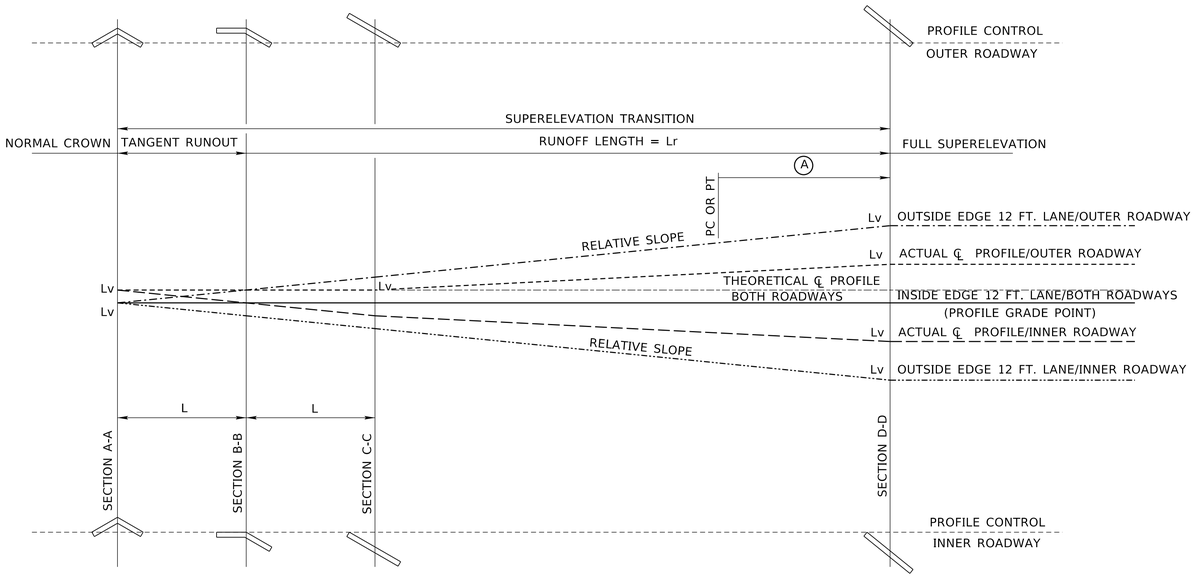
Standard Plans

Table of Contents

August 1, 2025

Plan No.	Std. Plan No.	Letting Date	Title	Comments
1010 0 R7	101-R7	JAN 2018	Superelevation Plan for Dual Highways (Crowned Surface)	
1020 0 R2	102-R2	JAN 2018	Superelevation Plan for Dual Highways (Raised Median)	
1040 0 R6	104-R6	JAN 2018	Superelevation Plan for Dual Highways (Tangent Surface)	
1080 0 R5	108-R5	JAN 2018	Superelevation Plan for Concrete and Bituminous Surfacing	
1090 0 R4	109-R4	JAN 2018	Superelevation Plan for Gravel Surfacing	
3010 0 R12	301-R12	JAN 2018	Pavement Details	
3030 0 R4	303-R4	MAY 2024	Curb Ramps	
3070 0 R3	307-R3	JAN 2018	Mailbox Turnout	
3290 0 R12	329-R12	JUN 2023	8 to 16 Inch Concrete Pavement	
4030 0 R3	403-R3	JAN 2018	Bends and Breaks for Concrete Box Culverts	
4040 0 R4	404-R4	JAN 2018	Control Joints for Concrete Box Culverts	
4070 0 R0	407	JUN 2023	Concrete Headwall (For 12"-30" Pipes)	
4080 0 R0	408	JUN 2023	Concrete Headwall (For 36"-60" Pipes)	
4090 0 R0	409	JUN 2023	Concrete Headwall (For 72"-108" Pipes)	
4100 0 R5	410-R5	MAY 2024	Flared End Sections for Culvert Pipes	
4110 0 R2	411-R2	JAN 2018	Bedding and Backfill Requirements for Concrete Pipe	
4130 0 R3	413-R3	JAN 2018	Bar Grate for Flared End Sections	
4140 0 R3	414-R3	JAN 2018	Pipe Siphon	
4250 0 R5	425-R5	JAN 2018	Collars and Elbows for Concrete Pipes	
4280 0 R4	428-R4	JAN 2018	Concrete Plugs and Field Tap Details	
4350 0 R3	435-R3	JUN 2023	Manhole	
4370 0 R0	437	MAY 2024	Area Inlet with Bar	
4380 0 R0	438	MAY 2024	Area Inlet with Grate	
4390 0 R0	439	MAY 2024	5-Bar Grate Inlet	
4400 0 R0	440	JUN 2023	Mountable Curb Inlet Single Grate	
4410 0 R0	441	JUN 2023	Mountable Crub Inlet Twin Grates	
4420 0 R0	442	JUN 2023	Haunch Over Pipe at Shallow Curb Inlet	
4430 0 R13	443-R13	JUN 2023	Curb Inlets and Junction Box	
4440 0 R0	444	MAY 2024	Reconstruct Gutter Depression For 2" Grade Raise	
4530 0 R0	453	JUN 2023	Splash Basin	
4550 0 R2	455-R2	JAN 2018	Concrete Ditch Lining	
4900 0 R1	490-R1	JAN 2018	Bird Exclusion Netting	
5010 0 R7	501-R7	JAN 2018	Erosion Control	
5020 0 R2	502- R2	JAN 2018	Silt Fence Details	
5030 0 R0	503	MAY 2024	Concrete Washout & Construction Exit	
5040 0 R0	504	MAY 2024	Temporary Pipe Slope Drain	

Plan No.	Std. Plan No.	Letting Date	Title	Comments
5410 0 R0	541	MAY 2024	Concrete Flume, Type I	
5420 0 R0	542	MAY 2024	Concrete Flume, Type II	
5440 0 R0	544	MAY 2024	Concrete Flume, Type IV	
5450 0 R0	545	MAY 2024	Concrete Flume, Type V	
5460 0 R0	546	MAY 2024	Concrete Flume, Type VI	
5470 0 R4	547-R4	JUL 2020	Concrete Flume, Type VII	
5480 0 R4	548-R4	JUL 2020	Concrete Flume, Type VIII	
7020 0 R1	702-R1	JUL 2020	Cable Guardrail	
7100 0 R5	710-R5	JAN 2018	Fence Details	
7120 0 R2	712-R2	JUL 2020	Bullnose (12.5') (Tapered)	
7130 0 R2	713-R2	JUL 2020	Bullnose (12.5') (Parallel)	
7140 0 R1	714-R1	JAN 2018	4-Strand Wire Fence	
7150 0 R1	715-R1	JAN 2018	5-Strand Wire Fence	
7400 0 R1	740-R1	JAN 2018	Midwest Guardrail System Bridge Approach Section	
7410 0 R2	741-R2	JUL 2020	Thrie-Beam Bridge Approach Section	
7430 0 R3	743-R3	JUL 2020	Guardrail Details	
7440 0 R0	744	JUL 2020	Midwest Guardrail System Without Blockouts	
7450 0 R2	745-R2	JAN 2018	End Anchorage Assembly	
7460 0 R0	746	JAN 2018	Midwest Guardrail System Bridge Approach Section TL-2	
7470 0 R1	747-R1	JAN 2018	Parapet Guardrail Attachment	
7480 0 R2	748-R2	JUL 2020	Culvert Mounted Guardrail Post	
8040 0 R1	804-R1	JAN 2018	Precast Concrete R.O.W. Marker	
8050 0 R2	805-R2	JUL 2020	R.O.W. Sign	
8700 0 R0	870	JUL 2020	Concrete Protection Barrier	
9010 0 R12	901-R12	JUL 2020	Highway Delineators and Chevrons	
9100 0 R4	910-R4	JAN 2019	Signal Face Configuration	
9110 0 R2	911-R2	JAN 2018	Signal Mounting	
9120 0 R7	912-R7	JAN 2019	Traffic Signal Pole Detail	
9130 0 R3	913-R3	JAN 2018	Span Wire Signal Pole Detail	
9140 0 R9	914-R9	OCT 2024	Pull Box Detail	OCT 2024 - Revision
9200 0 R7	920-R7	JAN 2018	Traffic Control Construction and Maintenance	
9210 0 R8	921-R8	JAN 2018	Traffic Control, Construction and Maintenance	
9220 0 R11	922-R11	JAN 2018	Traffic Control for Asphalt Surfacing	
9230 0 R2	923-R2	JAN 2018	Traffic Control Road Closure	
9240 0 R4	924-R4	JUL 2020	Urban Traffic Control Plan	
9260 0 R0	926	JAN 2019	Typical Lane Closure Plan for Multilane Roadways	
9410 0 R1	941-R1	SEP 2021	Pavement Marking	
9420 0 R0	942	OCT 2018	Pavement Marking for Freeway Ramps	
9430 0 R0	943	OCT 2018	Temporary Pavement Marking	



DIAGRAMMATIC PROFILE SHOWING METHOD OF ATTAINING SUPERELEVATION

NOTES:

e = SUPERELEVATION RATE AS SHOWN IN THE PLANS (IN %)

FOR A SLAB WIDTH UP TO 16 FT., THE SUPERELEVATION RATE FOR THE SURFACED SHOULDER SHALL BE THE SAME AS FOR THE THRU LANE.

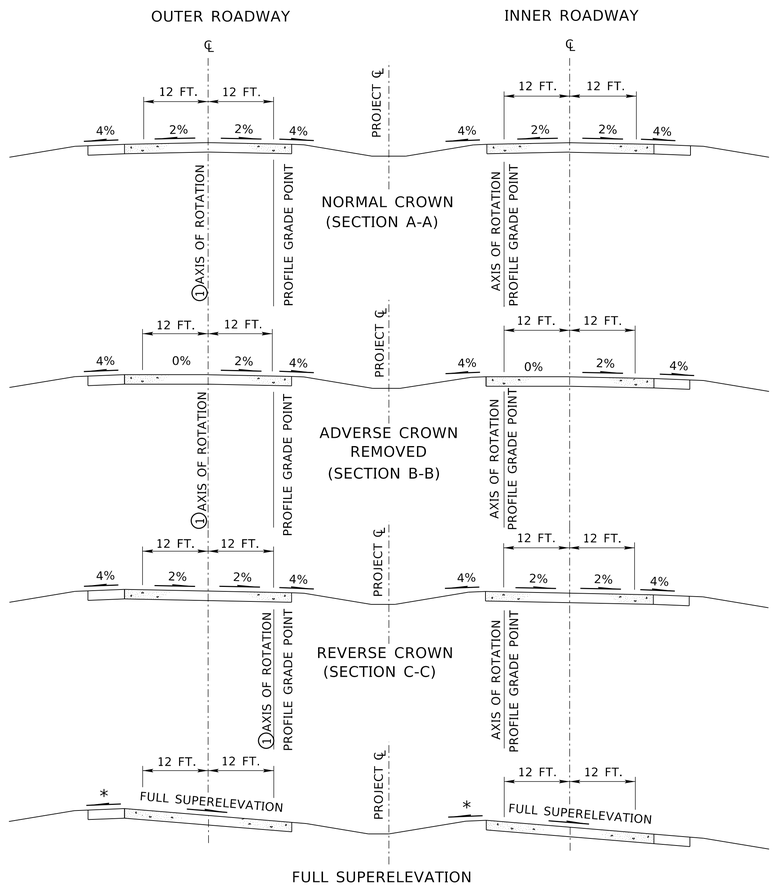
AT POINTS MARKED "Lv" IT MAY BE NECESSARY TO INSERT A SHORT CONVENIENT LENGTH OF PARABOLIC CURVE TO ELIMINATE THE SHARP BREAK IN THE STRAIGHT LINE TRANSITION.

L = 12 FT. (WIDTH OF ROADWAY BEING ROTATED) x 0.02 (CHANGE IN ROADWAY CROSS-SLOPE) x RELATIVE SLOPE.
FOR e GREATER THAN OR EQUAL TO 2.0: Lr = 24 FT. (WIDTH OF ROADWAY BEING ROTATED) x (e/100 - 0.02)
(FULL SUPERELEVATION MINUS REVERSE CROWN SLOPE) x RELATIVE SLOPE + L.

FOR A WIDER SLAB WIDTH, L AND Lr SHOULD BE COMPUTED BASED ON THE 12 FT. DRIVING LANE WIDTH.

(A) 60% TO 90% OF THE RUNOFF LENGTH SHOULD BE PLACED ON THE TANGENT.

DESIGN SPEED (mph)	MAXIMUM RELATIVE SLOPE
60	222:1
65	233:1
70	250:1
75	263:1
80	286:1



* THE SHOULDER SLOPE SHALL BE MAINTAINED UNTIL THE SUPERELEVATION RATE ON THE ROADWAY IS SUCH THAT THE ALGERBAIC DIFFERENCE BETWEEN CROSS SLOPES ON THE ROADWAY AND SHOULDER EQUALS 7%. THIS ALGERBAIC DIFFERENCE SHALL NOT EXCEED 7%.

(1) FOR THE OUTER ROADWAY, THE AXIS OF ROTATION SHALL SHIFT FROM THE CENTERLINE OF THE LANES TO THE INSIDE EDGE OF THE 12 FT. INSIDE LANE WHEN THE SUPERELEVATION TRANSITION ATTAINS REVERSE CROWN.

SUPERELEVATION FOR DUAL HIGHWAYS
WITH DEPRESSED MEDIANS OF 40 FT. OR LESS IN WIDTH

REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN. 18	NDOR BORDER TO NDOT BORDER
R6	OCT. 10	RUNOFF PLACEMENT
R5	JAN. 10	CORRECTED Lr EQUATION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 101-R7

SUPERELEVATION PLAN

FOR DUAL HIGHWAYS
(CROWNED)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

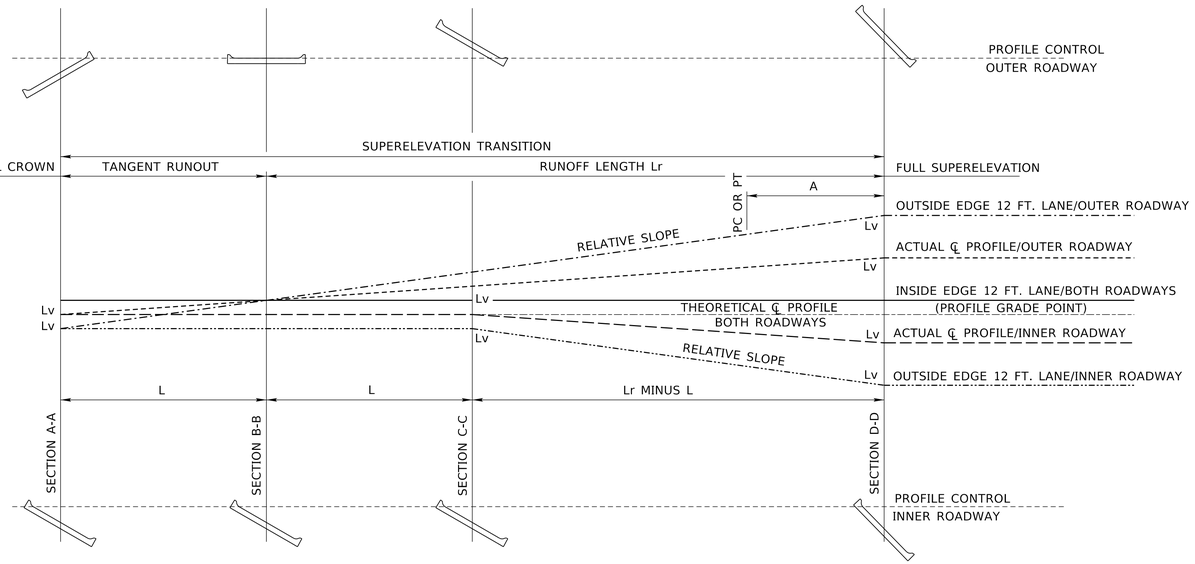
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

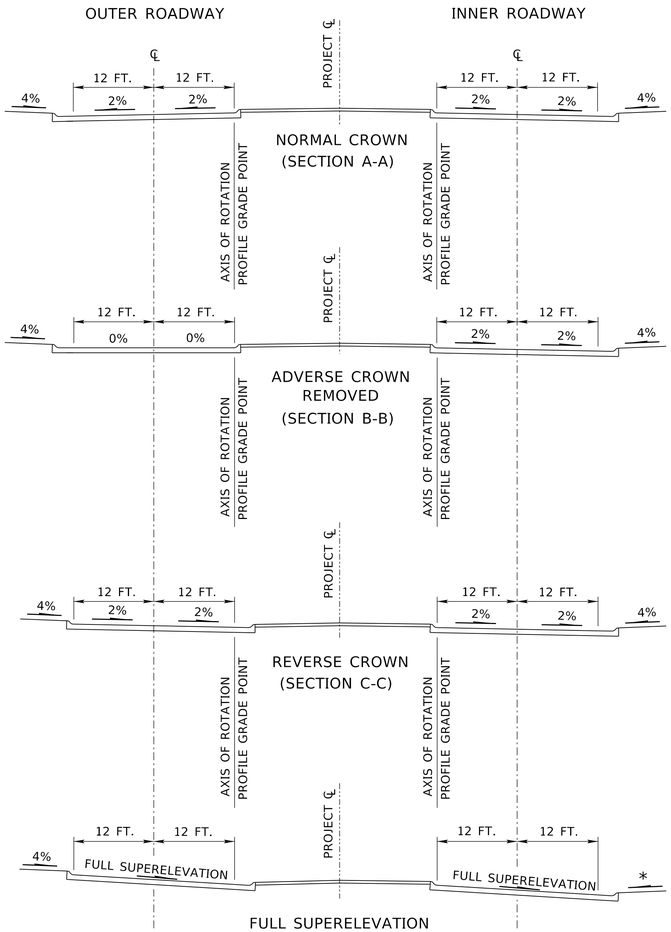
ORIGINAL:
JULY 30, 1974
DATE

1
1

COMPUTER: BG0419M187
DATE: 10-OCT-2024 12:38
FILE: 1010 0 R7.dgn



DIAGRAMMATIC PROFILE SHOWING METHOD OF ATTAINING SUPERELEVATION



NOTES:

e = SUPERELEVATION RATE AS SHOWN IN THE PLANS (IN %)

AT POINTS MARKED "Lv" IT MAY BE NECESSARY TO INSERT A SHORT CONVENIENT LENGTH OF PARABOLIC CURVE TO ELIMINATE THE SHARP BREAK IN THE STRAIGHT LINE TRANSITION.

L = 24 FT. (WIDTH OF ROADWAY BEING ROTATED) x 0.02 (CHANGE IN ROADWAY CROSS-SLOPE) x RELATIVE SLOPE.
Lr = 24 FT. (WIDTH OF ROADWAY BEING ROTATED) x e/100 (FULL SUPERELEVATION) x RELATIVE SLOPE.

L AND Lr SHOULD BE COMPUTED BASED ON THE 12 FT. DRIVING LANE WIDTH.

(A) 60% TO 90% OF THE RUNOFF LENGTH SHOULD BE PLACED ON THE TANGENT.

DESIGN SPEED (mph)	MAXIMUM RELATIVE SLOPE 2 LANES ROTATED
25	107:1
30	114:1
35	121:1
40	129:1
45	139:1
50	150:1
55	160:1
60	166.5:1
65	175:1
70	187.5:1
75	197:1
80	214.5:1

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JAN. 18	NDOR BORDER TO NDOT BORDER
R1	OCT. 10	RUNOFF PLACEMENT

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 102-R2

SUPERELEVATION PLAN

FOR DUAL HIGHWAYS
(RAISED MEDIAN)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

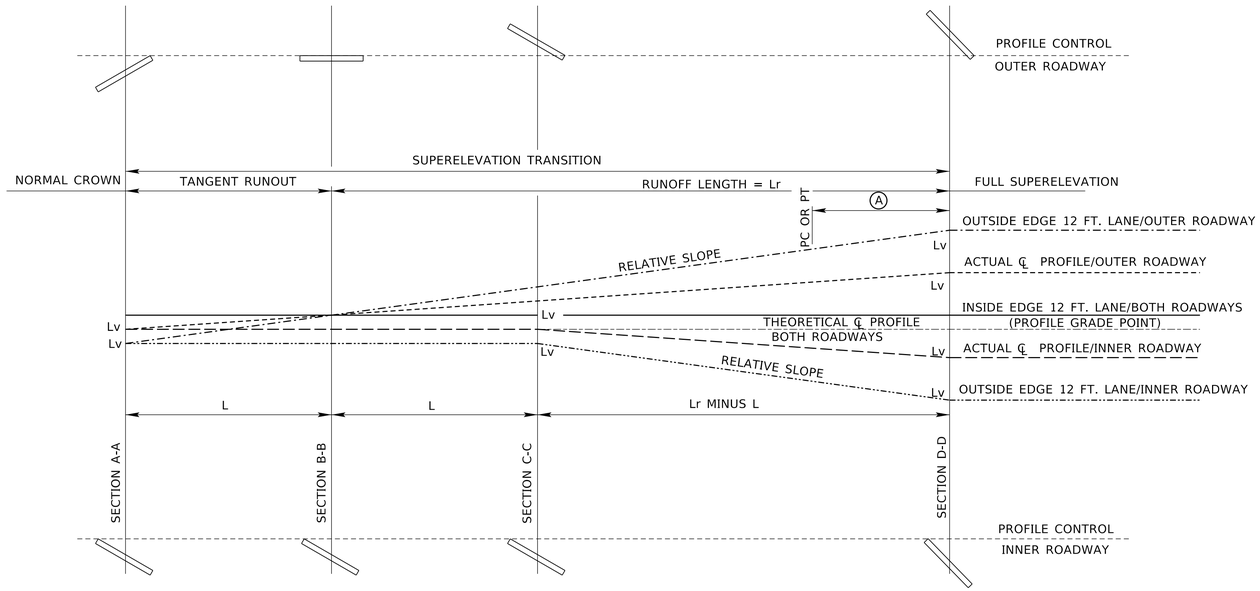
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

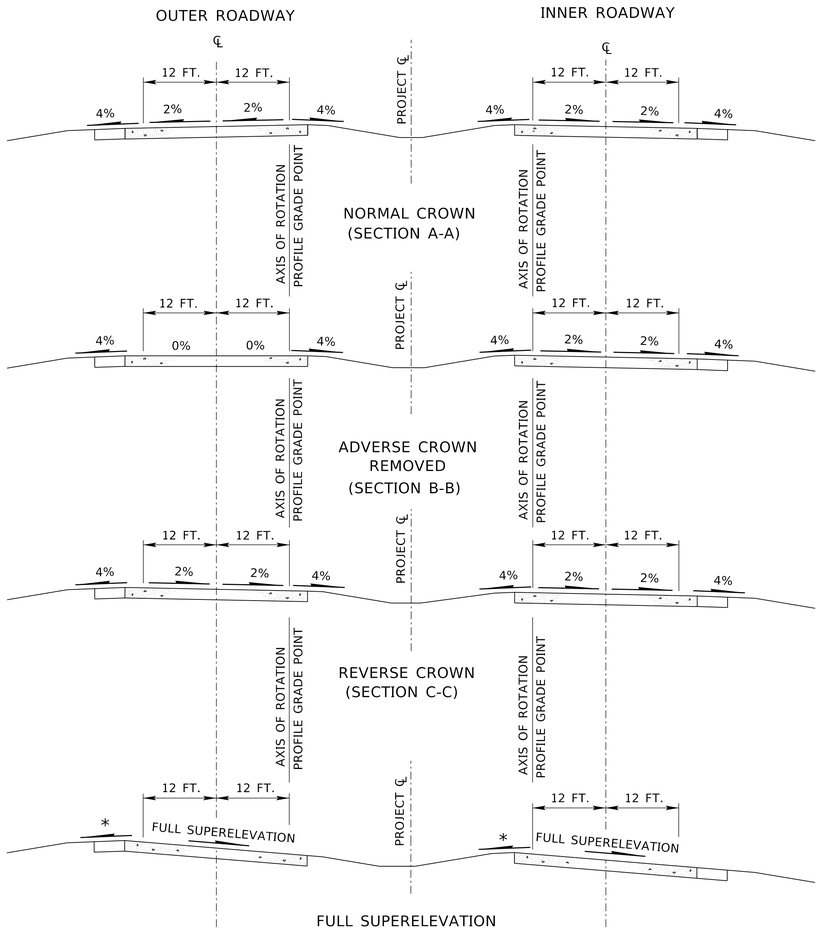
ORIGINAL:
SEPTEMBER 7, 2007
DATE

1
1

COMPUTER: BG0419M187
DATE: 10-OCT-2024 12:38
FILE: 1020 0 R2.dgn



DIAGRAMMATIC PROFILE SHOWING METHOD OF ATTAINING SUPERELEVATION



∗ THE SHOULDER SLOPE SHALL BE MAINTAINED UNTIL THE SUPERELEVATION RATE ON THE ROADWAY IS SUCH THAT THE ALGEBRAIC DIFFERENCE BETWEEN CROSS SLOPES ON THE ROADWAY AND SHOULDER EQUALS 7%. THIS ALGEBRAIC DIFFERENCE SHALL NOT EXCEED 7%.

SUPERELEVATION FOR DUAL HIGHWAYS WITH
DEPRESSED MEDIANS OF 40 FT. OR LESS IN WIDTH

NOTES:

e = SUPERELEVATION RATE AS SHOWN IN THE PLANS (IN %)

FOR A 15 FT. SLAB WIDTH, THE SUPERELEVATION RATE FOR THE 3 FT. SURFACED SHOULDER SHALL BE THE SAME AS FOR THE THRU LANE.

AT POINTS MARKED "Lv" IT MAY BE NECESSARY TO INSERT A SHORT CONVENIENT LENGTH OF PARABOLIC CURVE TO ELIMINATE THE SHARP BREAK IN THE STRAIGHT LINE TRANSITION.

L = 24 FT. (WIDTH OF ROADWAY BEING ROTATED) x 0.02 (CHANGE IN ROADWAY CROSS-SLOPE) x RELATIVE SLOPE.
Lr = 24 FT. (WIDTH OF ROADWAY BEING ROTATED) x e/100 (FULL SUPERELEVATION) x RELATIVE SLOPE.
FOR A 15 FT. SLAB WIDTH L AND Lr SHOULD BE COMPUTED BASED ON THE 12 FT. DRIVING LANE WIDTH.

(A) 60% TO 90% OF THE RUNOFF LENGTH SHOULD BE PLACED ON THE TANGENT.

DESIGN SPEED (mph)	MAXIMUM RELATIVE SLOPE 2 LANES ROTATED
60	166.5:1
65	175:1
70	187.5:1
75	197:1
80	214.5:1

REV. NO.	DATE	DESCRIPTION OF REVISION
R6	JAN. 18	NDOR BORDER TO NDOT BORDER
R5	DEC. 16	SPELLING ERRORS
R4	OCT. 10	RUNOFF PLACEMENT

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 104-R6

SUPERELEVATION PLAN

FOR DUAL HIGHWAYS
(TANGENT)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

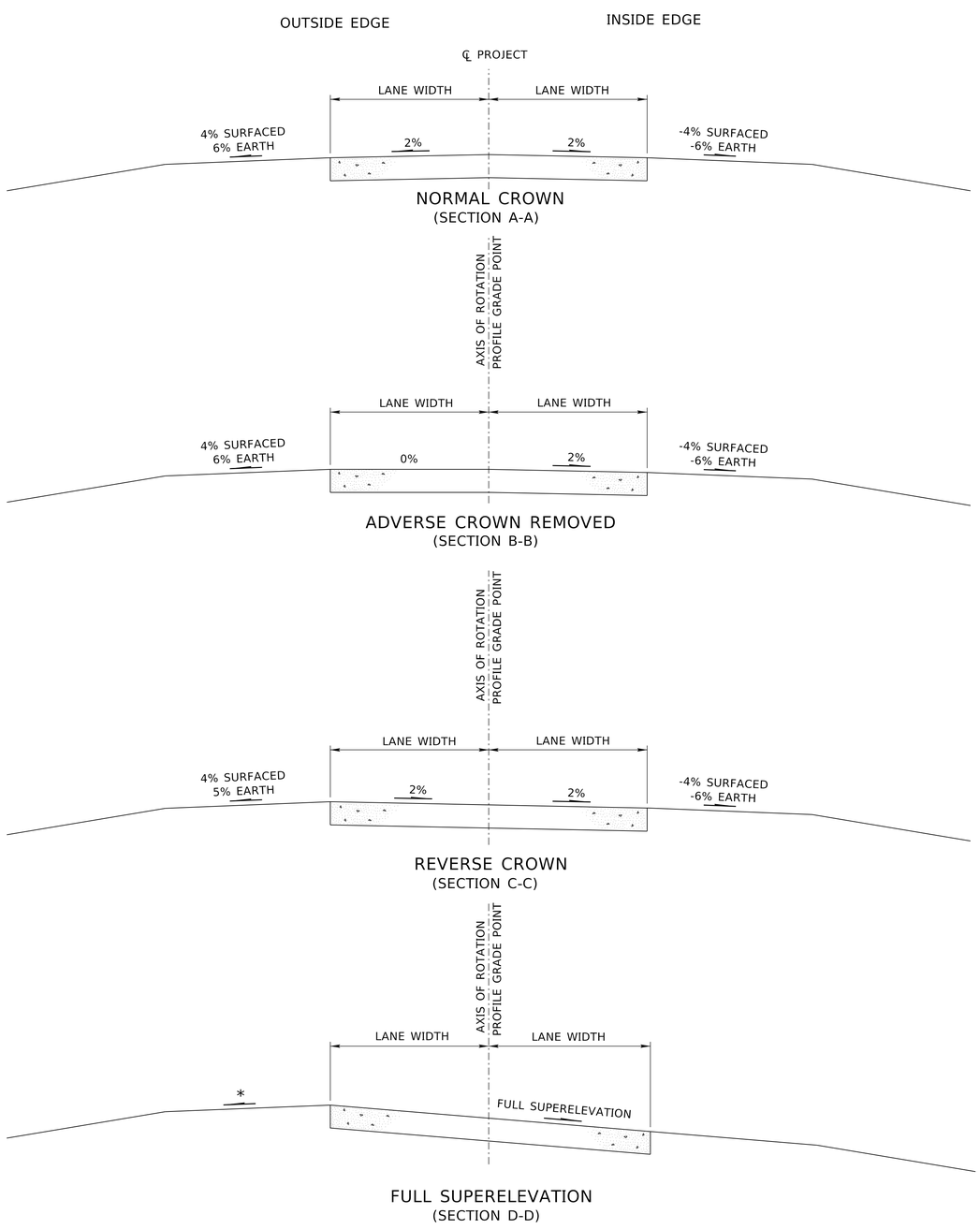
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL:
JULY 30, 1974
DATE

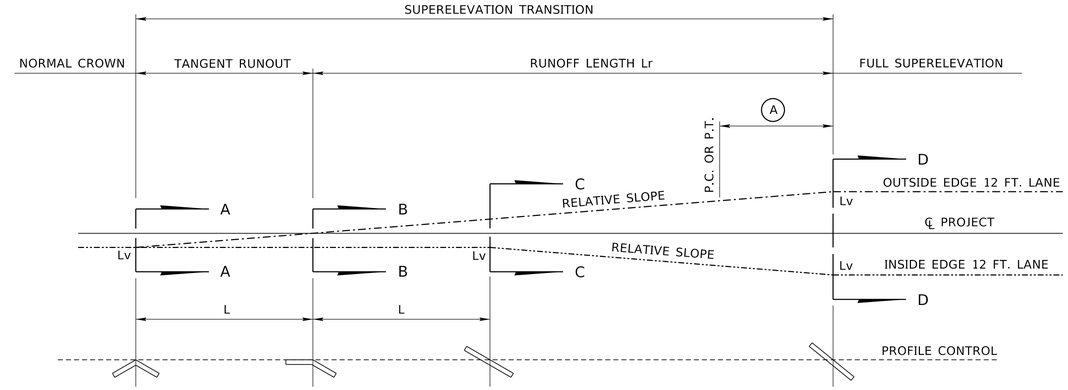
1
1

COMPUTER: BG04191M1187
DATE: 10-OCT-2024 12:38
FILE: 1040 0 R6.dgn



* THE SHOULDER SLOPE SHOULD BE MAINTAINED UNTIL THE SUPERELEVATION RATE ON THE ROADWAY IS SUCH THAT THE ALGEBRAIC DIFFERENCE BETWEEN CROSS SLOPES ON THE ROADWAY AND SHOULDER EQUALS 7%.

THIS ALGEBRAIC DIFFERENCE SHOULD NOT EXCEED 7%.



DIAGRAMMATIC PROFILE SHOWING METHOD OF ATTAINING SUPERELEVATION

NOTES:

e = SUPERELEVATION RATE AS SHOWN IN THE PLANS (IN %)

FOR A 28 FT. TOP SYSTEM THE SUPERELEVATION RATE FOR THE 2 FT. SURFACED SHOULDER WILL BE THE SAME AS FOR THE THRU LANE.

AT POINTS MARKED "Lv" IT MAY BE NECESSARY TO INSERT A SHORT CONVENIENT LENGTH OF PARABOLIC CURVE TO ELIMINATE THE SHARP BREAK IN THE STRAIGHT LINE TRANSITION.

L = 12 FT. (WIDTH OF ROADWAY BEING ROTATED) x 0.02 (CHANGE IN ROADWAY CROSS-SLOPE) x RELATIVE SLOPE.
Lr = 12 FT. (WIDTH OF ROADWAY BEING ROTATED) x e/100 (FULL SUPERELEVATION) x RELATIVE SLOPE.

FOR A 14 FT. LANE WIDTH L AND Lr SHOULD BE COMPUTED USING THE 12 FT. DRIVING LANE WIDTH.

(A) 60% TO 90% OF THE RUNOFF LENGTH SHOULD BE PLACED ON THE TANGENT.

DESIGN SPEED (mph)	MAXIMUM RELATIVE SLOPE
50	200:1
55	213:1
60	222:1
65	233:1
70	250:1

REV. NO.	DATE	DESCRIPTION OF REVISION
R5	JAN. 18	NDOR BORDER TO NDOT BORDER
R4	OCT. 10	RUNOFF PLACEMENT
R3	SEP. 07	RELATIVE SLOPE TABLE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 108-R5

SUPERELEVATION PLAN

FOR CONCRETE AND BITUMINOUS SURFACING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL: JULY 30, 1974
DATE

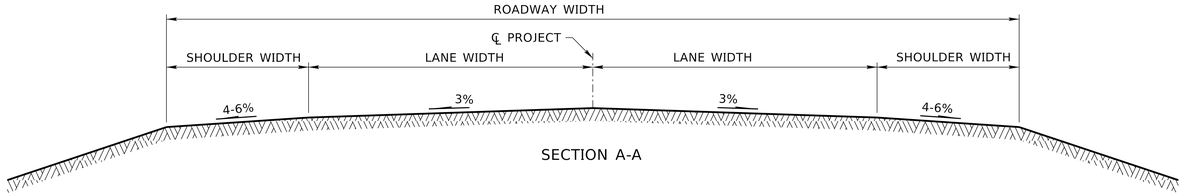
1
1

COMPUTER: BG0419M187
DATE: 10-OCT-2024 12:39
FILE: 1080 0 R5.dgn

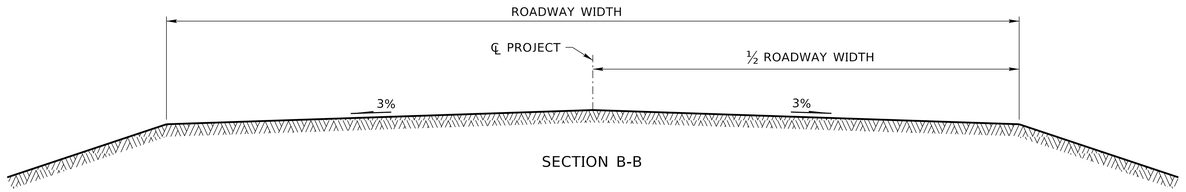
TRANSITION DISTANCES							
ROADWAY WIDTH (FT.)	SECTION	e = SUPERELEVATION					
		3%	4%	5%	6%	7%	8%
26	B-B TO C-C & C-C TO D-D	78	78	78	78	78	78
	D-D TO E-E	0	26	52	78	104	130
	B-B TO E-E	156	182	208	234	260	286
28	B-B TO C-C & C-C TO D-D	84	84	84	84	84	84
	D-D TO E-E	0	28	56	84	112	140
	B-B TO E-E	168	196	224	252	280	308
30	B-B TO C-C & C-C TO D-D	90	90	90	90	90	90
	D-D TO E-E	0	30	60	90	120	150
	B-B TO E-E	180	210	240	270	300	330
32	B-B TO C-C & C-C TO D-D	96	96	96	96	96	96
	D-D TO E-E	0	32	64	96	128	160
	B-B TO E-E	192	224	256	288	320	352
34	B-B TO C-C & C-C TO D-D	102	102	102	102	102	102
	D-D TO E-E	0	34	68	102	136	170
	B-B TO E-E	204	238	272	306	340	374
36	B-B TO C-C & C-C TO D-D	108	108	108	108	108	108
	D-D TO E-E	0	36	72	108	144	180
	B-B TO E-E	216	252	288	324	360	396

MAXIMUM SUPERELEVATION (FT.) (½ ROADWAY WIDTH × e)						
ROADWAY WIDTH (FT.)	e					
	3%	4%	5%	6%	7%	8%
26	.39	.52	.65	.78	.91	1.04
28	.42	.56	.70	.84	.98	1.12
30	.45	.60	.75	.90	1.05	1.20
32	.48	.64	.80	.96	1.12	1.28
34	.51	.68	.85	1.02	1.19	1.36
36	.54	.72	.90	1.08	1.26	1.44

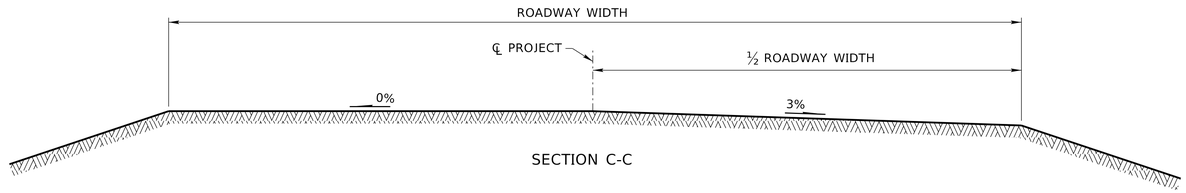
NORMAL CROWN DEPTH (SECTION B-B)						
ROADWAY WIDTH (FT.)	26	28	30	32	34	36
CROWN (FT.)	.39	.42	.45	.48	.51	.54



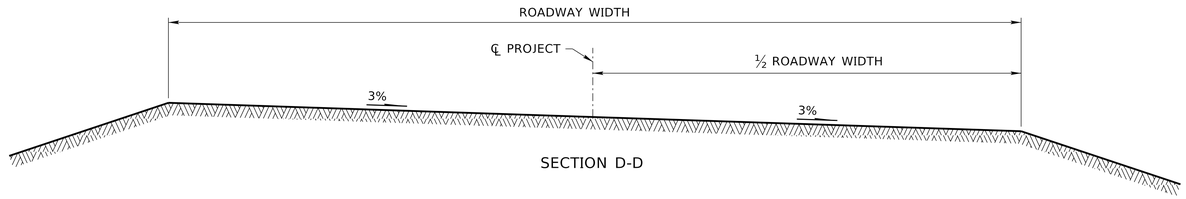
SECTION A-A



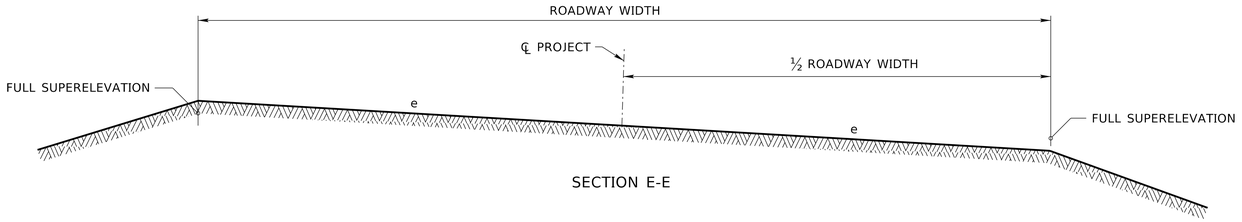
SECTION B-B



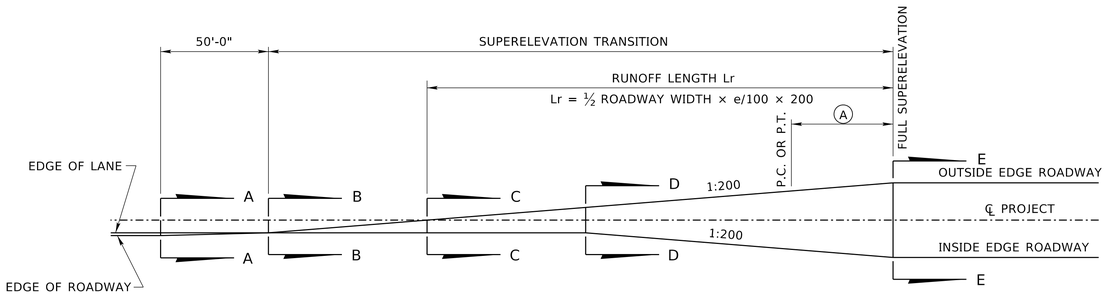
SECTION C-C



SECTION D-D



SECTION E-E



NOTE:
e = SUPERELEVATION RATE, AS SHOWN IN PLANS (%)

DIAGRAMMATIC PROFILE SHOWING METHOD OF ATTAINING SUPERELEVATION

Ⓐ ⅕ TO ⅖ (PREFERABLY 1/3) OF THE RUNOFF LENGTH Lr SHALL BE PLACED ON THE CURVE.

Ⓑ MINIMUM DESIGN SPEED 50 M.P.H.

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JAN. 18	NDOR BORDER TO NDOT BORDER
R3	NOV. 11	ADDED FHWA SIGNATURE
R2	AUG. 03	MULTIPLE CHANGES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 109-R4

SUPERELEVATION PLAN

FOR GRAVEL SURFACING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ MICHAEL H. OWEN E-6515 ★ STATE OF NEBRASKA

DATE

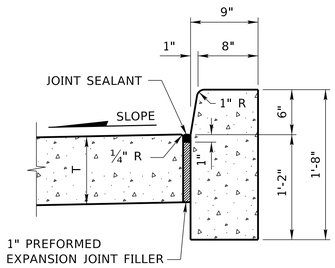
ORIGINAL: APRIL, 17 1995

DATE

1
1

COMPUTER: BG041914187
DATE: 10-OCT-2024 12:39
FILE: 1090 0 R4.dgn

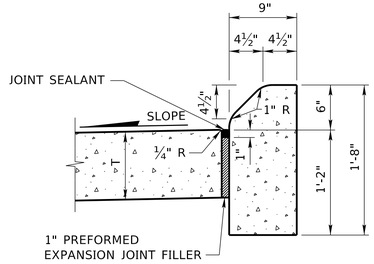
LEVEL 8 = Ⓑ FOR DESIGNER INFORMATION



CONCRETE BARRIER CURB *

QUANTITIES

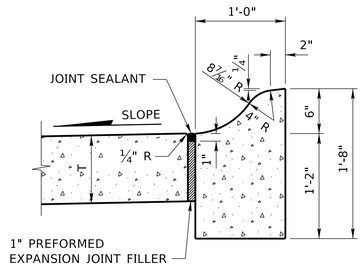
CONCRETE 4.55 CU. YDS./STA.
AREA 1.228 SQ. FT.



CONCRETE MEDIAN CURB *

QUANTITIES

CONCRETE 4.42 CU. YDS./STA.
AREA 1.192 SQ. FT.

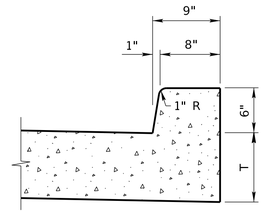


CONCRETE CURB, * TYPE I

QUANTITIES

CONCRETE 5.22 CU. YDS./STA.
AREA 1.408 SQ. FT.

NOTE: * ONE INCH PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED AT INTERVALS OF NOT MORE THAN 100 FEET THRU CONCRETE BARRIER CURB, CONCRETE MEDIAN CURB, AND CONCRETE CURB, TYPE I.

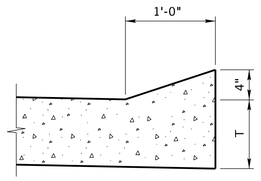


NOTE: MAY BE USED WHEN T IS LESS THAN 1 FOOT.

INTEGRAL CONCRETE BARRIER CURB

QUANTITIES

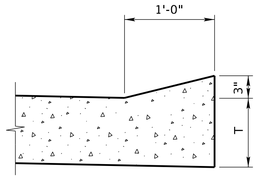
CONCRETE 1.33 CU. YDS./STA.
AREA 0.359 SQ. FT.



INTEGRAL CONCRETE SLOPING CURB

QUANTITIES

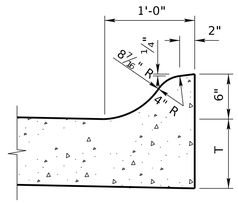
CONCRETE 0.62 CU. YDS./STA.
AREA 0.167 SQ. FT.



INTEGRAL CONCRETE SLOPING CURB

QUANTITIES

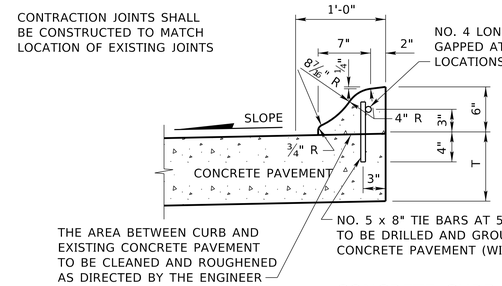
CONCRETE 0.46 CU. YDS./STA.
AREA 0.123 SQ. FT.



INTEGRAL CONCRETE CURB

QUANTITIES

CONCRETE 0.89 CU. YDS./STA.
AREA 0.239 SQ. FT.

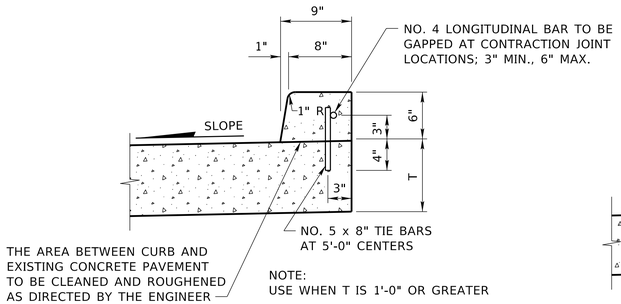


CONCRETE CURB, TYPE II

QUANTITIES

CONCRETE 0.87 CU. YDS./STA.
AREA 0.234 SQ. FT.

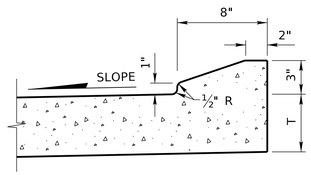
NOTE: T = PAVEMENT THICKNESS



CONCRETE BARRIER CURB ALTERNATE

QUANTITIES

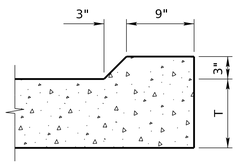
CONCRETE 1.33 CU. YDS./STA.
AREA 0.359 SQ. FT.



INTEGRAL CONCRETE TRUCK APRON CURB

QUANTITIES

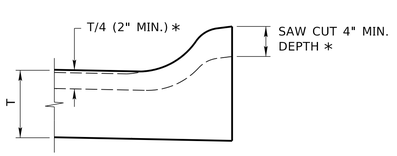
CONCRETE 0.47 CU. YDS./STA.
AREA 0.127 SQ. FT.



EROSION CONTROL CURB

QUANTITIES

CONCRETE 0.81 CU. YDS./STA.
AREA 0.219 SQ. FT.



CONTRACTION JOINT THRU CURB

* FOR NON-INTEGRAL CURB THE CONTRACTION JOINTS MAY BE MADE WITH A DOUBLE EDGER WHILE THE CONCRETE IS STILL PLASTIC.

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JAN 18	NDOR BORDER TO NDOT BORDER
R11	JUL 15	ADDED TRUCK APRON CURB
R10	FEB 09	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 301-R12

PAVEMENT DETAILS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER * MICHAEL H. OWEN E-6515 * STATE OF NEBRASKA

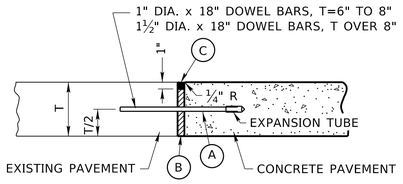
DATE

ORIGINAL: JANUARY 31, 1974

DATE

1/3

COMPUTER: BG04194187
DATE: 10-OCT-2024 13:42
FILE: 3010 0 R12.dgn



(A) GREASE DOWEL BAR ON EXPANSION TUB SIDE

(B) 1" PREFORMED EXPANSION JOINT FILLER

(C) JOINT SEALANT

NOTES:

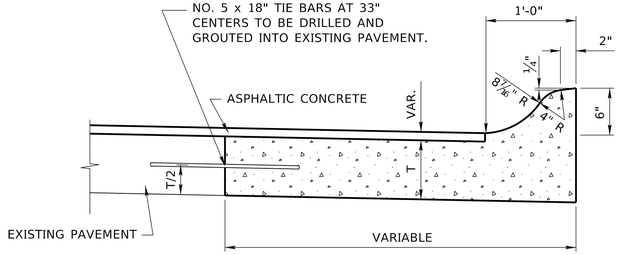
DOWEL BARS SHALL BE DRILLED TO A DEPTH OF 8" INTO EXISTING PAVEMENT AND GROUTED.

DOWEL BARS SHALL BE PLACED AT 1 FOOT CENTERS. THE OUTSIDE DOWEL BAR SHALL BE PLACED 6" FROM THE EDGE OF THE PAVEMENT.

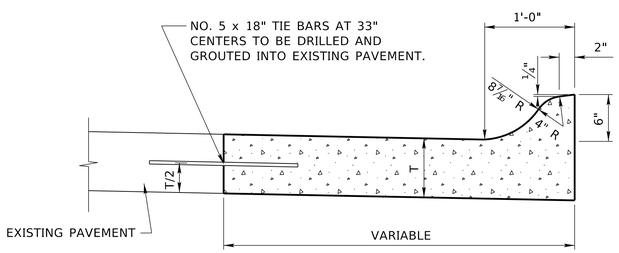
THIS JOINT SHALL BE CONSTRUCTED TRANSVERSE TO THE ROADWAY WHERE THE NEW CONCRETE ABUTS THE EXISTING CONCRETE.

DOWEL BARS SHALL BE PLACED PARALLEL TO THE ROADWAY ℄ AND TO THE ROAD BED.

EXPANSION JOINT (SUBSIDIARY)

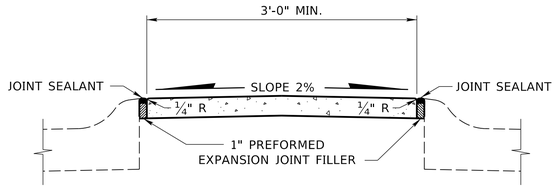


CONCRETE BASE COURSE W/INTEGRAL CURB



THE FOLLOWING NOTE IS TYPICAL FOR CONCRETE BASE COURSE WITH INTEGRAL CURB AND CONCRETE PAVEMENT WIDENING: CONTRACTION AND EXPANSION JOINTS SHALL BE CONSTRUCTED TO MATCH LOCATIONS OF EXISTING JOINTS.

CONCRETE PAVEMENT WIDENING



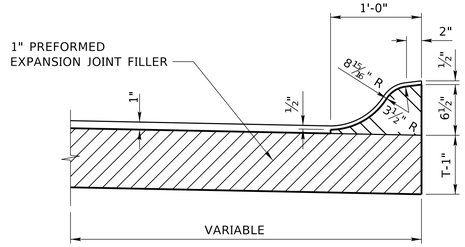
CONCRETE MEDIAN SURFACING

ONE INCH PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED ACROSS THE FULL WIDTH OF THE MEDIAN SURFACING AT INTERVALS OF NOT MORE THAN 49 FEET.

LONGITUDINAL JOINTS ONE INCH DEEP SHALL BE MADE IN ALL MEDIANS WHEN SURFACING WIDTH IS 16 FEET OR GREATER.

TRANSVERSE JOINTS ONE INCH DEEP SHALL BE MADE IN ALL MEDIANS AT INTERVALS OF NOT MORE THAN 8 FEET.

TRANSVERSE AND LONGITUDINAL JOINTS SHALL NOT BE FILLED.

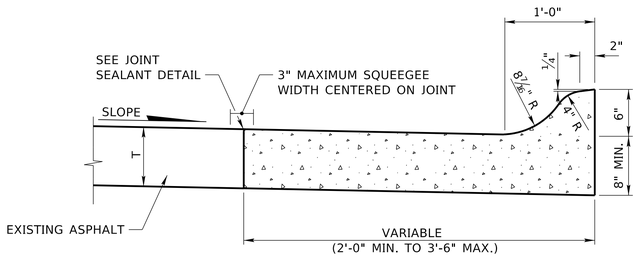


ONE INCH PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED AT INTERSECTION RETURNS AND WHERE SHOWN ON THE PLANS. TRANSVERSE JOINTS SHALL BE PLACED EVERY 8 FEET OR WHERE SHOWN ON THE PLANS.

NOTE:

RECESS THE EXPANSION JOINT FILLER 1/2" FROM THE TOP SURFACE OF THE CURB UNDER CONSTRUCTION

DETAIL FOR CUTTING & PLACEMENT OF EXPANSION JOINT FILLER

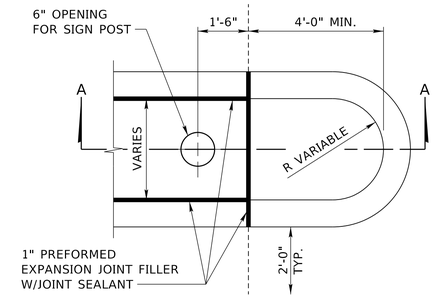


COMBINATION CONCRETE CURB & GUTTER

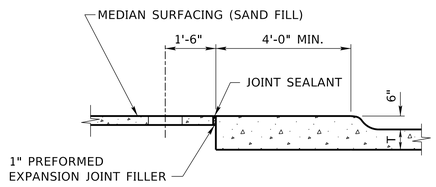
NOTE:

TRANSVERSE JOINTS SHALL BE PLACED EVERY 8 FEET AND JOINTS SHALL BE PLACED AT EACH HEADER, 2-NO. 5 x 18" TIE BARS ARE TO BE USED.

PLACE 1" PREFORMED EXPANSION JOINT FILLER AND SEAL AT THE RETURN OF RADIUS AT INTERSECTIONS.

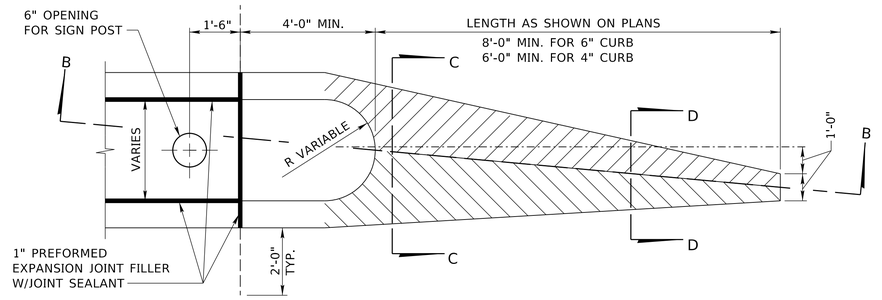


PLAN

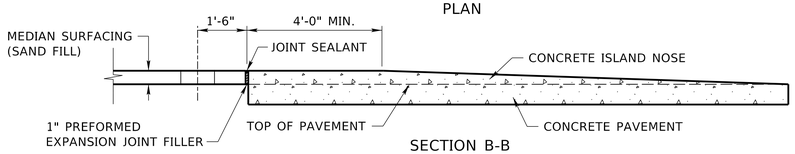


SECTION A-A

END OF MEDIAN ISLAND



PLAN



SECTION B-B

SECTION C-C

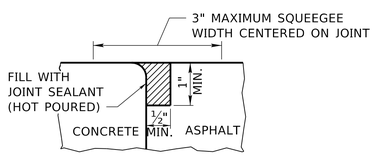
SECTION D-D

CONCRETE ISLAND NOSE

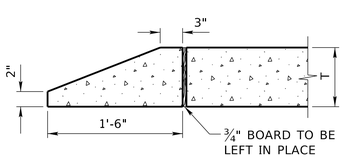
NOTE:

EXISTING CONCRETE PAVEMENT IS TO BE REMOVED TO BUILD CONCRETE ISLAND NOSE.

NOTE: T = PAVEMENT THICKNESS



JOINT SEALANT DETAIL



CONCRETE HEADER

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JAN 18	NDOR BORDER TO NDOT BORDER
R11	JUL 15	ADDED TRUCK APRON CURB
R10	FEB 09	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 301-R12

PAVEMENT DETAILS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ MICHAEL H. OWEN E-6515 ★ STATE OF NEBRASKA

DATE

ORIGINAL: JANUARY 31, 1974

DATE

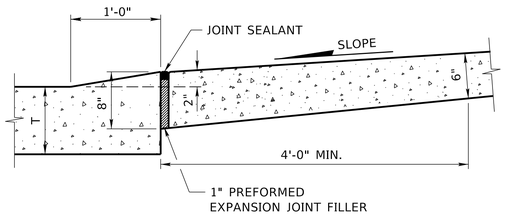
2/3

COMPUTER: BG0419M187

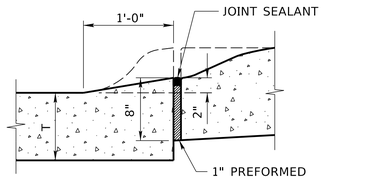
DATE: 10-OCT-2024 13:42

FILE: 3010 0 R12.dgn

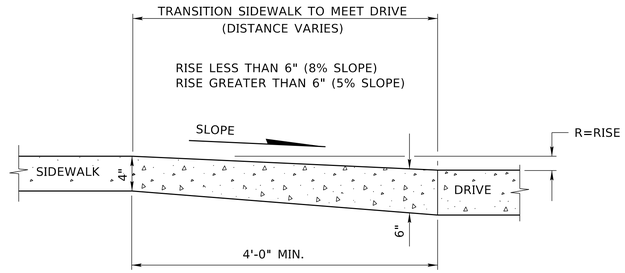
COMPUTER: BG041M187
DATE: 10-OCT-2024 13:42
FILE: 3010 0 R12.dgn



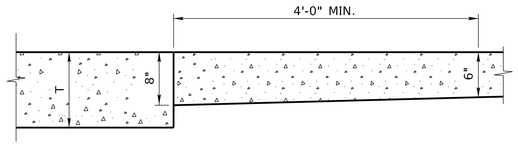
SECTION E-E



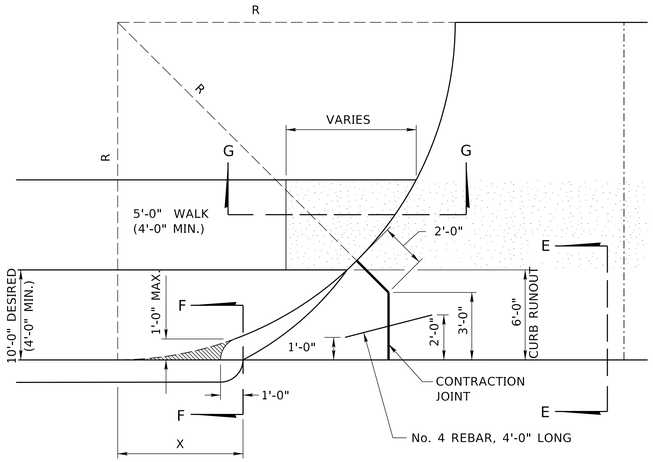
SECTION F-F



SECTION G-G



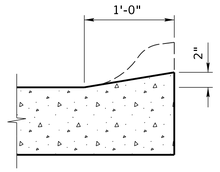
(RURAL DRIVEWAY)



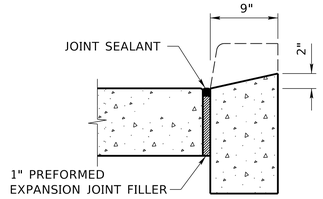
URBAN DRIVEWAY PLAN

R	X
10'-0"	4.6'
15'-0"	5.6'
20'-0"	6.0'
25'-0"	7.0'
30'-0"	8.0'
35'-0"	8.6'
40'-0"	9.0'

R = RADIUS
X = $\sqrt{(2R-1)}$
(X & R IN FEET)

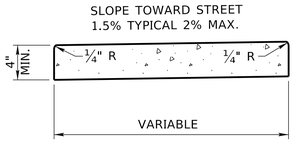


INTEGRAL CURB

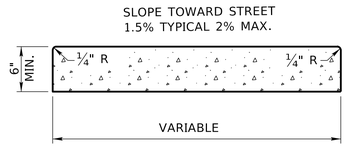


BARRIER CURB

DETAILS OF CURB DROPS



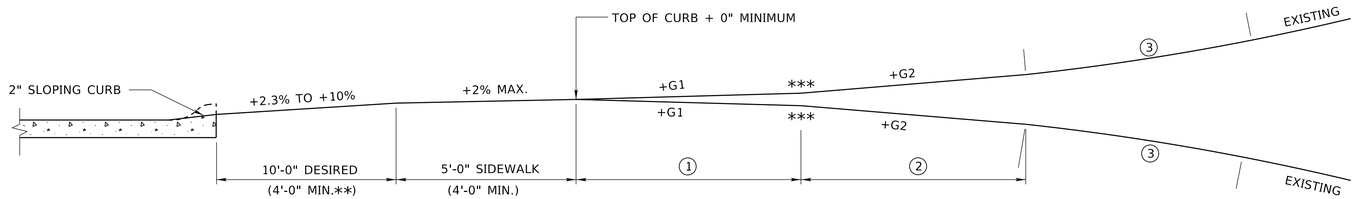
SIDEWALK



SIDEWALK AT
DRIVEWAY

NOTE:

1 INCH PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED IN ALL SIDEWALKS OR CROSSWALKS AT INTERVALS OF NOT MORE THAN 50 FOOT, AND AT ALL POINTS WHERE SIDEWALKS OR CROSSWALKS ARE ADJACENT TO CURB. IF SIDEWALK OR CROSSWALK TO BE CONSTRUCTED IS LESS THAN 50 FOOT IN LENGTH, ONE SUCH EXPANSION JOINT SHALL BE PLACED AS DIRECTED BY THE ENGINEER.



PROFILE URBAN DRIVEWAY WITH SIDEWALK
(MAXIMUM PERCENT OF GRADE)

NOTE: T = PAVEMENT THICKNESS

① 10'-0" MINIMUM IS REQUIRED WHEN THE EXISTING GRADE IS GREATER THAN ±8%
② 10'-0" MINIMUM IS REQUIRED WHEN THE EXISTING GRADE IS GREATER THAN ±15%
③ 10'-0" MINIMUM ROUNDING IS REQUIRED WHEN THE EXISTING GRADE IS GREATER THAN ±22%

** 0 FEET IS ALLOWED IN URBAN BUSINESS DISTRICTS WITH SIDEWALKS OF 6 FEET MINIMUM WIDTH.
*** 10 FEET MINIMUM ROUNDING DESIRABLE FOR THE FOLLOWING GRADE CHANGES.

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JAN 18	NDOR BORDER TO NDOT BORDER
R11	JUL 15	ADDED TRUCK APRON CURB
R10	FEB 09	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 301-R12

PAVEMENT DETAILS

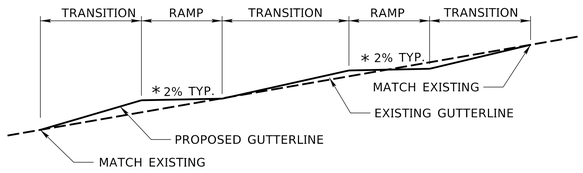
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

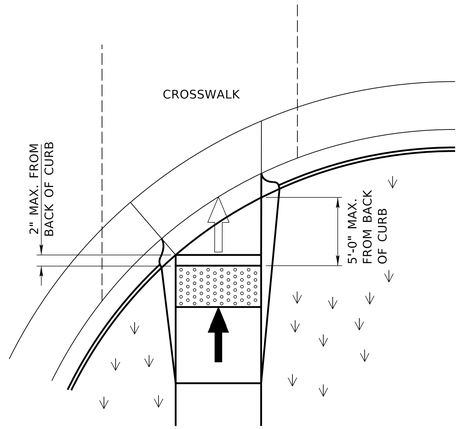
ORIGINAL:
JANUARY 31, 1974
DATE

3
3

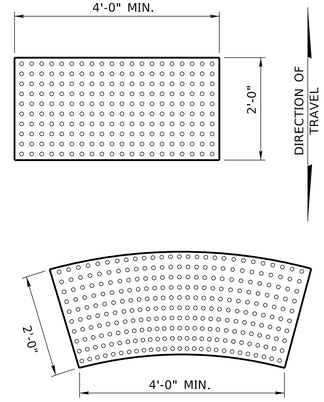


∗2% PREFERRED WHERE TRAFFIC STOPS, UP TO 5% ALLOWED WHERE TRAFFIC CONTINUES THROUGH THE CROSSWALK WITHOUT STOPPING (INCLUDING TRAFFIC SIGNALS).

GUTTER PROFILE DETAIL



DETECTABLE WARNING PANEL PLACEMENT DETAIL

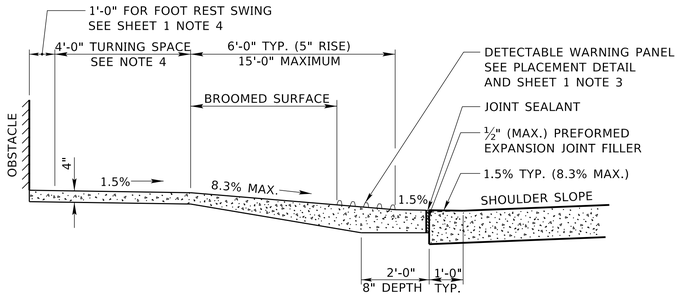


DETECTABLE WARNING PANELS

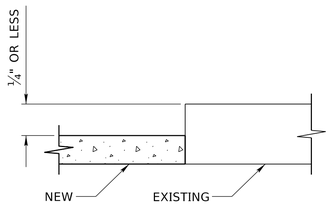
NOTES:

1. THE SURFACE OF ALL CURB RAMPS SHALL BE BROOMED PERPENDICULAR TO THE SLOPE OF THE CURB RAMP.
2. CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE CURB RAMP, FREE OF SAGS AND SHORT GRADE CHANGES.
3. DETECTABLE WARNING PANELS SHALL CONTRAST VISUALLY AND EXTEND 2 FT. MINIMUM IN THE DIRECTION OF PEDESTRIAN TRAVEL FOR THE WIDTH OF THE RAMP. TYPE C RAMP; DETECTABLE WARNING PANELS SHALL EXTEND THE FULL LENGTH OF THE TRAVERSABLE CURB.

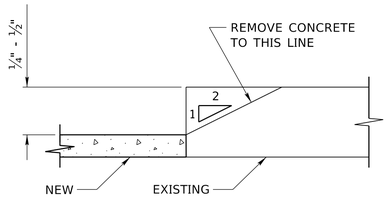
   NEW CURB RAMPS SHALL HAVE CAST IN CONCRETE DETECTABLE WARNING PANELS.
4. TURNING SPACE SHALL HAVE MINIMUM DIMENSIONS OF 4 FT. x 4 FT. AND SHALL BE A MINIMUM OF 1 FT. FROM ANY OBSTACLE SUCH AS A CURB OR RETAINING WALL FOR SWING OF WHEELCHAIR FOOT REST. THE SLOPE SHALL BE 2% MAXIMUM IN ANY DIRECTION.
5. THE WORK OF CONSTRUCTING CURB RAMPS SHALL BE INCLUDED IN THE QUANTITIES FOR "CONCRETE SIDEWALKS", "CONCRETE MEDIAN SURFACING" OR "CONCRETE BIKEWAY". THE WORK OF MODIFICATION OF NEW OR EXISTING CURB WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS OF WORK FOR WHICH DIRECT PAYMENT IS MADE.



TYPICAL RAMP PROFILE



NO BEVELING

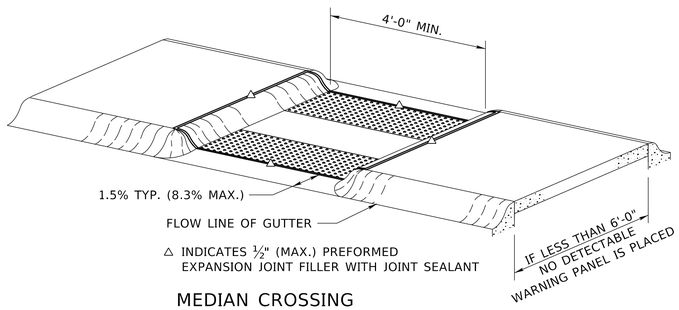


BEVEL AS REQUIRED

WHEN EXISTING SIDEWALK DOES NOT MEET THE 2% CROSS SLOPE, BEVELING TO MEET PROPOSED GUIDELINES IS REQUIRED.

THE SIDEWALK PANEL ABUTTING THE EXISTING SIDEWALK (WHICH MAY NOT BE 2% SLOPE): BUILD FULL WIDTH OF THE NEW SIDEWALK, ON 2% MAXIMUM CROSS SLOPE AND BEVEL THE EXISTING SIDEWALK EDGE WHERE IT DOES NOT MEET THE NEW WITHIN ¼", THIS WORK IS SUBSIDIARY.

BEVELING DETAIL



MEDIAN CROSSING

LEGEND

- DETECTABLE WARNING PANEL
- BROOMED CURB RAMP WHEN 5% TO 8.3%
- RAMP FLARE
- GRASS OR NON WALKING SURFACE
- CURB TRANSITION
- CURB FACE SLOPE 1 VERT. : 2 HORZ.

SLOPE LEGEND

	SIDEWALK/TURNING SPACE AND RAMP CROSS SLOPE 1.5% TYPICAL, 2.0% MAX. SLOPE
	RAMP RUNNING SLOPE 8.0% TYPICAL, 8.3% MAX. SLOPE
	FLARE 90° TO RAMP 9.0% TYPICAL, 10.0% MAX. SLOPE

THE CONTRACTOR SHOULD ACCOUNT FOR CONSTRUCTION TOLERANCES TO PREVENT EXCEEDING THE MAXIMUM SLOPES. ANY SLOPES EXCEEDING THE MAXIMUMS SHALL NOT BE ACCEPTED WITHOUT PRIOR APPROVAL FROM THE ROADWAY DESIGN ENGINEER. AN EXCEPTION TO THIS IS THE TRANSITIONAL SEGMENT TO EXISTING SIDEWALK MUST CONNECT TO THE EXISTING SIDEWALK PANEL; THIS DOES NOT REQUIRE A STATEMENT OF TECHNICAL INFEASIBILITY. (REF. PROWAG CHAPTER R3 TECHNICAL REQUIREMENTS)

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	MAY 24	ADDED CURB WALL DETAIL
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	OCT 14	CHANGE PM TO RD ENGINEER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 303-R4

CURB RAMPS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

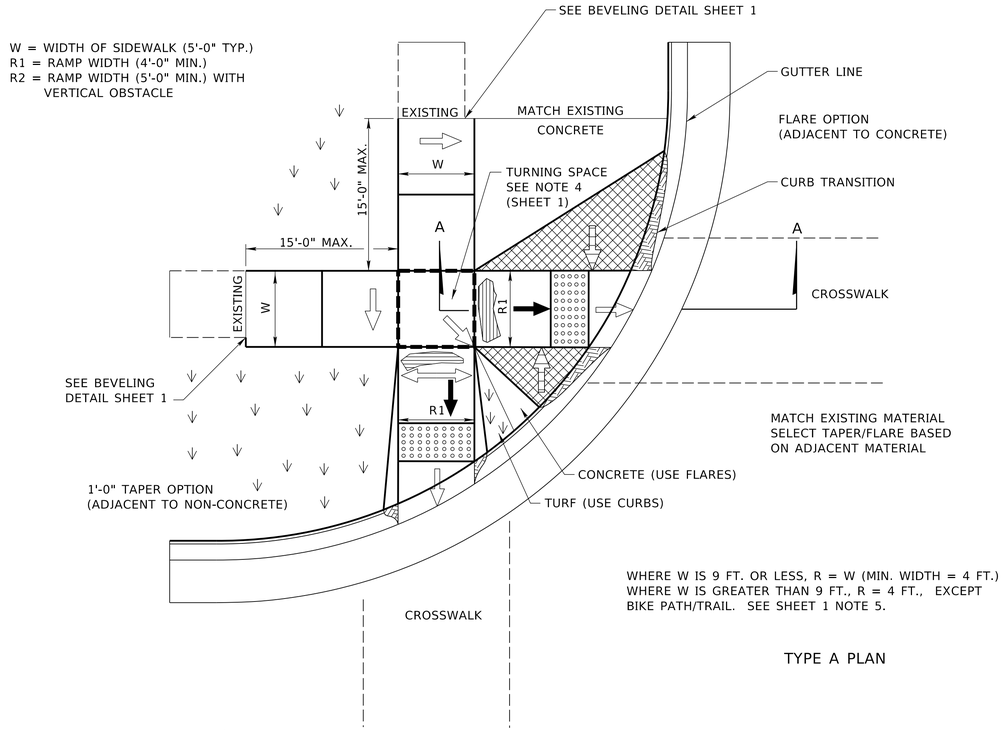
DATE

ORIGINAL: MARCH 22, 2010

DATE

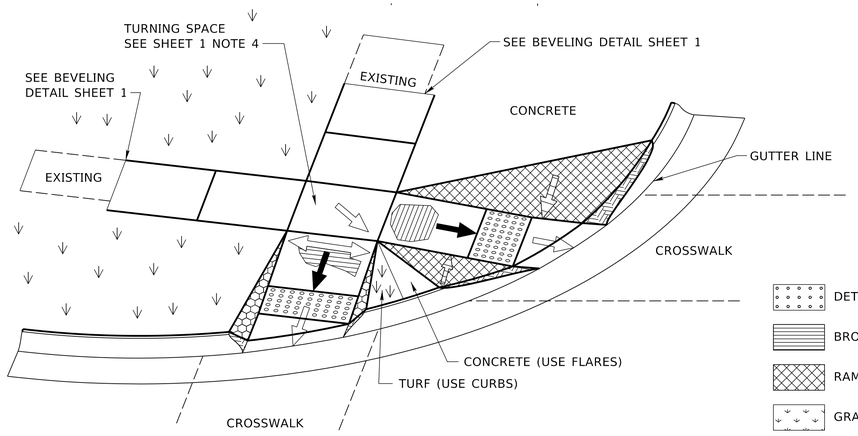
1
5

COMPUTER: BG0419M593
DATE: 10-JUL-2025 11:55
FILE: 3030 0 R4.dgn

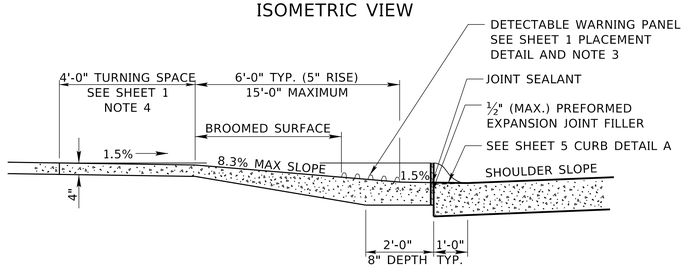


WHERE W IS 9 FT. OR LESS, R = W (MIN. WIDTH = 4 FT.)
WHERE W IS GREATER THAN 9 FT., R = 4 FT., EXCEPT BIKE PATH/TRAIL. SEE SHEET 1 NOTE 5.

TYPE A PLAN



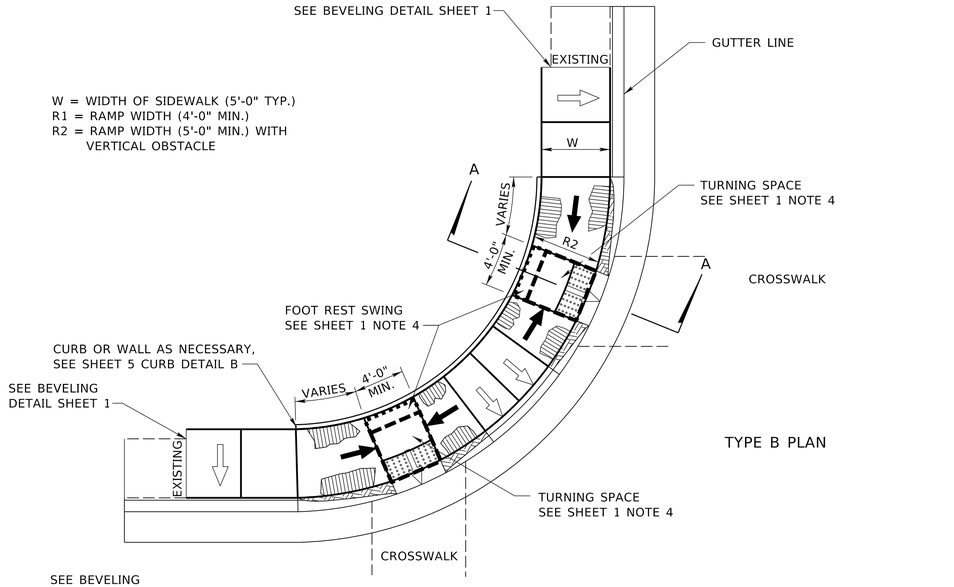
ISOMETRIC VIEW



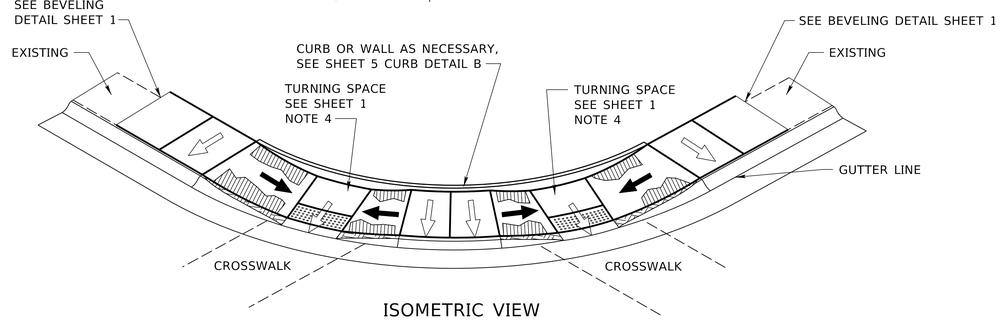
TYPE A CROSS SECTION
SECTION A-A

LEGEND

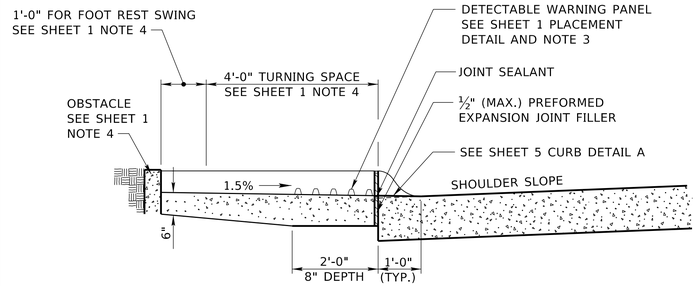
- DETECTABLE WARNING PANEL
- BROOMED CURB RAMP WHEN 5% TO 8.3%
- RAMP FLARE
- GRASS OR NON WALKING SURFACE
- CURB TRANSITION
- CURB FACE SLOPE 1 VERT. : 2 HORZ.



TYPE B PLAN



ISOMETRIC VIEW



TYPE B CROSS SECTION
SECTION A-A

SLOPE LEGEND

⇦	SIDEWALK/TURNING SPACE AND RAMP CROSS SLOPE 1.5% TYPICAL, 2.0% MAX. SLOPE
⬅	RAMP RUNNING SLOPE 8.0% TYPICAL, 8.3% MAX. SLOPE
⇦	FLARE 90° TO RAMP 9.0% TYPICAL, 10.0% MAX. SLOPE

THE CONTRACTOR SHOULD ACCOUNT FOR CONSTRUCTION TOLERANCES TO PREVENT EXCEEDING THE MAXIMUM SLOPES. ANY SLOPES EXCEEDING THE MAXIMUMS SHALL NOT BE ACCEPTED WITHOUT PRIOR APPROVAL FROM THE ROADWAY DESIGN ENGINEER. AN EXCEPTION TO THIS IS THE TRANSITIONAL SEGMENT TO EXISTING SIDEWALK MUST CONNECT TO THE EXISTING SIDEWALK PANEL; THIS DOES NOT REQUIRE A STATEMENT OF TECHNICAL INFEASIBILITY. (REF. PROWAG CHAPTER R3 TECHNICAL REQUIREMENTS)

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	MAY 24	ADDED CURB WALL DETAIL
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	OCT 14	CHANGE PM TO RD ENGINEER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 303-R4

CURB RAMPS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

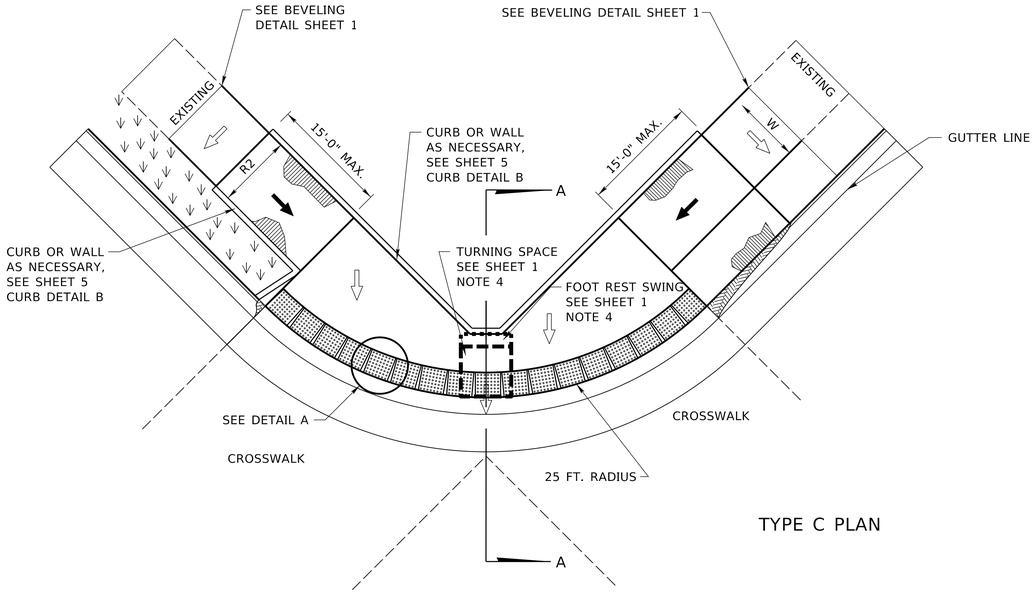
DATE

ORIGINAL: MARCH 22, 2010

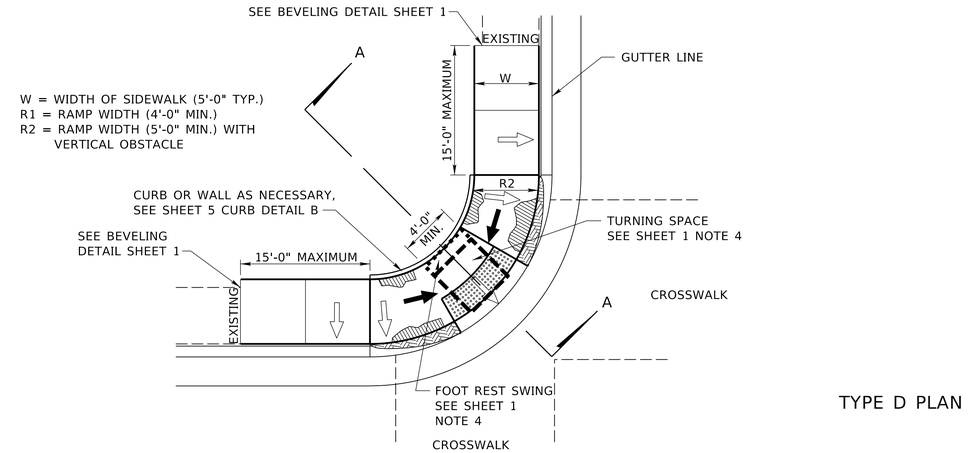
DATE

2
5

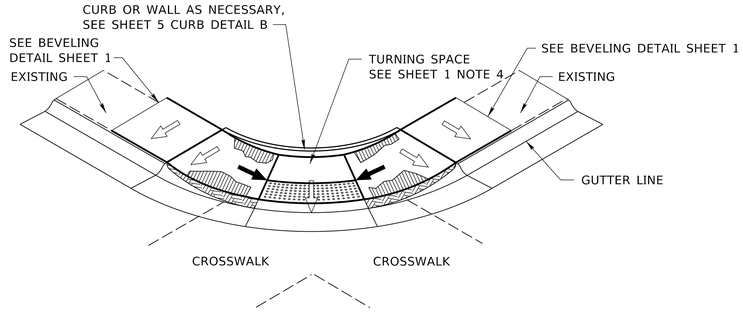
COMPUTER: BG0419M593
DATE: 10-JUL-2025 11:55
FILE: 3030 0 R4.dgn



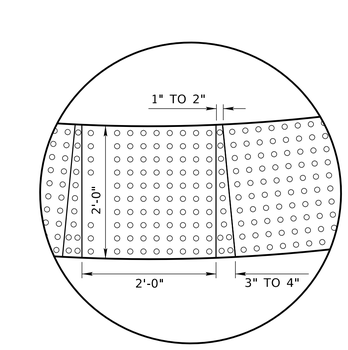
TYPE C PLAN



TYPE D PLAN



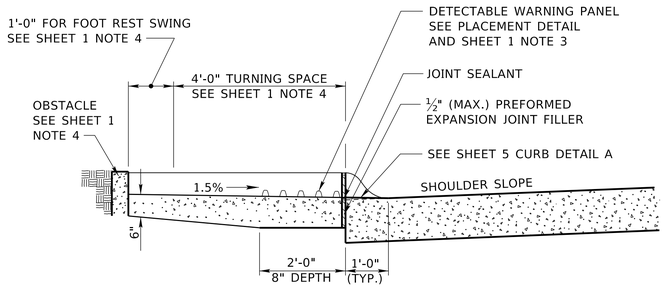
ISOMETRIC VIEW



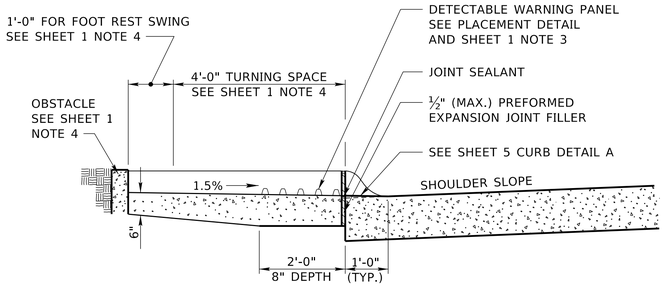
DETAIL A

LEGEND

- DETECTABLE WARNING PANEL
- BROOMED CURB RAMP WHEN 5% TO 8.3%
- RAMP FLARE
- GRASS OR NON WALKING SURFACE
- CURB TRANSITION
- CURB FACE SLOPE 1 VERT. : 2 HORZ.



TYPE C CROSS SECTION
SECTION A-A



TYPE D CROSS SECTION
SECTION A-A

SLOPE LEGEND

⇦	SIDEWALK/TURNING SPACE AND RAMP CROSS SLOPE 1.5% TYPICAL, 2.0% MAX. SLOPE
⬅	RAMP RUNNING SLOPE 8.0% TYPICAL, 8.3% MAX. SLOPE
⇦	FLARE 90° TO RAMP 9.0% TYPICAL, 10.0% MAX. SLOPE

THE CONTRACTOR SHOULD ACCOUNT FOR CONSTRUCTION TOLERANCES TO PREVENT EXCEEDING THE MAXIMUM SLOPES. ANY SLOPES EXCEEDING THE MAXIMUMS SHALL NOT BE ACCEPTED WITHOUT PRIOR APPROVAL FROM THE ROADWAY DESIGN ENGINEER. AN EXCEPTION TO THIS IS THE TRANSITIONAL SEGMENT TO EXISTING SIDEWALK MUST CONNECT TO THE EXISTING SIDEWALK PANEL; THIS DOES NOT REQUIRE A STATEMENT OF TECHNICAL INFEASIBILITY. (REF. PROWAG CHAPTER R3 TECHNICAL REQUIREMENTS)

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	MAY 24	ADDED CURB WALL DETAIL
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	OCT 14	CHANGE PM TO RD ENGINEER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 303-R4

CURB RAMPS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

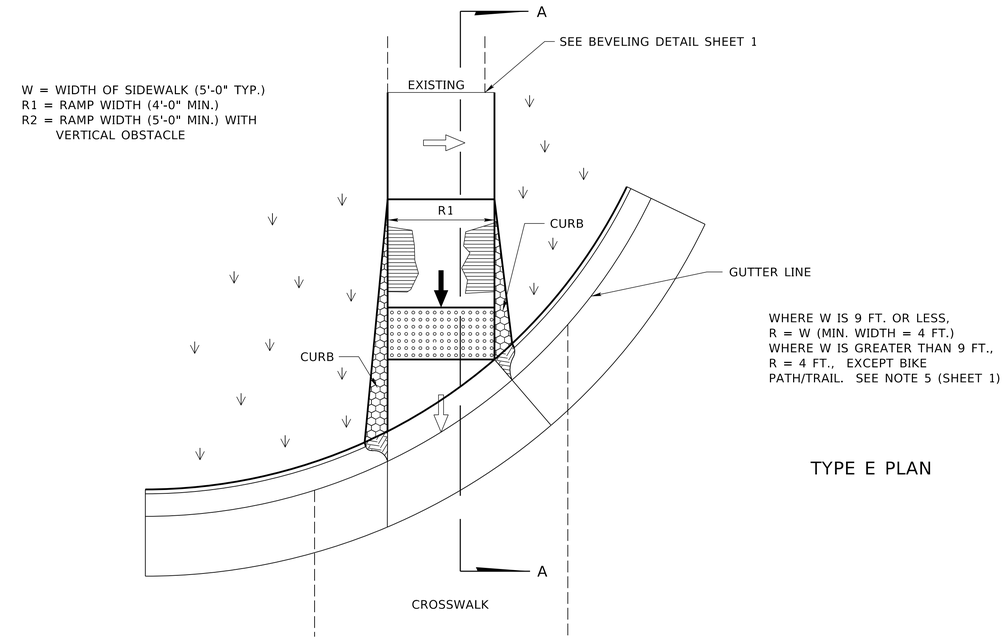
DATE

ORIGINAL: MARCH 22, 2010

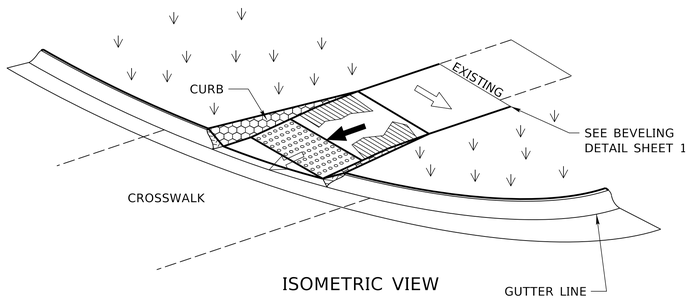
DATE

3/5

COMPUTER: BG0419M5593
DATE: 10-JUL-2025 11:55
FILE: 3030 0 R4.dgn



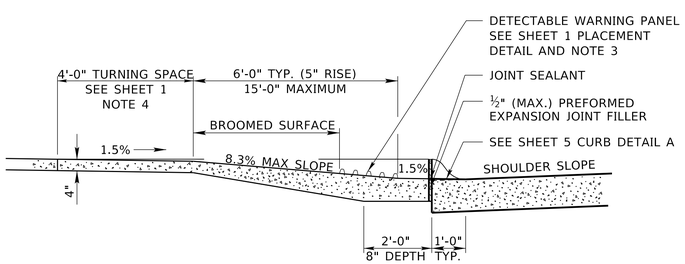
TYPE E PLAN



ISOMETRIC VIEW

LEGEND

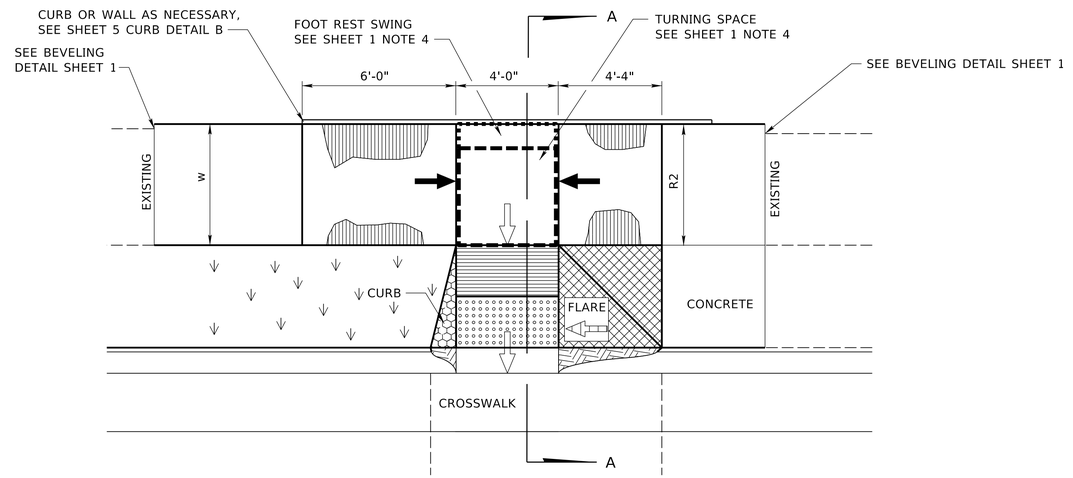
- DETECTABLE WARNING PANEL
- BROOMED CURB RAMP WHEN 5% TO 8.3%
- RAMP FLARE
- GRASS OR NON WALKING SURFACE
- CURB TRANSITION
- CURB FACE SLOPE 1 VERT. : 2 HORZ.



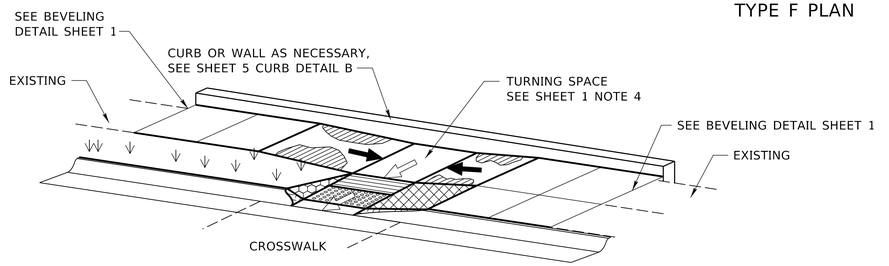
TYPE E CROSS SECTION

SECTION A-A

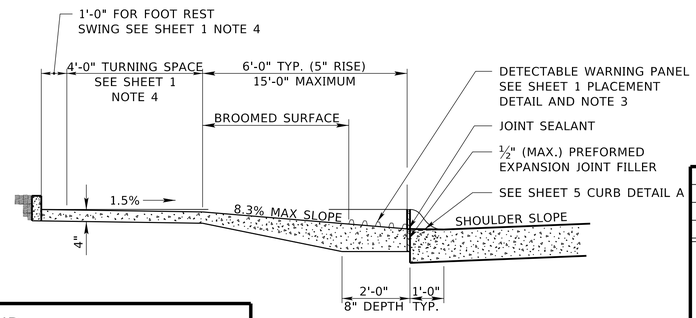
W = WIDTH OF SIDEWALK (5'-0" TYP.)
R1 = RAMP WIDTH (4'-0" MIN.)
R2 = RAMP WIDTH (5'-0" MIN.) WITH
VERTICAL OBSTACLE



TYPE F PLAN



ISOMETRIC VIEW



TYPE F CROSS SECTION

SECTION A-A

SLOPE LEGEND

⇦	SIDEWALK/TURNING SPACE AND RAMP CROSS SLOPE 1.5% TYPICAL, 2.0% MAX. SLOPE
⬅	RAMP RUNNING SLOPE 8.0% TYPICAL, 8.3% MAX. SLOPE
⇦	FLARE 90° TO RAMP 9.0% TYPICAL, 10.0% MAX. SLOPE

THE CONTRACTOR SHOULD ACCOUNT FOR CONSTRUCTION TOLERANCES TO PREVENT EXCEEDING THE MAXIMUM SLOPES. ANY SLOPES EXCEEDING THE MAXIMUMS SHALL NOT BE ACCEPTED WITHOUT PRIOR APPROVAL FROM THE ROADWAY DESIGN ENGINEER. AN EXCEPTION TO THIS IS THE TRANSITIONAL SEGMENT TO EXISTING SIDEWALK MUST CONNECT TO THE EXISTING SIDEWALK PANEL; THIS DOES NOT REQUIRE A STATEMENT OF TECHNICAL INFEASIBILITY. (REF. PROWAG CHAPTER R3 TECHNICAL REQUIREMENTS)

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	MAY 24	ADDED CURB WALL DETAIL
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	OCT 14	CHANGE PM TO RD ENGINEER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 303-R4

CURB RAMPS

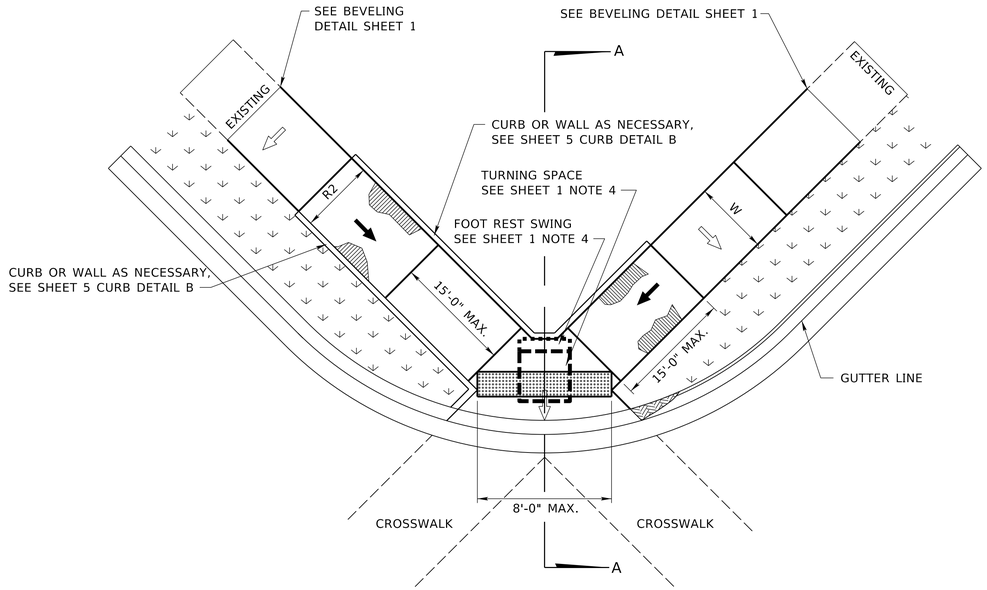
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

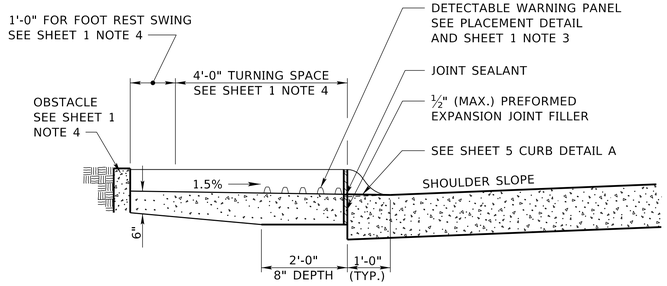
ORIGINAL:
MARCH 22, 2010
DATE

4
5

COMPUTER: BG04194593
DATE: 10-JUL-2025 11:55
FILE: 3030 0 R4.dgn



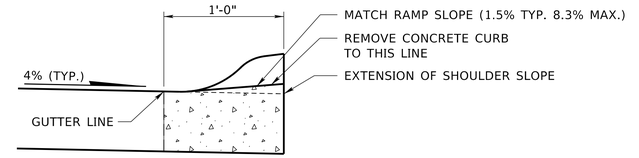
TYPE G PLAN



TYPE G CROSS SECTION
SECTION A-A

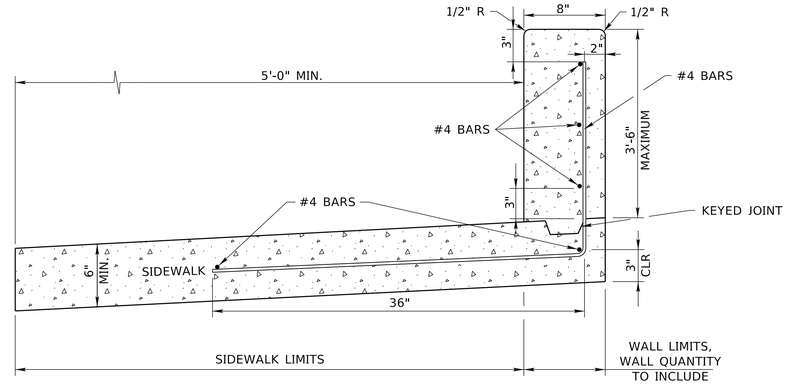
LEGEND

- DETECTABLE WARNING PANEL
- BROOMED CURB RAMP WHEN 5% TO 8.3%
- RAMP FLARE
- GRASS OR NON WALKING SURFACE
- CURB TRANSITION
- CURB FACE SLOPE 1 VERT. : 2 HORZ.



NOTE:
COMBINATION CONCRETE CURB AND GUTTER MAY BE REMOVED AND REPLACED IN LIEU OF MILLING.

CURB DETAIL A



SIDEWALK CURB WALL
WALK AT BACK OF CURB - WITH CONCRETE CURB WALL

CURB DETAIL B

NOTES:

1. ALL REINFORCING STEEL SHALL BE PLACED AS SHOWN WITH 3" CLEARANCE.
2. KEY WAY SHALL BE 1.5" X 3.5" AND BEVELED AS SHOWN.
3. REINFORCING SHALL BE PLACED WITH A TOLERANCE OF -1/4" AND +1/2" ON CLEARANCE.
4. HORIZONTAL BAR SPACING SHALL BE UNIFORM, EQUIDISTANT, AND LESS THAN OR EQUAL TO 12" CENTERS. VERTICAL BARS SHALL BE UNIFORM, PLUMB, EQUIDISTANT AND LESS THAN OR EQUAL TO 12" CENTERS.
5. IF WALL HEIGHT IS LESS THAN 12" MAX HEIGHT, WALL CAN BE POURED INTEGRALLY WHEN APPROVED BY THE ENGINEER. INTEGRAL WALLS DO NOT REQUIRE REINFORCEMENT.
6. WALL FACE AND TOP SHALL BE SEALED WITH A PENETRATING SEALER APPROVED BY THE ENGINEER.
7. CURB WALL SHALL BE PAID FOR BY THE SQUARE FOOT, MEASURED FROM TOP OF CURB WALL TO TOP OF SIDEWALK.
8. ALL CONCRETE USED SHALL BE CLASS 47B-3000.

SLOPE LEGEND

⇦	SIDEWALK/TURNING SPACE AND RAMP CROSS SLOPE 1.5% TYPICAL, 2.0% MAX. SLOPE
⬅	RAMP RUNNING SLOPE 8.0% TYPICAL, 8.3% MAX. SLOPE
⇦	FLARE 90° TO RAMP 9.0% TYPICAL, 10.0% MAX. SLOPE

THE CONTRACTOR SHOULD ACCOUNT FOR CONSTRUCTION TOLERANCES TO PREVENT EXCEEDING THE MAXIMUM SLOPES. ANY SLOPES EXCEEDING THE MAXIMUMS SHALL NOT BE ACCEPTED WITHOUT PRIOR APPROVAL FROM THE ROADWAY DESIGN ENGINEER. AN EXCEPTION TO THIS IS THE TRANSITIONAL SEGMENT TO EXISTING SIDEWALK MUST CONNECT TO THE EXISTING SIDEWALK PANEL; THIS DOES NOT REQUIRE A STATEMENT OF TECHNICAL INFEASIBILITY. (REF. PROWAG CHAPTER R3 TECHNICAL REQUIREMENTS)

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	MAY 24	ADDED CURB WALL DETAIL
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	OCT 14	CHANGE PM TO RD ENGINEER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 303-R4

CURB RAMPS

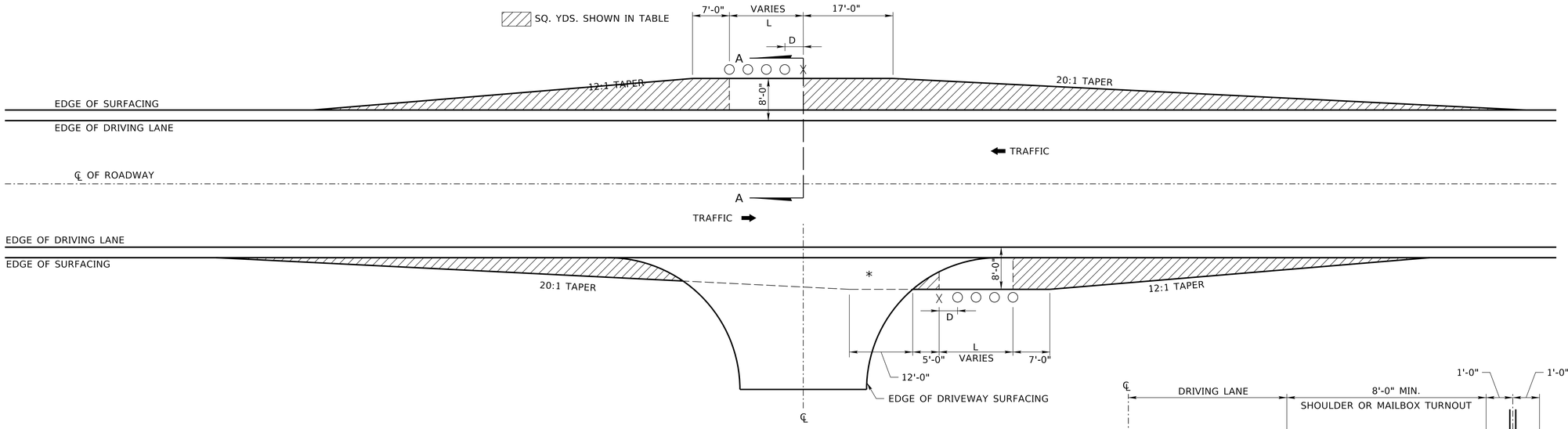
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

ORIGINAL: MARCH 22, 2010
DATE

5/5

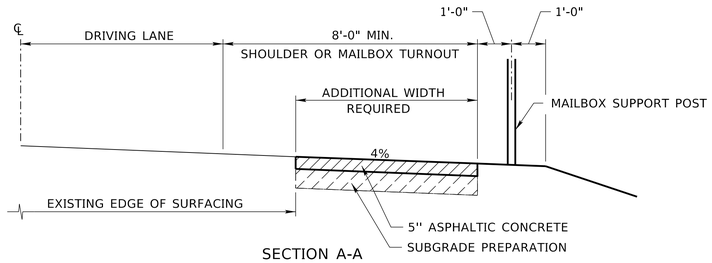
COMPUTER: BG0419M5593
DATE: 10-JUL-2025 11:55
FILE: 3030 0 R4.dgn



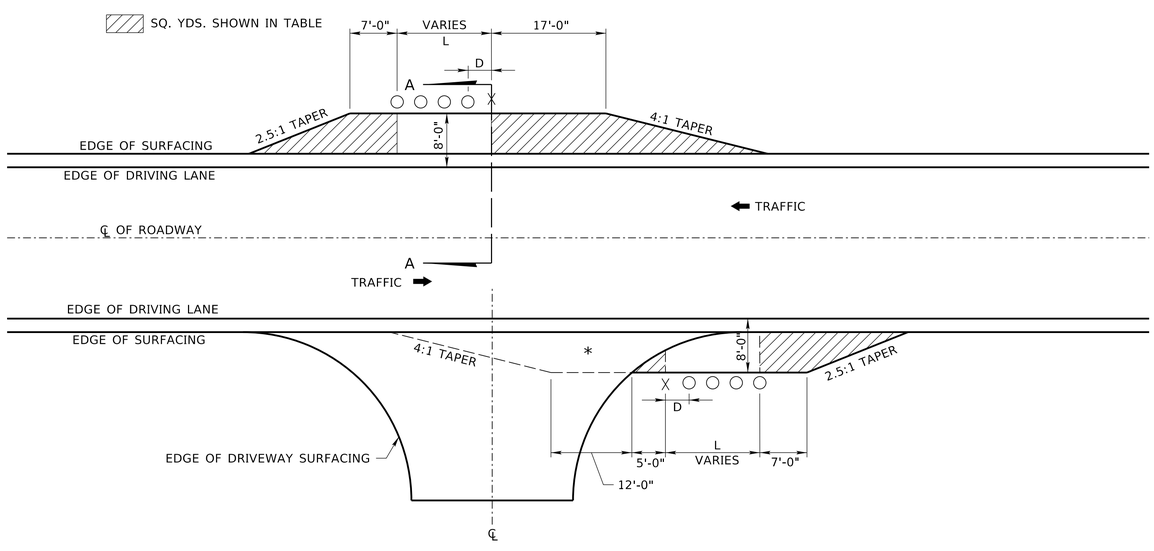
PLAN

MAILBOX TURNOUT AT DRIVEWAY

(HIGH SPEED POSTED OVER 45 MPH)



SECTION A-A



PLAN

MAILBOX TURNOUT AT DRIVEWAY

(LOW SPEED POSTED 45 MPH AND UNDER)

NOTES:

* = FOR EARTH DRIVE, SURFACE THE MAILBOX TURNOUT ACROSS THE DRIVE AREA.

D = 3'-6" FOR U-CHANNEL POST OR 8'-0" FOR LOOP.

L = (NUMBER OF SUPPORT POSTS - 1) x D

X = FIRST OR ONLY POST LOCATION

◯ = MULTIPLE BOX LOCATIONS

QUANTITIES FOR SPECIAL MAILBOX SURFACING				
ADDED WIDTH FOR 8' TURNOUT (FT.)	WITHOUT DRIVEWAY (SQ. YDS.)		WITH DRIVEWAY (SQ. YDS.)	
	HIGH SPEED	LOW SPEED	HIGH SPEED	LOW SPEED
2	12	7	3	1
3	24	12	8	2
4	39	16	18	4
5	57	22	31	7
6	79	29	49	10
7	105	36	70	13
8	135	44	94	16

QUANTITIES ARE BASED ON DRIVEWAY WITH 24' WIDTH AND 25' RADII WITH ONE MAILBOX (L = 0).

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JAN 18	ADDED DIMENSION D
R2	OCT 14	MOVE MAILBOX AND ADD LAYOUT
R1	FEB 09	CHANGE 0.04'/FT TO 4%

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 307-R3

MAILBOX TURNOUT

(ASPHALT)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

ORIGINAL: JANUARY 23, 2008

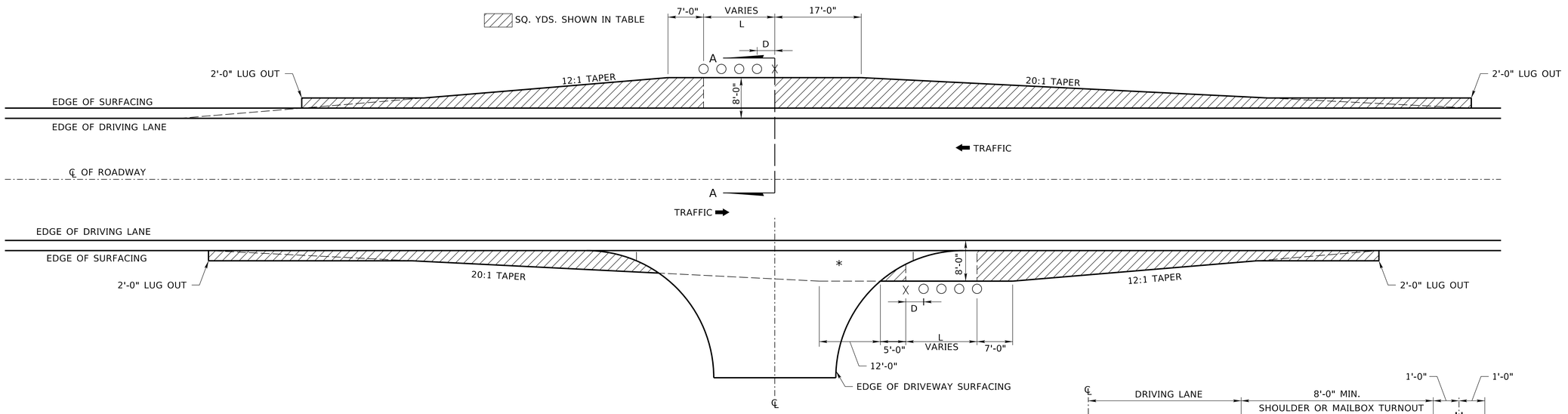
DATE

1
2

COMPUTER: BG04191M4593

DATE: 10-JUL-2025 12:30

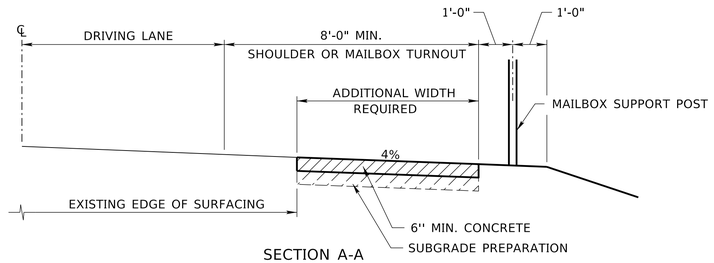
FILE: 3070 0 R3.dgn



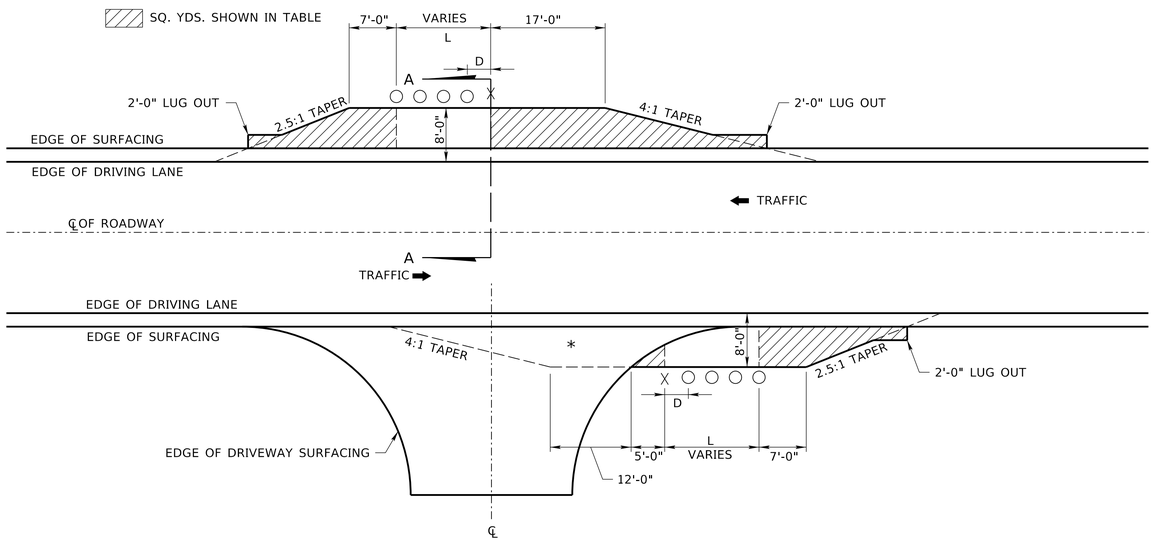
PLAN

MAILBOX TURNOUT AT DRIVEWAY

(HIGH SPEED POSTED OVER 45 MPH)



SECTION A-A



PLAN

MAILBOX TURNOUT AT DRIVEWAY

(LOW SPEED POSTED 45 MPH AND UNDER)

NOTES:

* = FOR EARTH DRIVE, SURFACE THE MAILBOX TURNOUT ACROSS THE DRIVE AREA.

D = 3'-6" FOR U-CHANNEL POST OR 8'-0" FOR LOOP.

L = (NUMBER OF SUPPORT POSTS - 1) x D

X = FIRST OR ONLY POST LOCATION

◯ = MULTIPLE BOX LOCATIONS

QUANTITIES FOR SPECIAL MAILBOX SURFACING				
ADDED WIDTH FOR 8' TURNOUT (FT.)	WITHOUT DRIVEWAY (SQ. YDS.)		WITH DRIVEWAY (SQ. YDS.)	
	HIGH SPEED	LOW SPEED	HIGH SPEED	LOW SPEED
2	12	7	4	2
3	26	12	9	4
4	46	18	18	6
5	65	24	32	8
6	87	30	52	10
7	113	38	73	13
8	142	46	97	17

QUANTITIES ARE BASED ON DRIVEWAY WITH 24' WIDTH AND 25' RADII WITH ONE MAILBOX (L = 0).

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JAN 18	ADDED DIMENSION D
R2	OCT 14	MOVE MAILBOX AND ADD LAYOUT
R1	FEB 09	CHANGE 0.04'/FT TO 4%

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 307-R3

MAILBOX TURNOUT

(CONCRETE)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

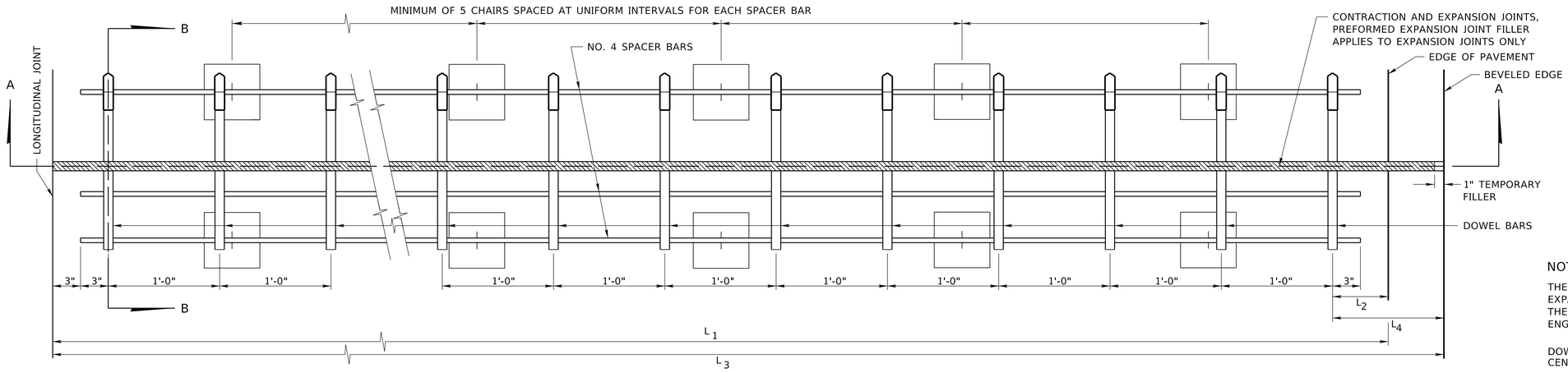
DATE

ORIGINAL: JANUARY 23, 2008

DATE

2
2

COMPUTER: BG04194593
DATE: 10-JUL-2025 12:30
FILE: 3070 0 R3.dgn



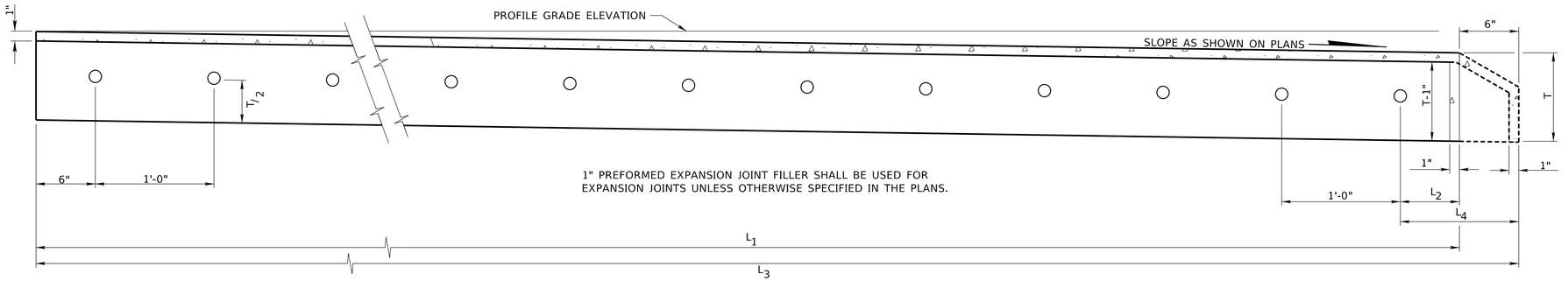
ASSEMBLY PLAN

DOWEL BAR HEIGHT AND DIAMETER			
PAVEMENT THICKNESS (T)	MINIMUM BAR DIA.	DOWEL BAR HEIGHT (T/2)	SKEW TOLERANCE
LESS THAN 10"	1¼"	T/2 ± ½"	¼"
10" OR MORE	1½"	T/2 ± ½"	¼"

DOWEL BAR LOCATION TABLE (WITHOUT BEVELED EDGE)				
	L1	L2	#BARS	DESCRIPTION
*	LESS THAN 12'-0'	6"	VARIES	IRREGULAR AREAS (WIDEN, FILLETS, GORE....)
	12'-0"	6"	12	12'-0" PAVEMENT
	14'-0"	2'-6"	12	14'-0" PAVEMENT
	15'-0"	2'-6"	13	15'-0' PAVEMENT (INCLUDES 3'-0" SHOULDER)
	16'-0"	3'-6"	13	16'-0" PAVEMENT (INCLUDES 4'-0" SHOULDER)
	16'-0"	6"	16	16'-0" RAMP & LOOPS
	LESS THAN 14'-6"	1'-6"	VARIES	PAVEMENT WITH CURB
	14'-6" OR MORE	2'-6"	VARIES	

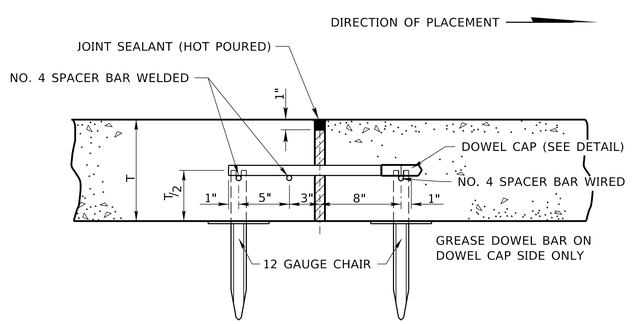
DOWEL BAR LOCATION TABLE (WITH BEVELED EDGE)				
	L3	L4	#BARS	DESCRIPTION
*	LESS THAN 12'-6"	1'-0"	VARIES	IRREGULAR AREAS (WIDEN, FILLETS, GORE....)
	12'-6"	1'-0"	12	12'-6" PAVEMENT INCLUDES BEVEL
	14'-6"	3'-0"	12	14'-6" PAVEMENT INCLUDES BEVEL
	15'-6"	3'-0"	13	15'-6" PAVEMENT (INCLUDES 3'-0" SHOULDER + BEVEL)
	16'-6"	4'-0"	13	16'-6" PAVEMENT (INCLUDES 4'-0" SHOULDER + BEVEL)
	16'-6"	1'-0"	16	16'-6" RAMP & LOOPS INCLUDES BEVEL
	LESS THAN 14'-6"	1'-6"	VARIES	PAVEMENT WITH CURB
	14'-6" OR MORE	2'-6"	VARIES	

L1 = PAVEMENT WIDTH PLUS 6" BEVEL FOR NON-CURBED SECTIONS

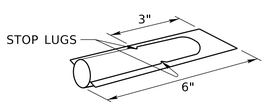


SECTION A-A

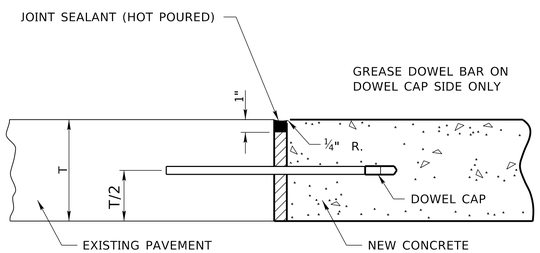
CONTRACTION AND EXPANSION JOINTS (PREFORMED EXPANSION JOINTS FILLER APPLIES TO EXPANSION JOINTS ONLY)



SECTION B-B



DOWEL CAP



NOTES:

DOWEL BARS SHALL BE DRILLED TO A DEPTH OF 8" INTO EXISTING PAVEMENT AND EPOXIED.

SECTION B-B

EXPANSION JOINT
(SUBSIDIARY)

NOTES:

THE CONTRACTOR MAY SUBSTITUTE OTHER DESIGNS FOR EXPANSION AND CONTRACTION JOINT SUPPORTS IN LIEU OF THE TYPE SHOWN WITH PRIOR WRITTEN APPROVAL BY THE ENGINEER.

DOWEL BARS SHALL BE A MINIMUM OF 17¾" IN LENGTH, CENTERED ON JOINTS AND BE SMOOTH BARS.

TIE BARS SHALL BE DEFORMED BARS.

FOR LOAD TRANSFER DEVICES AT EXPANSION JOINTS IN LANES OTHER THAN THE LANES SHOWN, MAINTAIN THE SPACING OF THE 1'-6" DOWEL BARS AT 1'-0" INTERVALS.

THE ENDS OF THE NO. 4 SPACER BARS SHALL NOT BE LESS THAN 3" FROM THE EDGES OF THE PAVEMENT OR THE LONGITUDINAL JOINT.

TIE, DOWEL & SPACER BARS SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS.

KEY TYPE LONGITUDINAL JOINTS AND TRANSVERSE CONSTRUCTION JOINTS SHALL BE EDGED WITH ¼" R. AT TIME OF CONCRETE PLACEMENT.

CONCRETE PAVEMENT SHALL BE TINED UNLESS OTHERWISE SHOWN IN THE PLANS.

EXPANSION JOINTS SHALL BE INSTALLED AT LOCATIONS SHOWN IN THE PLANS.

PAVEMENT PLACED ADJACENT TO R.R. TRACKS REQUIRES 3-EXPANSION JOINTS SPACED AT APPROXIMATELY 49'-6" INTERVALS.

EXPANSION JOINTS SHALL NOT BE SKEWED.

T= PAVEMENT THICKNESS

BEVELED EDGE SHALL BE USED WHEN PAVEMENT IS ADJACENT TO AN EARTH SHOULDER. CONCRETE SHOULDERS SHALL INCLUDE A BEVELED EDGE WHEN THE SHOULDER WIDTH IS LESS THAN 6'-0".

* THE DEPARTMENT REQUIRES THAT DOWEL BASKETS BE PLACED IN ALL CONTRACTION JOINTS WHICH ARE 6'-0" OR WIDER. THE DOWEL BASKETS SHALL BE PLACED TRANSVERSE TO THE DIRECTION OF THE PREDOMINANT TRAFFIC DIRECTION.

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JUN 23	ADDING BEVELED EDGE
R11	JUL 20	CHANGED TINING INFORMATION
R10	JAN 18	CHANGED DOWEL BAR LOCATION TABLE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 329-R12

8 TO 16 INCH CONCRETE PAVEMENT

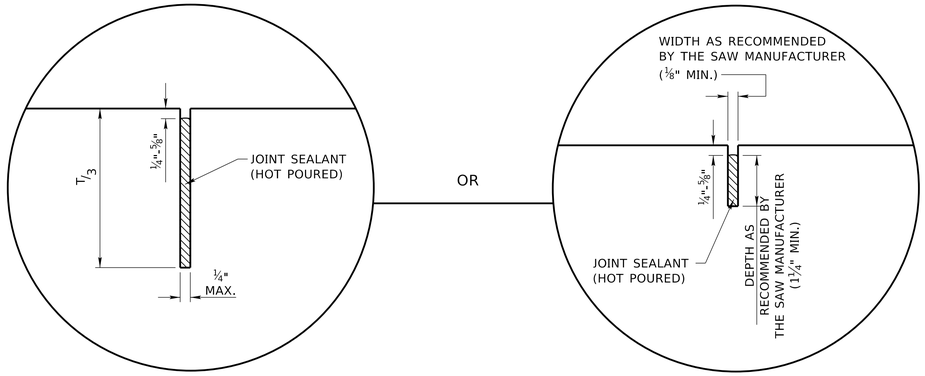
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

ORIGINAL: OCTOBER 25, 1994
DATE

1/4

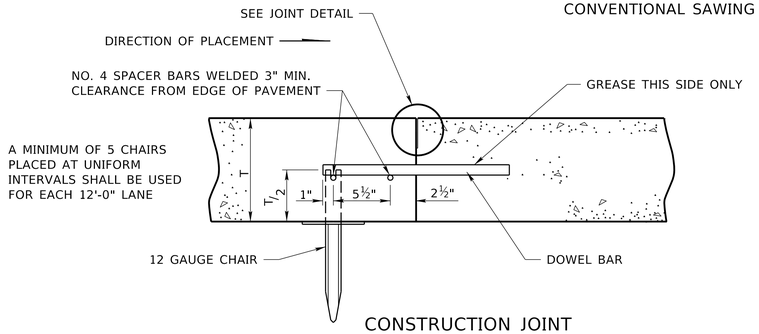
COMPUTER: BG0419M593
DATE: 10-JUL-2025 12:54
FILE: 3290 0 R12.dgn



CONVENTIONAL SAWING

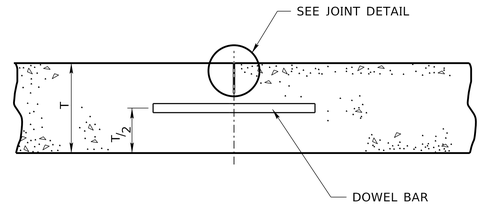
JOINT DETAIL

EARLY-SAW CUT

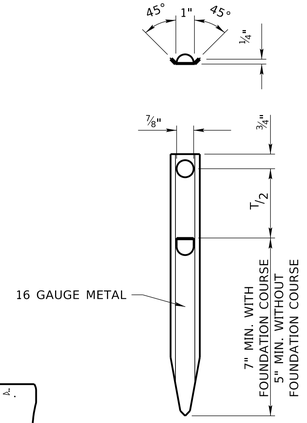


CONSTRUCTION JOINT
(BARS ARE SUBSIDIARY)
TO PAVEMENT

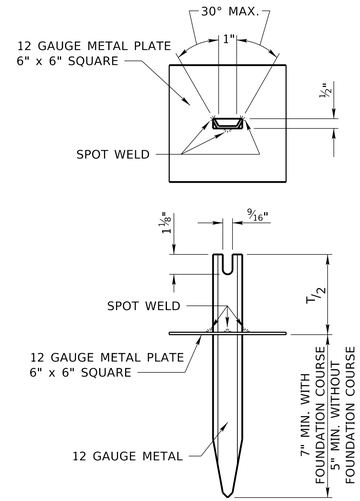
THE DOWEL BAR SPACING SHALL BE THE SAME AS SHOWN FOR THE EXPANSION JOINT. REFER TO DOWEL BAR LOCATION TABLE AND THE DOWEL BAR HEIGHT AND DIAMETER TABLE ON SHEET 1 OF 4.



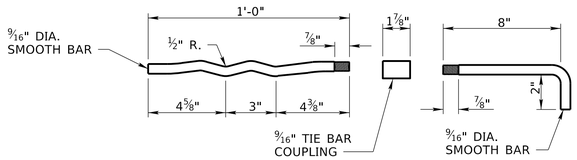
CONTRACTION JOINT



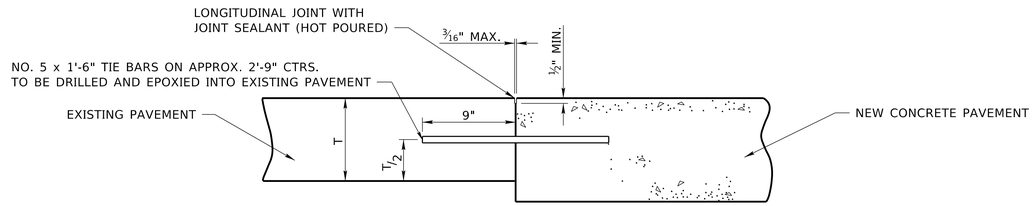
TIE BAR PIN



CHAIR

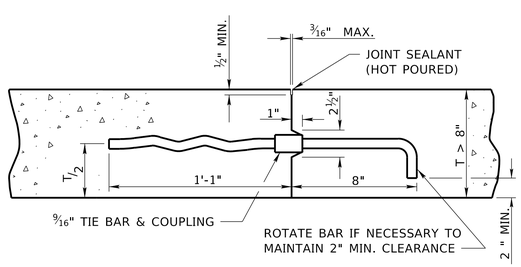


DETAILS OF "W" BAR



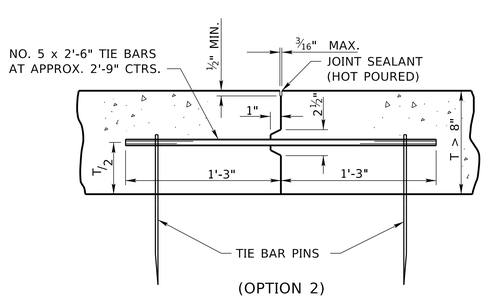
TIE BARS ARE TO BE INSTALLED WHERE NEW CONCRETE PAVEMENT IS PLACED ADJACENT TO EXISTING CONCRETE PAVEMENT

DETAILS OF TIE BAR



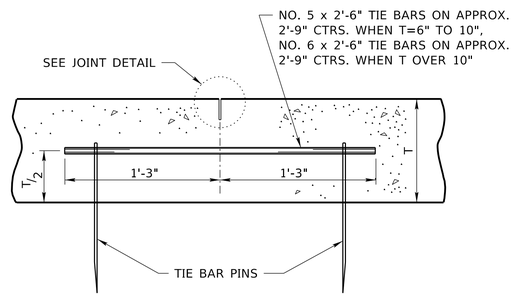
(OPTION 1)
KEY TYPE

NO. 5 HOOK AND W-BARS AT APPROX. 2'-9" CTRS.
OR 9/16" HOOK AND W-BARS AT APPROX. 2'-9" CTRS.



(OPTION 2)
KEY TYPE

KEY TYPE JOINT SHALL BE USED ON ALL LONGITUDINAL CONSTRUCTION JOINTS WHEN THE ADJACENT LANE IS NOT PLACED AT THE SAME TIME



SAWED

WHEN TWO ADJACENT LANES ARE PLACED AT THE SAME TIME, THE LONGITUDINAL JOINT COMMON TO THE LANES SHALL BE SAWED

LONGITUDINAL JOINTS

NOTES:
NO TIE BARS SHALL BE CLOSER THAN 1'-3" TO A TRANSVERSE JOINT. ALL LONGITUDINAL JOINTS BETWEEN LANES AND BETWEEN LANES AND SHOULDERS MUST BE TIED. MEDIAN SHOULD NOT BE TIED.

NOTE: T = PAVEMENT THICKNESS

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JUN 23	ADDING BEVELED EDGE
R11	JUL 20	CHANGED TINING INFORMATION
R10	JAN 18	CHANGED DOWEL BAR LOCATION TABLE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 329-R12

8 TO 16 INCH CONCRETE PAVEMENT

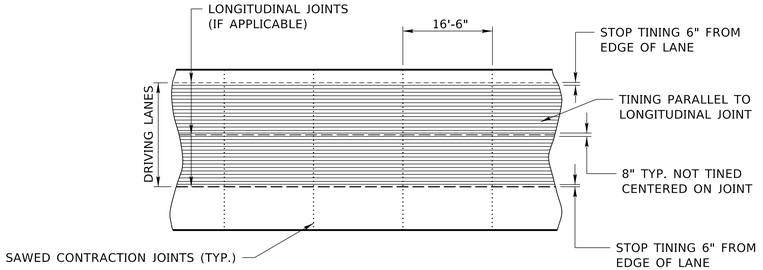
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

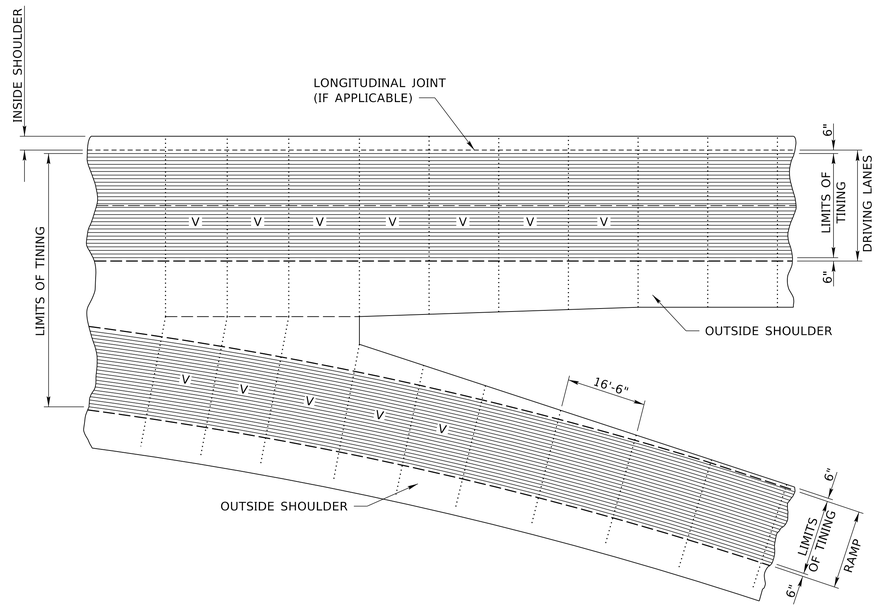
ORIGINAL:
OCTOBER 25, 1994
DATE

2/4

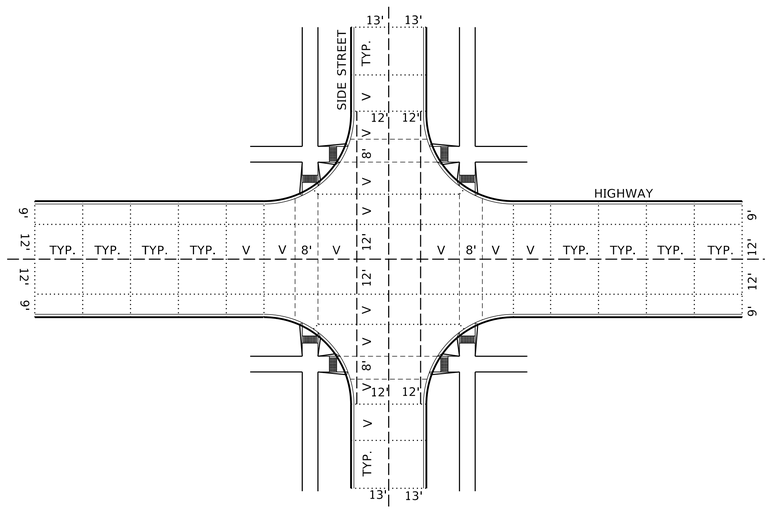
COMPUTER: BG0419M593
DATE: 10-JUL-2025 12:54
FILE: 3290 0 R12.dgn



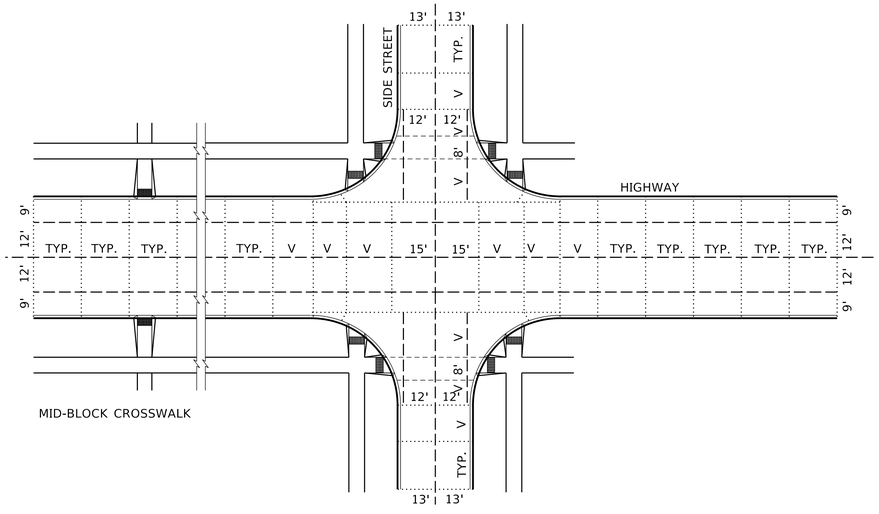
TINING WITH CONCRETE SHOULDER



TINING LIMITS GORE AREA



STOP OR YIELD CONTROL ON ALL FOUR LEGS



STOP OR YIELD CONTROL ON THE SIDE STREETS ONLY

NOTES:

TINING IS REQUIRED FOR PAVEMENT WITH POSTED SPEEDS GREATER THAN 40 MPH (INCLUDING TURN LANES).

16'-6" TRANSVERSE JOINT SPACING IS THE STANDARD JOINT SPACING REGARDLESS OF THE PAVEMENT THICKNESS.

V VARIES FROM 10'-0" TO MAX. 16'-6".

THE LONGITUDINAL JOINT BETWEEN THE SHOULDER AND THE 12'-0" DRIVING LANE IS NOT REQUIRED FOR SHOULDER WIDTHS OF 4'-0" OR LESS.

TRANSVERSE JOINTS FOR DOWELED CONCRETE PAVEMENT SHALL BE CONSTRUCTED PERPENDICULAR TO THE ROADWAY.

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JUN 23	ADDING BEVELED EDGE
R11	JUL 20	CHANGED TINING INFORMATION
R10	JAN 18	CHANGED DOWEL BAR LOCATION TABLE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 329-R12

8 TO 16 INCH CONCRETE PAVEMENT

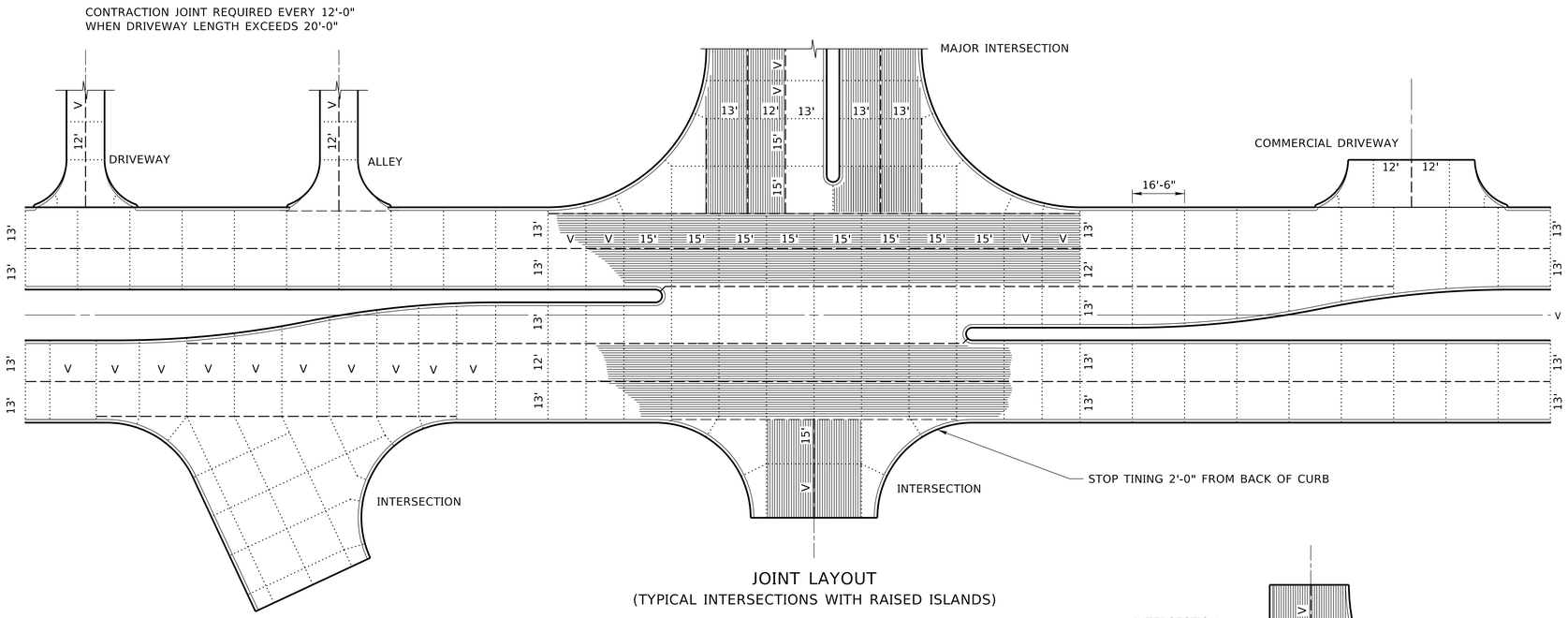
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

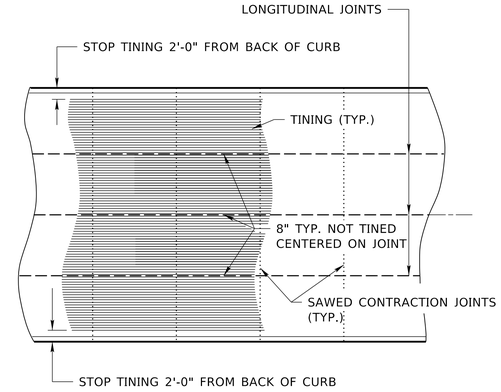
ORIGINAL:
OCTOBER 25, 1994
DATE

3
4

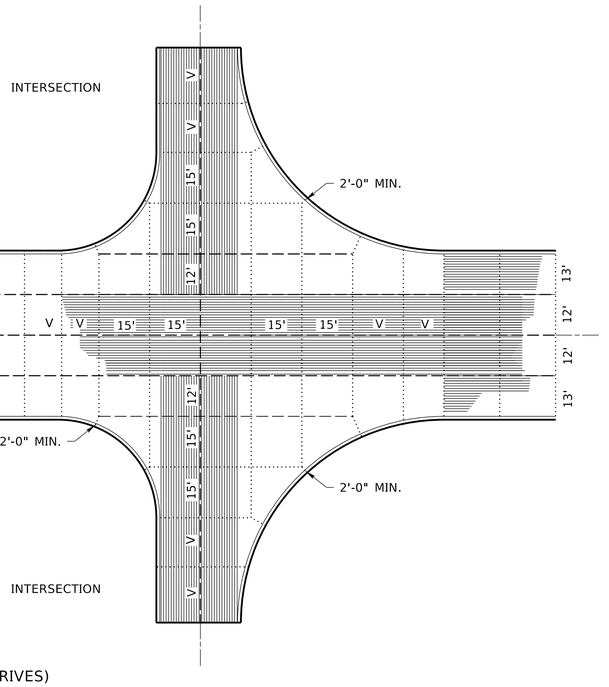
COMPUTER: BG04194593
DATE: 10-JUL-2025 12:54
FILE: 3290 0 R12.dgn



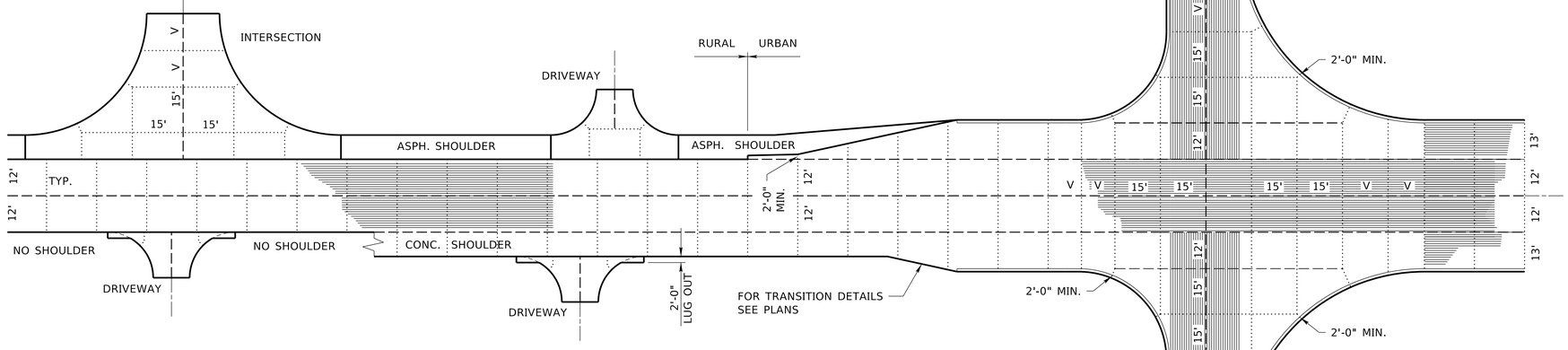
JOINT LAYOUT
(TYPICAL INTERSECTIONS WITH RAISED ISLANDS)

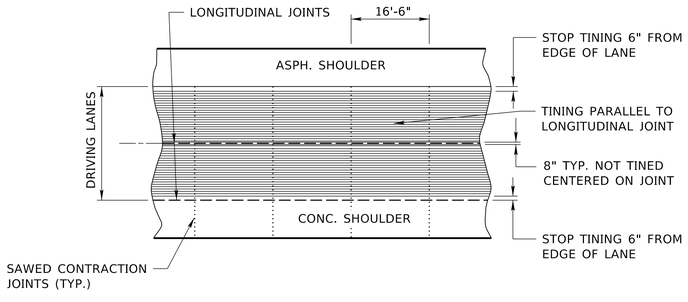


TINING LIMITS



JOINT LAYOUT
(TYPICAL INTERSECTIONS & DRIVES)





RURAL TINING LIMITS WITH SURFACED SHOULDERS

LEGEND

SAWED CONTRACTION JOINT

LONGITUDINAL JOINT

NOTES:

TINING IS REQUIRED FOR PAVEMENT WITH POSTED SPEEDS GREATER THAN 40 MPH (INCLUDING TURN LANES).

16'-6" TRANSVERSE JOINT SPACING IS THE STANDARD JOINT SPACING REGARDLESS OF THE PAVEMENT THICKNESS.

V VARIES FROM 10'-0" TO MAX. 16'-6".

VARIABLE SPACING IS USED AROUND INTERSECTIONS AND LARGE DRIVEWAYS WHICH IS TIED TO THE CONCRETE LANES OR SHOULDERS TO MATCH THE JOINTS.

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JUN 23	ADDING BEVELED EDGE
R11	JUL 20	CHANGED TINING INFORMATION
R10	JAN 18	CHANGED DOWEL BAR LOCATION TABLE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 329-R12

8 TO 16 INCH CONCRETE PAVEMENT

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

ORIGINAL:
OCTOBER 25, 1994
DATE

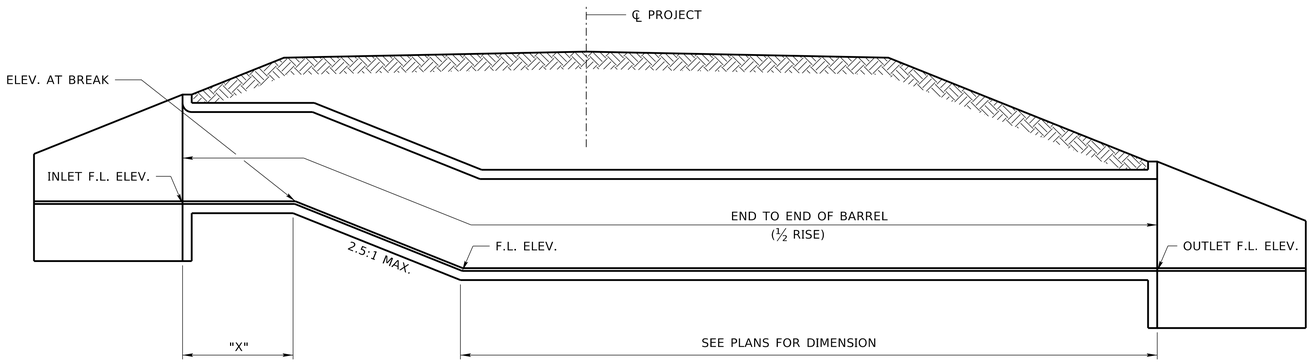
4
4

COMPUTER: BG0419M593
DATE: 10-JUL-2025 12:54
FILE: 3290 0 R12.dgn

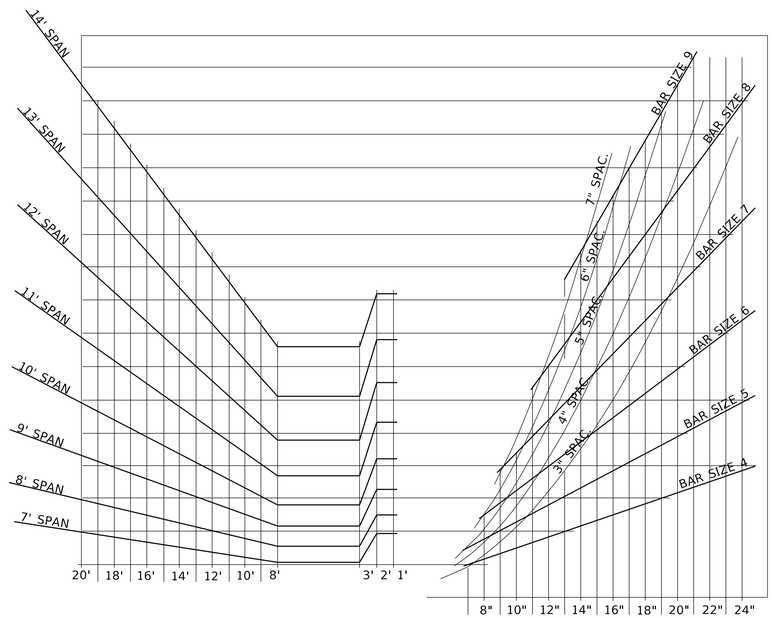
NOTE:

FOR NON-SKEWED CULVERTS, DIMENSION "X" SHALL BE NO LESS THAN 2'.

FOR SKEWED CULVERTS, DIMENSION "X" SHALL BE NO LESS THAN 2' PLUS (ONE HALF THE DISTANCE BETWEEN INNER FACES OF OUTER WALLS TIMES TANGENT OF SKEW ANGLE).



SECTIONAL ELEVATION OF BROKEN BACK BOX CULVERT



FILL (FT.) REQUIRED BEAM DEPTH (IN.)

CHART

NOTES:

THIS PLAN FOR BENDS AND BREAKS SHALL BE USED IN CONJUNCTION WITH CONCRETE BOX CULVERT PLANS.

ALL DETAILS, DIMENSIONS, BAR SIZES AND SPACING, EXCEPT AS SHOWN OR NOTED ON THIS PLAN, SHALL CONFORM TO THE CONCRETE BOX CULVERT PLANS.

THE ADDITIONAL ALLOWANCE FOR CONCRETE REFERRED TO IN THE SPECIFICATIONS SHALL BE CONSIDERED FULL COMPENSATION FOR ANY ADDITIONAL CONCRETE, REINFORCING STEEL, AND WORK REQUIRED FOR EACH HORIZONTAL BEND AND VERTICAL BREAK.

THE ADDITIONAL ALLOWANCE OF CONCRETE FOR EACH VERTICAL BREAK OR HORIZONTAL BEND IN BARREL ALIGNMENT SHALL BE COMPUTED BY MULTIPLYING THE TOTAL LINEAR FEET OF THE INSIDE PERIMETER OF THE NOMINAL BOX OPENING(S) BY 0.05 CU. YDS.

EXAMPLE:
A TWIN 10' x 10' BOX CULVERT WOULD HAVE AN INSIDE PERIMETER OF 80' x 0.05 CU. YDS. EQUALS AN ADDITIONAL ALLOWANCE OF 4 CU. YDS.

FOR A BEND WITH BEAMS, GO TO THE CHART AND LOCATE THE POINT OF INTERSECTION OF A SLOPING SPAN LENGTH LINE WITH A VERTICAL FILL DEPTH LINE. FROM THIS POINT OF INTERSECTION DRAW A HORIZONTAL LINE ACROSS THE CHART TO INTERSECT BAR SIZE LINES. FROM THE BAR SIZE INTERSECTS, DRAW VERTICAL LINES DOWN TO FIND THE RESPECTIVE BEAM DEPTHS REQUIRED. SPACING OF BARS CAN BE FOUND BY RELATING THE BAR SIZE INTERSECTS TO THE CURVED LINES INDICATING REQUIRED BAR SPACINGS.

EXAMPLE:
TWIN BOX CULVERT WITH A 10' SPAN, 2' FILL AND A DEFLECTION ANGLE OF 20°. FROM TABLE 1 (SHEET 2 OF 2) FIND THAT 3 BARS ARE REQUIRED IN EACH BEAM. THE CHART WILL PROVIDE ADDITIONAL INFORMATION FOR TWO COMBINATIONS AS FOLLOWS: 3 BARS, SIZE 7, 6¾" SPACING, WITH A 10½" BEAM DEPTH; OR 3-BARS, SIZE 6, 3½" SPACING, WITH A 13½" BEAM DEPTH.

NOTE THAT SPACING OF BEAM BARS SHALL NOT BE LESS THAN 3", AND THAT BEAM DEPTH SHALL NOT BE LESS THAN THE DESIGN SLAB THICKNESS OF THE CULVERT.

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	AUG 99	MULTIPLE CHANGES
R1	MAR 86	NOTE CHANGES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 403-R3

BENDS AND BREAKS FOR CONCRETE BOX CULVERTS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

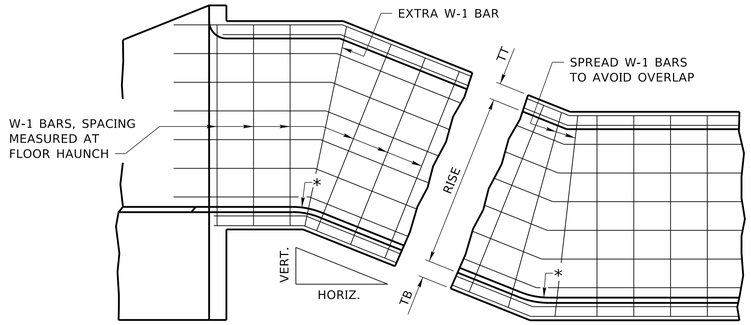
PROFESSIONAL CIVIL ENGINEER
MARK J. TRAYNOWICZ
E-8119
STATE OF NEBRASKA

DATE

ORIGINAL:
JANUARY 29, 1985
DATE

1/2

FILE: 4030 0 R3.dgn DATE: 10-OCT-2024 14:42 COMPUTER: BG0419M187



*ROUND CONCRETE TO ACCOMMODATE SMOOTH FLOWLINE

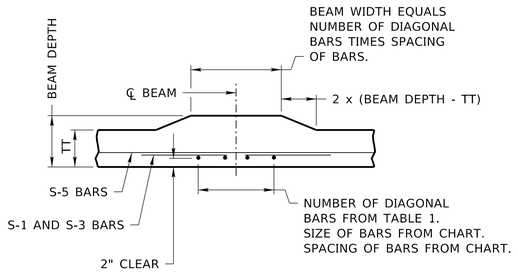
DETAILS AT VERTICAL BREAKS

NOTES FOR VERTICAL BREAKS:

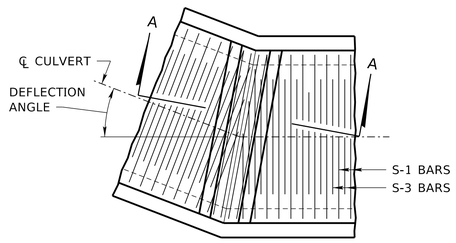
LONGITUDINAL BARS SHALL BE FIELD BENT TO CONFORM TO FLOWLINE GRADES.

TRANSVERSE BARS IN SLABS AND WALLS, EXCEPT AS SHOWN ON THIS PLAN, SHALL BE PLACED NORMAL TO CENTERLINE OF CULVERT.

W-4 BARS IN INTERIOR WALLS SHALL BE PLACED SIMILAR TO W-1 BARS SHOWN IN OUTER WALL.



TOP SLAB



HORIZONTAL BEND WITH BEAMS

TABLE 1

DIAGONAL BARS FOR BEAM	
DEFLECTION ANGLE FOR HORIZONTAL BEND (DEGREES)	REQUIRED NO. OF BARS
LESS THAN 18	2
18 THROUGH 26	3
MORE THAN 26 THROUGH 33	4
MORE THAN 33 THROUGH 39	5
MORE THAN 39 THROUGH 45	6

NOTES FOR HORIZONTAL BENDS:

SPACING OF TRANSVERSE SLAB BARS SHALL BE MEASURED ALONG CENTERLINE OF CULVERT.

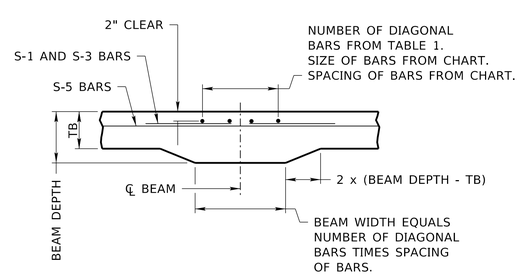
REINFORCING IN THE BOTTOM SLAB IS TO BE PLACED IN A PATTERN SIMILAR TO THAT USED IN THE TOP SLAB.

WALL AND CORNER BARS (NOT SHOWN) ARE TO BE SPACED THE SAME AS IN A NORMAL SECTION OF THE CULVERT.

LONGITUDINAL BARS (NOT SHOWN) SHALL BE FIELD BENT TO CONFORM TO THE DEFLECTION ANGLE AND CONTINUED THROUGH THE HORIZONTAL BEND.

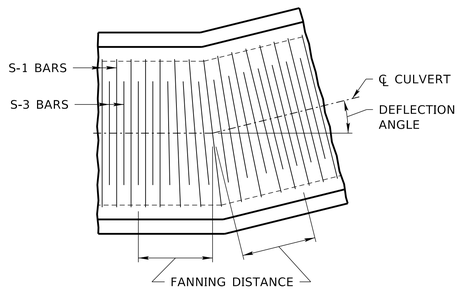
FANNING OF TRANSVERE SLAB BARS MAY BE USED, AS AN ALTERNATE TO BEAMS, AT HORIZONTAL BENDS FOR SPANS AND DEFLECTION ANGLES AS LIMITED IN TABLE 2.

WHERE FANNING IS PERMITTED, THE TRANSVERSE SLAB BARS ARE TO BE FANNED UNIFORMLY THROUGHOUT A DISTANCE DETERMINED AS FOLLOWS: FANNING DISTANCE = (NUMBER OF BARRELS) ` (SPAN IN FEET) ` (DEFLECTION ANGLE IN DEGREES)/20.



BOTTOM SLAB

SECTION A-A



HORIZONTAL BEND WITH FANNED BARS

TABLE 2

LIMITS FOR FANNING			
CULVERT SPAN (FT)	MAXIMUM ALLOWABLE DEFLECTION ANGLE (DEGREES)		
	SINGLE BOX	TWIN BOX	TRIPLE BOX
4	42	29	23
5	38	26	21
6	35	24	19
7	32	22	18
8	30	21	17
9	28	20	16
10	27	19	15
11	26	18	14
12	25	17	14
13	24	16	13
14	23	16	13

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	AUG 99	MULTIPLE CHANGES
R1	MAR 86	NOTE CHANGES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 403-R3

BENDS AND BREAKS FOR CONCRETE BOX CULVERTS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

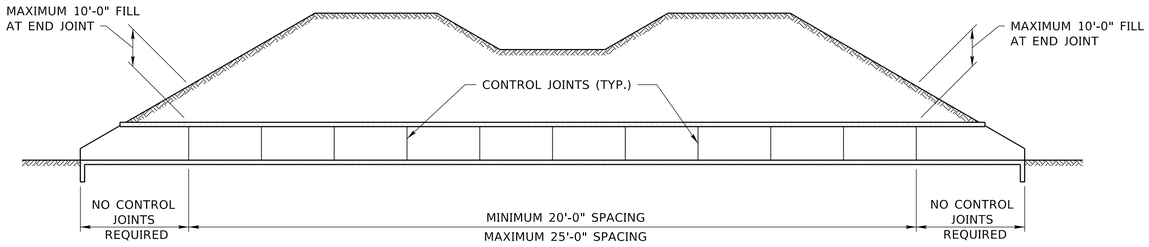
PROFESSIONAL CIVIL ENGINEER
MARK J. TRAYNOWICZ
E-8119
STATE OF NEBRASKA

DATE

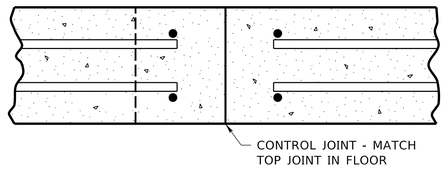
ORIGINAL: JANUARY 29, 1985
DATE

2
2

COMPUTER: BG04194187
DATE: 10-OCT-2024 14:42
FILE: 4030 0 R3.dgn

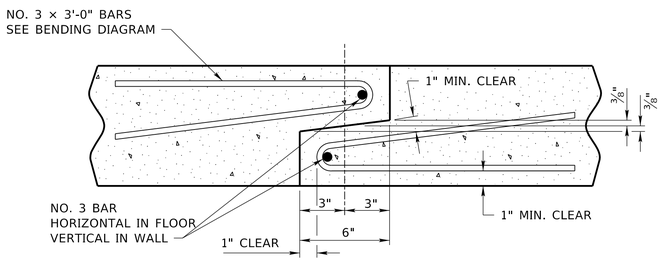


SECTION SHOWING CONTROL JOINTS IN FLOOR AND WALLS



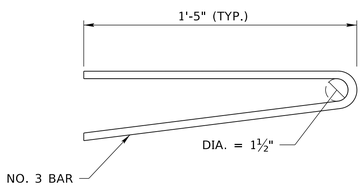
SECTION OF WALL

INTERIOR WALL AT CONTROL JOINT

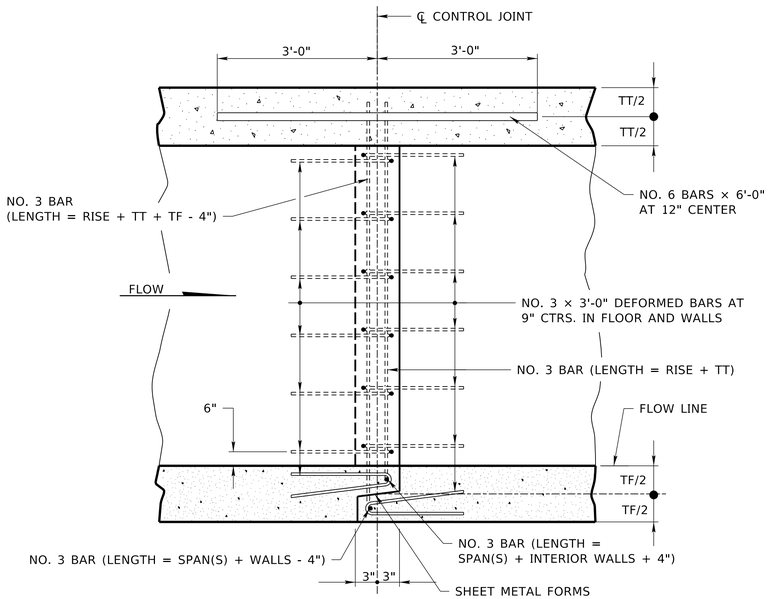


SECTION

FLOOR AND EXTERIOR WALL AT CONTROL JOINT



BENDING DIAGRAM



NOTE: NORMAL REINFORCING BARS NOT SHOWN

SECTION

CONTROL JOINT

TABLE OF ADDITIONAL BARS FOR CONTROL JOINTS						
SPAN (FT.)	QUANTITY OF NO. 6 x 6'-0" BARS IN TOP (PER BARREL)	QUANTITY OF NO. 3 x 3'-0" BARS IN FLOOR (PER BARREL)	* QUANTITY OF TOP & FLOOR (LBS./BARREL)	RISE (FT.)	QUANTITY OF NO. 3 x 3'-0" BARS IN 1 WALL	*QUANTITY 1 WALL (LBS.)
4	5	16	67	4	10	15
5	6	20	83	5	14	22
6	7	22	95	6	16	24
7	8	24	106	7	18	27
8	9	28	121	8	22	33
9	10	30	133	9	24	36
10	11	32	144	10	26	38
12	13	38	171	12	32	47
14	15	42	194	14	38	56
16	17	48	221	16	42	61

* NO. 3 BARS ARE INCLUDED IN QUANTITY

EXAMPLES:

12' x 6' CONCRETE BOX CULVERT
NUMBER OF CONTROL JOINTS = 4
QUANTITY FOR TOP AND FLOOR: 4 EA. x 171 LBS. = 684 LBS.
QUANTITY FOR 2 WALLS: (4 EA. × 24 LBS.) × 2 = 192 LBS.

SUB TOTAL QUANTITY 876 LBS.

THIS TOTAL QUANTITY IS TO BE ADDED TO THE NORMAL QUANTITY OF "REINFORCING STEEL FOR BOX CULVERTS"

TWIN 12' x 6' CONCRETE BOX CULVERT
NUMBER OF CONTROL JOINTS = 4
QUANTITY FOR TOP AND FLOOR: (4 EA. × 171 LBS.) × 2 = 1,368 LBS.
QUANTITY FOR 2 OUTSIDE WALLS: (4 EA. × 24 LBS.) × 2 = 192 LBS.

SUB TOTAL QUANTITY 1,560 LBS.

THIS TOTAL QUANTITY IS TO BE ADDED TO THE NORMAL QUANTITY OF "REINFORCING STEEL FOR BOX CULVERTS"

NOTES:

CONTROL JOINTS SHALL BE USED IN BOX CULVERTS HAVING FILLS OF OVER 10 FT. WHEN SETTLEMENT IS ANTICIPATED.

ALL NORMAL LONGITUDINAL BARS IN THE FLOOR AND WALLS SHALL BE CUT TO CLEAR THE FORMS BY 1" MINIMUM. NORMAL TRANSVERSE FLOOR BARS AND VERTICAL WALL BARS SHALL BE PLACED TO CLEAR THE CONTROL JOINT FORMS BY 3" MINIMUM.

THE FURNISHING AND PLACING OF SHEET METAL FORMS SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEMS FOR WHICH PAYMENT IS MADE.

THE SHEET METAL FORMS USED AT CONTROL JOINTS SHALL BE SHAPED TO CONFORM TO THE DIMENSIONS AS SHOWN ON THE PLAN AND SHALL BE SUPPORTED SO THAT NO DISPLACEMENT OCCURS WHEN CONCRETE IS PLACED.

ALL LONGITUDINAL BARS SHALL BE INTERRUPTED AT CONTROL JOINTS.

ALL REINFORCING STEEL USED SHALL CONFORM TO ASTM A615\A615M, GRADE 60.

LEGEND

TT = THICKNESS OF TOP
TF = THICKNESS OF FLOOR

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JAN 18	NDOR BORDER TO NDOT BORDER
R3	AUG 06	UPDATED TABLE AND EXAMPLES
R2	AUG 99	MULTIPLE CHANGES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 404-R4

CONTROL JOINTS FOR CONCRETE BOX CULVERTS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MARK
TRAYNOWICZ
E-8119
STATE OF NEBRASKA

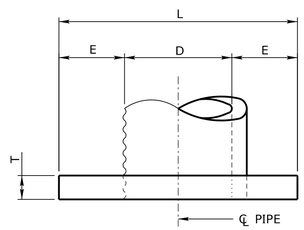
DATE

ORIGINAL:
APRIL 4, 1974
DATE

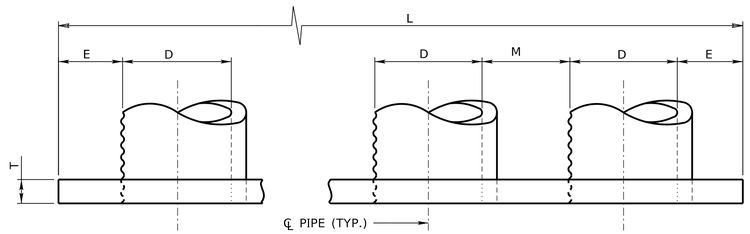
1
1

COMPUTER: BG04I9M593
DATE: 10-JUL-2025 13:42
FILE: 4040 0 R4.dgn

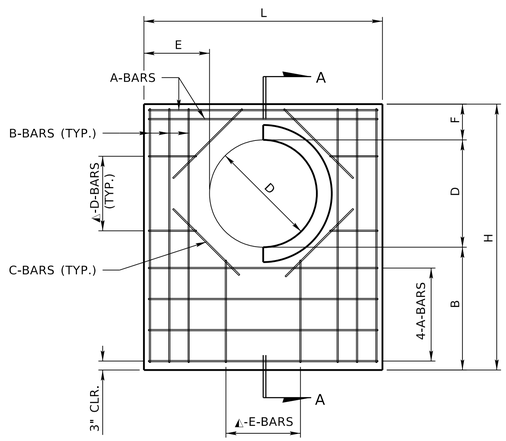
PIPE DIA. (D)	NO. OF PIPES	DIMENSIONS							REINFORCING STEEL (ALL BARS ARE NO. 4 BARS)												◪ QUANTITIES		◑ ADDITIONAL (SEE NOTES)	
		M	T	E	F (MIN.)	B	H	L	A-BAR		B-BAR		C-BAR		◭-D-BAR		◭-E-BAR		◭-F-BAR		CONCRETE (CY)	REINFORCING STEEL (LB)	CONCRETE (CY)	REINFORCING STEEL (LB)
									NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH				
15"	1	--	8"	1'-8"	1'-0"	3'-0"	5'-3"	4'-7"	6	4'-3"	6	4'-11"	4	1'-3"	4	1'-1"	2	2'-5"	--	--	0.5	45	0.06	2
	2	5'-5"	8"	1'-8"	1'-0"	3'-0"	5'-3"	11'-3"	6	10'-11"	12	4'-11"	8	1'-3"	4	1'-1"	4	2'-5"	2	4'-8"	1.4	105	0.14	4
	3	5'-5"	8"	1'-8"	1'-0"	3'-0"	5'-3"	17'-11"	6	17'-7"	18	4'-11"	12	1'-3"	4	1'-1"	6	2'-5"	4	4'-8"	2.2	165	0.22	6
18"	1	--	8"	1'-9"	1'-0"	3'-0"	5'-6"	5'-0"	6	4'-8"	6	5'-2"	4	1'-6"	4	1'-2"	2	2'-5"	--	--	0.6	50	0.06	2
	2	5'-5"	8"	1'-9"	1'-0"	3'-0"	5'-6"	11'-11"	6	11'-7"	12	5'-2"	8	1'-6"	4	1'-2"	4	2'-5"	2	4'-8"	1.5	110	0.15	4
	3	5'-5"	8"	1'-9"	1'-0"	3'-0"	5'-6"	18'-10"	6	18'-6"	18	5'-2"	12	1'-6"	4	1'-2"	6	2'-5"	4	4'-8"	2.3	175	0.23	6
24"	1	--	8"	2'-0"	1'-0"	3'-0"	6'-0"	6'-0"	6	5'-8"	6	5'-8"	4	2'-0"	4	1'-5"	2	2'-5"	--	--	0.8	60	0.07	2
	2	5'-6"	8"	2'-0"	1'-0"	3'-0"	6'-0"	13'-6"	6	13'-2"	12	5'-8"	8	2'-0"	4	1'-5"	4	2'-5"	2	4'-8"	1.8	125	0.17	4
	3	5'-6"	8"	2'-0"	1'-0"	3'-0"	6'-0"	21'-0"	6	20'-8"	18	5'-8"	12	2'-0"	4	1'-5"	6	2'-5"	4	4'-8"	2.7	195	0.26	6
30"	1	--	8"	2'-4"	1'-1"	3'-0"	6'-7"	7'-2"	6	6'-10"	6	6'-3"	4	2'-6"	6	1'-8"	3	2'-4"	--	--	1.0	70	0.09	2
	2	5'-8"	8"	2'-4"	1'-1"	3'-0"	6'-7"	15'-3"	6	14'-11"	12	6'-3"	8	2'-6"	6	1'-8"	6	2'-4"	3	4'-8"	2.1	150	0.19	4
	3	5'-8"	8"	2'-4"	1'-1"	3'-0"	6'-7"	23'-4"	6	23'-0"	18	6'-3"	12	2'-6"	6	1'-8"	9	2'-4"	6	4'-8"	3.2	225	0.29	6



PLAN

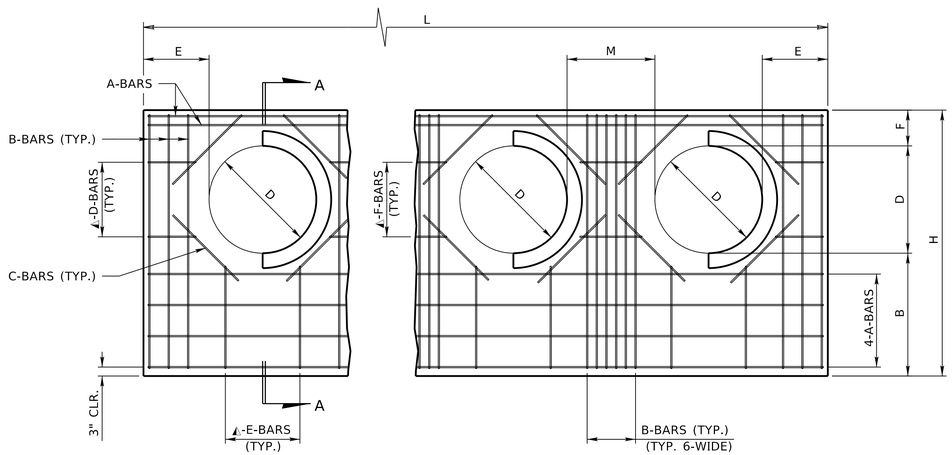


PLAN



ELEVATION

SINGLE PIPE HEADWALL



ELEVATION

MULTIPLE PIPE HEADWALL

NOTES:

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM "CLASS 47B-3000 CONCRETE FOR HEADWALL".

ALL REINFORCING STEEL USED SHALL BE NO. 4 BARS, AND SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M. DESIGNATION A615, GRADE 60, AND SHALL BE PAID FOR UNDER THE ITEM "REINFORCING STEEL FOR HEADWALL".

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE 2", EXCEPT AS SHOWN. THE MAXIMUM BAR SPACING SHALL BE 12".

FIELD BEND AND/OR CLIP REINFORCING STEEL TO MAINTAIN MINIMUM CLEARANCE.

WHEN CONCRETE PIPES ARE USED THE GROOVE OR BELL ENDS SHALL BE PLACED AT THE INLET OF THE CULVERT.

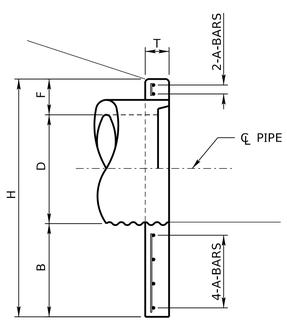
SPACING BETWEEN TWIN OR TRIPLE PIPES IS BASED ON A DISTANCE OF 5'-0" OUTSIDE OF PIPE TO OUTSIDE OF PIPE FOR CONCRETE PIPES. METAL PIPES WILL BE SPACED TO MATCH THE "M" DIMENSION.

◪ QUANTITIES SHOWN ARE FOR ONE HEADWALL.

◭ NUMBER OF BARS VARIES WITH SIZE OF PIPE.

HEADWALLS FOR PIPES 15"-30" REQUIRE A SINGLE MAT OF REINFORCING STEEL AS SHOWN IN SECTION A-A.

◑ ADDITIONAL QUANTITIES TO BE ADDED IF THE HEIGHT OF THE HEADWALL MUST BE INCREASED TO MEET THE MINIMUM "F" DIMENSION DUE TO A VERTICAL SKEW OF THE CULVERT PIPE. AMOUNTS SHOWN ARE FOR A 6" INCREASE ONLY.



SECTION A-A

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 407

CONCRETE HEADWALL (FOR 15"-30" PIPES)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ ROSS D. BARRON E-14018 ★ STATE OF NEBRASKA

DATE

ORIGINAL: FEBRUARY 21, 2023

DATE

1 / 1

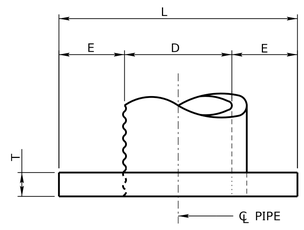
COMPUTER: BG041PM187

DATE: 10-OCT-2024 14:43

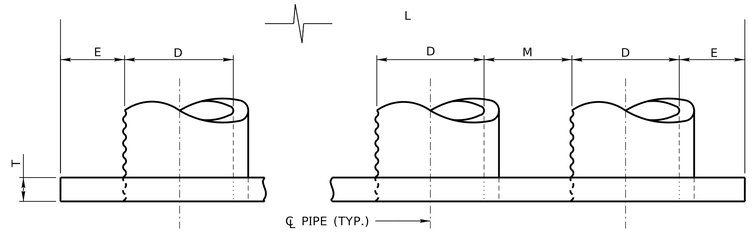
FILE: 4070 0 R0.dgn

Approved Date: FEB 2023 Effective Letting Date: JUNE 2023

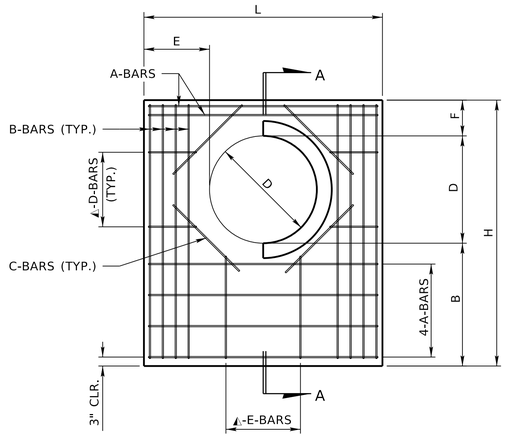
PIPE DIA. (D.)	NO. OF PIPES	DIMENSIONS							REINFORCING STEEL (ALL BARS ARE NO. 4 BARS)												◪ QUANTITIES		◑ ADDITIONAL (SEE NOTES)	
		M	T	E	F (MIN.)	B	H	L	A-BAR		B-BAR		C-BAR		◭-D-BAR		◭-E-BAR		◭-F-BAR		CONCRETE (CY)	REINFORCING STEEL (LB)	CONCRETE (CY)	REINFORCING STEEL (LB)
									NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH				
36"	1	--	8"	2'-7"	1'-1"	3'-0"	7'-1"	8'-2"	12	7'-10"	16	6'-9"	8	3'-0"	16	1'-11"	8	2'-4"	--	--	1.2	185	0.10	5
	2	5'-8"	8"	2'-7"	1'-1"	3'-0"	7'-1"	16'-10"	12	16'-6"	28	6'-9"	16	3'-0"	16	1'-11"	16	2'-4"	8	4'-8"	2.4	360	0.21	9
	3	5'-8"	8"	2'-7"	1'-1"	3'-0"	7'-1"	25'-6"	12	25'-2"	40	6'-9"	24	3'-0"	16	1'-11"	24	2'-4"	16	4'-8"	3.7	540	0.31	13
42"	1	--	8"	2'-11"	1'-2"	3'-0"	7'-8"	9'-4"	12	9'-0"	16	7'-4"	8	3'-6"	16	2'-2"	8	2'-3"	--	--	1.4	205	0.12	5
	2	5'-9"	8"	2'-11"	1'-2"	3'-0"	7'-8"	18'-7"	12	18'-3"	28	7'-4"	16	3'-6"	16	2'-2"	16	2'-3"	8	4'-8"	2.8	395	0.23	9
	3	5'-9"	8"	2'-11"	1'-2"	3'-0"	7'-8"	27'-10"	12	27'-6"	40	7'-4"	24	3'-6"	16	2'-2"	24	2'-3"	16	4'-8"	4.2	580	0.34	13
48"	1	--	8"	3'-2"	1'-2"	3'-0"	8'-2"	10'-4"	12	10'-0"	16	7'-10"	8	4'-0"	20	2'-5"	10	2'-3"	--	--	1.6	235	0.13	5
	2	5'-10"	8"	3'-2"	1'-2"	3'-0"	8'-2"	20'-2"	12	19'-10"	28	7'-10"	16	4'-0"	20	2'-5"	20	2'-3"	10	4'-8"	3.2	440	0.25	9
	3	5'-10"	8"	3'-2"	1'-2"	3'-0"	8'-2"	30'-0"	12	29'-8"	40	7'-10"	24	4'-0"	20	2'-5"	30	2'-3"	20	4'-8"	4.7	650	0.37	13
54"	1	--	8"	3'-6"	1'-3"	3'-0"	8'-9"	11'-6"	12	11'-2"	16	8'-5"	8	4'-6"	20	2'-8"	10	2'-2"	--	--	1.9	255	0.14	5
	2	5'-11"	8"	3'-6"	1'-3"	3'-0"	8'-9"	21'-11"	12	21'-7"	28	8'-5"	16	4'-6"	20	2'-8"	20	2'-2"	10	4'-8"	3.6	475	0.27	9
	3	5'-11"	8"	3'-6"	1'-3"	3'-0"	8'-9"	32'-4"	12	32'-0"	40	8'-5"	24	4'-6"	20	2'-8"	30	2'-2"	20	4'-8"	5.3	695	0.40	13
60"	1	--	8"	3'-9"	1'-3"	3'-0"	9'-3"	12'-6"	12	12'-2"	16	8'-11"	8	5'-0"	24	2'-11"	12	2'-2"	--	--	2.2	285	0.15	5
	2	6'-0"	8"	3'-9"	1'-3"	3'-0"	9'-3"	23'-6"	12	23'-2"	28	8'-11"	16	5'-0"	24	2'-11"	24	2'-2"	12	4'-8"	4.0	525	0.29	9
	3	6'-0"	8"	3'-9"	1'-3"	3'-0"	9'-3"	34'-6"	12	34'-2"	40	8'-11"	24	5'-0"	24	2'-11"	36	2'-2"	24	4'-8"	5.8	765	0.43	13



PLAN

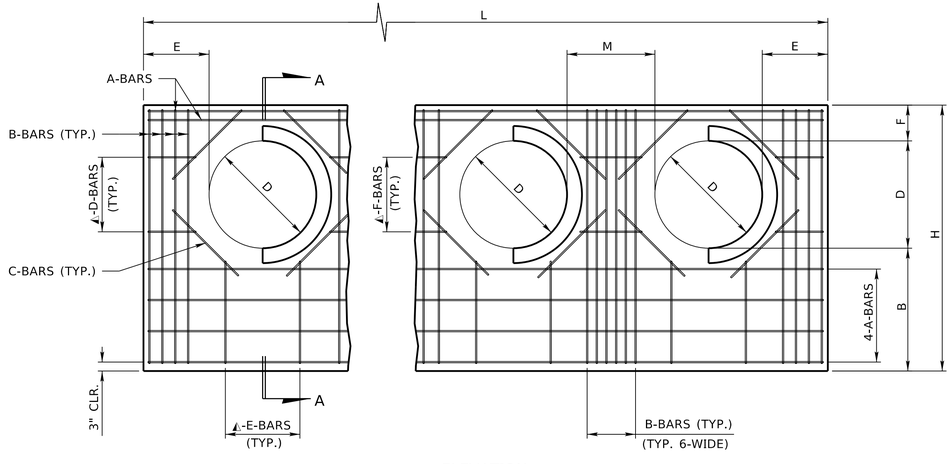


PLAN



ELEVATION

SINGLE PIPE HEADWALL



ELEVATION

MULTIPLE PIPE HEADWALL

NOTES:

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM "CLASS 47B-3000 CONCRETE FOR HEADWALL".

ALL REINFORCING STEEL USED SHALL BE NO. 4 BARS, AND SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M. DESIGNATION A615, GRADE 60, AND SHALL BE PAID FOR UNDER THE ITEM "REINFORCING STEEL FOR HEADWALL".

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE 2", EXCEPT AS SHOWN. THE MAXIMUM BAR SPACING SHALL BE 12".

FIELD BEND AND/OR CLIP REINFORCING STEEL TO MAINTAIN MINIMUM CLEARANCE.

WHEN CONCRETE PIPES ARE USED THE GROOVE OR BELL ENDS SHALL BE PLACED AT THE INLET OF THE CULVERT.

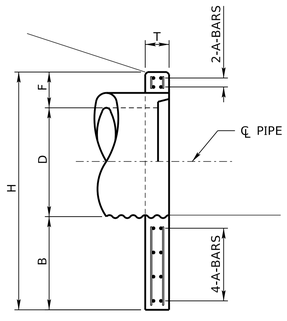
SPACING BETWEEN TWIN OR TRIPLE PIPES IS BASED ON A DISTANCE OF 5'-0" OUTSIDE OF PIPE TO OUTSIDE OF PIPE FOR CONCRETE PIPES. METAL PIPES WILL BE SPACED TO MATCH THE "M" DIMENSION.

◪ QUANTITIES SHOWN ARE FOR ONE HEADWALL.

◭ NUMBER OF BARS VARIES WITH SIZE OF PIPE.

HEADWALLS FOR PIPES 36"-60" REQUIRE A DOUBLE MAT OF REINFORCING STEEL AS SHOWN IN SECTION A-A.

◑ ADDITIONAL QUANTITIES TO BE ADDED IF THE HEIGHT OF THE HEADWALL MUST BE INCREASED TO MEET THE MINIMUM "F" DIMENSION DUE TO A VERTICAL SKEW OF THE CULVERT PIPE. AMOUNTS SHOWN ARE FOR A 6" INCREASE ONLY.



SECTION A-A

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 408

CONCRETE HEADWALL (FOR 36"-60" PIPES)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

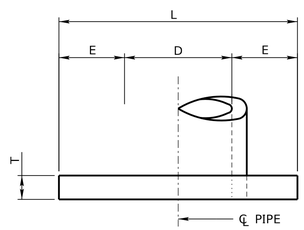
DATE

ORIGINAL: FEBRUARY 21, 2023
DATE

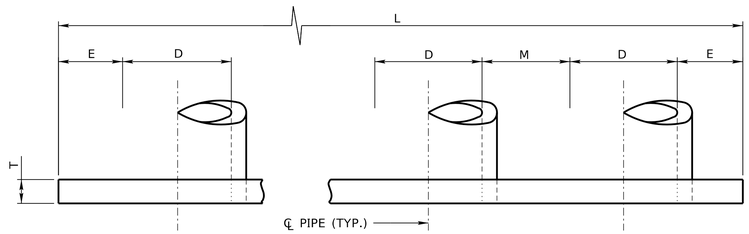
1
1

COMPUTER: BG0419M187
DATE: 10-OCT-2024 14:43
FILE: 4080 0 R0.dgn

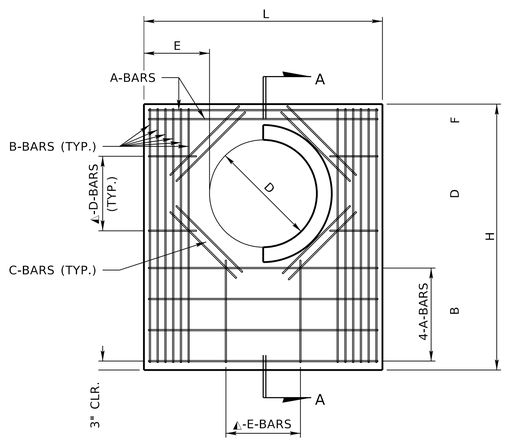
PIPE DIA. (D.)	NO. OF PIPES	DIMENSIONS							REINFORCING STEEL (ALL BARS ARE NO. 4 BARS)												◪ QUANTITIES		◑ ADDITIONAL (SEE NOTES)	
		M	T	E	F (MIN.)	B	H	L	A-BAR		B-BAR		C-BAR		◭-D-BAR		◭-E-BAR		◭-F-BAR		CONCRETE (CY)	REINFORCING STEEL (LB)	CONCRETE (CY)	REINFORCING STEEL (LB)
									NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH				
72"	1	--	8"	4'-4"	1'-4"	3'-0"	10'-4"	14'-8"	12	14'-4"	24	10'-0"	16	6'-0"	28	3'-5"	14	2'-1"	--	--	2.7	425	0.18	8
	2	6'-2"	8"	4'-4"	1'-4"	3'-0"	10'-4"	26'-10"	12	26'-6"	36	10'-0"	32	6'-0"	28	3'-5"	28	2'-1"	14	4'-8"	4.9	730	0.33	12
	3	6'-2"	8"	4'-4"	1'-4"	3'-0"	10'-4"	39'-0"	12	38'-8"	48	10'-0"	48	6'-0"	28	3'-5"	42	2'-1"	28	4'-8"	7.0	1035	0.48	16
84"	1	--	8"	4'-11"	1'-5"	3'-0"	11'-5"	16'-10"	12	16'-6"	24	11'-1"	16	7'-0"	32	3'-11"	16	2'-0"	--	--	3.4	490	0.21	8
	2	6'-4"	8"	4'-11"	1'-5"	3'-0"	11'-5"	30'-2"	12	29'-10"	36	11'-1"	32	7'-0"	32	3'-11"	32	2'-0"	16	4'-8"	5.8	830	0.37	12
	3	6'-4"	8"	4'-11"	1'-5"	3'-0"	11'-5"	43'-6"	12	43'-2"	48	11'-1"	48	7'-0"	32	3'-11"	48	2'-0"	32	4'-8"	8.2	1175	0.54	16
96"	1	--	8"	5'-6"	1'-6"	3'-0"	12'-6"	19'-0"	12	18'-8"	24	12'-2"	16	8'-0"	36	4'-5"	18	1'-11"	--	--	4.1	560	0.23	8
	2	6'-6"	8"	5'-6"	1'-6"	3'-0"	12'-6"	33'-6"	12	33'-2"	36	12'-2"	32	8'-0"	36	4'-5"	36	1'-11"	18	4'-8"	6.8	940	0.41	12
	3	6'-6"	8"	5'-6"	1'-6"	3'-0"	12'-6"	48'-0"	12	47'-8"	48	12'-2"	48	8'-0"	36	4'-5"	54	1'-11"	36	4'-8"	9.6	1315	0.59	16
108"	1	--	8"	6'-1"	1'-7"	3'-0"	13'-7"	21'-2"	12	20'-10"	24	13'-3"	16	9'-0"	44	4'-11"	22	1'-10"	--	--	4.9	645	0.26	8
	2	6'-8"	8"	6'-1"	1'-7"	3'-0"	13'-7"	36'-10"	12	36'-6"	36	13'-3"	32	9'-0"	44	4'-11"	44	1'-10"	22	4'-8"	7.9	1070	0.45	12
	3	6'-8"	8"	6'-1"	1'-7"	3'-0"	13'-7"	52'-6"	12	52'-2"	48	13'-3"	48	9'-0"	44	4'-11"	66	1'-10"	44	4'-8"	11.0	1495	0.65	16



PLAN

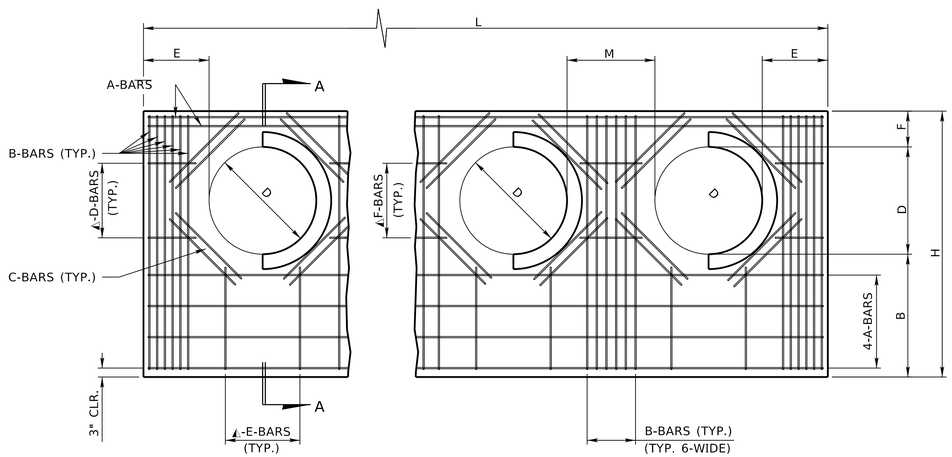


PLAN



ELEVATION

SINGLE PIPE HEADWALL



ELEVATION

MULTIPLE PIPE HEADWALL

NOTES:

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM "CLASS 47B-3000 CONCRETE FOR HEADWALL".

ALL REINFORCING STEEL USED SHALL BE NO. 4 BARS, AND SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M. DESIGNATION A615, GRADE 60, AND SHALL BE PAID FOR UNDER THE ITEM "REINFORCING STEEL FOR HEADWALL".

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE 2", EXCEPT AS SHOWN. THE MAXIMUM BAR SPACING SHALL BE 12".

FIELD BEND AND/OR CLIP REINFORCING STEEL TO MAINTAIN MINIMUM CLEARANCE.

WHEN CONCRETE PIPES ARE USED THE GROOVE OR BELL ENDS SHALL BE PLACED AT THE INLET OF THE CULVERT.

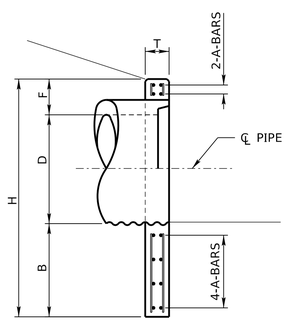
SPACING BETWEEN TWIN OR TRIPLE PIPES IS BASED ON A DISTANCE OF 5'-0" OUTSIDE OF PIPE TO OUTSIDE OF PIPE FOR CONCRETE PIPES. METAL PIPES WILL BE SPACED TO MATCH THE "M" DIMENSION.

◪ QUANTITIES SHOWN ARE FOR ONE HEADWALL.

◭ NUMBER OF BARS VARIES WITH SIZE OF PIPE.

HEADWALLS FOR PIPES 72"-108" REQUIRE A DOUBLE MAT OF REINFORCING STEEL AS SHOWN IN SECTION A-A.

◑ ADDITIONAL QUANTITIES TO BE ADDED IF THE HEIGHT OF THE HEADWALL MUST BE INCREASED TO MEET THE MINIMUM "F" DIMENSION DUE TO A VERTICAL SKEW OF THE CULVERT PIPE. AMOUNTS SHOWN ARE FOR A 6" INCREASE ONLY.



SECTION A-A

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 409

CONCRETE HEADWALL (FOR 72"-108" PIPES)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ ROSS D. BARRON E-14018 ★ STATE OF NEBRASKA

DATE

ORIGINAL: FEBRUARY 21, 2023

DATE

1 / 1

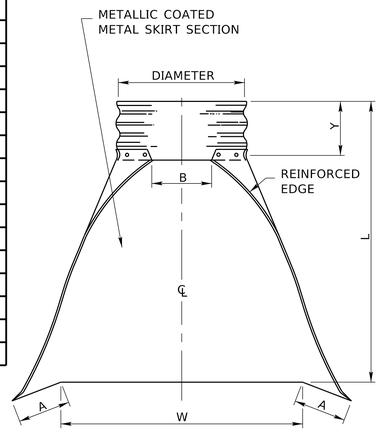
COMPUTER: BG041PM187

DATE: 10-OCT-2024 14:43

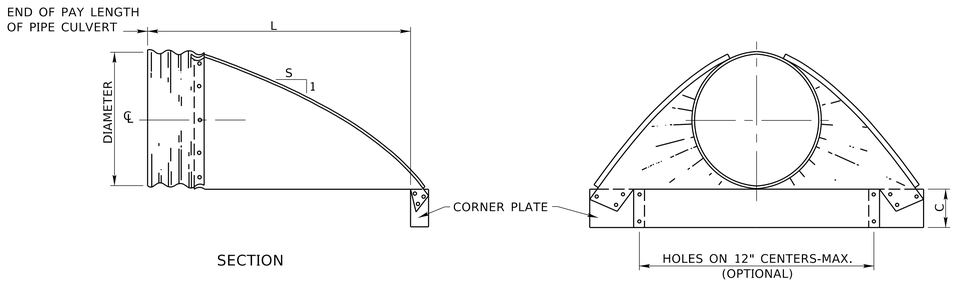
FILE: 4090 0 R0.dgn

Approved Date: JUN 23 Effective Letting Date: MAY 24

PIPE DIA.	GUAGE	NOMINAL DIMENSIONS						
		L ± 6"	W ± 2"	A MIN.	B MAX.	C MIN.	Y ± 4½"	S APPROX.
12"	16	6'-0⅞"	2'-0"	4¾"	6"	6"	4'-3⅜"	2½"
15"	16	6'-1"	2'-6"	6"	8"	6"	3'-11"	2½"
18"	16	6'-1"	3'-0"	7"	10"	6"	3'-8"	2½"
21"	16	6'-1"	3'-8"	8¼"	1'-0"	6"	3'-1"	2½"
24"	16	6'-1½"	4'-0"	9"	1'-1"	6"	2'-8½"	2½"
30"	14	6'-1¾"	5'-0"	11"	1'-4"	6"	1'-10¾"	2½"
36"	14	8'-1¾"	6'-0"	1'-2"	1'-7"	6"	3'-1¾"	2½"
42"	12	8'-2"	7'-0"	1'-4"	1'-10"	6"	2'-5"	2½"
48"	12	8'-2"	7'-6"	1'-6"	2'-3"	6"	1'-8"	2¼"
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"	1¾"
66"	12	8'-3"	10'-0"	1'-6"	3'-0"	6"	1'-0"	1½"
72"	12	8'-3"	10'-6"	1'-6"	3'-3"	6"	1'-0"	1⅓"
78"	12	8'-3"	11'-0"	1'-6"	3'-6"	6"	1'-0"	1¼"
84"	12	8'-3"	11'-6"	1'-6"	3'-9"	6"	1'-0"	1⅙"



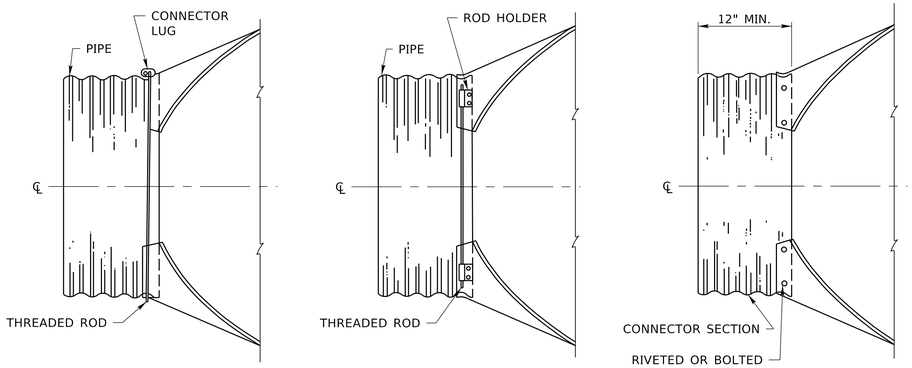
PLAN



SECTION ELEVATION

DETAILS OF METAL FLARED END SECTION

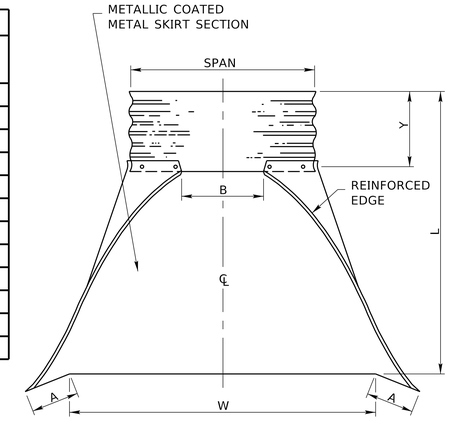
(FOR CORUGATED METAL PIPE)



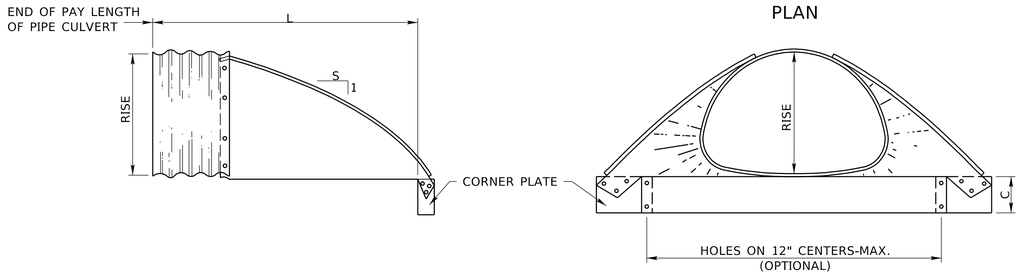
TYPICAL CONNECTIONS

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 ½" x 6" BOLT AND NUT. THIS STRAP MAY BE USED ON PIPE WITH ANNULAR ENDS ONLY.

EQUIV. DIA.	SPAN	RISE	GUAGE	NOMINAL DIMENSIONS						
				L ± 6"	W MIN.	A MIN.	B MAX.	C MIN.	Y ± 4½"	S APPROX.
15"	17"	13"	16	6'-0"	2'-6"	4½"	9"	6"	4'-5"	2½
18"	21"	15"	16	6'-0"	3'-0"	5¼"	10"	6"	4'-1"	2½
21"	24"	18"	16	6'-0"	3'-6"	6¼"	11½"	6"	3'-8"	2½
24"	28"	20"	16	6'-0"	4'-0"	7"	1'-2"	6"	3'-4½"	2½
30"	35"	24"	14	8'-0"	5'-0"	8¾"	1'-4"	6"	4'-9½"	2½
36"	42"	29"	14	8'-0"	6'-3"	10¾"	1'-5½"	6"	4'-2"	2½
42"	49"	33"	12	8'-0"	7'-1"	1'-0¼"	1'-8"	6"	3'-7"	2½
48"	57"	38"	12	8'-0"	7'-6"	1'-2"	2'-3"	6"	2'-9"	2½
54"	64"	43"	12	8'-0"	8'-6"	1'-3¾"	2'-6"	6"	2'-2"	2¼
60"	71"	47"	12	8'-0"	9'-6"	1'-5¼"	2'-9"	6"	1'-7"	2¼
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



PLAN



SECTION ELEVATION

DETAILS OF METAL FLARED END SECTION

(FOR CORUGATED 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 FOR 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 ⅜" 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 WTH STIFFENER ANGLES PLACED JUST BELOW THE REINFORCED EDGES ON THE OUTSIDE OF THE SKIRT SECTION. THE ANGLES WILL BE 2" x 2" x ¼". THE ANGLES TO BE ATTACHED BY ⅜" DIA. (MIN.) BOLTS AND NUTS AND ON 6" CENTERS (MAX.).

REV. NO.	DATE	DESCRIPTION OF REVISION
R5	MAY 24	ADDITIONAL NOTES & INFORMATION
R4	JAN 18	NDOR BORDER TO NDOT BORDER
R3	AUG 99	CHANGED NOTES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 410-R5

FLARED END SECTIONS FOR CULVERT PIPES

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ ROSS D. BARRON E-14018 ★ STATE OF NEBRASKA

DATE

ORIGINAL: FEBRUARY 22, 1974

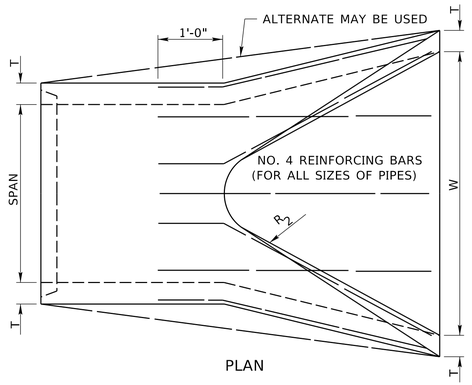
DATE

1 2

COMPUTER: BG04194593

DATE: 10-JUL-2025 13:54

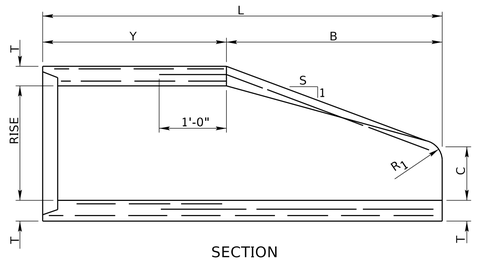
FILE: 4100 0 R5.dgn



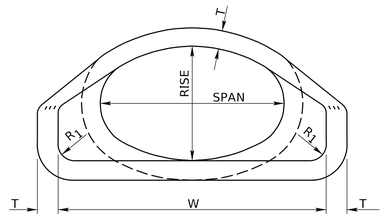
PLAN

EQUIV. DIA.	NOMINAL DIMENSIONS										
	SPAN	RISE	L ± 6"	B	Y ± 4½"	C	W ± 2"	R_1	R_2	S APPROX.	T MIN.
18"	23"	14"	6'-0"	2'-3"	3'-9"	8½"	3'-0"	3"	6"	2.3	2½"
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	3½"
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	4½"
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	5½"
*60"	76"	48"	8'-0"	5'-0"	3'-0"	2'-6"	8'-0"	6"	1'-6"	2.5	6"

*FLARED-END SECTION IS NOT MANUFACTURED AT THIS SIZE AND MUST BE CAST-IN-PLACE.

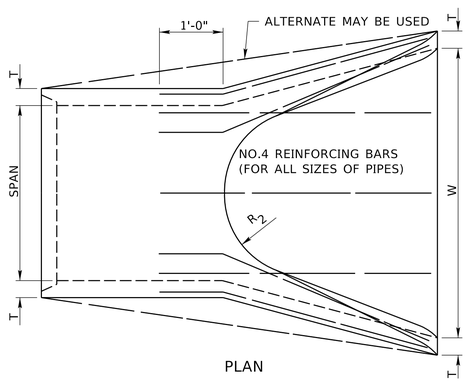


SECTION



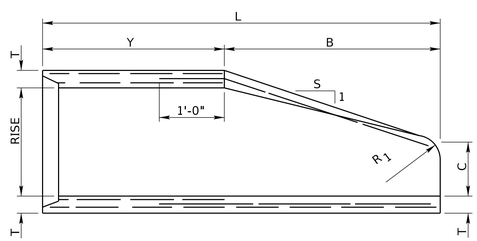
ELEVATION

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

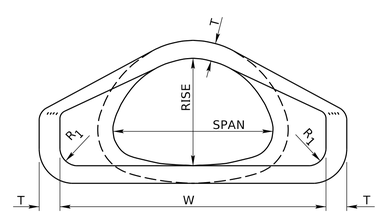


PLAN

EQUIV. DIA.	NOMINAL DIMENSIONS										
	SPAN	RISE	L ± 6"	B	Y ± 4½"	C	W ± 2"	R1	R2	S APPROX.	T MIN.
18"	22"	14"	6'-0"	2'-3"	3'-9"	7"	3'-0"	2"	1'-0"	2.2	2½"
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	3½"
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	4½"
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	5½"
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"



SECTION

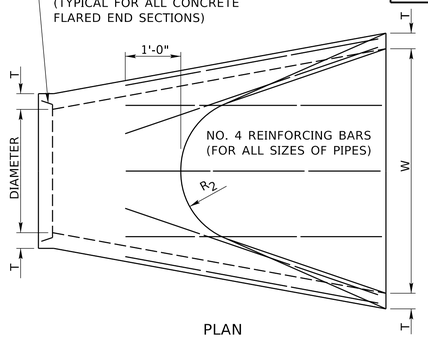


ELEVATION

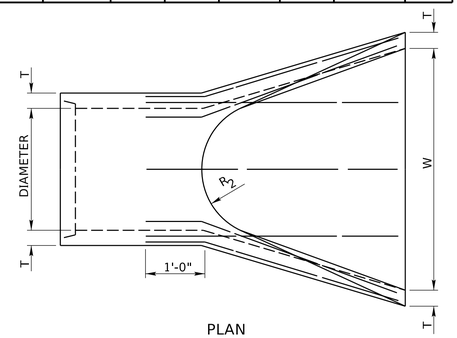
DETAILS OF CONCRETE FLARED END SECTION
(FOR REINFORCED CONCRETE PIPE-ARCH)**
**ARCH CONCRETE PIPE IS NOT READILY AVAILABLE IN NEBRASKA

PIPE DIA.	NOMINAL DIMENSIONS								
	L ± 6"	B	Y ± 4½"	C	W ± 2"	R1	R2	S APPROX.	T MIN.
12"	6'-0⅞"	2'-0"	4'-0⅞"	4"	2'-0"	1'-0⅛"	9"	3	2"
15"	6'-1"	2'-3"	3'-10"	6"	2'-6"	1'-0½"	11"	3	2¼"
18"	6'-1"	2'-3"	3'-10"	9"	3'-0"	1'-3½"	1'-0"	3	2½"
24"	6'-1½"	3'-7½"	2'-6"	9½"	4'-0"	1'-4 13/16"	1'-2"	3	3"
30"	6'-1¾"	4'-6"	1'-7¾"	1'-0"	5'-0"	1'-6½"	1'-3"	3	3½"
36"	8'-1¾"	5'-3"	2'-10¾"	1'-3"	6'-0"	2'-0 5/16"	1'-8"	3	4"
42"	8'-2"	5'-3"	2'-11"	1'-9"	6'-6"	2'-3½"	1'-10"	3	4½"
48"	8'-2"	6'-0"	2'-2"	2'-0"	7'-0"	2'-4½"	1'-10"	3	
54"	8'-4"	5'-5"	2'-11"	2'-3"	7'-6"	2'-9⅛"	2'-0"	2.4	5½"
60"	8'-3"	5'-0"	3'-3"	2'-6"	8'-0"	3'-0 11/16"	2'-0"	2	6"
66"	8'-3"	6'-6"	1'-9"	2'-6"	9'-0"	3'-0⅞"	2'-0"	2	6½"
72"	8'-3"	6'-6"	1'-9"	2'-6"	9'-0"	3'-2 15/16"	2'-0"	2	7"

GROOVE END ON OUTLET END SECTION
TOUNGE END ON INLET END SECTION
(TYPICAL FOR ALL CONCRETE
FLARED END SECTIONS)

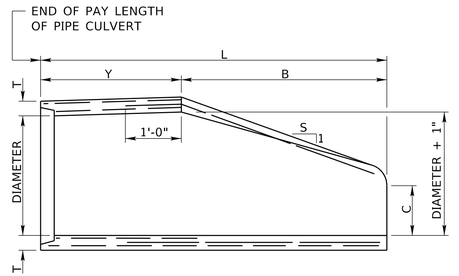


PLAN

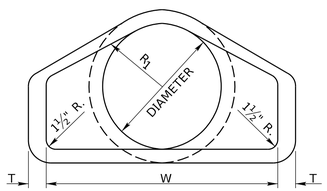


PLAN

END OF PAY LENGTH
OF PIPE CULVERT



SECTION



ELEVATION

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

NOTES:

CONCRETE FOR FLARED END SECTIONS SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF AASHTO DESIGNATION M170, M206, AND M207, FOR CLASS II PIPE.

REINFORCEMENT IN THE "Y" SECTION SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF AASHTO 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.

ACCORDING TO AASHTO DESIGNATION M170, M206 AND M207, ALTERNATIVE REINFORCEMENT DESIGN AND CONCRETE ADDITIVES SHALL BE EVALUATED ON A CASE-BY-CASE BASIS.

REV. NO.	DATE	DESCRIPTION OF REVISION
R5	MAY 24	ADDITIONAL NOTES & INFORMATION
R4	JAN 18	NDOR BORDER TO NDOT BORDER
R3	AUG 99	CHANGED NOTES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 410-R5

FLARED END SECTIONS FOR CULVERT PIPES

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

DATE

ORIGINAL:
FEBRUARY 22, 1974
DATE

2
2

COMPUTER: BG04194593
DATE: 15-JUL-2025 16:24
FILE: 4100 0 R5.dgn

COMPUTER: BG04190M593
DATE: 10-JUL-2025 14:19
FILE: 4110 0 R2.dgn

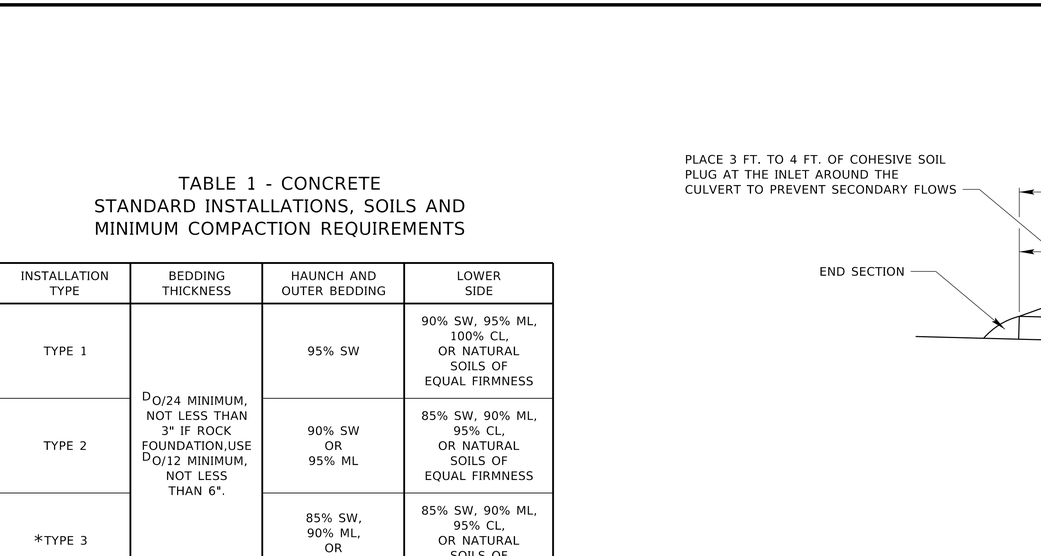
TABLE 1 - CONCRETE STANDARD INSTALLATIONS, SOILS AND MINIMUM COMPACTION REQUIREMENTS

INSTALLATION TYPE	BEDDING THICKNESS	HAUNCH AND OUTER BEDDING	LOWER SIDE
TYPE 1	$D_{O/24}$ MINIMUM, NOT LESS THAN 3" IF ROCK FOUNDATION,USE $D_{O/12}$ MINIMUM, NOT LESS THAN 6".	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 (SHADED) IN TABLE 4 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.

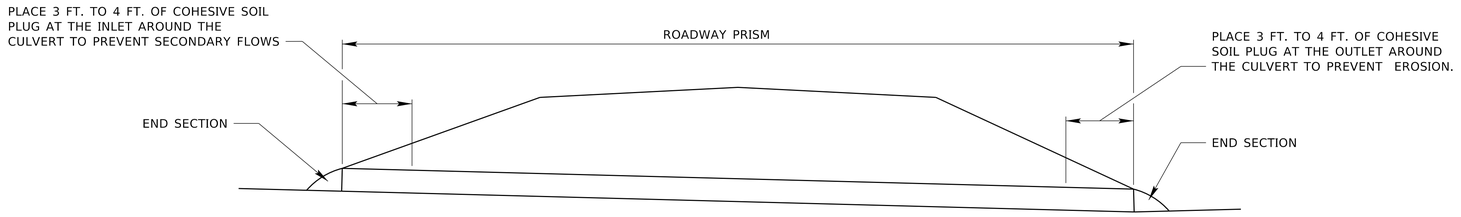
MAXIMUM FILL HEIGHTS FOR THE TYPE 1, 2, AND 3 INSTALLATIONS ARE SHOWN IN TABLE 4.



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



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 CONCRETE - 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 CONCRETE - TABLE 1).

(G) PLACE AND COMPACT THE HAUNCH, LOWER SIDE AND OVERFILL MATERIAL AT 6 IN. INTERVALS.

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
R2	JAN. 18	NDOR BORDER TO NDOT BORDER
R1	OCT. 14	UP TO 60" PLASTIC ALLOWED IN ALL OF TABLE 1 - PLASTIC

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 411-R2

BEDDING AND BACKFILL REQUIREMENTS FOR CONCRETE PIPE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER * MICK S. SYSLO E-10043 * STATE OF NEBRASKA

DATE

ORIGINAL: JUNE 6, 2008

DATE

1
4

COMPUTER: BG04194593
DATE: 10-JUL-2025 14:19
FILE: 4110 0 R2.dgn

TABLE 1 - CONCRETE STANDARD INSTALLATIONS, SOILS AND MINIMUM COMPACTION REQUIREMENTS

INSTALLATION TYPE	BEDDING THICKNESS	HAUNCH AND OUTER BEDDING	LOWER SIDE
TYPE 1	D_O/24 MINIMUM, NOT LESS THAN 3" IF ROCK FOUNDATION,USE D_O/12 MINIMUM, NOT LESS THAN 6".	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

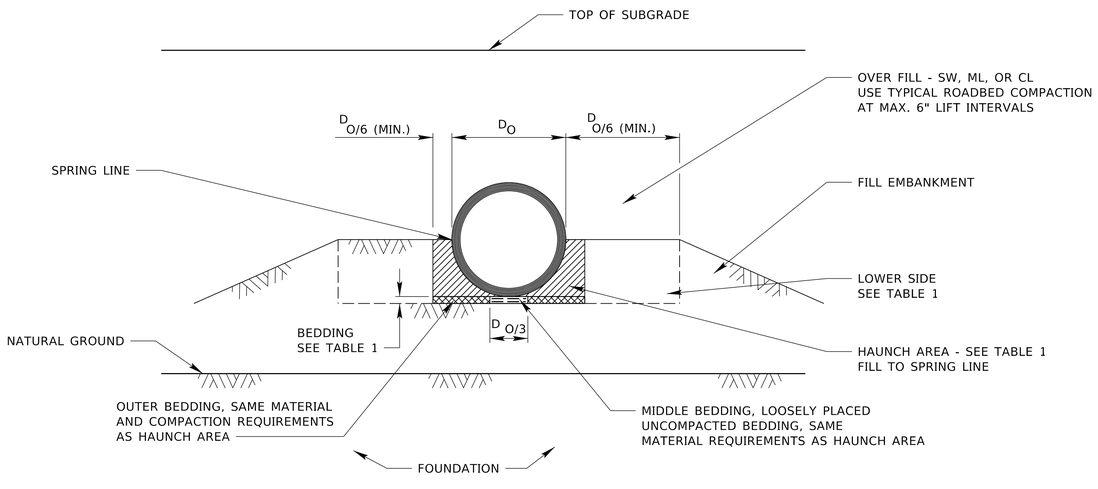
TABLE 1 NOTES:

*THE TYPE 3 INSTALLATION (SHADED) IN TABLE 4 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.

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

TABLE 2 - CONCRETE 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			



TYPICAL EMBANKMENT INSTALLATION

TABLE 3 SOIL CLASSIFICATION FOR BEDDING & BACKFILL

ASTM SOIL GROUP SYMBOL D 2487	DESCRIPTION	PERCENTAGE PASSING SIEVE SIZES		
		1½ IN.	NO. 4	NO. 200
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 D_O/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" 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.

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JAN. 18	NDOR BORDER TO NDOT BORDER
R1	OCT. 14	UP TO 60" PLASTIC ALLOWED IN ALL OF TABLE 1 - PLASTIC

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 411-R2

BEDDING AND BACKFILL REQUIREMENTS FOR CONCRETE PIPE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICK S. SYSLO
E-10043
STATE OF NEBRASKA

DATE

ORIGINAL: JUNE 6, 2008

DATE

2
4

TABLE 1 - CONCRETE STANDARD INSTALLATIONS, SOILS AND MINIMUM COMPACTION REQUIREMENTS

INSTALLATION TYPE	BEDDING THICKNESS	HAUNCH AND OUTER BEDDING	LOWER SIDE
TYPE 1	D_O/24 MINIMUM, NOT LESS THAN 3" IF ROCK FOUNDATION,USE D_O/12 MINIMUM, NOT LESS THAN 6".	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 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.

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

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 I 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

	INSTALLATION TYPE 3 * (NDOR STANDARD)			INSTALLATION TYPE 2			INSTALLATION TYPE 1		
PIPE SIZE (IN.)	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		

NOTES TABLE 4:

AASHTO M 170 SPECIFICATIONS ARE MODIFIED AS FOLLOWS:

ONLY SINGLE INNER CAGE, CIRCULAR REINFORCING IS ALLOWED FOR CLASS III, 15", 18", 21", AND 24" 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

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.

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

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JAN. 18	NDOR BORDER TO NDOT BORDER
R1	OCT. 14	UP TO 60" PLASTIC ALLOWED IN ALL OF TABLE 1 - PLASTIC

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 411-R2

BEDDING AND BACKFILL REQUIREMENTS FOR CONCRETE PIPE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

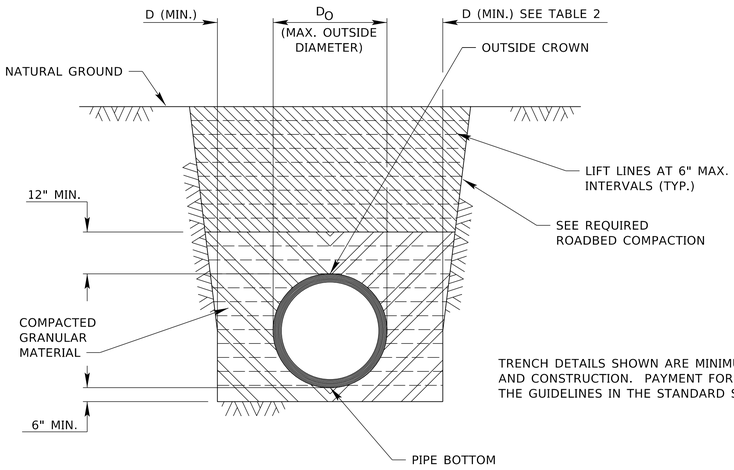
PROFESSIONAL CIVIL ENGINEER
MICK S. SYSLO
E-10043
STATE OF NEBRASKA

DATE

ORIGINAL: JUNE 6, 2008
DATE

3
4

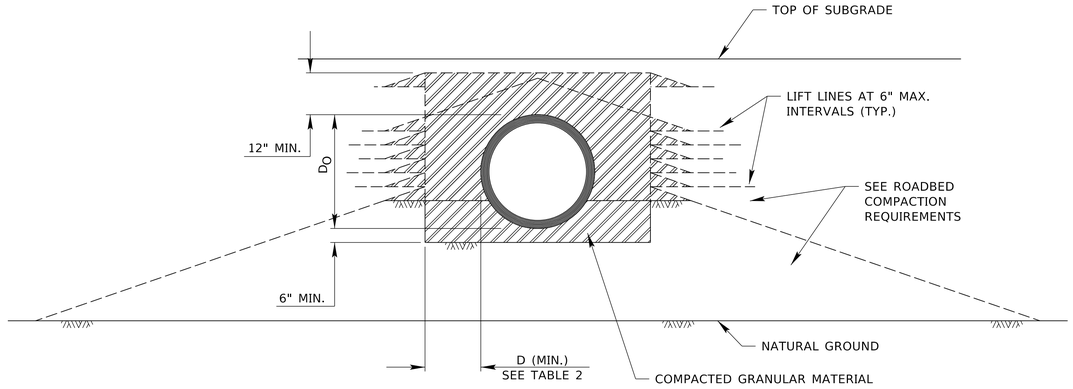
COMPUTER: BG0419M593
DATE: 10-JUL-2025 14:19
FILE: 4110 0 R2.dgn



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



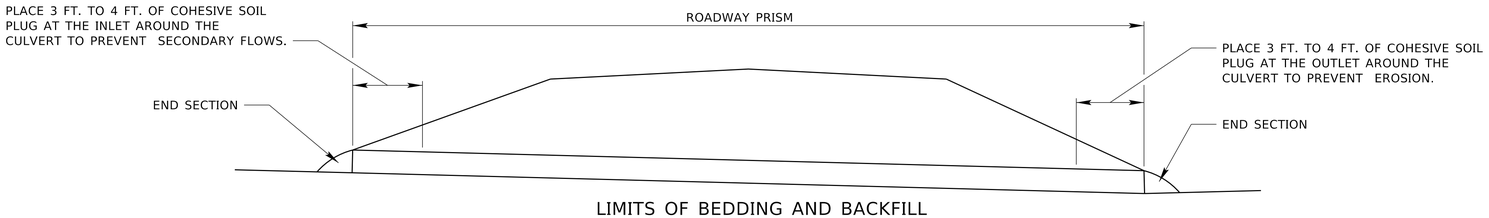
TYPICAL EMBANKMENT INSTALLATION

TABLE 1 - PLASTIC
SOIL CLASSIFICATION FOR GRANULAR FILL MATERIAL

SOIL GROUP SYMBOL D 2487	DESCRIPTION	% PASSING SIEVE SIZES		
		1½ IN.	NO. 4	NO. 200
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.		> 50% OF COARSE FRACTION	
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.		> 50% OF COARSE FRACTION	

TABLE 2 - PLASTIC
MINIMUM D (INCHES)

NOMINAL PIPE DIAMETER (INCHES)	TRENCH INSTALLATION		EMBANKMENT INSTALLATION	
	METAL PIPE	PLASTIC PIPE	METAL PIPE	PLASTIC PIPE
15	11	11	15	15
18	12	12	18	18
24	13	13	24	24
30	15	15	24	24
36	17	17	24	24
42	24	24	24	24
48	24	24	24	24
54	24	24	24	24
60	24	24	24	24
66	24		24	
72	24		24	
78	24		24	
84	24		24	



LIMITS OF BEDDING AND BACKFILL

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 FT. TO 4 FT. 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.

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JAN. 18	NDOR BORDER TO NDOT BORDER
R1	OCT. 14	UP TO 60" PLASTIC ALLOWED IN ALL OF TABLE 1 - PLASTIC

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 411-R2

BEDDING AND BACKFILL REQUIREMENTS FOR CONCRETE PIPE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

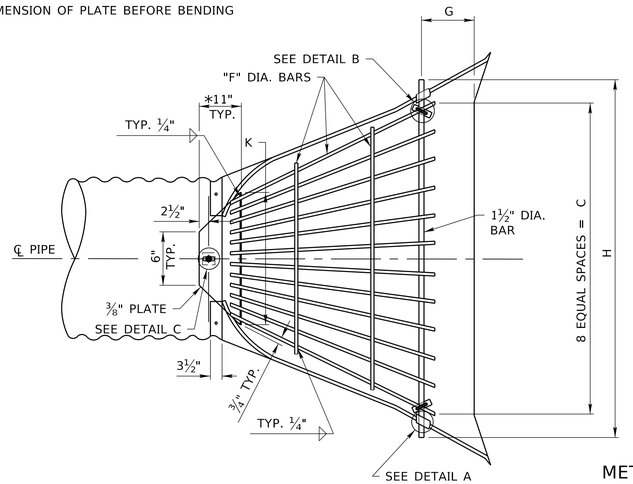
PROFESSIONAL CIVIL ENGINEER
MICK S. SYSLO
E-10043
STATE OF NEBRASKA

DATE

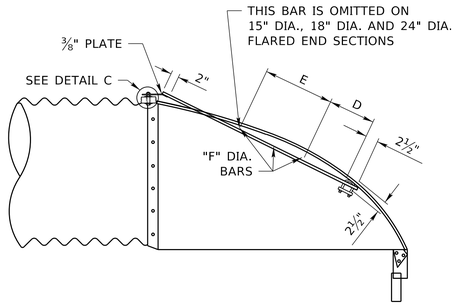
ORIGINAL:
JUNE 6, 2008
DATE

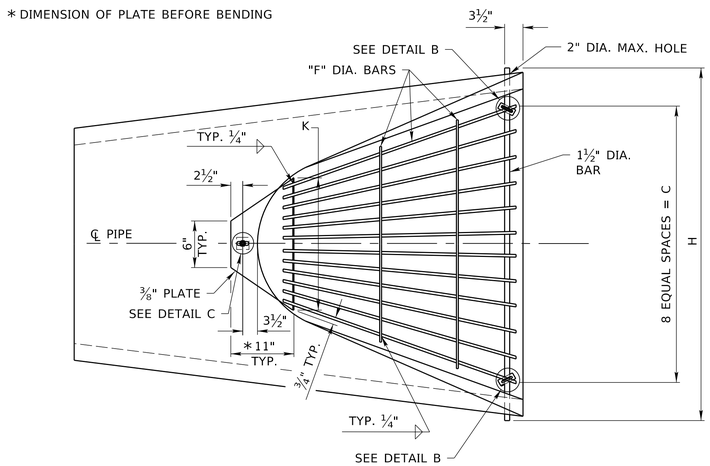
4
4

FILE: 4110 0 R2.dgn DATE: 10-JUL-2025 14:19 COMPUTER: BG0419M593

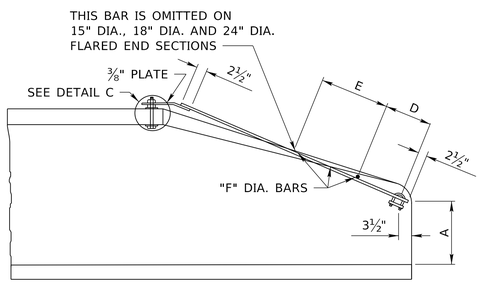


METAL FLARED END SECTION

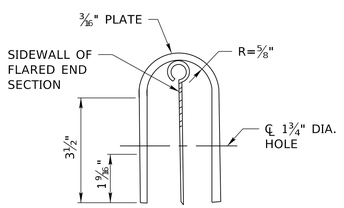




CONCRETE FLARED END SECTION



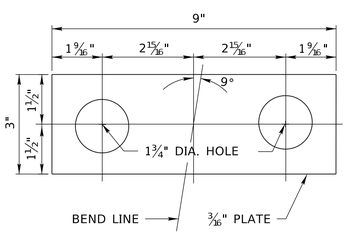
DETAIL B

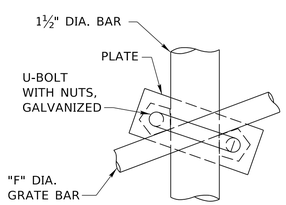


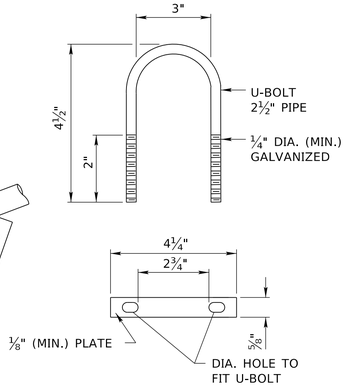
NOTES:

2 PLATES REQUIRED PER ASSEMBLY. MAKE ONE RIGHT AS SHOWN & ONE LEFT, OPPOSITE AS SHOWN

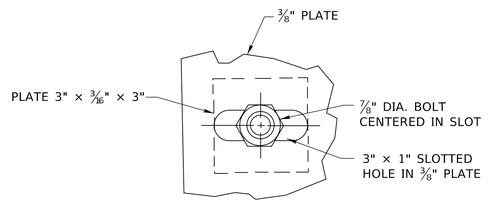
DETAIL A

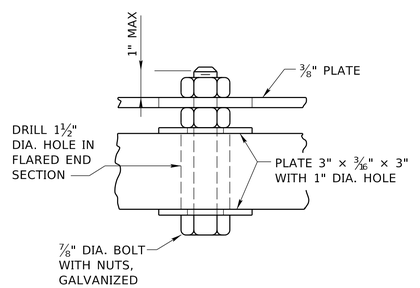






DETAIL C





BAR GRATE DATA
NOMINAL DIMENSIONS

METAL FLARED END SECTION & CONCRETE PIPE FLARED END SECTION									
DIA. PIPE SIZE	∗∗A	B	C	D	E	"F" BARS	∗∗∗ G	H	K
15"	5"	4	2'-0"	6"	——	⅝" DIA.	6"	2'-11"	1'-4"
18"	8"	5	2'-6"	6"	——	⅝" DIA.	8"	3'-6"	1'-4"
24"	8½"	7	3'-6"	9"	——	⅝" DIA.	8"	4'-7"	1'-8"
30"	11"	9	4'-6"	12"	1'-6"	⅞" DIA.	12"	5'-8"	1'-8"
36"	14"	11	5'-6"	12"	1'-6"	¾" DIA.	12"	6'-9"	2'-0"
42"	9"	12	6'-0"	12"	1'-6"	1" DIA.	9"	7'-4"	2'-0"
48"	9"	12	6'-6"	12"	1'-6"	1" DIA.	9"	7'-11"	2'-0"

∗∗ CONCRETE SECTIONS ONLY ∗∗∗ METAL SECTIONS ONLY

REINFORCED CONCRETE HORIZONTAL ELLIPTICAL FLARED END SECTION								
EQUIV. PIPE SIZE	A	B	C	D	E	"F" BARS	H	K
18"	5"	5	2'-6"	6"	——	⅝" DIA.	3'-6"	1'-0"
24"	5½"	7	4'-6"	9"	——	⅝" DIA.	4'-7"	1'-2"
30"	6½"	9	4'-6"	12"	1'-6"	¾" DIA.	5'-7"	1'-4"
36"	8¼"	11	5'-6"	12"	1'-6"	¾" DIA.	6'-10"	1'-6"
42"	12¾"	12	6'-0"	12"	1'-6"	1" DIA.	7'-5"	1'-8"
48"	18"	12	6'-8"	12"	1'-6"	1" DIA.	8'-0"	1'-10"

REINFORCED CONCRETE PIPE ARCH FLARED END SECTION								
EQUIV. PIPE SIZE	A	B	C	D	E	"F" BARS	H	K
18"	5"	5	2'-6"	6"	——	⅝" DIA.	3'-6"	1'-0"
24"	5½"	7	3'-6"	9"	——	⅝" DIA.	4'-7"	1'-8"
30"	6½"	9	4'-6"	12"	1'-6"	¾" DIA.	5'-9"	1'-8"
36"	8⅜"	11	5'-6"	12"	1'-6"	¾" DIA.	6'-10"	2'-0"
42"	12¾"	12	6'-0"	12"	1'-6"	1" DIA.	7'-4"	2'-2"
48"	18"	12	6'-6"	12"	1'-6"	1" DIA.	8'-0"	2'-2"

NOTES:

ALL STEEL MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M. A575 GRADE 1020 STEEL.

TWO SEPARATE COATS OF PAINT SHALL BE APPLIED TO ALL UNGALVANIZED STEEL MATERIAL. THE FIRST COAT SHALL BE INORGANIC ZINC RICH PRIMER AND THE SECOND COAT SHALL BE HI-BUILD VINYL GREEN BRIDGE PAINT. BOTH, THE INORGANIC ZINC PRIMER AND THE VINYL TOPCOAT SHOULD BE APPLIED SO EACH COAT WILL PROVIDE AN AVERAGE DRY FILM THICKNESS OF AT LEAST 3 MILS. THE MINIMUM DRY FILM THICKNESS MEASURED AT ANY POINT FOR EACH COAT SHALL BE 2.5 MILS AND THE MAXIMUM SHOULD NOT EXCEED 6 MILS. ALL PAINTING MAY BE DONE IN THE SHOP. UNLESS OTHERWISE SPECIFIED, BARS AND PLATES MAY BE GALVANIZED OR PAINTED.

GALVANIZATION SHALL BE IN ACCORDANCE WITH A.S.T.M. A123.

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JAN 18	NDOR NORDER TO NDOT BORDER
R2	JAN 10	NEW SEAL & FIXED U-BOLT
R1	AUG 82	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 413-R3

BAR GRATE FOR FLARED END SECTIONS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ MICHAEL H. OWEN E-6515 ★ STATE OF NEBRASKA

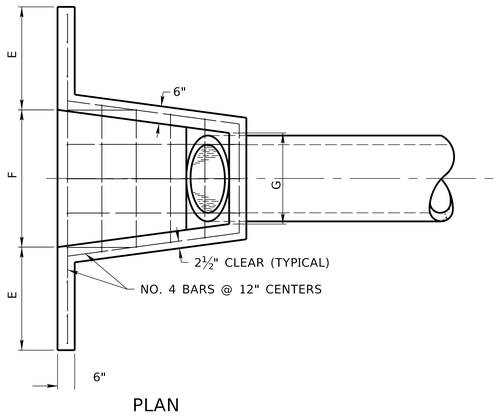
DATE

ORIGINAL: FEBRUARY 1, 2010

DATE

1 / 1

COMPUTER: BG04194187
DATE: 10-OCT-2024 14:11
FILE: 4130 0 R3.dgn



PLAN

HEADWALL DATA

DIA. OF PIPE D	DIMENSIONS									QUANTITIES-ONE HEADWALL (APPROXIMATE)		ADDITIONAL QUNATITIES PER ONE INCH INCREASE OF DIMENSION B	
	MAX. DIA.	A	* B	C	E	F	G	H	T	CONCRETE CU. YDS.	REINF. ST'L. LBS.	CONCRETE CU. YDS.	REINF. ST'L. LBS.
12"	20°	2'-6"	1'-6"	0'-5"	1'-6"	2'-0"	1'-6"	1'-2"	2"	0.6	50	0.01	1
18"	35°	3'-9"	2'-0"	0'-10"	2'-3"	3'-0"	2'-1"	1'-8"	2½"	1.1	80	0.02	1
24"	45°	5'-0"	2'-6"	1'-0"	3'-0"	4'-0"	2'-8"	2'-2"	3"	1.8	140	0.03	2
30"	45°	6'-3"	3'-0"	1'-6"	3'-9"	5'-0"	3'-3"	2'-8"	3½"	2.6	195	0.035	3
36"	45°	7'-6"	3'-6"	1'-9"	4'-6"	6'-0"	3'-10"	3'-2"	4"	3.6	265	0.04	3

* MINIMUM DIMENSION IS SHOWN. ACTUAL DIMENSION TO E AS DESIGNATED IN THE PLANS TO ESTABLISH AN UPPER ELEVATION WHICH IS A MINIMUM OF 6 INCHES ABOVE THE HIGH WATER ELEVATION

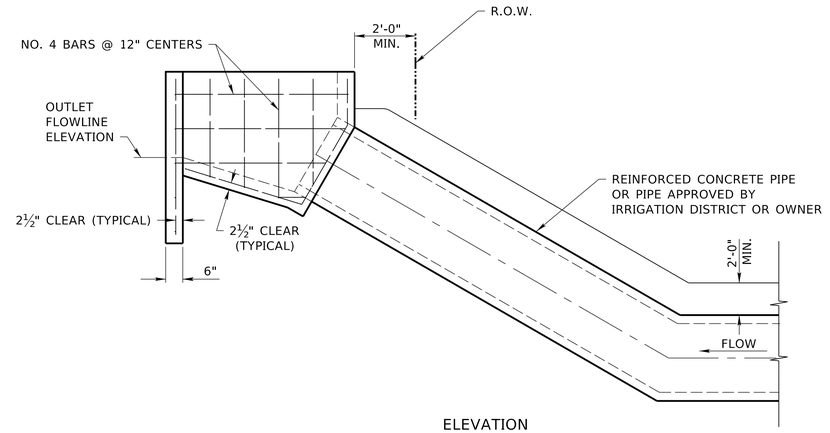
ALL CONCRETE SHALL BE CLASS "47A-S", "47B" OR "47C-S" WITH A WORKING STRESS OF 1,200 PSI AND A 28 DAY CYLINDER STRESS OF 3,000 PSI.

TRASH GUARDS ARE TO BE PROVIDED ONLY WHEN DESIGNATED IN THE PLANS. ALL BARS AND BRACES USED IN TRASH GUARDS SHALL CONFORM TO REQUIREMENTS OF ASTM A 575 GRADE 1020 STEEL. TWO SEPARATE COATS OF PAINT SHALL BE APPLIED TO THE TRASH GUARDS. THE FIRST COAT SHALL BE INORGANIC ZINC RICH PRIMER AND THE SECOND COAT SHALL BE HI-BUILD VINYL GREEN BRIDGE PAINT. BOTH THE INORGANIC ZINC PRIMER AND THE VINYL TOPCOAT SHOULD BE APPLIED SO EACH COAT WILL PROVIDE AN AVERAGE DRY FILM THICKNESS OF AT LEAST 3 MILS. THE MINIMUM DRY FILM THICKNESS MEASURED AT ANY POINT FOR EACH COAT SHALL BE 2.5 MILS AND THE MAXIMUM SHOULD NOT EXCEED 6 MILS. ALL PAINTING MAY BE DONE IN SHOP.

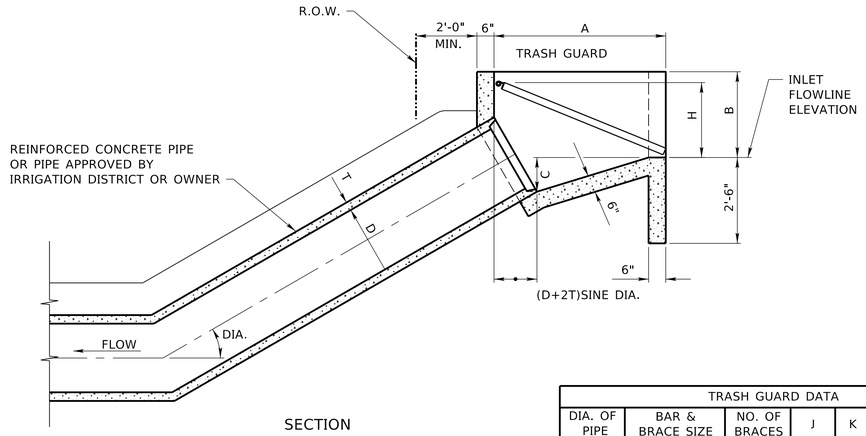
PAYMENT SHALL BE ON THE FOLLOWING BASIS:

(A) TRASH GUARDS; AT THE UNIT PRICE BID PER EACH FOR EACH SIZE TRASH GUARD WHICH SHALL INCLUDE ALL MATERIALS, FITTINGS AND INSTALLATION.

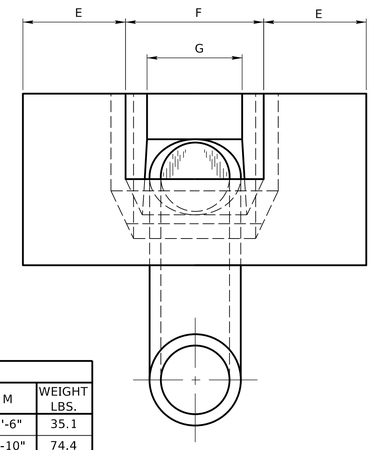
(B) HEADWALLS; AT THE UNIT PRICE BID PER EACH FOR EACH SIPHON HEADWALL, COMPLETE IN PLACE WHICH SHALL INCLUDE ALL NECESSARY EXCAVATION, CONCRETE, REINFORCING STEEL, MISCELLANEOUS MATERIALS AND LABOR. DIMENSION "B" MAY BE INCREASED OR DECREASED FROM THAT SHOWN IN THE PLANS BY NOT MORE THAN SIX INCHES WITHOUT ANY ADJUSTMENT IN COMPENSATION. CHANGES IN EXCESS OF SIX INCHES SHALL BE PAID FOR ON AN EXTRA WORK BASIS.



ELEVATION



SECTION

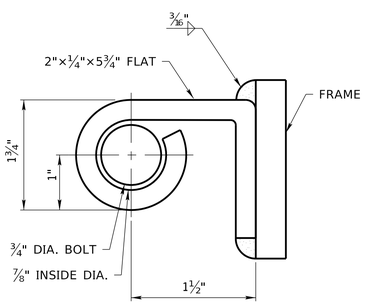


END VIEW

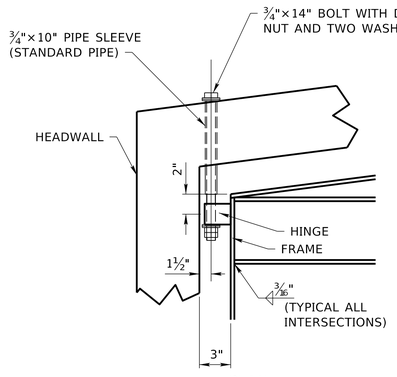
DETAILS OF PIPE SECTION

TRASH GUARD DATA

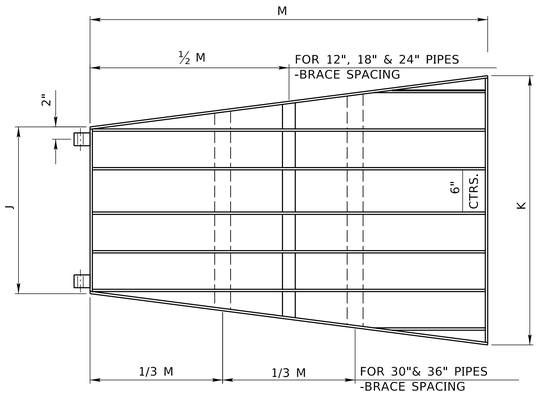
DIA. OF PIPE	BAR & BRACE SIZE	NO. OF BRACES	J	K	M	WEIGHT LBS.
12"	⅜" × 2"	1	1'-0"	1'-6"	2'-6"	35.1
18"	⅜" × 2"	1	1'-7"	2'-6"	3'-10"	74.4
24"	⅜" × 2"	1	2'-2"	3'-6"	5'-2"	120.5
30"	⅜" × 2½"	2	2'-9"	4'-6"	6'-6"	235.9
36"	⅜" × 2½"	2	3'-4"	5'-6"	7'-10"	317.6



SECTION
HINGE



PLAN
HINGE ASSEMBLY



PLAN

DETAILS OF TRASH GUARD

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	MAR 09	NOTE CHANGE
R1	NOV 08	NEW SEAL

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 414-R3

PIPE SIPHON

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

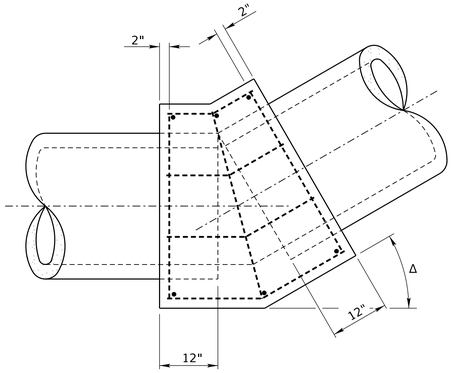
DATE

PROFESSIONAL CIVIL ENGINEER
MARK J. TRAYNOWICZ
E-8119
STATE OF NEBRASKA

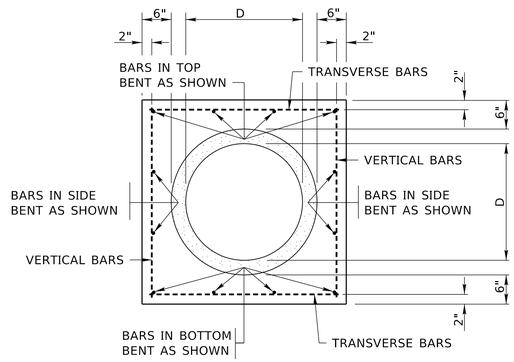
ORIGINAL: FEBRUARY 04, 1981
DATE

1
1

COMPUTER: BG04194187
DATE: 10-OCT-2024 14:56
FILE: 4140 0 R3.dgn



SIDE ELEVATION



END ELEVATION

DETAILS OF COLLARS

SCHEDULE OF BARS FOR COLLAR					
SIZE OF PIPE "D"	BAR SIZE	NUMBER OF BARS			
		TRANS-VERT	TOP	ONE SIDE	BOTTOM
12"	NO. 4	12	4	2	4
15"	N0. 4	12	4	2	4
18"	NO. 4	12	4	2	4
21"	NO. 4	12	4	2	4
24"	NO. 4	12	4	2	4
27"	NO. 4	12	4	2	5
30"	NO. 4	12	4	2	5
36"	NO. 4	12	4	2	5
42"	NO. 4	12	5	3	6
48"	NO. 4	12	5	3	6
54"	NO. 4	12	5	3	6
60"	NO. 4	12	5	3	6

DATA FOR COLLARS			
SIZE OF PIPE "D"	Δ	CONCRETE (CU. YDS.)	REINF. STEEL (LBS.)
12"	0°	0.30	32
	15°	0.33	33
	30°	0.36	36
	45°	0.39	37
15"	0°	0.36	35
	15°	0.40	36
	30°	0.43	38
	45°	0.47	40
18"	0°	0.42	38
	15°	0.49	41
	30°	0.56	44
	45°	0.64	46
21"	0°	0.47	40
	15°	0.55	42
	30°	0.64	46
	45°	0.74	48
24"	0°	0.53	43
	15°	0.63	45
	30°	0.74	49
	45°	0.86	51
27"	0°	0.57	45
	15°	0.70	48
	30°	0.84	52
	45°	0.99	55
30"	0°	0.63	49
	15°	0.79	53
	30°	0.96	57
	45°	1.14	61
36"	0°	0.77	53
	15°	1.01	58
	30°	1.26	63
	45°	1.53	68
42"	0°	0.96	65
	15°	1.32	72
	30°	1.69	80
	45°	2.09	91
48"	0°	1.16	68
	15°	1.66	77
	30°	2.19	86
	45°	2.75	95
54"	0°	1.34	75
	15°	2.01	84
	30°	2.70	95
	45°	3.44	106
60"	0°	1.54	77
	15°	2.39	89
	30°	3.28	100
	45°	4.23	113

THE DIMENSIONS FOR CONCRETE PIPE SHOWN ON THIS PLAN ARE FOR CLASS III REINFORCED CONCRETE PIPE, AASHTO DESIGNATION M170, WALL "B".

ALL QUANTITIES ARE BASED ON DIMENSIONS SHOWN ON THIS PLAN. NO ADJUSTMENTS WILL BE MADE IN THESE QUANTITIES IF OTHER STRENGTH STANDARD PIPE IS FURNISHED IN ACCORDANCE WITH THE SPECIFICATIONS OR IF COLLARS ARE USED ON PIPE OTHER THAN CONCRETE.

WHEN A CONCRETE COLLAR, CONNECTING EXISTING AND NEW CONCRETE PIPE, IS CONSTRUCTED WITH A BEND, IT SHALL BE CONSIDERED AS A COLLAR NOT AN ELBOW.

ALL REINFORCING STEEL USED SHALL CONFORM TO THE REQUIREMENTS OF THE ASTM DESIGNATIONS A615/A615M, GRADE 60. ALL BAR DESIGNATIONS ARE IN CUSTOMARY U.S. UNITS.

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

FOR A SINGLE LINE OF REINFORCING WIRE MESH, TIE REINFORCING BARS ON THE OUTSIDE OF THE CAGE.

FOR A DOUBLE LINE OF REINFORCING WIRE MESH, TIE REINFORCING WIRE MESH ON THE INSIDE OF THE OUTSIDE CAGE.

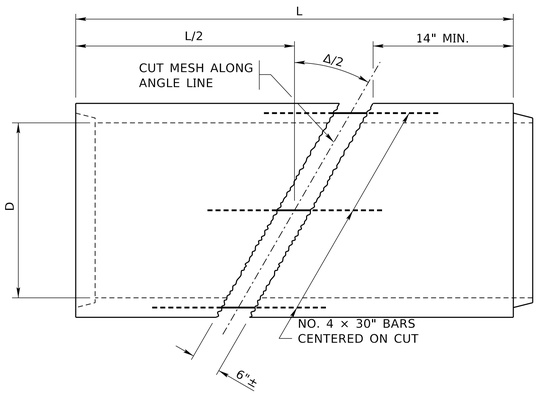
REINFORCING BARS SHALL BE LAPPED WHERE THE BEND IS MADE.

REINFORCING WIRE MESH SHALL BE LAPPED AND TIED WHERE THE BEND IS MADE.

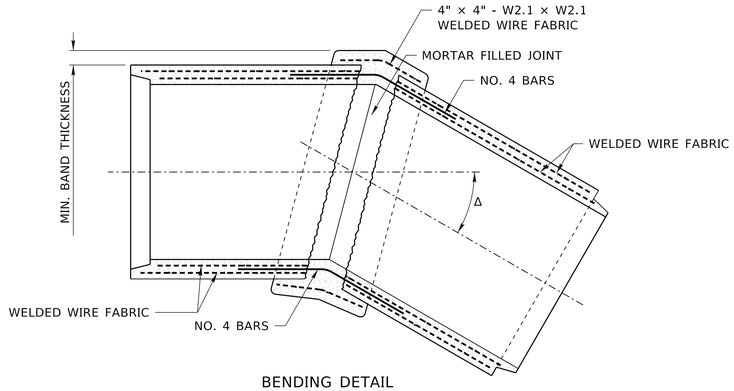
WELDED WIRE FABRIC OR EQUAL SHALL BE LAPPED 12" AT SPLICES.

THE ORIENTATION OF THE PIPE SHALL BE MARKED WHEN CASTING TO ASSURE ADEQUATE REINFORCING BAR EMBEDMENT AND PROPER ALIGNMENT WHEN CUTTING AND ROTATING.

ALL PIPE DIMENSIONS SHOWN ARE NOMINAL.

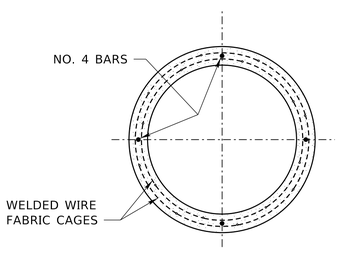


CUTTING DETAIL

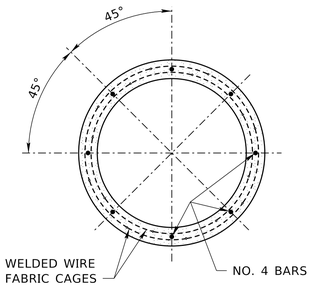


BENDING DETAIL

DETAILS OF CONCRETE ELBOWS



12" THROUGH 24"
PIPE DIAMETERS



OVER 24" PIPE DIAMETER

DATA FOR PRECAST ELBOWS			
SIZE OF PIPE "D"	MINIMUM BAND THICKNESS	Δ MAXIMUM	
		L=6'	L=7½'
12"	1"	90°	90°
15"	1"	90°	90°
18"	1"	90°	90°
21"	1"	90°	90°
24"	1⅛"	90°	90°
27"	1⅛"	90°	90°
30"	1¼"	90°	90°
36"	1⅜"	81°	90°
42"	1½"	73°	90°
48"	1¾"	66°	88°
54"	2"	60°	81°
60"	2"	55°	75°

BAR LOCATION DETAILS

REV. NO.	DATE	DESCRIPTION OF REVISION
R5	JAN 18	NDOR BORDER TO NDOT BORDER
R4	JAN 07	REMOVED REFERENCE TO CONC. AX-3000
R3	AUG 99	COMPUTER FILE/CHANGES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 425-R5

COLLARS AND ELBOWS FOR CONCRETE PIPE

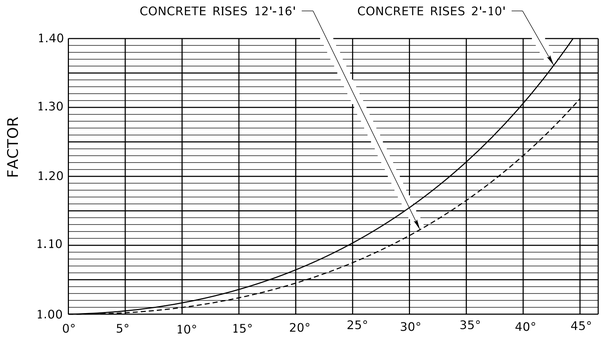
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

ORIGINAL:
FEBRUARY 22, 1974
DATE

1
1

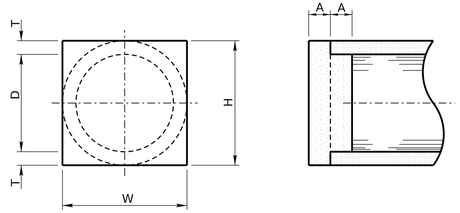
COMPUTER: BG04194593
DATE: 11-JUL-2025 07:06
FILE: 4250 0 R5.dgn



BOX CULVERT FACTOR CHART
(CONCRETE)

DIA. (IN.)	A (IN.)	T (IN.)	H (FT/IN)	W (IN.)	CONCRETE ** (CU. YDS.)
12	4	2	1'-4"		0.03
15	4	2¼	1'-7½"		0.05
18	4	2½	1'-11"		0.07
24	4	2¾	2'-5½"		0.11
30	4	3	3'-0"		0.17
36	6	3½	3'-7"	SAME AS H	0.37
42	6	4¼	4'-2½"		0.51
48	6	5	4'-10"		0.66
54	6	5½	5'-5"		0.84
60	8	6	6'-0"		1.37
66	8	6½	6'-7"		1.66
72	8	7	7'-2"		1.97
78	8	7½	7'-9"		2.30
84	8	8	8'-4"		2.66

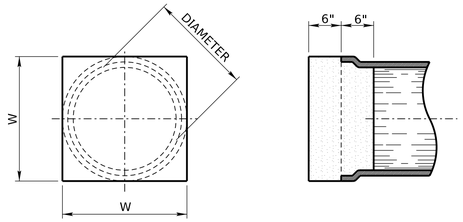
** QUANTITIES FOR 1 - PLUG



CONCRETE PLUG
(FOR CONCRETE PIPE)

DIA. (IN.)	W (IN.)	CONCRETE **(CU. YDS.)
8	11	0.02
10	13	0.03
12	16	0.05
15	19	0.07
18	23	0.11
21	26	0.14
24	30	0.19

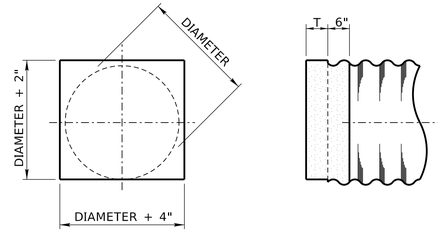
** QUANTITIES FOR 1 - PLUG



CONCRETE PLUG
(FOR CLAY TILE PIPE)

DIA. (IN.)	T (IN.)	CONCRETE ** (CU. YDS.)
18	6	0.09
24	6	0.15
30	6	0.23
36	6	0.33
42	6	0.44
48	6	0.57
54	8	0.85
60	8	1.04
72	8	1.49

** QUANTITIES FOR 1 - PLUG



CONCRETE PLUG
(FOR CORRUGATED METAL PIPE)

SPAN (FT.)	RISE (FT.)	X (IN.)	Y (FT/IN)	CONCRETE ** (CU. YDS.)
2	2	6	1'-6"	0.20
3	2	6	1'-6"	0.30
4	2	6	1'-6"	0.41
3	3	6	1'-6"	0.45
4	3	6	1'-6"	0.60
5	3	6	1'-6"	0.75
6	3	6	1'-6"	0.90
8	3	6	1'-6"	1.19
10	3	6	1'-6"	1.50
12	3	6	1'-6"	1.81
4	4	6	1'-6"	0.78
5	4	6	1'-6"	0.98
6	4	6	1'-6"	1.18
8	4	6	1'-6"	1.57
10	4	6	1'-6"	1.97
12	4	6	1'-6"	2.37
4	5	8	2'-0"	1.29
5	5	8	2'-0"	1.62
6	5	8	2'-0"	1.94
8	5	8	2'-0"	2.58
10	5	8	2'-0"	3.23
12	5	8	2'-0"	3.89
4	6	8	2'-0"	1.53
5	6	8	2'-0"	1.92
6	6	8	2'-0"	2.31
8	6	8	2'-0"	3.07
10	6	8	2'-0"	3.85
12	6	8	2'-0"	4.63
5	7	10	2'-6"	2.79
6	7	10	2'-6"	3.35
7	7	10	2'-6"	3.90
8	8	10	2'-6"	5.07
10	8	10	2'-6"	6.35
12	8	10	2'-6"	7.64
10	10	10	3'-0"	8.79
12	10	10	3'-0"	10.54
12	12	10	3'-0"	12.61

** QUANTITIES FOR 1 - PLUG

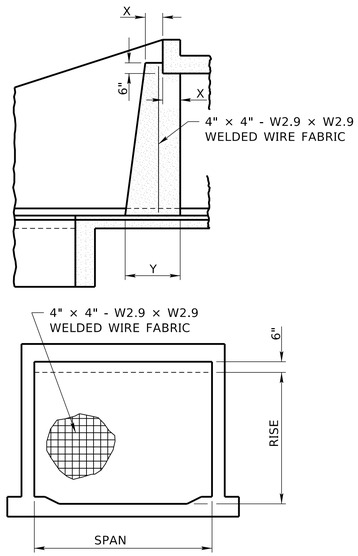
TYPICAL COMPUTATIONS FOR QUANTITY
IN ONE SKEWED CONCRETE BOX PLUG

EXAMPLE:

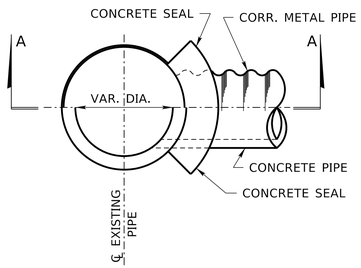
10' × 5' CONCRETE BOX CULVERT,
SKEWED 35° FROM TABLE, QUANTITY FOR ONE PLUG:

10' × 5' BOX = 3.23 CU. YDS.
FACTOR FOR 35° FROM CHART = 1.221

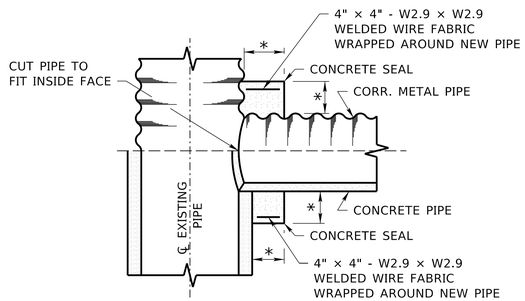
ADJUSTED QUANTITY FOR ONE PLUG
3.23 × 1.221 = 3.94 CU.YDS.



CONCRETE PLUG FOR CONCRETE BOX CULVERT



ELEVATION



SECTION A-A

NOTES:

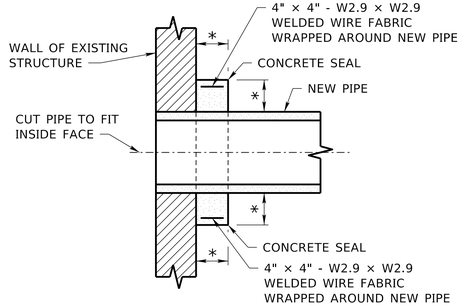
ALL CONCRETE SHALL BE CLASS 47B-3000.

BEFORE PLACING THE CONCRETE, ALL LOOSE DIRT SHALL BE REMOVED FROM PARTS OF STRUCTURE COMING IN CONTACT WITH NEW CONCRETE.

EXCAVATION FOR CULVERT PLUGS SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEMS FOR WHICH PAYMENT IS MADE.

FIELD PIPE TAP DETAILS

NOTES:
DIMENSIONS MARKED THUS, *, ARE 6"
ON PIPES UP TO 24" DIA. INCLUSIVE AND
8" ON PIPES 30" DIA. AND OVER.



TAP FOR EXISTING STRUCTURE

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JAN 18	NDOR BORDER TO NDOT BORDER
R3	JAN 07	REMOVED REFERENCE TO CONC. AX-3000
R2	AUG 99	CHART CHANGES/WELDED WIRE FABRIC

NEBRASKA DEPARTMENT OF TRANSPORTATION
STANDARD PLAN NO. 428-R4

CONCRETE PLUGS AND FIELD TAP DETAILS

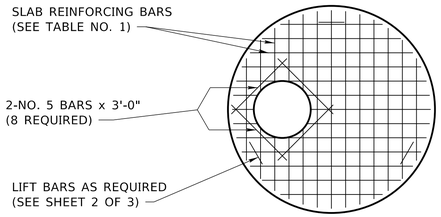
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

ORIGINAL:
FEBRUARY 22, 1974
DATE

1
1

COMPUTER: BG0419M593
DATE: 11-JUL-2025 07:20
FILE: 4280 0 R4.dgn

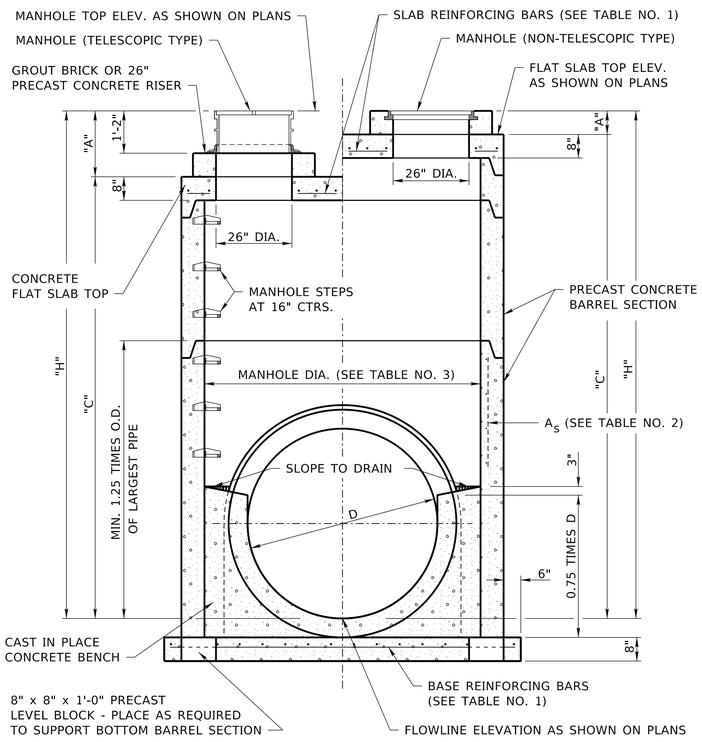


FLAT SLAB BASE

TABLE NO. 1	
BASE AND TOP SLAB FOR ROUND MANHOLE	
MANHOLE DIAMETER	SLAB REINFORCING BAR SIZE AND SPACING
48" - 60"	NO. 4 AT 6" CTRS.
66" & 72"	NO. 5 AT 7½" CTRS.
84" & 96"	NO. 5 AT 6½" CTRS.
120"	NO. 5 AT 5½" CTRS.

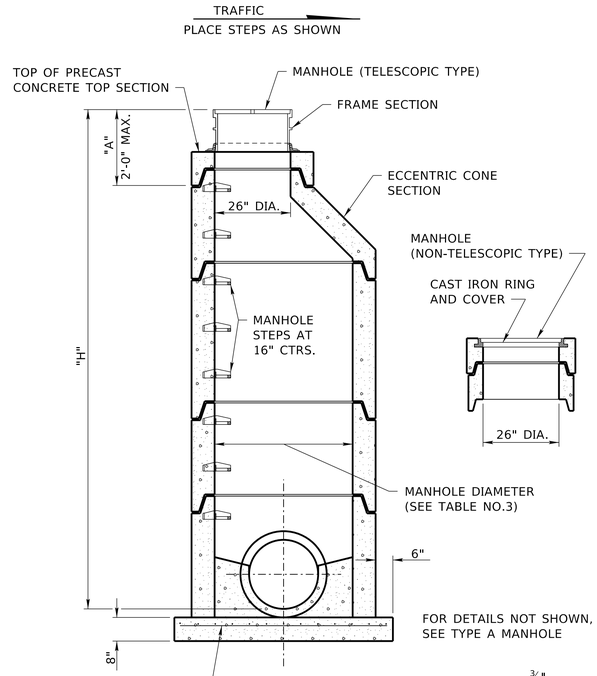
TABLE NO. 2	
CIRCUMFERENTIAL REINFORCEMENT PER FOOT OF BARREL	
DIAMETER BARREL SECTION	AREA OF STEEL A_S (SQ. IN./FT.)
84"	0.37
96"	0.47
120"	0.70

TRAFFIC
PLACE STEPS AS SHOWN

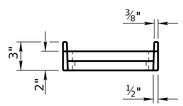


TYPE A

TRAFFIC
PLACE STEPS AS SHOWN



TYPE B



END ELEVATION

NOTES:

DIMENSION "A" SHALL BE THE DIFFERENCE BETWEEN THE MANHOLE TOP ELEVATION AND THE FLAT TOP ELEVATION FOR TYPE A MANHOLE. DIMENSION "A" SHALL BE THE DIFFERENCE BETWEEN THE TOP MANHOLE ELEVATION AND THE TOP OF THE ECCENTRIC TRANSITION SECTION FOR TYPE B MANHOLE. THE MIN. DIMENSION A SHALL BE 9" UNDER PAVEMENT AND 1'-4" OUTSIDE THE PAVEMENT. DIMENSION "A" SHALL NOT EXCEED 2'-0". WHEN RECONSTRUCTING OR ADJUSTING TO GRADE AN EXISTING MANHOLE, TYPE A OR B, DIMENSION "A" MAY BE INCREASED TO 5'-0" MAX., IF THE RECONSTRUCTION WOULD REQUIRE DIMENSION "A" TO BE IN EXCESS OF 5'-0", THEN THE CONE SECTION OF THE FLAT SLAB TOP MUST BE RAISED AND THE 2'-0" MAX. DIMENSION "A" WILL AGAIN APPLY.

DIMENSION "C" SHALL BE THE DIFFERENCE BETWEEN THE FLOWLINE ELEVATION SHOWN ON THE PLANS AND THE FLAT SLAB TOP ELEVATION WHEN SHOWN ON THE PLANS. ONE OR MORE PRECAST CONCRETE BARREL SECTIONS MAY BE PROVIDED TO OBTAIN THE REQUIRED HEIGHT. THE CONTRACTOR MAY PROVIDE ANY COMBINATION OF STANDARD LENGTH PRECAST CONCRETE SECTIONS THAT WILL EQUAL OR EXCEED DIMENSION "C". IF ADDITIONAL LENGTH IS PROVIDED, THE LEVEL BLOCKS SHALL BE SET AT THE PROPER ELEVATION BELOW THE FLOWLINE SO THAT THE FLAT SLAB TOP ELEVATION SHOWN ON THE PLANS WILL BE OBTAINED. ALL ADDITIONAL MATERIAL OR WORK REQUIRED SHALL BE AT THE CONTRACTOR'S EXPENSE.

DIMENSION "H" SHALL BE THE DIFFERENCE BETWEEN THE FLOWLINE ELEVATION SHOWN ON THE PLANS AND THE MANHOLE TOP ELEVATION SHOWN ON THE PLANS.

THE FURNISHING AND PLACING OF MANHOLE STEPS AND LIFT BARS SHALL BE SUBSIDIARY TO THE MANHOLE.

MATCH TOP INSIDE SURFACES OF THE PIPES COMING INTO THE MANHOLE WHENEVER POSSIBLE. THE MANHOLE BENCH SHALL COME UP TO ¾ THE DIA. OF THE LARGEST PIPE AND SLOPE UP 3" TO THE SIDE. CONTOUR THE BENCH TO DRAIN.

THE MIN. CLEARANCE OF REINFORCING STEEL SHALL BE 2".

BARREL DIA. SHOWN ON THE PLAN ARE THE MIN. DIA. THAT MAY BE USED AT EACH LOCATION. THESE DIA. ARE BASED ON CENTER BARREL SECTIONS WHICH ARE USUALLY AVAILABLE FROM THE FABRICATOR. THE CONTRACTOR MAY PROVIDE BARREL SECTIONS OF LARGER DIA. THAN SHOWN ON THE PLAN. NO ADDITIONAL PAYMENT SHALL BE MADE FOR BARREL SECTIONS OF A LARGER DIA. THAN SHOWN ON THE PLANS.

EACH SECTION SHALL BE SET IN A FRESH BED OF MORTAR AND POINTED UP INSIDE AND OUT, OR A COLD FORMED JOINT MATERIAL CONFORMING TO FEDERAL SPECIFICATIONS SS-S-00210.

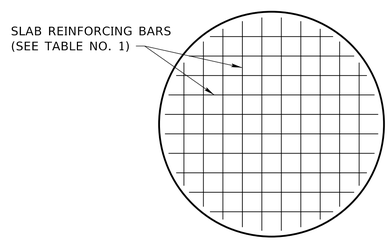
THE CONTRACTOR MAY, AT HIS OPTION, CAST-IN-PLACE THE FIRST SECTION OF THE MANHOLE WHEN THE STANDARD KNOCKOUTS ARE NOT AVAILABLE. THE CONCRETE WALL THICKNESS AND REINFORCING STEEL AREA SHALL BE AS SHOWN FOR THE RESPECTIVE "H" DIMENSION IN CHART NO. 1 FOR MANHOLE TYPE C. THE MIN. LS AND SS DIMENSION SHALL BE OF SUFFICIENT DIMENSION TO ACCOMMODATE PIPES ENTERING THE RESPECTIVE WALL. THE TOP OF THE CAST-IN-PLACE SECTION SHALL BE FORMED TO THE SAME DIA. AS THE RESPECTIVE PRECAST SECTION.

UNLESS SPECIFIED IN THE PLANS, THE CONTRACTOR MAY DETERMINE THE TYPE MANHOLE TO BE CONSTRUCTED.

THE CONTRACTOR MAY, AT HIS OPTION, USE TRANSITION SECTIONS TO REDUCE THE BARREL SIZE OF THE MANHOLE. DIMENSION "A" CANNOT EXCEED 2'-0" ON THE 26" DIA. RISER SECTION.

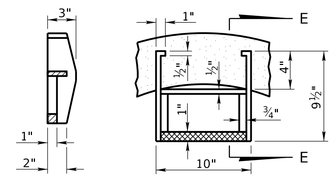
WHEN USING BRICK FOR THE FINAL ADJUSTMENT OF THE FLANGE SECTION, A DOUBLE ROW OF BRICK PLASTERED ½" THICK INSIDE AND OUT SHALL BE USED. THE BRICK SHALL CONFORM TO REQUIREMENTS OF A.S.T.M. C32.

PRECAST MANHOLE SECTIONS MAY BE SET WITH EITHER THE TONGUE END UP OR THE GROOVE END UP.

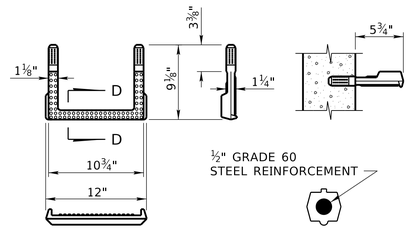


TYPE A AND B BASE

TABLE NO. 3	
MANHOLE SIZE BASED ON LARGEST PIPE INTO MANHOLE	
LARGEST PIPE DIAMETER	MINIMUM MANHOLE DIAMETER
24" OR LESS	48"
30"	54"
36"	60"
42"	66"
48"	72"
54"	84"
66"	96"
84"	120"



STEPS AT 16" CTRS.
DETAILS OF CAST IRON STEP



STEPS AT 16" CTRS.
DETAILS OF POLYPROPYLENE
ENCAPSULATED STEEL ROD STEP
(ALTERNATE DESIGN)

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JUN 23	REMOVE FLANGE SECTION CALLOUT
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	NOV 98	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION
STANDARD PLAN NO. 435-R3
MANHOLE

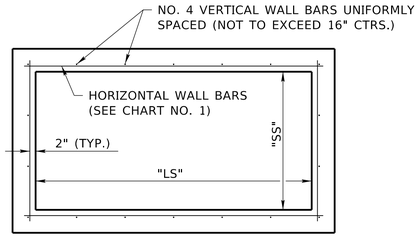
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

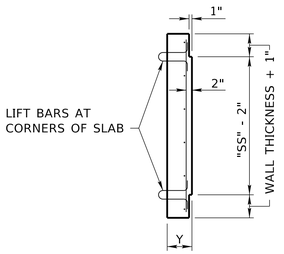
ORIGINAL:
APRIL 4, 1988
DATE

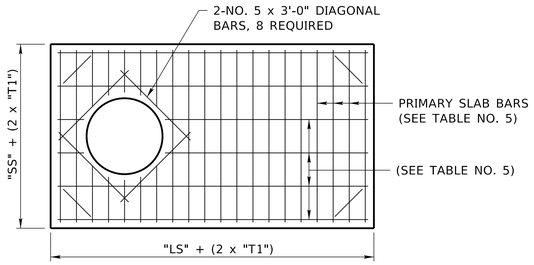
1
3

COMPUTER: BG0419M593
DATE: 11-JUL-2025 07:33
FILE: 4350 0 R3.dgn



SECTION A-A





TOP SLAB

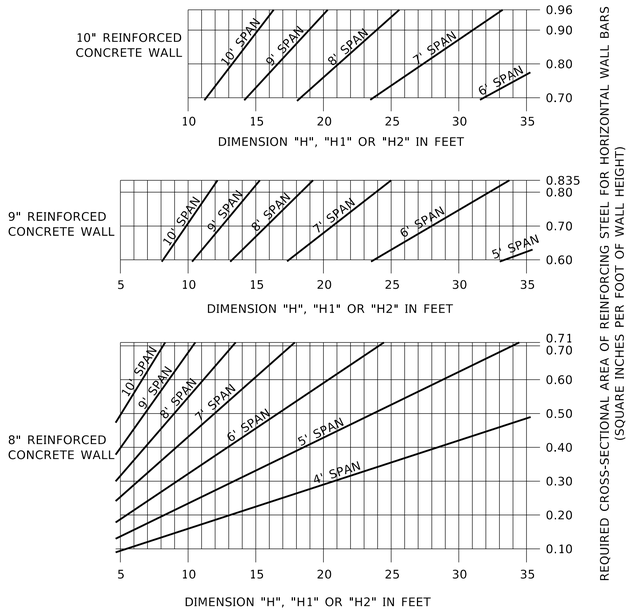
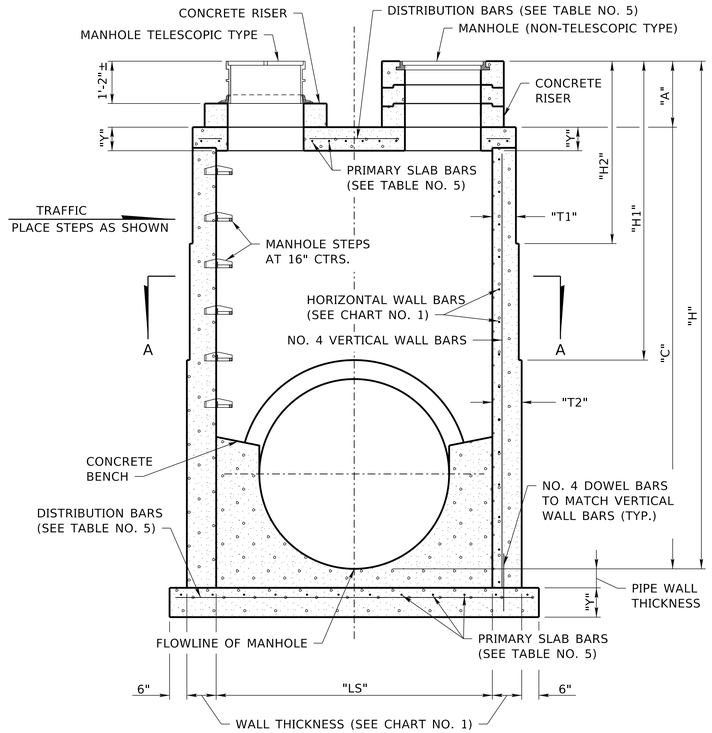
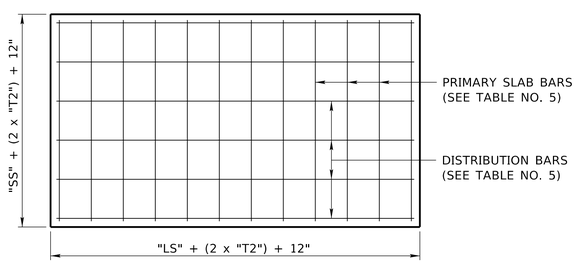


CHART NO. 1



FOR DEFINITIONS OF DIMENSIONS "A", "C" AND "H", SEE SHEET 1.

TYPE C



BASE

TABLE NO. 4			
CROSS SECTIONAL AREAS IN SQUARE INCHES OF BARS IN WALL SECTIONS ONE FOOT HIGH			
SPACING	BAR SIZE		
	NO. 4	NO. 5	NO. 6
5"	0.46	0.74	1.06
5½"	0.44	0.68	0.96
6"	0.40	0.62	0.88
6½"	0.37	0.57	0.81
7"	0.34	0.53	0.75
7½"	0.32	0.50	0.70
8"	0.30	0.47	0.66
8½"	0.28	0.44	0.62
9"	0.27	0.41	0.59
9½"	0.25	0.39	0.56
10"	0.24	0.37	0.53
10½"	0.23	0.35	0.50
11"	0.22	0.34	0.48
11½"	0.21	0.32	0.46
12"	0.20	0.31	0.44

TABLE NO. 5			
BASE AND TOP SLAB FOR RECTANGULAR MANHOLE			
SHORT SPAN DIMENSION "SS"	SLAB THICKNESS "Y"	PRIMARY SLAB REINFORCING BAR SIZE & SPACING	DISTRIBUTION REINFORCING BAR SIZE & SPACING
2'-6" TO 4'-11"	8½"	NO. 5 AT 5½" CTRS.	NO. 5 AT 11" CTRS.
5'-0" TO 5'-11"	9"	NO. 5 AT 5" CTRS.	NO. 5 AT 10" CTRS.
6'-0" TO 6'-11"	9½"	NO. 5 AT 4½" CTRS.	NO. 5 AT 9" CTRS.
7'-0" TO 7'-11"	10"	NO. 6 AT 5½" CTRS.	NO. 6 AT 11" CTRS.
8'-0" TO 8'-11"	11"	NO. 6 AT 5½" CTRS.	NO. 6 AT 11" CTRS.
9'-0" TO 10'-0"	12"	NO. 6 AT 5" CTRS.	NO. 6 AT 10" CTRS.

NOTES:

CHART NO. 1 SHALL BE USED TO DETERMINE THE WALL THICKNESS AND THE AMOUNT OF HORIZONTAL REINFORCING STEEL REQUIRED FOR A PARTICULAR VALUE OF "H" AND A LONG SPAN DIMENSION "LS". TO USE THE CHART, LOCATE THE POINT OF INTERSECTION OF A VERTICAL "H" DIMENSION LINE WITH A SLOPING SPAN LENGTH LINE. FROM THIS POINT OF INTERSECTION, DRAW A HORIZONTAL LINE TO THE RIGHT TO FIND THE REQUIRED AMOUNT OF HORIZONTAL REINFORCING STEEL PER FOOT OF WALL HEIGHT. THE REQUIRED WALL THICKNESS WILL BE FOUND AT THE LEFT OF THE PARTICULAR CHART SECTION.

EXAMPLE 1: GIVEN A MANHOLE WITH "H" = 13 FEET AND LONG SPAN "LS" = 6 FEET. FROM THE CHART FIND THAT A 8" THICK WALL WITH 0.40 SQ. IN./FT. OF REINFORCING STEEL IS REQUIRED. THE HORIZONTAL BARS MAY BE NO. 4 AT 6" SPACING OR NO. 5 AT 9" SPACING. (SEE TABLE NO. 4)

EXAMPLE 2: GIVEN A MANHOLE WITH "H" = 19 FEET AND LONG SPAN "LS" = 7.5 FEET. NOTE THAT THE CENTER SECTION OF THE CHART MUST BE USED WHICH INDICATES THAT A 9" THICK WALL IS REQUIRED. ON THE VERTICAL LINE REPRESENTING "H" = 19 FEET, FIND A POINT MIDWAY BETWEEN THE 7-FOOT AND 8-FOOT SPAN LENGTH LINES. THE REQUIRED AMOUNT OF HORIZONTAL REINFORCING STEEL WOULD THEN BE READ AS 0.73 SQ. IN./FT., WHICH COULD BE PROVIDED BY USING NO. 5 BARS AT 5" SPACING OR NO. 6 BARS AT 7" SPACING. (SEE TABLE NO. 4)

THE WALL THICKNESS AND THE AMOUNT OF HORIZONTAL REINFORCING AS DETERMINED FROM THE CHART SHALL BE USED FOR ALL FOUR WALLS IN A PARTICULAR LIFT OR POUR. THE SAME WALL DESIGN MAY BE USED THROUGHOUT THE HEIGHT OF THE MANHOLE, OR A DIFFERENT WALL DESIGN FOR THE NEXT LIFT MAY BE DETERMINED BY REENTERING THE CHART WITH THE VALUES OF "H1" AND "LS" WALL DESIGN FOR ADDITIONAL LIFTS WOULD BE HANDLED IN THE SAME MANNER.

WHEN DESIGNING A MANHOLE FROM CHART NO. 1, THE MINIMUM VALUE OF "H" SHALL BE 5 FEET (FOR DESIGN PURPOSES ONLY). THE MINIMUM HORIZONTAL REINFORCING SHALL BE NO. 4 BARS AT 12" CENTERS AND THE MINIMUM WALL THICKNESS SHALL BE 8".

NOTES:

FOR TYPE C MANHOLE, THE MAX. VALUES OF H SHALL BE:
MAX. "H" = 17 FEET WHEN "LS" = 10 FEET
MAX. "H" = 26 FEET WHEN "LS" = 8 FEET
MAX. "H" = 35 FEET WHEN "LS" = 6 FEET
MAX. "H" = 21 FEET WHEN "LS" = 9 FEET
MAX. "H" = 34 FEET WHEN "LS" = 7 FEET

THE LONGER CLEAR SPAN LS OF THE WALLS, AS SEEN IN A HORIZONTAL SECTION, SHALL BE USED TO FIND A WALL DESIGN FROM CHART NO. 1.

THE SHORTER CLEAR SPAN "SS" SHALL BE USED TO FIND A BASE AND TOP SLAB DESIGN FROM THE TABLE NO. 5.

THE MIN. COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF A REINFORCING BAR, SHALL BE 2" EXCEPT AS SHOWN.

THE FURNISHING AND PLACING OF MANHOLE STEPS SHALL BE SUBSIDIARY TO THE MANHOLE.

THE TOP SLAB MAY BE CAST-IN-PLACE OR PRECAST, BUT IF IT IS PRECAST, IT SHALL BE SET IN A FRESH BED OF MORTAR AND POINTED UP INSIDE AND OUT.

FOR RISER AND BENCH DETAILS NOT SHOWN, SEE SHEET 1.

THE MIN. "LS" AND "SS" DIMENSION SHALL BE 2'-6" FOR MANHOLES WITH "H" LESS THAN 6 FEET AND SHALL BE 4'-0" FOR MANHOLES WITH "H" GREATER THAN 6 FEET. WHEN "LS" AND "SS" DIMENSIONS ARE NOT SPECIFIED ON THE PLANS, THE DIMENSIONS SHALL BE OF SUFFICIENT DIMENSION TO ACCOMMODATE PIPES ENTERING THE RESPECTIVE WALL. A MIN. OF 6" SHALL BE MAINTAINED BETWEEN THE INSIDE CORNER OF THE MANHOLE AND THE OUTER SHELL OF AN ENTERING PIPE, AND BETWEEN OUTER SHELLS OF PIPE ENTERING THE SAME WALL.

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JUN 23	REMOVE FLANGE SECTION CALLOUT
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	NOV 98	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 435-R3

MANHOLE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

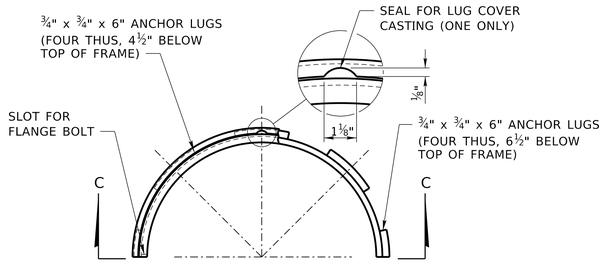
DATE

ORIGINAL: APRIL 4, 1988

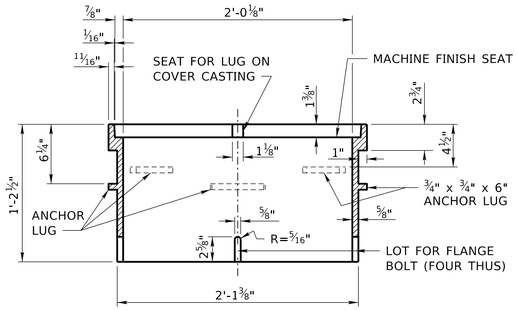
DATE

2
3

COMPUTER: BG0419M593
DATE: 11-JUL-2025 07:33
FILE: 4350 0 R3.dgn



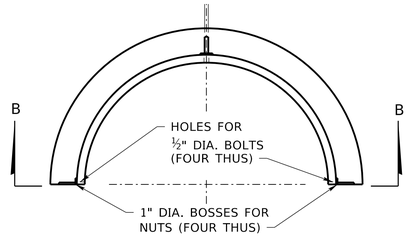
HALF TOP VIEW



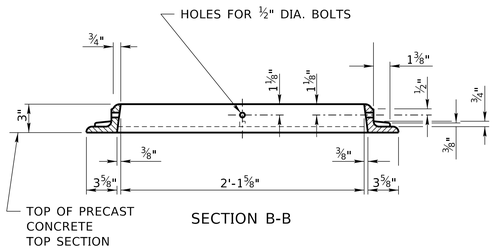
SECTION C-C

FRAME

DURING PAVEMENT CONSTRUCTION, FRAME CASTING TO BE TEMPORARILY HELD IN POSITION BY BOLTING TO FLANGE CASTING. BOLTS TO BE REMOVED AFTER CONCRETE HAS HARDENED.



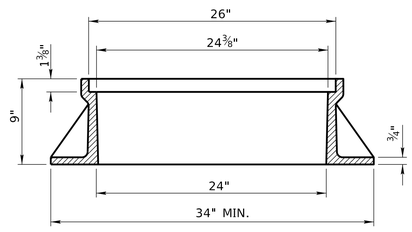
HALF TOP VIEW



SECTION B-B

TYPE I
DETAILS OF FRAME

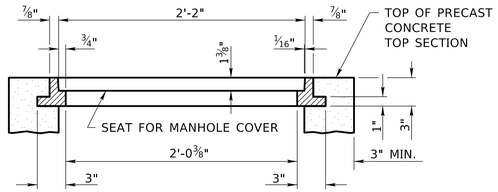
TELESCOPIC TYPE (CAST IRON)



SECTION

TYPE II
DETAILS OF FRAME

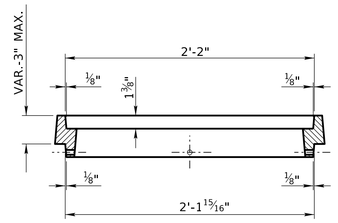
NON-TELESCOPIC TYPE (CAST IRON)



SECTION

TYPE III
DETAILS OF RING

NON-TELESCOPIC TYPE (CAST IRON)



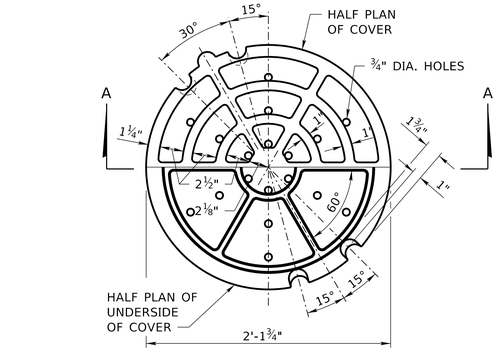
SECTION

ADJUSTING RINGS MAY BE USED IN ORDER TO OBTAIN THE REQUIRED ELEVATION OF EITHER NEW OR EXISTING MANHOLES. THE RINGS ARE SUBSIDIARY TO BUILD MANHOLE, ADJUST MANHOLE TO GRADE OR RECONSTRUCT MANHOLE.

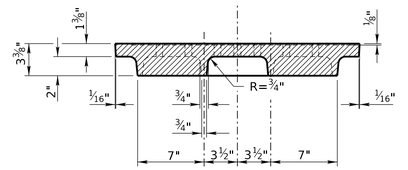
THE ADJUSTING RINGS SHALL BE HELD RIGIDLY TO THE FRAME AND TO EACH OTHER BY USE OF FOUR SET SCREWS IN THE BEARING LEG OF THE RING. ADJUSTING RINGS MAY BE USED TO A MAXIMUM HEIGHT OF 12 INCHES.

THE CONTRACTOR SHALL INSPECT THE CONDITION AND VERIFY THE DIMENSIONS OF EXISTING MANHOLE PRIOR TO USING ADJUSTING RINGS.

DETAILS OF ADJUSTING RING



HALF PLAN



SECTION A-A

DETAILS OF COVER

(CAST IRON)

WEIGHTS

(CAST IRON)

TYPE A COVER	225 POUNDS
TYPE B COVER	230 POUNDS
FRAME (TYPE I)	260 POUNDS
FLANGE (TYPE I)	95 POUNDS
FRAME (TYPE II)	275 POUNDS
RING FOR COVER (TYPE III)	120 POUNDS

NOTES:

TYPE I AND II ASSEMBLIES NORMALLY USED IN PAVEMENT.

TYPE III ASSEMBLY IS NORMALLY USED OUTSIDE OF PAVEMENT.

FOR TYPE A COVER (STORM SEWER), USE DETAILS AS SHOWN.

FOR TYPE B COVER (SANITARY SEWER), OMIT ¾" DIA. HOLES IN COVER.

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JUN 23	REMOVE FLANGE SECTION CALLOUT
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	NOV 98	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 435-R3

MANHOLE

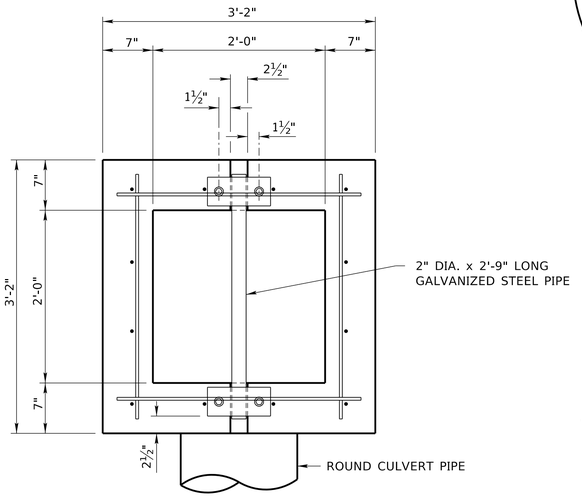
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

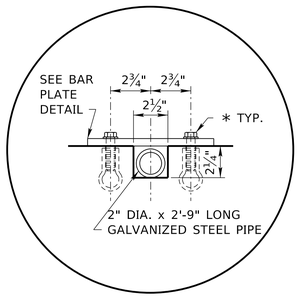
ORIGINAL:
APRIL 4, 1988
DATE

3
3

FILE: 4350 0 R3.dgn DATE: 11-JUL-2025 07:33 COMPUTER: BG04194593

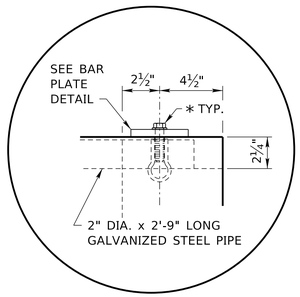


PLAN VIEW



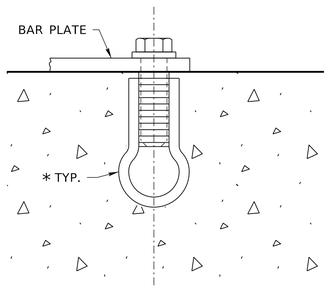
DETAIL A

* ½" DIA. FERRULE LOOP INSERT OR APPROVED EQUAL

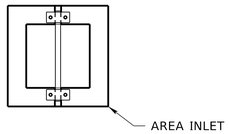


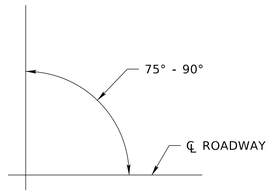
DETAIL B

QUANTITIES TABLE					
X	CONCRETE (CU. YDS.)	STEEL (LBS.)	X	CONCRETE (CU. YDS.)	STEEL (LBS.)
2'-0"	0.7	49	5'-0"	1.4	96
2'-6"	0.8	61	5'-6"	1.5	96
3'-0"	0.9	65	6'-0"	1.4	96
2'-0"	0.7	49	5'-0"	1.4	96
2'-0"	0.7	49	5'-0"	1.4	96
2'-0"	0.7	49	5'-0"	1.4	96
THE MINIMUM X VALUE ALLOWED FOR 15" DIA. PIPE IS 2'-0" THE MINIMUM X VALUE ALLOWED FOR 18" DIA. PIPE IS 2'-3" THE MINIMUM X VALUE ALLOWED FOR 24" DIA. PIPE IS 2'-9" THE MAXIMUM SIZE PIPE THAT MAY BE USED IS 24" DIA.					



CONCRETE ANCHOR INSERT DETAIL





ORIENTATION

NOTES:

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM "CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX".

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR SHALL BE 2" UNLESS OTHERWISE NOTED.

ALL REINFORCING STEEL USED SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 60. ALL REINFORCING STEEL SHALL BE NO. 4 BARS PLACED AT 1'-0" CENTERS (MAXIMUM) AND SHALL BE PAID FOR UNDER THE ITEM "REINFORCING STEEL FOR INLET AND JUNCTION BOX".

FIELD BEND AND/OR CLIP REINFORCING STEEL TO ALLOW FOR MINIMUM CLEARANCE AND TO CLEAR PIPE OPENINGS.

THE 2" DIA. X 2'-9" PIPE, TRASH BAR PLATES AND ALL ASSOCIATED HARDWARE SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A123.

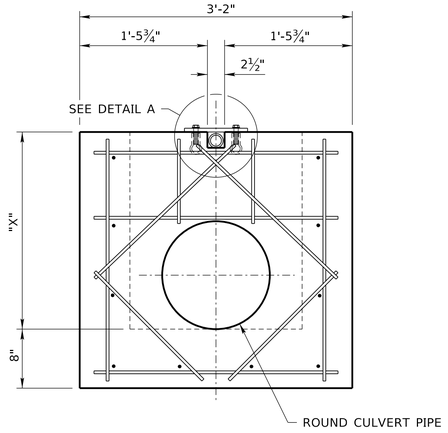
ALL DIAGONAL BARS, PREPARATION, MATERIALS, EQUIPMENT, TOOLS, LABOR, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK THAT ARE NOT PAID FOR DIRECTLY, SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS FOR WHICH PAYMENT IS MADE.

NO DEDUCTIONS HAVE BEEN MADE IN THE QUANTITIES FOR PIPE OPENINGS.

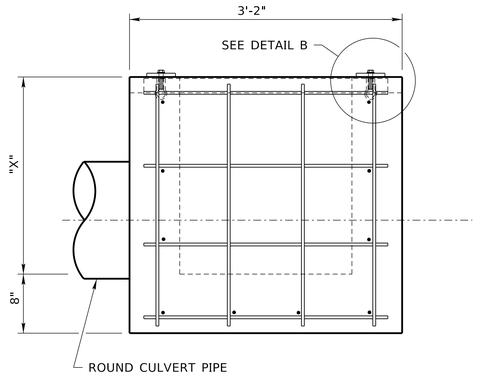
IF A PIPE IS ENTERING THE BOX ON A SKEW, THE OUTSIDE HORIZONTAL DIAMETER OF THE PIPE MUST NOT EXCEED THE INSIDE WIDTH OF THE BOX AND IT MUST ENTER THE BOX BETWEEN THE OUTSIDE CORNERS OF THE BOX.

CULVERT PIPE SHOWN FOR ORIENTATION PURPOSES ONLY.

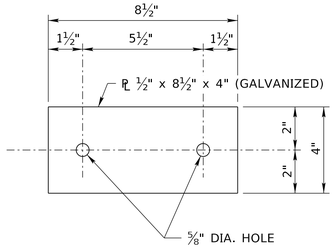
FERRULE LOOPS SHALL HAVE WORKING LOAD OF 1,320 LBS. IN SHEAR AND 2,000 LBS. IN TENSION



ELEVATION



END VIEW



BAR PLATE DETAIL

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 437

AREA INLET WITH BAR

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

ORIGINAL: NOVEMBER 11, 2023
DATE

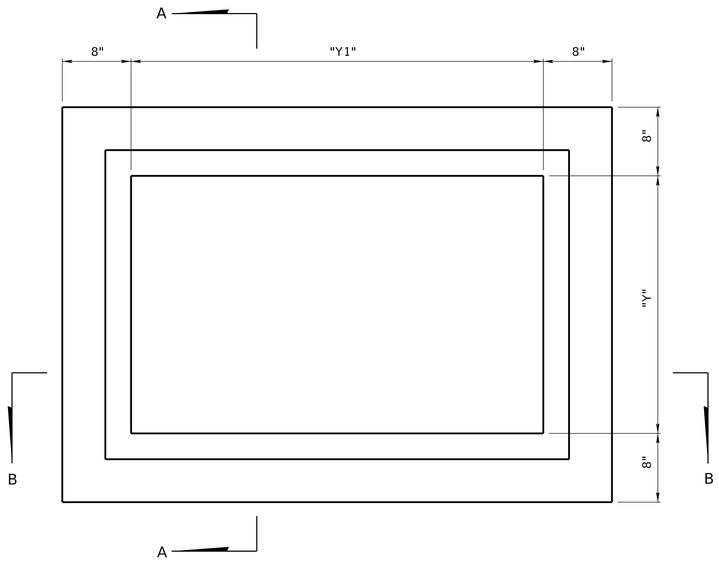
1
1

COMPUTER: BG04194187
DATE: 10-OCT-2024 14:12
FILE: 4370 0 R0.dgn

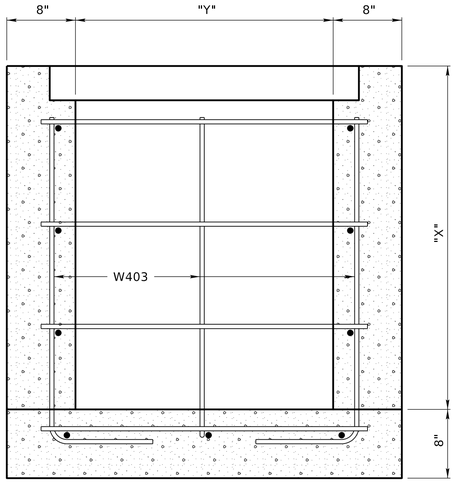
PIPE DIA. (IN.)	MIN "X" VALUE
15	2'-0"
18	2'-3"
21	2'-9"
24	3'-0"
30	3'-6"
36	4'-0"
42	4'-6"
48	5'-0"

INLET QUANTITIES

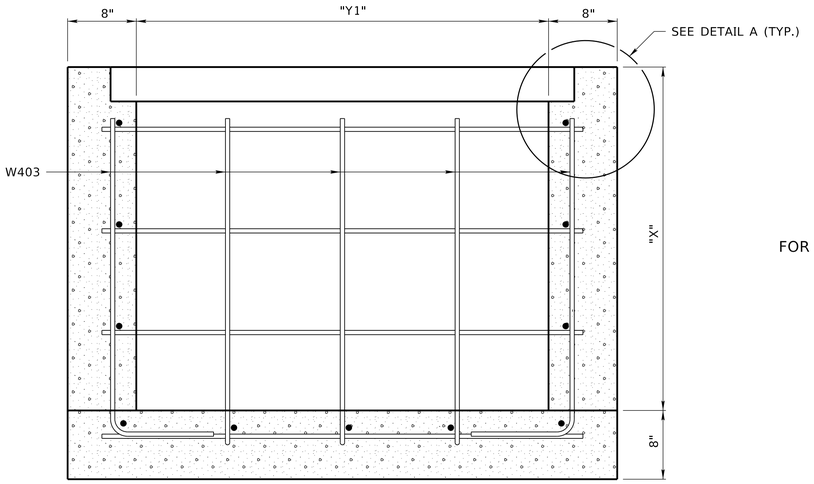
"X" VALUE	GRATE TYPE "A" "Y"=3'-0", "Y1"=3'-0"		GRATE TYPE "B" "Y"=3'-6", "Y1"=3'-6"		GRATE TYPE "C" "Y"=2'-6", "Y1"=4'-0"		GRATE TYPE "D" "Y"=1'-8", "Y1"=3'-8"		GRATE TYPE "E" "Y"=2'-0", "Y1"=2'-0"		GRATE TYPE "F" "Y"=1'6", "Y1"=1'-6"	
	CONCRETE (CU. YDS.)	STEEL (LBS.)	CONCRETE (CU. YDS.)	STEEL (LBS.)	CONCRETE (CU. YDS.)	STEEL (LBS.)	CONCRETE (CU. YDS.)	STEEL (LBS.)	CONCRETE (CU. YDS.)	STEEL (LBS.)	CONCRETE (CU. YDS.)	STEEL (LBS.)
2'-0"	1.2	65	1.4	80	1.3	70	1.0	60	0.8	40	0.6	35
2'-6"	1.4	65	1.6	85	1.5	75	1.2	60	0.9	45	0.7	40
3'-0"	1.6	80	1.8	105	1.7	90	1.4	75	1.1	55	0.8	45
3'-6"	1.7	85	2.0	110	1.9	95	1.5	80	1.2	55	0.9	50
4'-0"	1.9	100	2.2	125	2.1	110	1.7	90	1.3	65	1.1	60
4'-6"	2.1	100	2.4	130	2.2	115	1.9	95	1.5	70	1.2	60
5'-0"	2.3	115	2.6	145	2.4	130	2.0	110	1.6	80	1.3	70
5'6"	2.5	120	2.8	150	2.6	135	2.2	110	1.7	80	1.4	70
6'-0"	2.6	135	3.0	170	2.8	150	2.3	125	1.9	90	1.5	80
6'-6"	2.8	140	3.3	175	3.0	155	2.5	130	2.0	95	1.6	85
7'-0"	3.0	150	3.5	190	3.2	170	2.7	140	2.1	105	1.7	90



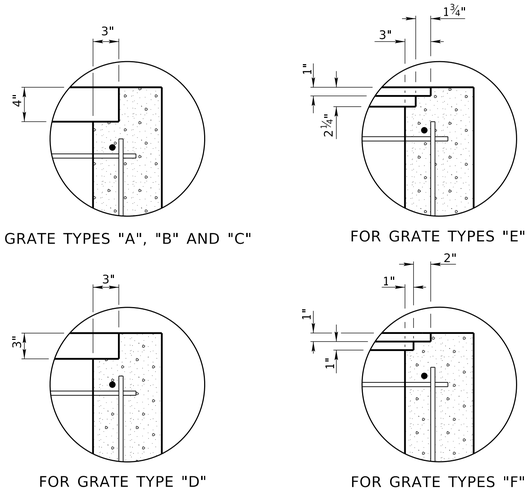
PLAN VIEW



SECTION A-A

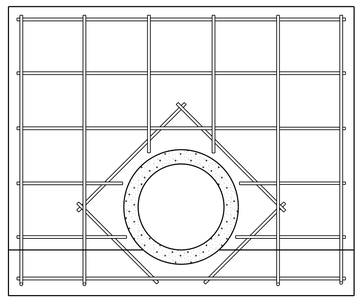


SECTION B-B



DETAIL A

BENDING DIAGRAM



DETAIL B
USE FOR PLACEMENT OF DIAGONAL BARS ONLY

NOTES:

IN NO CASE SHALL THE SPAN OF THE PIPE PLUS THE ADDITIONAL ALLOWANCE FOR THE SKEW OF THE PIPE BE GREATER THAN THE "Y" OR "Y1" DIMENSION OF THE INLET WALL IT IS INTENDED TO PENETRATE.

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM "CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX".

ALL REINFORCING STEEL USED SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615, GRADE 60. ALL REINFORCING STEEL SHALL BE NO. 4 BARS AT 12" CENTERS (MAX.) UNLESS NOTED OTHERWISE.

PLACE DIAGONAL REINFORCING AROUND PIPE OPENINGS AS SHOWN IN DETAIL B.

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE 2" UNLESS OTHERWISE NOTED.

FIELD BEND AND/OR CLIP REINFORCING STEEL TO ALLOW FOR MINIMUM CLEARANCE AND TO CLEAR PIPE OPENINGS.

THE CAST IRON GRATES AND FRAMES SHALL CONFORM TO THE SPECIAL PLAN AND STANDARD SPECIFICATIONS AND SHALL BE PAID FOR UNDER THE ITEM "CAST IRON GRATE AND FRAME".

EXCAVATION, BACKFILL AND DIAGONAL REINFORCING STEEL SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS FOR WHICH PAYMENT IS MADE.

NO DEDUCTIONS HAVE BEEN MADE IN THE QUANTITIES FOR PIPE OPENINGS.

ALL PIPES USED SHALL BE ROUND CORRUGATED METAL, REINFORCED CONCRETE, OR PLASTIC PIPE.

SEE SHEET 2 OF 2 FOR GRATE DETAILS.

FERRULE LOOPS SHALL HAVE WORKING LOAD REQUIREMENTS OF 1,320 LBS. IN SHEAR AND 2,000 LBS. IN TENSION

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 438

AREA INLET WITH GRATE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ROSS D. BARRON E-14018 STATE OF NEBRASKA

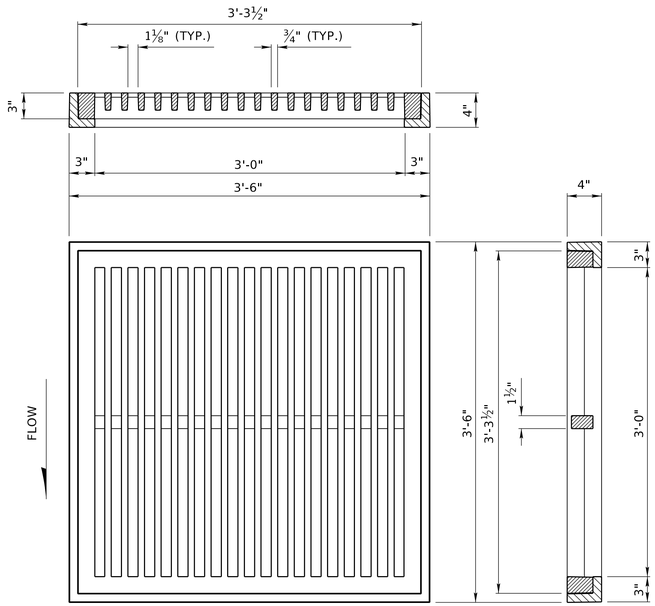
DATE

ORIGINAL: NOVEMBER 3, 2023

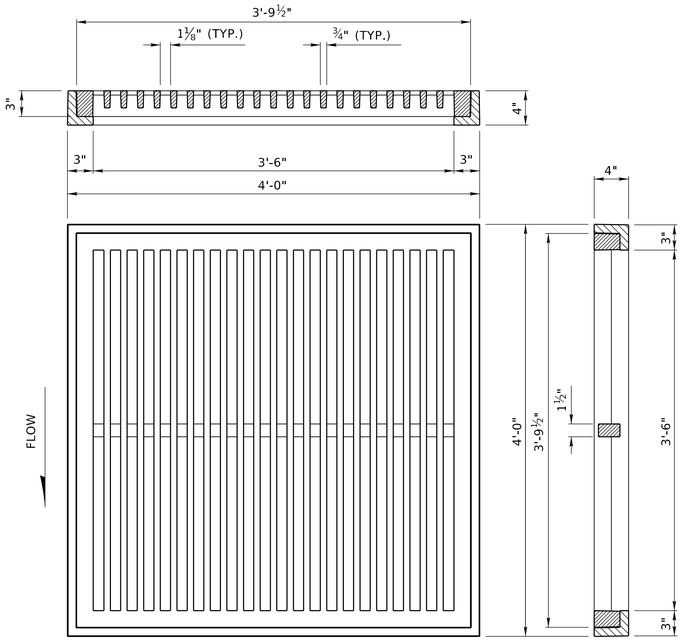
DATE

1/2

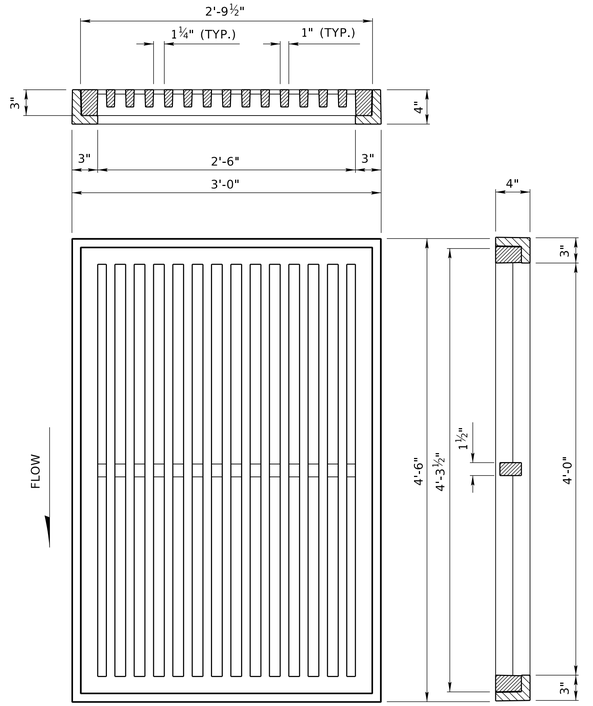
COMPUTER: BG0419M187
DATE: 10-OCT-2024 14:12
FILE: 4380 0 R0.dgn



GRATE TYPE "A"
CLEAR OPENING 5.1 SQ. FT.
WEIGHT CAST IRON 745 LBS.



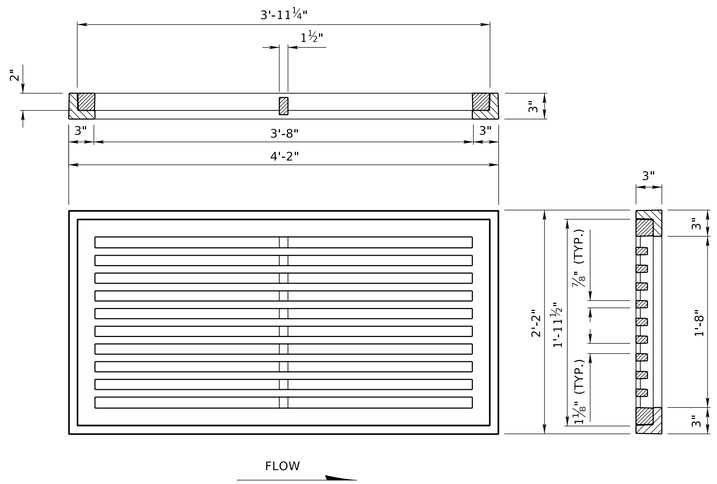
GRATE TYPE "B"
CLEAR OPENING 6.6 SQ. FT.
WEIGHT CAST IRON 990 LBS.



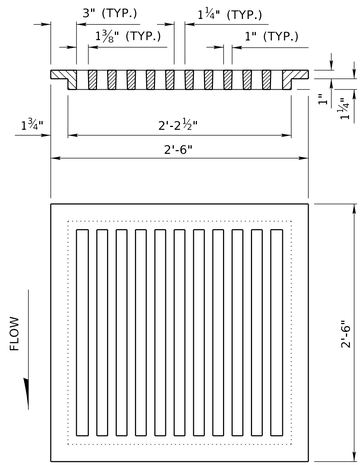
GRATE TYPE "C"
CLEAR OPENING 5.5 SQ. FT.
WEIGHT CAST IRON 825 LBS.

NOTE:

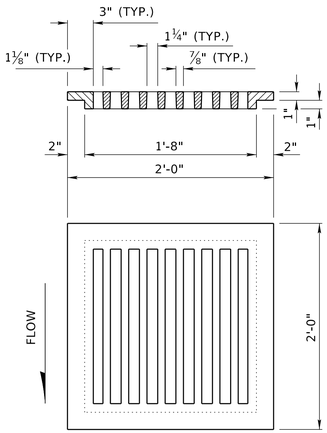
THESE GRATES ARE NOT TO BE USED IN AREAS THAT ALLOW BICYCLE TRAFFIC.



GRATE TYPE "D"
CLEAR OPENING 3.4 SQ. FT.
WEIGHT CAST IRON 555 LBS.



GRATE TYPE "E"
CLEAR OPENING 2.3 SQ. FT.
WEIGHT CAST IRON 265 LBS.



GRATE TYPE "F"
CLEAR OPENING 1.3 SQ. FT.
WEIGHT CAST IRON 175 LBS.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION
STANDARD PLAN NO. 438
AREA INLET WITH GRATE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

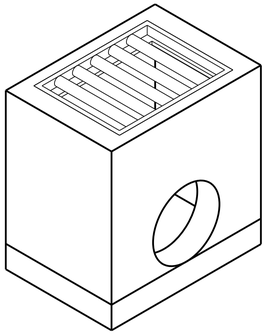
PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

DATE

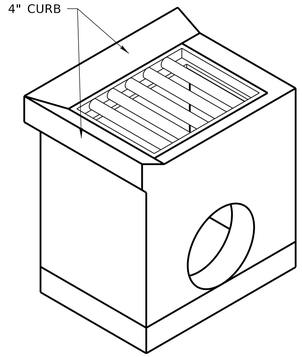
ORIGINAL:
NOVEMBER 3, 2023
DATE

2
2

COMPUTER: BG04194187
DATE: 9-SEP-2024 10:03
FILE: 4380 0 R0.dgn



WITHOUT CURB(S)



WITH CURB(S)

ISOMETRIC

5-BAR GRATE INLET QUANTITIES (FOR ONE INLET ONLY)				
'X'	WITH CURB(S)		WITHOUT CURB(S)	
	CONCRETE (CY)	REINF. STEEL (LB)	CONCRETE (CY)	REINF. STEEL (LB)
2'-0"	1.0	100	0.9	85
2'-6"	1.1	120	1.1	100
3'-0"	1.3	125	1.2	105
3'-6"	1.4	140	1.4	125
4'-0"	1.6	145	1.5	130
4'-6"	1.7	160	1.7	145
5'-0"	1.9	170	1.8	150
5'-6"	2.1	185	2.0	170
6'-0"	2.2	190	2.1	175
6'-6"	2.4	205	2.3	190
7'-0"	2.5	215	2.4	195
7'-6"	2.7	230	2.6	215
8'-0"	2.8	235	2.7	220
8'-6"	3.0	250	2.9	235
9'-0"	3.1	260	3.0	240
CAST IRON GRATE AND FRAME _____ 660 LB				

NOTES:

IN NO CASE SHALL THE SPAN OF THE PIPE PLUS THE ADDITIONAL ALLOWANCE FOR THE SKEW OF THE PIPE BE GREATER THAN THE INTERIOR DIMENSION OF THE INLET WALL IT IS INTENDED TO PENETRATE.

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER CY UNDER THE ITEM "CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX".

ALL REINFORCING STEEL USED SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION A615/A615M, GRADE 60, AND SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER LB UNDER ITEM "REINFORCING STEEL FOR INLET AND JUNCTION BOX."

ALL REINFORCING STEEL USED SHALL BE NO. 4 BARS SPACED AT 12" CTRS. (MAX).

PLACE DIAGONAL REINFORCING AROUND PIPE OPENINGS AS SHOWN IN DETAIL A.

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE 2", EXCEPT AS SHOWN.

FIELD BEND AND/OR CLIP REINFORCING STEEL TO ALLOW FOR MINIMUM CLEARANCE AND TO CLEAR PIPE OPENINGS.

THE CAST IRON GRATE AND FRAME SHALL CONFORM TO THIS PLAN, THE STANDARD SPECIFICATIONS AND SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER LB UNDER THE ITEM "CAST IRON GRATE AND FRAME."

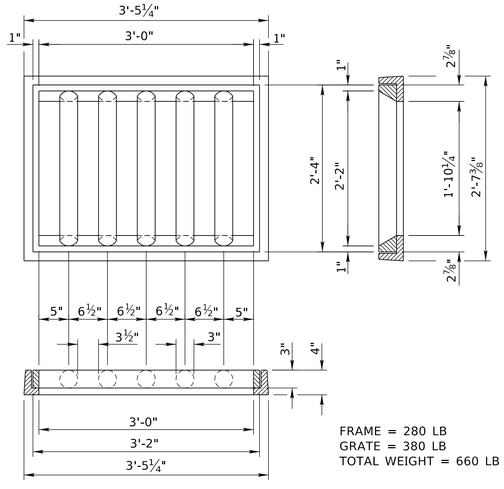
EXCAVATION, BACKFILL AND DIAGONAL REINFORCING STEEL SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS FOR WHICH PAYMENT IS MADE.

NO DEDUCTIONS HAVE BEEN MADE IN THE QUANTITIES FOR PIPE OPENINGS.

PLAN REPRESENTS THE CONSTRUCTION OF A 5-BAR GRATE INLET WITH OR WITHOUT SLOPED CURBS BUILT ON THE BACK SIDE AND THE LEFT SIDE OF THE INLET. THE INLET MAY ALSO BE CONSTRUCTED WITH THE SIDE CURB ON THE OPPOSITE END OF THE INLET BY USING THESE SAME PLANS, BUT OPPOSITE HAND. QUANTITIES WILL BE THE SAME REGARDLESS OF WHICH SIDE THE CURB IS CONSTRUCTED ON.

WHEN CURB(S) ARE OMITTED COMPLETELY, OMIT THE 404, 405, 406 AND 407 BARS AND USE QUANTITIES SHOWN IN TABLE.

THE CAST IRON FRAME MAY BE CAST IN PLACE WITH THE CONCRETE OR PLACED WHILE THE CONCRETE IS STILL WET.

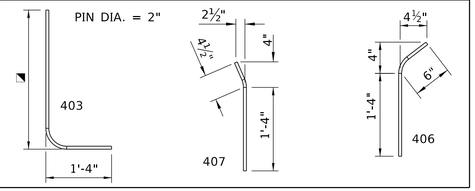


FRAME = 280 LB
GRATE = 380 LB
TOTAL WEIGHT = 660 LB

CAST IRON GRATE AND FRAME

'X'	◪401	◪402
2'-0"	10	8
2'-6"	12	10
3'-0"	12	10
3'-6"	14	12
4'-0"	14	12
4'-6"	16	14
5'-0"	16	14
5'-6"	18	16
6'-0"	18	16
6'-6"	20	18
7'-0"	20	18
7'-6"	22	20
8'-0"	22	20
8'-6"	24	22
9'-0"	24	22

BILL OF BARS				BENDING DIAGRAMS
MARK	NO.	LENGTH	TYPE	ALL DIMENSIONS ARE OUT TO OUT NOT TO SCALE
401	◪	2'-10"	STR.	
402	◪	4'-0"	STR.	
403	20	'X' + 1'-4"	403	
404	1	3'-2½"	STR.	
405	1	4'-2½"	STR.	
406	6	1'-10"	406	
407	4	1'-8½"	407	



NOTES:

◪ NUMBER OF BARS VARIES WITH 'X' VALUE.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 439

5-BAR GRATE INLET

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

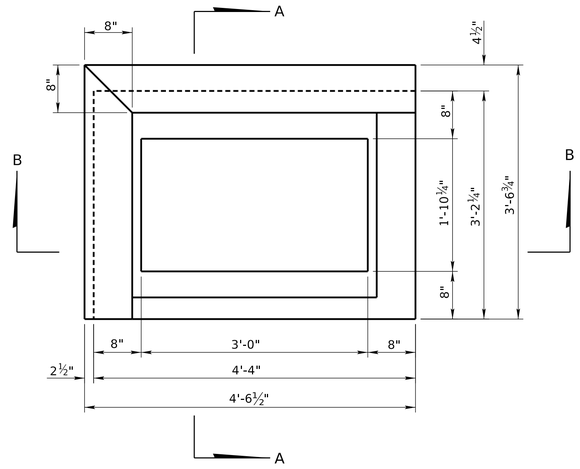
_____ DATE

PROFESSIONAL CIVIL ENGINEER ★ ROSS D. BARRON E-14018 ★ STATE OF NEBRASKA

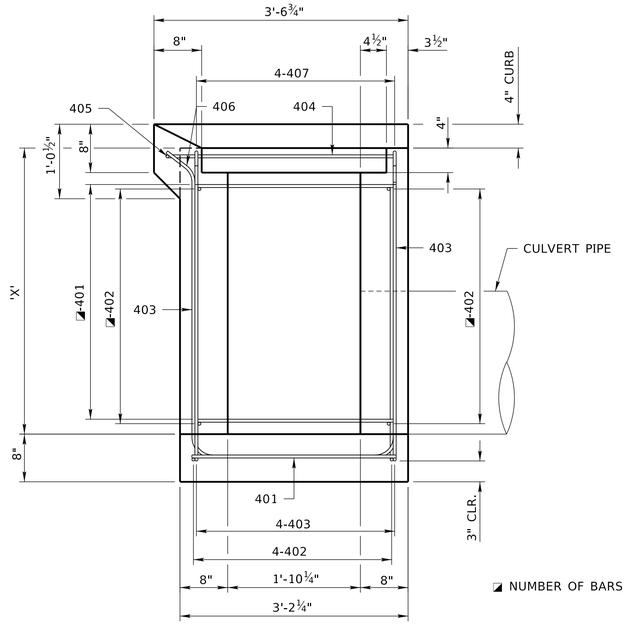
ORIGINAL: NOVEMBER 3, 2023 DATE

1 / 2

FILE: 4390 0 R0.dgn DATE: 10-OCT-2024 14:12 COMPUTER: BG041911187

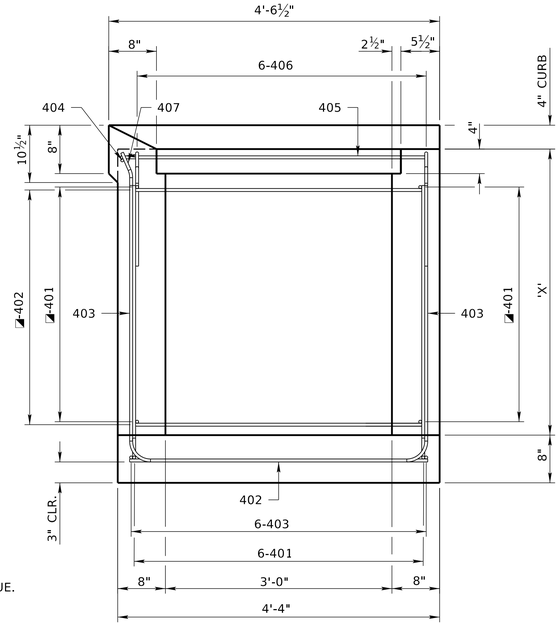


PLAN VIEW
(SHOWING DIMENSIONS)

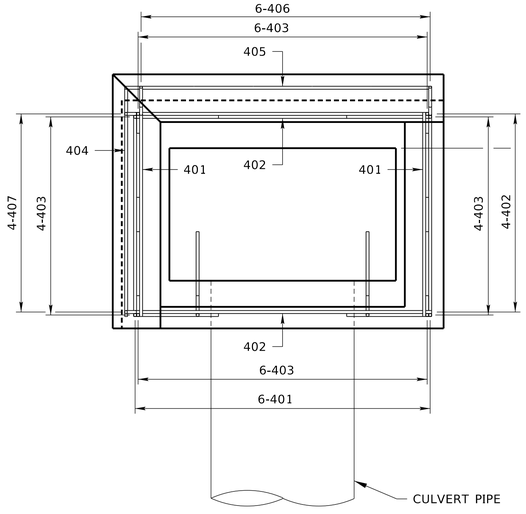


SECTION A-A

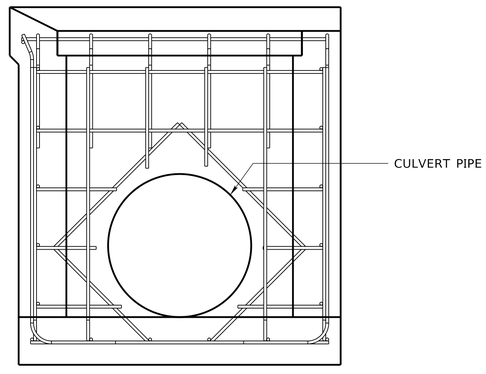
◪ NUMBER OF BARS VARIES WITH 'X' VALUE.



SECTION B-B



PLAN VIEW
(SHOWING REINFORCEMENT)



DETAIL A
(FOR PLACEMENT OF DIAGONAL BARS AROUND PIPE OPENINGS)

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 439

5-BAR GRATE INLET

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

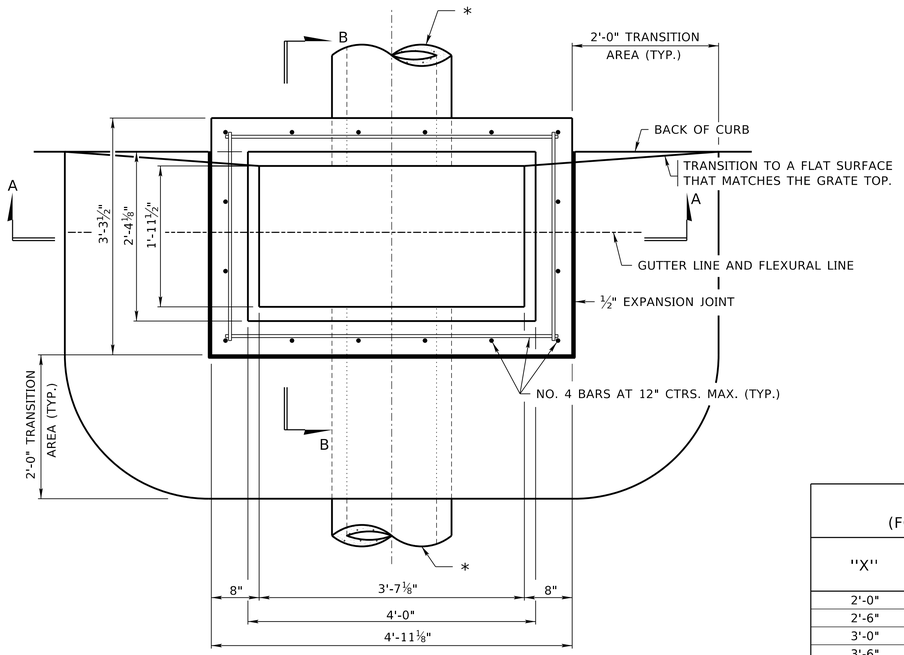
DATE

PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

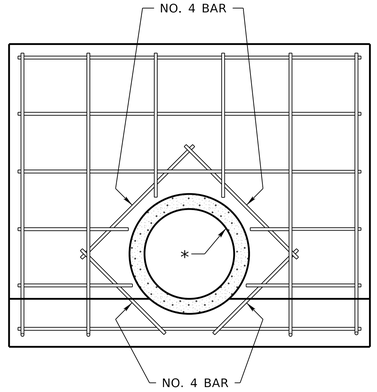
ORIGINAL:
NOVEMBER 3, 2023
DATE

2
2

COMPUTER: BG04190187
DATE: 10-OCT-2024 14:12
FILE: 4390 0 R0.dgn



PLAN



PIPE DETAIL

QUANTITIES (FOR ONE SINGLE GRATED INLET)		
''X''	CONCRETE (CY)	REINFORCING STEEL (LB)
2'-0"	1.0	90
2'-6"	1.2	100
3'-0"	1.4	110
3'-6"	1.5	120
4'-0"	1.7	130
4'-6"	1.9	140
5'-0"	2.1	150
5'-6"	2.2	160
6'-0"	2.4	170
6'-6"	2.6	180
7'-0"	2.8	190
CAST IRON GRATE AND FRAME _____ 750 LB		

NOTES:

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM "CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX".

ALL REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M. DESIGNATION A615/A615M, GRADE 60, AND SHALL BE PAID FOR UNDER THE ITEM "REINFORCING STEEL FOR INLET AND JUNCTION BOX".

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE 2", EXCEPT AS SHOWN.

FIELD BEND AND/OR CLIP REINFORCING STEEL TO ALLOW FOR MINIMUM CLEARANCE AND TO CLEAR PIPE OPENINGS.

EXCAVATION AND BACKFILL SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS FOR WHICH PAYMENT IS MADE.

DROP INLET ¼" BELOW PAVING GRADE AT FRONT OF INLET. SLOPE PAVING BACK TO GRADE 2'-0" FROM INLET FRAME.

DROP INLET 1" BELOW PAVING GRADE AT GUTTER LINE. SLOPE PAVING BACK TO GRADE 2'-0" FROM INLET FRAME.

THE ½" PREFORMED JOINT FILLER SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS FOR WHICH PAYMENT IS MADE.

THE ½" EXPANSION JOINT SHALL EXTEND 1" MIN. BELOW BOTTOM OF PAVEMENT.

THE CAST IRON GRATES AND FRAMES SHALL CONFORM TO THE SPECIAL PLAN AND THE STANDARD SPECIFICATIONS.

ALL MATERIALS REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PROJECT.

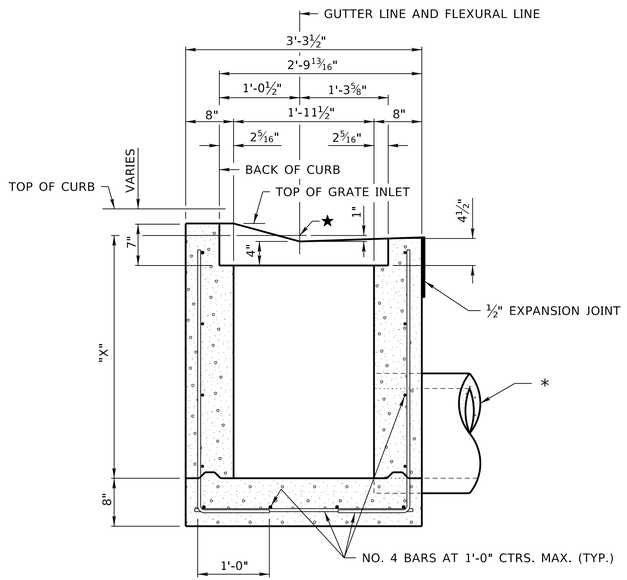
NUMBER 4 BARS SHALL BE PLACED AROUND PIPE OPENINGS AS SHOWN IN PIPE DETAIL. THESE DIAGONAL REINFORCING BARS SHALL BE CONSIDERED AS SUBSIDIARY TO THE ITEM "REINFORCING STEEL FOR INLET AND JUNCTION BOX".

SEE SHEET 2 FOR GRATE DETAILS.

* PIPES MAY BE PLACED IN ANY WALL. THE INSIDE PIPE DIMENSION SHALL NOT EXCEED THE INSIDE HORIZONTAL DIMENSIONS OF THE INLET WALL IT PENETRATES.

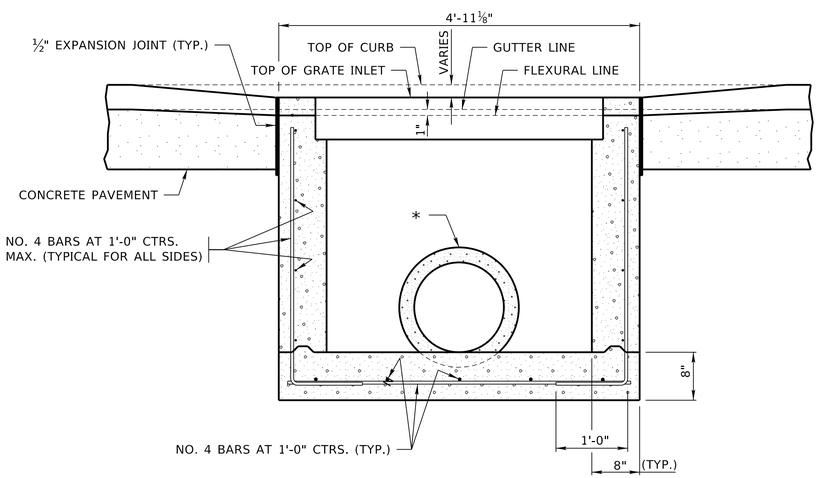
THE MINIMUM CLEARANCE BETWEEN THE TOP OF THE PIPE AND THE BOTTOM OF THE GRATE SHALL BE 1" MINIMUM.

NO DEDUCTIONS HAVE BEEN MADE IN THE QUANTITIES FOR ANY PIPE OPENINGS.

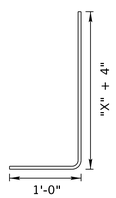


★ PROFILE GRADE OF GUTTER LINE AT FLEXURAL LINE.

SECTION B-B



SECTION A-A



BENT BAR

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 440

MOUNTABLE CURB INLET SINGLE GRATE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

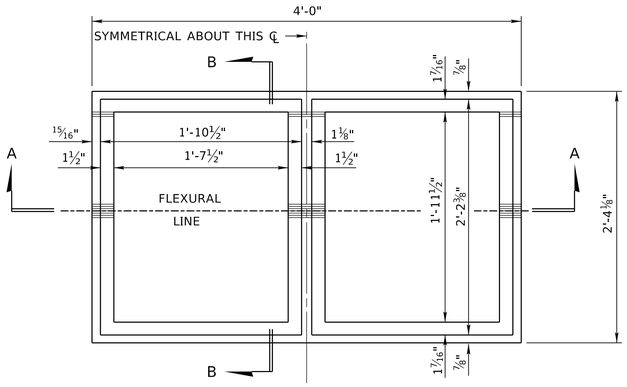
PROFESSIONAL CIVIL ENGINEER ★ ROSS D. BARRON E-14018 ★ STATE OF NEBRASKA

_____ DATE

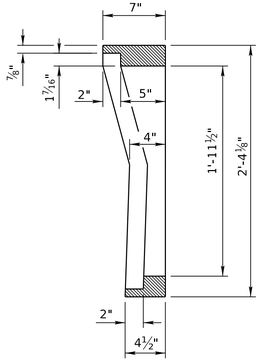
ORIGINAL: FEBRUARY 21, 2023 DATE

1/2

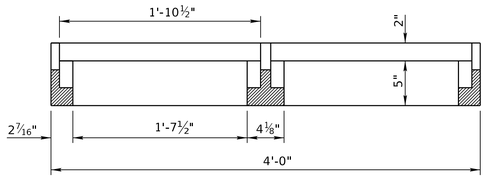
COMPUTER: BG0419M187
DATE: 10-OCT-2024 14:53
FILE: 4400 0 R0.dgn



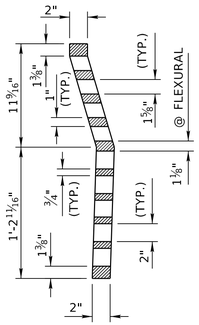
PLAN OF FRAME



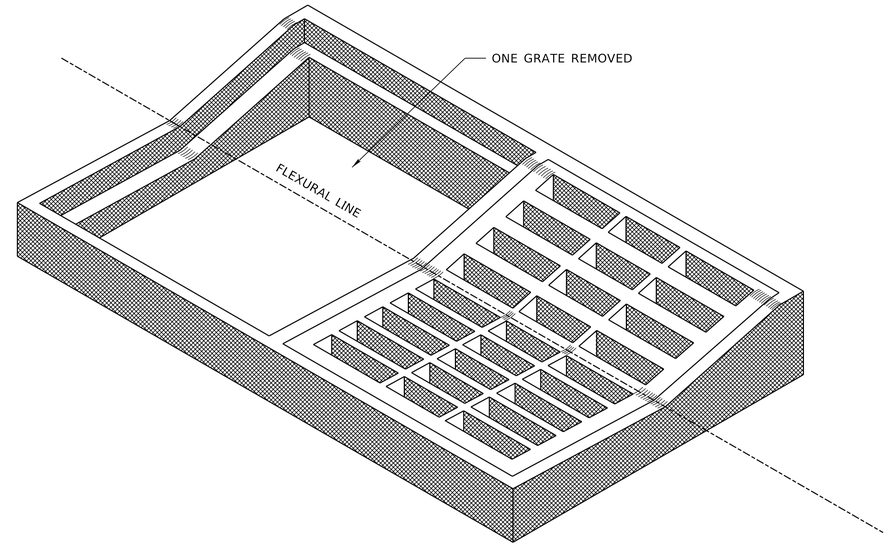
SECTION B-B



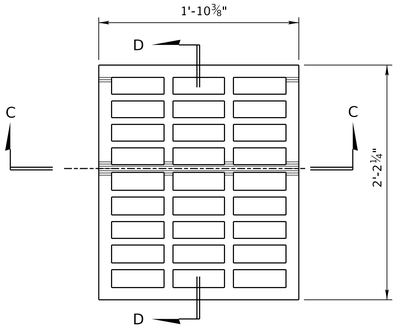
SECTION A-A



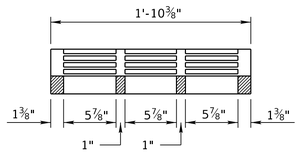
SECTION D-D



ISOMETRIC VIEW



PLAN OF GRATE



SECTION C-C

NOTES:

GRATE AND FRAME SHALL BE MANUFACTURED OF GREY IRON AND SHALL BE OF UNIFORM QUALITY, FREE FROM BLOW HOLES, POROSITY, HARD SPOTS, SHRINKAGE DEFECTS, CRACKS OR OTHER INJURIOUS DEFECTS. THEY SHALL BE SMOOTH AND WELL CLEANED BY SHOT BLASTING AND UNLESS OTHERWISE SPECIFIED, SHALL BE COATED WITH COAL TAR PITCH VARNISH OF SPECIFICATION WHICH WILL MAKE A SMOOTH COATING, TOUGH AND TENACIOUS WHEN COLD, NOT TACKY AND NOT BRITTLE.

MATERIAL USED IN THE MANUFACTURE OF THE CASTING SHALL CONFORM TO A.S.T.M. SPECIFICATIONS A48 CLASS 30 IRON.

ALL CASTINGS ARE TO BE MANUFACTURED TRUE TO PATTERN AND WITH SATISFACTORY FIT OF COMPONENT PARTS.

ALL WEIGHTS AS GIVEN ARE APPROXIMATE AND AVERAGE VARIATION WILL NOT EXCEED SPECIFIED WEIGHT LIMIT IN ACCORDANCE WITH A.S.T.M. STANDARDS.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 440

MOUNTABLE CURB INLET SINGLE GRATE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

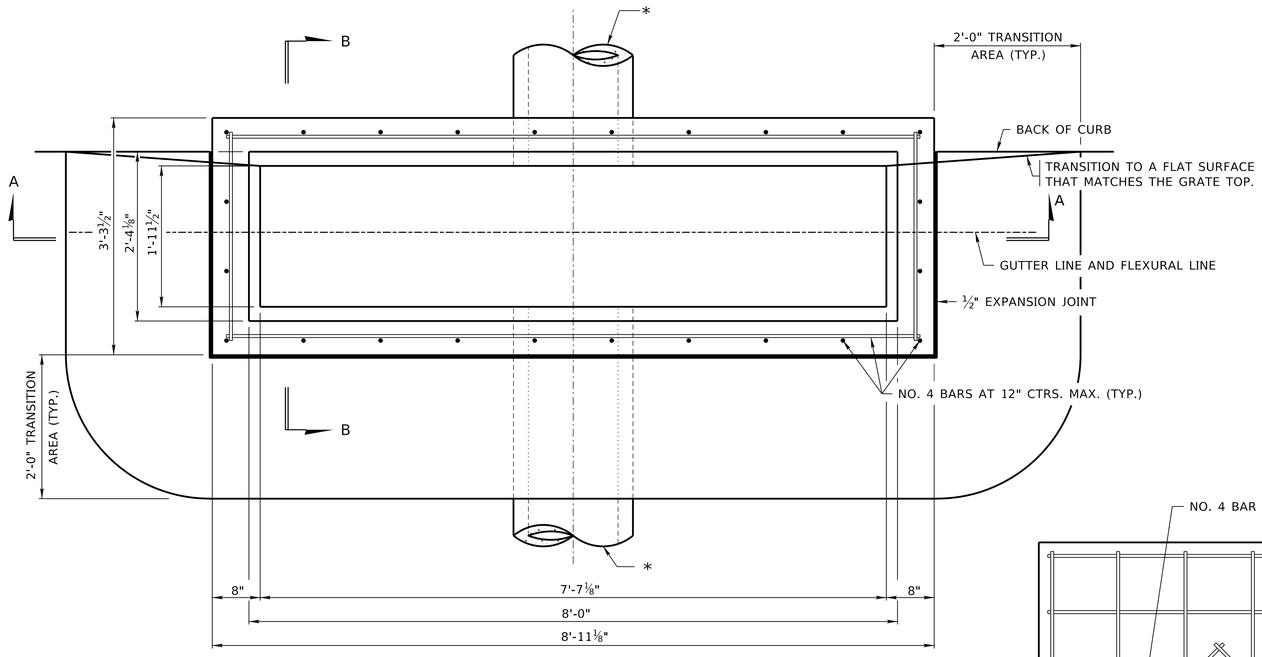
PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

DATE

ORIGINAL: FEBRUARY 21, 2023
DATE

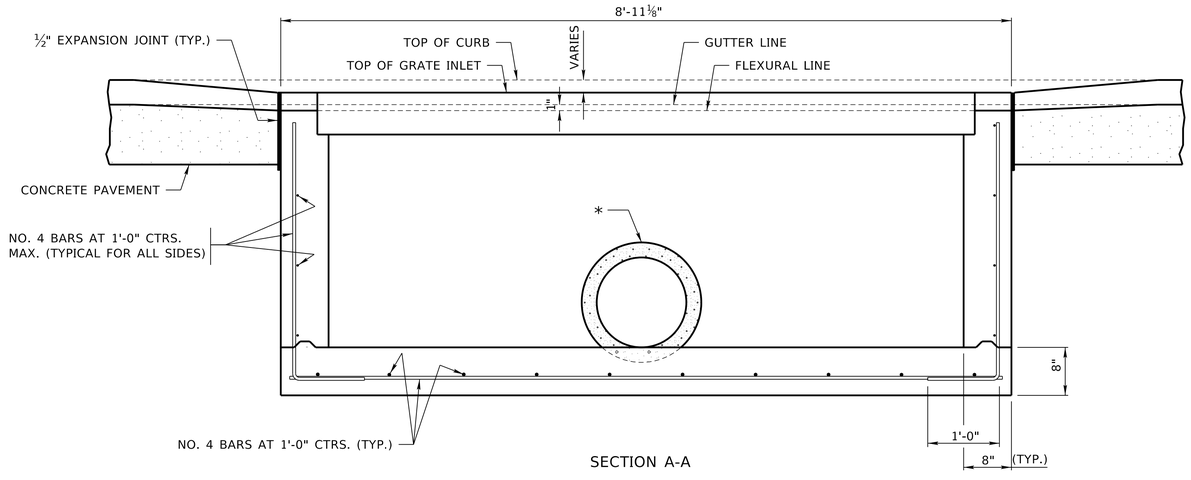
2
2

COMPUTER: BG04194187
DATE: 10-OCT-2024 14:53
FILE: 4400 0 R0.dgn

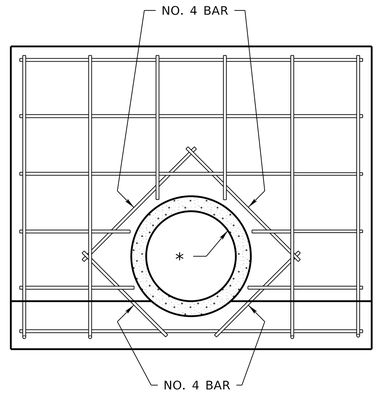


PLAN

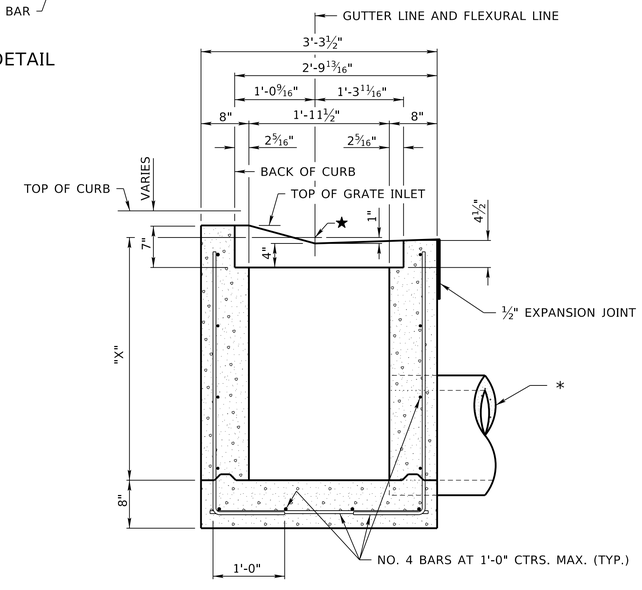
QUANTITIES (FOR ONE TWIN GRATED INLET)		
''X''	CONCRETE (CY)	REINFORCING STEEL (LB)
2'-0"	1.8	143
2'-6"	2.1	151
3'-0"	2.3	174
3'-6"	2.6	182
4'-0"	2.9	206
4'-6"	3.1	214
5'-0"	3.4	237
5'-6"	3.7	245
6'-0"	4.0	269
6'-6"	4.2	277
7'-0"	4.5	300
CAST IRON GRATE AND FRAME ____ 1500 LB		



SECTION A-A

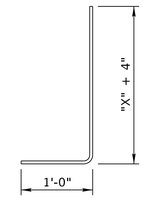


PIPE DETAIL



★ PROFILE GRADE OF GUTTER LINE AT FLEXURAL LINE.

SECTION B-B



BENT BAR

NOTES:

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM "CLASS 47B CONCRETE FOR INLET AND JUNCTION BOX".

ALL REINFORCING STEEL SHALL BE NO. 4 BARS, AND SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M. DESIGNATION A615/A615M, GRADE 60, AND SHALL BE PAID FOR UNDER THE ITEM "REINFORCING STEEL FOR INLET AND JUNCTION BOX".

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE 2", EXCEPT AS SHOWN.

FIELD BEND AND/OR CLIP REINFORCING STEEL TO ALLOW FOR MINIMUM CLEARANCE AND TO CLEAR PIPE OPENINGS.

EXCAVATION AND BACKFILL SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS FOR WHICH PAYMENT IS MADE.

DROP INLET ¼" BELOW PAVING GRADE AT FRONT OF INLET. SLOPE PAVING BACK TO GRADE 2'-0" FROM INLET FRAME.

DROP INLET 1" BELOW PAVING GRADE AT GUTTER LINE. SLOPE PAVING BACK TO GRADE 2'-0" FROM INLET FRAME.

THE ½" PREFORMED JOINT FILLER SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS FOR WHICH PAYMENT IS MADE.

THE ½" EXPANSION JOINT SHALL EXTEND 1" MIN. BELOW BOTTOM OF PAVEMENT.

THE CAST IRON GRATES AND FRAMES SHALL CONFORM TO THE SPECIAL PLAN AND THE STANDARD SPECIFICATIONS.

ALL MATERIALS REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PROJECT.

NUMBER 4 BARS SHALL BE PLACED AROUND PIPE OPENINGS AS SHOWN IN PIPE DETAIL. THESE DIAGONAL REINFORCING BARS SHALL BE CONSIDERED AS SUBSIDIARY TO THE ITEM "REINFORCING STEEL FOR INLET AND JUNCTION BOX".

SEE SHEET 2 FOR GRATE AND FRAME DETAILS.

* PIPES MAY BE PLACED IN ANY WALL. THE INSIDE PIPE DIMENSION SHALL NOT EXCEED THE INSIDE HORIZONTAL DIMENSIONS OF THE INLET WALL IT PENETRATES, INCLUDING ANY ADDITIONAL ALLOWANCE FOR SKEWED PIPES.

THE MINIMUM CLEARANCE BETWEEN THE TOP OF THE PIPE AND THE BOTTOM OF THE GRATE SHALL BE 1" MINIMUM.

NO DEDUCTIONS HAVE BEEN MADE IN THE QUANTITIES FOR PIPE OPENINGS.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 441

MOUNTABLE CURB INLET TWIN GRATES

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

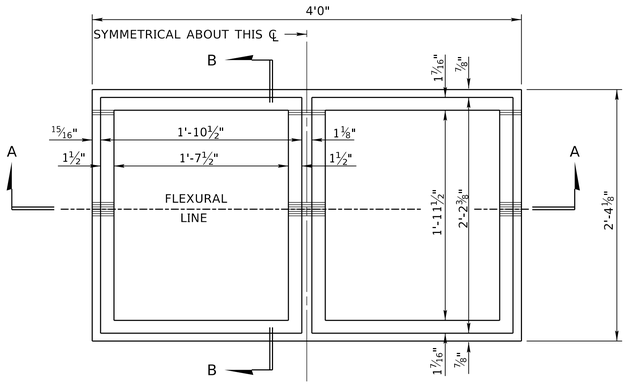
PROFESSIONAL CIVIL ENGINEER ★ ROSS D. BARRON E-14018 ★ STATE OF NEBRASKA

ORIGINAL: FEBRUARY 21, 2023

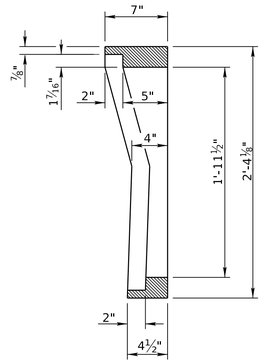
DATE

1
2

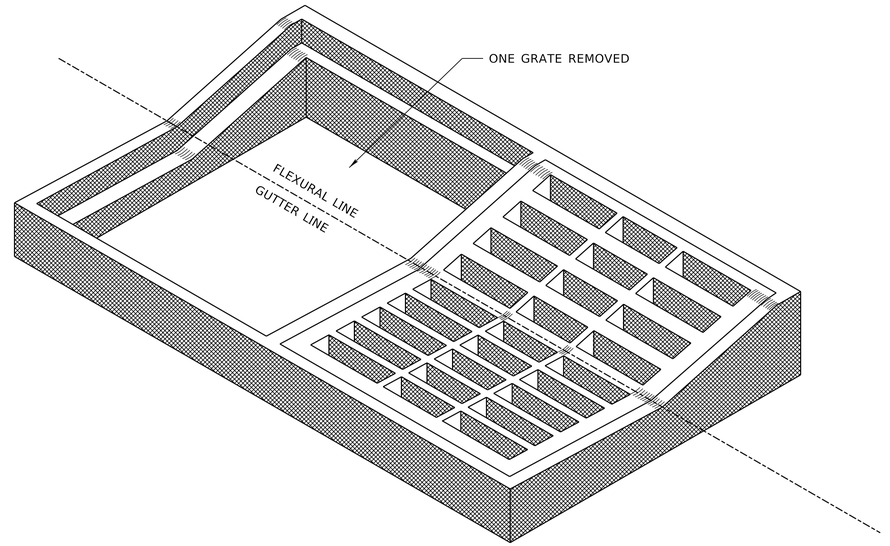
COMPUTER: BG04194187
DATE: 10-OCT-2024 14:49
FILE: 4410 0 R0.dgn



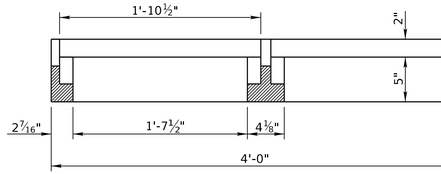
PLAN OF FRAME



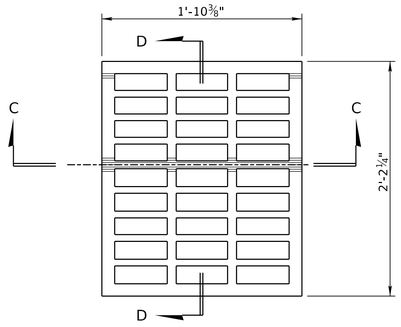
SECTION B-B



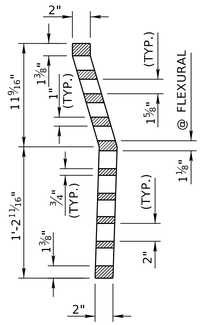
ISOMETRIC VIEW



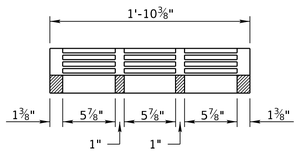
SECTION A-A



PLAN OF GRATE



SECTION D-D



SECTION C-C

NOTES:

GRATE AND FRAME SHALL BE MANUFACTURED OF GREY IRON AND SHALL BE OF UNIFORM QUALITY, FREE FROM BLOW HOLES, POROSITY, HARD SPOTS, SHRINKAGE DEFECTS, CRACKS OR OTHER INJURIOUS DEFECTS. THEY SHALL BE SMOOTH AND WELL CLEANED BY SHOT BLASTING AND UNLESS OTHERWISE SPECIFIED, SHALL BE COATED WITH COAL TAR PITCH VARNISH OF SPECIFICATION WHICH WILL MAKE A SMOOTH COATING, TOUGH AND TENACIOUS WHEN COLD, NOT TACKY AND NOT BRITTLE.

MATERIAL USED IN THE MANUFACTURE OF THE CASTING SHALL CONFORM TO A.S.T.M. SPECIFICATIONS A48 CLASS 30 IRON.

ALL CASTINGS ARE TO BE MANUFACTURED TRUE TO PATTERN AND WITH SATISFACTORY FIT OF COMPONENT PARTS.

ALL WEIGHTS AS GIVEN ARE APPROXIMATE AND AVERAGE VARIATION WILL NOT EXCEED SPECIFIED WEIGHT LIMIT IN ACCORDANCE WITH A.S.T.M. STANDARDS.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 441

MOUNTABLE CURB INLET TWIN GRATES

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

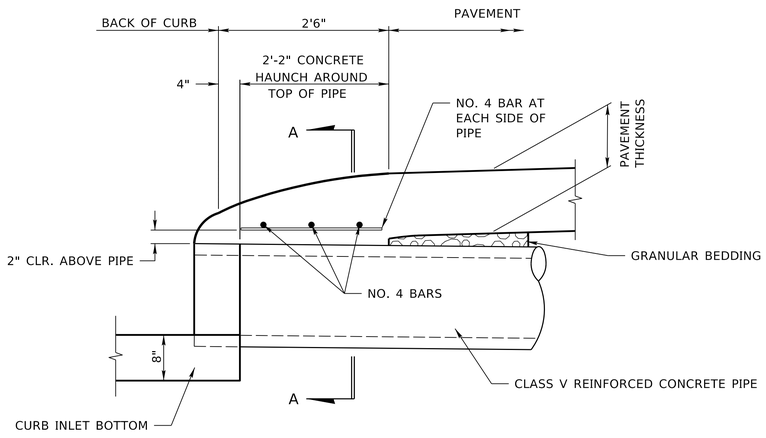
PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

ORIGINAL: FEBRUARY 21, 2023
DATE

2
2

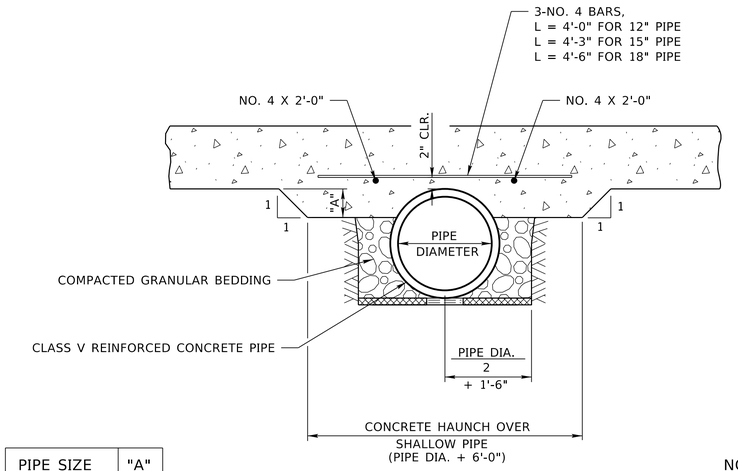
FILE: 4410 0 R0.dgn DATE: 10-OCT-2024 14:12 COMPUTER: BG04194187

COMPUTER: BG04194187
DATE: 10-OCT-2024 14:49
FILE: 4420 0 R0.dgn



CONCRETE HAUNCH OVER TRANSVERSE PIPE AT SHALLOW INLETS

PIPE SIZE	"A"
12"	4"
15"	5"
18"	6"



SECTION A-A THROUGH CONCRETE HAUNCH

NOTE:

CONCRETE HAUNCH SHALL BE USED WHEN TOP OF PIPE TO TOP OF CURB INLET IS LESS THAN 1'-11".

FOR DETAILS OF CURB INLET AND GUTTER DEPRESSION, SEE STANDARD PLAN 443.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 442

HAUNCH OVER PIPE AT SHALLOW CURB INLET

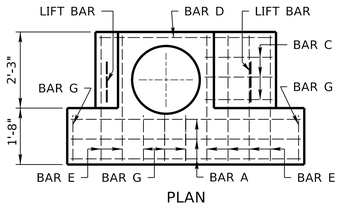
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

DATE

ORIGINAL: FEBRUARY 21, 2023
DATE

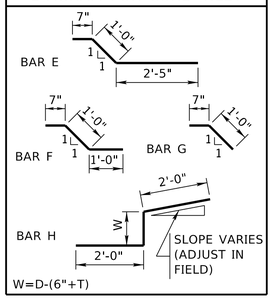
1
1



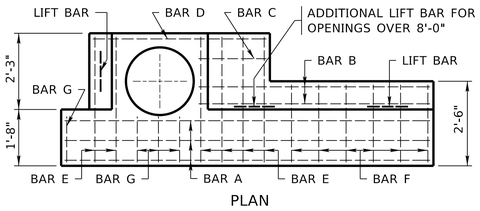
PLAN

INLET COVER

REINFORCING BAR BENDING DIAGRAM FOR CURB INLET



W=D-(6"+T)

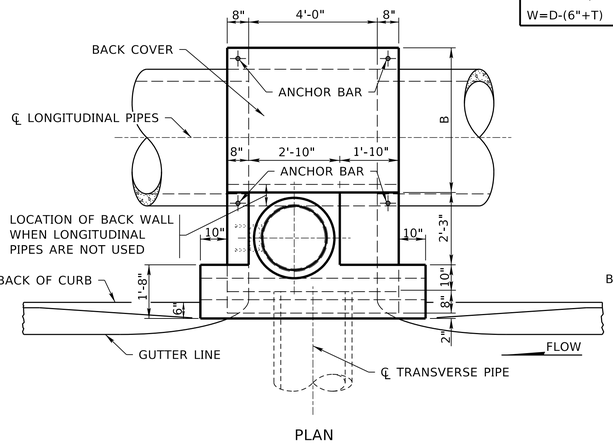


PLAN

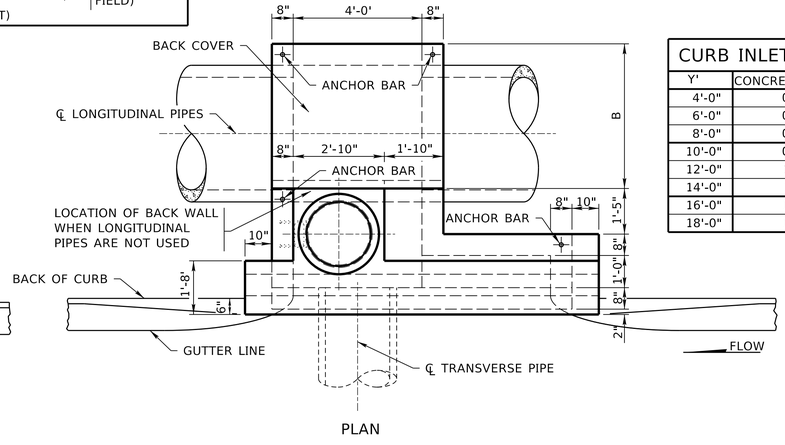
INLET COVER

REINFORCING BAR SCHEDULE FOR CURB INLETS (INCLUDES COVER)

BAR	SIZE	SHAPE	Y = 4'-0"		Y = 6'-0"		Y = 8'-0"		Y = 10'-0"		Y = 12'-0"		Y = 14'-0"		Y = 16'-0"		Y = 18'-0"	
			NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
A	8	STR.	3	6'-9"	3	8'-9"	3	10'-9"	3	12'-9"	3	14'-9"	3	16'-9"	3	18'-9"	3	20'-9"
B	6	STR.	--	--	2	4'-10	2	6'-10"	2	8'-10"	2	10'-10"	2	12'-10"	2	14'-10"	2	16'-10"
C	6	STR.	3	2'-0"	1	2'-0"	1	2'-0"	1	2'-0"	1	2'-0"	1	2'-0"	1	2'-0"	1	2'-0"
D	6	STR.	1	5'-1"	1	5'-1"	1	5'-1"	1	5'-1"	1	5'-1"	1	5'-1"	1	5'-1"	1	5'-1"
E	5	BENT	6	4'-0"	6	4'-0"	6	4'-0"	6	4'-0"	6	4'-0"	6	4'-0"	6	4'-0"	6	4'-0"
F	5	BENT	--	2'-7"	3	2'-7"	6	2'-7"	8	2'-7"	11	2'-7'	13	2'-7"	16	2'-7"	18	2'-7"
G	5	BENT	5	1'-7"	4	1'-7"	4	1'-7"	4	1'-7"	4	1'-7"	4	1'-7"	4	1'-7"	4	1'-7"
H	4	BENT	--	--	10	W+4'-0"	10	W+4'-0"	10	W+4'-0"	10	W+4'-0"	10	W+4'-0"	10	W+4'-0"	10	W+4'-0"
J	4	STR.	--	--	--	--	--	--	--	--	--	--	2	2'-2"	2	2'-2"	2	2'-2"
K	4	STR.	--	--	--	--	--	--	--	--	--	--	4	1'-9"	4	1'-9"	4	1'-9"
LIFT	4	BENT	VAR.	2'-6"	VAR.	2'-6"	VAR.	2'-6"	VAR.	2'-6"	VAR.	2'-6"	VAR.	2'-6"	VAR.	2'-6"	VAR.	2'-6"
M	4	STR.	VAR.	5'-1"	VAR.	5'-1"	VAR.	5'-1"	VAR.	5'-1'	VAR.	5'-1"	VAR.	5'-1"	VAR.	5'-1"	VAR.	5'-1"
N	4	STR.	8	B-3	8	B-3	8	B-3	8	B-3	8	B-3	8	B-3	8	B-3	8	B-3



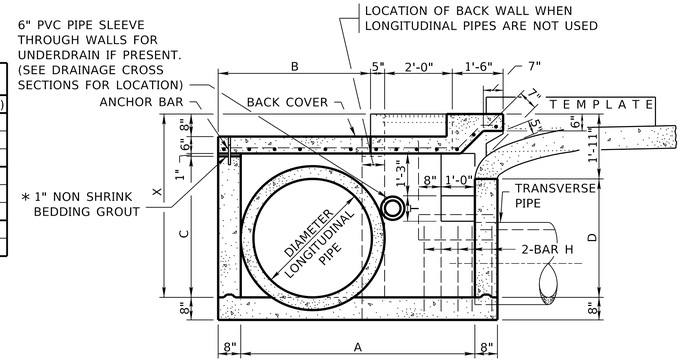
PLAN



PLAN

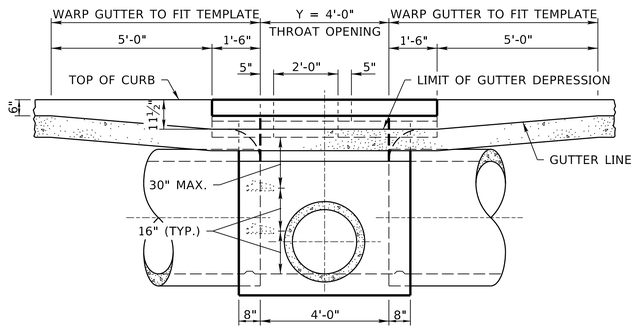
CURB INLET COVER QUANTITIES

Y'	CONCRETE (CU.YDS.)	REINFORCING (LB.)
4'-0"	0.62	46
6'-0"	0.72	58
8'-0"	0.82	71
10'-0"	0.92	83
12'-0"	1.02	95
14'-0"	1.12	112
16'-0"	1.22	122
18'-0"	1.32	136

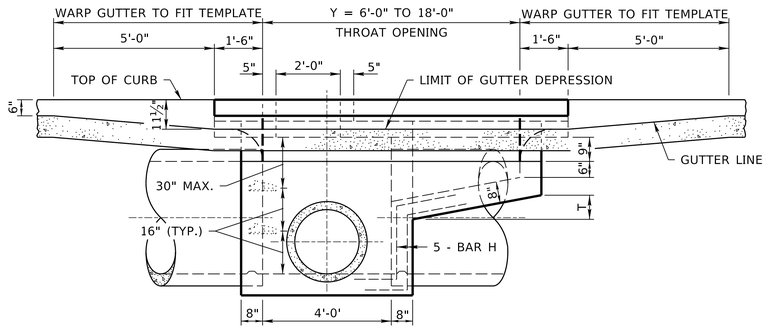


TYPICAL SECTION OF INLETS

∗ GROUT SHALL BE FINISHED SUCH THAT THE TOP ELEVATION OF THE INLET LID, WHEN INSTALLED, MATCHES THE FINISHED SHOULDER SLOPE OF THE ROADWAY CROSS-SECTIONS.



FRONT ELEVATION



FRONT ELEVATION

CURB INLETS

DATA FOR CURB INLETS (INCLUDES INLET COVER)

DIA. OF LONGIT. PIPE	DIMENSIONS					QUANTITIES															NO. OF M BARS	ADDITIONAL QUANTITIES PER ONE FOOT INCREASE OF DIMENSION "X"	
						CONCRETE, CU. YDS. ③							REINFORCING STEEL, LBS.									CONCRETE CU. YDS.	REINF. STEEL LBS. ④
	X ① (MIN.)	A②	B	C	D	Y=4'	Y=6'	Y=8'	Y=10'	Y=12'	Y=14'	Y=16'	Y=18'	Y=4'	Y=6'	Y=8'	Y=10'	Y=12'	Y=14'	Y=16'	Y=18'			
--	3'-11"	2'-8"	--	2'-8"	2'-0"	2.08	2.43	2.79	3.15	3.51	4.06	4.46	4.85	113	175	202	231	259	289	316	344	NONE	0.383	6.7
12"	2'-11"	4'-0"	1'-7"	1'-8"	1'-0"	2.14	2.51	2.86	3.21	3.56	3.95	4.30	4.65	133	186	216	245	274	310	340	364	3	0.459	6.7
15"	3'-2"	4'-4"	1'-11"	1'-11"	1'-3"	2.37	2.71	3.07	3.43	3.79	4.21	4.57	4.94	136	193	221	250	277	312	342	370	3	0.473	6.7
18"	3'-5"	4'-7"	2'-2"	2'-2"	1'-6"	2.60	2.95	3.30	3.67	4.03	4.44	4.80	5.16	141	200	228	257	284	318	349	376	4	0.490	6.7
21"	3'-8"	4'-11"	2'-6"	2'-5"	1'-9"	2.83	3.19	3.53	3.90	4.26	4.68	5.04	5.40	144	203	231	260	287	322	351	379	4	0.504	6.7
24"	3'-11"	5'-2"	2'-9"	2'-8"	2'-0"	3.06	3.41	3.76	4.12	4.49	5.04	5.43	5.83	148	210	238	267	294	324	352	379	5	0.518	6.7
27"	4'-2"	5'-6"	3'-1"	2'-11"	2'-3"	3.31	3.66	4.01	4.37	4.74	5.29	5.68	6.08	150	213	241	270	297	327	354	382	5	0.532	6.7
30"	4'-5"	5'-9"	3'-4"	3'-2"	2'-6"	3.54	3.89	4.25	4.61	4.97	5.52	5.92	6.32	151	217	244	273	301	331	358	385	5	0.547	6.7
36"	4'-11"	6'-4"	3'-11"	3'-8"	3'-0"	4.06	4.41	4.77	5.13	5.49	6.04	6.44	6.83	158	226	254	283	310	340	368	395	6	0.576	6.7
42"	5'-5"	6'-11"	4'-6"	4'-2"	3'-6"	4.60	4.95	5.31	5.67	6.03	6.58	6.98	7.38	164	236	264	293	320	350	378	405	7	0.605	6.7
48"	5'-11"	7'-6"	5'-1"	4'-8"	4'-0"	5.18	5.53	5.89	6.25	6.61	7.16	7.56	7.95	171	246	274	303	330	360	387	415	8	0.634	6.7
54"	6'-5"	8'-1"	5'-8"	5'-2"	4'-6"	5.78	6.13	6.49	6.85	7.21	7.76	8.16	8.56	174	253	280	309	337	367	394	421	8	0.663	6.7
60"	6'-11"	8'-8"	6'-3"	5'-8"	5'-0"	6.41	6.76	7.12	7.48	7.84	8.39	8.79	9.19	180	262	290	319	346	376	404	431	9	0.691	6.7
66"	7'-5"	9'-3"	6'-10"	6'-2"	5'-6"	7.07	7.42	7.78	8.14	8.50	9.05	9.45	9.85	187	272	300	329	356	386	414	441	10	0.720	6.7

T = 9" EXCEPT FOR THE FOLLOWING:
T = 6" FOR 6'-0" TO 18'-0" OPENINGS WHEN X = 2'-11" THRU 3'-1"
T = 1'-6" FOR 14'-0" TO 18'-0" OPENINGS WHEN X = 3'-11" THRU 7'-5"

① "X" SHALL NOT EXCEED 7'-6".

② "A" SHALL NOT EXCEED 10'-0".

③ NO DEDUCTIONS WILL BE MADE FOR PIPE OPENINGS.

④ NOT APPLICABLE WHERE Y = 4'-0".

DIAMETER OF PIPE AND MINIMUM "X" IN THIS INLET DATA TABLE ARE BASED ON THE LONGITUDINAL PIPE. DEPTH OF THE INLET MAY BE GOVERNED BY THE TRANSVERSE PIPE (MINIMUM "D" = TRANSVERSE PIPE DIAMETER PLUS 9").

NOTES:

THE MINIMUM COVERING, MEASURED FROM THE FACE OF CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE $1\frac{1}{2}$".

THE QUANTITIES OF CONCRETE AND STEEL FOR CURB INLET INCLUDES THAT PORTION OF CONCRETE AND STEEL BELOW AND BACK OF THE CURB SECTION AS SHOWN ON THIS PLAN.

THE CONCRETE COVERS MAY BE CAST IN PLACE OR PRECAST.

THE CAST IRON COVERS, FRAMES SHALL BE GREY IRON CONFORMING TO THE SPECIFICATIONS. CAST IRON STEPS SHALL BE INSTALLED IN CURB INLETS AND JUNCTION BOXES WHEN THE "X" DIMENSION IS 4'-6" OR GREATER. THE FURNISHING AND PLACING OF CAST IRON STEPS SHALL BE SUBSIDIARY TO THE ITEM FOR WHICH DIRECT PAYMENT IS MADE.

THE GUTTER DEPRESSION TEMPLATE SHALL BE USED THROUGHOUT THE THROAT OPENING.

CLASS OF CONCRETE AND MINIMUM COMPRESSIVE STRENGTH AND TYPE OF STEEL FOR REINFORCING BARS SHALL CONFORM TO THE NDOT "STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION."

THE INLET COVER SHALL BE IMPRINTED "NO DUMPING" SEE SHEET 2.

REV. NO.	DATE	DESCRIPTION OF REVISION
R13	JUN 23	ADDED 18 FOOT THROAT OPENING
R12	JUL 20	ADDED UNDERDRAIN NOTE & TABLE
R11	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 443-R13

CURB INLETS AND JUNCTION BOX

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

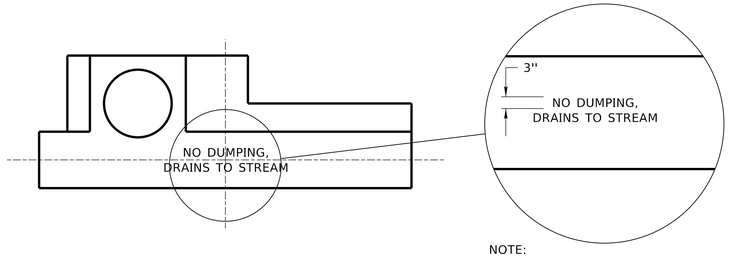
DATE

ORIGINAL: FEBRUARY 22, 1974

DATE

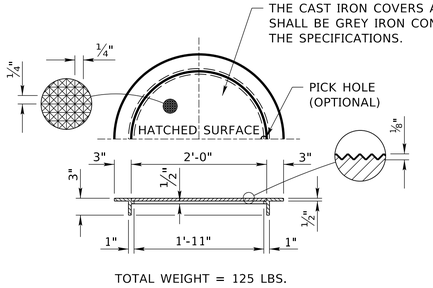
1
2

COMPUTER: BG0419M593
DATE: 11-JUL-2025 07:43
FILE: 4430 0 R13.dgn



INLET COVER

NOTE:
TEXT IS TO BE IMPRINTED INTO CONCRETE, AT A DEPTH OF ¼".

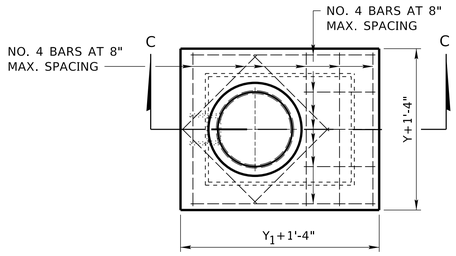


TOTAL WEIGHT = 125 LBS.

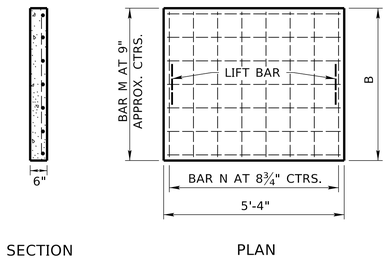
CAST IRON COVER AND FRAME
FOR JUNCTION BOX AND CURB INLET

QUANTITIES FOR JUNCTION BOX			
SIZE Y x Y_1	X = 2'-6''		ADDITIONAL QUANTITIES OF CONCRETE (CU. YDS.) PER ONE FOOT INCREASE OF DIMENSIONS "X" **
	CONCRETE CU. YDS.*	REINFORC. STEEL LBS.	
2'-0" x 2'-0"	0.94	15	0.26
2'-0" x 2'-6"	1.06	18	0.27
2'-0" x 3'-0"	1.18	23	0.31
2'-6" x 2'-6"	1.20	19	0.31
2'-6" x 3'-0"	1.33	22	0.34
3'-0" x 3'-0"	1.47	29	0.36
3'-0" x 3'-6"	1.61	30	0.39
3'-0" x 4'-0"	1.76	34	0.41

* NO DEDUCTIONS WILL BE MADE FOR PIPE OPENINGS
** DIMENSION "X" SHALL NOT EXCEED 5'-6"

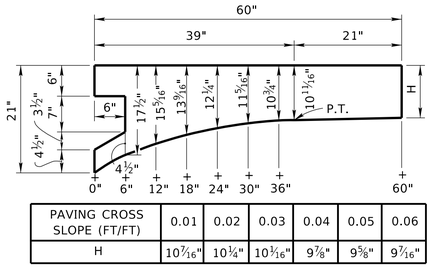


PLAN



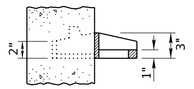
SECTION PLAN

BACK COVER

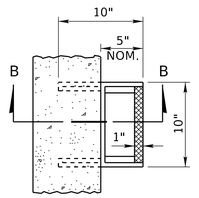


PAVING CROSS SLOPE (FT/FT)	0.01	0.02	0.03	0.04	0.05	0.06
H	10⁷⁄₁₆"	10¼"	10¹⁄₁₆"	9⅞"	9⅝"	9⁷⁄₁₆"

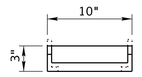
GUTTER DEPRESSION TEMPLATE



SECTION B-B



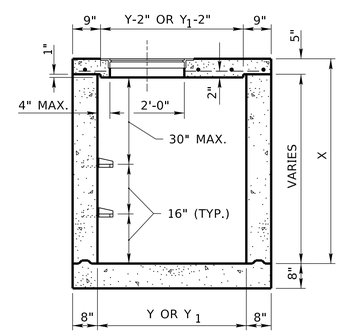
PLAN



FRONT ELEVATION

STEPS TO BE PLACED AT 16" CENTERS

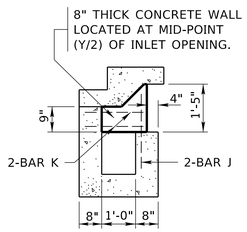
CAST IRON STEPS



SECTION C-C
JUNCTION BOX
(NOT FOR USE UNDER TRAFFIC)

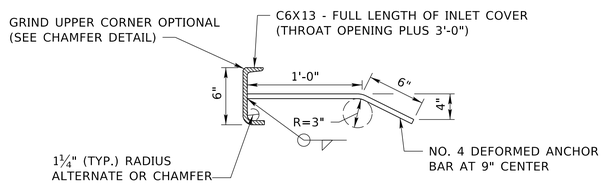
STRUCTURAL STEEL FOR FACE ARMOR	
THROAT OPENING	WEIGHT (LBS.)
4'-0"	100
6'-0"	129
8'-0"	157
10'-0"	186
12'-0"	215
14'-0"	243
16'-0"	272
18'-0"	300

CHAMFER DETAIL



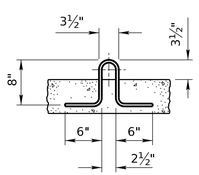
SECTION
FOR 14'-0", 16'-0" & 18'-0" INLET OPENINGS

MID-POINT
COVER SUPPORT

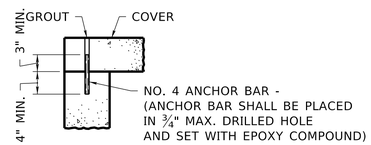


FACE ARMOR

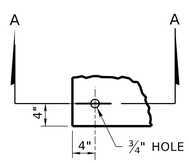
NOTES:
THE COMPLETED FACE ARMOR/ANCHOR BAR ASSEMBLY SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.



LIFT BAR



SECTION A-A



PLAN

ANCHOR BAR

REV. NO.	DATE	DESCRIPTION OF REVISION
R13	JUN 23	ADDED 18 FOOT THROAT OPENING
R12	JUL 20	ADDED UNDERDRAIN NOTE & TABLE
R11	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION
STANDARD PLAN NO. 443-R13

CURB INLETS AND JUNCTION BOX

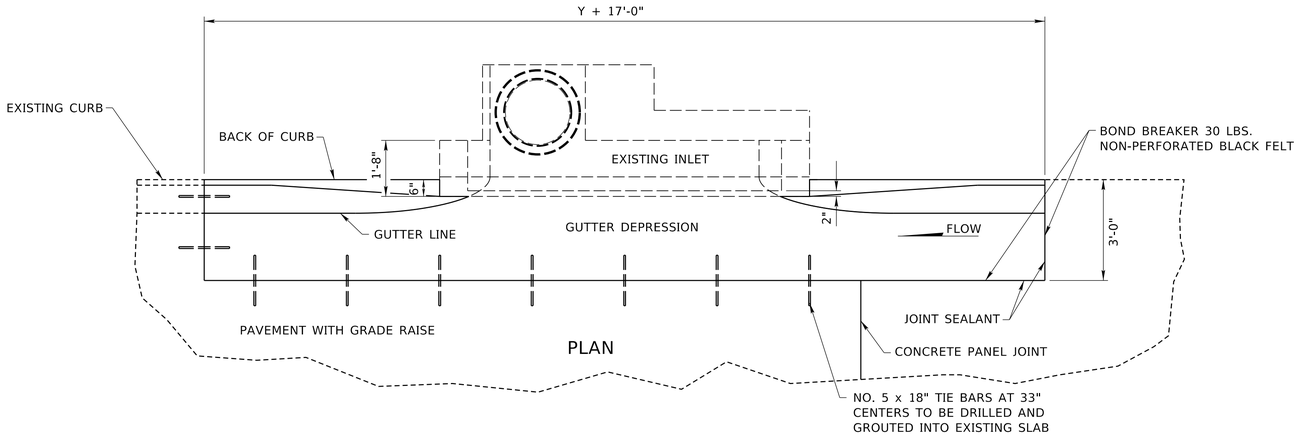
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

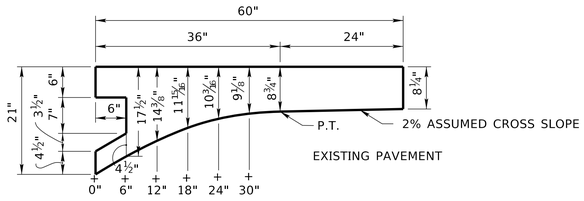
ORIGINAL:
FEBRUARY 22, 1974
DATE

2
2

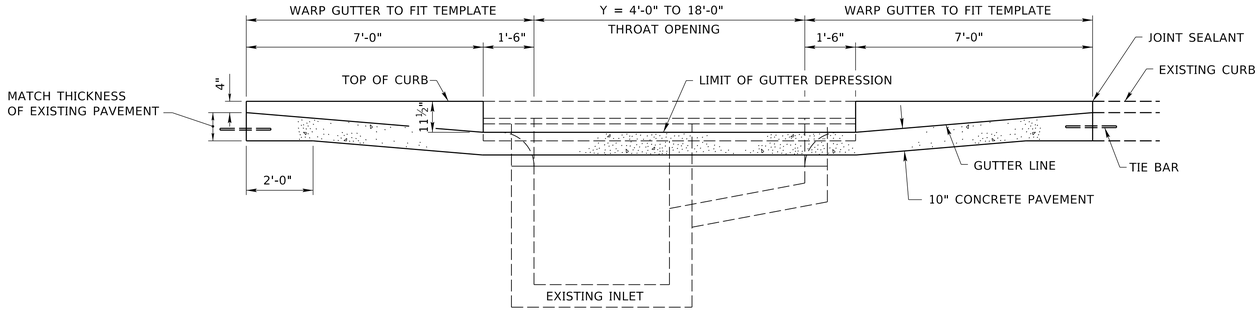
COMPUTER: BG0419M593
DATE: 11-JUL-2025 07:43
FILE: 4430 0 R13.dgn



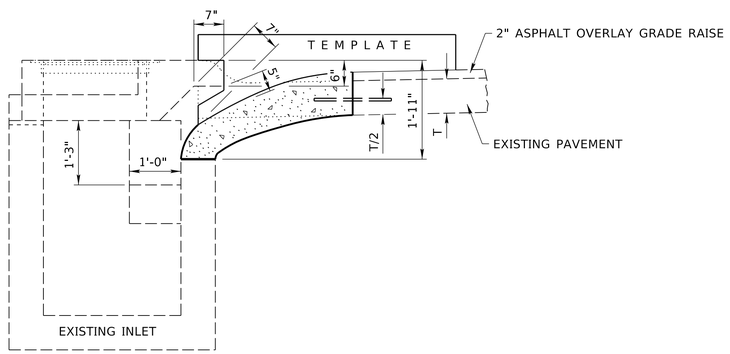
PLAN



GUTTER DEPRESSION TEMPLATE
FOR 2" GRADE RAISE



FRONT ELEVATION



TYPICAL SECTION OF GUTTER DEPRESSION

NOTES:

TIE BARS ARE REQUIRED WHEREVER THE NEW GUTTER DEPRESSION ABUTS EXISTING CONCRETE.

ALL CONCRETE SHALL BE CLASS 47B-3500

THE GUTTER DEPRESSION TEMPLATE SHALL BE USED THROUGHOUT THE THROAT OPENING.

THIS PLAN IS USED TO RECONSTRUCT GUTTER DEPRESSIONS FOR OVERLAYS 2" ABOVE THE ORIGINAL FINISH GRADE.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 444

RECONSTRUCT GUTTER DEPRESSION 2" GRADE RAISE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

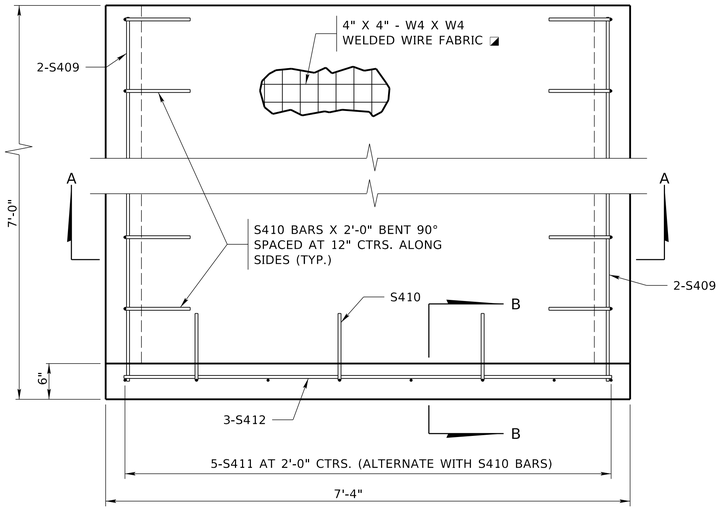
PROFESSIONAL CIVIL ENGINEER
MICK S. SYSLO
E-10043
STATE OF NEBRASKA

DATE

ORIGINAL:
OCTOBER 19, 2023
DATE

1
1

COMPUTER: BG0419M1187
DATE: 25-JUN-2024 10:08
FILE: 4440 0 R0.dgn



REINFORCING DETAIL FOR SPLASH BASIN

NOTES:

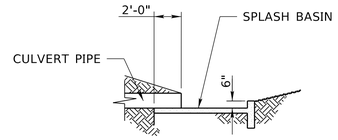
ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM "CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX".

ALL REINFORCING STEEL USED SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M. DESIGNATION A615/A615M, GRADE 60, AND SHALL BE PAID FOR UNDER THE ITEM "REINFORCING STEEL FOR INLET AND JUNCTION BOX".

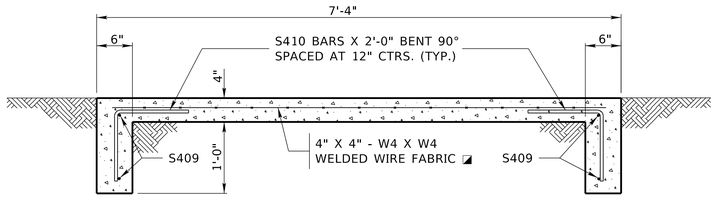
◪ NO. 4 BARS AT 12" CENTERS (MAX.) MAY BE USED IN LIEU OF THE WELDED WIRE FABRIC FOR THE SPLASH BASIN. NO ADJUSTMENTS IN QUANTITIES SHALL BE MADE FOR THIS SUBSTITUTION.

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR, SHALL BE 2", UNLESS NOTED OTHERWISE.

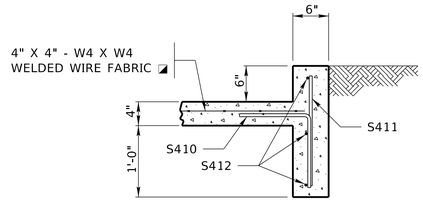
ALL EXCAVATION, MATERIALS, EQUIPMENT, TOOLS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE WORK, THAT ARE NOT PAID FOR DIRECTLY, SHALL BE CONSIDERED AS SUBSIDIARY TO THE ITEM "CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX".



CROSS-SECTION VIEW

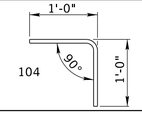


SECTION A-A



SECTION B-B

BILL OF BARS (SPLASH BASIN)				BENDING DIAGRAMS
MARK	NO.	LENGTH	TYPE	ALL DIMENSIONS ARE OUT TO OUT NOT TO SCALE
S409	4	6'-8"	STR	
S410	17	2'-0"	104	
S411	5	1'-6"	STR	
S412	3	7'-0"	STR	



QUANTITIES FOR SPLASH BASIN	
CONCRETE (CY)	STEEL (LB)
1.1	60

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 453

SPLASH BASIN

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

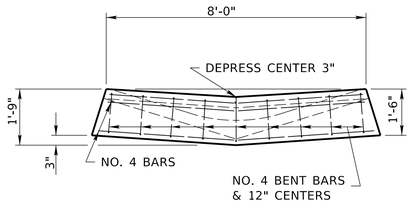
DATE

PROFESSIONAL CIVIL ENGINEER
ROSS D. BARRON
E-14018
STATE OF NEBRASKA

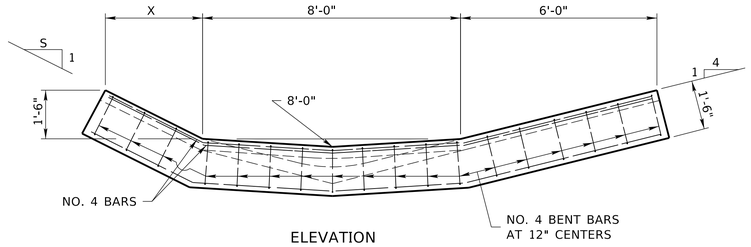
ORIGINAL: FEBRUARY 21, 2023
DATE

1
1

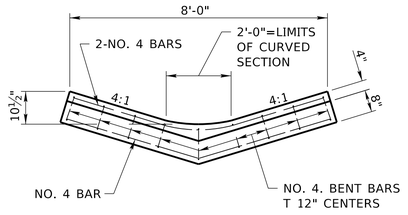
COMPUTER: BG04190187
DATE: 10-OCT-2024 14:13
FILE: 4530 0 R0.dgn



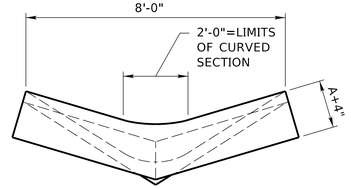
ELEVATION



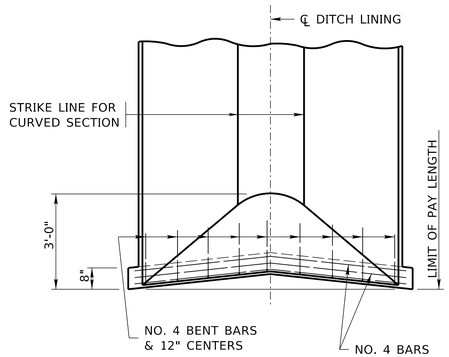
ELEVATION



ELEVATION

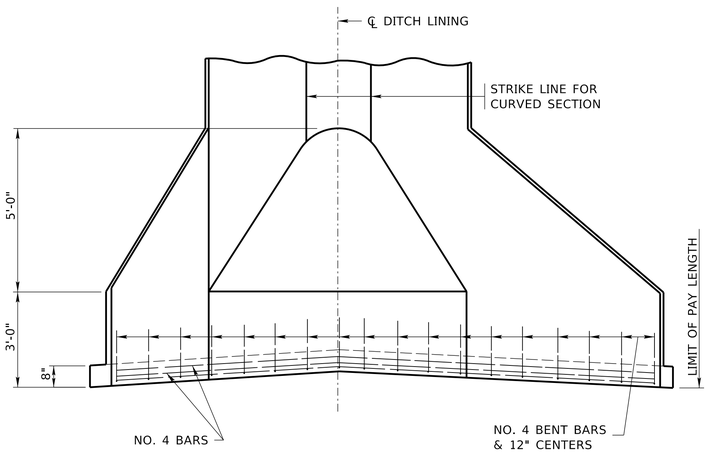


ELEVATION



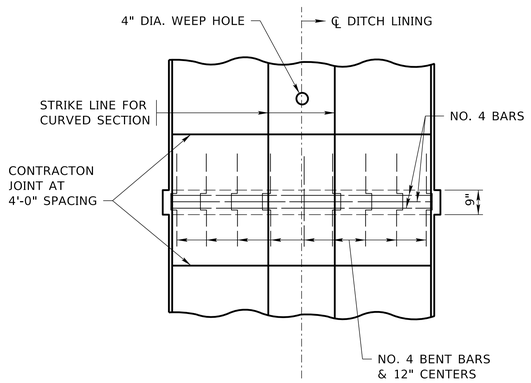
PLAN

TYPE A INLET DETAILS



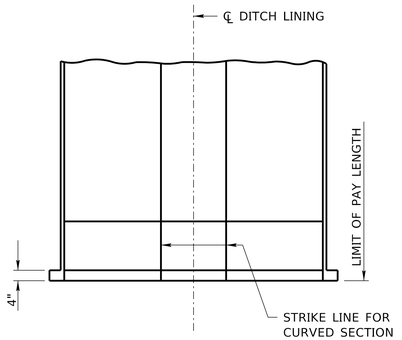
PLAN

TYPE BUTTON HEAD INLET DETAILS



PLAN

INTERMEDIATE FOOTING DETAILS



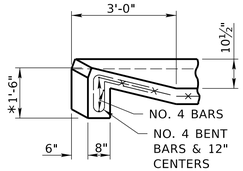
PLAN

OUTLET DETAILS

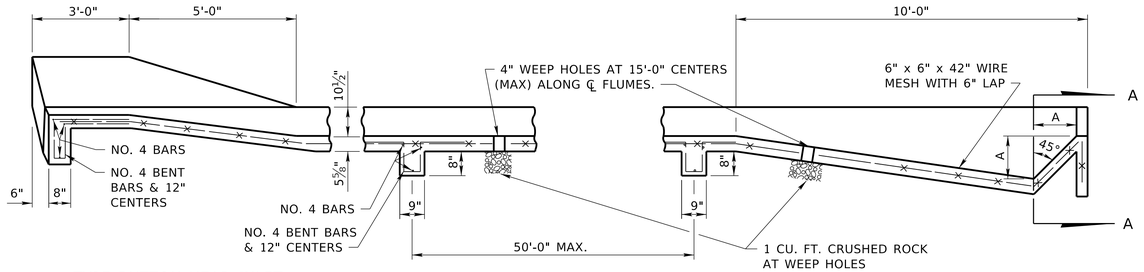
QUANTITES
(FOR BIDDING PURPOSES ONLY)

1 LIN. FT. OF DITCH LINING 0.106 CU. YDS.
1 INTERMEDIATE FOOTING 0.155 CU. YDS.

TYPE A INLET
10 LIN. FT. AT INLET 1.262 CU. YDS.



TYPE A INLET AT ℄



TYPE BUTTON HEAD INLET

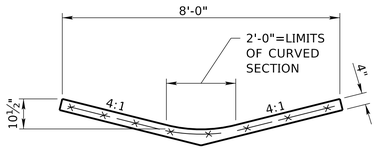
SECTIONAL VIEW AT ℄

DIMENSIONS MARKED THUS, * ℄,
ARE MEASURED NORMAL TO SLOPE.

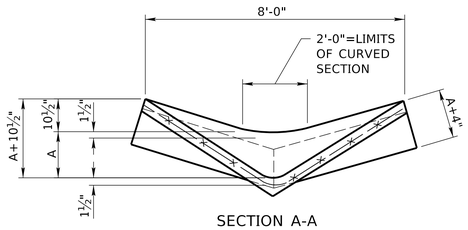
A=1'-2" FOR DITCH GRADE 4:1
A=1'-6" FOR DITCH GRADE 3:1
A=1'-10" FOR DITCH GRADE 2:1 OR STEEPER.

OUTLET ONLY	
A	QUANTITY FOR 10 LIN. FT.
1'-2"	1.22 CU. YDS.
1'-6"	1.27 CU. YDS.
1'-10"	1.32 CU. YDS.

TYPE BUTTON HEAD INLET ONLY		
S	X	QUANTITY FOR 10 LIN. FT.
2	3'-0"	2.10 CU. YDS.
3	4'-6"	2.25 CU. YDS.
4	6'-0"	2.35 CU. YDS.



TYPICAL CROSS SECTION
OF DITCH LINER



SECTION A-A

NOTES:

ALL CONCRETE SHALL BE CLASS 47A-S, 47B OR 47C-S.
ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED.
THE MINIMUM COVERING, MEASURING FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR OR WIRE MESH, SHALL BE 1½", EXCEPT AS SHOWN.
WIRE MESH REINFORCING STEEL AND CRUSHED ROCK AT WEEP HOLES WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE ITEMS FOR WHICH PAYMENT IS MADE.
INTERMEDIATE FOOTINGS TO BE PLACED AT INTERVALS OF NOT MORE THAN 50'-0" ALONG LONGITUDINAL AXIS OF LINING.

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	APR 13	CONVERT TIFF TO DGN FILE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 455-R2

CONCRETE DITCH LINING

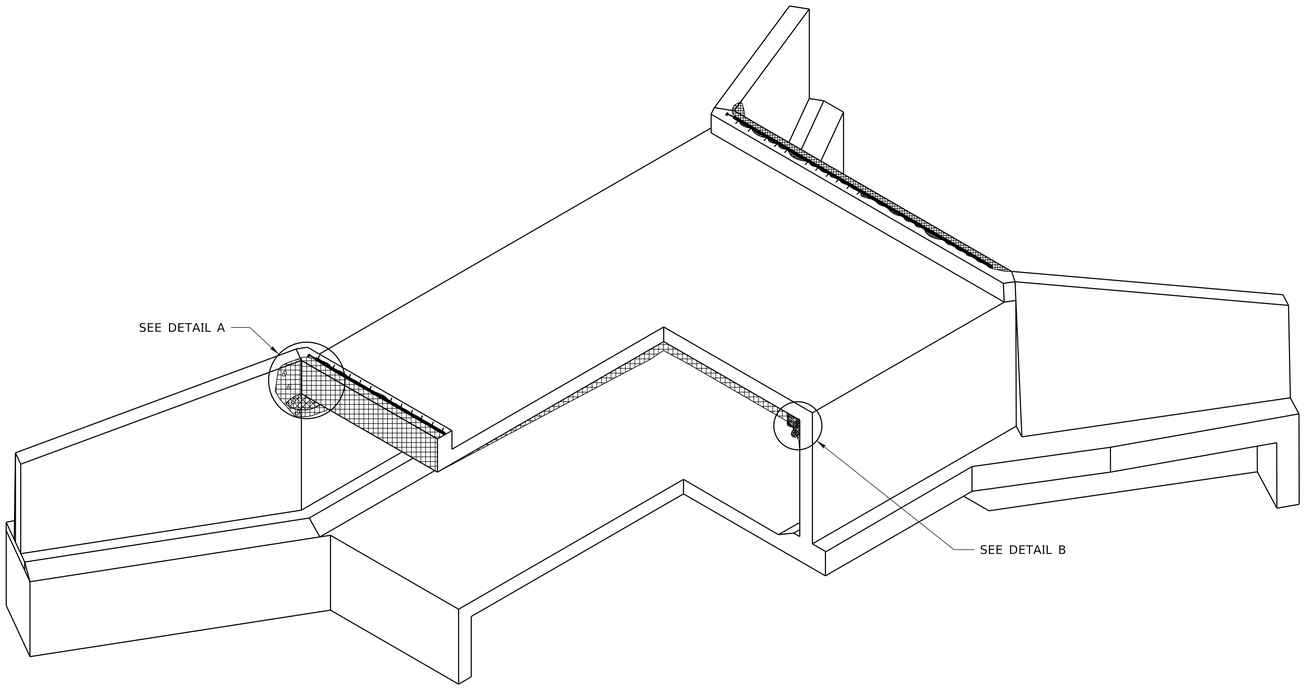
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

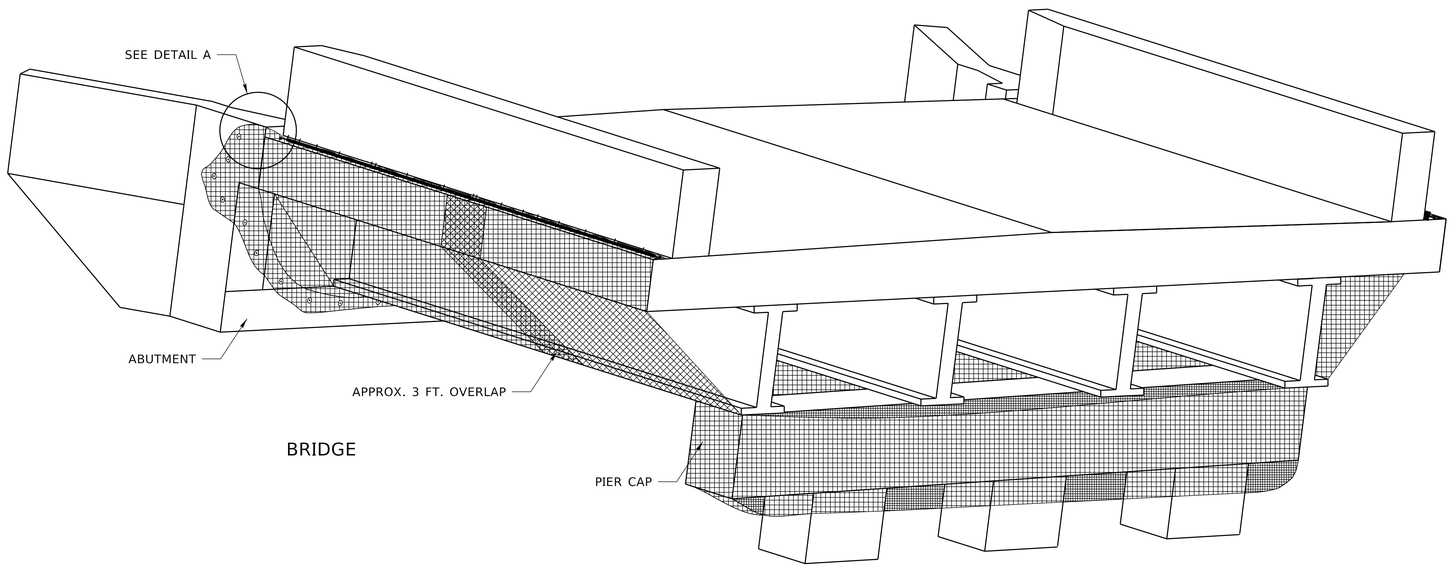
ORIGINAL:
FEBRUARY 1974
DATE

1
1

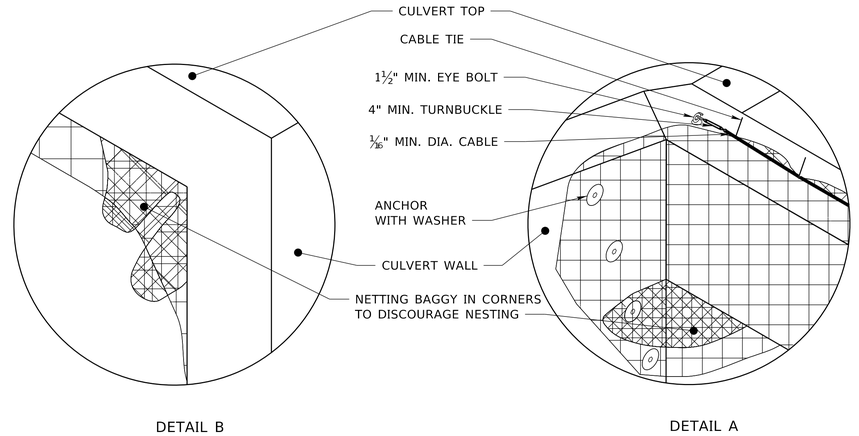
COMPUTER: BG0419M593
DATE: 11-JUL-2025 08:08
FILE: 4550 0 R2.dgn



BOX CULVERT



BRIDGE



DETAIL B DETAIL A

NOTES:

MAY BE USED ON OTHER STRUCTURES SUCH AS LARGE CORRUGATED METAL PIPES.

THE CONTRACTOR SHALL USE NETTING CONSISTING OF OPENINGS NO LARGER THAN ½" WIDE. THE NETTING MATERIAL WILL BE CONSTRUCTED OF EXTRUDED POLYPROPYLENE OR NYLON MESH.

THE CONTRACTOR SHALL INSTALL NETTING IN A MANNER THAT GAPS BETWEEN THE NETTING AND THE BRIDGE/CULVERT ARE LESS THAN ½" AT THE POINT OF ATTACHMENT. LOOSE FITTING NETTING IS DESIRABLE FOR STRUCTURES SUCH AS BOX CULVERTS, WHERE NETTING FITTED TIGHT TO THE STRUCTURE MAY ALLOW NESTING.

NETTING SHOULD OVERLAP IN END AREAS OF BRIDGE PIERS BY APPROXIMATELY 3 FT. AND SHOULD EXTEND TO THE BOTTOM OF THE PIER CAP, IF PRESENT. FOR SLAB BRIDGES, NETTING SHOULD BE PULLED TAUT NOT BE TIGHT AGAINST THE STRUCTURE AT INSIDE CORNER AREAS BETWEEN THE UNDERSIDE OF A BRIDGE DECK AND PIER CAP AND MAINTAINED TO MINIMIZE SAGGING.

DEVICES SUCH AS STEEL CABLES AND EYE BOLTS USED TO SECURE NETTING TO THE STRUCTURE SHOULD BE OF ADEQUATE NUMBER AND STRENGTH TO ACCOUNT FOR THE WEIGHT OF THE NET AND SUBSEQUENT STRETCHING, AND SHALL MEET THE SPECIFICATIONS OUTLINED IN SECTION 1057 AND 1062 OF THE STANDARD SPECIFICATION FOR HIGHWAY CONSTRUCTION.

PLASTIC CABLE OR "ZIP" TIES SHOULD BE USED TO SECURE TO THE STEEL CABLES AND TO BUNCH EXCESS NETTING WHERE NEEDED.

STANDARD DIMENSIONAL LUMBER SECURELY ATTACHED TO THE STRUCTURE MAY BE SUBSTITUTED FOR THE CABLE AND EYE BOLT METHOD OF SECURING THE NETTING TO THE STRUCTURE.

THE CONTRACTOR SHALL INSTALL THE NETTING IN A MANNER THAT WILL MINIMIZE THE OBSTRUCTION TO WATERCOURSES DURING PERIODS OF HIGH FLOW BY KEEPING THE NETTING TAUT TO THE TOP OF THE CULVERT.

FURTHER GUIDANCE FOR PLACEMENT IS AVAILABLE FROM THE NDOR ENVIRONMENTAL SECTION IN PLANNING AND PROJECT DEVELOPMENT.

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 490-R1

BIRD EXCLUSION NETTING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

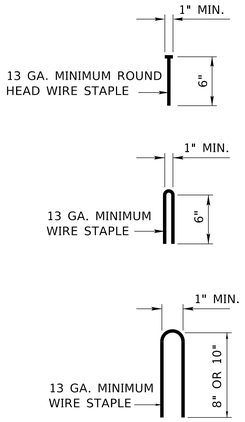
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

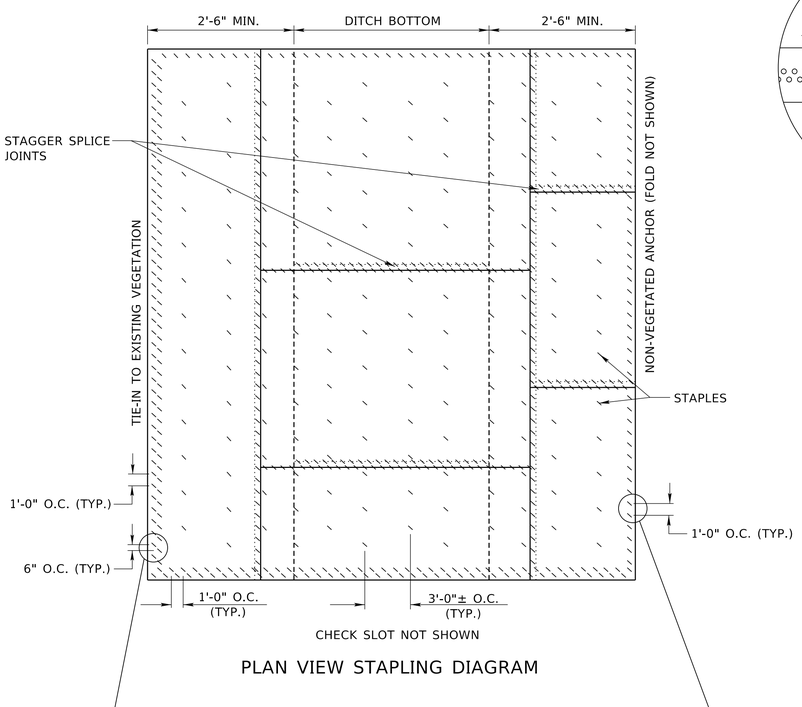
ORIGINAL:
JULY 1, 2011
DATE

1
1

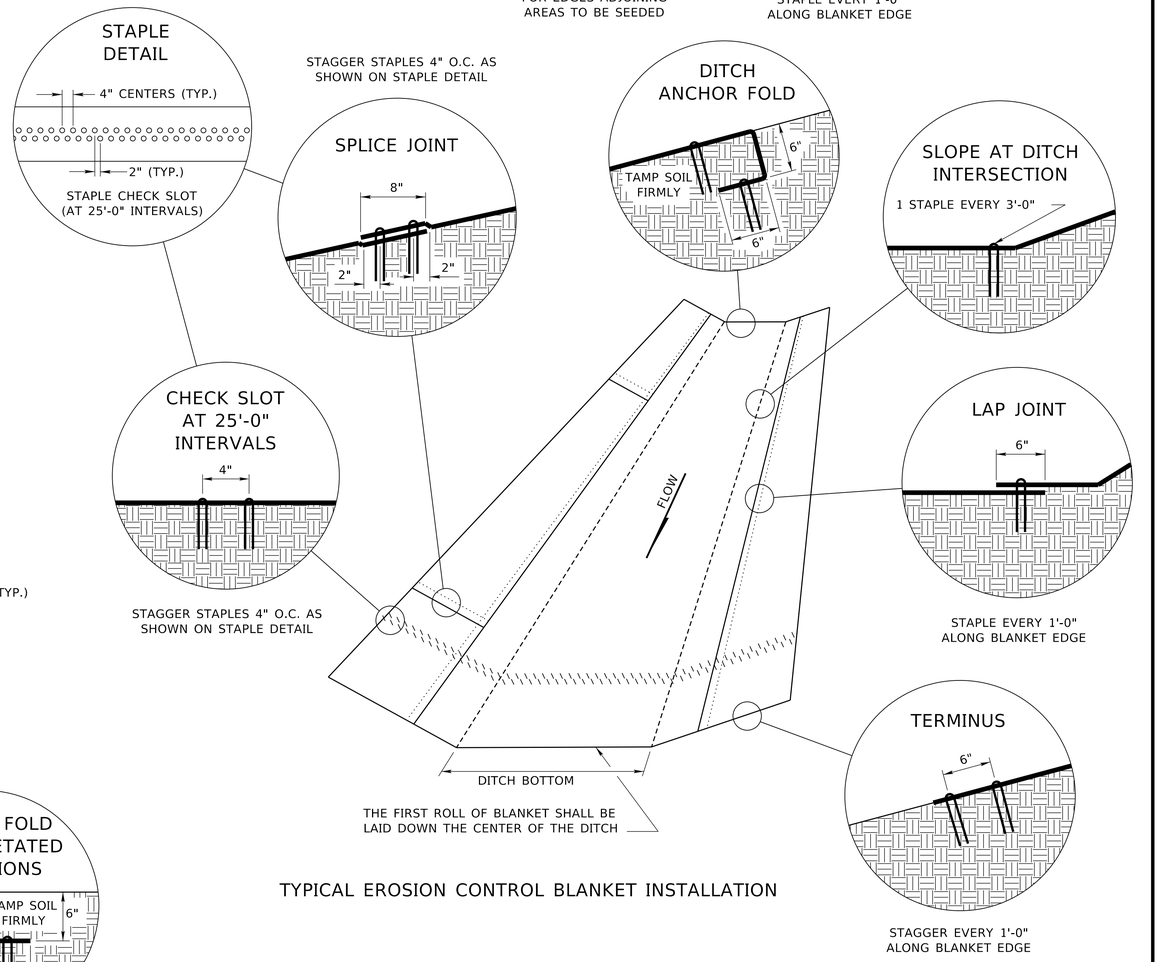
COMPUTER: BG04190187
DATE: 10-OCT-2024 14:13
FILE: 4900 0 R1.dgn



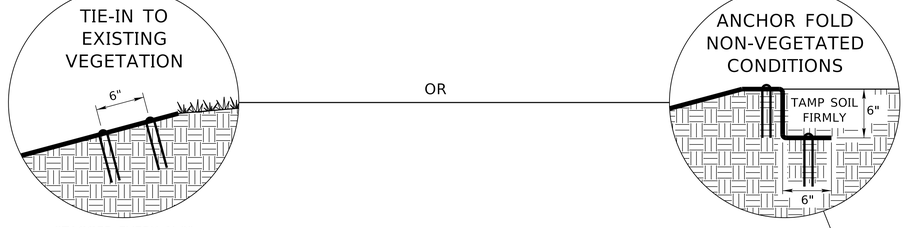
WIRE STAPLE DETAIL

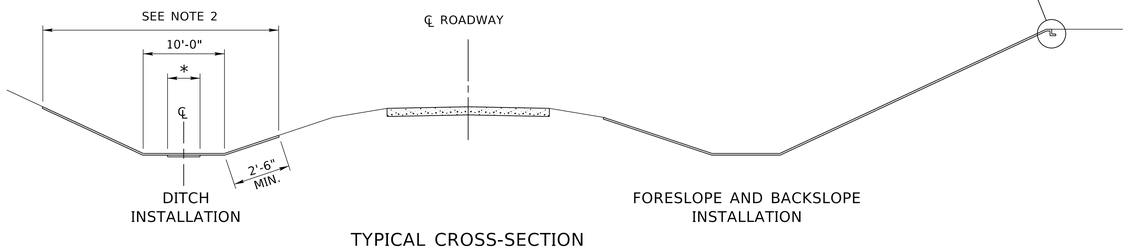


PLAN VIEW STAPLING DIAGRAM



TYPICAL EROSION CONTROL BLANKET INSTALLATION





TYPICAL CROSS-SECTION

* THE FIRST ROLL OF BLANKET SHALL BE LAID DOWN THE CENTER OF THE DITCH

NOTES:

1. THIS PLAN IS APPLICABLE FOR THE FOLLOWING: EROSION CONTROL CLASS 1B, 1C, 1D, 1E, 1F, 2A, 2B & 2C.
2. SOIL RETENTION BLANKET SHALL BE LAID A MINIMUM OF 2'-6" UP THE BACKSLOPE AND FORESLOPE.
3. CHECK SLOTS ARE PLACED PERPENDICULAR TO DITCH CENTER LINE ON 25'-0" INTERVALS.
4. THE MANUFACTURERS' RECOMMENDED STAPLING PATTERNS SHALL GOVERN OVER THE PLANS.

REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN 18	NDOR BORDER TO NDOT BORDER
R6	APR 14	UPDATE INSTALLATION METHOD
R5	OCT 07	EROSION CONTROL AT SPLASH BASIN

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 501-R7

EROSION CONTROL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
BRANDIE S. NEEMANN
E-11829
STATE OF NEBRASKA

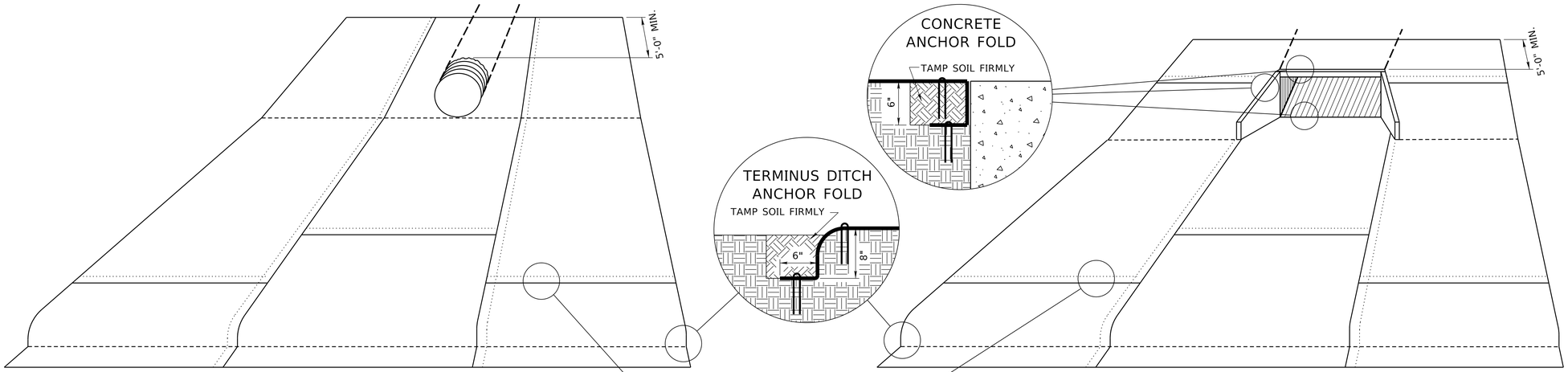
DATE

ORIGINAL: NOVEMBER 1973

DATE

1
3

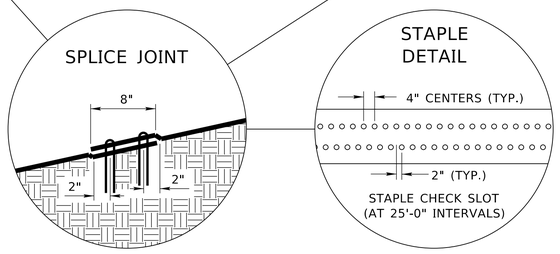
FILE: 5010 0 R7.dgn DATE: 28-AUG-2024 14:39 COMPUTER: BG04194I187

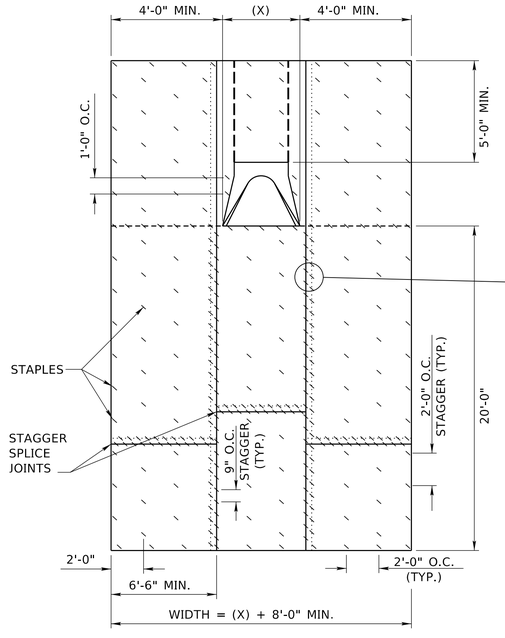


TYPICAL INSTALLATION AT PIPE CULVERT

(SHOWING STRAIGHT PIPE)

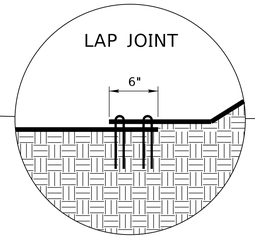
TYPICAL INSTALLATION AT BOX CULVERT



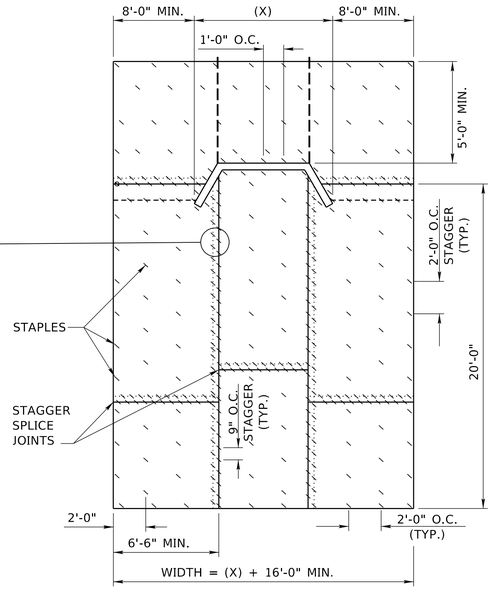


PLAN VIEW STAPLING DIAGRAM

(X) IS EQUAL TO THE OUTSIDE WIDTH OF THE FLARED END SECTION

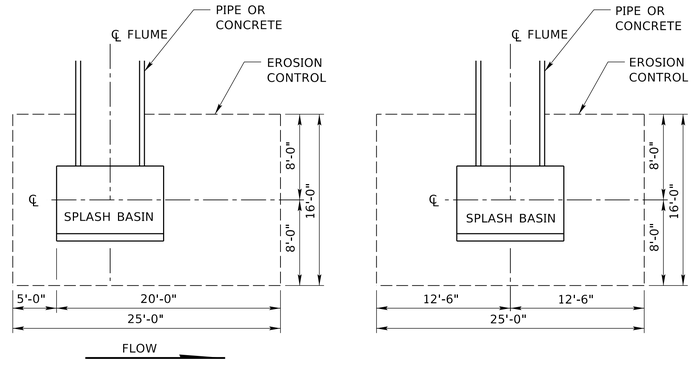


STAGGER STAPLES EVERY 1'-0" O.C. WITHIN 20'-0" OF PIPE



PLAN VIEW STAPLING DIAGRAM

(X) IS EQUAL TO THE OUTSIDE WIDTH OF THE WING WALLS



NOTE:
OFFSET EROSION CONTROL PLACEMENT ALONG THE DRAINAGE PATH

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

EROSION CONTROL BLANKET PLACEMENT AT SPLASH BASIN

REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN 18	NDOR BORDER TO NDOT BORDER
R6	APR 14	UPDATE INSTALLATION METHOD
R5	OCT 07	EROSION CONTROL AT SPLASH BASIN

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 501-R7

EROSION CONTROL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

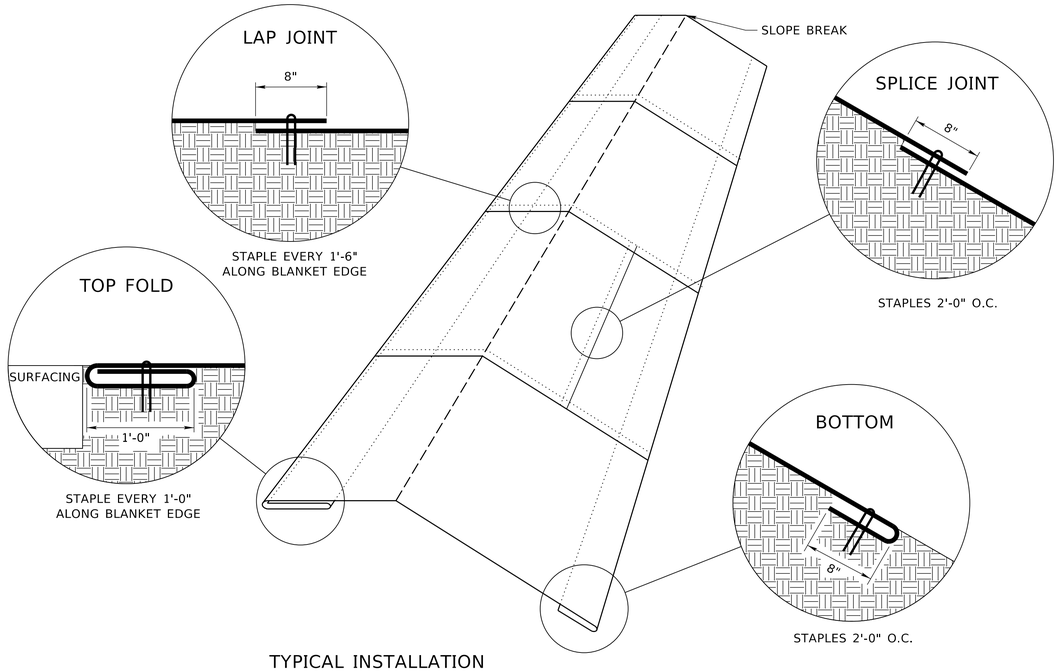
PROFESSIONAL CIVIL ENGINEER
BRANDIE S. NEEMANN
E-11829
STATE OF NEBRASKA

DATE

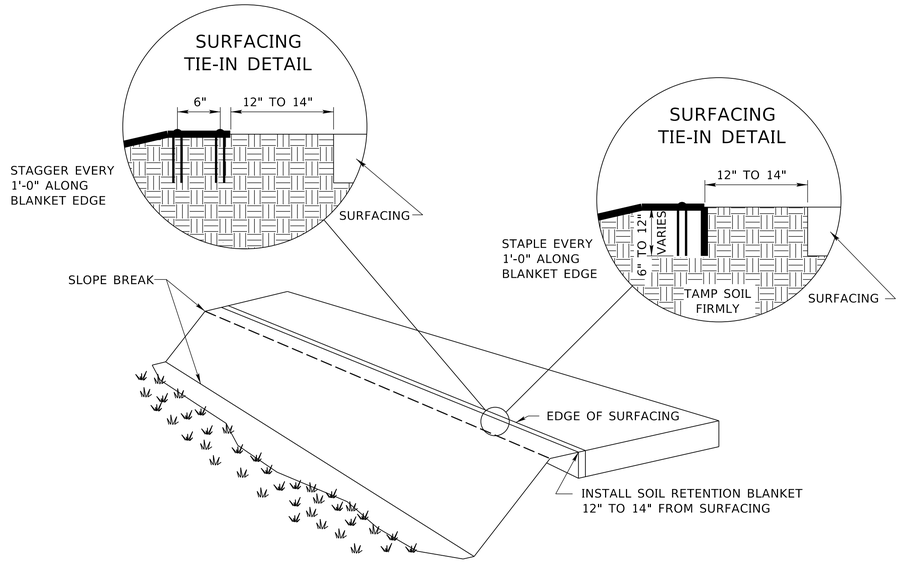
ORIGINAL: NOVEMBER 1973
DATE

2
3

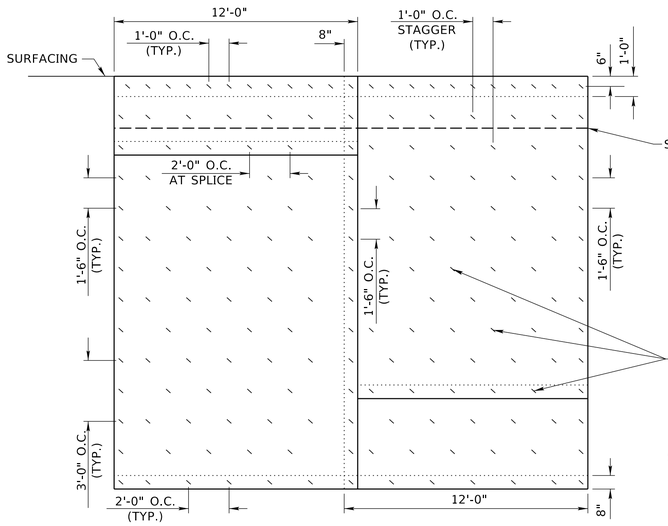
COMPUTER: BG04190187
DATE: 28-AUG-2024 14:39
FILE: 5010 0 R7.dgn



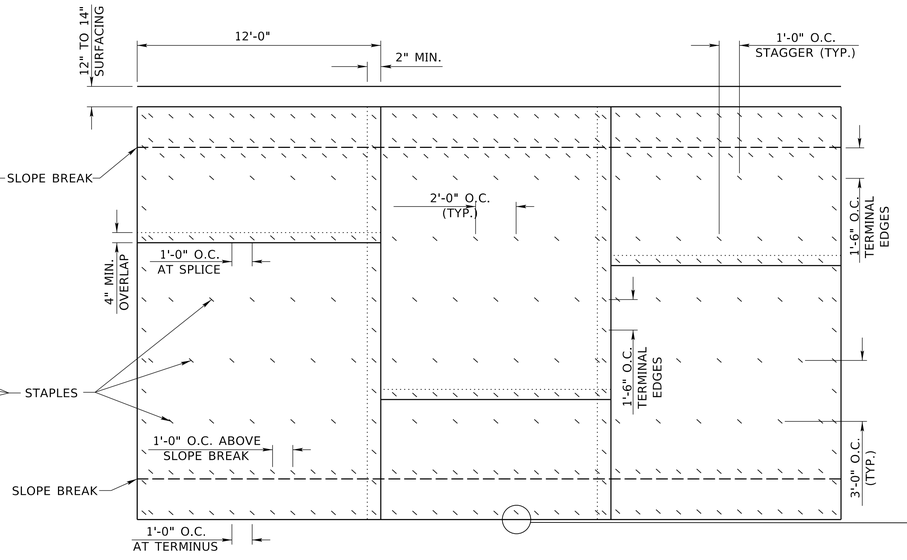
TYPICAL INSTALLATION
CLASS 1A (SLOPE PROTECTION, SAND)



SURFACING INSTALLATION



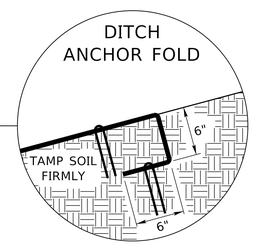
PLAN VIEW STAPLING DIAGRAM FOR
CLASS 1A (SLOPE PROTECTION, SAND)



TERMINATE BLANKET AT THE TOE OF SLOPE OR AT UNDISTURBED VEGETATION

PLAN VIEW STAPLING DIAGRAM FOR
CLASS 1B, 1C, 1D, 1E, 1F, 2A, 2B, & 2C

FOR EDGES ADJOINING
AREAS TO BE SEEDED



STAPLE EVERY 1'-0"
ALONG BLANKET EDGE

NOTES:

1. THE MANUFACTURERS' RECOMMENDED STAPLING PATTERNS SHALL GOVERN OVER THE PLANS.
2. SURFACING INSTALLATION IS APPLICABLE FOR ASPHALT, CONCRETE, OR BEVELLED EDGE.

REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN 18	NDOR BORDER TO NDOT BORDER
R6	APR 14	UPDATE INSTALLATION METHOD
R5	OCT 07	EROSION CONTROL AT SPLASH BASIN

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 501-R7

EROSION CONTROL

ACCEPTED BY FHWA FOR USE ON THE
NATIONAL HIGHWAY SYSTEM:

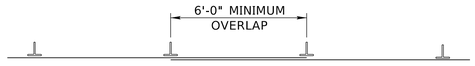
PROFESSIONAL CIVIL ENGINEER
BRANDIE S. NEEMANN E-11829
STATE OF NEBRASKA

DATE

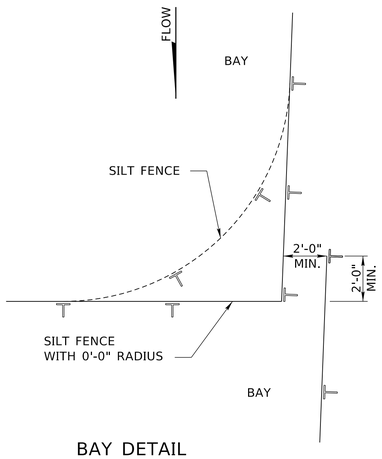
ORIGINAL:
NOVEMBER 1973
DATE

3
3

COMPUTER: BG0419M187
DATE: 28-AUG-2024 14:39
FILE: 5010 0 R7.dgn

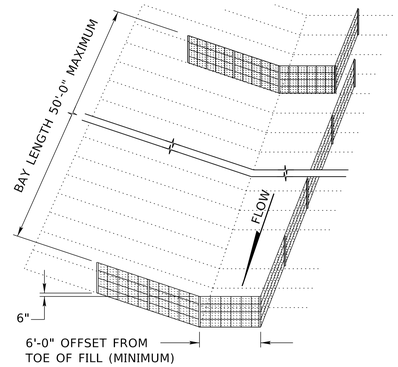


SILT FENCE SPLICE

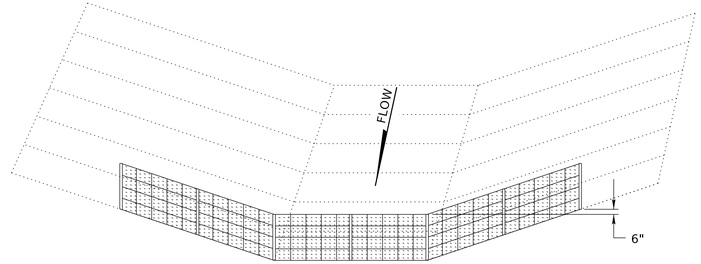


BAY DETAIL

NOTE:
SILT FENCE AT CORNERS SHALL HAVE A RADIUS OF 0'-0" MINIMUM TO 10'-0" MAXIMUM

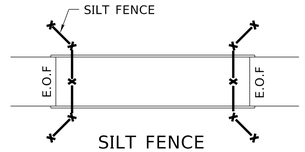


SILT FENCE BAYS

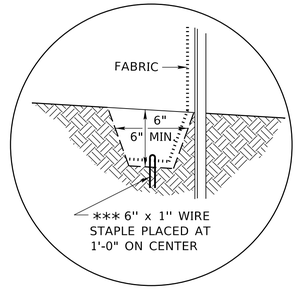


HIGH POROSITY SILT FENCE
(ACROSS DITCH)

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



SILT FENCE
(UNDER BRIDGE)



TRENCH DETAIL

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

NOTES:

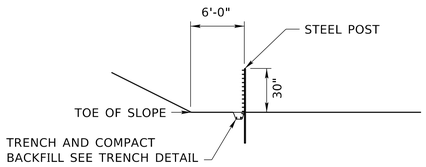
SILT FENCE SHOULD BE 30" ABOVE GRADE (MAY VARY)

SILT FENCE MINIMUM ROLL WIDTH:
- LOW POROSITY = 42"
- HIGH POROSITY = 42"
- LOW PROFILE = 36"
- COIR SILT FENCE = 36"

STEEL STUDDED "T" LINE POSTS 5'-6" LENGTH; 6'-0" MAXIMUM SPACING.

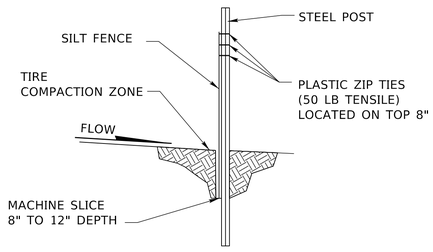
FOR EACH STEEL STUDDED "T" LINE POST, 3 PLASTIC CABLE TIES ARE REQUIRED.

2" x 2" x 6'-0" NOMINAL WOOD STAKES SPACING, 6'-0" MAXIMUM ON CENTER DRIVEN UNTIL FIRM.

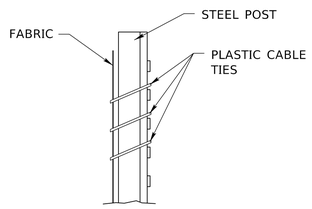


OPTION ONE (PREFERED)

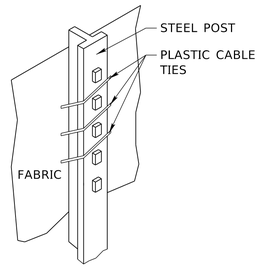
SILT FENCE
(6'-0" OFFSET FROM TOE OF FILL)



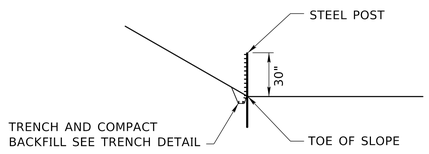
SILT FENCE MACHINE SLICED



PROFILE VIEW
ATTACHMENT TO POST

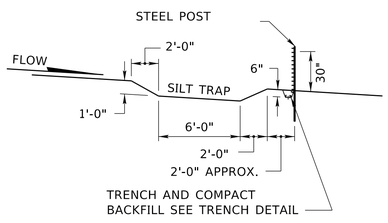


BACK VIEW
ATTACHMENT TO POST

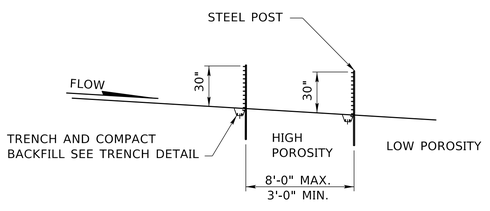


OPTION TWO (WITH LIMITED R.O.W.)

SILT FENCE
(AT TOE OF FILL)



HIGH POROSITY SILT
FENCE WITH SILT TRAP
(ACROSS DITCH)



SILT FENCE
(ACROSS DITCH)

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	APR 14	STEEL POST INSTALLATION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 502-R2

SILT FENCE DETAILS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

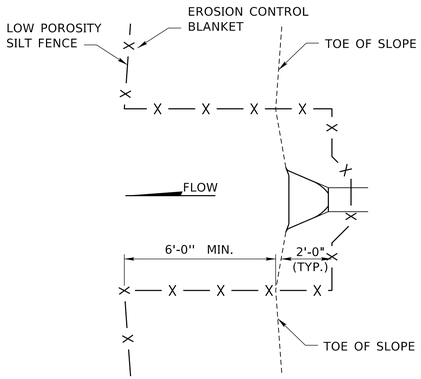
PROFESSIONAL CIVIL ENGINEER
BRANDIE S. NEEMANN
E-11829
STATE OF NEBRASKA

DATE

ORIGINAL:
DECEMBER 2006
DATE

1
2

COMPUTER: BG0419M187
DATE: 28-AUG-2024 14:39
FILE: 5020 0 R2.dgn



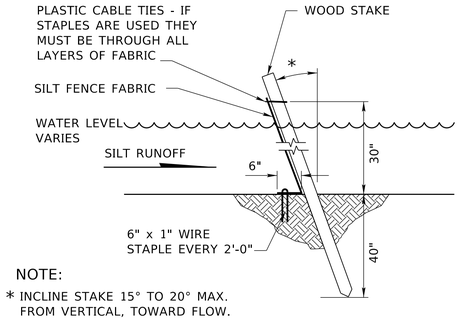
SILT FENCE OUTLET PROTECTION

NOTES:

1. SILT FENCE SHOULD BE BROUGHT FLUSH WITH WING WALLS ON BOX CULVERTS IF IT CAN NOT BE INSTALLED ABOVE THE BOX CULVERT.

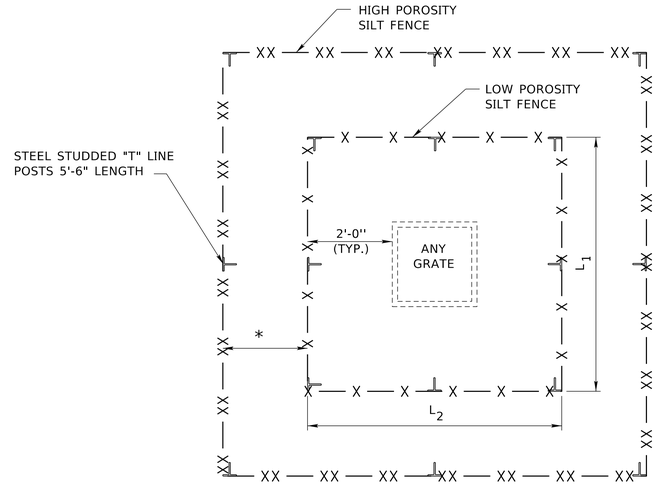
2. IF APPLICABLE, SILT FENCE AROUND THE CULVERT SHOULD BE ADJUSTED TO ALLOW FOR THE INSTALLATION OF EROSION CONTROL AS SHOWN IN STANDARD PLAN 501.

3. SILT CHECKS MAY USED IN PLACE OF SILT FENCE ABOVE THE OPENING OF A CULVERT, AS SHOWN IN SPECIAL PLAN C.



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

SILT FENCE
(WET & BELOW WATER INSTALLATION)

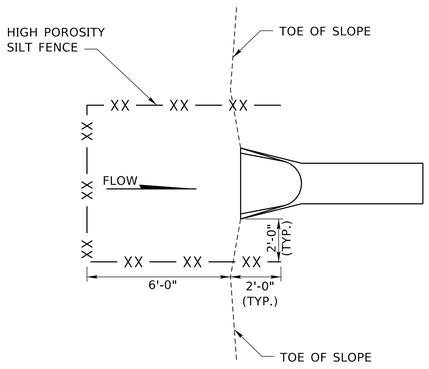


L_1 & L_2 = OUTSIDE OF WALL + 4'-0"

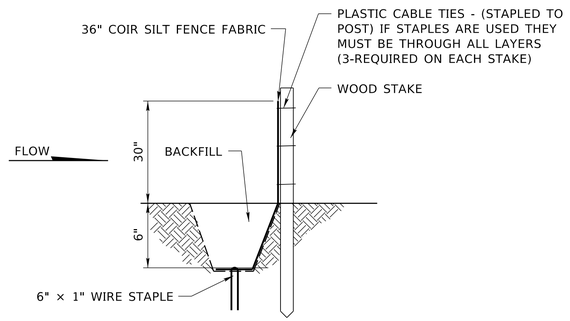
PLAN VIEW

SILT FENCE FOR GRATE, AREA, MEDIAN INLETS OR JUNCTION BOXES

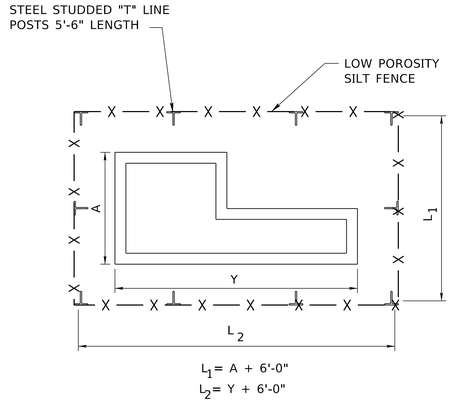
*3'-0" IF POSSIBLE (MAY VARY)



SILT FENCE INLET PROTECTION



COIR SILT FENCE - ON WOOD POSTS - DRY INSTALLATION



L_1 = A + 6'-0"
L_2 = Y + 6'-0"

PLAN VIEW

SILT FENCE CURB INLET

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	APR 14	STEEL POST INSTALLATION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 502-R2

SILT FENCE DETAILS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

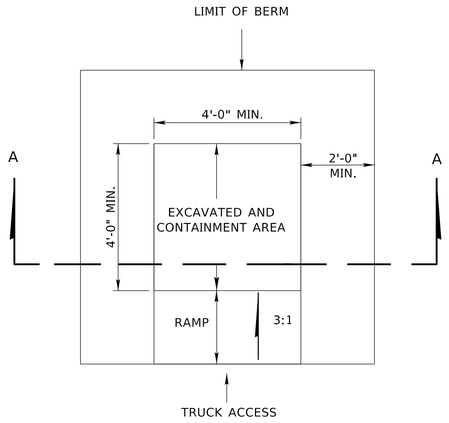
PROFESSIONAL CIVIL ENGINEER
BRANDIE S. NEEMANN
E-11829
STATE OF NEBRASKA

DATE

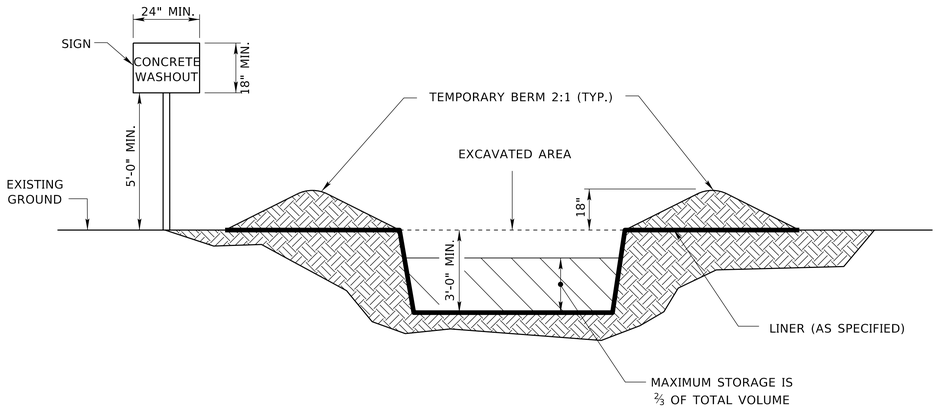
ORIGINAL: DECEMBER 2006
DATE

2
2

COMPUTER: BG0419M187
DATE: 28-AUG-2024 14:39
FILE: 5020 0 R2.dgn



PLAN VIEW



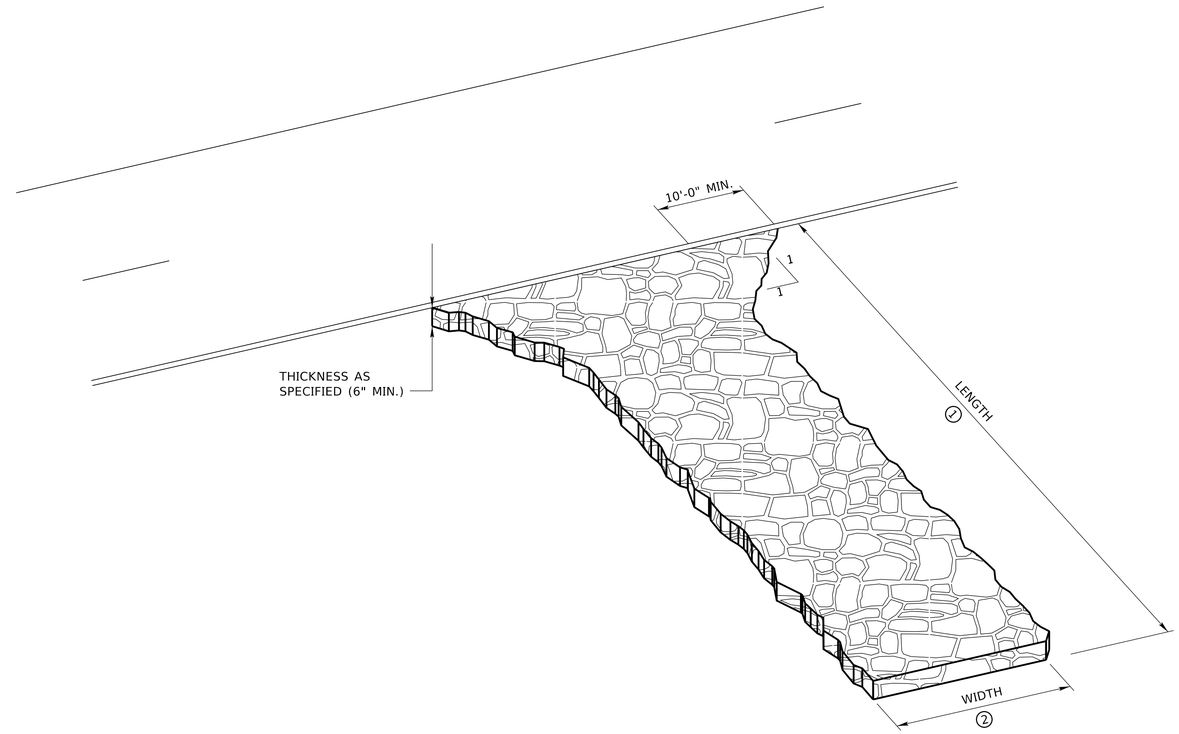
SECTION A-A

NOTES:
HAY OR STRAW BALES MAY BE USED AS AN ALTERNATIVE FOR THE BERM AREA, EXCEPT AT THE OPENING.

THE CONCRETE WASHOUT SIGN SHALL HAVE LETTERS AT LEAST 3 INCHES HIGH.

STRUCTURE MUST BE LINED WITH MATERIAL NOTED IN SPECIAL PROVISIONS.

CONCRETE WASHOUT STRUCTURE



NOTES:

REMOVE VEGETATION AND EXCAVATE SOFT SOILS FROM EXIT AREA. THOROUGHLY COMPACT SUBGRADE PRIOR TO PLACING STONE.

INSTALL CULVERT UNDER EXIT IF NECESSARY TO MAINTAIN DRAINAGE.

GRADE EXIT TO PREVENT RUNOFF FROM FLOWING ONTO STREET. DIRECT ALL RUNOFF FROM EXIT TO A SEDIMENT RETENTION DEVICE.

WHEN SPECIFIED, INSTALL SUBGRADE STABILIZATION FABRIC PRIOR TO PLACING CRUSHED STONE.

INSTALL LAYER OF CRUSHED STONE TO THE THICKNESS (6 INCH MINIMUM) AND DIMENSIONS SPECIFIED.

① EXIT LENGTH: 30 FT. MINIMUM OR AS SPECIFIED. LENGTH OF EXIT MAY BE INCREASED IF SEDIMENT TRACK-OUT OCCURS.

② EXIT WIDTH: 20 FT. MINIMUM.

STABILIZED CONSTRUCTION EXIT

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 503

CONCRETE WASHOUT & CONSTRUCTION EXIT

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

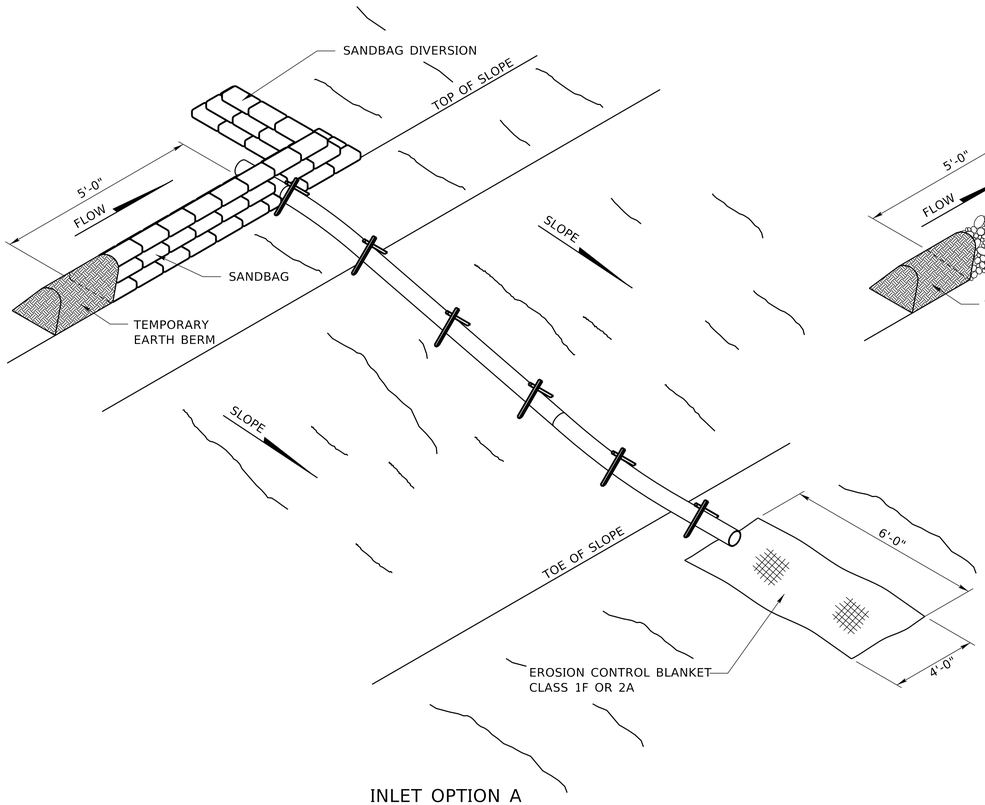
PROFESSIONAL CIVIL ENGINEER
BRANDIE S. NEEMANN
E-11829
STATE OF NEBRASKA

DATE

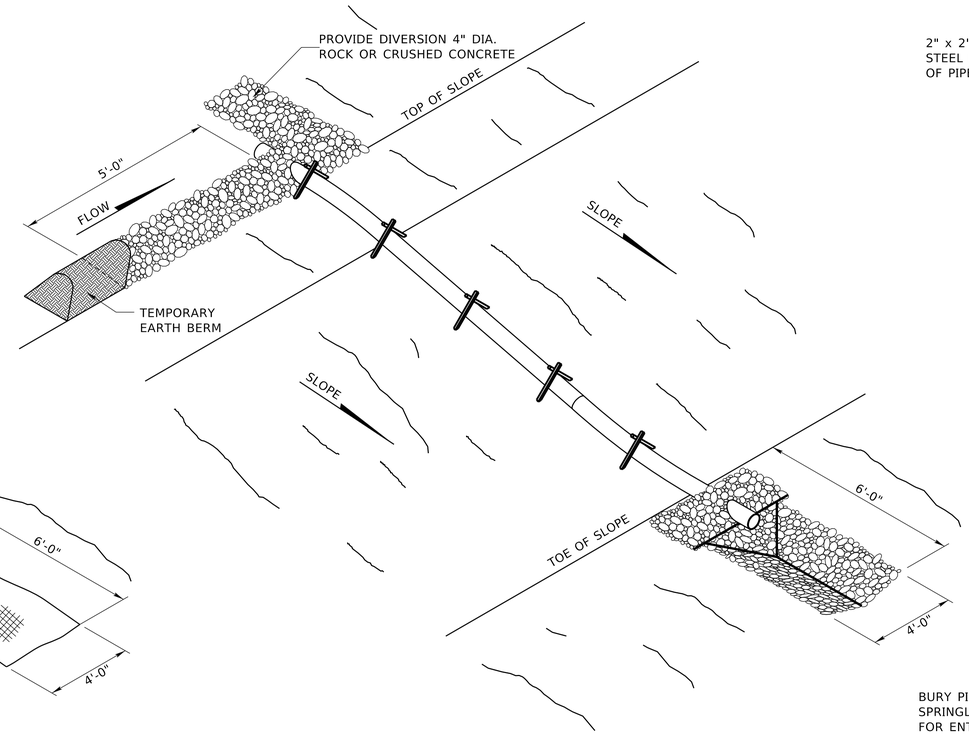
ORIGINAL:
NOVEMBER 7, 2023
DATE

1
1

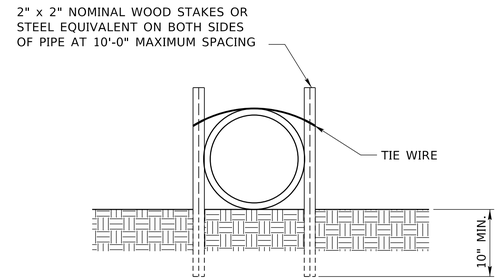
COMPUTER: BG04194187
DATE: 28-AUG-2024 14:39
FILE: 5030 0 R0.dgn



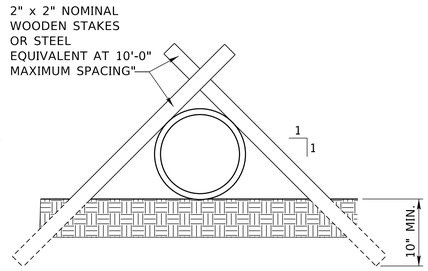
INLET OPTION A



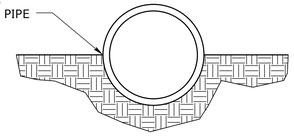
INLET OPTION B



OPTION A

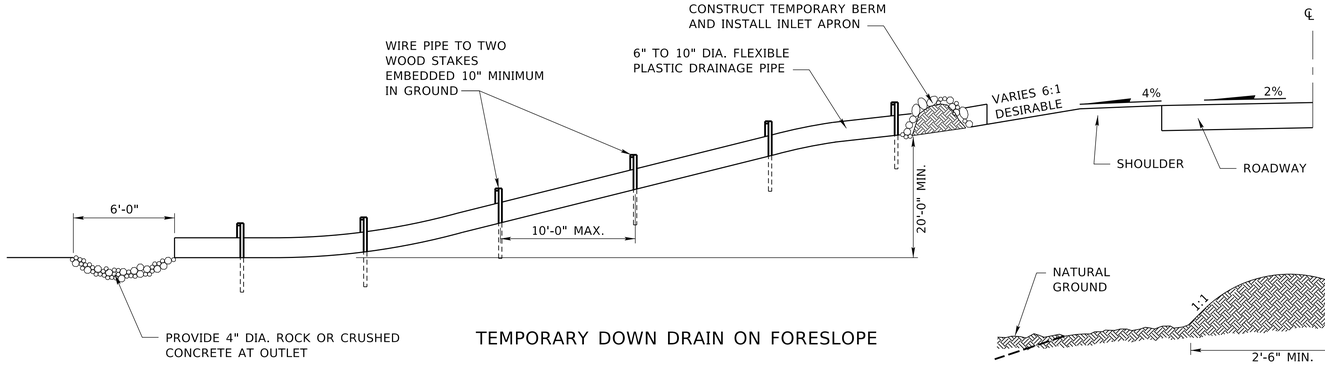


OPTION B

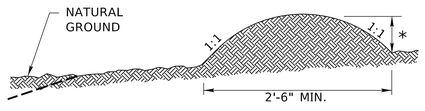


OPTION C

SLOPE DRAIN ANCHORING OPTIONS



TEMPORARY DOWN DRAIN ON FORESLOPE



TYPICAL SECTION OF
TEMPORARY EARTH BERM

* 1 FT. MINIMUM OR VARIES

SLOPE DRAIN DESIGN GUIDELINES				
PIPE	BERM HEIGHT (H)	CAPACITY (HW-TOP OF PIPE)	LAND USE (MAX AREA FOR 2-YR STORM)	
			PAVEMENT	GRASS/PASTURE/CROP
6" HDPE	12"	0.4 CFS	0.1 ACRE	0.25 ACRE
8" HDPE	14"	0.8 CFS	0.2 ACRE	0.50 ACRE
10" HDPE	16"	1.4 CFS	0.4 ACRE	0.85 ACRE

HDPE - HIGH DENSITY POLYETHYLENE PIPE
HEIGHT OF SANDBAG OR ROCK CHECK DIVERSION IS H+4"

1. BERMS SHALL BE USED TO INTERCEPT AND DIVERT DRAINAGE TO A DESIGNATED OUTLET.
2. BERMS SHALL NOT BE USED WHERE DRAINAGE AREA EXCEEDS 10 ACRES.
3. BERM MATERIAL SHALL BE COMPACTED WITH THE WHEELS OF THE EQUIPMENT USED TO CONSTRUCT IT.

NOTES:

PLACE SLOPE DRAIN ON UNDISTURBED SOIL OR WELL COMPACTED FILL. CAREFULLY COMPACT COHESIVE SOILS AROUND INLET END OF THE DRAIN IN 6" LIFTS.

DISCHARGE SLOPE DRAIN TO A STABLE OUTLET OR TO A SEDIMENT RETENTION DEVICE.

PROVIDE PIPE AND APRONS OF DIAMETER SPECIFIED. PERFORATED PIPE IS NOT ALLOWED.

TEMPORARY BERM SHOULD BE USED TO DIRECT DRAINAGE INTO SLOPE DRAIN INLET.

OPTIONS A, B & C ARE INTERCHANGEABLE UNLESS SPECIFIED

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 504

TEMPORARY PIPE SLOPE DRAIN

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

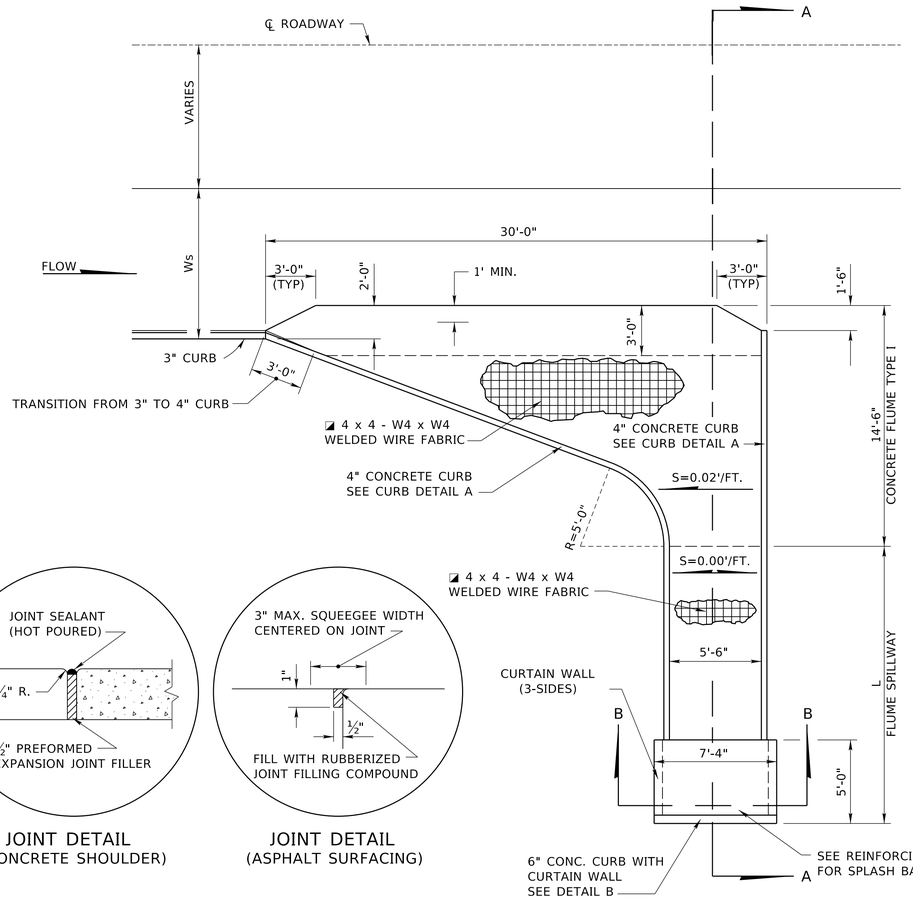
PROFESSIONAL CIVIL ENGINEER
BRANDIE S. NEEMANN
E-11829
STATE OF NEBRASKA

DATE

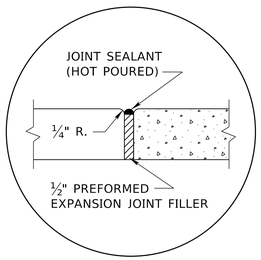
ORIGINAL:
NOVEMBER 11, 2023
DATE

1
1

COMPUTER: BG0419M187
DATE: 28-AUG-2024 14:39
FILE: 5040 0 R0.dgn

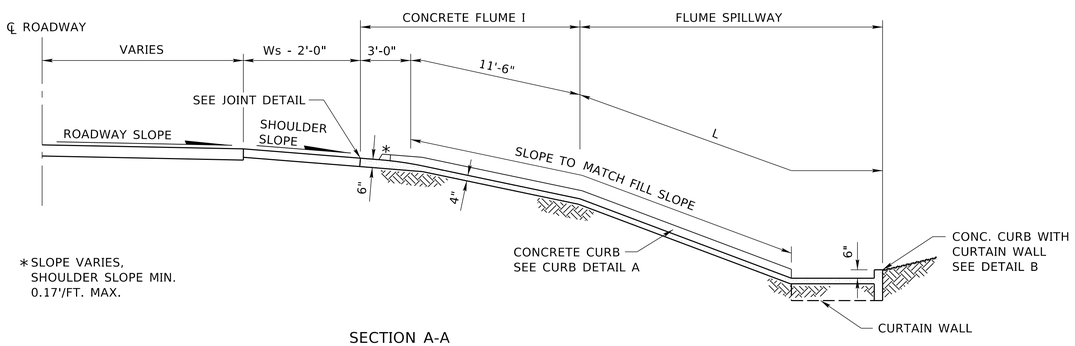


PLAN

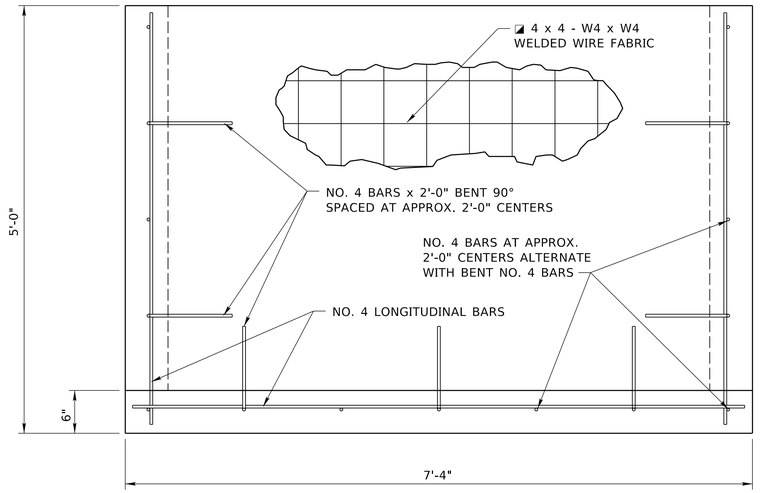


JOINT DETAIL
(CONCRETE SHOULDER)

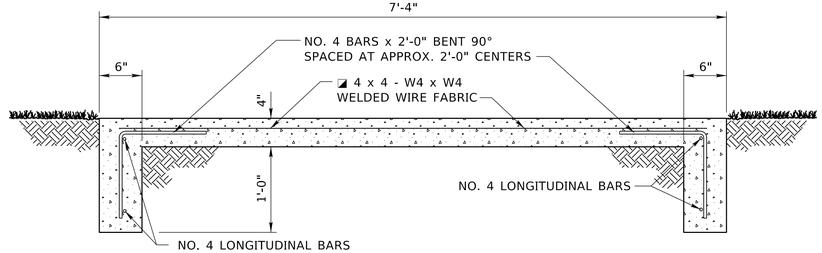
JOINT DETAIL
(ASPHALT SURFACING)



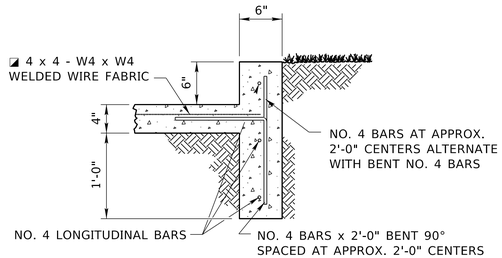
SECTION A-A



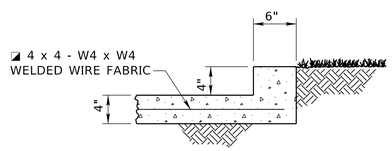
REINFORCING DETAIL FOR SPLASH BASIN



SECTION B-B



CONCRETE CURB WITH CURTAIN WALL
DETAIL B



CONCRETE CURB
DETAIL A

NOTES:

Ws = SURFACED SHOULDER WIDTH

L - DIMENSION SHALL BE AS SHOWN IN THE PLANS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

FINAL LOCATION OF FLUME TO BE DETERMINED BY THE ENGINEER.

CONCRETE FLUME TYPE I SHALL BE PAID FOR AS ONE EACH.

THE FLUME SPILLWAY SHALL BE SURFACE MEASURED AND PAID FOR BY THE LINEAR FOOT FOR THE ITEM "FLUME SPILLWAY".

JOINT FILLER AND SEALANT MATERIALS ARE SUBSIDIARY TO THE FLUME.

ALL REINFORCING STEEL TO CONFORM TO A615/A615M, GRADE 60.

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

◪ NO. 4 BARS AT 12" CENTERS (MAX.) MAY BE USED IN LIEU OF THE WELDED WIRE FABRIC. NO ADJUSTMENTS IN QUANTITIES SHALL BE MADE FOR THIS SUBSTITUTION.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 541

CONCRETE FLUME TYPE I

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ MICK S. SYSLO E-10043 ★ STATE OF NEBRASKA

DATE

ORIGINAL: OCTOBER 19, 2023

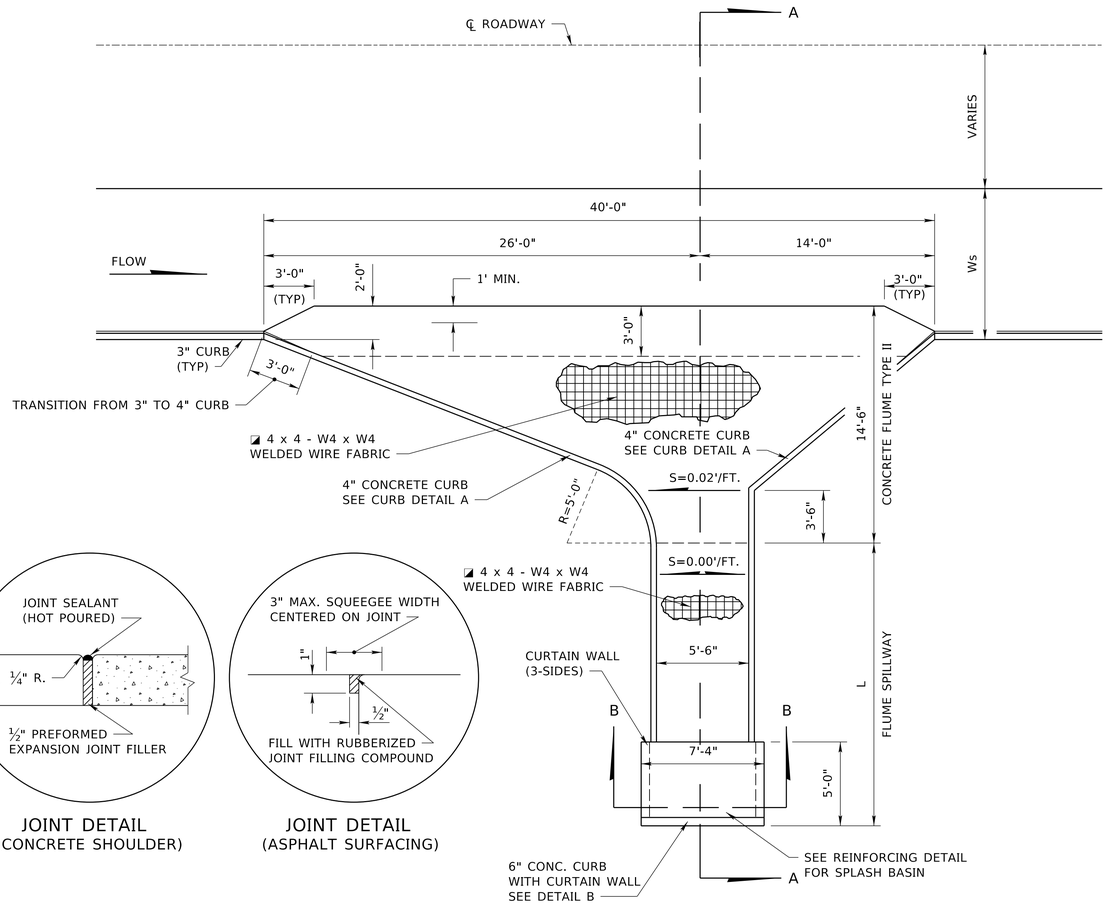
DATE

1
1

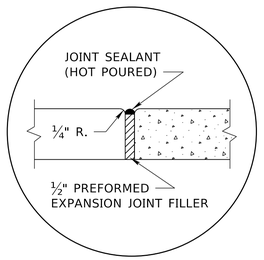
COMPUTER: BG04194187

DATE: 28-AUG-2024 14:39

FILE: 5410 0 R0.dgn

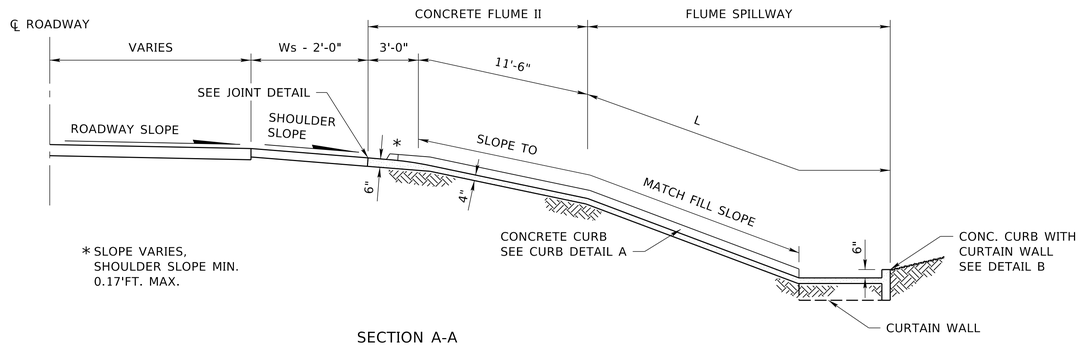


PLAN

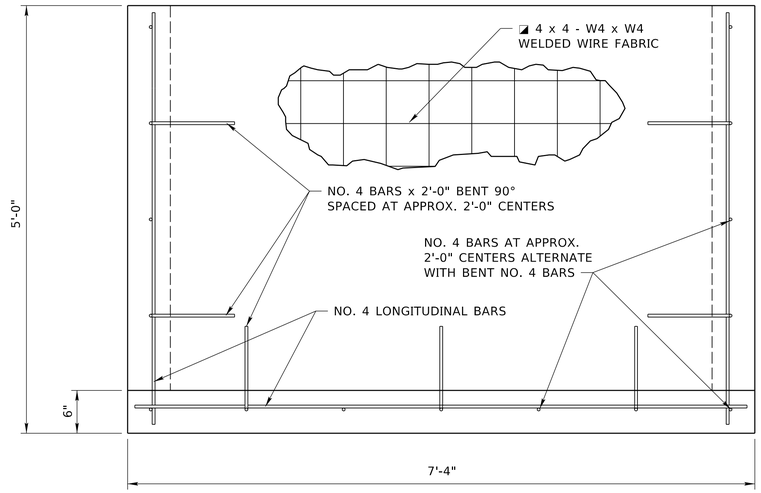


JOINT DETAIL
(CONCRETE SHOULDER)

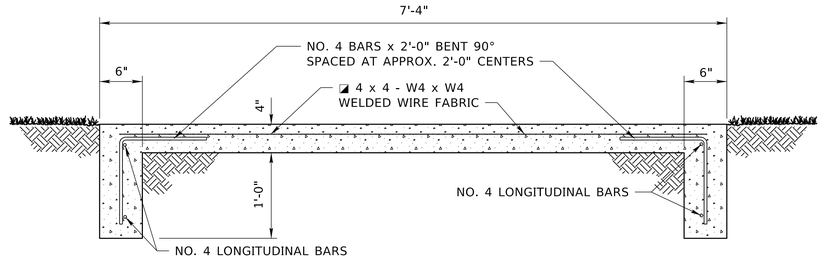
JOINT DETAIL
(ASPHALT SURFACING)



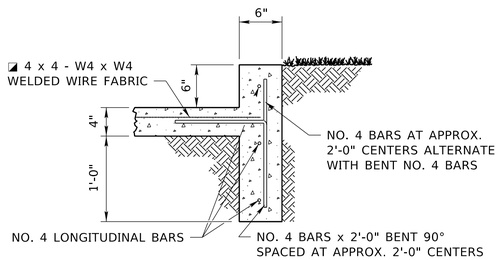
SECTION A-A



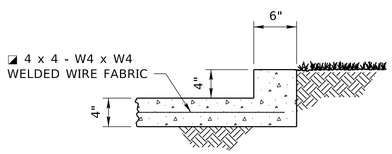
REINFORCING DETAIL FOR SPLASH BASIN



SECTION B-B



CONCRETE CURB WITH CURTAIN WALL
DETAIL B



CONCRETE CURB
DETAIL A

NOTES:

Ws = SURFACED SHOULDER WIDTH

L - DIMENSION SHALL BE AS SHOWN IN THE PLANS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

FINAL LOCATION OF FLUME TO BE DETERMINED BY THE ENGINEER.

CONCRETE FLUME TYPE II SHALL BE PAID FOR AS ONE EACH.

THE FLUME SPILLWAY SHALL BE SURFACE MEASURED AND PAID FOR BY THE LINEAR FOOT FOR THE ITEM "FLUME SPILLWAY".

JOINT FILLER AND SEALANT MATERIALS ARE SUBSIDIARY TO THE FLUME.

ALL REINFORCING STEEL TO CONFORM TO A615/A615M, GRADE 60.

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

◪ NO. 4 BARS AT 12" CENTERS (MAX.) MAY BE USED IN LIEU OF THE WELDED WIRE FABRIC. NO ADJUSTMENTS IN QUANTITIES SHALL BE MADE FOR THIS SUBSTITUTION.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 542

CONCRETE FLUME TYPE II

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

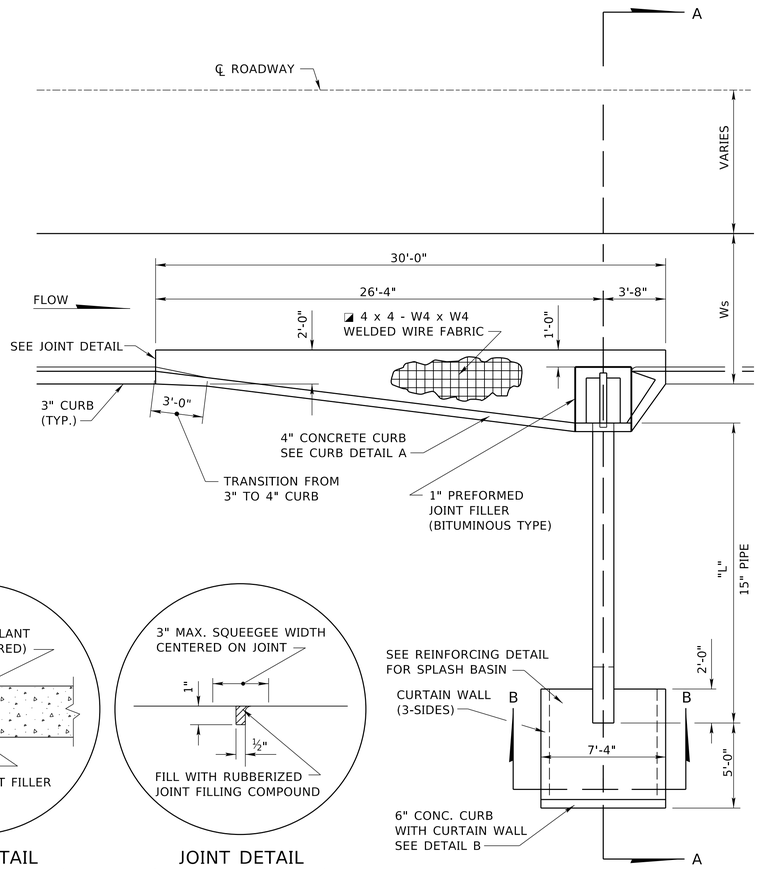
ORIGINAL: OCTOBER 19, 2023

DATE

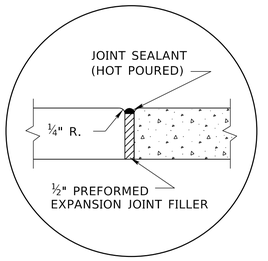
1 / 1

COMPUTER: BG0419M187
DATE: 26-NOV-2024 08:36
FILE: 5420 0 R0.dgn

COMPUTER: BG04194187
DATE: 28-AUG-2024 14:40
FILE: 5440 0 R0.dgn

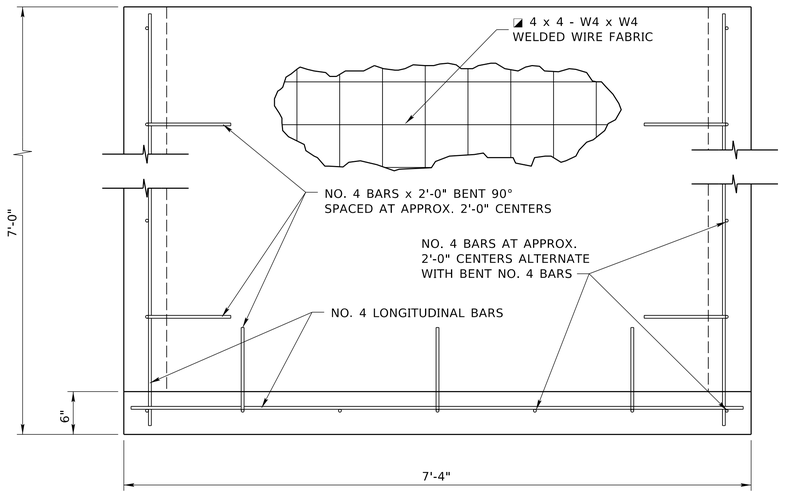


PLAN

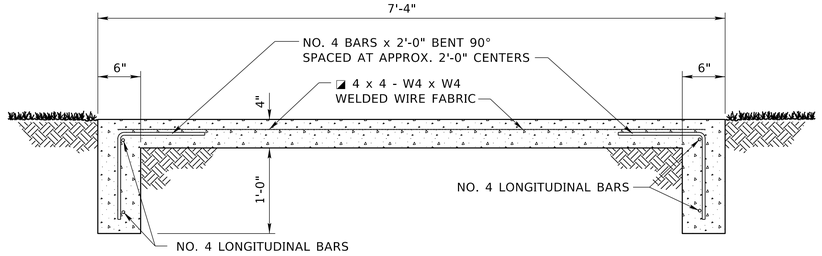


JOINT DETAIL
(CONCRETE SHOULDER)

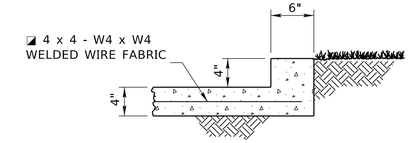
JOINT DETAIL
(ASPHALT SURFACING)



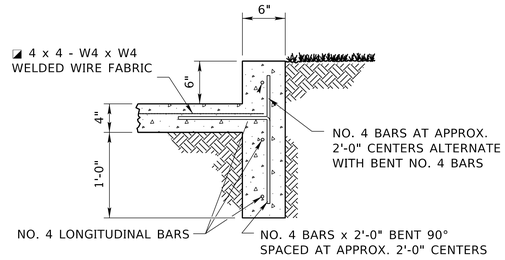
REINFORCING DETAIL FOR SPLASH BASIN



SECTION B-B



CONCRETE CURB
DETAIL A



CONCRETE CURB WITH CURTAIN WALL
DETAIL B

NOTES:

Ws = SURFACED SHOULDER WIDTH

"L" DIMENSION SHALL BE AS SHOWN IN THE PLANS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

FINAL LOCATION OF FLUME TO BE DETERMINED BY THE ENGINEER.

COLLAR COUPLING BAND SHALL BE COATED WITH ½" BITUMINOUS MASTIC PRIOR TO INSTALLATION. WHEN AIR TEMPERATURE IS 50° F. OR LOWER, HEAT SHALL BE APPLIED TO SOFTEN THE MASTIC.

EXCAVATION FOR THE FLUME, SPLASH BASIN, DIAPHRAGM AND CULVERT PIPE IS SUBSIDIARY TO OTHER PAY ITEMS FOR WHICH DIRECT PAYMENT IS MAKE.

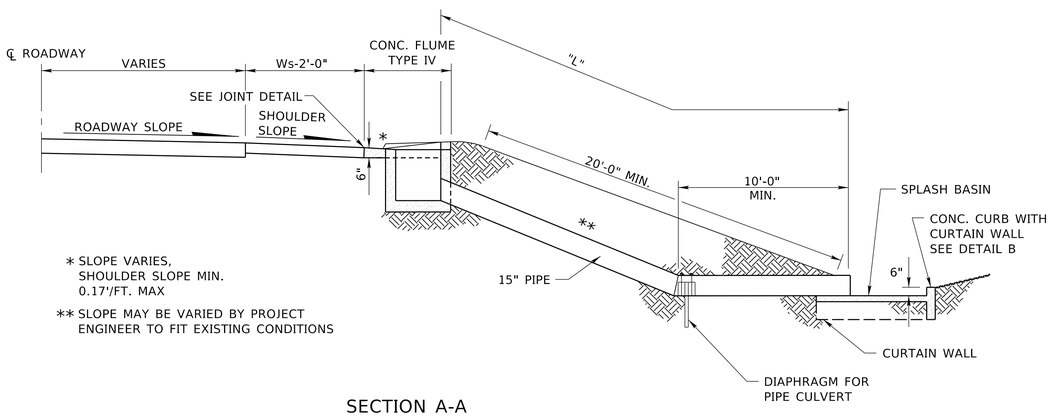
DIAPHRAGM AND SPLASH BASIN ARE SUBSIDIARY TO OTHER PAY ITEMS FOR WHICH DIRECT PAYMENT IS MADE.

JOINT FILLER AND THE SEALANT MATERIALS ARE SUBSIDIARY TO THE FLUME.

ALL REINFORCING STEEL TO CONFORM TO A615/A615M, GRADE 60.

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

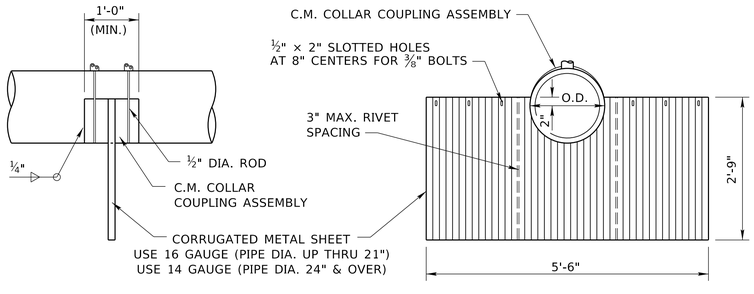
◪ NO. 4 BARS AT 12" CENTERS (MAX.) MAY BE USED IN LIEU OF THE WELDED WIRE FABRIC. NO ADJUSTMENTS IN QUANTITIES SHALL BE MADE FOR THIS SUBSTITUTION.



* SLOPE VARIES, SHOULDER SLOPE MIN. 0.17'/FT. MAX

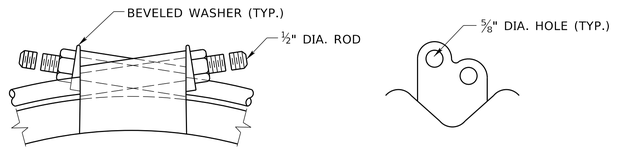
** SLOPE MAY BE VARIED BY PROJECT ENGINEER TO FIT EXISTING CONDITIONS

SECTION A-A



SECTION

ELEVATION OF ASSEMBLED DIAPHRAGM



ELEVATION

END VIEW

STANDARD TANK LUG DETAILS

METAL DIAPHRAGM DETAILS

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 544

CONCRETE FLUME TYPE IV

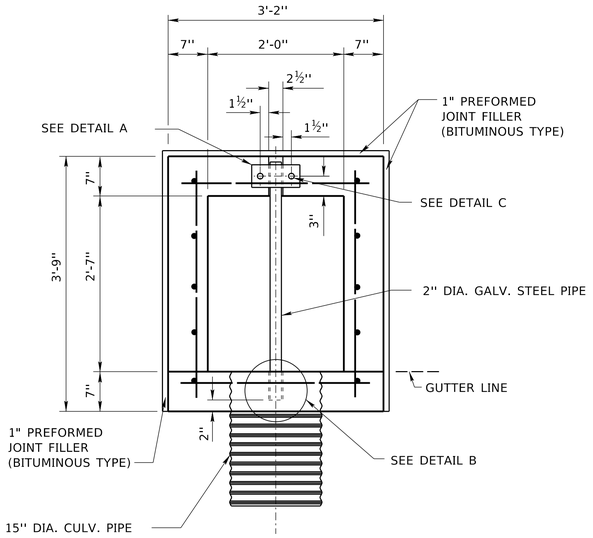
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICK S. SYSLO
E-10043
STATE OF NEBRASKA

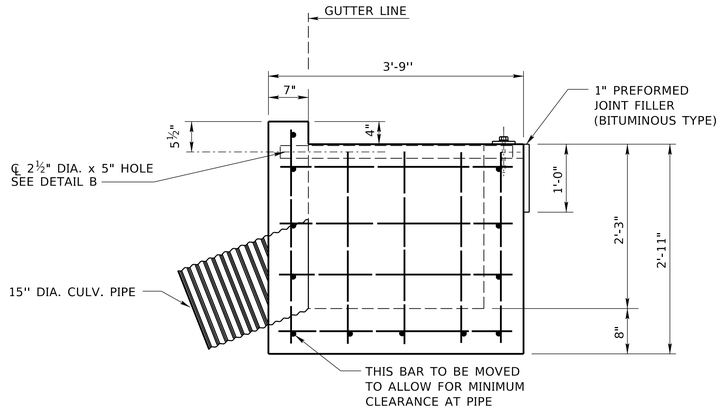
DATE

ORIGINAL: OCTOBER 19, 2023
DATE

1/2



PLAN VIEW



END VIEW

NOTES:

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

ALL REINFORCING STEEL USED SHALL BE NO. 4 BARS AT 12" CENTERS (MAX.) AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION A615/A615M GRADE 60.

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR SHALL BE 2" UNLESS NOTED OTHERWISE.

FIELD BEND AND/OR CLIP REINFORCING STEEL TO MAINTAIN MINIMUM CLEARANCE AND TO CLEAR PIPE OPENINGS.

ALL PREPARATION, MATERIALS, EQUIPMENT, TOOLS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE WORK THAT IS NOT PAID FOR DIRECTLY, SHALL BE CONSIDERED SUBSIDIARY TO THE ITEMS FOR WHICH DIRECT PAYMENT IS MADE

ALL CONCRETE SURFACES TO BE IN CONTACT WITH THE NEW WORK SHALL BE THROUGHLY CLEANED BEFORE PLACING NEW CONCRETE.

DEDUCTIONS FOR PIPE OPENINGS HAVE BEEN INCLUDED IN THE "QUANTITIES FOR INFORMATION ONLY".

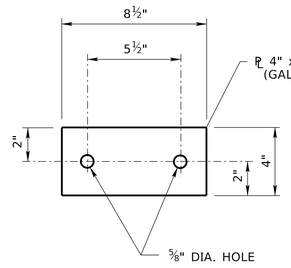
FERRULE LOOPS SHALL HAVE WORKING LOAD REQUIREMENTS OF 1,320 LBS. IN SHEAR AND 2,000 LBS. IN TENSION.

QUANTITIES

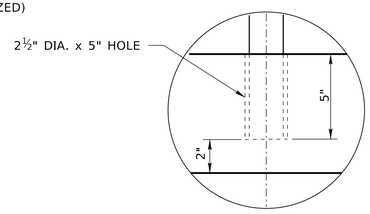
- FOR INFORMATION ONLY -

CONCRETE	0.85 CU. YDS.
REINFORCED STEEL	75 LBS.
2" GALVANIZED STEEL PIPE	3.50 LIN. FT.

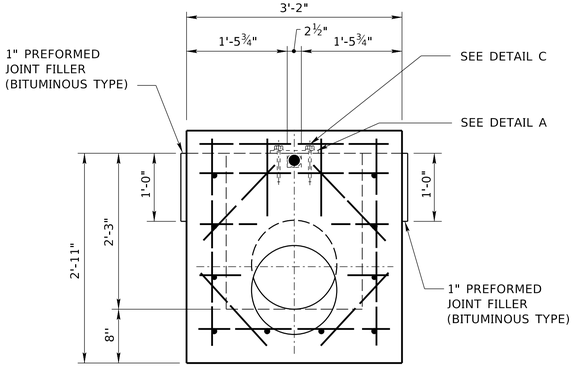
(THE ABOVE ITEMS ARE SUBSIDIARY TO OTHER PAY ITEMS FOR WHICH DIRECT PAYMENT IS MADE.)



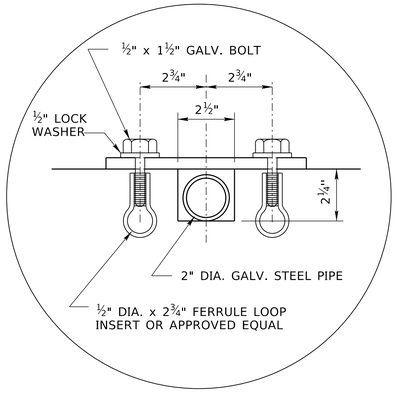
DETAIL A



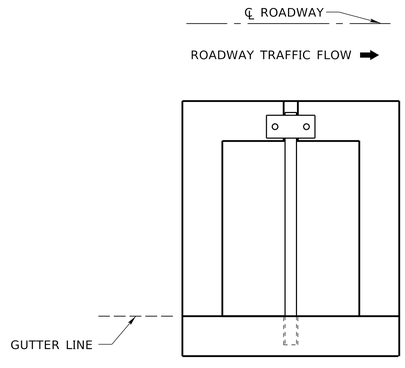
DETAIL B



ELEVATION



DETAIL C



INLET ORIENTATION SKETCH

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 544

CONCRETE FLUME TYPE IV

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

PROFESSIONAL CIVIL ENGINEER ★ MICK S. SYSLO E-10043 ★ STATE OF NEBRASKA

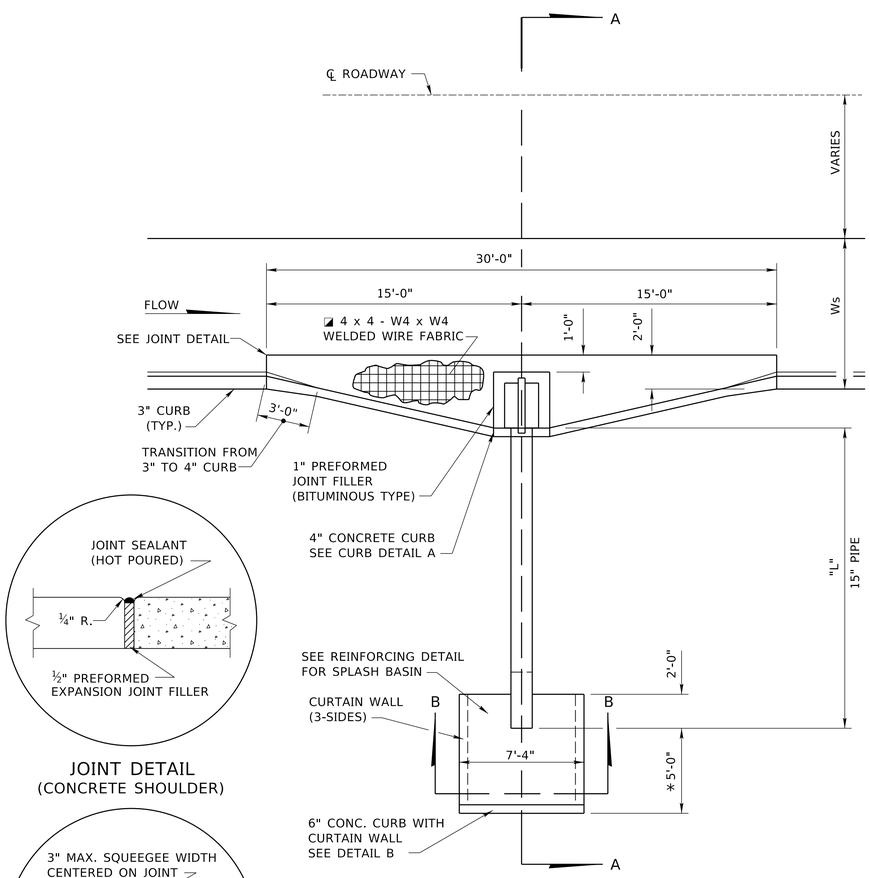
ORIGINAL: OCTOBER 19, 2023

DATE

2
2

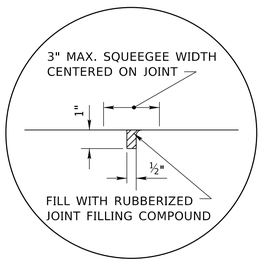
COMPUTER: BG04190187
DATE: 28-AUG-2024 14:40
FILE: 5440 0 R0.dgn

COMPUTER: BG04194187
DATE: 28-AUG-2024 14:34
FILE: 5450 0 R0.dgn

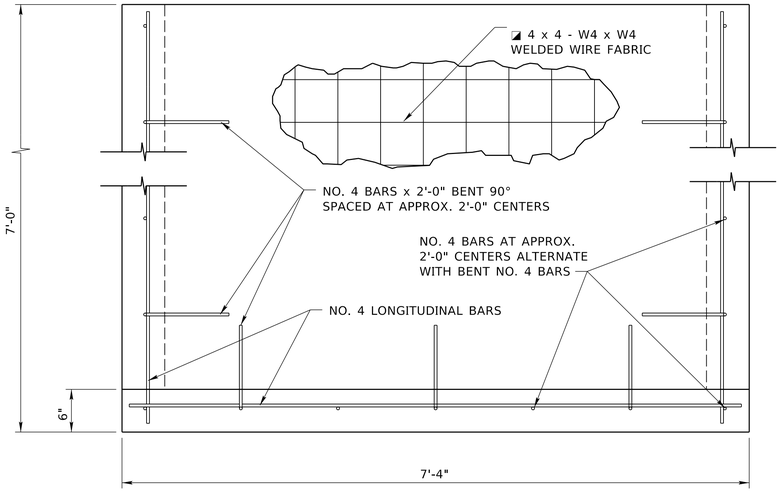


PLAN

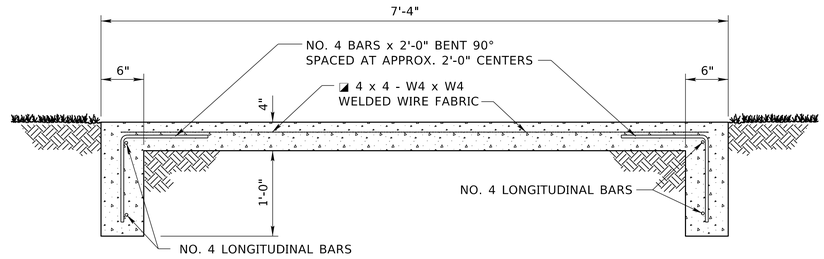
JOINT DETAIL
(CONCRETE SHOULDER)



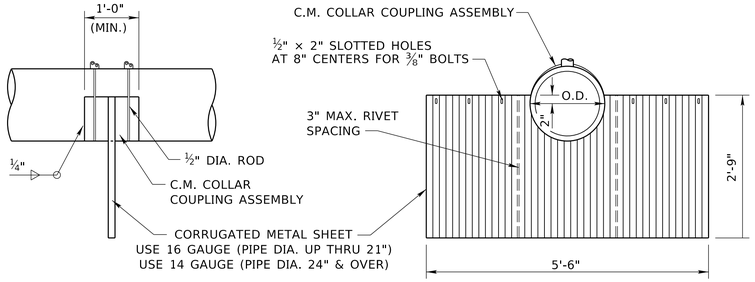
JOINT DETAIL
(ASPHALT SURFACING)



REINFORCING DETAIL FOR SPLASH BASIN

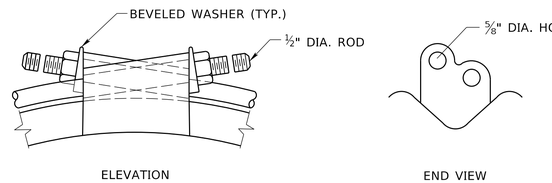


SECTION B-B



SECTION

ELEVATION OF ASSEMBLED DIAPHRAGM

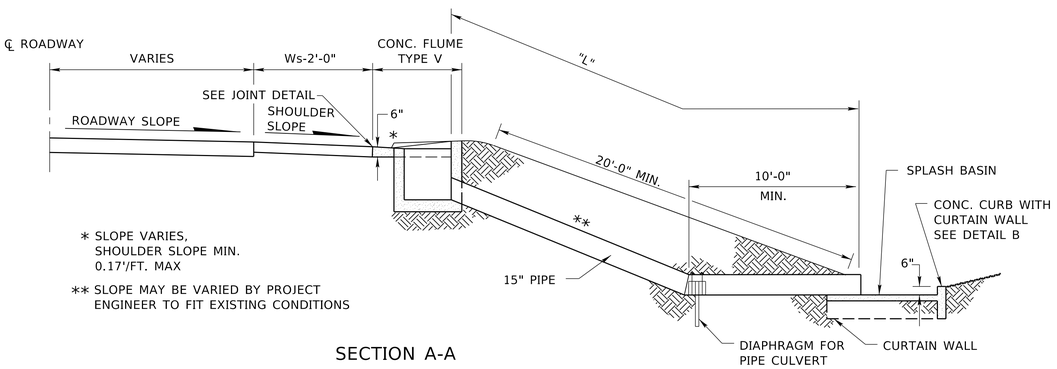


ELEVATION

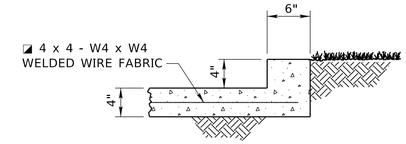
END VIEW

STANDARD TANK LUG DETAILS

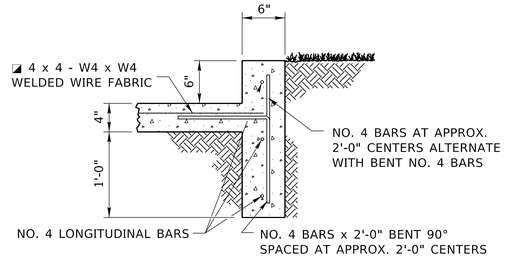
METAL DIAPHRAGM DETAILS



SECTION A-A



CONCRETE CURB
DETAIL A



CONCRETE CURB WITH CURTAIN WALL
DETAIL B

NOTES:

Ws = SURFACED SHOULDER WIDTH

"L" DIMENSION SHALL BE AS SHOWN IN THE PLANS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

FINAL LOCATION OF FLUME TO BE DETERMINED BY THE ENGINEER.

COLLAR COUPLING BAND SHALL BE COATED WITH ½" BITUMINOUS MASTIC PRIOR TO INSTALLATION. WHEN AIR TEMPERATURE IS 50° F. OR LOWER, HEAT SHALL BE APPLIED TO SOFTEN THE MASTIC.

EXCAVATION FOR THE FLUME, SPLASH BASIN, DIAPHRAGM AND CULVERT PIPE IS SUBSIDIARY TO OTHER PAY ITEMS FOR WHICH DIRECT PAYMENT IS MAKE.

DIAPHRAGM AND SPLASH BASIN ARE SUBSIDIARY TO OTHER PAY ITEMS FOR WHICH DIRECT PAYMENT IS MADE.

JOINT FILLER AND THE SEALANT MATERIALS ARE SUBSIDIARY TO THE FLUME.

ALL REINFORCING STEEL TO CONFORM TO A615/A615M, GRADE 60.

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

◪ NO. 4 BARS AT 12" CENTERS (MAX.) MAY BE USED IN LIEU OF THE WELDED WIRE FABRIC. NO ADJUSTMENTS IN QUANTITIES SHALL BE MADE FOR THIS SUBSTITUTION.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 545

CONCRETE FLUME TYPE V

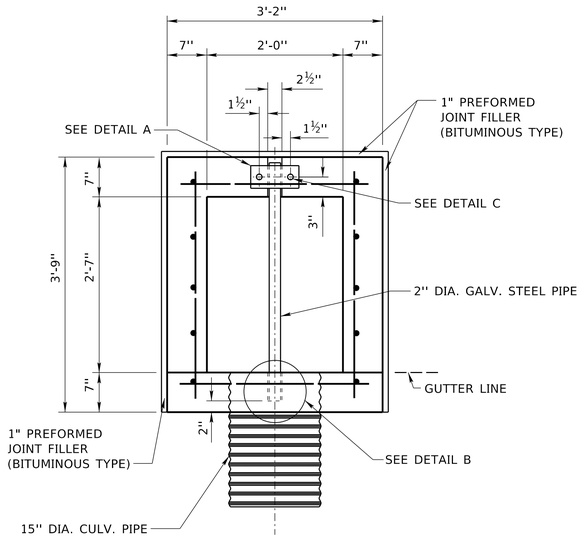
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICK S. SYSLO
E-10043
STATE OF NEBRASKA

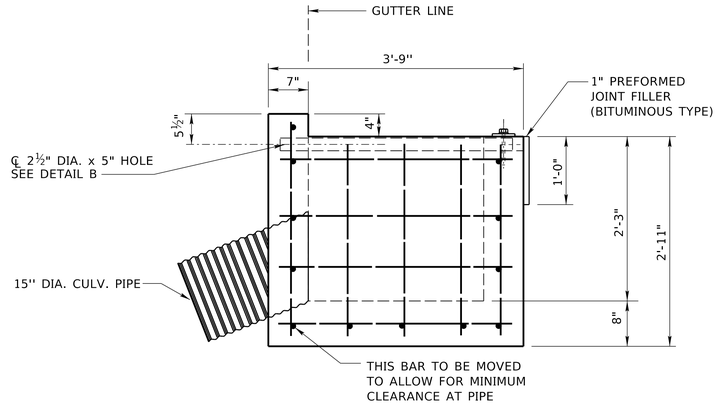
DATE

ORIGINAL:
MARCH 22, 2010
DATE

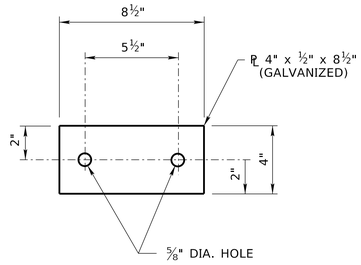
1
2



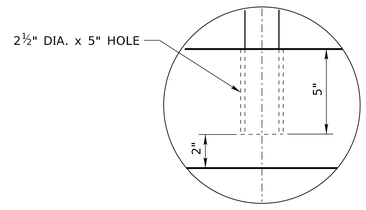
PLAN VIEW



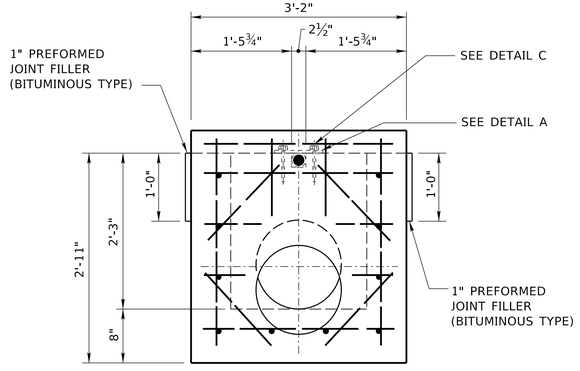
END VIEW



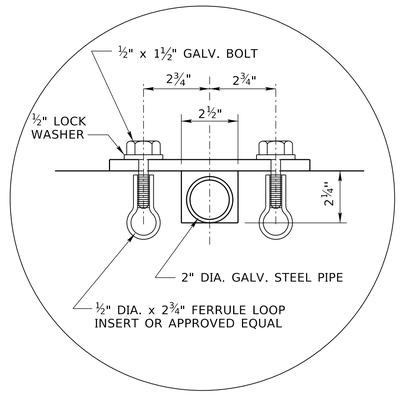
DETAIL A



DETAIL B



ELEVATION



DETAIL C

NOTES:

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

ALL REINFORCING STEEL USED SHALL BE NO. 4 BARS AT 12" CENTERS (MAX.) AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION A615/A615M GRADE 60.

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR SHALL BE 2" UNLESS NOTED OTHERWISE.

FIELD BEND AND/OR CLIP REINFORCING STEEL TO MAINTAIN MINIMUM CLEARANCE AND TO CLEAR PIPE OPENINGS.

ALL PREPARATION, MATERIALS, EQUIPMENT, TOOLS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE WORK THAT IS NOT PAID FOR DIRECTLY, SHALL BE CONSIDERED SUBSIDIARY TO THE ITEMS FOR WHICH DIRECT PAYMENT IS MADE

ALL CONCRETE SURFACES TO BE IN CONTACT WITH THE NEW WORK SHALL BE THROUGHLY CLEANED BEFORE PLACING NEW CONCRETE.

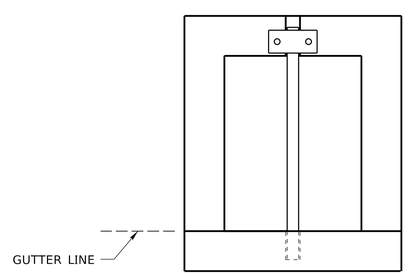
DEDUCTIONS FOR PIPE OPENINGS HAVE BEEN INCLUDED IN THE "QUANTITIES FOR INFORMATION ONLY".

FERRULE LOOPS SHALL HAVE WORKING LOAD REQUIREMENTS OF 1,320 LBS. IN SHEAR AND 2,000 LBS. IN TENSION.

QUANTITIES
- FOR INFORMATION ONLY -

CONCRETE	0.85 CU. YDS.
REINFORCED STEEL	75 LBS.
2" GALVANIZED STEEL PIPE	3.50 LIN. FT.

(THE ABOVE ITEMS ARE SUBSIDIARY TO OTHER PAY ITEMS FOR WHICH DIRECT PAYMENT IS MADE.)



INLET ORIENTATION SKETCH

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 545

CONCRETE FLUME TYPE V

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

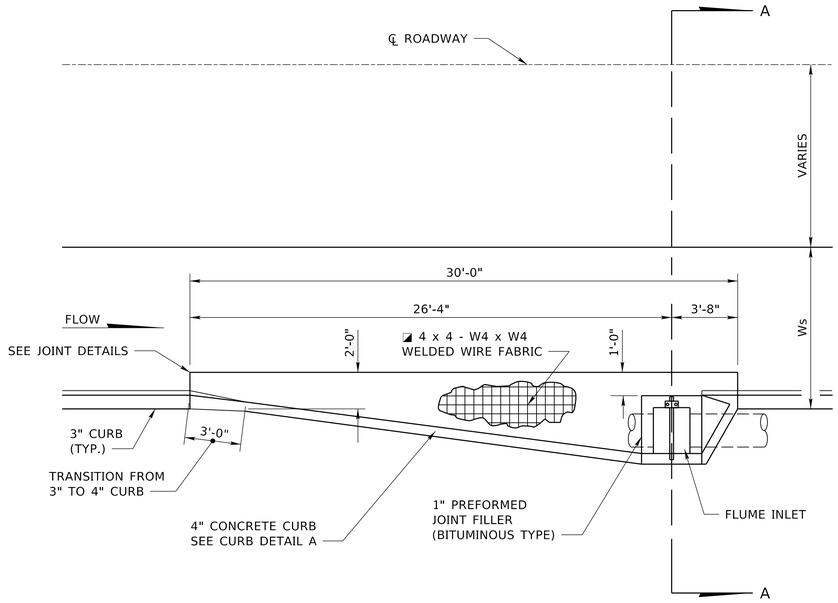
PROFESSIONAL CIVIL ENGINEER
MICK S. SYSLO
E-10043
STATE OF NEBRASKA

DATE

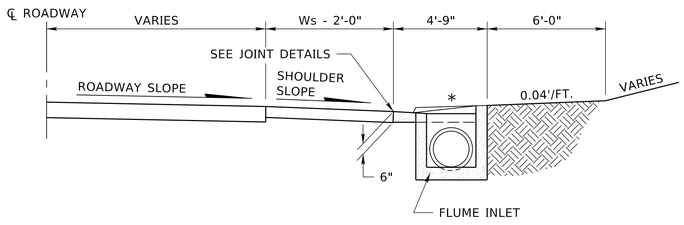
ORIGINAL: OCTOBER 19, 2023
DATE

2
2

COMPUTER: BG04190187
DATE: 28-AUG-2024 14:34
FILE: 5450 0 R0.dgn

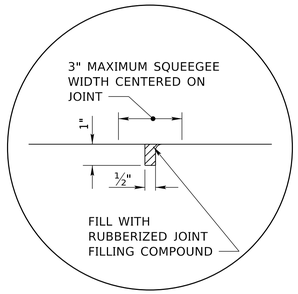


PLAN

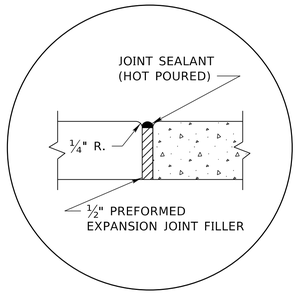


* SLOPE VARIES,
SHOULDER SLOPE MIN.
0.17'/FT. MAX.

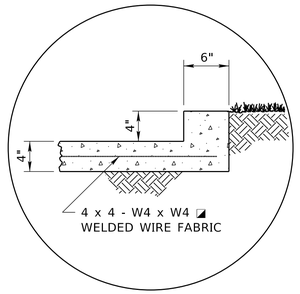
SECTION A-A



JOINT DETAIL
(ASPHALT SURFACING)



JOINT DETAIL
(CONCRETE SHOULDER)



DETAIL A
CONCRETE CURB

NOTES:

Ws = SURFACED SHOULDER WIDTH

FINAL LOCATION OF FLUME TO BE DETERMINED BY THE ENGINEER.

EXCAVATION FOR THE FLUME IS SUBSIDIARY TO OTHER PAY ITEMS FOR WHICH DIRECT PAYMENT IS MAKE.

JOINT FILLER AND THE SEALANT MATERIALS ARE SUBSIDIARY TO THE FLUME.

ALL REINFORCING STEEL TO CONFORM TO A615/A615M, GRADE 60.

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

◪ NO. 4 BARS AT 12" CENTERS (MAX.) MAY BE USED IN LIEU OF THE WELDED WIRE FABRIC. NO ADJUSTMENTS IN QUANTITIES SHALL BE MADE FOR THIS SUBSTITUTION.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 546

CONCRETE FLUME TYPE VI

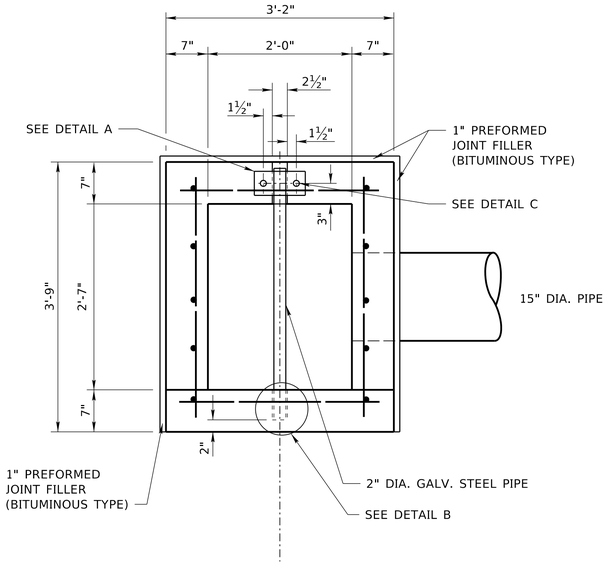
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

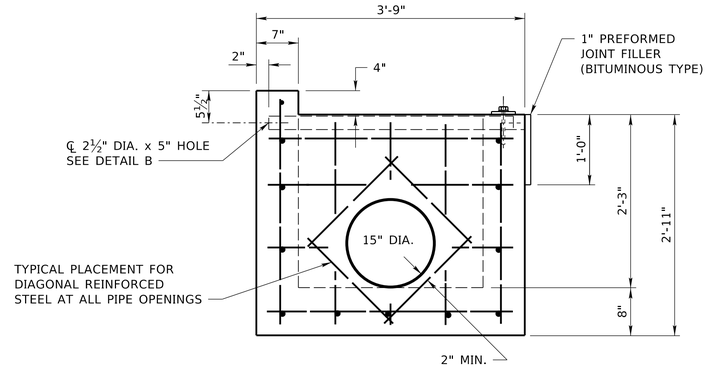
ORIGINAL:
MARCH 22, 2010
DATE

1
2

COMPUTER: BG04190187
DATE: 18-JUL-2025 08:46
FILE: 5460 0 R0.dgn



PLAN VIEW



END VIEW

NOTES:

ALL REINFORCING STEEL USED SHALL BE NO. 4 BARS AT 12" CENTERS (MAX.) AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION A615/A615M GRADE 60.

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR SHALL BE 2" UNLESS NOTED OTHERWISE.

FIELD BEND AND/OR CLIP REINFORCING STEEL TO MAINTAIN MINIMUM CLEARANCE AND TO CLEAR PIPE OPENINGS.

ALL PREPARATION, MATERIALS, EQUIPMENT, TOOLS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE WORK THAT IS NOT PAID FOR DIRECTLY, SHALL BE CONSIDERED SUBSIDIARY TO THE ITEMS FOR WHICH DIRECT PAYMENT IS MADE.

ALL CONCRETE SURFACES TO BE IN CONTACT WITH THE NEW WORK SHALL BE THROUGHLY CLEANED BEFORE PLACING NEW CONCRETE.

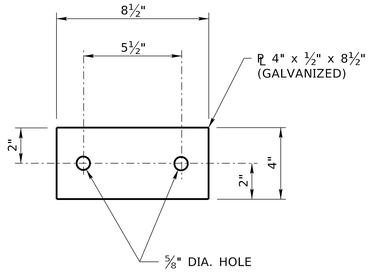
N0 DEDUCTIONS FOR PIPE OPENINGS HAVE BEEN INCLUDED IN THE "QUANTITIES FOR INFORMATION ONLY".

FERRULE LOOPS SHALL HAVE WORKING LOAD REQUIREMENTS OF 1,320 LBS. IN SHEAR AND 2,000 LBS. IN TENSION.

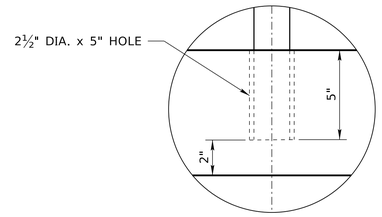
QUANTITIES
- FOR INFORMATION ONLY -

CONCRETE	0.88 CU. YDS.
REINFORCED STEEL	75 LBS.
2" GALVANIZED STEEL PIPE	3.50 LIN. FT.

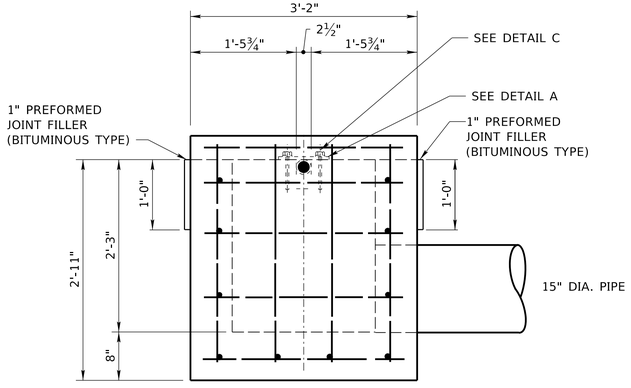
(THE ABOVE ITEMS ARE SUBSIDIARY TO OTHER PAY ITEMS FOR WHICH DIRECT PAYMENT IS MADE.)



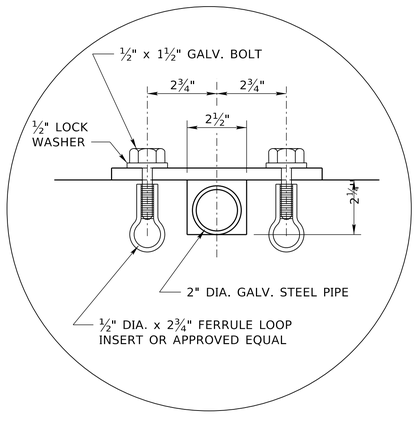
DETAIL A



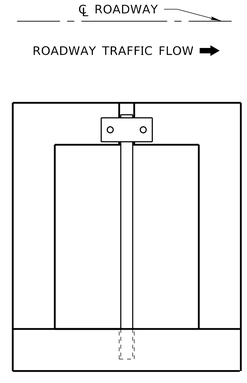
DETAIL B



ELEVATION



DETAIL C



INLET ORIENTATION SKETCH

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 546

CONCRETE FLUME TYPE VI

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

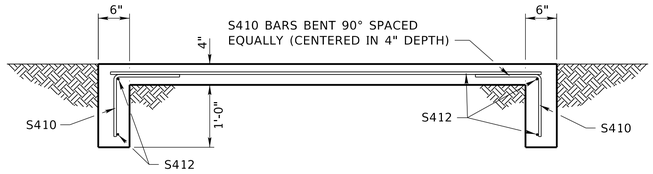
ORIGINAL: MARCH 22, 2010

DATE

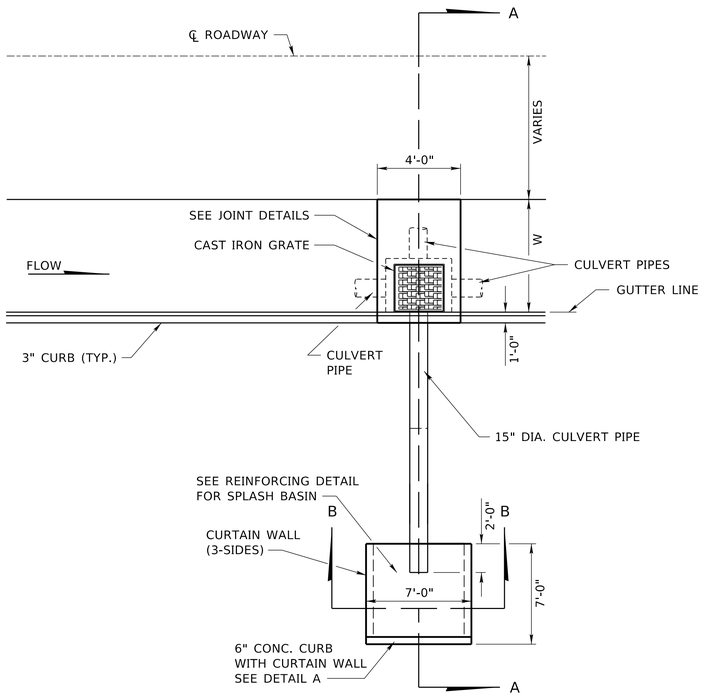
2
2

FILE: 5460 0 R0.dgn DATE: 18-JUL-2025 08:45 COMPUTER: BG04194I187

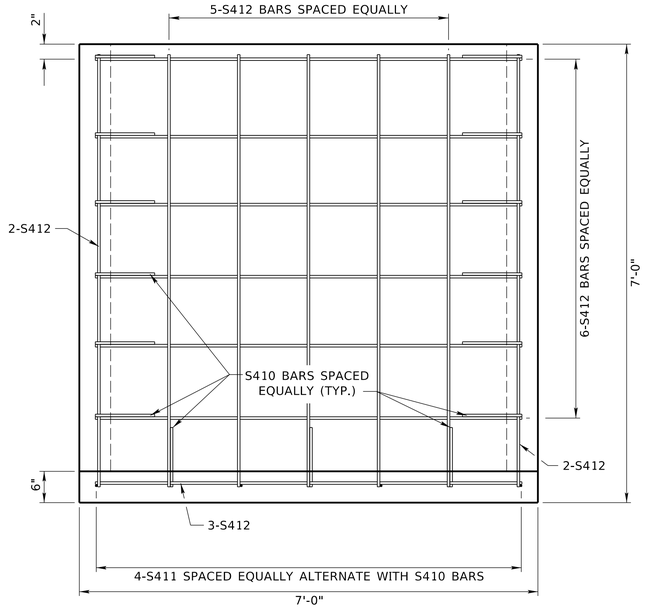
COMPUTER: BG0419M187
DATE: 28-AUG-2024 14:35
FILE: 5470 0 R4.dgn



SECTION B-B



PLAN

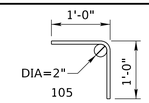


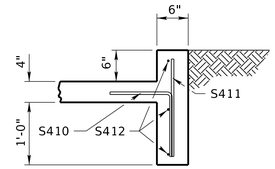
REINFORCING DETAIL FOR SPLASH BASIN

BILL OF BARS (SPLASH BASIN)			
MARK	NO.	LENGTH	TYPE
S410	15	2'-0"	105
S411	4	1'-6"	STR
S412	18	6'-8"	STR

BENDING DIAGRAMS

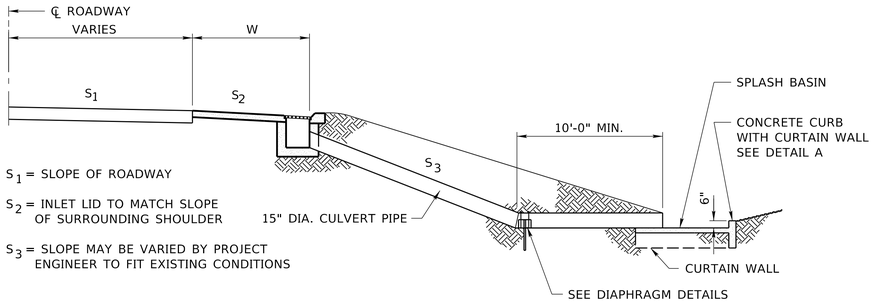
ALL DIMENSIONS ARE OUT TO OUT NOT TO SCALE





CONCRETE CURB WITH CURTAIN WALL

DETAIL A

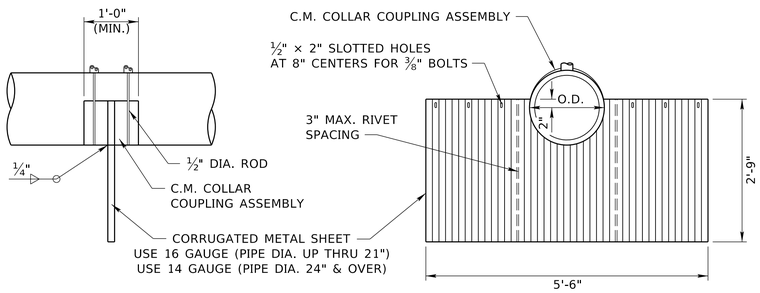


S_1 = SLOPE OF ROADWAY

S_2 = INLET LID TO MATCH SLOPE OF SURROUNDING SHOULDER

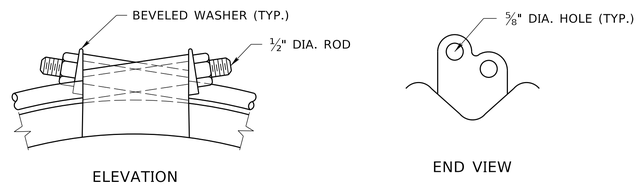
S_3 = SLOPE MAY BE VARIED BY PROJECT ENGINEER TO FIT EXISTING CONDITIONS

SECTION A-A



SECTION ELEVATION OF ASSEMBLED DIAPHRAGM

METAL DIAPHRAGM DETAILS



ELEVATION END VIEW

STANDARD TANK LUG DETAILS

NOTES:

W = SURFACED SHOULDER WIDTH AS SHOWN ON SHEET 2-T.

FINAL LOCATION OF FLUME TO BE DETERMINED BY THE ENGINEER.

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX.

ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615/A615M, GRADE 60.

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR SHALL BE 2" UNLESS NOTED OTHERWISE.

FIELD BEND AND/OR CLIP REINFORCING STEEL AS NECESSARY TO MAINTAIN MINIMUM COVERING AND TO CLEAR PIPE OPENINGS.

ALL CONCRETE SURFACES TO BE IN CONTACT WITH THE NEW WORK SHALL BE THOROUGHLY CLEANED BEFORE PLACING NEW CONCRETE.

ALL PREPARATION, EXCAVATION, DIAPHRAGM, MATERIALS, JOINT FILLER, SEALANT MATERIAL, EQUIPMENT, TOOLS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE WORK, THAT ARE NOT PAID FOR DIRECTLY, SHALL BE CONSIDERED SUBSIDIARY TO THE ITEM CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX.

THE CAST IRON GRATE AND FRAME SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER POUND UNDER THE ITEM CAST IRON GRATE AND FRAME, AND SHALL CONFORM TO THE STANDARD SPECIFICATIONS AND THE DIMENSIONS SHOWN.

NO ADJUSTMENTS SHALL BE MADE IN THE QUANTITIES FOR PIPE OPENINGS.

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JUL 20	CHANGED STEEL QUANTITIES
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	FEB 13	DELETED L INFO. & CONC CURB DETAIL

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 547-R4

CONCRETE FLUME TYPE VII

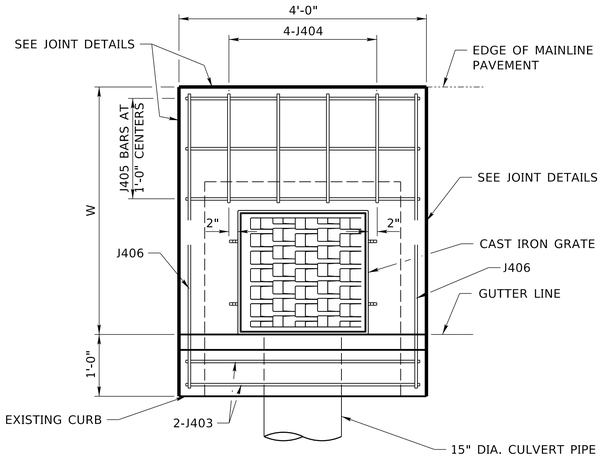
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

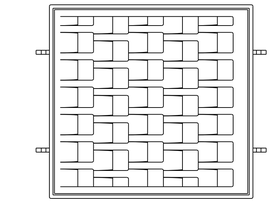
DATE

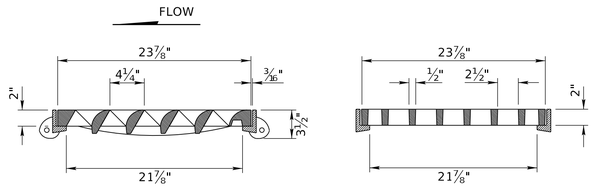
ORIGINAL: FEBRUARY 14, 2008
DATE

1
2



PLAN VIEW

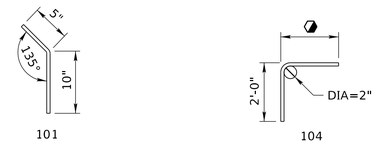




CAST IRON GRATE AND FRAME DETAILS

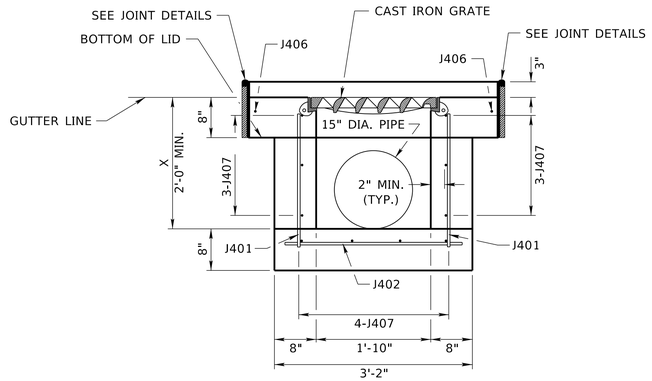
TYPE "L" CURVED VANE STYLE GRATE
238 LBS.

BILL OF BARS (INLET BOX)				BENDING DIAGRAMS
MARK	NO.	LENGTH	TYPE	ALL DIMENSIONS ARE OUT TO OUT — NOT TO SCALE
J401	14	2'-1"	STR	
J402	12	2'-8"	STR	
J403	4	3'-8"	STR	
J404	4	◑	STR	
J405	◪	3'-8"	STR	
J406	2	▲	STR	
J407	10	2'-8"	STR	
J408	4	1'-3"	101	
J409	4	◪ +2'-0"	104	

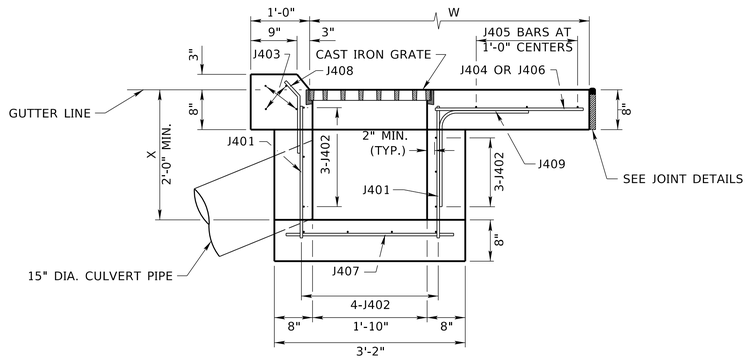


QUANTITIES FOR CONCRETE FLUME, TYPE VII				
	INLET BOX & SHOULDER		SPLASH BASIN	
W	CONCRETE CU. YDS.	STEEL (LBS.)	CONCRETE CU. YDS.	STEEL (LBS.)
4'-0"	1.0	105	1.10	100
5'-0"	1.1	110	1.10	100
6'-0"	1.2	115	1.10	100
7'-0"	1.2	120	1.10	100
8'-0"	1.3	125	1.10	100
9'-0"	1.3	135	1.10	100
10'-0"	1.4	140	1.10	100
2' × 2' CAST IRON GRATE AND FRAME - 238 LBS.				

TABLE QUANTITY BASED ON X = 2'-0".
EACH ADDITIONAL 6" DEPTH OF INLET BOX - ADD 0.2 CU. YDS. CONCRETE AND 5 LBS. STEEL UP TO A TOTAL DEPTH OF X = 4'-6".



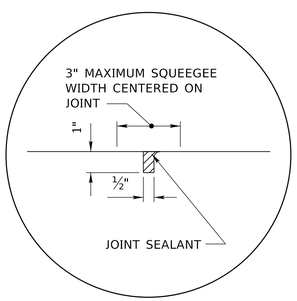
ELEVATION



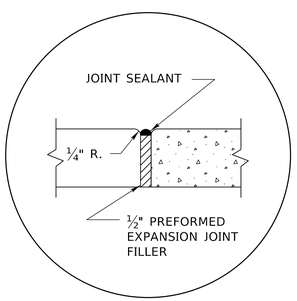
END VIEW

MARK	W	NO.	LENGTH	MARK	W	NO.	LENGTH
◑ J404	4'-0"	4	1'-8"	◪ J405	4'-0"	2	3'-8"
	5'-0"	4	2'-8"		5'-0"	3	3'-8"
	6'-0"	4	3'-8"		6'-0"	4	3'-8"
	7'-0"	4	4'-8"		7'-0"	5	3'-8"
	8'-0"	4	5'-8"		8'-0"	6	3'-8"
	9'-0"	4	6'-8"		9'-0"	7	3'-8"
	10'-0"	4	7'-8"		10'-0"	8	3'-8"

MARK	W	NO.	LENGTH	MARK	W	NO.	LENGTH
▲ J406	4'-0"	2	4'-8"	◔ J409	4'-0"	4	3'-9"
	5'-0"	2	5'-8"		5'-0"	4	4'-0"
	6'-0"	2	6'-8"		6'-0"	4	4'-0"
	7'-0"	2	7'-8"		7'-0"	4	4'-0"
	8'-0"	2	8'-8"		8'-0"	4	4'-0"
	9'-0"	2	9'-8"		9'-0"	4	4'-0"
	10'-0"	2	10'-8"		10'-0"	4	4'-0"



JOINT DETAIL
(ASPHALT SURFACING)



JOINT DETAIL
(CONCRETE SHOULDER)

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JUL 20	CHANGED STEEL QUANTITIES
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	FEB 13	DELETED L INFO. & CONC CURB DETAIL

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 547-R4

CONCRETE FLUME TYPE VII

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

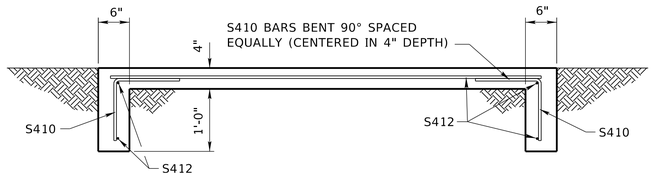
DATE

ORIGINAL:
FEBRUARY 14, 2008
DATE

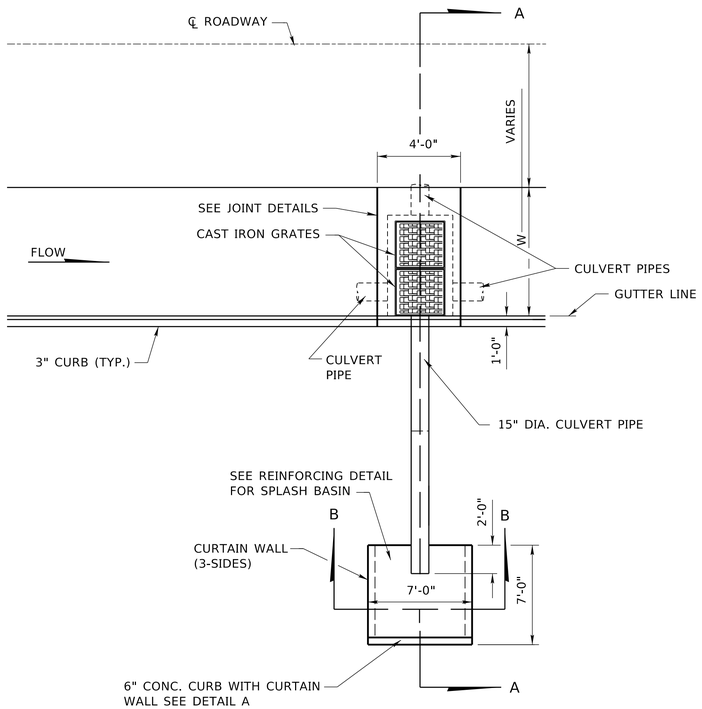
2
2

COMPUTER: BG04194I187
DATE: 28-AUG-2024 14:35
FILE: 5470 0 R4.dgn

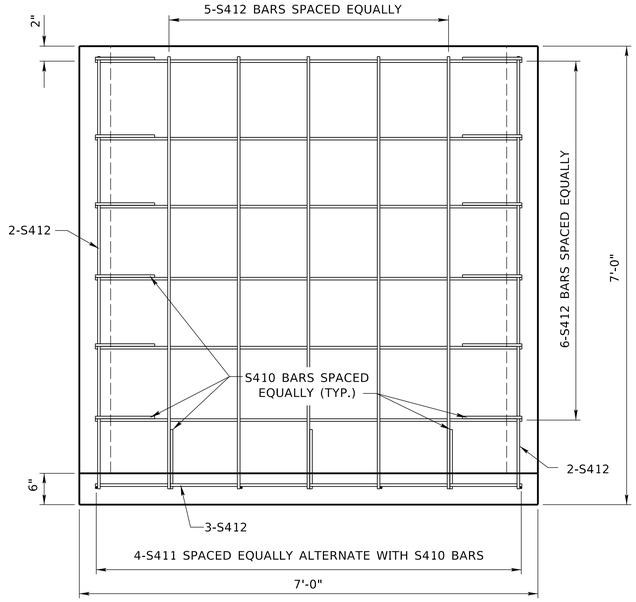
COMPUTER: BG04190187
DATE: 28-AUG-2024 14:35
FILE: 5480 0 R4.dgn



SECTION B-B



PLAN

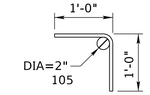


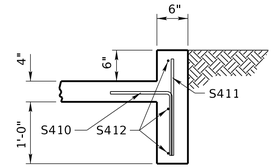
REINFORCING DETAIL FOR SPLASH BASIN

BILL OF BARS (SPLASH BASIN)			
MARK	NO.	LENGTH	TYPE
S410	15	2'-0"	105
S411	4	1'-6"	STR
S412	18	6'-8"	STR

BENDING DIAGRAMS

ALL DIMENSIONS ARE OUT TO OUT NOT TO SCALE





CONCRETE CURB WITH CURTAIN WALL

DETAIL A

NOTES:

W = SURFACED SHOULDER WIDTH AS SHOWN ON SHEET 2-T.

FINAL LOCATION OF FLUME TO BE DETERMINED BY THE ENGINEER.

ALL CONCRETE USED SHALL BE CLASS 47B-3000 AND SHALL BE PAID FOR UNDER THE ITEM CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX.

ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615/A615M, GRADE 60.

THE MINIMUM COVERING, MEASURED FROM THE FACE OF THE CONCRETE TO THE SURFACE OF ANY REINFORCING BAR SHALL BE 2" UNLESS NOTED OTHERWISE.

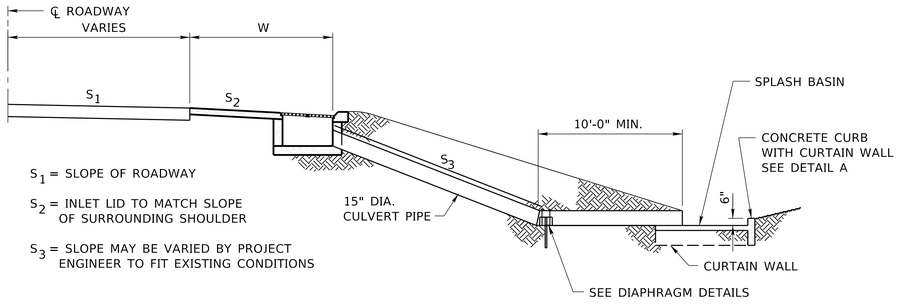
FIELD BEND AND/OR CLIP REINFORCING STEEL AS NECESSARY TO MAINTAIN MINIMUM COVERING AND TO CLEAR PIPE OPENINGS.

ALL CONCRETE SURFACES TO BE IN CONTACT WITH THE NEW WORK SHALL BE THOROUGHLY CLEANED BEFORE PLACING NEW CONCRETE.

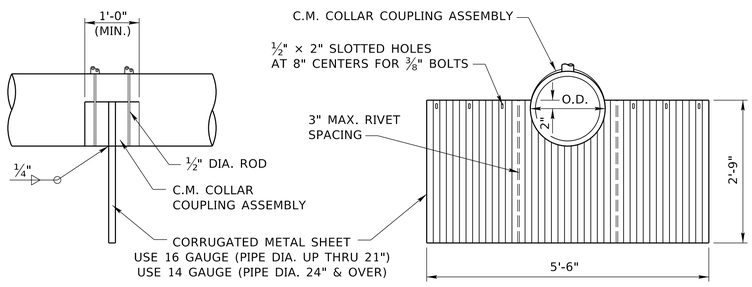
ALL PREPARATION, EXCAVATION, DIAPHRAGM, MATERIALS, JOINT FILLER, SEALANT MATERIAL, EQUIPMENT, TOOLS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE WORK, THAT ARE NOT PAID FOR DIRECTLY, SHALL BE CONSIDERED SUBSIDIARY TO THE ITEM CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX.

THE CAST IRON GRATES AND FRAMES SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER POUND UNDER THE ITEM CAST IRON GRATE AND FRAMES, AND SHALL CONFORM TO THE STANDARD SPECIFICATIONS AND THE DIMENSIONS SHOWN.

NO ADJUSTMENTS SHALL BE MADE IN THE QUANTITIES FOR PIPE OPENINGS.

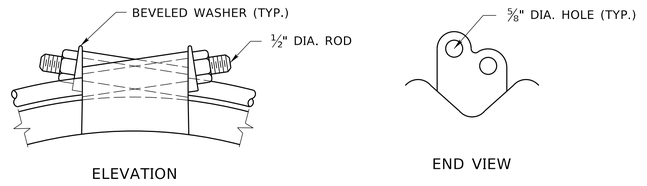


SECTION A-A



SECTION ELEVATION OF ASSEMBLED DIAPHRAGM

METAL DIAPHRAGM DETAILS



ELEVATION END VIEW

STANDARD TANK LUG DETAILS

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JUL 20	CHANGED STEEL QUANTITIES
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	FEB 13	DELETED L INFO. & CONC CURB DETAIL

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 548-R4

CONCRETE FLUME TYPE VIII

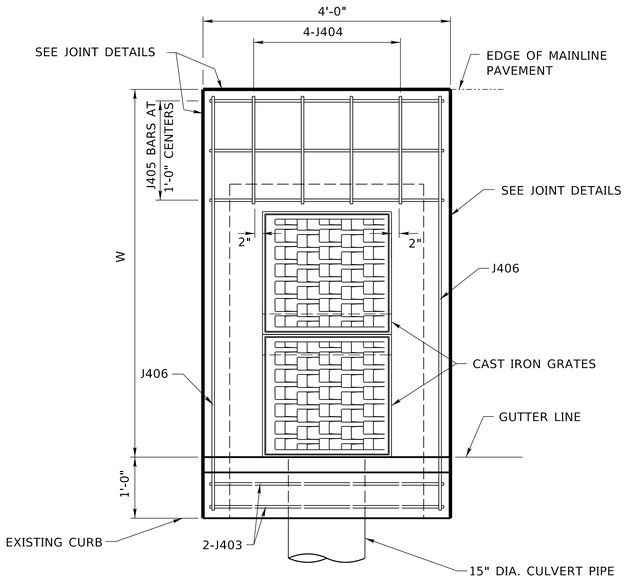
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

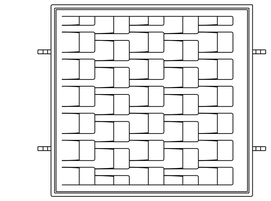
DATE

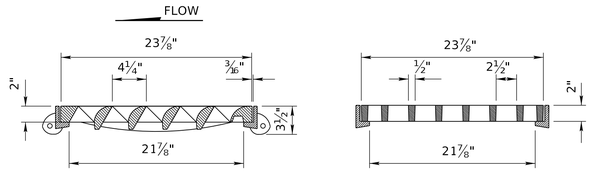
ORIGINAL: FEBRUARY 14, 2008
DATE

1
2



PLAN VIEW





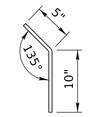
CAST IRON GRATE AND FRAME DETAILS

TYPE "L" CURVED VANE STYLE GRATE
238 LBS.

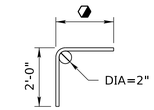
BILL OF BARS (INLET BOX)			
MARK	NO.	LENGTH	TYPE
J401	14	2'-1"	STR
J402	12	2'-8"	STR
J403	4	3'-8"	STR
J404	4	◑	STR
J405	◪	3'-8"	STR
J406	2	▲	STR
J407	10	4'-8"	STR
J408	4	1'-3"	101
J409	4	◔ +2'-0"	104

BENDING DIAGRAMS

ALL DIMENSIONS ARE OUT TO OUT — NOT TO SCALE



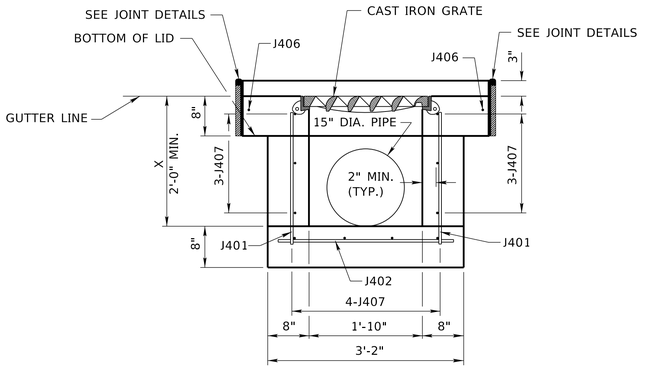
101



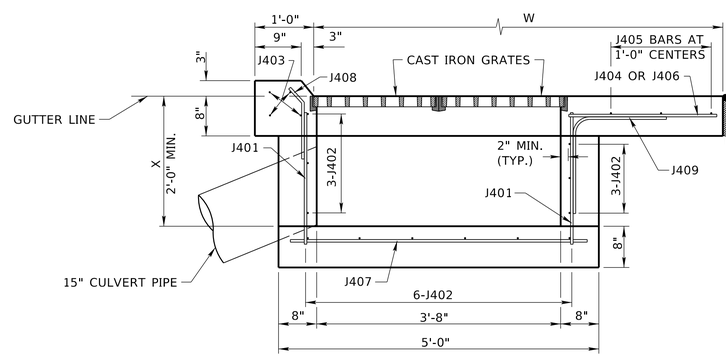
104

QUANTITIES FOR CONCRETE FLUME, TYPE VIII				
	INLET BOX & SHOULDER		SPLASH BASIN	
W	CONCRETE CU. YDS.	STEEL (LBS.)	CONCRETE CU. YDS.	STEEL (LBS.)
5'-0"	1.2	110	1.10	100
6'-0"	1.3	115	1.10	100
7'-0"	1.4	120	1.10	100
8'-0"	1.5	130	1.10	100
9'-0"	1.5	135	1.10	100
10'-0"	1.6	140	1.10	100
2 - 2' x 2' CAST IRON GRATES AND FRAME - 476 LBS.				

TABLE QUANTITY BASED ON X = 2'-0".
EACH ADDITIONAL 6" DEPTH OF INLET BOX - ADD 0.2 CU. YDS. CONCRETE AND 5 LBS. STEEL UP TO A TOTAL DEPTH OF X = 4'-6".



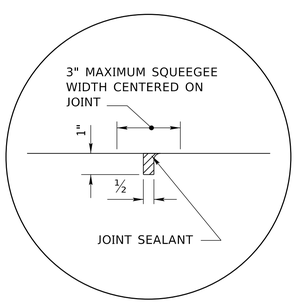
ELEVATION



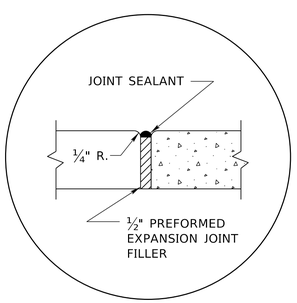
END VIEW

MARK	W	NO.	LENGTH	MARK	W	NO.	LENGTH
◑ J404	5'-0"	-	-	◪ J405	5'-0"	2	3'-8"
	6'-0"	4	1'-8"		6'-0"	2	3'-8"
	7'-0"	4	2'-8"		7'-0"	3	3'-8"
	8'-0"	4	3'-8"		8'-0"	4	3'-8"
	9'-0"	4	4'-8"		9'-0"	5	3'-8"
	10'-0"	4	5'-8"		10'-0"	6	3'-8"

MARK	W	NO.	LENGTH	MARK	W	NO.	LENGTH
▲ J406	5'-0"	2	5'-8"	◔ J409	5'-0"	4	2'-9"
	6'-0"	2	6'-8"		6'-0"	4	3'-9"
	7'-0"	2	7'-8"		7'-0"	4	4'-0"
	8'-0"	2	8'-8"		8'-0"	4	4'-0"
	9'-0"	2	9'-8"		9'-0"	4	4'-0"
	10'-0"	2	10'-8"		10'-0"	4	4'-0"



JOINT DETAIL
(ASPHALT SURFACING)



JOINT DETAIL
(CONCRETE SHOULDER)

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JUL 20	CHANGED STEEL QUANTITIES
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	FEB 13	DELETED L INFO. & CONC CURB DETAIL

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 548-R4

CONCRETE FLUME TYPE VIII

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

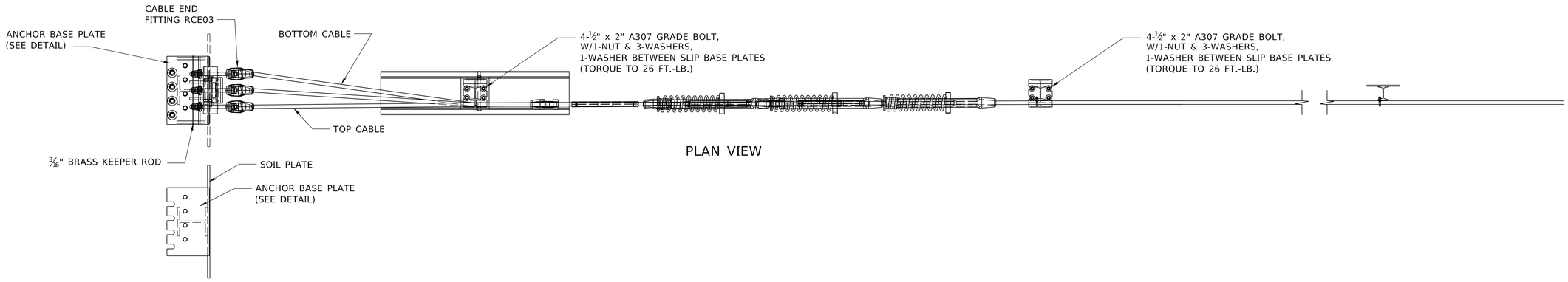
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL:
FEBRUARY 14, 2008
DATE

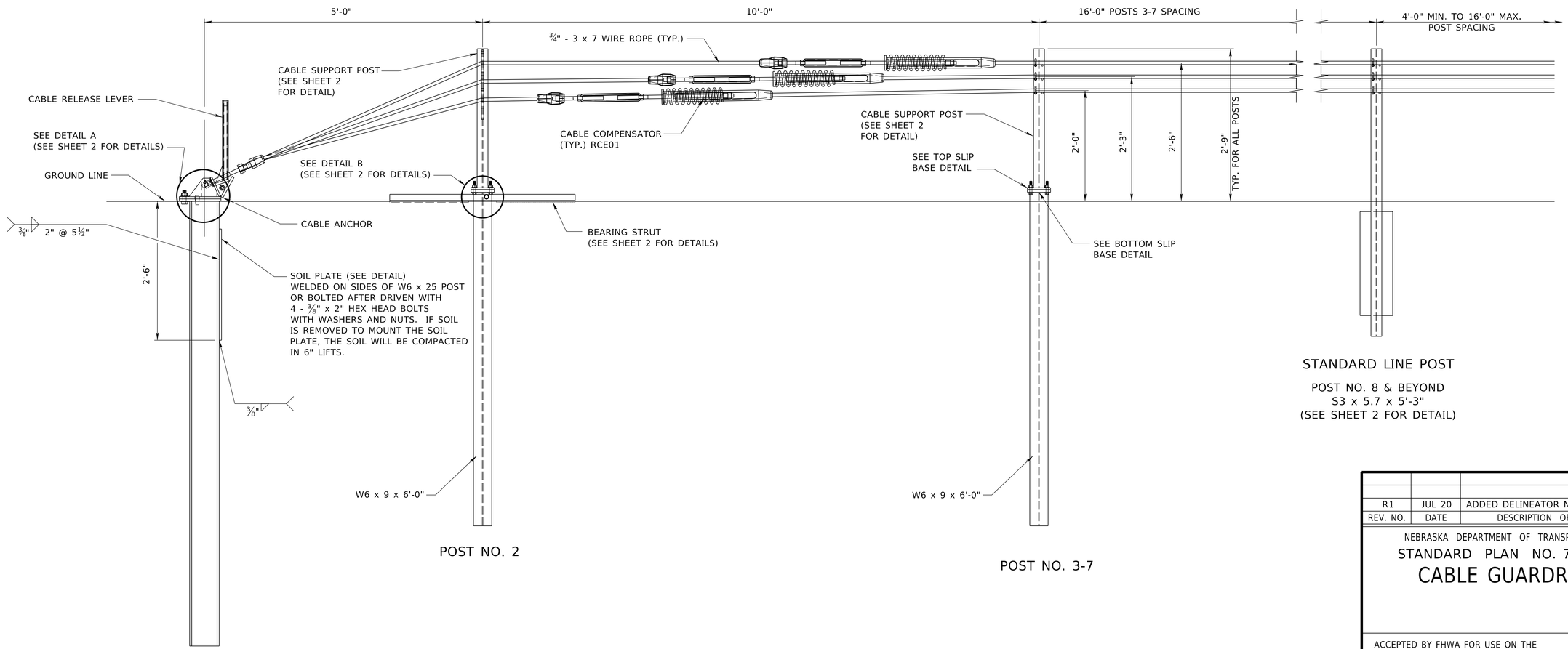
2
2

COMPUTER: BG04194187
DATE: 28-AUG-2024 14:35
FILE: 5480 0 R4.dgn



PLAN VIEW

TOP VIEW
POST NO. 1



POST NO. 1
W6 x 25 x 8'-0"

POST NO. 2

POST NO. 3-7

PROFILE VIEW

STANDARD LINE POST

POST NO. 8 & BEYOND
S3 x 5.7 x 5'-3"
(SEE SHEET 2 FOR DETAIL)

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JUL 20	ADDED DELINEATOR NOTE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 702-R1

CABLE GUARDRAIL

ACCEPTED BY FHWA FOR USE ON THE
NATIONAL HIGHWAY SYSTEM:

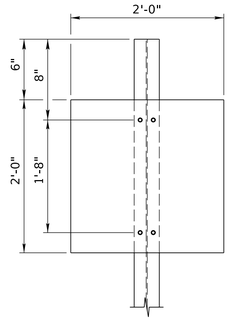
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL:
JANUARY 2018
DATE

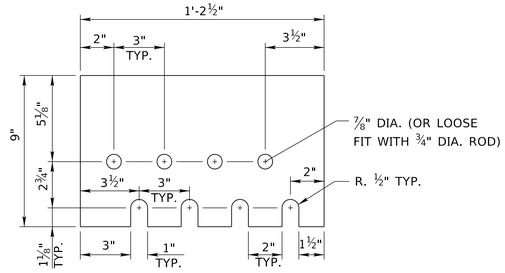
1
6

COMPUTER: BG04194187
DATE: 27-AUG-2024 15:16
FILE: 7020 0 R1.dgn



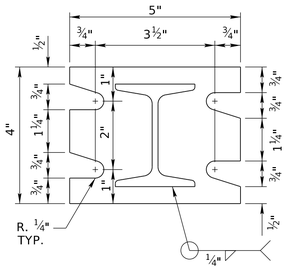
SOIL PLATE DETAIL

PL ½" x 2'-0" x 2'-0"
(CENTERED ON
W6 x 25 x 8'-0")



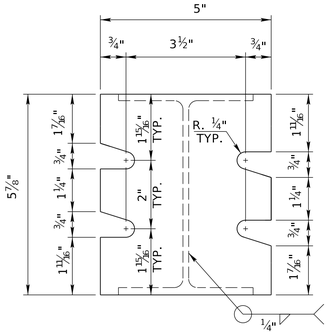
ANCHOR BASE PLATE DETAIL

PL ½" x 9" x 1'-2½"



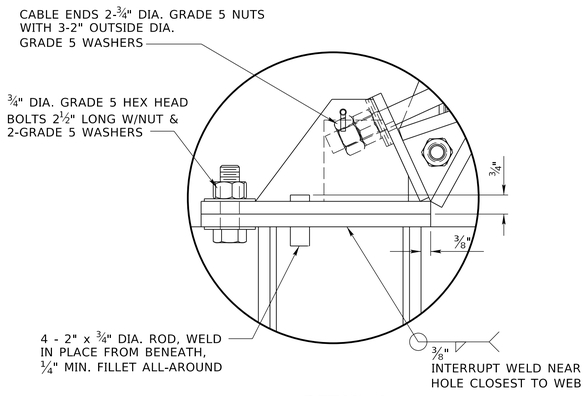
TOP SLIP BASE DETAIL

PL ⅜" x 4" x 5"

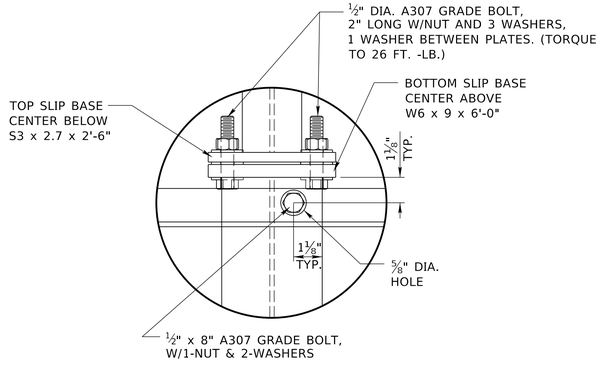


BOTTOM SLIP BASE DETAIL

PL ½" x 5" x 5⅞"



DETAIL A



DETAIL B

NOTE:

USE GRADE 5 BOLTS, NUTS, AND WASHERS UNLESS NOTED OTHERWISE.

A36 STEEL COMPONENTS (PLATE, ANGLES, ETC.)

THE TERMINAL ANCHORAGE SECTION SHALL INCLUDE POSTS 1 THRU 7, CABLE COMPENSATORS ON ONE END, TURNBUCKLE ON THE OTHER END OF EACH INDIVIDUAL CABLE, ALL OTHER PARTS USED TO ASSEMBLE POSTS 1 THRU 7, AND WIRE ROPE.

CABLE RUNS OVER 1000 FT. USE CABLE COMPENSATORS ON EACH END OF CABLE.

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JUL 20	ADDED DELINEATOR NOTE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 702-R1

CABLE GUARDRAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

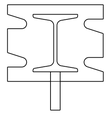
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL:
JANUARY 2018
DATE

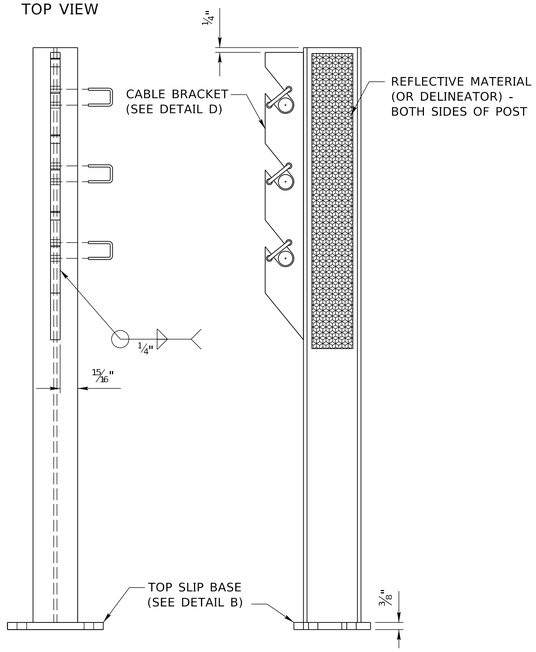
2
6

COMPUTER: BG041914187
DATE: 27-AUG-2024 15:16
FILE: 7020 0 R1.dgn



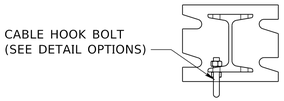
TOP VIEW

GUARDRAIL LENGTH	DELINEATOR SPACING APPROX.
≤ 200'	25'
> 200'	50'

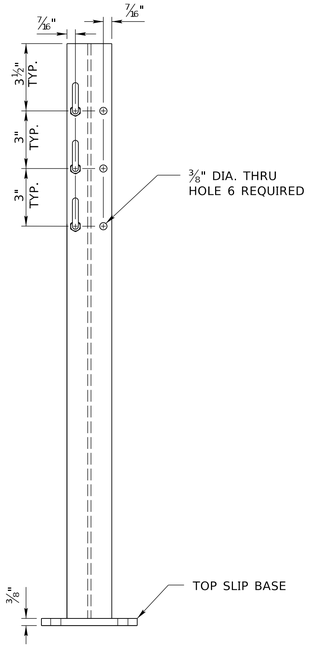


FRONT VIEW SIDE VIEW

CABLE SUPPORT POST
POST NO. 2
S3 x 5.7 x 2'-6"

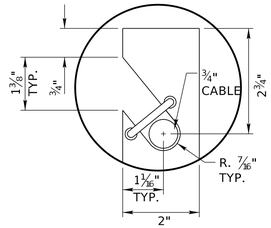


TOP VIEW

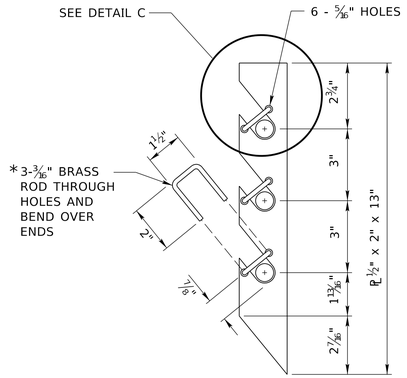


FRONT VIEW

CABLE SUPPORT POST
POST NO. 3-7
S3 x 5.7 x 2'-6"

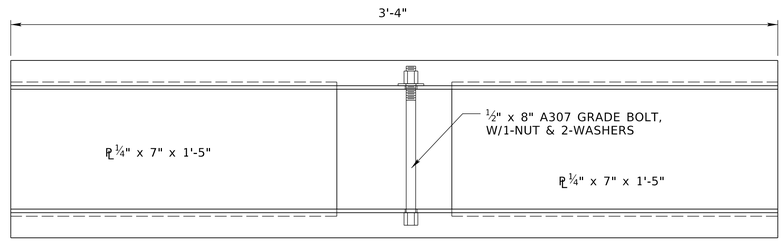


DETAIL C

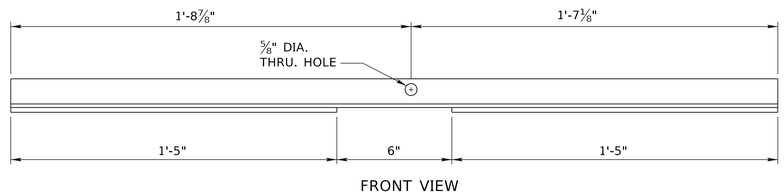


CABLE BRACKET
DETAIL D

*3/16" BRASS ROD (OPTIONAL) IS FOR CONSTRUCTION PURPOSES ONLY, MAY BE LEFT IN PLACE AT END OF CONSTRUCTION OR REMOVED.

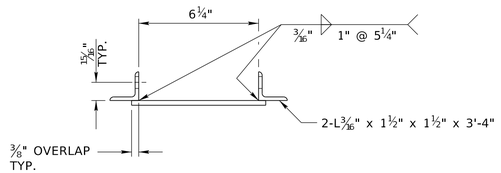


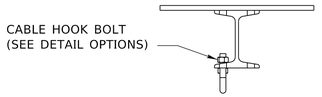
PLAN VIEW



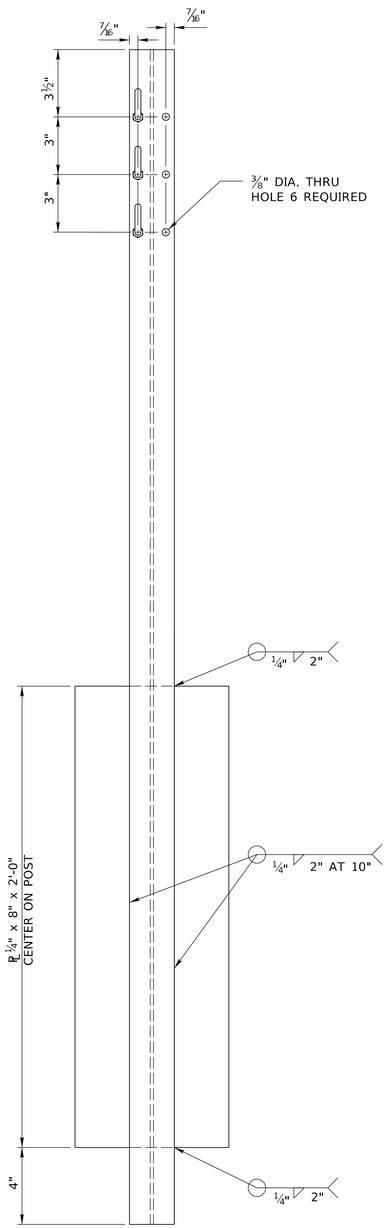
FRONT VIEW

BEARING STRUT
(POST 2)



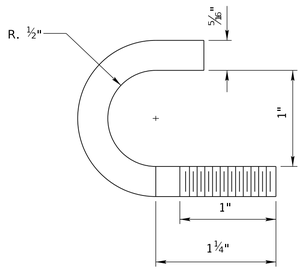


TOP VIEW



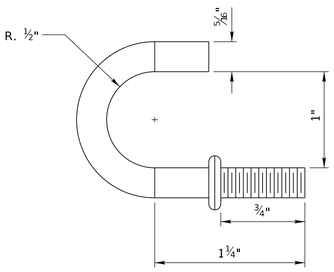
FRONT VIEW

STANDARD LINE POST
POST NO. 8 & BEYOND
S3 x 5.7 x 5'-3"



USE 2 HEX NUTS
TO FASTEN TO POST

CABLE HOOK BOLT
DETAIL OPTION 1



USE 1 HEX NUT
TO FASTEN TO POST

CABLE HOOK BOLT
DETAIL OPTION 2

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JUL 20	ADDED DELINEATOR NOTE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 702-R1

CABLE GUARDRAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

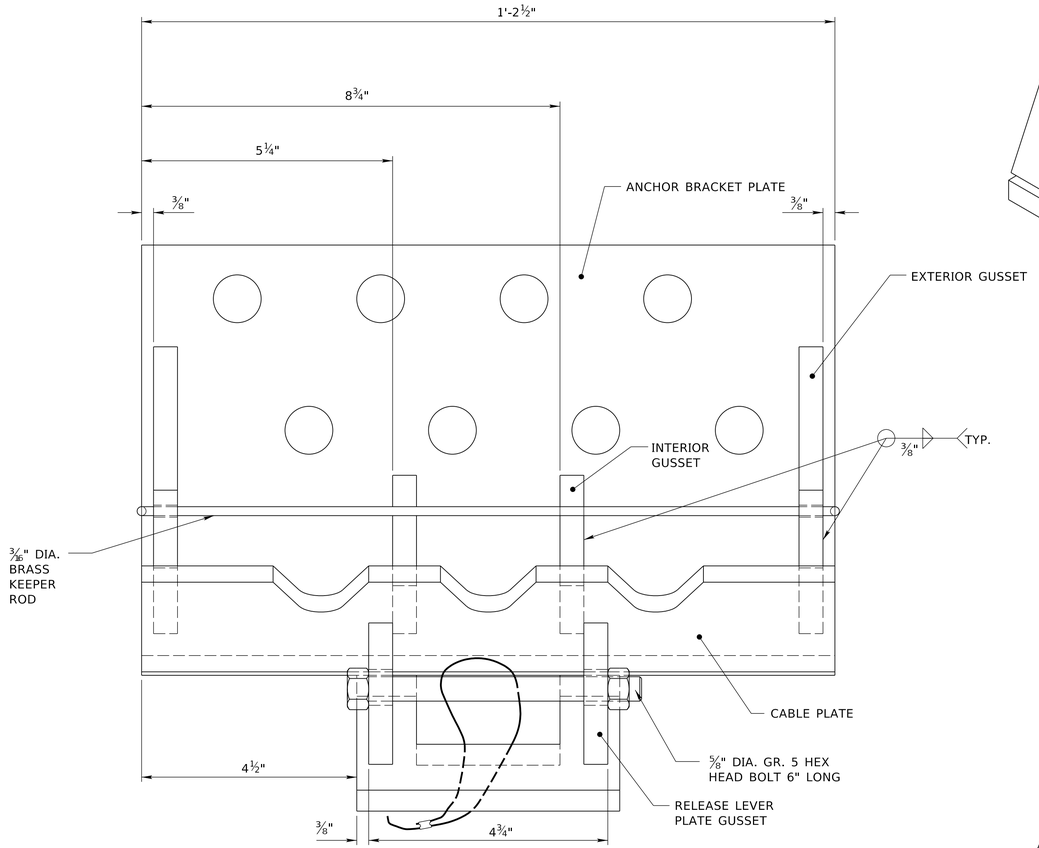
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

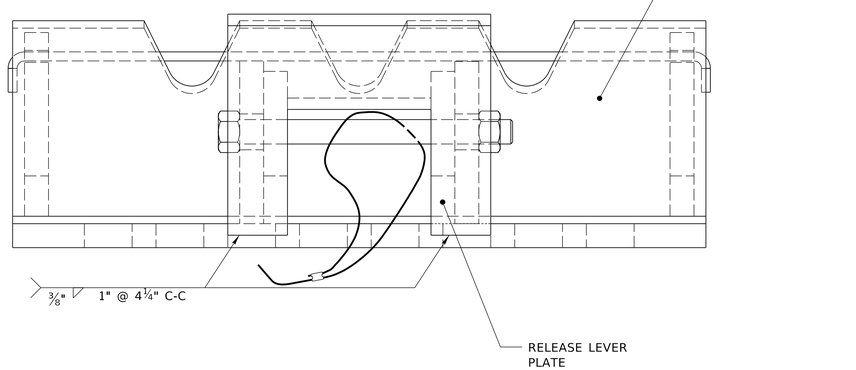
ORIGINAL:
JANUARY 2018
DATE

3
6

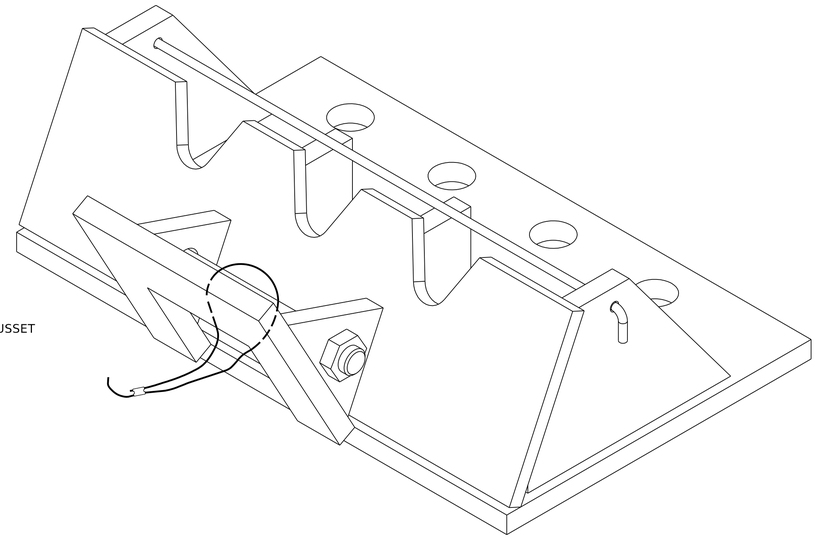
COMPUTER: BG04190187
DATE: 27-AUG-2024 15:16
FILE: 7020 0 R1.dgn



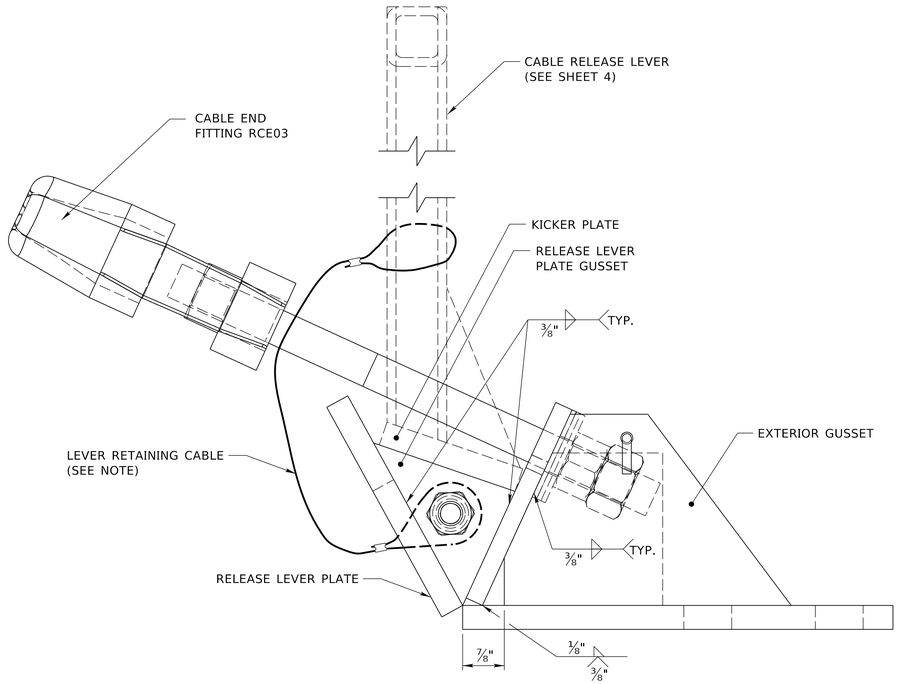
PLAN VIEW



FRONT VIEW



CABLE ANCHOR



SIDE VIEW

PRIOR TO FINAL ACCEPTANCE BY THE STATE, THE FOLLOWING VALUES SHALL BE USED TO TIGHTEN THE TURNBUCKLES, DEPENDING ON THE TEMPERATURE AT THE TIME OF THE ADJUSTMENT.

TEMPERATURE (DEGREE)	SPRING COMPRESSION
110 TO 120	1"
100 TO 109	1¼"
90 TO 99	1½'
80 TO 89	1¾"
70 TO 79	2"
60 TO 69	2¼"
50 TO 59	2½"
40 TO 49	2¾"
30 TO 39	3"
20 TO 29	3¼"
10 TO 19	3½"
0 TO 9	3¾"
-10 TO -1	4"
-20 TO -11	4¼"

NOTE: SPRING COMPRESSION FROM UNLOADED POSITION IN EACH SPRING.

NOTE:

ALL CABLE ENDS AND SPLICES SHALL BE DESIGNED AND SHALL DEVELOP THE FULL STRENGTH OF THE ¾" ROUND CABLE (25,000 LBS.).

STAGGER CABLE SPLICES, PROVIDE A MINIMUM OF 20 FT. BETWEEN ANY PAIR. PROVIDE A MINIMUM OF 100 FT. BETWEEN CABLE SPLICES ON THE SAME CABLE.

ALL CABLES RUN OVER THE KICKER PLATE OF THE CABLE RELEASE LEVER. THE MIDDLE CABLE RUNS THROUGH THE LEVER UPRIGHTS.

THE RETAINING CABLE IS GALVANIZED, ⅜" DIA. x 3 FT. LONG WITH 3" LONG LOOPS AND 1" CLIPS.

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JUL 20	ADDED DELINEATOR NOTE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 702-R1

CABLE GUARDRAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

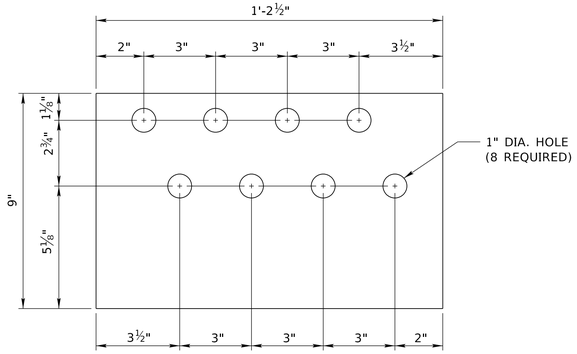
DATE

ORIGINAL: JANUARY 2018

DATE

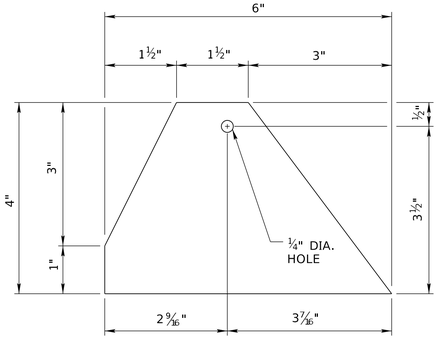
4
6

COMPUTER: BG0419M187
DATE: 27-AUG-2024 15:16
FILE: 7020 0 R1.dgn



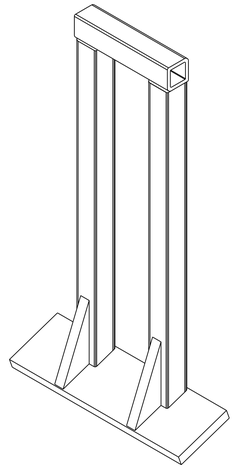
ANCHOR BRACKET PLATE

PL ½" × 9" × 1'-2½"

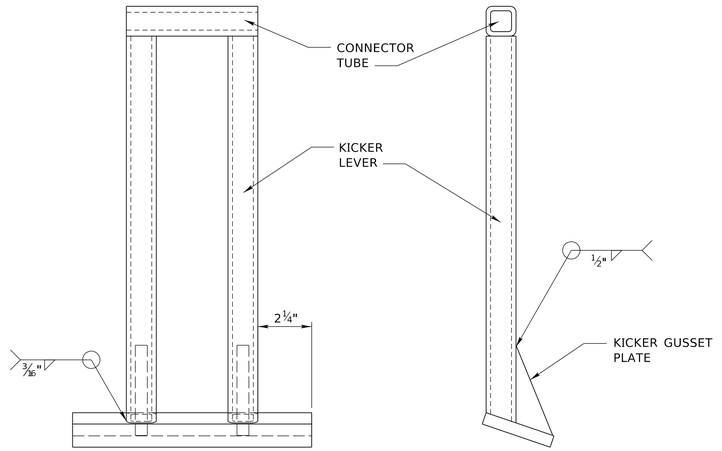


EXTERIOR GUSSET

PL ½" × 4" × 6"

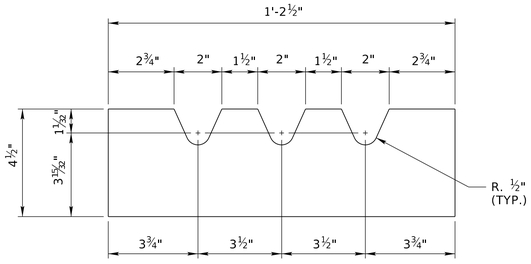


PLAN VIEW



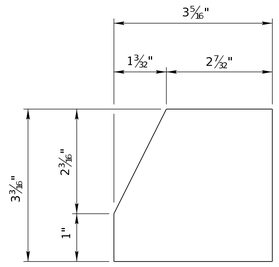
FRONT VIEW SIDE VIEW

CABLE RELEASE LEVER



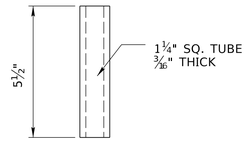
CABLE RETAINER PLATE

PL 3/8" × 4½" × 1'-2½"

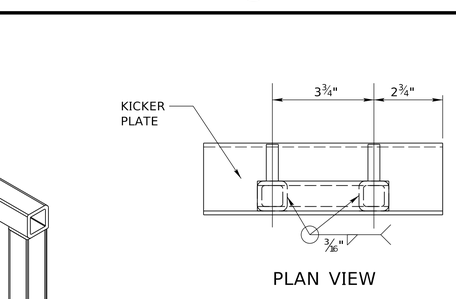


INTERIOR GUSSET

PL ½" x 3 3/16" x 3 5/16"

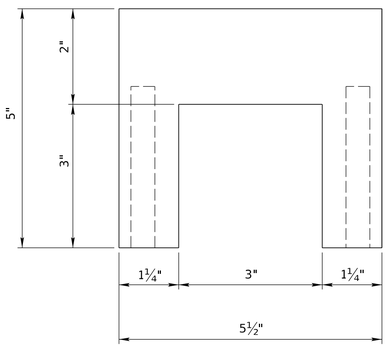


CONNECTOR
TUBE



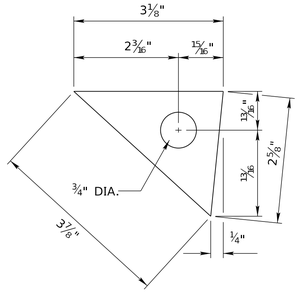
KICKER PLATE GUSSET

PL ½" × 1 9/16" × 3¼"



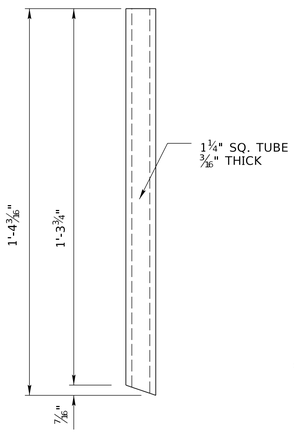
RELEASE LEVER PLATE

PL ½" × 5" × 5½"

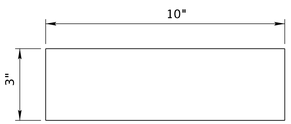


RELEASE LEVER PLATE GUSSET

PL ½" × 2⅝" × 3⅛"



KICKER LEVER



KICKER PLATE

PL ½" × 3" × 10"

NOTE:

THE KICKER LEVER SHOULD BE FLUSH WITH THE TOP OF THE KICKER PLATE, AND THE 3¼" LEG OF THE KICKER PLATE GUSSET SHOULD LINE UP WITH THE KICKER LEVER, AND THE BOTTOM OF THE KICKER PLATE GUSSET SHOULD ALIGN WITH THE BOTTOM OF THE KICKER PLATE.

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JUL 20	ADDED DELINEATOR NOTE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 702-R1

CABLE GUARDRAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL: JANUARY 2018

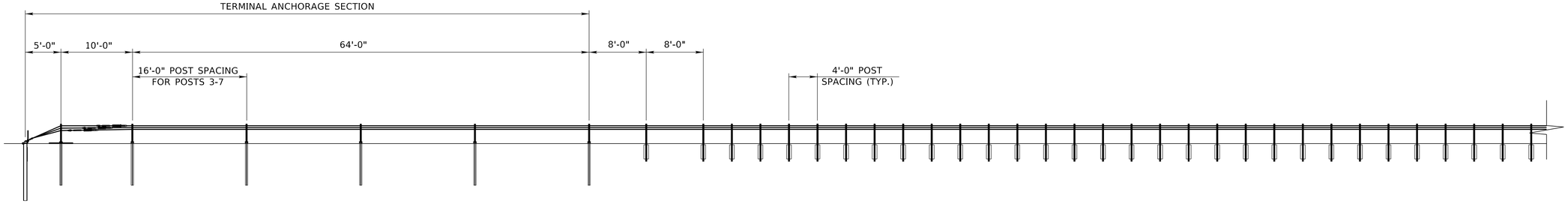
DATE

5
6

COMPUTER: BG04191M1187
DATE: 27-AUG-2024 15:16
FILE: 7020 0 R1.dgn

Approved Date: OCT 2019 Effective Letting Date: JULY 2020

PLAN VIEW



PROFILE VIEW

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JUL 20	ADDED DELINEATOR NOTE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 702-R1

CABLE GUARDRAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

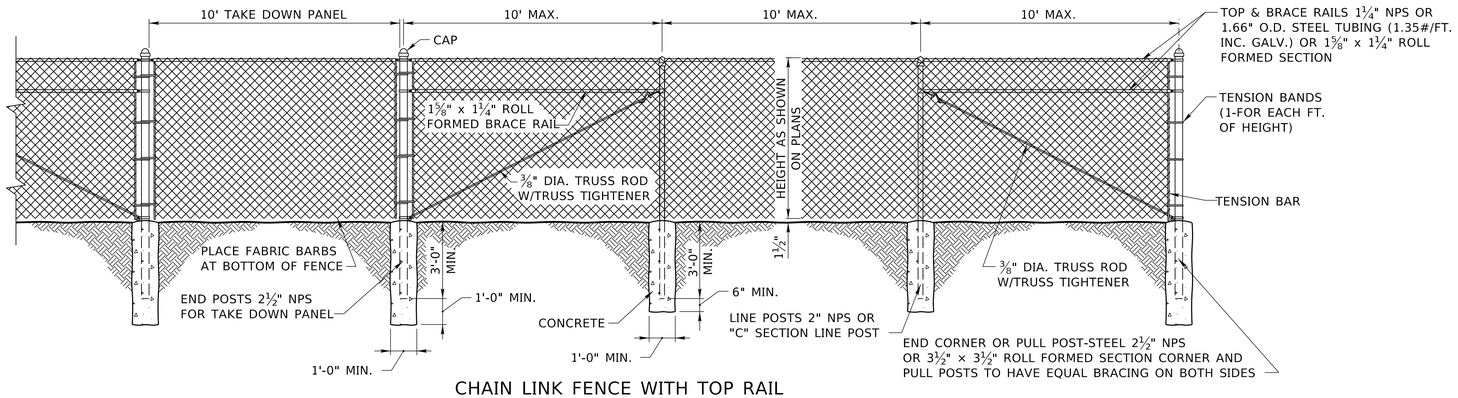
DATE

ORIGINAL: JANUARY 2018

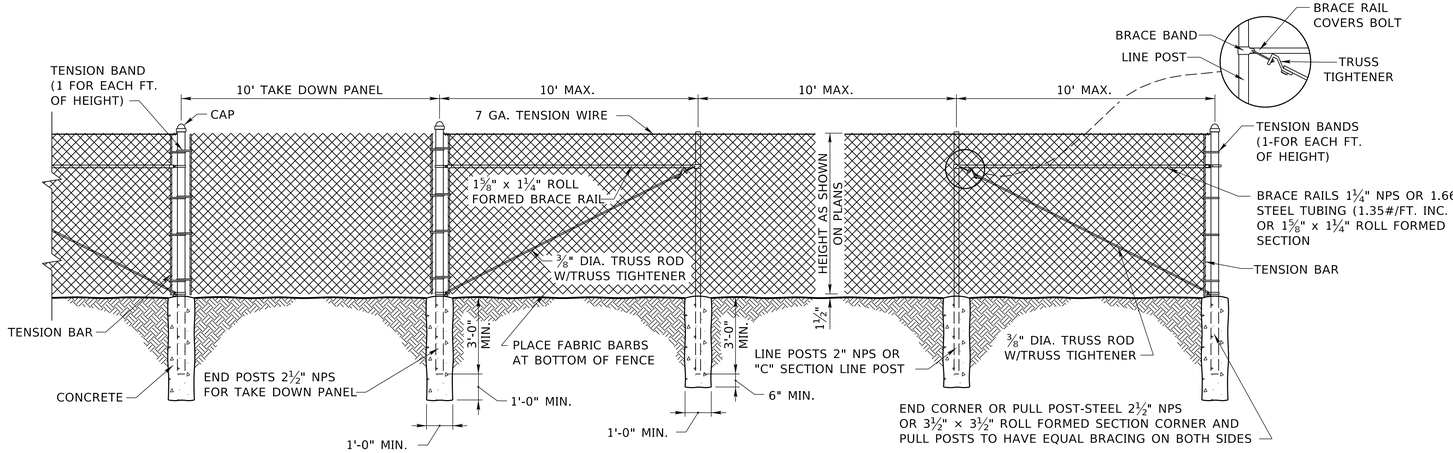
DATE

6
6

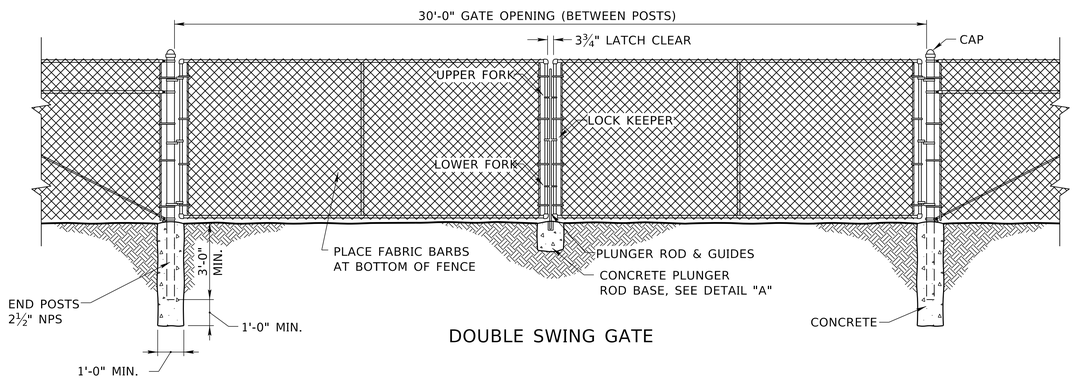
COMPUTER: BG04190187
DATE: 27-AUG-2024 15:16
FILE: 7020 0 R1.dgn



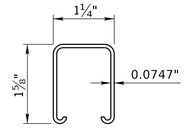
CHAIN LINK FENCE WITH TOP RAIL
(FOR INSTALLATION OUTSIDE OF LATERAL OBSTACLE CLEARANCE)



CHAIN LINK FENCE WITH TENSION WIRE
(FOR INSTALLATION WITHIN THE LATERAL OBSTACLE CLEARANCE)

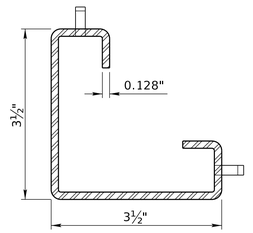


DOUBLE SWING GATE



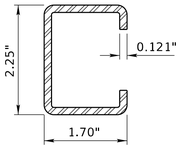
1.35#/FT. (INCL. 2.0 OZ. GALV.)

SECTION OF ROLLED FORMED TOP AND BRACE RAILS



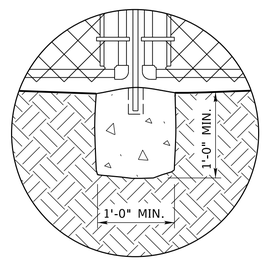
4.85#/FT. (INCL. 2.0 OZ. GALV.)

SECTION OF ROLL FORMED END, CORNER OR PULL POSTS



2.64#/FT. (INCL. 2.0 OZ. GALV.)

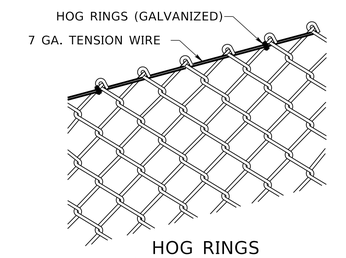
"C" SECTION LINE POST



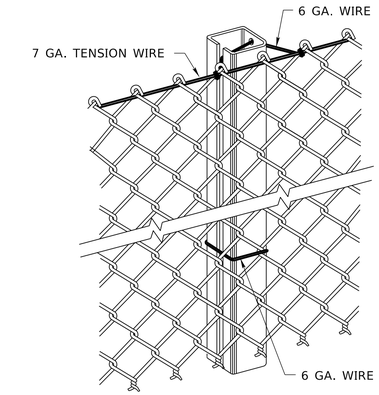
DETAIL "A"
(CONCRETE PLUNGER ROD BASE)

NOMINAL PIPE SIZE (N.P.S.)	OUTSIDE DIA.		WALL THICKNESS		WEIGHT #/FT.	
	NOM.	MIN.	NOM.	MIN.	NOM.	MIN.
1¼	1.660	1.629	0.140	0.122	2.27	2.16
2	2.375	2.351	0.154	0.135	3.65	3.47
2½	2.875	2.846	0.203	0.178	5.79	5.50
3	3.500	3.465	0.216	0.189	7.58	7.20

NOMINAL PIPE SIZE (NPS) DIMENSIONS, WEIGHTS & MINIMUM TOLERANCES
(AS PER ASTM F1083, ALL DIMENSIONS ARE IN INCHES)



HOG RINGS
(24" MAX. SPACING)



FABRIC BANDS FOR LINE POSTS

NOTES:

THE ALTERNATE DESIGN R.O.W. FENCE SHALL BE GROUNDED AT APPROXIMATELY 900' INTERVALS WITH ONE 8' × 1.33#/FT. MIN. STEEL POST, UNLESS OTHER METHODS ARE REQUIRED BY THE STANDARD SPECIFICATIONS.

UNLESS OTHERWISE PROVIDED, THE CONTRACTOR MAY SUBSTITUTE THE ALTERNATE DESIGN SHOWN IN THESE PLANS, IN LIEU OF THE ORIGINAL DESIGN FOR R.O.W. FENCE.

NO DEDUCTIONS OR ADDITIONS WILL BE MADE FOR THE USE OF THE ALTERNATE DESIGN. THE DESIGN SHALL BE USED FOR THE ENTIRE LENGTH OF FENCE ERECTED UNDER AN INDIVIDUAL CONTRACT.

REV. NO.	DATE	DESCRIPTION OF REVISION
R5	JAN 18	NDOR BORDER TO NDOT BORDER
R4	OCT 01	ASTM NUMBER CHANGE
R3	JUL 99	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 710-R5

FENCE DETAILS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN E-6515
STATE OF NEBRASKA

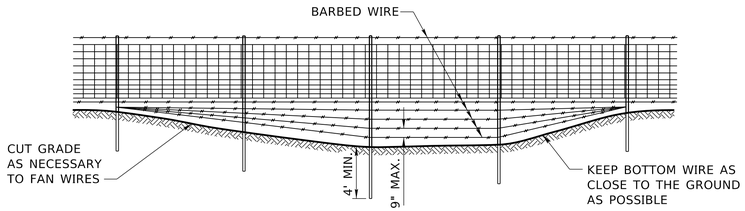
DATE

ORIGINAL: FEBUARY 12, 1974

DATE

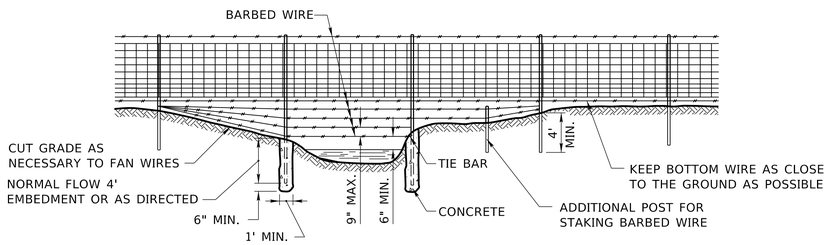
1 2

COMPUTER: BG0419M187
DATE: 27-AUG-2024 15:03
FILE: 7100 0 R5.dgn



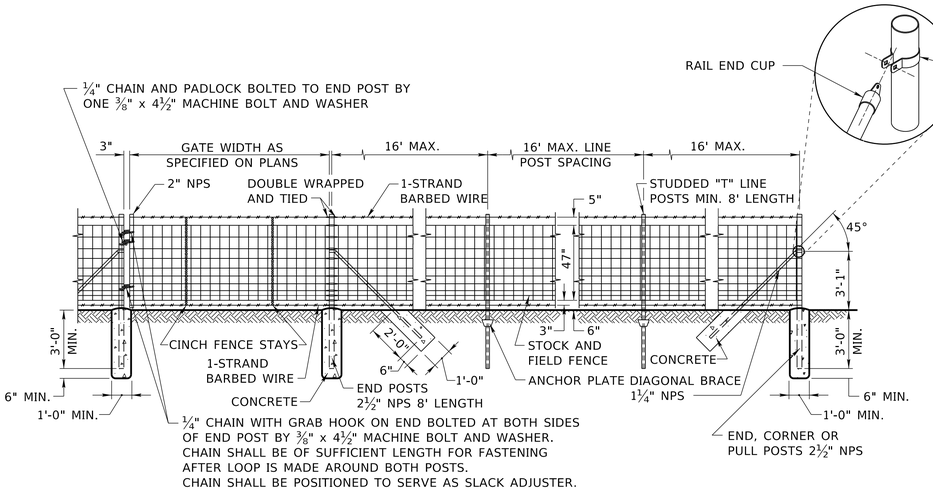
ADDITIONAL LENGTH POSTS AS DIRECTED BY THE ENGINEER

TYPE A CHANNEL CROSSING



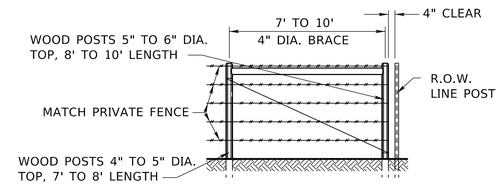
ADDITIONAL LENGTH POSTS AS DIRECTED BY THE ENGINEER

TYPE B CHANNEL CROSSING



CORNER AND PULL POSTS TO HAVE EQUAL BRACING ON BOTH SIDES

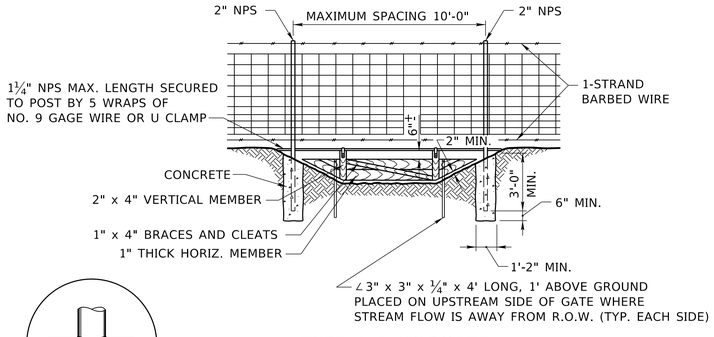
RIGHT-OF-WAY FENCE
(ORIGINAL DESIGN)



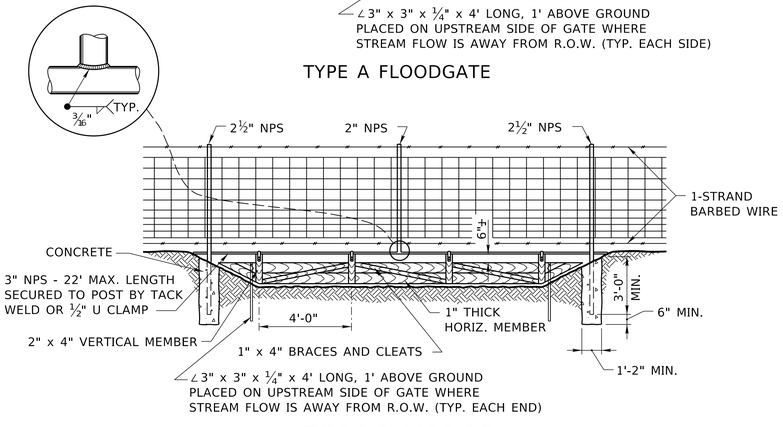
PRIVATE FENCE SHALL NOT BE CONNECTED TO R.O.W. FENCE

PRIVATE FENCE TERMINAL INSTALLATION FOR EXISTING FENCES WITH WOOD POSTS IS SHOWN. WHERE EXISTING FENCE CONSISTS OF STEEL POSTS USE THE END POST ASSEMBLY FOR R.O.W. FENCE, ORIGINAL DESIGN, AS PRIVATE FENCE TERMINAL.

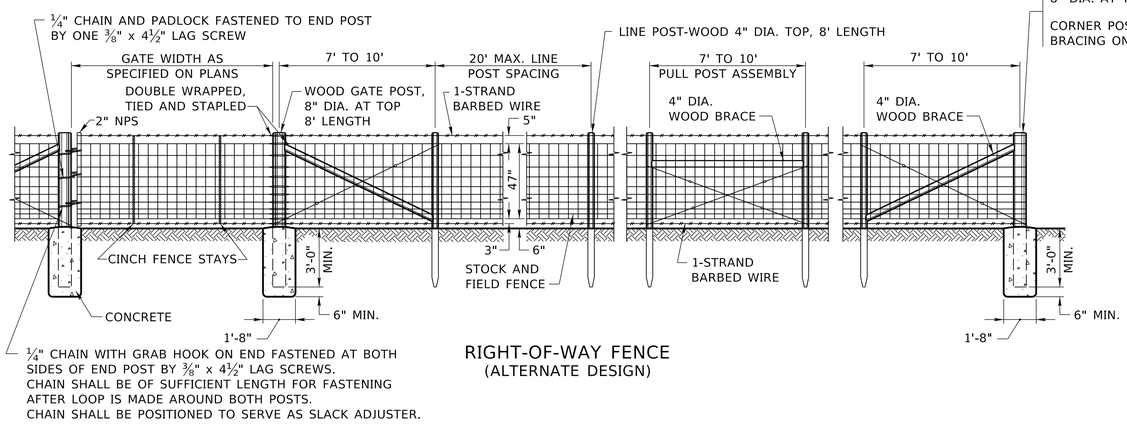
PRIVATE FENCE TERMINAL INSTALLATION



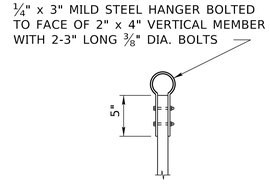
TYPE A FLOODGATE



TYPE B FLOODGATE



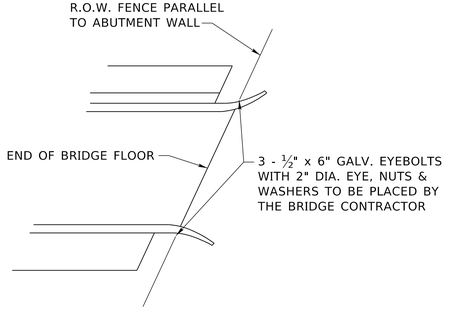
RIGHT-OF-WAY FENCE
(ALTERNATE DESIGN)



TYPE A - BEND HANGER FOR LOOSE FIT ON 1¼" NPS

TYPE B - BEND HANGER FOR LOOSE FIT ON 3" NPS

FLOODGATE HANGER DETAIL



DETAIL OF STRUCTURE TERMINAL

REV. NO.	DATE	DESCRIPTION OF REVISION
R5	JAN 18	NDOR BORDER TO NDOT BORDER
R4	OCT 01	ASTM NUMBER CHANGE
R3	JUL 99	MULTIPLE REVISIONS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 710-R5

FENCE DETAILS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN E-6515
STATE OF NEBRASKA

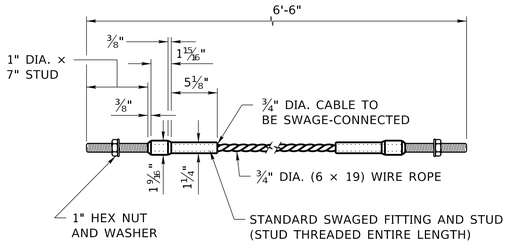
DATE

ORIGINAL:
FEBUARY 12, 1974
DATE

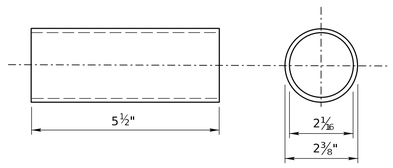
2
2

COMPUTER: BG0419M187
DATE: 27-AUG-2024 15:03
FILE: 7100 0 R5.dgn

COMPUTER: BG04194187
DATE: 27-AUG-2024 14:38
FILE: 7120 0 R2.dgn

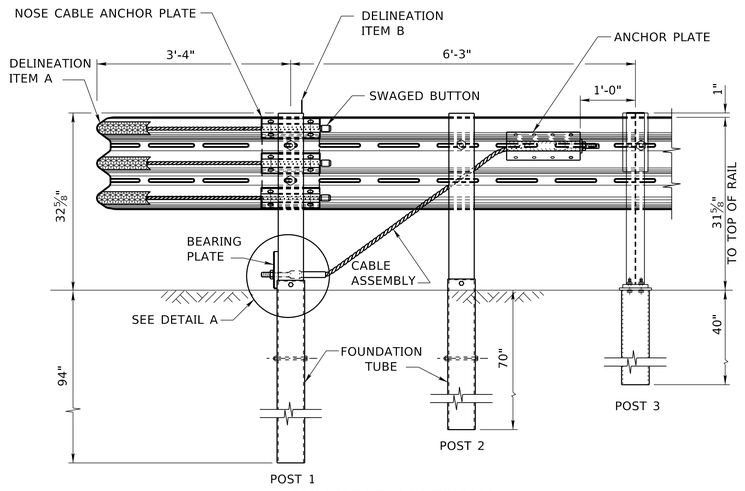


DETAILS OF CABLE ASSEMBLY
(FCA01-02)

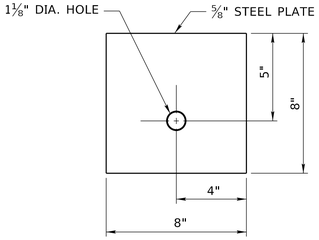


BREAKAWAY TERMINAL POST SLEEVE

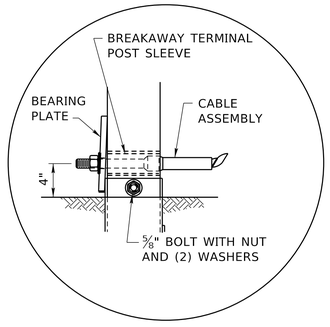
FOR DELINEATION ITEMS A & B
SEE NOTES & TABLE SHEET 2



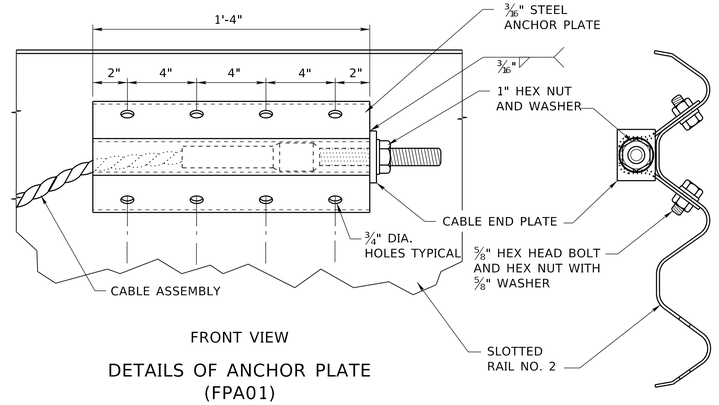
BULLNOSE ASSEMBLY



BEARING PLATE
(FPB01)

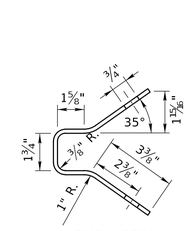


DETAIL A

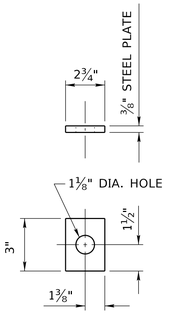


FRONT VIEW

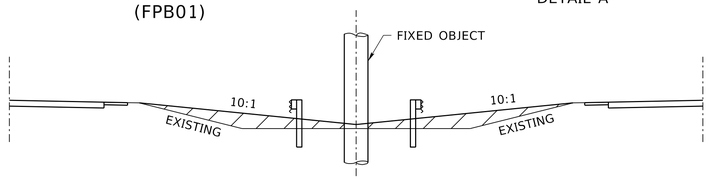
DETAILS OF ANCHOR PLATE
(FPA01)



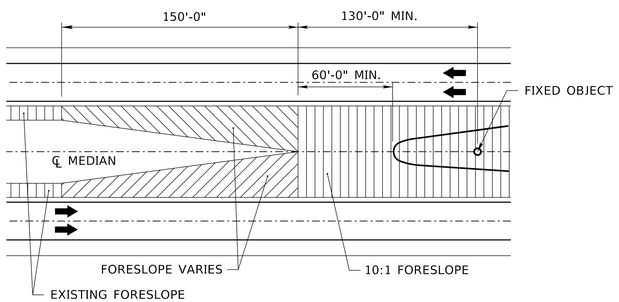
END VIEW



CABLE END PLATE

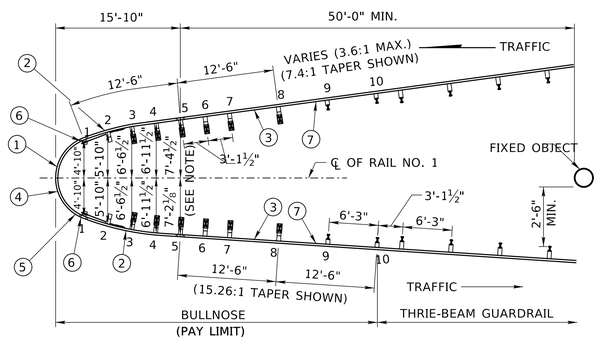


MEDIAN GRADING SECTION



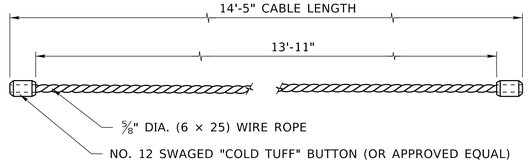
PLAN

GRADING AT BULLNOSE

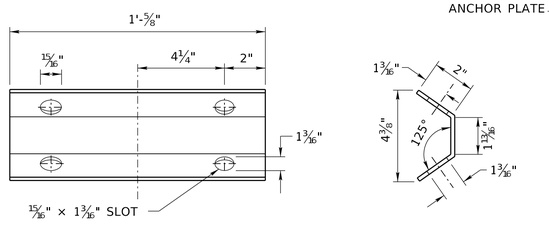


PLAN

DETAILS OF BULLNOSE



NOSE CABLE

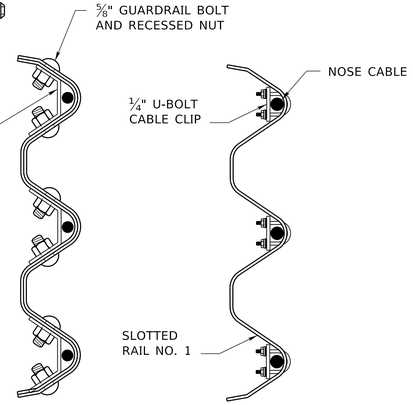


ELEVATION

END VIEW

NOTE: 1'-1/2" × 5 7/8" × 3/16" STEEL PLATE

NOSE CABLE ANCHOR PLATE
(A306)



END VIEW

U-BOLT CABLE CLIP DETAIL

NOTES:

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

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

1. SLOTTED RAIL NO. 1 12'-6", SHOP BEND TO R=5'-2"
2. SLOTTED RAIL NO. 2 12'-6", SHOP BEND TO R=34'-2"
3. SLOTTED RAIL NO. 3 12'-6", TANGENT
4. 1/4" U-BOLT CABLE CLIPS (3 PER CABLE) SPACED OUT ON NOSE, TO HOLD CABLE TO BACKSIDE OF THE RAIL.
5. NOSE CABLE WITH SWAGED END BUTTONS
6. NOSE CABLE ANCHOR PLATE (BACKSIDE OF SPLICE)
7. THRIE-BEAM GUARDRAIL, 12'-6".

NOTES:

MEASUREMENTS ARE FROM BACK OF RAIL TO BACK OF RAIL.

FOR GUARDRAIL LAPPING DETAIL, SEE SHEET 2 OF 3.

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	ADDED CABLE ON BOTTOM RAIL
R1	JAN 18	CHANGE BOLT ORIENTATION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 712-R2

BULLNOSE (TAPERED)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

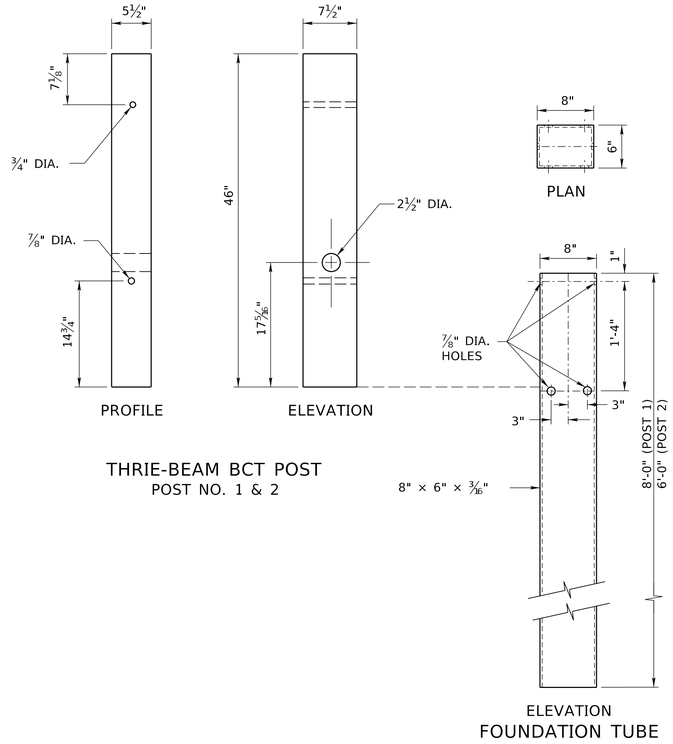
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

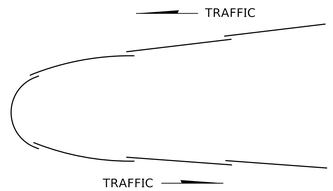
ORIGINAL: OCTOBER 2011

DATE

1
3



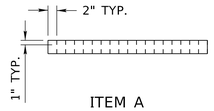
THRIE-BEAM BCT POST
POST NO. 1 & 2



GUARDRAIL LAPPING DETAIL

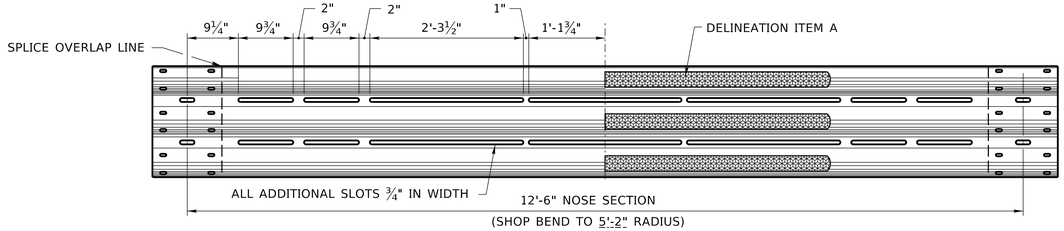
NOTES: SHEETING AND DELINEATORS SUBSIDIARY TO BULLNOSE.
1. ALIGN LEFT EDGE OF THE SHEETING WITH CENTERLINE OF BULLNOSE.
2. PREP SHEETING FOR CURVATURE TO PREVENT WRINKLES BY CUTTING SLITS AS SHOWN BELOW.

ITEM	MATERIAL
A 3-EACH	ASTM D4956, TYPE V FLUORESCENT YELLOW RETRO-REFLECTIVE SHEETING 3" x 36"
B	DELINEATOR - POST 1 & 25'-0" SPACING

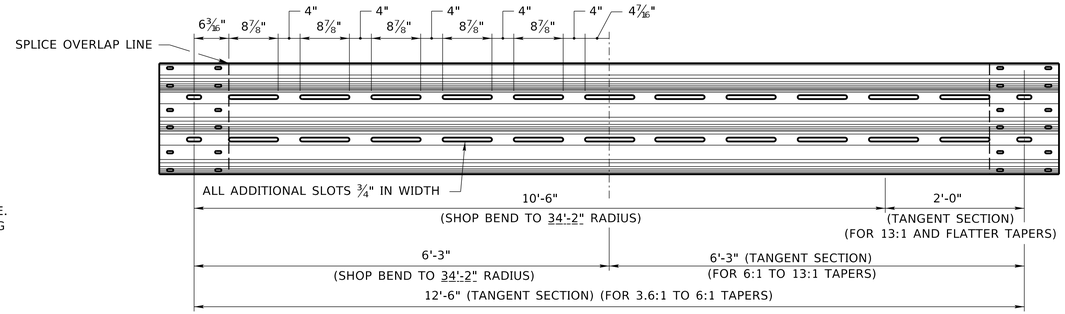


ITEM A

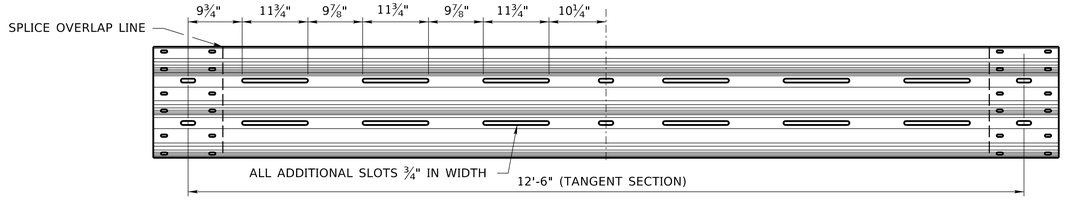
DELINEATION



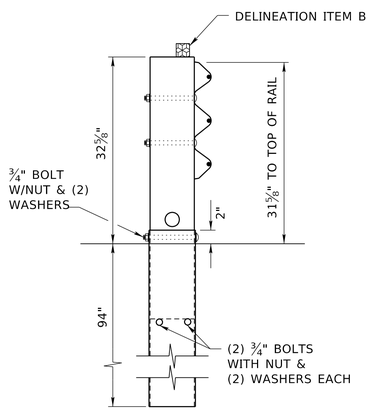
SLOTTED RAIL NO. 1



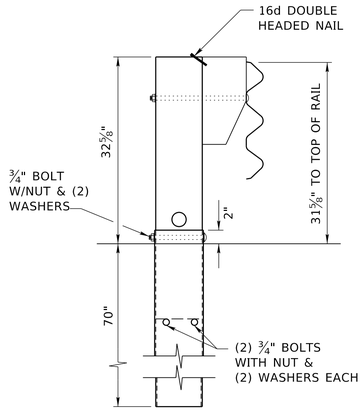
SLOTTED RAIL NO. 2



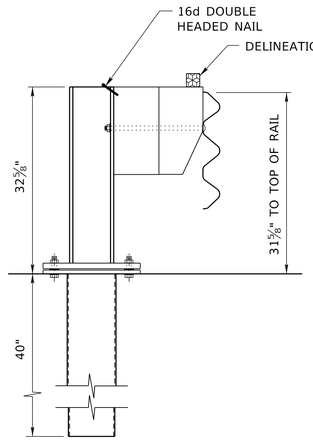
SLOTTED RAIL NO. 3



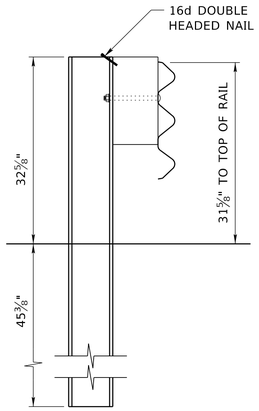
THRIE-BEAM BCT POST
(WITH 96" FOUNDATION TUBE)
POST NO. 1



THRIE-BEAM BCT POST
(WITH 72" FOUNDATION TUBE
AND 14" TAPERED BLOCK)
POST NO. 2

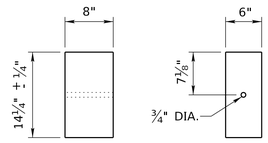


BREAKAWAY STEEL POST
(WITH 14" BLOCK AND
14" TAPERED BLOCK)
POST NO. 3 - 8

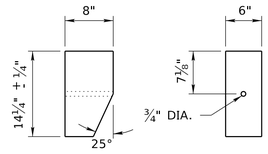


THRIE-BEAM W6 x 9 POST
OR W6 × 8.5 POST

(78" LONG WITH 14" BLOCK)
POST NO. 9 & 10



STANDARD BLOCK



TAPERED BLOCK

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	ADDED CABLE ON BOTTOM RAIL
R1	JAN 18	CHANGE BOLT ORIENTATION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 712-R2

BULLNOSE (TAPERED)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER * MICHAEL H. OWEN E-6515 * STATE OF NEBRASKA

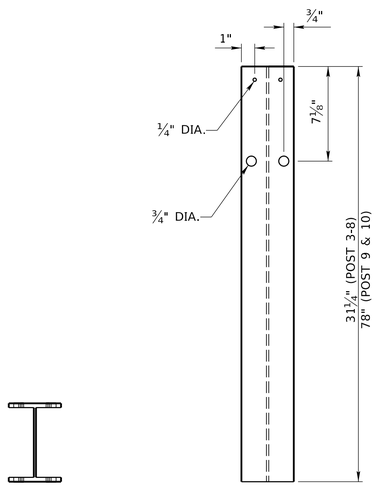
DATE

ORIGINAL: OCTOBER 2011

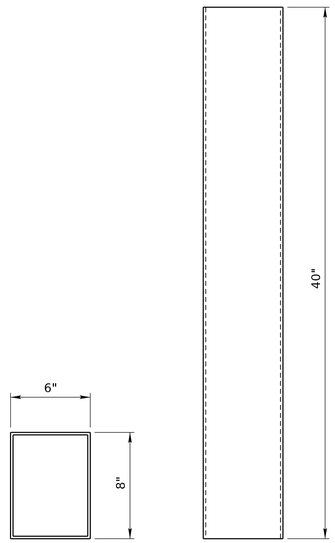
DATE

2
3

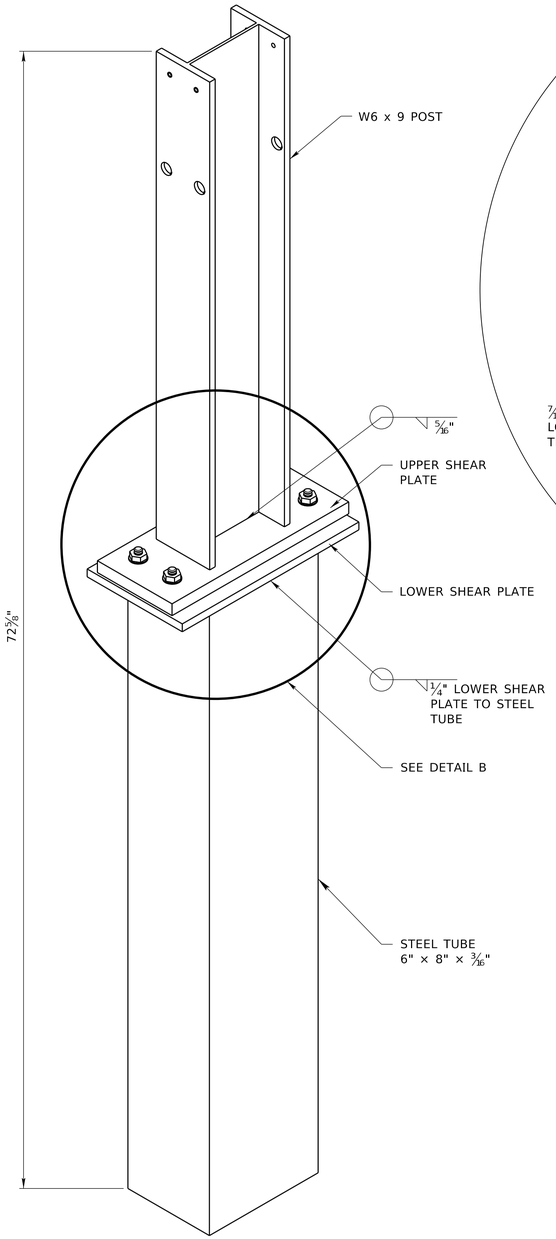
COMPUTER: BG04190187
DATE: 27-AUG-2024 14:38
FILE: 7120 0 R2.dgn



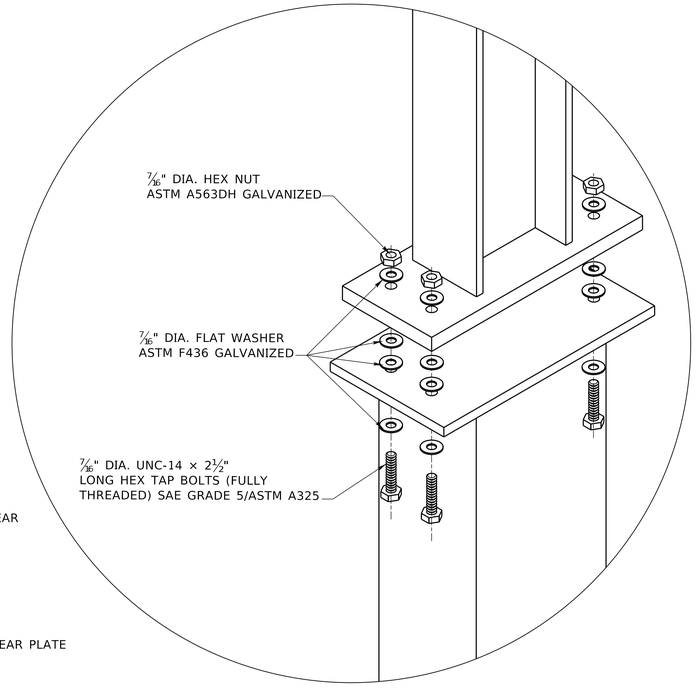
W6 × 9 POST OR
W6 × 8.5 POST



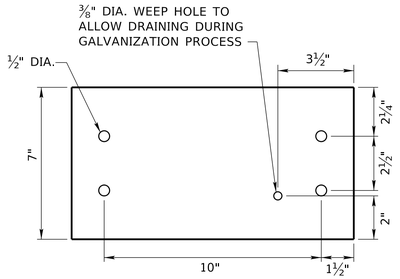
POST NO. 3 - 8

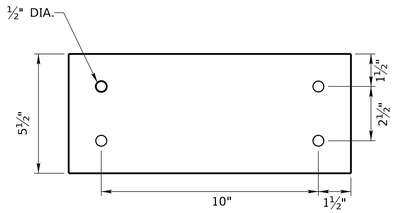


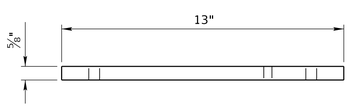
BREAKAWAY STEEL POST



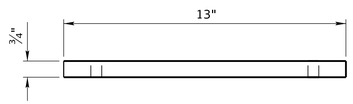
DETAIL B







7" × 13" × ⅝"



5½" × 13" × ¾"

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	ADDED CABLE ON BOTTOM RAIL
R1	JAN 18	CHANGE BOLT ORIENTATION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 712-R2

BULLNOSE (TAPERED)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

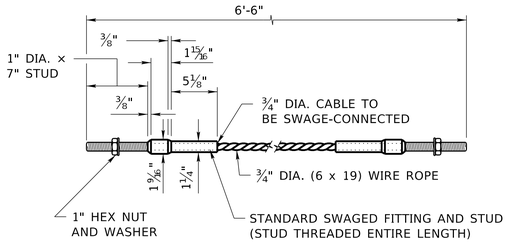
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

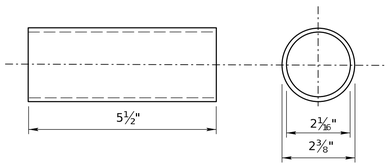
ORIGINAL:
OCTOBER 2011
DATE

3
3

COMPUTER: BG04190187
DATE: 27-AUG-2024 14:38
FILE: 7120 0 R2.dgn

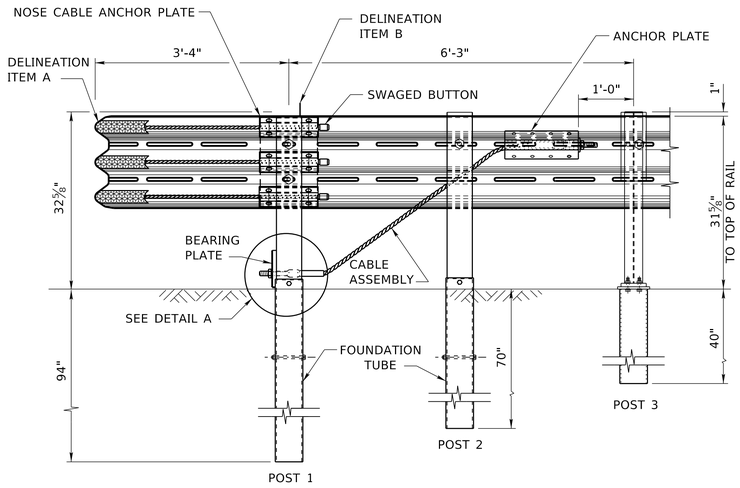


DETAILS OF CABLE ASSEMBLY
(FCA01-02)

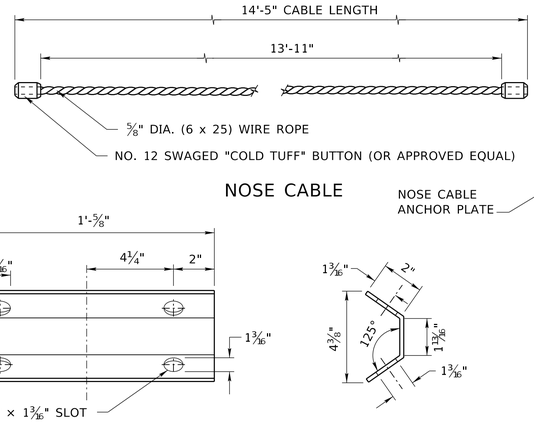


BREAKAWAY TERMINAL POST SLEEVE

FOR DELINEATION ITEMS A & B
SEE NOTES & TABLE SHEET 2



BULLNOSE ASSEMBLY



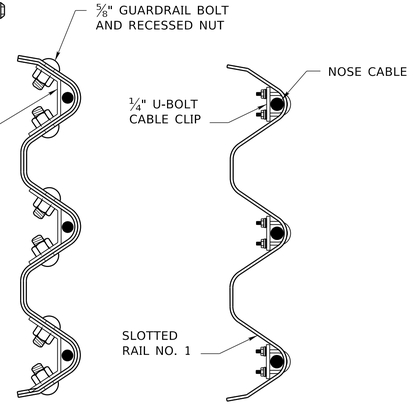
NOSE CABLE

ELEVATION

END VIEW

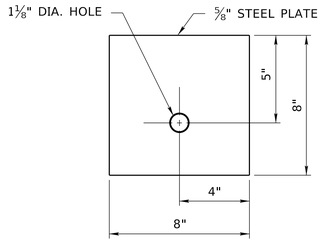
NOTE: 1'-½" × 5⅞" × ⅜" STEEL PLATE

NOSE CABLE ANCHOR PLATE
(A306)

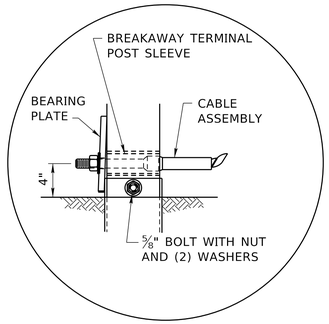


END VIEW

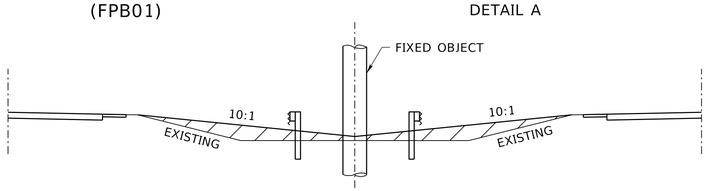
U-BOLT CABLE CLIP DETAIL



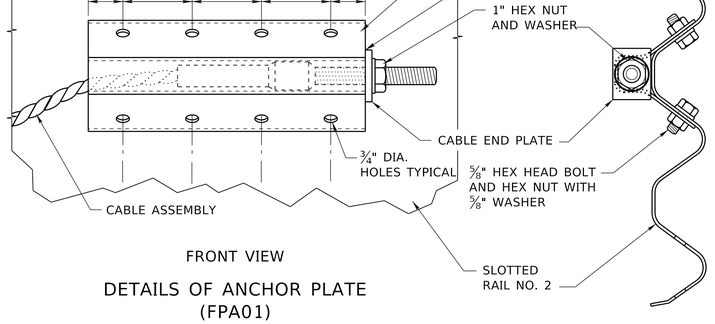
BEARING PLATE
(FPB01)



DETAIL A

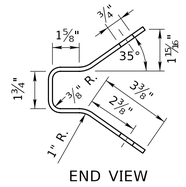


MEDIAN GRADING SECTION

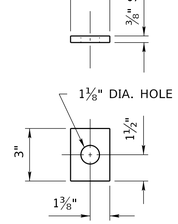


FRONT VIEW

DETAILS OF ANCHOR PLATE
(FPA01)



END VIEW

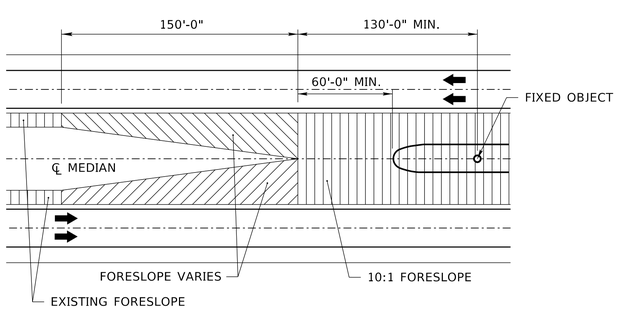


CABLE END PLATE

NOTES:

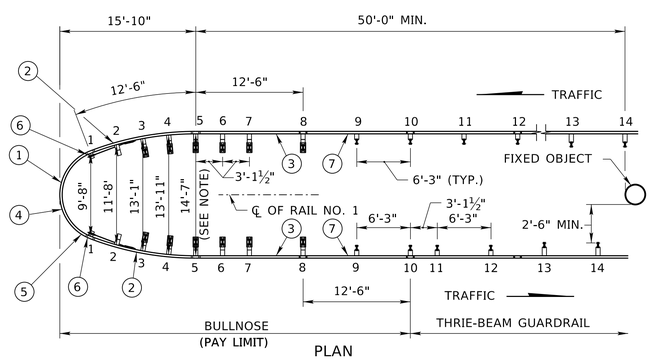
BUTTON HEAD BOLT ⅝" DIA. × LENGTH AS REQUIRED, SECURED WITH WASHER AND HEX NUT.

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



PLAN

GRADING AT BULLNOSE



PLAN

DETAILS OF BULLNOSE

1. SLOTTED RAIL NO. 1 12'-6", SHOP BEND TO R=5'-2"
2. SLOTTED RAIL NO. 2 12'-6", SHOP BEND TO R=34'-2"
3. SLOTTED RAIL NO. 3 12'-6", TANGENT
4. ¼" U-BOLT CABLE CLIPS (3 PER CABLE) SPACED OUT ON NOSE, TO HOLD CABLE TO BACKSIDE OF THE RAIL.
5. NOSE CABLE W/SWAGED END BUTTONS
6. NOSE CABLE ANCHOR PLATE (BACKSIDE OF SPLICE)
7. THRIE-BEAM GUARDRAIL, 12'-6".

NOTES:

MEASUREMENTS ARE FROM BACK OF RAIL TO BACK OF RAIL.

FOR GUARDRAIL LAPPING DETAIL, SEE SHEET 2 OF 3.

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	ADDED CABLE ON BOTTOM RAIL
R1	JAN 18	CHANGE BOLT ORIENTATION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 713-R2

BULLNOSE (PARALLEL)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

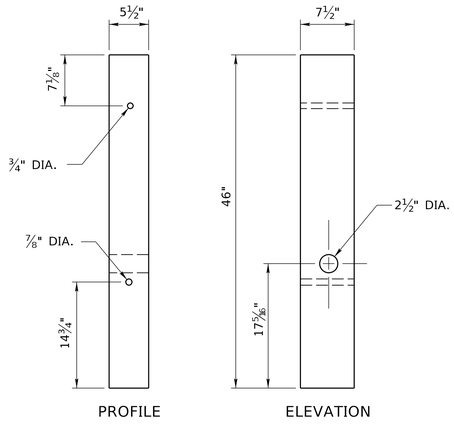
DATE

ORIGINAL: OCTOBER 2011
DATE

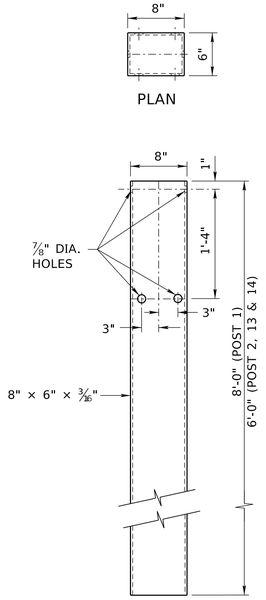
1
3

COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:38
FILE: 7130 0 R2.dgn

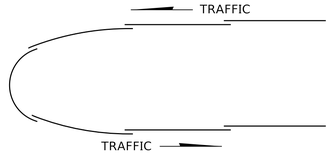
Plan 743 is also Required When Using This Plan.



THRIE-BEAM BCT POST
POST NO. 1, 2, 13 & 14



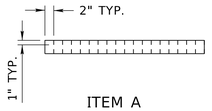
FOUNDATION TUBE



GUARDRAIL LAPPING DETAIL

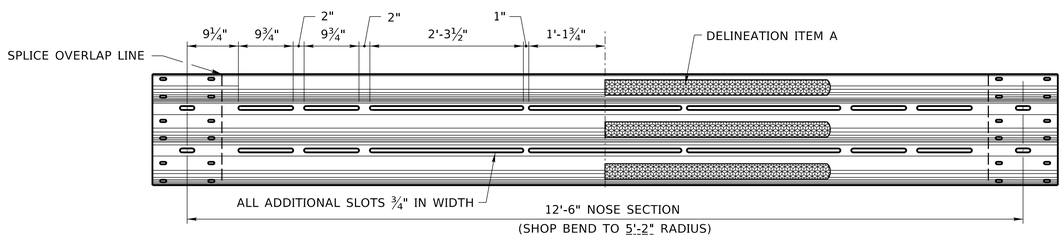
NOTES: SHEETING AND DELINEATORS SUBSIDIARY TO BULLNOSE.
1. ALIGN LEFT EDGE OF THE SHEETING WITH CENTERLINE OF BULLNOSE.
2. PREP SHEETING FOR CURVATURE TO PREVENT WRINKLES BY CUTTING SLITS AS SHOWN BELOW.

ITEM	MATERIAL
A 3-EACH	ASTM D4956, TYPE V FLUORESCENT YELLOW RETRO-REFLECTIVE SHEETING 3" x 36"
B	DELINEATOR - POST 1 & 25'-0" SPACING

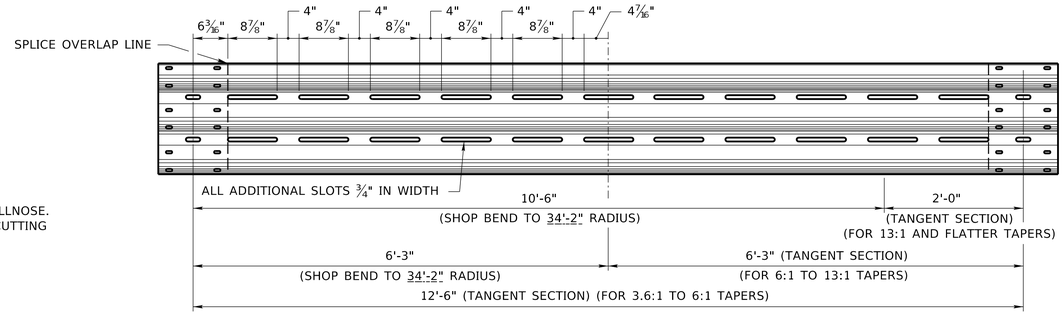


ITEM A

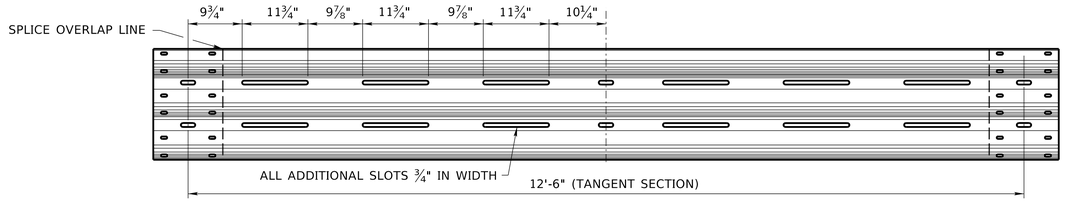
DELINEATION



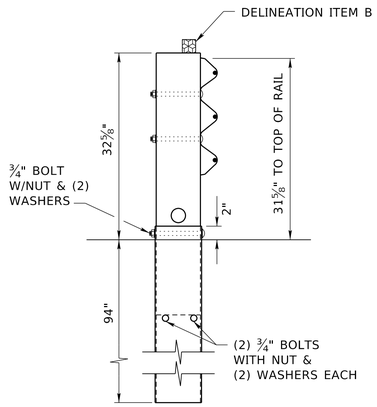
SLOTTED RAIL NO. 1



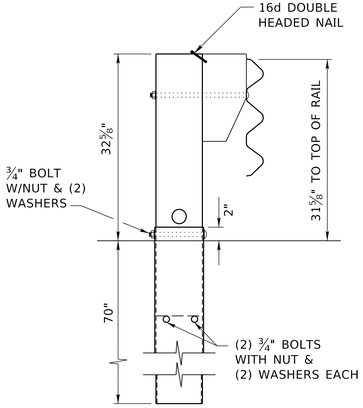
SLOTTED RAIL NO. 2



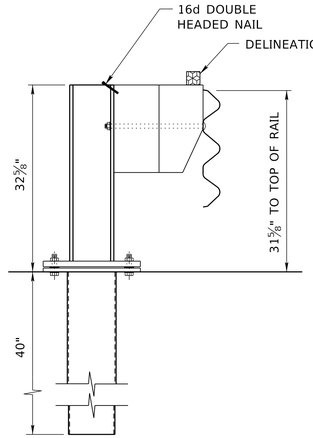
SLOTTED RAIL NO. 3



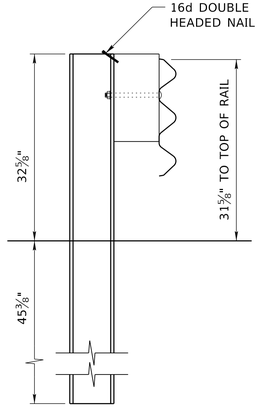
THRIE-BEAM BCT POST
(WITH 96" FOUNDATION TUBE)
POST NO. 1



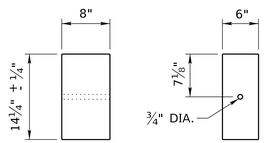
THRIE-BEAM BCT POST
(WITH 72" FOUNDATION TUBE
AND 14" TAPERED BLOCK)
POST NO. 2



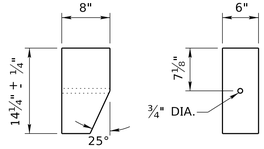
BREAKAWAY STEEL POST
(WITH 14" BLOCK AND
14" TAPERED BLOCK)
POST NO. 3 - 8



THRIE-BEAM W6x9 POST
OR W6 x 8.5 POST
(78" LONG WITH 14" BLOCK)
POST NO. 9 & 12



STANDARD BLOCK



TAPERED BLOCK

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	ADDED CABLE ON BOTTOM RAIL
R1	JAN 18	CHANGE BOLT ORIENTATION

NEBRASKA DEPARTMENT OF TRANSPORTATION
STANDARD PLAN NO. 713-R2
BULLNOSE (PARALLEL)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

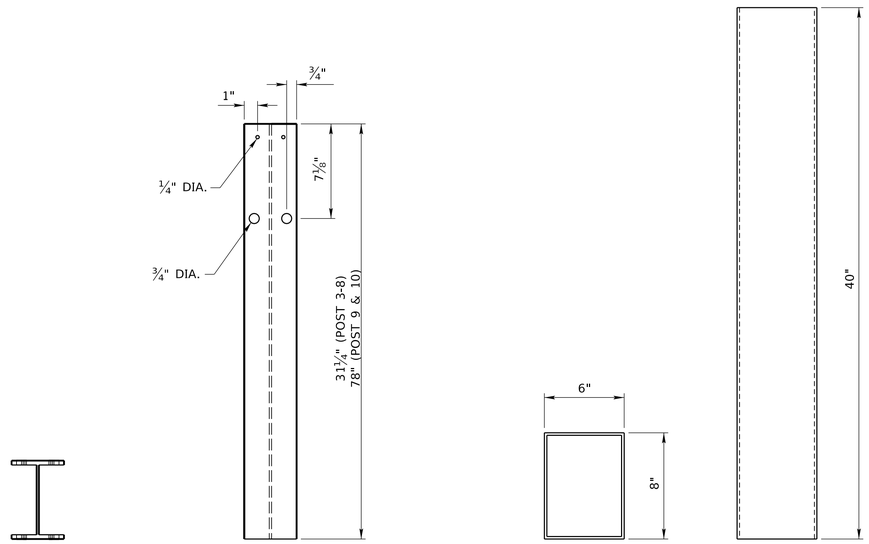
PROFESSIONAL CIVIL ENGINEER * MICHAEL H. OWEN E-6515 * STATE OF NEBRASKA

DATE

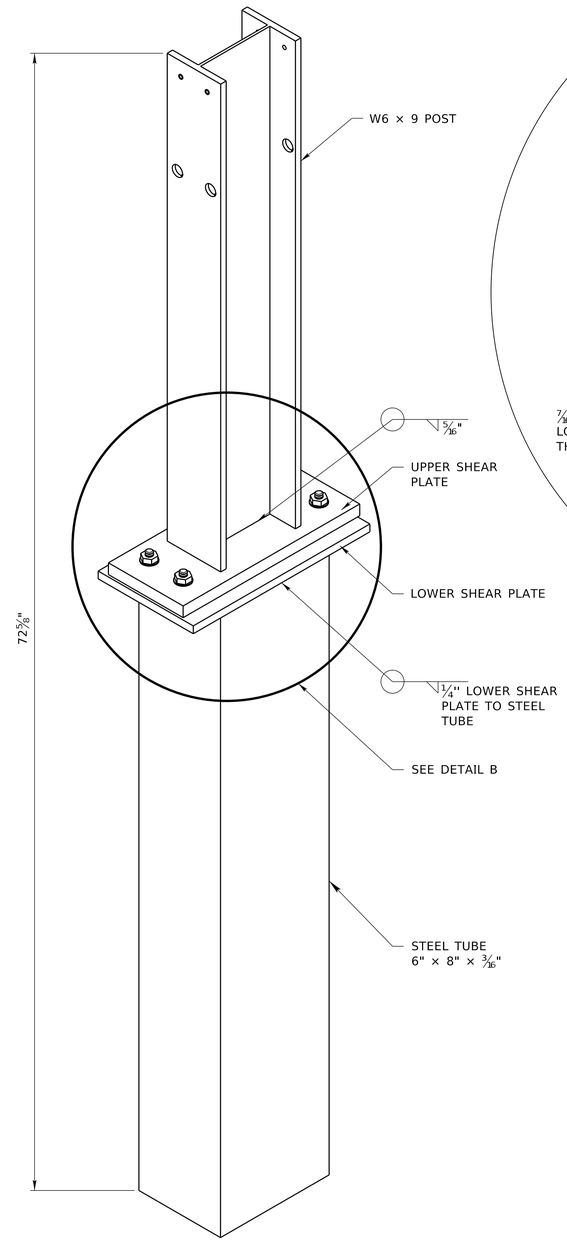
ORIGINAL: OCTOBER 2011
DATE

2/3

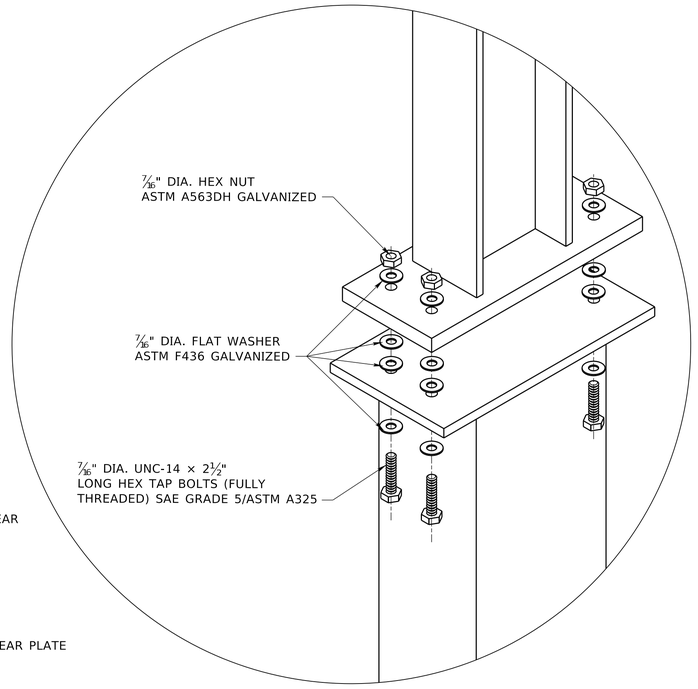
COMPUTER: BG04190187
DATE: 27-AUG-2024 14:38
FILE: 7130 0 R2.dgn



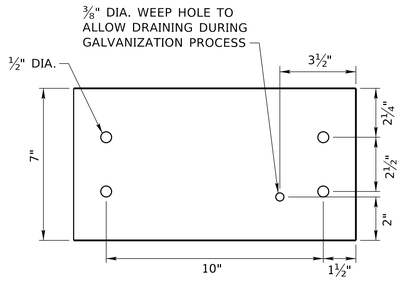
W6 × 9 POST OR W6 × 8.5 POST



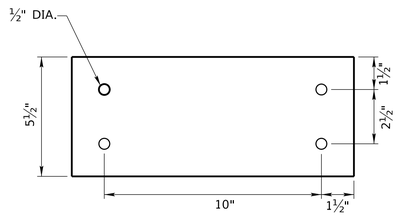
BREAKAWAY STEEL POST



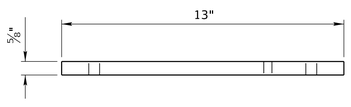
DETAIL B



PLAN

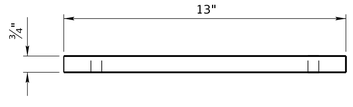


PLAN



ELEVATION

7" × 13" × ⅝"



ELEVATION

5½" × 13" × ¾"

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	ADDED CABLE ON BOTTOM RAIL
R1	JAN 18	CHANGE BOLT ORIENTATION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 713-R2

BULLNOSE (PARALLEL)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

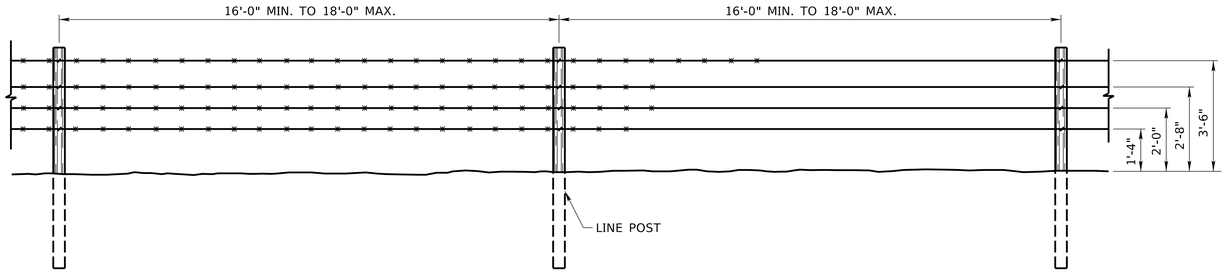
DATE

ORIGINAL: OCTOBER 2011

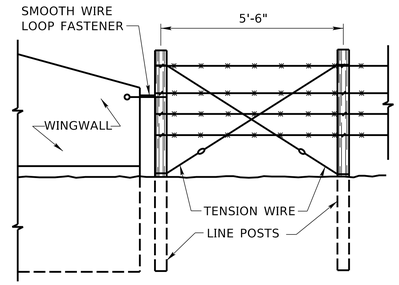
DATE

3
3

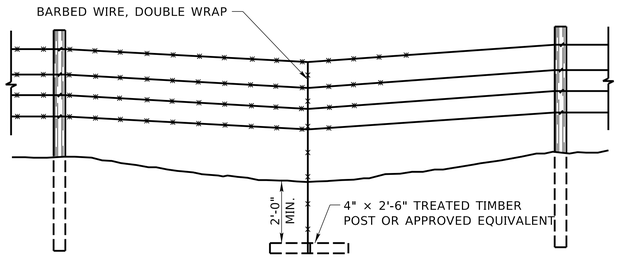
COMPUTER: BG04190187
DATE: 27-AUG-2024 14:38
FILE: 7130 0 R2.dgn



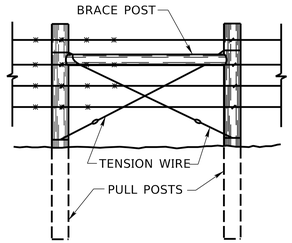
SMOOTH OR BARBED WIRE FENCE DETAIL



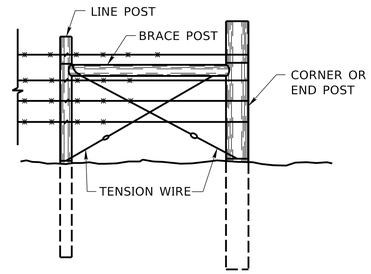
DRAINAGE STRUCTURE TERMINAL DETAIL



TYPICAL DEADMAN ANCHOR

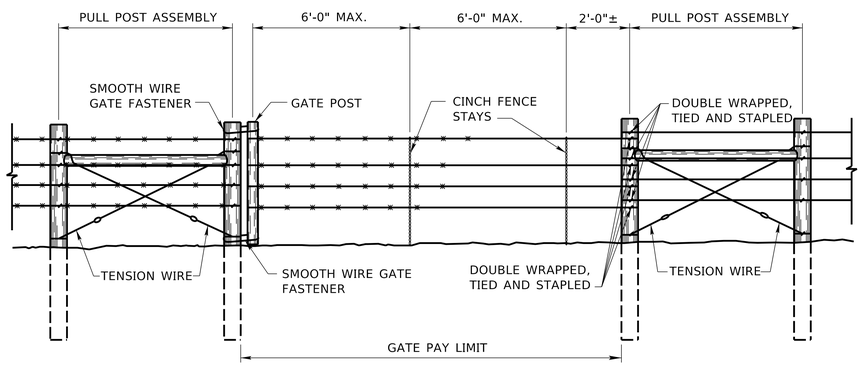


PULL POST ASSEMBLY

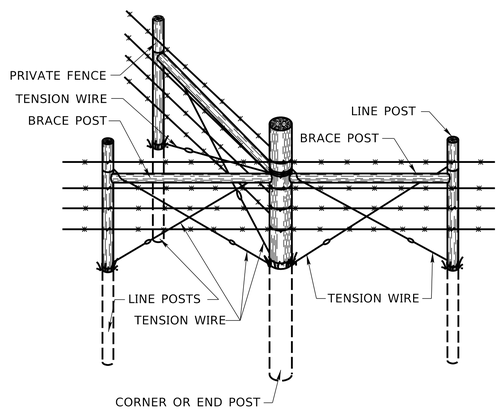


(CORNER POSTS TO HAVE EQUAL SPACING ON BOTH SIDES)

CORNER OR END POST ASSEMBLY



GATE DETAIL



PRIVATE FENCE TERMINAL DETAIL

NOTES

PULL POST	-	6" x 7'-0" TREATED ROUND WOOD
END OR CORNER POST	-	8" x 8'-0" TREATED ROUND WOOD
BRACE POST	-	4" x 5'-6" TREATED ROUND WOOD
LINE POST	-	4" x 7'-0" TREATED ROUND WOOD OR 6'-6" STUDDED TEE STEEL
GATE POST	-	2" MIN. - 4" MAX. NON TREATED ROUND WOOD

MINIMUM DEPTH TO SET POST INTO THE GROUND

STEEL LINE POSTS	-	2'-6"
PULL POST	-	3'-0"
WOOD LINE POST	-	3'-0"
CORNER OR END POSTS	-	3'-6"

PULL POSTS SHALL BE USED AT SHARP BREAKS IN VERTICAL GRADES OR AT APPROXIMATELY 330'-0" CENTERS ON STRAIGHT RUNS OR AS DIRECTED BY THE ENGINEER.

DEADMAN ANCHORS SHALL BE USED AT SHARP SAG BREAKS IN VERTICAL GRADES TO MAINTAIN A MAXIMUM SPACE OF 1'-8" BETWEEN THE BOTTOM WIRE OF THE FENCE AND GROUND LINE OR AS DIRECTED BY THE ENGINEER.

THE SMOOTH WIRE GATE FASTENER SHALL BE OF SUFFICIENT LENGTH TO PROVIDE EASE IN OPENING AND CLOSING OF THE GATE SECTIONS.

LINE POSTS SHALL BE CONSTRUCTED WITH A MINIMUM OF ONE WOOD TO FOUR STEEL.

STUDDED TEE LINE POSTS SHALL BE EITHER GALVANIZED OR PAINTED.

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 714-R1

4-STRAND WIRE FENCE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

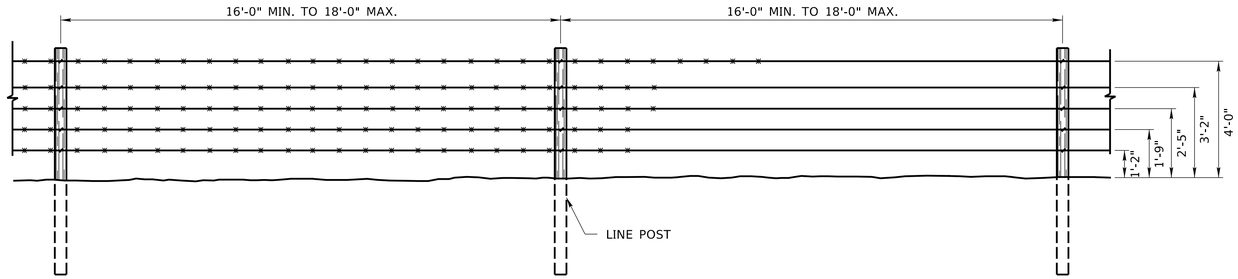
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

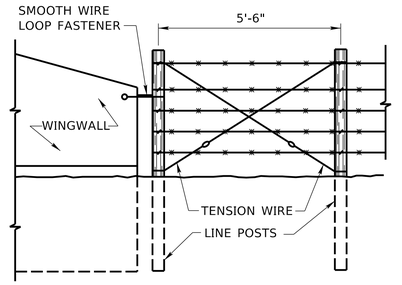
ORIGINAL:
APRIL 1, 2013
DATE

1
1

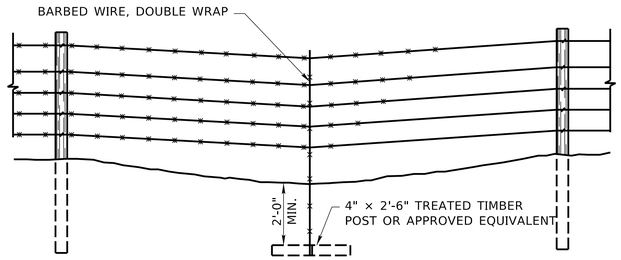
COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:38
FILE: 7140 0 R1.dgn



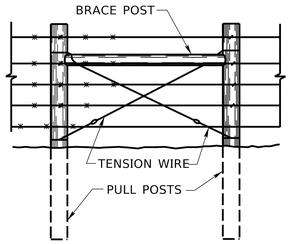
SMOOTH OR BARBED WIRE FENCE DETAIL



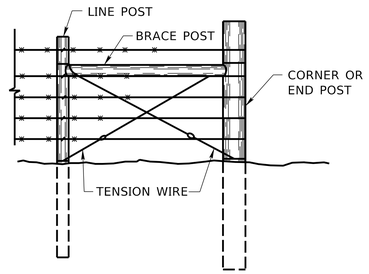
DRAINAGE STRUCTURE TERMINAL DETAIL



TYPICAL DEADMAN ANCHOR



PULL POST ASSEMBLY



(CORNER POSTS TO HAVE EQUAL SPACING ON BOTH SIDES)

CORNER OR END POST ASSEMBLY

NOTES

PULL POST	-	6" × 8'-0" TREATED ROUND WOOD
END OR CORNER POST	-	8" × 8'-0" TREATED ROUND WOOD
BRACE POST	-	4" × 5'-6" TREATED ROUND WOOD
LINE POST	-	4" × 8'-0" TREATED ROUND WOOD OR 7'-6" STUDDED TEE STEEL
GATE POST	-	2" MIN. - 4" MAX. NON TREATED ROUND WOOD

MINIMUM DEPTH TO SET POST INTO THE GROUND

STEEL LINE POSTS	-	3'-0"
PULL POST	-	3'-6"
WOOD LINE POST	-	3'-6"
CORNER OR END POSTS	-	3'-6"

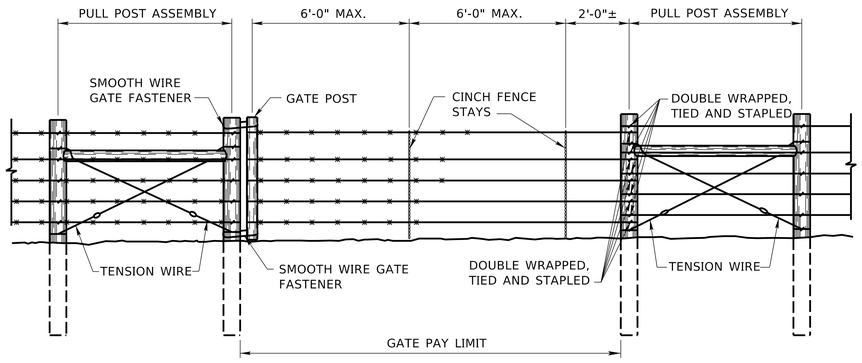
PULL POSTS SHALL BE USED AT SHARP BREAKS IN VERTICAL GRADES OR AT APPROXIMATELY 330'-0" CENTERS ON STRAIGHT RUNS OR AS DIRECTED BY THE ENGINEER.

DEADMAN ANCHORS SHALL BE USED AT SHARP SAG BREAKS IN VERTICAL GRADES TO MAINTAIN A MAXIMUM SPACE OF 1'-8" BETWEEN THE BOTTOM WIRE OF THE FENCE AND GROUND LINE OR AS DIRECTED BY THE ENGINEER.

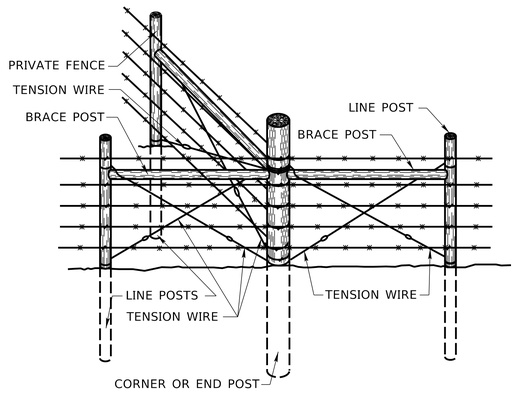
THE SMOOTH WIRE GATE FASTENER SHALL BE OF SUFFICIENT LENGTH TO PROVIDE EASE IN OPENING AND CLOSING OF THE GATE SECTIONS.

LINE POSTS SHALL BE CONSTRUCTED WITH A MINIMUM OF ONE WOOD TO FOUR STEEL.

STUDDED TEE LINE POSTS SHALL BE EITHER GALVANIZED OR PAINTED.



GATE DETAIL



PRIVATE FENCE TERMINAL DETAIL

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 715-R1

5-STRAND WIRE FENCE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL: APRIL 1, 2013

DATE

1
1

COMPUTER: BG04I9M187
DATE: 27-AUG-2024 14:38
FILE: 7150 0 R1.dgn

CONNECTION NOTES:

FOR DIVIDED ROADWAY

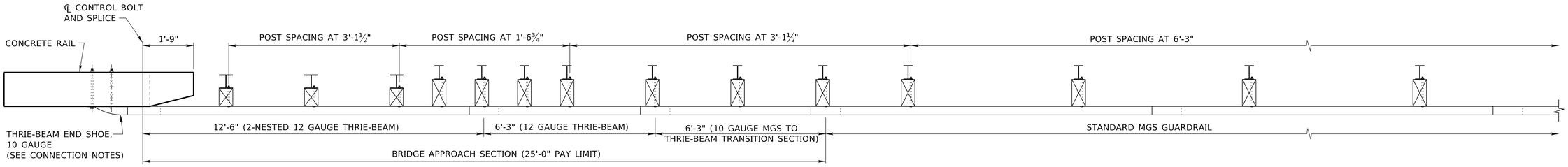
INSTALL THRIE-BEAM END SHOE,
BETWEEN NESTED GUARDRAIL ELEMENTS.
(SUBSIDIARY TO BRIDGE APPROACH SECTION)

TRAFFIC FLOW

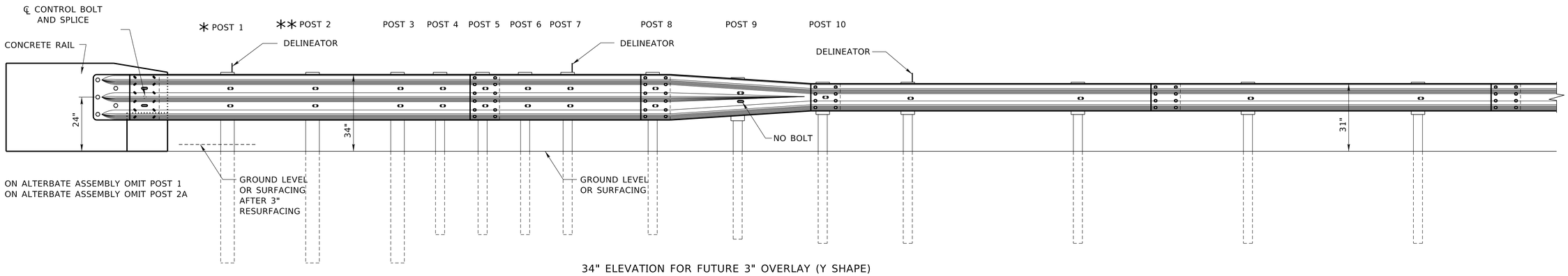
FOR 2-LANE ROADWAY

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

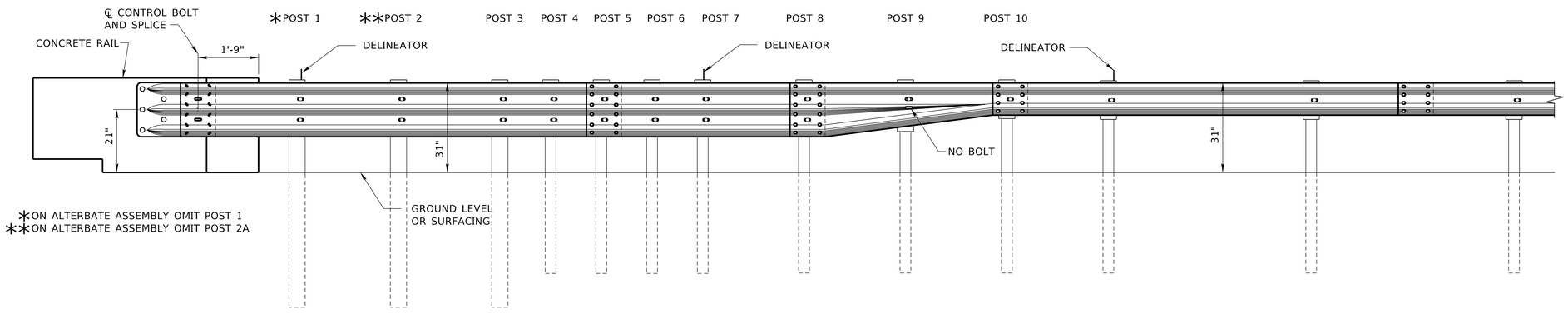
FOR DEPARTING TRAFFIC
INSTALL THRIE-BEAM END SHOE,
OUTSIDE OF THE NESTED GUARDRAIL ELEMENTS.
(SUBSIDIARY TO BRIDGE APPROACH SECTION)



PLAN VIEW



34" ELEVATION FOR FUTURE 3" OVERLAY (Y SHAPE)



31" ELEVATION STANDARD INSTALLATION (ASYMMETRICAL SHAPE)

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NEW 34 INCH B.A.S.

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 740-R1

MIDWEST GUARDRAIL SYSTEM BRIDGE APPROACH SECTION

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

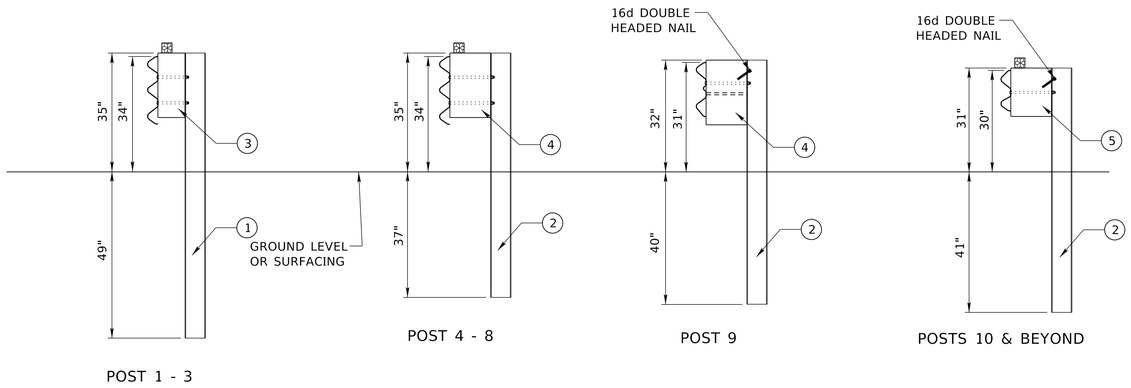
ORIGINAL: AUGUST 2011

DATE

1
3

COMPUTER: BG041904187
DATE: 27-AUG-2024 14:39
FILE: 7400 0 R1.dgn

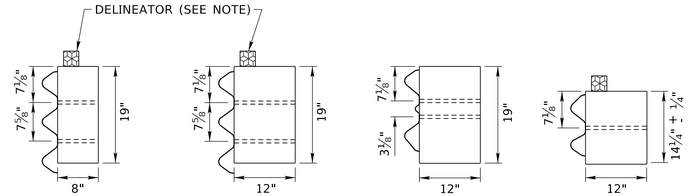
COMPUTER: BG041904187
DATE: 27-AUG-2024 14:39
FILE: 7400 0 R1.dgn



POST 1 - 3 POST 4 - 8 POST 9 POSTS 10 & BEYOND

LEGEND

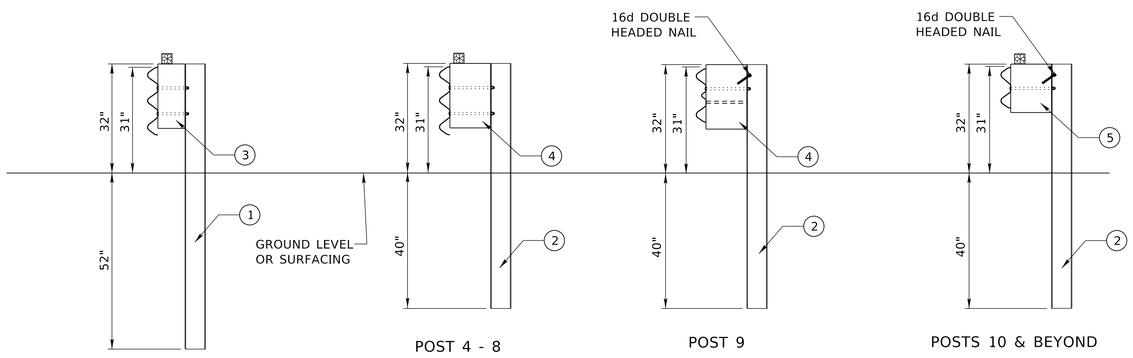
1. W6 × 15 × 7' POST
2. W6 × 9 × 6' POST OR W6 × 8.5 × 6' POST
3. 6" × 8" × 19" OFFSET BLOCK
4. 6" × 12" × 19" OFFSET BLOCK
5. 6" × 12" × 14¼" ± ¼" OFFSET BLOCK



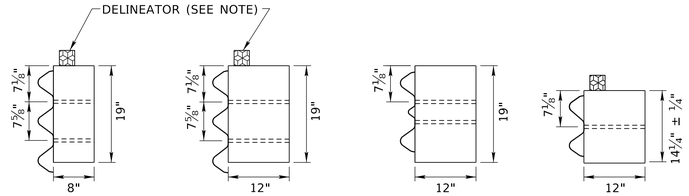
POSTS 1 - 3 POSTS 4 - 8 POST 9 POSTS 10 & BEYOND

BLOCK DETAILS

POSTS FOR FUTURE 3" OVERLAY PLACEMENT PRIOR TO 3" OVERLAY USING Y SHAPE W-BEAM



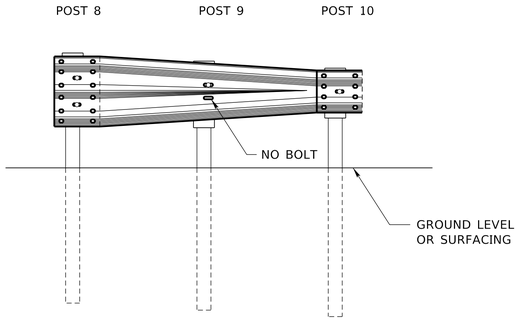
POST 1 - 3 POST 4 - 8 POST 9 POSTS 10 & BEYOND



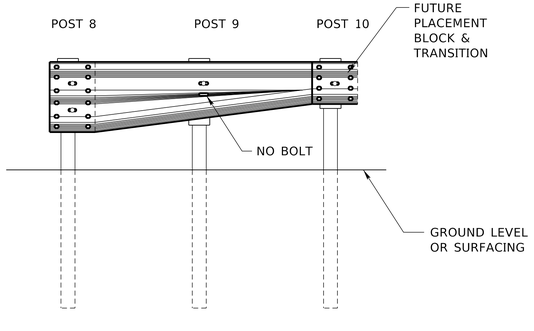
POSTS 1 - 3 POSTS 4 - 8 POST 9 POSTS 10 & BEYOND

BLOCK DETAILS

POSTS FOR ASYMMETRICAL SHAPE



INSTALLATION PRIOR TO 3" OVERLAY USING Y SHAPE TRANSITION



STANDARD 31" INSTALLATION USING ASYMMETRICAL SHAPE TRANSITION

NOTES:

DELINEATORS SUBSIDIARY TO BRIDGE APPROACH SECTION.

BUTTON HEAD BOLT ⅝" DIA. × LENGTH AS REQUIRED, SECURED WITH HEX NUT.

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

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NEW 34 INCH B.A.S.

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 740-R1

MIDWEST GUARDRAIL SYSTEM BRIDGE APPROACH SECTION

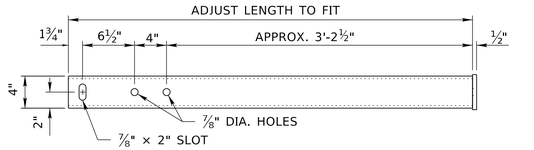
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

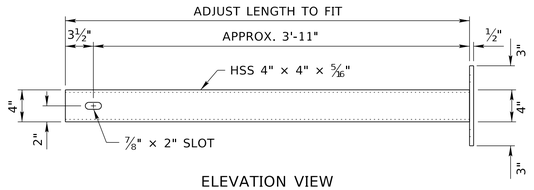
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

ORIGINAL: AUGUST 2011
DATE

2
3

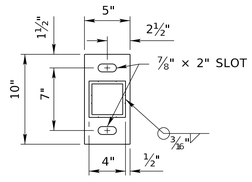


PLAN VIEW



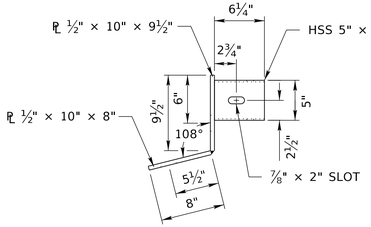
ELEVATION VIEW

RAIL DETAIL

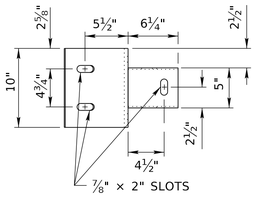


SIDE VIEW

℄ ½" × 10" × 5"

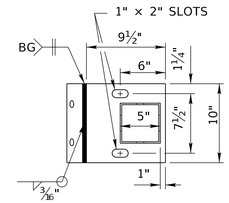


TOP VIEW

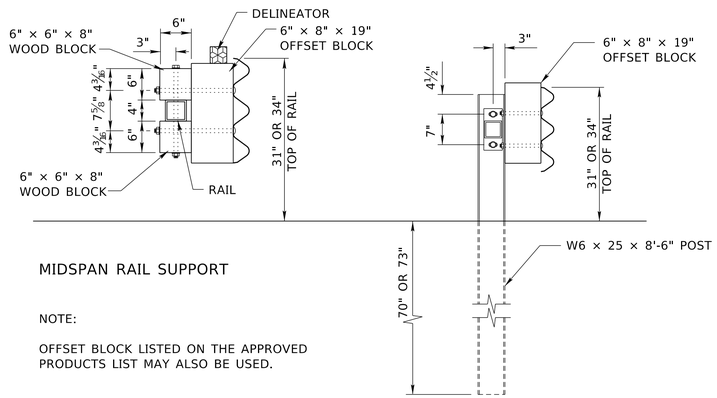


ELEVATION VIEW

END BRACKET DETAIL



SIDE VIEW



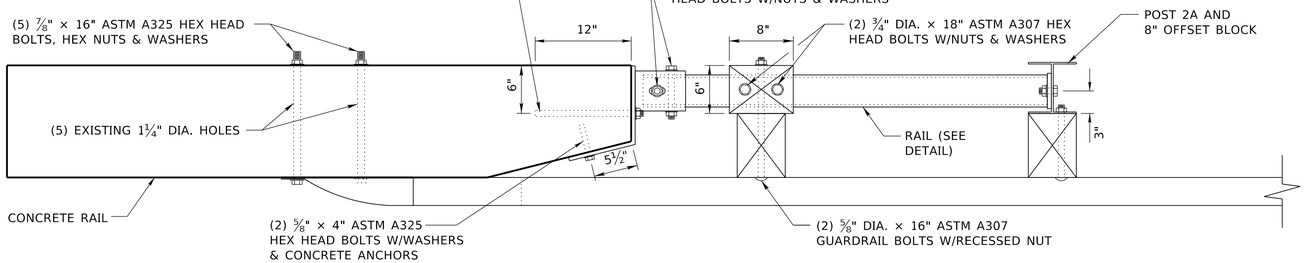
MIDSPAN RAIL SUPPORT

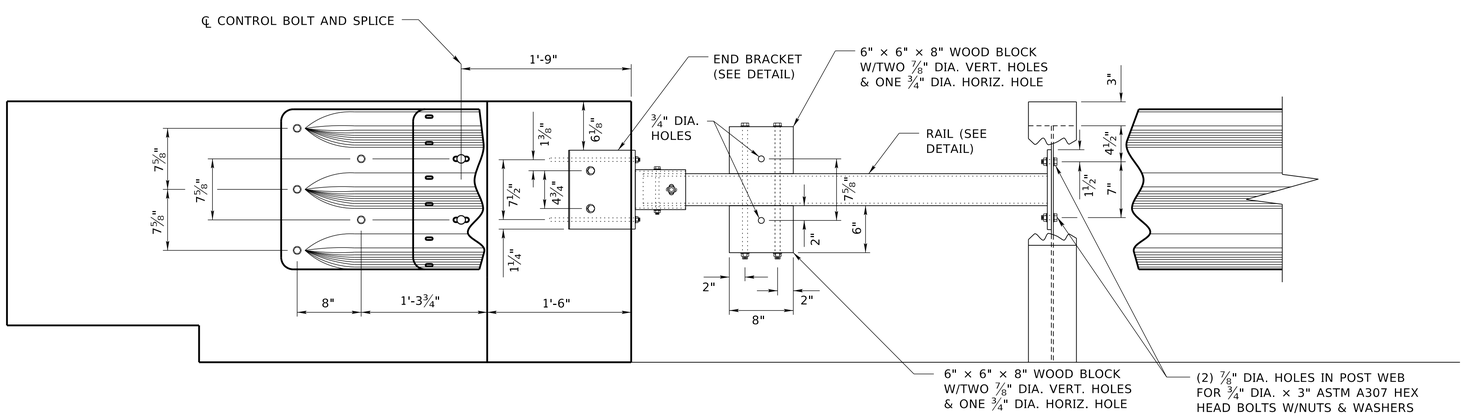
NOTE:

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

POST 2A

SIDE VIEW





ELEVATION VIEW

MIDSPAN RAIL SUPPORT DETAIL

MUST USE POST 2A (W6 × 25 × 8'-6")

NOTE:

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

IN LIEU OF THE CAST IN PLACE ¾" DIA. × 14" ANCHOR BOLTS, THE CONTRACTOR MAY GROUT ¾" DIA. × 12" BOLTS INTO ⅞" DIA. × 12" DRILLED HOLES. ALL GROUT USED SHALL BE AN APPROVED NON-SHRINK GROUT. FOR ⅝" DIA. BOLTS USE ¾" DIA. HOLES. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR THIS OPTION.

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NEW 34 INCH B.A.S.

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 740-R1

MIDWEST GUARDRAIL SYSTEM BRIDGE APPROACH SECTION

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL: AUGUST 2011

DATE

3
3

COMPUTER: BG041PM187
DATE: 27-AUG-2024 14:39
FILE: 7400 0 R1.dgn

CONNECTION NOTES:

FOR DIVIDED ROADWAY

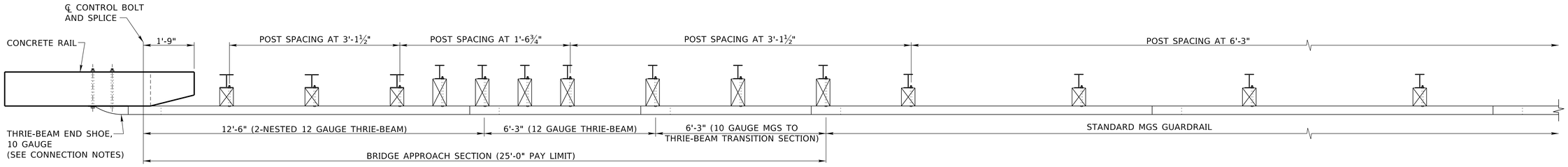
INSTALL THRIE-BEAM END SHOE,
BETWEEN NESTED GUARDRAIL ELEMENTS.
(SUBSIDIARY TO BRIDGE APPROACH SECTION)

TRAFFIC FLOW

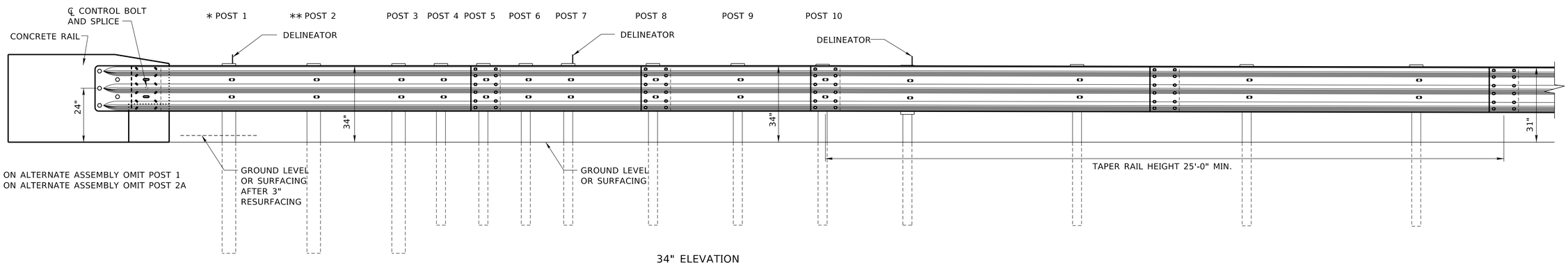
FOR 2-LANE ROADWAY

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

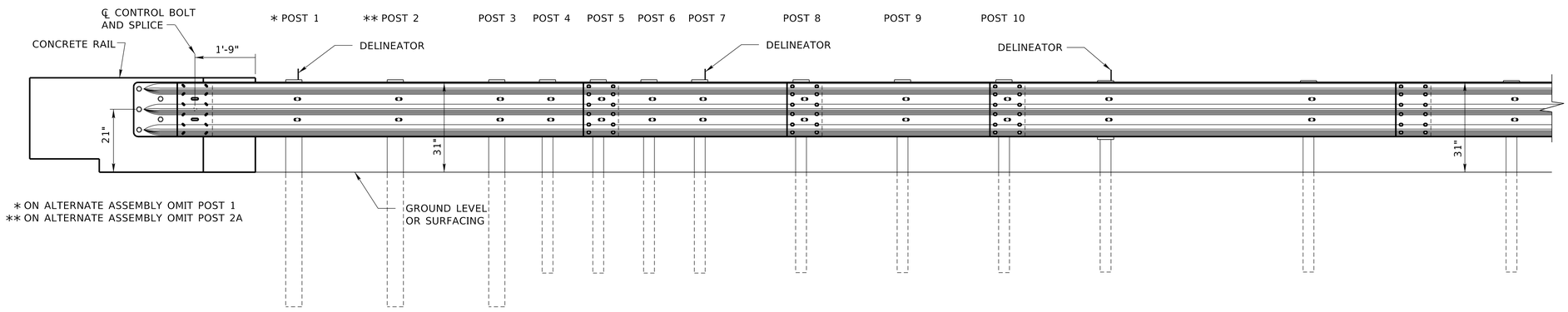
FOR DEPARTING TRAFFIC
INSTALL THRIE-BEAM END SHOE,
OUTSIDE OF THE NESTED GUARDRAIL ELEMENTS.
(SUBSIDIARY TO BRIDGE APPROACH SECTION)



PLAN VIEW



34" ELEVATION



31" ELEVATION

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	BLOCK DETAIL POST 11 & BEYOND
R1	JAN 18	NEW 34 INCH B.A.S.

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 741-R2

THRIE-BEAM BRIDGE APPROACH SECTION

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

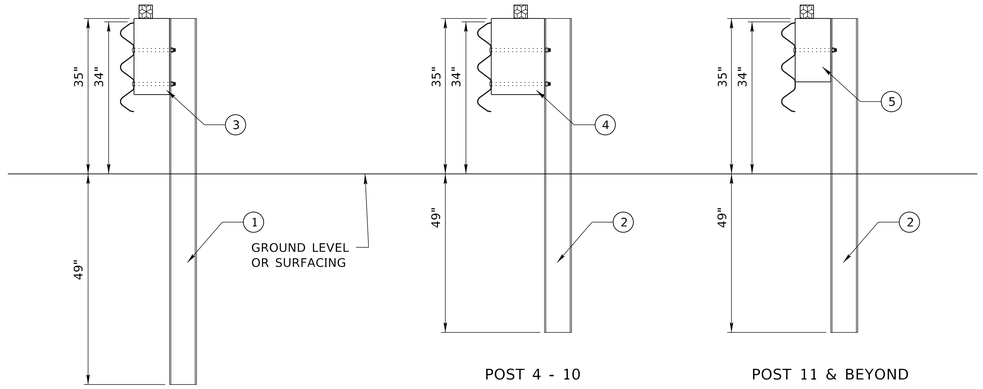
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL: AUGUST 2011
DATE

1
3

COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:35
FILE: 7410 0 R2.dgn

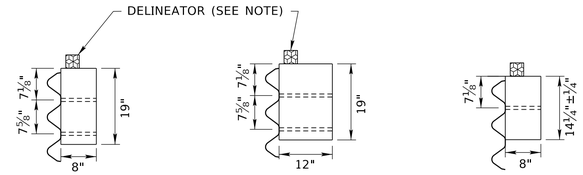


POST 1 - 3 POST 4 - 10 POST 11 & BEYOND

POSTS FOR 34" SYSTEM

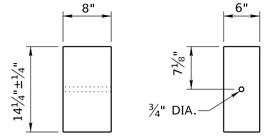
LEGEND

1. W6 × 15 × 7' POST
2. W6 × 9 × 6' POST OR W6 × 8.5 × 6' POST
3. 6" × 8" × 19" OFFSET BLOCK
4. 6" × 12" × 19" OFFSET BLOCK
5. 6" × 8" × 14¼" OFFSET BLOCK

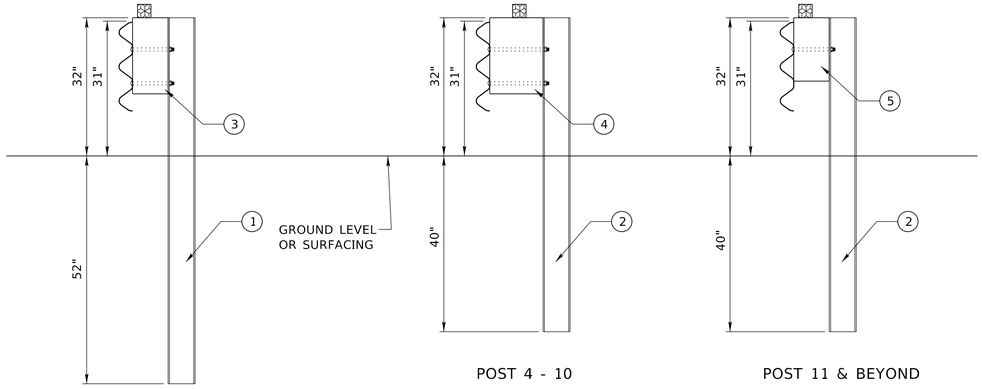


POSTS 1 - 3 POSTS 4 - 10 POSTS 11 & BEYOND

BLOCK DETAILS



STANDARD BLOCK



POST 1 - 3 POST 4 - 10 POST 11 & BEYOND

POSTS FOR 31" SYSTEM

NOTES:

DELINEATORS SUBSIDIARY TO BRIDGE APPROACH SECTION.

BUTTON HEAD BOLT ⅝" DIA. × LENGTH AS REQUIRED, SECURED WITH HEX NUT.

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

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	BLOCK DETAIL POST 11 & BEYOND
R1	JAN 18	NEW 34 INCH B.A.S.

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 741-R2

THRIE-BEAM BRIDGE APPROACH SECTION

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

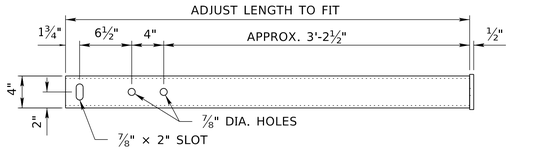
DATE

ORIGINAL: AUGUST 2011
DATE

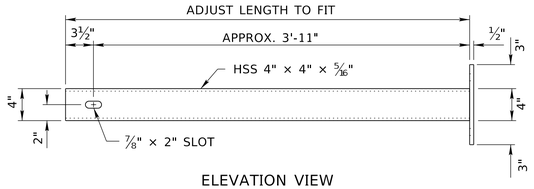
2
3

COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:35
FILE: 7410 0 R2.dgn

COMPUTER: BG04190M187
DATE: 27-AUG-2024 14:35
FILE: 7410 0 R2.dgn

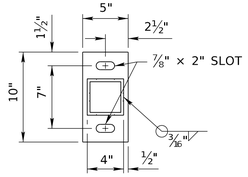


PLAN VIEW

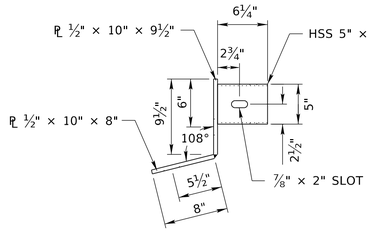


ELEVATION VIEW

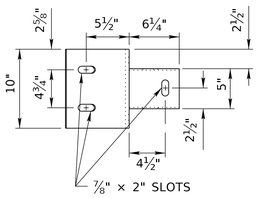
RAIL DETAIL



SIDE VIEW
℄ ½" × 10" × 5"

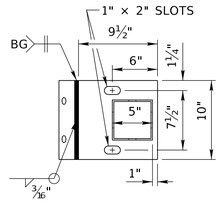


TOP VIEW

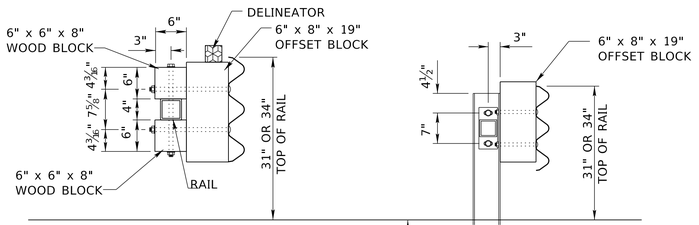


ELEVATION VIEW

END BRACKET DETAIL



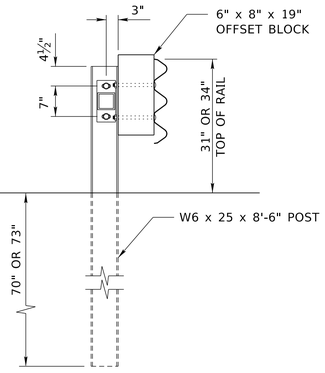
SIDE VIEW



MIDSPAN RAIL SUPPORT

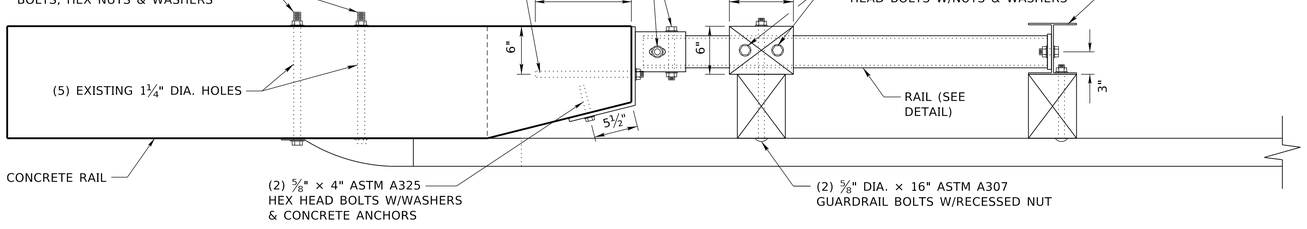
NOTE:

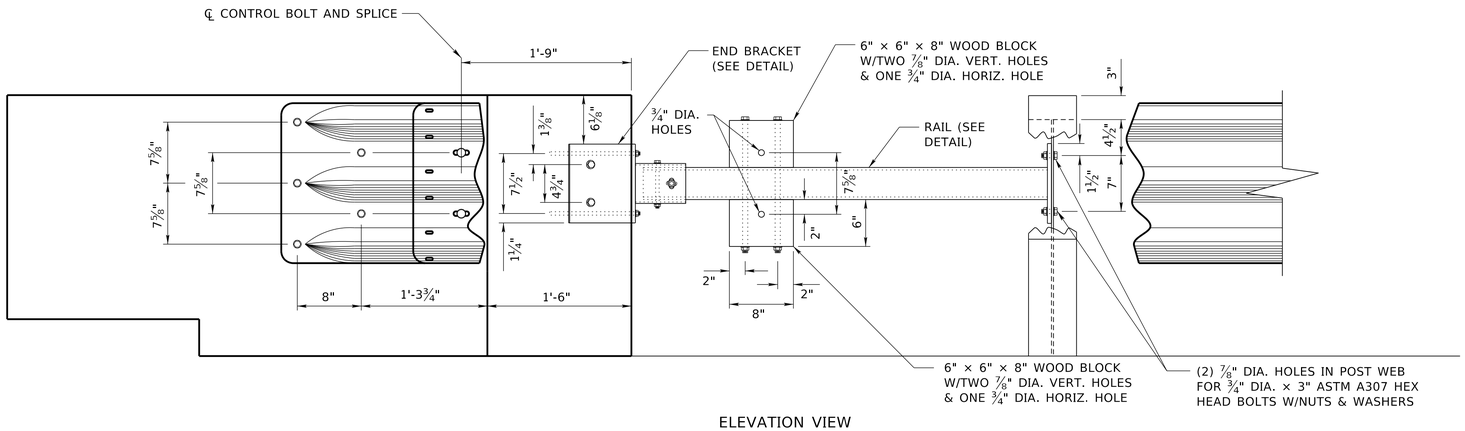
OFFSET BLOCK LISTED ON THE APPROVED PRODUCTS LIST MAY ALSO BE USED.



POST 2A

SIDE VIEW





ELEVATION VIEW

MIDSPAN RAIL SUPPORT DETAIL

MUST USE POST 2A (W6 x 25 x 8'-6")

NOTE:

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

IN LIEU OF THE CAST IN PLACE ¾" DIA. × 14" ANCHOR BOLTS, THE CONTRACTOR MAY GROUT ¾" DIA. × 12" BOLTS INTO ⅞" DIA. × 12" DRILLED HOLES. ALL GROUT USED SHALL BE AN APPROVED NON-SHRINK GROUT. FOR ⅝" DIA. BOLTS USE ¾" DIA. HOLES. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR THIS OPTION.

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	BLOCK DETAIL POST 11 & BEYOND
R1	JAN 18	NEW 34 INCH B.A.S.

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 741-R2

THRIE-BEAM BRIDGE APPROACH SECTION

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL: AUGUST 2011
DATE

3
3

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	0.0	0.0
2	3.1	0.0
3	9.4	0.1
4	15.6	0.3
5	21.8	0.5
6	28.1	0.7
7	34.3	0.9
8	40.6	1.1
9	46.8	1.4
10	53.1	1.6
11	59.3	1.8
12	65.6	2.0
13	71.8	2.2
14	78.1	2.4
15	84.3	2.6
16	90.6	2.8
17	96.8	3.0
18	103.1	3.2
19	109.3	3.4
20	115.6	3.6
21	121.8	3.9
22	128.1	4.1
23	134.3	4.3
24	140.6	4.5
25	146.8	4.7
26	153.1	4.9
27	159.3	5.1
28	165.5	5.3
29	171.8	5.5
30	178.0	5.7
31	184.3	5.9
32	190.5	6.1
33	196.8	6.4
34	203.0	6.6
35	209.3	6.8
36	215.5	7.0
37	221.8	7.2
38	228.0	7.4
39	234.3	7.6
40	240.5	7.8
41	246.8	8.0
42	253.0	8.2
43	259.2	8.4
44	265.5	8.7
45	271.7	8.8
46	278.0	9.1
47	284.2	9.3
48	290.5	9.5
49	296.7	9.7
50	303.0	9.9
51	309.2	10.1
52	315.5	10.3
53	321.7	10.5
54	328.0	10.7
55	334.2	10.9
56	340.4	11.1
57	346.7	11.3
58	352.9	11.6
59	359.2	11.8
60	365.4	12.0

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	0.0	0.0
2	3.1	0.0
3	9.4	0.1
4	15.6	0.4
5	21.9	0.6
6	28.1	0.9
7	34.4	1.1
8	40.6	1.4
9	46.9	1.6
10	53.1	1.9
11	59.3	2.1
12	65.6	2.4
13	71.8	2.6
14	78.1	2.6
15	84.3	3.1
16	90.6	3.4
17	96.8	3.6
18	103.1	3.9
19	109.3	4.1
20	115.6	4.4
21	121.8	4.6
22	128.0	4.9
23	134.3	5.1
24	140.5	5.4
25	146.8	5.6
26	153.0	5.9
27	159.3	6.1
28	165.5	6.4
29	171.8	6.6
30	178.0	6.9
31	184.2	7.1
32	190.5	7.4
33	196.7	7.6
34	202.0	7.9
35	209.2	8.1
36	215.5	8.4
37	221.8	8.6
38	228.0	8.9
39	234.2	9.1
40	240.5	9.4
41	246.7	9.6
42	253.0	9.9
43	259.2	10.1
44	265.4	10.4
45	271.7	10.6
46	278.0	10.9
47	284.2	11.1
48	290.4	11.4
49	296.7	11.6
50	302.9	11.9
51	309.1	12.1
52	315.4	12.4
53	321.6	12.6
54	327.9	12.9
55	334.1	13.1
56	340.4	13.4
57	346.6	13.6
58	352.9	13.9
59	359.1	14.1
60	365.4	14.4

TABLE C

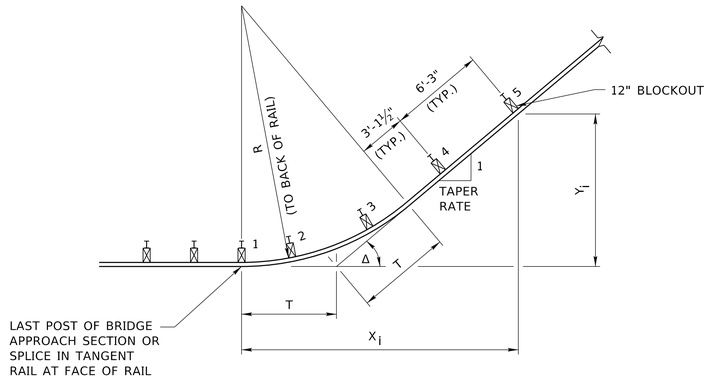
DEFLECTION, Δ = 2°51'44"
TAPER = 20:1
RADIUS, R = 250.20'
TANGENT, T = 6.25'

POST NUMBER	X_i	Y_i
1	0.0	0.0
2	3.1	0.0
3	9.4	0.2
4	15.6	0.5
5	21.9	0.8
6	28.1	1.1
7	34.4	1.4
8	40.6	1.7
9	46.8	2.0
10	53.1	2.3
11	59.3	2.7
12	65.6	3.0
13	71.8	3.3
14	78.1	3.6
15	84.3	3.9
16	90.5	4.2
17	96.8	4.5
18	103.0	4.8
19	109.3	5.1
20	115.6	5.5
21	121.7	5.8
22	128.0	6.1
23	134.2	6.4
24	140.5	6.7
25	146.7	7.0
26	153.0	7.3
27	159.2	7.6
28	165.4	8.0
29	171.7	8.3
30	177.9	8.6
31	184.2	8.9
32	190.4	9.2
33	196.7	9.5
34	202.9	9.8
35	209.1	10.1
36	215.4	10.4
37	221.6	10.8
38	227.9	11.0
39	234.1	11.4
40	240.3	11.7
41	246.6	12.0
42	252.8	12.3
43	259.0	12.6
44	265.3	12.9
45	271.6	13.3
46	277.8	13.6
47	284.0	13.9
48	290.3	14.2
49	296.5	14.5
50	302.8	14.8
51	309.0	15.1
52	315.3	15.4
53	321.5	15.7
54	327.7	16.1
55	334.0	16.4
56	340.2	16.7
57	346.5	17.0
58	352.7	17.3
59	359.0	17.6
60	365.2	17.9

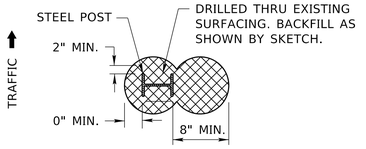
TABLE D

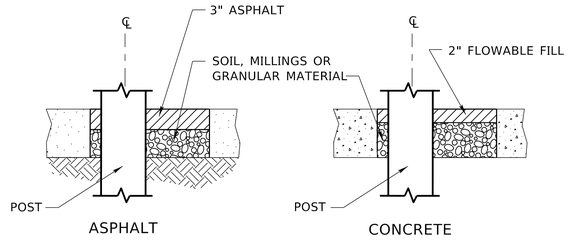
DEFLECTION, Δ = 3°48'51"
TAPER = 15:1
RADIUS, R = 187.77'
TANGENT, T = 6.25'

POST NUMBER	X_i	Y_i
1	0.0	0.0
2	3.1	0.0
3	9.4	0.2
4	15.6	0.6
5	21.9	1.0
6	28.1	1.5
7	34.3	1.9
8	40.6	2.3
9	46.8	2.7
10	53.0	3.1
11	59.3	3.5
12	65.5	4.0
13	71.8	4.4
14	78.0	4.8
15	84.2	5.2
16	90.5	5.6
17	96.7	6.0
18	102.9	6.4
19	109.2	6.9
20	115.4	7.3
21	121.6	7.7
22	127.9	8.1
23	134.1	8.5
24	140.4	8.9
25	146.6	9.3
26	152.8	9.8
27	159.0	10.2
28	165.3	10.6
29	171.5	11.0
30	177.8	11.4
31	184.0	11.8
32	190.2	12.2
33	196.5	12.7
34	202.7	13.1
35	209.0	13.5
36	215.2	13.9
37	221.4	14.3
38	227.7	14.7
39	233.9	15.1
40	240.1	15.6
41	246.4	16.0
42	252.6	16.4
43	258.8	16.8
44	265.0	17.2
45	271.3	17.6
46	277.5	18.1
47	283.8	18.5
48	290.0	18.9
49	296.3	19.3
50	302.5	19.7
51	308.7	20.1
52	315.0	20.5
53	321.2	21.0
54	327.4	21.4
55	333.7	21.8
56	339.9	22.2
57	346.1	22.6
58	352.4	23.0
59	358.6	23.4
60	364.9	23.9

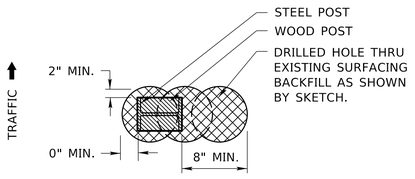


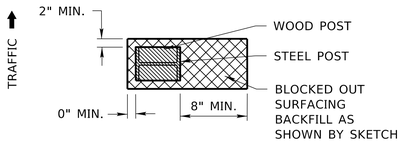
NOTE
THE X_i AND Y_i DISTANCES FOUND IN THE TABLES SHALL BE MEASURED FROM A LINE THAT PARALLELS THE EDGE OF THE PAVEMENT.





DETAIL OF BACKFILLING AROUND POST





GUARDRAIL POSTS
IN SURFACING

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JUL 20	REMOVE MINIMUM OFFSET
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	DEC 16	UPDATED GUARDRAIL OFFSET TABLE

NEBRASKA DEPARTMENT OF TRANSPORTATION
STANDARD PLAN NO. 743-R3
GUARDRAIL DETAILS

ACCEPTED BY FHWA FOR USE ON THE
NATIONAL HIGHWAY SYSTEM:

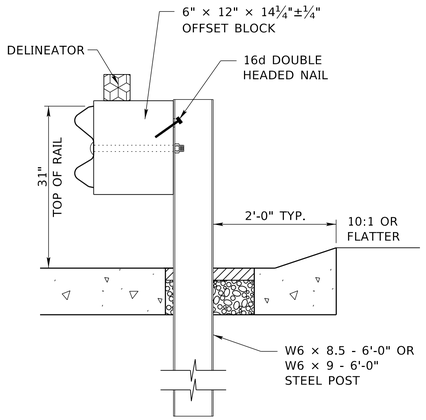
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

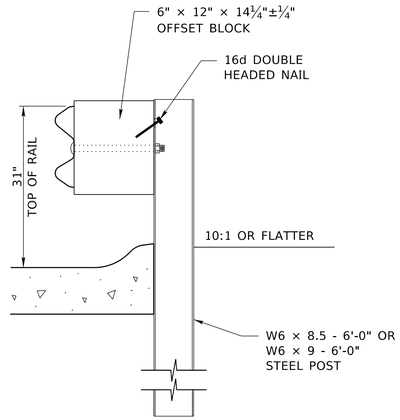
ORIGINAL:
AUGUST 25, 2011
DATE

1
4

COMPUTER: BG04194187
DATE: 27-AUG-2024 14:35
FILE: 7430 0 R3.dgn

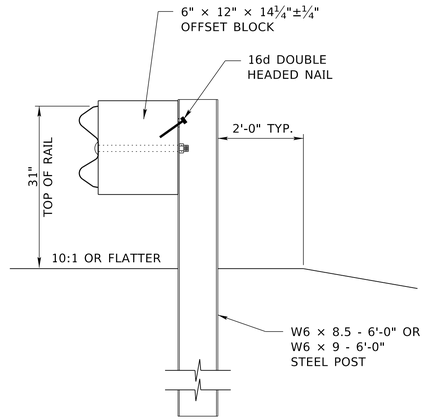


SIDE VIEW



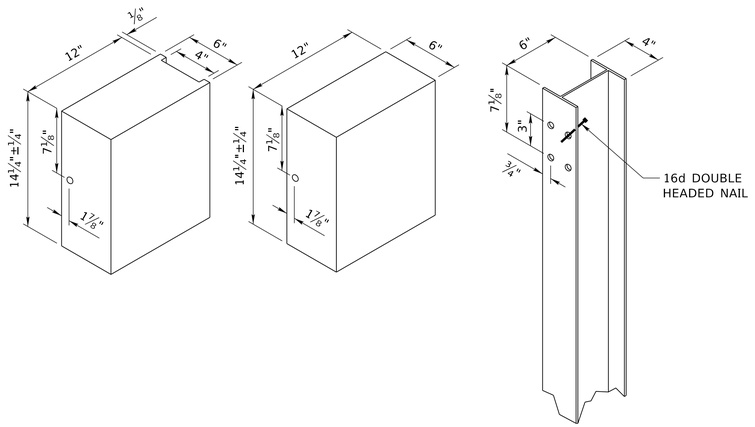
SIDE VIEW

CURBED LOCATIONS



SIDE VIEW

NON-CURBED LOCATIONS



NOTES:

ALL HOLE DIAMETERS ARE ¾"

W6 × 8.5 OR W6 × 9 POST & 14¼"±¼" 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 W-BEAM)

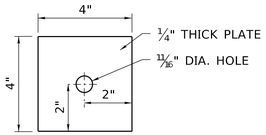
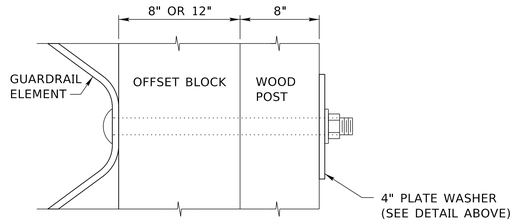
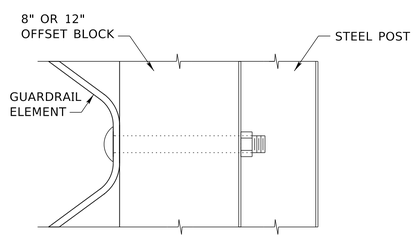


PLATE WASHER



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 ON 2 LANE ROADWAYS, SINGLE-FACED HIGH INTENSITY DELINEATORS ON 4 LANE ROADWAYS.

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

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

DELINEATORS SUBSIDIARY TO GUARDRAIL.

NOTES:

BUTTON HEAD BOLT ⅝" DIA. × LENGTH AS REQUIRED, SECURED WITH 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

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JUL 20	
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	DEC 16	UPDATED GUARDRAIL OFFSET TABLE REMOVE MINIMUM OFFSET

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 743-R3

GUARDRAIL DETAILS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

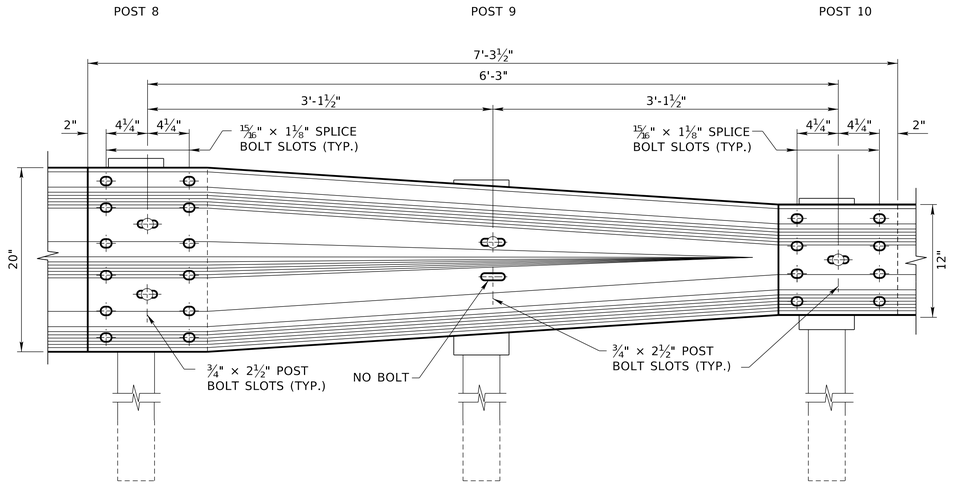
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

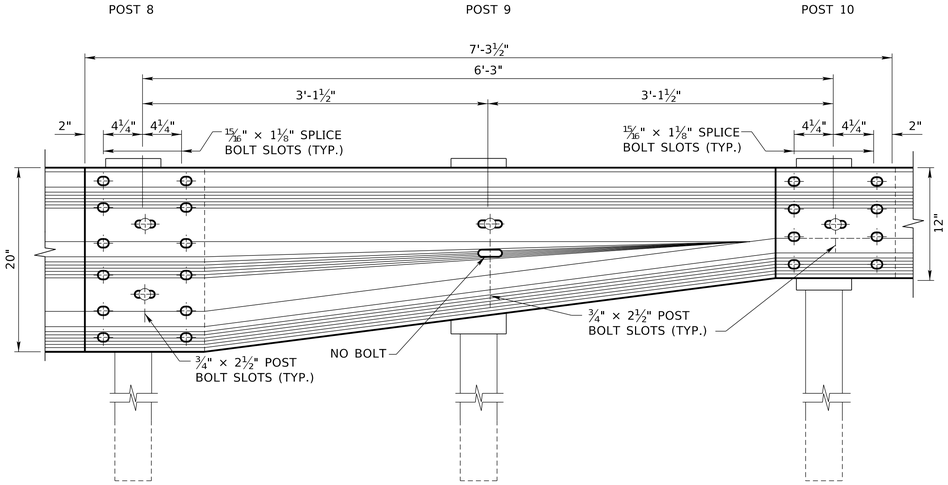
ORIGINAL:
AUGUST 25, 2011
DATE

2
4

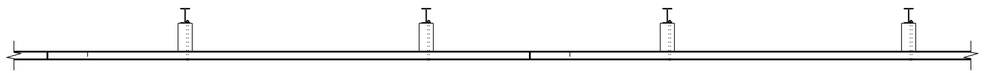
COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:35
FILE: 7430 0 R3.dgn



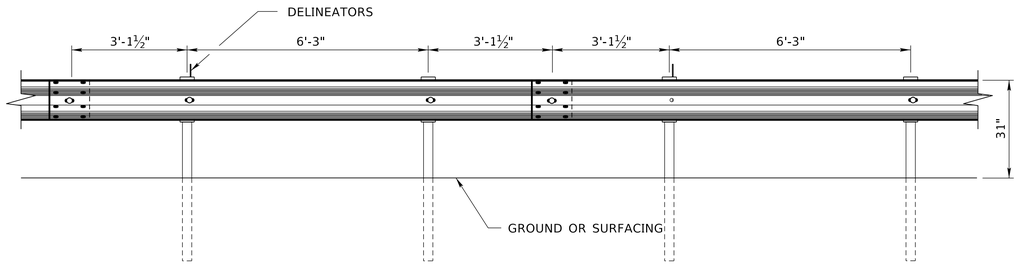
W-THRIE BEAM TRANSITION (10 GAUGE)
(34" ELEVATION FOR FUTURE 3" OVERLAY Y SHAPE)



W-THRIE BEAM TRANSITION (10 GAUGE)
31" ELEVATION (ASYMMETRICAL SHAPE)

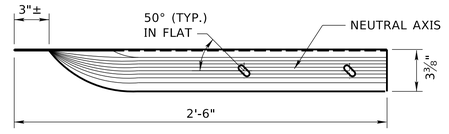


PLAN

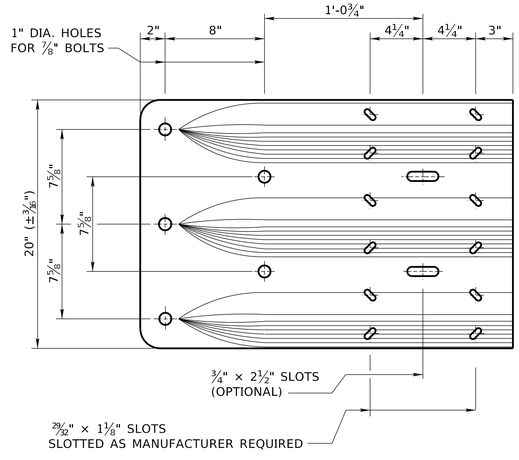


ELEVATION

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



PLAN



ELEVATION
THRIE-BEAM END SHOE

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JUL 20	REMOVE MINIMUM OFFSET
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	DEC 16	UPDATED GUARDRAIL OFFSET TABLE

NEBRASKA DEPARTMENT OF TRANSPORTATION
STANDARD PLAN NO. 743-R3
GUARDRAIL DETAILS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

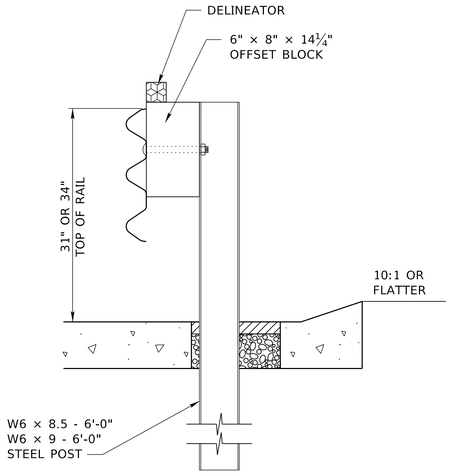
DATE

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

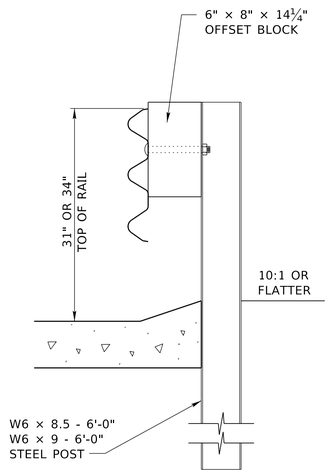
ORIGINAL:
AUGUST 25, 2011
DATE

3
4

COMPUTER: BG041914187
DATE: 27-AUG-2024 14:35
FILE: 7430 0 R3.dgn

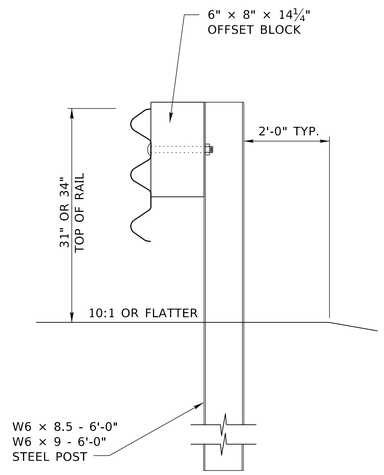


SIDE VIEW



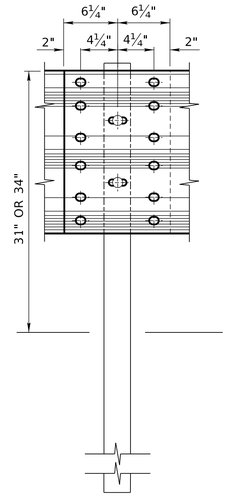
SIDE VIEW

THRIE-BEAM CURBED LOCATIONS

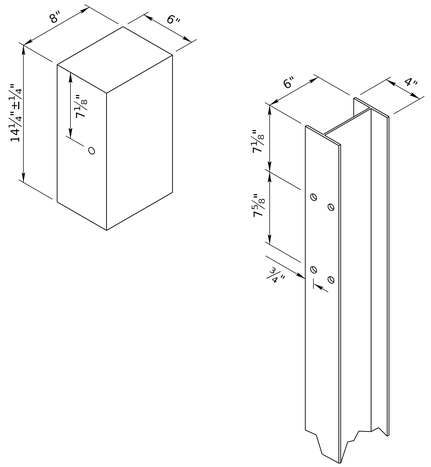


SIDE VIEW

THRIE-BEAM NON-CURBED LOCATIONS

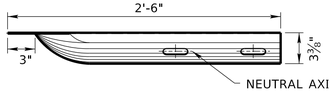


RAIL ELEMENT SPLICING
AND POST MOUNTING DETAIL
FOR ¼ OR ½ POST SPACING

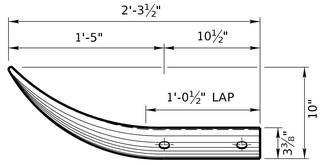


OFFSET BLOCK & STEEL POST
(FOR THRIE-BEAM)

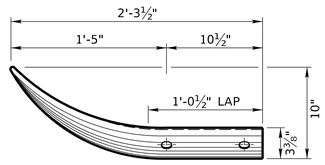
SPECIAL END SHOE SHALL BE 10 GAUGE STEEL
AND GALVANIZED IN ACCORDANCE WITH ASTM A93
OR ASTM A123 WITH COATING CLASS 250.



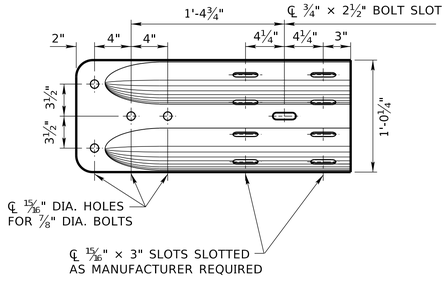
PLAN



PLAN

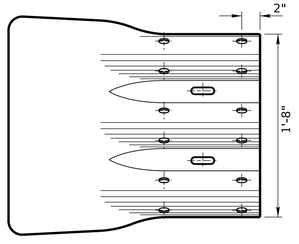


PLAN



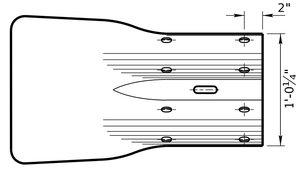
ELEVATION

W-BEAM END SHOE



ELEVATION

THRIE-BEAM TERMINAL SECTION



ELEVATION

W-BEAM TERMINAL SECTION

NOTES:

ALL HOLE DIAMETERS ARE ¾"

W6 × 8.5 POST & W6 × 9 & 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
R3	JUL 20	REMOVE MINIMUM OFFSET
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	DEC 16	UPDATED GUARDRAIL OFFSET TABLE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 743-R3

GUARDRAIL DETAILS

ACCEPTED BY FHWA FOR USE ON THE
NATIONAL HIGHWAY SYSTEM:

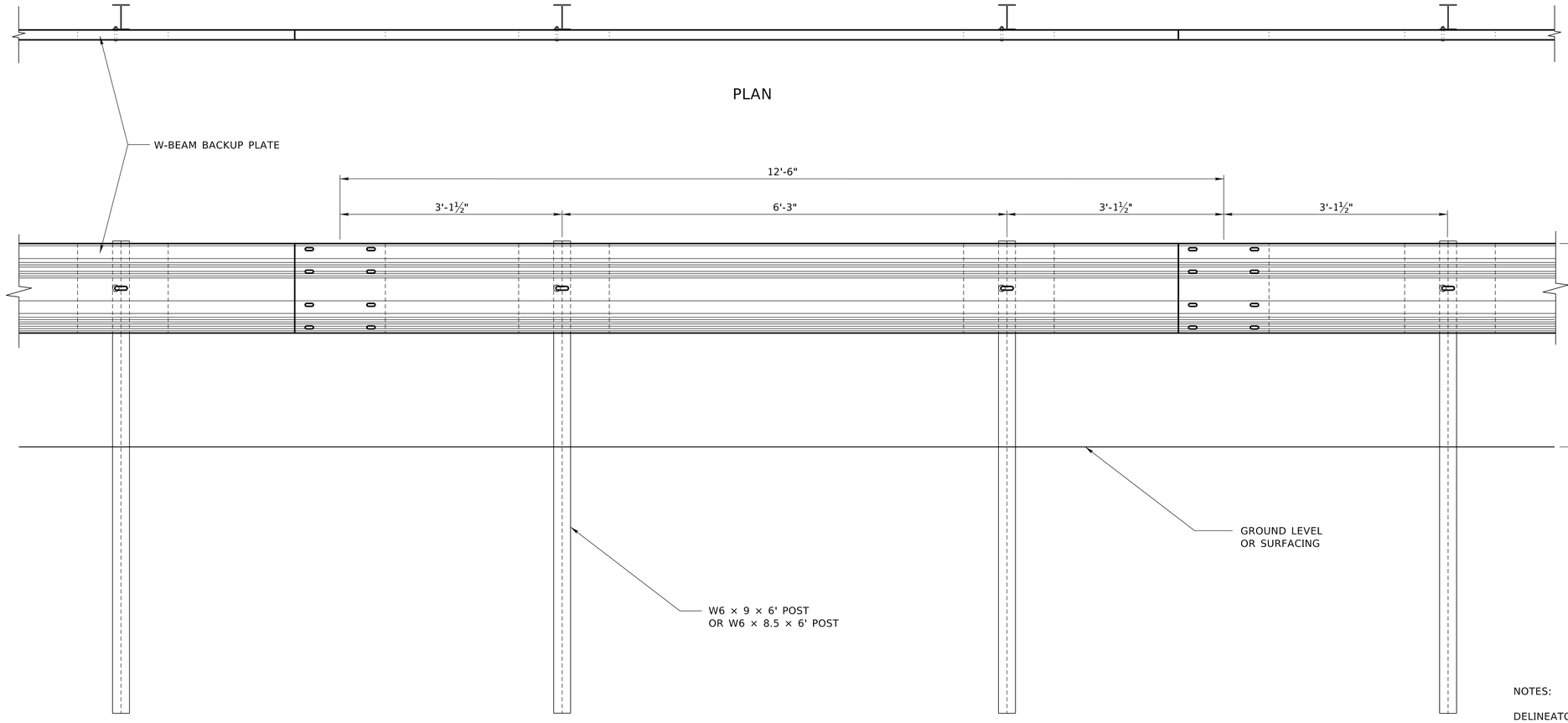
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL:
AUGUST 25, 2011
DATE

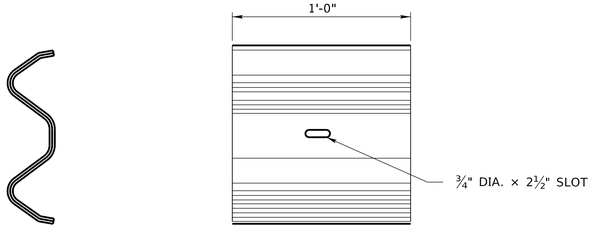
4
4

COMPUTER: BG04190187
DATE: 27-AUG-2024 14:35
FILE: 7430 0 R3.dgn



PLAN

ELEVATION



SIDE FRONT

W-BEAM BACKUP PLATE

NOTES:

DELINEATORS SUBSIDIARY GUARDRAIL.

BUTTON HEAD BOLT ⅝" DIA. × LENGTH AS REQUIRED, SECURED WITH HEX NUT.

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

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 744

MIDWEST GUARDRAIL SYSTEM WITHOUT BLOCKOUTS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ MICHAEL H. OWEN E-6515 ★ STATE OF NEBRASKA

DATE

ORIGINAL: JANUARY 2018

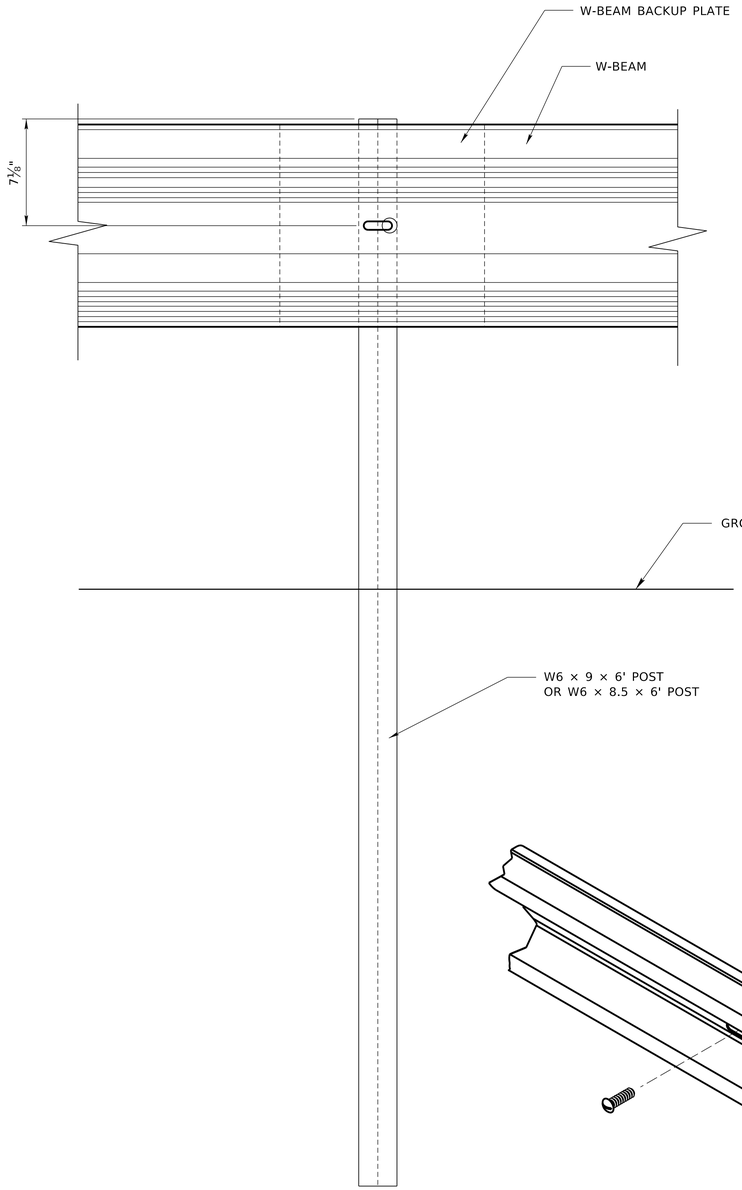
DATE

1/2

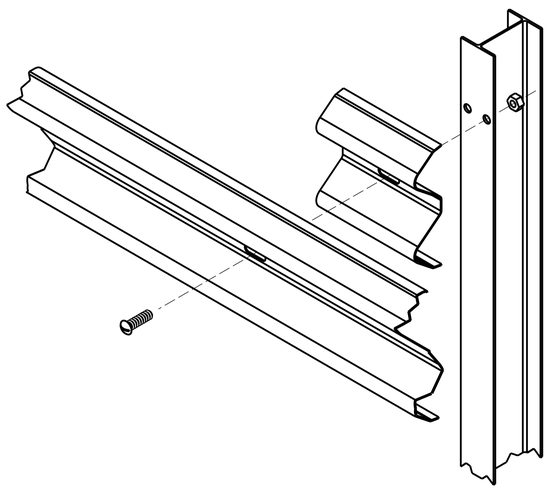
COMPUTER: BG04194187

DATE: 27-AUG-2024 14:35

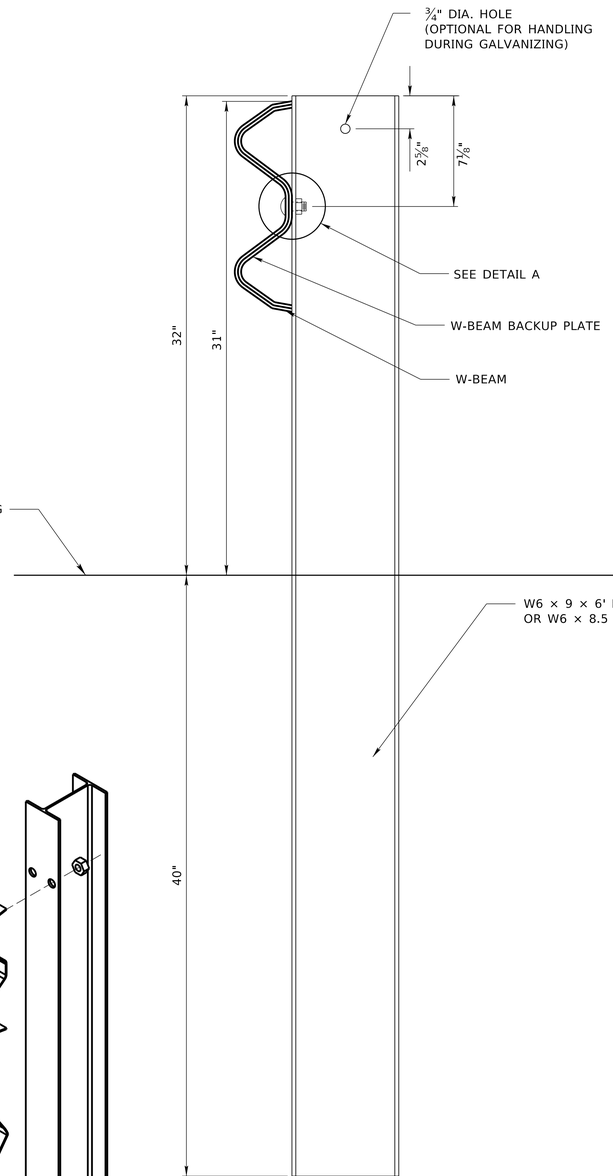
FILE: 7440 0 R0.dgn



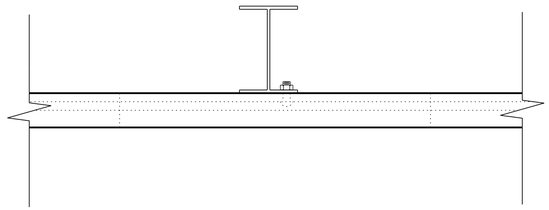
FRONT



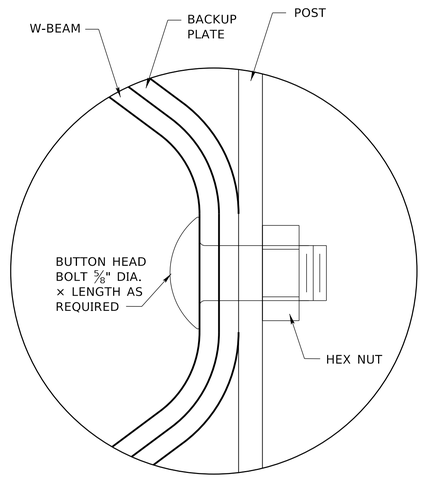
POST DETAILS



SIDE



PLAN



DETAIL A

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 744

MIDWEST GUARDRAIL SYSTEM WITHOUTS BLOCKOUTS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

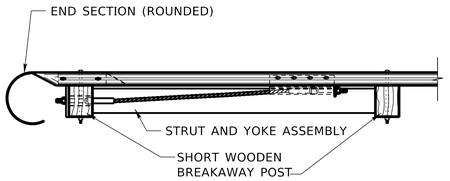
DATE

ORIGINAL:
JANUARY 2018
DATE

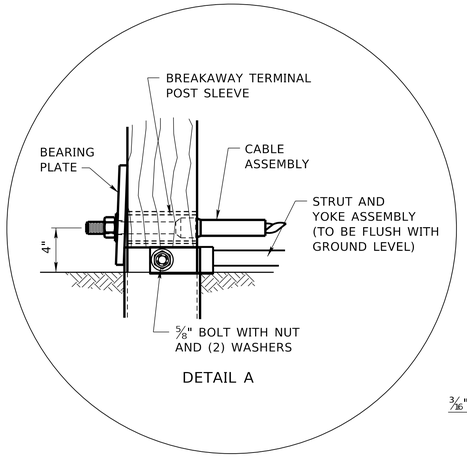
2
2

COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:35
FILE: 7440 0 R0.dgn

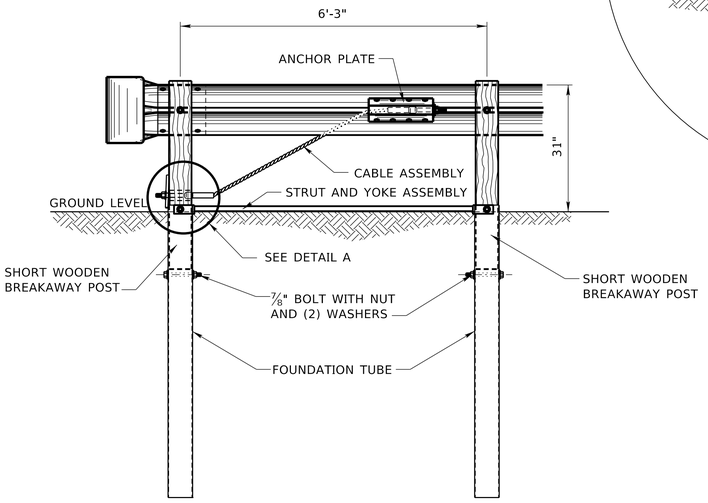
COMPUTER: BG041914187
DATE: 27-AUG-2024 14:35
FILE: 7450 0 R2.dgn



PLAN

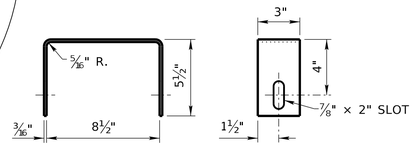


DETAIL A



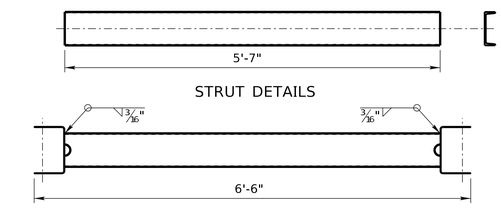
ELEVATION

END ANCHORAGE ASSEMBLY



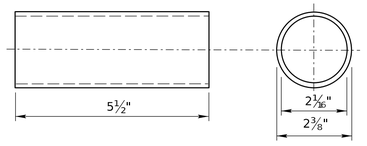
FRONT VIEW END VIEW

YOKE DETAILS

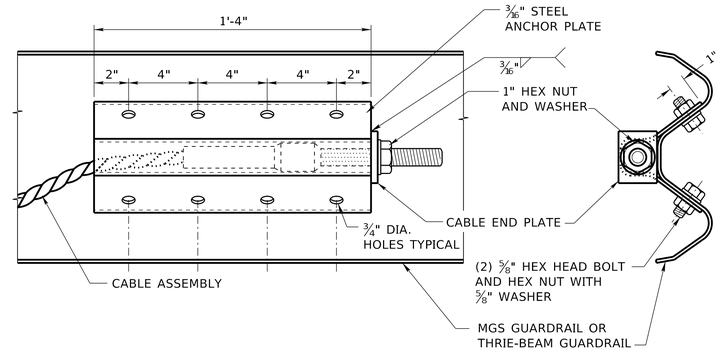


STRUT DETAILS

STRUT AND YOKE ASSEMBLY



BREAKAWAY TERMINAL POST SLEEVE

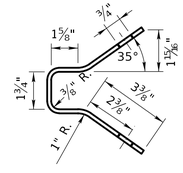


FRONT VIEW END VIEW

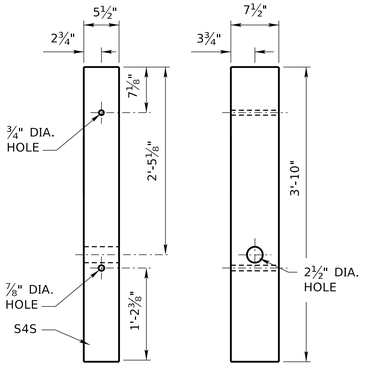
DETAILS OF ANCHOR PLATE

BEARING PLATE

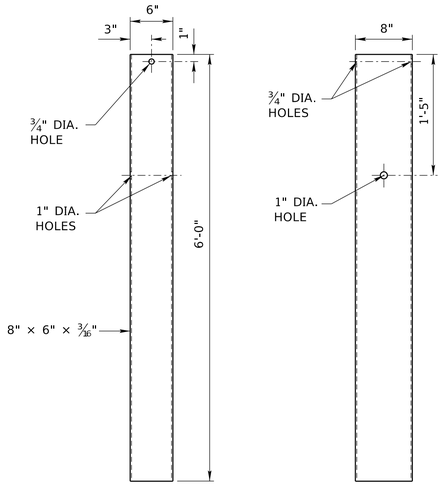
CABLE END PLATE



ANCHOR PLATE END VIEW

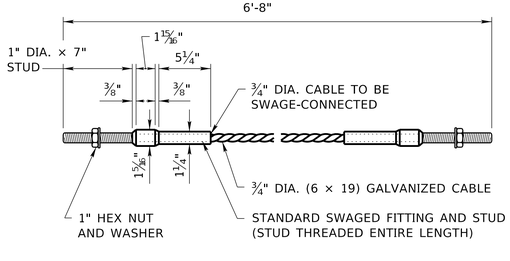


SHORT WOODEN BREAKAWAY POST



FRONT VIEW SIDE VIEW

FOUNDATION TUBE



DETAILS OF CABLE ASSEMBLY

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	PG 2 ADDED ANCHORAGE CABLE NOTE
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 745-R2

END ANCHORAGE ASSEMBLY (W-BEAM)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

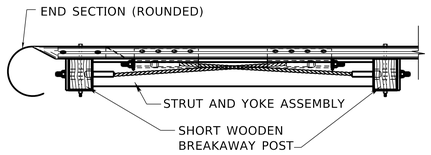
DATE

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

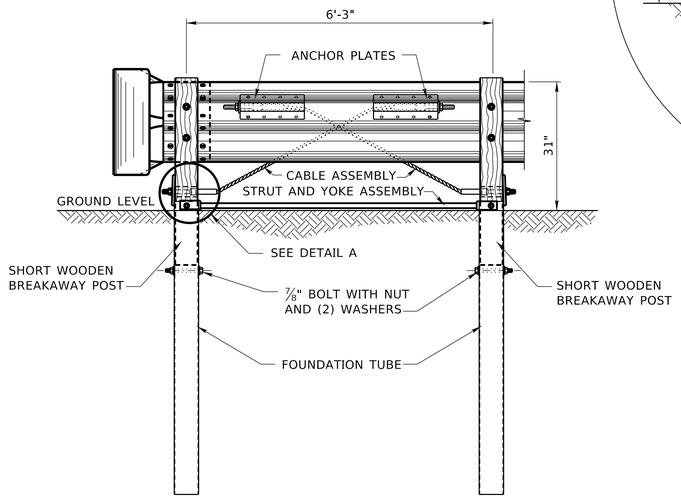
ORIGINAL: DECEMBER 1, 2016
DATE

1
2

COMPUTER: BG04191M187
DATE: 27-AUG-2024 14:35
FILE: 7450 0 R2.dgn



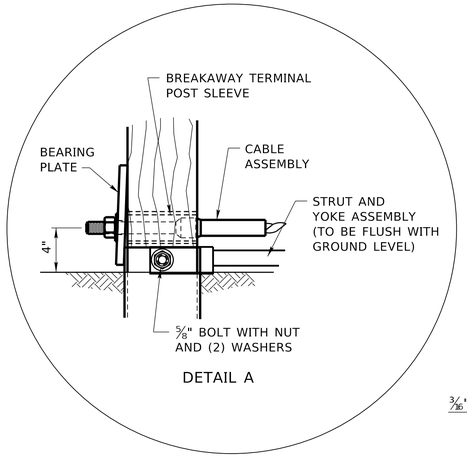
PLAN



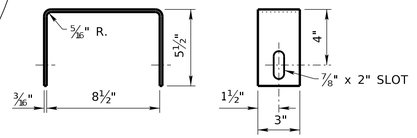
ELEVATION

END ANCHORAGE ASSEMBLY

BOTH OF THESE CABLES ARE USED FOR BULLNOSE RAIL WHEN NOT ATTACHED DIRECTLY TO A BRIDGE.
THE CABLE BOTTOM LEFT TO TOP RIGHT IS ONLY USED FOR END ANCHORAGE ASSEMBLY ON A TRAILING END.

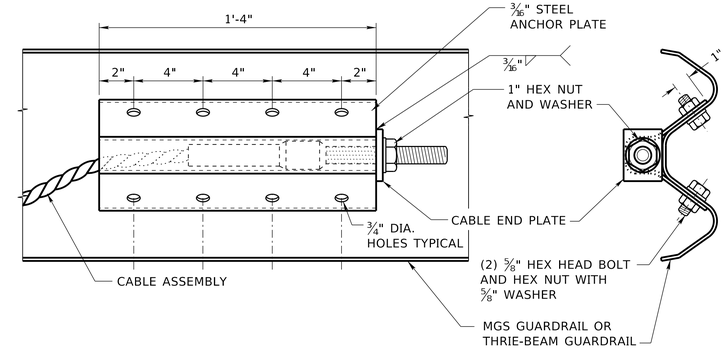


DETAIL A



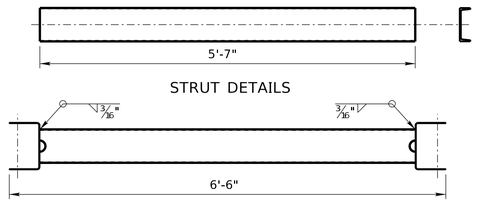
FRONT VIEW END VIEW

YOKE DETAILS



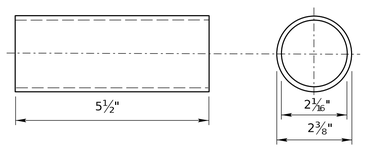
FRONT VIEW END VIEW

DETAILS OF ANCHOR PLATE

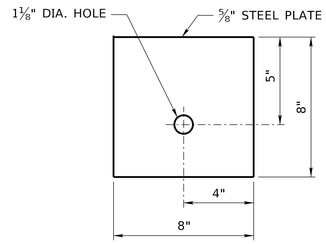


STRUT DETAILS

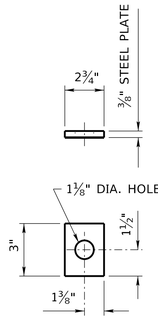
STRUT AND YOKE ASSEMBLY



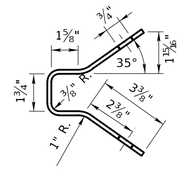
BREAKAWAY TERMINAL POST SLEEVE



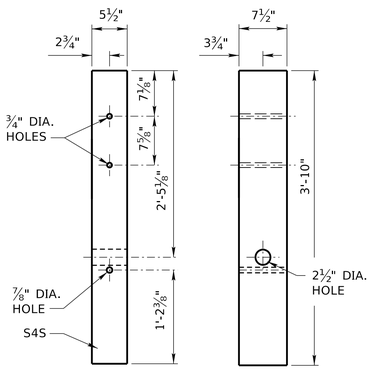
BEARING PLATE



CABLE END PLATE

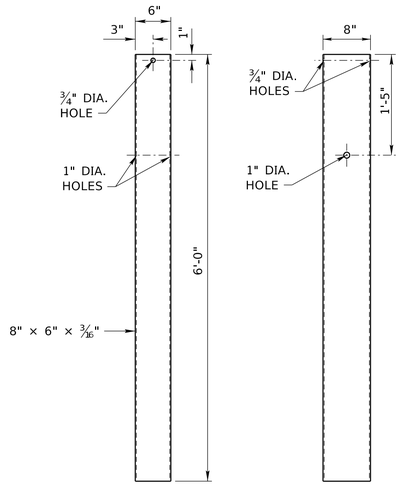


ANCHOR PLATE END VIEW



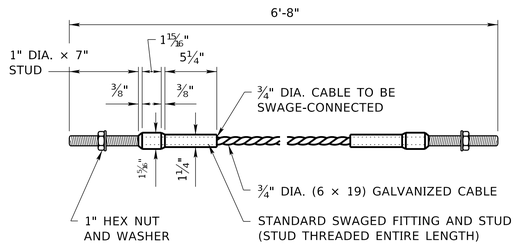
FRONT VIEW SIDE VIEW

SHORT WOODEN BREAKAWAY POST



FRONT VIEW SIDE VIEW

FOUNDATION TUBE



DETAILS OF CABLE ASSEMBLY

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	PG 2 ADDED ANCHORAGE CABLE NOTE
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 745-R2

END ANCHORAGE ASSEMBLY (THRIE BEAM)

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ MICHAEL H. OWEN E-6515 ★ STATE OF NEBRASKA

DATE

ORIGINAL: DECEMBER 1, 2016

DATE

2
2

CONNECTION NOTES:

FOR DIVIDED ROADWAY

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

TRAFFIC FLOW

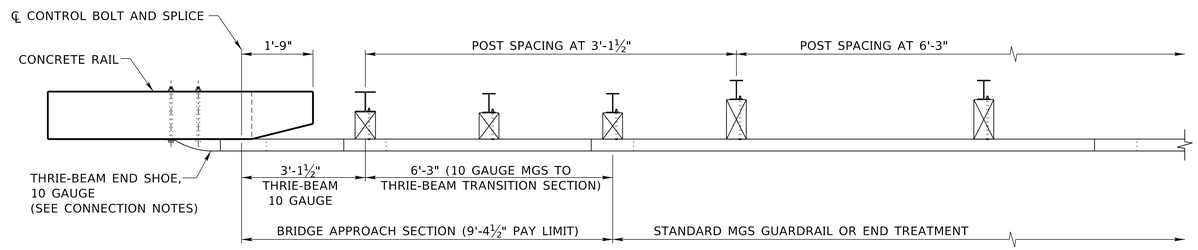
FOR 2-LANE ROADWAY

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

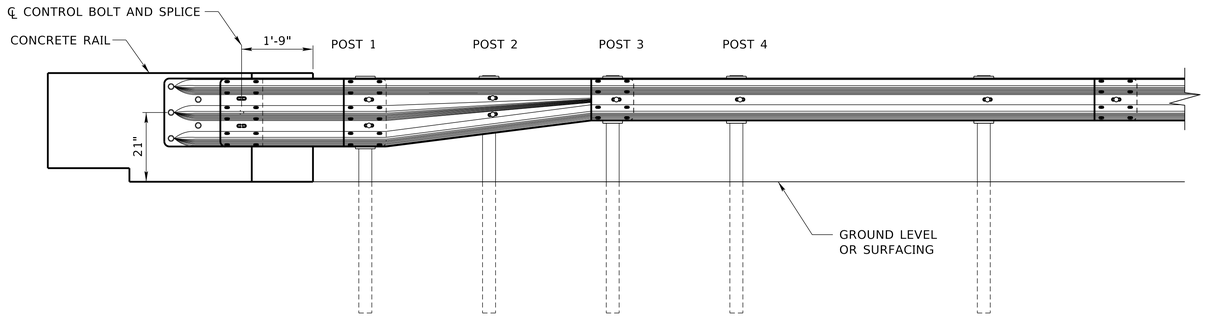
FOR DEPARTING TRAFFIC
INSTALL THRIE-BEAM END SHOE,
OUTSIDE OF THE NESTED GUARDRAIL ELEMENTS.
(SUBSIDIARY TO BRIDGE APPROACH SECTION)

LEGEND

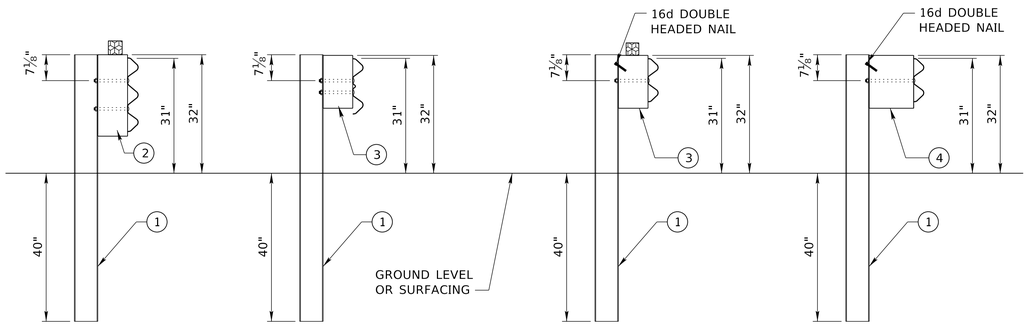
1. W6 × 9 × 6' POST OR W6 × 8.5 × 6' POST
2. 6" × 8" × 22" OFFSET BLOCK
3. 6" × 8" × 14¼" ± ¼" OFFSET BLOCK
4. 6" × 12" × 14¼" ± ¼" OFFSET BLOCK

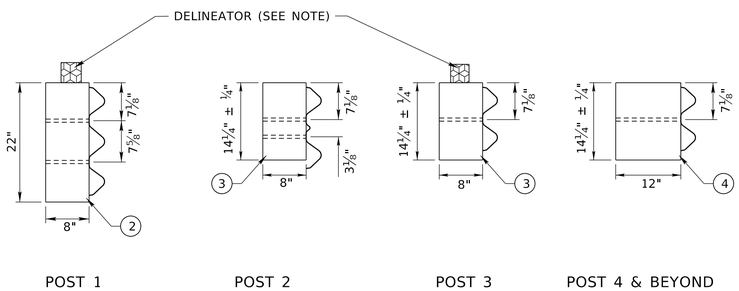


PLAN VIEW



ELEVATION





BLOCK DETAILS

NOTES:

DELINEATORS SUBSIDIARY TO BRIDGE APPROACH SECTION.

BUTTON HEAD BOLT ⅝" DIA. × LENGTH AS REQUIRED, SECURED WITH HEX NUT.

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

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 746

MIDWEST GUARDRAIL SYSTEM BRIDGE APPROACH SECTION TL-2

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

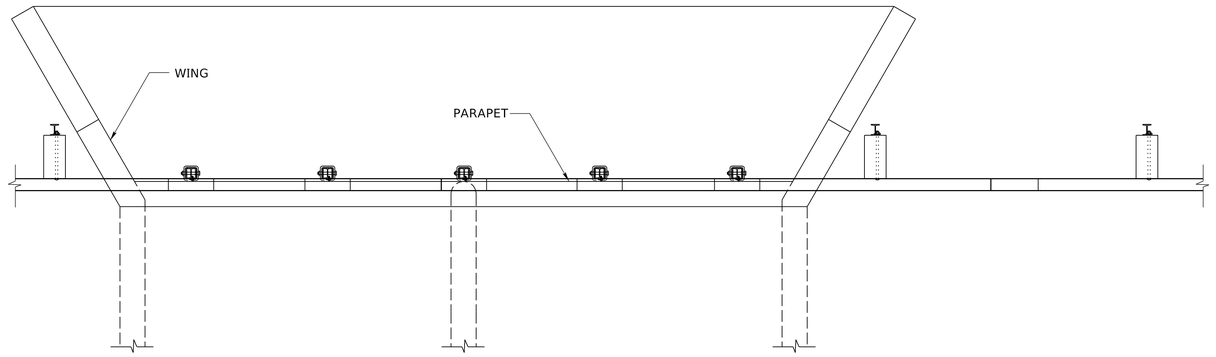
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

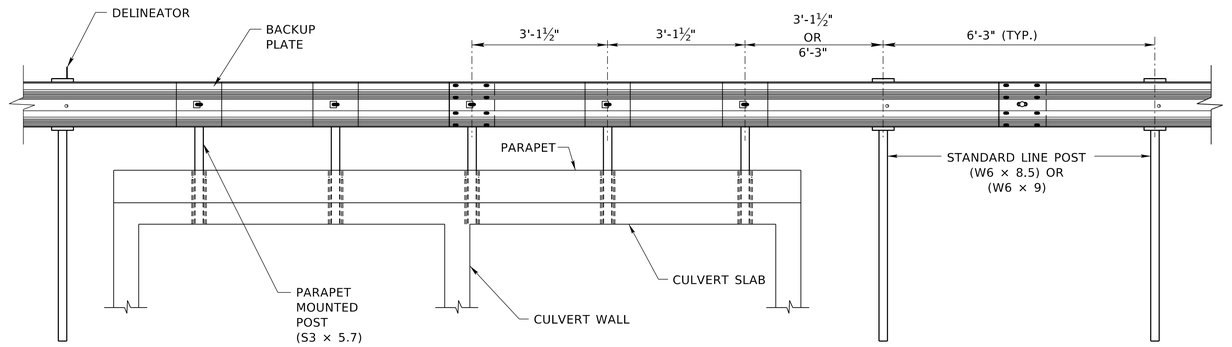
ORIGINAL:
JANUARY 2018
DATE

1
1

COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:30
FILE: 7460 0 R0.dgn

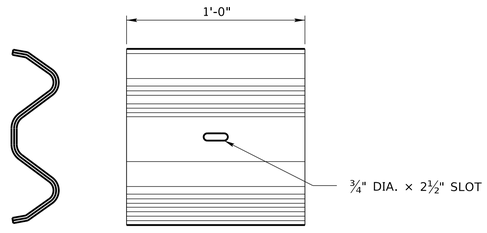


PLAN VIEW



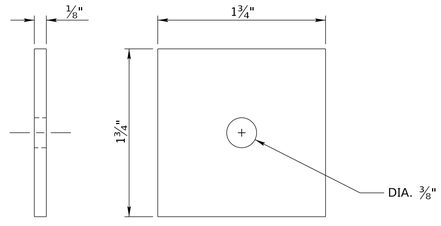
ELEVATION
(MGS SHOWN)

S3 x 5.7



SIDE FRONT

W-BEAM BACKUP PLATE



SIDE FRONT

SQUARE WASHER

NOTES:

ALL POSTS SHALL BE MANUFACTURED USING STEEL CONFORMING TO ASTM A36. THIS SECTION SHALL BE MANUFACTURED SUCH THAT IT CONFORMS TO THE GEOMETRY AND TOLERANCES OF ASTM A6 FOR A S3 x 5.7 S-SECTION. AFTER ALL PUNCHING, DRILLING, STAMPING AND WELDING IS COMPLETE, THE SECTION SHALL BE GALVANIZED ACCORDING TO ASTM A123. ALL HOLES SHALL BE PUNCHED THROUGH BOTH FLANGES (IN-LINE).

MATERIAL FOR HOT DIPPED ZINC-COATED BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A307 GRADE A.

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

UNIFIED NATIONAL COARSE (UNC.)
⅝" DIA. UNC. 1¼" LONG HEX BOLT AND NUT WITH 1¾" SQUARE WASHER BETWEEN THE BOLT HEAD AND FACE OF THE RAIL.

UNLESS NOTED OTHERWISE ALL WELDS AT E70xx.

FOR ADDITIONAL DETAILS SEE PLAN 743.

DELINEATORS SUBSIDIARY TO GUARDRAIL.

THE EPOXY USED TO SECURE THREADED RODS MUST HAVE A MINIMUM BOND STRENGTH OF 1305 PSI.

ANY OF THE FOUR MOUNTING TYPE 1-4 OR ATTACHMENT DESIGNS ON SHEETS 3-6 CAN BE USED WITH THE WEAK-POST, W-BEAM GUARDRAIL SYSTEM ATTACHED TO PARAPET.

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 747-R1

PARAPET GUARDRAIL ATTACHMENT

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

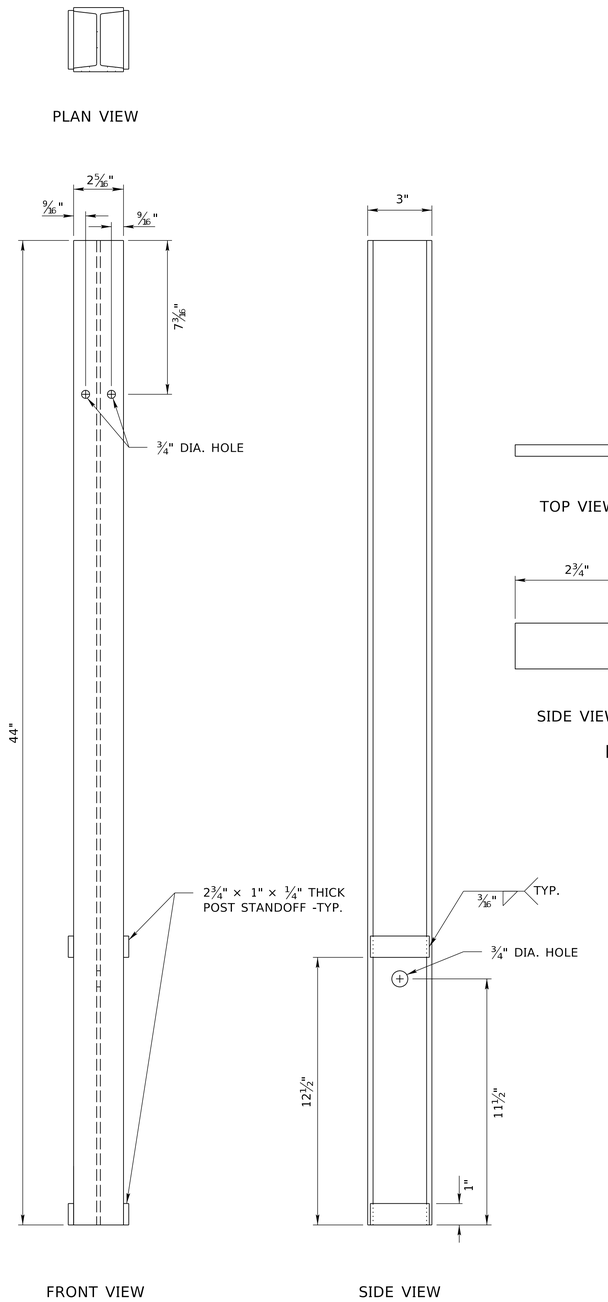
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

ORIGINAL:
DECEMBER 1, 2016
DATE

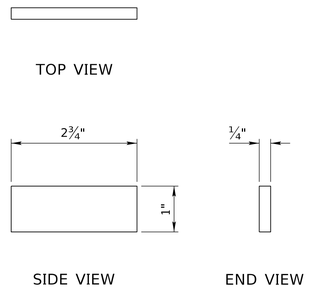
1
6

COMPUTER: BG04194187
DATE: 27-AUG-2024 14:30
FILE: 7470 0 R1.dgn

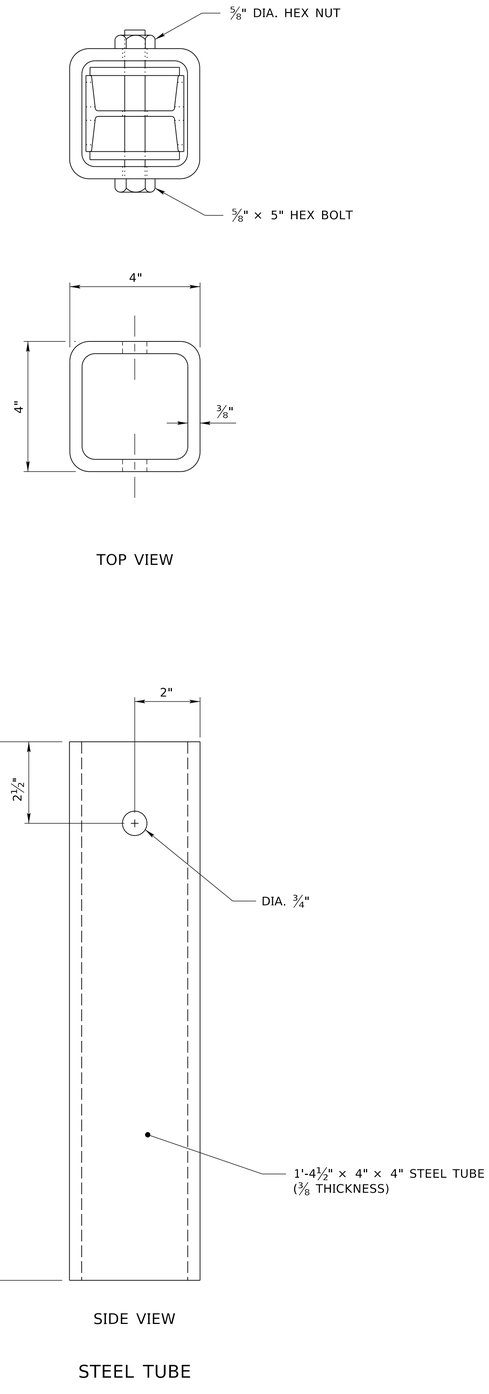
COMPUTER: BG0419M1187
DATE: 27-AUG-2024 14:30
FILE: 7470 0 R1.dgn



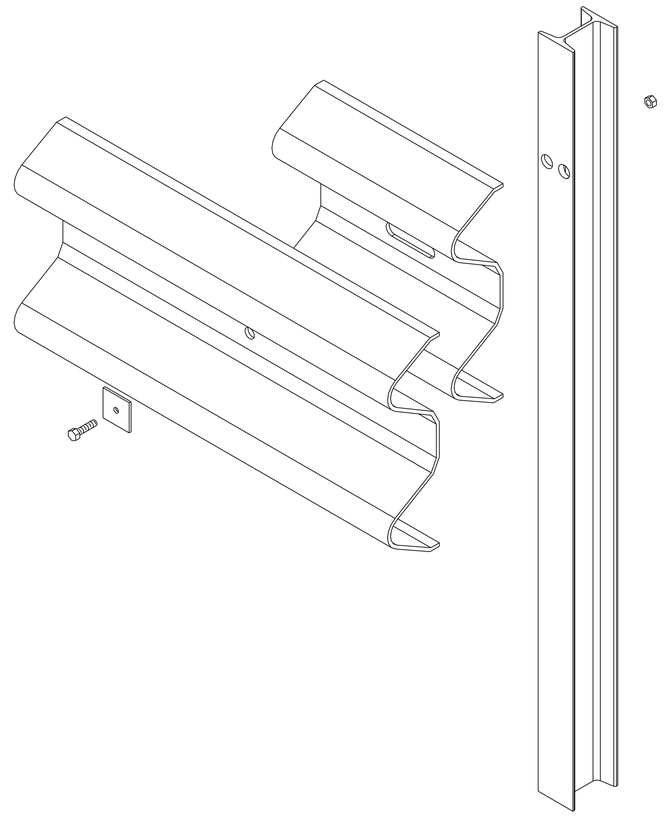
S3 x 5.7 POST



POST STANDOFF



STEEL TUBE



POST DETAILS

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 747-R1

PARAPET GUARDRAIL ATTACHMENT

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

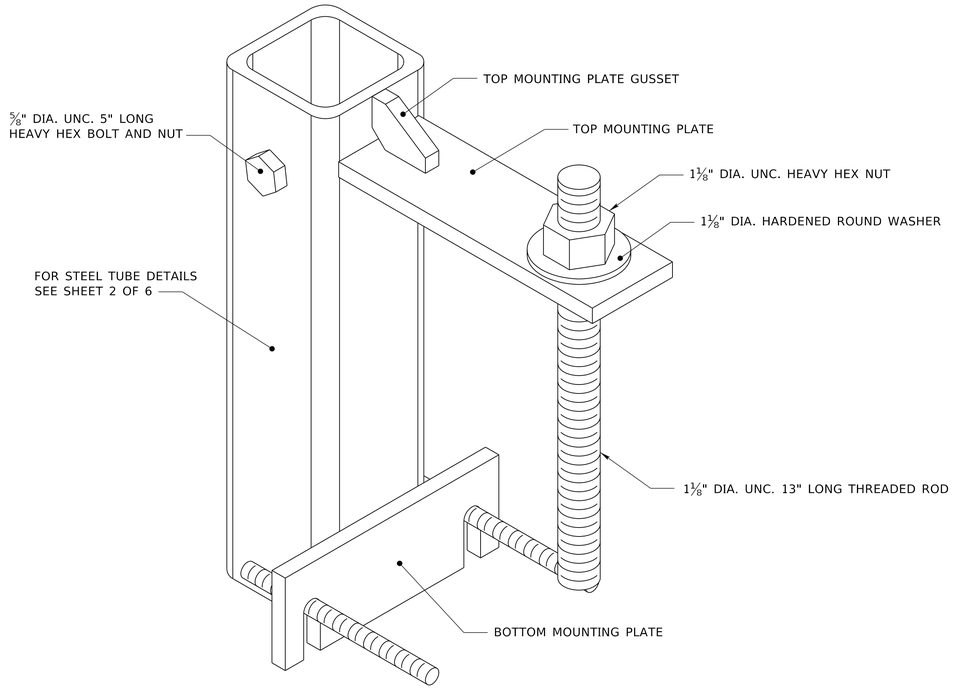
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

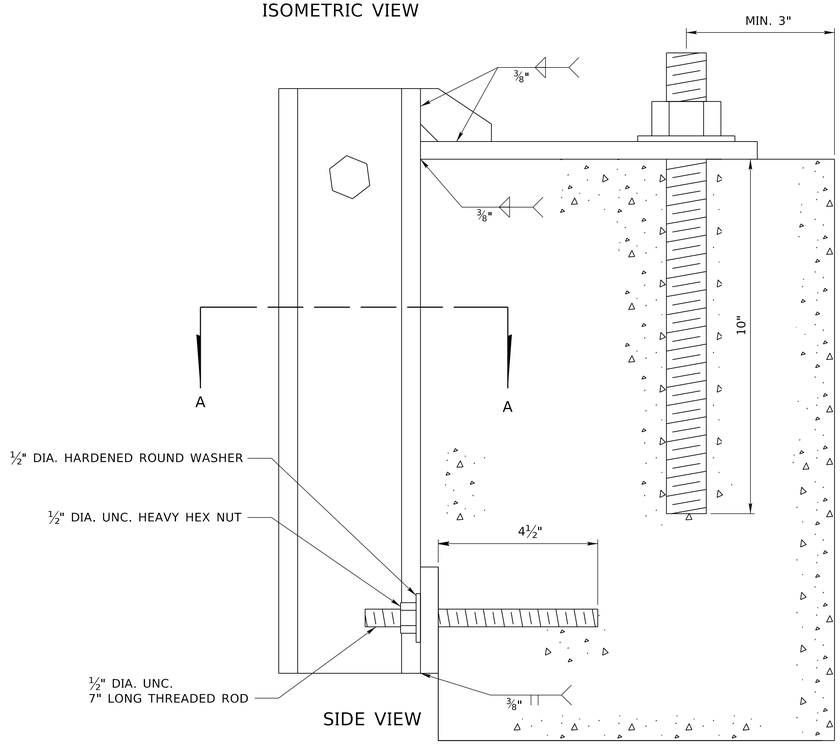
ORIGINAL:
DECEMBER 1, 2016
DATE

2
6

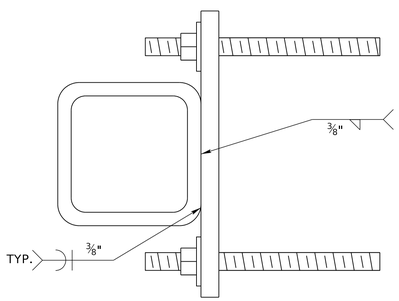
COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:30
FILE: 7470 0 R1.dgn



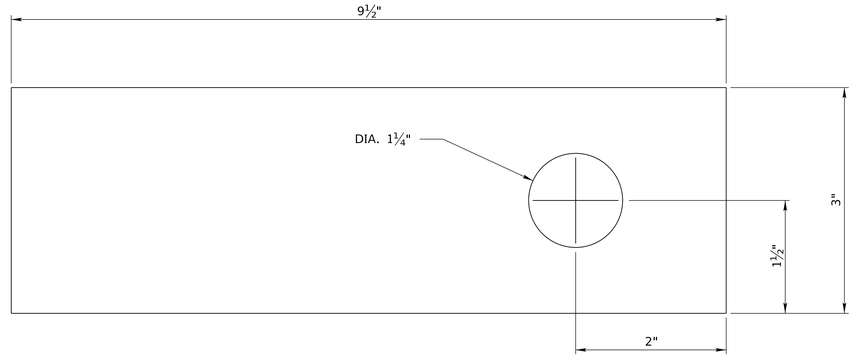
ISOMETRIC VIEW



SIDE VIEW

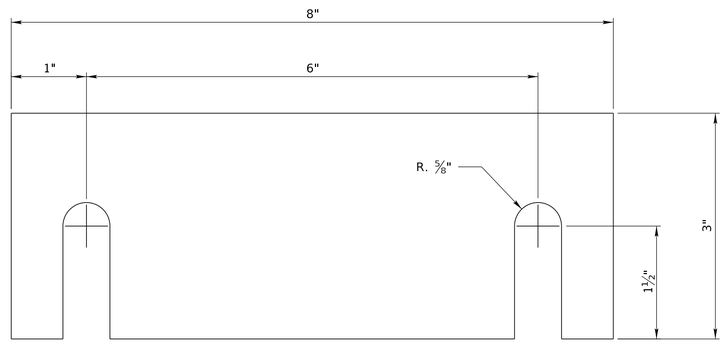


SECTION A-A



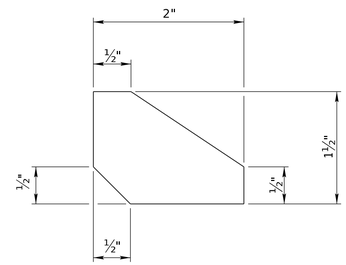
TOP MOUNTING PLATE

PL 9½" × 3" × ½"



BOTTOM MOUNTING PLATE

PL 8" × 3" × ½"



TOP MOUNTING PLATE GUSSET

PL 2" × 1½" × ½"

TYPE 1

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 747-R1

PARAPET GUARDRAIL ATTACHMENT

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

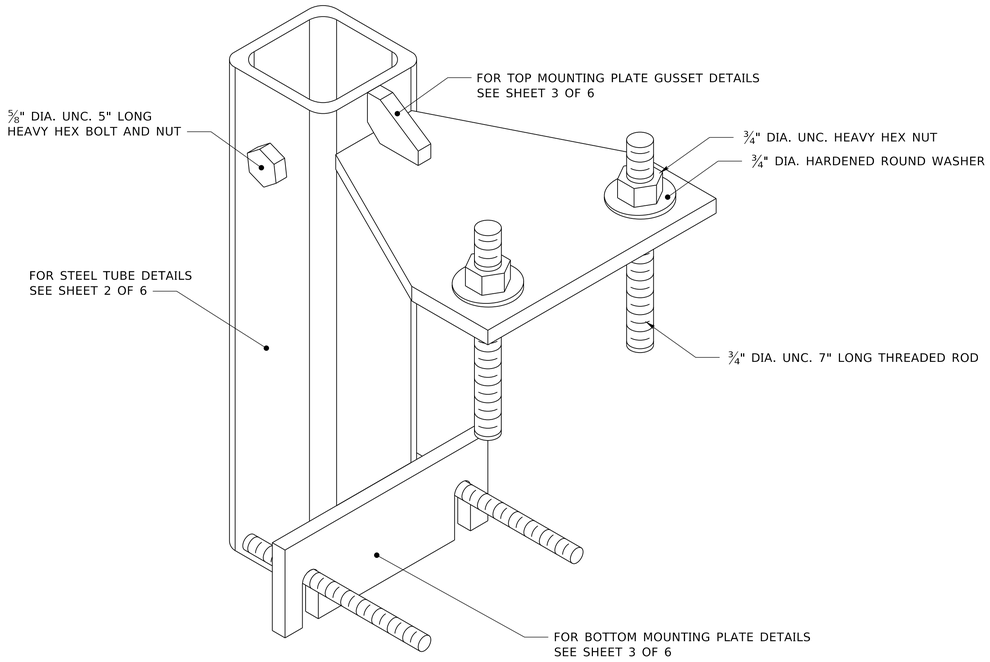
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

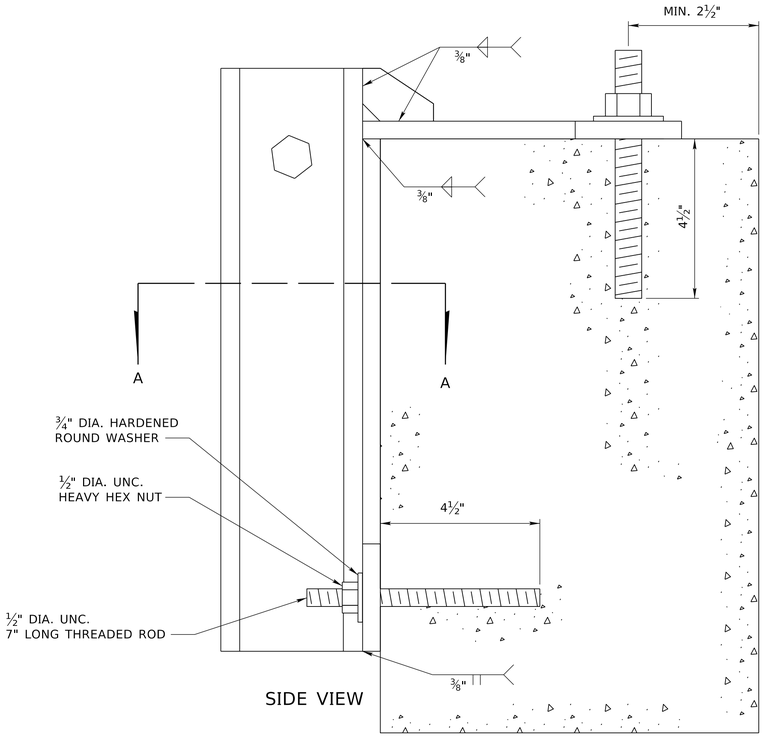
ORIGINAL:
DECEMBER 1, 2016
DATE

3
6

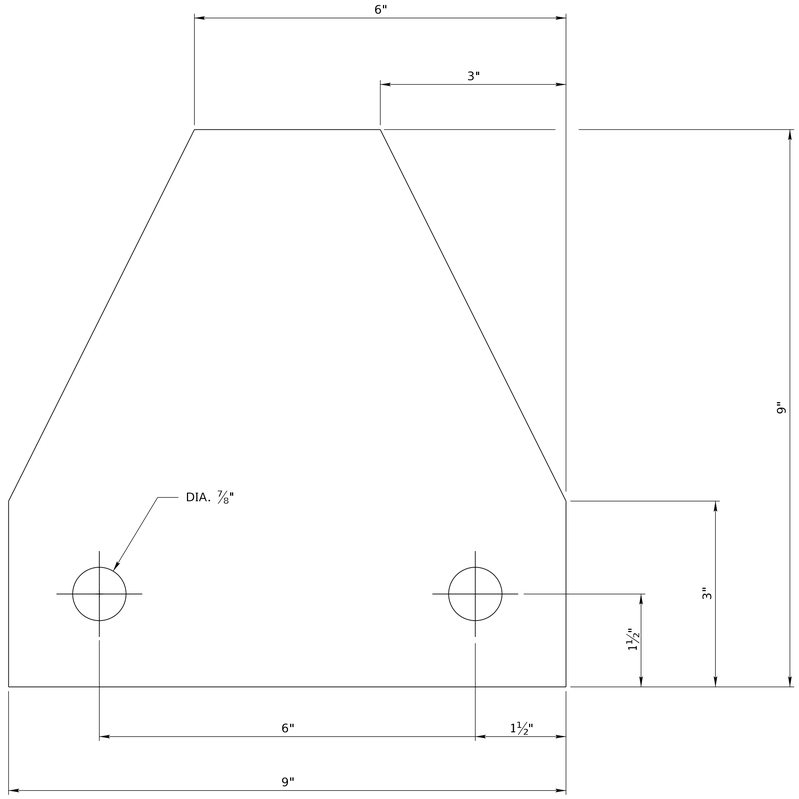
COMPUTER: BG04190187
DATE: 27-AUG-2024 14:30
FILE: 7470 0 R1.dgn



ISOMETRIC VIEW

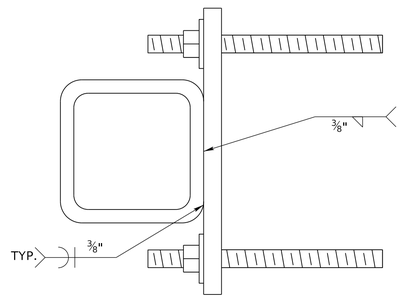


SIDE VIEW



TOP MOUNTING PLATE

PL 9" × 9" × ½"



SECTION A-A

TYPE 2

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 747-R1

PARAPET GUARDRAIL ATTACHMENT

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

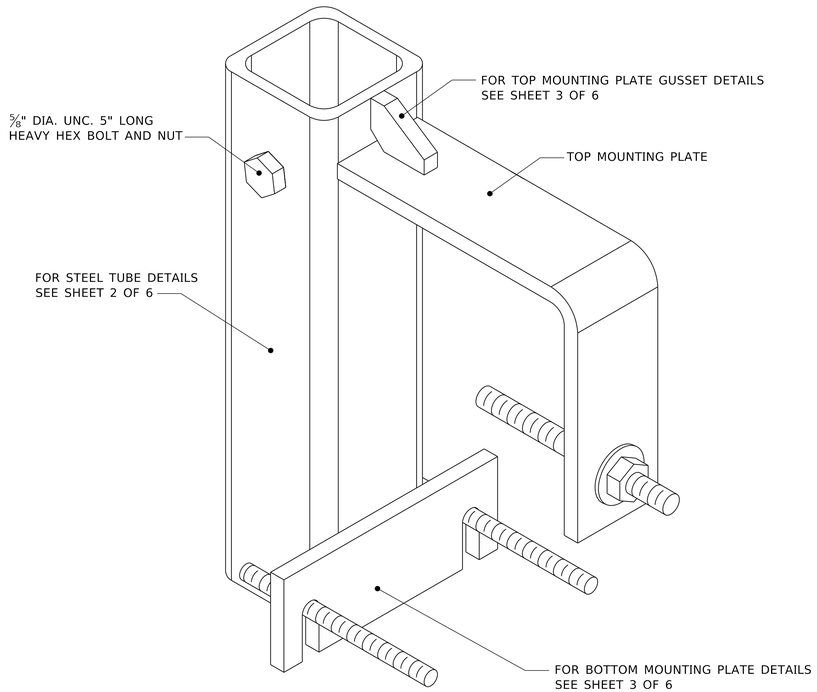
PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL:
DECEMBER 1, 2016
DATE

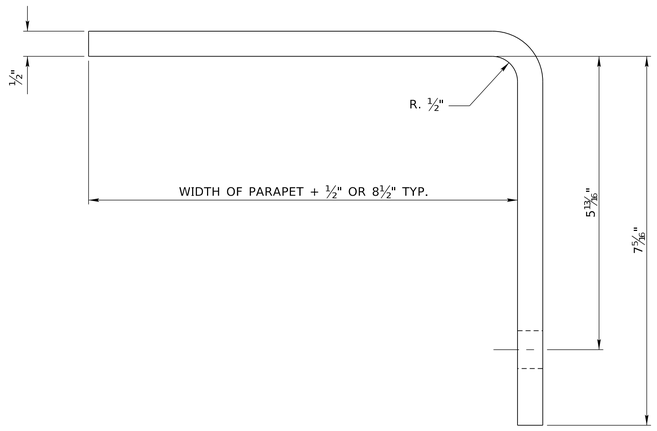
4
6

COMPUTER: BG04191M1187
DATE: 27-AUG-2024 14:30
FILE: 7470 0 R1.dgn

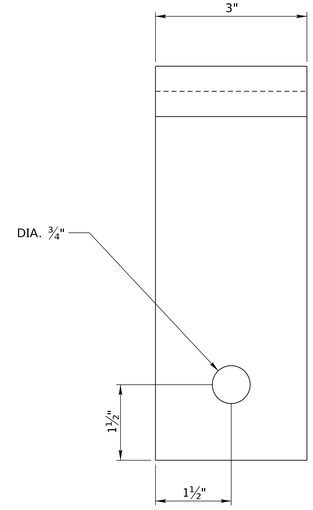


ISOMETRIC VIEW

TOP VIEW

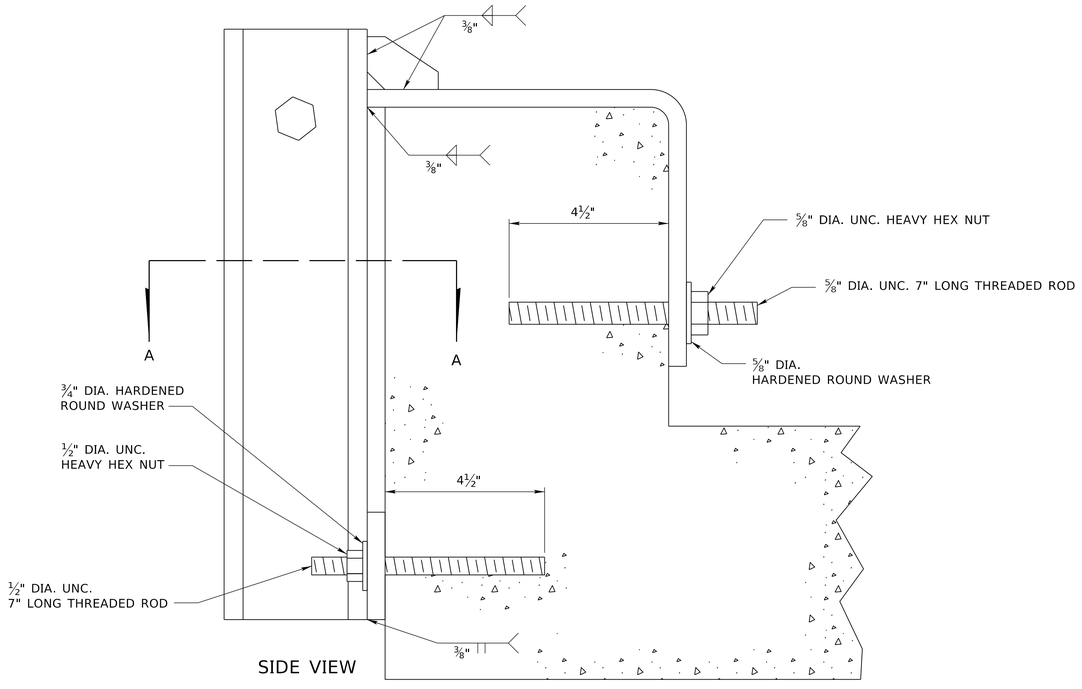


SIDE VIEW

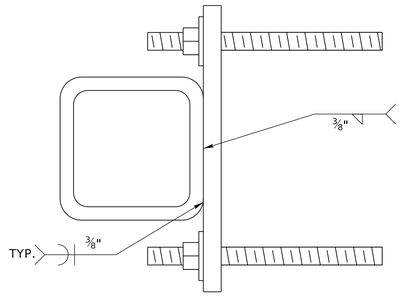


FRONT VIEW

TOP MOUNTING PLATE
PL 20" × 3" × 1/2"



SIDE VIEW



SECTION A-A

TYPE 3

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 747-R1

PARAPET GUARDRAIL ATTACHMENT

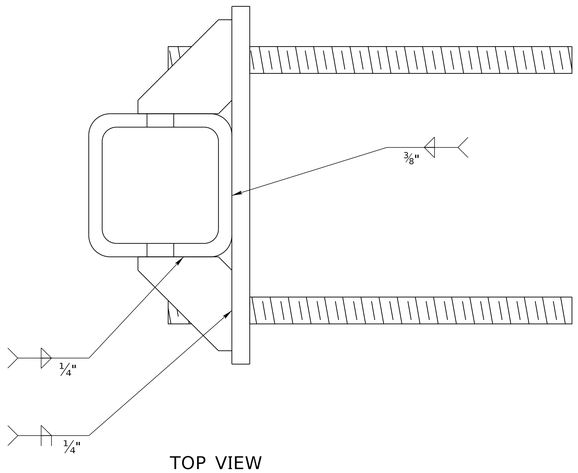
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

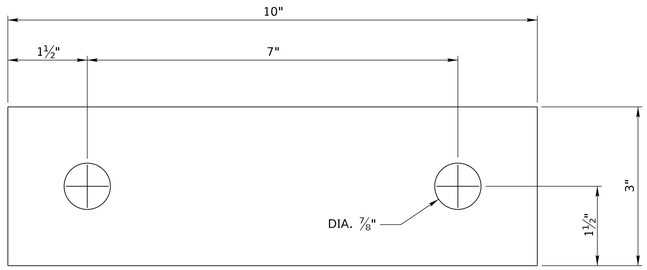
DATE

ORIGINAL:
DECEMBER 1, 2016
DATE

5
6

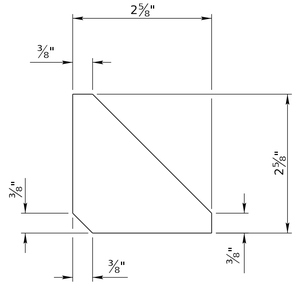


TOP VIEW



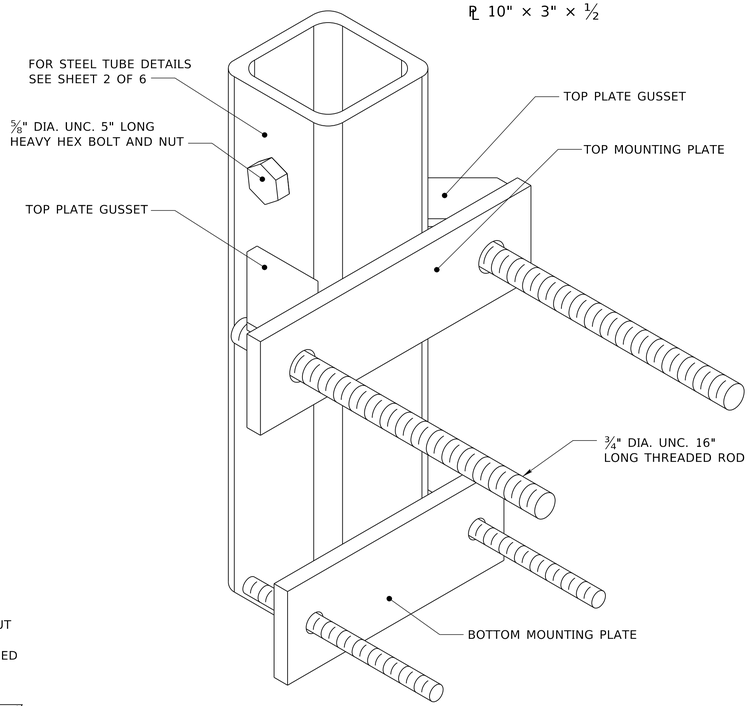
TOP MOUNTING PLATE

PL 10" × 3" × ½

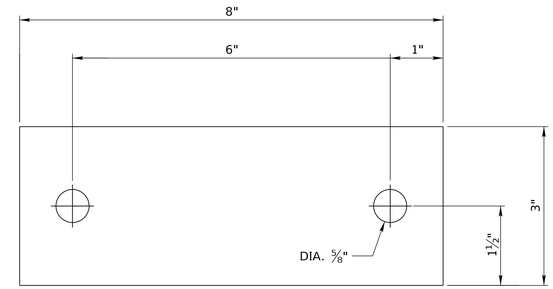


TOP PLATE GUSSET

PL 3" × 3" × ¼"

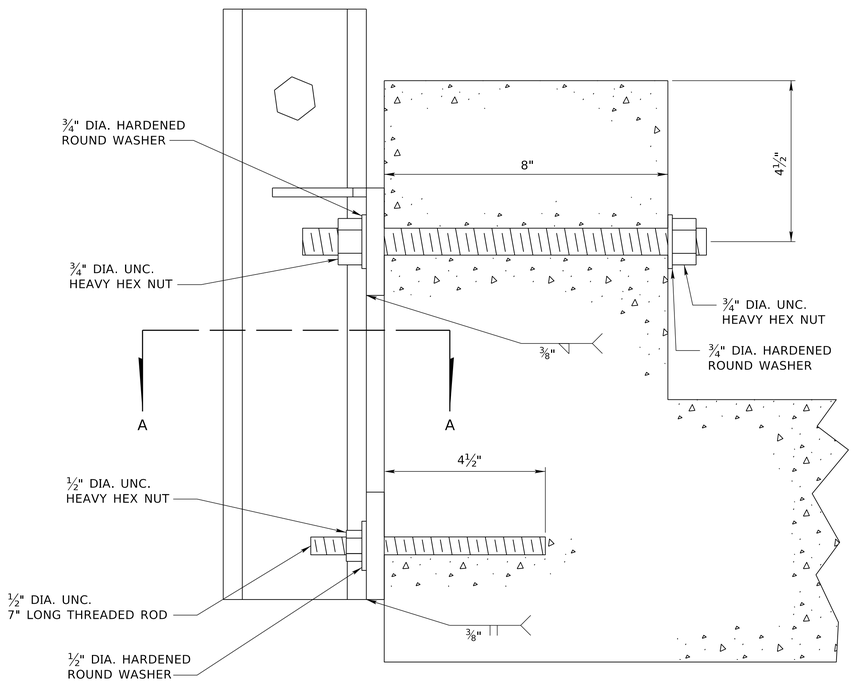


ISOMETRIC VIEW

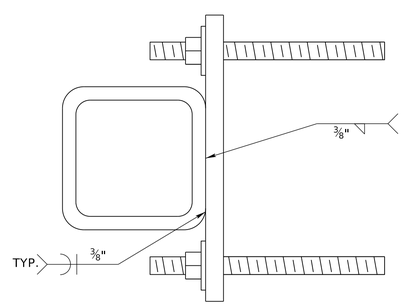


BOTTOM MOUNTING PLATE

PL 8" × 3" × ½"



SIDE VIEW



SECTION A-A

TYPE 4

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 747-R1

PARAPET GUARDRAIL ATTACHMENT

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

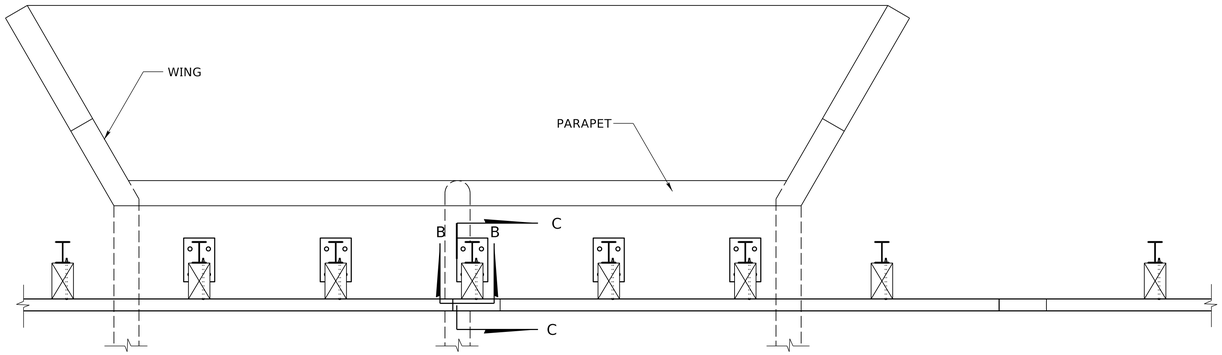
DATE

ORIGINAL:
DECEMBER 1, 2016
DATE

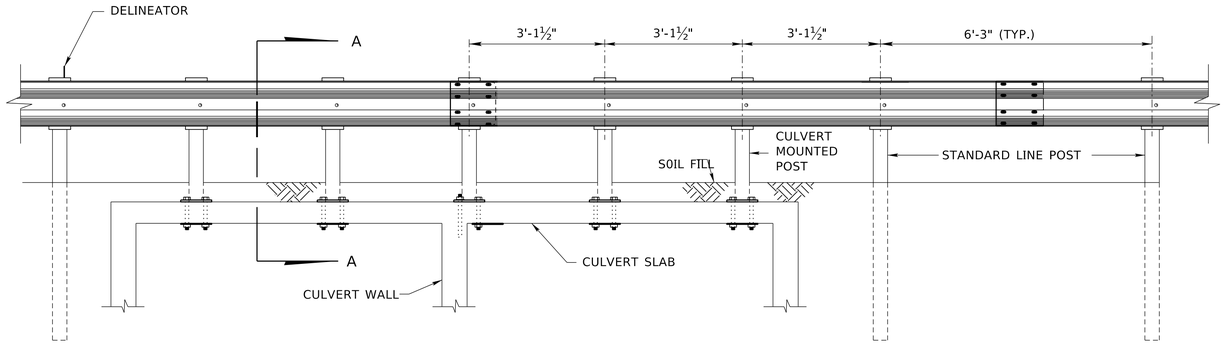
6
6

COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:30
FILE: 7470 0 R1.dgn

COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:30
FILE: 7480 0 R2.dgn

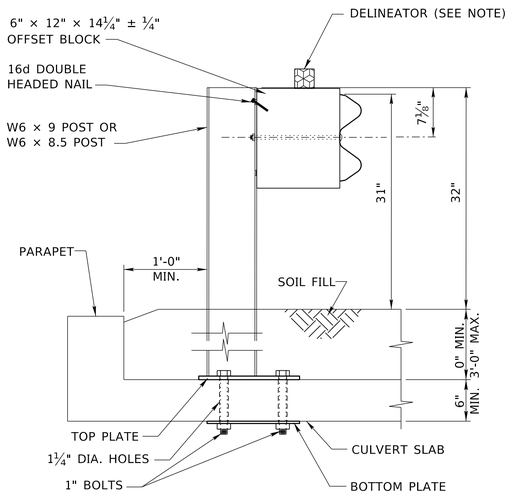


PLAN VIEW



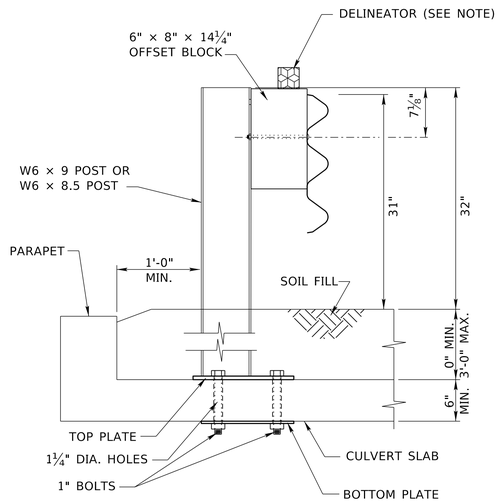
ELEVATION

(MGS SHOWN)



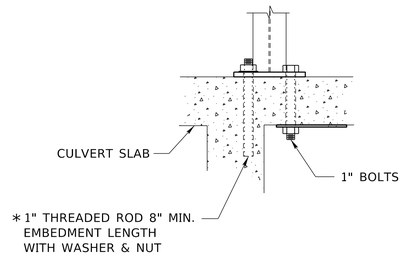
SECTION A-A

W-BEAM

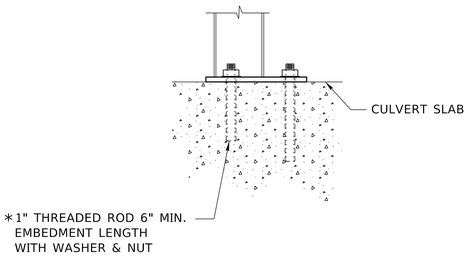


SECTION A-A

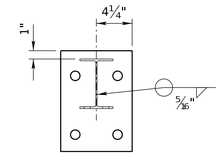
THRIE-BEAM



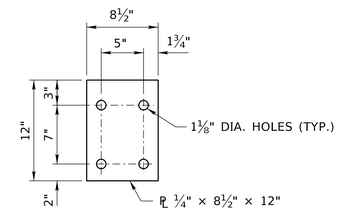
SECTION B-B



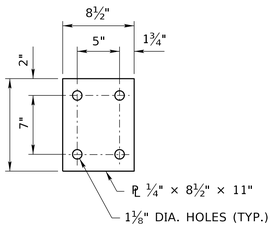
SECTION C-C



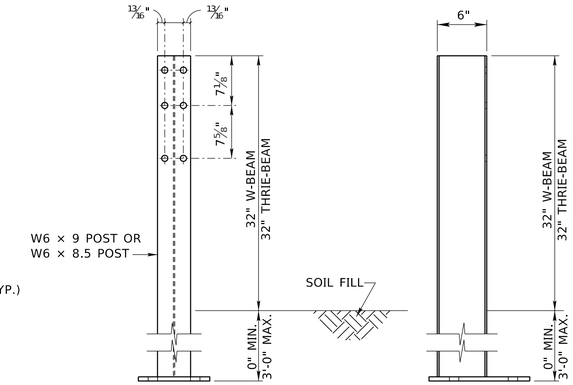
TOP PLATE W/POST



TOP PLATE



BOTTOM PLATE



FRONT VIEW SIDE VIEW

CULVERT MOUNTED GUARDRAIL POST

DELINEATOR NOTES:

DELINEATORS SUBSIDIARY TO GUARDRAIL.

NOTES:

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

POST WILL BE ANCHORED TO CULVERT SLABS USING ASTM A307 BOLTS AND NUTS WITH PLATES. THE LENGTH OF THE BOLTS WILL BE DETERMINED BY ADDING A MINIMUM OF 1¾" FOR EACH THREADED END TO THE THICKNESS OF THE CULVERT SLAB.

∗ ANCHORAGE WILL INCLUDE EPOXY-RESIN BASE BONDING SYSTEM PROVIDED ON THE NDOT APPROVED PRODUCTS LIST.

FOR ADDITIONAL DETAILS SEE PLAN 743.

TYPE I WITH BOTTOM PLATE

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	ALTERNATIVE PLATE
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 748-R2

CULVERT MOUNTED GUARDRAIL POST

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

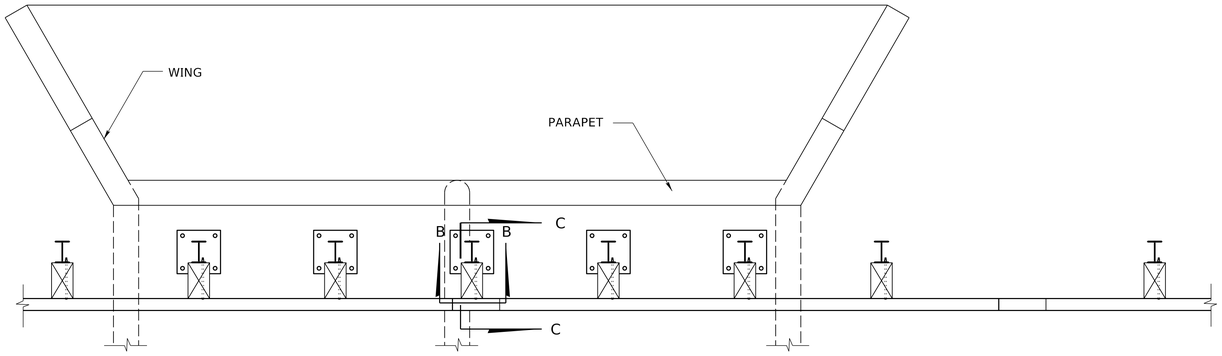
ORIGINAL: AUGUST 2011

DATE

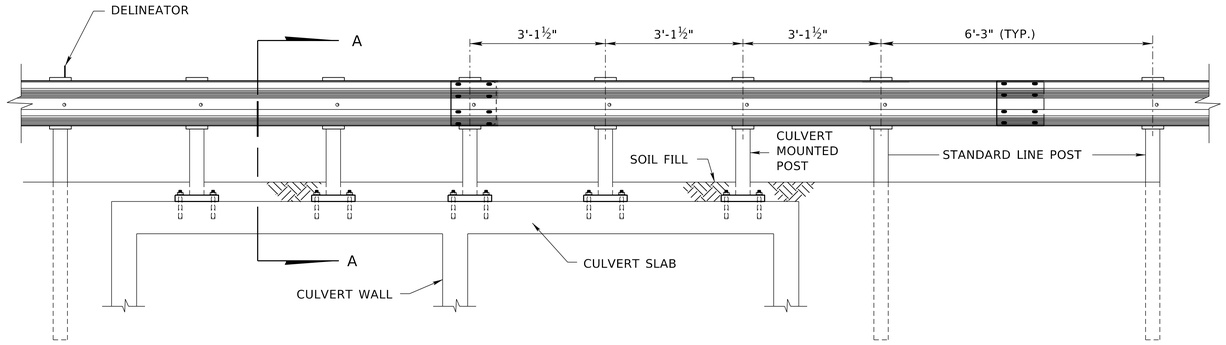
1
2

Plan 743 is also Required When Using This Plan.

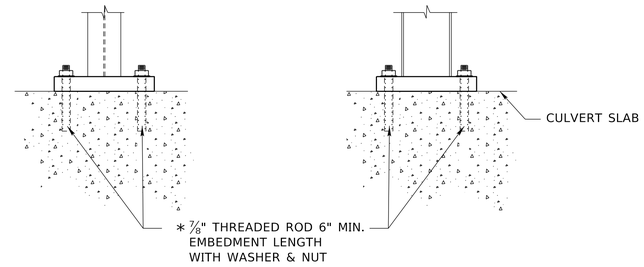
COMPUTER: BG041914187
DATE: 27-AUG-2024 14:30
FILE: 7480 0 R2.dgn



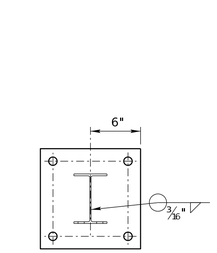
PLAN VIEW



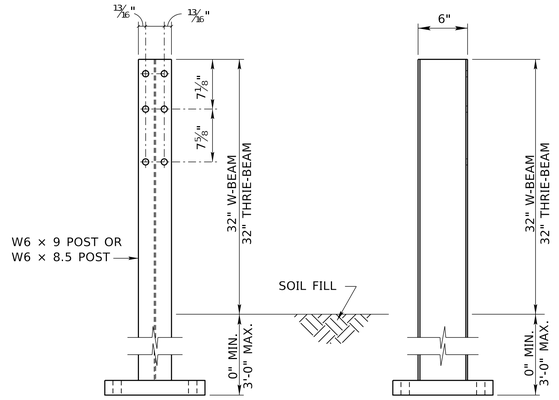
ELEVATION
(MGS SHOWN)



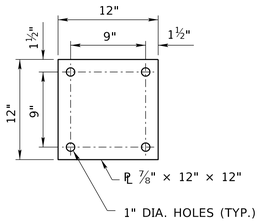
SECTION B-B SECTION C-C



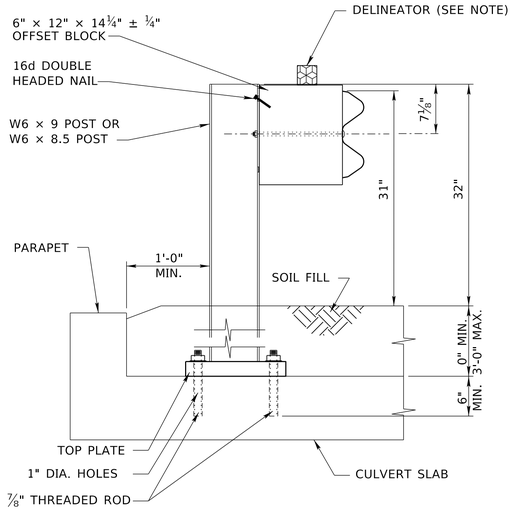
TOP PLATE W/POST



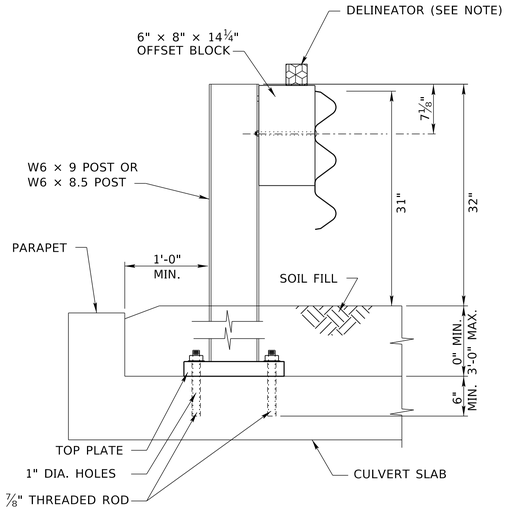
CULVERT MOUNTED GUARDRAIL POST



TOP PLATE



SECTION A-A
W-BEAM



SECTION A-A
THRIE-BEAM

DELINEATOR NOTES:

DELINEATORS SUBSIDIARY TO GUARDRAIL.

NOTES:

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

POST WILL BE ANCHORED TO CULVERT SLABS USING ASTM A307 BOLTS AND NUTS WITH PLATES.

∗ ANCHORAGE WILL INCLUDE EPOXY-RESIN BASE BONDING SYSTEM PROVIDED ON THE NDOT APPROVED PRODUCTS LIST.

FOR ADDITIONAL DETAILS SEE PLAN 743.

TYPE II WITHOUT BOTTOM PLATE

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	ALTERNATIVE PLATE
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 748-R2

CULVERT MOUNTED GUARDRAIL POST

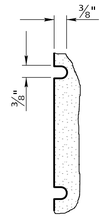
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER ★ MICHAEL H. OWEN E-6515 ★ STATE OF NEBRASKA

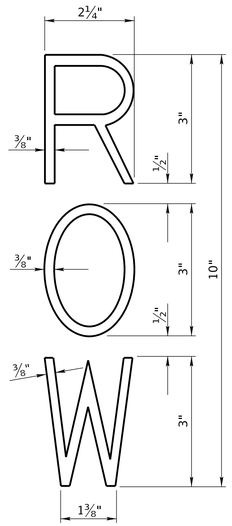
DATE

ORIGINAL: AUGUST 2011
DATE

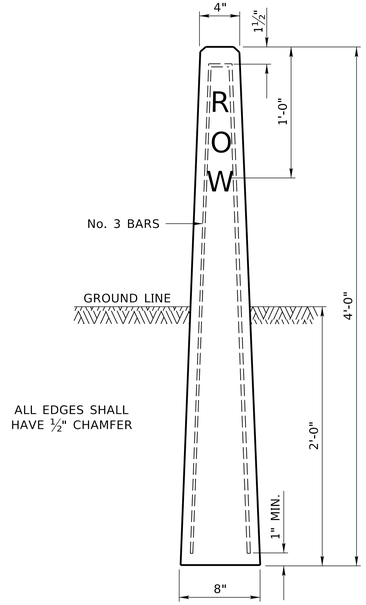
2
2



TYPICAL SECTION
THROUGH LETTER

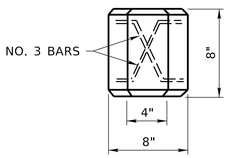


DETAIL OF LETTERS

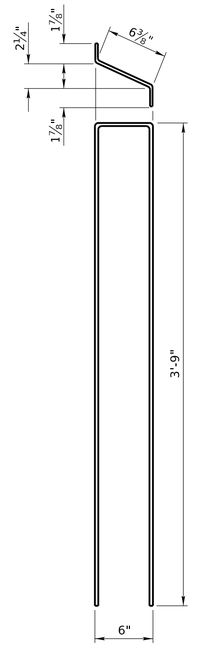


ALL EDGES SHALL
HAVE ½" CHAMFER

FRONT ELEVATION



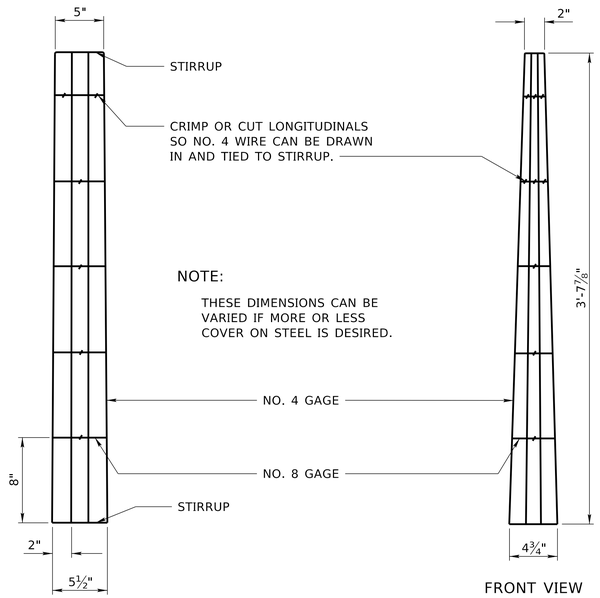
PLAN



NO. 3 BARS
(ALL DIMENSIONS ARE OUT TO OUT)
BENDING DIAGRAM

QUANTITIES

CONCRETE	0.05 CU. YDS.
REINFORCING STEEL	6.0 LBS.



SIDE VIEW

FRONT VIEW

QUANTITIES

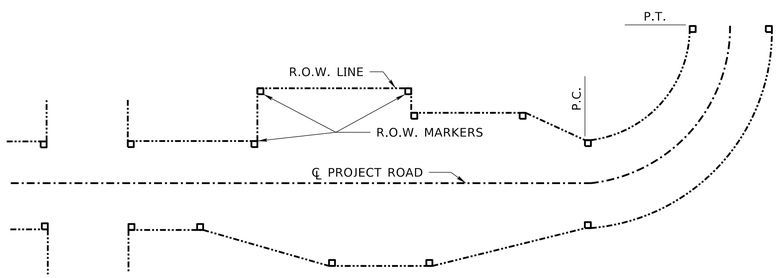
2 - PIECES 2 × 8 × 8/4 WELDED WIRE
MESH 44" LONG & 12" WIDE

1 - BOTTOM STIRRUP 4¾" × 5½" No. 8 GAGE

1 - TOP STIRRUP 2" × 5" No. 8 GAGE

APPROXIMATELY 20 TIE WIRES

ALTERNATE DESIGN



TYPICAL LOCATION SKETCH

MARKERS ARE TO BE SET WITH THE LETTERED FACE TOWARD THE CENTERLINE OF THE ROADWAY. MARKERS SHALL BE PLACED AT ALL BREAKS IN THE R.O.W. LINE AND AT TOP OF HILLS AND SHALL BE NOT MORE THAN 1000 FEET APART.

NOTES:

MARKERS SHALL NOT BE SET WITHIN CORPORATE LIMITS UNLESS OTHERWISE PROVIDED IN THE PLANS OR ORDERED BY THE ENGINEER.

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 804-R1

PRECAST CONCRETE R.O.W. MARKER

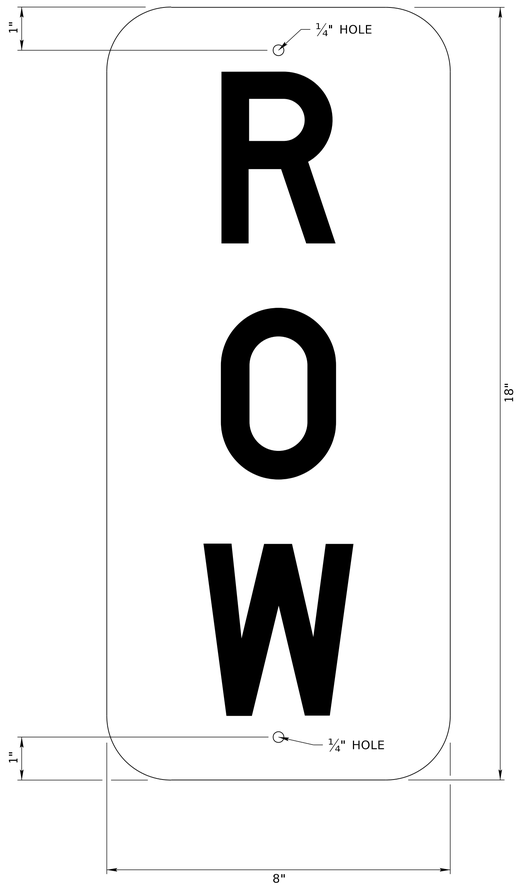
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

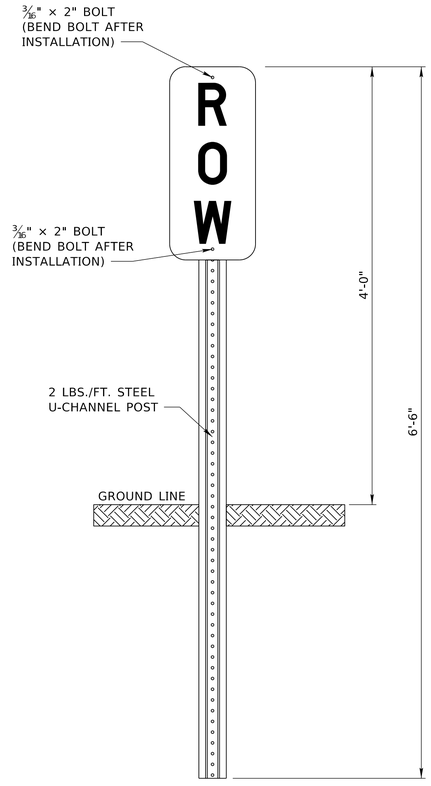
ORIGINAL:
NOVEMBER 26, 1974
DATE

1
1

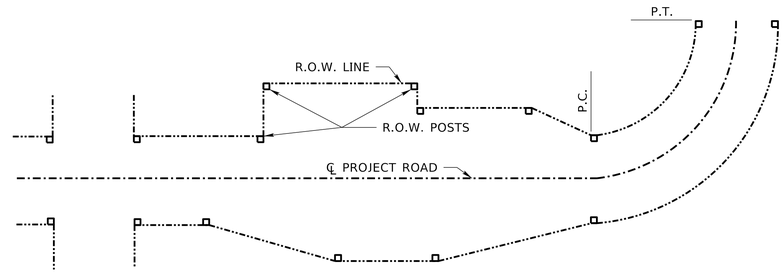
COMPUTER: BG04194593
DATE: 11-JUL-2025 08:16
FILE: 8040 0 R1.dgn



DETAIL OF SIGN
(NO BORDER W/BLACK ON ORANGE)



FRONT VIEW



TYPICAL LOCATION SKETCH

POSTS ARE TO BE SET WITH THE LETTERS FACING TOWARD THE CENTERLINE OF THE ROADWAY. POSTS SHALL BE PLACED AT ALL BREAKS IN THE R.O.W. LINE AND AT TOP OF HILLS AND SHALL BE NO MORE THAN 1,000 FEET APART.

NOTES:

POSTS SHALL NOT BE SET WITHIN THE CORPORATE LIMITS UNLESS OTHERWISE PROVIDED IN THE PLANS OR ORDERED BY THE ENGINEER.

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JUL 20	REWORKED NOTE
R1	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 805-R2

R.O.W. POST

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

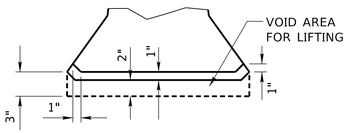
DATE

ORIGINAL:
JULY 14, 2010
DATE

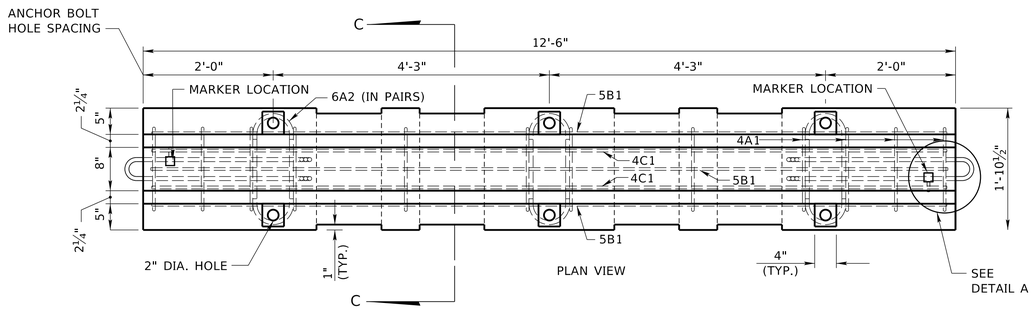
1
1

COMPUTER: BG04190M593
DATE: 11-JUL-2025 08:24
FILE: 8050 0 R2.dgn

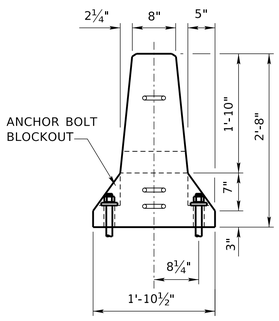
COMPUTER: BG0419M187
DATE: 27-AUG-2024 14:12
FILE: 8700 0 R0.dgn



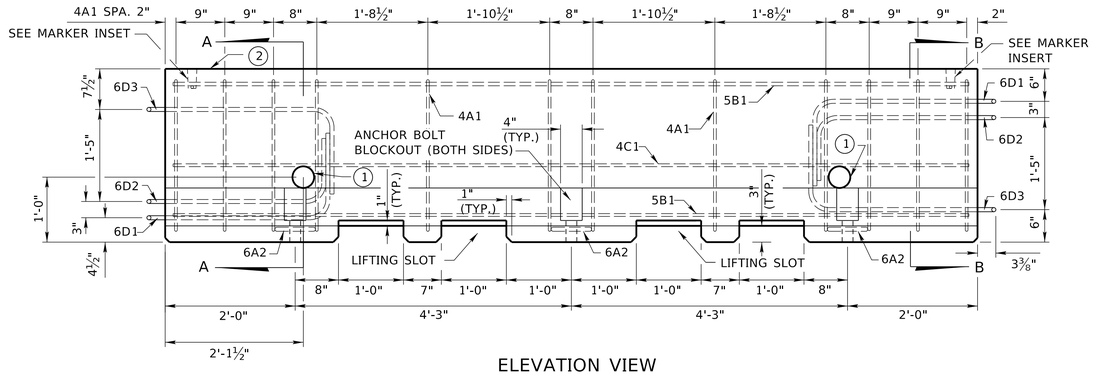
SECTION C-C
LIFTING SLOT DETAIL
(1" CHAMFER TO PREVENT SPALLING)



PLAN VIEW

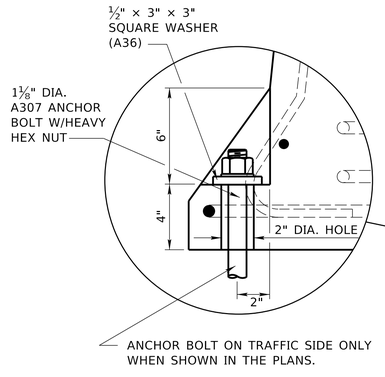


END VIEW

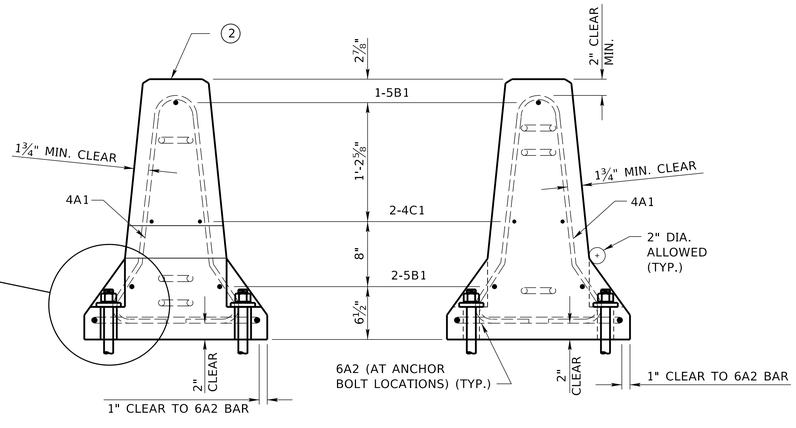


ELEVATION VIEW

∗ MARKED END

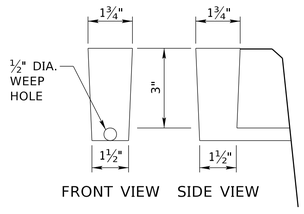


ANCHOR BOLT BLOCKOUT DETAIL



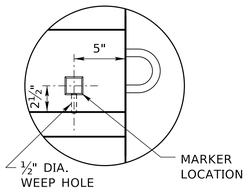
SECTION A-A
(STIRRUP PLACEMENT)

SECTION B-B
(STIRRUP PLACEMENT)



FRONT VIEW SIDE VIEW

MARKER INSERT



DETAIL A

NOTES:

THESE DETAILS ARE FOR THE FABRICATION AND INSTALLATION OF CONCRETE PROTECTION BARRIER. DETAILS SHOWN ARE TYPICAL.

CONCRETE PROTECTION BARRIERS SHALL BE MADE OF 5,000 psi CONCRETE AND BE PRECAST IN ACCORDANCE WITH APPLICABLE PORTIONS OF SECTION 705 IN THE STANDARD SPECIFICATIONS. THE FORMS MAY BE REMOVED WHEN THE CONCRETE HAS ATTAINED A COMPRESSIVE STRENGTH OF 2,175 psi. THE BARRIERS MAY BE TRANSPORTED WITHIN THE PLANT ONCE THE CONCRETE HAS ATTAINED A COMPRESSIVE STRENGTH OF 3,000 psi. THE BARRIERS MAY BE SHIPPED WHEN THE CONCRETE HAS ATTAINED A COMPRESSIVE STRENGTH OF 5,000 psi.

REINFORCING STEEL USED WITHIN THE CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF ASTM A 615 GRADE 60.

THE LOOP REINFORCING STEEL (BARS 6D1, 6D2 & 6D3) SHALL BE SMOOTH, MEETING THE REQUIREMENTS OF ASTM A 706 GRADE 60 OR ASTM A 615 GRADE 60, MODIFIED TO MEET THE FOLLOWING PHYSICAL AND CHEMICAL REQUIREMENTS. THE LOOP SHALL PASS A 180° BEND TEST ON A 2¾" PIN.

TENSILE REQUIREMENTS	
YIELD STRENGTH, MINIMUM PSI	60,000
TENSILE STRENGTH, MINIMUM PSI	80,000
ELONGATION IN 8 INCH, MINIMUM	14%

CHEMICAL COMPOSITION	
ELEMENT	MAXIMUM%
CARBON	0.30
MANGANESE	1.50
PHOSPHORUS	0.035
SULFUR	0.045
SILICON	0.50

THE CONTRACTOR OR SUPPLIER SHALL FURNISH THE MATERIALS & RESEARCH DIVISION THE MANUFACTURERS CERTIFIED TEST REPORTS FOR THE ACTUAL HEAT OF STEEL BEING USED THAT SHOWS THE CHEMICAL AND PHYSICAL TEST RESULTS FOR THE LOOP REINFORCING STEEL BEFORE COATING OR FABRICATION BEGINS.

ALL STEEL SHALL BE ZINC-COATED (GALVANIZED) AS SPECIFIED BELOW OR EPOXY COATED TO NEBRASKA STANDARDS.

ZINC-COATED (GALVANIZED) STEEL BARS SHALL MEET THE REQUIREMENTS OF ASTM A 123, (COATING GRADE 100, MINIMUM COATING--2.30 OZ. PER SQUARE FOOT). THE BARS SHALL BE FABRICATED PRIOR TO GALVANIZING. THE PROCEDURES OF ASTM A 143 SHALL BE OBSERVED AS APPLICABLE. ALL ZINC COATING DAMAGE DUE TO FABRICATION OR HANDLING SHALL BE REPAIRED WITH A ZINC DUST (ZINC-RICH) FORMULATION IN ACCORDANCE WITH ASTM A 780.

THE COATING PLANT INTENDING TO SUPPLY THE LOOP REINFORCING STEEL SHALL NOTIFY THE MATERIALS AND RESEARCH DIVISION (402-479-4746 OR 402-479-3849) TWO TO THREE WEEKS BEFORE PROCESSING ANY MATERIAL TO ARRANGE FOR NDOT PERSONNEL TO INSPECT THE MATERIAL DURING THE COATING AND FABRICATION PROCESS.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER A LETTER CERTIFYING THE CONCRETE PROTECTION BARRIERS FOR USE ON THIS PROJECT ARE MADE IN ACCORDANCE WITH THESE PLANS.

CONCRETE PROTECTION BARRIERS ARE THE PROPERTY OF THE CONTRACTOR.

THE CONTRACTOR SHALL PROVIDE FOR AN APPROVED MONITORING SCHEDULE, WITH A PERSON ON CALL, AND AVAILABLE 24 HOURS A DAY, EACH DAY OF THE WEEK, TO REALIGN CONCRETE PROTECTION BARRIER WHICH HAS BEEN STRUCK. INITIATION OF SERVICE SHALL BE WITHIN ONE HOUR OF NOTIFICATION OF NEED.

(1) 4" DIAMETER PVC OR 11 GAUGE STEEL ROUND MECHANICAL TUBING SLEEVE.

(2) ONE END OF EACH BARRIER SHALL BE PERMANENTLY MARKED WITH THE FOLLOWING INFORMATION:

- TYPE C
- MANUFACTURER
- DATE MANUFACTURED (MONTH AND YEAR)

USE 1⅛" DIA. ASTM A 307 ANCHOR BOLTS WITH HEAVY HEX NUT & WASHER (A36). USE ASTM A36 NON COATED STEEL FOR THE CONNECTION PIN.

SURFACE PREPARATION: WHEN PLACED ON A PAVED SURFACE ALL LOOSE DIRT AND SAND SHALL BE REMOVED FROM THE ROADWAY SURFACE PRIOR TO PLACEMENT OF THE BARRIER.

BARRIERS MUST BE PULLED TIGHT DURING INSTALLATION TO REMOVE SLACK.

AT NO TIME SHALL THE BARRIERS BE LIFTED BY USE OF THE LOOP BARS: 6D1, 6D2 OR 6D3.

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 870

CONCRETE PROTECTION BARRIER

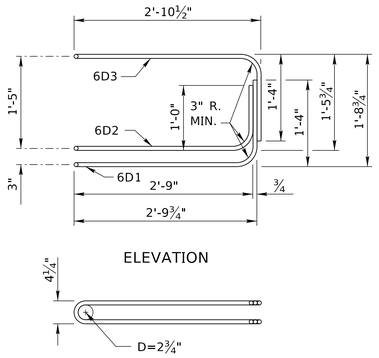
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

PROFESSIONAL CIVIL ENGINEER
MICHAEL H. OWEN
E-6515
STATE OF NEBRASKA

DATE

ORIGINAL:
JULY 2020
DATE

1
2

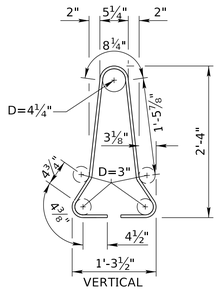


ELEVATION

PLAN

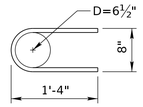
LOOP BAR ASSEMBLY

(MARKED END SHOWN, ROTATE FOR OTHER END)
(MATERIAL AS STATED IN GENERAL NOTES)
(DIMENSIONS ARE OUT TO OUT OF BARS UNLESS OTHERWISE NOTED)



VERTICAL STIRRUPS

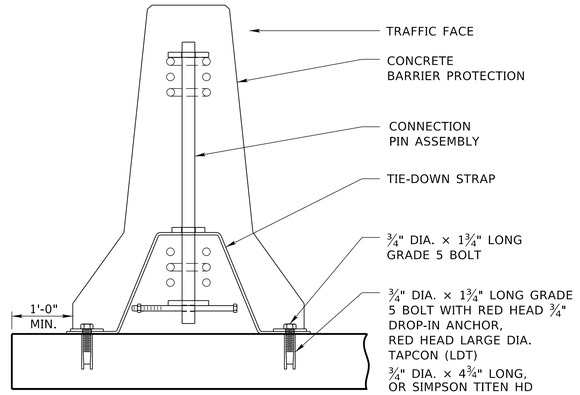
4A1



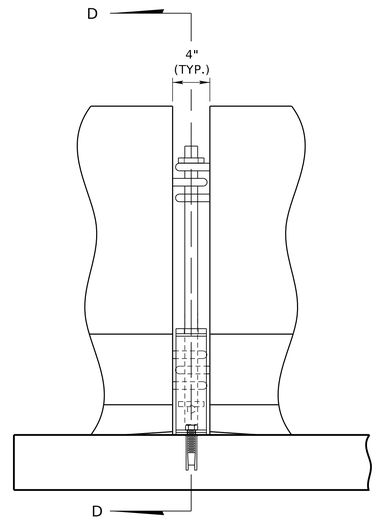
6A2

REINFORCING STEEL A615 GRADE 60 PER 12'-6" BARRIER					
BAR	BAR SIZE	SHAPE	NO. OF BARS	LENGTH FT.	WEIGHT LBS.
4A1	4		12	6'-0"	48.1
6A2	6		6	2'-11"	26.3
5B1	5		3	12'-2"	38.1
4C1	4		2	12'-2"	16.3
LOOP STEEL (SEE NOTES)					
6D1	6		2	8'-5"	25.3
6D2	6		2	7'-7"	22.8
6D3	6		2	8'-6"	25.5

CONCRETE QUANTITY = 1.3 CU. YD.



SECTION D-D



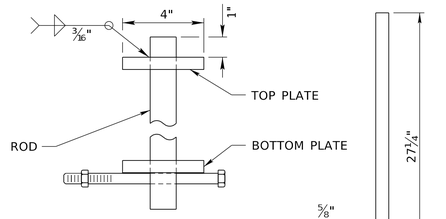
TIE DOWN DETAILS (STRAP)

TIE-DOWN NOTES:

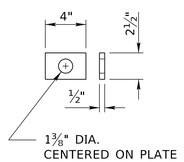
TIE DOWN STRAPS ARE REQUIRED ONLY WHERE THE CONCRETE PROTECTION BARRIER IS WITHIN 2 FEET OF A 3 FEET OR GREATER DROP-OFF. HOLES INTO THE PAVEMENT TO ANCHOR THE CONCRETE PROTECTION BARRIER MAY BE DRILLED AFTER POSITIONING THE CONCRETE PROTECTION BARRIER RAIL.

WHEN THE ANCHOR BOLTS ARE REMOVED, THE HOLES SHOULD BE FILLED WITH A NON-SHRINK GROUT FROM THE APPROVED PRODUCT LIST, MEETING THE REQUIREMENTS OF ASTM C 1107 FOR GRADE B OR C.

CONCRETE PROTECTION BARRIER TIE DOWNS ARE CONSIDERED SUBSIDIARY TO THE PAY ITEM "CONCRETE PROTECTION BARRIER".

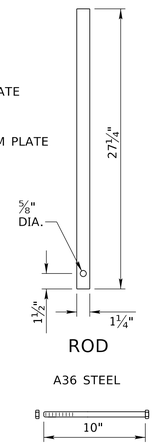


ENLARGED PIN DETAIL



TOP & BOTTOM PLATE

A36 STEEL



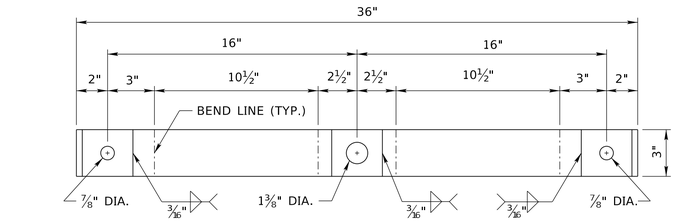
ROD

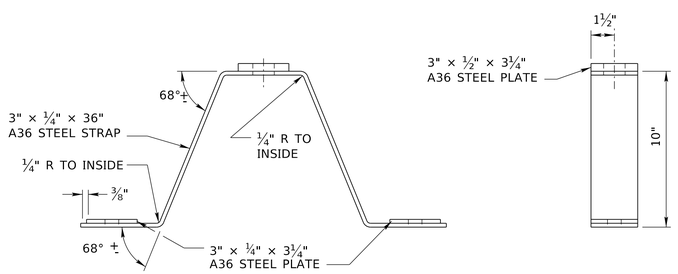
A36 STEEL

BOLT & NUT

½" DIA. × 10" BOLT & NUT (ASTM A 325)

CONNECTION PIN DETAILS





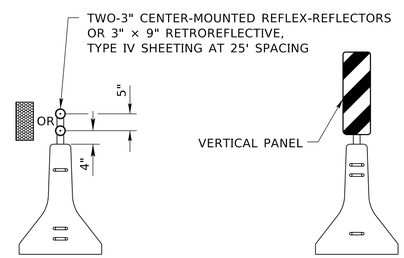
TIE-DOWN STRAP DETAILS

MARKER NOTES:

THE COLOR OF THE REFLECTORS SHALL MATCH THE COLOR OF THE ADJACENT EDGE LINE.

VERTICAL PANELS MOUNTED ON LEFT SIDE OF TRAFFIC SHALL BE VP-1L, RIGHT SIDE SHALL BE VP-1R, AT EVERY 2 × S = __(FT) SPACING ON TOP OF BARRIER, EVERY S(FT) SPACING ALONG BARRIER TAPER. INSTALL VERTICAL PANEL IN PLACE OF REFLECTOR WHEN BOTH FALL IN SAME LOCATION.
(S = POSTED SPEED LIMIT IN MPH)

THE CONTRACTOR SHALL FURNISH VERTICAL PANELS, REFLECTORS AND A BRACKET TO SUPPORT THE VERTICAL PANELS AND REFLECTORS IN A STABLE POSITION ON THE CONCRETE PROTECTION BARRIERS. THE BRACKET SHALL BE CONSTRUCTED OF A MATERIAL THAT MAY BEND, BUT NOT COME LOOSE IF STRUCK BY A PASSING VEHICLE. THE CONTRACTOR SHALL MAINTAIN THE MARKERS AND PROMPTLY REPAIR OR REPLACE ANY DAMAGED OR MISSING UNITS. ALL COSTS FOR FURNISHING, INSTALLING AND MAINTAINING REFLECTORS SHALL BE INCLUDED IN THE PRICE BID FOR THE CONCRETE PROTECTION BARRIER.



MARKER PLACEMENT DETAIL

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 870

CONCRETE PROTECTION BARRIER

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

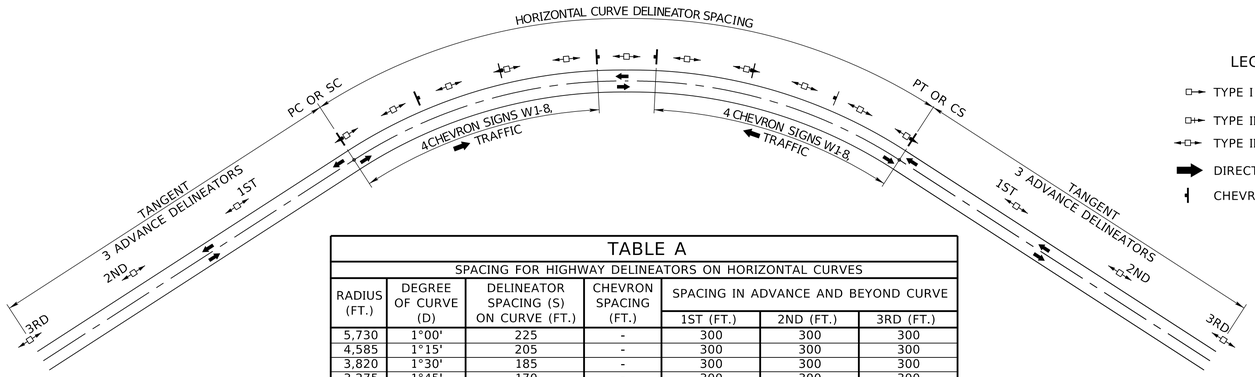
PROFESSIONAL CIVIL ENGINEER * MICHAEL H. OWEN E-6515 * STATE OF NEBRASKA

DATE

ORIGINAL: JULY 2020
DATE

2
2

FILE: 8700 0 R0.dgn DATE: 27-AUG-2024 14:12 COMPUTER: BG04194187



LEGEND

- TYPE I DELINEATOR
- TYPE II DELINEATOR
- TYPE III DELINEATOR
- DIRECTION OF TRAVEL
- CHEVRON ALIGNMENT SIGN

TABLE A						
SPACING FOR HIGHWAY DELINEATORS ON HORIZONTAL CURVES						
RADIUS (FT.)	DEGREE OF CURVE (D)	DELINEATOR SPACING (S) ON CURVE (FT.)	CHEVRON SPACING (FT.)	SPACING IN ADVANCE AND BEYOND CURVE		
				1ST (FT.)	2ND (FT.)	3RD (FT.)
5,730	1°00'	225	-	300	300	300
4,585	1°15'	205	-	300	300	300
3,820	1°30'	185	-	300	300	300
3,275	1°45'	170	-	300	300	300
2,865	2°00'	160	200	300	300	300
2,545	2°15'	150	200	300	300	300
2,290	2°30'	140	200	280	300	300
2,085	2°45'	135	200	270	300	300
1,910	3°00'	130	195	260	300	300
1,765	3°15'	125	190	250	300	300
1,635	3°30'	120	180	240	300	300
1,530	3°45'	115	175	230	300	300
1,430	4°00'	110	165	220	300	300
1,275	4°30'	105	155	210	300	300
1,145	5°00'	100	150	200	300	300
1,040	5°30'	95	140	190	285	300
955	6°00'	90	135	180	270	300
820	7°00'	85	125	170	255	300
715	8°00'	80	120	160	240	300
640	9°00'	75	110	150	225	300
575	10°00'	70	105	140	210	300

DELINEATOR SPACING FOR SPECIFIC CURVES NOT SHOWN SHOULD BE ROUNDED DOWN TO THE NEAREST DISTANCE AS SHOWN IN TABLE A. SPACINGS WHICH FALL OUTSIDE THE VALUES SHOWN IN THE TABLE SHOULD BE COMPUTED FROM THE FORMULA $S=3\sqrt{\text{RADIUS OF CURVE - 50}}$ AND ROUNDED DOWN TO THE NEAREST 5 FT. INCREMENT. THE MINIMUM SPACING SHOULD BE 20 FT. THE SPACING ON CURVES SHOULD NOT EXCEED 300 FT. THE SPACING OF THE FIRST DELINEATOR APPROACHING A CURVE IS 2S, THE SECOND 3S, AND THE THIRD IS 6S, BUT NOT TO EXCEED 300 FT. IF A SPACING LESS THAN 300 FT. IS USED APPROACHING THE CURVE, THE DISTANCES SHOWN ABOVE SHOULD BE ADJUSTED ACCORDINGLY.

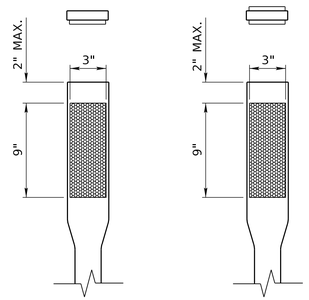
CHEVRONS SHOULD BE INSTALLED AT 1 1/2 DELINEATOR SPACING, NOT TO EXCEED 200 FT.

TABLE B
TYPE III DELINEATOR SPACING FOR TANGENT FILL SECTIONS WITHOUT GUARDRAIL

LENGTH (FT.)	SPACING (FT.)
150-250	50
OVER 250	100

WHEN FILL SECTIONS ARE DEEPER THAN 10 FT., LONGER THAN 150 FT., AND HAVE SHOULDER SECTIONS LESS THAN 6 FT., WITH A FORESLOPE STEEPER THAN 1:3.

ONE SIDED TWO SIDED



TYPE I/II TYPE III

FLEXIBLE POST

NOTES

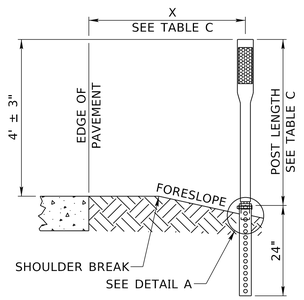
DELINEATORS

1. DELINEATOR REFLECTOR COLOR SHALL CONFORM TO THE COLOR OF THE ADJACENT STRIPED EDGE LINE UNLESS OTHERWISE NOTED.
2. ALL DELINEATORS SHALL BE MOUNTED TRULY VERTICAL.
3. ALL STEEL U-CHANNEL DELINEATOR POSTS SHALL BE PAINTED BLACK OR DARK GREEN WITH ENAMEL PAINT. THEIR WEIGHT SHALL BE 1.12 TO 3 LBS./FT. ALL FLEXIBLE DELINEATOR POSTS SHALL BE BLACK UNLESS OTHERWISE NOTED.
4. DELINEATORS SHALL BE PLACED 2 FT. TO 8 FT. OUTSIDE THE OUTER EDGE OF THE PAVEMENT. DELINEATORS FOR RAMPS AND GORES SHALL BE PLACED 6 FT. OUTSIDE THE OUTER EDGE OF THE PAVEMENT. WHEN DELINEATORS ARE TO BE INSTALLED WHERE GUARDRAIL IS IN PLACE, THE DELINEATOR POST SHALL BE DRIVEN IN LINE AND ADJACENT TO GUARDRAIL POSTS. SEE TABLE C OR D FOR DELINEATOR POST LENGTHS.
5. TYPICALLY, DELINEATORS WILL NOT BE REQUIRED ON CURVES OF LESS THAN 1°.
6. WHEN UNIFORM SPACING IS INTERRUPTED BY SUCH FEATURES AS DRIVEWAYS AND INTERSECTIONS, DELINEATORS WHICH WOULD ORDINARILY BE LOCATED WITHIN THE FEATURES MAY BE RELOCATED IN EITHER DIRECTION FOR A DISTANCE NOT EXCEEDING ONE QUARTER OF THE UNIFORM SPACING. DELINEATORS STILL FALLING WITHIN SUCH FEATURES MAY BE ELIMINATED.
7. INSTALL DELINEATOR REFLECTORS ON THE SAME POST AS THE CHEVRON SIGN WHEN THE DELINEATOR LOCATION IS WITHIN 25 FT. OF THE CHEVRON SIGN. (STEEL POST ONLY).
8. TYPE I DELINEATORS SHALL BE INSTALLED AT 100 FT. INTERVALS ALONG ON RAMPS, EXCEPT FOR CURVES SHARPER THAN 5° WHERE THE SPACING WILL BE IN ACCORDANCE WITH TABLE A.
9. TYPE II DELINEATORS SHALL BE INSTALLED AT 100 FT. INTERVALS ALONG TRANSITION LANES, ACCELERATION LANES, DECELERATION LANES, AND ALONG OFF RAMPS, EXCEPT FOR CURVES SHARPER THAN 5° WHERE SPACING WILL BE IN ACCORDANCE WITH TABLE A.
10. WHEN USED ON EXPRESSWAY OR FREEWAY-TYPE FACILITIES, TYPE I DELINEATORS SHALL BE SPACED AT 0.05 MILE ALONG THE THROUGH ROAD, INCLUDING CURVES UP TO 1°30' (RADIUS 3,820 FT.). DELINEATOR MEASUREMENTS SHALL BE MADE TO CORRESPOND WITH THE HIGHWAY REFERENCE POST (I.E. EVERY 20TH DELINEATOR SHALL BE MOUNTED ON THE REFERENCE POST AT THE RECOMMENDED HEIGHT WITH THE REFERENCE NUMBER PLACED ABOVE).
11. WHEN INSTALLED ON CURVES OF 3° OR GREATER, STEEL TYPE III DELINEATORS SHALL BE INSTALLED ON MOUNTING BRACKETS, TO HOLD THE DELINEATORS PERPENDICULAR TO APPROACHING TRAFFIC. A LIGHT ALUMINUM STRAP ¾" TO 1½" WIDE MAY BE USED FOR THE BRACKET TO ADJUST THE ANGLE OF THE DELINEATOR TO APPROACHING TRAFFIC, APPROXIMATELY 200 FT. FROM THE DELINEATOR POST.
12. 3" × 9" RETROREFLECTIVE PANELS MAY BE USED IN LIEU OF ROUND REFLECTORS ON STEEL POST DELINEATORS. IF USED, 3" × 9" PANELS MAY BE USED FOR TYPE I, II OR III DELINEATORS.

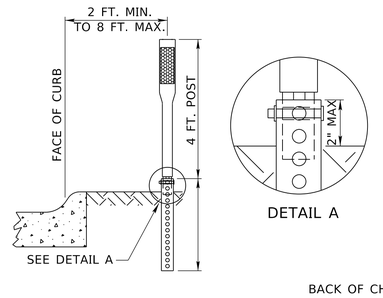
CHEVRONS

1. ALL CHEVRON SIGNS SHALL BE MOUNTED TRULY VERTICAL.
2. ALL POSTS USED FOR CHEVRONS SHALL BE 10 FT. STEEL, HEAVY BLACK OR DARK GREEN ENAMEL TYPE, AND POST'S WEIGHT SHALL NOT BE LESS THAN 2.5 LB./FT.
3. FOR CURVES OF 2° OR MORE, FOUR CHEVRON SIGNS (W1-8) SHALL BE USED FOR EACH DIRECTION OF TRAVEL ON THE CURVE.
4. THE CONTRACTOR WILL INSTALL CHEVRON SIGNS (FURNISHED BY THE STATE) ON 10 FT. POSTS (SUPPLIED BY THE CONTRACTOR). INSTALLATION OF THE CHEVRON SIGNS, 10 FT. POSTS, HARDWARE AND DELINEATOR BUTTONS WHEN REQUIRED, ON THE SAME POST, ARE INCLUDED IN THE PAY ITEM "INSTALL CHEVRON."
5. THE FIRST CHEVRON SIGN SHALL BE PLACED AT THE BEGINNING OF THE CURVE FOLLOWED BY THE NEXT THREE CHEVRON SIGNS AT THE REQUIRED SPACING.
6. CHEVRONS ARE NOT REQUIRED ON CURVES LESS THAN 2°.
7. WHEN AN ADVISORY SPEED PLAQUE INDICATES A REDUCTION OF SPEED GREATER THAN 15 MILES PER HOUR, THE ONE-DIRECTIONAL LARGE ARROW SIGN (W1-6-48) SHOULD BE USED INSTEAD OF THE CHEVRON SIGN. WHEN USED, INSTALL A MINIMUM OF TWO ARROWS STARTING WITH THE SECOND CHEVRON LOCATION BEYOND THE BEGINNING OF THE CURVE.

TABLE C FLEXIBLE DELINEATOR POST				
X (FT.)	POST LENGTH & FORESLOPE			
	1:10 (FT.)	1:6 (FT.)	1:4 (FT.)	1:3 (FT.)
2	4	4	4	4
4	4	5	5	5
6	5	5	5	6
8	5	5	6	6

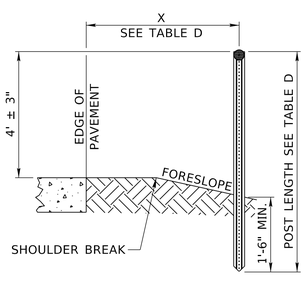


FLEXIBLE DELINEATOR POST

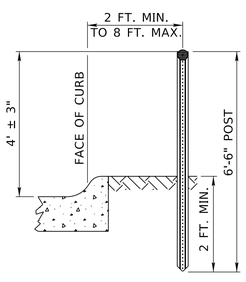


FLEXIBLE DELINEATOR POST

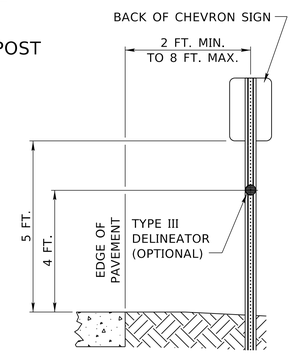
TABLE D STEEL DELINEATOR POST				
X (FT.)	POST LENGTH & FORESLOPE			
	1:10 (FT.)	1:6 (FT.)	1:4 (FT.)	1:3 (FT.)
2	6.5	6.5	6.5	6.5
4	6.5	7.0	7.0	7.0
6	6.5	7.0	7.5	8.0
8	6.5	7.5	8.0	8.5



STEEL DELINEATOR POST

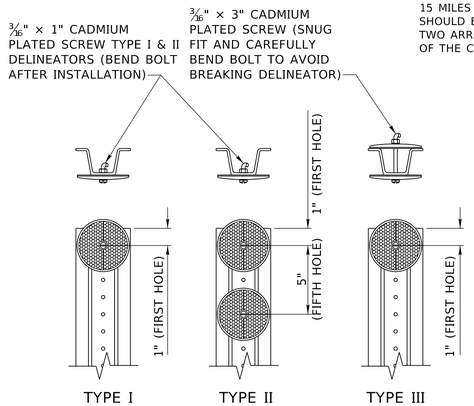


STEEL DELINEATOR POST



CHEVRON SIGN POSTS

DELINEATOR POST LOCATIONS



STEEL POST

TYPICAL DELINEATOR MOUNTINGS

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JUL 20	CHANGES MADE TO NOTE #3
R11	JAN 19	MULTIPLE CHANGES & PAGE 2 ADDED
R10	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 901-R12

HIGHWAY DELINEATORS AND CHEVRONS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

DATE

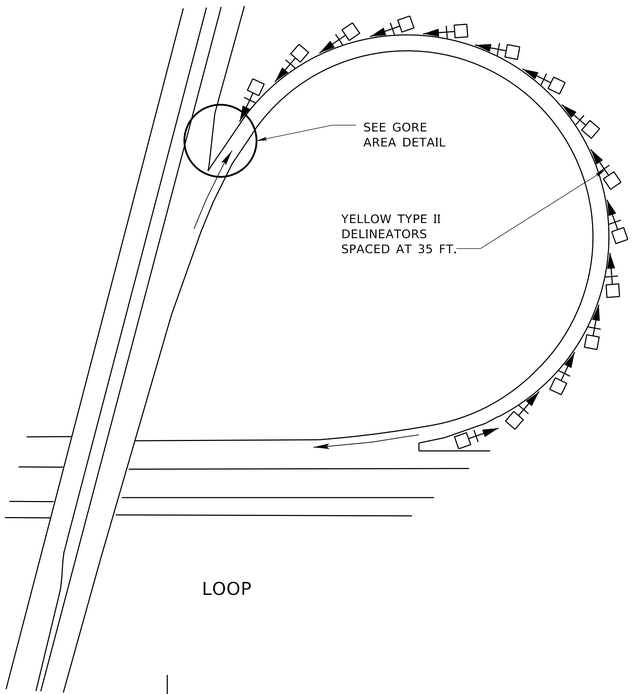
ORIGINAL: JUNE 11, 1975

DATE

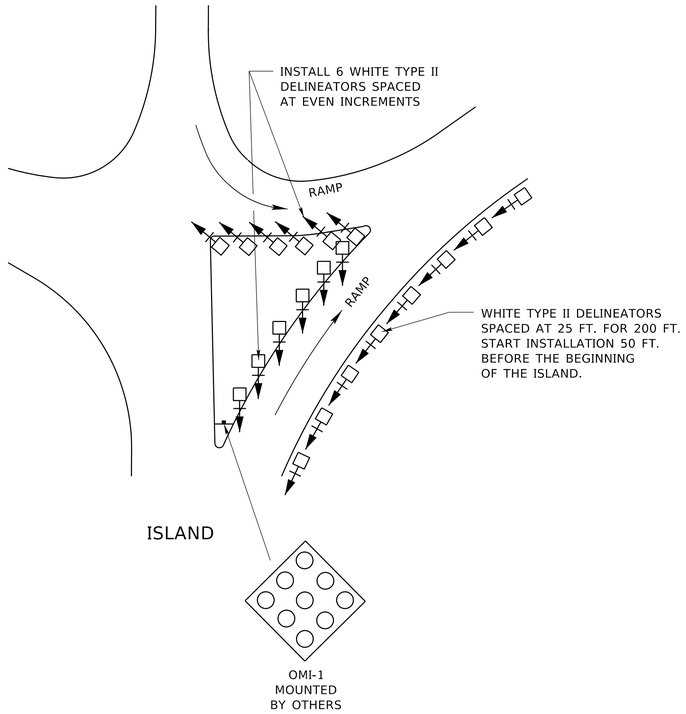
1 2

COMPUTER: BG041MI187
DATE: 27-AUG-2024 13:53
FILE: 9010 0 R12.dgn

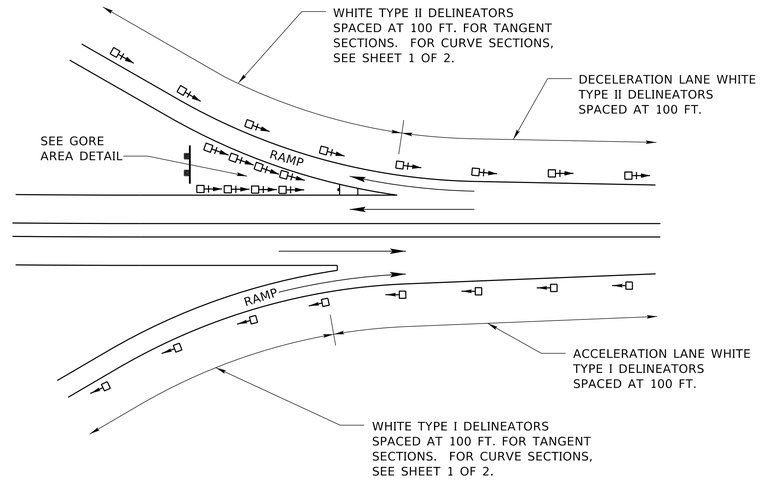
COMPUTER: BG04194187
DATE: 27-AUG-2024 13:53
FILE: 9010 0 R12.dgn



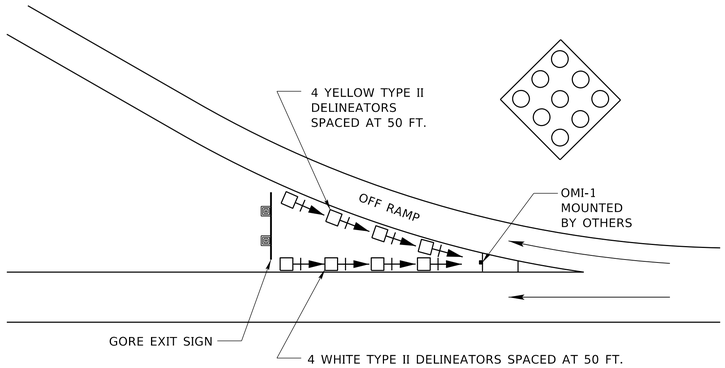
LOOP



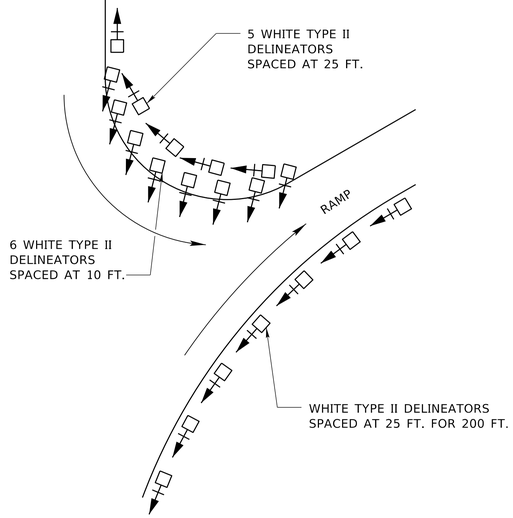
ISLAND



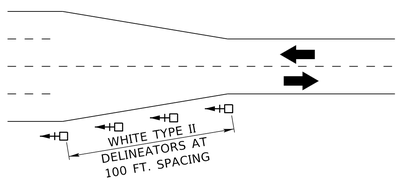
ON/OFF RAMP



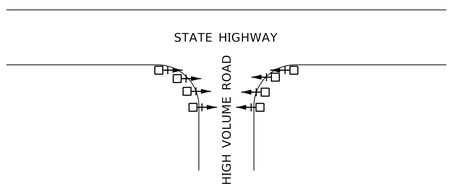
GORE AREA DETAIL



RAMP



TYPICAL DELINEATOR LAYOUT
FOR TRANSITION LANE



WHITE TYPE II DELINEATORS SHALL BE LAID OUT AS SHOWN. AT LOCATIONS REQUIRED BY THE ENGINEER. DELINEATORS SHALL BE SPACED 15 FT. APART.

TYPICAL DELINEATOR LAYOUT
FOR HIGH VOLUME RURAL ROADS
AND STATE HIGHWAYS

REV. NO.	DATE	DESCRIPTION OF REVISION
R12	JUL 20	CHANGES MADE TO NOTE #3
R11	JAN 19	MULTIPLE CHANGES & PAGE 2 ADDED
R10	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 901-R12

HIGHWAY DELINEATORS AND CHEVRONS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

DATE

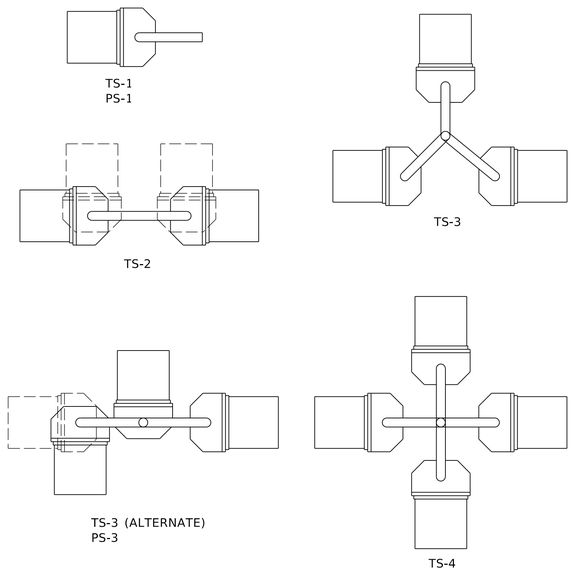
ORIGINAL:
JUNE 11, 1975
DATE

2
2

SIGNAL HEAD CONFIGURATIONS

"TS" - DENOTES "TRAFFIC SIGNAL" ASSEMBLY
"PS" - DENOTES "PEDESTRIAN SIGNAL ASSEMBLY

NUMERAL - INDICATES NUMBER OF SIGNAL HEADS PER ASSEMBLY
SUFFIX "OP" (TS- *-OP) DENOTES OPTICALLY PROGRAMMED SIGNAL ASSEMBLY



SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		CONDUIT UNDER ROADWAY/JACKED
		CONDUIT IN TRENCH
		OVERHEAD (AERIAL) CABLE
		DIRECT BURIED CABLE
		VEHICLE DETECTOR (INDUCTIVE LOOP TYPE)
		VEHICLE DETECTOR (MAGNETIC TYPE)
		PEDESTRIAN PUSH BUTTON ON POLE
		CONTROLLER CABINET AND PAD
		CONTROLLER CABINET ON POLE
		TRAFFIC SIGNAL HEAD
		TRAFFIC SIGNAL HEAD WITH BACKPLATE
		TRAFFIC SIGNAL HEAD WITH TURN ARROW AND BACKPLATE
		TRAFFIC SIGNAL HEAD WITH ALL LENSES OPTICALLY PROGRAMMED
		PEDESTRIAN SIGNAL HEAD
		LUMINAIRE ON MAST ARM
		LUMINAIRE ON POLE TOP
	ANCHOR GUY	WOOD POLE WITH ANCHOR GUY
		PEDESTAL POLE
		METAL SPAN WIRE OR MAST ARM POLE AND FOUNDATION
		PULL BOX
	SPARE BEND	POLE FOUNDATION WITH SPARE CONDUIT BEND
		SIGN
		POWER POLE
		TELEPHONE POLE

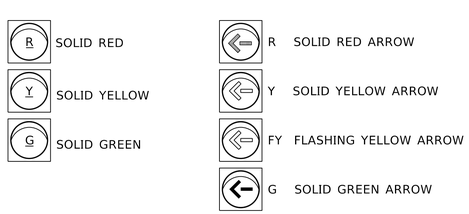
NOTES

1. LED MODULES FOR SIGNAL HEADS SHALL CONFORM TO THE STANDARD SET BY THE INSTITUTE OF TRANSPORTATION ENGINEERS (ITE).

2. TRAFFIC SIGNAL AND PEDESTRIAN SIGNAL HEADS SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION AVAILABLE FROM THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, AND SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH SIGNAL HEAD STANDARD INCLUDED IN THE LATEST EDITION OF THE ITE STANDARDS ON ADJUSTABLE FACE VEHICULAR TRAFFIC CONTROL SIGNAL HEADS.

3. REFER TO THE PLANS FOR SIGNAL HEAD TYPE, LOCATION AND FACE REQUIREMENTS.

SIGNAL FACE ARRANGEMENT LEGEND



STANDARD SIGNAL FACE ARRANGEMENTS

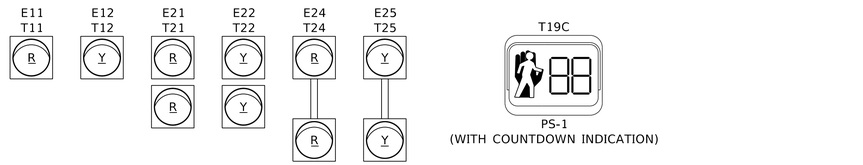
SIGNAL FACE NOTATION KEY

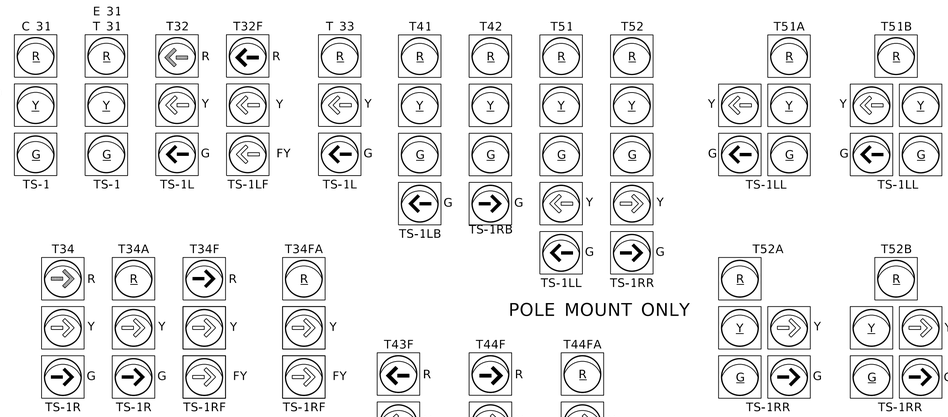
XOO
- "E" - ALL 8" SIGNAL LENS
- "T" - ALL 12" SIGNAL LENS
- "C" - COMBINATION 8" & 12" SIGNAL LENS
- SIGNAL FACE ARRANGEMENT NUMBER OF LENS IN SIGNAL FACE

BID ITEMS

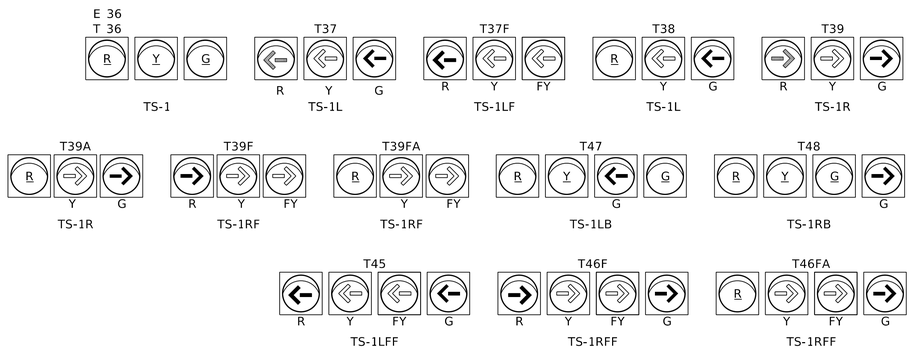
XS-O ***
- "T" DENOTES TRAFFIC SIGNAL
- "P" DENOTES PEDESTRIAN SIGNAL
- LENS ARRANGEMENT NUMBER OF FACES

VERTICAL SIGNAL HEADS





HORIZONTAL SIGNAL HEADS



REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JAN 19	MULTIPLE CHANGES
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	MAR 98	RENEW SIGNAL FACE ARRANGEMENTS

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 910-R4

SIGNAL FACE CONFIGURATION

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

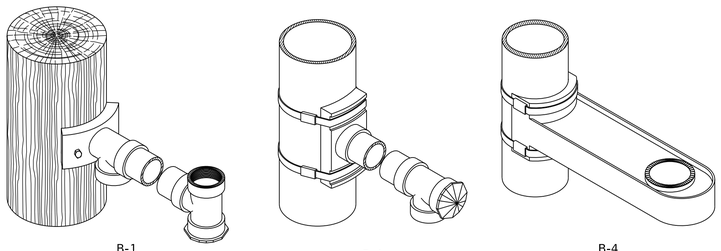
DATE

ORIGINAL: JANUARY 14, 1977
DATE

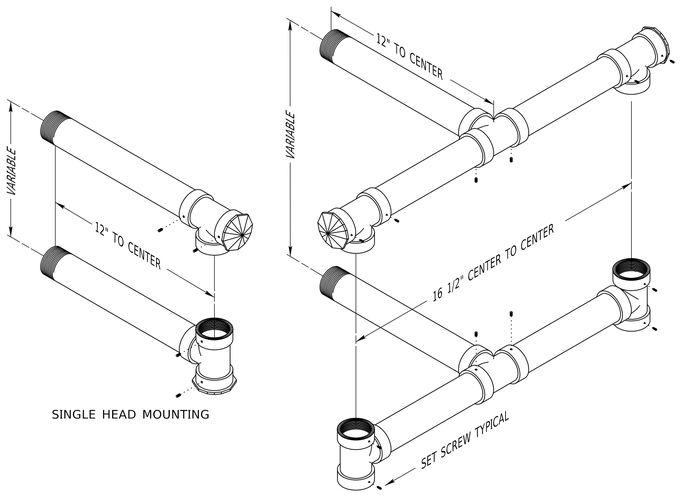
1
1

COMPUTER: BG0419M4593
DATE: 7-NOV-2025 10:34
FILE: 9100 0 R4.dgn

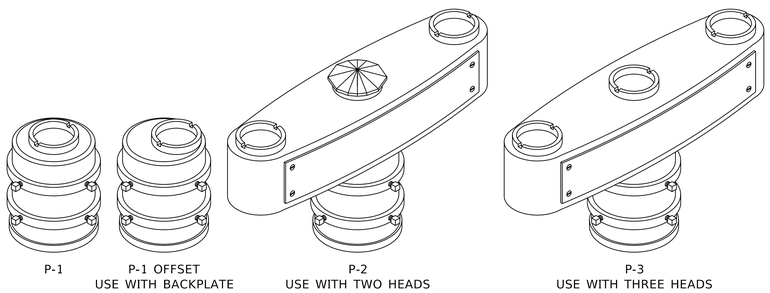
COMPUTER: BG04194187
DATE: 22-AUG-2024 11:30
FILE: 9110 0 R2.dgn



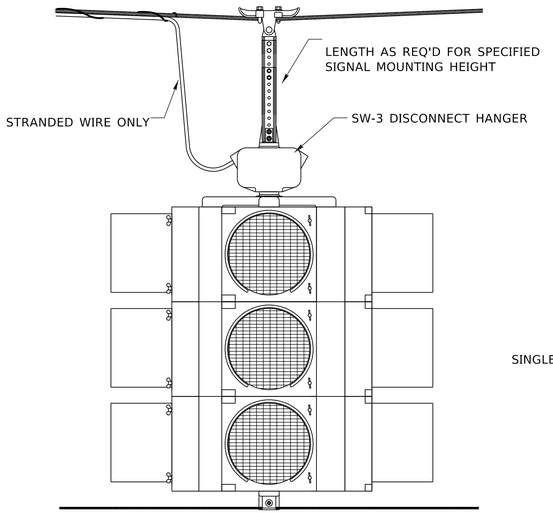
POLE MOUNTED BRACKET INSTALLATION



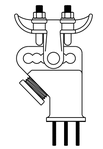
BRACKET ARM DETAIL

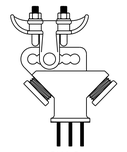


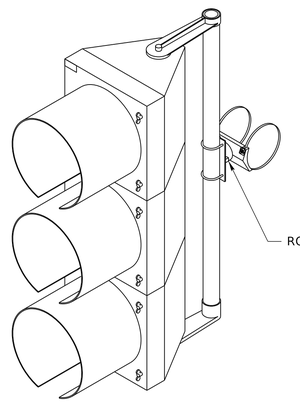
PEDESTAL POLE MOUNTING



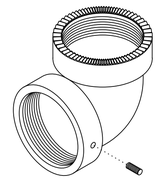
SPAN WIRE MOUNTING DETAIL

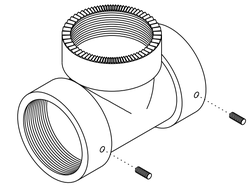


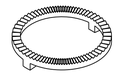


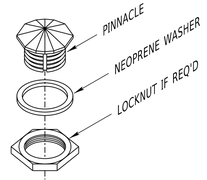


MA-5 ADJUSTABLE MAST ARM
AND PEDESTAL POLE MOUNTING
HORIZONTAL OR VERTICAL INSTALLATION

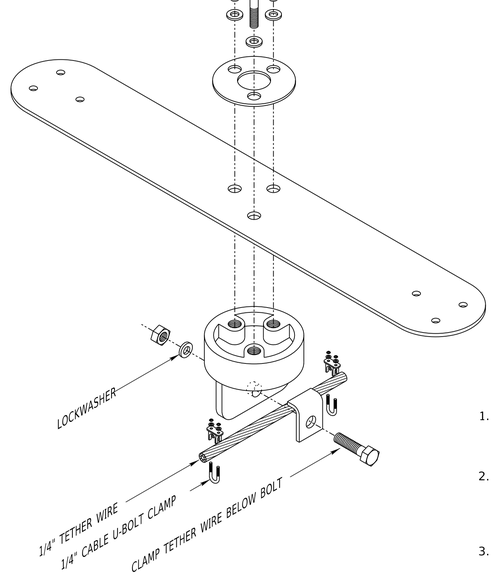




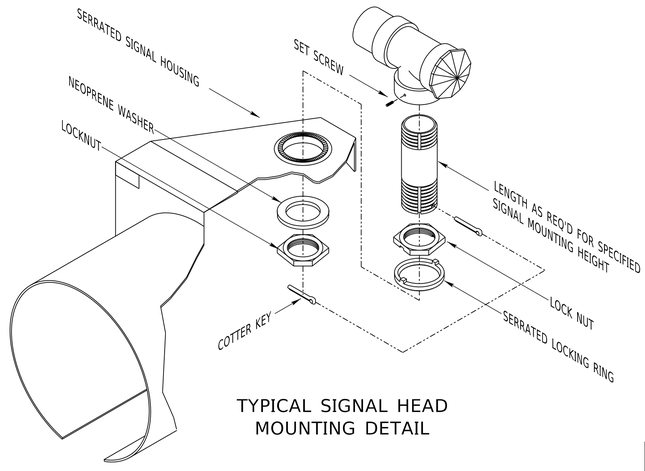




TYPICAL ACCESSORIES



BREAK-AWAY TETHER CLAMP DETAIL
DETAIL IS TYPICAL FOR 1-WAY AND 2-WAY SIGNAL HEADS
VIEW IS OF 2-WAY SIGNAL HEAD ASSEMBLY



TYPICAL SIGNAL HEAD
MOUNTING DETAIL

GENERAL NOTES

1. PIPE COUPLINGS FOR SIGNAL BRACKETS SHALL BE EITHER 1 1/2 INCH OR 2 INCH DEPENDING UPON THE SIGNAL HEAD TO BE INSTALLED. SIGNAL BRACKETS SHALL BE FURNISHED BY THE MANUFACTURER OF THE SIGNAL HEADS.
2. UNLESS OTHERWISE SPECIFIED IN THE PLANS. ALL TRAFFIC SIGNALS MOUNTED ABOVE THE ROADWAY SHALL HAVE A HEIGHT OF 18'-0" ± 6", ALL SIDE MOUNTED TRAFFIC SIGNALS A HEIGHT OF 10' AND PEDESTRIAN SIGNALS AT A HEIGHT OF 8' AS MEASURED TO THE BOTTOM OF THE SIGNAL HEAD HOUSING OR BACKPLATE.
3. THE TETHER CLAMPS USED ON SPAN WIRE INSTALLATIONS SHALL HOLD THE TETHER WIRE CLEAR OF THE SIGNAL BACKPLATES. CUTTING OR BENDING THE BACKPLATES TO CLEAR THE TETHER SHALL NOT BE ACCEPTED.
4. ONE-WAY AND TWO-WAY TRAFFIC SIGNAL HEADS INSTALLED ON SPAN WIRES SHALL BE EQUIPPED WITH A TETHER WIRE. THREE WAY AND FOUR WAY SIGNALS AND BEACONS SHALL NOT BE TETHERED.
5. SIGNAL HEADS SHALL BE HELD SECURELY IN POSTION BY USE OF SERRATED COUPLING OR OTHER HARDWARE RECOMMENDED BY THE SIGNAL MANUFACTURER. STUD STYLE HANGERS AND TETHER CLAMPS SHALL BE USED FOR SPAN WIRE MOUNTING.

REV. NO.	DATE	DESCRIPTION OF REVISION
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	MAR 98	REMOVE MA-1 MOUNTING

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 911-R2

SIGNAL MOUNTING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

DATE

ORIGINAL:
JANUARY 14, 1977
DATE

1
1

NOTES:

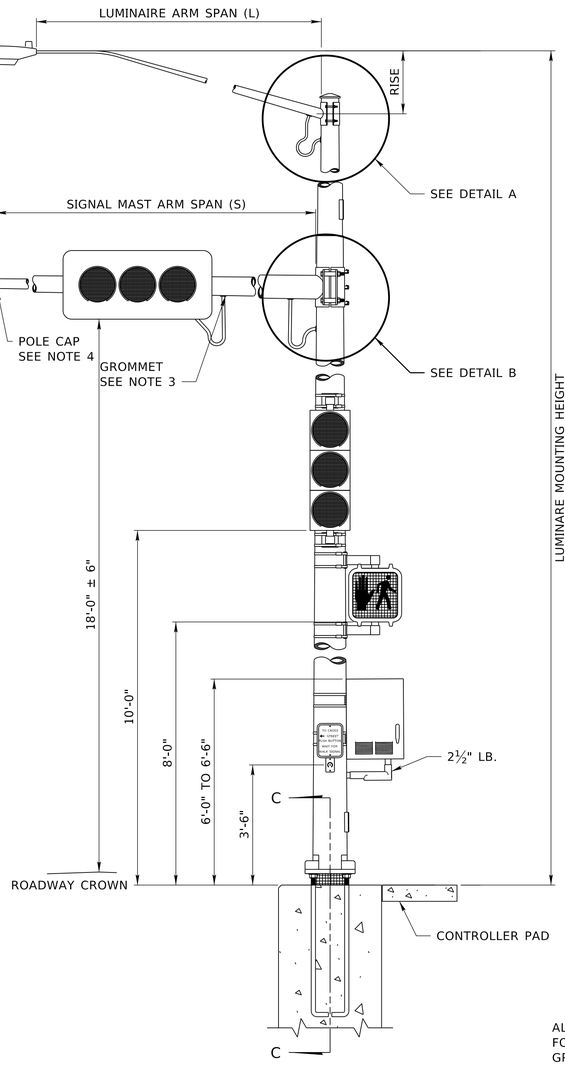
POLE SPECIFICATIONS

1. TRAFFIC SIGNAL POLES SHALL BE DESIGNED IN ACCORDANCE WITH ASSHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS (SIXTH EDITION 2013, INCLUDING ALL CURRENT INTERIM REVISIONS). CATEGORY 1, WITHOUT GALLOPING AND TRUCK-INDUCED LOADS. NDOT WILL NOT INSTALL MITIGATION DEVICES ON POLES THAT EXHIBIT A GALLOPING PROBLEM.
2. POLES SHAFTS SHALL BE 20 FT. MINIMUM IN LENGTH
3. ALL SIGNAL AND LUMINAIRE MAST ARMS, POLE SHAFTS, AND LUMINAIRE EXTENSIONS SHALL BE SUPPLIED WITH 1" I.D. RUBBER GROMMETS FOR CABLE INLETS. SIGNAL MAST ARMS SHALL BE SUPPLIED WITH ADDITIONAL 1" RUBBER GROMMETS FOR THE NUMBER OF SIGNALS SPECIFIED IN THE PLANS. ALL INLET HOLES SHALL BE DRILLED BY THE CONTRACTOR
4. POLE CAPS SHALL BE PROVIDED FOR EACH POLE SHAFT OR LUMINAIRE EXTENSION, AND SIGNAL MAST ARM.
5. ALL HAND HOLES SHALL HAVE A MINIMUM OPENING OF 4" × 6". THE HAND HOLE SHALL BE REINFORCED TO MAINTAIN THE FULL STRENGTH OF THE POLE. POLE SHAFTS AND LUMINAIRE EXTENSIONS SHALL BE SUPPLIED WITH HAND HOLE COVERS. HAND HOLE SHALL BE LOCATED AWAY FROM TRAFFIC. HAND HOLE COVER PLATES SHALL INCLUDE A NEOPRENE GASKET.
6. SIGNAL MAST ARMS SHALL HAVE A MAXIMUM RISE OF 5° UNLOADED AND A MINIMUM RISE OF 0° AT THE END OF THE MAST ARM FULLY LOADED.
7. EACH POLE SHAFT, LUMINAIRE EXTENSION, LUMINAIRE ARM, AND SIGNAL ARM SHALL BE FURNISHED WITH ALL MISCELLANEOUS HARDWARE NECESSARY TO COMPLETE ASSEMBLY.
8. ALL MISCELLANEOUS STEEL HARDWARE AND THREADED FASTENERS OVER ⅜" DIAMETER SHALL BE GALVANIZED TO COMPLY WITH ASTM-A153.
9. THE POLE SHAFT, LUMINAIRE EXTENSION, LUMINAIRE ARM, AND SIGNAL ARM SHALL BE GALVANIZED TO COMPLY WITH ASTM-A123.
10. A GROUND NUT FOR ACCOMMODATION OF THE NO. 6 AWG COPPER WIRE SHALL BE PROVIDED ON THE INSIDE OF THE POLE SHAFT DIRECTLY OPPOSITE THE HAND HOLE OPENING. NO GROUNDING PROVISION WILL BE ALLOWED ON THE HAND HOLE FRAME.

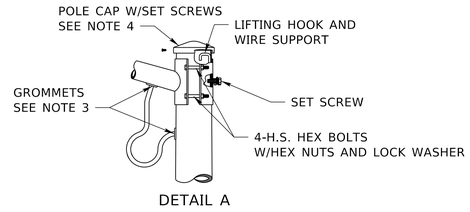
POLE FOUNDATIONS

11. MAST ARM POLE FOUNDATIONS SHALL BE DESIGNED BY THE CONTRACTOR TO ASSHTO STANDARDS (SEE NOTE 1). THE POLE FOUNDATION MAY BE ROUND OR SQUARE. THE EXCAVATION SHALL BE TO THE NEAT LINES OF THE FOUNDATION, ONLY THE TOP 2 FT. MAY BE FORMED.
12. FOUNDATION SHALL BE FLUSH WITH SURROUNDING CONCRETE SURFACE OR A MINIMUM OF 2" PROJECTION WHEN IN EARTH. PREFORMED EXPANSION JOINT FILLER SHALL BE USED WHEN ABUTTING SIDEWALK OR OTHER SURFACING MATERIAL. CONCRETE SHALL BE CLASS 47B-3000.
13. REINFORCEMENT BARS ARE ⅝" MINIMUM DIAMETER. THE PEDESTAL POLE FOUNDATION DOES NOT REQUIRE REINFORCEMENT BARS.
14. ANCHOR BOLTS SHALL HAVE ROLLED THREADS. EACH ANCHOR BOLT SHALL BE SUPPLIED WITH TWO HEX NUTS AND TWO FLAT WASHERS. ANCHOR BOLTS SHALL BE GRADE 55, MANUFACTURED IN ACCORDANCE WITH AASTHO M-314.
15. THE GROUND ROD SHOULD BE PLACED BEFORE THE FOUNDATION IS POURED AND LOCATED AS SHOWN IN THE FOUNDATION DETAIL. IT SHALL EXTEND AT LEAST 8" ABOVE THE TOP OF THE FINISHED FOUNDATION AND SHALL EXTEND A MINIMUM OF 8 FT. BELOW THE FOUNDATION. GROUND RODS SHALL BE ⅝" × 12'-0" FOR PEDESTAL POLE FOUNDATIONS, ⅝" × 17'-0" FOR 8 FT. FOUNDATIONS.

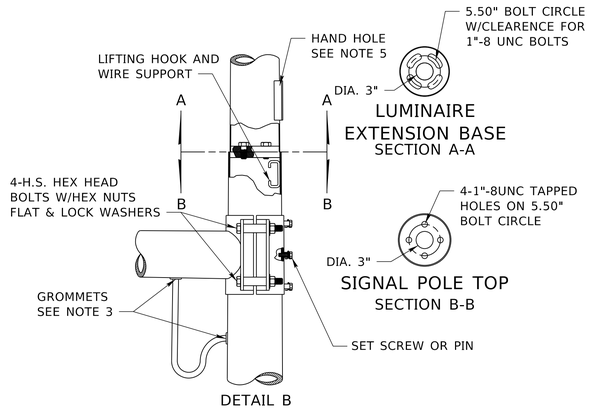
    WHEN THE GROUND IS PLACED OUTSIDE THE FOUNDATION, IT SHALL BE CONNECTED TO THE GROUND NUT IN THE POLE WITH #6 AWG BARE COPPER.
16. CONDUIT BENDS SHALL BE 90°. THEY SHALL BE LOCATED A MINIMUM OF 30" BELOW GROUND LEVEL. CONDUIT SHALL EXTEND A MINIMUM OF 2" ABOVE THE TOP OF THE FINISHED FOUNDATION. THERE SHALL BE ONE SPARE CONDUIT BEND INSTALLED IN EACH FOUNDATION TERMINATING IN THE NEAREST PULL BOX WITH BOTH ENDS PLUGGED AND FREE OF DEBRIS AND MOISTURE



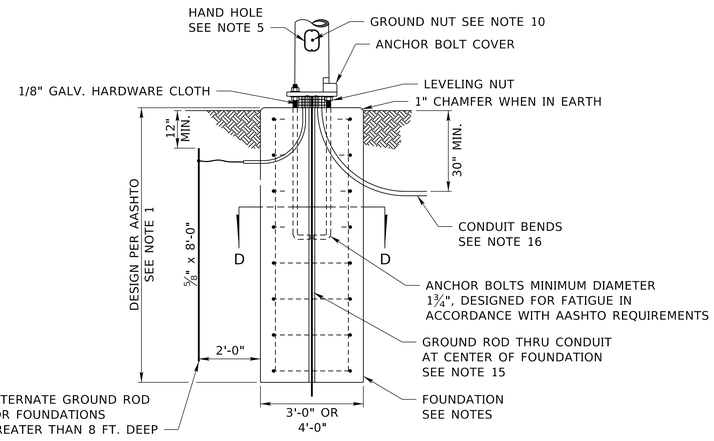
MAST ARM SIGNAL POLE, TYPE MP-S
OR
COMBINATION MAST ARM SIGNAL
AND LIGHTING POLE, TYPE CMP-S-L



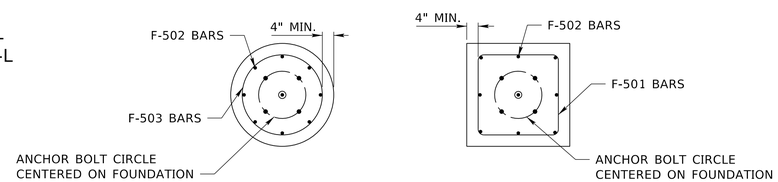
DETAIL A



DETAIL B



SECTION C-C



ROUND FOUNDATION SQUARE FOUNDATION

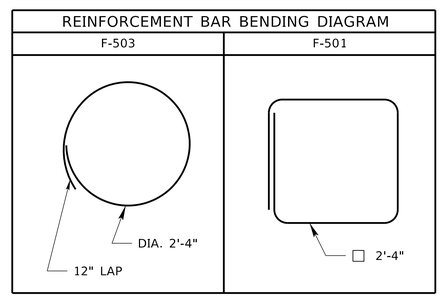
SECTION D-D

LUMINAIRE ARM SCHEDULE		
ARM SPAN	RISE HEIGHT	ARM SHAFT SIZE
8'	1'-4"	3.6" × 2.4"
10'	1'-8"	3.8" × 2.4"
12'	2'-0"	4.1" × 2.4"
15'	2'-6"	4.6" × 2.4"

LUMINAIRE EXTENSION SCHEDULE				
BASE DIA.	TOP DIA.	LENGTH	GAUGE	LUM. MNTG. HEIGHT
8.70"	7.51"	8'-6"	11	30'
8.70"	6.81"	13'-6"	11	35'
8.70"	6.11"	18'-6"	11	40'
8.70"	5.41"	23'-6"	11	45'
8.70"	4.71"	28'-6"	11	50'

MAST ARM FOUNDATION REINFORCEMENT BAR USAGE			
BAR NO.	QUANTITY	LENGTH	USAGE
F-501	PER DESIGN	-	SQUARE FOUNDATION ONLY
F-502	PER DESIGN	PER DESIGN	VERTICAL BARS
F-503	PER DESIGN	-	ROUND FOUNDATION ONLY

REINFORCEMENT BAR BENDING DIAGRAM



REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN 19	MULTIPLE CHANGES
R6	JAN 18	NDOR BORDER TO NDOT BORDER
R5	SEP 16	REVISE NOTE 13, ADDED 2013

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 912-R7

TRAFFIC SIGNAL POLE DETAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

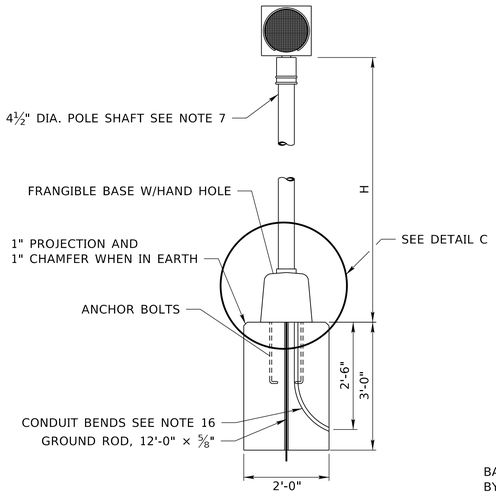
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

DATE

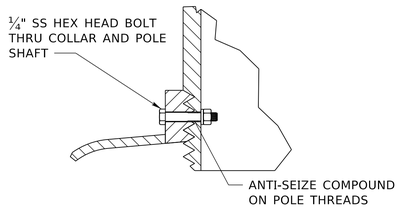
ORIGINAL:
JULY 1977
DATE

1
2

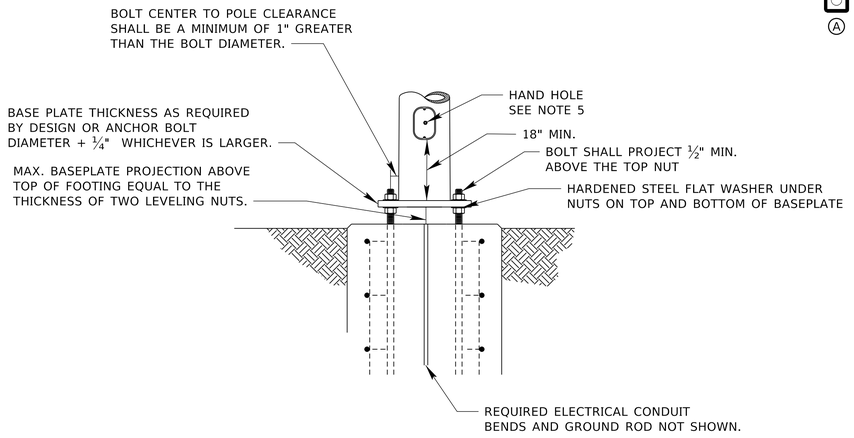
COMPUTER: BG04194N593
DATE: 7-NOV-2025 08:26
FILE: 9120 0 R7.dgn



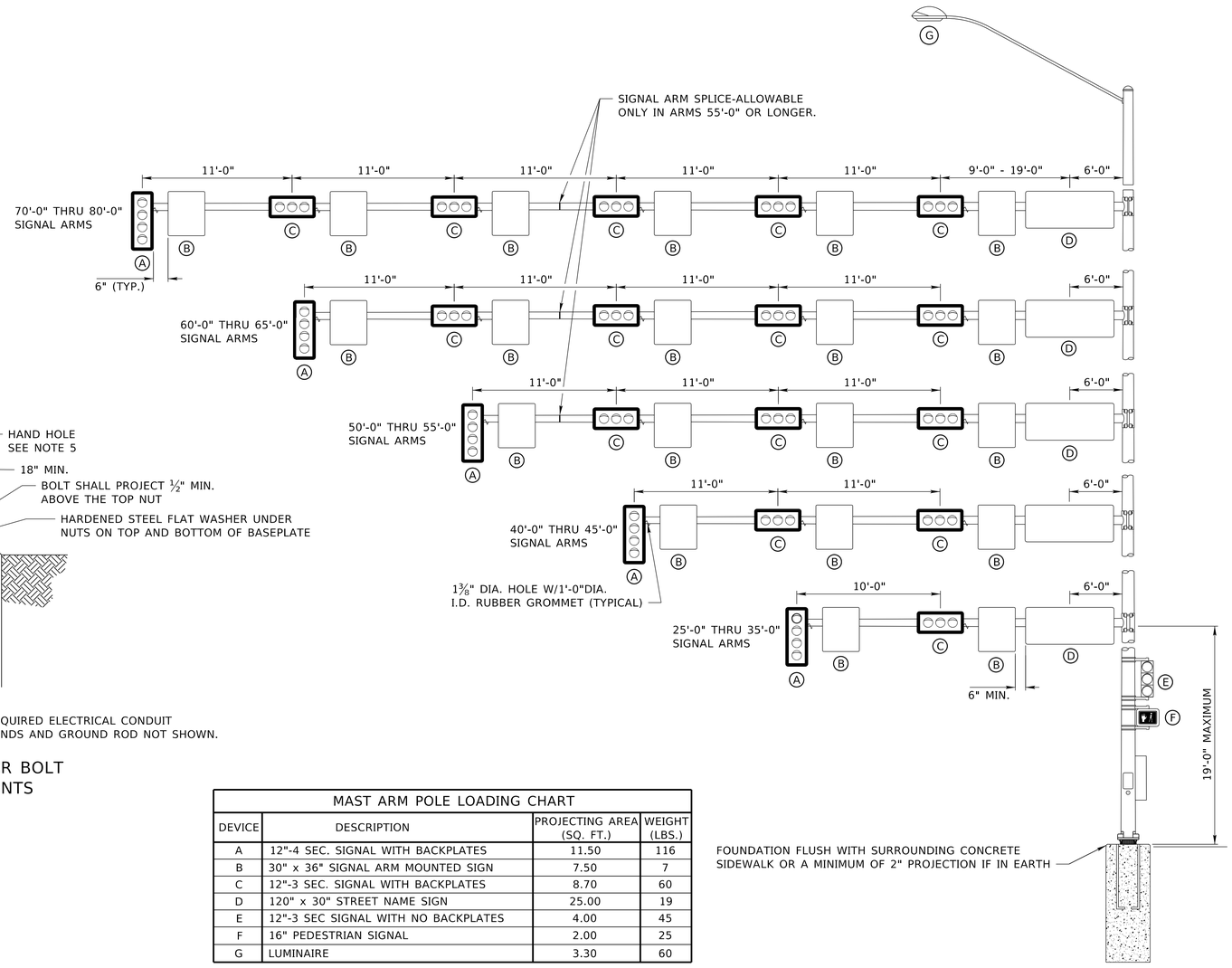
PEDESTAL POLE, TYPE PP-"H"



DETAIL C



SIGNAL POLE & ANCHOR BOLT
DESIGN REQUIREMENTS



MAST ARM DESIGN LOADING

MAST ARM POLE LOADING CHART			
DEVICE	DESCRIPTION	PROJECTING AREA (SQ. FT.)	WEIGHT (LBS.)
A	12"-4 SEC. SIGNAL WITH BACKPLATES	11.50	116
B	30" x 36" SIGNAL ARM MOUNTED SIGN	7.50	7
C	12"-3 SEC. SIGNAL WITH BACKPLATES	8.70	60
D	120" x 30" STREET NAME SIGN	25.00	19
E	12"-3 SEC SIGNAL WITH NO BACKPLATES	4.00	45
F	16" PEDESTRIAN SIGNAL	2.00	25
G	LUMINAIRE	3.30	60

PROPER TENSIONING OF SIGNAL POLE ANCHOR BOLTS AND CONNECTING BOLTS

IN ORDER TO PROVIDE THE CORRECT TENSION TO ANCHOR BOLTS, THE CONTRACTOR WILL BE REQUIRED TO HAVE ON HAND THE FOLLOWING ITEMS:

- (A) A STANDARD COMBINATION WRENCH (BOX END/OPEN END) 36 INCHES IN LENGTH.
- (B) A DEEP WELL IMPACT SOCKET FOR FINAL TIGHTENING, FOR EACH SIZE NUT BEING INSTALLED.
- (C) A TORQUE MULTIPLIER (PLATE REACTION STYLE) WITH THE FOLLOWING MINIMUM REQUIREMENTS:

GEAR RATIO: 60:1
TORQUE RATIO: 52:1
OUTPUT CAPACITY: 8000 FT.-LB.

IN LIEU OF A PLATE REACTION STYLE TORQUE MULTIPLIER (AS DESCRIBED ABOVE), THE CONTRACTOR MAY USE A HYDRAULIC TORQUE WRENCH OR OTHER DEVICE AS APPROVED BY THE MATERIALS AND RESEARCH DIVISION.

ANCHOR BOLT HOLD-DOWN NUTS SHALL BE TIGHTENED BY THE TURN-OF-THE-NUT METHOD AS DESCRIBED BELOW, BUT ONLY AFTER DETERMINING THAT THE LEVELING NUT/FLAT HARDENED WASHERS FOR THE ANCHOR BOLTS ARE IN FULL CONTACT WITH THE UNDERSIDE OF A LEVEL BASE PLATE.

TURN-OF-THE-NUT METHOD

(A) LUBRICATE THE BOLT THREADS AND NUT THREADS WITH A HIGH-PRESSURE LUBRICANT (I.E.: SAE 90 GEAR OIL OR APPROVED EQUAL). SNUG TIGHTEN (BOTH HOLD DOWN AND LEVELING NUTS) AND FINAL TIGHTEN ALL NUTS IN A "STAR" PATTERN.

(B) USING THE APPROPRIATE COMBINATION WRENCH, APPLY FULL EFFORT OF A WORKMAN TO THE END OF THE WRENCH TO "SNUG TIGHTEN" THE NUT. AFTER THE ANCHOR BOLT HOLD-DOWN NUTS ARE SNUG TIGHTENED, ALL LEVELING NUTS SHOULD BE RETIGHTENED (TO THE SNUG TIGHT POSITION) TO ASSURE THAT FULL CONTACT HAS BEEN MAINTAINED WITH THE BOTTOM OF THE BASE PLATE.

(C) MARK THE LOCATION OF ONE CORNER OF THE NUT ON THE BASE PLATE.

(D) USING THE TORQUE MULTIPLIER AND THE MARK PLACED ON THE BASE PLATE; TIGHTEN THE NUT ONTO THE ANCHOR BOLT BY GIVING THE NUT 1/6TH OF A TURN (THIS IS EQUAL TO TURNING THE NUT ONTO THE ANCHOR BOLT A DISTANCE EQUAL TO THE LENGTH OF ONE FLAT OR UNTIL THE NEXT CORNER OF THE NUT IS EVEN WITH THE MARK ON THE BASE PLATE).

(E) AFTER THE TOP NUTS ARE FULLY TIGHTENED, ALL LEVELING NUTS SHOULD BE RETIGHTENED TO ASSURE THAT FULL CONTACT HAS BEEN MAINTAINED WITH THE BOTTOM OF THE BASE PLATE. CONNECTING BOLT NUTS SHALL BE TIGHTENED BY THE SAME TURN-OF-THE-NUT METHOD AS DESCRIBED FOR ANCHOR BOLTS WITH THE EXCEPTION THAT THE BOLT HEAD MUST BE HELD STATIONARY WHILE APPLYING THE TORQUE. TURN-OF-NUT REQUIREMENTS FOR CONNECTING BOLTS SHALL BE AS PER SECTION 708 OF THE STANDARD SPECIFICATIONS. ANCHOR BOLT NUTS SHALL BE RECHECKED FOR TIGHTNESS BY THE CONTRACTOR, IN THE PRESENCE OF THE ENGINEER, NO LESS THAN 14 DAYS NOR MORE THAN 30 DAYS FOLLOWING THEIR INSTALLATION.

REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN 19	MULTIPLE CHANGES
R6	JAN 18	NDOR BORDER TO NDOT BORDER
R5	SEP 16	REVISE NOTE 13, ADDED 2013

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 912-R7

TRAFFIC SIGNAL POLE DETAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

DATE

ORIGINAL: JULY 1977

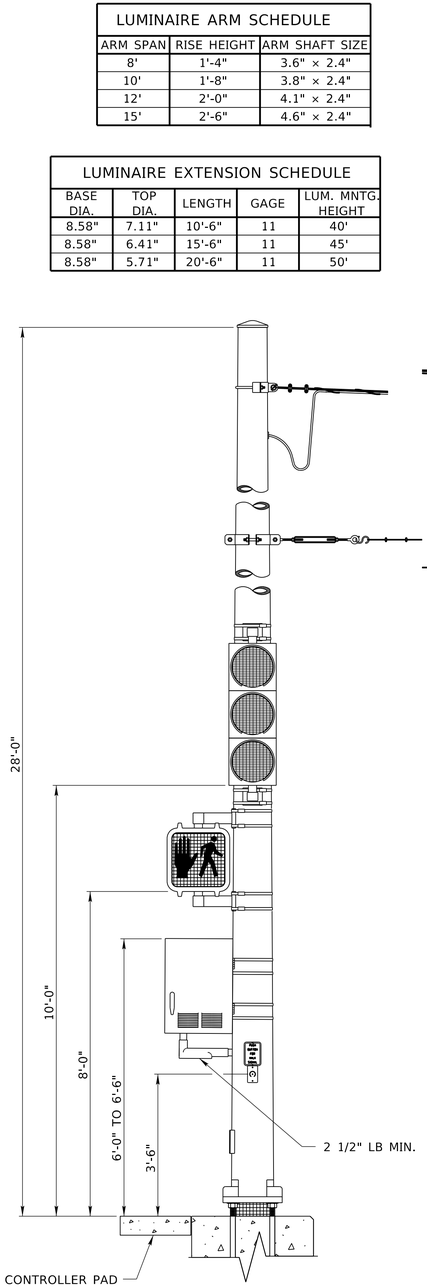
DATE

2
2

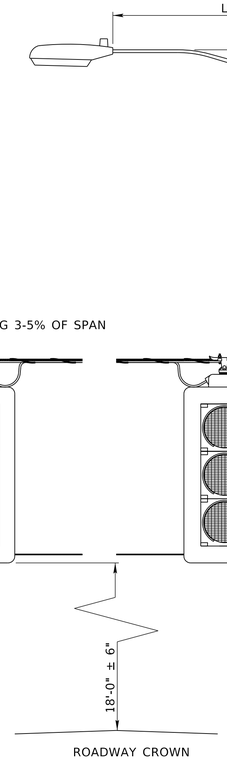
COMPUTER: BG0419M593
DATE: 7-NOV-2025 08:25
FILE: 9120 0 R7.dgn

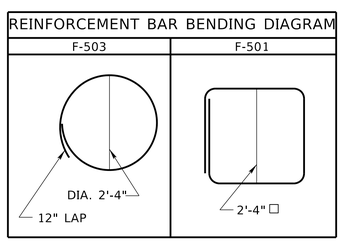
LUMINAIRE ARM SCHEDULE		
ARM SPAN	RISE HEIGHT	ARM SHAFT SIZE
8'	1'-4"	3.6" × 2.4"
10'	1'-8"	3.8" × 2.4"
12'	2'-0"	4.1" × 2.4"
15'	2'-6"	4.6" × 2.4"

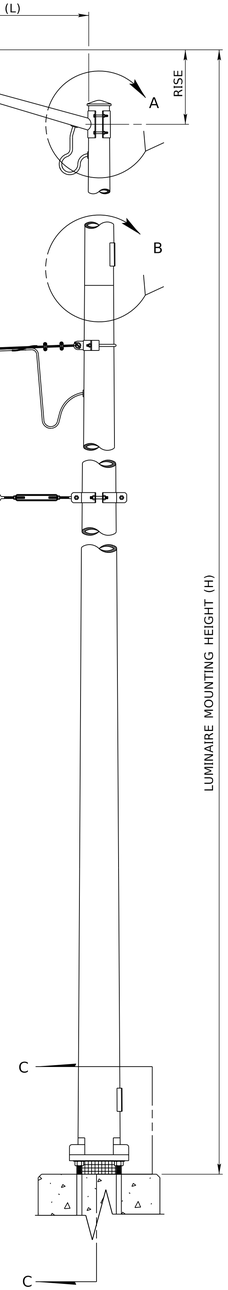
LUMINAIRE EXTENSION SCHEDULE				
BASE DIA.	TOP DIA.	LENGTH	GAGE	LUM. MNTG. HEIGHT
8.58"	7.11"	10'-6"	11	40'
8.58"	6.41"	15'-6"	11	45'
8.58"	5.71"	20'-6"	11	50'



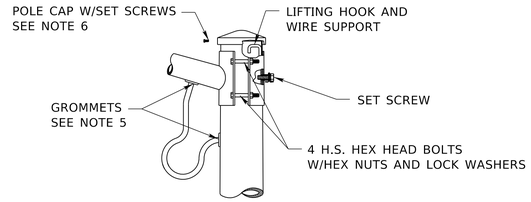
SPAN WIRE SIGNAL POLE,
TYPE SWP-1



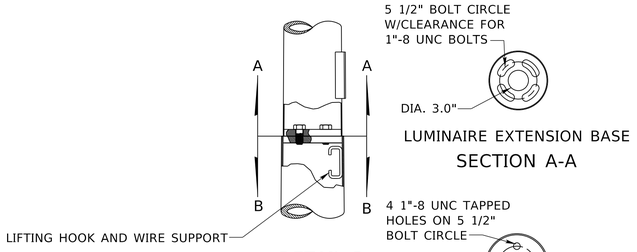




COMBINATION SPAN WIRE SIGNAL
AND LIGHTING POLE,
TYPE SWP-H-L

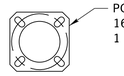


DETAIL A

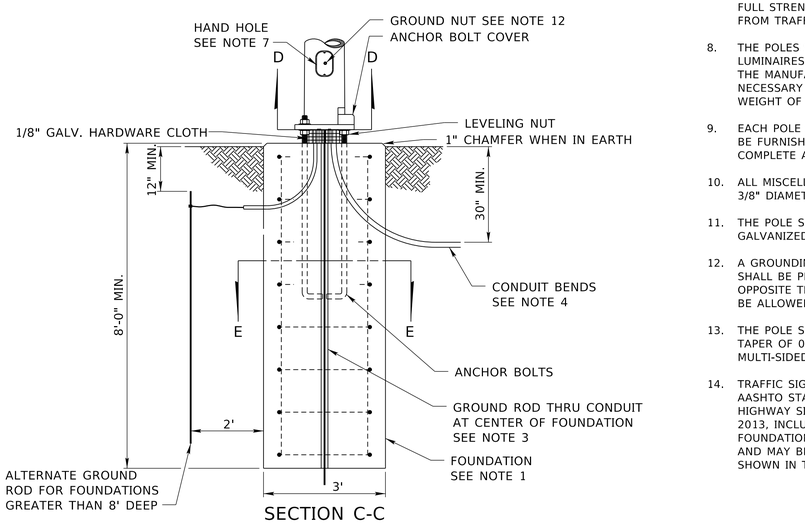


DETAIL B

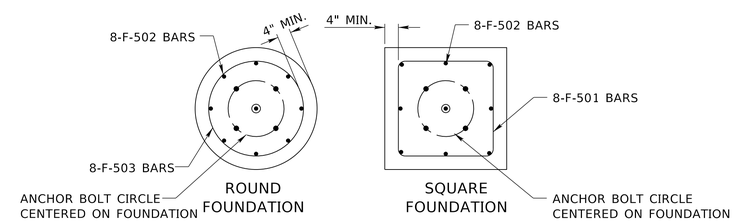
SIGNAL POLE TOP
SECTION B-B



SECTION D-D



SECTION C-C



SECTION E-E

NOTES

POLE FOUNDATIONS

1. THE POLE FOUNDATION MAY BE ROUND OR SQUARE. THE EXCAVATION SHALL BE TO THE NEAT LINES OF THE FOUNDATION. ONLY THE TOP TWO FEET MAY BE FORMED. THE PEDESTAL POLE FOUNDATION DOES NOT REQUIRE REINFORCEMENT BARS.
   FOUNDATION SHALL BE FLUSH WITH SURROUNDING CONCRETE SURFACE OR A MINIMUM OF 2" PROJECTION WHEN IN EARTH. PREFORMED EXPANSION JOINT FILLER SHALL BE USED WHEN ABUTTING SIDEWALK OR OTHER SURFACING MATERIAL. CONCRETE SHALL BE CLASS 47B-3000.
2. ANCHOR BOLTS SHALL BE THREADED. EACH ANCHOR BOLT SHALL BE SUPPLIED WITH TWO HEX NUTS AND TWO FLAT WASHERS. ANCHOR BOLTS SHALL BE GRADE 55, MANUFACTURED IN ACCORDANCE WITH AASHTO M 314.
3. THE GROUND ROD SHOULD BE PLACED BEFORE THE CONCRETE FOUNDATION IS POURED AND LOCATED AS SHOWN IN THE FOUNDATION DETAIL. IT SHALL EXTEND AT LEAST EIGHT INCHES ABOVE TOP OF FINISHED FOUNDATION AND SHALL EXTEND A MINIMUM OF EIGHT FEET BELOW THE FOUNDATION. THE GROUND ROD SHALL BE 5/8" × 17' FOR EIGHT FOOT FOUNDATIONS.
   THE GROUND ROD FOR FOUNDATIONS DEEPER THAN 8 FOOT SHALL BE 5/8" × 10' PLACED OUTSIDE OF THE FOUNDATION CONNECTED TO THE GROUND NUT IN THE POLE WITH #6 AWG BARE COPPER.
4. CONDUIT BENDS SHALL BE 90°. THEY SHALL BE LOCATED A MINIMUM OF 30 INCHES BELOW GROUND LEVEL. STANDPIPE CONDUIT A MINIMUM OF 2 INCHES ABOVE TOP OF FINISHED FOUNDATION. THERE SHALL BE A MINIMUM OF ONE SPARE CONDUIT BEND INSTALLED IN EACH FOUNDATION WITH BOTH ENDS PLUGGED AND FREE OF DEBRIS AND MOISTURE.

POLE SPECIFICATIONS

5. POLE SHAFTS, LUMINAIRE EXTENSIONS AND LUMINAIRE MAST ARMS SHALL BE SUPPLIED WITH 1" I.D. RUBBER GROMMETS FOR CABLE INLETS. ALL INLET HOLES SHALL BE DRILLED IN THE FIELD BY THE CONTRACTOR.
6. POLE CAPS SHALL BE PROVIDED WITH EACH POLE SHAFT OR LUMINAIRE EXTENSION.
7. ALL HAND HOLES SHALL HAVE A MINIMUM OPENING OF 4" × 6". POLE SHAFTS AND LUMINAIRE EXTENSIONS SHALL BE SUPPLIED WITH HAND HOLE COVERS. THE HAND HOLE SHALL BE REINFORCED TO MAINTAIN FULL STRENGTH OF THE POLE. HAND HOLES SHALL BE ORIENTED AWAY FROM TRAFFIC.
8. THE POLES SHALL BE DESIGNED TO SUPPORT THE REQUIRED SIGNALS, LUMINAIRES, AND SIGNAL AND LIGHTING CABLES SHOWN ON THE PLAN. THE MANUFACTURER SHALL STATE THE AMOUNT OF POLE RAKE NECESSARY FOR THE POLE TO SET PLUMB UNDER LOAD. THE DESIGN WEIGHT OF THE SIGNAL HEADS SHALL BE 75 POUNDS EACH.
9. EACH POLE SHAFT, LUMINAIRE EXTENSION AND LUMINAIRE ARM SHALL BE FURNISHED WITH ALL MISCELLANEOUS HARDWARE NECESSARY TO COMPLETE ASSEMBLY.
10. ALL MISCELLANEOUS STEEL HARDWARE AND THREADED FASTENERS OVER 3/8" DIAMETER SHALL BE GALVANIZED TO COMPLY WITH ASTM-A 153.
11. THE POLE SHAFT, LUMINAIRE EXTENSION AND LUMINARY ARM SHALL BE GALVANIZED TO COMPLY WITH ASTM-A 123.
12. A GROUNDING NUT FOR ACCOMMODATION OF NO. 6 AWG COPPER WIRE SHALL BE PROVIDED ON THE INSIDE OF THE POLE SHAFT DIRECTLY OPPOSITE THE HAND HOLE OPENING. NO GROUNDING PROVISIONS WILL BE ALLOWED ON THE HAND HOLE FRAME.
13. THE POLE SHAFT SHALL BE MINIMUM 12 1/2" O.D. 3 GAUGE WITH A TAPER OF 0.14 IN./FT.. POLE SHAFTS MAY BE ROUND OR MULTI-SIDED WITH 8 OR MORE SIDES.
14. TRAFFIC SIGNAL POLES SHALL BE DESIGNED IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS (SIXTH EDITION 2013, INCLUDING ALL CURRENT INTERIM REVISIONS). POLE, FOUNDATION AND ANCHOR BOLT DIMENSIONS SHOWN ARE MINIMUMS AND MAY BE INCREASED TO MEET THE LOADING REQUIREMENTS AS SHOWN IN THE PLANS.

REV. NO.	DATE	DESCRIPTION OF REVISION
R3	JAN 18	NDOR BORDER TO NDOT BORDER
R2	SEP 16	REVISE NOTE 14, ADDED 2013
R1	MAR 98	REVISED AND UPDATED

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 913-R3

SPAN WIRE SIGNAL POLE DETAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

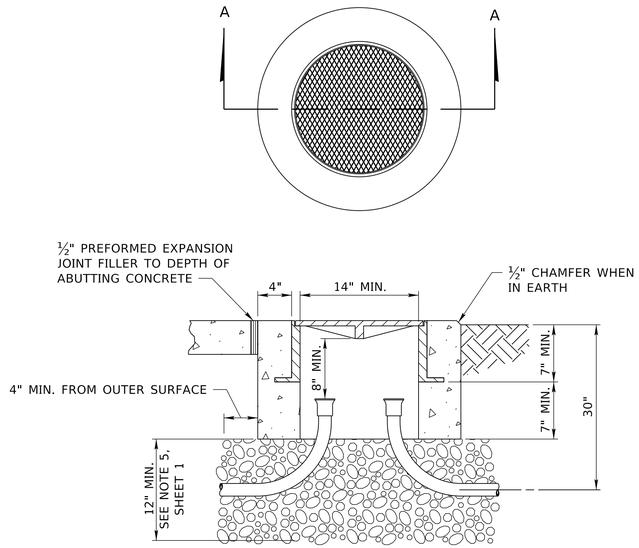
DATE

ORIGINAL:
MAY 18, 1998
DATE

1
1

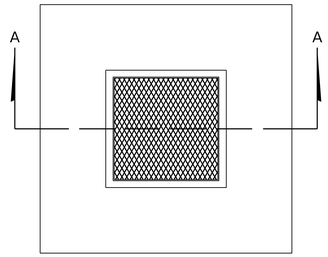
COMPUTER: BG04194187
DATE: 22-AUG-2024 11:30
FILE: 9130 0 R3.dgn

COMPUTER: BG0419M593
DATE: 11-JUL-2025 08:33
FILE: 9140 0 R9.dgn

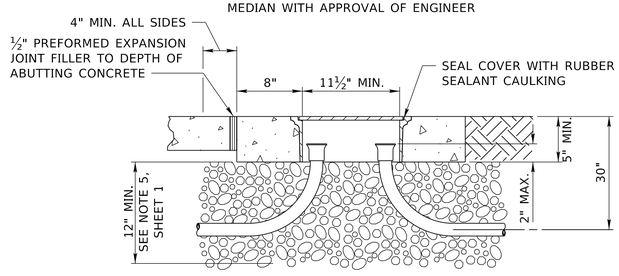


SECTION A-A

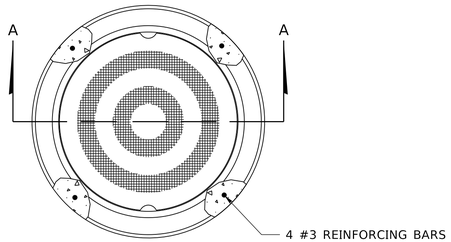
PULL BOX, TYPE PB-1

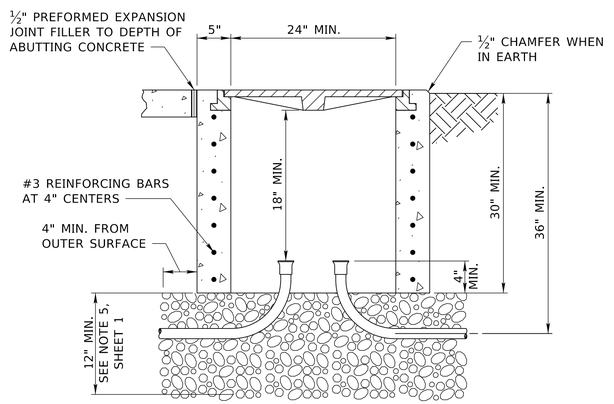


BOX MAY BE CAST IN SIDEWALK OR MEDIAN WITH APPROVAL OF ENGINEER



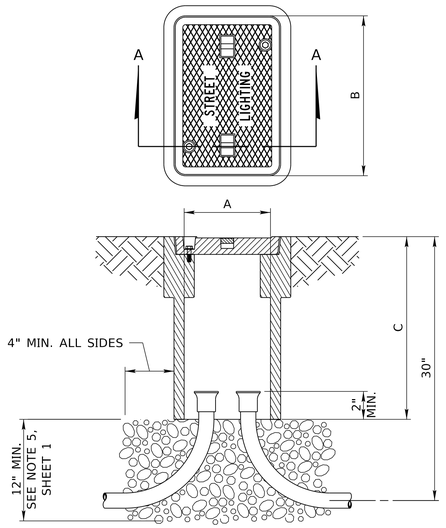
PULL BOX, TYPE PB-4
SECTION A-A





SECTION A-A

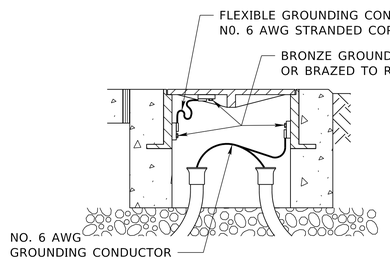
PULL BOX, TYPE PB-2



SECTION A-A

APPROXIMATE DIMENSIONS			
TYPE	A	B	C
PB-5	13"	24"	18"
PB-6	17"	30"	18"

PULL BOX, TYPE PB-5 & PB-6



GROUNDING CONNECTIONS
FOR METAL FRAME AND COVER

NOTES:

1. ACCESS DUCTS, BENDS AND/OR SWEEPS, ARE SUBSIDIARY TO THE PULL BOX PAY ITEM.
2. FILL MATERIAL SHALL BE GRAVEL OR CRUSHED ROCK COMPOSED OF CLEAN, DURABLE AND UNCOATED PARTICLES. FILL MATERIAL SHALL EXTEND A MINIMUM OF 4 INCHES BEYOND THE OUTER WALL OF THE ENCLOSURE. CRUSHED LIMESTONE SHALL NOT BE USED.
3. PROLONGED EXPOSURE OF THE PULL BOX AND COVER TO SUNLIGHT, COMMON ICE MELTING CHEMICALS OR FERTILIZERS SHALL NOT CAUSE SIGNIFICANT DAMAGE TO THE PULL BOX OR COVER, OR IMPAIR IT'S FUNCTION.
4. CONDUIT ENDS IN PULL BOX SHALL BE FITTED WITH BELL OR FLARED ENDS.
5. BASE MATERIAL SHALL BE CRUSHED ROCK OR GRAVEL CAPABLE OF PROVIDING A STABLE BASE.

TYPE PB-1, PB-2 AND PB-4

6. CONCRETE SHALL BE CLASS 47B-3000.
7. PULL BOXES WHICH ARE INTENDED FOR INSTALLATION IN SURFACED AREAS, SUCH AS SIDEWALKS OR SURFACED MEDIANS, SHALL HAVE A LIP OR FLANGED EDGE FRAMING THE COVER OPENING TO PROVIDE A FLUSH, FRAMED SEPARATION BETWEEN THE SURFACING MATERIAL AND THE EDGES OF THE COVER.
8. PULL BOX COVERS SHALL BE EMBOSSED WITH AN ANTI-SLIP SURFACE PATTERN, AND SHALL FIT SUFFICIENTLY TIGHT TO PREVENT ENTRANCE OF RUN-OFF WATER.
9. SEATING SURFACES OF FRAME AND COVER SHALL BE MACHINED TO FIT. FRAME AND COVER TO BE CAST IRON.
10. PULL BOXES TYPE PB-1 AND TYPE PB-2, SHALL BE CAPABLE OF SUPPORTING VEHICULAR TRAFFIC IN ACCORDANCE WITH AASHTO SPECIFICATIONS H-20 LOADING.
11. PULL BOX TYPE PB-4 SHALL BE CAPABLE OF SUPPORTING LIGHT VEHICULAR TRAFFIC IN ACCORDANCE WITH AASHTO SPECIFICATION H-10 LOADING.

TYPE PB-5 AND PB-6

12. TYPE PB-5 AND PB-6 PULL BOXES ARE IN GROUND, GRADE LEVEL ENCLOSURES INTENDED TO BE INSTALLED BEHIND CURBS OR AT DISTANCES OFF OF THE ROADWAY WHERE NO DELIBERATE VEHICULAR TRAFFIC IS ANTICIPATED AND ONLY AN OCCASIONAL HEAVY VEHICLE WILL BE ENCOUNTERED.
13. THE PULL BOX ILLUSTRATIONS SHOWN ARE TYPICAL OF COMMERCIALLY AVAILABLE UNITS AND ARE NOT INTENDED TO LIMIT DESIGN. PULL BOXES OF EQUAL OR GREATER VOLUME HAVING TAPERED SIDES OR CIRCULAR OR SQUARE PLAN SECTION ARE ALSO ACCEPTABLE. A MINIMUM PULL BOX DEPTH OF 18 INCHES MUST BE MAINTAINED.
14. THE TYPE PB-5 AND PB-6 PULL BOX ENCLOSURES (BOX AND COVER) SHALL BE NON-METALLIC AND GREEN OR GRAY IN COLOR.
15. PULL BOX COVERS SHALL BE OF HEAVY-DUTY CONSTRUCTION TO WITHSTAND THE STRUCTURAL REQUIREMENTS OF THE SPECIFICATIONS. COVERS SHALL FIT SUFFICIENTLY TIGHT TO PREVENT THE ENTRANCE OF RUN-OFF WATER. COVERS SHALL BE EMBOSSED WITH AN ANTI-SLIP SURFACE, THE MANUFACTURER'S NAME AND THE LOGO "STREET LIGHTING". COVERS SHALL BE HELD SECURELY IN PLACE BY TWO OR MORE 3/8" (MIN. DIA.) STAINLESS STEEL HEX HEAD BOLTS WITH FLAT WASHER. BOLTS SHALL BE HELD CAPTIVE TO THE COVER. ALL COVERS SHALL BE EQUIPPED WITH A RECESSED "LIFT PIN" AND HAVE A MINIMUM 0.50 COEFFICIENT OF FRICTION SKID RESISTANT SURFACE.
16. EACH PB-5 AND PB-6 PULL BOX ASSEMBLY (BOX WITH HEAVY-DUTY COVER SECURELY ATTACHED) SHALL CONFORM TO ALL TEST PROVISIONS AND REQUIREMENTS FOR TIER 15 APPLICATIONS AS OUTLINED IN THE LATEST ISSUE OF THE ANSI/SCTE 77 STANDARD TITLED "SPECIFICATION FOR UNDER GROUND ENCLOSURE INTEGRITY". INDEPENDENT THIRD-PARTY TEST REPORTS TOGETHER WITH CERTIFICATION THAT ALL TEST PROVISIONS OF THE LATEST ISSUE OF THE ANSI/SCTE 77 STANDARD HAVE BEEN MET WILL BE REQUIRED FOR EACH TYPE OF PULL BOX BEING FURNISHED. ALL TEST REPORTS SHALL BE DATED AND SIGNED BY A REGISTERED PROFESSIONAL ENGINEER AND SHALL BEAR THE LETTERHEAD OF THE TESTING AGENCY.
17. THE INDEPENDENT TEST REPORTS SHALL BE CERTIFIED AS TO BEING REPRESENTATIVE OF THE RESULTS THAT WOULD BE OBTAINED BY SIMILARLY TESTING PULL BOXES OF LIKE KIND THAT THE MANUFACTURER WILL BE FURNISHING TO STATE OF NEBRASKA HIGHWAY PROJECTS. THE CERTIFICATION SHALL BE EXECUTED AND SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE PULL BOX MANUFACTURER AND SHALL BEAR THE MANUFACTURER'S LETTERHEAD. A NEW TEST REPORT AND CERTIFICATION FOR EACH TYPE PULL BOX BEING FURNISHED WILL BE REQUIRED EVERY FIVE YEARS.
18. THE TEST REPORTS AND CERTIFICATIONS, IF FOUND ACCEPTABLE, WILL BE PLACED ON FILE IN THE ROADWAY DESIGN DIVISION OF THE NEBRASKA DEPARTMENT OF TRANSPORTATION IN LINCOLN, NEBRASKA AND THE PULL BOX MANUFACTURER'S NAME AND PART NUMBER WILL BE ADDED TO THE NEBRASKA DEPARTMENT OF TRANSPORTATION "APPROVED PRODUCTS LIST."
19. AFTER ACCEPTANCE BY THE STATE, THE PULL BOX MANUFACTURER SHALL MAKE NO CHANGES IN DIMENSIONS, MANUFACTURING PROCESS OR MATERIAL WITHOUT SUBMITTING NEW TEST REPORTS FOR APPROVAL.

REV. NO.	DATE	DESCRIPTION OF REVISION
R9	OCT 24	ADDED TYPE FOR-27 & PB FIBER VAULT
R8	JAN 18	NDOR BORDER TO NDOT BORDER
R7	DEC 16	ADD 8" GAP TO PB-1 & NOTES 2,4,6,17

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 914-R9

PULL BOX DETAIL

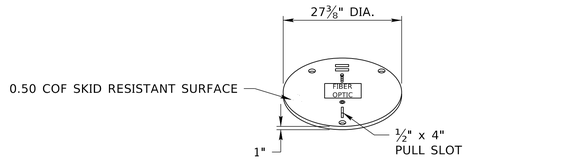
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

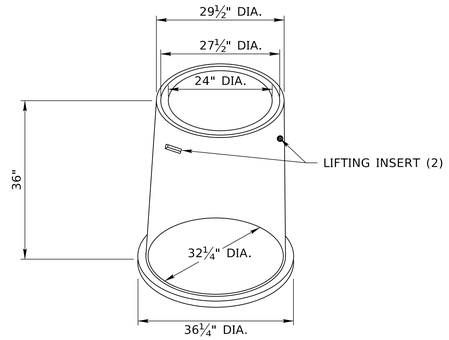
DATE

ORIGINAL:
JULY 2, 1981
DATE

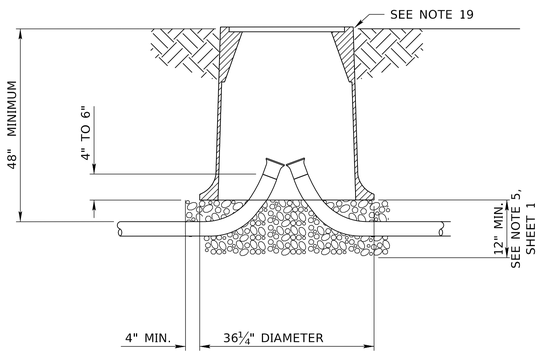
1
3



COVER



BOX



PULL BOX, TYPE FOR-27

TYPE FOR-27 AND PB FIBER VAULT

20. PULL BOX SHALL BE INSTALLED SO THAT THE COVER IS FLUSH WITH THE SURFACE WHEN CONSTRUCTING IN A SIDEWALK OR DRIVEWAY. PULL BOX COVER SHALL BE APPROXIMATELY 1 INCH ABOVE THE FINISHED SURFACE OF THE SURROUNDING GROUND WHEN CONSTRUCTING IN AN EARTH EMBANKMENT OR NON-PAVED SURFACE.

21. CONDUIT SHALL ENTER THE PULL BOX FROM THE BOTTOM AND EXTEND CONDUIT ENDS BETWEEN 4 AND 6 INCHES ABOVE THE AGGREGATE BEDDING. NO CONDUIT SHALL PENETRATE THE ENCLOSURE SIDE WALL.

22. PULL BOXES SHALL BE CONSTRUCTED OF EPOXY OR POLYESTER RESIN MORTAR WITH WOVEN GLASS FIBER

23. PULL BOX MATERIALS SHALL NOT SUPPORT COMBUSTION WHEN TESTED IN ACCORDANCE WITH ASTM D-635: STANDARD TEST METHOD FOR RATE OF BURNING AND/OR EXTENT AND TIME OF BURNING OF PLASTICS IN A HORIZONTAL POSITION

24. WATER ABSORPTION SHALL NOT EXCEED TWO PERCENT OF THE ORIGINAL WEIGHT OF MATERIAL UNDER TEST CONDITIONS PER ASTM D-570: STANDARD TEST METHOD FOR WATER ABSORPTION OF PLASTICS

25. THE PULL BOX SHALL BE FUNCTIONAL WITHOUT FAILURE THROUGHOUT A TEMPERATURE RANGE OF -50 TO +170 DEGREES F.

26. THE PULL BOX WALLS SHALL NOT DEFLECT MORE THAN 0.024 INCHES PER FOOT OF LENGTH OF BOX WHEN INSTALLED AND SUBJECT TO AN ASTM C-857 TIER 22 LOAD

27. PULL BOX COVERS SHALL BE OF HEAVY-DUTY CONSTRUCTION TO WITHSTAND THE STRUCTURAL REQUIREMENTS OF THE SPECIFICATIONS. COVERS SHALL FIT SUFFICIENTLY TIGHT TO PREVENT THE ENTRANCE OF RUN-OFF WATER. COVERS SHALL BE EMBOSSED WITH AN ANTI-SLIP SURFACE, THE MANUFACTURER'S NAME AND THE LOGO "FIBER OPTICS". ALL COVERS SHALL BE EQUIPPED WITH A RECESSED "LIFT PIN" AND HAVE A MINIMUM 0.50 COEFFICIENT OF FRICTION (COF) SKID RESISTANT SURFACE. LID BOLTS SHALL NOT BE INSTALLED.

28. EACH PULL BOX ASSEMBLY (BOX WITH HEAVY-DUTY COVER) SHALL CONFORM TO ALL TEST PROVISIONS AND REQUIREMENTS FOR TIER 15 APPLICATIONS AS OUTLINED IN THE LATEST ISSUE OF THE ANSI/SCTE 77 STANDARD TITLED "SPECIFICATION FOR UNDER GROUND ENCLOSURE INTEGRITY". INDEPENDENT THIRD-PARTY TEST REPORTS TOGETHER WITH CERTIFICATION THAT ALL TEST PROVISIONS OF THE LATEST ISSUE OF THE ANSI/SCTE 77 STANDARD HAVE BEEN MET WILL BE REQUIRED FOR EACH TYPE OF PULL BOX BEING FURNISHED. ALL TEST REPORTS SHALL BE DATED AND SIGNED BY A REGISTERED PROFESSIONAL ENGINEER AND SHALL BEAR THE LETTERHEAD OF THE TESTING AGENCY.

29. THE INDEPENDENT TEST REPORTS SHALL BE CERTIFIED AS TO BEING REPRESENTATIVE OF THE RESULTS THAT WOULD BE OBTAINED BY SIMILARLY TESTING PULL BOXES OF LIKE KIND THAT THE MANUFACTURER WILL BE FURNISHING TO STATE OF NEBRASKA HIGHWAY PROJECTS. THE CERTIFICATION SHALL BE EXECUTED AND SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE PULL BOX MANUFACTURER AND SHALL BEAR THE MANUFACTURER'S LETTERHEAD. A NEW TEST REPORT AND CERTIFICATION FOR EACH TYPE PULL BOX BEING FURNISHED WILL BE REQUIRED EVERY FIVE YEARS.

30. THE TEST REPORTS AND CERTIFICATIONS, IF FOUND ACCEPTABLE, WILL BE PLACED ON FILE IN THE ROADWAY DESIGN DIVISION OF THE NEBRASKA DEPARTMENT OF TRANSPORTATION IN LINCOLN, NEBRASKA AND THE PULL BOX MANUFACTURER'S NAME WILL BE ADDED TO THE NEBRASKA DEPARTMENT OF TRANSPORTATION "APPROVED PRODUCTS LIST."

31. AFTER ACCEPTANCE BY THE STATE, THE PULL BOX MANUFACTURER SHALL MAKE NO CHANGES IN DIMENSIONS, MANUFACTURING PROCESS OR MATERIAL WITHOUT SUBMITTING NEW TEST REPORTS FOR APPROVAL.

REV. NO.	DATE	DESCRIPTION OF REVISION
R9	OCT 24	ADDED TYPE FOR-27 & PB FIBER VAULT
R8	JAN 18	NDOR BORDER TO NDOT BORDER
R7	DEC 16	ADD 8" GAP TO PB-1 & NOTES 2,4,6,17

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 914-R9

PULL BOX DETAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

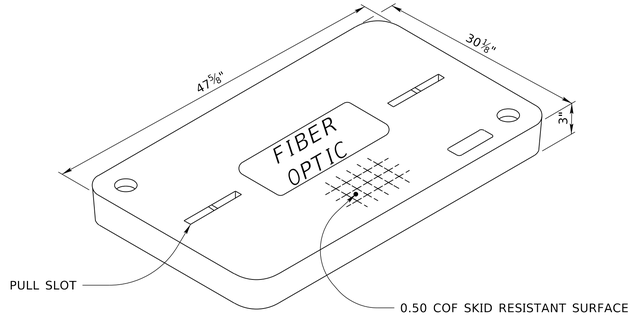
DATE

ORIGINAL: JULY 2, 1981

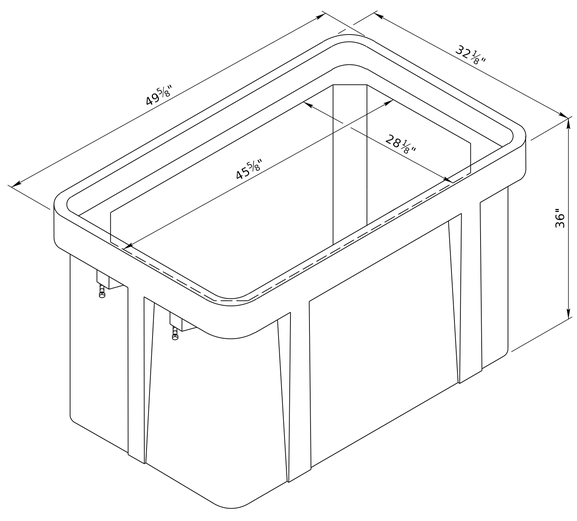
DATE

2/3

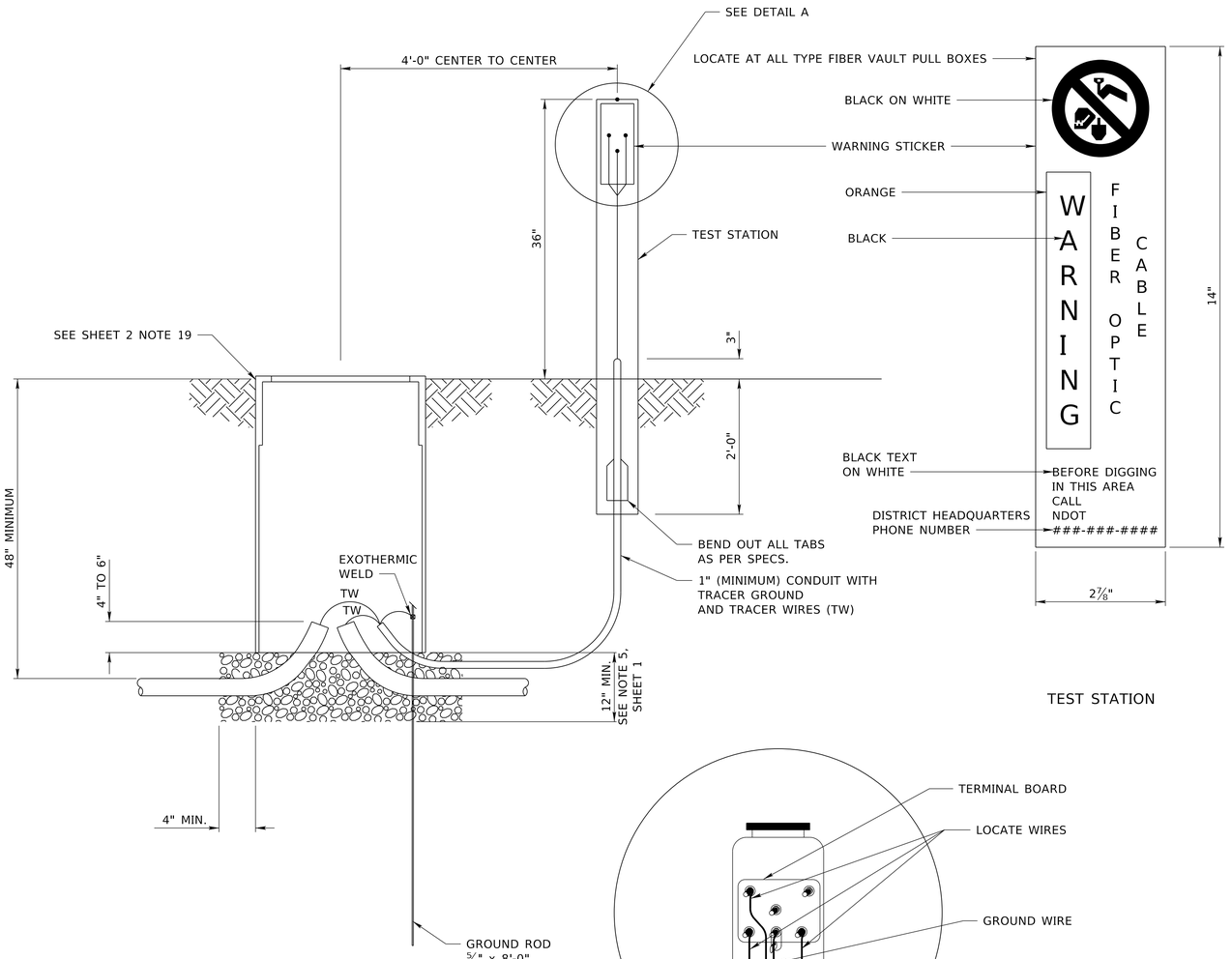
COMPUTER: BG04194593
DATE: 11-JUL-2025 08:33
FILE: 9140 0 R9.dgn



COVER

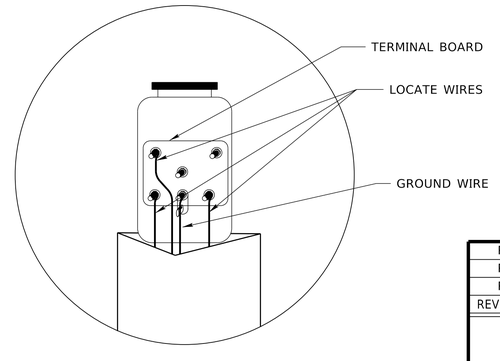


BOX



TEST STATION

PULL BOX - TYPE PB FIBER VAULT



DETAIL A:
TEST STATION
TERMINAL BOARD DETAIL

REV. NO.	DATE	DESCRIPTION OF REVISION
R9	OCT 24	ADDED TYPE FOR-27 & PB FIBER VAULT
R8	JAN 18	NDOR BORDER TO NDOT BORDER
R7	DEC 16	ADD 8" GAP TO PB-1 & NOTES 2,4,6,17

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 914-R9

PULL BOX DETAIL

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

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

ORIGINAL: JULY 2, 1981

DATE

3
3

COMPUTER: BG04194593
DATE: 11-JUL-2025 08:33
FILE: 9140 0 R9.dgn

COMPUTER: BG0419M1187
DATE: 22-AUG-2024 11:31
FILE: 9200 0 R7.dgn

CHANNELIZATION DEVICES

THE FUNCTION OF CHANNELIZATION DEVICES IS TO WARN ROAD USERS 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 POSTS, VERTICAL PANELS, DRUMS, BARRICADES, TRAFFIC LANE DIVIDERS, 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 SHALL MEET THE CRASHWORTHY PERFORMANCE CRITERIA CONTAINED IN THE NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP) REPORT 350 OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH). THEY 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, 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) S	SPACING OF DEVICES (FEET)	
	TAPER	TANGENT
25	25	50
35	35	70
45	45	90
55	55	110
60	60	120
65	65	130
75	75	150

WARNING LIGHTS MAY BE ADDED TO CHANNELIZING DEVICES IN AREAS WITH FREQUENT FOG, SNOW, OR SEVERE ROADWAY CURVATURE, OR WHERE VISUAL DISTRACTIONS ARE PRESENT, EXCEPT FOR THE SEQUENTIAL FLASHING WARNING LIGHTS, WARNING LIGHTS PLACED ON CHANNELIZING DEVICES USED IN A SERIES TO CHANNELIZE ROAD USERS SHALL BE STEADY-BURN.

THE RETROREFLECTIVE MATERIAL USED ON CHANNELIZING DEVICES SHALL HAVE A SMOOTH, SEALED OUTER SURFACE, MEETING THE REQUIREMENTS OF THE ASTM SPECIFICATION D4956, FOR TYPE IV SHEETING OR TYPE V REBOUNDABLE SHEETING (OR GREATER).

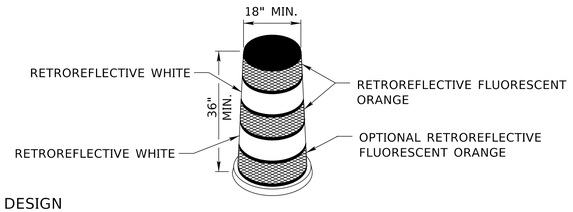
COEFFICIENT OF RETROREFLECTION ($CD/LUX/M^2$)			
WHITE	ORANGE	RED	YELLOW
250	100	45	170

THE AMERICAN TRAFFIC SAFETY SERVICES ASSOCIATION (ATSSA) "QUALITY GUIDELINES FOR WORK ZONE TRAFFIC CONTROL DEVICES" SHALL BE USED AS A VISUAL GUIDE FOR DETERMINING IF A TRAFFIC CONTROL DEVICE/OR SIGN 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 DEVICE FACE. THE LETTERS AND NUMBERS SHALL BE A NON-REFLECTIVE COLOR AND NOT OVER 15 SQUARE INCHES IN TOTAL AREA.

PARTICULAR ATTENTION SHOULD BE GIVEN TO MAINTAINING THE CHANNELIZING DEVICES TO KEEP THEM CLEAN, VISIBLE, AND PROPERLY POSITIONED. DEVICES SHALL BE REPLACED THAT ARE DAMAGED AND/OR HAVE LOST A SIGNIFICANT AMOUNT OF THEIR RETROREFLECTIVITY AND EFFECTIVENESS.

REFLECTORIZED PLASTIC DRUMS



DESIGN

REFLECTORIZED PLASTIC DRUMS USED FOR TRAFFIC WARNING OR CHANNELIZATION SHALL BE CONSTRUCTED OF LIGHTWEIGHT, FLEXIBLE, AND DEFORMABLE MATERIALS AND BE A MINIMUM OF 36 INCHES IN HEIGHT AND HAVE A MINIMUM WIDTH OF AT LEAST A 18 INCHES, REGARDLESS OF ORIENTATION. THE PREDOMINANT COLOR OF THE DRUM SHALL BE ORANGE. METAL DRUMS SHALL NOT BE USED. THE MARKINGS ON DRUMS SHALL BE HORIZONTAL, SHALL BE CIRCUMFERENTIAL, AND SHALL DISPLAY FOUR 6 INCH WIDE BANDS OF RETROREFLECTIVE SHEETING, ALTERNATING FLUORESCENT ORANGE-WHITE-FLUORESCENT ORANGE-WHITE, DRUMS SHALL HAVE CLOSED TOPS THAT WILL NOT ALLOW COLLECTION OF CONSTRUCTION OR OTHER DEBRIS.

APPLICATION

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

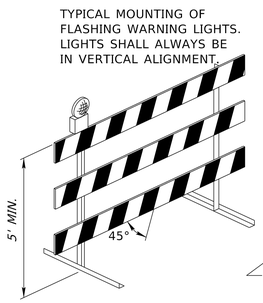
BALLAST SHALL NOT BE PLACED ON TOP OF THE DRUM. DRUMS SHOULD NOT BE WEIGHTED WITH SAND, WATER, OR ANY MATERIAL.

BARRICADES

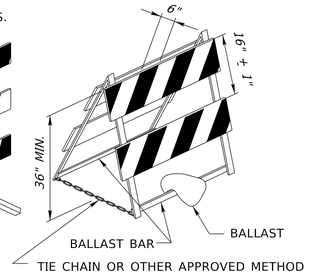
BARRICADE TYPE	TYPE II	TYPE III
WIDTH OF RAIL *	8 INCHES MIN. - 12 INCHES MAX.	8 INCHES MIN. - 12 INCHES MAX.
LENGTH OF RAIL	36 INCHES	8 FEET **
WIDTH OF STRIPES	6 INCHES	6 INCHES
HEIGHT	36 INCHES	5 FEET
REFLECTIVE SHEETING	TYPE IV	TYPE IV
NUMBER OF REFLECTORIZED RAIL FACES	4 (TWO EACH DIRECTION)	6 (THREE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

TYPE III BARRICADE



TYPE II BARRICADE



BALLAST SHALL NOT BE PLACED OVER ANY REFLECTIVE DEVICE

DESIGN

A BARRICADE IS A PORTABLE OR FIXED DEVICE HAVING TWO OR THREE RAILS WITH APPROPRIATE MARKINGS. IT IS USED TO CONTROL ROAD USERS 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 ROAD USERS ARE TO PASS. THE STRIPES SHALL BE 6 INCHES WIDE. THE MINIMUM RAIL LENGTH FOR A TYPE II BARRICADE IS 36 INCHES.

WHERE BARRICADES EXTEND ENTIRELY ACROSS A ROADWAY, THE STRIPES SHOULD SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH ROAD USERS 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 ROAD USER, AND IN A MANNER THAT PROVIDES A STABLE SUPPORT THAT IS NOT EASILY BLOWN OVER OR DISPLACED.

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.

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

** WHEN LATERAL SPACE IS LIMITED, SOME TYPE III BARRICADES WITH A 4 FOOT LENGTH OF RAIL, MAY BE ALLOWED WHEN APPROVED BY THE ENGINEER.

APPLICATION

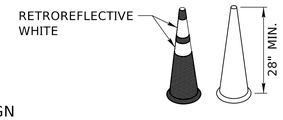
TYPE II BARRICADES ARE INTENDED FOR USE IN SITUATIONS WHERE TRAFFIC IS MAINTAINED THROUGH THE TEMPORARY TRAFFIC CONTROL ZONE. THEY MAY BE USED INDIVIDUALLY OR IN GROUPS TO MARK A SPECIFIC CONDITION, OR THEY MAY BE USED IN A SERIES FOR CHANNELIZING TRAFFIC. ON THE INTERSTATE, FREEWAY AND EXPRESSWAY SYSTEM, TYPE II BARRICADES SHALL NOT BE USED FOR CHANNELIZATION.

TYPE III BARRICADES USED AT A ROAD CLOSURE MAY EXTEND COMPLETELY ACROSS A ROADWAY 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 WHO SHALL PROVIDE 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 BARRICADES MAY 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 WORK AHEAD", FOR EXAMPLE CAN EFFECTIVELY BE MOUNTED ABOVE THE BARRICADE THAT CLOSES 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.

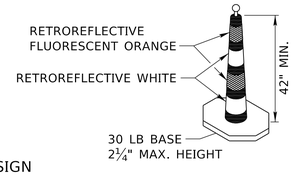
FOR NIGHTTIME USE, CONES SHALL BE RETROREFLECTIVE OR EQUIPPED WITH LIGHTING DEVICES FOR MAXIMUM VISIBILITY. RETROREFLECTION OF 28 INCH OR 36 INCH CONES SHALL BE PROVIDED BY A WHITE BAND 6 INCHES WIDE, NO MORE THAN 4 INCHES FROM THE TOP OF THE CONE, AND AN ADDITIONAL 4 INCH WIDE WHITE BAND A MINIMUM OF 2 INCHES BELOW THE 6 INCH BAND.

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 FOR LANE CLOSURE TAPERS OR SHIFTS, CONES SMALLER THAN 42 INCHES 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.

42 INCH CONES



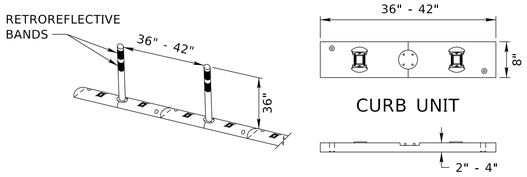
DESIGN

42 INCH CONES SHALL INCLUDE A 30 POUND RUBBER BASE AND DISPLAY FOUR 6 INCH WIDE BANDS OF RETROFEFLECTIVE SHEETING, ALTERNATING FLUORESCENT ORANGE-WHITE-FLOURESCENT ORANGE-WHITE.

APPLICATION

WHEN APPROVED BY THE ENGINEER OR SHOWN IN THE PLANS, 42 INCH REFLECTIVE CONES MAY BE USED IN LIEU OF TYPE II BARRICADES OR REFLECTORIZED DRUMS. 42 INCH CONES SHALL NOT BE USED FOR LANE-CLOSURE TAPERS OR SHIFTS. IF A RECTANGULAR BASE IS USED, THE LONG SIDE OF THE BASE SHOULD BE ORIENTED PARALLEL TO THE DIRECTION OF TRAFFIC.

TUBULAR POST AND CURB SYSTEM



DESIGN

TUBULAR POSTS USED IN THE SYSTEM SHALL BE 36 INCHES HIGH AND A MINIMUM OF 2 INCHES WIDE WHEN FACING TRAFFIC. THE TUBULAR POST AND CURB SYSTEM SHALL BE MADE OF A MATERIAL THAT CAN BE STRUCK WITHOUT DAMAGING IMPACTING VEHICLES. THE COLOR SHALL BE AS SHOWN IN THE PLANS.

THE TUBULAR POSTS SHALL BE RETROREFLECTIVE. RETROREFLECTION OF TUBULAR POSTS SHALL BE PROVIDED BY TWO 3-INCH WIDE RETROREFLECTIVE BANDS PLACED A MAXIMUM OF 2 INCHES FROM THE TOP WITH A MAXIMUM OF 6 INCHES BETWEEN THE BANDS. EACH CURB SECTION SHALL CONTAIN ONE RETROREFLECTIVE MARKER FACING EACH DIRECTION OF TRAFFIC. THE COLOR OF THE RETROREFLECTIVE BANDS AND MARKERS SHALL MATCH THE POST/CURB COLOR.

THE CURB SECTIONS SHALL BE CONFIGURED TO ALLOW FOR DRAINAGE FROM THE PAVEMENT SURFACE.

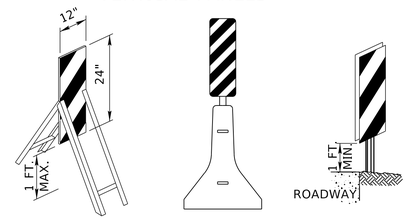
APPLICATION

TUBULAR POST AND CURB SYSTEMS MAY BE USED TO DIVIDE OPPOSING LANES OF TRAFFIC OR TO DIVIDE TRAFFIC LANES WHEN TWO OR MORE LANES ARE KEPT OPEN IN THE SAME DIRECTION.

FASTENING THE CURBS TO THE PAVEMENT WITH ANCHOR BOLTS OR OTHER SUITABLE METHODS AS DIRECTED BY THE MANUFACTURER IS REQUIRED TO MINIMIZE THE CHANCE OF BEING MOVED BY TRAFFIC.

TUBULAR POST AND CURB SYSTEMS SHALL BE INSTALLED IN THE LOCATIONS SHOWN IN THE PLANS OR DIRECTED BY THE ENGINEER.

VERTICAL PANELS



DESIGN

RETROREFLECTIVE MATERIAL ON VERTICAL PANELS SHALL BE 12 INCHES WIDE AND AT LEAST 24 INCHES HIGH. THEY SHALL HAVE ALTERNATING ORANGE AND WHITE STRIPES, WHERE THE HEIGHT OF THE RETROREFLECTIVE MATERIAL ON THE VERTICAL PANEL IS MORE THAN 36 INCHES, A PANEL STRIPE WIDTH OF 6 INCHES SHALL BE USED. WHERE THE HEIGHT OF THE RETROREFLECTIVE MATERIAL ON THE VERTICAL PANEL IS 36 INCHES OR LESS, A PANEL STRIPE WIDTH OF 4 INCHES SHALL BE USED. IF USED FOR TWO-WAY TRAFFIC, BACK-TO-BACK PANELS SHALL BE USED.

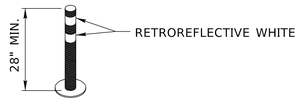
MARKINGS FOR VERTICAL PANELS SHALL BE ALTERNATING ORANGE AND WHITE RETROREFLECTORIZED STRIPES SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION TRAFFIC IS TO PASS.

POST MOUNTED VERTICAL PANELS SHALL BE MOUNTED WITH THE BOTTOM A MINIMUM OF 1 FOOT ABOVE THE ROADWAY. VERTICAL PANELS ON A TEMPORARY STAND SHALL BE MOUNTED WITH THE BOTTOM A MAXIMUM OF 1 FOOT ABOVE THE ROADWAY.

APPLICATION

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

TUBULAR POSTS



DESIGN

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

TUBULAR POSTS SHALL BE RETROREFLECTIVE. RETROREFLECTION OF TUBULAR POSTS 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 POSTS 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 POSTS WILL NOT BE BLOWN OVER OR DISPLACED BY TRAFFIC BY EITHER AFFIXING THEM TO THE PAVEMENT WITH ANCHOR BOLTS OR ADHESIVE, IF A NONCYLINDRICAL DEVICE IS USED, IT SHALL BE ATTACHED TO THE PAVEMENT TO ENSURE THAT THE WIDTH FACING TRAFFIC MEETS THE MINIMUM REQUIREMENTS.

TUBULAR POSTS SHOULD NOT BE USED FOR PEDESTRIAN CHANNELIZATION OR A PEDESTRIAN BARRIERS IN TEMPORARY TRAFFIC CONTROL ZONES ON OR ALONG SIDEWALKS.

REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN 18	NDOR BORDER TO NDOT BORDER
R6	JUN 14	2009 MUTCD UPDATE
R5	OCT 98	REVISE CHANNELIZATION DEVICES, TAPER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 920-R7

TRAFFIC CONTROL, CONSTRUCTION AND MAINTENANCE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

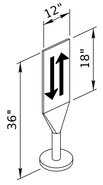
PROFESSIONAL CIVIL ENGINEER ★ DANIEL J. WADDLE E-6289 ★ STATE OF NEBRASKA

DATE

ORIGINAL: OCTOBER 1998
DATE

1/3

OPPOSING TRAFFIC LANE DIVIDERS



DESIGN

OPPOSING TRAFFIC LANE DIVIDERS SHALL BE A TWO SIDED UPRIGHT RETROREFLECTORIZED ORANGE PANEL, WITH A WIDTH OF 12 INCHES AND A HEIGHT OF 18 INCHES. 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 4 INCHES. THE BASE SHALL BE ATTACHED TO THE EXISTING SURFACE BY EPOXY OR OTHER SUITABLE ADHESIVE, TO ENSURE THAT THE PANEL REMAINS FACING TRAFFIC.

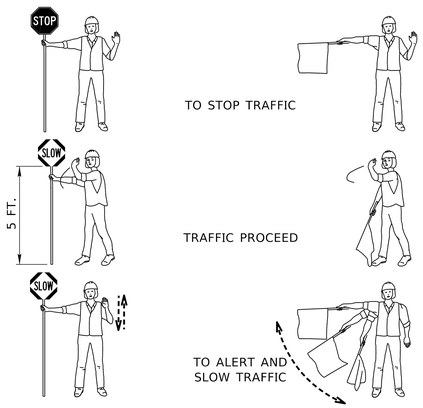
APPLICATION

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 PADDLE

THE STOP/SLOW PADDLE SHALL HAVE AN OCTAGONAL SHAPE ON A RIGID HANDLE. STOP/SLOW PADDLES SHALL BE AT LEAST 18 INCHES WIDE WITH LETTERS AT LEAST 6 INCHES HIGH. IF THE STOP/SLOW PADDLE IS PLACED ON A RIGID STAFF, THE MINIMUM LENGTH OF THE STAFF, MEASURED FROM THE BOTTOM OF THE SIGN TO THE END OF THIS STAFF THAT RESTS ON THE GROUND, SHOULD BE 5 FEET. THE STOP/SLOW PADDLE SHOULD BE THE PRIMARY AND PREFERRED HAND-SIGNALING DEVICE BECAUSE THE STOP/SLOW PADDLE GIVES ROAD USERS MORE POSITIVE GUIDANCE THAN RED FLAGS. USE OF FLAGS SHOULD BE LIMITED TO EMERGENCY SITUATIONS.

FLAGGERS

A FLAGGER MUST BE DRESSED FOR SAFETY. IN ADDITION TO THE REQUIREMENTS OF THE "WORKER VISIBILITY" SECTION LISTED BELOW, FLAGGERS SHALL WEAR:

1. AN ORANGE OR YELLOW/GREEN CAP OR HARD HAT.
2. A SHIRT WITH SLEEVES, PANTS AND SHOES (TANK TOPS, SHORTS OR SANDALS SHALL NOT BE WORN).

FLAGGERS SHALL BE INSTRUCTED IN THE PROPER LOCATION, DUTIES AND PROCEDURES FOR FLAGGING 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.

WORKER VISIBILITY

ALL WORKERS WITHIN THE RIGHT-OF-WAY WHO ARE EXPOSED EITHER TO TRAFFIC (VEHICLES USING THE HIGHWAY FOR PURPOSES OF TRAVEL) OR TO CONSTRUCTION EQUIPMENT WITHIN THE WORK AREA SHALL WEAR HIGH-VISIBILITY SAFETY APPAREL. HIGH-VISIBILITY SAFETY APPAREL IS DEFINED TO MEAN PERSONAL PROTECTIVE SAFETY CLOTHING THAT;

1. IS INTENDED TO PROVIDE CONSPICUITY DURING BOTH DAYTIME AND NIGHTTIME USAGE, AND
2. MEETS THE PERFORMANCE CLASS 2 OR CLASS 3 REQUIREMENTS OF THE ANSI/ISEA 107-2004 PUBLICATION ENTITLED "AMERICAN NATIONAL STANDARDS FOR HIGH-VISIBILITY SAFETY APPAREL AND HEADWEAR"

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 "A" HIGH INTENSITY FLASHING WARNING LIGHTS ARE NORMALLY MOUNTED ON THE TYPE III BARRICADE THAT ACCOMPANIES THE ADVANCE WARNING SIGNS.

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. WHEN USED TO SUPPLEMENT CHANNELIZATION, THE MAXIMUM SPACING FOR WARNING LIGHTS SHOULD BE IDENTICAL TO THE CHANNELIZING DEVICE SPACING REQUIREMENTS. WHEN USED TO DELINEATE A CURVE, TYPE "C" WARNING LIGHTS SHOULD ONLY BE USED ON DEVICES ON THE OUTSIDE OF THE CURVE, AND NOT ON THE INSIDE OF THE CURVE.

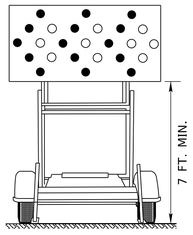
FLASHING ARROW PANEL (DISPLAY)

AN ARROW PANEL IS A SIGN WITH A MATRIX OF ELEMENTS, CAPABLE OF EITHER FLASHING OR SEQUENTIAL DISPLAYS. THIS SIGN SHALL PROVIDE ADDITIONAL WARNING AND DIRECTIONAL INFORMATION TO ASSIST IN MERGING AND CONTROLLING ROAD USERS THROUGH OR AROUND A TEMPORARY TRAFFIC CONTROL ZONE. AN ARROW PANEL SHOULD BE USED IN COMBINATION WITH APPROPRIATE SIGNS, CHANNELIZING DEVICES 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 NON-REFLECTIVE BLACK. THE PANEL SHALL BE MOUNTED ON A VEHICLE, TRAILER OR OTHER SUITABLE SUPPORT. MINIMUM MOUNTING HEIGHT MEASURED VERTICALLY FROM THE BOTTOM OF THE PANEL TO THE ROADWAY BELOW IT OR TO THE ELEVATION OF THE NEAR EDGE OF THE ROADWAY. SHALL BE 7 FEET EXCEPT ON VEHICLE-MOUNTED PANELS, WHICH SHOULD BE AS HIGH AS PRACTICAL.



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	FLASHING LINE OR FLASHING CORNERS OR ALTERNATING DIAMOND CAUTION

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

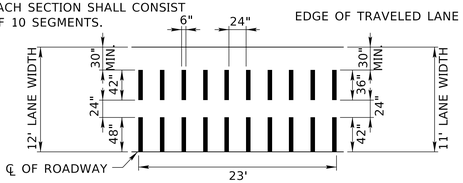
A FLASHING ARROW OR SEQUENTIAL CHEVRON MODE SHALL ONLY BE USED FOR STATIONARY OR MOVING LANE CLOSURES.

FOR SHOULDER WORK BLOCKING THE SHOULDER, FOR ROADSIDE WORK NEAR THE SHOULDER, OR FOR TEMPORARILY CLOSING ONE LANE ON A TWO-LANE, TWO-WAY ROADWAY, AN ARROW PANEL SHALL BE USED ONLY IN THE CAUTION MODE.

AN ARROW DISPLAY MODE 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 TO LATERALLY SHIFT TRAFFIC.

TEMPORARY RUMBLE STRIPS

EACH SECTION SHALL CONSIST OF 10 SEGMENTS.



DESIGN

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

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.

IF, AFTER THE SIGNAL ASSEMBLIES ARE ERECTED AND THE ROAD IS OPEN TO PUBLIC TRAVEL, THE SIGNAL SYSTEM IS NOT PUT IMMEDIATELY INTO OPERATION, THE SIGNAL FACES SHALL BE COVERED WITH BURLAP OR OTHER OPAQUE MATERIAL SUBJECT TO THE APPROVAL OF THE ENGINEER, INOPERATIVE SIGNALS ON ROADS OPEN TO THE PUBLIC SHALL ALWAYS BE COVERED. TILTING THE SIGNALS UPWARD IS NOT AN ACCEPTABLE ALTERNATIVE TO COVERING THE HEADS.

FLOODLIGHTS

WHEN NIGHTTIME WORK IS REQUIRED, FLOODLIGHTS SHALL BE USED TO ILLUMINATE FLAGGER STATIONS. FLOODLIGHTS SHOULD BE USED TO ILLUMINATE 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.

TAPERS

TAPERS ARE CREATED USING A SERIES OF CHANNELIZING DEVICES OR PAVEMENT MARKINGS 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 INTO COMMON ROAD SPACE. THE TAPER SHOULD BE LONG ENOUGH TO ENABLE MERGING DRIVERS TO HAVE ADEQUATE ADVANCE WARNING AND SUFFICIENT LENGTH TO ADJUST THEIR SPEEDS AND MERGE INTO A SINGLE LANE BEFORE THE DOWNSTREAM 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 WHERE SHOULDERS ARE PART OF THE ACTIVITY AREA AND ARE CLOSED, OR WHEN IMPROVED SHOULDERS MIGHT BE MISTAKEN AS A DRIVING LANE IN THESE INSTANCES, THE SAME TYPE, BUT ABBREVIATED, CLOSURE PROCEDURES USED ON A NORMAL PORTION OF THE ROADWAY CAN BE USED. 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 OR 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 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 MINIMUM LENGTH OF 50 FEET AND A MAXIMUM LENGTH OF 100 FEET WITH CHANNELZING DEVICES AT APPROXIMATELY 20 FOOT SPACINGS SHOULD BE USED TO GUIDE TRAFFIC INTO THE ONE-LANE-SECTION AND A DOWNSTREAM TAPER WITH A LENGTH OF APPROXIMATELY 100 FEET SHOULD BE USED TO GUIDE TRAFFIC BACK INTO THEIR ORIGINAL LANE.

TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES	
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

FORMULAS FOR L	
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

TAPER LENGTH L (FEET)			
SPEED (MPH)	LANE WIDTH		
S	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
60	600	660	720
65	650	715	780
75	750	825	900

REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN 18	NDOR BORDER TO NDOT BORDER
R6	JUN 14	2009 MUTCD UPDATE
R5	OCT 98	REVISE CHANNELIZATION DEVICES, TAPER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 920-R7

TRAFFIC CONTROL, CONSTRUCTION AND MAINTENANCE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

DATE

ORIGINAL: OCTOBER 1998

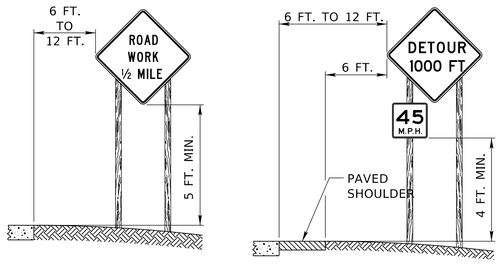
DATE

2
3

COMPUTER: BG0419M187
DATE: 22-AUG-2024 11:31
FILE: 9200 0 R7.dgn

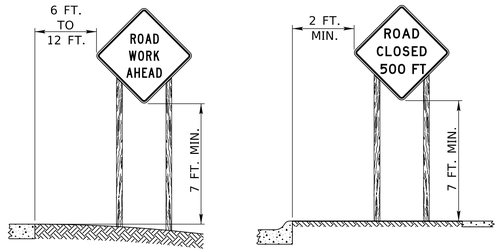
ROADSIDE SIGNS

HEIGHT AND LATERAL LOCATION OF SIGNS
RURAL AREA



WITH SPEED ADVISORY PLATE

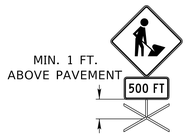
URBAN AREA



TYPICAL SIGN MOUNTINGS

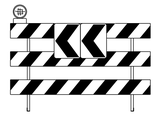
OTHER THAN POST MOUNTED

TYPE III BARRICADE
WITH SIGN



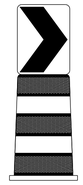
PORTABLE AND
TEMPORARY MOUNTING

TYPE III BARRICADE WITH
SIGN AND DETOUR ARROW



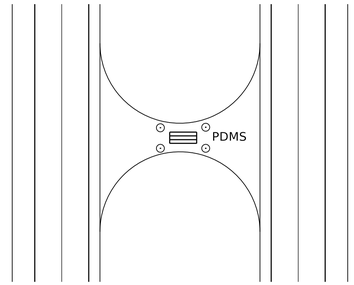
TYPE III BARRICADE
WITH CHEVRONS

TYPE II BARRICADE WITH
DETOUR ARROW OR SIGN

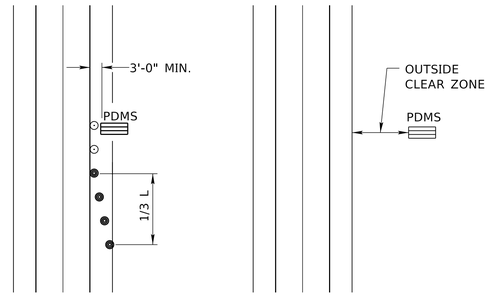


PLASTIC DRUM WITH
CHEVRON OR SIGN

PORTABLE DYNAMIC MESSAGE SIGN DELINEATION



IN MEDIAN



ON SHOULDER OFF SHOULDER

NOTES

1. ALL TRAFFIC CONTROL DEVICES SHALL MEET THE APPLICABLE STANDARDS AND SPECIFICATIONS PRESCRIBED IN PART 6 OF THE LATEST ADOPTED EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, (MUTCD)" AND THE STATE OF NEBRASKA SUPPLEMENT TO THE MUTCD. ALL TRAFFIC CONTROL DEVICES SHALL BE CRASHWORTHY AND QUALIFY AS SUCH ACCORDING TO THE TESTING AND ACCEPTANCE GUIDELINES OF THE NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP) REPORT 350 OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH).
2. 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.
3. TRAFFIC CONTROL DEVICES SHALL BE INSTALLED SO AS NOT TO OBSTRUCT THE VIEW OF OTHER TRAFFIC CONTROL DEVICES.
4. THE ENGINEER SHALL HAVE THE AUTHORITY TO REQUIRE THE USE, AND APPROVE THE LOCATION OF ANY OF THE DEVICES SHOWN IN THESE PLANS.

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.

G. DOUBLE FINES AND REDUCED SPEED ZONE SIGNING ARE NOT REQUIRED FOR SHORT-DURATION WORK LESS THAN 12 HOURS.

TYPICAL FIRST SIGN AT CONSTRUCTION SITE

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

PORTABLE AND TEMPORARY MOUNTING

TEMPORARY SIGN SUPPORTS

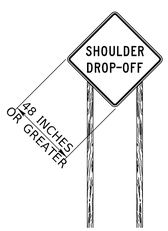
ALL "TEMPORARY SIGN" SUPPORTS (BASES) SHALL BE NCHRP 350 OR MASH (TL-3) APPROVED.

"TEMPORARY SIGNS" ARE ALL TEMPORARILY MOUNTED WORK ZONE SIGNS THAT ARE NOT POST MOUNTED IN THE GROUND AT THE TYPICAL 5 FOOT MOUNTING HEIGHT. TEMPORARY SIGNS ARE CONSIDERED NCHRP 350 OR MASH CATEGORY 2 DEVICES AND ARE MOUNTED ON TEMPORARY SIGN STANDS. TEMPORARY SIGNS SHALL BE MOUNTED A MINIMUM OF 1 FOOT ABOVE THE GROUND, UNLESS OTHERWISE REQUIRED TO BE MOUNTED AT A HIGHER HEIGHT.

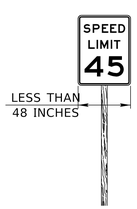
TEMPORARY SIGNS AND THEIR SUPPORTS SHALL NOT BE IN PLACE LONGER THAN 3 DAYS. ANY SIGN THAT IS TO BE IN PLACE LONGER THAN 3 DAYS SHALL BE POST MOUNTED OR MOUNTED TO A DRUM, BARRICADE, OR BARRIER, AS REQUIRED BY THE PLANS OR SPECIFICATIONS.

TYPICAL SIGN MOUNTINGS

POST MOUNTED



SIGNS 48 INCHES OR WIDER
REQUIRE TWO POSTS



SIGN WIDTHS LESS THAN 48 INCHES
MAY BE MOUNTED WITH ONE POST

PORTABLE DYNAMIC MESSAGE SIGNS (PDMS)

THE PLACEMENT OF PDMS SHOULD BE IN THE FOLLOWING ORDER:

WHENEVER POSSIBLE, PDMS SHOULD BE PLACED OFF OF ANY USABLE PORTION OF THE ROADWAY ON THE RIGHT SIDE OF THE ROADWAY. WHEN PLACED OUTSIDE THE CLEAR ZONE OR BEHIND GUARDRAIL OR CONCRETE PROTECTION BARRIERS, DELINEATION IS NOT REQUIRED.

WHERE FIELD CONDITIONS DO NOT ALLOW FOR THIS PLACEMENT, THE SIGNS MAY BE LOCATED ON THE OUTSIDE SHOULDER OF THE ROADWAY OR WITHIN THE MEDIAN.

A. A MINIMUM CLEARANCE OF 3 FEET MEASURED HORIZONTALLY FROM THE EDGE OF THE SIGN TO THE EDGE OF THE TRAVELED WAY IS RECOMMENDED.
B. THE PDMS SHOULD HAVE A MINIMUM MOUNTED HEIGHT OF 7 FEET ON FREEWAYS, EXPRESSWAYS AND IN URBAN AREAS.
C. ALL OTHER RURAL APPLICATIONS SHOULD HAVE A MINIMUM HEIGHT OF 5 FEET.

THESE HEIGHTS ARE MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE ELEVATION OF THE NEAR EDGE OF THE PAVEMENT.

REFLECTORIZED PLASTIC DRUMS SHOULD BE USED TO DELINEATE EACH SIGN USING A 1/3 L TAPER. THESE DRUMS SHOULD BE POSITIONED ON THE UPSTREAM END OF THE SIGN TO FORM A TAPER LEADING UP TO THE TRAFFIC SIDE OF THE SIGN. FOR A SIGN LOCATED IN THE MEDIAN, THE SIGN SHOULD BE DELINEATED WITH A 42 INCH CONE ON ALL FOUR CORNERS.

WHEN DEPLOYED, THE SIGN SHALL BE SIGHTED AND ALIGNED WITH APPROACHING TRAFFIC TO ENSURE VISIBILITY OF THE MESSAGE. IF MULTIPLE SIGNS ARE USED, THE SIGNS SHOULD BE LOCATED ON THE SAME SIDE OF THE ROAD AND SEPARATED ACCORDING TO PROPER SIGN SPACING.

WHEN PRACTICAL, PDMS SHOULD NOT BE USED TO REPLACE STATIC SIGNS FOR LONG TERM USAGE (OVER 10 DAYS).

WHEN PDMS ARE TO BE DEPLOYED FOR LONG PERIODS, SUCH AS INCIDENT MANAGEMENT ROLES, CONCRETE PADS WITH APPROPRIATE TIE DOWNS SHOULD BE CONSTRUCTED FOR THEIR PLACEMENT.

PDMS NOT ACTIVELY BEING USED IN A CONSTRUCTION OR INCIDENT MANAGEMENT ROLE SHOULD BE REMOVED.

REFER TO NDOR "DMS GUIDELINES" FOR PROPER PDMS MESSAGE INFORMATION.

TAPER FORMULA

L = S x 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
- REFLECTORIZED PLASTIC DRUM
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- PORTABLE DYNAMIC MESSAGE SIGN

REV. NO.	DATE	DESCRIPTION OF REVISION
R7	JAN 18	NDOR BORDER TO NDOT BORDER
R6	JUN 14	2009 MUTCD UPDATE
R5	OCT 98	REVISE CHANNELIZATION DEVICES, TAPER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 920-R7

TRAFFIC CONTROL, CONSTRUCTION AND MAINTENANCE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

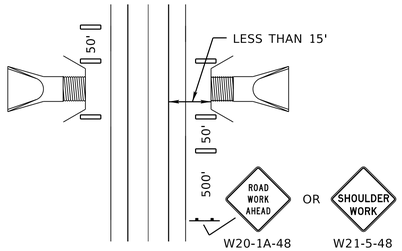
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

DATE

ORIGINAL:
OCTOBER 1998
DATE

3
3

COMPUTER: BG04191M1187
DATE: 22-AUG-2024 11:31
FILE: 9200 0 R7.dgn

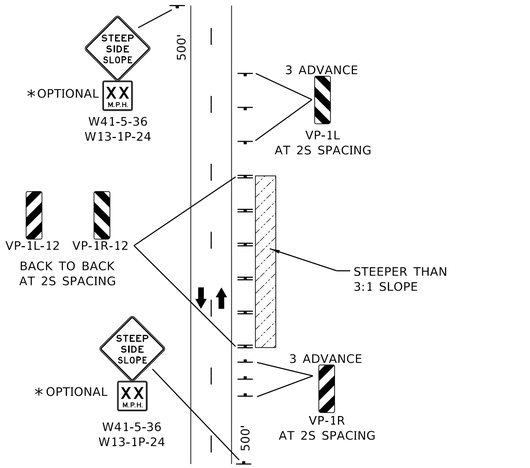


CULVERT DELINEATION

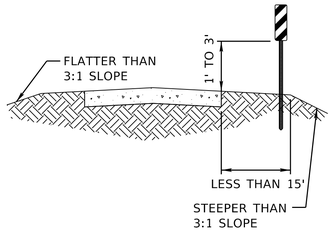
WHEN GUARDRAIL IS REMOVED AND/OR EXCAVATION IS LESS THAN 15 FEET FROM EDGE OF TRAVELED WAY

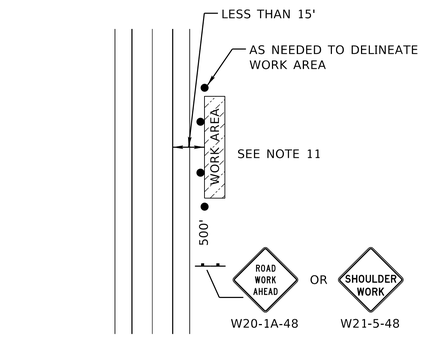
BRIDGE RAIL END DELINEATION

WHEN GUARDRAIL IS REMOVED



STEEP SLOPE DELINEATION





WORK BEYOND THE SHOULDER

TA-1

LEGEND

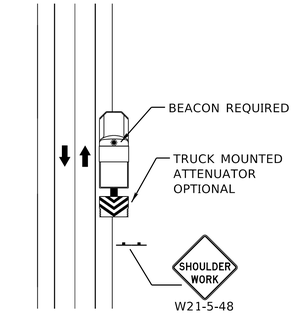
- FLAGGER
- REFLECTORIZED PLASTIC DRUM
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- TYPE III BARRICADE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN
- TRAFFIC SIGNAL

TAPER FORMULA

L = S × W FOR SPEEDS OF 45 MPH OR MORE.

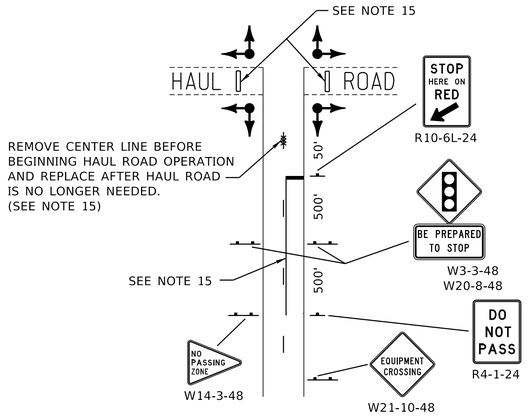
$L = \frac{WS^2}{60}$ FOR SPEEDS OF 40 MPH OR LESS.

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



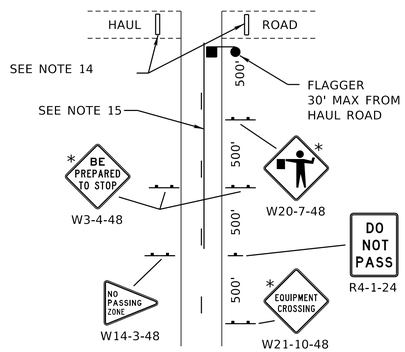
MOBILE OPERATION ON SHOUDER

NO ENCROACHMENT ON TRAVEL LANE
TA-4



HAUL ROAD CROSSING IN CONSTRUCTION AREA USING TEMPORARY TRAFFIC SIGNAL

TA-14



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 (W13-1P) 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 (W20-7) SHALL BE USED WHEN A FLAGGER IS PRESENT, AND REMOVED WHEN NOT APPLICABLE.
4. THE CONTRACTOR SHALL INSTALL, MAINTAIN, AND REMOVE ALL SIGNS IN ACCORDANCE WITH THE DETAILS OF AND AT THE LOCATIONS SHOWN IN THE PLANS. SIGNS INSTALLED BY THE DEPARTMENT OF ROADS OR OTHER GOVERNMENT AGENCY SHALL BE MAINTAINED AND REMOVED BY THEIR FORCES.
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. CULVERT, BRIDGE AND STEEP SLOPE DELINEATION. EXISTING GUARDRAIL SHOULD REMAIN IN PLACE AS LONG AS PRACTICAL FOR THE PROTECTION IT PROVIDES, AND REINSTALLED AS SOON AS PRACTICAL.
10. 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 INTO THE OPEN TRAVEL LANE.
11. TA-1 AND 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.
12. TA-4
VEHICLE HAZARD WARNING SIGNALS SHALL NOT BE USED INSTEAD OF THE VEHICLE'S HIGH-INTENSITY ROTATING, FLASHING OR AMBER STROBE LIGHTS.
13. 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.
14. 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.
15. TA-14
THE "NO PASSING" SIGNS (R4-1-24 AND W14-3-48) AND PAVEMENT MARKINGS ARE NOT REQUIRED IF HAULING OPERATION IS IN EFFECT ONLY DURING DAYLIGHT HOURS.
16. 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.
17. 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.
18. REFER TO STANDARD PLAN 920 FOR GENERAL INFORMATION NOT SHOWN.
19. A MINIMUM OF 7-36" OR 42" CONES SHALL BE PLACED ON THE CENTERLINE IN ADVANCE OF THE FLAGGER. THE CONES SHOULD BE SPACED AT 250 FEET.
20. THE SPEED IN FLAGGING/PILOT CAR OPERATIONS IS GENERALLY CONTROLLED BY THE PILOT CAR, A SPEED REDUCTION MAY NOT BE NECESSARY IF THE WORK ZONE CONDITIONS WILL NOT EXIST UPON COMPLETION OF EACH DAYS WORK. W3-5 SIGN IS NOT NEEDED IF SPEED LIMIT IS NOT REDUCED.

REV. NO.	DATE	DESCRIPTION OF REVISION
R8	JAN 18	NDOR BORDER TO NDOT BORDER
R7	JAN 17	ADD CONES ON CENTERLINE
R6	JUN 14	2009 MUTCD UPDATE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 921-R8

TRAFFIC CONTROL, CONSTRUCTION AND MAINTENANCE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

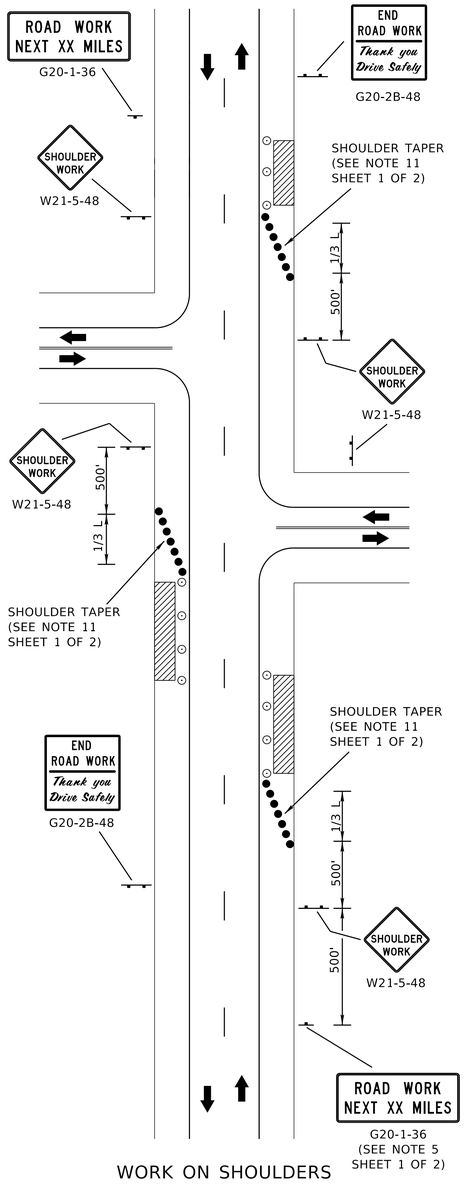
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

ORIGINAL:
JUNE 3, 1980
DATE

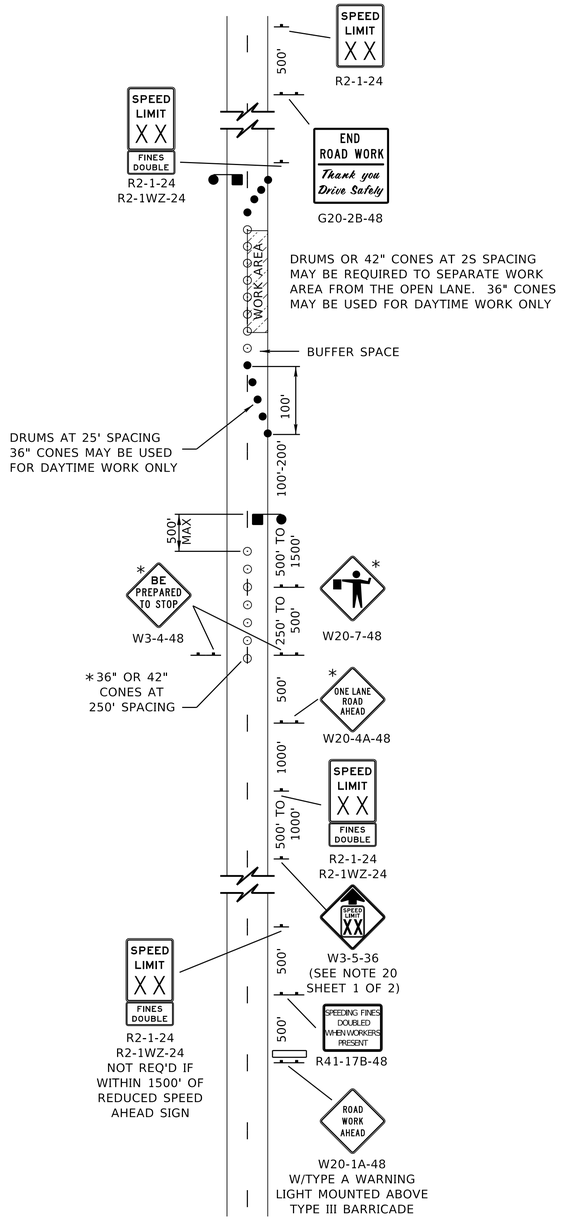
1
2

COMPUTER: BG041904187
DATE: 22-AUG-2024 11:31
FILE: 9210 0 R8.dgn

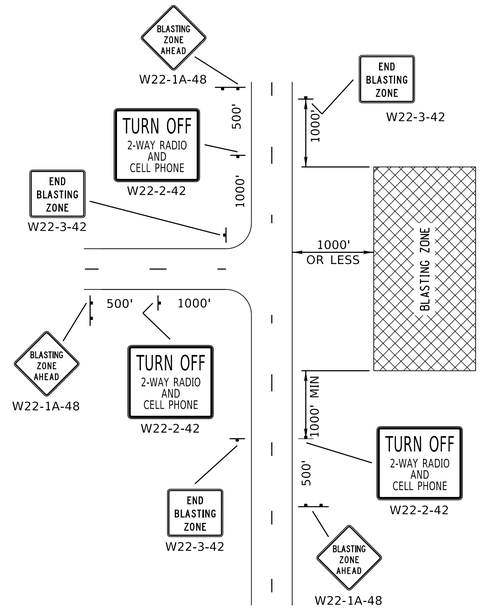
COMPUTER: BG0419M1187
DATE: 22-AUG-2024 11:31
FILE: 9210 0 R8.dgn



WORK ON SHOULDERS
TA-3



LANE CLOSURE
TA-10
*SIGNS AND CONES ARE SUBSIDIARY TO THE FLAGGING OPERATION.



BLASTING ZONE
TA-2

LEGEND

- FLAGGER
- REFLECTORIZED PLASTIC DRUM
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- TYPE III BARRICADE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN
- TRAFFIC SIGNAL

TAPER FORMULA

L = S × 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
R8	JAN 18	NDOR BORDER TO NDOT BORDER
R7	JAN 17	ADD CONES ON CENTERLINE
R6	JUN 14	2009 MUTCD UPDATE

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 921-R8

TRAFFIC CONTROL, CONSTRUCTION AND MAINTENANCE

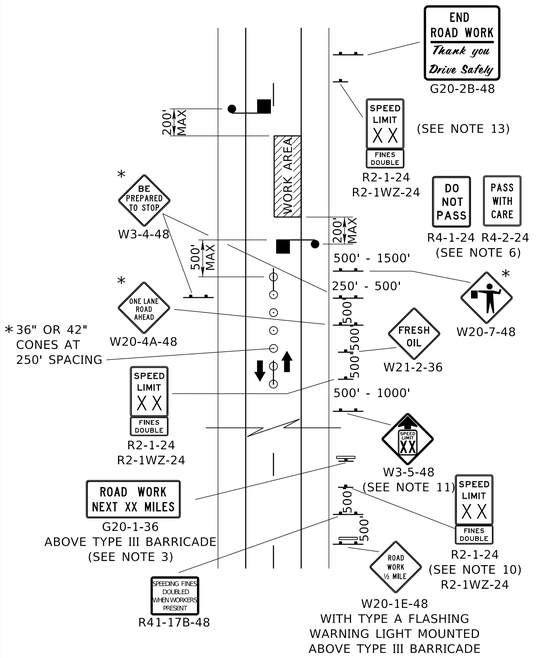
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

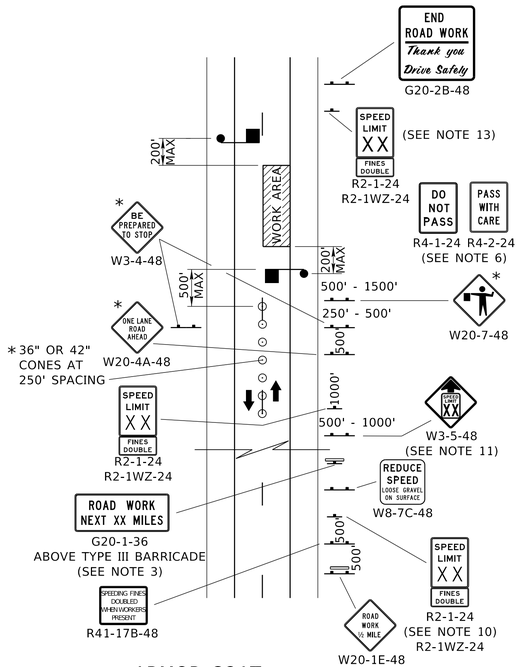
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

ORIGINAL: JUNE 3, 1980
DATE

2
2

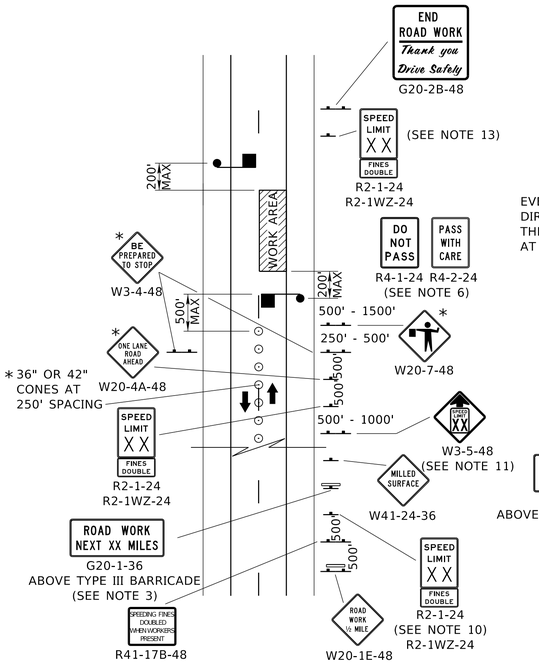


ASPHALT SURFACING
OR FOG SEAL

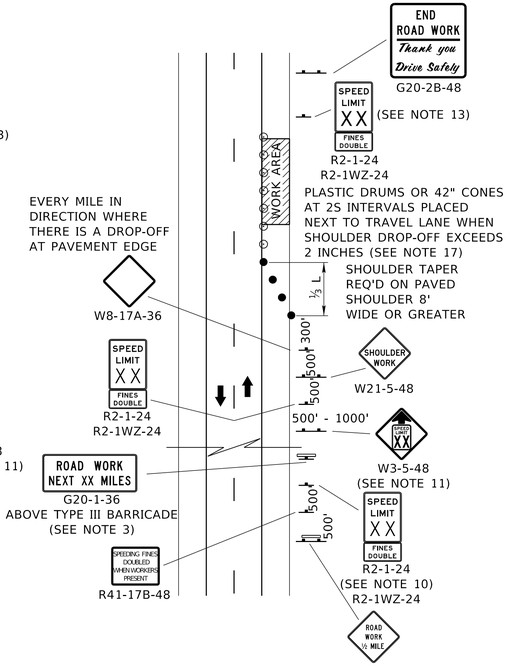


ARMOR COAT
SURFACING

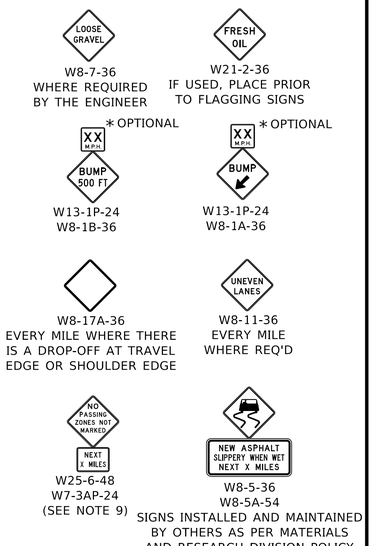
∗ SIGNS AND CONES ARE SUBSIDIARY TO THE FLAGGING OPERATION.



MILLING



SHOULDER WORK
ADJACENT
TO TRAVEL LANE



ADDITIONAL SIGNS
USE WHERE APPLICABLE

GENERAL NOTES

1. SIGNS SHOWN ARE USUALLY FOR ONE DIRECTION OF TRAVEL ONLY.
2. "FLAGGERS AHEAD SYMBOL" SIGN (W20-7-48) SHALL BE USED WHEN A FLAGGER IS PRESENT, AND REMOVED WHEN NOT APPLICABLE.
3. G20-1 "ROAD WORK NEXT XX MILES" SHALL BE USED ON ANY CONSTRUCTION OR MAINTENANCE PROJECT LONGER THAN 2 MILES.
4. WHEN MESSAGE IS NOT PERTINENT, SIGNS SHALL BE TAKEN DOWN, COVERED OR FOLDED. TAPE WILL NOT BE PERMITTED ON THE FACE OF THE SIGN.
5. ORANGE FLAGS MAY BE USED TO CALL ATTENTION TO THE ADVANCE WARNING SIGNS.
6. "DO NOT PASS" AND "PASS WITH CARE" SIGNS WILL BE INSTALLED AT THE BEGINNING AND ENDING OF EACH "NO PASSING" ZONE WHERE PAVEMENT HAS NOT BEEN MARKED. FOR ROADWAYS WITH ADTs OF 2,000 VEHICLES PER DAY OR LESS, THE TIME PERIOD BETWEEN COMPLETION OF THE WORK AND PLACEMENT OF THE PAVEMENT MARKINGS SHALL NOT EXCEED TWO WEEKS. FOR ROADWAYS WITH ADTs GREATER THAN 2,000 VEHICLES PER DAY, THE TIME PERIOD SHALL NOT EXCEED THREE CALENDAR DAYS, CONDITIONS PERMITTING.
7. WHERE TRAFFIC QUEUES ARE LONG AND FLAGGER VISIBILITY IS LIMITED, THE ENGINEER MAY REQUIRE AN ADDITIONAL FLAGGER.
8. "MILLED SURFACE" SIGN (W41-24) IS NOT REQUIRED FOR MILLED SURFACES LESS THAN 1000 FEET IN LENGTH OR FOR MILLED SURFACES THAT ARE NOT BEING OVERLAID WITH THE PROJECT.
9. "NO PASSING ZONES NOT MARKED" SIGN (W25-6-48) SHOULD BE INSTALLED AT EACH END OF THE PROJECT WHENEVER THE EXISTING NO PASSING ZONE PAVEMENT MARKINGS HAVE BEEN REMOVED OR COVERED AND NO PASSING ZONE PAVEMENT MARKINGS ARE NOT INCLUDED IN THE PROJECT.
10. SPEED LIMIT SIGN IS NOT REQUIRED IF WITHIN 1500 FT OF A REDUCED SPEED AHEAD SIGN.
11. THE SPEED IN FLAGGING/PILOT CAR OPERATIONS IS GENERALLY CONTROLLED BY THE PILOT CAR, A SPEED REDUCTION MAY NOT BE NECESSARY IF THE WORK ZONE CONDITIONS WILL NOT EXIST UPON COMPLETION OF EACH DAYS' WORK. W3-5 SIGN IS NOT NEEDED IF SPEED LIMIT IS NOT REDUCED.
12. WORK ZONE SPEED LIMITS SHALL NOT BE INSTALLED WITHOUT A SPEED ZONE AUTHORIZATION COMPLETED BY THE DEPARTMENT. THE WORK ZONE SPEED LIMIT SHALL BE ESTABLISHED ACCORDING TO DOR-OI 60-18. SEE WORK ZONE SPEED LIMIT NOTES ON STANDARD PLAN 920.
13. A SPEED LIMIT SIGN ENDING THE REDUCED SPEED ZONE SHALL BE INSTALLED AT THE END OF EACH ZONE.
14. 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. AT NO TIME, WILL THE QUEUE FROM A FLAGGING OPERATION EXTEND ACROSS A RAILROAD CROSSING.
15. EARLY COORDINATION WITH THE RAILROAD COMPANY SHOULD OCCUR BEFORE WORK STARTS.
16. THE "DO NOT STOP ON TRACKS" SIGN SHOULD BE USED ON ALL APPROACHES TO A HIGHWAY-RAIL GRADE CROSSING WITHIN THE LIMITS OF A TEMPORARY TRAFFIC CONTROL ZONE.
17. PLACE TYPE II BARRICADES, REFLECTORIZED PLASTIC DRUMS, OR 42" CONES ON THE TRAFFIC SIDE OF THE DROP-OFF WHERE SUFFICIENT LATERAL DISTANCE EXISTS BETWEEN THE TRAVEL LANE AND THE DROP-OFF (DROP-OFF DETAIL ON SHEET 2).
18. 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.
19. ON ARMOR COAT SURFACING, A "LOOSE GRAVEL" SIGN (W8-7-36) IS REQUIRED AT THE BEGINNING OF THE DAYS WORK AND SHALL REMAIN IN PLACE UNTIL THE LOOSE GRAVEL HAS BEEN SWEPT OFF.
20. SIGN SIZES SHOWN ARE FOR TYPICAL SITUATIONS- REFER TO NEBRASKA SUPPLEMENT TO THE MUTCD FOR FURTHER SIZE INFORMATION.
21. REFER TO STANDARD PLAN 920 FOR GENERAL INFORMATION NOT SHOWN.
22. A MINIMUM OF 7-36" OR 42" CONES SHALL BE PLACED ON CENTERLINE IN ADVANCE OF THE FLAGGER. THE CONES SHOULD BE SPACED AT 250 FEET.

LEGEND

- FLAGGER
- REFLECTORIZED PLASTIC DRUM
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- TYPE III BARRICADE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN

TAPER FORMULA

L = S × 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
R11	JAN 18	NDOR BORDER TO NDOT BORDER
R10	JAN 17	ADD CONES TO CENTERLINE
R9	JUN 14	2009 MUTCD UPDATES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 922-R11

TRAFFIC CONTROL FOR ASPHALT SURFACING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

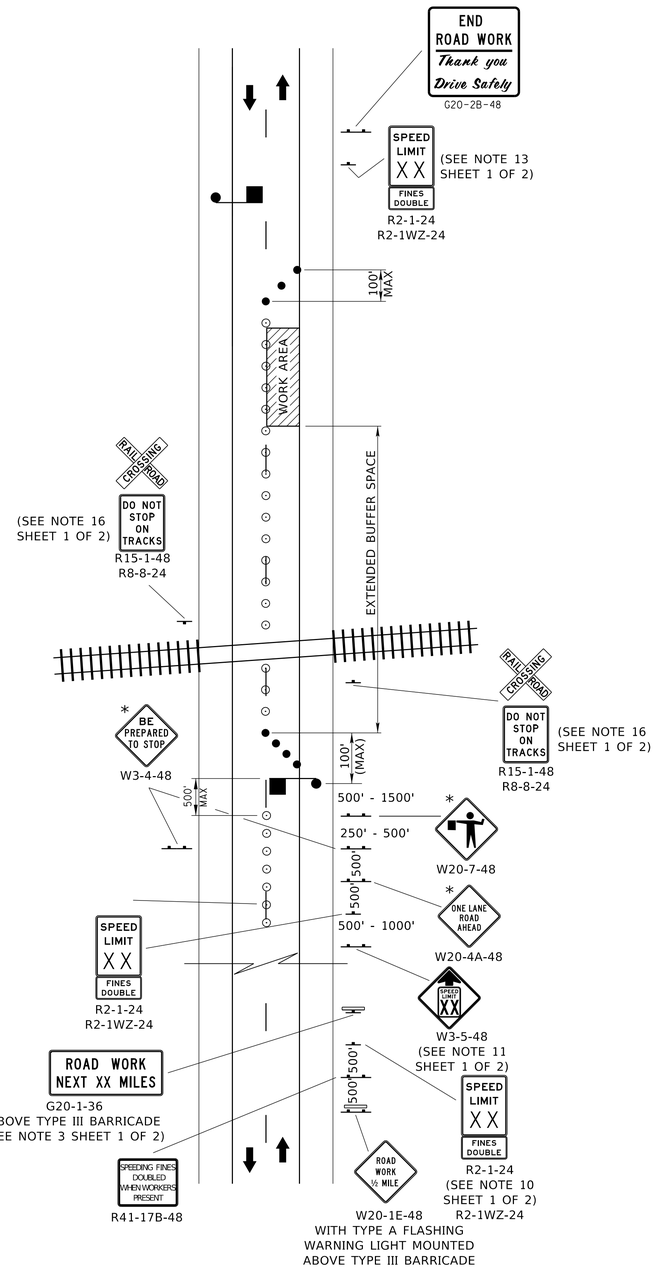
DATE

ORIGINAL: JUNE 3, 1980

DATE

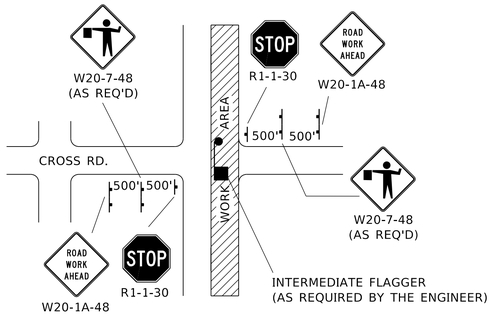
1
2

COMPUTER: BG0419M1187
DATE: 22-AUG-2024 11:31
FILE: 9220 0 R11.dgn

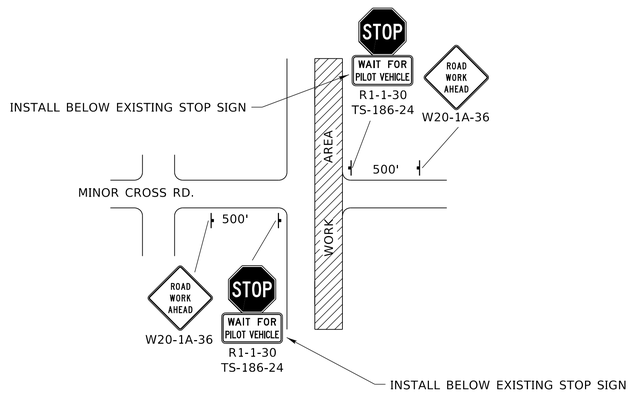


∗ SIGNS AND CONES ARE SUBSIDIARY TO THE FLAGGING OPERATION.

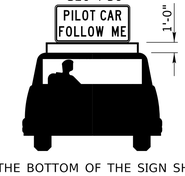
WORK IN VICINITY OF
RAILROAD CROSSING



MINOR OR MAJOR CROSS ROAD WITH FLAGGER

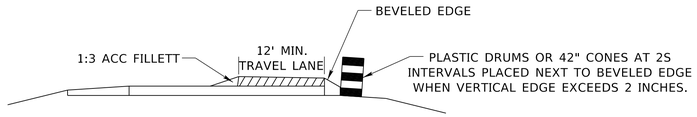


MINOR CROSS ROAD NO FLAGGER
WITH PILOT CAR OPERATION

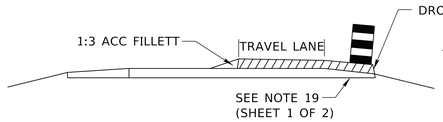


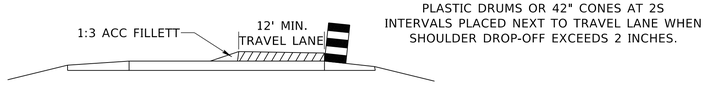
THE BOTTOM OF THE SIGN SHALL BE MOUNTED A MINIMUM OF 1 FOOT ABOVE THE VEHICLE'S ROOF. THE SIGN SHALL BE SECURELY COVERED OR REMOVED WHEN NOT IN USE.

PILOT CAR SIGN

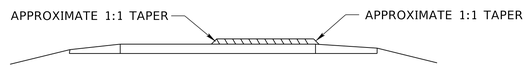


BEVELED EDGE





DROP-OFF GREATER THAN 2 INCHES



DROP-OFF 2 INCHES AND LESS

LEGEND

- FLAGGER
- REFLECTORIZED PLASTIC DRUM
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- TYPE III BARRICADE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN

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
R11	JAN 18	NDOR BORDER TO NDOT BORDER
R10	JAN 17	ADD CONES TO CENTERLINE
R9	JUN 14	2009 MUTCD UPDATES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 922-R11

TRAFFIC CONTROL FOR ASPHALT SURFACING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

DATE

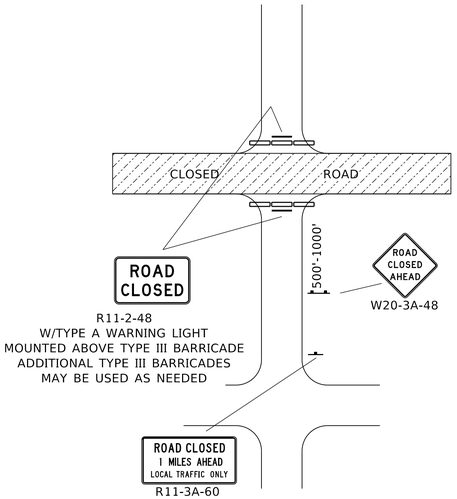
ORIGINAL: JUNE 3, 1980
DATE

2
2

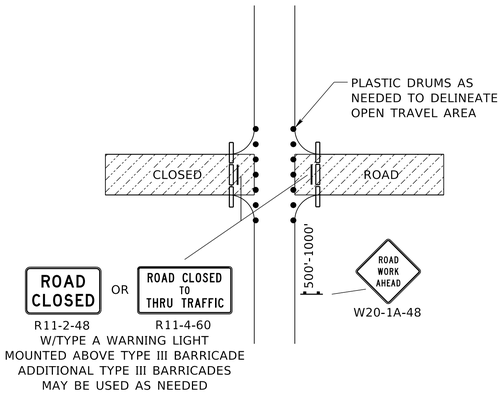
COMPUTER: BG0419M187
DATE: 22-AUG-2024 11:31
FILE: 9220 0 R11.dgn

COMPUTER: BG04194187
DATE: 22-AUG-2024 11:31
FILE: 9230 0 R2.dgn

CROSS ROAD INTERSECTING CLOSED ROAD

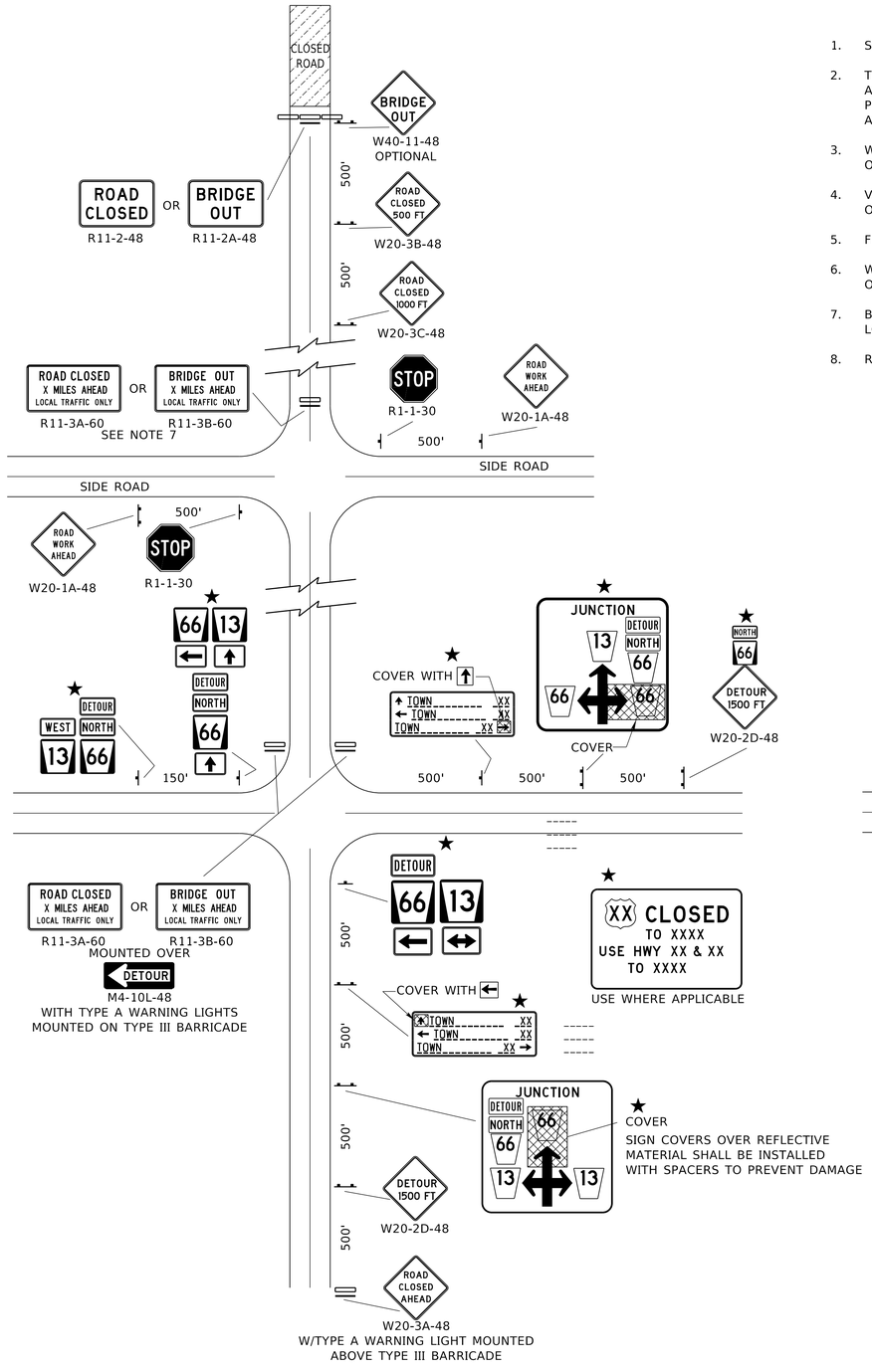


TRAFFIC NOT ALLOWED TO CROSS CLOSED ROAD



TRAFFIC ALLOWED TO CROSS CLOSED ROAD

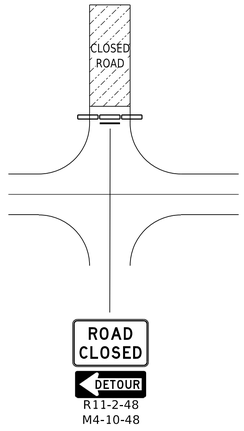
ROAD CLOSED BEYOND JUNCTION



NOTES

1. SIGNS SHOWN ARE USUALLY FOR ONE DIRECTION OF TRAVEL ONLY.
2. THE CONTRACTOR SHALL INSTALL, MAINTAIN, AND REMOVE ALL SIGNS IN ACCORDANCE WITH THE DETAILS OF AND AT THE LOCATIONS SHOWN IN THE PLANS. SIGNS INSTALLED BY THE DEPARTMENT OR OTHER GOVERNMENT AGENCY SHALL BE MAINTAINED AND REMOVED BY THEIR FORCES.
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 920 FOR GENERAL INFORMATION NOT SHOWN.

ROAD CLOSED AT JUNCTION



LEGEND

- TYPE III BARRICADE
- REFLECTORIZED PLASTIC DRUM
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN
- ★ INSTALLED BY OTHERS

TAPER FORMULA

L = S × 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
R2	JAN 18	NDOR BORDER TO NDOT BORDER
R1	JUN 14	2009 MUTCD UPDATES

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 923-R2

TRAFFIC CONTROL ROAD CLOSURE

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

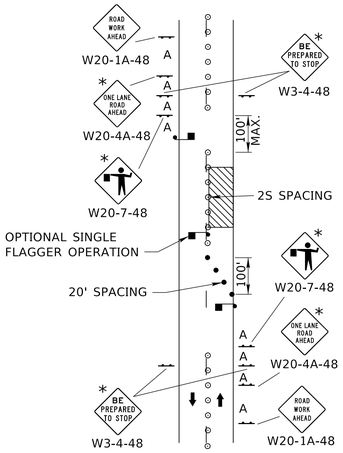
PROFESSIONAL CIVIL ENGINEER ★ DANIEL J. WADDLE E-6289 ★ STATE OF NEBRASKA

DATE

ORIGINAL: AUGUST 1998

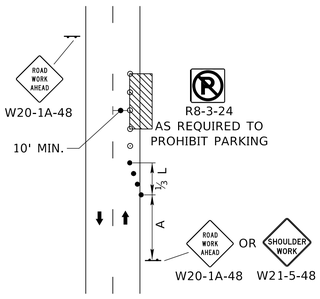
DATE

1/1

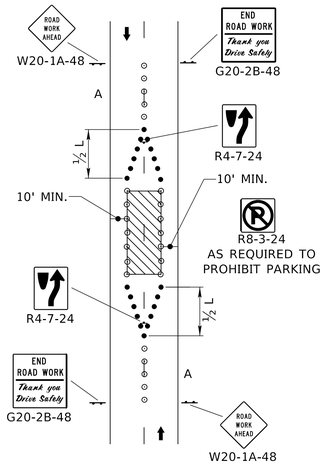


ONE LANE CLOSED
WITH FLAGGER

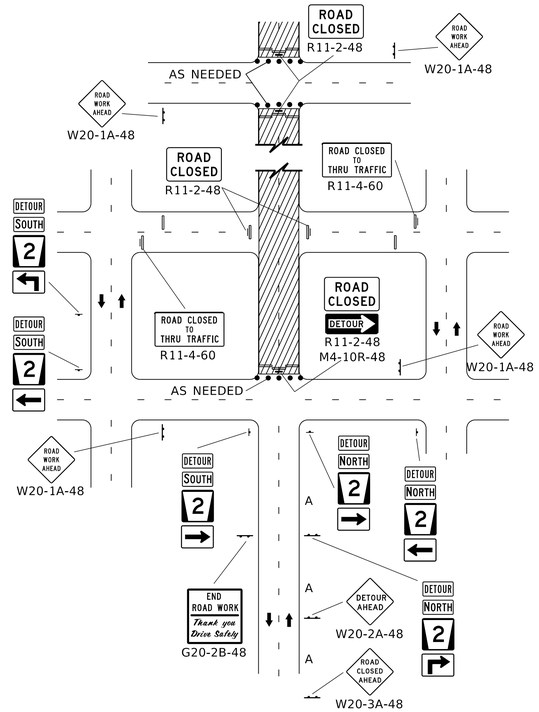
∗ SIGNS AND CONES ARE SUBSIDIARY TO THE FLAGGING OPERATION.



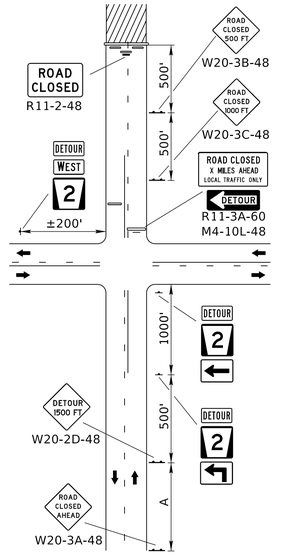
SHOULDER OR PARKING
LANE CLOSED



WORK IN CENTER OF
ROAD WITH LOW
TRAFFIC VOLUMES



ROAD CLOSED AT DETOUR



ROAD CLOSED BEYOND DETOUR

LEGEND

- FLASHING ARROW PANEL
- TYPE III BARRICADE
- REFLECTORIZED PLASTIC DRUM
- TUBULAR POST
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN
- FLAGGER
- xxxx PAVEMENT MARKING REMOVAL

TAPER FORMULA

L = S × 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.

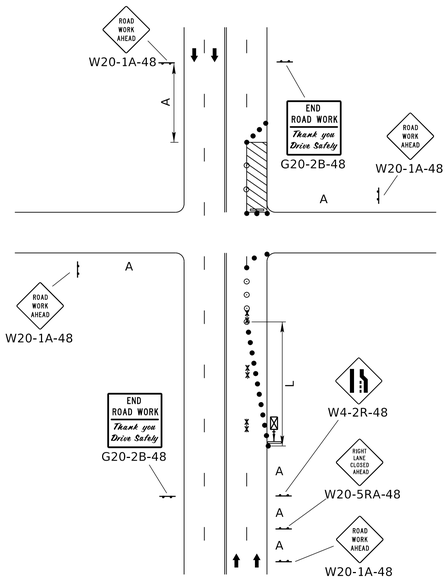
S = NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK.

W = WIDTH OF OFFSET (LANE WIDTH).

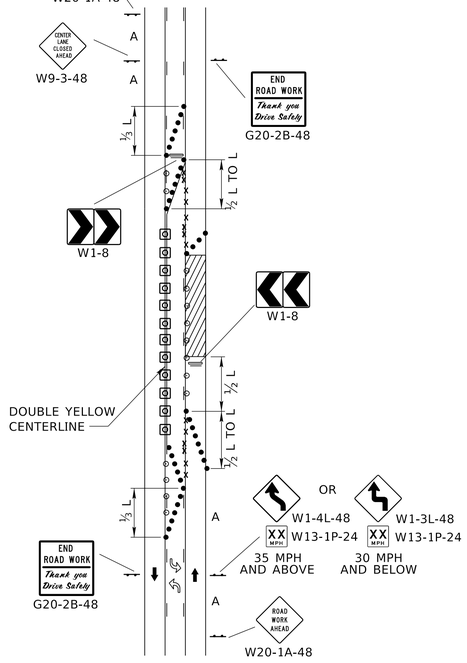
NOTES

1. ALL BARRICADE AND SIGN LOCATIONS ON THIS PLAN ARE APPROXIMATE, AND MAY BE ADJUSTED TO FIT FIELD CONDITIONS. THE SIGNS SHALL BE INSTALLED SO AS NOT TO OBSCURE THE VIEW OF OTHER TRAFFIC CONTROL DEVICES.
2. MINIMUM WIDTH OF TRAVELLED LANE SHALL BE AS REQUIRED BY THE ENGINEER.
3. FLASHING ARROW PANEL REQUIRED ON ALL ROADWAYS WITH POSTED SPEED LIMIT 45 MPH OR HIGHER. THE USE OF A FLASHING ARROW PANEL IS OPTIONAL ON ROADWAYS WITH A POSTED SPEED OF 40 MPH OR LOWER.
4. LONG-TERM FLASHING ARROW PANELS IN URBAN RESIDENTIAL AREAS WHERE DIESEL ENGINE NOISE WILL BE DISRUPTIVE TO RESIDENTS, MAY BE REQUIRED TO OPERATE BY 120 VAC, OR IF SIGHT DISTANCE ALLOWS, A SOLAR POWERED ARROW PANEL MAY BE USED.
5. FOR SHORT-TERM WORK (LESS THAN 24 HOURS) SIGN G20-2B-48 (END ROAD WORK, THANK YOU, DRIVE SAFELY) MAY BE OMITTED.
6. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD BE APPROXIMATELY EQUAL IN FEET TO THE SPEED LIMIT (S). WHERE CHANNELIZING DEVICES ARE USED ALONG THE WORK AREA, THE SPACING MAY BE INCREASED TO THE DISTANCE IN FEET EQUAL TO THE SPEED LIMIT, DOUBLED (2 x S). SEE "TAPER FORMULA" TABLE FOR MORE INFORMATION.
7. FOR LANE CLOSURES OVER 72 HOURS, ALL CONFLICTING PAVEMENT MARKINGS SHALL BE REMOVED. ON ASPHALT SURFACES, DURABLE PAVEMENT MARKINGS MAY BE COVERED WITH APPROVED BLACK TEMPORARY PAVEMENT MARKING TAPE.
8. DESIGNATION OF SPEED SHOWN ON ADVISORY SPEED SIGNS W13-1P SHALL BE DETERMINED BY THE ENGINEER IN ACCORDANCE WITH MUTCD. THE SPEED DESIGNATION SHALL BE AS HIGH AS PRACTICAL AND FEASIBLE.

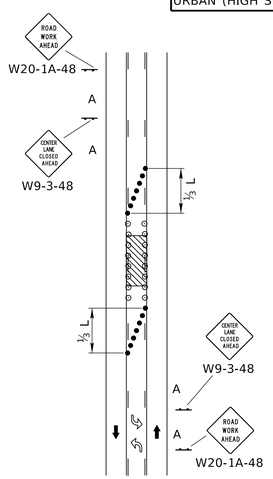
ROAD TYPE	MINIMUM DISTANCE BETWEEN SIGNS
	A
URBAN (LOW SPEED - 25 MPH TO 40 MPH)	100'
URBAN (HIGH SPEED - 45 MPH OR HIGHER)	350'



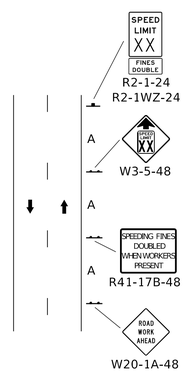
LANE CLOSED NEAR INTERSECTION
(RIGHT LANE CLOSED)



3-LANE ROADWAY
ONE LANE CLOSED



TWO-WAY LEFT TURN
LANE CLOSED



TYPICAL ADVANCED
SIGNING

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JUL 20	ADDED NOTE TO SHEET ONE
R3	JAN 19	TOOK OUT 1/2 L ON SHEET 2
R2	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 924-R4

URBAN TRAFFIC CONTROL PLAN

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

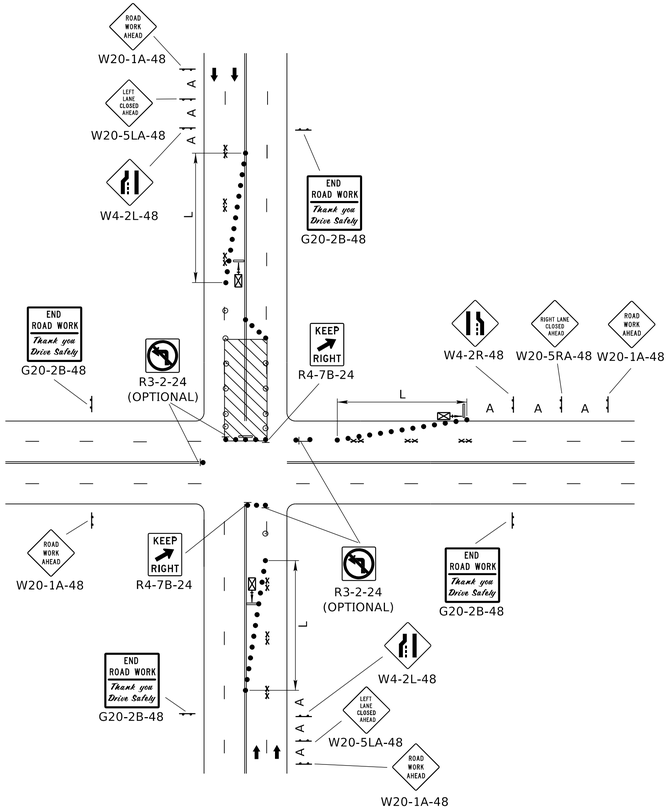
DATE

ORIGINAL:
FEBRUARY 1, 2010
DATE

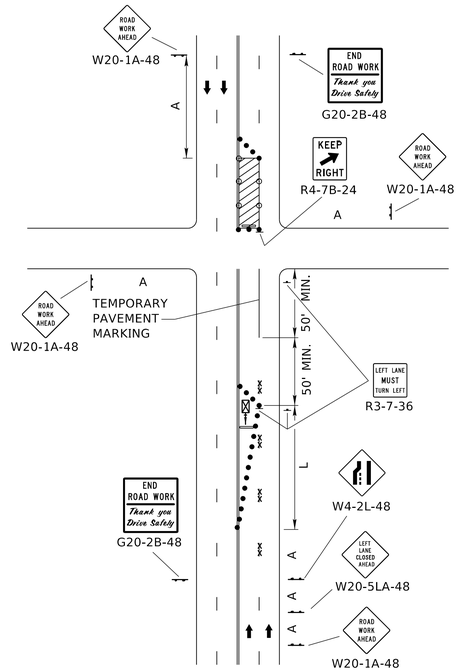
1
3

COMPUTER: BG0419M187
DATE: 22-AUG-2024 11:31
FILE: 9240 0 R4.dgn

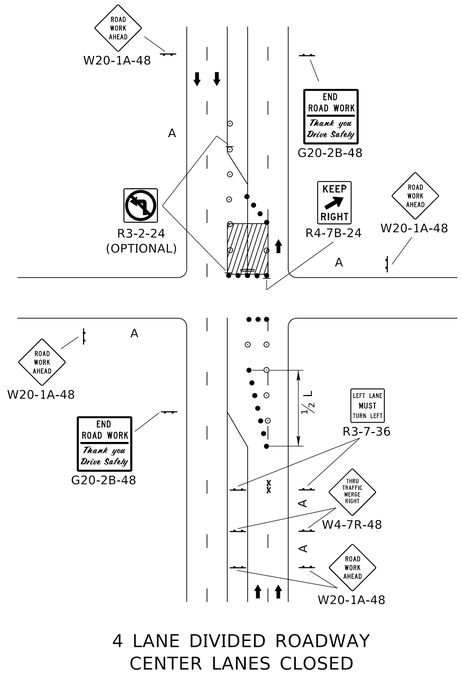
Approved Date: OCT 2019 Effective Letting Date: JULY 2020



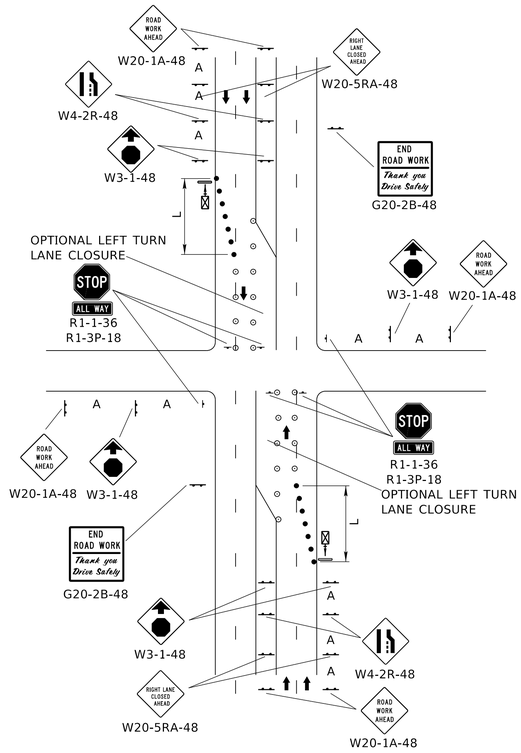
4 LANE UNDIVIDED ROADWAY
CENTER LANES CLOSED
NEAR INTERSECTION



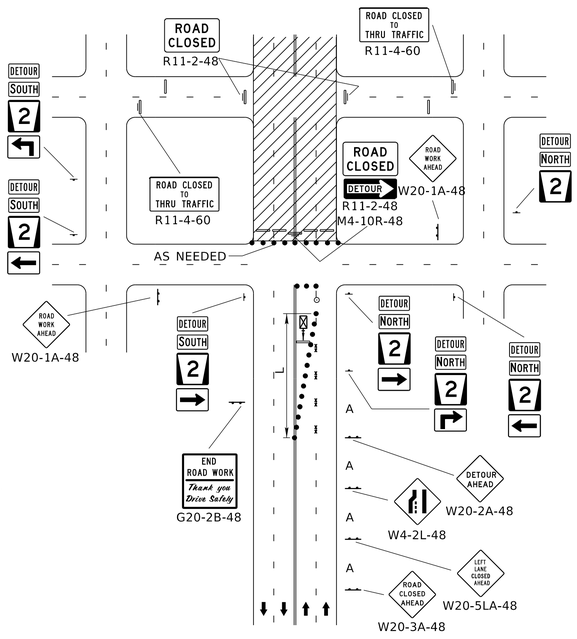
LANE CLOSED NEAR INTERSECTION
(LEFT LANE CLOSURE FORMING A TURNBAY)



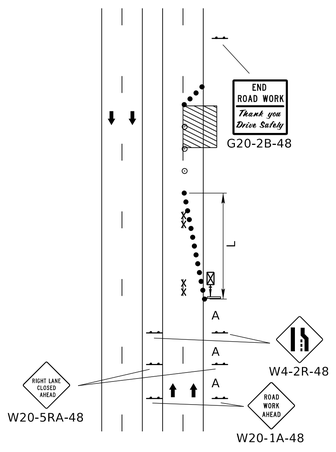
4 LANE DIVIDED ROADWAY
CENTER LANES CLOSED
NEAR INTERSECTION



TEMPORARY ALL-WAY STOP
FOR SIGNAL WORK



ROAD CLOSED AT DETOUR
(OPTIONAL LANE CLOSURE)



DIVIDED ROADWAY
ONE LANE CLOSED

ROAD TYPE	MINIMUM DISTANCE BETWEEN SIGNS
	A
URBAN (LOW SPEED - 25 MPH TO 40 MPH)	100'
URBAN (HIGH SPEED - 45 MPH OR HIGHER)	350'

LEGEND

- FLASHING ARROW PANEL
- TYPE III BARRICADE
- REFLECTORIZED PLASTIC DRUM
- TUBULAR POST
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN
- FLAGGER
- xxxx PAVEMENT MARKING REMOVAL

TAPER FORMULA

L = S × 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
R4	JUL 20	ADDED NOTE TO SHEET ONE
R3	JAN 19	TOOK OUT 1/2 L ON SHEET 2
R2	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 924-R4

URBAN TRAFFIC CONTROL PLAN

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

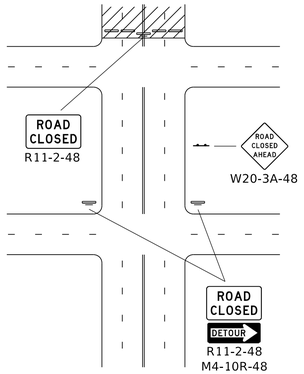
DATE

ORIGINAL:
FEBRUARY 1, 2010
DATE

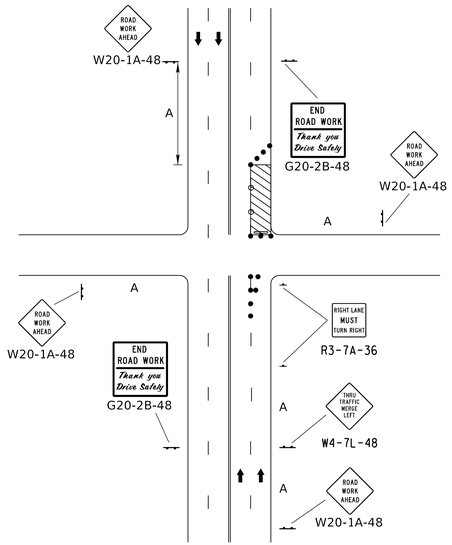
2
3

COMPUTER: BG0419M1187
DATE: 22-AUG-2024 11:31
FILE: 9240 0 R4.dgn

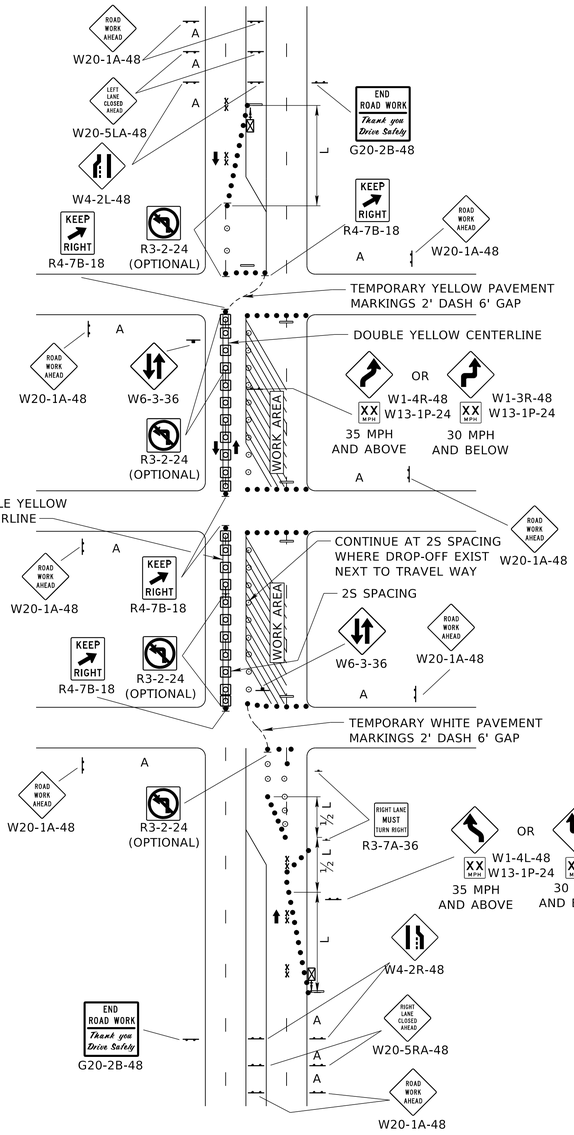
FILE: 9240 0 R4.dgn
DATE: 22-AUG-2024 11:31
COMPUTER: BG04194M187



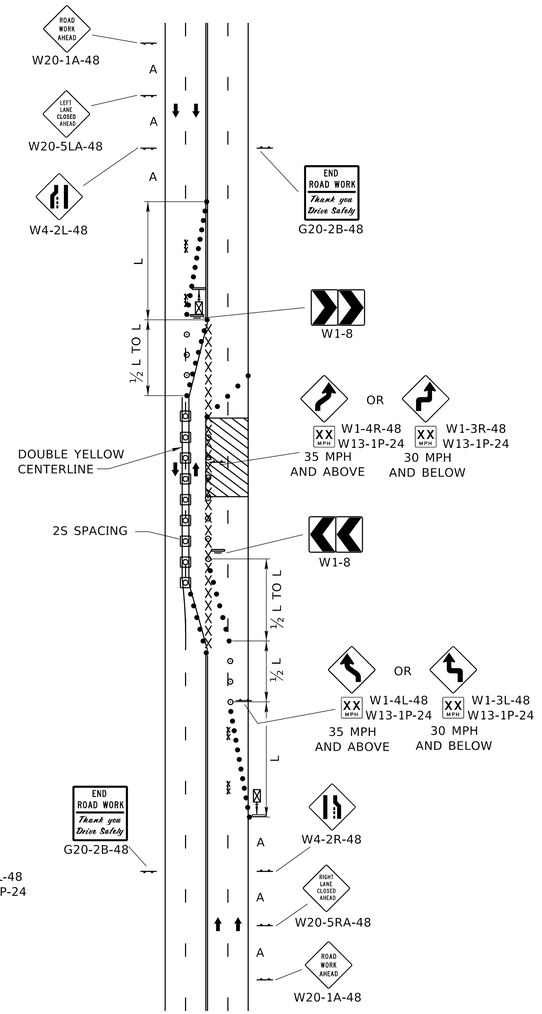
ROAD CLOSED
BEYOND DETOUR



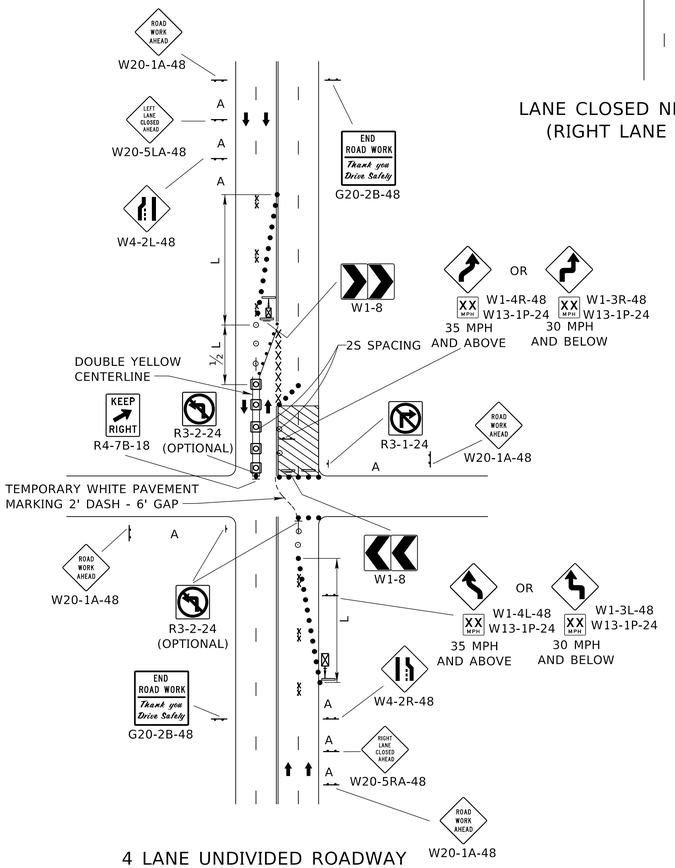
LANE CLOSED NEAR INTERSECTION
(RIGHT LANE REMAINS OPEN)



4-LANE DIVIDED
HALF CLOSED



4-LANE UNDIVIDED
2 LANES CLOSED



4 LANE UNDIVIDED ROADWAY
TWO LANES CLOSED NEAR INTERSECTION

LEGEND

- FLASHING ARROW PANEL
- TYPE III BARRICADE
- REFLECTORIZED PLASTIC DRUM
- TUBULAR POST
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN
- FLAGGER
- XXXX PAVEMENT MARKING REMOVAL

TAPER FORMULA

L = S × 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).

ROAD TYPE	MINIMUM DISTANCE BETWEEN SIGNS
	A
URBAN (LOW SPEED - 25 MPH TO 40 MPH)	100'
URBAN (HIGH SPEED - 45 MPH OR HIGHER)	350'

REV. NO.	DATE	DESCRIPTION OF REVISION
R4	JUL 20	ADDED NOTE TO SHEET ONE
R3	JAN 19	TOOK OUT 1/2 L ON SHEET 2
R2	JAN 18	NDOR BORDER TO NDOT BORDER

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 924-R4

URBAN TRAFFIC CONTROL PLAN

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

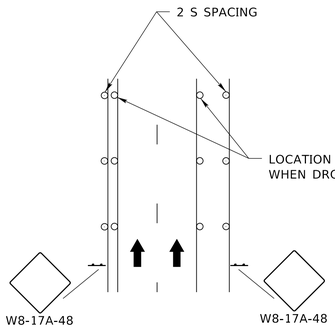
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

DATE

ORIGINAL:
FEBRUARY 1, 2010
DATE

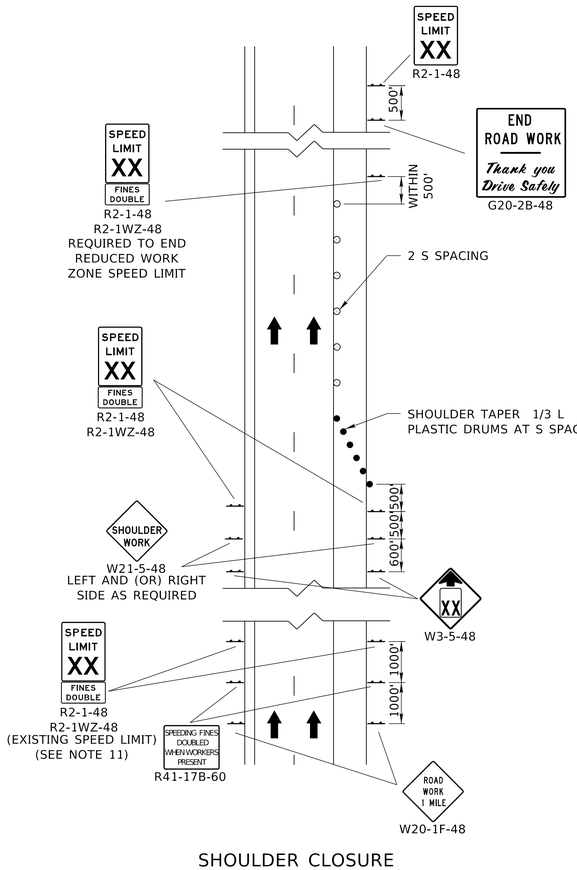
3
3

COMPUTER: BG041941187
DATE: 22-AUG-2024 11:32
FILE: 9260 0 R0.dgn



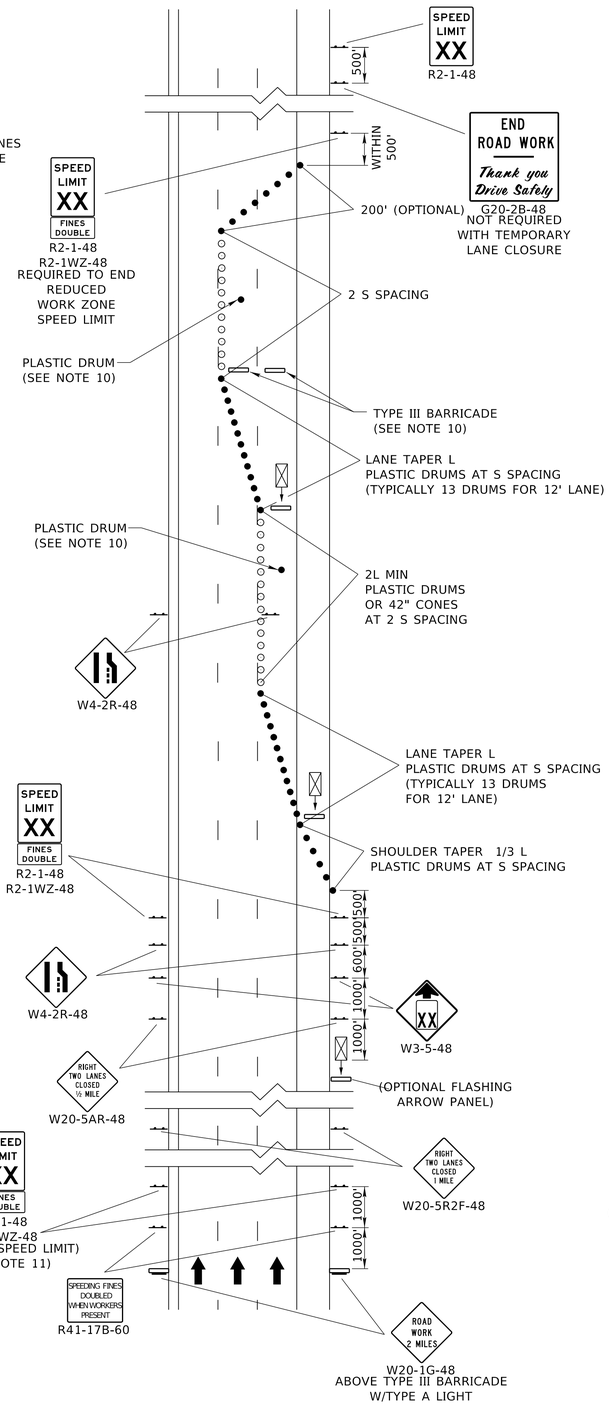
SHOULDER DROP-OFF

W8-17A-48 EVERY MILE WHERE THERE IS A DROP-OFF AT LEFT AND (OR) RIGHT PAVEMENT EDGE

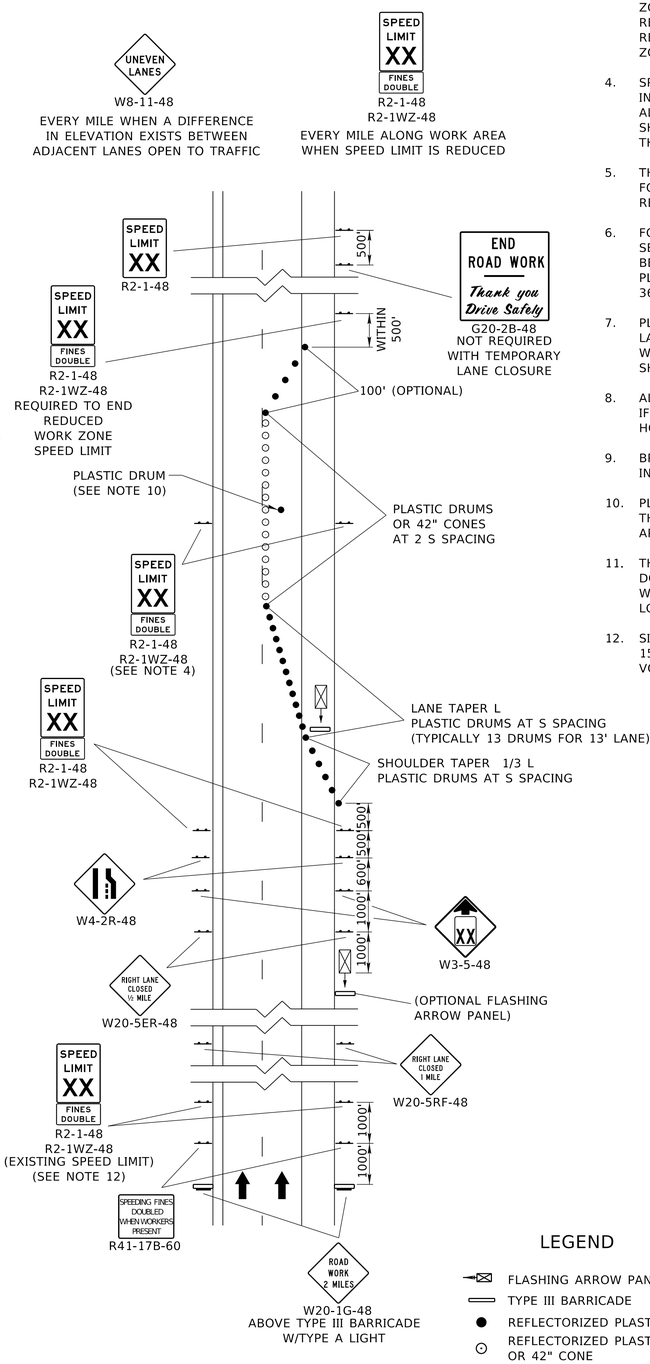


SHOULDER CLOSURE

FOR USE ON ROADWAYS WITH 8' AND WIDER PAVED SHOULDER



TWO LANE CLOSURE



SINGLE LANE CLOSURE

NOTES:

1. FLAGGERS SHALL BE PROVIDED WHENEVER THE CONTRACTORS OPERATION ENCROACHES ON THE OPEN LANE.
2. REVERSE PROCEDURE FOR LEFT LANE CLOSURE.
3. WORK ZONE SPEED LIMITS SHALL NOT BE INSTALLED W/O A SPEED ZONE AUTHORIZATION COMPLETED BY THE DEPARTMENT. WHEN A REDUCED SPEED LIMIT IS USED, IT SHALL COMPLY WITH THE REQUIREMENTS OF NDOT OPERATING INSTRUCTION 60-18, WORK ZONE SPEED LIMITS.
4. SPEED LIMIT SIGNS R2-1 SHALL BE 48" X 60" WHEN USED ON INTERSTATES OR FREEWAYS. 30" X 36" SIGNS MAY BE USED ON ALL OTHER ROADWAYS. SPEED LIMIT SIGNS (IF REQ'D FOR WORK) SHALL BE INSTALLED EVERY MILE THRU THE WORK AREA, WHEN THE SPEED LIMIT IS REDUCED.
5. THE FLASHING ARROW PANELS FOR TAPERS SHOULD BE VISIBLE FOR AT LEAST 1/2 MILE AND, IF NECESSARY, SHOULD BE RELOCATED TO PROVIDE THE MAXIMUM VISIBILITY.
6. FOR FOG SEALS, SLURRY SEALS, ARMOR COATS, CRACK AND JOINT SEALING WHERE ALL LANES OF TRAFFIC WILL BE REOPENED BEFORE NIGHT, THE CONTRACTOR MAY USE 36" OR 42" CONES IN PLACE OF PLASTIC DRUMS ALONG THE WORK AREA. WHEN USED 36" CONES SHALL BE CONSIDERED SUBSIDIARY TO THE WORK.
7. PLASTIC DRUMS SHALL BE REQUIRED TO BE PLACED IN FRONT OF LANE EXCAVATIONS IN PAVEMENT AND SLAB REPAIR, AND OTHER WORK ACTIVITIES AS DIRECTED BY THE ENGINEER. PLASTIC DRUMS SHALL BE REQUIRED FOR ALL TAPERS AND LANE SHIFTS.
8. ALL CONFLICTING PAVEMENT MARKINGS ARE REQ'D TO BE REMOVED IF THE LANE CLOSURE IS TO REMAIN IN PLACE LONGER THAN 72 HOURS.
9. BRIDGE WORK OR OTHER APPROPRIATE ADVANCE SIGN MAY BE USED IN PLACE OF ROAD WORK.
10. PLACE A PLASTIC DRUM OR TYPE III BARRICADE AS DIRECTED BY THE ENGINEER IN THE CENTER OF THE CLOSED LANE(S) APPROXIMATELY EVERY 1/4 MILE.
11. THE SPEED LIMIT SIGN SHOWN FOLLOWING THE "SPEEDING FINES DOUBLED WHEN WORKERS PRESENT" SIGN IS NOT REQUIRED IF W3-5 "REDUCED SPEED AHEAD" OR OTHER SPEED LIMIT SIGN IS LOCATED WITHIN 1/2 MILE.
12. SIGNS W20-5E, W20-5RF AND W20-1G MAY BE REDUCED TO 1500 FT, 1/2 MILE AND 1 MILE SPACING RESPECTIVELY IN LOW VOLUME AREA AT THE DIRECTION OF THE ENGINEER.

TAPER FORMULA

L = S × 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

- FLASHING ARROW PANEL
- TYPE III BARRICADE
- REFLECTORIZED PLASTIC DRUM
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 926

TYPICAL LANE CLOSURE PLANS FOR MULTILANE ROADWAYS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

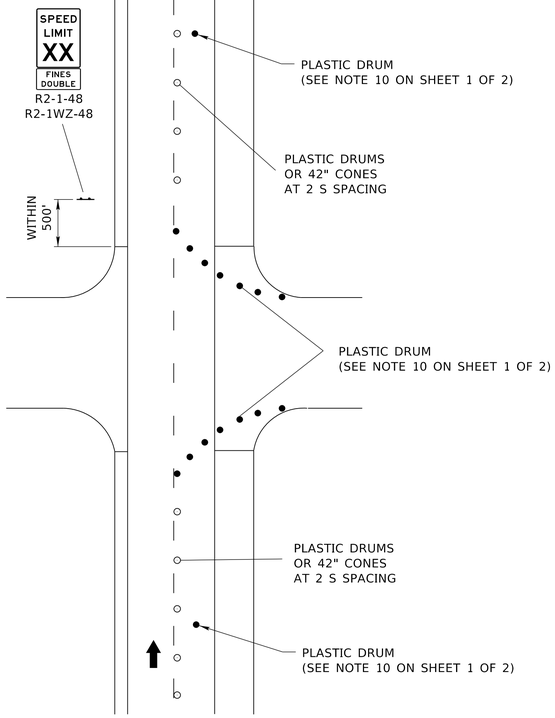
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

DATE

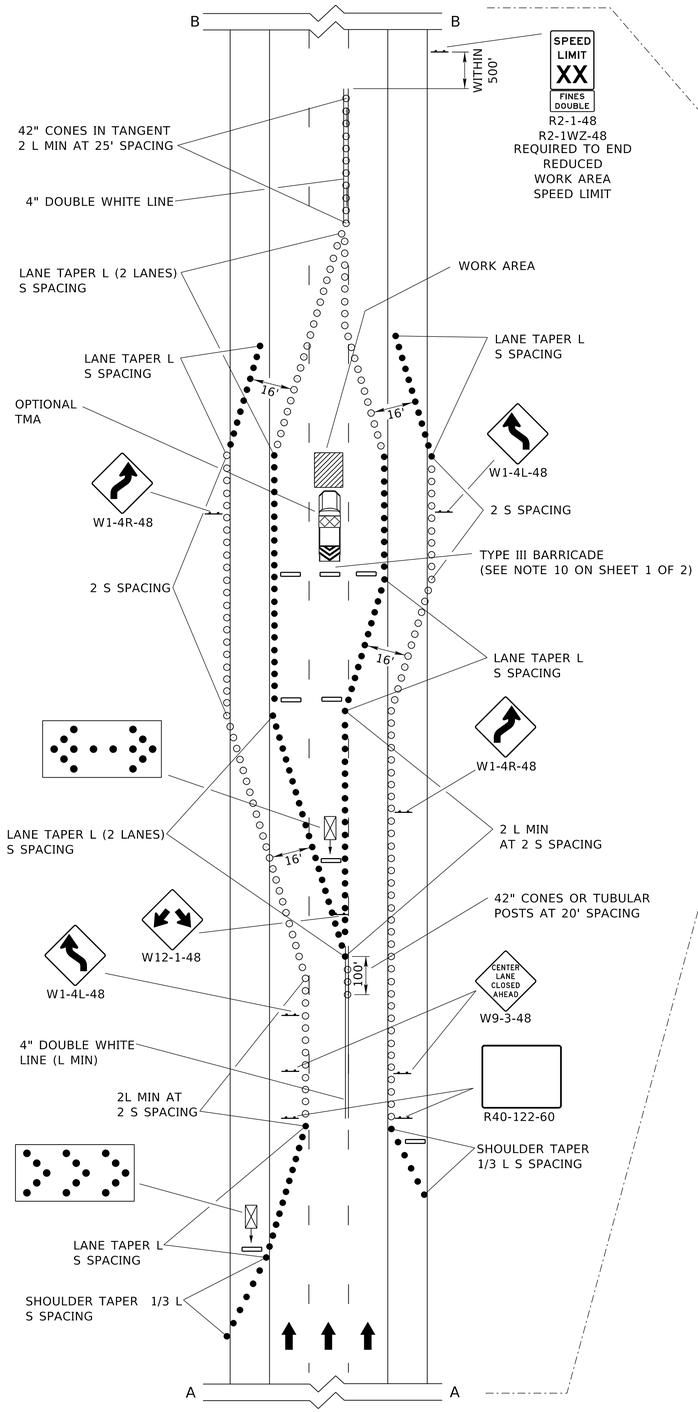
ORIGINAL: JANUARY 2019
DATE

1
2

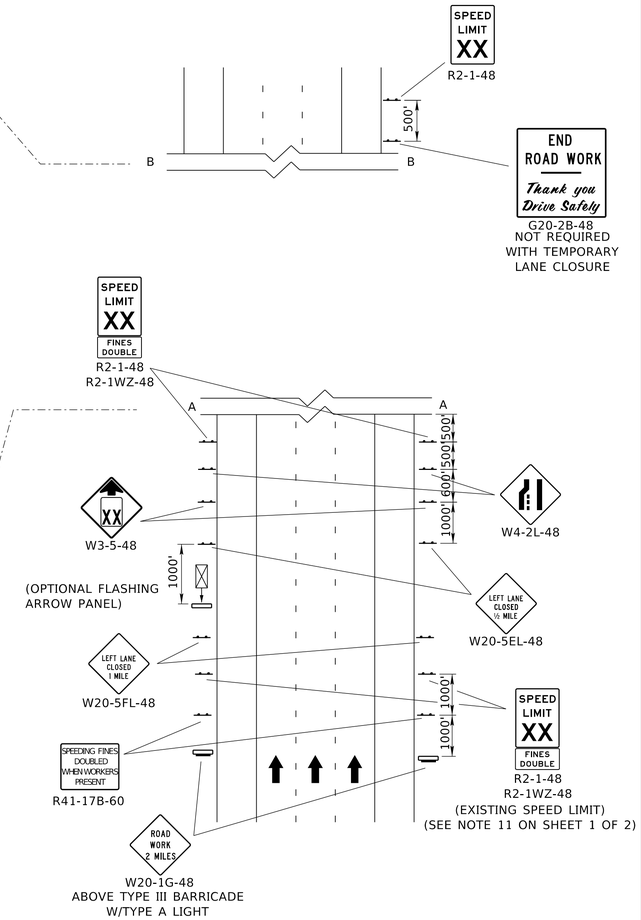
COMPUTER: BG0419M187
DATE: 22-AUG-2024 11:32
FILE: 9260 0 R0.dgn



SIDE ROAD ENTRY WITHIN LANE CLOSURE



CENTER LANE CLOSURE



LEGEND

- FLASHING ARROW PANEL
- TYPE III BARRICADE
- REFLECTORIZED PLASTIC DRUM
- REFLECTORIZED PLASTIC DRUM OR 42" CONE
- SINGLE POSTED SIGN
- DOUBLE POSTED SIGN
- TRUCK MOUNTED ATTENUATOR (TMA)

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 926

TYPICAL LANE CLOSURE PLANS FOR MULTILANE ROADWAYS

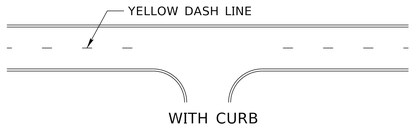
ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

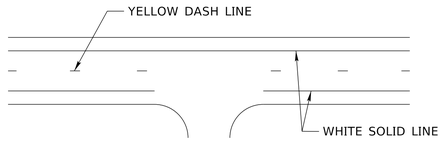
DATE

ORIGINAL: JANUARY 2019
DATE

2
2

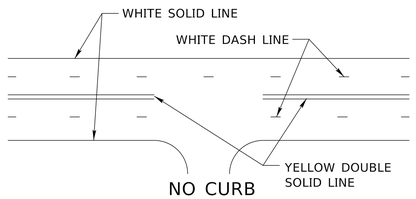


WITH CURB

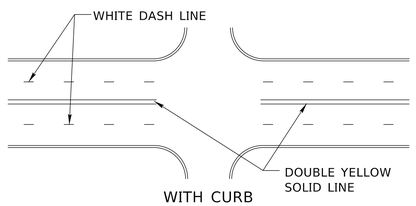


WITH SHOULDERS

2 LANE ROADWAY

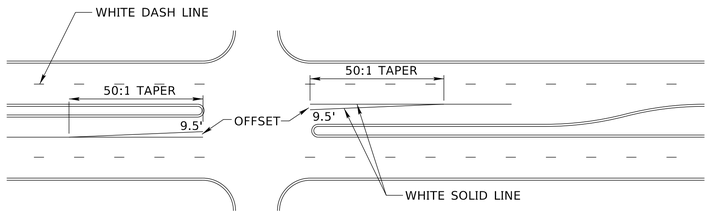


NO CURB

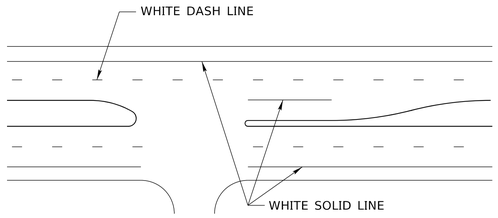


WITH CURB

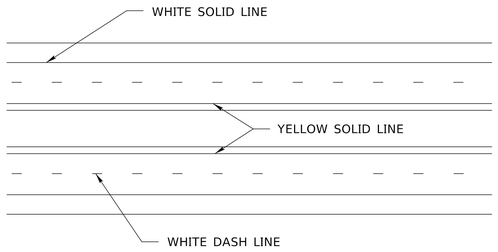
4 LANE UNDIVIDED ROADWAY



WITH CURB

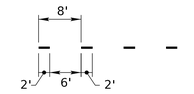


WITH SHOULDERS

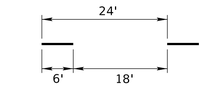


DEPRESSED MEDIAN

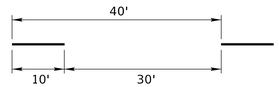
4 LANE DIVIDED ROADWAY



DOTTED LINE DETAIL

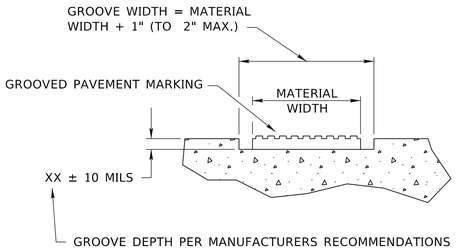


URBAN

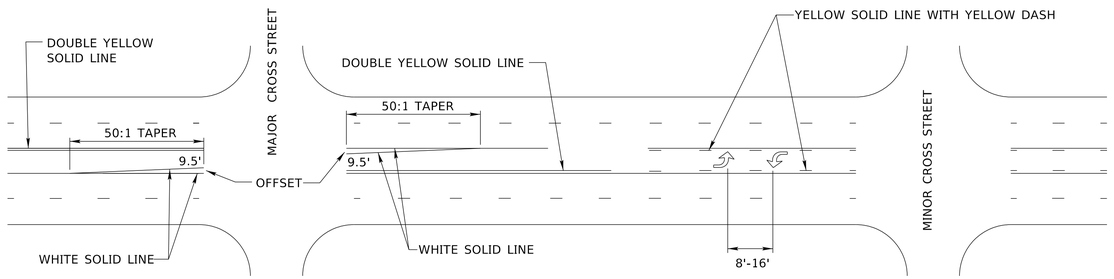


RURAL

DASH LINE DETAIL



PERMANENT PAVEMENT MARKINGS
INSTALLED IN GROOVES



3 OR 5 LANE WITH TWO-WAY LEFT TURN LANE

2-LANE ROADWAY REQUIRED LOCATION FOR EDGE LINES		
ROADWAY WIDTH	SHOULDER TYPE	DISTANCE FROM CENTERLINE OF ROADWAY TO OUTSIDE EDGE OF PAVEMENT EDGELINE
LESS THAN 24 FT	SURFACED	12 FT 0 IN
LESS THAN 24 FT	EARTH	PAVEMENT EDGE
24 FT	EARTH	PAVEMENT EDGE
24 FT	SURFACED	12 FT 0 IN
GREATER THAN 24 FT	EARTH	12 FT 0 IN

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	SEP 21	CHANGE 3-GUN TO 2-GUN LAYOUT

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 941-R1

PAVEMENT MARKING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

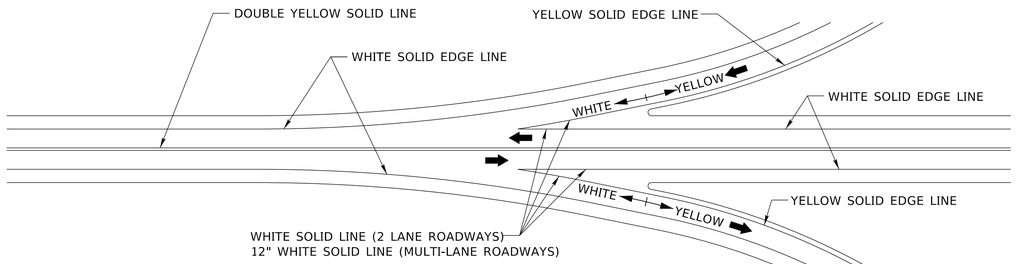
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

DATE

ORIGINAL: OCT. 2018
DATE

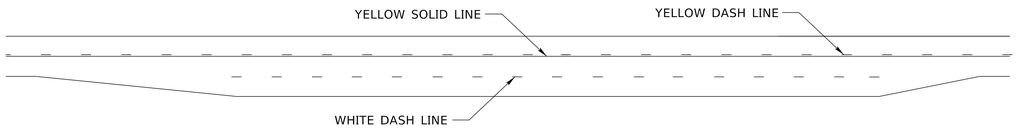
1
2

COMPUTER: BG0419M187
DATE: 22-AUG-2024 11:32
FILE: 9410 0 R1.dgn

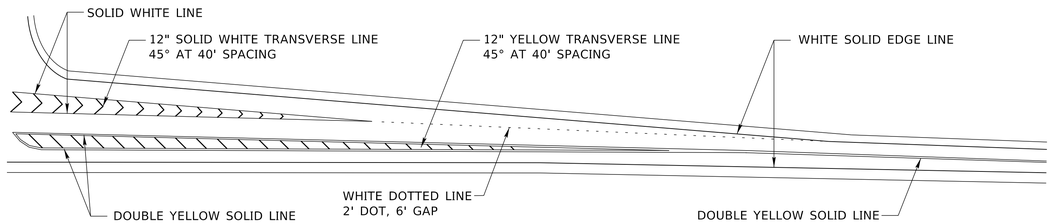


(NON-FREEWAY)

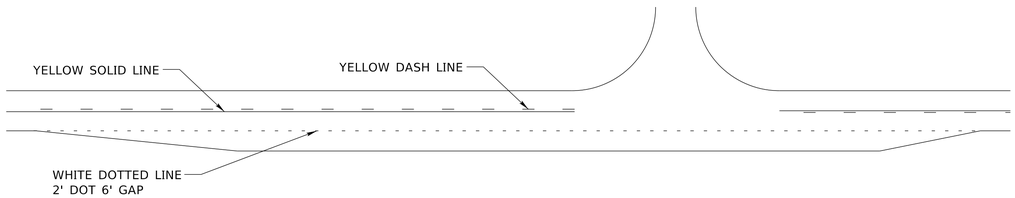
GORE MARKING



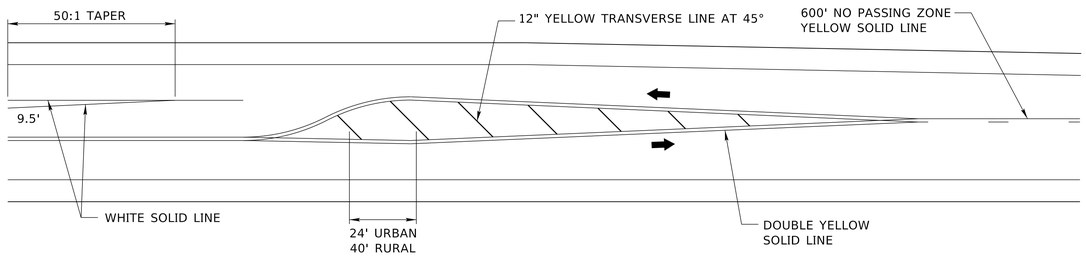
PASSING LANE MARKING



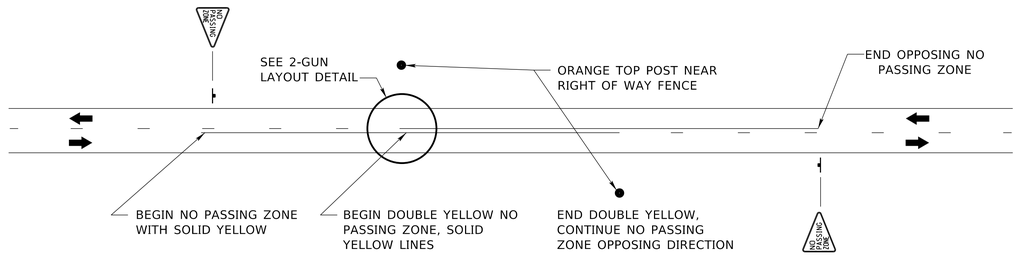
OFFSET RIGHT TURN LANE



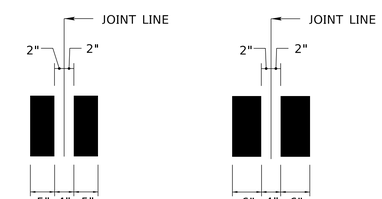
FLY-BY LANE MARKING



LEFT TURN LANE MARKING



NO PASSING ZONE MARKING



5" STRIPE WIDTH 6" STRIPE WIDTH

2-GUN LAYOUT

LEGEND

TRAFFIC FLOW

REV. NO.	DATE	DESCRIPTION OF REVISION
R1	SEP 21	CHANGE 3-GUN TO 2-GUN LAYOUT

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 941-R1

PAVEMENT MARKING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

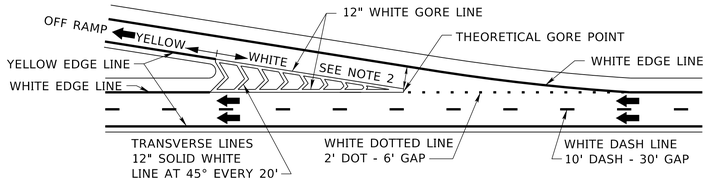
DATE

ORIGINAL: OCT. 2018

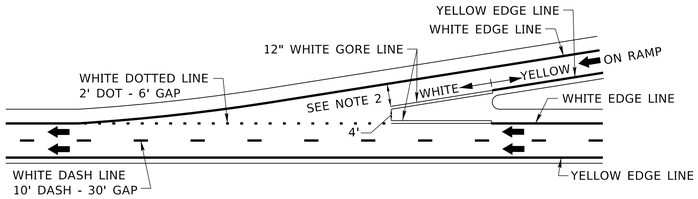
DATE

2
2

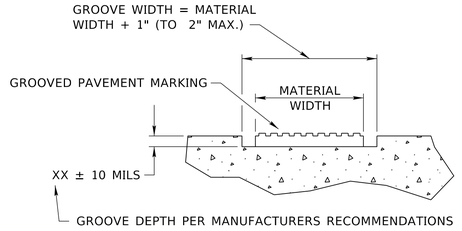
COMPUTER: BG0419M187
DATE: 22-AUG-2024 11:32
FILE: 9410 0 R1.dgn



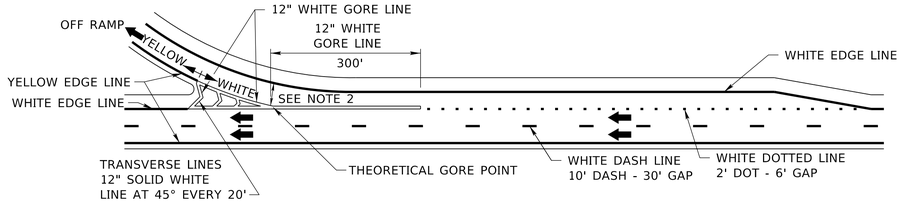
TAPERED DECELERATION LANE



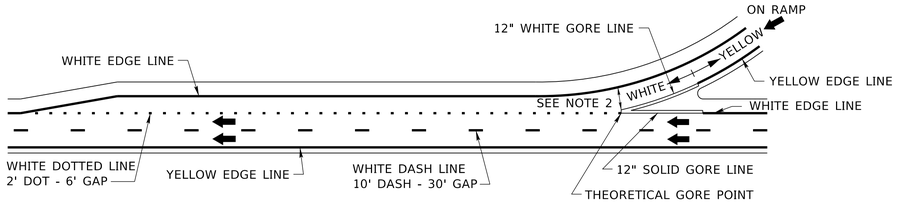
TAPERED ACCELERATION LANE



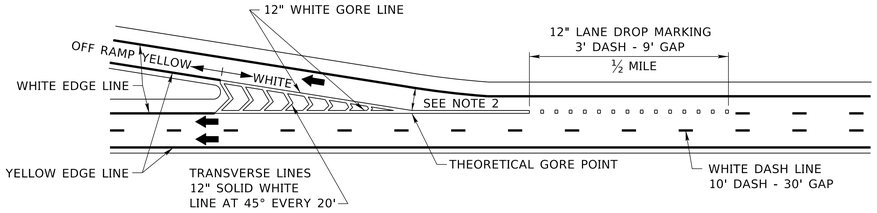
PERMANENT PAVEMENT MARKINGS
INSTALLED IN GROOVES



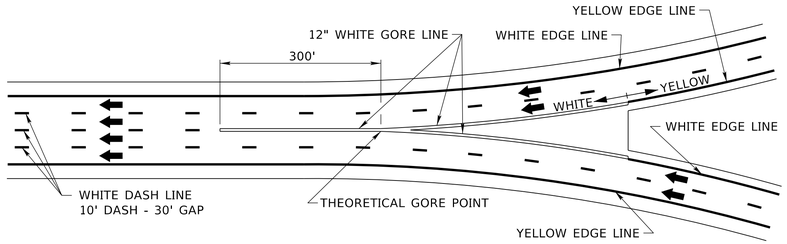
PARALLEL DECELERATION LANE



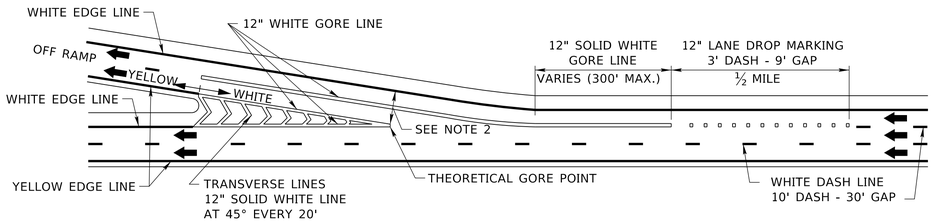
PARALLEL ACCELERATION LANE



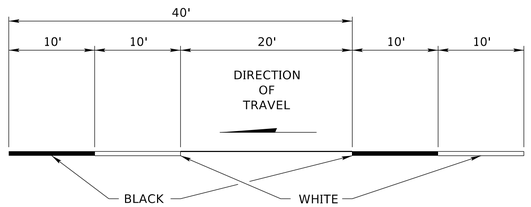
EXIT ONLY LANE DROP



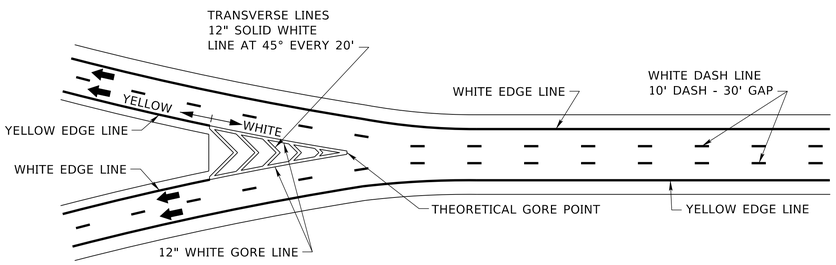
ADDED LANE(S)



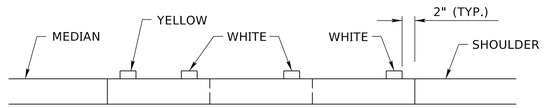
DUAL LANE EXIT RAMP



CONTRAST LINE



FREEWAY SPLIT



LATERAL LOCATION DETAIL

NOTES:

1. PLACE EDGE LINES AND DASH LINES ACCORDING TO THE LATERAL LOCATION DETAIL. 12" WHITE GORE LINES MAY STRADDLE THE JOINT IN ORDER TO LINE UP WITH ITS CORRESPONDING EDGE LINE.
2. RAMP LANE WIDTH TYPICALLY 16' FOR SINGLE LANE RAMP, 12' FOR TWO LANE RAMP.
3. DETAILS ARE NOT TO SCALE, ACTUAL MATERIAL QUANTITIES WILL BE AS REQUIRED IN THE FIELD CONTRACT.
4. CONTRAST LINES ARE ONLY TO BE INSTALLED ON CONCRETE SURFACES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

LEGEND

TRAFFIC FLOW

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 942

PAVEMENT MARKING FOR FREEWAY RAMPS

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

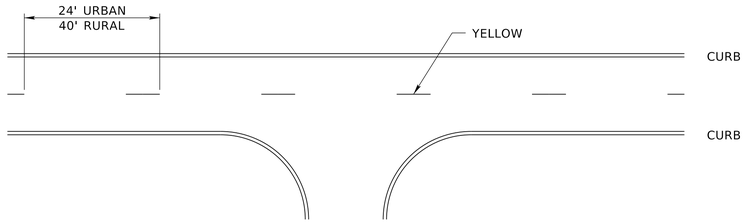
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

DATE

ORIGINAL:
OCT. 2018
DATE

1
1

COMPUTER: BG0419M187
DATE: 22-AUG-2024 11:32
FILE: 9420 0 R0.dgn



CURBED SECTION

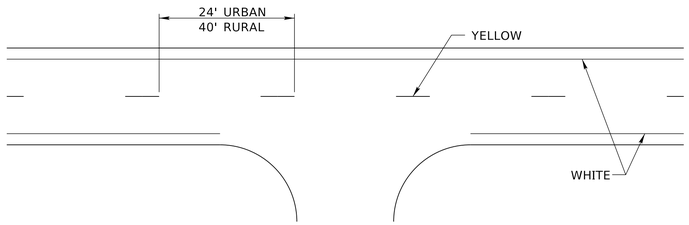
(NO EDGELINES ARE REQUIRED)

TABLE I				
BROKEN LINES				
TYPE OF MARKING	LENGTH		MATERIAL ALLOWED	
	RURAL	URBAN	LOWER LAYER	TOP LAYER
PAINT	10'	6'	X	
TYPE I TAPE	4' MIN.	2' MIN.		X
RPM/OVERLAY MARKER	2 AT 5' SPACING	2 AT 3' SPACING	X	X

TYPE I TAPE SHALL BE SUPPLEMENTED WITH A RPM OR AN OVERLAY MARKER AT THE INTERVALS AS SHOWN IN THE DRAWINGS BELOW.

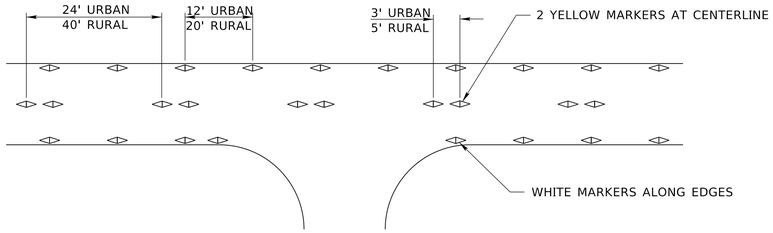
TABLE II				
SOLID LINES				
TYPE OF MARKING	LENGTH		MATERIAL ALLOWED	
	RURAL	URBAN	LOWER LAYER	TOP LAYER
PAINT	SOLID	SOLID	X	X
TYPE I TAPE	SOLID	SOLID		X
RPM/OVERLAY MARKER	20' SPACING	12' SPACING	X	X

TABLE III		
LOCATION OF EDGE LINES ON THE TOP LAYER		
ROADWAY WIDTH	SHOULDER TYPE	PLACE OUTSIDE OF EDGE LINE AT
LESS THAN 24'	SURFACED	EDGE OF LANE
LESS THAN 24'	EARTH	PAVEMENT EDGE
24'	EARTH	PAVEMENT EDGE
24'	SURFACED	12'-0"
24' TO 28'	EARTH	12'-0"

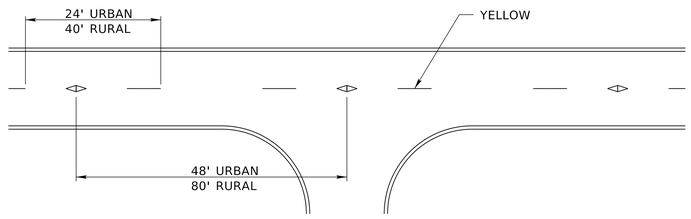


SHOULDER SECTION

LOWER LAYER

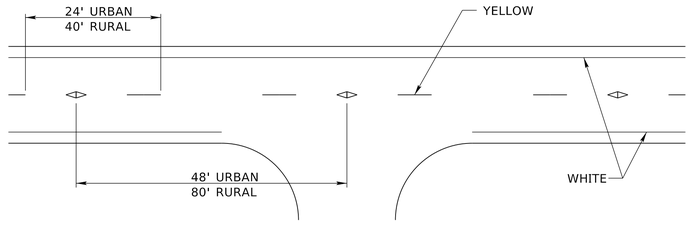


RPM/OVERLAY MARKER



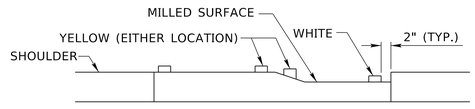
CURBED SECTION

(NO EDGELINES ARE REQUIRED)

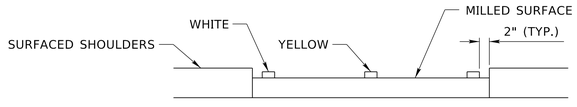


SHOULDER SECTION

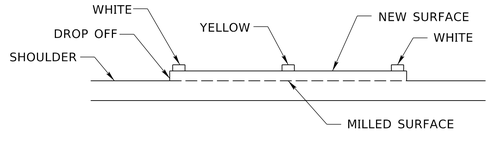
TOP LAYER



NOTCHED WEDGE CENTERLINE



MILLED SURFACE



NEW SURFACING

LATERAL LOCATION DETAILS

LEGEND

◁ RPM/OVERLAY MARKER

◁▷ BIDIRECTIONAL RPM/OVERLAY MARKER

NOTES:

1. ALL TEMPORARY MARKINGS SHALL BE NO LESS THAN 4 INCHES WIDE.
2. ALL TEMPORARY PAVEMENT MARKINGS THAT WILL BE COVERED BY PERMANENT PAVEMENT MARKINGS SHALL COMPLY WITH THE ALIGNMENT AND LOCATION REQUIREMENTS OF THE FINAL PAVEMENT MARKING MATERIAL. TEMPORARY PAVEMENT MARKINGS THAT ARE NOT COVERED BY THE PERMANENT MARKINGS SHALL BE REMOVED AT THE CONTRACTOR'S EXPENSE.
3. RAISED PAVEMENT MARKERS (RPM'S) & OVERLAY MARKERS SHALL BE REMOVED PRIOR TO INSTALLATION OF THE NEXT LAYER AND UPON COMPLETION OF PERMANENT STRIPING.
4. TYPE I TAPE SHALL BE REMOVED UPON COMPLETION OF PERMANENT STRIPING.
5. RPM/OVERLAY MARKERS ARE NOT REQUIRED ON MILLED SURFACES, HYDRATED LIME SURFACES AND STABILIZED SURFACES.
6. PROJECTS WHICH DO NOT CREATE AN EDGELINE DROP OFF WILL NOT REQUIRE TEMPORARY EDGELINE MARKING.

(2-LANE)

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 943

TEMPORARY PAVEMENT MARKING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

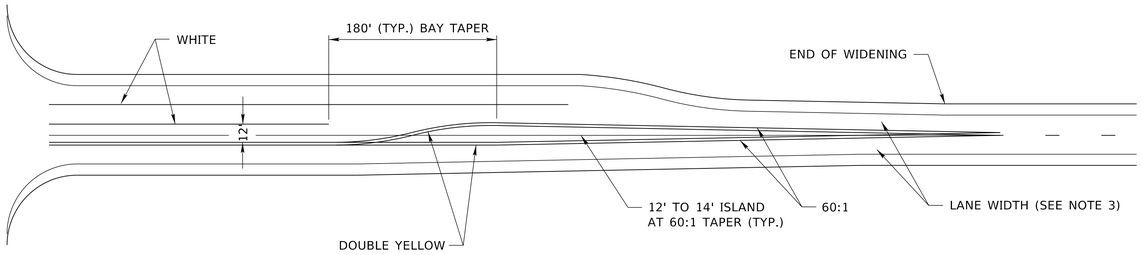
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

ORIGINAL: OCT. 2018

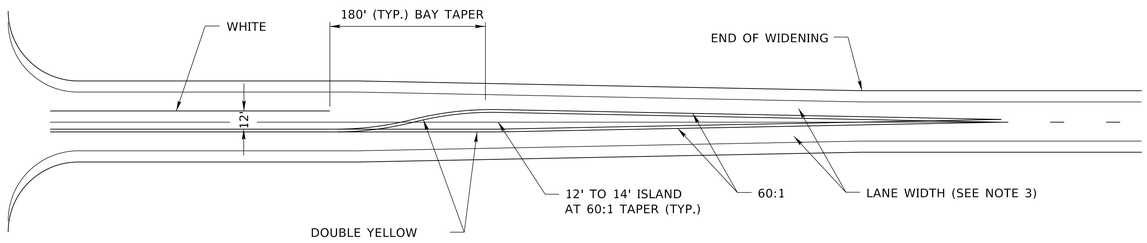
DATE

1
4

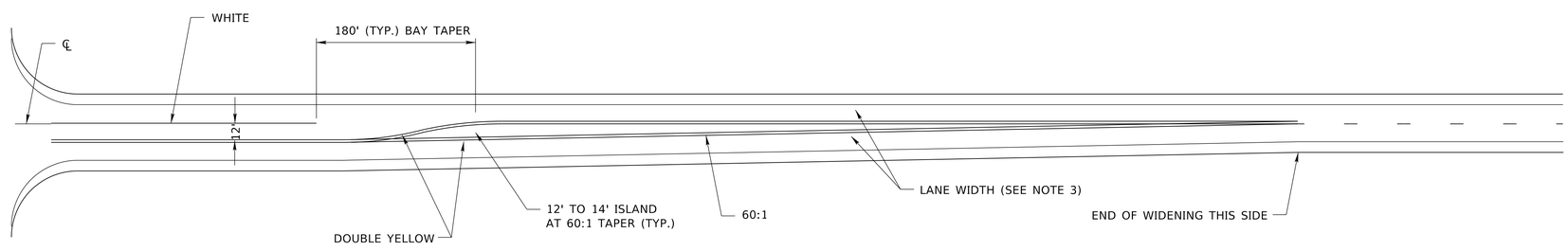
COMPUTER: BG041914187
DATE: 22-AUG-2024 11:32
FILE: 9430 0 R0.dgn



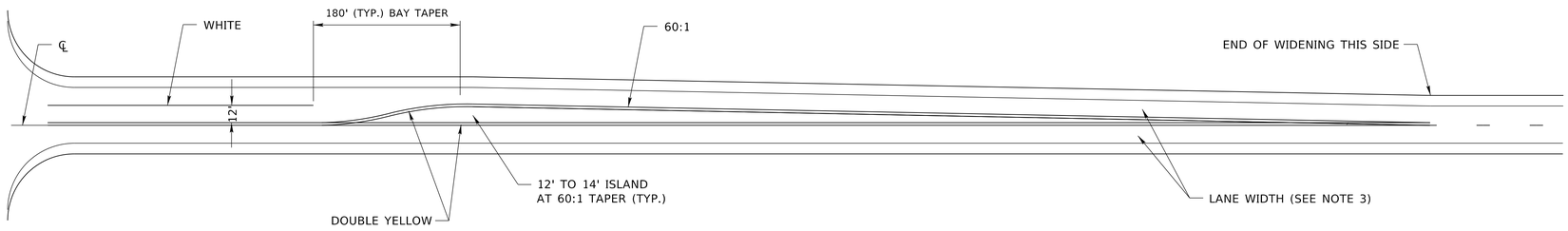
WIDENING BOTH SIDES WITH RIGHT TURN BAY



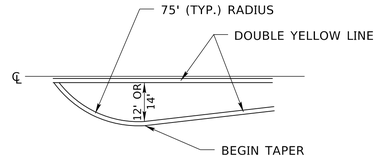
WIDENING BOTH SIDES



WIDENING ON DEPARTURE SIDE



WIDENING ON APPROACH SIDE



TYPICAL MARKING FOR
MEDIAN W/NO LEFT TURN

NOTES:

1. ALL TEMPORARY MARKINGS SHALL BE NO LESS THAN 4 INCHES WIDE.
2. MINIMUM LENGTH OF TURN BAYS SHALL BE 100 FEET. DESIRABLE LENGTH OF TURN BAYS FOR THE MAJOR TURNING MOVEMENT SHOULD BE FROM 150 FEET TO 240 FEET. ACTUAL LENGTHS WILL BE AS REQUIRED BY THE ENGINEER.
3. THE WIDTH OF TRAVELED LANE SHALL BE 12 FEET, UNLESS APPROVED OTHERWISE BY THE ENGINEER.
4. DIMENSIONS SHOWN ARE APPROXIMATE AND MAY BE ADJUSTED TO FIT FIELD CONDITIONS.
5. THE STRIPING OF LEFT TURN LANES ARE CONSIDERED OPTIONAL, AS REQUIRED BY THE ENGINEER.

(2-LANE)

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 943

TEMPORARY PAVEMENT MARKING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

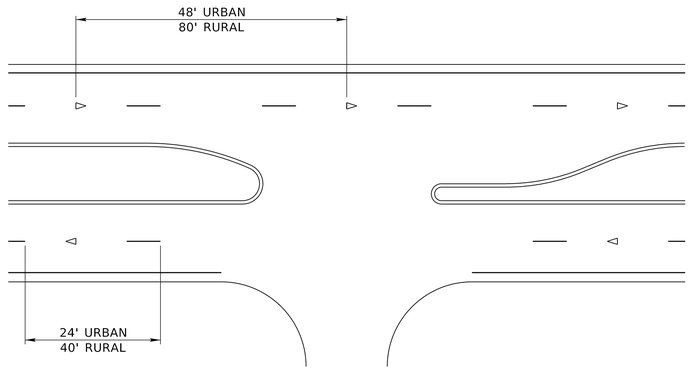
PROFESSIONAL CIVIL ENGINEER
DANIEL J. WADDLE
E-6289
STATE OF NEBRASKA

DATE

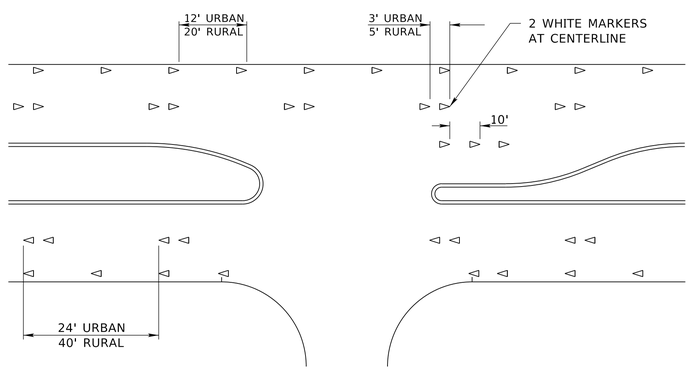
ORIGINAL:
OCT. 2018
DATE

2
4

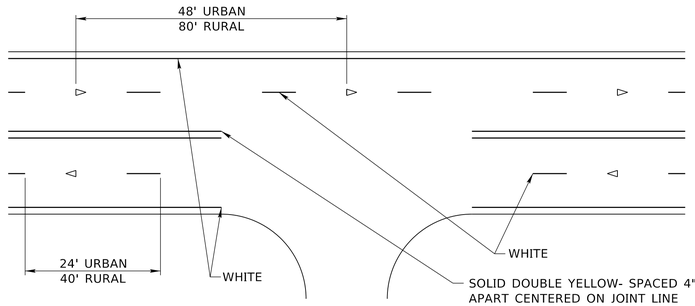
COMPUTER: BG041941187
DATE: 22-AUG-2024 11:32
FILE: 9430 0 R0.dgn



DIVIDED ROADWAY
ALL LINES & ▷ ARE WHITE

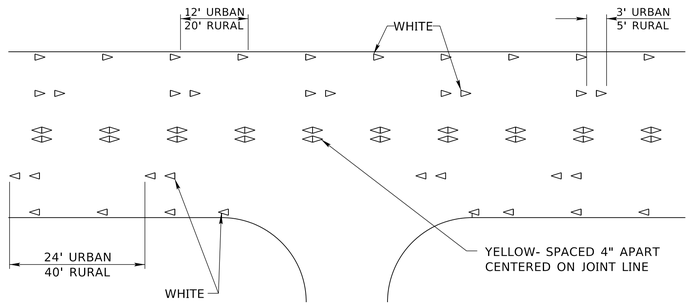


DIVIDED ROADWAY
ALL ▷ ARE WHITE



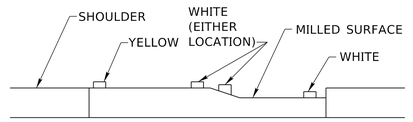
UNDIVIDED ROADWAY

PAINT/TAPE

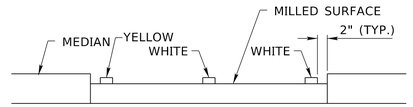


UNDIVIDED ROADWAY

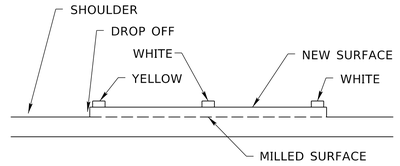
RPM/OVERLAY MARKER



NOTCHED WEDGE CENTERLINE

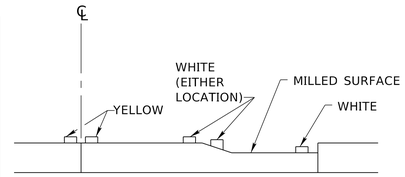


MILLED SURFACE

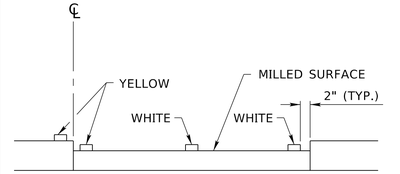


NEW SURFACING

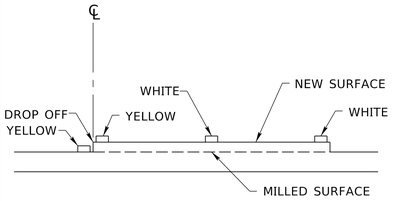
DIVIDED ROADWAY



NOTCHED WEDGE CENTERLINE



MILLED SURFACE



NEW SURFACING

UNDIVIDED ROADWAY

LATERAL LOCATION DETAILS

TABLE I				
BROKEN LINES				
TYPE OF MARKING	LENGTH		MATERIAL ALLOWED	
	RURAL	URBAN	LOWER LAYER	TOP LAYER
PAINT	10'	6'	X	∗X
TYPE I TAPE	4' MIN.	2' MIN.		∗X
RPM/OVERLAY MARKER	2 AT 5' SPACING	2 AT 3' SPACING	X	X

∗ PAINT OR TYPE I TAPE SHALL BE SUPPLEMENTED WITH A RPM OR AN OVERLAY MARKER AT INTERVALS SHOWN ON THE TOP LAYER.

TABLE II				
SOLID LINES				
TYPE OF MARKING	LENGTH		MATERIAL ALLOWED	
	RURAL	URBAN	LOWER LAYER	TOP LAYER
PAINT	SOLID	SOLID	X	X
∗ TYPE I TAPE	SOLID	SOLID		X
RPM/OVERLAY MARKER	20' SPACING	12' SPACING	X	X

NOTES:

1. ALL TEMPORARY MARKINGS SHALL BE NO LESS THAN 4 INCHES WIDE.
2. ALL TEMPORARY PAVEMENT MARKINGS THAT WILL BE COVERED BY PERMANENT PAVEMENT MARKINGS SHALL COMPLY WITH THE ALIGNMENT AND LOCATION REQUIREMENTS OF THE FINAL PAVEMENT MARKING MATERIAL. TEMPORARY PAVEMENT MARKINGS THAT ARE NOT COVERED BY THE PERMANENT MARKINGS SHALL BE REMOVED AT THE CONTRACTOR'S EXPENSE.
3. RAISED PAVEMENT MARKERS (RPM'S) & OVERLAY MARKERS SHALL BE REMOVED PRIOR TO INSTALLATION OF THE NEXT LAYER AND UPON COMPLETION OF PERMANENT STRIPING.
4. TYPE I TAPE SHALL BE REMOVED UPON COMPLETION OF PERMANENT STRIPING.
5. RPM/OVERLAY MARKERS ARE NOT REQUIRED ON MILLED SURFACES, HYDRATED LIME SURFACES AND STABILIZED SURFACES.
6. PLACE BROKEN LINE 2 INCHES TO THE LEFT OF JOINT LINE. EDGE LINE (SOLID) MARKINGS SHALL BE PLACED 12 FEET FROM THE CENTER JOINT LINE (2 INCHES INSIDE OF SHOULDER JOINT LINE WHEN APPLICABLE.)
7. PROJECTS WHICH DO NOT CREATE AN EDGELINE DROP OFF WILL NOT REQUIRE TEMPORARY EDGELINE MARKING.

LEGEND

◁ RPM/OVERLAY MARKER

◁▷ BIDIRECTIONAL RPM/OVERLAY MARKER

4-LANE

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 943

TEMPORARY PAVEMENT MARKING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

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

DATE

ORIGINAL: OCT. 2018

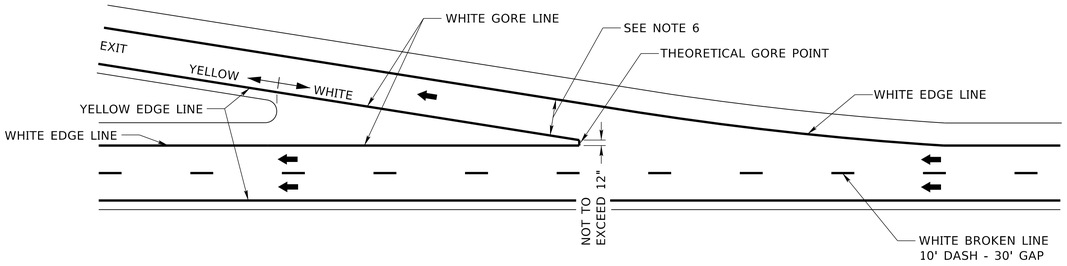
DATE

3/4

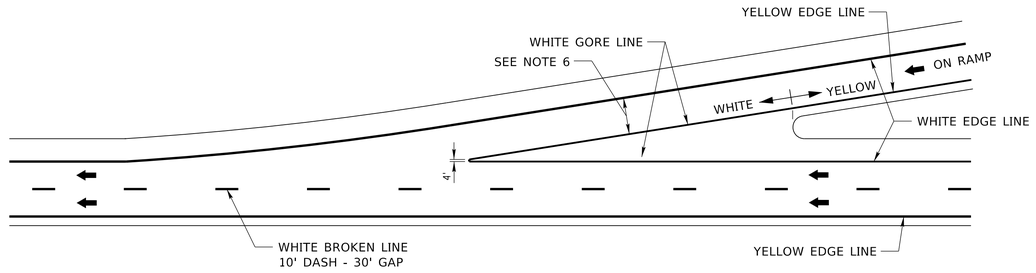
COMPUTER: BG0419M187

DATE: 22-AUG-2024 11:32

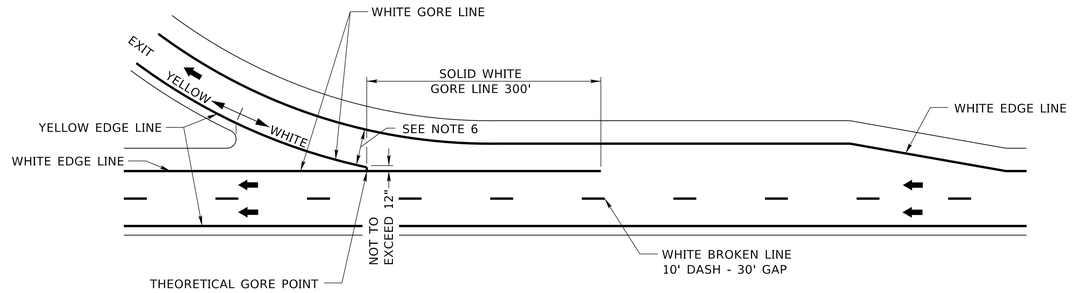
FILE: 9430 0 R0.dgn



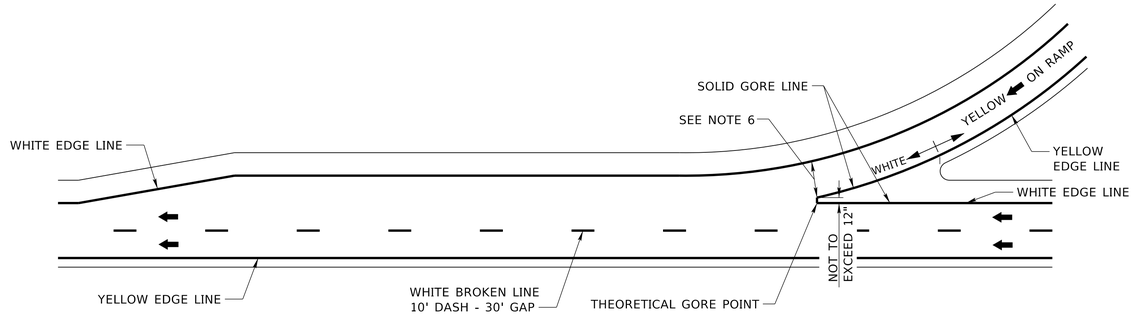
TAPERED DECELERATION LANE



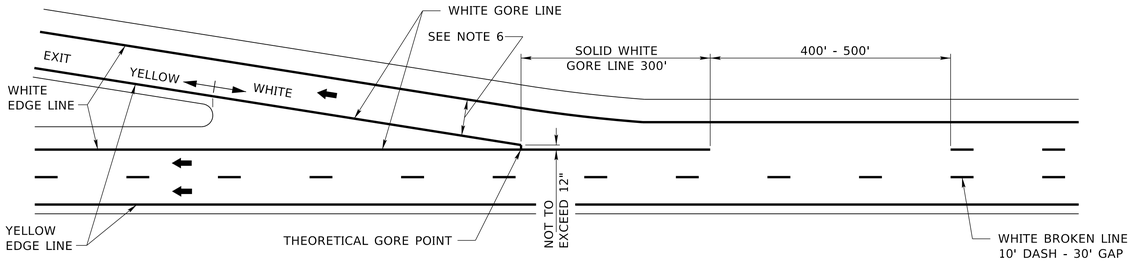
TAPERED ACCELERATION LANE



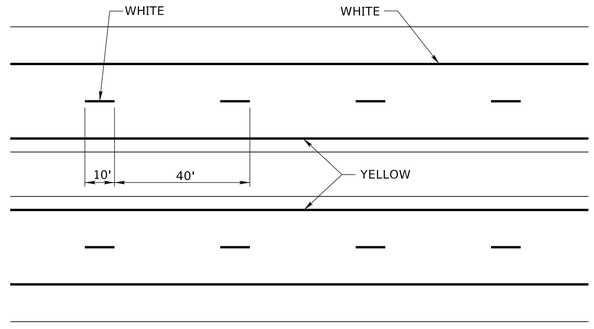
PARALLEL DECELERATION LANE



PARALLEL ACCELERATION LANE



EXIT ONLY LANE DROP



4 LANE DEPRESSED MEDIAN
WITH SURFACED SHOULDERS

NOTES:

1. ALL TEMPORARY MARKINGS SHALL BE NO LESS THAN 4 INCHES WIDE.
2. BROKEN LINE MARKINGS ON LOWER LAYERS (INCLUDING MILLED SURFACES) SHALL BE 4 INCHES BY 10 FEET PAINTED LINES AT 40 FEET INTERVALS, PLACED TO THE LEFT OF THE JOINT LINE.
3. BROKEN LINE MARKINGS ON TOP LAYERS SHALL BE 4 INCHES BY 8 FEET (MINIMUM) TO 10 FEET (MAXIMUM) PAINTED LINE AT 40 FEET INTERVALS, PLACED 2 INCHES TO THE LEFT OF THE JOINT LINE. THE INTERVAL SHALL BE 40 FEET (PLUS/MINUS) 2 INCHES TO ALLOW FOR THE PERMANENT PAVEMENT MARKING.
4. SOLID LINE MARKINGS SHALL BE PLACED 2 INCHES TO THE INSIDE OF THE EDGE JOINT LINE.
5. ALL TEMPORARY PAVEMENT MARKINGS THAT WILL BE COVERED BY PERMANENT PAVEMENT MARKINGS SHALL COMPLY WITH THE ALIGNMENT AND LOCATION REQUIREMENTS OF THE FINAL PAVEMENT MARKING MATERIAL. TEMPORARY PAVEMENT MARKINGS THAT ARE NOT COVERED BY THE PERMANENT MARKINGS SHALL BE REMOVED AT THE CONTRACTOR'S EXPENSE.
6. RAMP LANE WIDTH IS TYPICALLY 16 FEET FOR SINGLE LANE RAMP, 12 FEET FOR TWO LANE RAMP.

FREEWAY/EXPRESSWAY

REV. NO.	DATE	DESCRIPTION OF REVISION

NEBRASKA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN NO. 943

TEMPORARY PAVEMENT MARKING

ACCEPTED BY FHWA FOR USE ON THE NATIONAL HIGHWAY SYSTEM:

DATE

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

ORIGINAL:
OCT. 2018
DATE

4
4

COMPUTER: BG041914187
DATE: 22-AUG-2024 11:32
FILE: 9430 0 R0.dgn