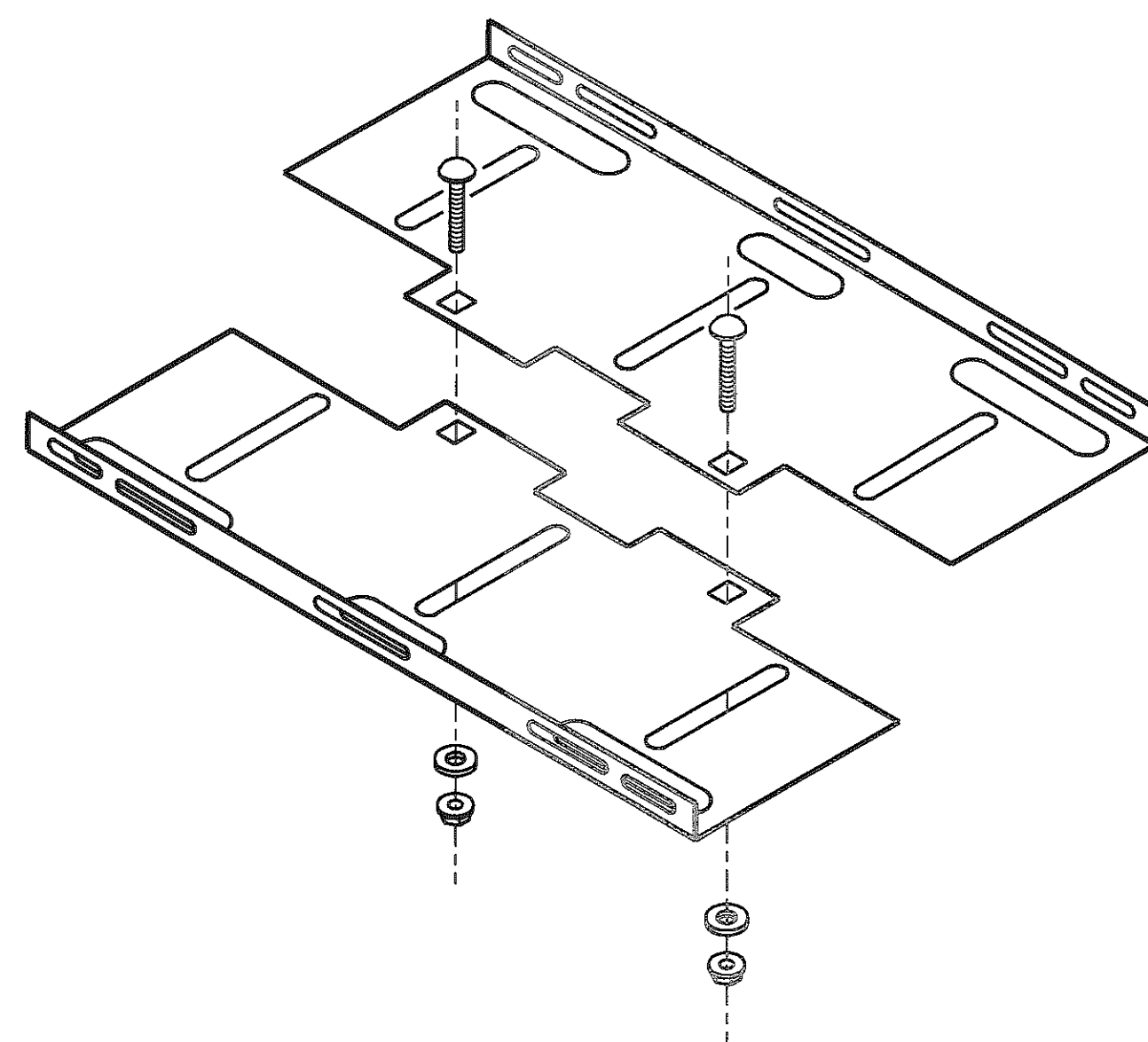


ORIGINAL:
JANUARY 23, 2008
DATE

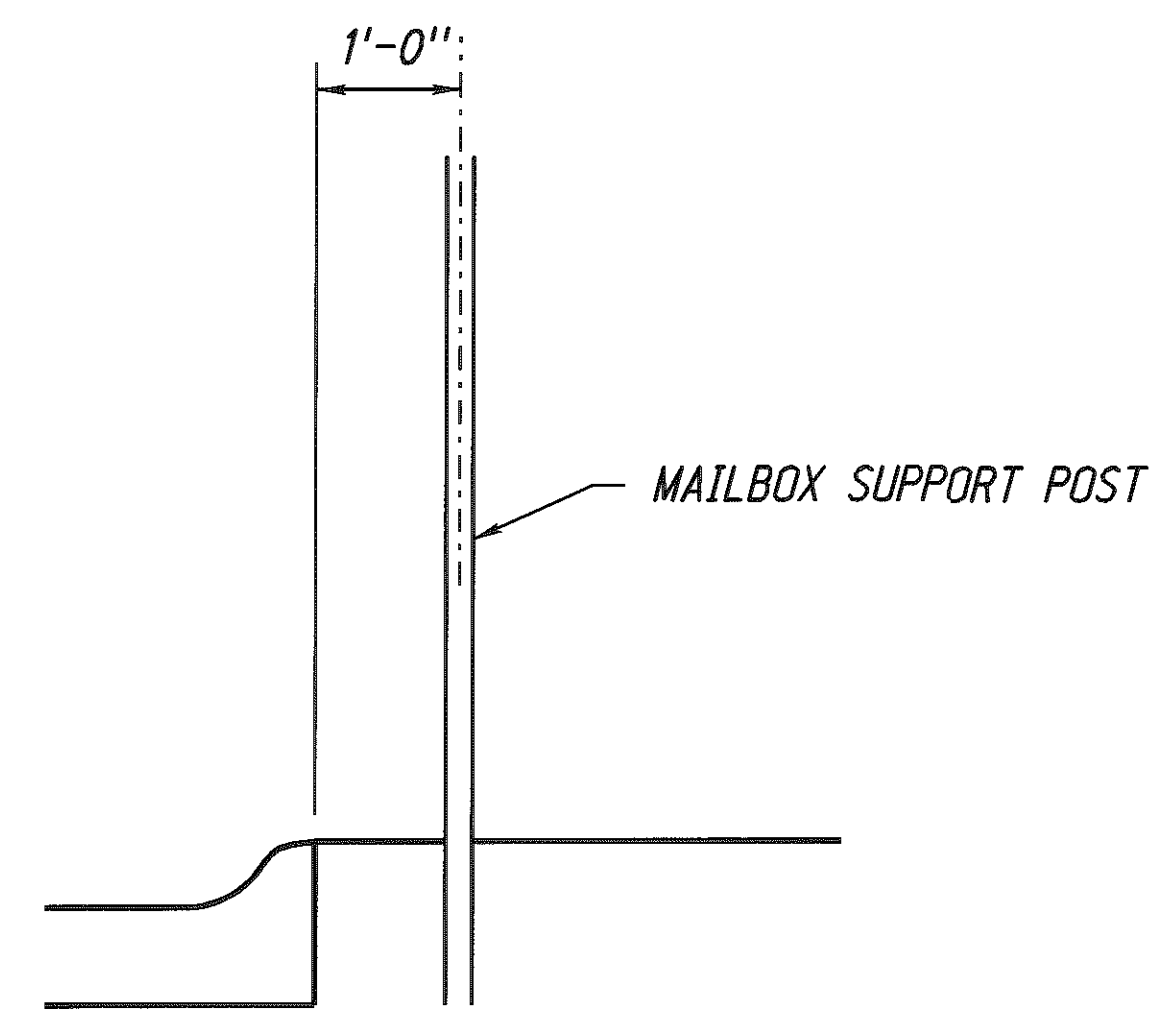




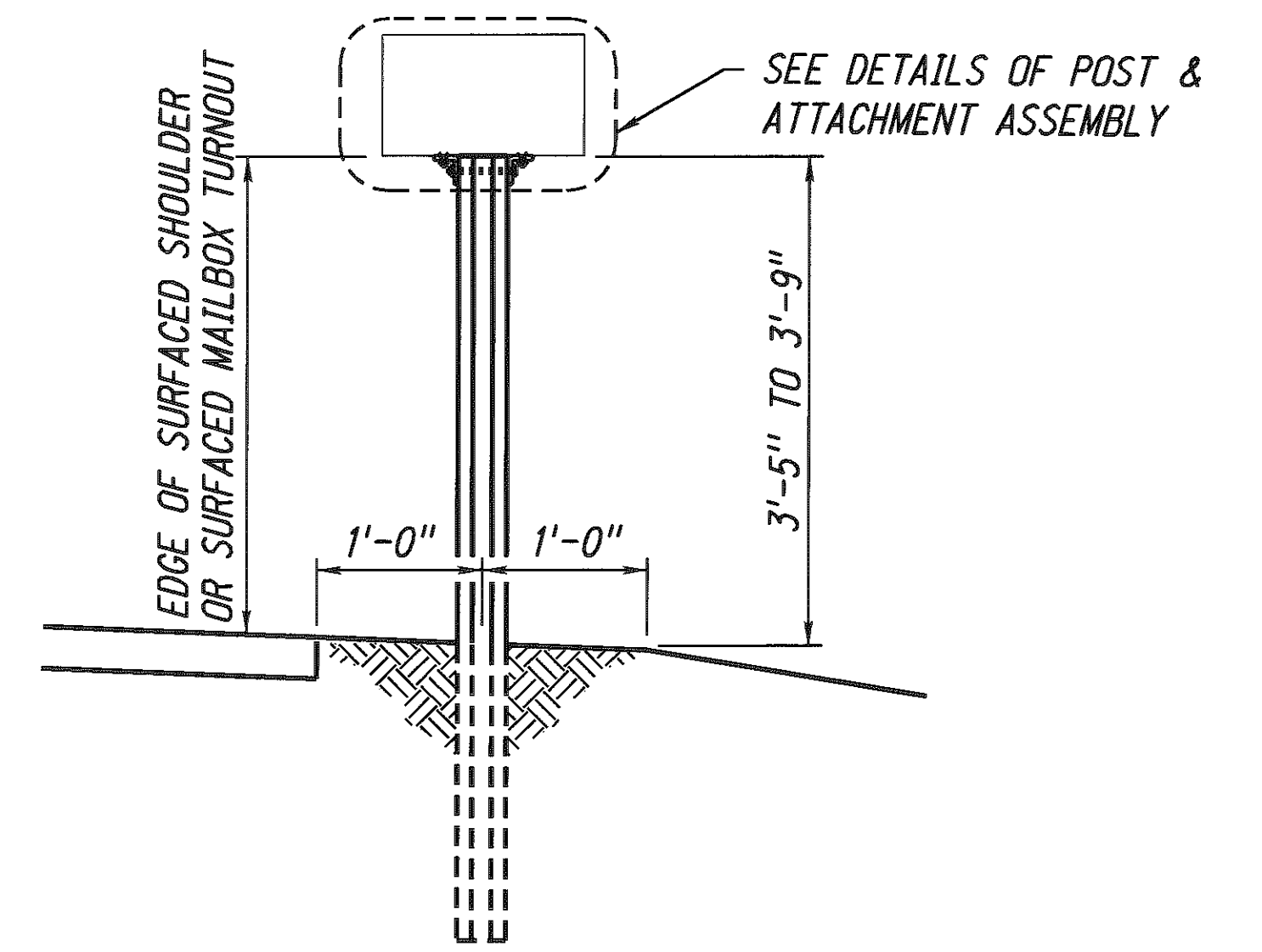
DETAILS OF POST AND ATTACHMENT ASSEMBLY



DETAILS OF PLATFORM ASSEMBLY FOR 12" MAILBOX



CURBED SECTION DETAIL



MAILBOX SUPPORT DETAIL

NOTES:

MAILBOXES SHALL BE LOCATED SO THAT THEY ARE ON THE RIGHT-HAND SIDE OF THE ROADWAY AS DETERMINED BY THE DIRECTION OF TRAVEL AS DESIGNATED BY THE LOCAL POSTMASTER FOR EACH DELIVERY ROUTE. ON ONE WAY STREETS MAILBOXES MAY BE ON THE LEFT SIDE IF DESIGNATED BY THE LOCAL POSTMASTER.

WHERE A MAILBOX IS LOCATED AT A DRIVEWAY, IT SHALL BE PLACED ON THE FAR SIDE OF THE DRIVEWAY AS DETERMINED BY THE DIRECTION OF TRAVEL AS DESIGNATED BY THE LOCAL POSTMASTER FOR EACH DELIVERY ROUTE.

NO MORE THAN TWO MAILBOXES MAY BE MOUNTED ON A SUPPORT STRUCTURE.

MOUNTING INSTRUCTIONS:

MOUNT BRACKETS TO POST WITH 2-⁵/₁₆" x 2¹/₄" HEX BOLTS AND LOCK WASHERS.

FASTEN PLATFORM TOGETHER WITH 2-³/₈" CARRIAGE BOLTS, FLAT WASHERS AND LOCK WASHERS THROUGH PLATFORM END SLOTS.

FASTEN PLATFORM TO BRACKETS WITH 2-³/₈" CARRIAGE BOLTS, FLAT WASHERS AND LOCK WASHERS THROUGH PLATFORM CENTER SLOTS.

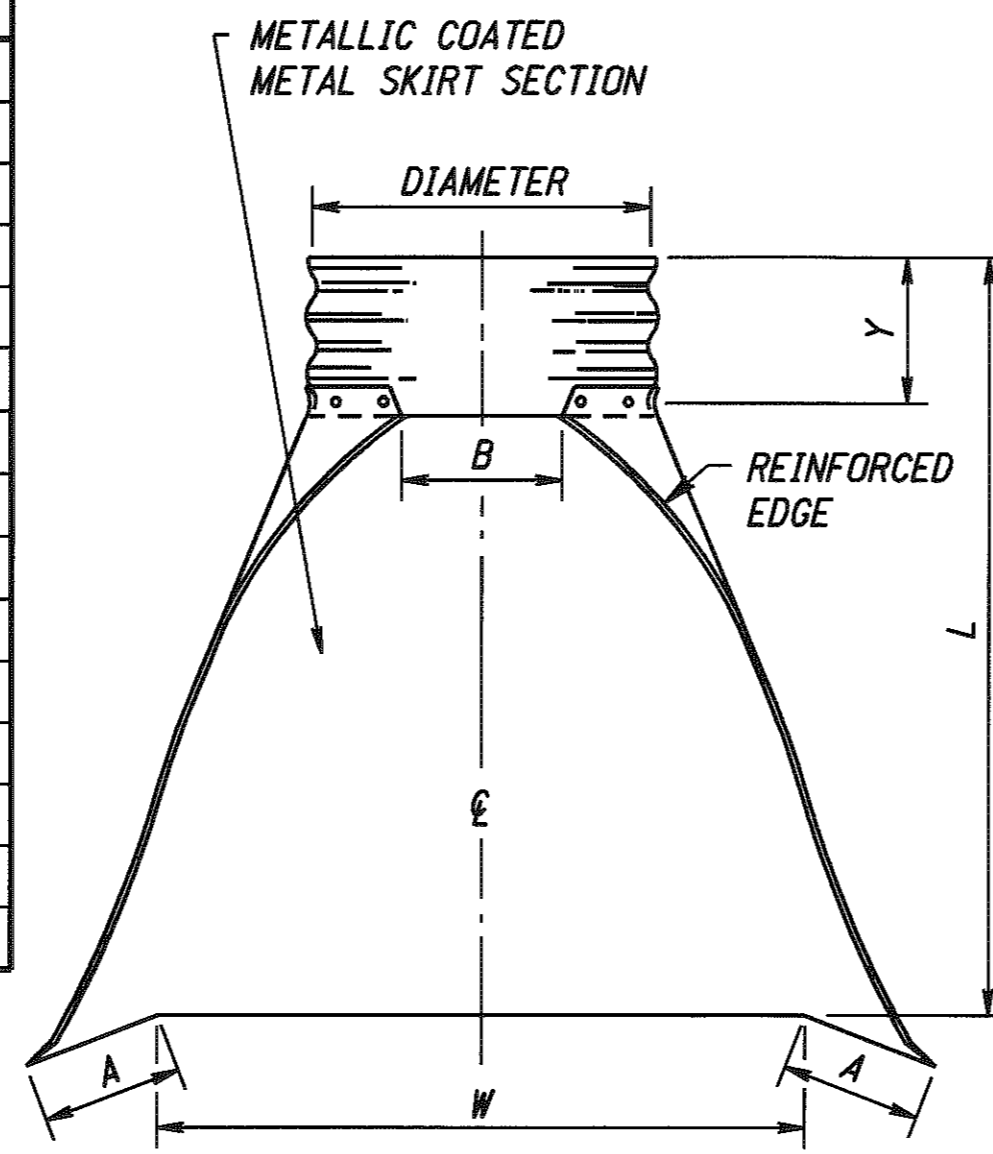
FOR DUAL MAILBOX INSTALLATIONS, FASTEN PLATFORMS AND ADAPTER PLATES TO BRACKETS WITH 4-³/₈" CARRIAGE BOLTS, FLAT WASHERS AND LOCK WASHERS THROUGH PLATFORM CENTER SLOTS.

TO FASTEN MAILBOX TO PLATFORM:

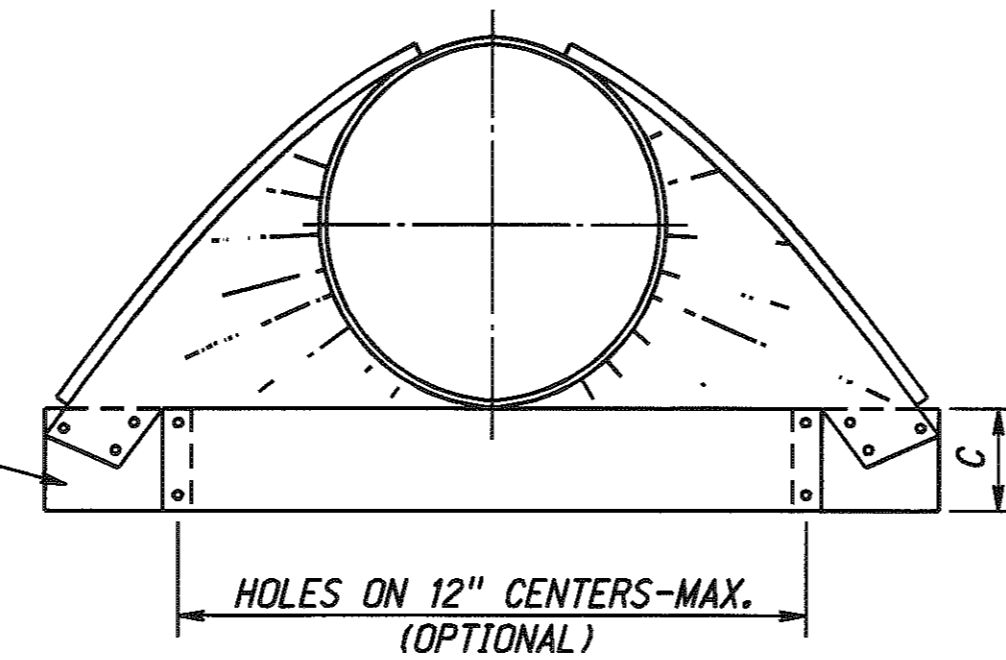
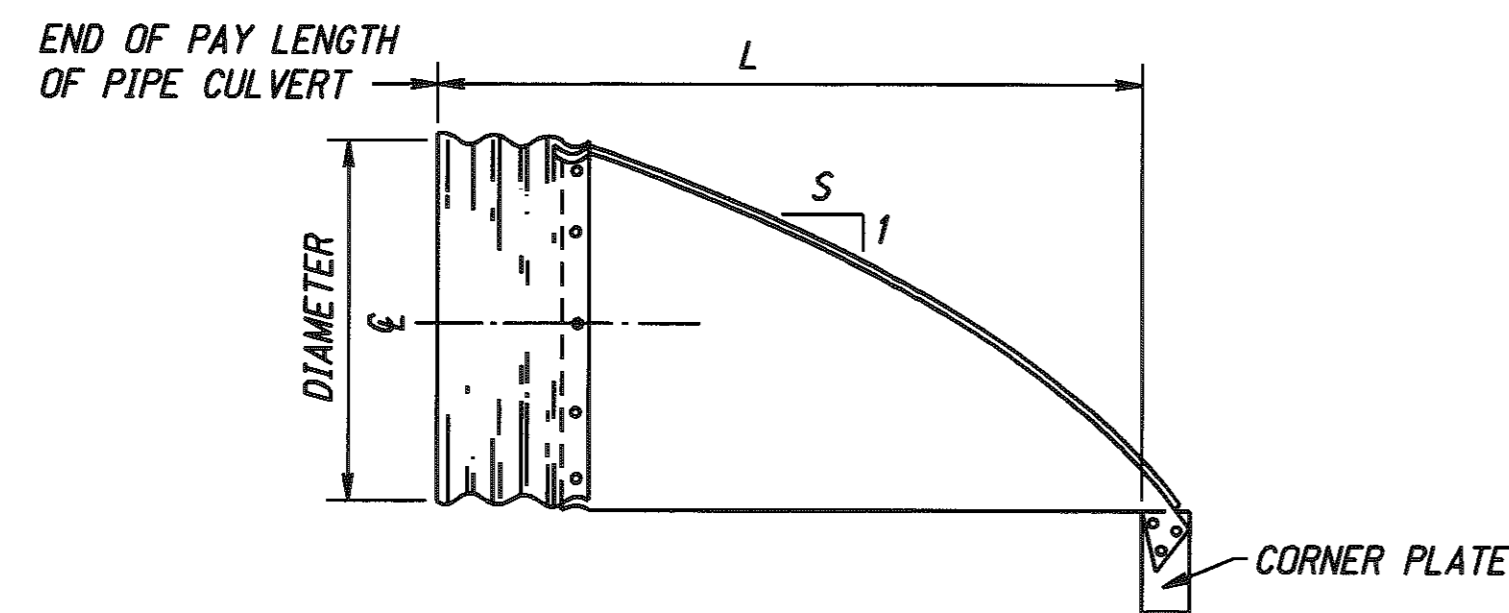
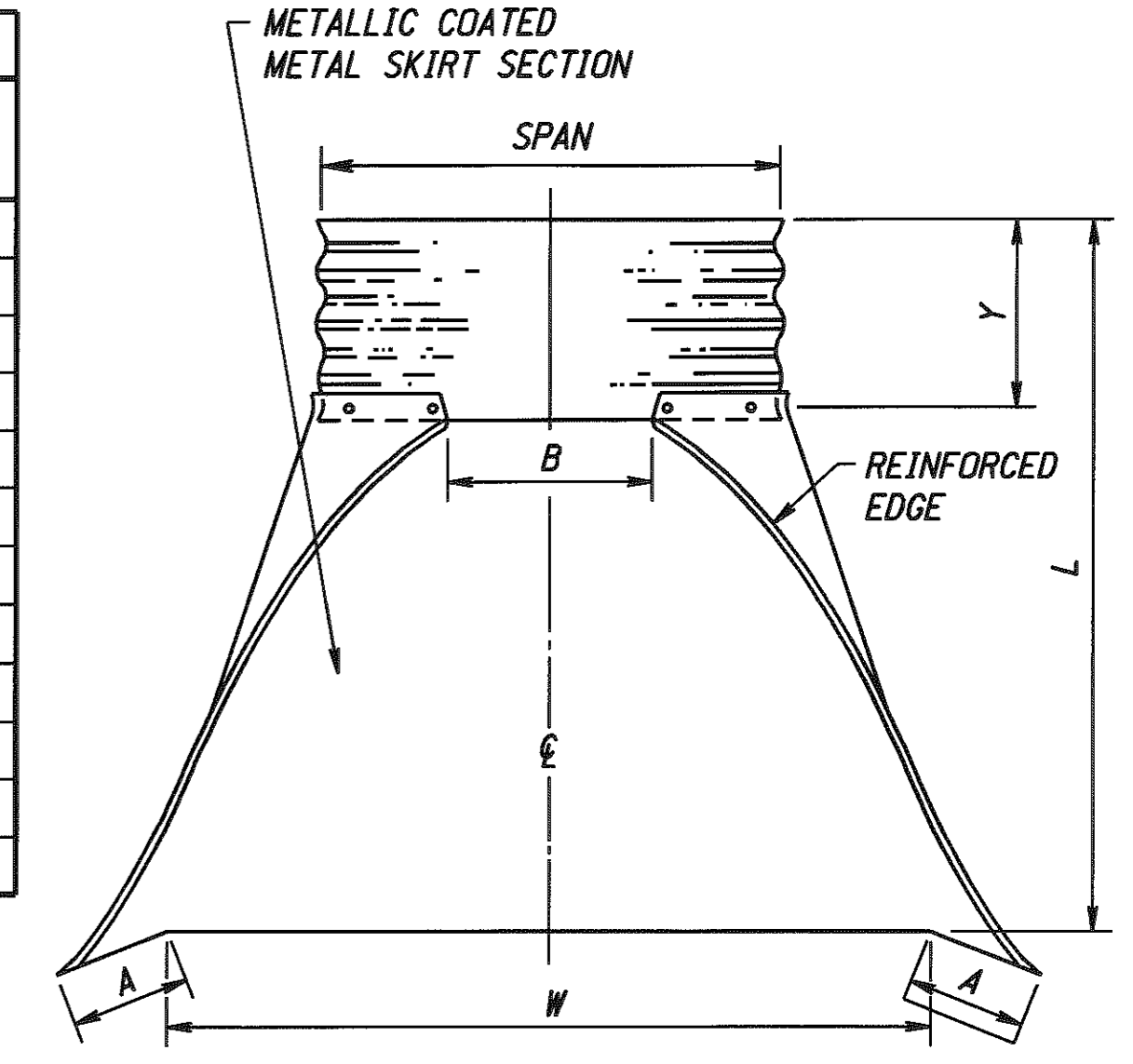
- TYPE 1: USE 4-¹/₄" x ³/₄" HEX BOLTS WITH FLAT WASHERS AND LOCK WASHERS
- TYPE 1A: USE 6-¹/₄" x ³/₄" HEX BOLTS WITH FLAT WASHERS AND LOCK WASHERS
- TYPE 2: USE 6-¹/₄" x ³/₄" HEX BOLTS WITH FLAT WASHERS AND LOCK WASHERS

REV. NO.	DATE	DESCRIPTION OF REVISION
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 309		
MAILBOX SUPPORT POST		
		ORIGINAL: JANUARY 23, 2008 DATE

PIPE DIA.	GAUGE	NOMINAL DIMENSIONS							
		L ± 6"	W ± 2"	A MIN.	B MAX.	C MIN.	Y ± 4 1/2"	S APPROX.	
12"	16	6'-0 1/8"	2'-0"	4 3/4"	6"	6"	4'-3 7/8"	2 1/2	
15"	16	6'-1"	2'-6"	6"	8"	6"	3'-11"	2 1/2	
18"	16	6'-1"	3'-0"	7"	10"	6"	3'-8"	2 1/2	
21"	16	6'-1"	3'-8"	8 1/4"	1'-0"	6"	3'-1"	2 1/2	
24"	16	6'-1 1/2"	4'-0"	9"	1'-1"	6"	2'-8 1/2"	2 1/2	
30"	14	6'-1 3/4"	5'-0"	11"	1'-4"	6"	1'-10 3/4"	2 1/2	
36"	14	8'-1 3/4"	6'-0"	1'-2"	1'-7"	6"	3'-1 3/4"	2 1/2	
42"	12	8'-2"	7'-0"	1'-4"	1'-10"	6"	2'-5"	2 1/2	
48"	12	8'-2"	7'-6"	1'-6"	2'-3"	6"	1'-8"	2 1/4	
54"	12	8'-4"	8'-6"	1'-6"	2'-6"	6"	1'-4"	2	
60"	12	8'-3"	9'-6"	1'-6"	2'-9"	6"	1'-0"	1 3/4	
66"	12	8'-3"	10'-0"	1'-6"	3'-0"	6"	1'-0"	1 1/2	
72"	12	8'-3"	10'-6"	1'-6"	3'-3"	6"	1'-0"	1 1/3	
78"	12	8'-3"	11'-0"	1'-6"	3'-6"	6"	1'-0"	1 1/4	
84"	12	8'-3"	11'-6"	1'-6"	3'-9"	6"	1'-0"	1 1/6	



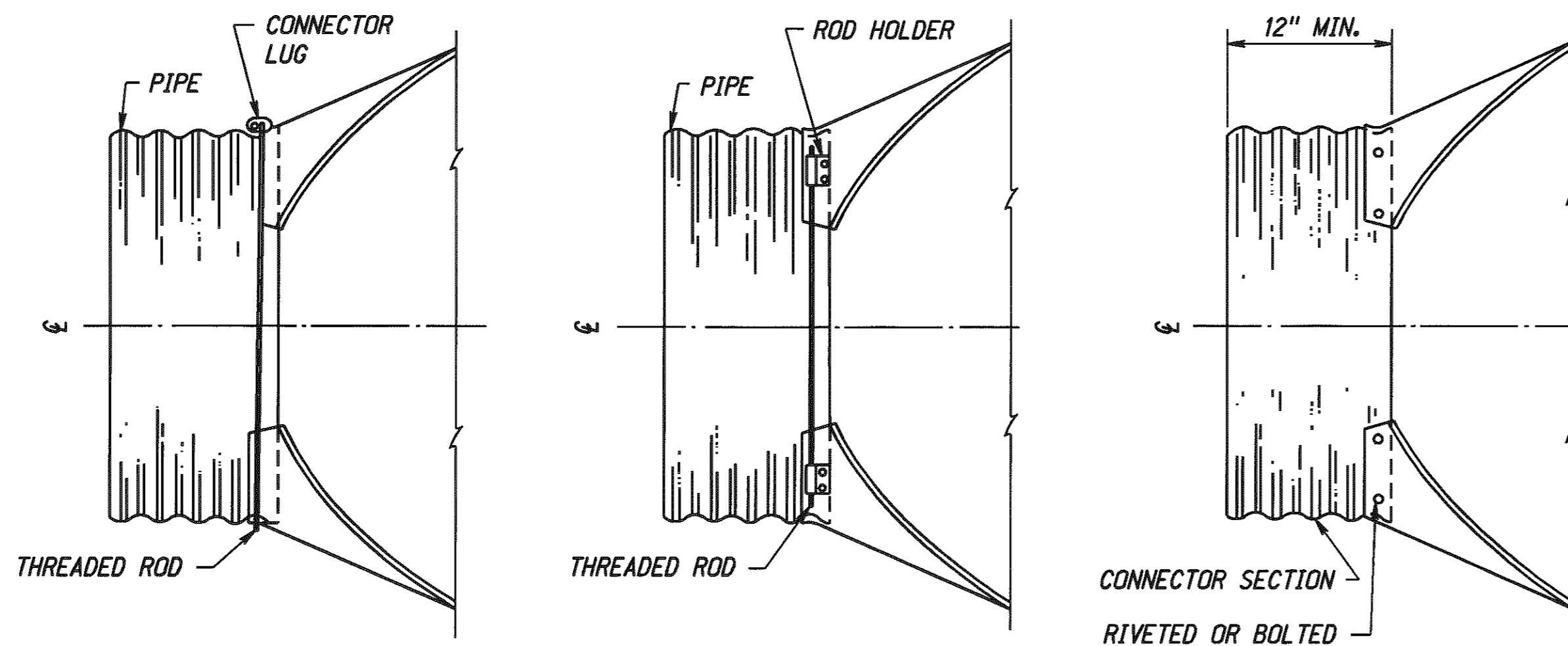
EQUIV. DIA.	SPAN	RISE	GAUGE	NOMINAL DIMENSIONS							
				L ± 6"	W MIN.	A MIN.	B MAX.	C MIN.	Y ± 4 1/2"	S APPROX.	
15"	17"	13"	16	6'-0"	2'-6"	4 1/2"	9"	6"	4'-5"	2 1/2	
18"	21"	15"	16	6'-0"	3'-0"	5 1/4"	10"	6"	4'-1"	2 1/2	
21"	24"	18"	16	6'-0"	3'-6"	6 1/4"	11 1/2"	6"	3'-8"	2 1/2	
24"	28"	20"	16	6'-0"	4'-0"	7"	1'-2"	6"	3'-4 1/2"	2 1/2	
30"	35"	24"	14	8'-0"	5'-0"	8 3/4"	1'-4"	6"	4'-9 1/2"	2 1/2	
36"	42"	29"	14	8'-0"	6'-3"	10 3/4"	1'-5 1/2"	6"	4'-2"	2 1/2	
42"	49"	33"	12	8'-0"	7'-1"	1'-0 1/4"	1'-8"	6"	3'-7"	2 1/2	
48"	57"	38"	12	8'-0"	7'-6"	1'-2"	2'-3"	6"	2'-9"	2 1/2	
54"	64"	43"	12	8'-0"	8'-6"	1'-3 3/4"	2'-6"	6"	2'-2"	2 1/4	
60"	71"	47"	12	8'-0"	9'-6"	1'-5 1/4"	2'-9"	6"	1'-7"	2 1/4	
66"	77"	52"	12	8'-0"	10'-6"	1'-6"	3'-0"	6"	1'-7"	2	
72"	83"	57"	12	8'-0"	11'-6"	1'-6"	3'-3"	6"	1'-7"	2	



SECTION

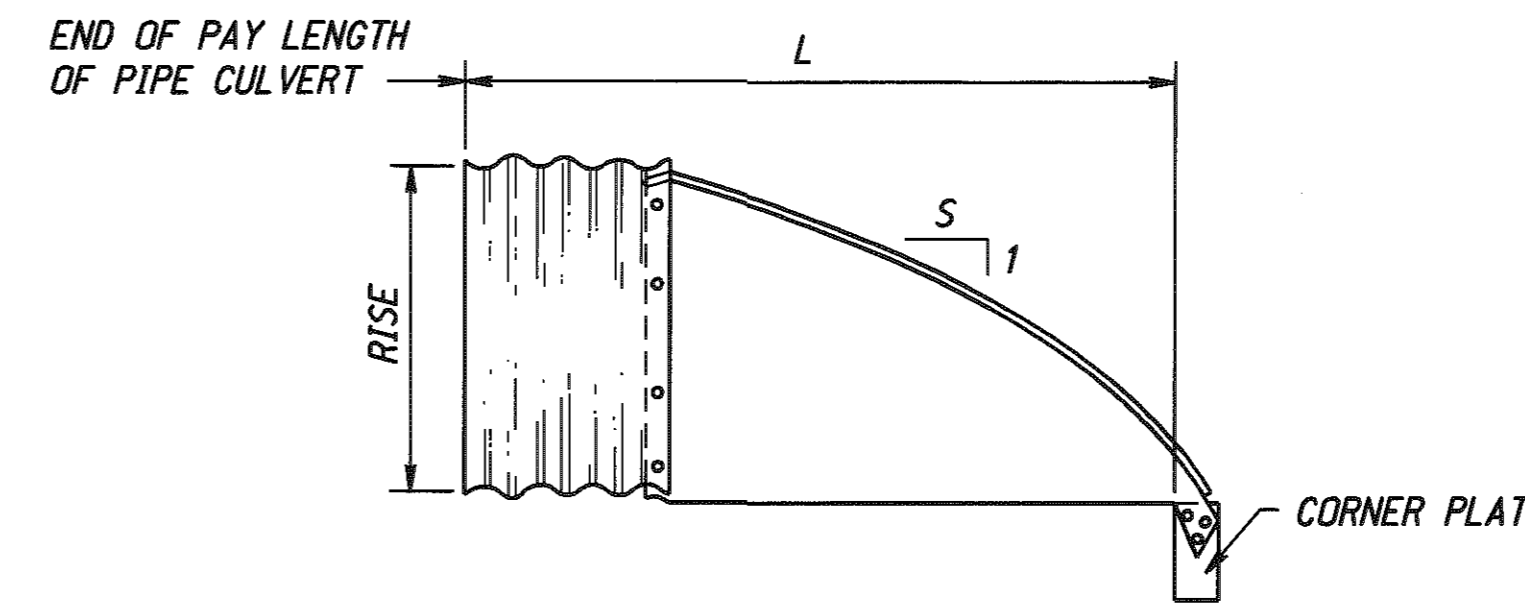
ELEVATION

DETAILS OF METAL FLARED END SECTION
(FOR CORRUGATED METAL PIPE)

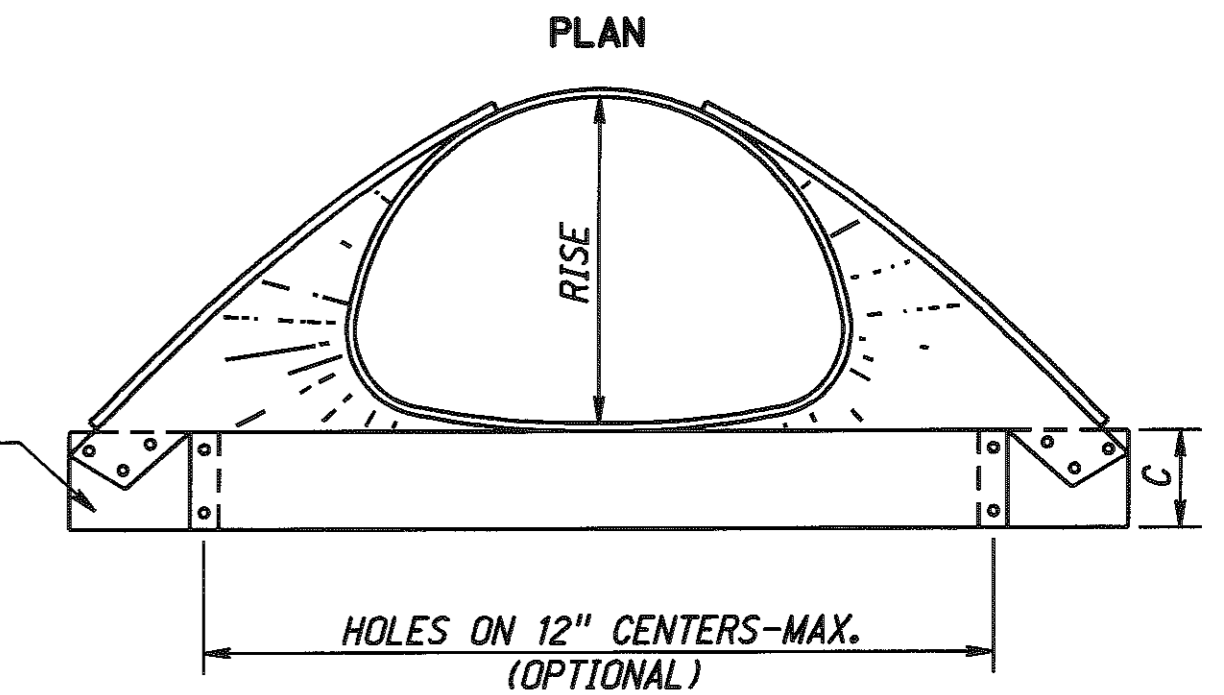


TYPICAL CONNECTIONS

FOR CORRUGATED METAL PIPE DIAMETERS OF 12" TO 24" INCLUSIVE AND CORRUGATED METAL PIPE-ARCHES WITH RISE OF 11" TO 18" INCLUSIVE, THE SKIRT SECTION MAY BE ATTACHED WITH A 1" WIDE, 12 GAUGE METAL CONNECTOR STRAP AND 1/2" x 6" BOLT AND NUT. THIS STRAP MAY BE USED ON PIPE WITH ANNULAR ENDS ONLY.



SECTION



ELEVATION

DETAILS OF METAL FLARED END SECTION
(FOR CORRUGATED METAL PIPE-ARCH)

NOTES:

CONNECTOR STRAP, STIFFENER ANGLES AND MISCELLANEOUS HARDWARE SHALL BE METALLIC COATED.

THE "Y" LENGTH MAY BE FABRICATED AS PART OF THE CULVERT.

CONNECTOR SECTIONS AND CORNER PLATES FOR CORRUGATED METAL PIPE AND PIPE-ARCH FLARED END SECTIONS SHALL BE METALLIC COATED AND OF THE SAME GAUGE AS SKIRTS AND EACH SHALL BE METALLIC COATED.

SKIRT SECTION FOR CORRUGATED METAL PIPE DIA. OF 12" TO 24" INCLUSIVE SHALL BE MADE IN ONE PIECE.

SKIRT SECTION FOR CORRUGATED METAL PIPE-ARCHES WITH RISE OF 11" TO 22" INCLUSIVE SHALL BE MADE IN ONE PIECE.

SKIRT SECTION OF CORRUGATED METAL PIPE DIA. OF 30" TO 54" INCLUSIVE AND CORRUGATED METAL PIPE-ARCHES WITH RISE OF 27" TO 40" INCLUSIVE MAY BE MADE FROM TWO SHEETS JOINED BY RIVETING OR BOLTING ON CENTERLINE.

SKIRT SECTION OF CORRUGATED METAL PIPE DIA. OF 60" AND LARGER, AND CORRUGATED METAL PIPE-ARCHES WITH RISE OF 44" AND LARGER SHALL BE MADE FROM THREE SHEETS JOINED BY RIVETING OR BOLTING AT EQUAL DISTANCES FROM CENTERLINE. THE CENTER PANEL SHALL BE FURNISHED IN 10 GAUGE MATERIAL AND THE WIDTH OF THE CENTER PANEL SHALL BE GREATER THAN 20% OF THE PIPE PERIPHERY.

MULTIPLE SHEET SKIRT SECTIONS SHALL HAVE 2" MIN. LAP SEAMS. BOLTS OR RIVETS SHALL BE 3/8" DIA. (MIN.) AND ON 6" CENTERS (MAX.).

TYPICAL CONNECTIONS SHOWN MAY BE USED FOR HELICAL CORRUGATED METAL PIPE.

FOR SKIRT SECTIONS OF 60" DIA. PIPE AND LARGER, AND CORRUGATED METAL PIPE-ARCHES WITH A RISE OF 49" AND LARGER, REINFORCED EDGES TO BE SUPPLEMENTED WITH STIFFENER ANGLES PLACED JUST BELOW THE REINFORCED EDGES ON THE OUTSIDE OF THE SKIRT SECTION. THE ANGLES WILL BE 2" x 2" x 1/4". THE ANGLES TO BE ATTACHED BY 3/8" DIA. (MIN.) BOLTS AND NUTS AND ON 6" CENTERS (MAX.).

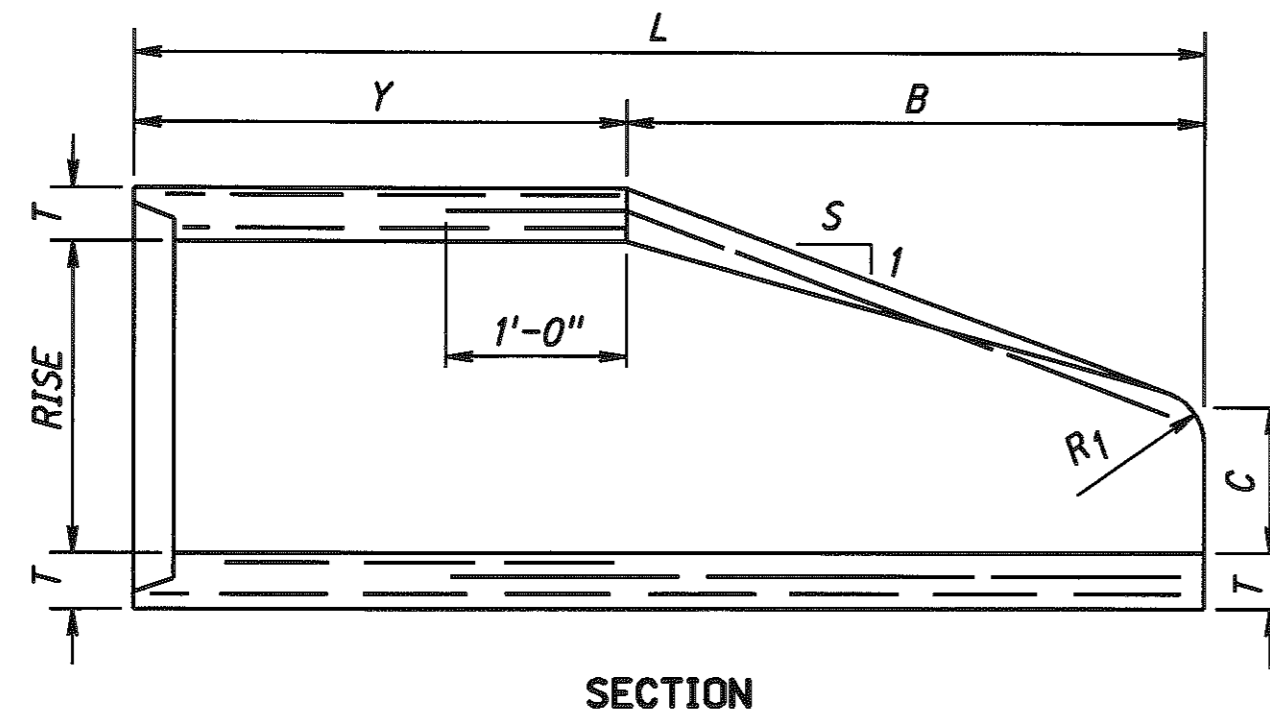
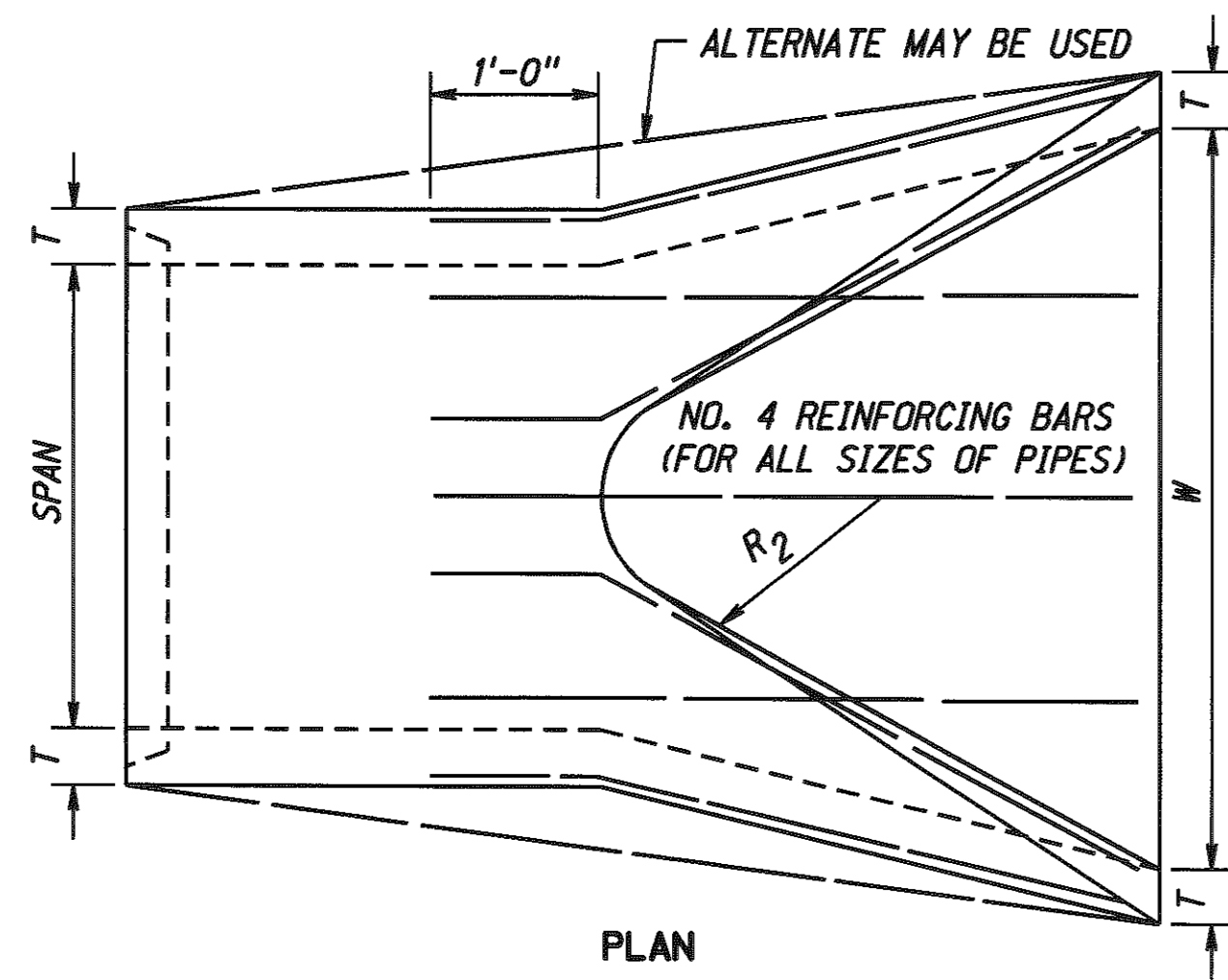
REV. NO.	DATE	DESCRIPTION OF REVISION
R3	AUG. 99	CHANGED NOTES
R2	MAR. 89	SPAN, RISE SIZES FOR CM. PIPE-ARCH
R1	MAR. 85	MULTIPLE CHANGES

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 410-R3
**FLARED END SECTIONS
FOR CULVERT PIPES**



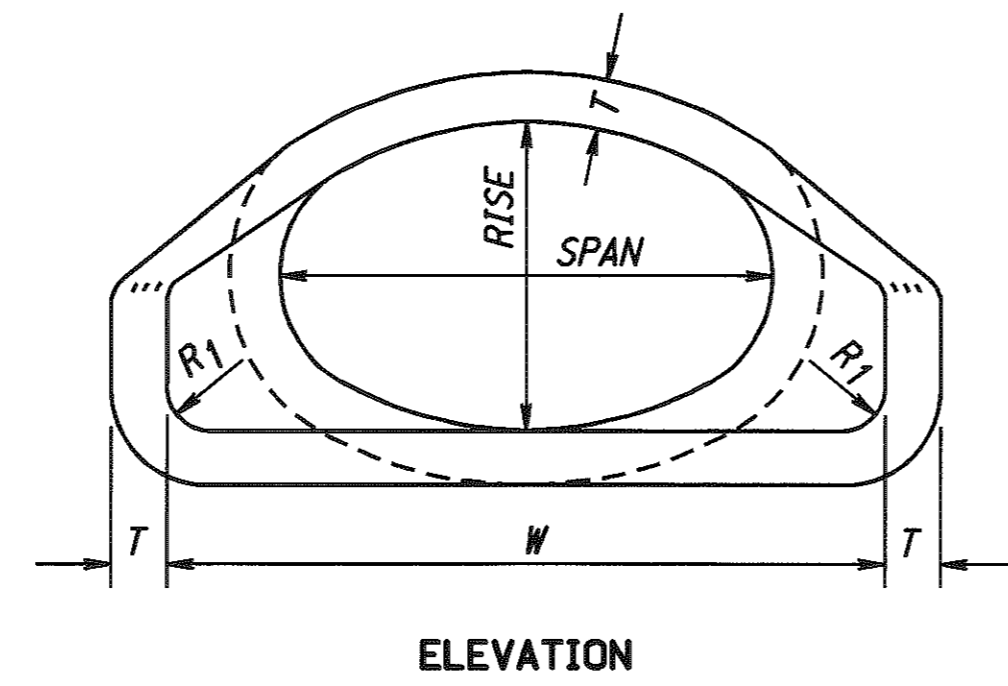
APPROVED:
FEBRUARY 22, 1974
DATE

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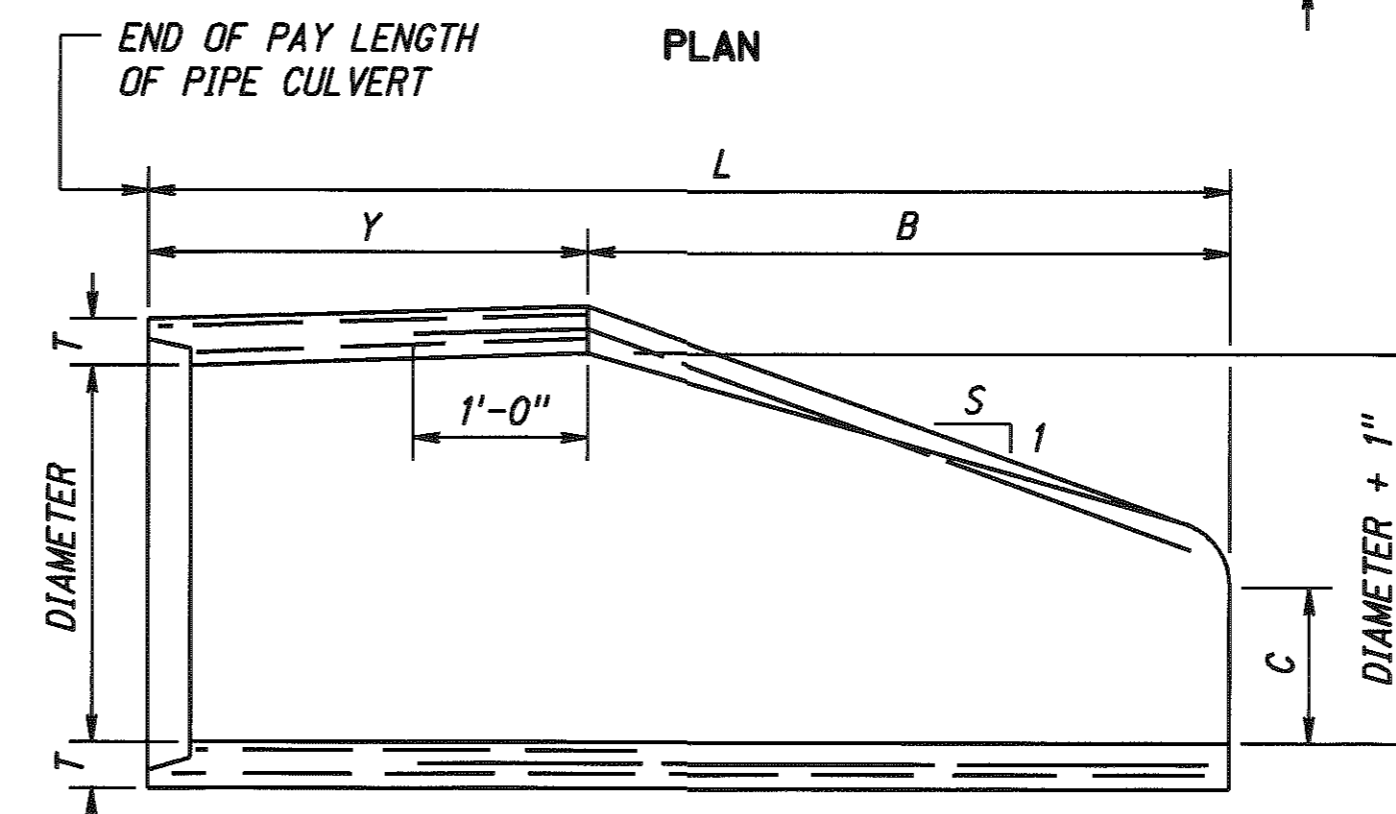
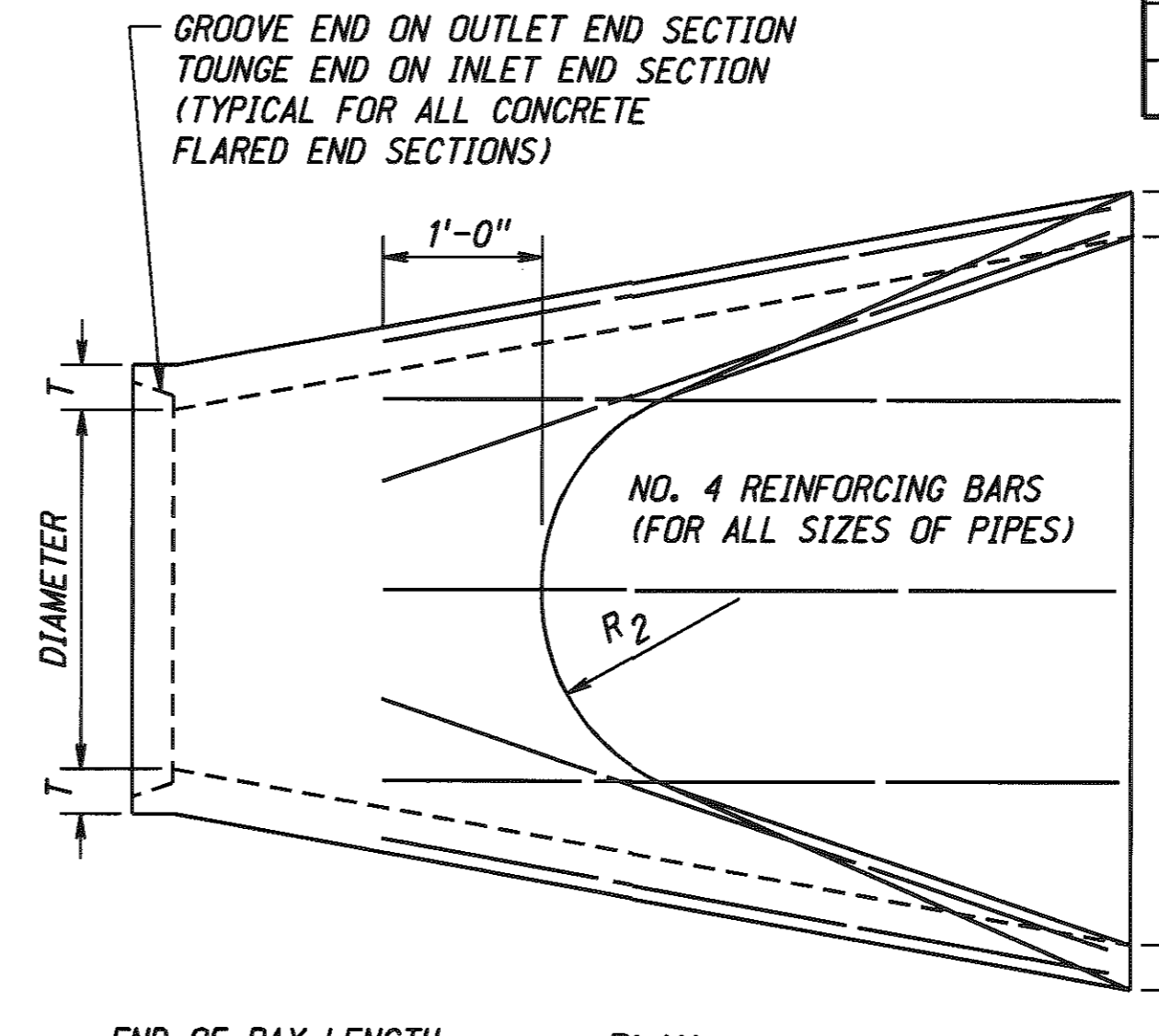


DETAILS OF CONCRETE FLARED END SECTION
(FOR REINFORCED CONCRETE ELLIPTICAL PIPE)

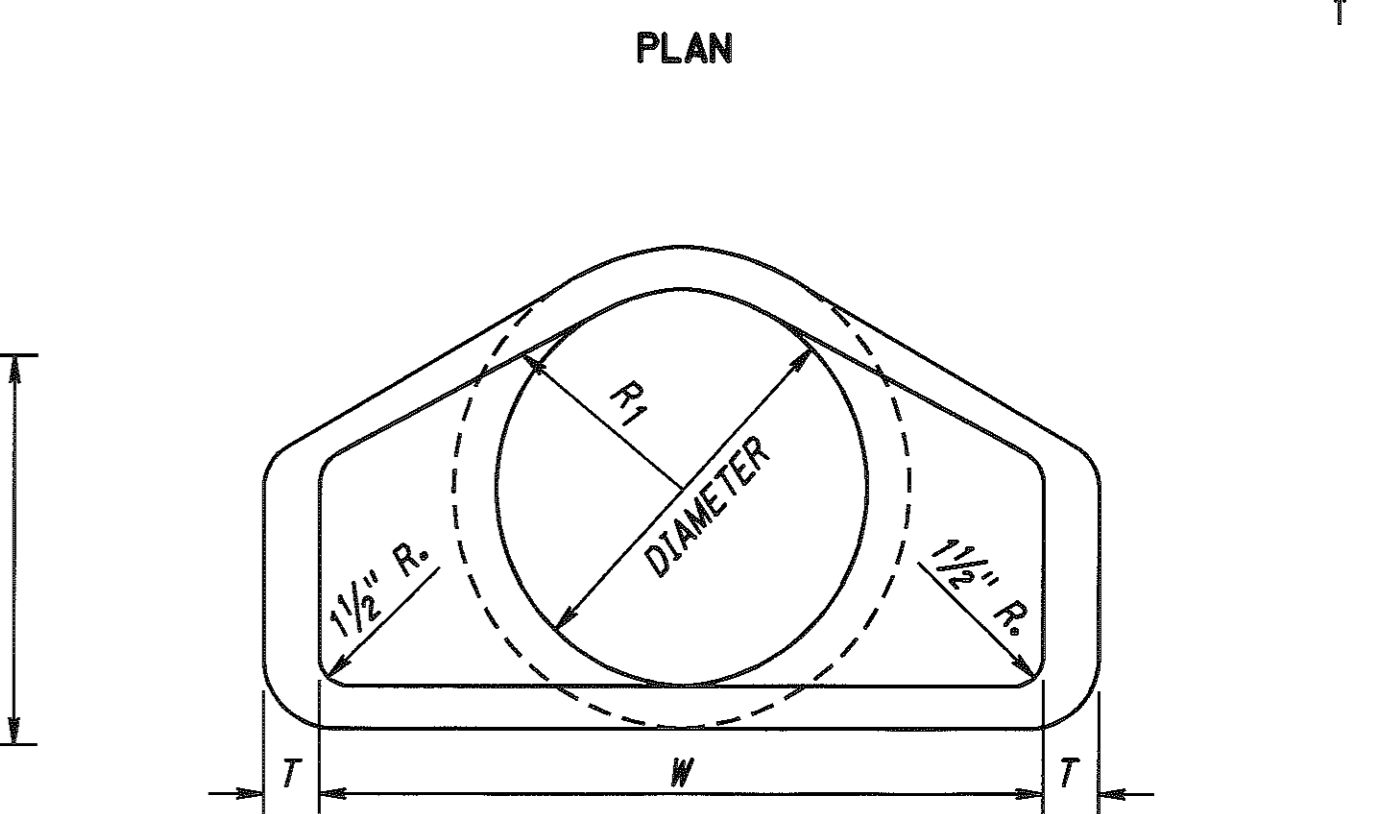
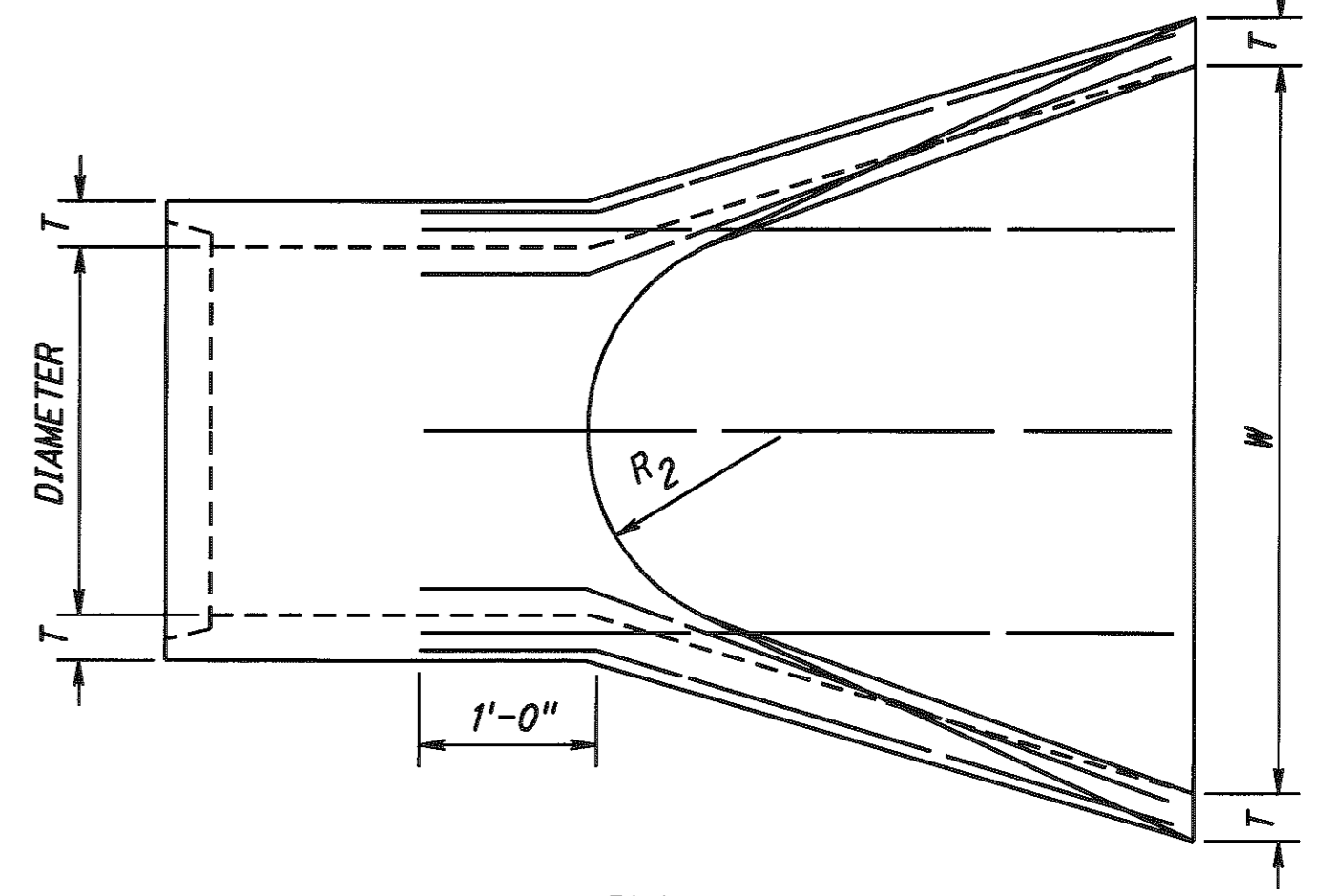
EQUIV. DIA.	NOMINAL DIMENSIONS										
	SPAN	RISE	L ± 6"	B	Y ± 4 1/2"	C	W ± 2"	R ₁	R ₂	S APPROX.	T MIN.
18"	23"	14"	6'-0"	2'-3"	3'-9"	8 1/2"	3'-0"	3"	6"	2.3	2 1/2"
24"	30"	19"	6'-0"	3'-3"	2'-9"	9"	4'-0"	3"	7"	2.9	3"
30"	38"	24"	6'-0"	4'-6"	1'-6"	10"	5'-0"	3"	9"	3	3 1/2"
36"	45"	29"	8'-0"	5'-0"	3'-0"	11"	6'-0"	3"	1'-0"	2.7	4"
42"	53"	34"	8'-0"	5'-0"	3'-0"	1'-4"	6'-6"	6"	1'-1"	2.6	4 1/2"
48"	60"	38"	8'-0"	5'-0"	3'-0"	1'-9"	7'-0"	6"	1'-2"	2.7	5"
54"	68"	43"	8'-0"	5'-0"	3'-0"	2'-1"	7'-6"	6"	1'-4"	2.5	5 1/2"
60"	76"	48"	8'-0"	5'-0"	3'-0"	2'-6"	8'-0"	6"	1'-6"	2.5	6"



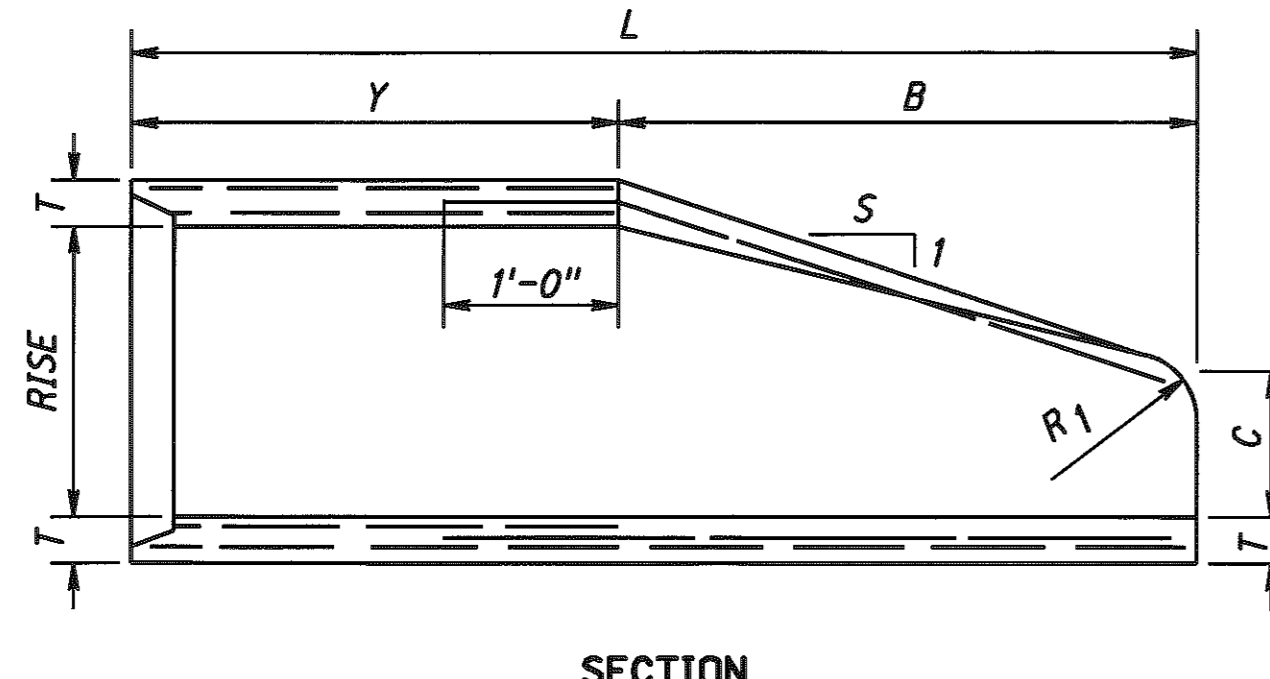
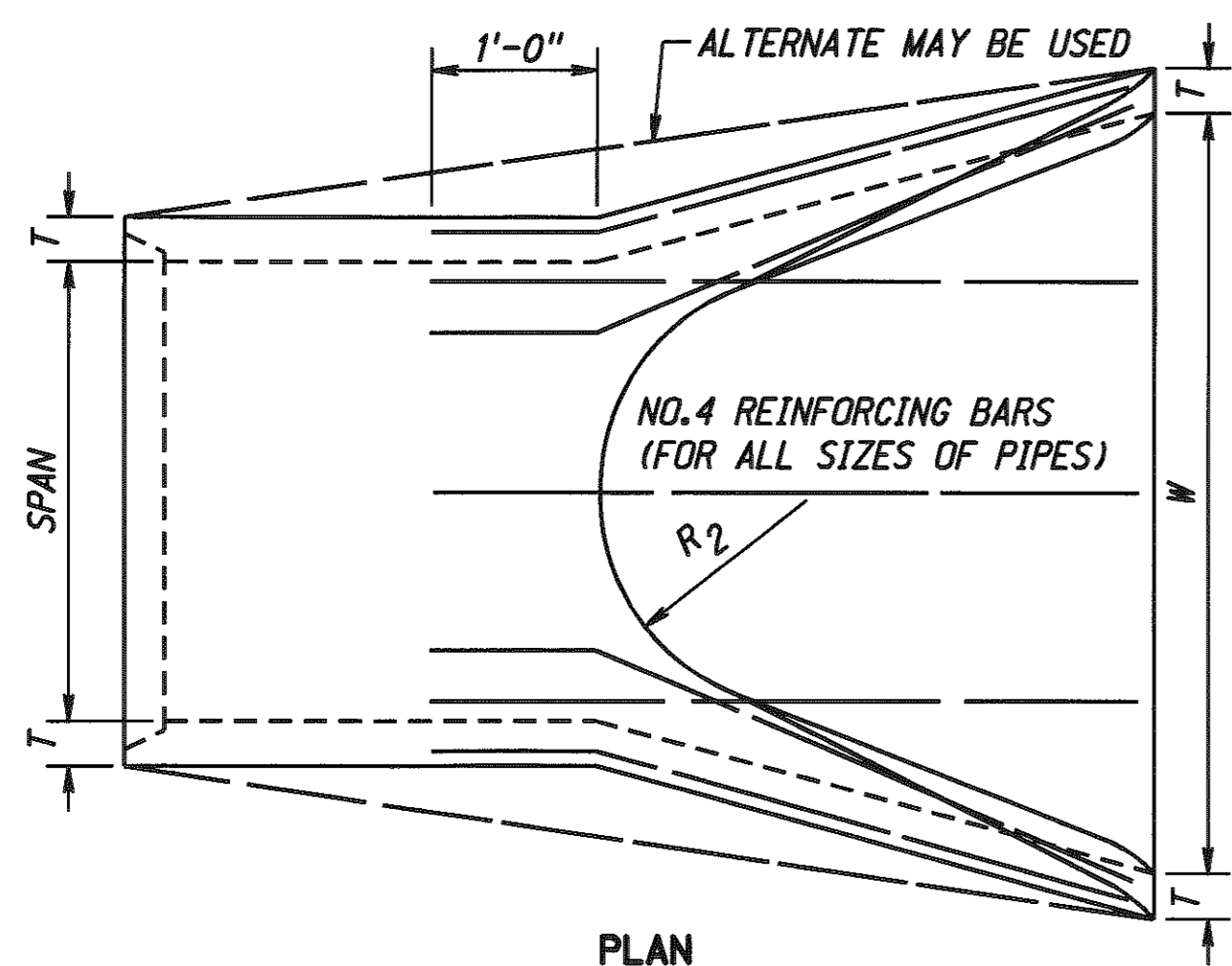
PIPE DIA.	NOMINAL DIMENSIONS									
	L ± 6"	B	Y ± 4 1/2"	C	W ± 2"	R ₁	R ₂	S APPROX.	T MIN.	
12"	6'-0 7/8"	2'-0"	4'-0 7/8"	4"	2'-0"	1'-0 1/8"	9"	3	2"	
15"	6'-1"	2'-3"	3'-10"	6"	2'-6"	1'-0 1/2"	11"	3	2 1/4"	
18"	6'-1 1/2"	2'-3"	3'-10"	9"	3'-0"	1'-3 1/2"	1'-0"	3	2 1/2"	
24"	6'-1 1/2"	3'-7 1/2"	2'-6"	9 1/2"	4'-0"	1'-4 9/16"	1'-2"	3	3"	
30"	6'-1 3/4"	4'-6"	1'-7 3/4"	1'-0"	5'-0"	1'-6 1/2"	1'-3"	3	3 1/2"	
36"	8'-1 3/4"	5'-3"	2'-10 3/4"	1'-3"	6'-0"	2'-0 5/8"	1'-8"	3	4"	
42"	8'-2"	5'-3"	2'-11"	1'-9"	6'-6"	2'-3 1/2"	1'-10"	3	4 1/2"	
48"	8'-2"	6'-0"	2'-2"	2'-0"	7'-0"	2'-4 1/2"	1'-10"	3	5"	
54"	8'-4"	5'-5"	2'-11"	2'-3"	7'-6"	2'-9 1/8"	2'-0"	2.4	5 1/2"	
60"	8'-3"	5'-0"	3'-3"	2'-6"	8'-0"	3'-0 1/16"	2'-0"	2	6"	
66"	8'-3"	6'-6"	1'-9"	2'-6"	9'-0"	3'-0 1/8"	2'-0"	2	6 1/2"	
72"	8'-3"	6'-6"	1'-9"	2'-6"	9'-0"	3'-2 9/16"	2'-0"	2	7"	



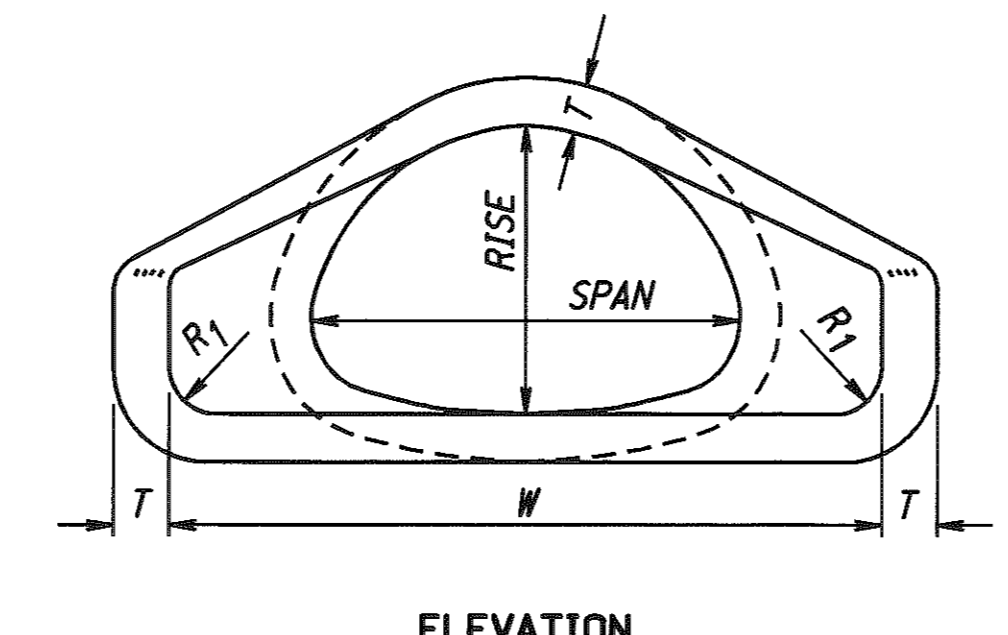
DETAILS OF CONCRETE FLARED END SECTION
(FOR REINFORCED CONCRETE PIPE)



EQUIV. DIA.	NOMINAL DIMENSIONS										
	SPAN	RISE	L ± 6"	B	Y ± 4 1/2"	C	W ± 2"	R ₁	R ₂	S APPROX.	T MIN.
18"	22"	14"	6'-0"	2'-3"	3'-9"	7"	3'-0"	2"	1'-0"	2.2	2 1/2"
24"	29"	18"	6'-0"	3'-3"	2'-9"	9"	4'-0"	3"	1'-2"	2.4	3"
30"	36"	23"	8'-0"	4'-0"	4'-0"	10"	5'-0"	3"	1'-3"	2.3	3 1/2"
36"	44"	27"	8'-0"	5'-0"	3'-0"	11"	6'-0"	6"	1'-8"	2.4	4"
42"	51"	32"	8'-0"	5'-0"	3'-0"	1'-4"	6'-6"	6"	1'-10"	2.4	4 1/2"
48"	59"	36"	8'-0"	5'-0"	3'-0"	1'-9"	7'-0"	6"	1'-10"	2.3	5"
54"	65"	40"	8'-0"	5'-0"	3'-0"	2'-0"	7'-6"	6"	2'-0"	2.1	5 1/2"
60"	74"	45"	8'-0"	5'-0"	3'-0"	2'-3"	8'-0"	6"	1'-9"	2	6"
72"	88"	54"	8'-4"	6'-6"	1'-10"	2'-11"	10'-0"	6"	2'-0"	2	7"



DETAILS OF CONCRETE FLARED END SECTION
(FOR REINFORCED CONCRETE PIPE-ARCH)



NOTES

CONCRETE FOR FLARED END SECTIONS SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF A.A.S.H.T.O. DESIGNATION M170, M206, AND M207, FOR CLASS II PIPE.

REINFORCEMENT IN THE "Y" SECTION SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF A.A.S.H.T.O. DESIGNATION M170, M206, AND M207, FOR CLASS II PIPE.

IN ADDITION TO THE REINFORCING BARS SHOWN, REINFORCEMENT IN THE "B" SECTION SHALL HAVE A CROSS-SECTIONAL AREA EQUAL TO THAT OF ONE LAYER OF STEEL IN THE "Y" SECTION.

R3	AUG. 99	CHANGED NOTES
R2	MAR. 89	SPAN, RISE SIZES FOR CM PIPE-ARCH
R1	MAR. 85	MULTIPLE CHANGES
REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 410-R3
**FLARED END SECTIONS
FOR CULVERT PIPES**

APPROVED:
FEBRUARY 22, 1974
DATE

2
2

**TABLE 1
STANDARD INSTALLATIONS, SOILS AND
MINIMUM COMPACTION REQUIREMENTS**

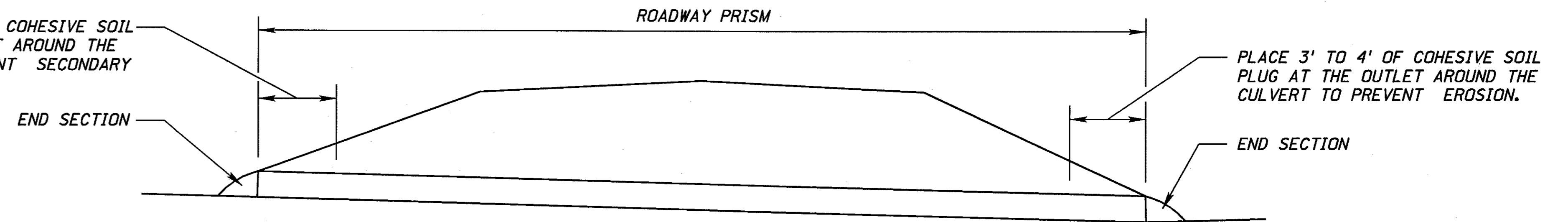
INSTALLATION TYPE	BEDDING THICKNESS	HAUNCH AND OUTER BEDDING	LOWER SIDE
TYPE 1	DO/24 MINIMUM, NOT LESS THAN 3 IN. IF ROCK FOUNDATION, USE DO/12 MINIMUM, NOT LESS THAN 6 IN.	95% SW	90% SW, 95% ML, 100% CL, OR NATURAL SOILS OF EQUAL FIRMNESS
TYPE 2		90% SW OR 95% ML	85% SW, 90% ML, 95% CL, OR NATURAL SOILS OF EQUAL FIRMNESS
* TYPE 3		85% SW, 90% ML, OR 95% CL	85% SW, 90% ML, 95% CL, OR NATURAL SOILS OF EQUAL FIRMNESS

TABLE 1 NOTES:

* THE TYPE 3 INSTALLATION SHOWN IS THE NDOR MINIMUM STANDARD, USING EITHER A SHAPED TRENCH ACCORDING TO THE STANDARD SPECIFICATIONS, OR AT THE OPTION OF THE CONTRACTOR, THE BEDDING WITH COMPACTIONS AS SHOWN.

ALLOWABLE FILL HEIGHTS FOR THE TYPE 1, 2, AND 3 INSTALLATIONS ARE SHOWN IN TABLE 4.

PLACE 3' TO 4' OF COHESIVE SOIL PLUG AT THE INLET AROUND THE CULVERT TO PREVENT SECONDARY FLOWS.



LIMITS OF BEDDING AND BACKFILL

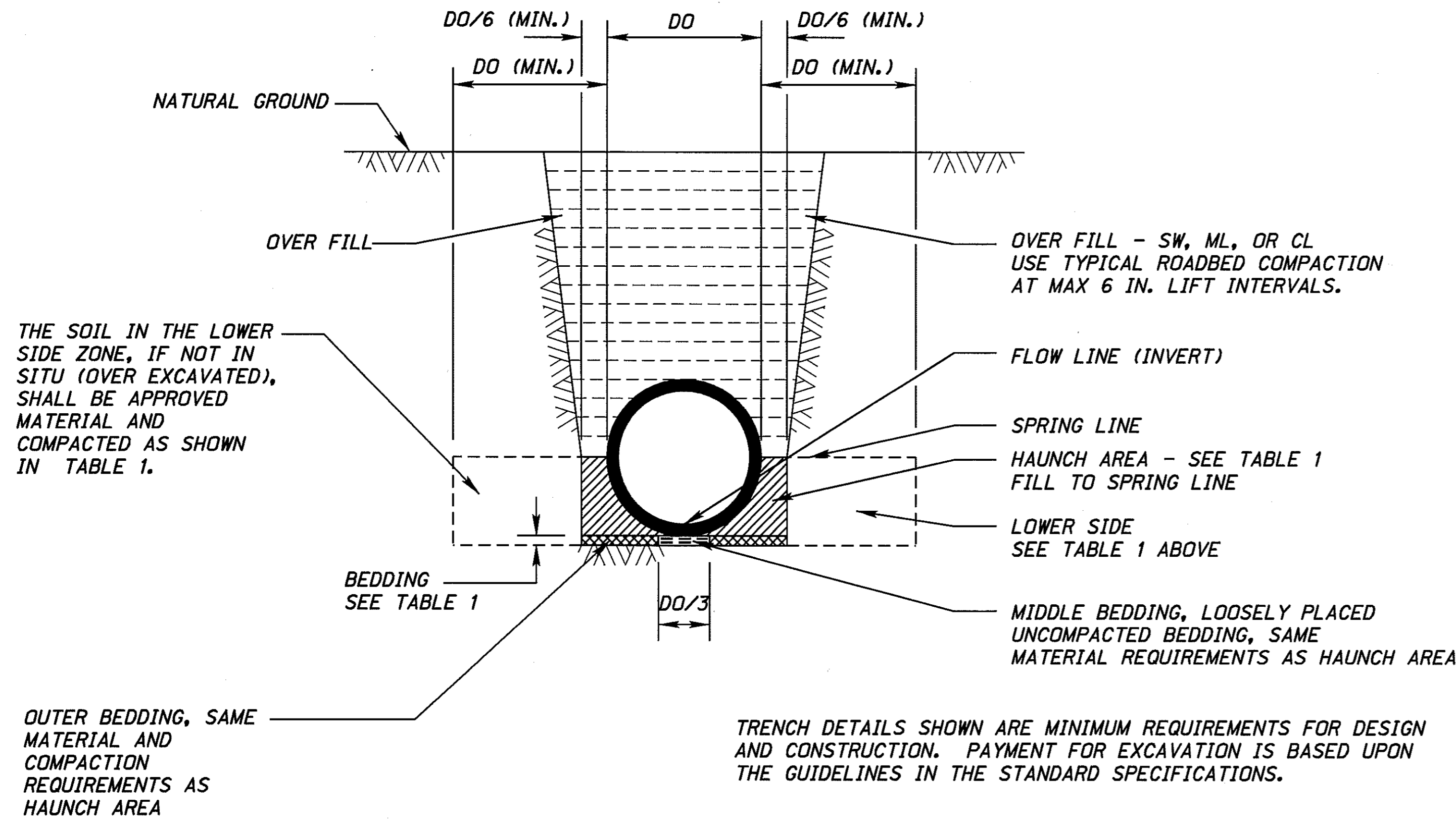
EXCAVATION, BEDDING AND EMBANKMENT SEQUENCE:

TRENCH INSTALLATION:

- (A) DETERMINE THE FLOW LINE AND TRENCH BOTTOM ELEVATIONS.
- (B) DETERMINE THE SHAPE OF TRENCH. DECIDE IF SHORING IS NEEDED. CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR THE SAFETY OF ALL WORKERS, EQUIPMENT AND MATERIALS IN THE TRENCH.
- (C) PLACE THE BEDDING MATERIAL (SEE TABLE 1) LOOSELY.
- (D) PLACE PIPE ON THE BEDDING AND COMPACT OUTER BEDDING, (SEE TABLE 1).
- (E) PLACE AND COMPACT THE LOWER SIDE, HAUNCH AND OVERFILL MATERIAL AT 6 IN. INTERVALS.

EMBANKMENT INSTALLATION:

- (A) DETERMINE THE FLOW LINE AND SPRING LINE ELEVATION.
- (B) IF FLOW LINE IS ABOVE THE NATURAL GROUND, PLACE AN EMBANKMENT AT LEAST 3DO WIDE WITH 3:1 FORESLOPES OR FLATTER AT SPRING LINE ELEVATION, COMPACTED AT ROADBED REQUIRED COMPACTION.
- (C) IF THE FLOW LINE IS BELOW THE NATURAL GROUND BUT THE SPRING LINE IS ABOVE THE NATURAL GROUND, PLACE THE EMBANKMENT SIMILAR TO THE ONE IN STEP B.
- (D) EXCAVATE TO PROPER ELEVATION.
- (E) PLACE BEDDING MATERIAL (SEE TABLE 1) LOOSELY.
- (F) PLACE THE PIPE ON THE BEDDING MATERIAL AND COMPACT OUTER BEDDING MATERIAL (SEE TABLE 1).
- (G) PLACE AND COMPACT THE HAUNCH, LOWER SIDE AND OVERFILL MATERIAL AT 6 IN. INTERVALS.



TRENCH DETAILS SHOWN ARE MINIMUM REQUIREMENTS FOR DESIGN AND CONSTRUCTION. PAYMENT FOR EXCAVATION IS BASED UPON THE GUIDELINES IN THE STANDARD SPECIFICATIONS.

TRENCHES SHALL BE EXCAVATED IN ACCORDANCE WITH APPROVED SAFETY PRACTICE.

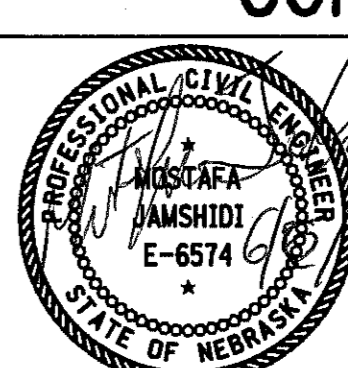
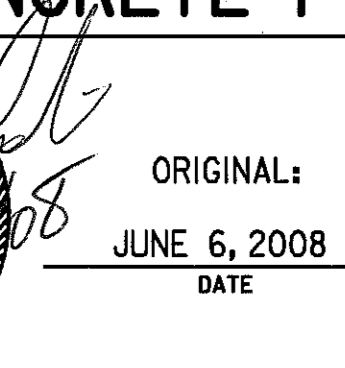
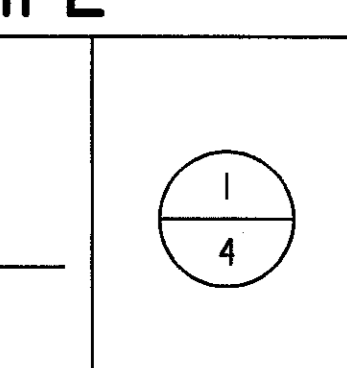
TYPICAL TRENCH INSTALLATION

NOTES FOR TRENCH INSTALLATIONS:

1. COMPACTION AND SOIL SYMBOLS, I.E. 95% SW, REFER TO SW SOIL MATERIAL WITH MINIMUM STANDARD PROCTOR COMPACTION OF 95%.
2. THE TRENCH TOP ELEVATION SHALL BE NO LOWER THAN 1 FT. BELOW THE BOTTOM OF THE PAVEMENT BASE MATERIAL.
3. SOIL IN BEDDING AND HAUNCH ZONES SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS SPECIFIED FOR THE MAJORITY OF SOIL IN THE BACKFILL ZONES.
4. THE TRENCH WIDTH SHALL BE WIDER THAN SHOWN IF REQUIRED FOR ADEQUATE SPACE TO ATTAIN THE SPECIFIED COMPACTION IN THE HAUNCH AND BEDDING ZONES.
5. FOR TRENCH WALLS THAT ARE WITHIN 10 DEGREES OF VERTICAL, THE COMPACTION OR FIRMNESS OF THE SOIL IN THE TRENCH WALLS AND LOWER SIDE ZONE NEED NOT TO BE CONSIDERED.
6. FOR TRENCH WALLS WITH GREATER THAN 10 DEGREE SLOPES THAT CONSIST OF EMBANKMENT, THE LOWER SIDE SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS SPECIFIED FOR THE SOIL IN THE BACKFILL ZONE.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 411
**BEDDING AND BACKFILL
REQUIREMENTS FOR
CONCRETE PIPE**

ORIGINAL:  ORIGINAL:  ORIGINAL: 

JUNE 6, 2008
DATE

1
4

**TABLE 1
STANDARD INSTALLATIONS, SOILS AND
MINIMUM COMPACTION REQUIREMENTS**

INSTALLATION TYPE	BEDDING THICKNESS	HAUNCH AND OUTER BEDDING	LOWER SIDE
TYPE 1	DO/24 MINIMUM, NOT LESS THAN 3 IN. IF ROCK FOUNDATION, USE DO/12 MINIMUM, NOT LESS THAN 6 IN.	95% SW	90% SW, 95% ML, OR 100% CL.
TYPE 2		90% SW OR 95% ML	85% SW, 90% ML, OR 95% CL.
* TYPE 3		85% SW, 90% ML, OR 95% CL	85% SW, 90% ML, OR 95% CL.

TABLE 1 NOTES:

* THE TYPE 3 INSTALLATION SHOWN IS THE NDOR MINIMUM STANDARD, USING EITHER A SHAPED TRENCH ACCORDING TO THE STANDARD SPECIFICATIONS, OR AT THE OPTION OF THE CONTRACTOR, THE BEDDING WITH COMPACTIONS AS SHOWN.

ALLOWABLE FILL HEIGHTS FOR THE TYPE 1, 2, AND 3 INSTALLATIONS ARE SHOWN IN TABLE 4.

**TABLE 2
PIPE DIMENSIONS**

NOMINAL PIPE DIAMETER (INCHES)	STANDARD OUTSIDE PIPE DIAMETER, DO (SPAN)			
	ROUND PIPE	ARCH PIPE	H. ELLIP. PIPE	V. ELLIP. PIPE
15	19.5	22.5		
18	23	27	28.5	
21	26.5	31.5		
24	30	34.5	36.5	
27	33.5		41	
30	37	43.25	45.5	
36	44	51.75	54	38
42	51	60.13	63	44
48	58	68.5	71	49
54	65	76	80	55
60	72	85	89	61
66	79		97	67
72	86	102	106	73
78	93		114	79
84	100	118	123	85
90	107			
96	114			
102	121			
108	128			

**TABLE 3
SOIL CLASSIFICATION FOR BEDDING & BACKFILL**

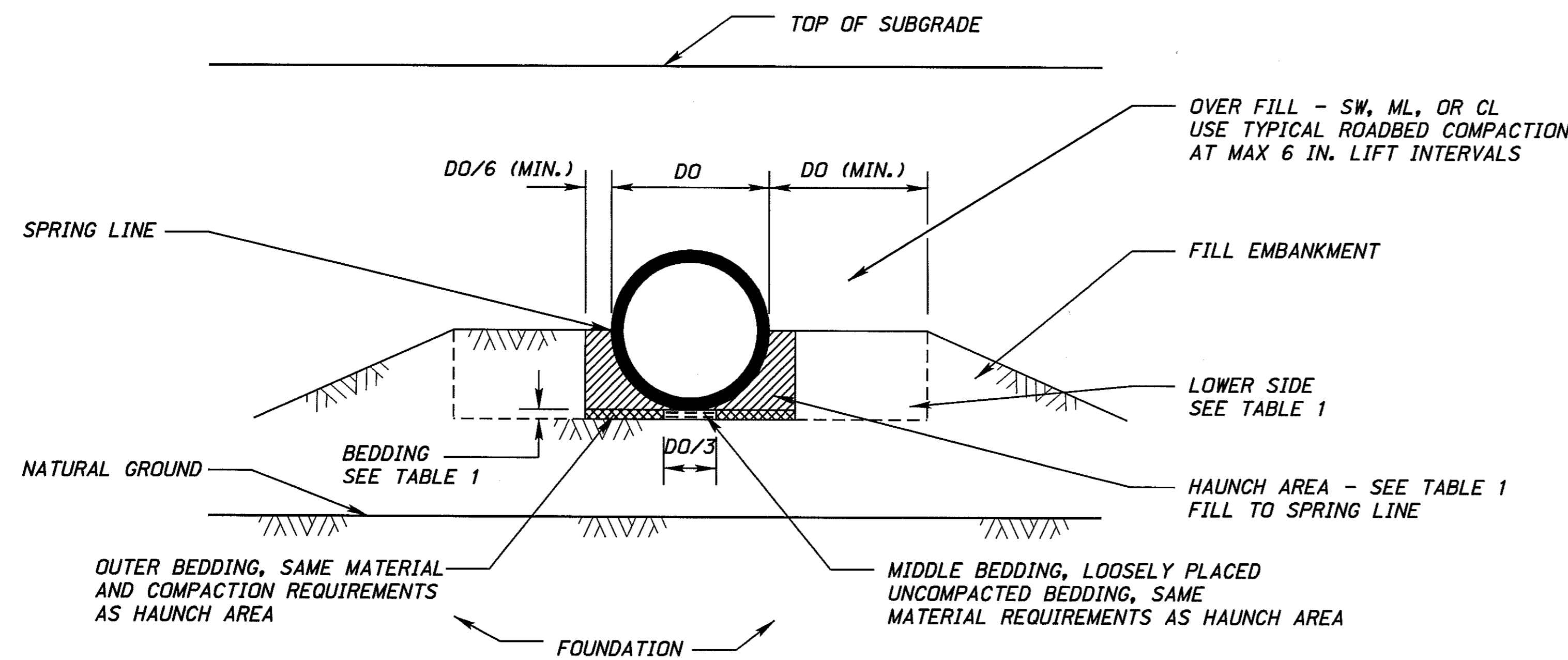
ASTM SOIL GROUP SYMBOL D 2487	DESCRIPTION	PERCENTAGE PASSING SIEVE SIZES		
		1 1/2 IN. (40 mm)	NO. 4 (4.75 mm)	NO. 200 (0.075 mm)
SW	WELL GRADED SANDS AND GRAVELLY-SANDS: LITTLE OR NO FINES, NON PLASTIC	100%	> 50% OF "COURSE FRACTION"	< 5%
ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY-FINE-SANDS, SILTS WITH SLIGHT PLASTICITY		100%	> 50%
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELY-CLAYS, SANDY-CLAYS, SILTY-CLAYS, LEAN CLAYS			

NOTES FOR EMBANKMENT INSTALLATIONS:

1. COMPACTION AND SOIL SYMBOLS, I.E. 95% SW, REFER TO SW SOIL MATERIAL WITH A MINIMUM STANDARD PROCTOR COMPACTION OF 95%.
2. SOIL IN THE OUTER BEDDING, HAUNCH, AND LOWER SIDE ZONES, EXCEPT WITHIN THE DO/3 MIDDLE BEDDING, SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS THE MAJORITY OF THE SOIL IN THE OVERFILL ZONES.
3. SUBTRENCHES
 - 3.1 A SUBTRENCH IS DEFINED AS A TRENCH WITH ITS TOP AT AN ELEVATION LOWER THAN 1 FT. BELOW THE BOTTOM OF THE PAVEMENT BASE MATERIAL.
 - 3.2 THE MINIMUM WIDTH OF A SUBTRENCH SHALL BE 1.33DO, OR WIDER IF REQUIRED FOR ADEQUATE SPACE TO ATTAIN THE SPECIFIED COMPACTION IN THE HAUNCH AND BEDDING ZONES.
 - 3.3 FOR SUBTRENCHES WITH WALLS OF NATURAL SOIL, ANY PORTION OF THE LOWER SIDE ZONE IN THE SUBTRENCH WALL SHALL BE AT LEAST AS FIRM AS AN EQUIVALENT SOIL PLACED TO THE COMPACTION REQUIREMENTS SPECIFIED FOR THE LOWER SIDE ZONE, AND AS FIRM AS THE MAJORITY OF SOIL IN THE OVERFILL ZONE, OR SHALL BE REMOVED AND REPLACED WITH SOIL COMPACTED TO THE SPECIFIED LEVEL.

GENERAL NOTES:

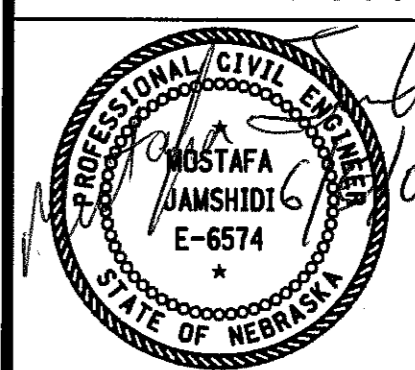
- WHEN IN-SITU LATERAL SOIL RESISTANCE IS NEGLIGIBLE, E.G. PEAT, MUCK, OR HIGHLY EXPANSIVE SOIL, EMBEDMENT SHALL BE PLACED AND COMPACTED AT THE DIRECTION OF THE ENGINEER.
- TO PROTECT THE PIPE AND BACKFILL DURING CONSTRUCTION, PROVIDE A MINIMUM OF 36 IN. OF COMPACTED FILL MATERIAL OVER THE TOP OF THE PIPE BEFORE ALLOWING ANY HEAVY EQUIPMENT TO TRAVERSE OVER THE PIPE. EXTREMELY HEAVY EQUIPMENT MAY REQUIRE LARGER COVER AS DETERMINED BY THE CONTRACTOR.
- THE PIPE VOLUME SHOULD NOT BE SUBTRACTED FROM THE VOLUME OF EXCAVATION.
- THESE DESIGN STANDARDS ARE MINIMUM. IF A MORE RESTRICTIVE DESIGN IS REQUIRED BY THE ENGINEER OR CULVERT MANUFACTURER, THEN THESE STANDARDS SHALL BE MODIFIED. CHANGES TO PAY ITEM QUANTITIES DUE TO UNFORESEEN SITE CONDITIONS SHALL BE CALCULATED AND INCORPORATED INTO THE CONTRACT THRU A CHANGE ORDER.
- BOTH ENDS OF THE PIPE SHALL BE SEALED WITH COHESIVE SOIL (AROUND THE PIPE EXTENDING 3 FT. TO 4 FT. FROM EACH END) TO PROTECT AGAINST INFILTRATION AND EROSION.
- BEDDING AND BACKFILL MATERIAL IS NOT PAID FOR DIRECTLY, BUT IS SUBSIDIARY TO THE LINEAR FEET OF CULVERT.
- BEDDING AND BACKFILL MATERIAL SHALL MEET ASTM D 2487 (SOIL GROUPS AS SHOWN IN TABLE 3).
- PERCENT COMPACTION SHALL BE DETERMINED IN ACCORDANCE WITH NDOR STANDARD TEST METHOD T 99.



TYPICAL EMBANKMENT INSTALLATION

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 411
**BEDDING AND BACKFILL
REQUIREMENTS FOR
CONCRETE PIPE**


 ORIGINAL:
 MUSTAFA JAMSHIDI
 E-6574
 JUNE 6, 2008
 DATE

2
4

STANDARD INSTALLATIONS, SOILS AND MINIMUM COMPACTION REQUIREMENTS

INSTALLATION TYPE	BEDDING THICKNESS	HAUNCH AND OUTER BEDDING	LOWER SIDE
TYPE 1	DO/24 MINIMUM, NOT LESS THAN 3 IN. IF ROCK FOUNDATION, USE DO/12 MINIMUM, NOT LESS THAN 6 IN.	95% SW	90% SW, 95% ML, OR 100% CL,
TYPE 2		90% SW OR 95% ML	85% SW, 90% ML, OR 95% CL,
* TYPE 3		85% SW, 90% ML, OR 95% CL	85% SW, 90% ML, OR 95% CL,

NOTES:

* THE TYPE 3 INSTALLATION (SHADED) IN TABLE 4 IS THE NDOR STANDARD, USING EITHER A SHAPED TRENCH ACCORDING TO THE STANDARD SPECIFICATIONS, OR AT THE OPTION OF THE CONTRACTOR, THE BEDDING WITH COMPACTIONS AS SHOWN.

INSTALLATION TYPE 2 AND TYPE 1 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE 1 WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL. THE CONTRACTOR WILL CHOOSE THE INSTALLATION TYPE AND CLASS OF PIPE. ACTUAL PROJECT FILL HEIGHTS MUST BE KNOWN IN ORDER TO USE TABLE 4.

ROUND EQUIVALENT, NON-CIRCULAR PIPE SUCH AS ARCH OR ELLIPTICAL PIPE, MAY BE SELECTED, PROVIDED SUCH PIPE ARE DESIGNED AND MANUFACTURED TO THE SAME D-LOADS AND ULTIMATE STRENGTHS (SEE TABLE 5) AS THE SELECTED CIRCULAR PIPE FROM THE FILL HEIGHT TABLE.

**TABLE 4
MAXIMUM FILL HEIGHTS (FEET) FOR STANDARD DESIGN (AASHTO M 170) ROUND CONCRETE PIPE**

PIPE SIZE (IN.)	INSTALLATION TYPE 3* (NDOR STANDARD)			INSTALLATION TYPE 2			INSTALLATION TYPE 1		
	CLASS III	CLASS IV	CLASS V	CLASS III	CLASS IV	CLASS V	CLASS III	CLASS IV	CLASS V
15	12	15	21	15	19	26	23	28	40
18	12	17	24	16	22	30	24	32	45
21	13	19	26	16	24	32	25	37	48
24	13	19	26	17	24	33	25	32	45
27	13	17	26	17	21	34	23	26	51
30	12	14	25	15	17	32	20	21	49
36	10	16	24	13	21	31	20	31	47
42	10	15	23	13	19	29	20	29	44
48	10	14	22	13	18	29	20	28	43
54	10	14		13	17		20	27	
60	9	14		12	18		19	28	
66	9	14		12	18		19	28	
72	9	14		12	18		19	28	
78	9			12			19		
84	9			12			19		
90	9			12			20		
96	9			12			19		
102	10			13			20		
108	10			14			22		

TABLE 4 NOTES:

AASHTO M 170 SPECIFICATIONS ARE MODIFIED AS FOLLOWS:

ONLY SINGLE INNER CAGE, CIRCULAR REINFORCING IS ALLOWED FOR CLASS III, 15, 18, 21, AND 24 IN. ROUND RCP AS SHOWN:

PIPE SIZE (IN.)	CLASS	MINIMUM CIRCUMFERENTIAL REINFORCING (IN. ² /FT. OF PIPE WALL)
15	III	0.08
18	III	0.10
21	III	0.12
24	III	0.14

APPLICABLE SPECIFICATIONS:

- AASHTO M 170---ROUND RCP
- AASHTO M 206---ARCH RCP
- AASHTO M 207---ELLIPTICAL RCP

**TABLE 5
D-LOADS FOR CONCRETE PIPE**

PIPE CLASS	III	IV	V
D-LOAD TO PRODUCE A 0.01-IN. CRACK	1350	2000	3000
D-LOAD TO PRODUCE THE ULTIMATE LOAD	2000	3000	3750

NOTES:

LOAD ON PIPE IN POUNDS PER LINEAR FOOT = D-LOAD X INSIDE SPAN IN FEET
D-LOAD = TEST LOAD EXPRESSED IN POUNDS-FORCE PER LINEAR FOOT PER FOOT OF DIAMETER

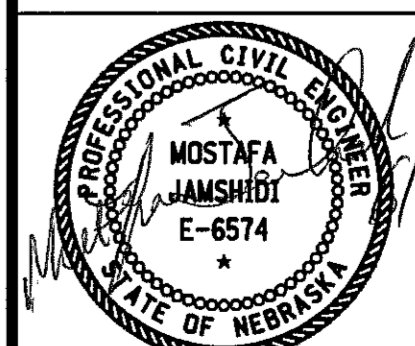
GENERAL NOTES:

FILL HEIGHTS SHOWN IN TABLE 4 WERE DEVELOPED USING ASCE STANDARDS FOR DIRECT DESIGN OF BURIED PRECAST CONCRETE PIPE, MANUFACTURED IN ACCORDANCE WITH AASHTO M 170 SPECIFICATION REQUIREMENTS (SEE TABLE 4 FOOTNOTE FOR EXCEPTIONS). FILL HEIGHTS SHOWN APPLY ONLY TO ROUND PIPE (UNDER FULL FLOW CONDITIONS), USED UNDER RIGID AND FLEXIBLE PAVEMENT, WITH SOIL OVERFILL WEIGHING 120 POUNDS PER CUBIC FOOT. UNDER SPECIAL CIRCUMSTANCES (WHERE PAVEMENT IS NOT USED AND LIVE LOAD BECOMES CRITICAL, OR DIFFERENT SOIL DENSITY IS ENCOUNTERED, OR THE ONE FOOT MINIMUM CLEARANCE FROM THE BOTTOM OF THE PAVEMENT TO THE TOP OF THE PIPE CANNOT BE MAINTAINED) THESE FILL HEIGHTS MAY NEED TO BE MODIFIED. DEEPER FILL HEIGHTS MAY BE USED BY SUBMITTING A SPECIAL STANDARD INSTALLATION DIRECT DESIGN (SIDD) FOR NDOR APPROVAL.

CONCRETE PIPE DESIGNS THAT ARE NOT SHOWN IN APPLICABLE AASHTO SPECIFICATIONS WILL BE CONSIDERED SPECIAL DESIGNS THAT MUST BE SUBMITTED TO NDOR FOR APPROVAL.

REV. NO.	DATE	DESCRIPTION OF REVISION

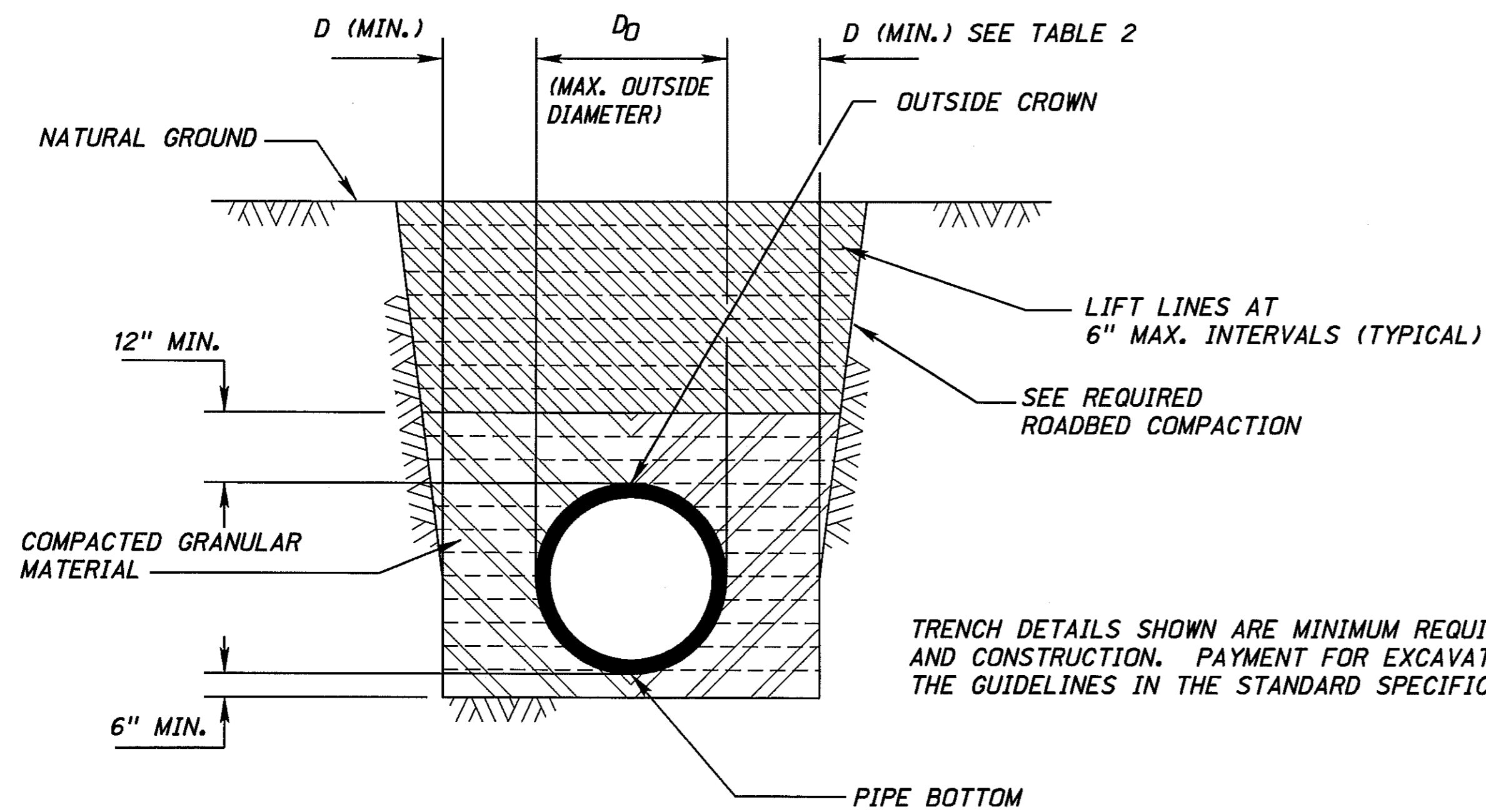
NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 411
BEDDING AND BACKFILL REQUIREMENTS FOR CONCRETE PIPE



MOSTAFA JAMSHIDI
E-6574
STATE OF NEBRASKA

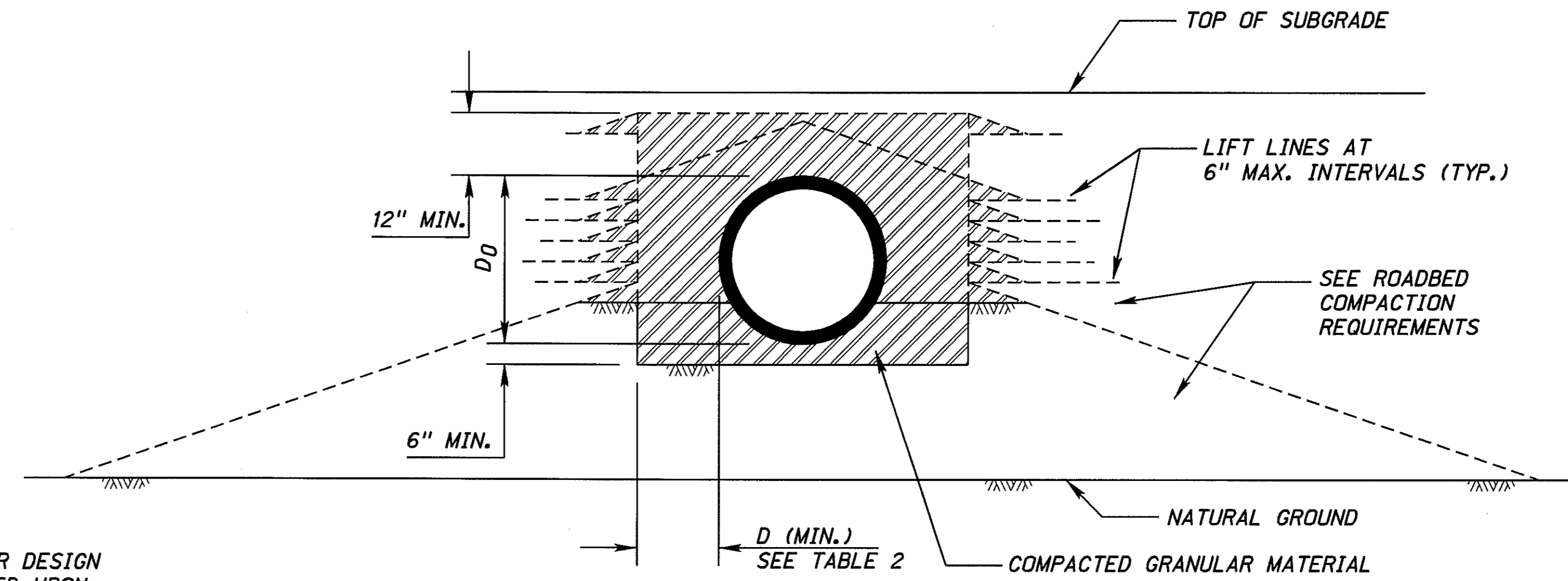
ORIGINAL:
JUNE 6, 2008
DATE

3
4



TRENCHES SHALL BE EXCAVATED IN ACCORDANCE WITH APPROVED SAFETY PRACTICE.

TYPICAL TRENCH INSTALLATION



TYPICAL EMBANKMENT INSTALLATION

NOTES:

INSTALLATIONS AS SHOWN ARE REQUIRED UNDER ALL SURFACED ROADWAYS. BEDDING AND BACKFILL FOR DRIVE PIPE OR OTHER PIPE OUTSIDE THE ROADWAY PRISM (OR BACK OF CURB-LINE FOR URBAN PROJECTS) MAY BE INSTALLED USING SUITABLE EXISTING SOIL, PLACED AND COMPACTED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHERE IN-SITU LATERAL SOIL RESISTANCE IS NEGLIGIBLE E.G. PEAT, MUCK, OR HIGHLY EXPANSIVE SOIL, EMBEDMENT SHALL BE PLACED AND COMPACTED AT THE DIRECTION OF THE ENGINEER.

TO PROTECT THE PIPE AND BACKFILL DURING CONSTRUCTION, PROVIDE A MINIMUM OF 36" OF COMPACTED FILL MATERIAL OVER THE TOP OF THE PIPE BEFORE ALLOWING ANY HEAVY EQUIPMENT TO TRAVERSE OVER THE PIPE. EXTREMELY HEAVY EQUIPMENT MAY REQUIRE LARGER COVER AS DETERMINED BY THE CONTRACTOR.

PIPE VOLUME SHOULD NOT BE SUBTRACTED FROM THE VOLUME OF EXCAVATION.

THESE DESIGN STANDARDS ARE MINIMUM. IF A MORE RESTRICTIVE DESIGN IS REQUIRED BY THE ENGINEER OR THE CULVERT MANUFACTURER, THEN THESE STANDARDS SHALL BE MODIFIED. CHANGES TO PAY ITEM QUANTITIES DUE TO UNFORESEEN SITE CONDITIONS SHALL BE CALCULATED AND INCORPORATED INTO THE CONTRACT BY A CHANGE ORDER.

EXPOSED ENDS OF THE PIPE SHALL BE SEALED WITH COHESIVE SOIL (AROUND THE PIPE EXTENDING 3' TO 4' FROM EACH END) TO PROTECT AGAINST INFILTRATION AND EROSION.

GRANULAR FILL MATERIAL IS NOT PAID FOR DIRECTLY, BUT IS SUBSIDIARY TO THE LINEAR FEET OF CULVERT.

GRANULAR MATERIAL SHALL MEET ASTM D 2487 (SOIL GROUP AS SHOWN IN TABLE 1). MATERIAL SHALL BE COMPACTED TO AT LEAST 90% PROCTOR TEST DENSITY.

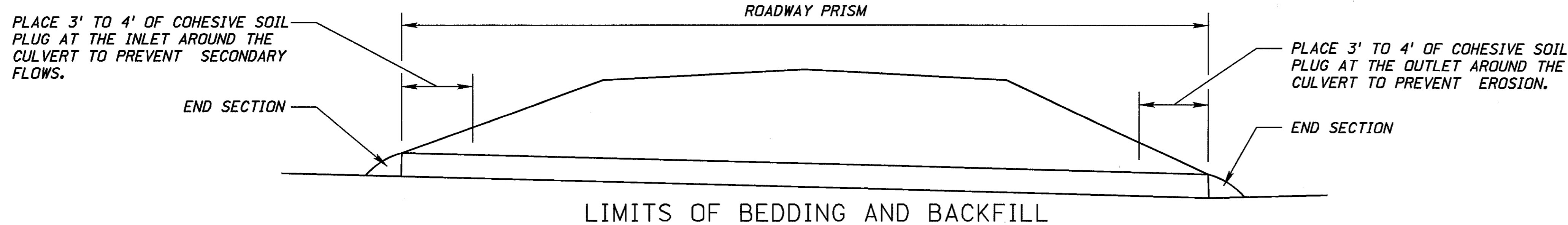
PERCENT COMPACTION SHALL BE DETERMINED IN ACCORDANCE WITH NDOR STANDARD TEST METHOD T 99.

**TABLE 1
SOIL CLASSIFICATION FOR GRANULAR FILL MATERIAL**

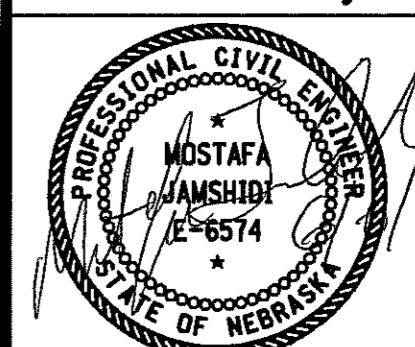
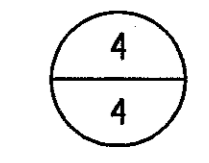
	SOIL GROUP SYMBOL D 2487	DESCRIPTION	% PASSING SIEVE SIZES		
			1/2 IN.	NO. 4	NO. 200
PLASTIC PIPE MCCMP & PCCMP	GW	WELL GRADED GRAVEL AND GRAVEL-SAND MIXTURES; LITTLE OR NO FINES.	100%	< 50% OF COARSE FRACTION	< 5%
	GP	POORLY GRADED GRAVEL AND GRAVEL-SAND MIXTURES; LITTLE OR NO FINES.			
	SW	WELL GRADED SAND AND GRAVEL-SANDS; LITTLE OR NO FINES.	100%	> 50% OF COARSE FRACTION	5% TO 12%
	SP	POORLY GRADED SAND AND GRAVEL-SANDS; LITTLE OR NO FINES.			
	E.G. GW-GC SP-SM	SAND AND GRAVELS WHICH ARE BORDER LINE BETWEEN CLEAN AND WITH FINES.	100%	VARIES	5% TO 12%
	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES.	100%	< 50% OF COARSE FRACTION	12% TO 50%
	GC	CLAYEY-GRAVEL, GRAVEL-SAND-CLAY MIXTURES.			
	SM	SILTY SANDS, SAND-SILT MIXTURES.			

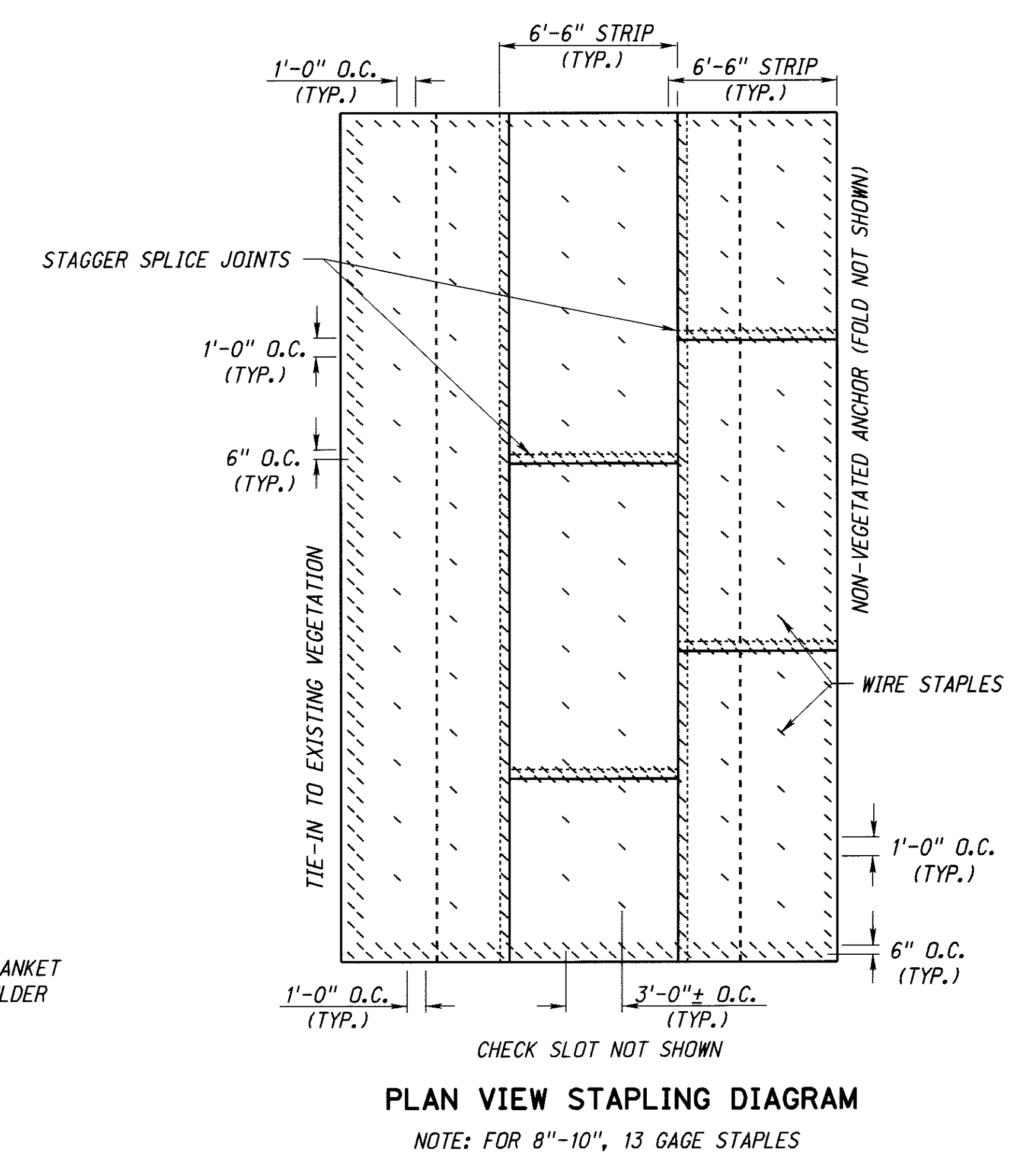
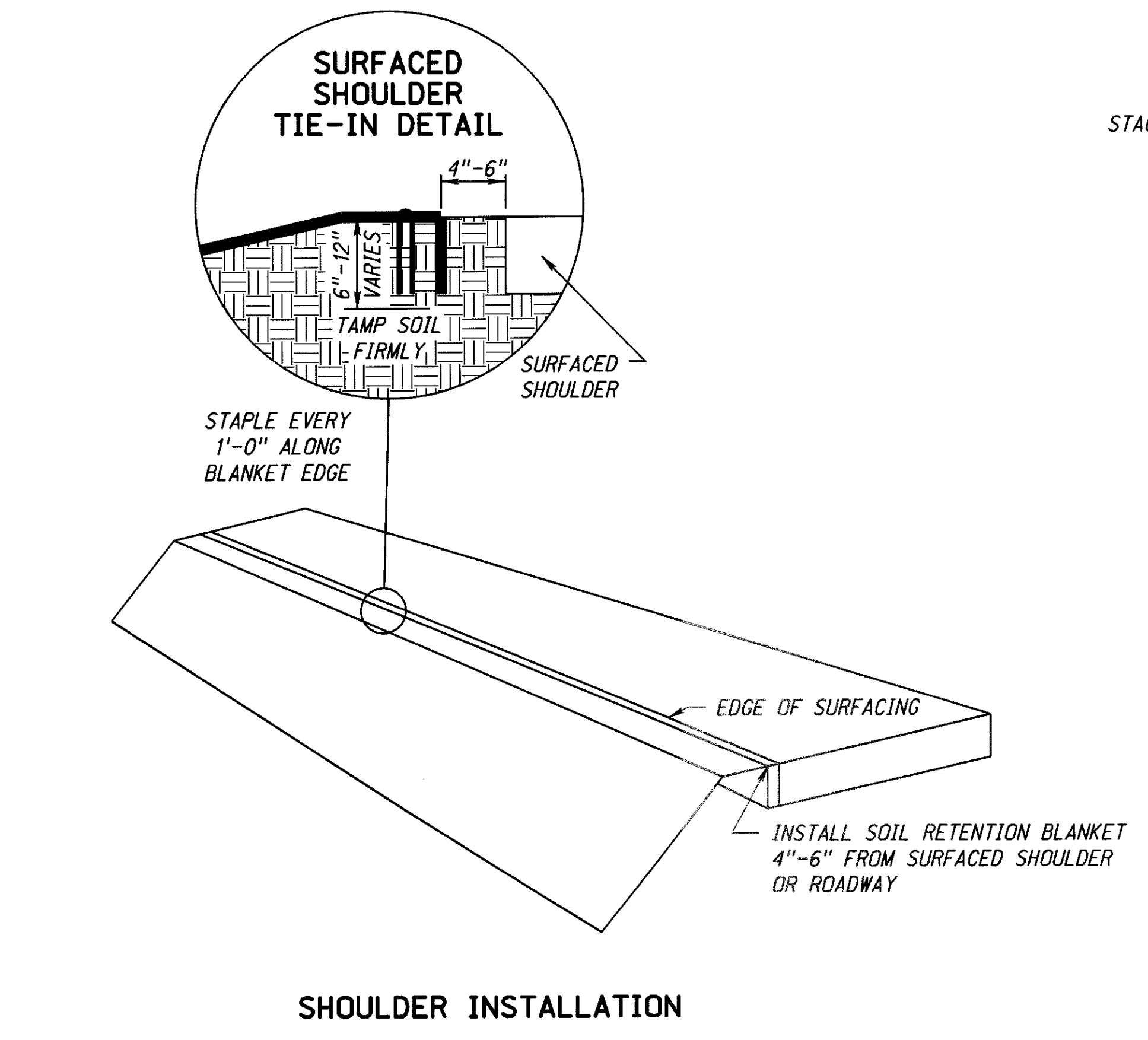
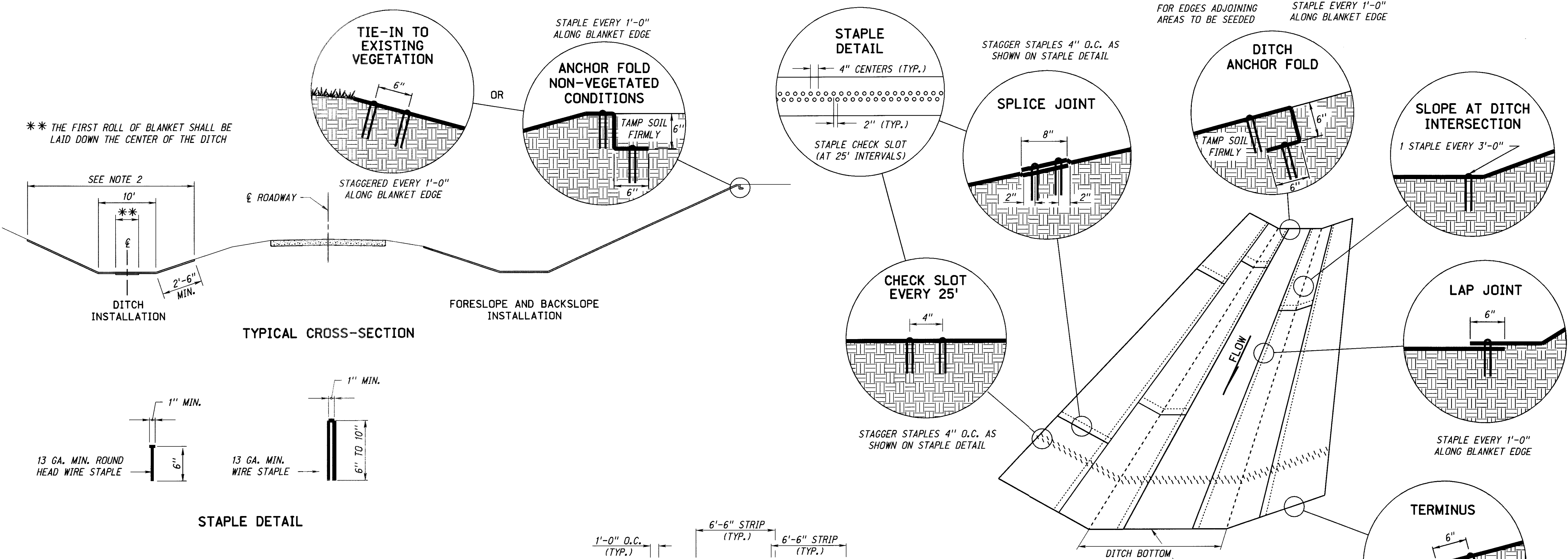
**TABLE 2
MINIMUM D (INCHES)**

NOMINAL PIPE DIAMETER (INCHES)	TRENCH INSTALLATION		EMBANKMENT INSTALLATION	
	METAL PIPE	PLASTIC PIPE	METAL PIPE	PLASTIC PIPE
15	8	8	15	15
18	9	9	18	18
24	9	9	24	24
30	10	10	24	24
36	11	11	24	24
42	24		24	
48	24		24	
54	24		24	
60	24		24	
66	24		24	
72	24		24	
78	24		24	
84	24		24	



LIMITS OF BEDDING AND BACKFILL

REV. NO.	DATE	DESCRIPTION OF REVISION
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 411 BEDDING AND BACKFILL REQUIREMENTS FOR MCCMP, PCCMP, & PLASTIC PIPE		
		ORIGINAL: JUNE 6, 2008 DATE
		



TYPICAL SOIL RETENTION BLANKET INSTALLATION

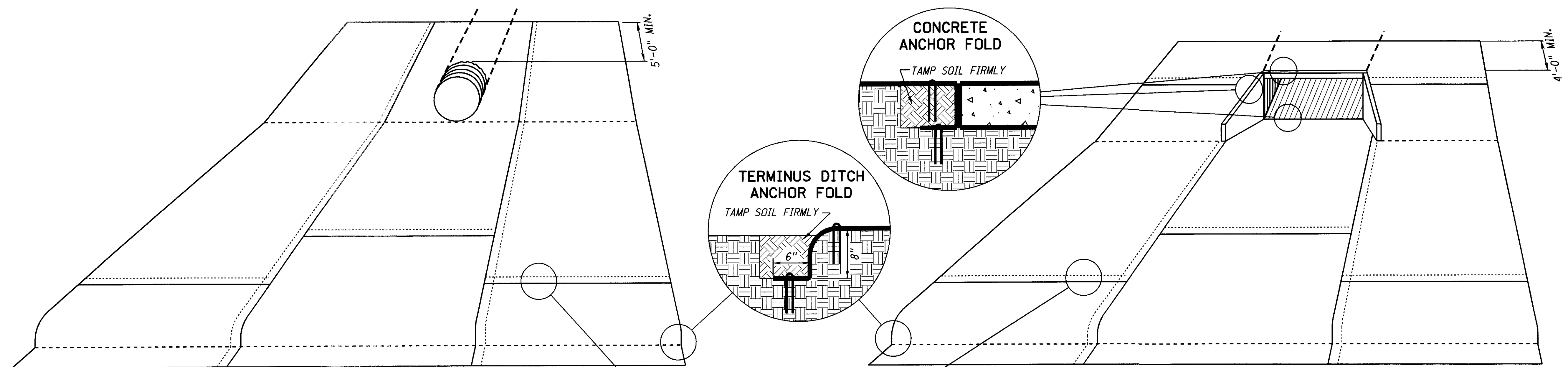
- NOTES:**
- THIS PLAN IS APPLICABLE FOR THE FOLLOWING: EROSION CONTROL, TYPE "HV", "A", "AA", "AAA" OR CLASS 1B, 1C, 1D, 1E, 1F, 2A, 2B, & 2C.
 - SOIL RETENTION BLANKET SHALL BE LAID A MINIMUM OF 2'-6" UP THE BACKSLOPE AND FORESLOPE.
 - CHECK SLOTS ARE PLACED PERPENDICULAR TO DITCH CENTER LINE ON 25'-0" CENTERS.
 - THE MANUFACTURERS' RECOMMENDED STAPLING PATTERN SHALL GOVERN OVER THE PLANS.
 - WHEN USED IN CONJUNCTION WITH EROSION CHECKS, REMOVE 7'-6" OF PAY LENGTH OF EROSION CONTROL FOR EACH EROSION CHECK.

REV. NO.	DATE	DESCRIPTION OF REVISION
R5	OCT. 07	EROSION CONTROL AT SPLASH BASIN
R4	DEC. 06	UPDATE INSTALLATION METHOD
R3	FEB. 01	CHANGE STAPLE DIMENSIONS

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 501-R5
EROSION CONTROL

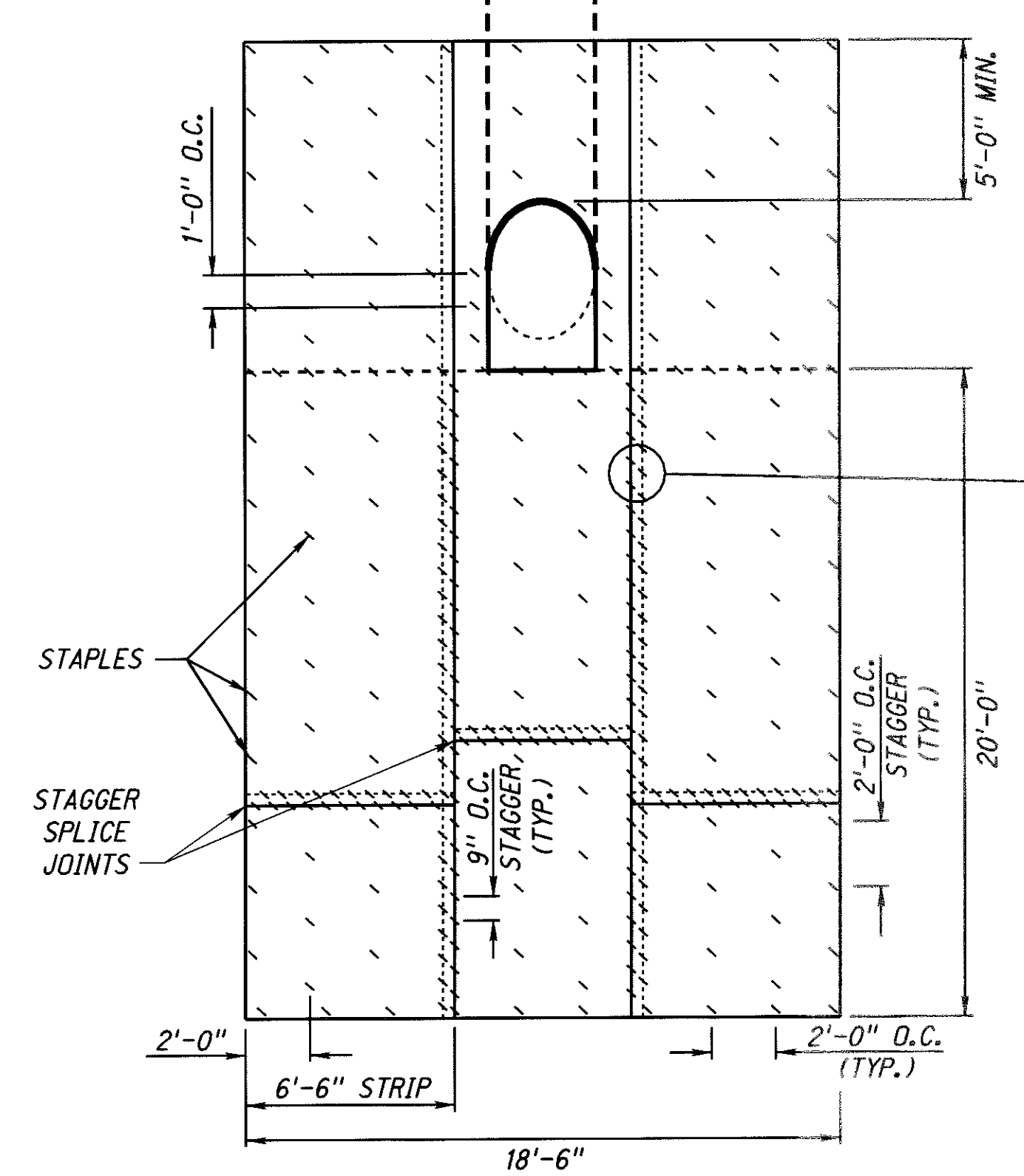
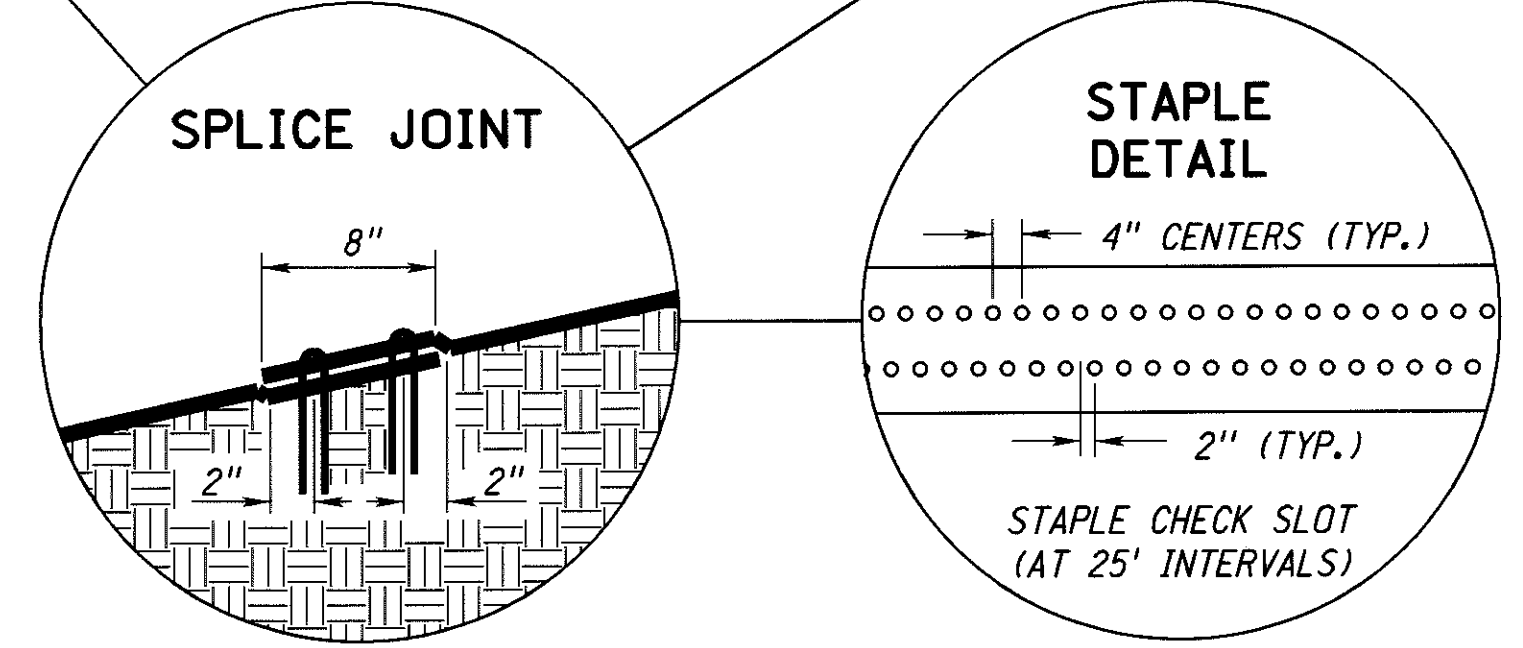
APPROVED: NOVEMBER 14, 1973
DATE

1
3

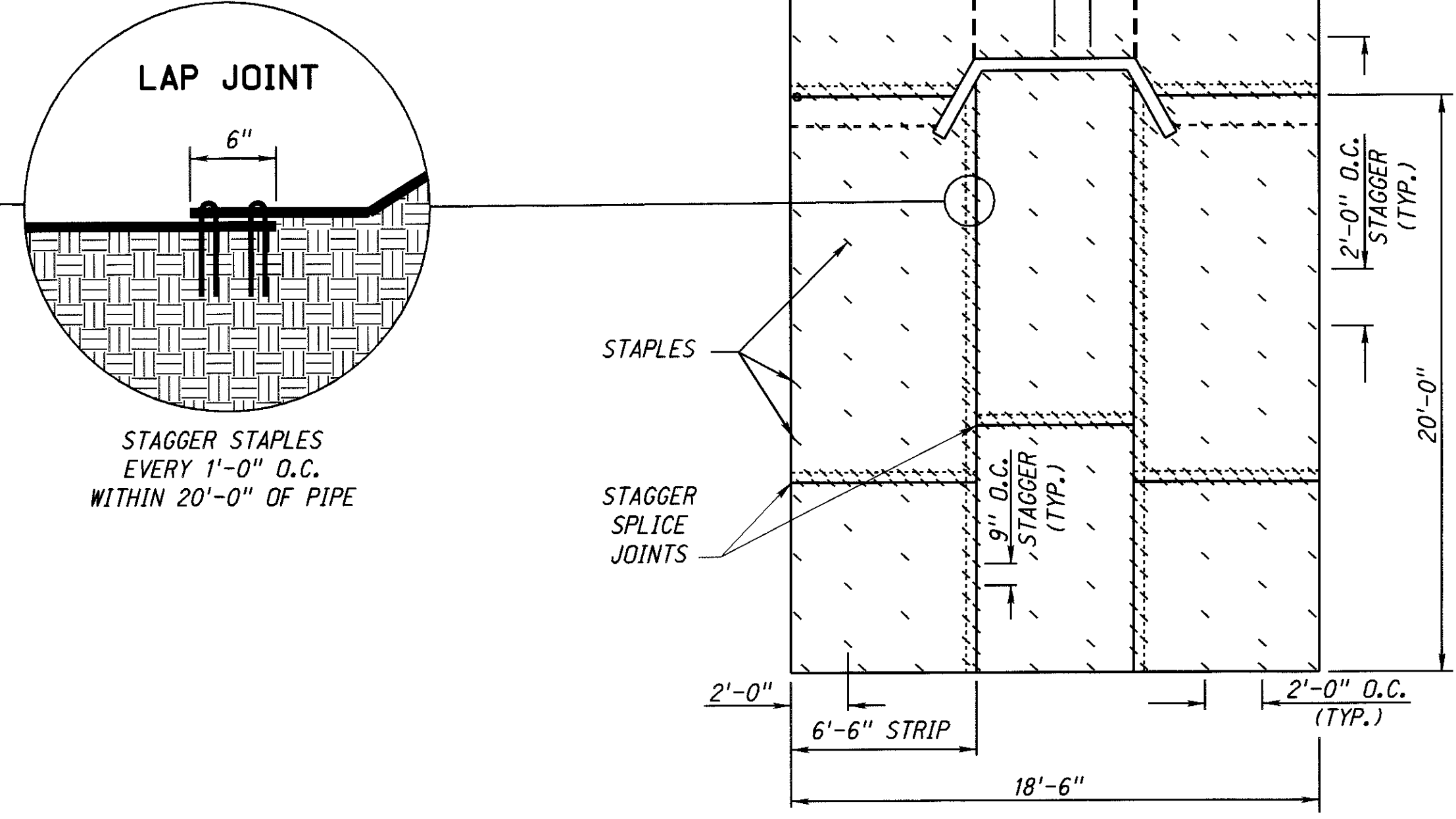


TYPICAL INSTALLATION AT PIPE CULVERT

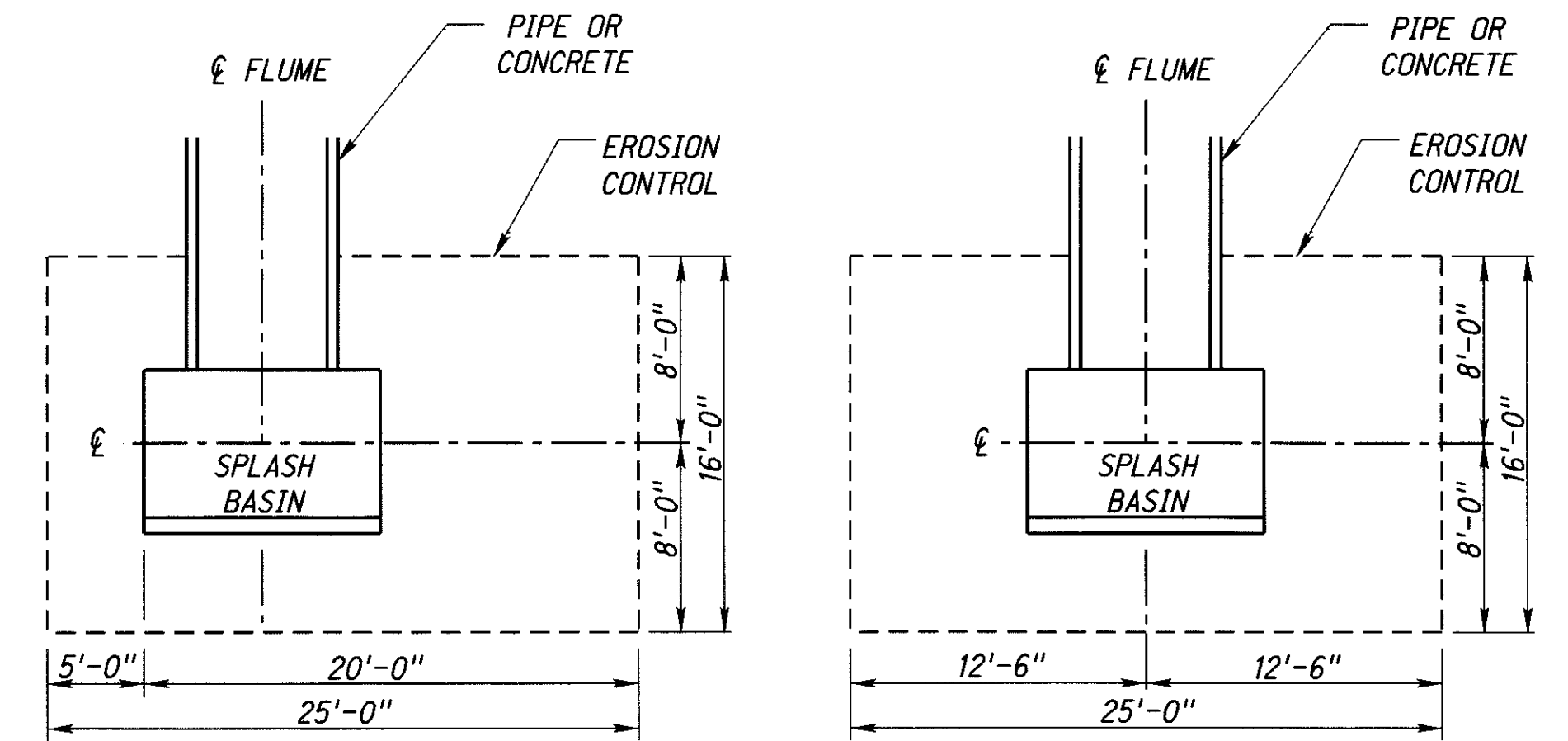
TYPICAL INSTALLATION AT BOX CULVERT



PLAN VIEW STAPLING DIAGRAM



PLAN VIEW STAPLING DIAGRAM



NOTE:
OFFSET EROSION CONTROL PLACEMENT
ALONG THE DRAINAGE PATH

NOTE:
CENTER EROSION CONTROL ON FLUME WHERE
THERE IS NO DEFINED DRAINAGE PATH

EROSION CONTROL PLACEMENT AT SPLASH BASIN

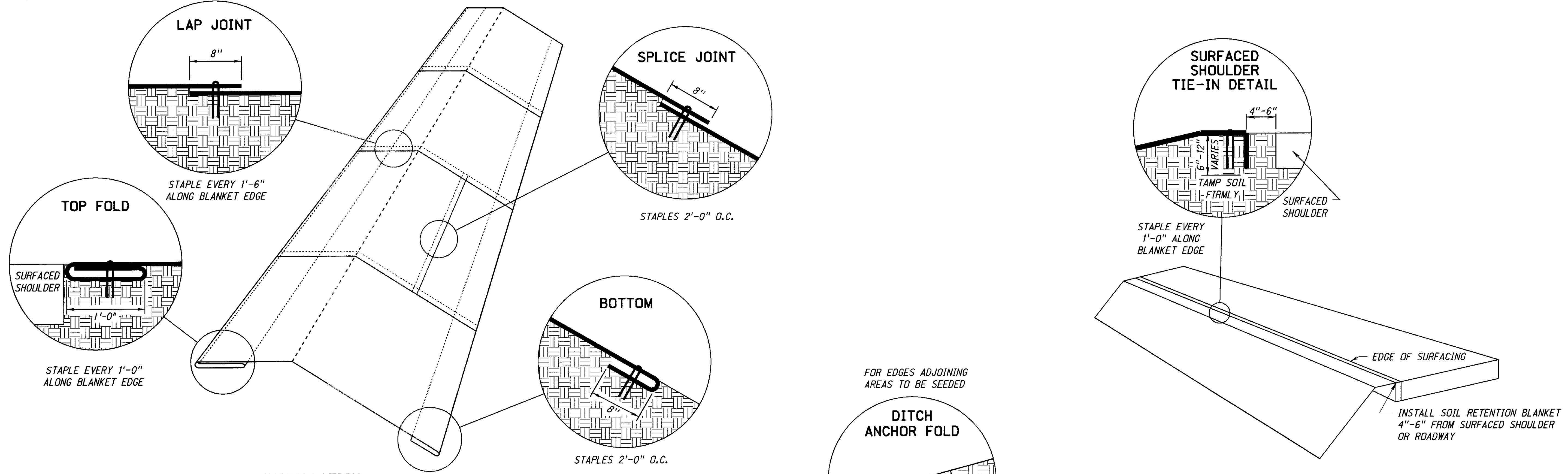
REV. NO.	DATE	DESCRIPTION OF REVISION
R5	OCT.07	EROSION CONTROL AT SPLASH BASIN
R4	DEC.06	UPDATE INSTALLATION METHOD
R3	FEB.01	CHANGE STAPLE DIMENSIONS

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 501-R5
EROSION CONTROL



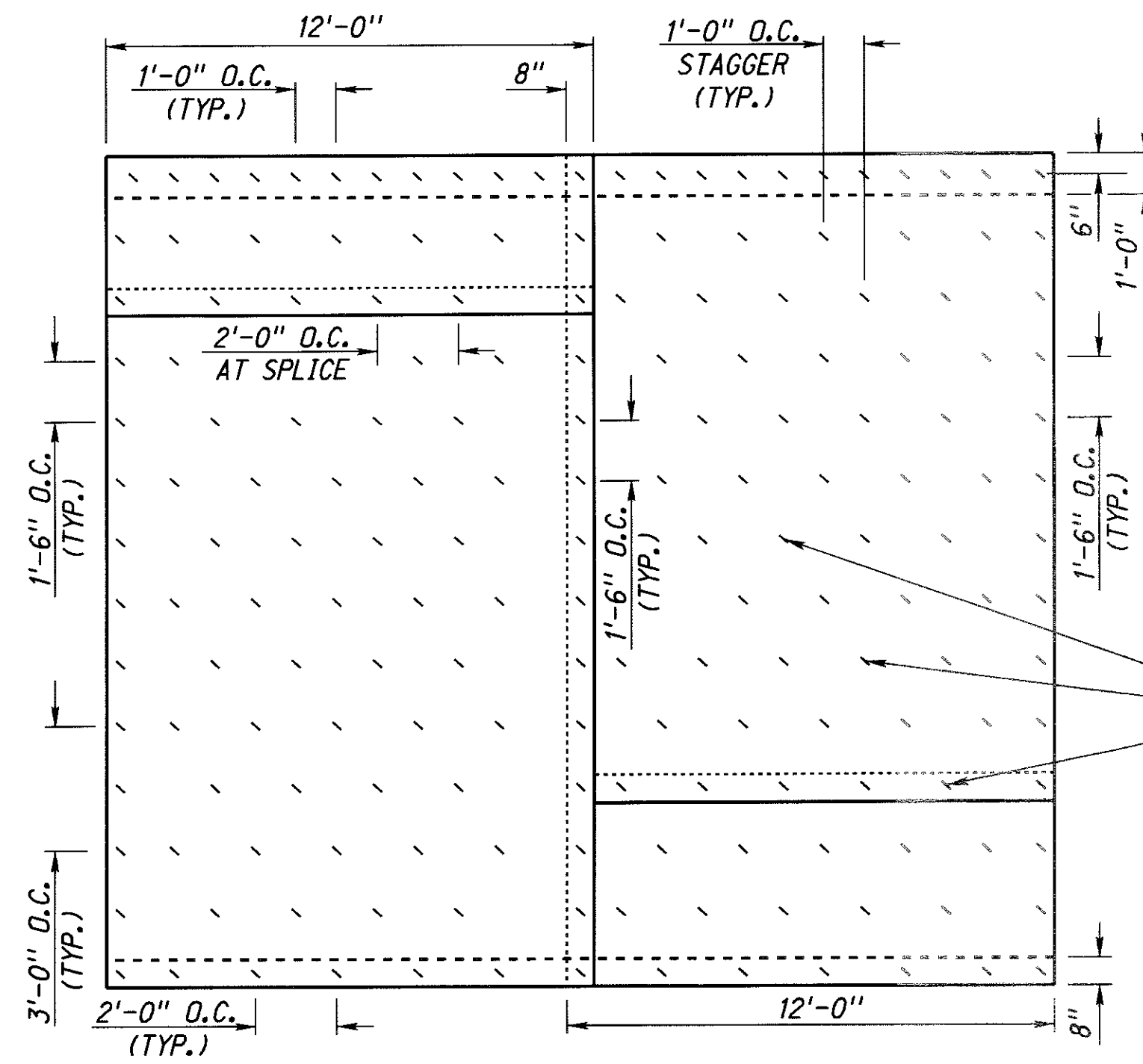
APPROVED:
NOVEMBER 14, 1973
DATE

2
3

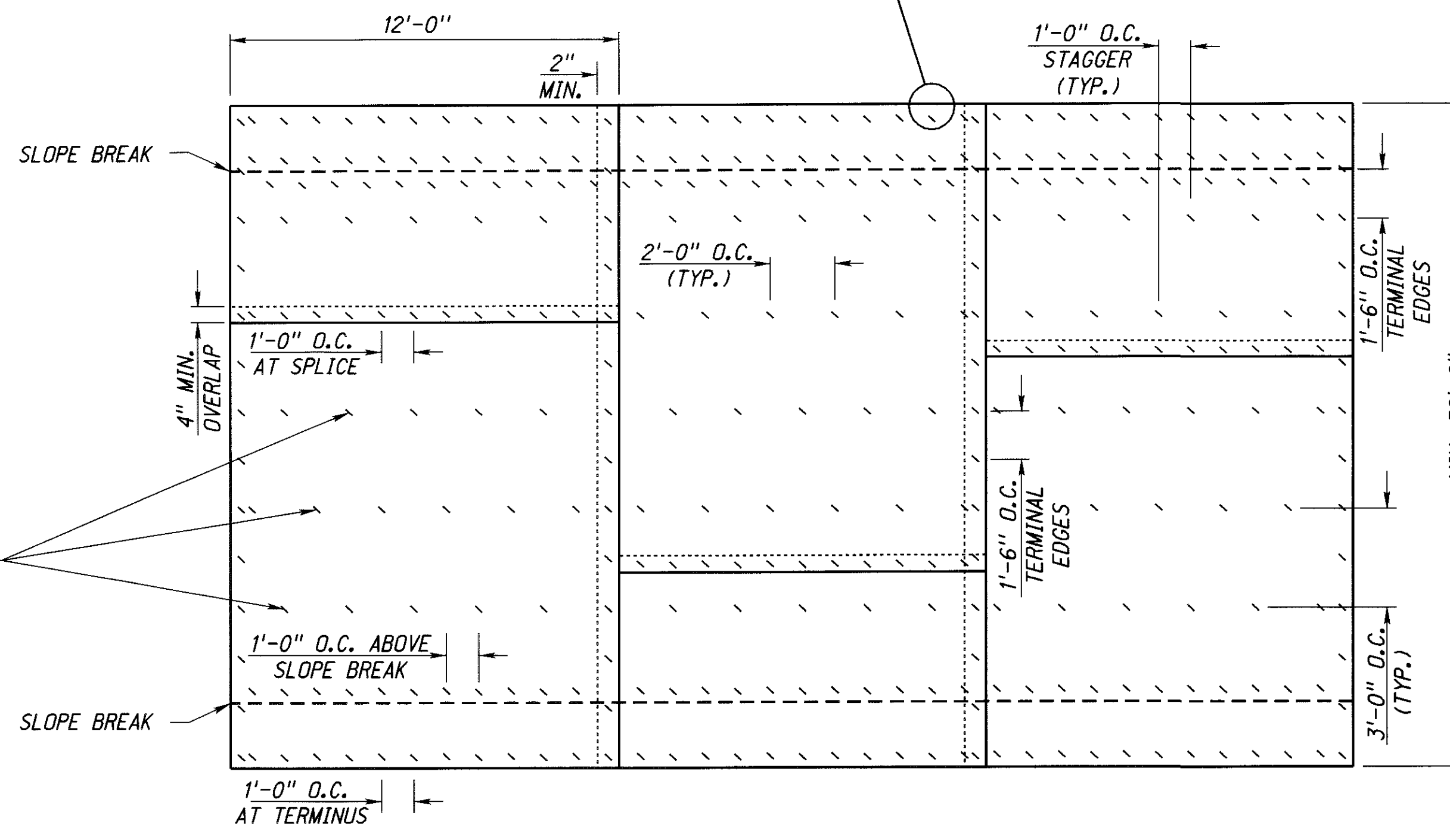


TYPICAL INSTALLATION CLASS 1A (SLOPE PROTECTION, SAND)

SHOULDER INSTALLATION



PLAN VIEW STAPLING DIAGRAM FOR CLASS 1A (SLOPE PROTECTION, SAND)



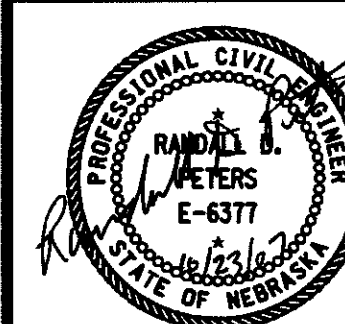
PLAN VIEW STAPLING DIAGRAM FOR CLASS 1B, 1C, 1D, 1E (EROSION CONTROL, B, HV, C1, C)

NOTE: ON SLOPES OVER 50' IN LENGTH (FROM TOP OF SLOPE TO TOE)

- NOTES:
- THE MANUFACTURERS' RECOMMENDED STAPLING PATTERN SHALL GOVERN OVER THE PLANS.

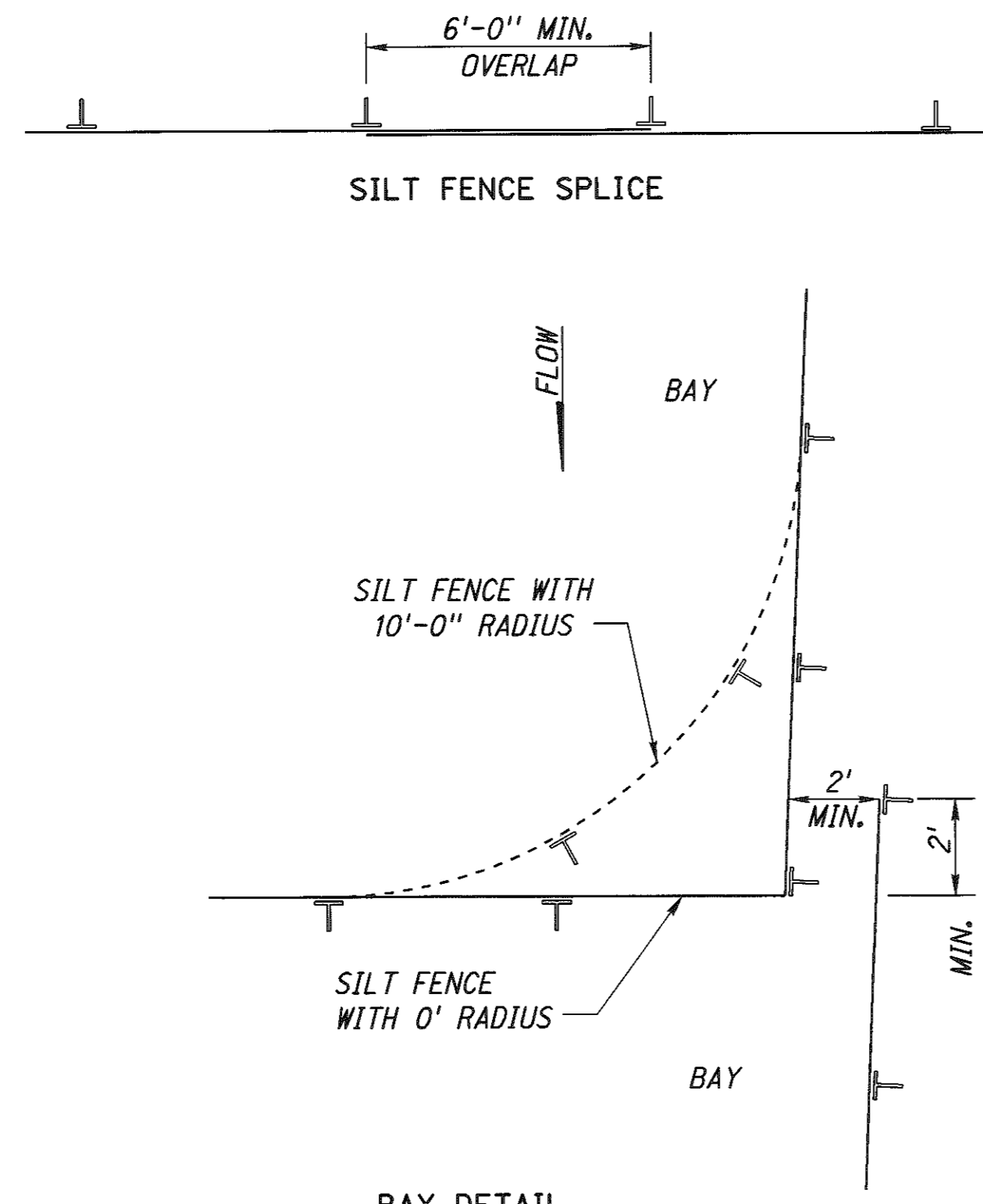
REV. NO.	DATE	DESCRIPTION OF REVISION
R5	OCT. 07	EROSION CONTROL AT SPLASH BASIN
R4	DEC. 06	UPDATE INSTALLATION METHOD
R3	FEB. 01	CHANGE STAPLE DIMENSIONS

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 501-R5
EROSION CONTROL

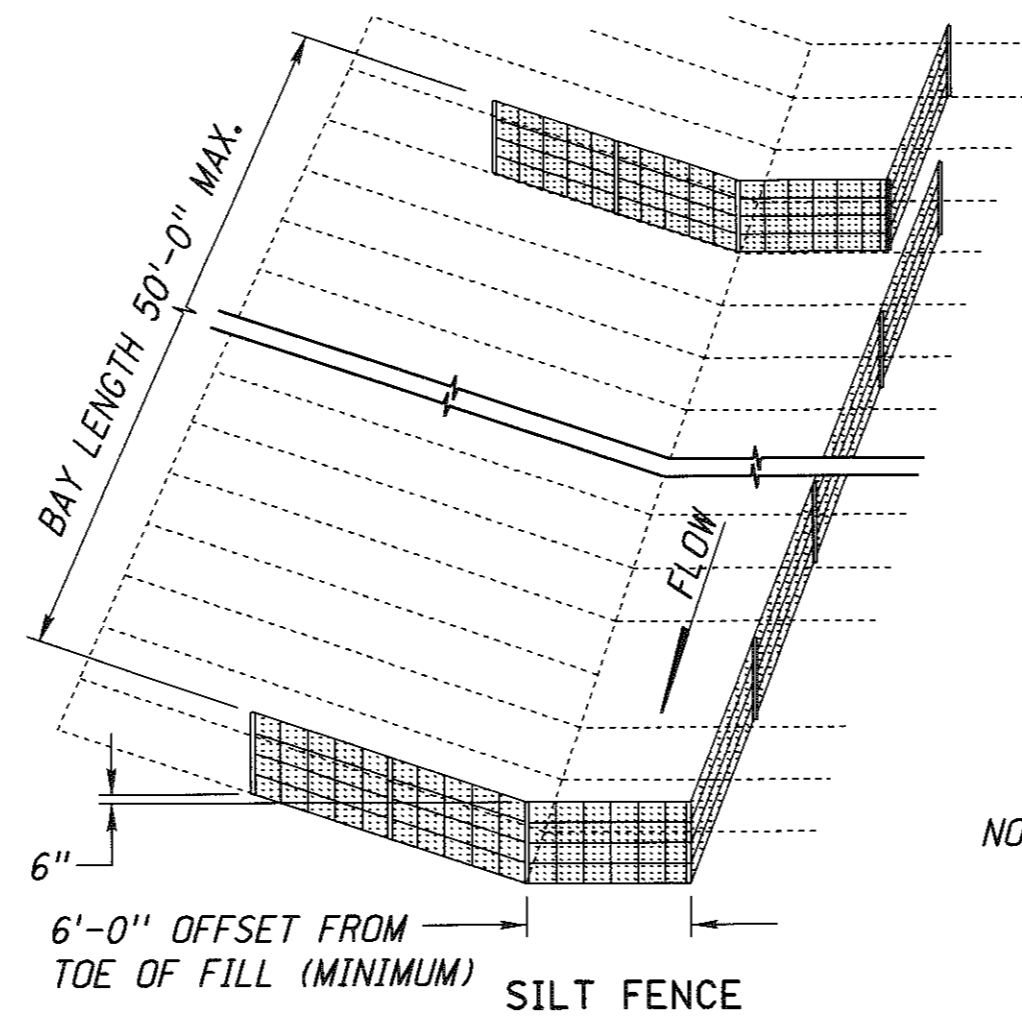


APPROVED:
NOVEMBER 14, 1973
DATE

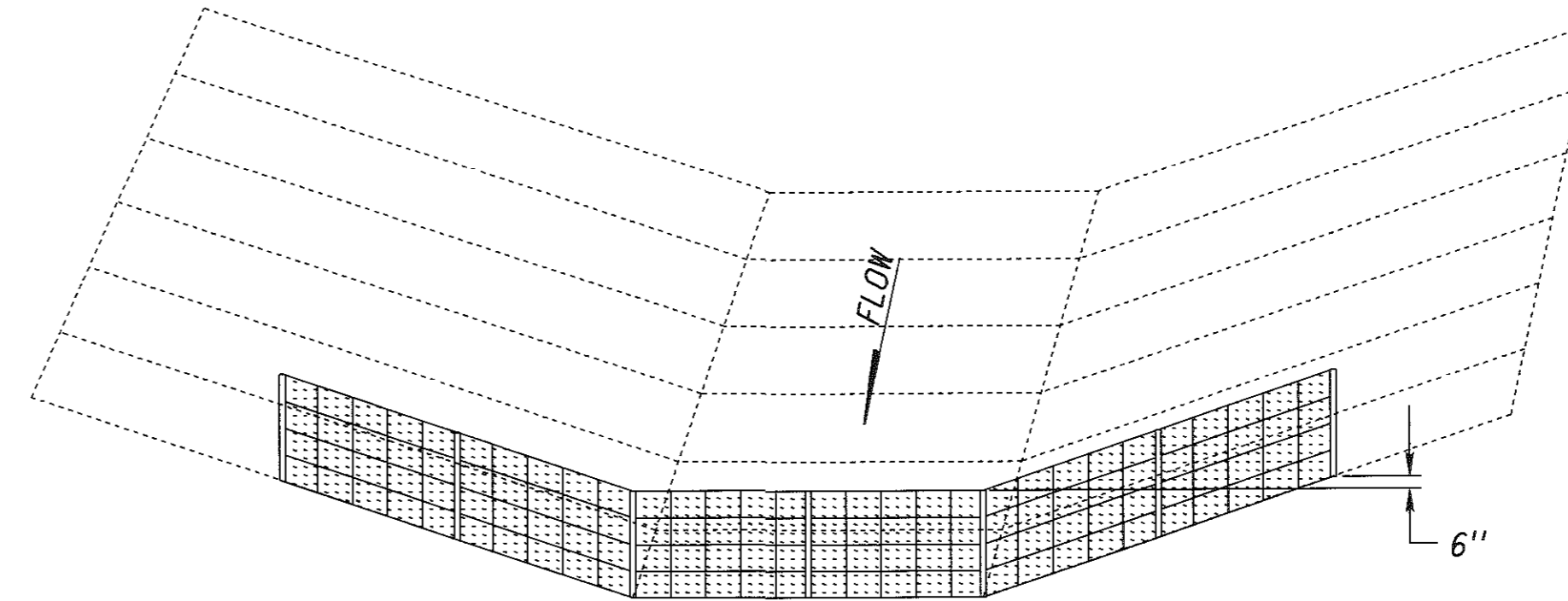
3
3



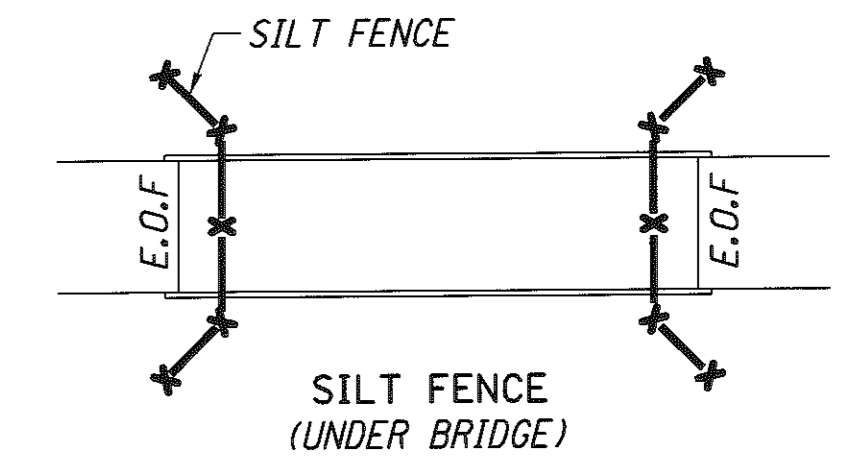
NOTE: SILT FENCE AT CORNERS SHALL HAVE A RADIUS OF 0' MIN. TO 10'-0" MAX.



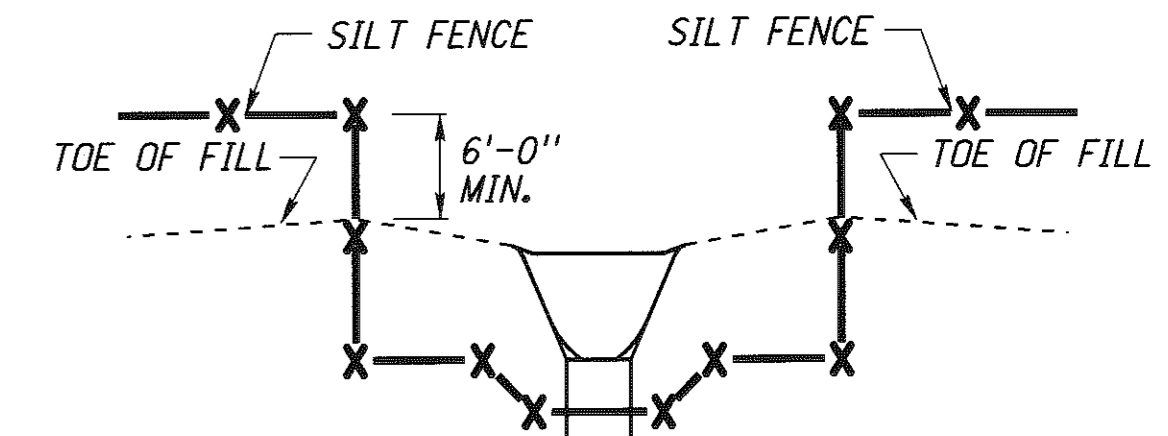
NOTE: POST SPACING 6'-0" MAX. MULTIPLE BAYS MAY BE USED



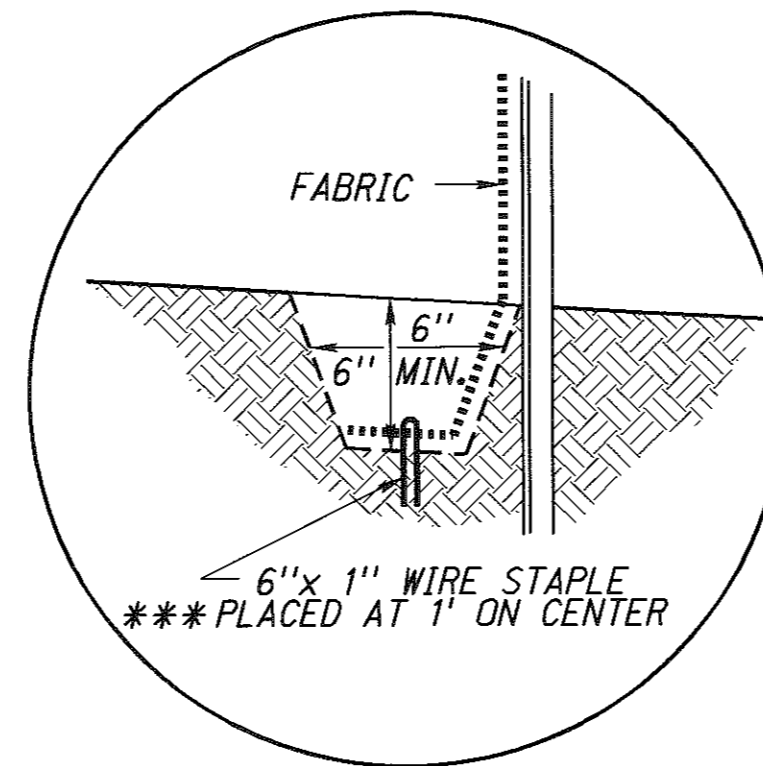
HIGH POROSITY SILT FENCE (ACROSS DITCH)



SILT FENCE (UNDER BRIDGE)

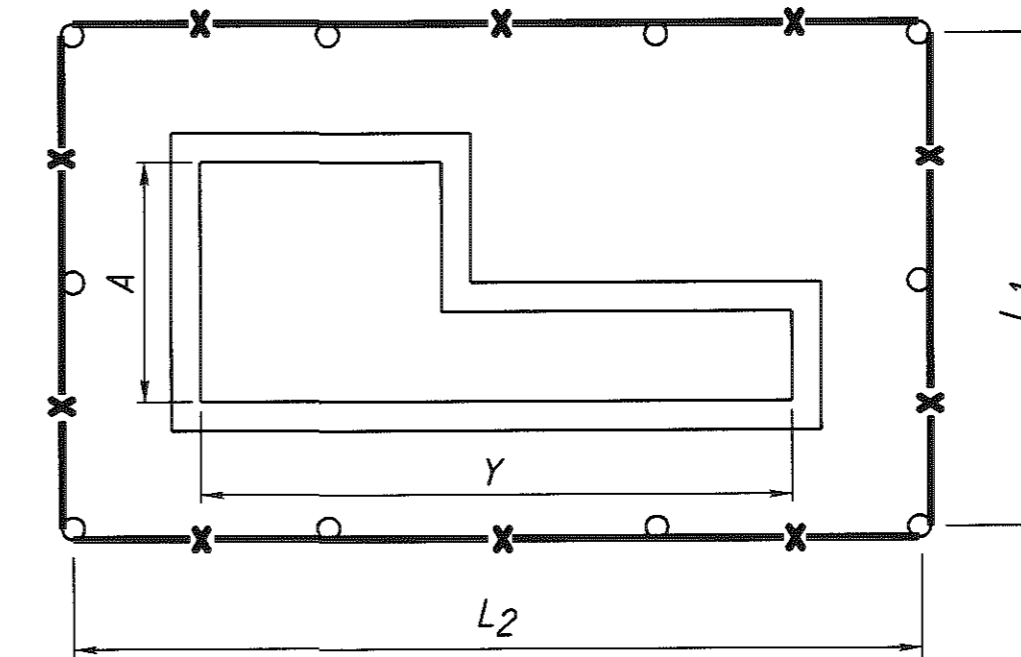


SILT FENCE (AT DRAINAGE STRUCTURE)

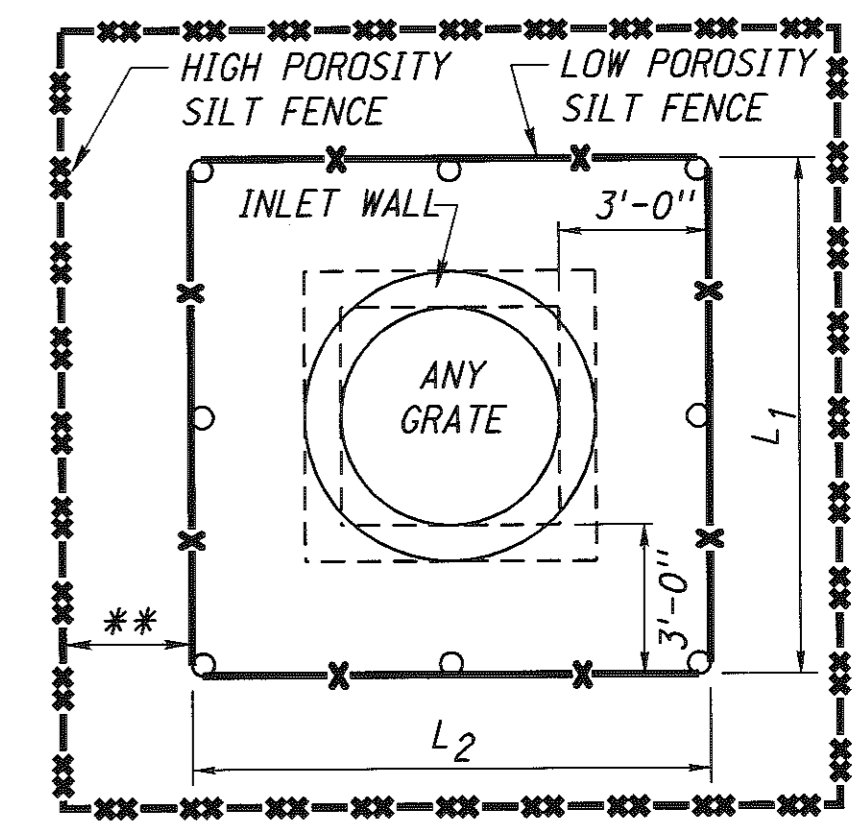


TRENCH DETAIL

*** SILT FENCE MAY ALSO BE INSTALLED WITH A SILT FENCE PLOW. NO STAPLING IS REQUIRED WHEN THE SILT FENCE PLOW IS USED.



$L_1 = A + 6'-0"$
 $L_2 = Y + 6'-0"$
CURB INLET

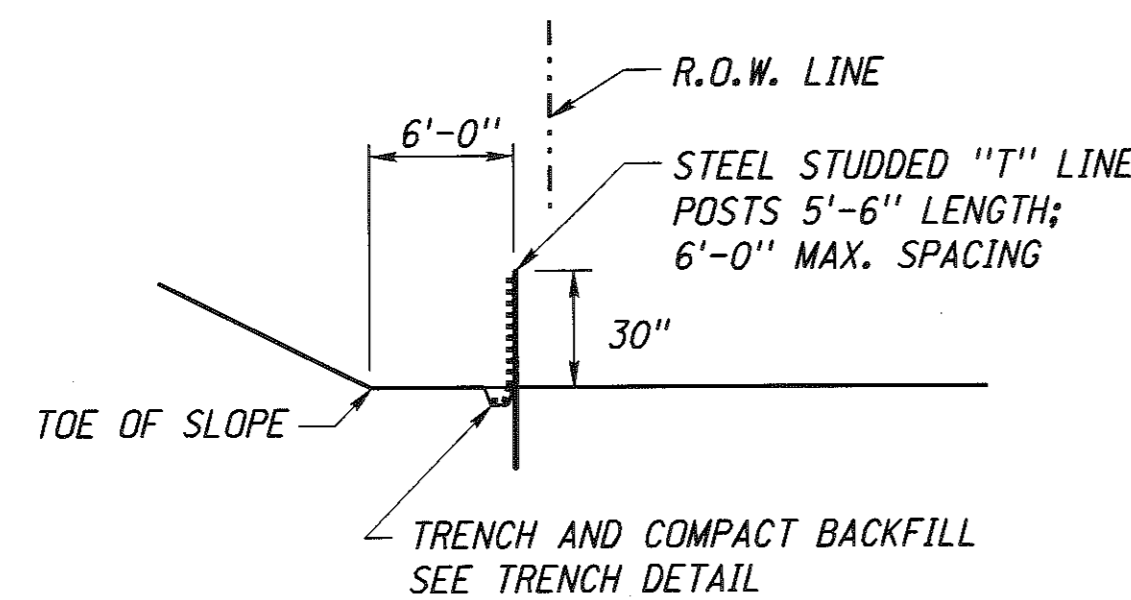


L_1 & L_2 = FACE OF INSIDE WALL + 6'-0"

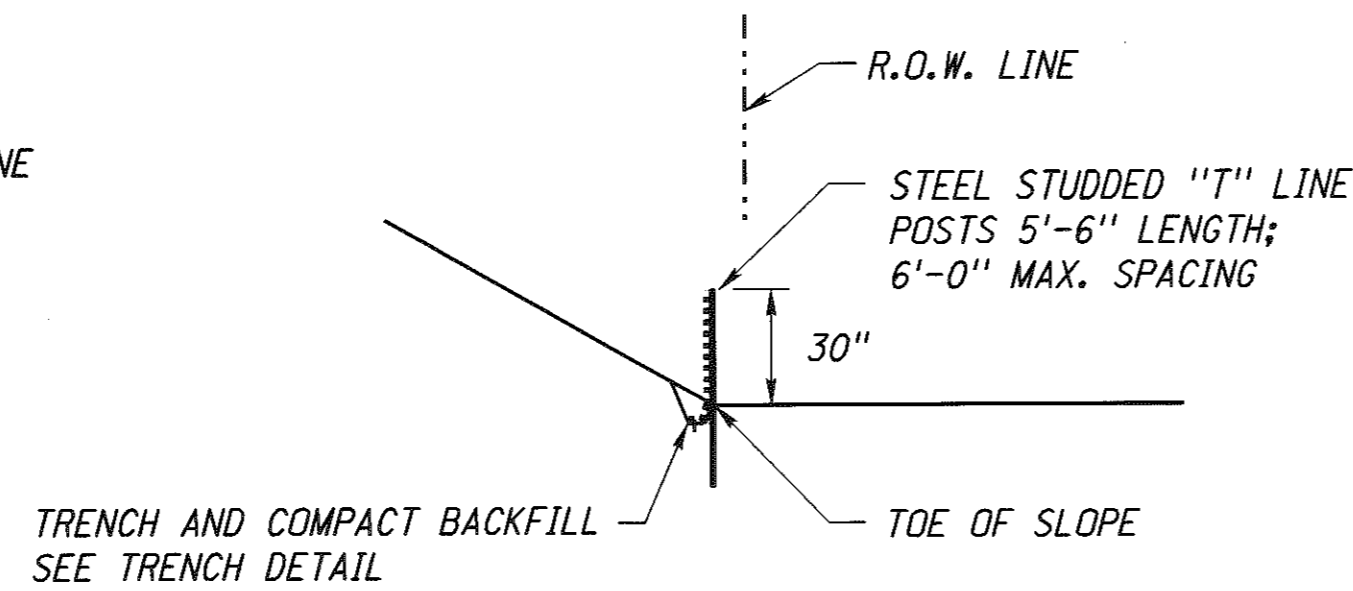
GRATE, AREA, MEDIAN INLETS OR JUNCTION BOXES

NOTE: ** 3'-0" IF POSSIBLE (MAY VARY)
SILT FENCE SHOULD BE 30" ABOVE GRADE (MAY VARY)
SILT FENCE MINIMUM ROLL WIDTH:
LOW POROSITY = 42"
HIGH POROSITY = 42"
LOW PROFILE = 36"
COIR SILT FENCE = 36"

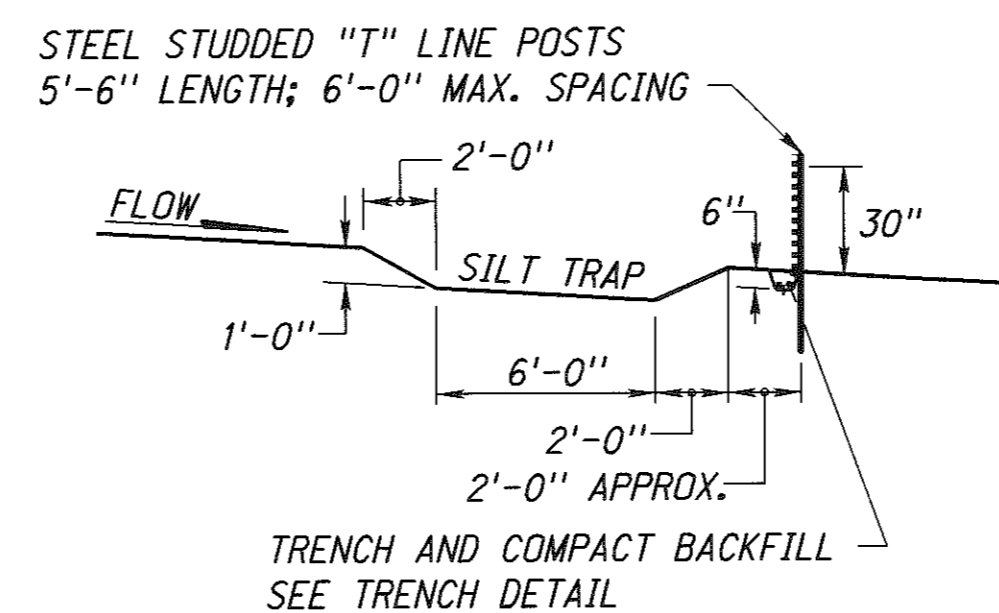
FOR EACH STEEL STUDDED "T" LINE POST, 3 PLASTIC CABLE TIES ARE REQUIRED.



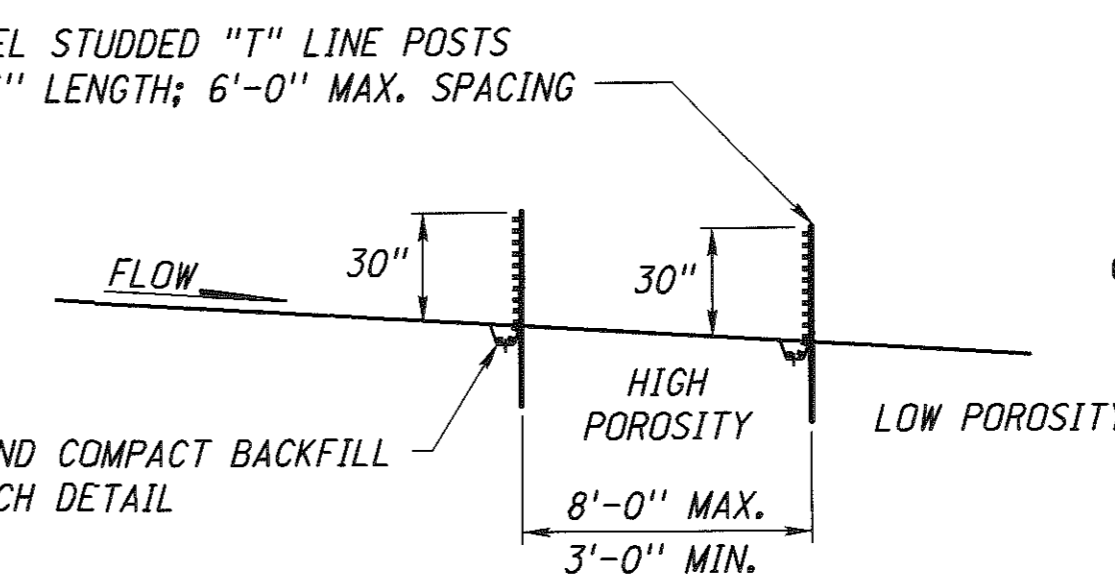
OPTION ONE (PREFERRED) SILT FENCE (6'-0" OFFSET FROM TOE OF FILL)



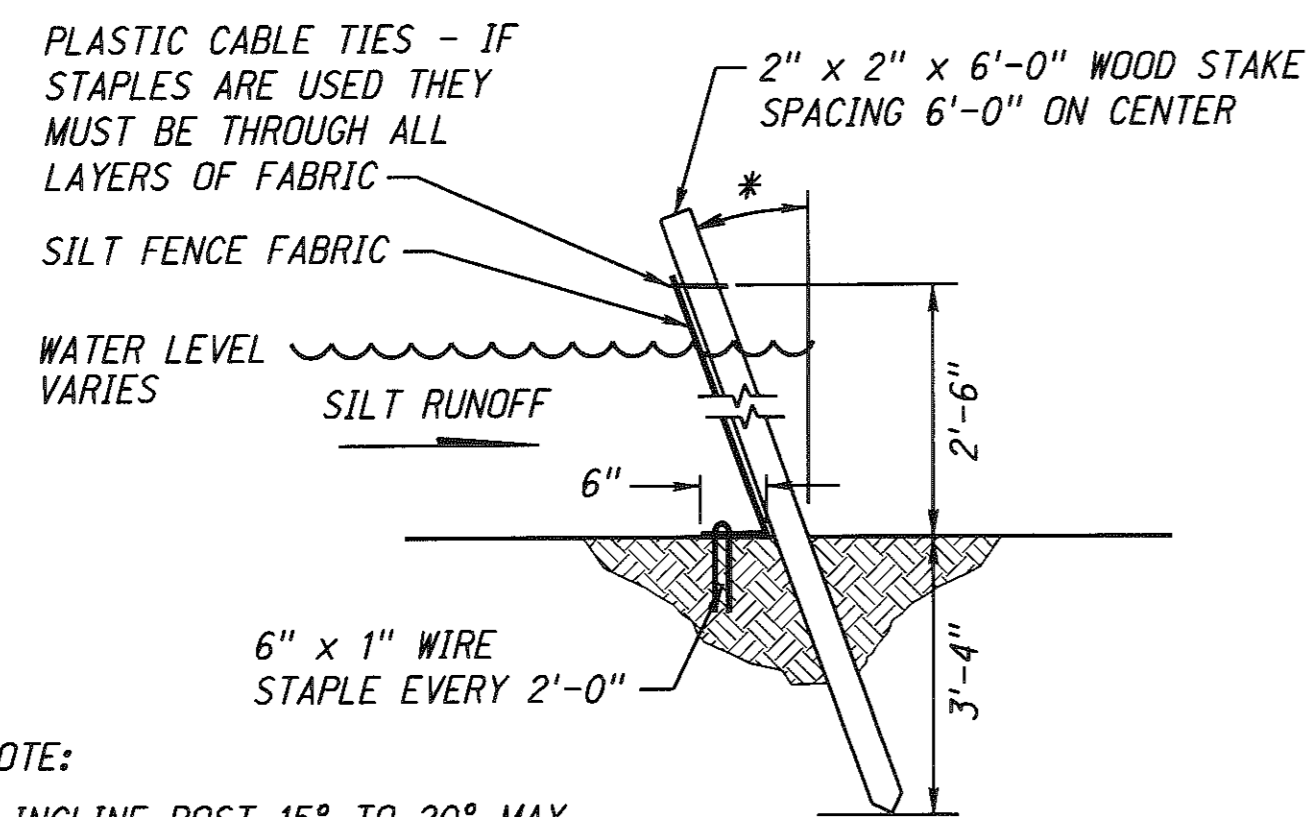
OPTION TWO (WITH LIMITED R.O.W.) SILT FENCE (AT TOE OF FILL)



SILT FENCE WITH SILT TRAP (ACROSS DITCH)

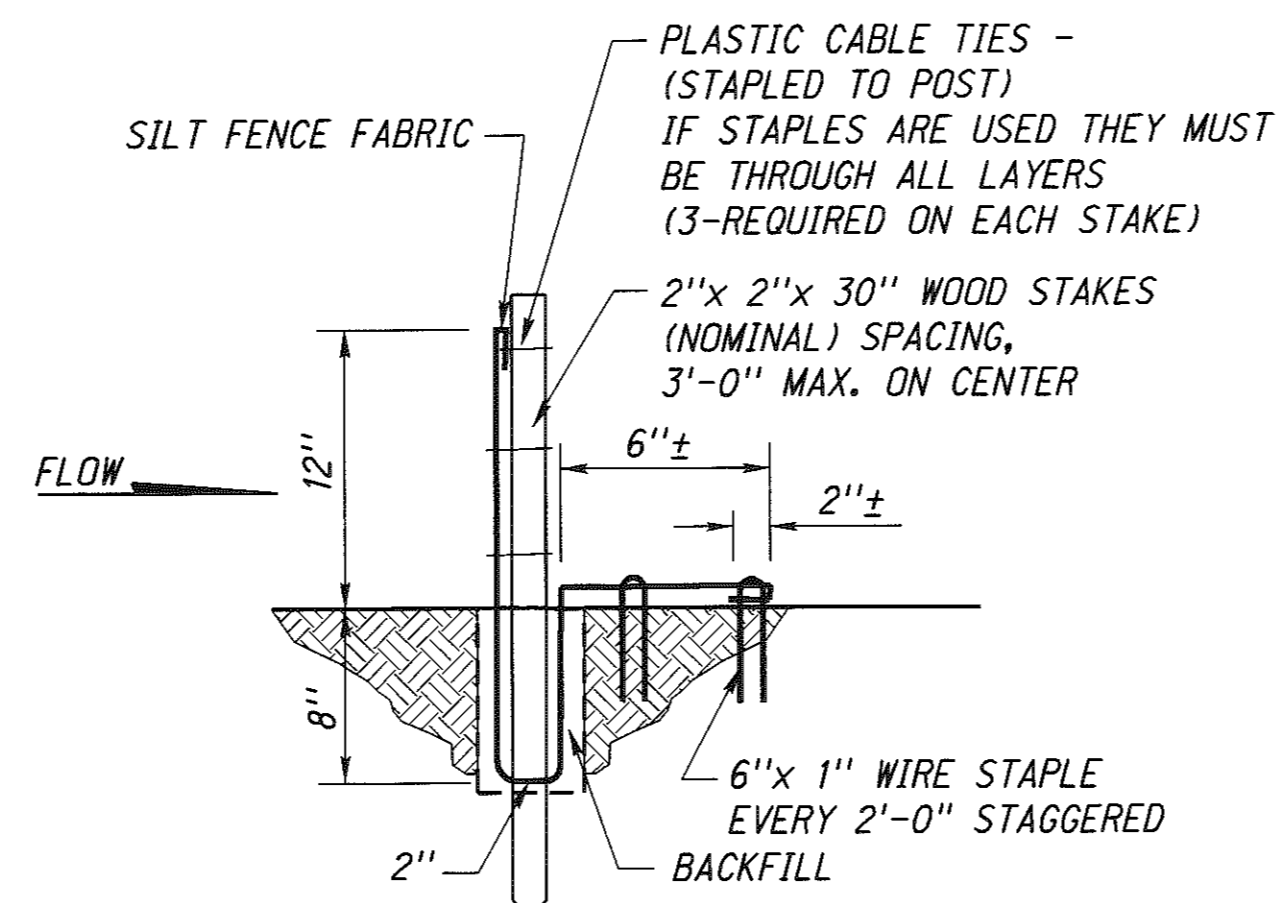


SILT FENCE (ACROSS DITCH)

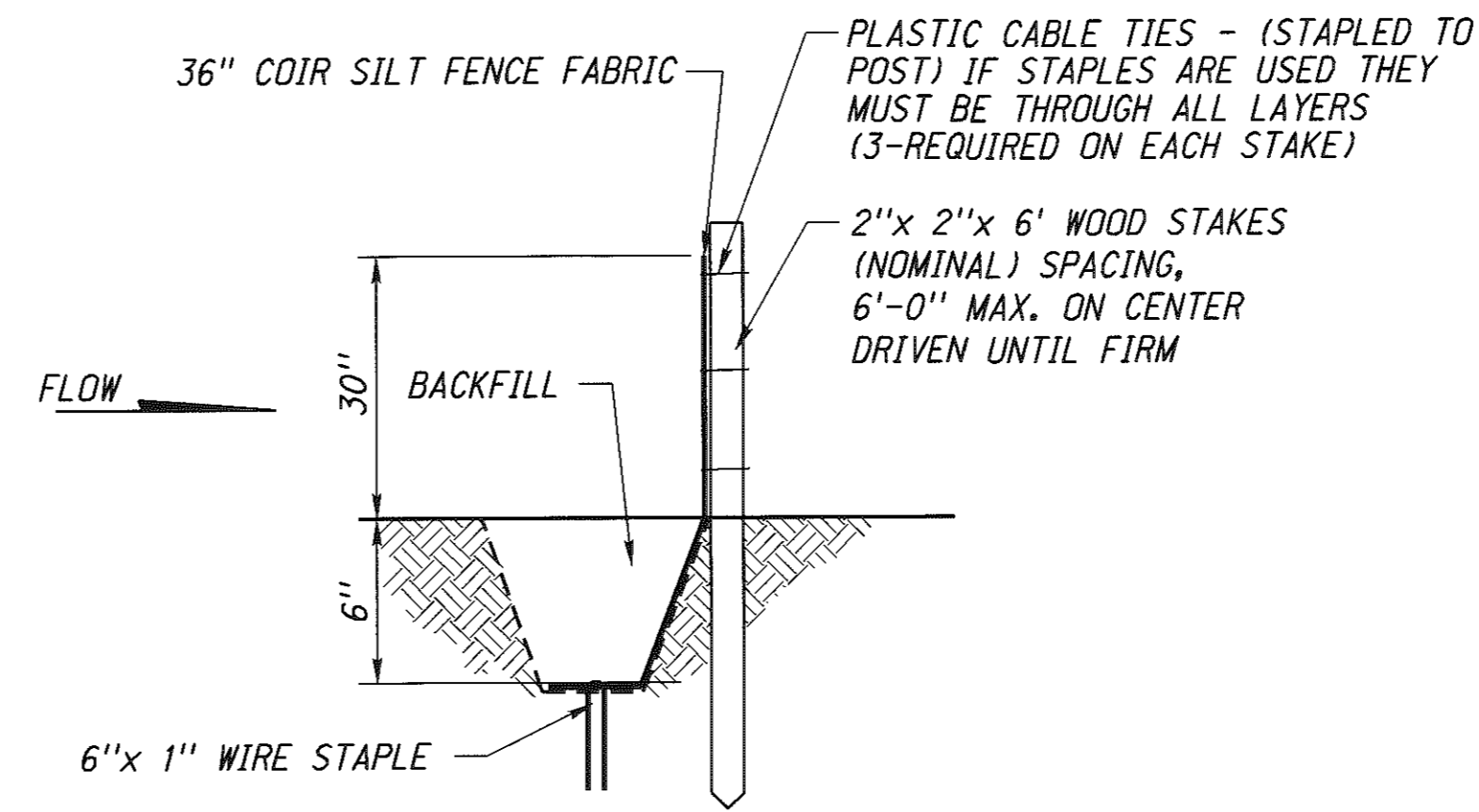


NOTE: * INCLINE POST 15° TO 20° MAX. FROM VERTICAL, TOWARD FLOW.

SILT FENCE (WET & BELOW WATER INSTALLATION)



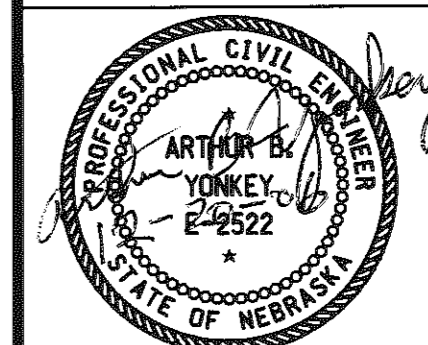
SILT FENCE - LOW PROFILE (LOW AND/OR HIGH POROSITY)



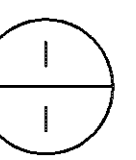
COIR SILT FENCE - ON WOOD POSTS - DRY INSTALLATION

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 502
SILT FENCE DETAILS



APPROVED:
DECEMBER 18, 2006
DATE



CONNECTION NOTES:

FOR DIVIDED ROADWAY

INSTALL THRIE-BEAM END SHOE,
BETWEEN NESTED GUARDRAIL ELEMENTS.
(SUBSIDIARY TO BRIDGE APPROACH SECTION)

FOR 2-LANE ROADWAY

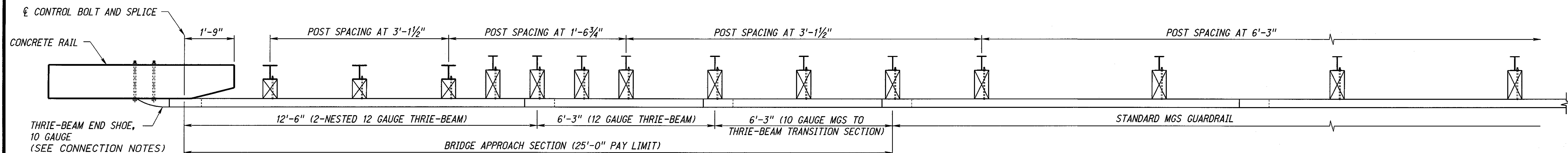
FOR APPROACHING TRAFFIC
INSTALL THRIE-BEAM END SHOE,
BETWEEN NESTED GUARDRAIL ELEMENTS.
(SUBSIDIARY TO BRIDGE APPROACH SECTION)

FOR OFF END CONNECTIONS
INSTALL THRIE-BEAM END SHOE,
OUTSIDE OF THE NESTED GUARDRAIL ELEMENTS.
(SUBSIDIARY TO BRIDGE APPROACH SECTION)

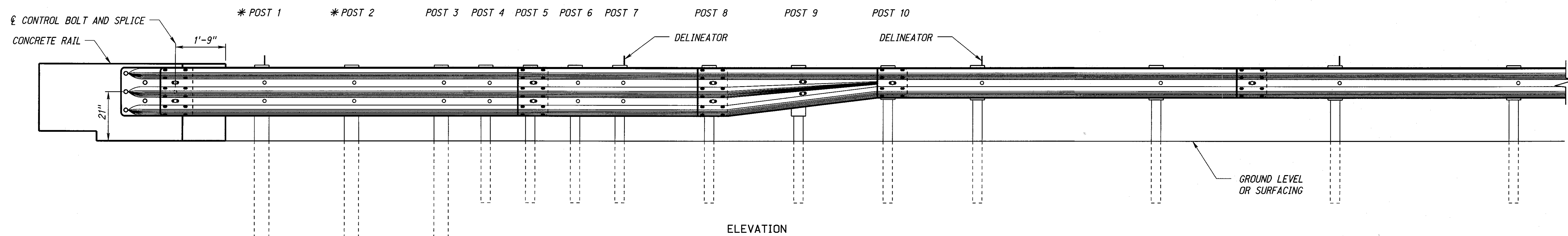
TRAFFIC FLOW

LEGEND

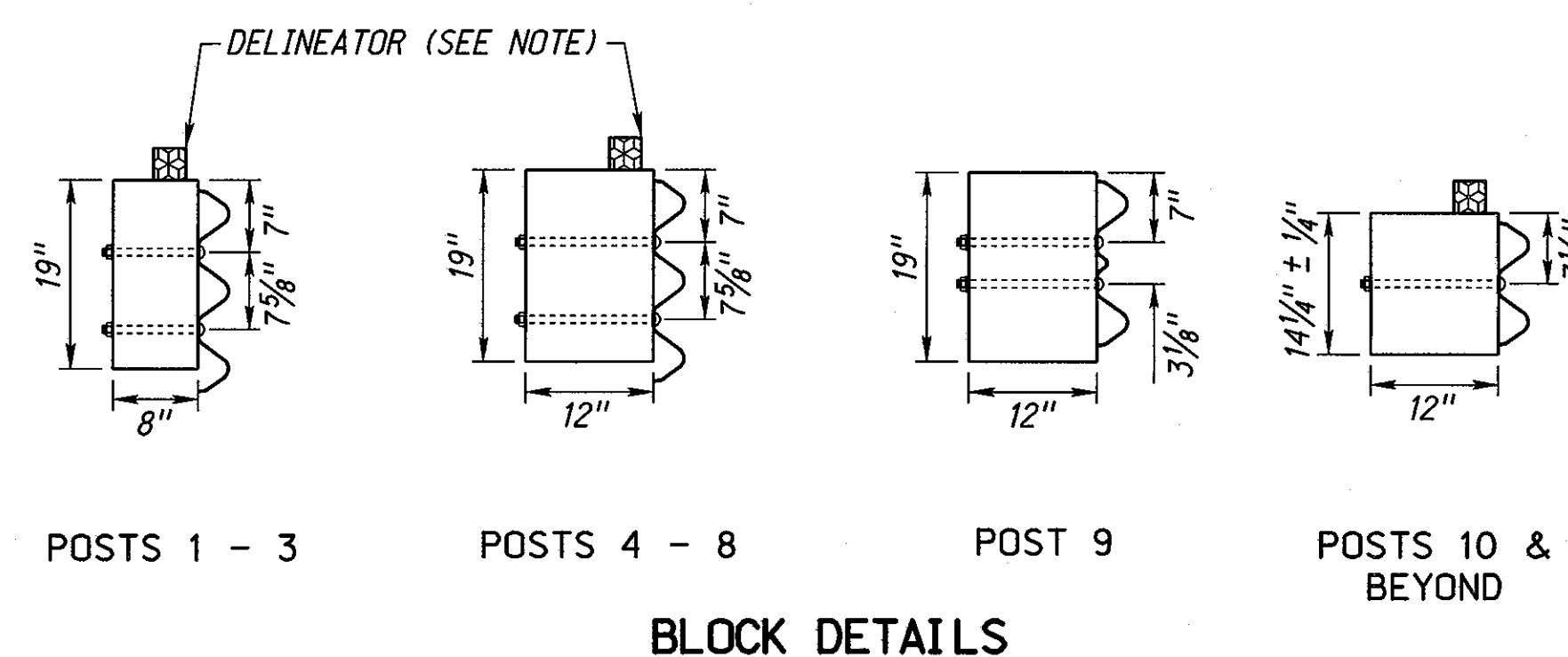
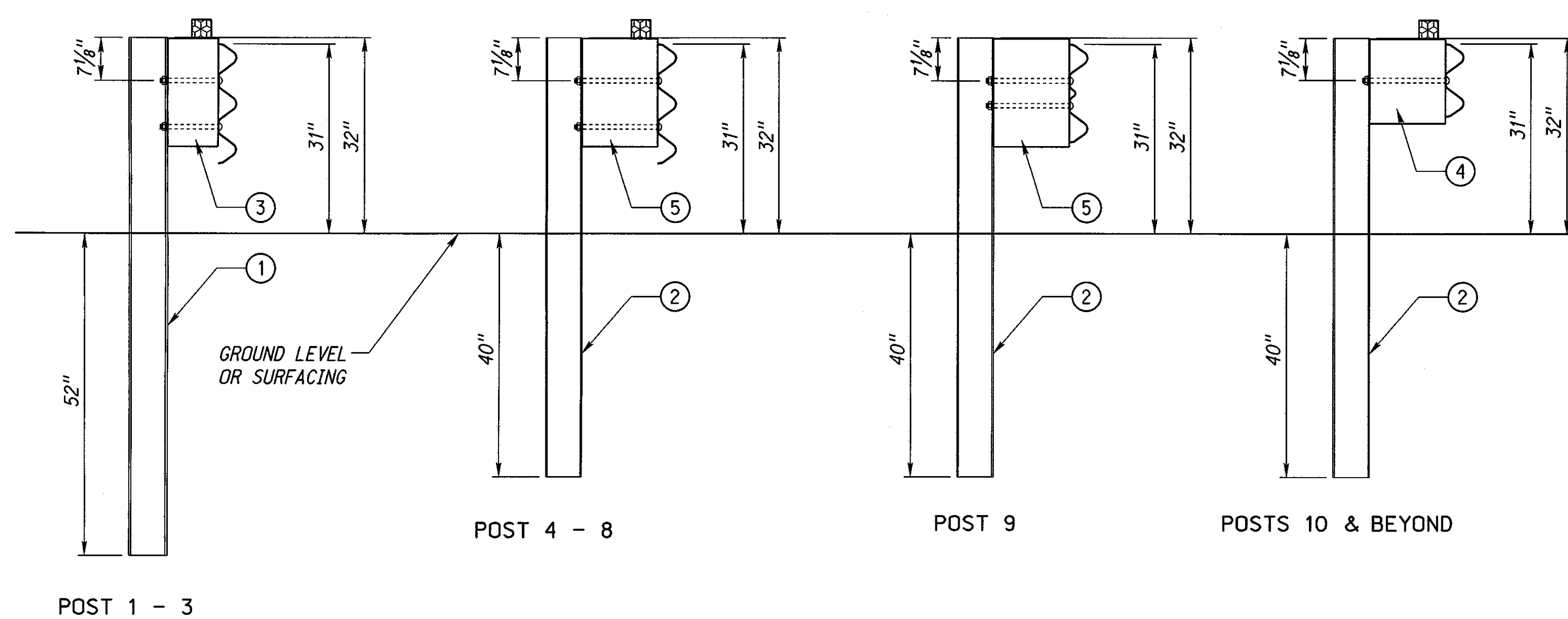
- ① W6 x 15 x 7' POST
- ② W6 x 9 x 6' POST
- ③ 6" x 8" x 19" OFFSET BLOCK
- ④ 6" x 12" x 14 1/4" ± 1/4" OFFSET BLOCK
- ⑤ 6" x 12" x 19" OFFSET BLOCK



PLAN VIEW



ELEVATION



BLOCK DETAILS

NOTES:

FOR ADDITIONAL DETAILS SEE PLAN 743.

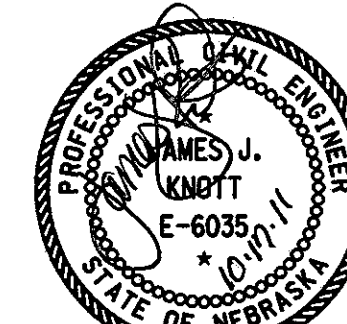
DELINEATORS SUBSIDIARY TO BRIDGE APPROACH SECTION.

BUTTON HEAD BOLT 5/8" DIA. x LENGTH AS REQUIRED,
SECURED WITH WASHER AND HEX NUT.

ALL STEEL MEMBERS SHALL BE GALVANIZED IN ACCORDANCE
WITH THE STANDARD SPECIFICATIONS.

DROESIGN55
 dor13017
 20-SEP-2011 12:33

74000e00.dgn
 100:1

REV. NO.	DATE	DESCRIPTION OF REVISION
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 740 MIDWEST GUARDRAIL SYSTEM BRIDGE APPROACH SECTION		
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:		 ORIGINAL: AUGUST 25, 2011 DATE
DATE: _____ DATE: _____		

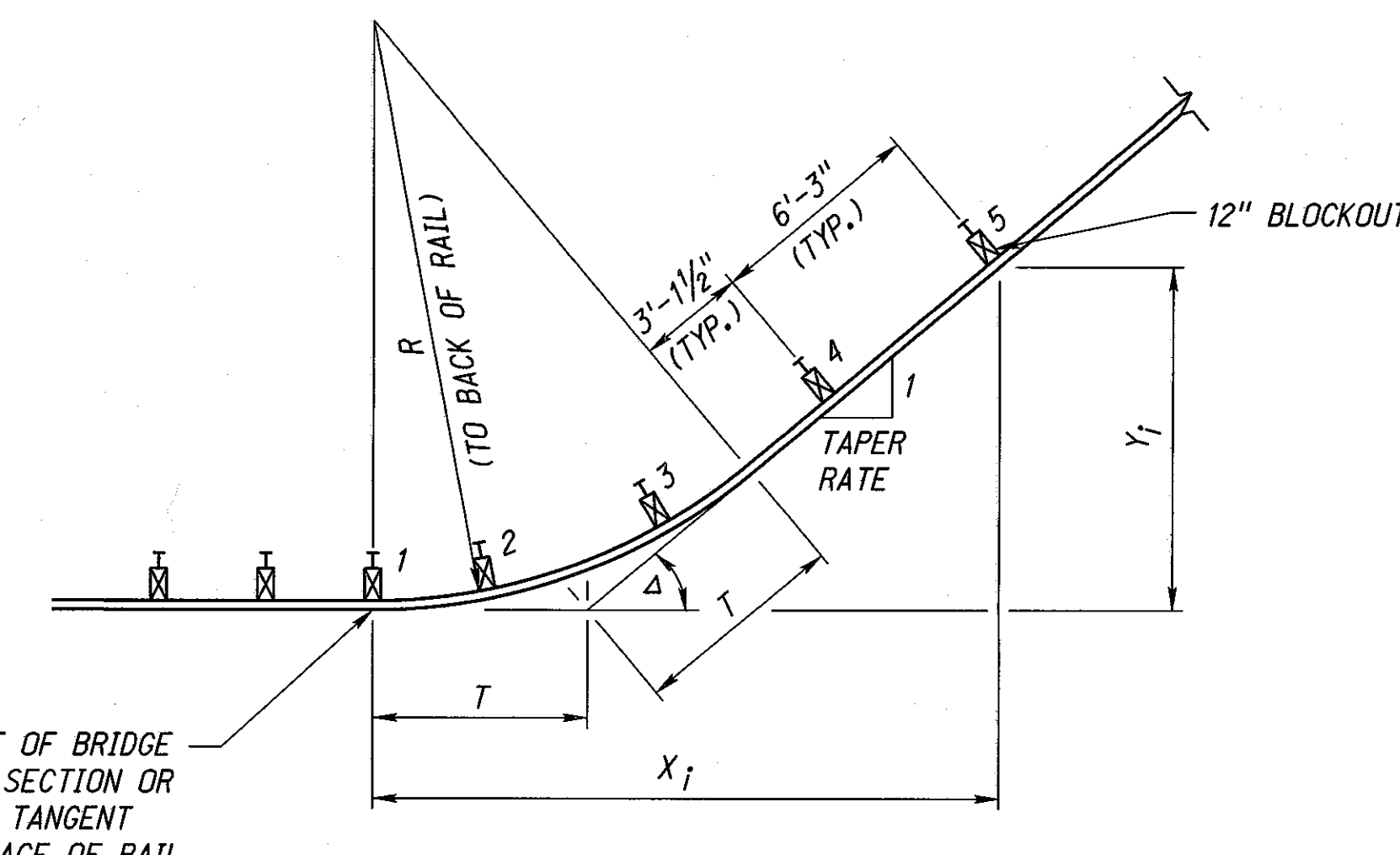
POST SPACING = 6.25'
POST NO. 1: X = 0 & Y = 0

TABLE A		
DEFLECTION, Δ = 1°54'33"		
TAPER = 30:1		
RADIUS, R = 375.10'		
TANGENT, T = 6.25'		
POST NUMBER	X _i	Y _i
1	0.00	0.00
2	3.12	0.00
3	9.37	0.10
4	15.62	0.31
5	21.87	0.52
6	28.12	0.73
7	34.36	0.94
8	40.61	1.14
9	46.86	1.35
10	53.10	1.56
11	59.35	1.77
12	65.60	1.98
13	71.84	2.19
14	78.09	2.39
15	84.34	2.60
16	90.58	2.81
17	96.83	3.02
18	103.08	3.23
19	109.32	3.43
20	115.57	3.64
21	121.81	3.85
22	128.06	4.06
23	134.31	4.27
24	140.55	4.47
25	146.80	4.68
26	153.05	4.89
27	159.29	5.10
28	165.54	5.31
29	171.79	5.51
30	178.03	5.72
31	184.28	5.93
32	190.53	6.14
33	196.77	6.35
34	203.02	6.56
35	209.27	6.76
36	215.51	6.97
37	221.76	7.18
38	228.01	7.39
39	234.25	7.60
40	240.50	7.80
41	246.75	8.01
42	252.99	8.22
43	259.24	8.43
44	265.48	8.64
45	271.73	8.84
46	277.98	9.05
47	284.22	9.26
48	290.47	9.47
49	296.72	9.68
50	302.96	9.88
51	309.21	10.09
52	315.46	10.30
53	321.70	10.51
54	327.95	10.72
55	334.20	10.93
56	340.44	11.13
57	346.69	11.34
58	352.94	11.55
59	359.18	11.76
60	365.43	11.97

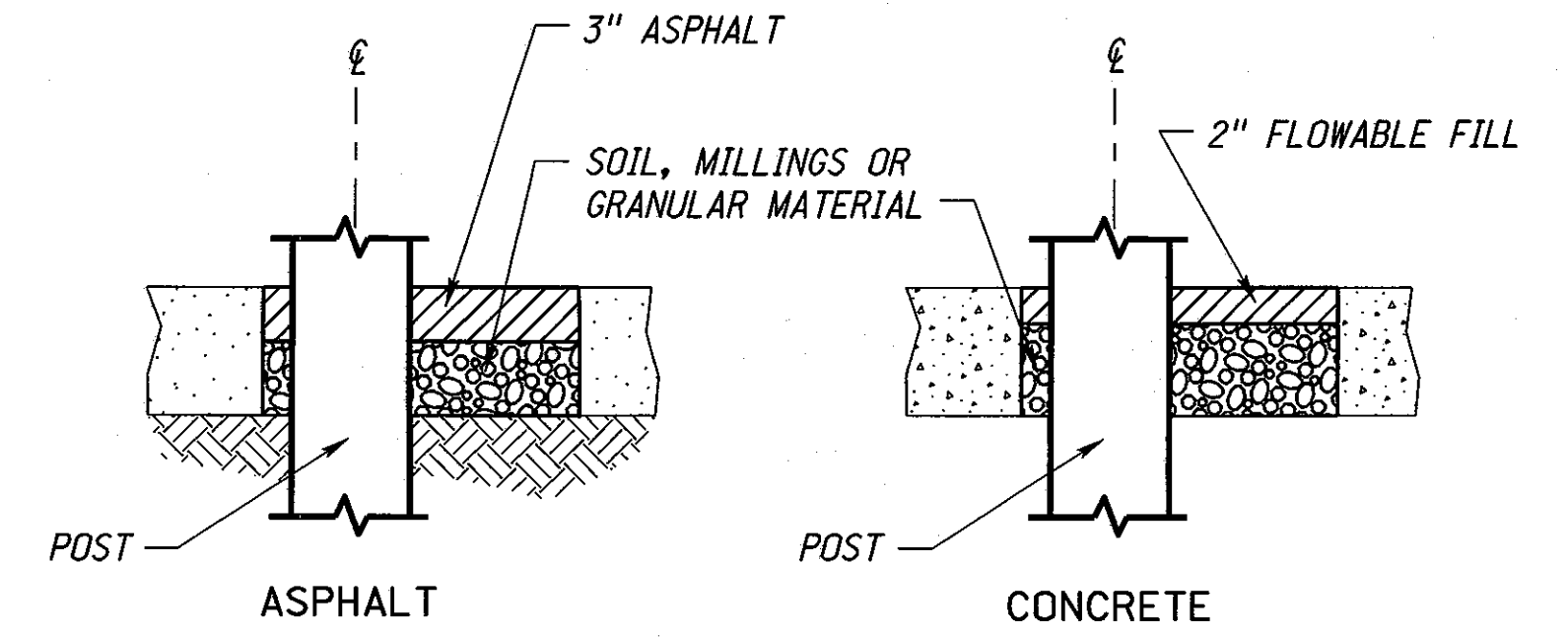
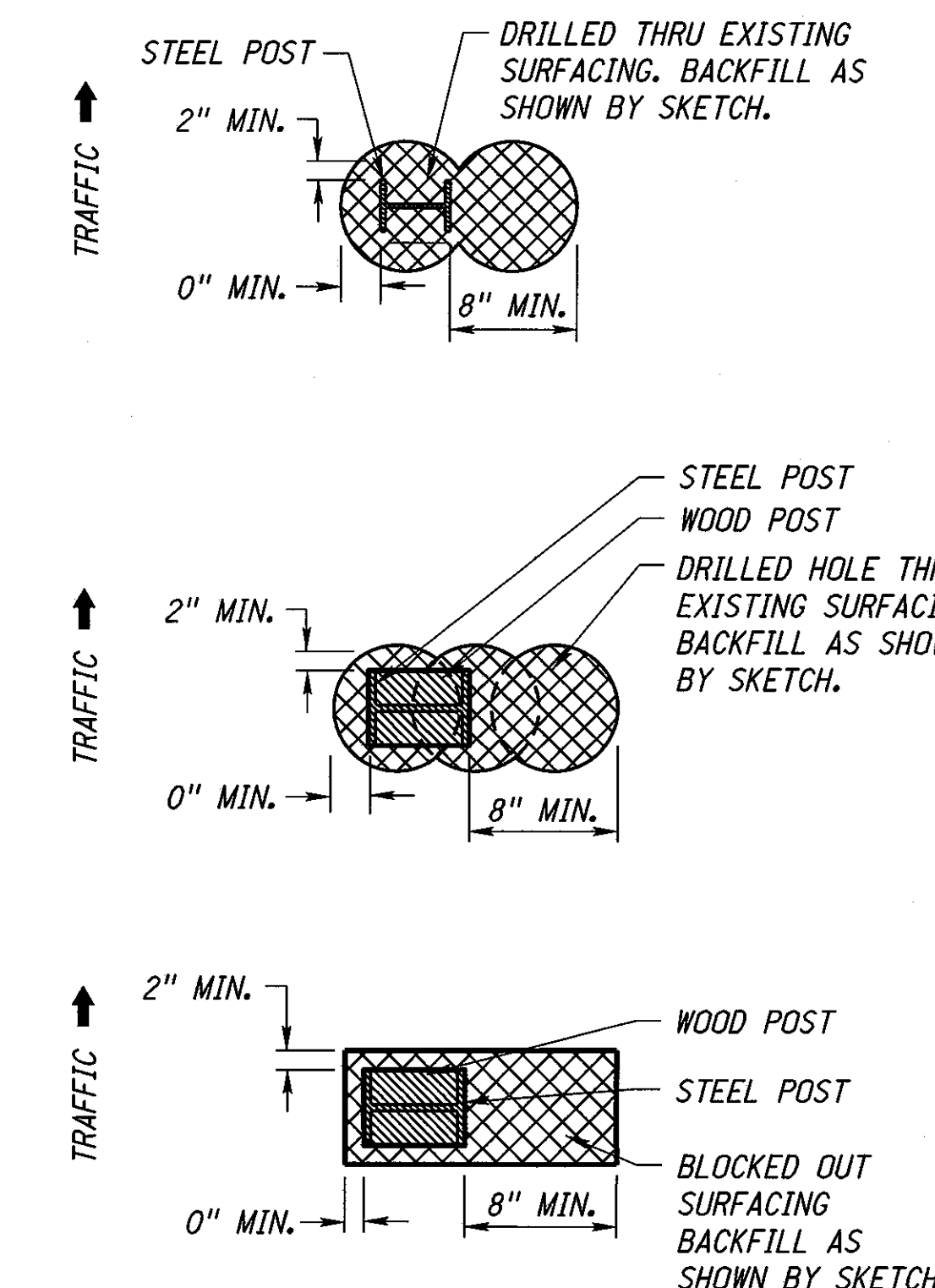
TABLE B		
DEFLECTION, Δ = 2°17'26"		
TAPER = 25:1		
RADIUS, R = 312.67'		
TANGENT, T = 6.25'		
POST NUMBER	X _i	Y _i
1	0.00	0.00
2	3.12	0.00
3	9.37	0.12
4	15.63	0.37
5	21.87	0.62
6	28.12	0.87
7	34.36	1.12
8	40.61	1.37
9	46.85	1.62
10	53.10	1.87
11	59.34	2.12
12	65.59	2.37
13	71.83	2.62
14	78.08	2.87
15	84.32	3.12
16	90.57	3.37
17	96.81	3.62
18	103.06	3.87
19	109.30	4.12
20	115.55	4.37
21	121.79	4.62
22	128.04	4.87
23	134.28	5.12
24	140.53	5.37
25	146.77	5.62
26	153.02	5.87
27	159.26	6.12
28	165.51	6.37
29	171.75	6.61
30	178.00	6.86
31	184.24	7.11
32	190.49	7.36
33	196.73	7.61
34	202.98	7.86
35	209.22	8.11
36	215.47	8.36
37	221.71	8.61
38	227.96	8.86
39	234.20	9.11
40	240.45	9.36
41	246.69	9.61
42	252.94	9.86
43	259.18	10.11
44	265.43	10.36
45	271.67	10.61
46	277.92	10.86
47	284.16	11.11
48	290.41	11.36
49	296.65	11.61
50	302.90	11.86
51	309.14	12.11
52	315.39	12.36
53	321.63	12.61
54	327.88	12.85
55	334.12	13.10
56	340.37	13.35
57	346.61	13.60
58	352.86	13.85
59	359.10	14.10
60	365.35	14.35

TABLE C		
DEFLECTION, Δ = 2°51'44"		
TAPER = 20:1		
RADIUS, R = 250.20'		
TANGENT, T = 6.25'		
POST NUMBER	X _i	Y _i
1	0.00	0.00
2	3.12	0.00
3	9.36	0.16
4	15.62	0.47
5	21.87	0.78
6	28.11	1.09
7	34.35	1.40
8	40.59	1.72
9	46.84	2.03
10	53.08	2.34
11	59.32	2.65
12	65.56	2.96
13	71.80	3.27
14	78.05	3.59
15	84.29	3.90
16	90.53	4.21
17	96.77	4.52
18	103.02	4.83
19	109.26	5.14
20	115.50	5.46
21	121.74	5.77
22	127.98	6.08
23	134.23	6.39
24	140.47	6.70
25	146.71	7.01
26	152.95	7.33
27	159.20	7.64
28	165.44	7.95
29	171.68	8.26
30	177.92	8.57
31	184.16	8.88
32	190.41	9.20
33	196.65	9.51
34	202.89	9.82
35	209.13	10.13
36	215.38	10.44
37	221.62	10.75
38	227.86	11.07
39	234.10	11.38
40	240.34	11.69
41	246.59	12.00
42	252.83	12.31
43	259.07	12.63
44	265.31	12.94
45	271.55	13.25
46	277.80	13.56
47	284.04	13.87
48	290.28	14.18
49	296.52	14.50
50	302.77	14.81
51	309.01	15.12
52	315.25	15.43
53	321.49	15.74
54	327.73	16.05
55	333.98	16.37
56	340.22	16.68
57	346.46	16.99
58	352.70	17.30
59	358.95	17.61
60	365.19	17.92

TABLE D		
DEFLECTION, Δ = 3°48'51"		
TAPER = 15:1		
RADIUS, R = 187.77'		
TANGENT, T = 6.25'		
POST NUMBER	X _i	Y _i
1	0.00	0.00
2	3.12	0.00
3	9.35	0.21
4	15.62	0.62
5	21.86	1.04
6	28.10	1.45
7	34.33	1.87
8	40.57	2.28
9	46.81	2.70
10	53.04	3.11
11	59.28	3.53
12	65.51	3.94
13	71.75	4.36
14	77.99	4.77
15	84.22	5.19
16	90.46	5.60
17	96.69	6.02
18	102.93	6.43
19	109.17	6.85
20	115.40	7.26
21	121.64	7.68
22	127.88	8.09
23	134.11	8.51
24	140.35	8.92
25	146.58	9.33
26	152.82	9.75
27	159.06	10.16
28	165.29	10.58
29	171.53	10.99
30	177.76	11.41
31	184.00	11.82
32	190.24	12.24
33	196.47	12.65
34	202.71	13.07
35	208.95	13.48
36	215.18	13.90
37	221.42	14.31
38	227.65	14.73
39	233.89	15.14
40	240.13	15.56
41	246.36	15.97
42	252.60	16.39
43	258.83	16.80
44	265.07	17.22
45	271.31	17.63
46	277.54	18.05
47	283.78	18.46
48	290.02	18.88
49	296.25	19.29
50	302.49	19.71
51	308.72	20.12
52	314.96	20.54
53	321.20	20.95
54	327.43	21.36
55	333.67	21.78
56	339.90	22.19
57	346.14	22.61
58	352.38	23.02
59	358.61	23.44
60	364.85	23.85

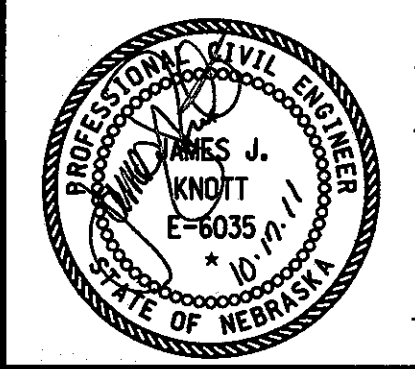


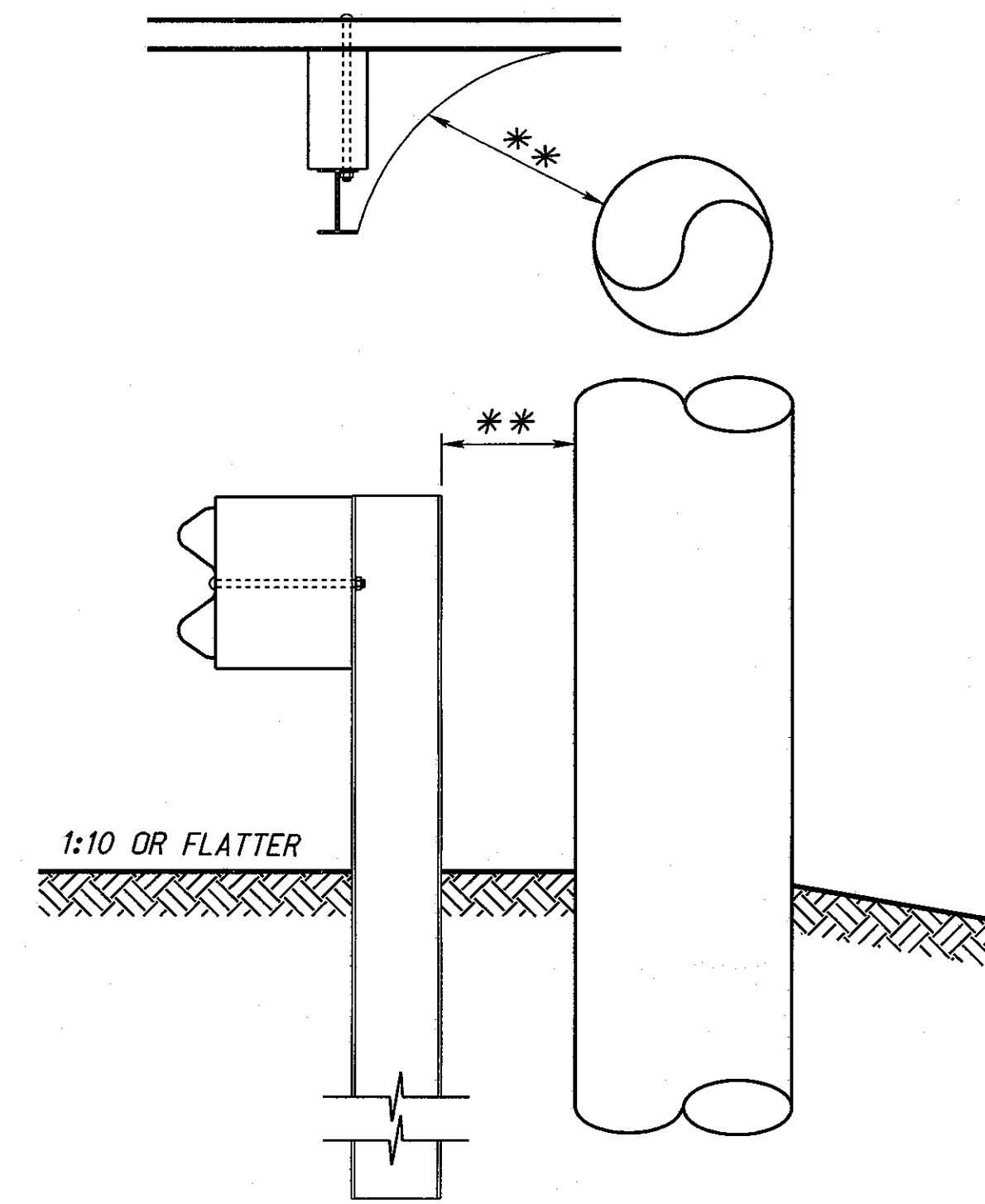
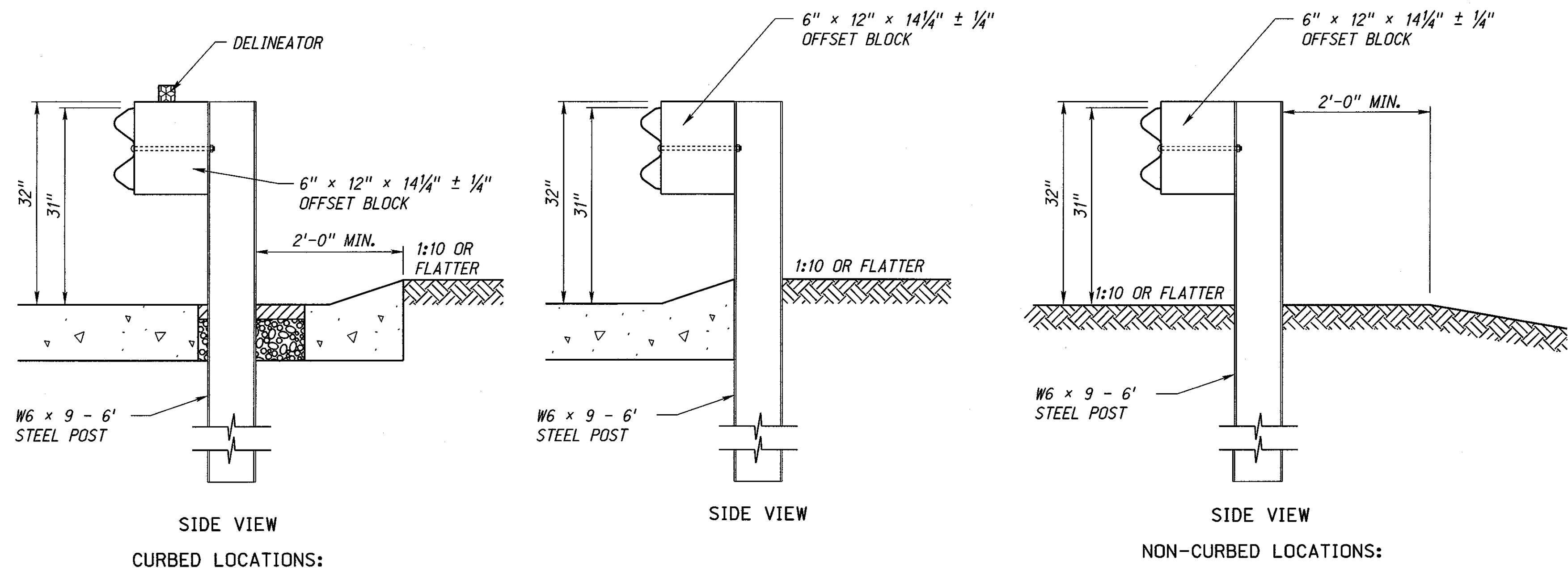
NOTE
THE X_i AND Y_i DISTANCES FOUND IN THE TABLES SHALL BE MEASURED FROM A LINE THAT PARALLELS THE EDGE OF THE PAVEMENT.



DETAIL OF BACKFILLING AROUND POST

GUARDRAIL POSTS IN SURFACING

REV. NO.	DATE	DESCRIPTION OF REVISION
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 743 GUARDRAIL DETAILS		
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:		
DATE: <u> </u> ORIGINAL: AUGUST 25, 2011 DATE: <u> </u>		
1		4



** ADJUST THE POSTS LONGITUDINALLY SO THAT THEY WILL NOT BE PLACED DIRECTLY OPPOSITE A PIER COLUMN. IF THIS CAN BE DONE THE MINIMUM OFFSET DISTANCE FROM BACK OF RAIL IS:

MGS
 3'-10" FOR WOOD OR STEEL POSTS
 3'-5" FOR 1/2 POST SPACING
 2'-6" FOR 1/4 POST SPACING

THRIE-BEAM
 2'-3"

IF NOT, OR IF THE HAZARD IS A CONTINUOUS SOLID MASS, THE MINIMUM OFFSET DISTANCE IS:

MGS
 4'-1" FOR NORMAL POST SPACING
 3'-5" FOR 1/2 POST SPACING
 2'-6" FOR 1/4 POST SPACING

THRIE-BEAM
 2'-10"

GUARDRAIL ADJACENT TO PIER COLUMN OR FIXED OBJECT

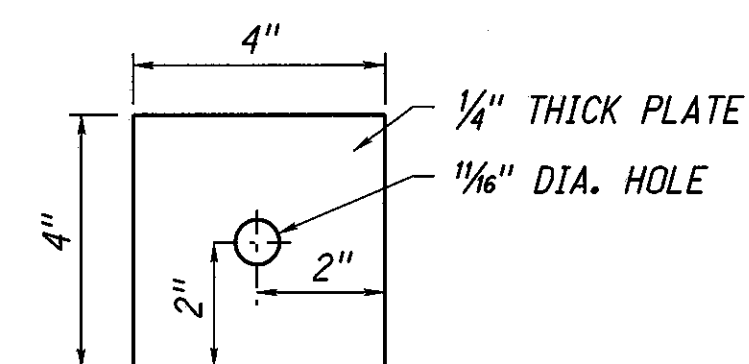
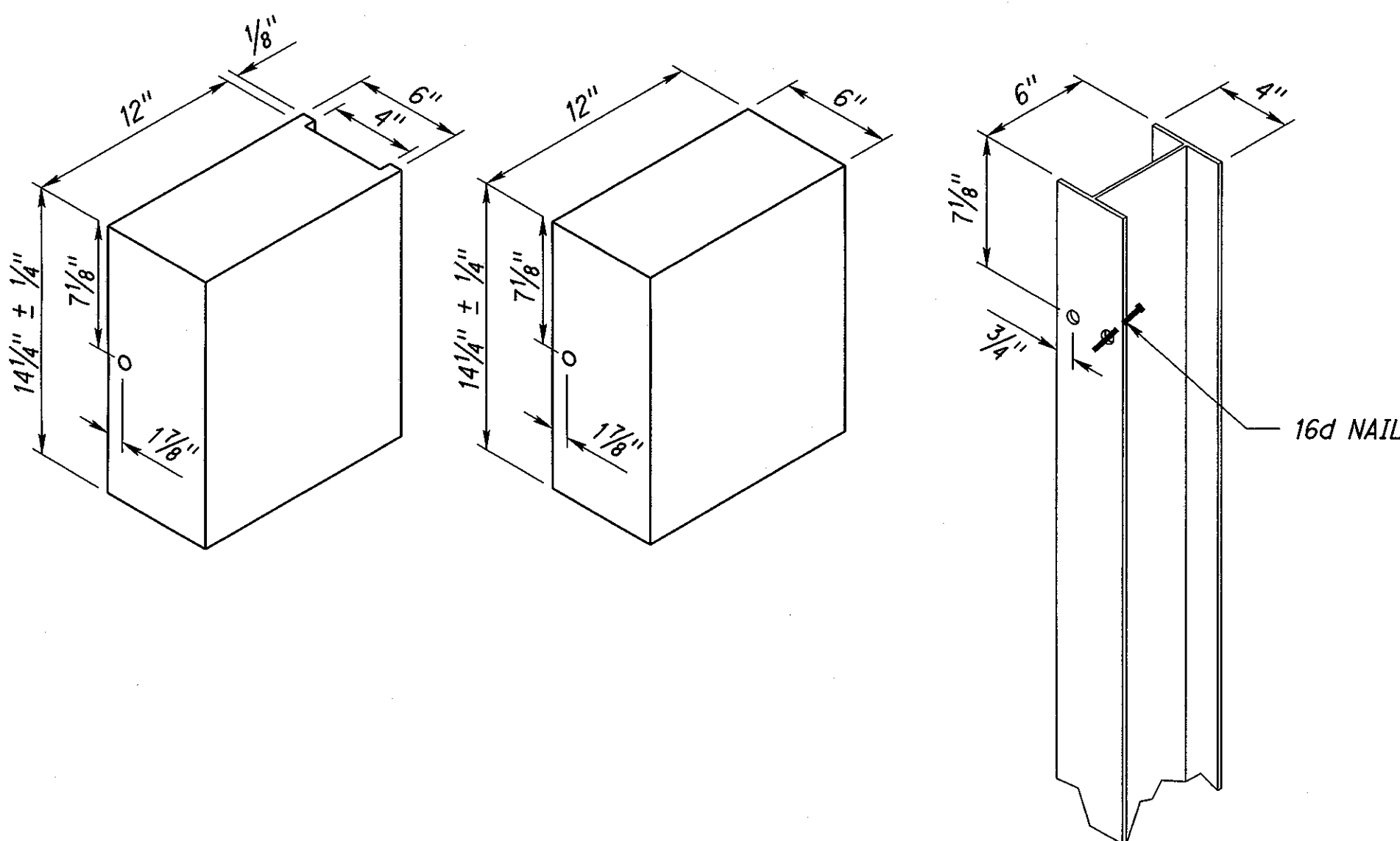
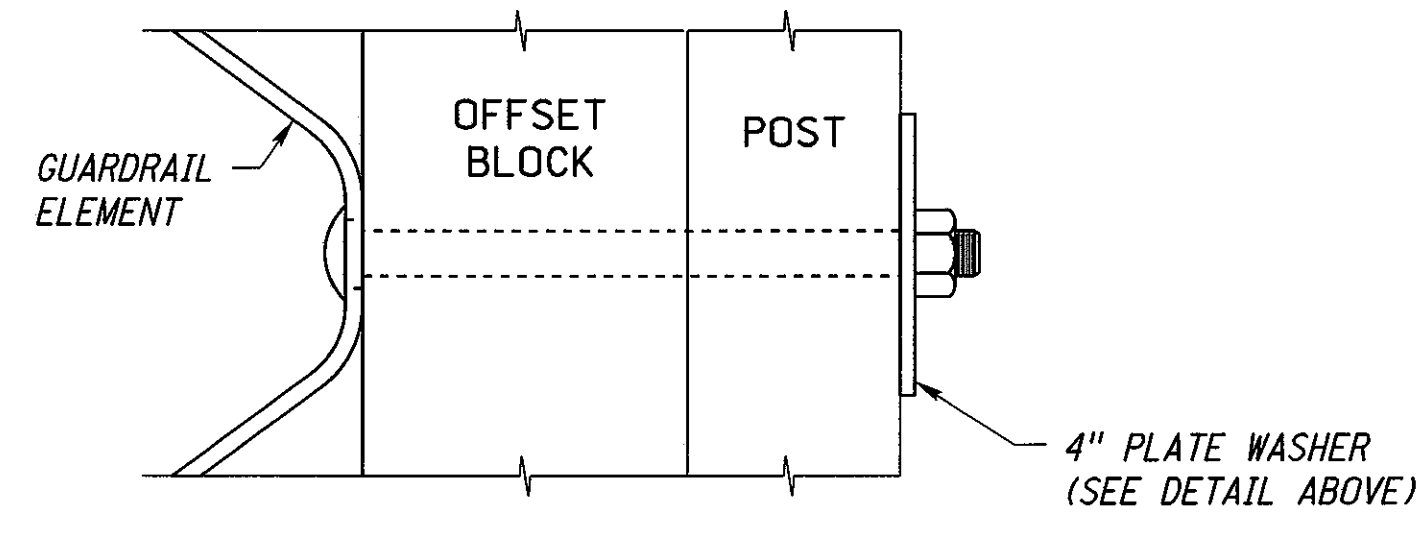
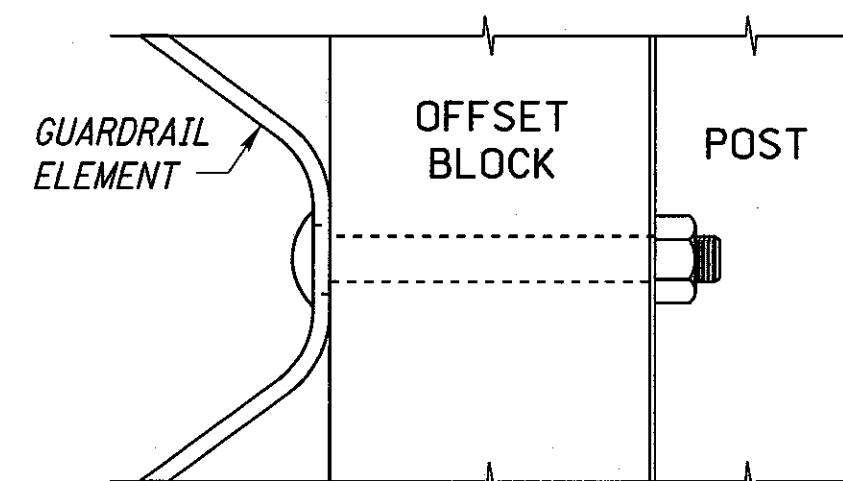


PLATE WASHER



WOOD POST BOLT ASSEMBLY



STEEL POST BOLT ASSEMBLY

DELINEATOR NOTES:

4 LANE: YELLOW ON LEFT AND WHITE ON RIGHT.
 2 LANE: WHITE ON BOTH SIDES.

DELINEATORS ARE A MINIMUM OF 3" HIGH AND ARE DOUBLE-FACED HIGH INTENSITY DELINEATORS.

WHEN GUARDRAIL IS ATTACHED TO A BRIDGE APPROACH SECTION: GUARDRAIL DELINEATION AT 12'-6" SPACING FOR THE FIRST 50', THEN 25' SPACING WHEN THE REMAINING GUARDRAIL LENGTH IS 150' OR LESS; USE 50' SPACING WHEN THE REMAINING GUARDRAIL LENGTH IS GREATER THAN 150'.

WHEN GUARDRAIL IS INDEPENDENT OF A BRIDGE: GUARDRAIL DELINEATION AT 25' SPACING WHEN THE GUARDRAIL LENGTH IS 200' OR LESS; USE 50' SPACING WHEN THE GUARDRAIL LENGTH IS GREATER THAN 200'.

DELINEATORS SUBSIDIARY TO GUARDRAIL.

NOTES:

BUTTON HEAD BOLD 5/8" DIA. x LENGTH AS REQUIRED, SECURED WITH WASHER AND HEX NUT.

ALL STEEL MEMBERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

POST SPACING SHALL BE 6'-3" UNLESS OTHERWISE NOTED IN THE PLANS.

GUARDRAIL LAPPING PROCEDURE TRAFFIC FLOW →

NOTES:

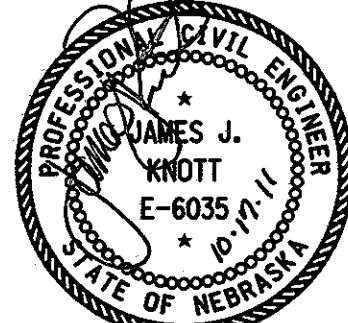
ALL HOLE DIAMETERS ARE 3/4"

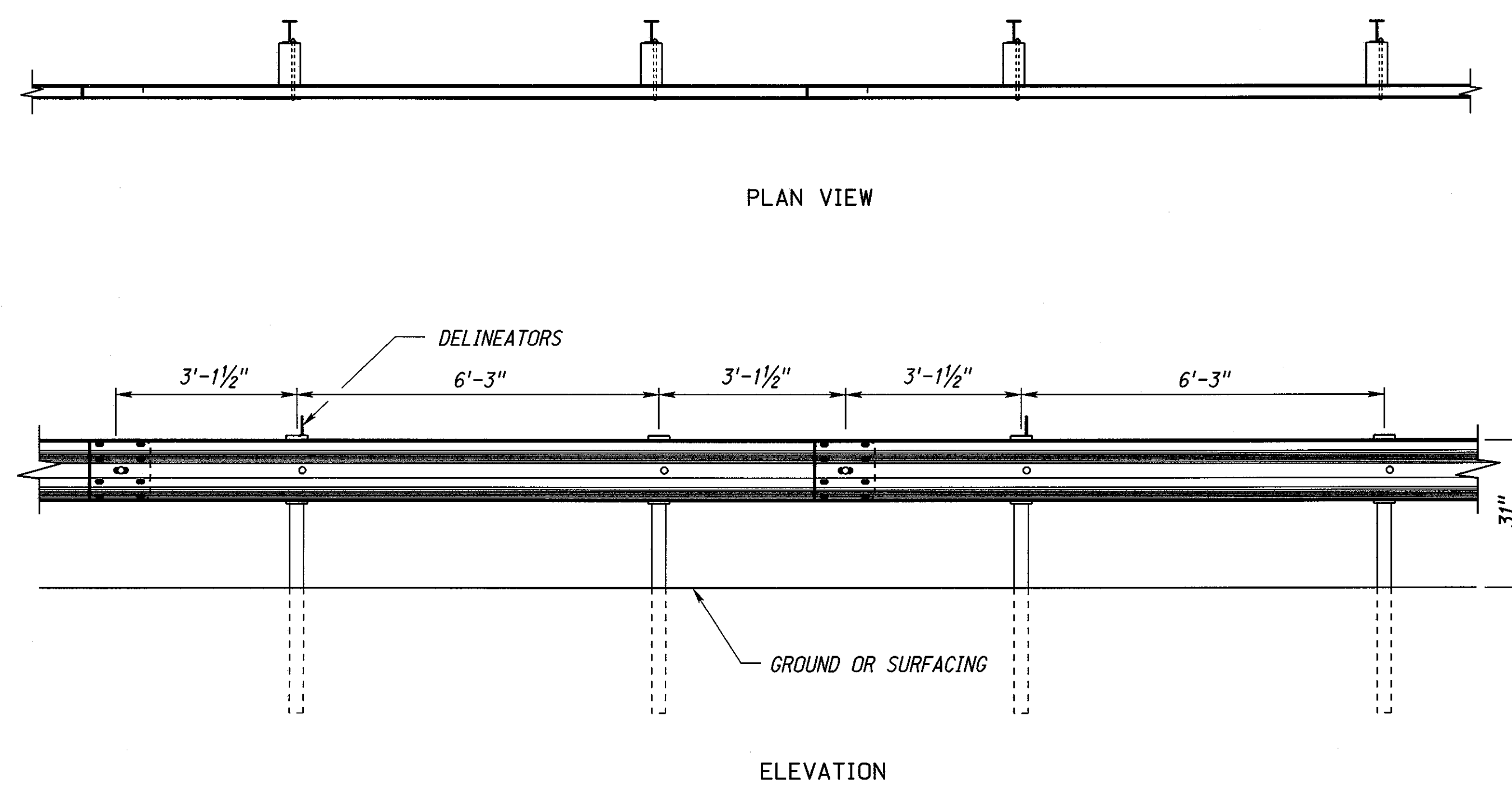
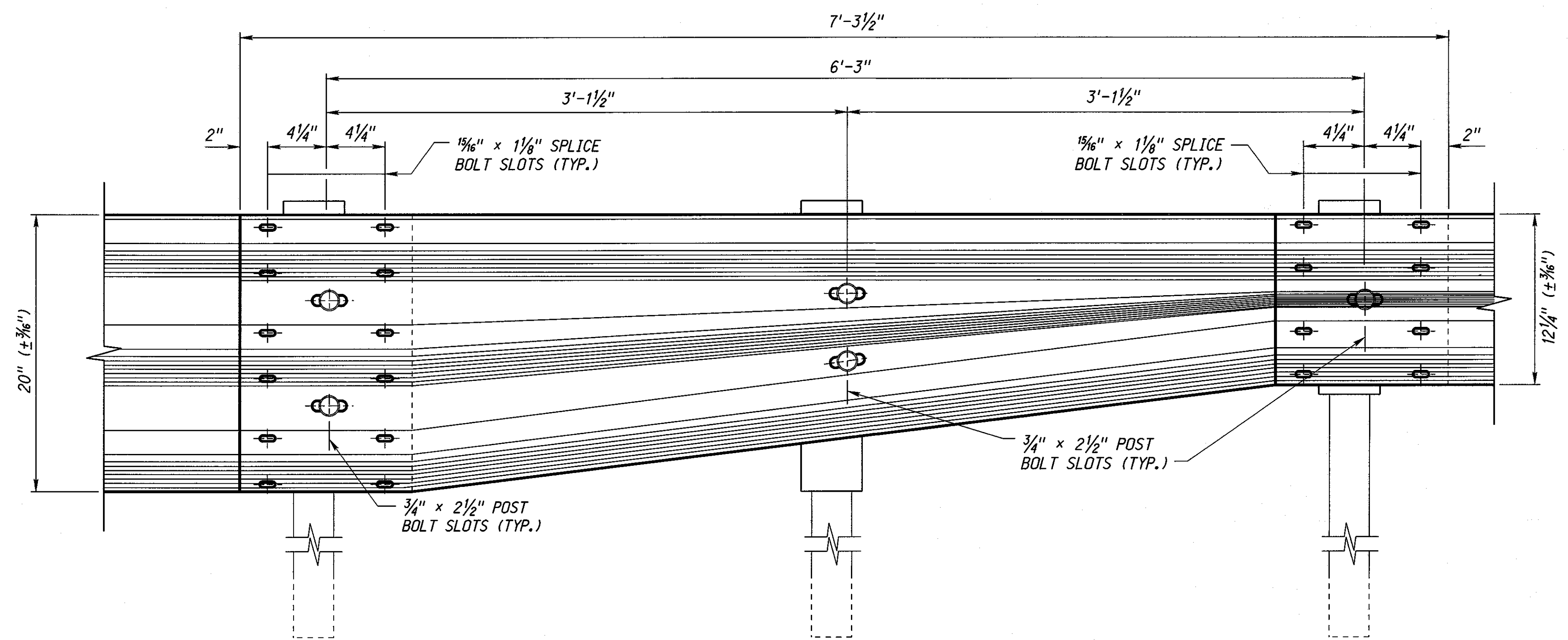
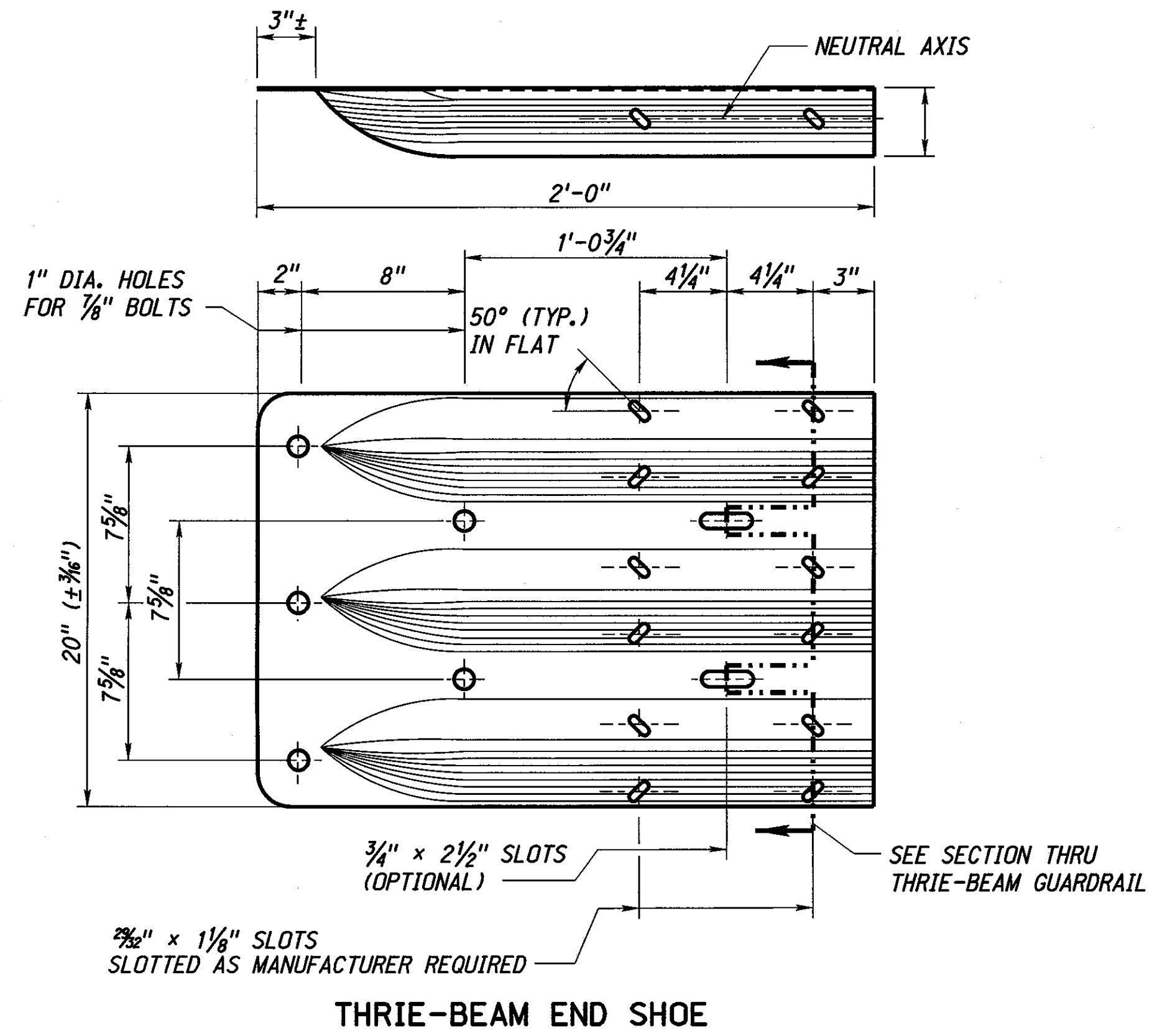
W6 x 9 POST & 14 1/4" ± 1/4" OFFSET BLOCKS, TO BE USED WITH MGS INSTALLATIONS.

OFFSET BLOCKS LISTED ON THE APPROVED PRODUCTS LIST MAY ALSO BE USED.


16d NAIL NEEDS TO BE PUT IN OFFSET BLOCK AGAINST POST IN EMPTY HOLE AS NEEDED TO PREVENT ROTATION WHEN NO RIBS ARE PRESENT.

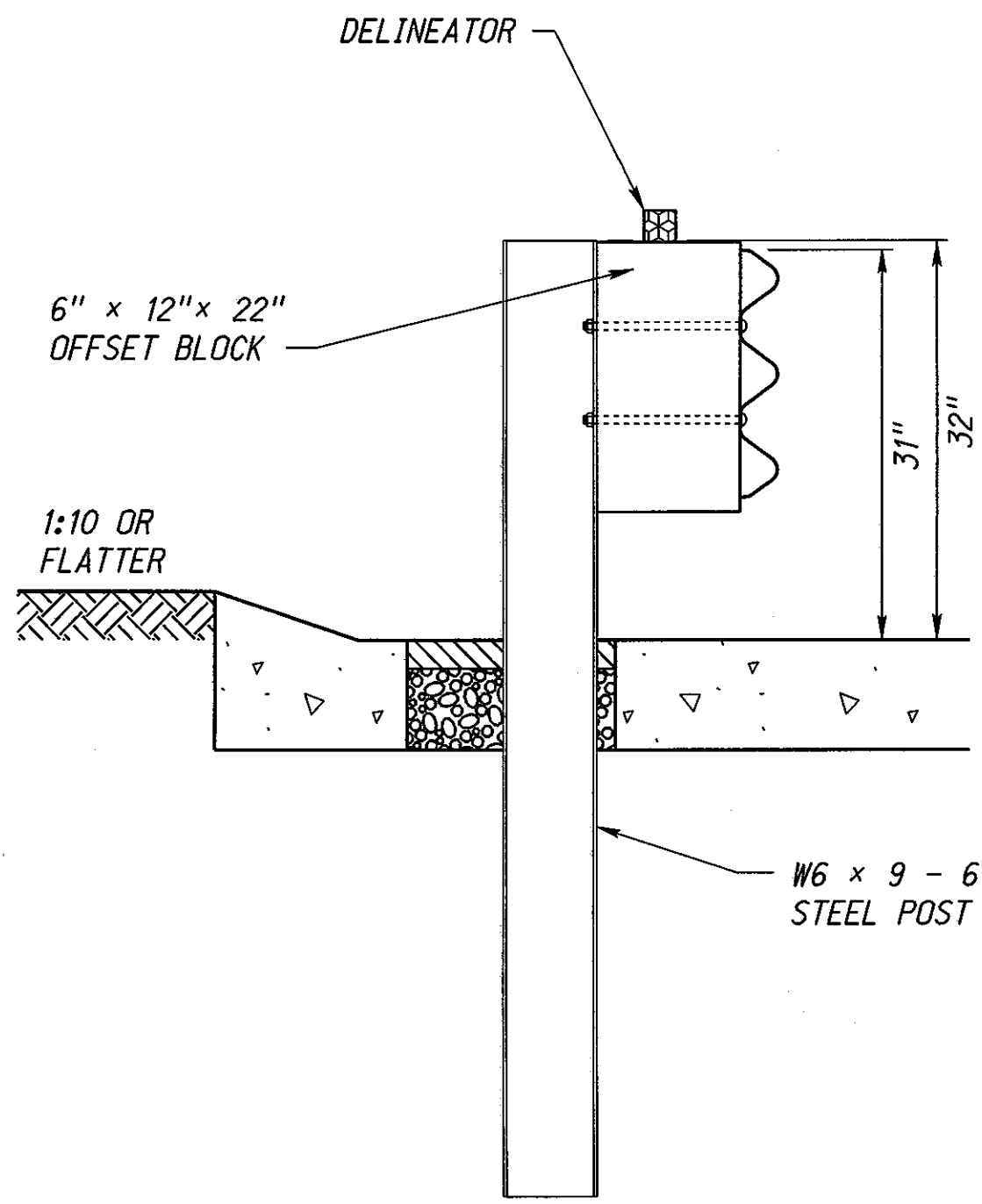
ALTERNATE OFFSET BLOCK & STEEL POST (FOR MGS)

REV. NO.	DATE	DESCRIPTION OF REVISION
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 743 GUARDRAIL DETAILS		
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:		
ORIGINAL: AUGUST 25, 2011 DATE		
10/14/2011 DATE		2 4



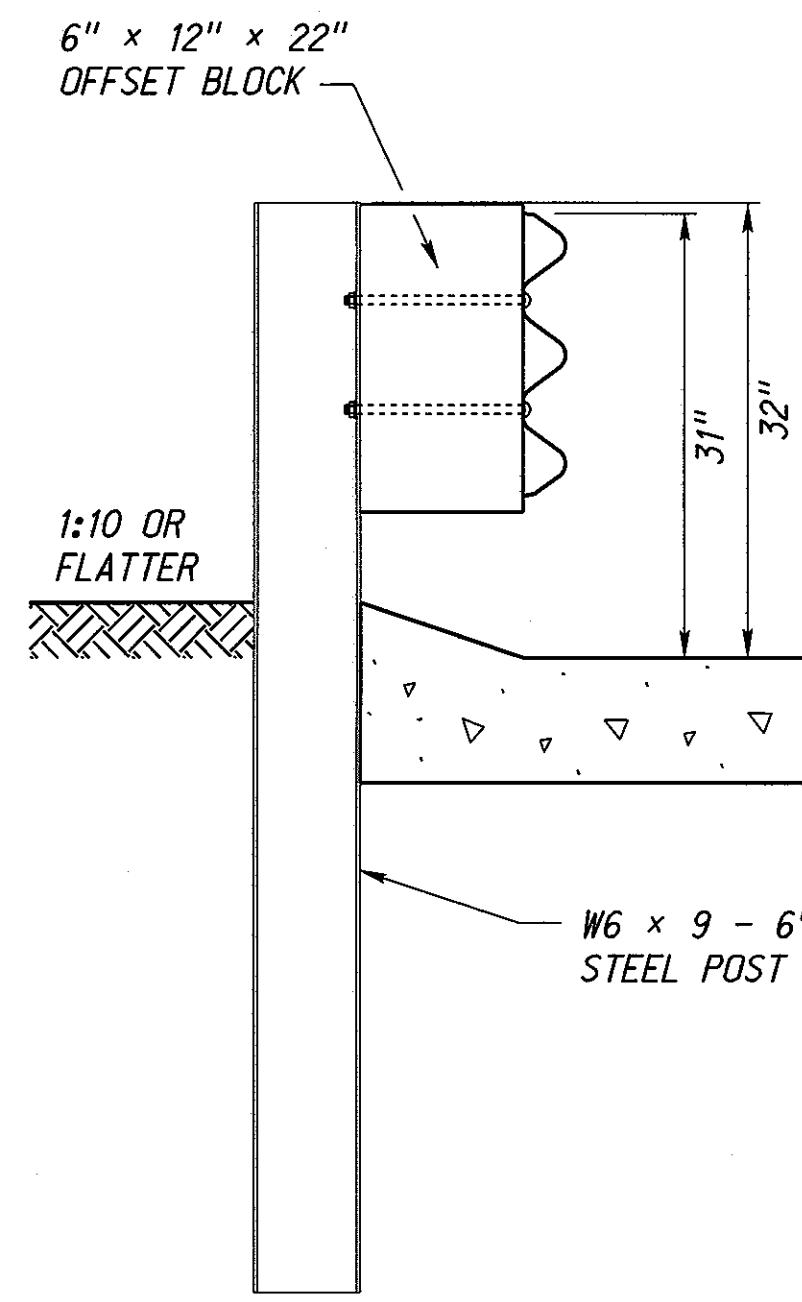
MIDWEST GUARDRAIL SYSTEM (MGS) INSTALLATION
(PAID FOR AS W-BEAM GUARDRAIL)

REV. NO.	DATE	DESCRIPTION OF REVISION
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 743 GUARDRAIL DETAILS		
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:		 DATE: 10/14/2011
ORIGINAL: AUGUST 25, 2011		
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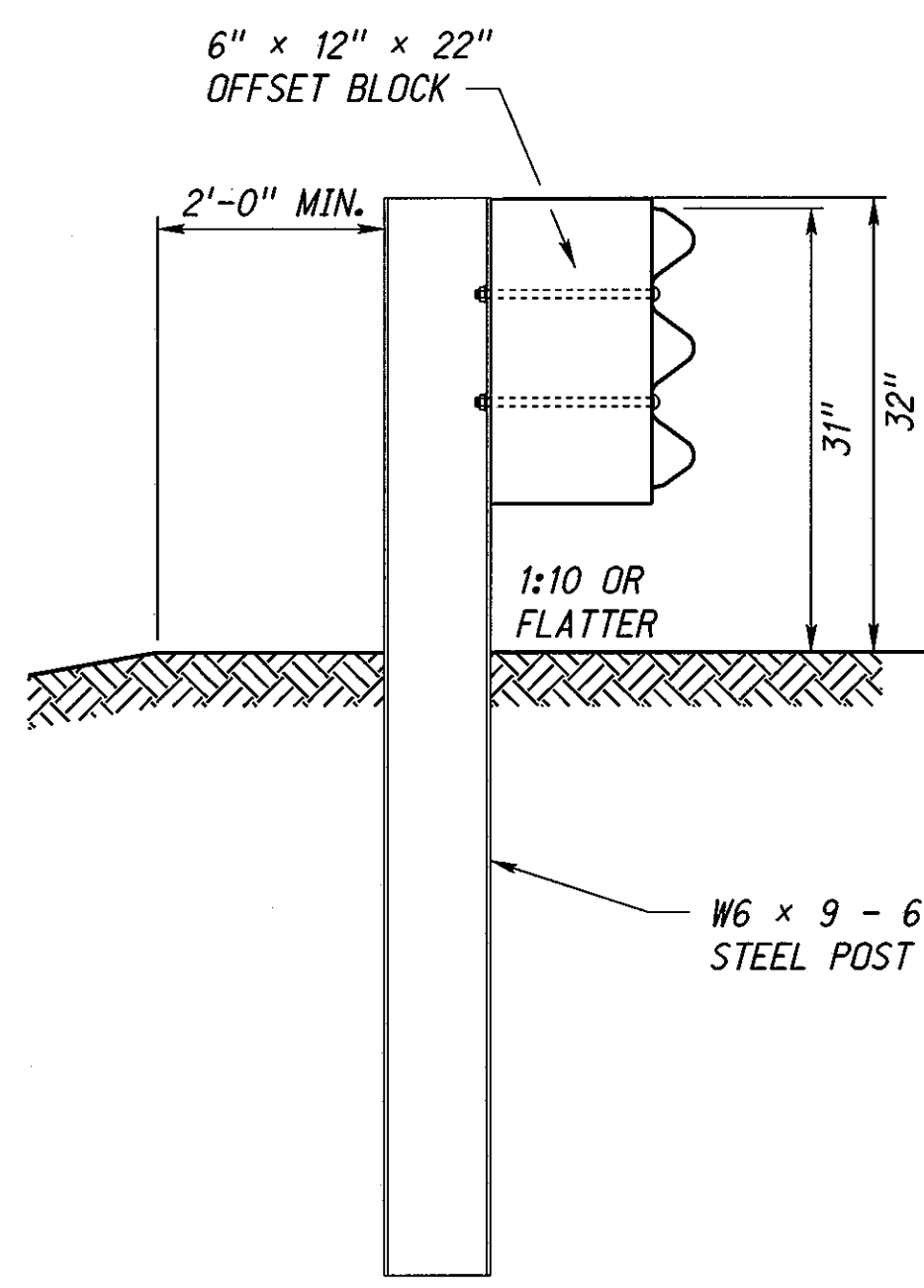


SIDE VIEW

CURBED LOCATIONS

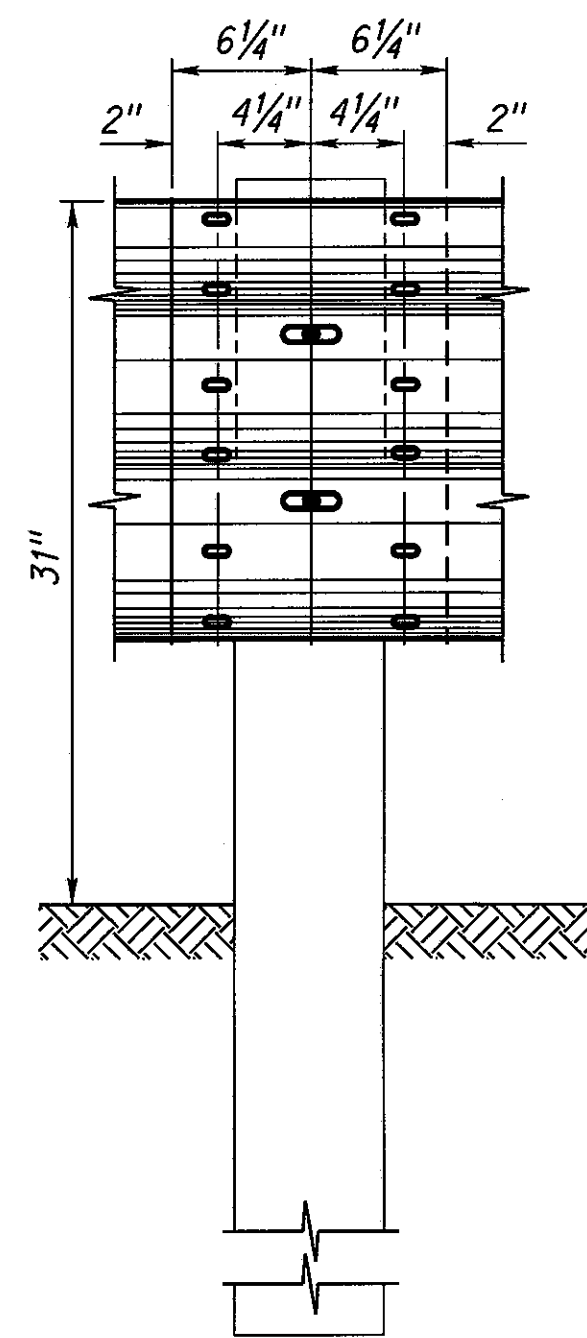


SIDE VIEW

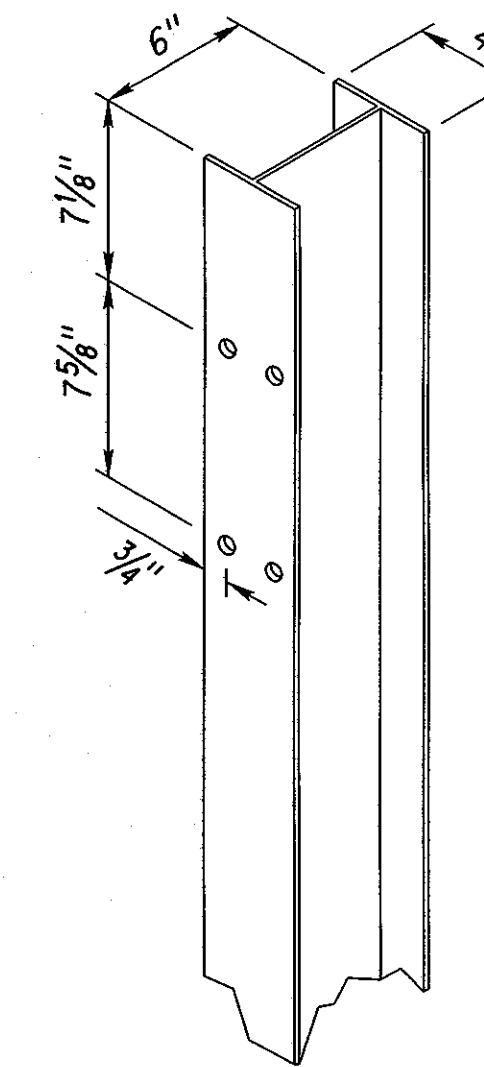
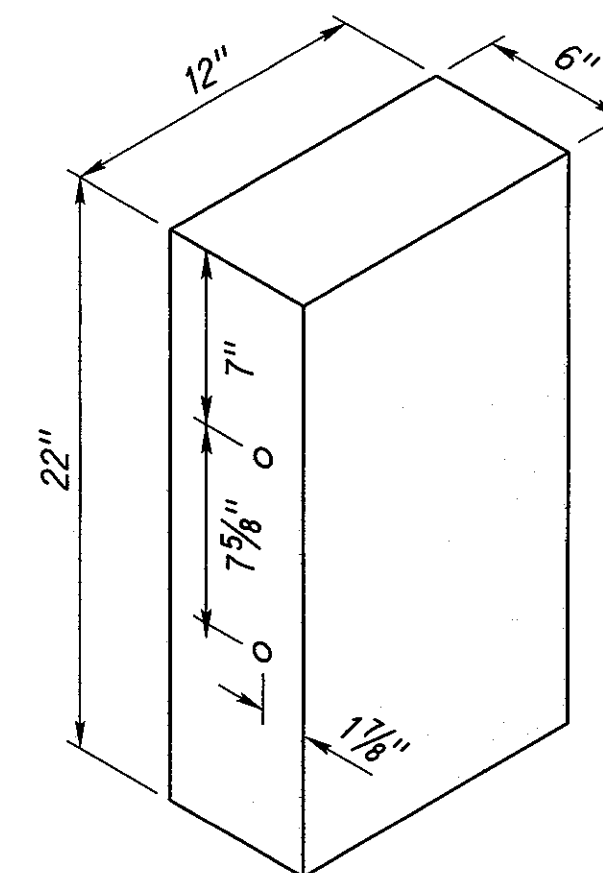


SIDE VIEW

NON-CURBED LOCATIONS

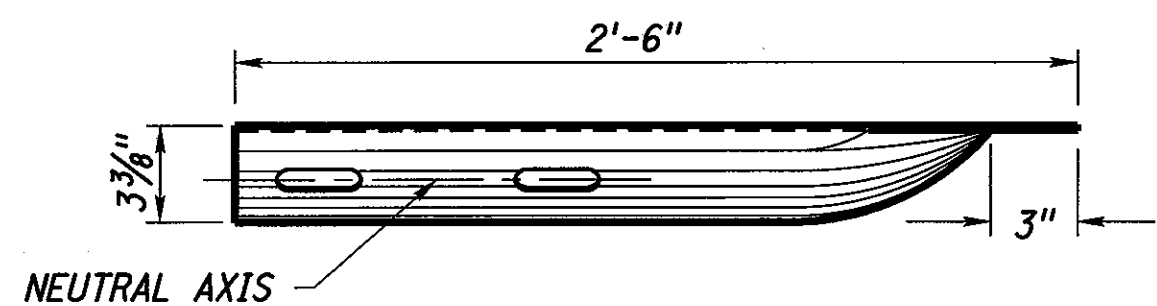


RAIL ELEMENT SPLICING AND POST MOUNTING DETAIL FOR 1/4 OR 1/2 POST SPACING

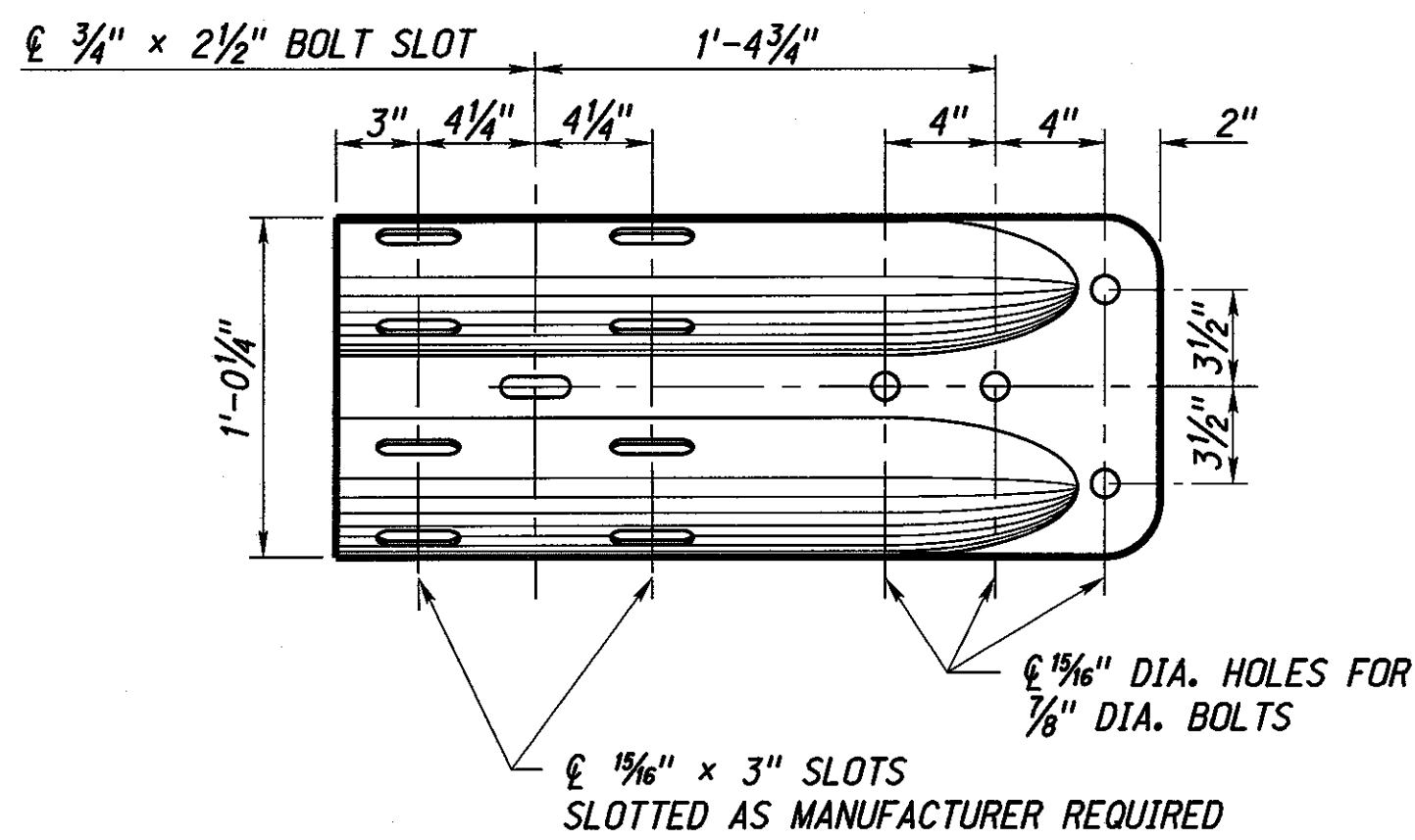


ALTERNATE OFFSET BLOCK & STEEL POST (FOR THRIE-BEAM)

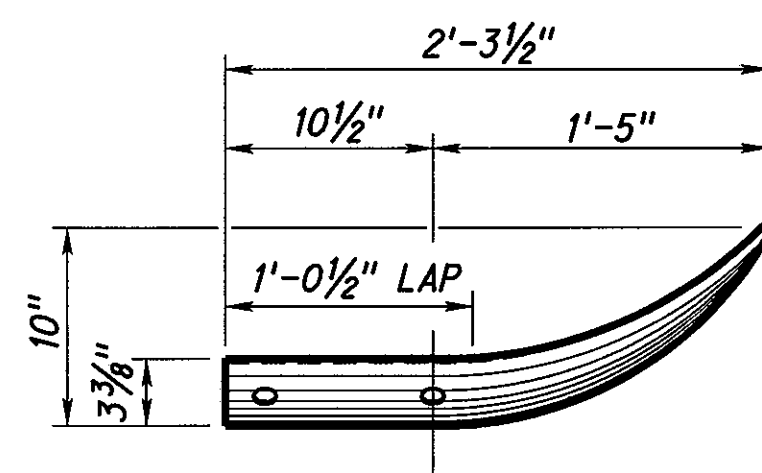
SPECIAL END SHOE SHALL BE 10 GAUGE STEEL AND GALVANIZED IN ACCORDANCE WITH ASTM A93 OR ASTM A123 WITH COATING CLASS 250.



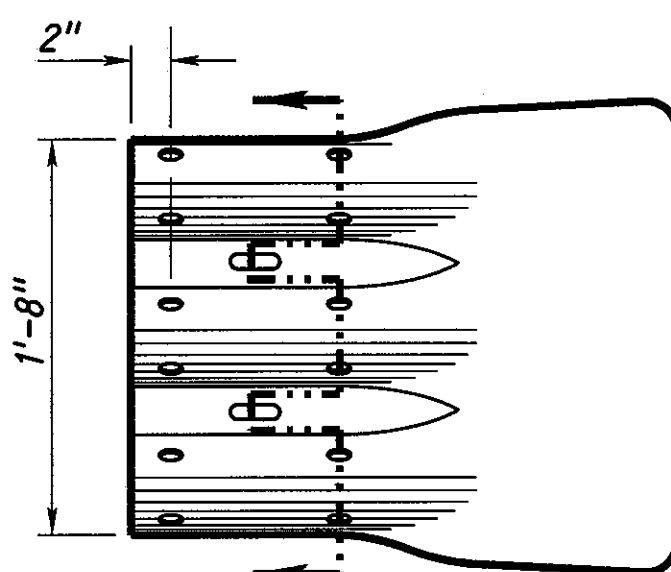
PLAN



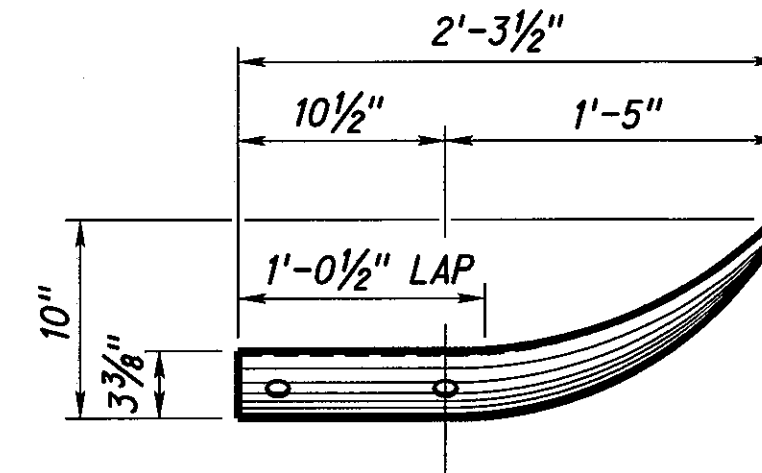
ELEVATION
W-BEAM END SHOE



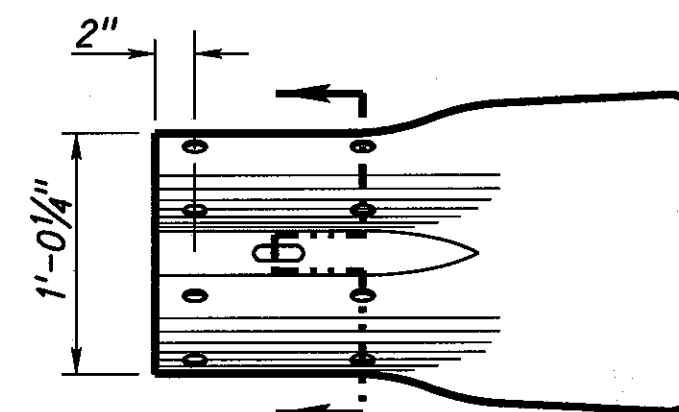
PLAN



ELEVATION
THRIE-BEAM TERMINAL SECTION



PLAN



SEE SECTION THRU W-BEAM GUARDRAIL
ELEVATION
W-BEAM TERMINAL SECTION

NOTES:

ALL HOLE DIAMETERS ARE 3/4"

W6 x 9 POST & 22" OFFSET BLOCK, TO BE USED WITH THRIE-BEAM GUARDRAIL INSTALLATIONS.

OFFSET BLOCKS LISTED ON THE APPROVED PRODUCTS LIST MAY ALSO BE USED.

REV. NO.	DATE	DESCRIPTION OF REVISION
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 743 GUARDRAIL DETAILS		
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DATE: 10/14/2011 ORIGINAL: AUGUST 25, 2011 DATE:		
4		4

CHANNELIZATION DEVICES

THE FUNCTION OF CHANNELIZATION DEVICES IS TO WARN DRIVERS OF CONDITIONS CREATED BY WORK ACTIVITIES IN OR NEAR THE TRAVELED WAY, TO PROTECT WORKERS IN THE TEMPORARY TRAFFIC CONTROL ZONE, AND TO GUIDE DRIVERS AND PEDESTRIANS SAFELY. CHANNELIZING DEVICES INCLUDE BUT ARE NOT LIMITED TO CONES, TUBULAR MARKERS, VERTICAL PANELS, DRUMS, BARRICADES, TEMPORARY RAISED ISLANDS, AND BARRIERS.

DEVICES USED FOR CHANNELIZATION SHOULD PROVIDE FOR SMOOTH AND GRADUAL TRAFFIC MOVEMENT FROM ONE LANE TO ANOTHER, ONTO A BYPASS OR DETOUR, OR TO REDUCE THE WIDTH OF THE TRAVELED WAY. THEY MAY ALSO BE USED TO SEPARATE TRAFFIC FROM THE WORK SPACE, PAVEMENT DROP-OFFS, PEDESTRIAN PATHS, OR OPPOSING DIRECTIONS OF TRAFFIC.

CHANNELIZING DEVICES SHOULD BE CONSTRUCTED AND BALLASTED TO PERFORM IN A PREDICTABLE MANNER WHEN INADVERTENTLY STRUCK BY A VEHICLE. IF STRUCK, THE DEVICE SHOULD YIELD OR BREAK AWAY, AND FRAGMENTS OR OTHER DEBRIS FROM THE DEVICE SHOULD NOT PENETRATE THE PASSENGER COMPARTMENT OF THE VEHICLE OR BE A POTENTIAL HAZARD TO WORKERS OR PEDESTRIANS IN THE IMMEDIATE AREA.

SPACING OF CHANNELIZING DEVICES SHOULD NOT EXCEED A DISTANCE IN FEET EQUAL TO THE SPEED WHEN USED FOR THE TAPER CHANNELIZATION, AND A DISTANCE IN FEET OF TWICE THE SPEED WHEN USED FOR TANGENT CHANNELIZATION.

SPACING OF CHANNELIZATION DEVICES		
SPEED (MPH)	SPACING OF DEVICES IN FEET	
	TAPER	TANGENT
25	25 FT	50 FT
35	35 FT	70 FT
45	45 FT	90 FT
55	55 FT	110 FT
65	65 FT	130 FT
70	70 FT	140 FT
75	75 FT	150 FT

WARNING LIGHTS ON CHANNELIZING DEVICES. CONSIDERATION SHOULD BE GIVEN TO FOG OR SNOW AREAS, SEVERE ROADWAY CURVATURE, AND USUALLY CLUTTERED ENVIRONMENTS. FLASHING WARNING LIGHTS SHALL BE PLACED ON CHANNELIZING DEVICES USED SINGLY OR IN GROUPS TO MARK A SPOT CONDITION. STEADY-BURN WARNING LIGHTS MAY BE USED ON CHANNELIZING DEVICES USED IN A SERIES.

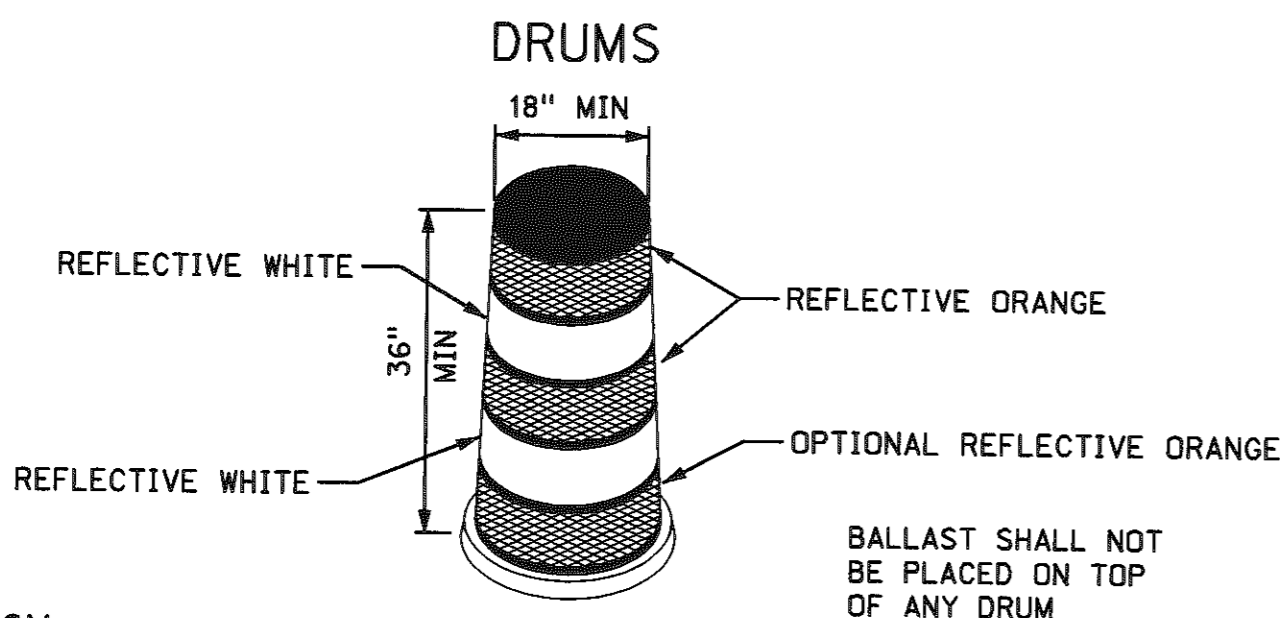
THE RETROREFLECTIVE MATERIAL USED ON CHANNELIZING DEVICES SHALL HAVE A SMOOTH, SEALED OUTER SURFACE, MEETING THE REQUIREMENTS OF THE ASTM SPECIFICATION: D4956, FOR TYPE III SHEETING. THE COEFFICIENT OF RETROREFLECTION OF CHANNELIZING DEVICES SHALL HAVE THE FOLLOWING MINIMUM BRIGHTNESS VALUES MEASURED AT 0.2° OBSERVATION ANGLE AND -4° ENTRANCE ANGLE. CANDÉLAS PER LUX PER SQUARE METER.

COEFFICIENT OF RETROREFLECTION			
WHITE	ORANGE	RED	YELLOW
125	50	22.5	85

IN ADDITION TO THE MINIMUM COEFFICIENT OF RETROREFLECTION, THE AMERICAN TRAFFIC SAFETY SERVICES ASSOCIATION (ATSSA) "QUALITY STANDARD FOR WORK ZONE TRAFFIC CONTROL DEVICES" MAY BE USED AS A VISUAL GUIDE FOR DETERMINING IF A TRAFFIC CONTROL DEVICE IS ACCEPTABLE, MARGINAL OR UNACCEPTABLE.

THE NAME AND TELEPHONE NUMBER OF THE AGENCY, CONTRACTOR, OR SUPPLIER MAY BE SHOWN ON THE CHANNELIZING DEVICE BACK OR SUPPORT, BUT NOT ON THE DEVICES FACE. THE LETTERS AND NUMBERS SHALL BE A NON-REFLECTIVE COLOR AND NOT OVER 100 SQUARE CENTIMETERS IN TOTAL AREA.

PARTICULAR ATTENTION SHOULD BE GIVEN TO ASSURING THAT CHANNELIZING DEVICES ARE MAINTAINED AND KEPT CLEAN, VISIBLE, AND PROPERLY POSITIONED AT ALL TIMES. DEVICES SHALL BE REPLACED THAT ARE DAMAGED AND HAVE LOST A SIGNIFICANT AMOUNT OF THEIR RETROREFLECTIVITY AND EFFECTIVENESS.



DESIGN

DRUMS USED FOR TRAFFIC WARNING OR CHANNELIZATION SHALL BE CONSTRUCTED OF LIGHT-WEIGHT, FLEXIBLE, AND DEFORMABLE MATERIALS AND BE A MINIMUM OF 36 INCHES IN HEIGHT AND HAVE AT LEAST A 18 INCHES MINIMUM WIDTH, REGARDLESS OF ORIENTATION. THE PREDOMINANT COLOR OF THE DRUM SHALL BE ORANGE. STEEL DRUMS SHALL NOT BE USED. THE MARKINGS ON DRUMS SHALL BE HORIZONTAL, CIRCUMFERENTIAL, ALTERNATING ORANGE AND WHITE RETROREFLECTIVE STRIPES 6 INCHES TO 8 INCHES WIDE. EACH DRUM SHALL HAVE A MINIMUM OF TWO ORANGE AND TWO WHITE STRIPES. ANY NON-RETROREFLECTIVE SPACES BETWEEN THE HORIZONTAL ORANGE AND WHITE STRIPES, SHALL NOT EXCEED 2 INCHES WIDE. DRUMS SHALL HAVE CLOSED TOPS THAT WILL NOT ALLOW COLLECTION OF ROADWORK OR OTHER DEBRIS.

APPLICATION

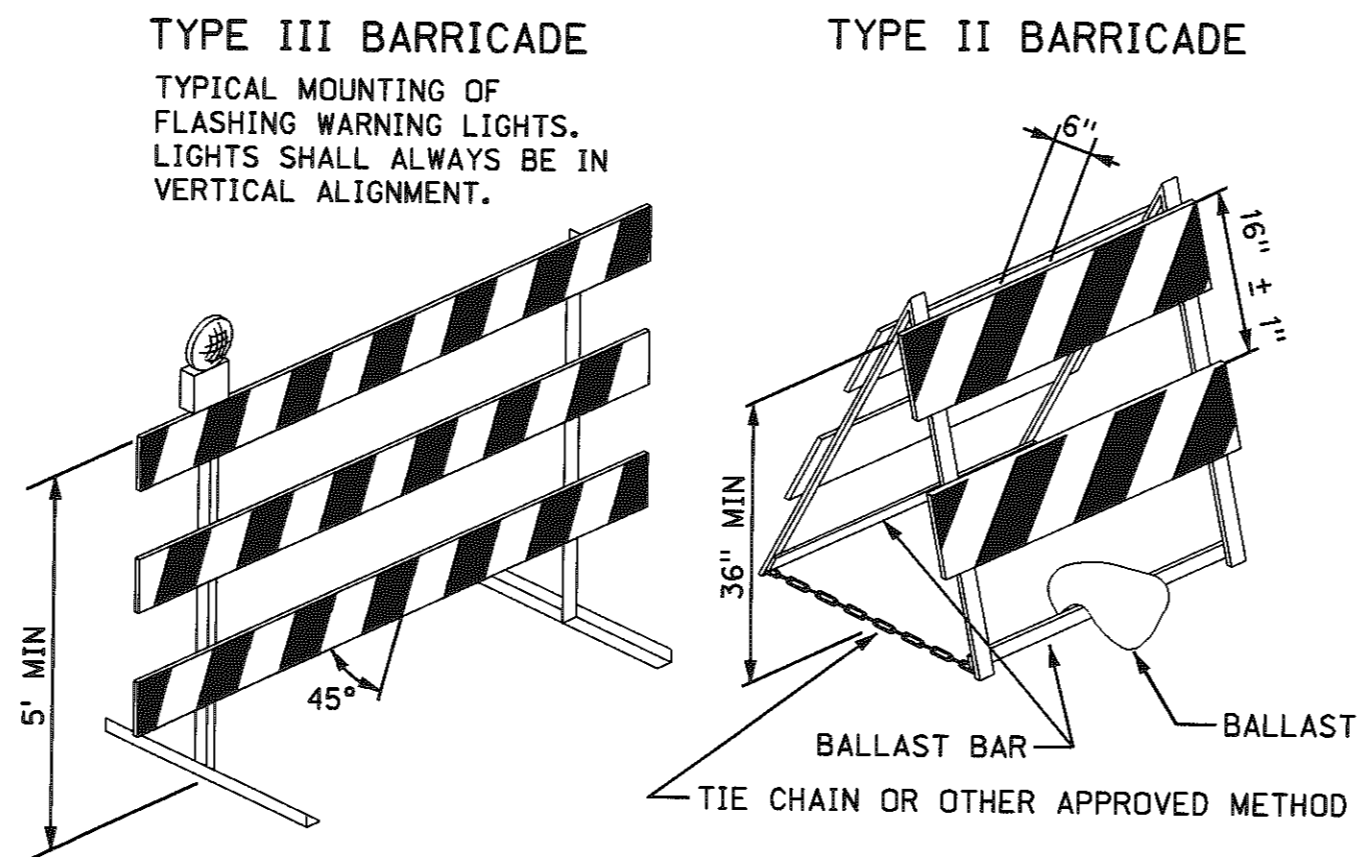
DRUMS ARE MOST COMMONLY USED TO CHANNELIZE OR DELINEATE TRAFFIC FLOW BUT MAY ALSO BE USED SINGLY OR IN GROUPS TO MARK SPECIFIC LOCATIONS. DRUMS ARE HIGHLY VISIBLE AND HAVE GOOD TARGET VALUE, GIVEN THE APPEARANCE OF BEING FORMIDABLE OBSTACLES AND, THEREFORE, COMMAND THE RESPECT OF DRIVERS.

DRUMS SHOULD NOT BE WEIGHTED WITH SAND, WATER, OR ANY MATERIAL TO AN EXTENT THAT WOULD MAKE THEM HAZARDOUS TO MOTORISTS, PEDESTRIANS, OR WORKERS. WHEN THEY ARE USED IN REGIONS SUSCEPTIBLE TO FREEZING, THEY SHOULD HAVE DRAINAGE HOLES IN THE BOTTOM SO WATER WILL NOT ACCUMULATE AND FREEZE, CAUSING A HAZARD IF STRUCK BY A MOTORIST. BALLAST SHALL NOT BE PLACED ON TOP OF THE DRUM.

BARRICADES

BARRICADE TYPE	TYPE II	TYPE III
WIDTH OF RAIL *	8 INCHES MIN - 12 INCHES MAX	8 INCHES MIN - 12 INCHES MAX
LENGTH OF RAIL	36 INCHES	8 FEET **
WIDTH OF STRIPES	6 INCHES	6 INCHES
HEIGHT	36 INCHES	5 FEET
REFLECTIVE SHEETING	TYPE III	TYPE III
NUMBER OF REFLECTORIZED RAIL FACES	4 (TWO EACH DIRECTION)	6 (THREE EACH DIRECTION)

* NOMINAL DIMENSIONS ARE PERMISSIBLE WHEN CONSTRUCTED FROM LUMBER.
** WHEN LATERAL SPACE IS LIMITED, SOME TYPE III BARRICADES WITH A 4 FOOT LENGTH OF RAIL, MAY BE ALLOWED WHEN APPROVED BY THE ENGINEER.



DESIGN

A BARRICADE IS A PORTABLE OR FIXED DEVICE HAVING TWO OR THREE RAILS WITH APPROPRIATE MARKINGS. IT IS USED TO CONTROL TRAFFIC BY CLOSING, RESTRICTING, OR DELINEATING ALL OR A PORTION OF THE RIGHT-OF-WAY.

BARRICADES SHALL BE ONE OF TWO TYPES: TYPE II, OR TYPE III.

STRIPES ON BARRICADE RAILS SHALL BE ALTERNATING ORANGE AND WHITE RETROREFLECTIVE STRIPES (SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION TRAFFIC IS TO PASS). THE STRIPES SHALL BE 6 INCHES WIDE. THE MINIMUM RAIL LENGTH IS 36 INCHES.

WHERE A BARRICADE EXTENDS ENTIRELY ACROSS A ROADWAY, THE STRIPES SHOULD SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH TRAFFIC MUST TURN. WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED, THE STRIPES MAY SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE OR BARRICADES. WHERE NO TURNS ARE INTENDED, THE STRIPES SHOULD SLOPE DOWNWARD TOWARD THE CENTER OF THE BARRICADE OR BARRICADES.

BARRICADE RAILS SHOULD BE SUPPORTED IN A MANNER THAT WILL ALLOW THEM TO BE SEEN BY THE MOTORIST AND PROVIDE A STABLE SUPPORT NOT EASILY BLOWN OVER BY THE WIND OR TRAFFIC.

BARRICADES ARE LOCATED ADJACENT TO TRAFFIC AND ARE THEREFORE SUBJECT TO IMPACT BY ERRANT VEHICLES. BECAUSE OF THEIR VULNERABLE POSITION AND THE HAZARD THEY CREATE, THEY SHOULD BE CONSTRUCTED OF LIGHTWEIGHT MATERIALS AND HAVE NO RIGID STAY BRACING FOR A-FRAME DESIGNS. TYPE II BARRICADES SHALL BE BUILT WITH LEGS OR SUPPORTS THAT WILL COLLAPSE WHEN THE BARRICADE IS TIPPED OVER OR HAS BEEN LAID DOWN.

ON HIGH-SPEED ROADWAYS OR IN OTHER SITUATIONS WHERE BARRICADES MAY BE SUSCEPTIBLE TO OVERTURNING IN THE WIND, SANDBAGS SHOULD BE USED FOR BALLASTING. SANDBAGS MAY BE PLACED ON LOWER PARTS OF THE FRAME OR STAYS TO PROVIDE THE REQUIRED BALLAST BUT SHALL NOT BE PLACED ON TOP OF ANY STRIPED RAIL. BARRICADES SHALL NOT BE BALLASTED BY HEAVY OBJECTS SUCH AS ROCKS OR CHUNKS OF CONCRETE.

ON THE INTERSTATE, FREEWAY AND EXPRESSWAY SYSTEM, TYPE II BARRICADES SHALL NOT BE USED FOR CHANNELIZATION.

THE BARRICADE OWNERS NAME, NOT TO EXCEED 15 SQUARE INCHES SHALL BE SHOWN ON THE BARRICADE BACK OR SUPPORT, BUT NOT ON ITS FACE.

APPLICATION

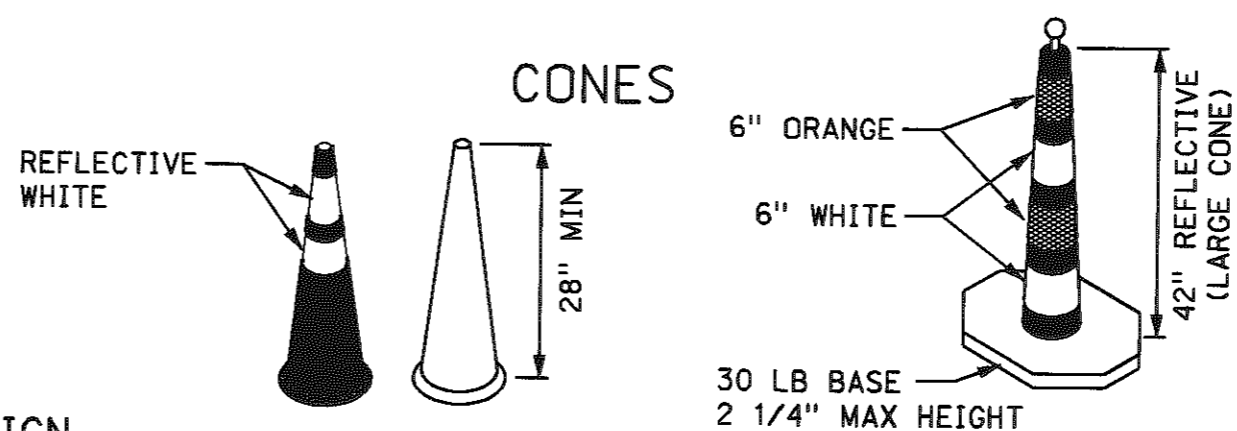
TYPE II BARRICADES ARE INTENDED FOR USE IN SITUATIONS WHERE TRAFFIC IS MAINTAINED THROUGH THE TEMPORARY TRAFFIC CONTROL ZONE. THEY MAY BE USED SINGLY OR IN GROUPS TO MARK A SPECIFIC CONDITION, OR THEY MAY BE USED IN A SERIES FOR CHANNELIZING TRAFFIC. TYPE III BARRICADES SHALL BE SUPPLEMENTED, WITH A LIGHTING DEVICE UNLESS SPECIFICALLY DELETED BY THE ENGINEER TO USE SOME BARRICADES WITHOUT LIGHTS.

TYPE III BARRICADES USED AT A ROAD CLOSURE MAY EXTEND COMPLETELY ACROSS A ROADWAY OR FROM CURB TO CURB. WHERE PROVISION IS MADE FOR ACCESS OF AUTHORIZED EQUIPMENT AND VEHICLES, THE RESPONSIBILITY FOR THE TYPE III BARRICADES SHOULD BE ASSIGNED TO A PERSON TO ENSURE PROPER CLOSURE AT THE END OF EACH WORK DAY.

WHEN A HIGHWAY IS LEGALLY CLOSED BUT ACCESS MUST STILL BE ALLOWED FOR LOCAL TRAFFIC, THE TYPE III BARRICADE SHOULD NOT BE EXTENDED COMPLETELY ACROSS A ROADWAY. A SIGN WITH THE APPROPRIATE LEGEND CONCERNING PERMISSIBLE USE BY LOCAL TRAFFIC SHALL BE MOUNTED.

NORMALLY PERMANENT SIGNS MOUNTED ON BARRICADES SHALL BE ERECTED ABOVE THE BARRICADE. THE SIGNS "ROAD CLOSED", OR "ROAD CONSTRUCTION AHEAD", FOR EXAMPLE CAN EFFECTIVELY BE MOUNTED ABOVE THE BARRICADE THAT CLOSURES THE ROADWAY. TYPE III BARRICADES SHALL BE SUPPLEMENTED WITH A LIGHTING DEVICE UNLESS SPECIFICALLY OMITTED BY THE ENGINEER. DETOUR ARROW AND LARGE WARNING ARROW SIGNS SHOULD BE PLACED ON THE FACE OF BARRICADE.

CONES



DESIGN

CONES SHALL BE PREDOMINANTLY ORANGE, FLOURESCENT RED-ORANGE, OR FLOURESCENT YELLOW/ORANGE, NOT LESS THAN 28 INCHES IN HEIGHT, AND SHALL BE MADE OF A MATERIAL THAT CAN BE STRUCK WITHOUT DAMAGING VEHICLES ON IMPACT. CONES WHEN ALLOWED ON THE INTERSTATE, FREEWAY OR EXPRESSWAY SYSTEM SHALL BE A MINIMUM OF 36 INCHES IN HEIGHT.

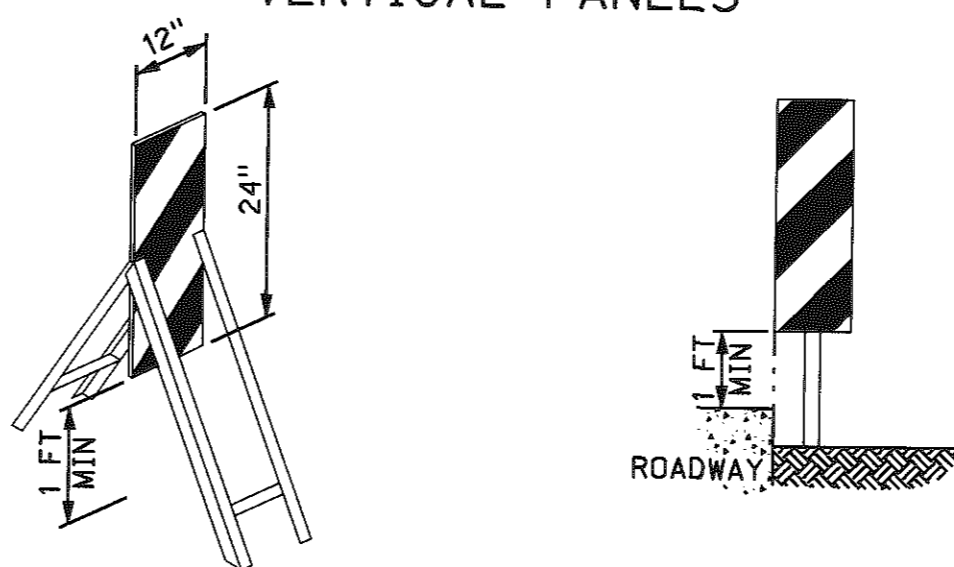
FOR NIGHTTIME USE, CONES SHALL BE RETROREFLECTIVE OR EQUIPPED WITH LIGHTING DEVICES FOR MAXIMUM VISIBILITY. RETROREFLECTION OF 28 INCH OR 36 INCH CONES SHALL BE PROVIDED BY A WHITE BAND 6 INCHES WIDE, NO MORE THAN 3 INCHES TO 4 INCHES FROM THE TOP OF THE CONE, AND AN ADDITIONAL 4 INCHES WIDE WHITE BAND A MINIMUM OF 2 INCHES BELOW THE 6 INCHES BAND. LARGE REFLECTIVE CONES SHALL BE PROVIDED WITH FOUR REFLECTIVE BANDS 6 INCHES EACH, ALTERNATING FROM THE TOP, ORANGE, WHITE, ORANGE, WHITE, WITH A TWO INCH SEPARATION BETWEEN BANDS. WHEN APPROVED BY THE ENGINEER, LARGE CONES MAY BE USED IN PLACE OF VERTICAL PANELS. LARGE CONES SHALL NOT BE USED IN PLACE OF DRUMS OR TYPE II BARRICADES.

APPLICATION

TRAFFIC CONES ARE USED TO CHANNELIZE TRAFFIC, DIVIDE OPPOSING TRAFFIC LANES, DIVIDE TRAFFIC LANES WHEN TWO OR MORE LANES ARE KEPT OPEN IN THE SAME DIRECTION, AND DELINEATE SHORT-DURATION MAINTENANCE AND UTILITY WORK. CONES SHALL NOT BE USED AT NIGHT ON RURAL HIGHWAYS, UNLESS SHOWN ON THE PLANS OR AS APPROVED OR DIRECTED BY THE ENGINEER.

STEPS SHOULD BE TAKEN TO ENSURE THAT CONES WILL NOT BE BLOWN OVER OR DISPLACED BY WIND OR MOVING TRAFFIC. CONES CAN BE DOUBLED UP TO INCREASE THEIR WEIGHT. SOME CONES ARE CONSTRUCTED WITH BASES THAT CAN BE FILLED WITH BALLAST. OTHERS HAVE SPECIAL WEIGHTED BASES, OR WEIGHTS SUCH AS SANDBAG RINGS THAT CAN BE DROPPED OVER THE CONES AND ONTO THE BASE TO PROVIDE ADDED STABILITY. BALLAST, HOWEVER, SHOULD NOT PRESENT A HAZARD IF THE CONES ARE INADVERTENTLY STRUCK.

VERTICAL PANELS



DESIGN

VERTICAL PANELS SHALL BE 12 INCHES WIDE AND AT LEAST 24 INCHES HIGH. THEY SHALL HAVE ORANGE AND WHITE STRIPES, AND BE RETROREFLECTIVE. PANEL STRIPE WIDTHS SHALL BE 6 INCHES, EXCEPT WHERE PANEL HEIGHTS ARE LESS THAN 36 INCHES, THEN 4 INCHES STRIPES MAY BE USED. IF USED FOR TWO-WAY TRAFFIC, BACK-TO-BACK PANELS SHALL BE USED.

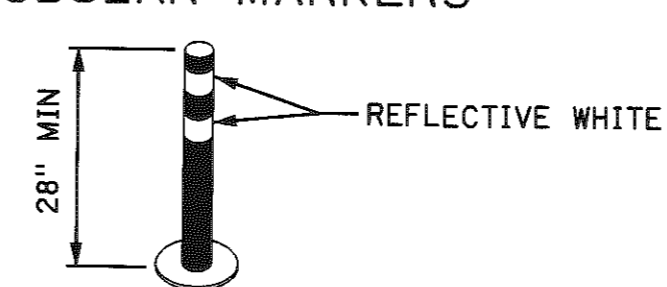
MARKINGS FOR VERTICAL PANELS SHALL BE ALTERNATING ORANGE AND WHITE RETROREFLECTORIZED STRIPES (SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION TRAFFIC IS TO PASS).

VERTICAL PANELS SHALL BE MOUNTED UPRIGHT WITH THE TOP A MINIMUM OF 36 INCHES ABOVE THE ROADWAY. VERTICAL PANELS NOT MOUNTED ABOVE CONCRETE BARRIERS SHALL HAVE LEGS OR SUPPORTS THAT WILL BREAK AWAY UPON IMPACT.

APPLICATION

VERTICAL PANELS MAY BE USED TO CHANNEL TRAFFIC, DIVIDE OPPOSING LANES OF TRAFFIC, DIVIDE TRAFFIC LANES OR IN PLACE OF BARRICADES WHERE SPACE IS LIMITED. WHEN APPROVED BY THE ENGINEER, VERTICAL PANELS MAY BE POST-MOUNTED ALONG THE SIDE OF THE ROADWAY.

TUBULAR MARKERS



DESIGN

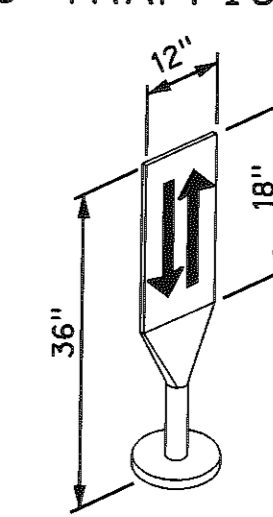
TUBULAR MARKERS SHALL BE PREDOMINANTLY ORANGE, NOT LESS THAN 28 INCHES HIGH, MINIMUM 2 INCHES WIDE WHEN FACING TRAFFIC, AND MADE OF A MATERIAL THAT CAN BE STRUCK WITHOUT DAMAGING IMPACTING VEHICLES.

FOR NIGHTTIME USE, TUBULAR MARKERS SHALL BE RETROREFLECTIVE. RETROREFLECTION OF TUBULAR MARKERS SHALL BE PROVIDED BY TWO 3 INCHES WIDE WHITE BANDS PLACED A MAXIMUM OF 2 INCHES FROM THE TOP, WITH A MAXIMUM OF 6 INCHES BETWEEN THE BANDS. THE BASE SHALL NOT BE WIDER THAN 12 INCHES OR HIGHER THAN 2 INCHES.

APPLICATION

TUBULAR MARKERS HAVE LESS VISIBLE AREA THAN OTHER DEVICES AND SHOULD BE USED ONLY WHERE SPACE RESTRICTIONS DO NOT ALLOW FOR THE USE OF OTHER MORE VISIBLE DEVICES. THEY MAY BE USED EFFECTIVELY TO DIVIDE OPPOSING LANES OF TRAFFIC OR TO DIVIDE TRAFFIC LANES WHEN TWO OR MORE LANES ARE KEPT OPEN IN THE SAME DIRECTION. STEPS SHOULD BE TAKEN TO ASSURE THAT TUBULAR MARKERS WILL NOT BE BLOWN OVER OR DISPLACED BY TRAFFIC BY EITHER AFFIXING THEM TO THE PAVEMENT WITH ANCHOR BOLTS OR ADHESIVE, USING WEIGHTED BASES, OR WEIGHTS THAT CAN BE DROPPED OVER THE TUBULAR MARKERS AND ONTO THE BASE TO PROVIDE ADDED STABILITY. BALLAST, HOWEVER, SHOULD NOT BE ALLOWED TO PRESENT A HAZARD IF THE TUBULAR MARKERS ARE INADVERTENTLY STRUCK. IF A NONCYLINDRICAL DEVICE IS USED, AND IT COULD BE DISPLAYED WITH A WIDTH LESS THAN THE MINIMUM FACING TRAFFIC, IT SHALL BE ATTACHED TO THE PAVEMENT TO ENSURE THAT THE WIDTH FACING TRAFFIC MEETS THE MINIMUM REQUIREMENTS.

OPPOSING TRAFFIC LANE DIVIDERS



DESIGN

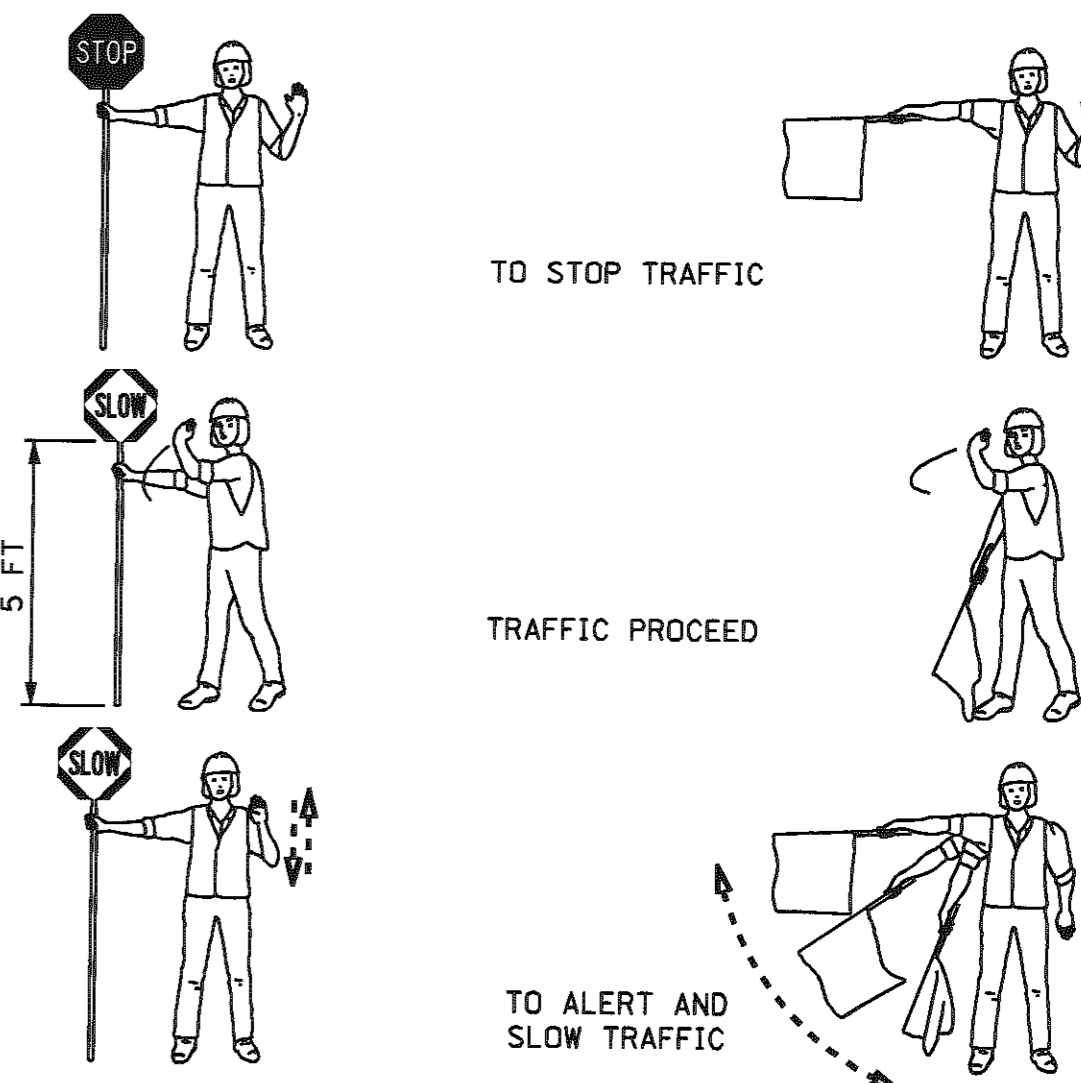
OPPOSING TRAFFIC LANE DIVIDER SHALL BE A TWO SIDED UPRIGHT REFLECTORIZED ORANGE PANEL, WITH A 12 INCHES WIDTH AND 18 INCHES HEIGHT. THE TOP OF THE PANEL SHALL BE 36 INCHES ABOVE THE PAVEMENT. THE SYMBOL ON EACH SIDE SHALL BE TWO OPPOSING BLACK ARROWS. THE LANE DIVIDER SHALL BE MADE OF LIGHTWEIGHT MATERIAL THAT WILL YIELD UPON IMPACT BY A VEHICLE. THE LANE DIVIDER BASE SHALL NOT BE WIDER THAN 12 INCHES OR HIGHER THAN 2 INCHES. THE BASE SHALL BE ATTACHED TO THE EXISTING SURFACE BY EPOXY OR OTHER SUITABLE ADHESIVE, TO ENSURE THAT THE PANEL REMAINS FACING TRAFFIC.

APPLICATION

OPPOSING TRAFFIC LANE DIVIDERS ARE DELINEATION DEVICES USED AS CENTER LANE DIVIDERS TO SEPARATE OPPOSING TRAFFIC ON A TWO-LANE, TWO-WAY OPERATION.

FLAGGERS

REQUIRED METHOD EMERGENCY USE ONLY



FLAGGER PADDLES

FLAGGER PADDLES SHALL BE A MINIMUM 18 INCH WIDE OCTAGON WITH LETTERS AT LEAST 6 INCHES HIGH, WITH A 5 FOOT RIGID HANDLE. FLAGS AND PADDLES SHALL NOT BE USED AT THE SAME TIME. IN EMERGENCIES WHERE THE STANDARD SIGN IS NOT AVAILABLE, A RED FLAG MAY BE USED BY FLAGGERS IN ACCORDANCE WITH THE FLAGGERS HANDBOOK. TO IMPROVE CONSPICUITY, THE STOP/SLOW PADDLES MAY BE SUPPLEMENTED BY ONE OR TWO SYMMETRICALLY POSITIONED FLASHING WHITE HIGH-INTENSITY LAMPS.

FLAGGERS

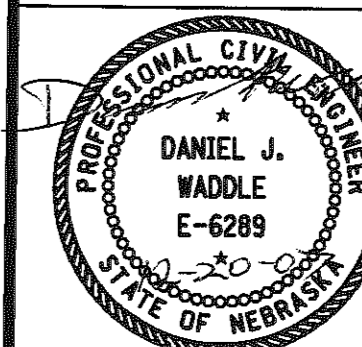
A FLAGGER MUST BE DRESSED FOR SAFETY. TO BE EASILY VISIBLE A FLAGGER MUST WEAR A VEST, SHIRT, OR JACKET, AND A CAP OR HARD HAT THAT IS BRIGHT ORANGE, YELLOW, YELLOW GREEN OR FLOURESCENT VERSIONS OF THESE COLORS (FADED OR SOILED GARMENT WILL NOT BE ALLOWED). FOR NIGHTTIME FLAGGING THE GARMENT SHALL BE REFLECTORIZED.

FLAGGERS SHALL BE INSTRUCTED IN THE PROPER LOCATION, DUTIES AND PROCEDURES FOR FLAGGERS AS OUTLINED IN THE CURRENT MUTCD AND THE DEPARTMENT OF ROADS FLAGGER'S HANDBOOK. AS REQUIRED BY THE DEPARTMENT OF ROADS, THE FLAGGER SHALL BE CERTIFIED, AND HAVE IN THEIR POSSESSION, A VALID FLAGGER CERTIFICATION CARD.

R5	OCT.98	REVISE CHANNELIZATION DEVICES,TAPER
R4	JAN.95	REWRITE
R3	AUG.88	WORDING, REFLECTIVITY
REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 920-R5

TRAFFIC CONTROL CONSTRUCTION AND MAINTENANCE



ORIGINAL:
OCTOBER 1998
DATE

1
2

LIGHTING DEVICES

FUNCTION

CONSTRUCTION AND MAINTENANCE ACTIVITIES OFTEN CREATE CONDITIONS ON OR NEAR THE TRAVELED WAY THAT ARE PARTICULARLY HAZARDOUS AT NIGHT. IT IS OFTEN DESIRABLE AND NECESSARY TO SUPPLEMENT THE REFLECTORIZED SIGNS, BARRIERS, AND CHANNELIZING DEVICES WITH LIGHTING DEVICES. STROBE TYPE LIGHTS ARE NOT PERMITTED.

BARRICADE WARNING LIGHTS DESIGN (BATTERY OPERATED)

TYPE "A" LOW INTENSITY FLASHING WARNING LIGHTS ARE MOST COMMONLY MOUNTED ON BARRICADES, OR WITH SIGNS AND ARE INTENDED TO WARN THE DRIVER THAT THEY ARE PROCEEDING IN A HAZARDOUS AREA. THESE LIGHTS SHALL NOT BE USED FOR DELINEATION, AS A SERIES OF FLASHING LIGHTS IN A ROW WOULD TEND TO OBSCURE THE DESIRED PATH.

TYPE "B" HIGH INTENSITY FLASHING WARNING LIGHTS ARE NORMALLY MOUNTED ON THE ADVANCE WARNING SIGNS. EXTREMELY HAZARDOUS SITE CONDITIONS WITHIN THE CONSTRUCTION AREA MAY REQUIRE THAT THE LIGHTS BE MOUNTED ON TYPE III BARRICADES, SIGNS, OR OTHER SUPPORTS. AS THESE LIGHTS ARE EFFECTIVE IN DAYLIGHT, THEY ARE DESIGNED TO OPERATE 24 HOURS PER DAY.

TYPE "C" STEADY BURN LIGHTS AS USED HEREIN, SHALL MEAN A SERIES OF LOW WATTAGE YELLOW ELECTRIC LIGHTS. WHERE LIGHTS ARE NEEDED TO DELINEATE OR MARK THE TRAVELED WAY THROUGH AND AROUND OBSTRUCTIONS IN A CONSTRUCTION MAINTENANCE AREA, THE DELINEATION SHALL BE ACCOMPLISHED BY USE OF STEADY BURNING LIGHTS.

FLASHING ARROW PANEL (DISPLAY)

AN ARROW PANEL IS A SIGN WITH A MATRIX OF ELEMENTS. THE MATRIX, CAPABLE OF EITHER FLASHING OR SEQUENTIAL DISPLAYS, IS INTENDED TO PROVIDE ADDITIONAL WARNING AND DIRECTIONAL INFORMATION TO ASSIST IN MERGING AND CONTROLLING TRAFFIC THROUGH OR AROUND A TEMPORARY TRAFFIC CONTROL ZONE. AN ARROW PANEL SHOULD BE USED IN COMBINATION WITH APPROPRIATE SIGNS, BARRICADES, OR OTHER TRAFFIC CONTROL DEVICES.

DESIGN

ARROW PANELS SHALL MEET THE SIZE AND SPECIFICATIONS OF THE MUTCD FOR TYPE C ARROW DISPLAYS.

FLASHING ARROW PANEL SHALL BE RECTANGULAR, OF SOLID APPEARANCE AND FINISHED IN NONREFLECTIVE BLACK. THE PANEL SHALL BE MOUNTED ON A VEHICLE, TRAILER OR OTHER SUITABLE SUPPORT. MINIMUM MOUNTING HEIGHT SHALL BE 7 FEET FROM THE ROADWAY TO THE BOTTOM OF THE PANEL, EXCEPT ON VEHICLE-MOUNTED PANELS, WHICH SHOULD BE AS HIGH AS PRACTICABLE.

THE FOLLOWING SELECTIONS SHALL BE PROVIDED ON THE ARROW PANEL	
OPERATING MODE	PANEL DISPLAY
FLASHING ARROW	RIGHT SHOWN; LEFT OPPOSITE
SEQUENTIAL ARROW	RIGHT SHOWN; LEFT OPPOSITE
SEQUENTIAL CHEVRON	RIGHT SHOWN; LEFT OPPOSITE
FLASHING DOUBLE ARROW	
FLASHING OR ALTERNATING CAUTION	OR

THE ARROW PANEL SHALL HAVE A MINIMUM SIZE OF 96 INCHES WIDE AND 48 INCHES HIGH. THE MINIMUM LEGIBILITY DISTANCE SHALL BE 1 MILE. THE PANEL SHALL CONTAIN 25 LAMP ELEMENTS. ARROW PANEL ELEMENTS SHALL BE CAPABLE OF A MINIMUM 50 PERCENT DIMMING, AUTOMATICALLY WHEN AMBIENT LIGHT FALLS BELOW 50 LUX.

THE MINIMUM ELEMENT "ON TIME" SHALL BE 50 PERCENT FOR THE FLASHING MODE AND EQUAL INTERVALS OF 25 PERCENT FOR EACH SEQUENTIAL CHEVRON PHASE. THE FLASHING RATE SHALL BE NO FEWER THAN 25 NOR MORE THAN 40 FLASHES PER MINUTE.

APPLICATION

A FLASHING ARROW OR SEQUENTIAL CHEVRON MAY BE USED FOR STATIONARY OR MOVING LANE CLOSURES. AN ARROW DISPLAY IN THE CAUTION MODE SHALL BE USED ONLY FOR SHOULDER WORK, BLOCKING THE SHOULDER, OR ROADSIDE WORK NEAR THE SHOULDER. AN ARROW DISPLAY SHALL NOT BE USED ON A TWO-LANE TWO-WAY ROADWAY FOR TEMPORARY ONE-LANE OPERATION OR LANE SHIFTS. AN ARROW DISPLAY SHALL NOT BE USED ON A MULTILANE ROADWAY TO LATERALLY SHIFT ALL LANES OF TRAFFIC, BECAUSE UNNECESSARY LANE CHANGING MAY RESULT.

TRAFFIC SIGNALS

TRAFFIC SIGNALS MAY BE ALLOWED AT CERTAIN EQUIPMENT CROSSINGS WHERE THE VOLUME OF FILL MATERIAL AND THE NUMBER OF EQUIPMENT CROSSINGS PER HOUR IS HIGH. TRAFFIC SIGNALS MAY BE ALLOWED AT CERTAIN BRIDGE CONSTRUCTION SITES WHERE A COMBINATION OF ONE-WAY TRAFFIC AND HIGH TRAFFIC VOLUMES WOULD BE BEST SERVED WITH THIS TYPE OF TRAFFIC CONTROL.

ALL TRAFFIC SIGNAL REQUESTS AND METHOD OF INSTALLATION ON THE STATE HIGHWAY SYSTEM SHALL BE IN COMPLIANCE WITH THE MUTCD AND MUST BE APPROVED BY THE STATE TRAFFIC ENGINEER.

FLOOD LIGHTS

WHEN NIGHTTIME WORK IS REQUIRED, FLOODLIGHTS SHOULD BE USED TO ILLUMINATE FLAGGER STATIONS, EQUIPMENT CROSSINGS, AND OTHER AREAS WHERE EXISTING LIGHT IS NOT ADEQUATE FOR THE WORK TO BE PERFORMED SAFELY.

IN NO CASE SHALL FLOODLIGHTING BE PERMITTED TO CREATE A DISABLING GLARE FOR DRIVERS. THE ADEQUACY OF THE FLOODLIGHT PLACEMENT AND ELIMINATION OF POTENTIAL GLARE SHOULD BE CHECKED BY DRIVING THROUGH THE PROJECT.

PAVEMENT MARKING

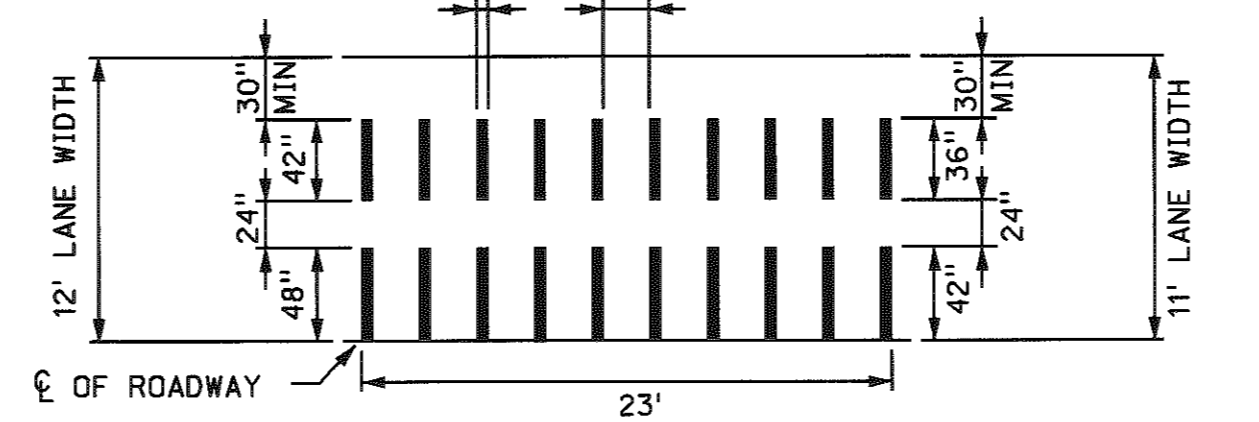
IT IS INTENDED TO THE EXTENT POSSIBLE, THAT MOTORISTS BE PROVIDED MARKINGS WITHIN A WORK AREA COMPARABLE TO THE MARKINGS NORMALLY MAINTAINED ALONG ADJACENT ROADWAYS, PARTICULARLY AT EITHER END OF THE WORK AREA.

ALL MARKINGS AND DEVICES USED TO DELINEATE VEHICLE AND PEDESTRIAN PATHS SHALL BE CAREFULLY REVIEWED DURING DAYTIME AND NIGHTTIME PERIODS TO AVOID INADVERTENTLY LEADING DRIVERS OR PEDESTRIANS FROM THE INTENDED PATH.

PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED UNLESS OTHERWISE APPROVED BY THE ENGINEER.

RUMBLE STRIPS

EACH SECTION SHALL CONSIST OF 10 SEGMENTS.



DESIGN

RUMBLE STRIPS MAY BE MADE OF ASPHALT PAVING MATERIAL, EPOXY AND AGGREGATE OR OTHER SUITABLE MATERIAL WHICH WILL MAINTAIN A DESIRABLE RUMBLE EFFECT. THE RUMBLE STRIP SHOULD HAVE AN INSTALLED HEIGHT OF 5/8". PREFORMED RUMBLE STRIPS MAY BE USED PROVIDED THEY HAVE A MINIMUM 1/2" HEIGHT.

TAPERS

TAPERS ARE CREATED USING A SERIES OF CHANNELIZING DEVICES OR PAVEMENT MARKINGS PLACED TO MOVE TRAFFIC OUT OF OR INTO ITS NORMAL PATH.

MERGING TAPER

A MERGING TAPER REQUIRES THE LONGEST DISTANCE BECAUSE DRIVERS ARE REQUIRED TO MERGE WITH AN ADJACENT LANE OF TRAFFIC AT THE PREVAILING SPEED. THE TAPER SHOULD BE LONG ENOUGH TO ENABLE MERGING DRIVERS TO ADJUST THEIR SPEEDS AND MERGE INTO A SINGLE LANE BEFORE THE END OF THE TRANSITION.

SHIFTING TAPER

A SHIFTING TAPER IS USED WHEN MERGING IS NOT REQUIRED, BUT A LATERAL SHIFT IS NEEDED. APPROXIMATELY ONE-HALF L HAS BEEN FOUND TO BE ADEQUATE. WHERE MORE SPACE IS AVAILABLE, IT MAY BE BENEFICIAL TO USE LONGER TAPERS. GUIDANCE FOR CHANGES IN ALIGNMENT MAY ALSO BE ACCOMPLISHED BY USING HORIZONTAL CURVES DESIGNED FOR NORMAL HIGHWAY SPEEDS.

SHOULDER TAPERS

A SHOULDER TAPER MAY BE BENEFICIAL ON HIGH-SPEED ROADWAYS WITH IMPROVED SHOULDERS THAT MAY BE MISTAKEN FOR DRIVING LANES (WHEN WORK IS OCCURRING IN THE SHOULDER AREAS). IF USED, SHOULDER TAPERS APPROACHING THE ACTIVITY AREA SHOULD HAVE A LENGTH OF ABOUT ONE-THIRD L.

DOWNSTREAM TAPERS

THE DOWNSTREAM TAPER MAY BE USEFUL IN TERMINATION AREAS TO PROVIDE A VISUAL CUE TO THE DRIVER THAT ACCESS IS AVAILABLE TO THE ORIGINAL LANE/PATH THAT WAS CLOSED. WHEN USED, IT SHOULD HAVE A MINIMUM LENGTH OF ABOUT 100 FEET PER LANE, WITH DEVICES SPACED ABOUT 20 FEET APART.

ONE LANE, TWO WAY TAPER

THE ONE-LANE, TWO-WAY TRAFFIC TAPER IS USED IN ADVANCE OF AN ACTIVITY AREA THAT OCCUPIES PART OF A TWO-WAY ROADWAY IN SUCH A WAY THAT A PORTION OF THE ROAD IS USED ALTERNATELY BY TRAFFIC IN EACH DIRECTION. A SHORT TAPER HAVING A MAXIMUM LENGTH OF 100 FEET WITH CHANNELIZING DEVICES AT APPROXIMATELY 20-FOOT SPACINGS SHOULD BE USED TO GUIDE TRAFFIC INTO THE ONE-WAY SECTION.

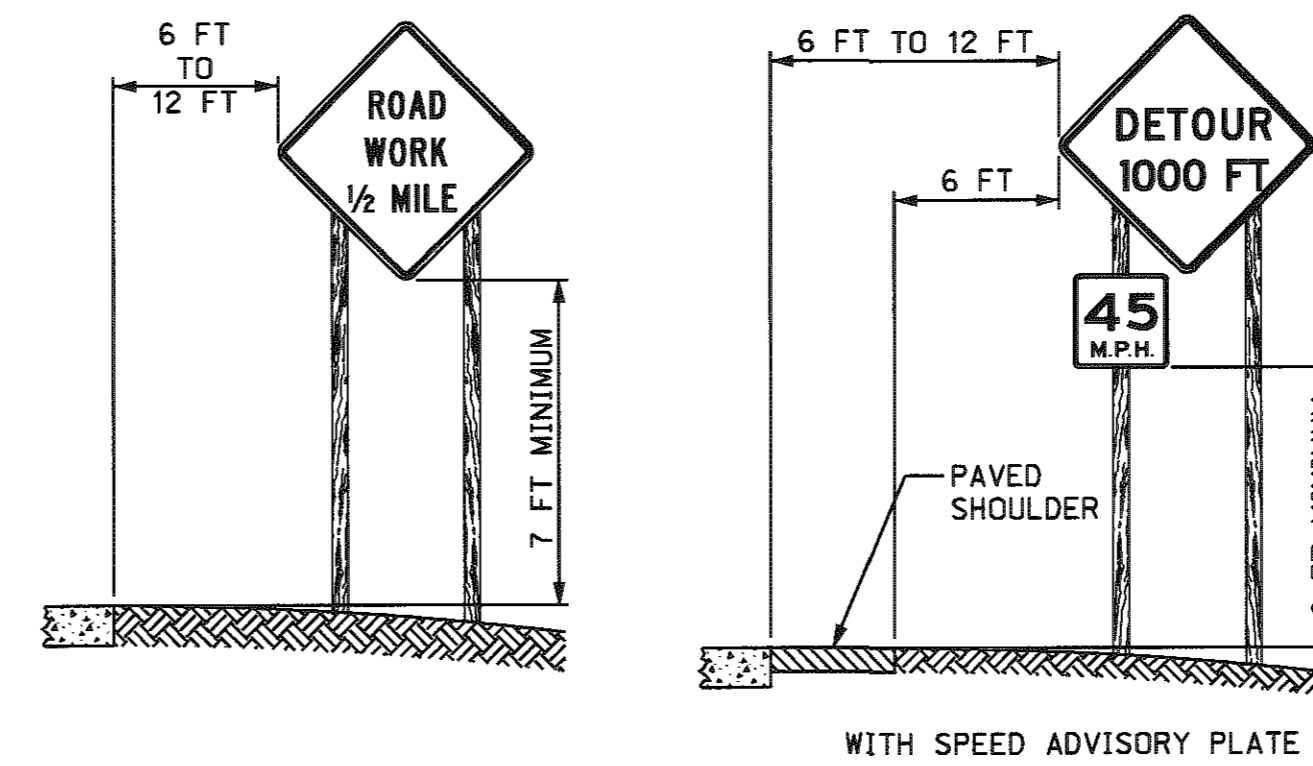
TYPE OF TAPER	TAPER LENGTH (FEET)
MERGING TAPER	L MINIMUM
SHIFTING TAPER	1/2 L MINIMUM
SHOULDER TAPER	1/3 L MINIMUM
TWO-WAY TAPER	100 FEET MAXIMUM

SPEED	FORMULA
40 MPH OR LESS	$L = \frac{WS^2}{60}$
45 MPH OR GREATER	$L = WS$

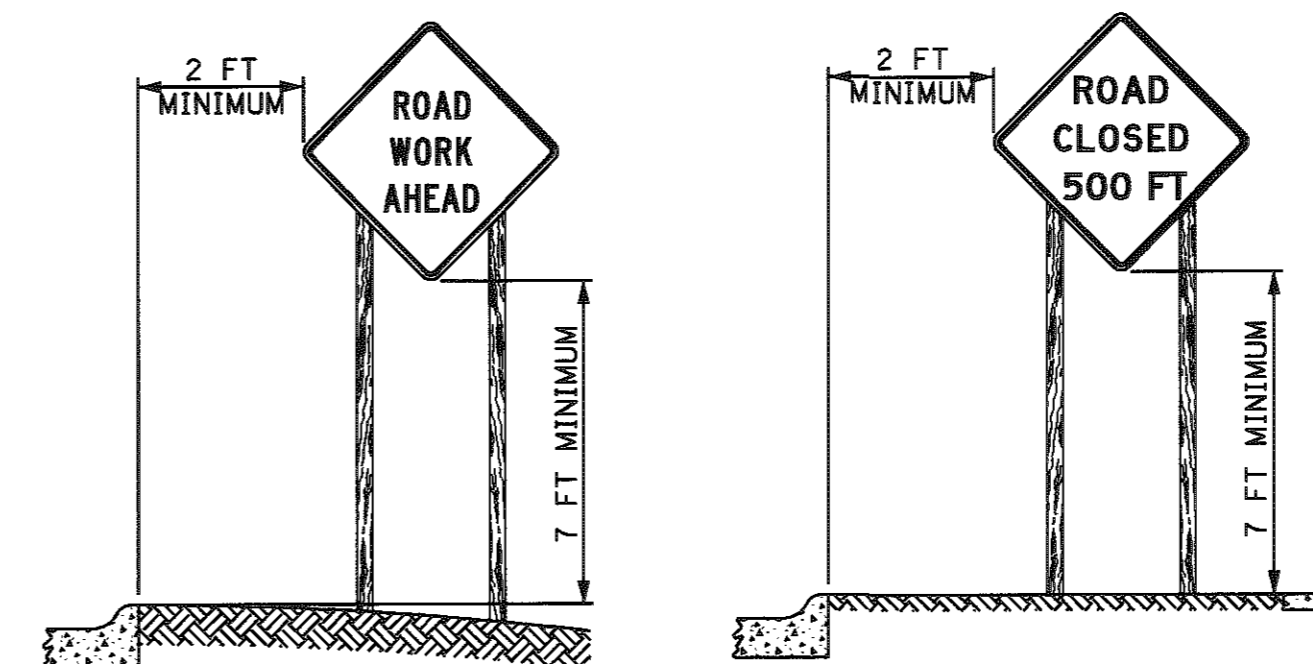
L = TAPER LENGTH IN FEET
W = WIDTH OF OFFSET IN FEET
S = POSTED SPEED LIMIT PRIOR TO WORK IN MPH

SPEED (MPH)	LANE WIDTH		
	10 FT	11 FT	12 FT
25	105	115	125
30	150	165	180
35	205	225	245
40	270	295	320
45	450	495	540
50	500	550	600
55	550	605	660
65	650	715	780
70	700	770	840
75	750	825	900

ROADSIDE SIGNS HEIGHT AND LATERAL LOCATION OF SIGNS RURAL AREA



URBAN AREA



TYPICAL FIRST SIGN AT CONSTRUCTION SITE

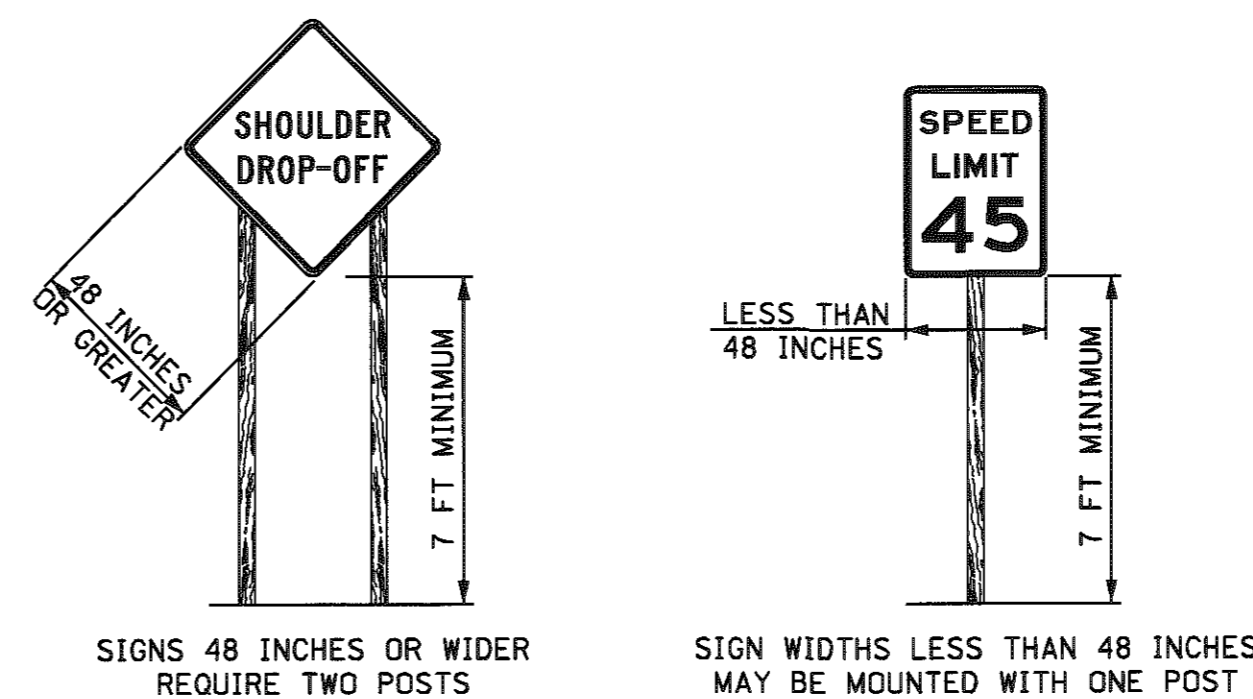


WITH TYPE "B" FLASHING WARNING LIGHT MOUNTED ABOVE TYPE III BARRICADE

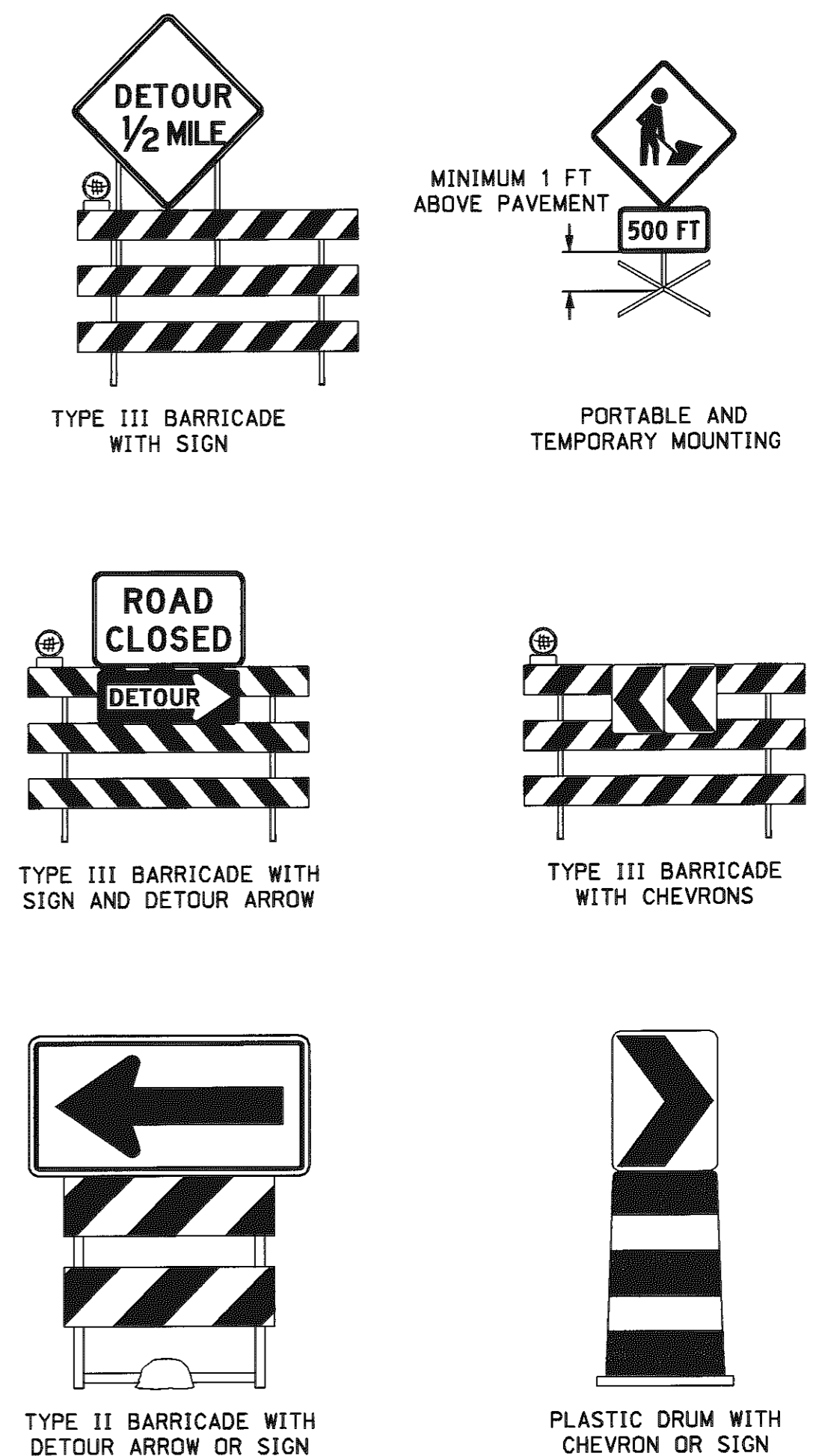
PORTABLE AND TEMPORARY MOUNTING



TYPICAL SIGN MOUNTINGS POST MOUNTED



TYPICAL SIGN MOUNTINGS OTHER THAN POST MOUNTED



GENERAL NOTES

- ALL TRAFFIC CONTROL DEVICES SHALL MEET THE APPLICABLE STANDARDS AND SPECIFICATIONS PRESCRIBED IN PART VI OF THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, (MUTCD)" AND THE STATE OF NEBRASKA SUPPLEMENT TO THE MUTCD.
- TRAFFIC CONTROL PLANS AND DEVICES SHOULD FOLLOW THE PRINCIPLES SET FORTH, BUT MAY DEViate FROM THE TYPICAL DRAWINGS TO ALLOW FOR CONDITIONS AND REQUIREMENTS OF THE PROJECT.
- TRAFFIC CONTROL DEVICES SHALL BE INSTALLED SO AS NOT TO OBSTRUCT THE VIEW OF OTHER TRAFFIC CONTROL DEVICES.
- THE ENGINEER SHALL HAVE THE AUTHORITY TO REQUIRE THE USE, AND APPROVE THE LOCATION OF ANY OF THE DEVICES SHOWN IN THESE PLANS.
- UNPROTECTED TEMPORARY AND POST MOUNTED SIGNS SHOULD BE CRASHWORTHY (REFER TO THE ROADSIDE DESIGN GUIDE, CHAPTER NINE, FOR ADDITIONAL GUIDANCE).

REV. NO.	DATE	DESCRIPTION OF REVISION
R5	OCT.98	REVISE CHANNELIZATION DEVICES,TAPER
R4	JAN.95	REWRITE
R3	AUG.88	WORDING, REFLECTIVITY

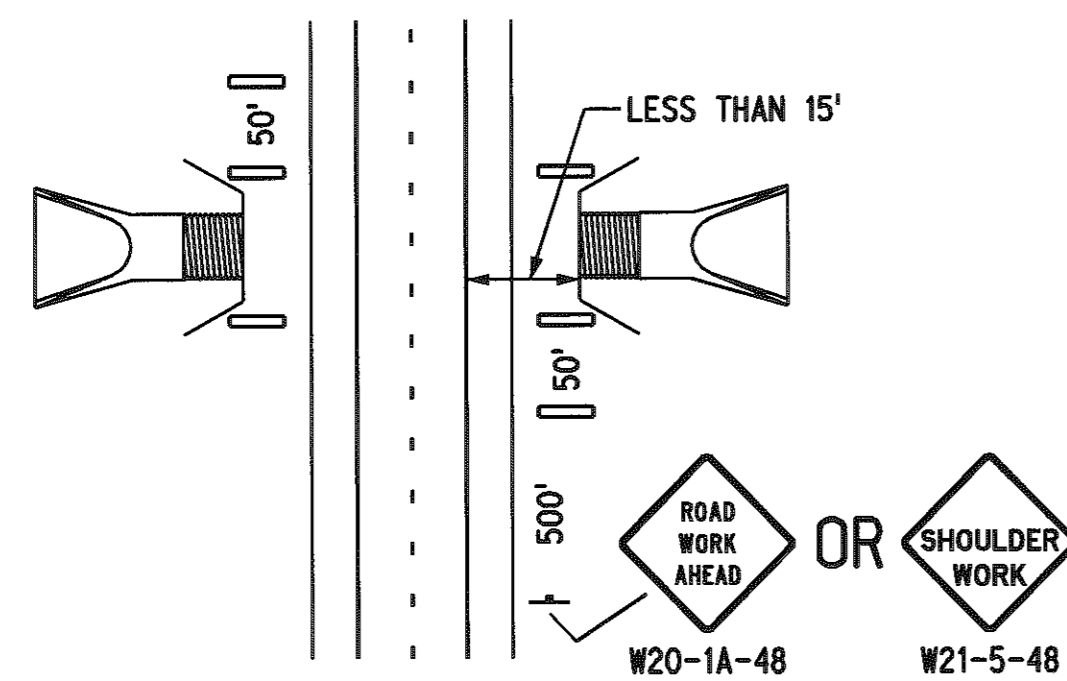
NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 920-R5

TRAFFIC CONTROL CONSTRUCTION AND MAINTENANCE

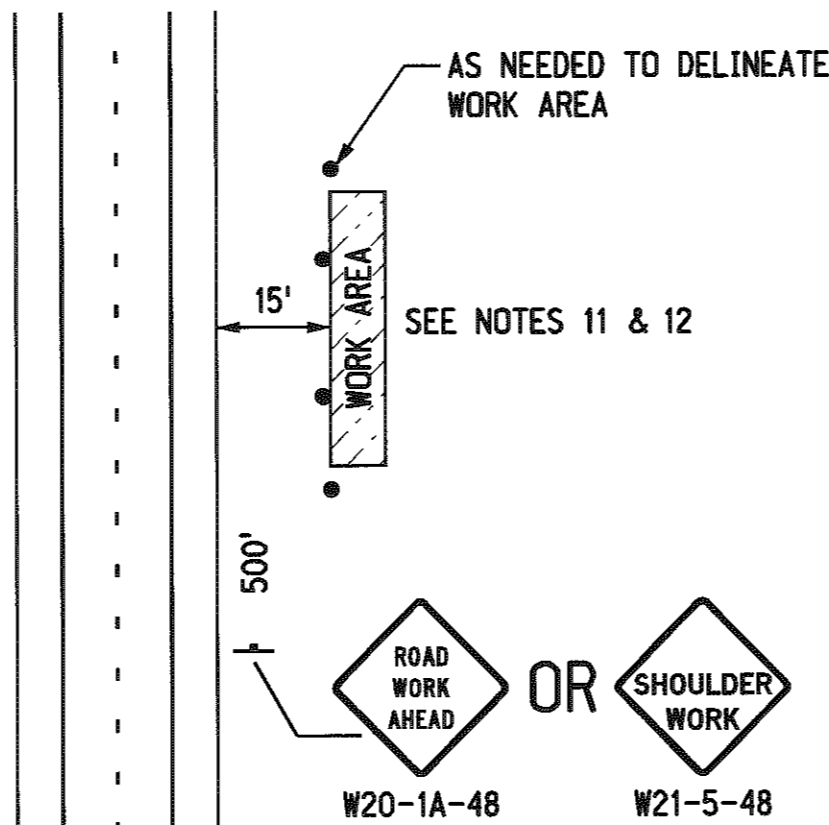
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDE
E-6289
STATE OF NEBRASKA

ORIGINAL:
OCTOBER 1998
DATE

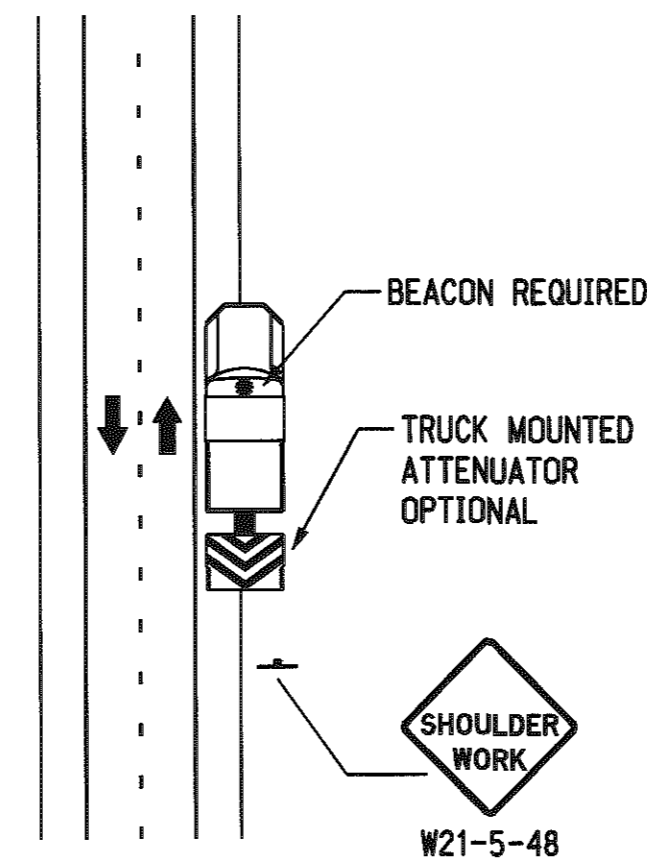
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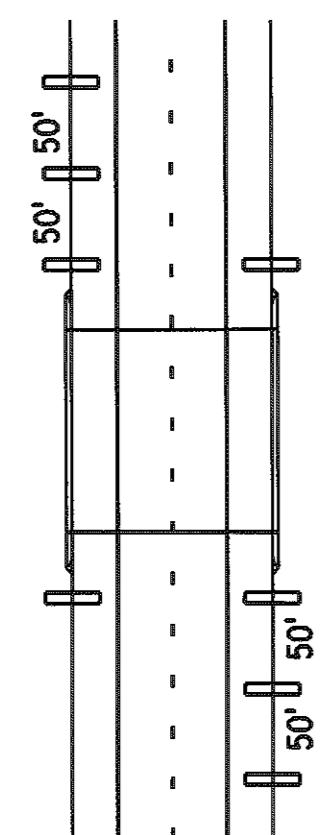
CULVERT PROTECTION
WHEN GUARDRAIL IS REMOVED AND/OR EXCAVATION IS LESS THAN 15 FEET FROM SHOULDER



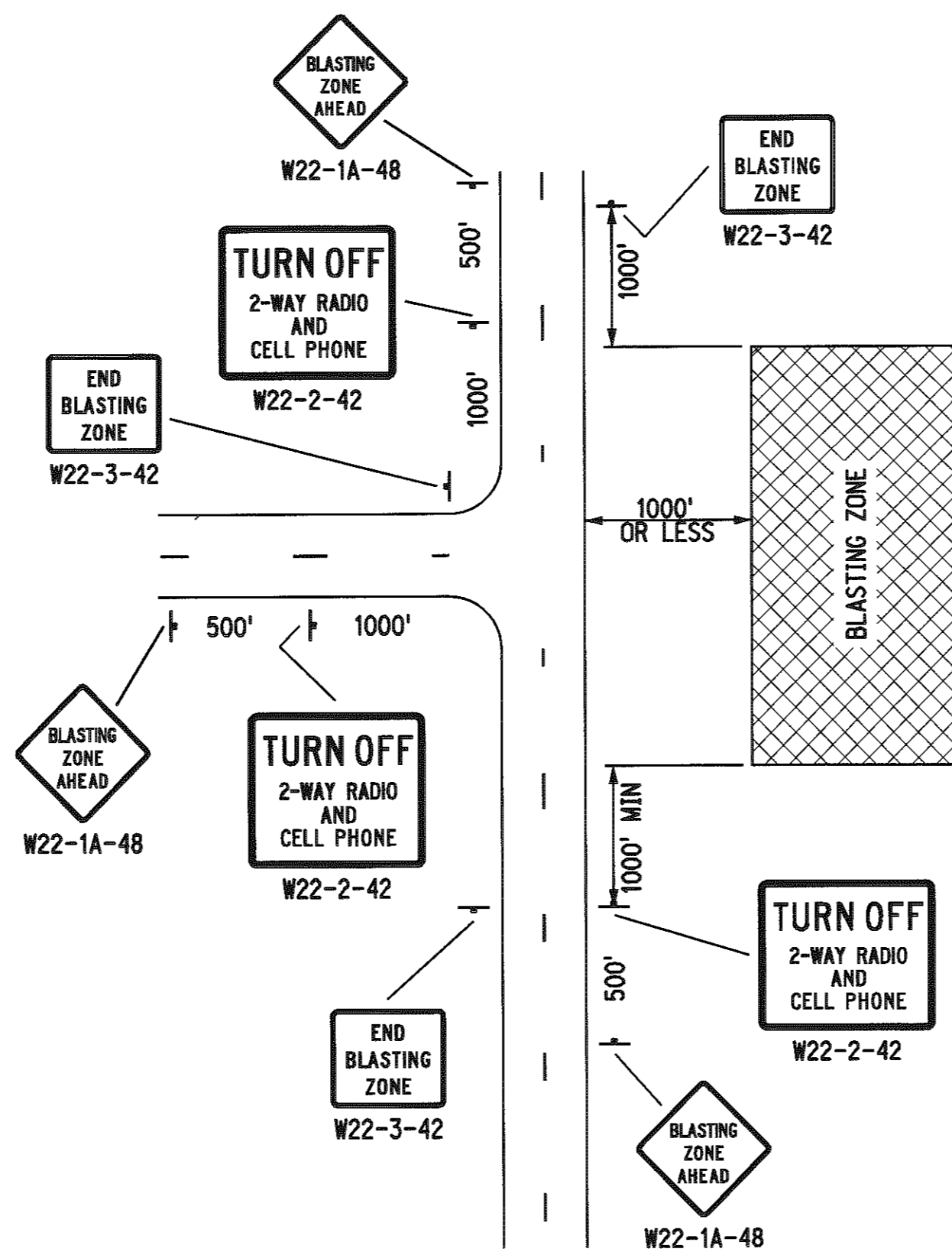
WORK BEYOND THE SHOULDER
TA-1



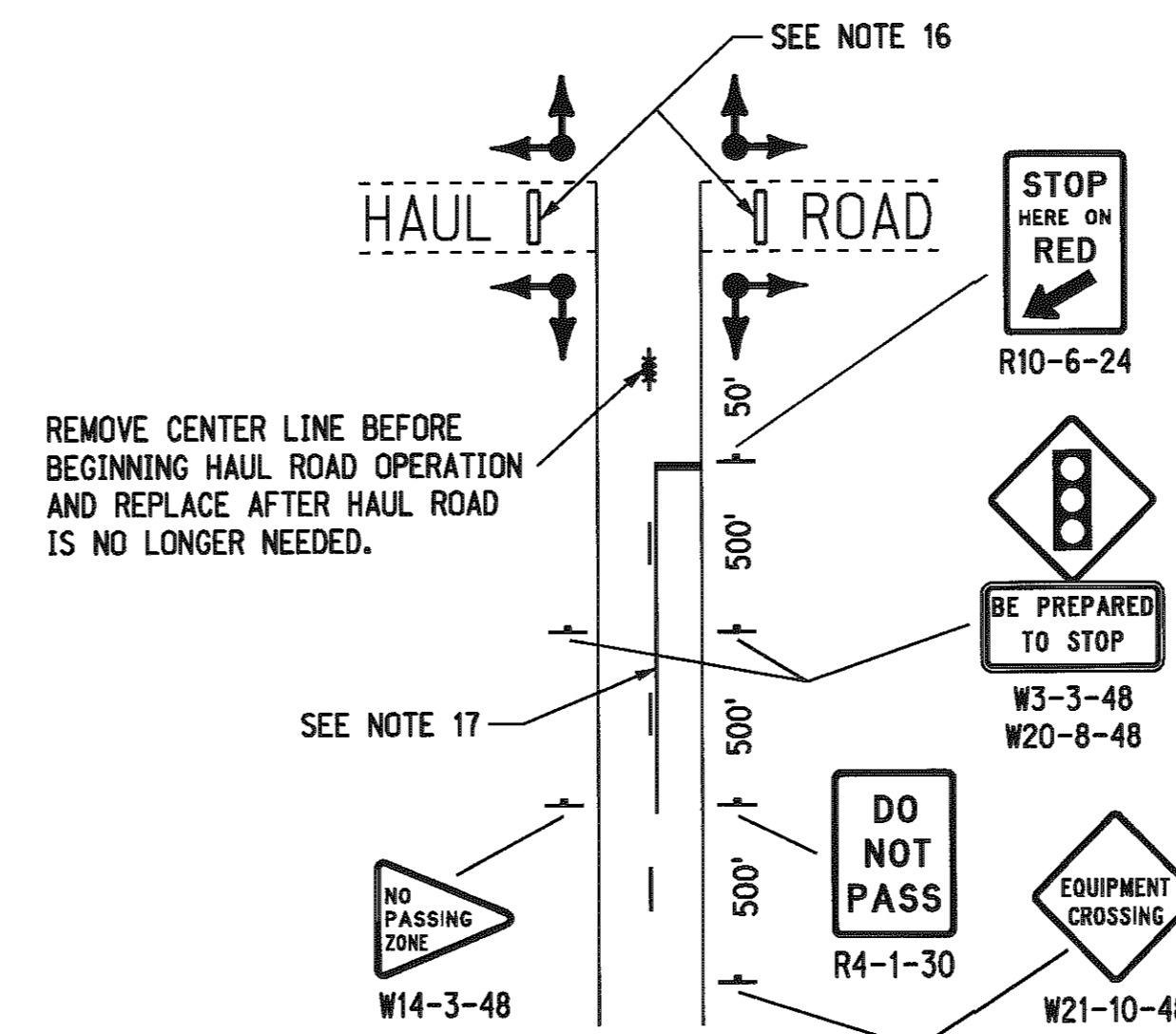
MOBILE OPERATION ON SHOULDER
NO ENCROACHMENT ON TRAVEL LANE
TA-4



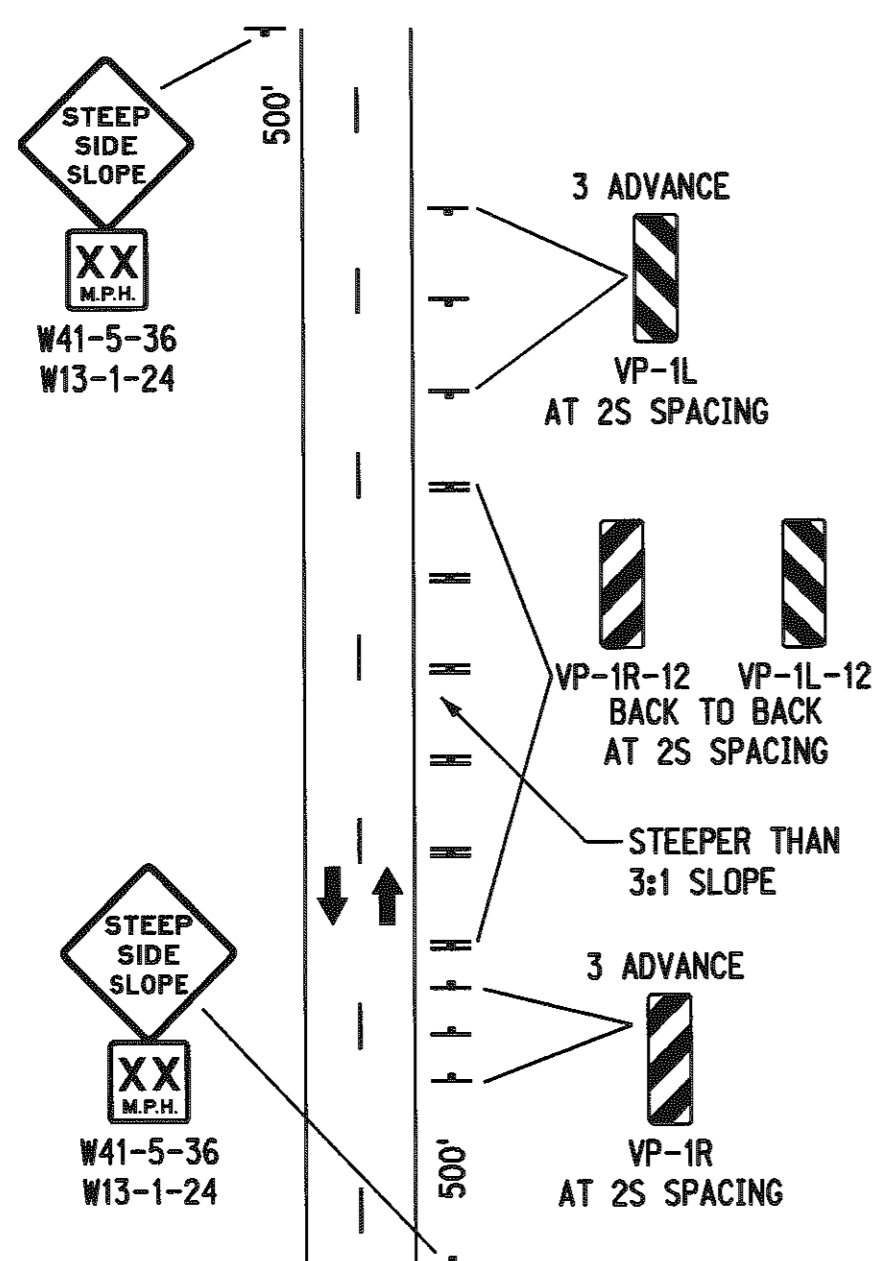
BRIDGE RAIL END PROTECTION
WHEN GUARDRAIL IS REMOVED



BLASTING ZONE
TA-2

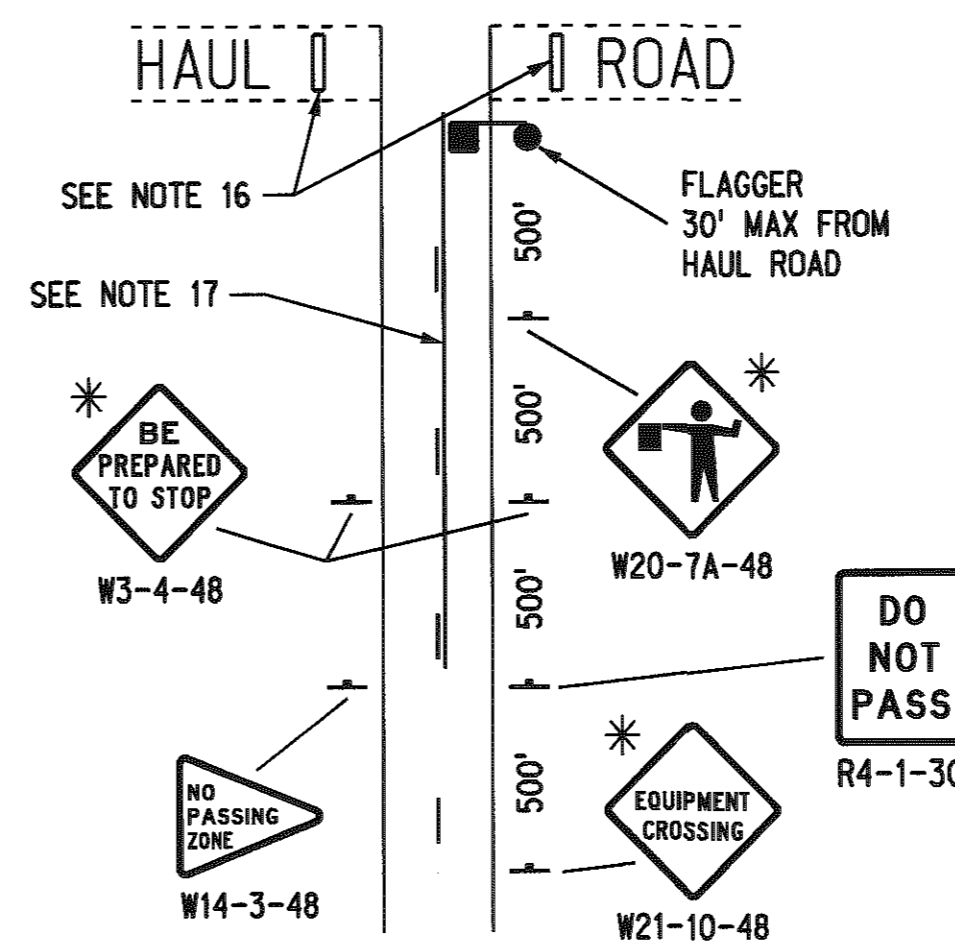


HAUL ROAD CROSSING IN CONSTRUCTION AREA USING TEMPORARY TRAFFIC SIGNAL
TA-14



SLOPE PROTECTION

- LEGEND**
- TYPE III BARRICADE
 - TYPE II BARRICADE OR REFLECTORIZED PLASTIC DRUM
 - ↑ SIGN
 - FLAGGER
 - △ CONE
 - CMS CHANGEABLE MESSAGE SIGN
 - ↔ TRAFFIC SIGNAL



HAUL ROAD CROSSING IN CONSTRUCTION AREA USING FLAGGERS
TA-14

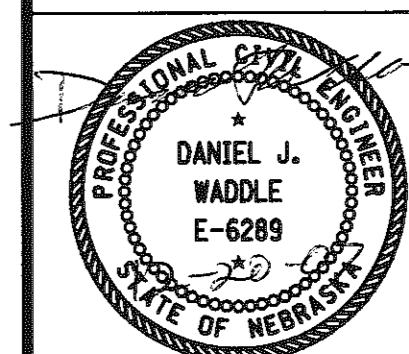
* SIGNS ARE SUBSIDIARY TO THE FLAGGING OPERATION.

NOTES

1. SIGNS SHOWN ARE USUALLY FOR ONE DIRECTION OF TRAVEL ONLY.
2. DESIGNATION OF SPEED SHOWN ON ADVISORY SPEED SIGNS W13-1 SHALL BE DETERMINED BY THE ENGINEER IN ACCORDANCE WITH MUTCD. THE SPEED DESIGNATION SHALL BE AS HIGH AS PRACTICAL AND FEASIBLE.
3. "FLAGGER AHEAD SYMBOL" SIGN (W20-7A) SHALL BE USED WHEN A FLAGGER IS PRESENT, AND REMOVED WHEN NOT APPLICABLE.
4. ALL SIGNS SHALL BE INSTALLED, MAINTAINED IN A CLEAN CONDITION AND REMOVED BY THE CONTRACTOR EXCEPT SIGNS WHICH SHALL BE INSTALLED AND MAINTAINED BY THE DEPARTMENT OF ROADS OR APPROPRIATE GOVERNMENT AGENCY.
5. G20-1 "ROAD WORK NEXT X MILES" SHALL BE USED ON ANY CONSTRUCTION OR MAINTENANCE PROJECT LONGER THAN 2 MILES.
6. WHEN MESSAGE IS NOT PERTINENT, SIGNS SHALL BE TAKEN DOWN, COVERED OR FOLDED. TAPE IS NOT PERMITTED ON THE FACE OF THE SIGN.
7. VEHICLES OR EQUIPMENT SHALL NOT BE PARKED SO AS TO OBSCURE OR DISTRACT FROM TRAFFIC CONTROL DEVICES.
8. ORANGE FLAGS MAY BE USED TO CALL ATTENTION TO WARNING SIGNS.
9. DOUBLE FINE AND REDUCED SPEED ZONE SIGNING NOT REQUIRED FOR SHORT-DURATION WORK LESS THAN 1/2 WORK DAY.
10. CULVERT, BRIDGE AND SLOPE PROTECTION. EXISTING GUARDRAIL SHOULD REMAIN IN PLACE AS LONG AS PRACTICAL FOR THE PROTECTION IT PROVIDES, AND REINSTALLED AS SOON AS PRACTICAL.
11. TA-1 AND CULVERT PROTECTION SIGNING IS NOT REQUIRED IF THE WORK SPACE IS 15 FEET OR MORE BEYOND THE EDGE OF THE SHOULDER.
12. TA-1 AND TA-3 FOR SHORT-DURATION OPERATIONS 60 MINUTES OR LESS, ALL SIGNS AND CHANNELIZING DEVICES MAY BE ELIMINATED IF A VEHICLE WITH AN ACTIVATED HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING OR AMBER STROBE LIGHTS ARE USED, AND THE WORK DOES NOT ENCROACH ONTO THE OPEN TRAVEL LANE.
13. TA-3 WHEN PAVED SHOULDERS HAVING A WIDTH OF 8 FEET OR MORE ARE CLOSED, AT LEAST ONE ADVANCE WARNING SIGN SHALL BE USED. IN ADDITION, CHANNELIZING DEVICES SHALL BE USED TO CLOSE THE SHOULDER IN ADVANCE TO DELINEATE THE BEGINNING OF THE WORK SPACE AND DIRECT VEHICULAR TRAFFIC TO REMAIN WITHIN THE TRAVELED WAY.
14. TA-4 VEHICLE HAZARD WARNING SIGNALS SHALL NOT BE USED INSTEAD OF THE VEHICLE'S HIGH-INTENSITY ROTATING, FLASHING OR AMBER STROBE LIGHTS.
15. TA-10 IF THE QUEUING OF VEHICLES ACROSS ACTIVE RAILROAD TRACKS CANNOT BE AVOIDED, A FLAGGER SHALL BE PROVIDED AT THE RAILROAD CROSSING TO PREVENT VEHICLES FROM STOPPING WITHIN THE RAILROAD CROSSING EVEN IF AUTOMATIC WARNING DEVICES ARE IN PLACE.
16. TA-14 WHEN THE HAUL ROAD IS NOT IN USE, TYPE III BARRICADES SHALL BE IN PLACE. THE "FLAGGER", "SIGNAL AHEAD", AND "BE PREPARED TO STOP" SIGNS SHALL BE COVERED OR REMOVED, AND THE TRAFFIC SIGNAL SHALL BE PUT INTO FLASH YELLOW ON THE HIGHWAY, RED ON THE HAUL ROAD.
17. TA-14 THE "NO PASSING" SIGNS AND PAVEMENT MARKINGS ARE NOT REQUIRED IF HAULING OPERATION IS IN EFFECT ONLY DURING DAYLIGHT HOURS.
18. A TYPE III BARRICADE IS REQUIRED WHEN THE CHANGEABLE MESSAGE IS WITHIN 15' OF THE SHOULDER.
19. BARRELS ARE REQUIRED WHEN THE CHANGEABLE MESSAGE SIGN IS INSTALLED ON OR NEAR A PAVED SHOULDER.
20. APPLICATIONS SHOWN ARE FOR LOCAL SITUATIONS IN PROPERLY MARKED CONSTRUCTION ZONES AND DO NOT INCLUDE LEAD SIGNS WHICH ARE INSTALLED AT THE BEGINNING OF THE PROJECT.
21. THE LEAD SIGNS ARE NOT NEEDED IF TWO PROJECTS ARE LESS THAN 1 MILE APART. THE "END CONSTRUCTION" SIGN (G20-2B-48) SHOULD NOT BE INSTALLED BETWEEN THE PROJECTS.
22. REFER TO STANDARD PLAN NO. 920 FOR GENERAL INFORMATION NOT SHOWN.

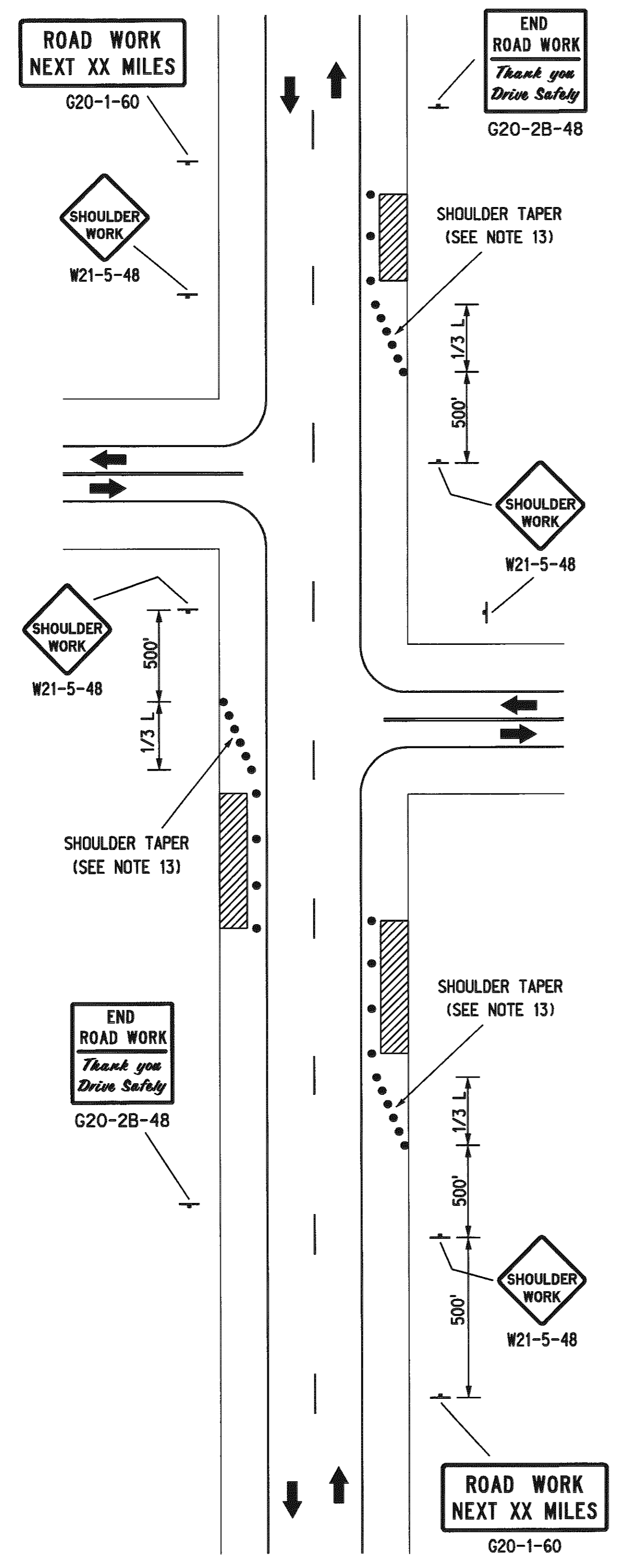
REV. NO.	DATE	DESCRIPTION OF REVISION
R5	DEC.05	2003 MUTCD UPDATE
R4	AUG.98	SIGN CHANGES, ADDITIONS
R3	MAY 83	ADDITIONS

NEBRASKA DEPARTMENT OF ROADS
STANDARD PLAN NO. 921-R5
**TRAFFIC CONTROL,
CONSTRUCTION AND MAINTENANCE**

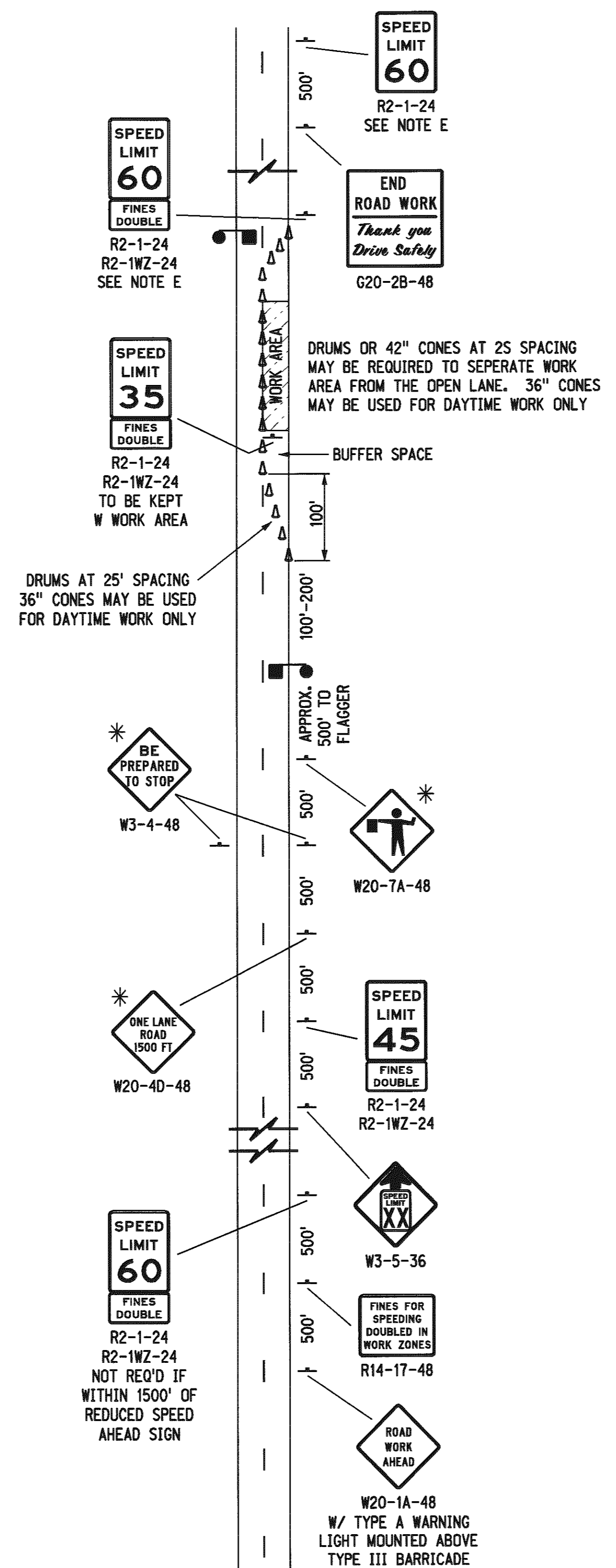


ORIGINAL:
JUNE 3, 1980
DATE

1
2



WORK ON SHOULDERS
TA-3

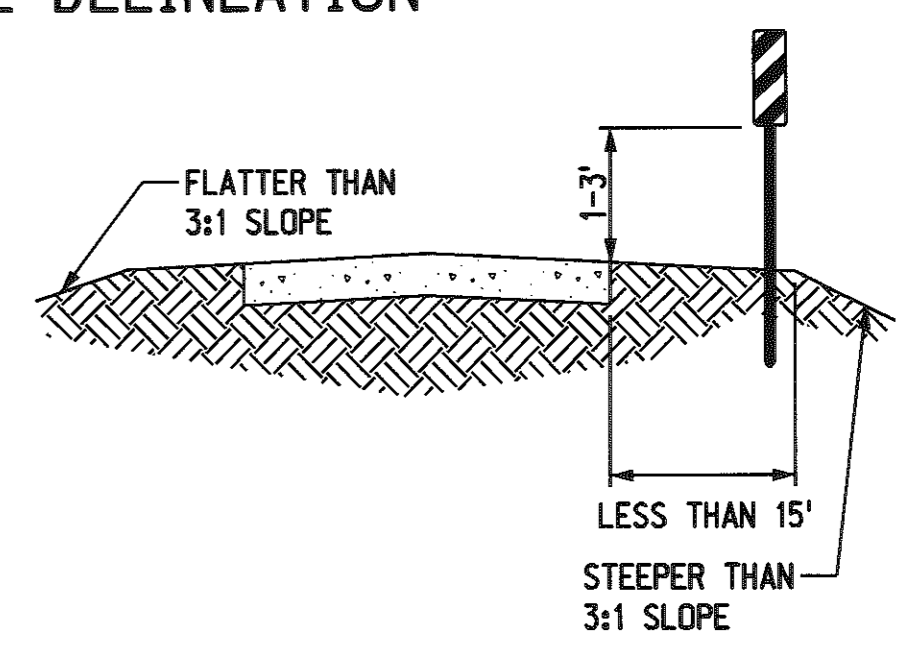


LANE CLOSURE
TA-10

* SIGNS ARE SUBSIDIARY TO THE FLAGGING OPERATION.

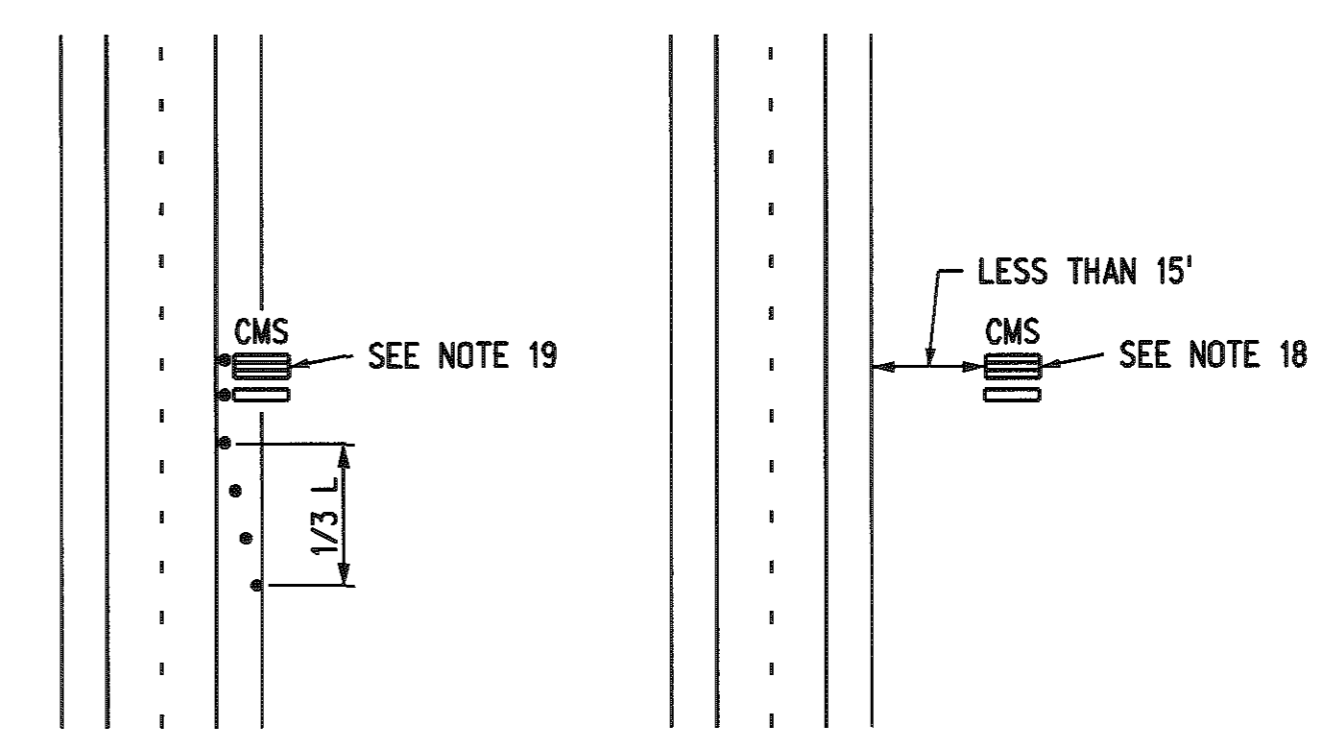
STEEP SLOPE DELINEATION

VERTICAL PANELS SHOULD BE USED FOR AREAS WHERE GUARD RAIL IS REMOVED, OR PROJECT GRADING HAS CREATED A DROP-OFF SLOPE STEEPER THAN 3:1, AND WITHIN 15 FEET OF THE TRAVEL LANE. NOT USED FOR CULVERT OR BRIDGE END PROTECTION. VERTICAL PANEL SPACING MAY BE REDUCED FOR HORIZONTAL CURVES.



WORK ZONE SPEED LIMIT NOTES

- A. WORK ZONE SPEED LIMITS SHALL NOT BE INSTALLED WITHOUT A SPEED ZONE AUTHORIZATION COMPLETED BY THE DEPARTMENT.
- B. REDUCED SPEED LIMITS SHOULD BE USED ONLY IN THE SPECIFIC PORTION OF THE WORK ZONE WHERE CONDITIONS OR RESTRICTIVE FEATURES ARE PRESENT. HOWEVER, FREQUENT CHANGES IN THE SPEED LIMIT SHOULD BE AVOIDED. THE REDUCTION OF SPEED SHOULD BE DESIGNED SO VEHICLES CAN SAFELY TRAVEL THROUGH THE WORK ZONE WITH A SPEED LIMIT REDUCTION OF NO MORE THAN 10 MPH UNLESS OTHERWISE NOTED IN THE PLANS.
- C. WORK ZONE SPEED LIMITS SHOWN ARE TYPICAL APPLICATIONS ONLY AND ARE NOT TO BE ASSUMED AS THE SPEED LIMITS REQUIRED FOR THE WORK.
- D. EXISTING SPEED LIMIT SIGNS SHALL BE REMOVED OR COVERED WHEN A REDUCED WORK ZONE SPEED LIMIT IS IN EFFECT IN THE SAME AREA.
- E. WORK ZONE SPEED LIMIT SIGNS SHALL BE INSTALLED EVERY MILE THROUGH THE WORK AREA WHEN SPEED ZONE IS REDUCED.
- F. A SPEED LIMIT SIGN ENDING THE REDUCED SPEED ZONE SHALL BE INSTALLED AT THE END OF EACH ZONE.



CHANGEABLE MESSAGE SIGN PROTECTION

TAPER FORMULA

$L = S \times W$ FOR SPEEDS OF 45 MPH OR MORE.
 $L = \frac{WS^2}{60}$ FOR SPEEDS OF 40 MPH OR LESS.

WHERE:
 L = MINIMUM LENGTH OF TAPER.
 S = NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK.
 W = WIDTH OF OFFSET (LANE WIDTH).

LEGEND

- TYPE III BARRICADE
- TYPE II BARRICADE OR REFLECTORIZED PLASTIC DRUM
- ↑ SIGN
- ⬮ FLAGGER
- △ CONE
- CMS CHANGEABLE MESSAGE SIGN
- ⬆ TRAFFIC SIGNAL

R5	DEC.05	2003 MUTCD UPDATE
R4	AUG.98	SIGN CHANGES, ADDITIONS
R3	MAY 83	ADDITIONS
REV. NO.	DATE	DESCRIPTION OF REVISION

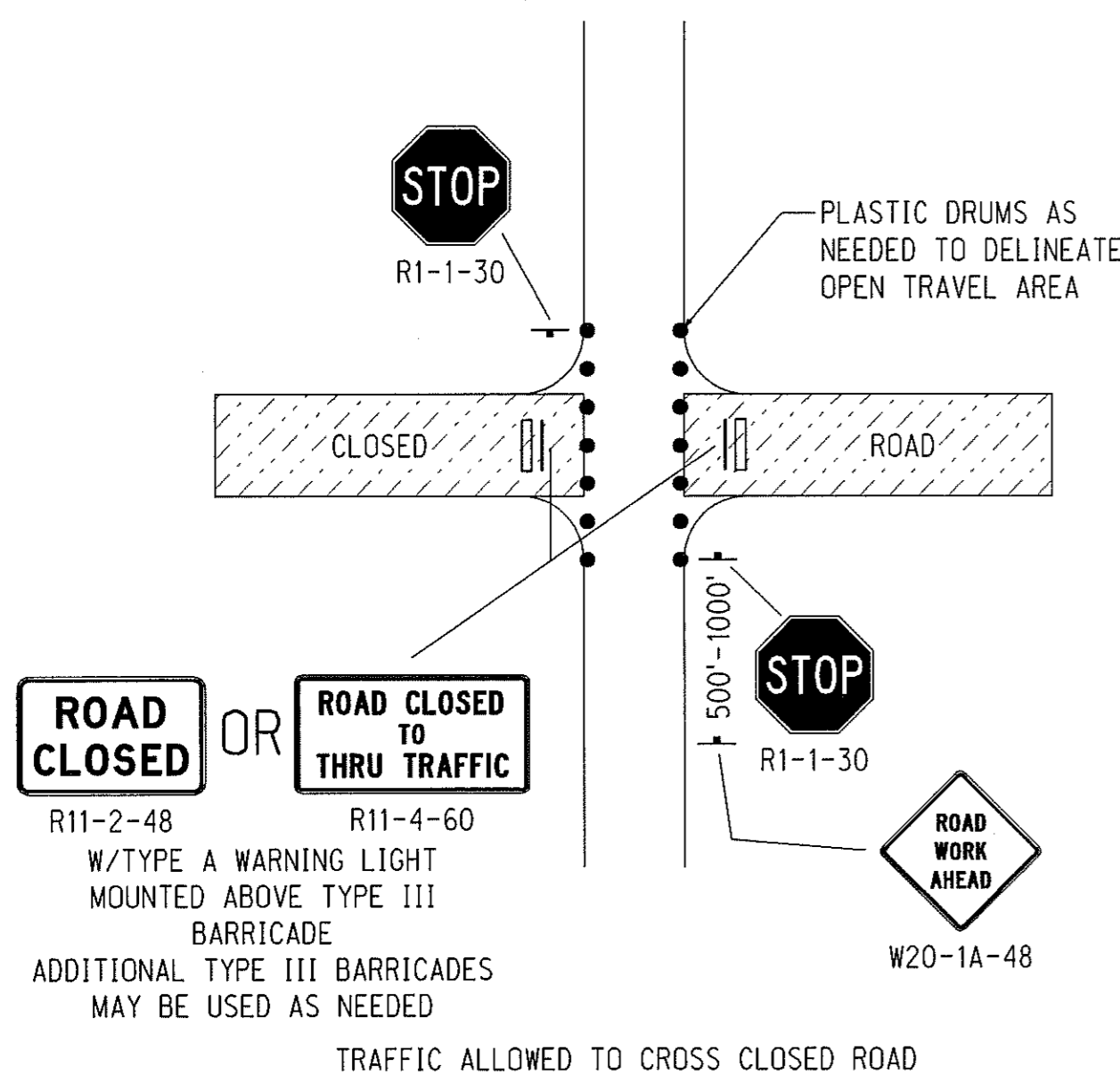
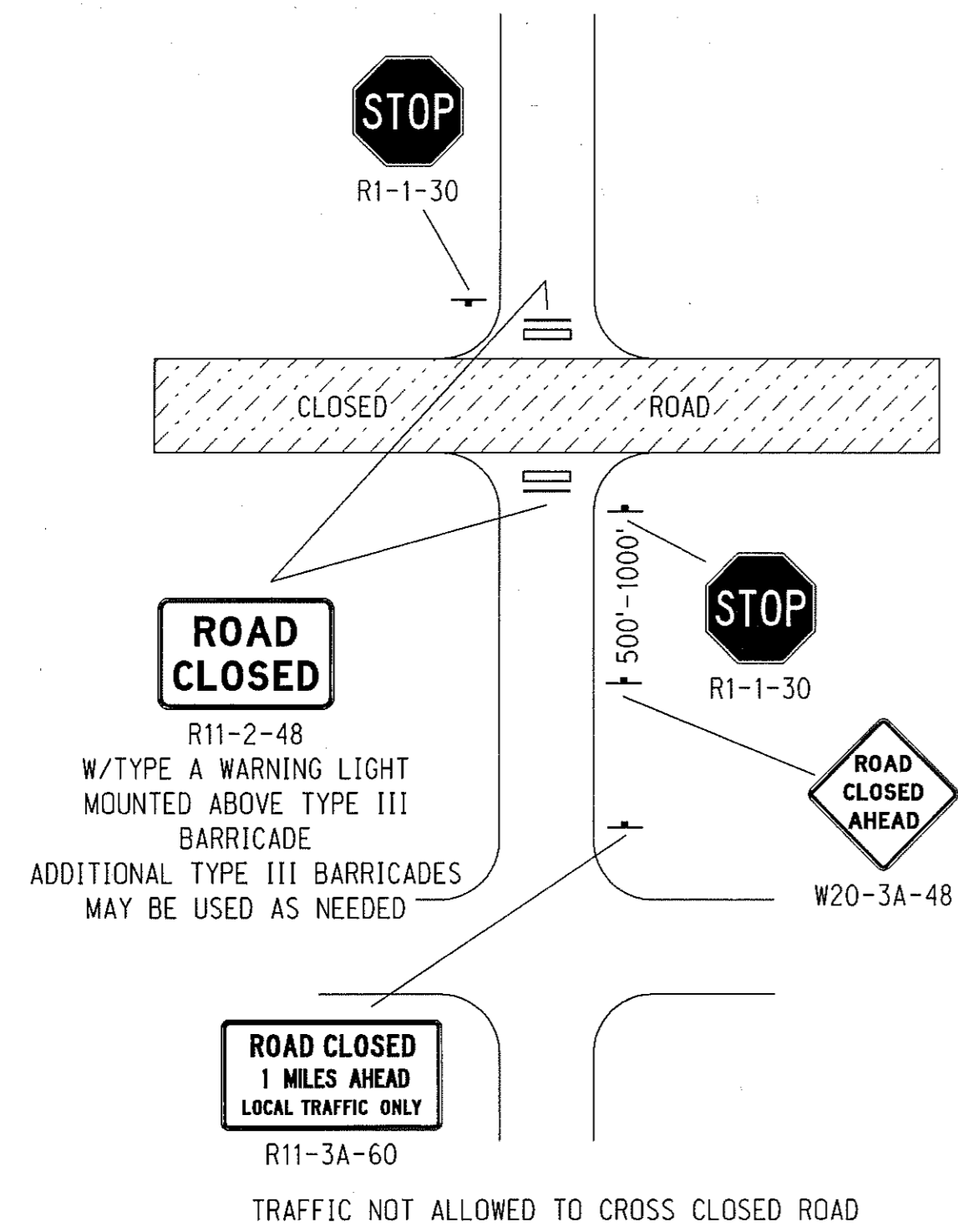
NEBRASKA DEPARTMENT OF ROADS
 STANDARD PLAN NO. 921-R5
**TRAFFIC CONTROL,
 CONSTRUCTION AND MAINTENANCE**

DANIEL J. WADDLE
E-6289

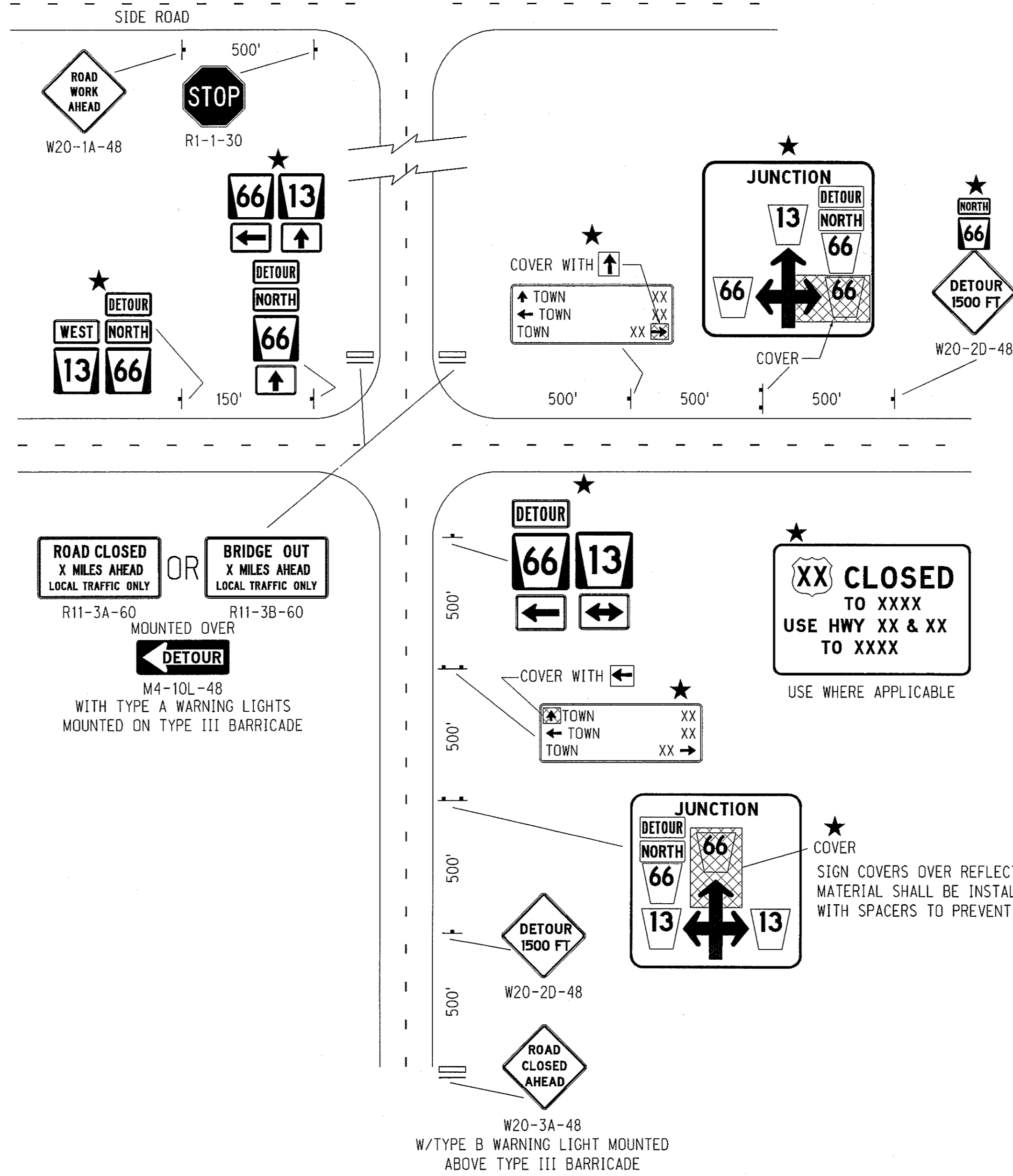
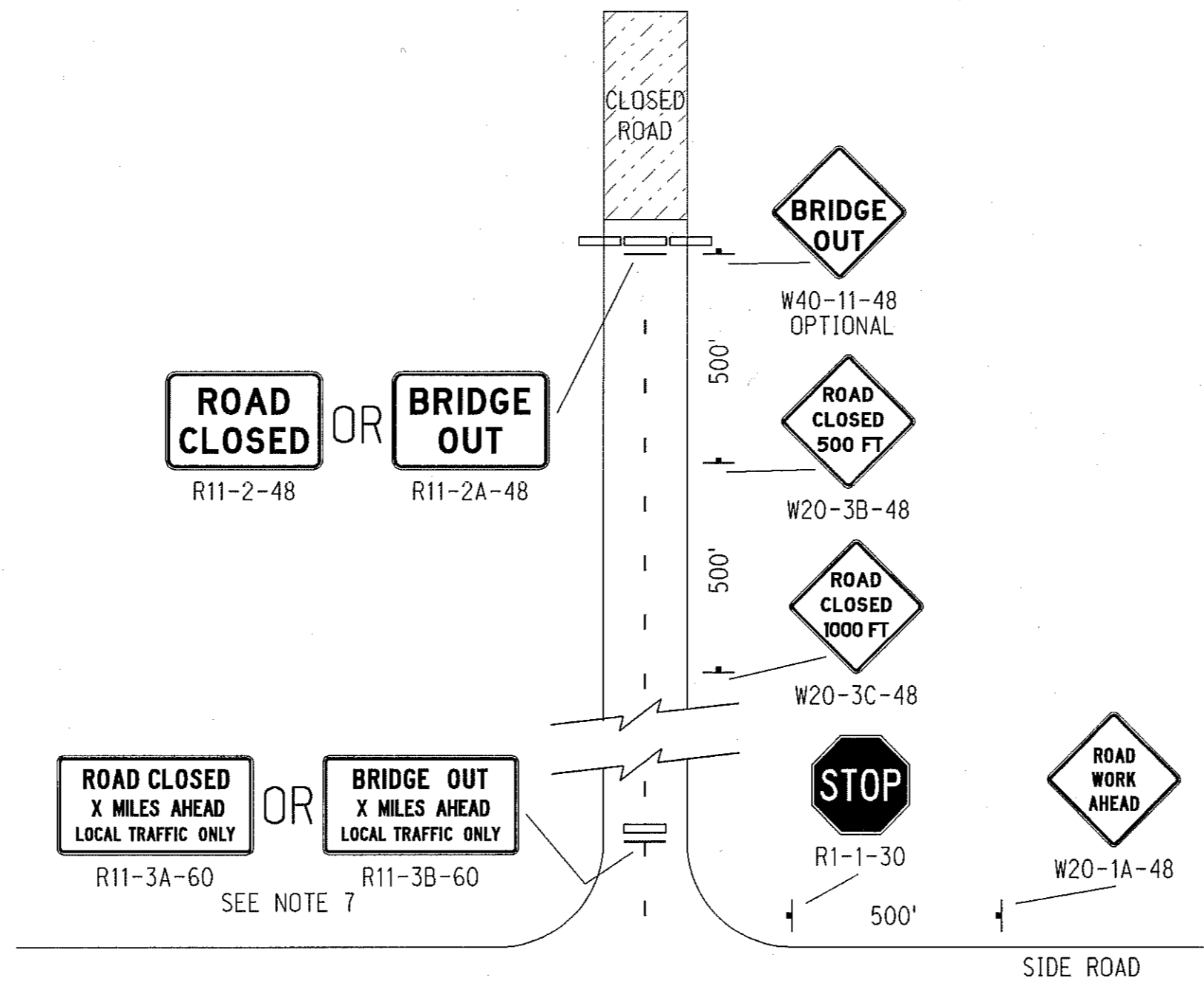
ORIGINAL:
 JUNE 3, 1980
 DATE

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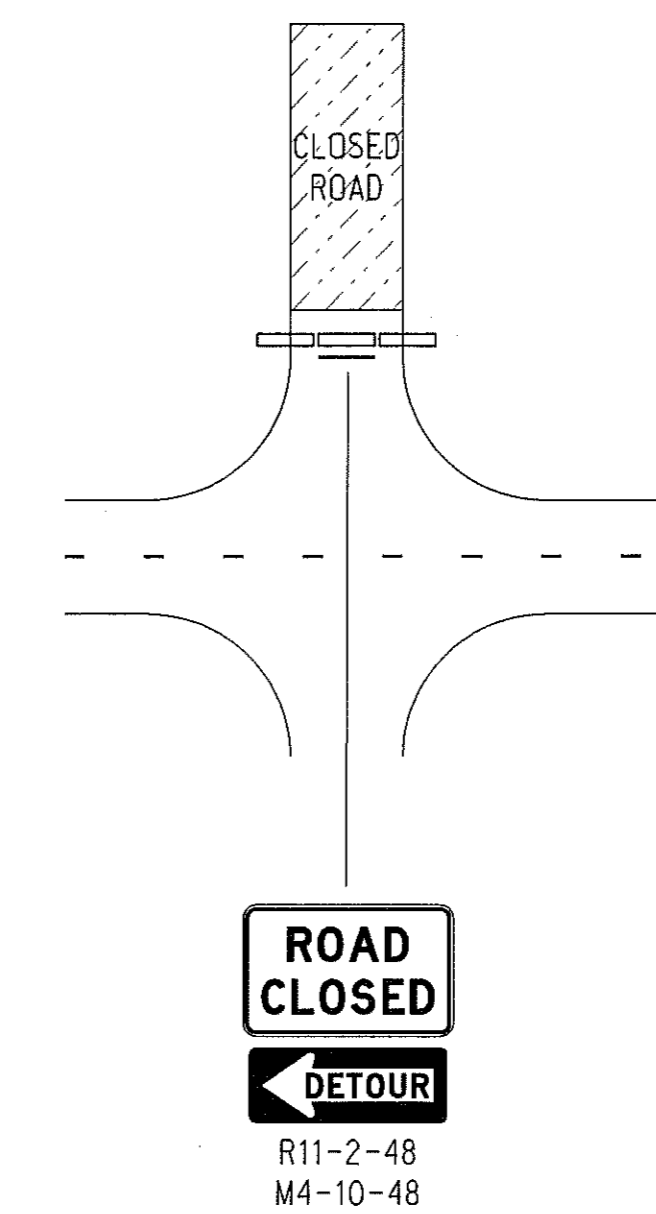
CROSS ROAD INTERSECTING CLOSED ROAD



ROAD CLOSED BEYOND JUNCTION



ROAD CLOSED AT JUNCTION



NOTES

1. SIGNS SHOWN ARE USUALLY FOR ONE DIRECTION OF TRAVEL ONLY.
2. ALL SIGNS SHALL BE INSTALLED, MAINTAINED IN A CLEAN CONDITION AND REMOVED BY THE CONTRACTOR EXCEPT SIGNS WHICH SHALL BE INSTALLED AND MAINTAINED BY THE DEPARTMENT OF ROADS OR APPROPRIATE GOVERNMENT AGENCY.
3. WHEN MESSAGE IS NOT PERTINENT, SIGNS SHALL BE TAKEN DOWN, COVERED OR FOLDED. TAPE IS NOT PERMITTED ON THE FACE OF THE SIGN.
4. VEHICLES OR EQUIPMENT SHALL NOT BE PARKED SO AS TO OBSCURE OR DISTRACT FROM TRAFFIC CONTROL DEVICES.
5. FLAGS MAY BE USED TO CALL ATTENTION TO WARNING SIGNS.
6. WHEN APPROPRIATE THE SIGN R11-2B "BRIDGE OUT" MAY BE USED INSTEAD OF R11-2 "ROAD CLOSED".
7. BARRICADE AND SIGN MAY BE PLACED ALONG EDGE OF ROAD IF NEEDED FOR LOCAL TRAFFIC.
8. REFER TO STANDARD PLAN NO. 920 FOR GENERAL INFORMATION NOT SHOWN.

LEGEND

- TYPE III BARRICADE
- TYPE II BARRICADE OR REFLECTORIZED PLASTIC DRUM
- ↓ SIGN
- FLAGGER
- △ CONE
- ★ INSTALLED BY OTHERS

TAPER FORMULA

$L = S \times W$ FOR SPEEDS OF 45 MPH OR MORE.
 $L = \frac{WS^2}{60}$ FOR SPEEDS OF 40 MPH OR LESS.

WHERE:

- L = MINIMUM LENGTH OF TAPER.
- S = NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK.
- W = WIDTH OF OFFSET (LANE WIDTH).

REV. NO.	DATE	DESCRIPTION OF REVISION
NEBRASKA DEPARTMENT OF ROADS STANDARD PLAN NO. 923 TRAFFIC CONTROL ROAD CLOSURE		
		APPROVED: AUGUST 1998 DATE