

THESE TABLES ARE APPLICABLE FOR THE FOLLOWING LIST OF CORRUGATED STEEL PIPE:

1. GALVANIZED CORRUGATED STEEL PIPE (CSP)
2. ALUMINIZED CORRUGATED STEEL PIPE TYPE 2 (ALT2 CSP)
3. BITUMINOUS COATED CORRUGATED STEEL PIPE (BIT. CO. CSP)
4. ARAMID FIBER BONDED CORRUGATED STEEL PIPE (A.F. BD. CSP)
5. PRECOATED CORRUGATED STEEL PIPE (PCSP- BOTH SIDES)

DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE				
		H MAXIMUM OF COVER (FT.)				
		16	14	12	10	8
12	24	207	259			
15	24	165	207			
18	24	138	172	242		
21	24	118	148	207		
24	24	103	129	181		
30	24	82	103	145		
36	24	68	86	120	155	
42	24	58	73	103	133	163
48	36	51	64	90	103	142
54	36		57	80	93	126
60	36			72	84	114
66	36				77	103
72	36					94
78	36					84
84	36					72

**2-²/₃" X 1/2" CORRUGATIONS
CORRUGATED STEEL PIPE**

SPAN X RISE (IN. X IN.)	ROUND EQUIVALENT (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE	H MAXIMUM COVER (FT.)
17 X 13	15	24	16	13
21 X 15	18	24	16	12
24 X 18	21	24	16	13
28 X 20	24	24	16	12
35 X 24	30	24	16	12
42 X 29	36	24	16	12
49 X 33	42	24	14	12
57 X 38	48	36	12	12
64 X 43	54	36	12	12
71 X 47	60	36	10	12
77 X 52	66	36	8	12
83 X 57	72	36	8	12

**2-²/₃" X 1/2" CORRUGATIONS *
CORRUGATED STEEL PIPE ARCH**

* CORNER BEARING PRESSURE OF 2 TONS PER SQ. FT.

DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE	
		H MAXIMUM OF COVER (FT.)	
		16	14
6	24	408	509
8	24	306	382
10	24	244	305

**1-1/2" X 1/4" CORRUGATIONS
CORRUGATED STEEL PIPE**

DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE				
		H MAXIMUM OF COVER (FT.)				
		16	14	12	10	8
48	36	59	74	104	134	164
54	36	52	65	92	119	146
60	36	47	59	83	107	131
66	36	42	53	75	97	119
72	36	39	49	69	89	109
78	36		45	63	82	101
84	36		42	59	76	93
90	36			55	71	87
96	36			51	66	81
102	36			48	62	77
108	36				59	72
114	36				56	68
120	36				53	65
126	42					62

**3" X 1" CORRUGATIONS
CORRUGATED STEEL PIPE**

SPAN X RISE (IN. X IN.)	ROUND EQUIVALENT (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE	H MAXIMUM COVER (FT.)
53 X 41	48	36	14	12
60 X 46	54	36	14	20
66 X 51	60	36	14	20
73 X 55	66	36	14	20
81 X 59	72	36	14	17
87 X 63	78	36	14	16
95 X 67	84	36	14	16
103 X 71	90	36	12	16
112 X 75	96	36	12	16
117 X 79	102	36	12	16

**3" X 1" CORRUGATIONS *
CORRUGATED STEEL PIPE ARCH**

<p>Computer File Information</p> <p>Creation Date: 07/04/12 Initials: DLM Last Modification Date: 10/02/14 Initials: LTA Full Path: www.coloradodot.info/business/designsupport Drawing File Name: 603010204.dgn CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English</p>	<p>Sheet Revisions</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Date:</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>03/05/14</td> <td>Revised detail titles and added "H" to tables.</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	Date:	Comments	03/05/14	Revised detail titles and added "H" to tables.					<p>Colorado Department of Transportation</p> <p> 4201 East Arkansas Avenue CDOT HQ, 4th Floor Denver, CO 80222 Phone: 303-757-9021 FAX: 303-757-9868</p> <p>Division of Project Support DLM/LTA</p>	<p>METAL PIPE</p> <p>Issued By: Project Development Branch on July 4, 2012</p>	<p>STANDARD PLAN NO.</p> <p>M-603-1</p> <p>Sheet No. 2 of 4</p>
Date:	Comments											
03/05/14	Revised detail titles and added "H" to tables.											

DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE				
		H MAXIMUM OF COVER (FT.)				
		16	14	12	10	8
54	36	46	58	82	106	129
60	36		52	74	95	116
66	36		47	66	86	106
72	36			61	79	97
78	36			56	73	89
84	36			53	68	83
90	36				63	77
96	36				59	72
102	36				55	68
108	36					64

**5" X 1" CORRUGATIONS
CORRUGATED STEEL PIPE**

DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE			
		H MAXIMUM OF COVER (FT.)			
		16	14	12	10
18	24	90	126		
21	24	77	108	181	
24	24	67	95	158	
30	24	54	75	126	
36	24	45	63	105	
42	24	38	54	90	
48	36	33	47	78	114
54	36	29	41	70	101
60	36		37	63	91
66	36		34	57	83
72	36			52	76
78	36			48	70
84	36			44	65
90	36				60
96	36				56
102	36				50

**3/4" X 3/4 7-1/2" CORRUGATIONS
CORRUGATED STEEL PIPE**

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1. GALVANIZED CORRUGATED STEEL PIPE (CSP)
2. ALUMINIZED CORRUGATED STEEL PIPE TYPE 2 (ALT2 CSP)
3. BITUMINOUS COATED CORRUGATED STEEL PIPE (BIT. CO. CSP)
4. ARAMID FIBER BONDED CORRUGATED STEEL PIPE (A.F. BO. CSP)
5. PRECOATED CORRUGATED STEEL PIPE (PCSP- BOTH SIDES)

SPAN X RISE (IN. X IN.)	ROUND EQUIVALENT (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE	H MAXIMUM COVER (FT.)
81 X 59	72	36	12	17
87 X 63	78	36	12	16
95 X 67	84	36	12	16

**5" X 1" CORRUGATIONS
CORRUGATED STEEL PIPE ARCH ***

* CORNER BEARING PRESSURE OF 2 TONS PER SQ. FT.

SPAN X RISE (IN. X IN.)	ROUND EQUIVALENT (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE	H MAXIMUM COVER (FT.)
20 X 16	18	24	16	16
23 X 19	21	24	16	15
27 X 21	24	24	16	13
33 X 26	30	24	16	13
40 X 31	36	24	16	14
46 X 36	42	24	12	13
53 X 41	48	36	12	13
60 X 46	54	36	12	20
66 X 51	60	36	12	20

**3/4" X 3/4 7-1/2" CORRUGATIONS
CORRUGATED STEEL PIPE ARCH ***

Computer File Information	Sheet Revisions	Colorado Department of Transportation	METAL PIPE	STANDARD PLAN NO.	
Creation Date: 07/04/12 Initials: DLM	Date: Comments	 4201 East Arkansas Avenue CDDT HQ, 4th Floor Denver, CO 80222 Phone: 303-757-9021 FAX: 303-757-9868	Issued By: Project Development Branch on July 4, 2012	M-603-1	
Last Modification Date: 10/02/14 Initials: LTA	(R-X) 03/05/14 Revised detail titles and added "H" to tables.			Division of Project Support DLM/LTA	Sheet No. 3 of 4
Full Path: www.coloradodot.info/business/designsupport	(R-X)				
Drawing File Name: 603010304.dgn	(R-X)				
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)				

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DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE	
		H MAXIMUM OF COVER (FT.)	
		16	
6	24	247	
8	24	185	
10	24	148	

1-1/2" X 1/4" CORRUGATIONS
CORRUGATED ALUMINUM PIPE

DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE			
		H MAXIMUM OF COVER (FT.)			
		16	14	12	10
18	24	43	61		
21	24	38	52	84	
24	24	33	45	73	
30	24	26	36	58	
36	24	21	30	49	69
42	24		25	41	59
48	36			36	51
54	36			32	46
60	36			29	41
66	36				37
72	36				34

3/4" X 3/4" 7-1/2" CORRUGATIONS
CORRUGATED ALUMINUM PIPE

SPAN X RISE (IN. X IN.)	ROUND EQUIVALENT (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE			
			H MAXIMUM OF COVER (FT.)			
			16	14	12	10
20 X 16	18	24	16			
23 X 19	21	24	15			
27 X 21	24	24	13	13		
33 X 26	30	24	13	13	13	
40 X 31	36	24		13	13	
46 X 36	42	24			13	13
53 X 41	48	36			13	13
60 X 46	54	36			20	20
66 X 51	60	36				20

3/4" X 3/4" 7-1/2" CORRUGATIONS
CORRUGATED ALUMINUM PIPE ARCH *

DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE				
		H MAXIMUM OF COVER (FT.)				
		16	14	12	10	8
12	24	125	157			
15	24	100	125			
18	24	83	104			
21	24	71	89			
24	24	62	78	109		
27	24		69	97		
30	24		62	87		
36	24		51	73	94	
42	24			62	80	
48	36			54	70	85
54	36			48	62	76
60	36				52	64
66	36					52
72	36					43

2-2/3" X 1/2" CORRUGATIONS
CORRUGATED ALUMINUM PIPE

SPAN X RISE (IN. X IN.)	ROUND EQUIVALENT (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE	H MAXIMUM COVER (FT.)
17 X 13	15	24	16	13
21 X 15	18	24	16	12
24 X 18	21	24	16	13
28 X 20	24	24	16	12
35 X 24	30	24	16	12
42 X 29	36	24	16	12
49 X 33	42	24	14	12
57 X 38	48	36	12	12
64 X 43	54	36	12	12
71 X 47	60	36	10	12

2-2/3" X 1/2" CORRUGATIONS
CORRUGATED ALUMINUM PIPE ARCH *

* CORNER BEARING PRESSURE OF 2 TONS PER SQ. FT.

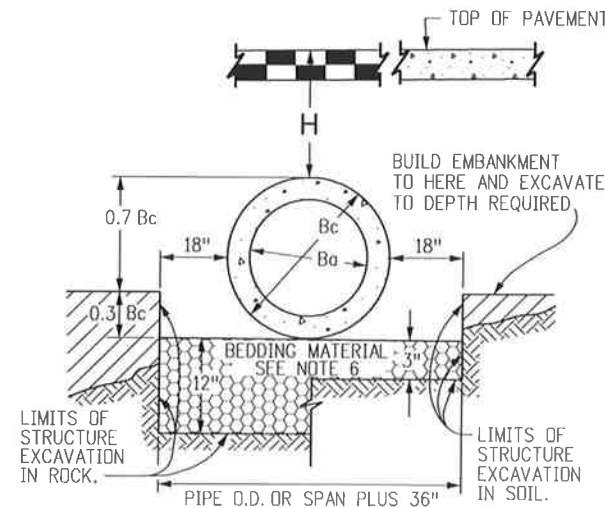
DIAMETER (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE				
		H MAXIMUM OF COVER (FT.)				
		16	14	12	10	8
30	24	57	72	101	135	159
36	24	47	60	84	112	132
42	24	40	51	72	96	113
48	36	35	44	62	84	99
54	36	31	39	55	74	88
60	36	28	35	50	67	79
66	36	25	32	45	61	72
72	36	23	29	41	56	66
78	36		27	38	51	61
84	36			35	48	56
90	36			33	44	52
96	36			31	41	49
102	36				39	46
108	36				37	43
114	36					39
120	36					36

3" X 1" CORRUGATIONS
CORRUGATED ALUMINUM PIPE

SPAN X RISE (IN. X IN.)	ROUND EQUIVALENT (IN.)	H MINIMUM COVER (IN.)	PIPE GAGE	H MAXIMUM COVER (FT.)
60 X 46	54	36	14	20
66 X 51	60	36	14	20
73 X 55	66	36	14	20
81 X 59	72	36	12	16
87 X 63	78	36	12	16
95 X 67	84	36	12	16
103 X 71	90	36	10	16
112 X 75	96	36	8	16

3" X 1" CORRUGATIONS
CORRUGATED ALUMINUM PIPE ARCH *

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Creation Date: 07/04/12	Initials: DLM	Date: 03/05/14	Comments: Revised detail titles and added "H" to tables.			
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Full Path: www.coloradodot.info/business/designsupport						
Drawing File Name: 603010404.dgn						
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English						



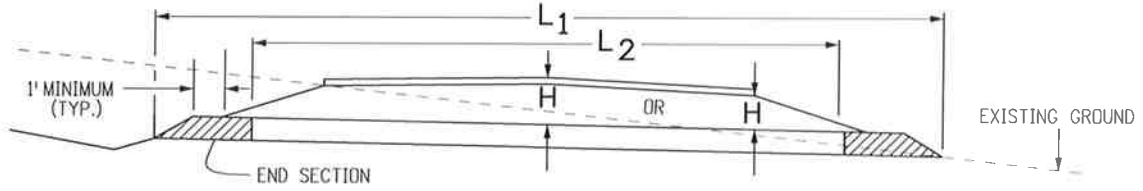
NOTE: Bc IS THE OUTSIDE DIMENSION FOR DIAMETER, SPAN OR RISE.

PIPE INSTALLATION
(WITH 0.7 PROJECTION RATIO)

CIRCULAR (CIR)			VERTICAL ELLIPTICAL (VE)				HORIZONTAL ELLIPTICAL (HE)			
PIPE SIZE = Ba (INSIDE DIA)	WALL THICKNESS	0.3 Bc (OUTSIDE DIA)	SPAN	RISE	WALL THICKNESS	0.3 OUTSIDE RISE	SPAN	RISE	WALL THICKNESS	0.3 OUTSIDE RISE
IN.		FT.				FT.	IN.			FT.
12	2	0.40								
15	2-1/4	0.49								
18	2-1/2	0.58					23	14	2-3/4	0.49
21	2-3/4	0.66								
24	3	0.75					30	19	3-1/4	0.66
27	3-1/4	0.84					34	22	3-1/2	0.73
30	3-1/2	0.92					38	24	3-3/4	0.79
33	3-3/4	1.01								
36	4	1.10	29	45	4-1/2	1.35	45	29	4-1/2	0.95
42	4-1/2	1.28	34	53	5	1.58	53	34	5	1.10
48	5	1.45	38	60	5-1/2	1.78	60	38	5-1/2	1.23
54	5-1/2	1.62	43	68	6	2.00	68	43	6	1.38
60	6	1.80	48	76	6-1/2	2.23	76	48	6-1/2	1.53
66	6-1/2	1.97	53	83	7	2.43	83	53	7	1.68
72	7	2.15	58	91	7-1/2	2.65	91	58	7-1/2	1.83
78	7-1/2	2.32	63	98	8	2.85	98	63	8	1.98
84	8	2.50	68	106	8-1/2	3.08	106	68	8-1/2	2.13
90	8-1/2	2.68	72	113	9	3.28	113	72	9	2.25
96	9	2.85	77	121	9-1/2	3.50	121	77	9-1/2	2.40
102	9-1/2	3.02	82	128	9-3/4	3.69	128	82	9-3/4	2.54
108	10	3.20	87	136	10	3.90	136	87	10	2.68

△ ALSO EQUIVALENT ROUND DIMENSION FOR ELLIPTICAL PIPE.

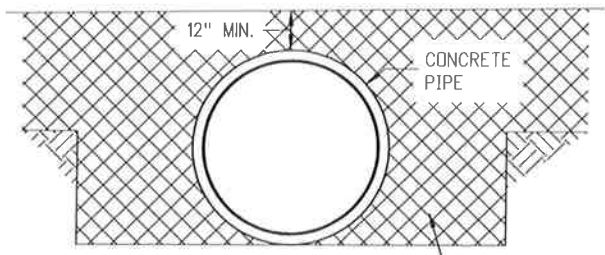
DIMENSIONS FOR REINFORCED CONCRETE PIPE
(FOR INFORMATION ONLY)



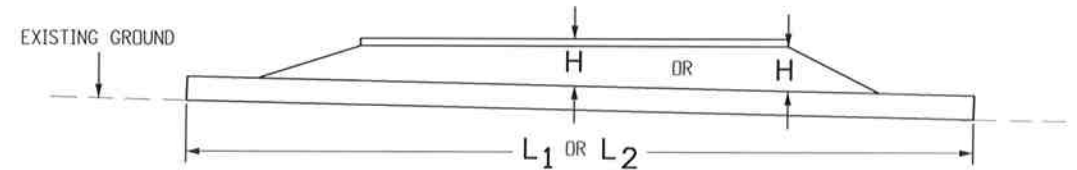
CONCRETE PIPE WITH END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

- H = HEIGHT OF FILL OVER TOP OF PIPE, INCLUDING PAVEMENT THICKNESS.
- L1 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 617 OR 624.
- L2 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 603.



CONSTRUCTION MINIMUM COVER FOR RIGID PIPE



CONCRETE PIPE WITHOUT END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

GENERAL NOTES

REINFORCED CONCRETE PIPE

1. FILL HEIGHTS GREATER THAN MAXIMUM ALLOWED IN THE HEIGHTS OF FILL TABLE ON THIS SHEET REQUIRE SPECIAL DESIGN OF STRUCTURE.
2. PIPE DESIGN IS BASED ON SAFETY FACTOR OF 1.33 ON ULTIMATE STRENGTH.
3. THE HEIGHTS OF FILL OVER TOP OF PIPE ARE BASED ON UNIT WEIGHT OF SOIL AT 135 LBS. PER CUBIC FT.
4. PIPE CLASS IS DETERMINED FROM 0.01 IN. CRACK D-LOAD.
5. BEDDING IS CLASS B (MODIFIED) (FROM CONCRETE PIPE DESIGN MANUAL-AMERICAN CONCRETE PIPE ASSOCIATION) WITH SETTLEMENT RATIO R = 0.0 sd (YIELDING BED). BEDDING MATERIAL FOR RIGID PIPE IN SOIL SHALL BE 3 IN. LOOSE THICKNESS STRUCTURE BACKFILL CLASS 2. BEDDING MATERIAL FOR RIGID PIPE IN ROCK SHALL BE 12 IN. LOOSE THICKNESS STRUCTURE BACKFILL CLASS 1.
6. CHANGES IN DESIGN FACTORS REQUIRE COMPENSATING CHANGES IN PIPE DESIGN.
7. MINIMUM WALL THICKNESS DIMENSIONS ARE BASED ON AASHTO M 170 (WALL B) FOR CIRCULAR PIPE, AND AASHTO M 207 FOR ELLIPTICAL PIPE.
8. SPACING FOR MULTIPLE PIPE INSTALLATIONS SHALL CONFORM TO THE DETAILS SHOWN ON STANDARD PLAN M-206-1.
9. WHEN A PIPE IS TO BE EXTENDED, THE SAME PIPE MATERIAL AND SIZE AS IN THE ORIGINAL PIPE INSTALLATION SHALL BE USED.

NONREINFORCED CONCRETE PIPE

1. AT THE OPTION OF THE CONTRACTOR, NONREINFORCED CONCRETE PIPE CONFORMING TO AASHTO M 86 MAY BE USED IN LIEU OF REINFORCED CONCRETE PIPE FOR ALL SIZES 36 INCHES IN DIAMETER AND SMALLER. THE NONREINFORCED CONCRETE PIPE SHALL MEET THE SAME D-LOAD TO PRODUCE THE ULTIMATE LOAD UNDER THE THREE-EDGE BEARING METHOD AS SPECIFIED FOR REINFORCED CONCRETE PIPE IN CONFORMANCE WITH AASHTO M 170. THE CONTRACTOR SHALL PROVIDE WRITTEN CERTIFICATION OF CONFORMANCE. THE WALL THICKNESS OF THE NONREINFORCED PIPE MAY BE INCREASED AS REQUIRED TO MEET D-LOAD REQUIREMENT.
2. ALL REQUIREMENTS FOR REINFORCED CONCRETE PIPE, EXCEPT THOSE REFERRING TO REINFORCEMENT, SHALL APPLY TO NONREINFORCED CONCRETE PIPE.

TYPE OF PIPE	HEIGHT OF FILL OVER TOP OF PIPE, H (FEET)				
	CLASS OF PIPE (0.01 IN. CRACK D-LOAD)				
	CLASS CIR II CLASS VE II CLASS HE II 1000 D	CLASS CIR III CLASS VE III CLASS HE III 1350 D	CLASS CIR IV CLASS VE IV CLASS HE IV 2000 D	CLASS CIR V CLASS VE V 3000 D	CLASS VE VI 4000 D
CIRCULAR (CIR)	1 TO 18	1 TO 25	± 25 TO 37	± 37 TO 45	
VERTICAL ELLIPTICAL (VE)	1 TO 18	1 TO 25	± 25 TO 37	± 37 TO 45	± 45 TO 62
HORIZONTAL ELLIPTICAL (HE)	1 TO 18	1 TO 25	± 25 TO 37		

ALLOWABLE RANGE OF HEIGHTS FOR FILL OVER REINFORCED CONCRETE PIPE

(ALL SIZES)

Computer File Information	
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Drawing File Name: 603020101.dgn	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

Sheet Revisions	
Date:	Comments
3/25/14	Made Min. Cover for Rigid Pipe detail like others. Deleted Gen Note 1 & renumbered.
4/11/14	Changed "Min." to 1 in Heights table.

Colorado Department of Transportation

4201 East Arkansas Avenue
 CDDT HQ, 4th Floor
 Denver, CO 80222
 Phone: 303-757-9021 FAX: 303-757-9868

Division of Project Support DLM/LTA

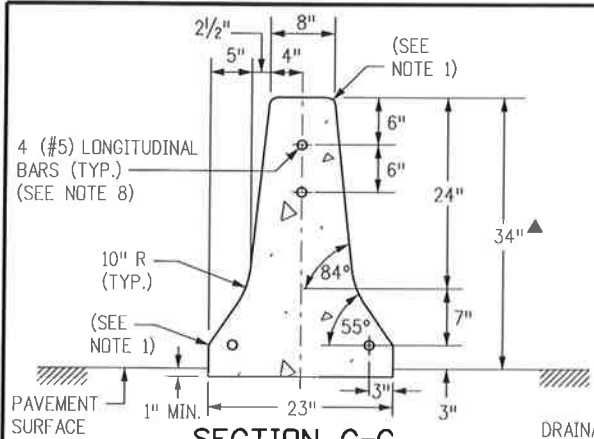
REINFORCED CONCRETE PIPE

Issued By: Project Development Branch on July 4, 2012

STANDARD PLAN NO.

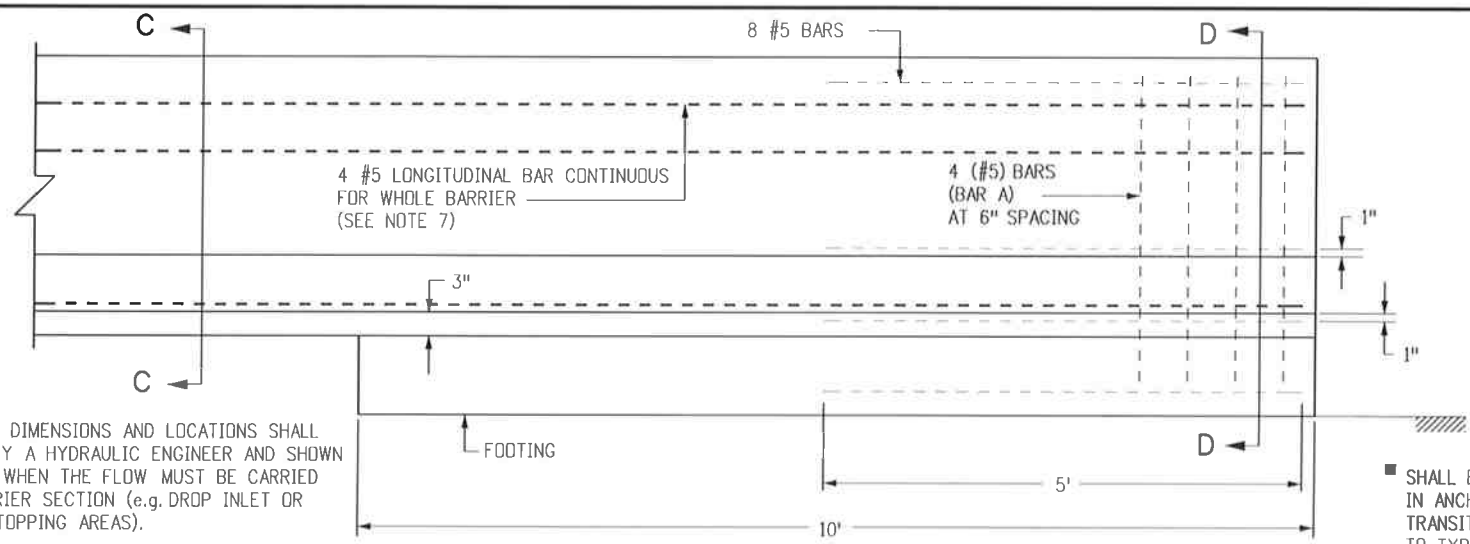
M-603-2

Sheet No. 1 of 1



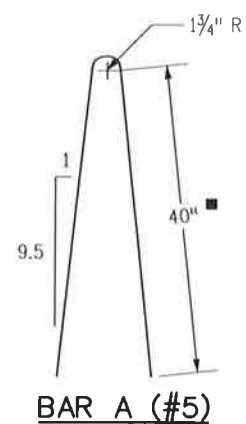
**SECTION C-C
STYLE CA
CONCRETE BARRIER (TYP.)**

DRAINAGE SLOT DIMENSIONS AND LOCATIONS SHALL BE PROVIDED BY A HYDRAULIC ENGINEER AND SHOWN ON THE PLANS WHEN THE FLOW MUST BE CARRIED ACROSS A BARRIER SECTION (e.g. DROP INLET OR CULVERT OVERTOPPING AREAS).

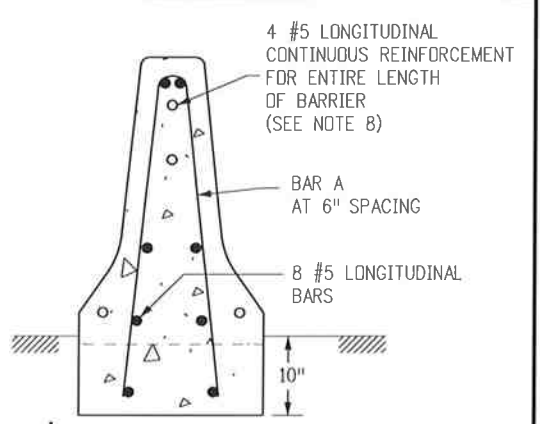


ANCHORAGE

BARRIER ELEVATION VIEW INCLUDING REINFORCED ANCHORAGE AT END (FOR ANCHORAGE THAT TRANSITIONS TO BRIDGE RAIL OR THRIE BEAM, SEE SHEET 2)



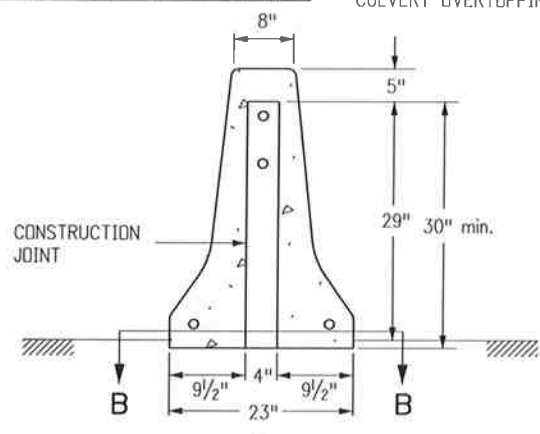
BAR A (#5)



***SECTION D-D
ANCHORAGE**

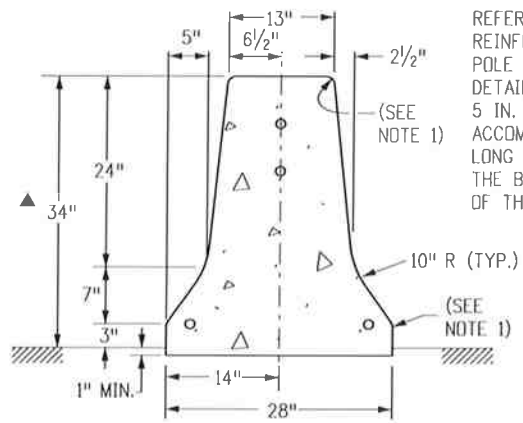
GENERAL NOTES

- ALL EDGES SHALL BE ROUNDED WITH A 1 IN. RADIUS EXCEPT AS SHOWN.
- THE BARRIER SHALL BE ANCHORED AT THE ENDS AND AT INTERRUPTIONS WITH THE 10 FT. REINFORCED ANCHORAGE. THE FOOTING AND END BARRIER MAY BE MONOLITHIC OR THE BARRIER MAY BE CONNECTED TO THE 10 IN. DEEP FOOTING USING TEN #8 REBAR DOWELS (10 IN. LONG) SET TWO IN LINE AT 24 IN. SPACING.
- BARRIER MAY BE CAST-IN-PLACE, SLIP FORMED, OR PRECAST (SEE STANDARD PLAN M-606-14).
- BARRIER FOUNDATION SHALL BE PAVEMENT, OR COMPACTED AGGREGATE BASE, OR EMBANKMENT MATERIAL.
- NO FOOTING IS REQUIRED (TYP.) EXCEPT FOR 10 FT. ANCHORAGE.
- CONSTRUCTION JOINTS SHALL BE USED ON ALL BARRIER TYPES SHOWN, AT THE END OF THE DAY'S POUR OR AFTER ANY INTERRUPTION LONGER THAN 30 MINUTES. ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.
- REINFORCING STEEL IN ANCHORAGE SHALL BE GRADE 60 EPOXY COATED DEFORMED BARS.
- CONTINUOUS LONGITUDINAL REINFORCEMENT SHALL BE EITHER GRADE 60 EPOXY COATED DEFORMED BARS OR WIRE STRAND WITH MINIMUM ULTIMATE TENSILE STRENGTH OF 28,000 LBS. AND CLASS C GALVANIZING ACCORDING TO ASTM A 603.
- TRANSITION TO EXISTING CONCRETE BARRIER INSTALLATIONS OF DISSIMILAR SHAPE SHALL BE ACCOMPLISHED IN ONE 10 FT. LONG SEGMENT OF BARRIER.
- CONCRETE SHALL BE CLASS D.
- ADDITIONAL MATERIAL FOR BARRIER EMBEDMENT GREATER THAN 1 IN. WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
- EPOXY COATED LONGITUDINAL REBAR SHALL HAVE A MINIMUM LAP SPLICE OF 38 IN. WIRE STRAND LONGITUDINAL REINFORCEMENT SHALL BE BUTT WELDED OR MECHANICALLY SPLICED TO MAINTAIN 100 PERCENT OF THE MINIMUM REQUIRED TENSILE STRENGTH.
- ALL INCIDENTAL WORK AND MATERIAL SUCH AS DOWELS, GROUT, ANCHORS, BOLTS, PINS, JOINT MATERIAL, EXCAVATION FOR BASES, CONTINUOUS LONGITUDINAL REINFORCEMENT, SHALL BE INCLUDED IN THE COST OF GUARDRAIL.
- RETROREFLECTORIZATION IS REQUIRED ON ALL BARRIER TYPES. SEE BARRIER RETROREFLECTOR NOTES ON STANDARD PLAN S-612-1.



**SECTION B-B
CONSTRUCTION JOINT**

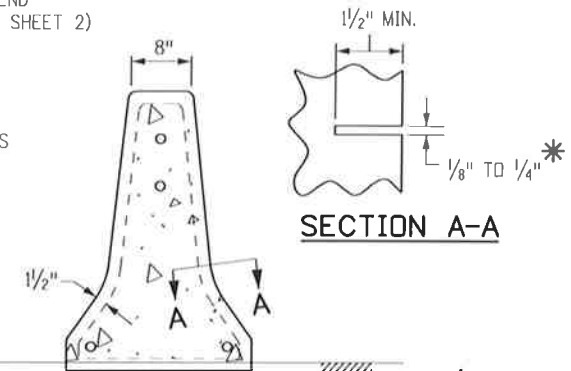
* SEE STYLE CA DETAIL FOR TYPICAL DIMENSIONS.



STYLE CL

BARRIER FOR MOUNTED LIGHT POLES

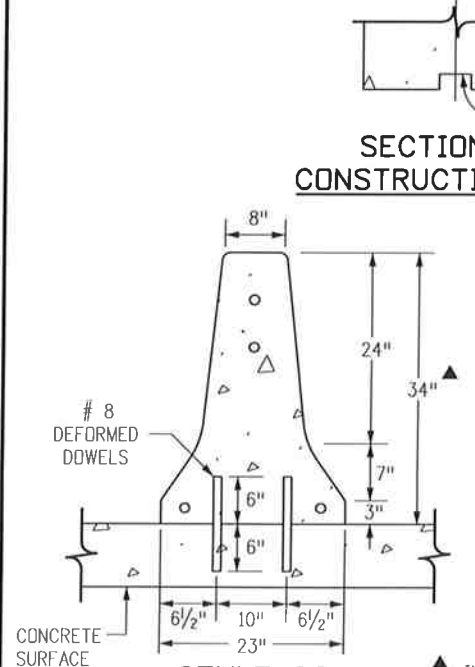
REFER TO THE PLANS FOR THE REINFORCING, WIRING, AND LIGHT POLE FOUNDATION INSTALLATION DETAILS. THE TRANSITION TO THIS 5 IN. WIDER SECTION SHALL BE ACCOMPLISHED IN ONE 10 FT. LONG SEGMENT OF BARRIER AT THE BEGINNING AND THE END OF THE RUN OF LIGHT POLES.



SECTION A-A

TRANSVERSE CONTRACTION JOINTS

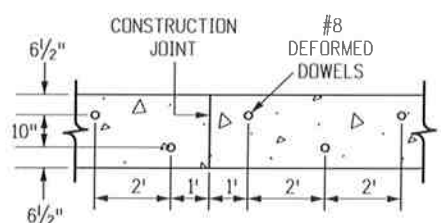
* FORMED OR SAWED TRANSVERSE CONTRACTION JOINTS ARE REQUIRED AT 20 FT. INTERVALS OR THE INTERVALS SHALL MATCH THE CONCRETE PAVEMENT JOINTS FOR INSTALLATIONS ON TOP OF THE CONCRETE ROADWAY PAVEMENT.



STYLE CC

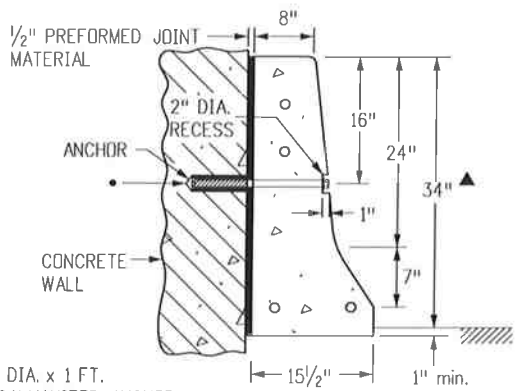
BARRIER DOWELLED TO CONCRETE SURFACE

▲ IN FUTURE OVERLAYS, AN OVERALL MINIMUM HEIGHT OF 31 IN. IS REQUIRED.



DOWEL PLACEMENT LAYOUT

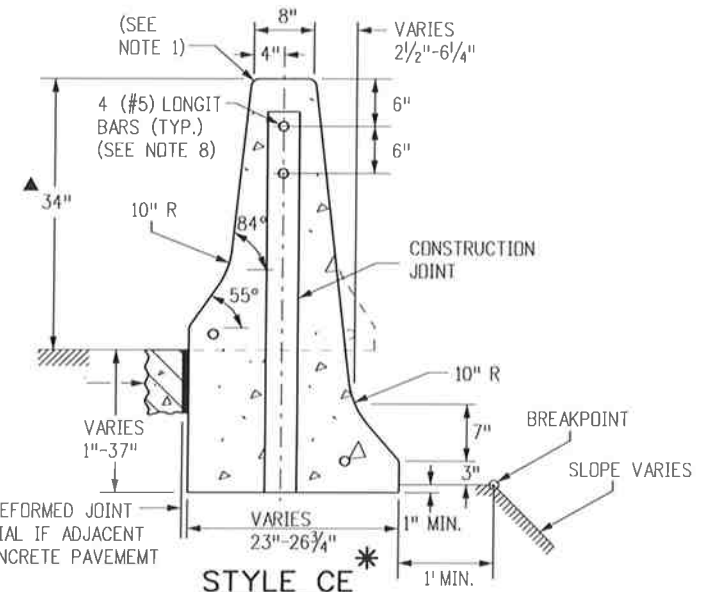
FOR STYLE CC BARRIER (PLAN VIEW)



STYLE CD

BARRIER AGAINST WALL

* 1/2 IN. DIA. x 1 FT. LONG GALVANIZED ANCHOR BOLT AND WASHER, MECHANICALLY FASTENED AT 2 FT. - 6 IN. CENTERS. USE ONLY WHEN CALLED FOR ON PLANS.



STYLE CE

BARRIER FOR OFFSET ROADWAYS

Computer File Information	
Creation Date: 07/04/12	Initials: DM
Last Modification Date: 08/30/13	Initials: LTA
Full Path: www.coloradodot.info/business/designsupport	
Drawing File Name: 6060130104.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

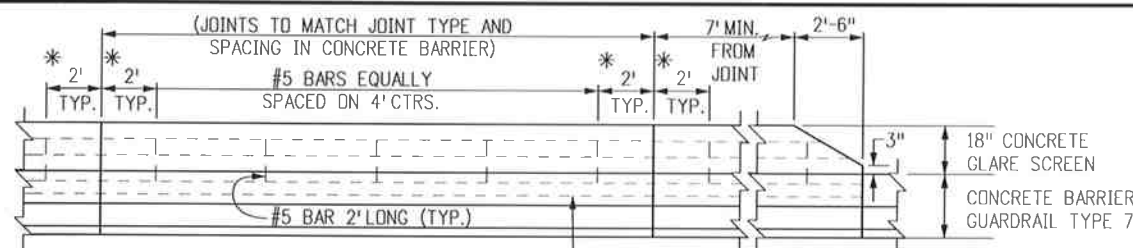
Sheet Revisions	
Date:	Comments
08/30/13	Revised Sheet 2 of 4.
(R-X)	
(R-X)	
(R-X)	

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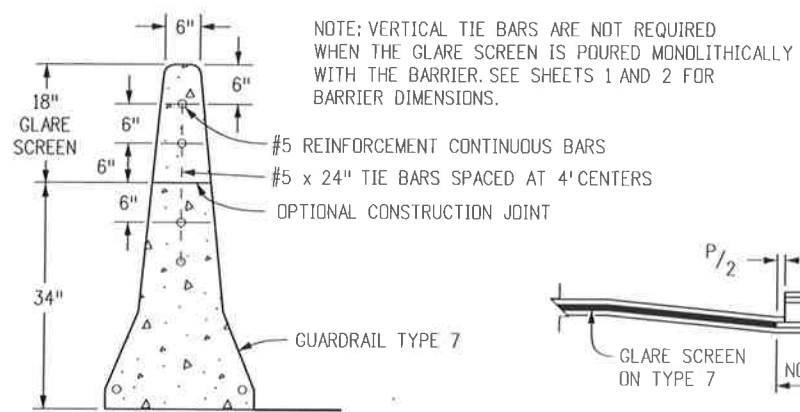
**GUARDRAIL TYPE 7
F-SHAPE BARRIER**
 Issued By: Project Development Branch July 4, 2012

STANDARD PLAN NO.
 M-606-13
 Sheet No. 1 of 4

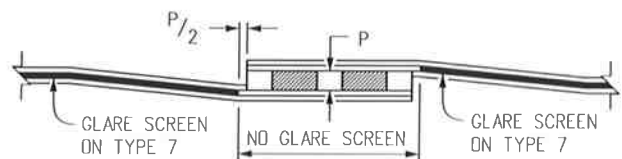


ELEVATION

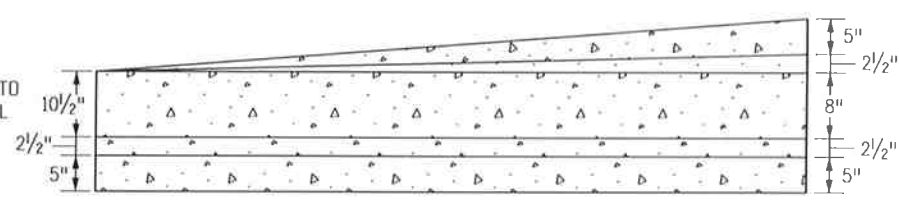
* 2 FT. IS TYPICAL FOR CAST-IN-PLACE BARRIERS.
1 FT. IS TYPICAL FOR PRECAST BARRIERS.
THE MINIMUM ACCEPTABLE DIMENSION IS 6 IN.



CONCRETE GLARE SCREEN

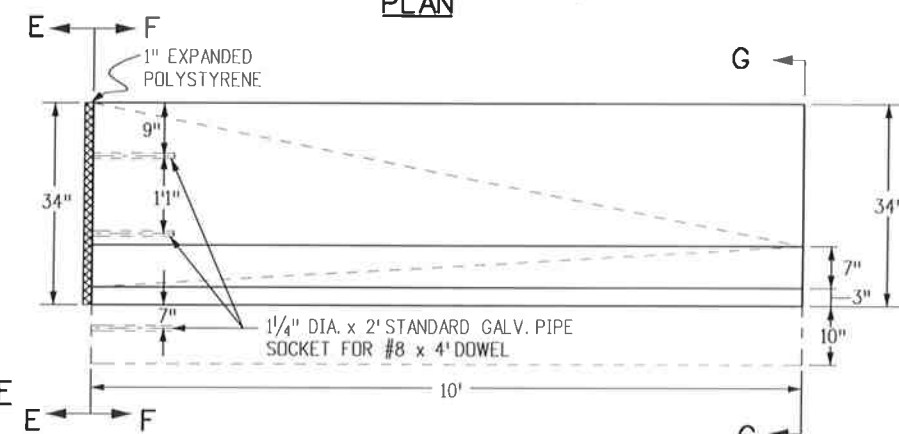
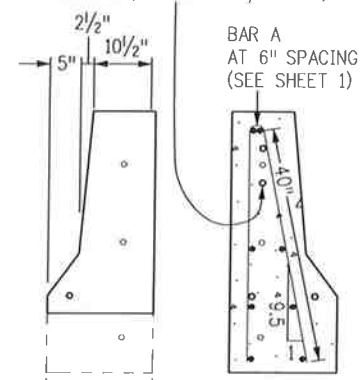


GLARE SCREEN AT MEDIAN OBSTRUCTIONS



PLAN

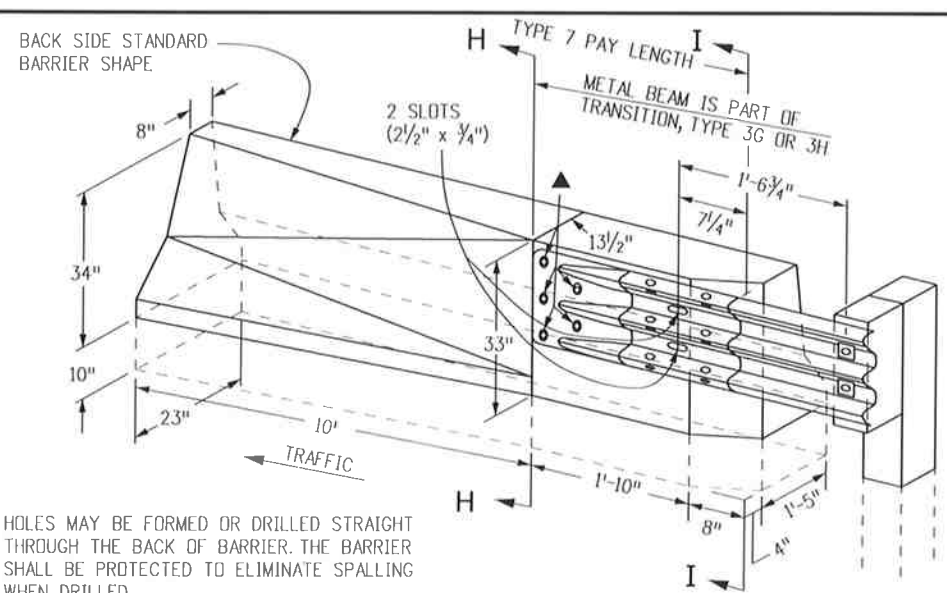
4 #5 LONGITUDINAL CONTINUOUS REINFORCEMENT FOR ENTIRE LENGTH OF BARRIER (SEE SHEET 1, NOTE 7)



ELEVATION

THIS SECTION PROVIDES A TRANSITION FOR THE SHAPE OF THE BRIDGE RAIL TYPE 7 TO THE ROADWAY GUARDRAIL TYPE 7. MEASURED AND PAID FOR AS GUARDRAIL TYPE 7. (SEE ANCHORAGE DETAIL ON SHEET 1 FOR REINFORCEMENT INFORMATION)

BRIDGE RAIL TYPE 7 TO ROADWAY SHOULDER TYPE 7 TRANSITION AND ANCHORAGE

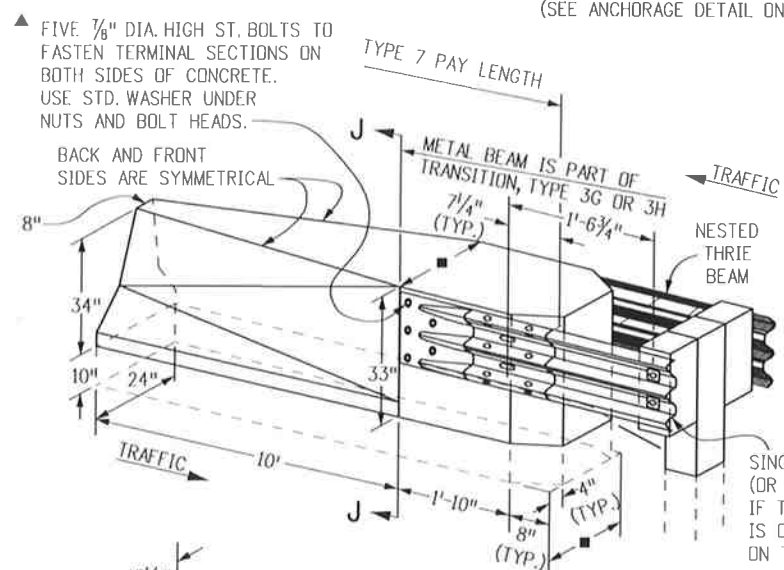


SECTION H-H

TYPE 7 TO SINGLE TYPE 3G TRANSITION AND ANCHORAGE

(SEE ANCHORAGE DETAIL ON SHEET 1 FOR REINFORCEMENT INFORMATION)

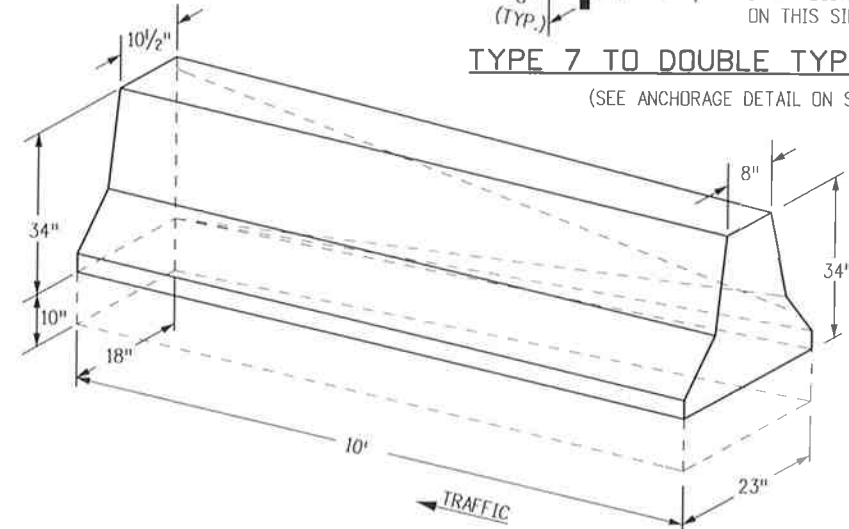
▲ HOLES MAY BE FORMED OR DRILLED STRAIGHT THROUGH THE BACK OF BARRIER. THE BARRIER SHALL BE PROTECTED TO ELIMINATE SPALLING WHEN DRILLED.



SECTION J-J

TYPE 7 TO DOUBLE TYPE 3G TRANSITION AND ANCHORAGE

(SEE ANCHORAGE DETAIL ON SHEET 1 FOR REINFORCEMENT INFORMATION)



Computer File Information

Creation Date: 07/04/12	Initials: DM
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Full Path: www.coloradodot.info/business/designsupport	
Drawing File Name: 6060130204.dgn	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments
08/30/13	Revised some dimensions in the Type 7 to Type 3G transition details for consistency with M-606-1, Guardrail Type 3 W-Beam.

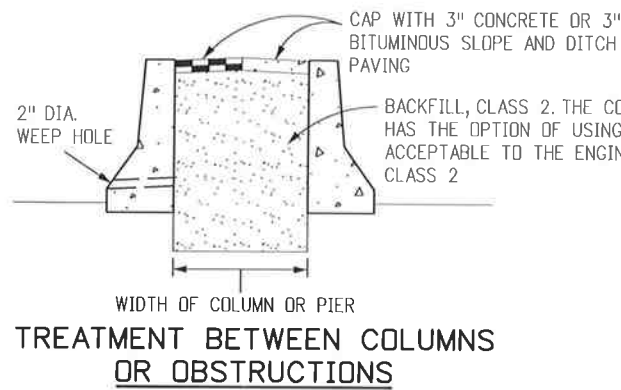
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**GUARDRAIL TYPE 7
F-SHAPE BARRIER**

Issued By: Project Development Branch July 4, 2012

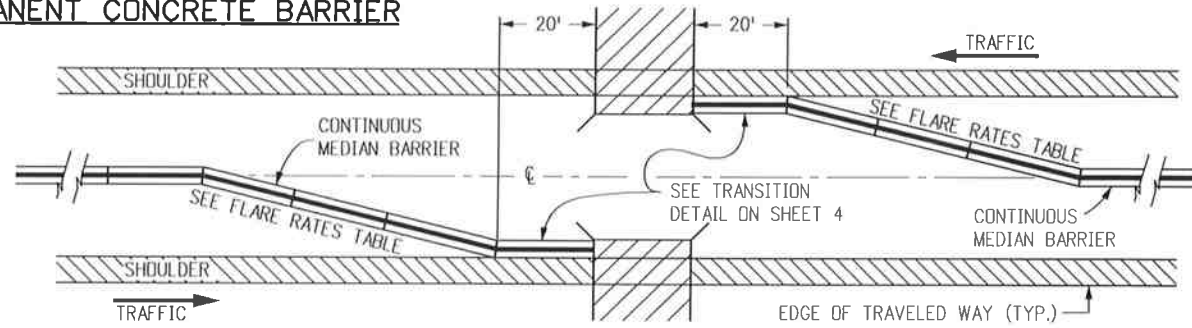
**STANDARD PLAN NO.
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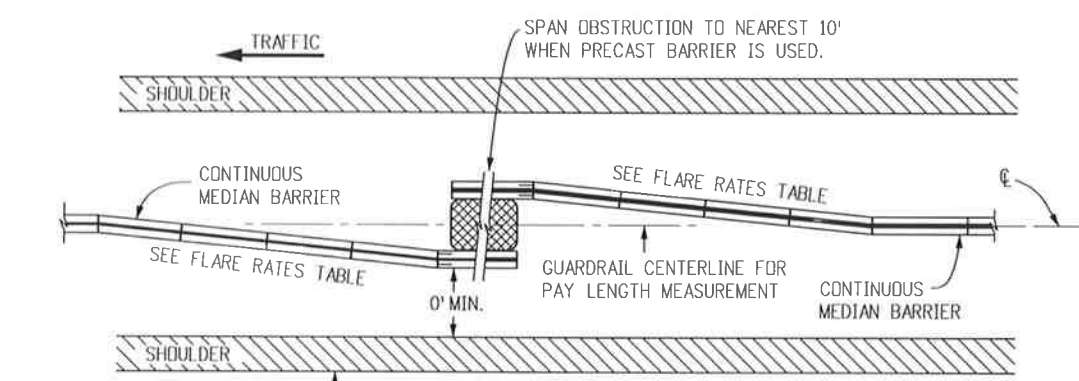
DESIGN SPEED (MPH)	SHY LINE OFFSET (FT.)*	FLARE RATE FOR BARRIER INSIDE SHY LINE	FLARE RATE FOR BARRIER OUTSIDE SHY LINE
80	12	30:1	20:1
75	10	30:1	20:1
70	9	30:1	20:1
60	8	26:1	18:1
55	7	24:1	16:1
50	6.5	21:1	14:1
45	6	18:1	12:1
40	5	16:1	10:1
30	4	13:1	8:1

- NOTES**
1. THE MEDIAN IN THESE APPLICATIONS SHALL BE PAVED ON A SLOPE CONTINUED FROM THE ADJACENT PAVED SHOULDER OR A 10:1 OR FLATTER SLOPE.
 2. THE PAY LENGTH FOR BARRIER ON BOTH SIDES OF AN OBSTRUCTION WILL BE DETERMINED BY ONE LINEAR MEASUREMENT ALONG THE GUARDRAIL CENTERLINE. THE BACKFILL AND CAP BETWEEN COLUMNS OR OBSTRUCTIONS WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
 3. GUARDRAIL BETWEEN COLUMNS OR OBSTRUCTIONS MAY BE STYLES CD OR CA AS SHOWN ON THE PLANS.

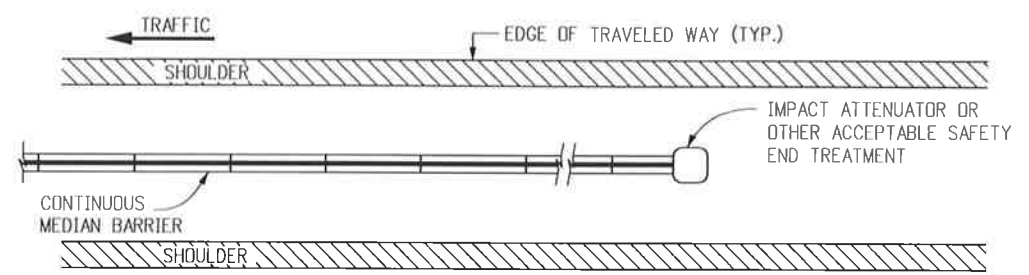
* THE SHY LINE OFFSET IS MEASURED FROM THE EDGE OF THE TRAVELED WAY.
TABLE OF FLARE RATES FOR PERMANENT CONCRETE BARRIER



BRIDGE APPROACH

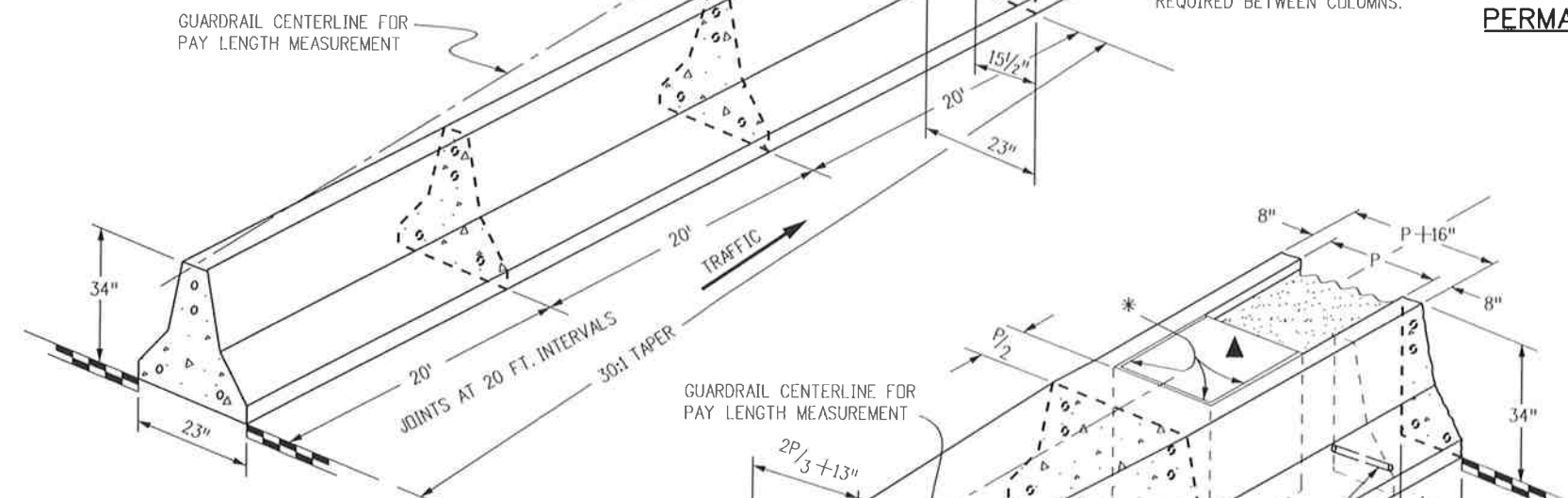


STYLE CA AT OBSTRUCTION
(OBSTRUCTION NOT SUITABLE FOR TYPE CD)



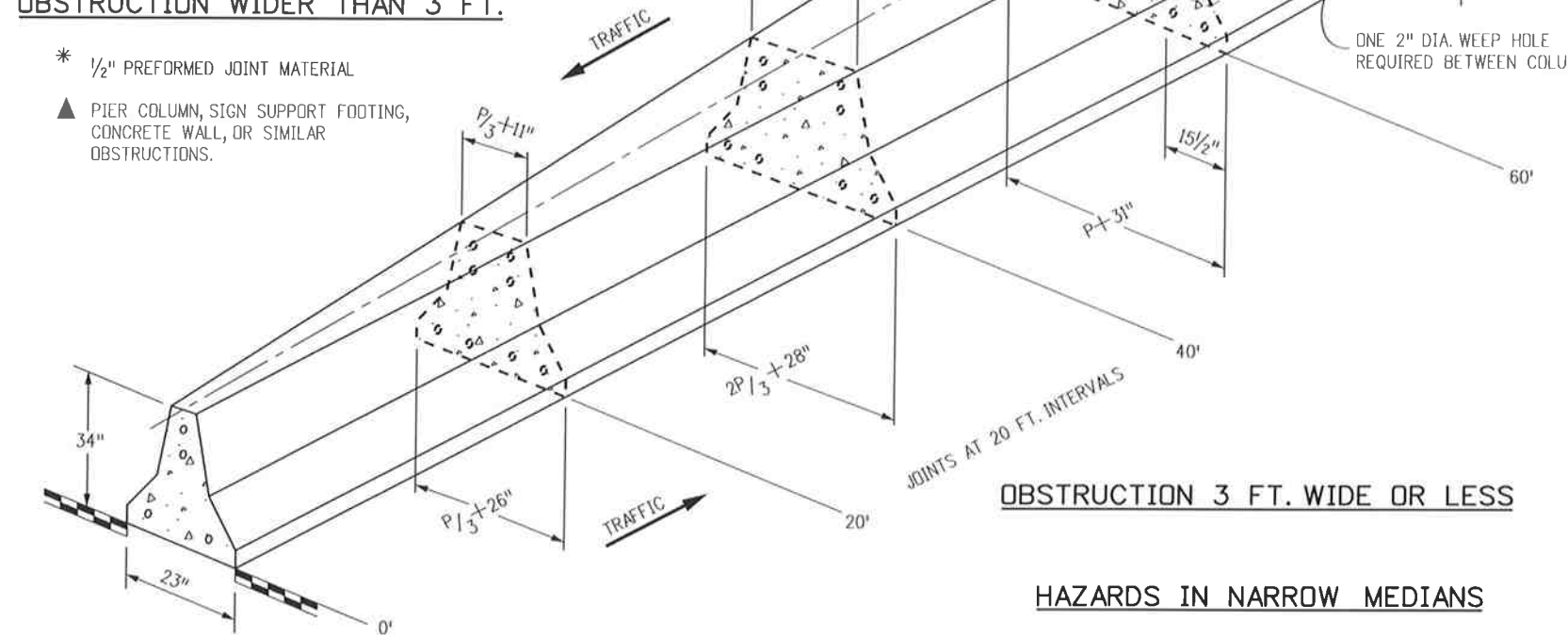
MEDIAN BARRIER END TREATMENT

TREATMENT BETWEEN COLUMNS OR OBSTRUCTIONS



OBSTRUCTION WIDER THAN 3 FT.

- * 1/2" PREFORMED JOINT MATERIAL
- ▲ PIER COLUMN, SIGN SUPPORT FOOTING, CONCRETE WALL, OR SIMILAR OBSTRUCTIONS.



OBSTRUCTION 3 FT. WIDE OR LESS

HAZARDS IN NARROW MEDIANS

Computer File Information

Creation Date: 07/04/12	Initials: DD
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Full Path: www.coloradodot.info/business/designsupport	(R-X)
Drawing File Name: 6060130304.dgn	(R-X)
CAD Ver.: MicroStation V8	Scale: Not to Scale
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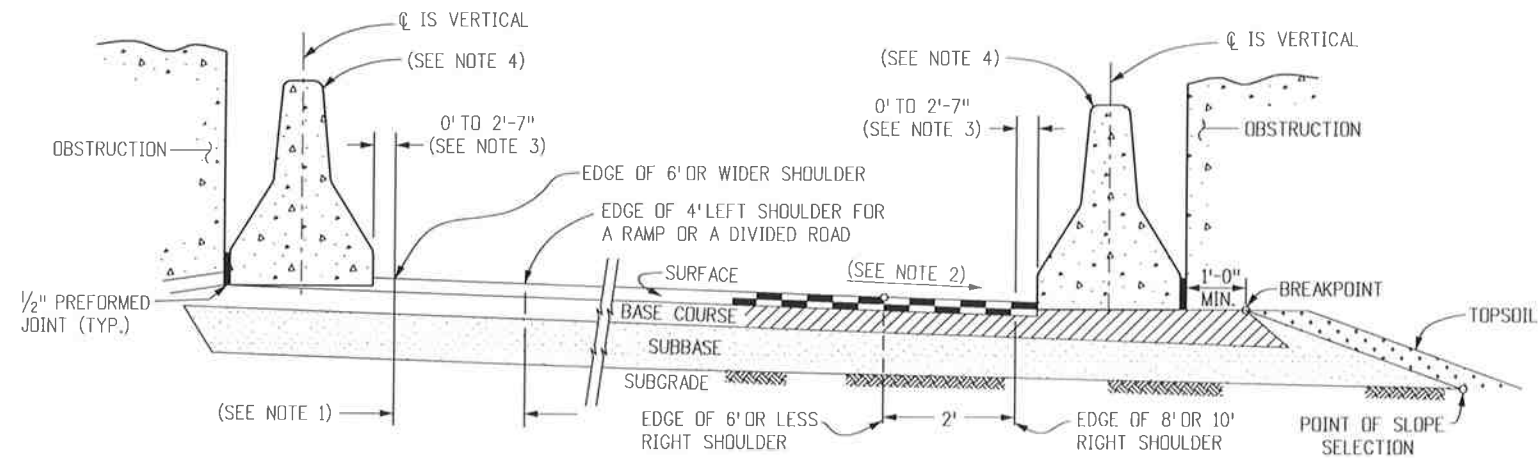
Sheet Revisions

Date:	Comments

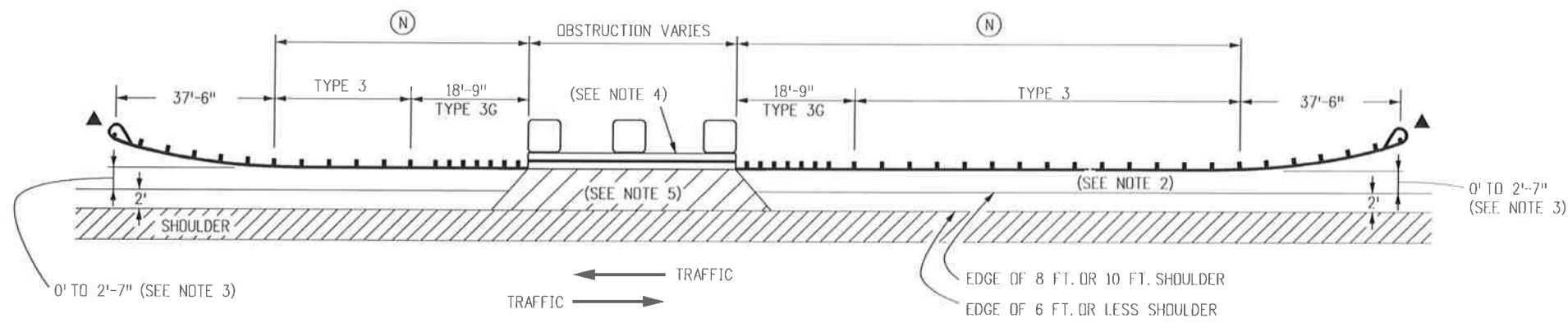
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**GUARDRAIL TYPE 7
F-SHAPE BARRIER**
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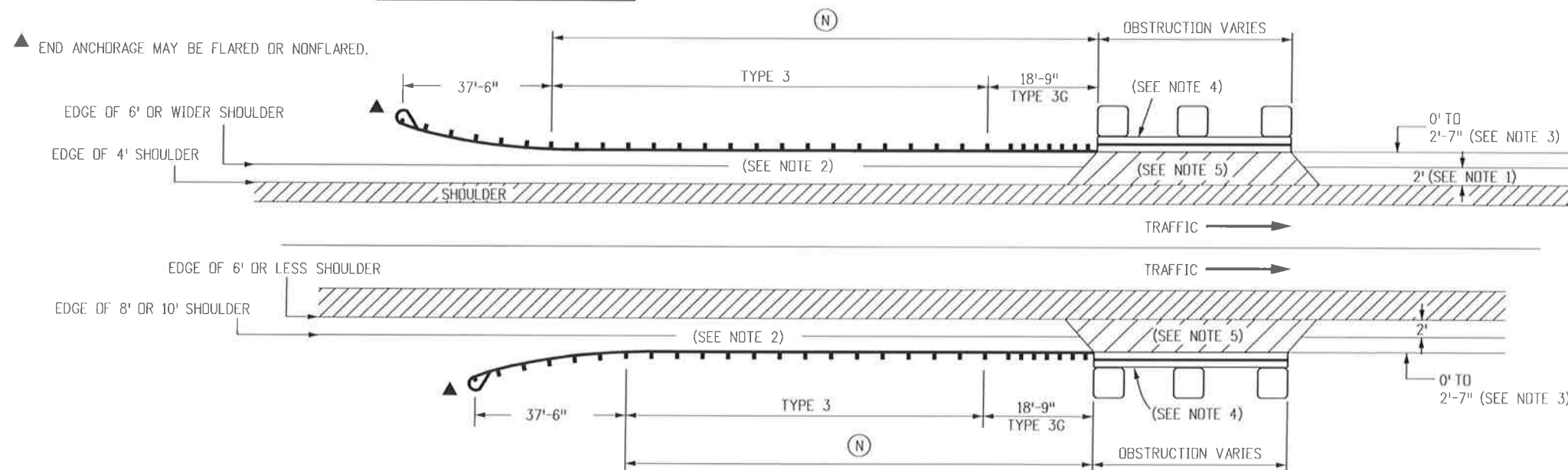
**STANDARD PLAN NO.
M-606-13
Sheet No. 3 of 4**



TYPE 7 ON LEFT AND RIGHT SHOULDERS AT OBSTRUCTIONS



2-LANE 2-WAY ROADS



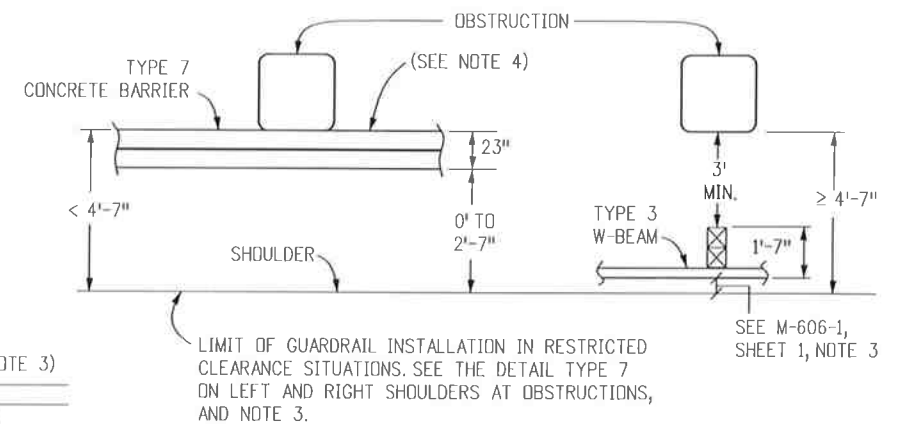
DIRECTIONAL ROADWAYS AND RAMPS

HAZARDS ON ROADSIDES

NOTES

1. TWO FT. IS DESIRABLE FOR THIS DIMENSION WITH A 4 FT. LEFT SHOULDER. THE MINIMUM IS 0 FT., WHICH IS ACCEPTABLE FOR 6 FT. OR WIDER SHOULDERS.
2. RATE OF SLOPE DEPENDS ON GUARDRAIL LOCATION:
 - A. FOR GUARDRAIL FACE 2 FT. OR LESS FROM THE NORMAL EDGE OF PAVED SHOULDER, CONTINUE THE RATE OF SLOPE OF THE NORMAL PAVED SHOULDER TO THE BREAKPOINT.
 - B. FOR GUARDRAIL FACE MORE THAN 2 FT. FROM THE NORMAL EDGE OF THE PAVED SHOULDER, THE SLOPE SHALL BE 10:1 OR FLATTER.
3. IF THE DISTANCE FROM THE EDGE OF SHOULDER TO THE OBSTRUCTION EXCEEDS 4 FT.-7 IN., TYPE 3-W BEAM GUARDRAIL MAY BE SPECIFIED ON THE PLANS INSTEAD OF TYPE 7 (SEE PLANS, AND DETAIL BELOW).
4. STYLE CA BARRIERS ARE SHOWN. STYLE CD MAY BE USED AS APPROPRIATE. SEE SHEET 2 FOR TYPE 7 TO SINGLE TYPE 3G TRANSITION.
5. THE AREA BETWEEN SHOULDER AND THE TYPE 7 SHALL BE PAVED. PAYMENT FOR THE PAVED SURFACE WILL BE MADE UNDER A PAVEMENT PAY ITEM, HMA OR CONCRETE, WITH QUANTITIES SHOWN ON THE PLANS.

(N) THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND AS SHOWN ON THE PLANS. MINIMUM SHALL BE 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW.



Computer File Information	
Creation Date: 07/04/12	Initials: DD
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Full Path: www.coloradodot.info/business/designsupport	(R-X)
Drawing File Name: 6060130404.dgn	(R-X)
CAD Ver.: MicroStation V8	(R-X)
Scale: Not to Scale	
Units: English	

Sheet Revisions	
Date:	Comments

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Project Development Branch **DD/LTA**

GUARDRAIL TYPE 7
F-SHAPE BARRIER

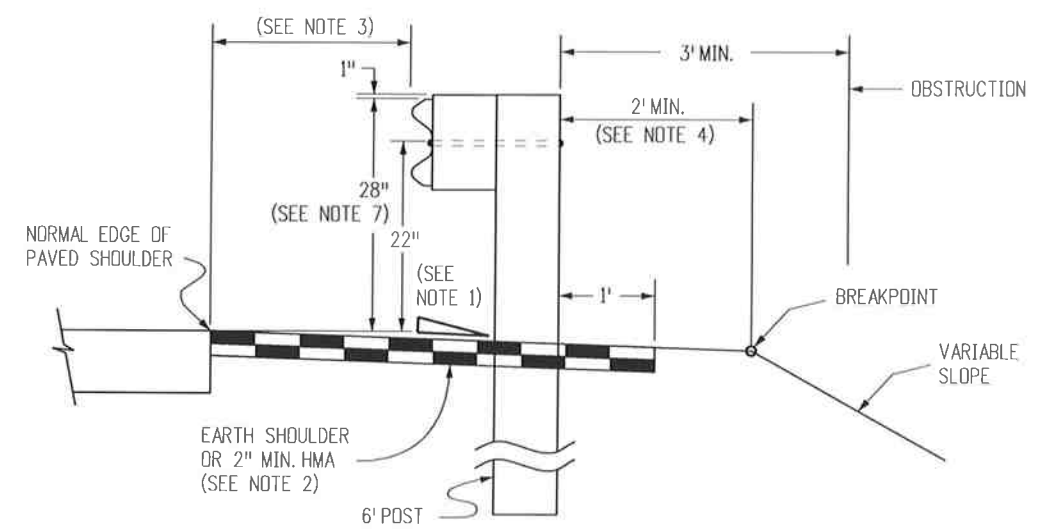
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STANDARD PLAN NO.
M-606-13
Sheet No. 4 of 4

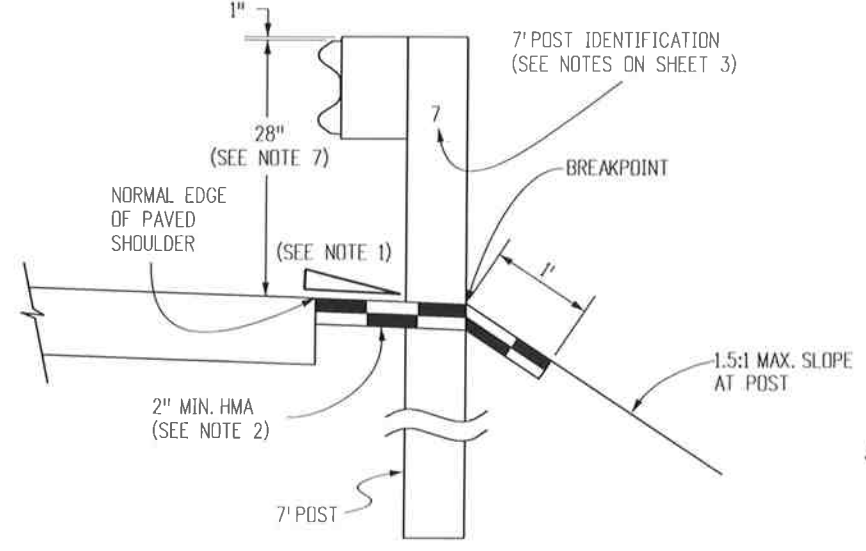
GENERAL NOTES

- RATE OF SLOPE DEPENDS ON GUARDRAIL LOCATION:
 - FOR GUARDRAIL FACE 2 FT. OR LESS FROM THE NORMAL EDGE OF PAVED SHOULDER, CONTINUE THE RATE OF SLOPE OF THE NORMAL PAVED SHOULDER TO THE BREAKPOINT.
 - FOR GUARDRAIL FACE MORE THAN 2 FT. FROM THE NORMAL EDGE OF THE PAVED SHOULDER, THE SLOPE SHALL BE 10:1 OR FLATTER.
- WHEN SPECIFIED ON THE PLANS, EXTEND A 2 IN. MINIMUM THICKNESS PAVED SURFACE TO 1 FT. BEHIND THE GUARDRAIL POSTS OR TO THE EROSION CONTROL CURB AS SHOWN ON PLANS. ASPHALT CUTTING & PATCHING OR OTHER APPROVED METHOD SHALL BE USED TO MINIMIZE DAMAGE TO ALL PAVED SURFACES UNDER GUARDRAIL INSTALLATIONS. ALL REPAIRS TO THE PAVED AREA WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK. A MINIMUM 3 IN. THICK FIBER REINFORCED CONCRETE PAVEMENT MAY ALSO BE USED FOR PAVING BENEATH THE GUARDRAIL. INSTALL THE POST IN A 1/2 IN. OVERSIZED FORMED HOLE FOR GUARDRAIL RUNS AND TERMINALS AS DIRECTED. PAYMENT FOR THIS PAVED SURFACE WILL BE MADE UNDER A PAVEMENT OR CONCRETE PAY ITEM WITH QUANTITIES SHOWN ON THE PLANS.
- THE MINIMUM GUARDRAIL OFFSET FROM PAVED SHOULDER EDGE SHALL BE:
 - 0 FT. FOR SHOULDERS 8 FT. OR WIDER
 - 2 FT. FOR SHOULDERS 6 FT. OR LESS
 THE GUARDRAIL OFFSET FROM PAVED INSIDE SHOULDER EDGE OF A DIVIDED HIGHWAY SHALL BE;
 - 0 FT. MINIMUM FOR SHOULDERS 6 FT. OR WIDER
 - 2 FT. DESIRABLE FOR 4 FT. SHOULDERS
 THE ABOVE 2 FT. GUARDRAIL TO SHOULDER OFFSET IS DESIRABLE BUT NOT REQUIRED FOR:
 - FOR AN EXISTING HIGHWAY WITH A DESIGN SPEED LESS THAN 50 MPH, THE MINIMUM OFFSET IS 4 FT. FROM THE TRAVELED WAY.
 - FOR A ONE-WAY ONE-LANE RAMP, AND WHERE ONE OR MORE OF THE FOLLOWING ARE TRUE:
 - THE NON-OFFSET GUARDRAIL BEGINS AT LEAST 100 FT. BEYOND RAMP NOSE.
 - THE NON-OFFSET GUARDRAIL IS NOT LOCATED ON THE RAMP EXIT OR ENTRANCE CURVE CONNECTION TO THE MAJOR HIGHWAY.
 - THE RAMP SHOULDERS ARE 4 FT. OR WIDER.
 USE OF GREATER THAN MINIMUM OFFSET DIMENSIONS IS ENCOURAGED TO MEET THE DESIRABLE GOAL OF PLACING THE GUARDRAIL AS FAR AS POSSIBLE FROM THE TRAVEL WAY, EVEN FOR SHORT DISTANCES, WHILE PROVIDING A SMOOTH CHANGE IN GUARDRAIL ALIGNMENT.
- IF 2 FT. CANNOT BE PROVIDED BETWEEN THE BACK OF THE GUARDRAIL POST AND THE BREAKPOINT, USE 7 FT. GUARDRAIL POSTS. REFER TO THE "RESTRICTIVE ROADSIDE INSTALLATION" DETAIL.
- WHEN SPECIFIED ON THE PLANS, INSTALL 4 IN. HIGH TYPE 6 CURB WITH ITS FACE AT OR BEHIND THE RAIL FACE. AS AN ALTERNATIVE WHEN SPECIFIED ON THE PLANS, INSTALL A 2 IN. x 6 IN. TREATED (AASHTO M 133) WOOD CURB. FASTEN WITH A 4 IN. LAG BOLT AND WASHER AT EACH WOOD POST, OR WITH A 1/4 IN. DIA. BOLT WITH WASHER AND NUT AT EACH STEEL POST. IF THE 2 IN. x 6 IN. WOOD CURB IS SPECIFIED, IT WILL BE INCLUDED IN THE COST OF THE GUARDRAIL. IF APPROVED BY THE ENGINEER, A 2 IN. x 4 IN. TREATED WOOD CURB MAY BE SUBSTITUTED FOR THE 2 IN. x 6 IN. CURB AND SET ON TOP OF PAVEMENT SURFACE AND ATTACHED AS DESCRIBED ABOVE. NO SPLICING SHALL BE ALLOWED IN WOOD CURBS. ADJACENT BOARDS SHALL BE BUTTED TOGETHER AND BOLTED AT A POST LOCATION. JOINTS SHALL BE LOCATED AT THE POSTS.
- SEE SHEET 7 FOR CURB TREATMENTS AT GUARDRAIL TERMINALS.
- RESET GUARDRAIL IF THIS DIMENSION WILL BE LESS THAN 25 IN.
- ALL W-BEAM SPLICES, AND SPLICES OF TERMINAL CONNECTORS TO W-BEAM SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC UNLESS OTHERWISE NOTED.
- MATERIAL TYPE AND SHAPE OF POSTS AND BLOCKS SHALL BE THE SAME THROUGHOUT THE PROJECT EXCEPT WHEN SPECIFIC POSTS AND BLOCKS ARE SPECIFIED, I.E. AT END ANCHORAGES AND BOX CULVERTS.
- CONCRETE MAY BE READY-MIXED OR FIELD-MIXED AND SHALL CONSIST OF A MINIMUM OF 1 PART CEMENT TO 6 PARTS AGGREGATE BY VOLUME.

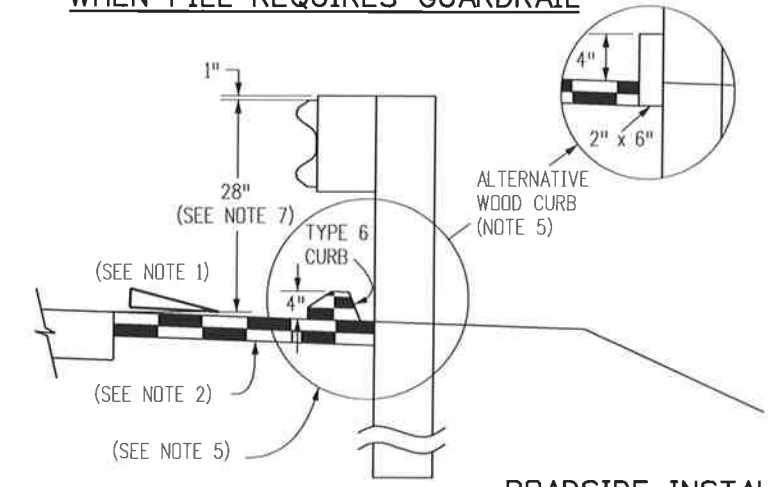
THE GENERAL NOTES ARE CONTINUED ON SHEET 2.



NORMAL ROADSIDE INSTALLATION WHEN FILL REQUIRES GUARDRAIL

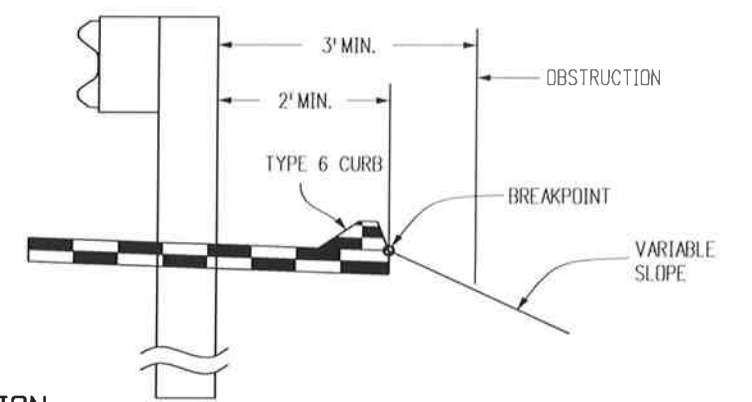


RESTRICTIVE ROADSIDE INSTALLATION WITH 7 FOOT GUARDRAIL POSTS
(SEE NOTE 4)

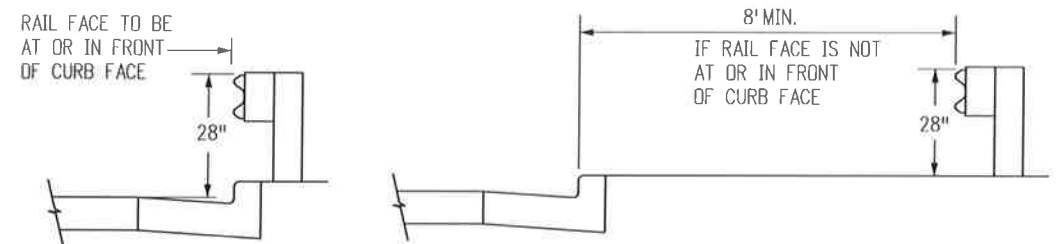


OPTION A

ROADSIDE INSTALLATION WITH EROSION CONTROL CURB



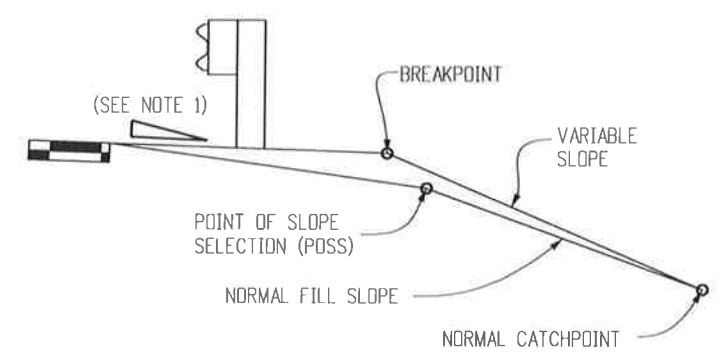
OPTION B



URBAN ROADSIDE INSTALLATION WITH CURB AND GUTTER

LOCATION	SPACING
ALL LOCATIONS EXCEPT BRIDGE RAIL LOCATIONS	6'-3"
BRIDGE OR STRUCTURE APPROACH	SEE SHEETS 12 & 20

NORMAL CENTER-TO-CENTER POST SPACING



EMBANKMENT WITH GUARDRAIL

(NOTE: THE CATCHPOINT REMAINS THE SAME AS THAT FOR "NORMAL" FILL SLOPE. FOR THE WIDER "Z" DISTANCES, THE VARIABLE SLOPE MAY "CATCH" AT THE POSS.)

Computer File Information

Creation Date: 07/04/12	Initials: DLM
Last Modification Date: 10/27/14	Initials: LTA
Full Path: www.coloradodot.info/business/designsupport	
Drawing File Name: 6010101020.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions

Date	Comments
10/09/14	Added details of the X-Lite flared and non-flared end terminations to sheets 6 and 8.
10/27/14	Removed the Et-Plus End Anchorage (non-flared) from sheet 8.

Colorado Department of Transportation

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Division of Project Support **DLM/LTA**

GUARDRAIL TYPE 3

W-BEAM

Issued By: Project Development Branch July 4, 2012

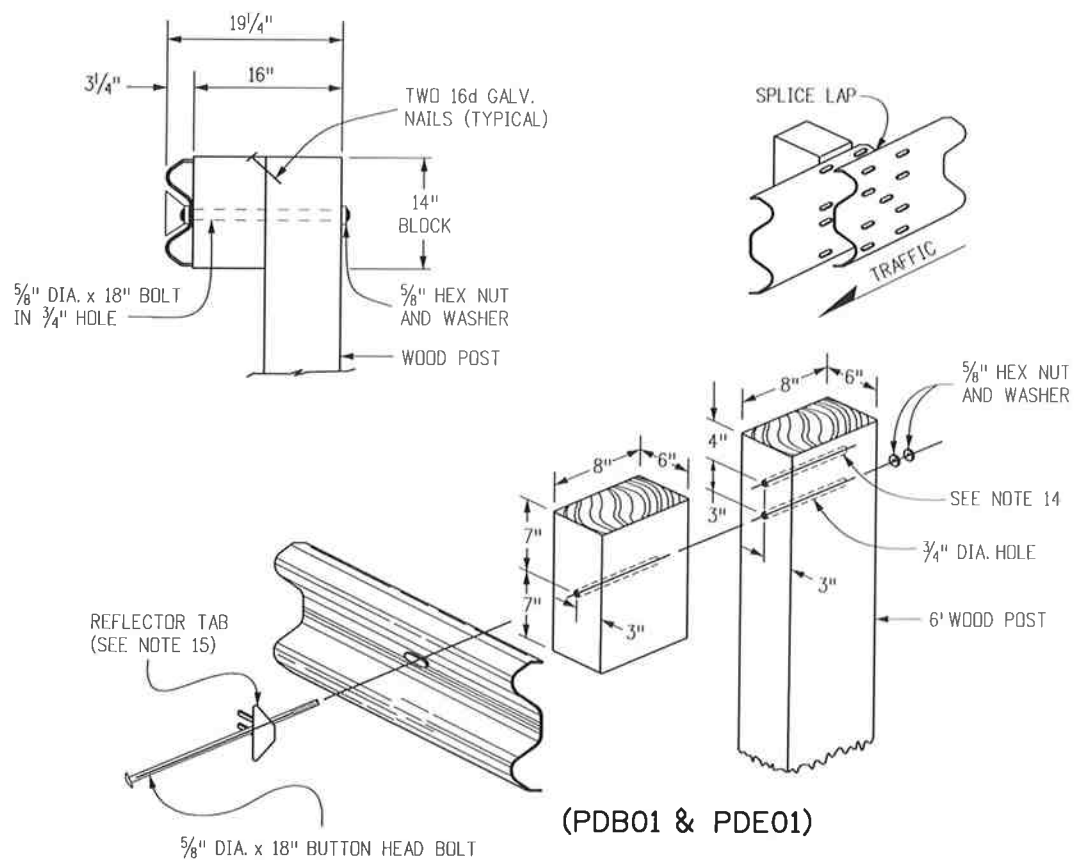
STANDARD PLAN NO.

M-606-1

Sheet No. 1 of 20

GENERAL NOTES (CONTINUED FROM SHEET 1)

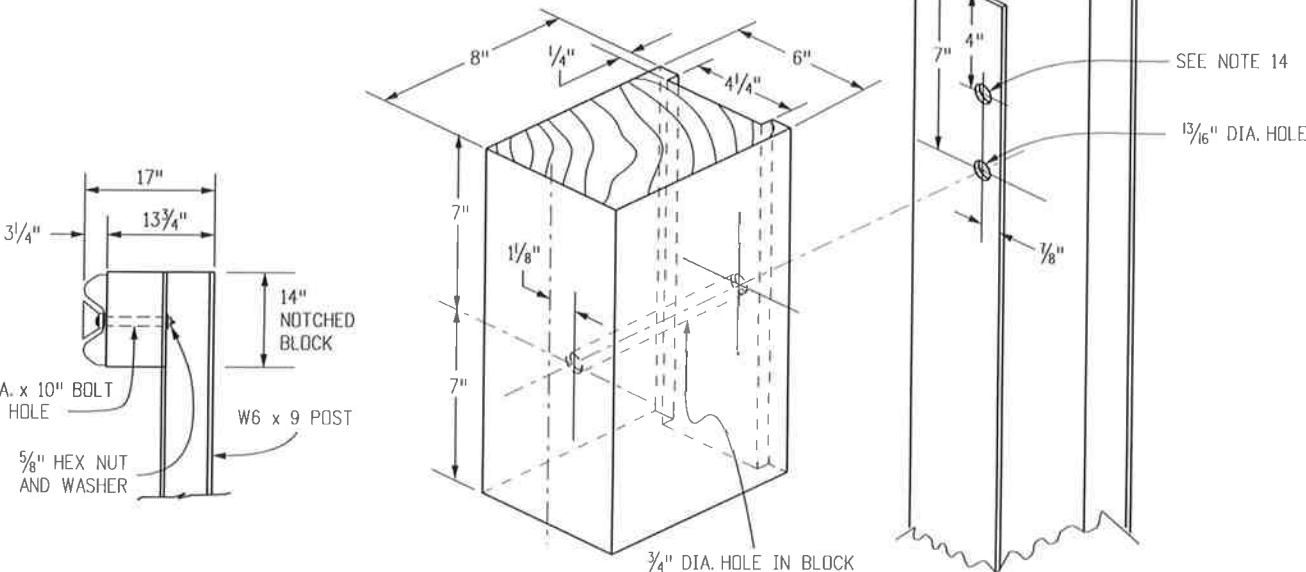
11. WHEN SPECIFIED IN THE CONTRACT, 7 FT. POSTS SHALL BE INSTALLED INSTEAD OF THE STANDARD 6 FT. POSTS. THE 7 FT. POSTS SHALL BE MARKED WITH THE NUMBER 7 TO ENSURE PERMANENT IDENTIFICATION. STEEL POSTS SHALL BE STAMPED PRIOR TO GALVANIZING. THE NUMBER 7 SHALL BE A MINIMUM 2 IN. TALL AND LOCATED AS SHOWN ON THE ELEVATION VIEW ON SHEET 1.
12. THE STANDARD 3 IN. X 1 3/4 IN. X 3/16 IN. RECTANGULAR WASHER USED UNDER POST BOLT HEADS IN THE PAST MAY REMAIN IN EXISTING INSTALLATIONS BUT SHALL NOT BE USED IN NEW CONSTRUCTION, REPAIRS, OR RESETTING OF RAIL, EXCEPT WHEN SPECIFICALLY IDENTIFIED ON THE STANDARD PLAN.
13. STANDARD GALVANIZED ROUND STEEL WASHERS SHALL BE USED UNDER ALL NUTS IN CONTACT WITH WOOD POSTS.
14. AN ADDITIONAL HOLE SHALL BE PROVIDED IN THE POSTS TO FACILITATE FUTURE RAISING OF THE RAIL ELEMENTS AND BLOCKS FOR OVERLAYS.
15. RETROREFLECTOR TABS SHALL BE INSTALLED AT 25 FT. INTERVALS (SEE SHEETS 6 AND 8 FOR EXCEPTIONS). RETROREFLECTOR TABS WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK. THE TABS SHALL BE MOUNTED SO THE BOLT SLOT FACES AWAY FROM TRAFFIC, AND THE RETROREFLECTOR SURFACE FACES THE APPROACHING TRAFFIC FOR ONE-WAY ROADS. FOR TWO-WAY ROADS, BOTH SIDES OF THE TABS SHALL BE RETROREFLECTIVE, SO THAT DELINEATION IS PROVIDED FOR BOTH DIRECTIONS OF TRAVEL. THE RETROREFLECTIVE SHEETING COLOR SHALL MATCH THE COLOR OF THE ADJACENT TRAVEL WAY EDGE LINE. SEE THE RETROREFLECTOR TAB DETAIL ON SHEET 3.
16. AT THE TIME OF INSTALLATION, WOOD POSTS OR BLOCKS WITH SEASONING CHECKS GREATER THAN 1/4 IN. SHALL NOT BE USED WHEN THE CHECK EXTENDS THE FULL LENGTH OF THE PIECE.
17. WOOD BLOCKS SHALL BE CUT FROM THE SAME CROSS-SECTION, SPECIES, AND GRADE, AND SHALL RECEIVE THE SAME PRESERVATIVE TREATMENT AS THE POSTS WHEN WOOD POSTS ARE USED.
18. REFERENCES SUCH AS 00PDB01, 00PDE01, AND 00PWE01 IN THIS STANDARD PLAN SPECIFY HARDWARE DETAILS FROM 00A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE PREPARED BY THE AASHTO-AGC-ARTBA JOINT COOPERATIVE COMMITTEE.
19. NOTCHED RAIL BLOCKS MANUFACTURED FROM SYNTHETIC MATERIAL WILL BE ACCEPTED AS ALTERNATIVES TO WOOD NOTCHED BLOCKS FOR USE WITH STEEL POSTS PROVIDED THAT THE BLOCKS HAVE RECEIVED FHWA APPROVAL AND ARE CERTIFIED AS IDENTICAL TO THE SPECIMENS USED FOR TESTING AND APPROVAL.
20. WOOD POSTS SHALL BE MADE OF TIMBER WITH AN EXTREME FIBER STRESS IN BENDING OF 1200 PSI STRESS GRADING AND POST DIMENSIONS SHALL CONFORM WITH THE RULES OF THE WEST COAST INSPECTION BUREAU, OR THE SOUTHERN PINE BUREAU, OR THE WESTERN WOOD PRODUCTS ASSOCIATION. TIMBER FOR POSTS SHALL BE EITHER ROUGH SAWN (UNPLANED) OR S4S (SURFACED FOUR SIDES) WITH NOMINAL DIMENSIONS INDICATED. ONLY ONE TYPE OF SURFACE FINISH SHALL BE USED FOR POSTS AND BLOCKS IN ANY ONE CONTINUOUS LENGTH OF GUARDRAIL.
21. GLULAM POSTS AND BLOCKS WILL BE ACCEPTED AS ALTERNATIVES PROVIDED THAT THE SUPPLIED MATERIALS HAVE RECEIVED FHWA APPROVAL AND ARE CERTIFIED AS IDENTICAL TO THE SPECIMENS USED FOR TESTING AND APPROVAL.
22. PRESSURE TREATMENT OF POSTS AND BLOCKS SHALL CONFORM TO AASHTO M 133 EXCEPT THAT BLOCKS NEED NOT BE INCISED. PRESERVATION ASSAY RETENTION REPORTS SHALL BE SUBMITTED TO THE ENGINEER. THE CONTRACTOR SHALL CERTIFY THAT THE SPECIES AND GRADE MEET THE REQUIREMENTS OF THE CONTRACT.
23. W-BEAM AND THRIE-BEAM GUARDRAIL POSTS SHALL BE MANUFACTURED USING AASHTO M 270 (ASTM A 709) GRADE 36 STEEL UNLESS CORROSION RESISTANT STEEL IS REQUIRED, IN WHICH CASE THE POST SHALL BE MANUFACTURED FROM AASHTO M 270 (ASTM A 709) GRADE 50W STEEL. THE DIMENSIONS OF THE CROSS-SECTION SHALL CONFORM TO A W6 X 9 SECTION AS DEFINED IN AASHTO M 160 (ASTM A 6). W6 X 8.5 WIDE FLANGE STEEL POSTS ARE AN ACCEPTABLE ALTERNATIVE TO THE W6 X 9.
24. AFTER THE SECTION IS CUT AND ALL HOLES ARE DRILLED OR PUNCHED THE COMPONENT SHALL BE ZINC-COATED CONFORMING TO AASHTO M 111 (ASTM A 123) UNLESS CORROSION-RESISTANT STEEL IS USED. WHEN CORROSION-RESISTANT STEEL IS USED THE PORTION OF THE POST TO BE EMBEDDED IN SOIL SHALL BE ZINC-COATED CONFORMING TO AASHTO M 111 (ASTM A 123) AND THE PORTION ABOVE THE SOIL SHALL NOT BE ZINC-COATED, PAINTED OR OTHERWISE TREATED.
25. FIELD MODIFICATION TO RAIL ELEMENTS ONLY IS ALLOWED BY SAWING AND DRILLING OF HOLES. FLAME CUTTING IS NOT PERMITTED. POSTS SHALL NOT BE MODIFIED. COMPONENTS ON WHICH THE SHELTER COATING HAS BEEN DAMAGED SHALL BE EITHER REGALVANIZED OR RECOATED IN CONFORMANCE WITH AASHTO M 36, OR PAINTED WITH ONE FULL BRUSH COAT OF ZINC RICH PAINT CONFORMING TO MILITARY SPECIFICATION DDD-P-21035A.



(PDB01 & PDE01)

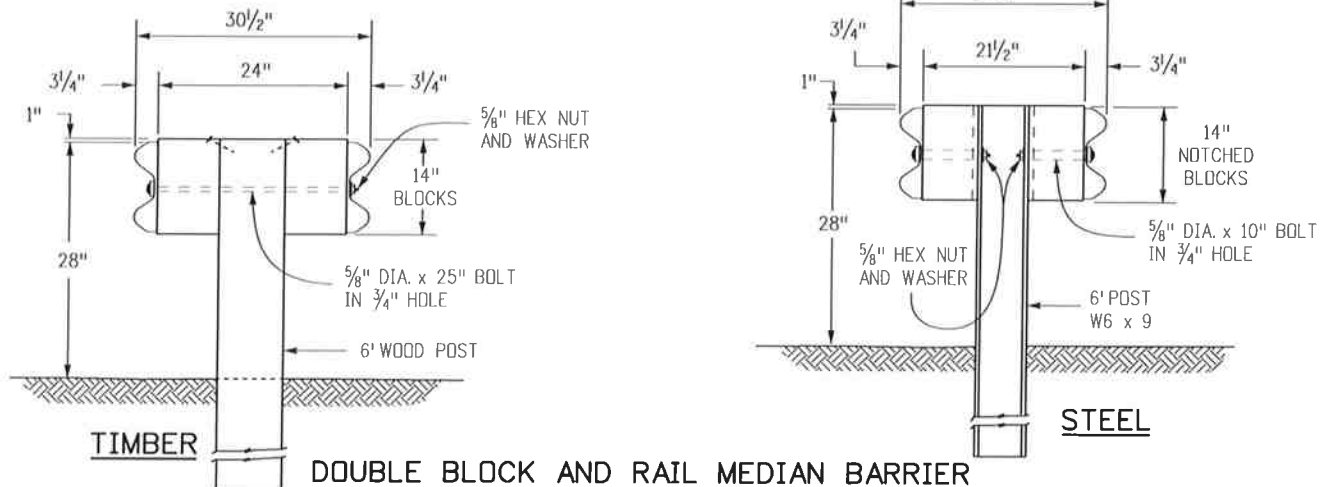
WOOD POST & BLOCK

(DIMENSIONS SHOWN ARE FOR NOMINAL 6" X 8" POSTS & BLOCKS)



STEEL POST & NOTCHED BLOCK

(NOMINAL DIMENSIONS ARE SHOWN FOR THE POSTS & BLOCKS)



DOUBLE BLOCK AND RAIL MEDIAN BARRIER GUARDRAIL TYPE 3 (DOUBLE)

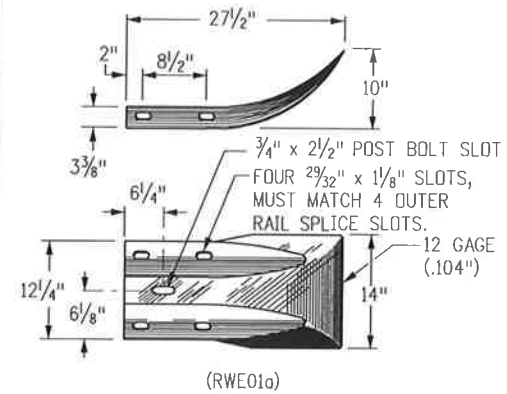
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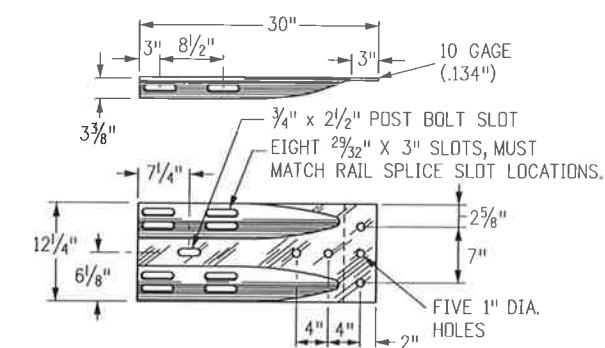
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GUARDRAIL TYPE 3
W-BEAM
 Issued By: Project Development Branch July 4, 2012

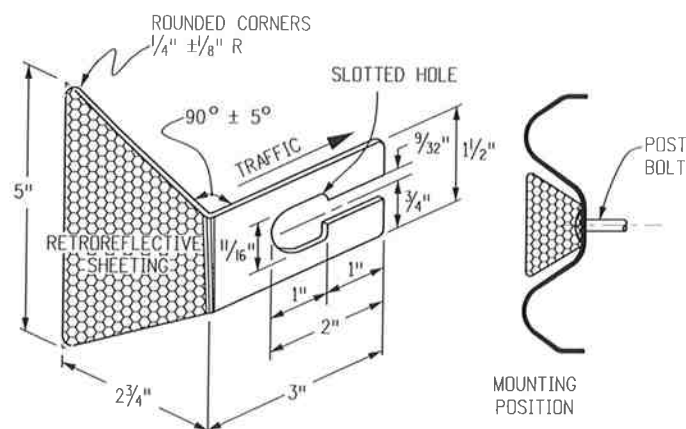
STANDARD PLAN NO.
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TERMINAL SECTION (FLARED)

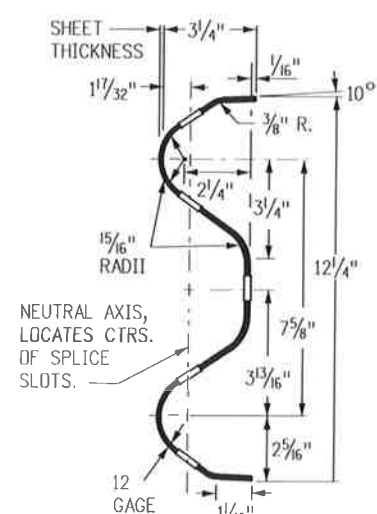


TERMINAL SECTION (CONNECTOR)

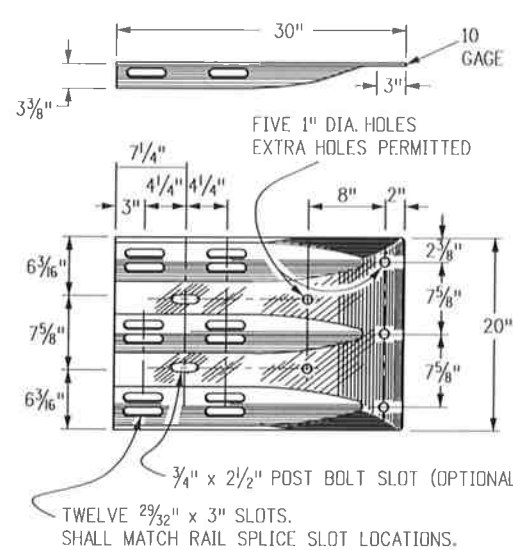


RETROREFLECTOR TAB

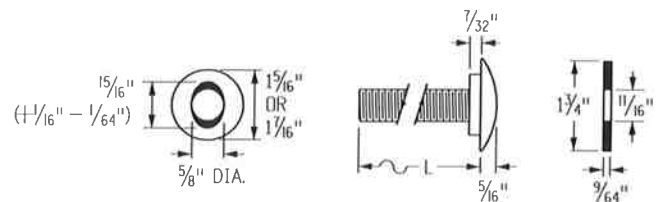
RETROREFLECTOR TABS SHALL BE MANUFACTURED FROM 12 TO 14 GAUGE STEEL. RETROREFLECTIVE SHEETING SHALL CONFORM TO ASTM D4956 TYPE III. SEE NOTE 7 ON SHEET 6.



W-BEAM RAIL SECTION



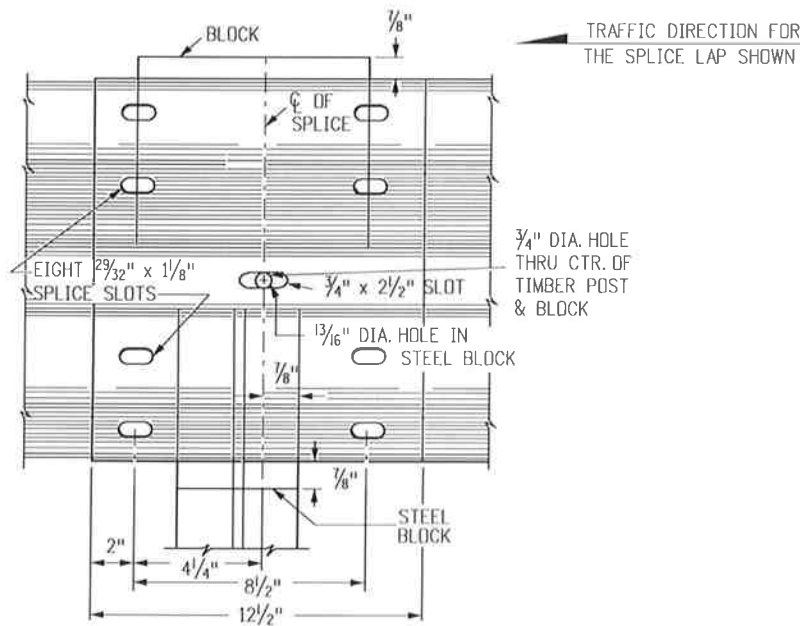
THRIE BEAM TERMINAL SECTION (CONNECTOR)



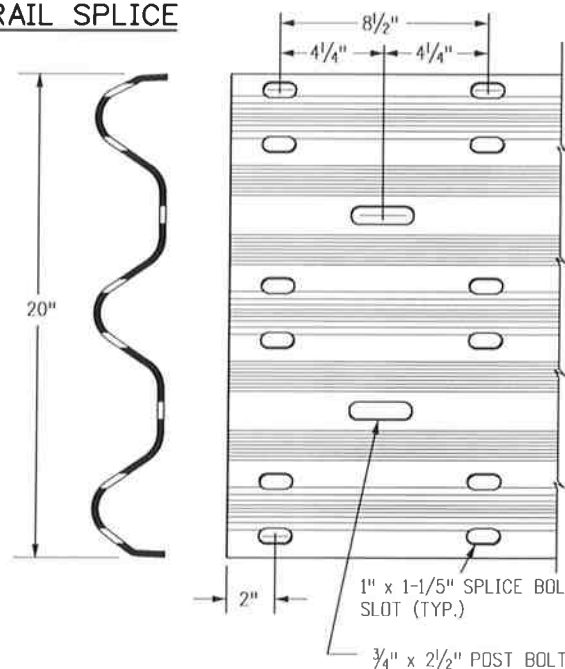
BUTTON HEAD BOLT WITH OVAL SHOULDER

WASHER

HEX NUT



RAIL SPLICE



THRIE BEAM DETAIL

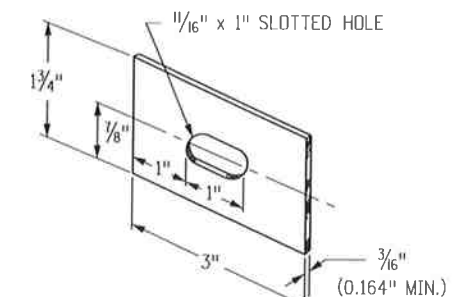
DIAMETER & TYPE (INCHES)	LENGTH L (INCHES)	THREAD LENGTH (INCHES)	INTENDED USE	AASHTO-AGC-ARTBA STANDARD NUMBER	NO. BOLTS, NUTS & WASHERS
5/8	1 1/4	FULL (1 1/2)	ALL RAIL SPLICES	FBB01	8 PER SPLICE*
BUTTON HEAD	18	MIN. 2 1/2	SINGLE BLOCK & POST (TIMBER)	FBB04	1 PER POST
OVAL	25	MIN. 2	DOUBLE BLOCK & POST (TIMBER)	FBB05	1 PER POST
SHLDR.	10	MIN. 2	FASTEN NOTCHED BLOCK TO STEEL POST	FBB03	1 PER BLOCK

* WASHERS NOT USED AT RAIL SPLICES

PART	MATERIAL SPEC.	GALVANIZING SPEC.	CORROSION-RESISTANT SPEC.
W-BEAM RAIL & TERMINAL SECTIONS	AASHTO M 180, CLASS A OR B	AASHTO M 180, TYPE 1 OR 2	AASHTO M 180, TYPE 4
BASE PLATE	ASTM A 36	AASHTO M 111	N.A.
NUTS, BOLTS & STUDS FOR GENERAL USE	ASTM A 307		AASHTO M 232, CLASS C
HIGH STRENGTH BOLTS & NUTS	ASTM A 325		OR
HIGH STRENGTH STUDS & NUTS	ASTM A 449		
ROUND STEEL WASHERS	ASTM F 436		ASTM B 695 CLASS 50 TYPE 1
RECTANGULAR WASHERS	AASHTO M 180		
OTHER FITTINGS	ASTM A 36	AASHTO M 111	

THE TABULATION OF GUARDRAIL WILL SPECIFY THE TYPE OF CORROSION PROTECTION: GALVANIZED OR CORROSION-RESISTANT STEEL.

STEEL POSTS SHALL HAVE THE SAME CORROSION PROTECTION AS SPECIFIED FOR THE METAL BEAM RAIL. PUNCHING, DRILLING, CUTTING, OR WELDING OF POSTS WILL NOT BE PERMITTED AFTER GALVANIZING.



RECTANGULAR WASHER (TO BE USED ONLY WHERE SPECIFIED.)

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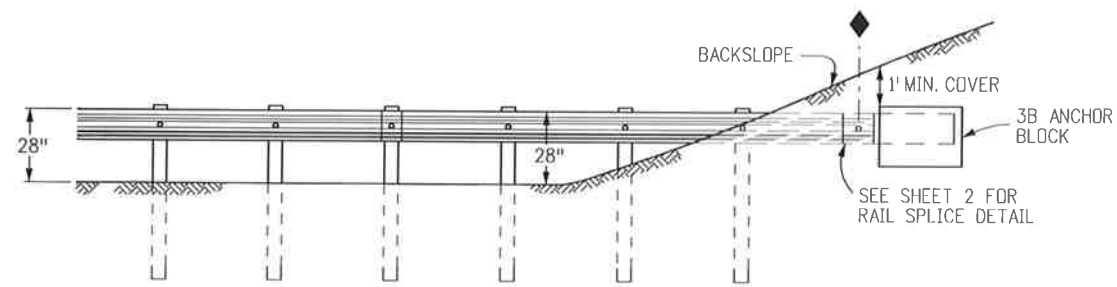
GUARDRAIL TYPE 3
 W-BEAM

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STANDARD PLAN NO.

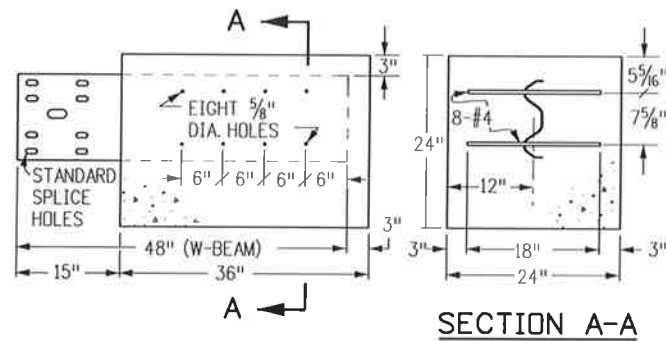
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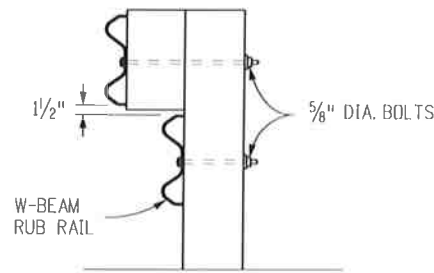


SEE TYPE 3B (RUB RAIL) PLAN VIEW FOR ALIGNMENT. THE 100 FT. FLARE LENGTH MAY BE SHORTENED IF THE SLOPE IS LESS THAN 8 FT. WIDE.

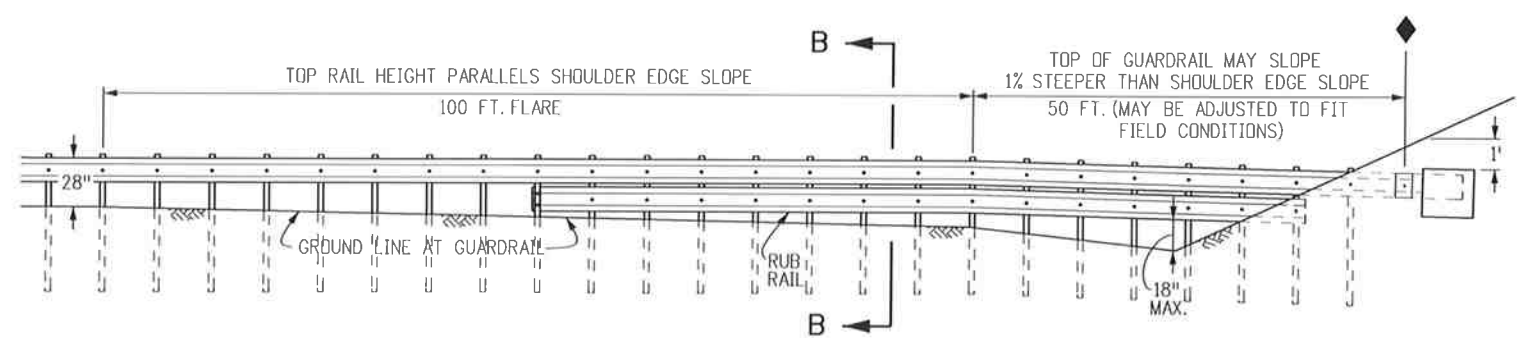
END ANCHORAGE TYPE 3B
(WITHOUT ROADSIDE DITCH AT GUARDRAIL)



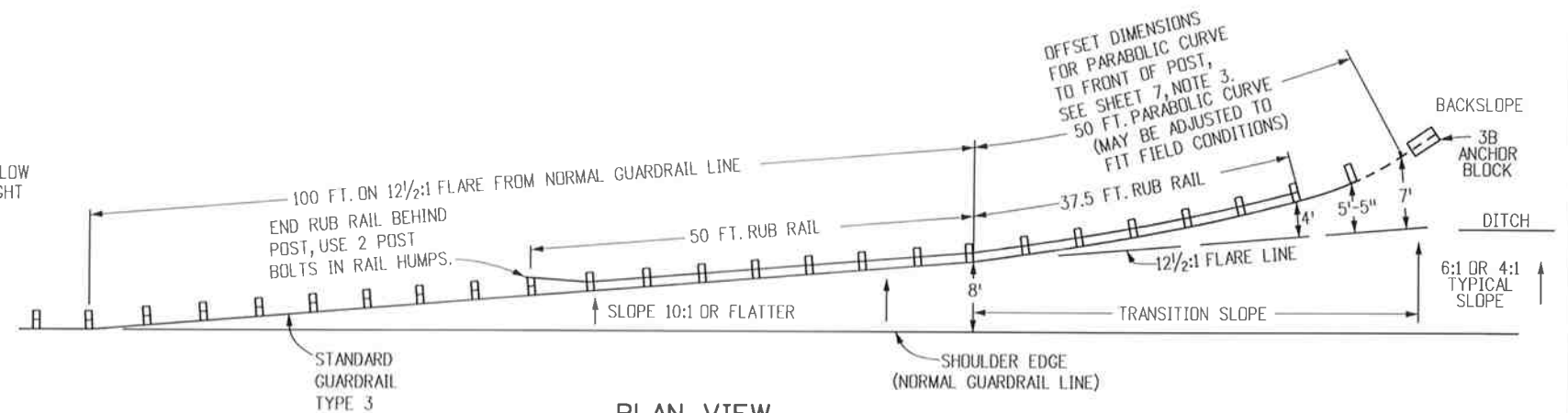
TYPE 3B ANCHOR BLOCK DETAIL



SECTION B-B
MOUNT A W-BEAM RUB RAIL 1-1/2 IN. BELOW THE TOP RAIL WHEN THE TOP RAIL HEIGHT EXCEEDS 30 IN. ABOVE THE GROUND

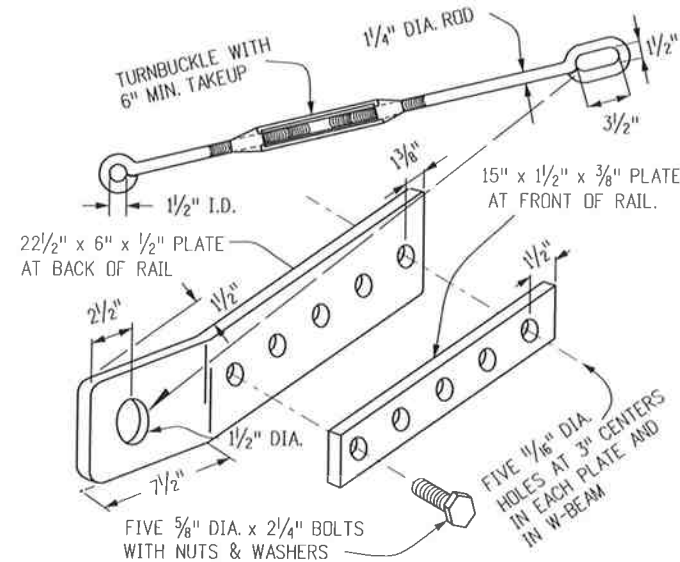


ELEVATION VIEW



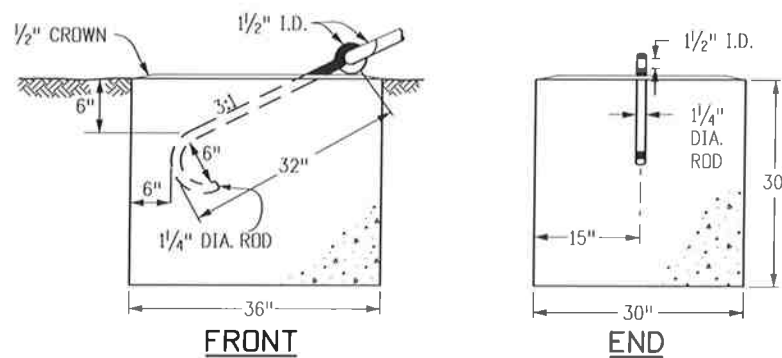
PLAN VIEW

END ANCHORAGE TYPE 3B (RUB RAIL)
(WITH ROADSIDE DITCH AT GUARDRAIL)

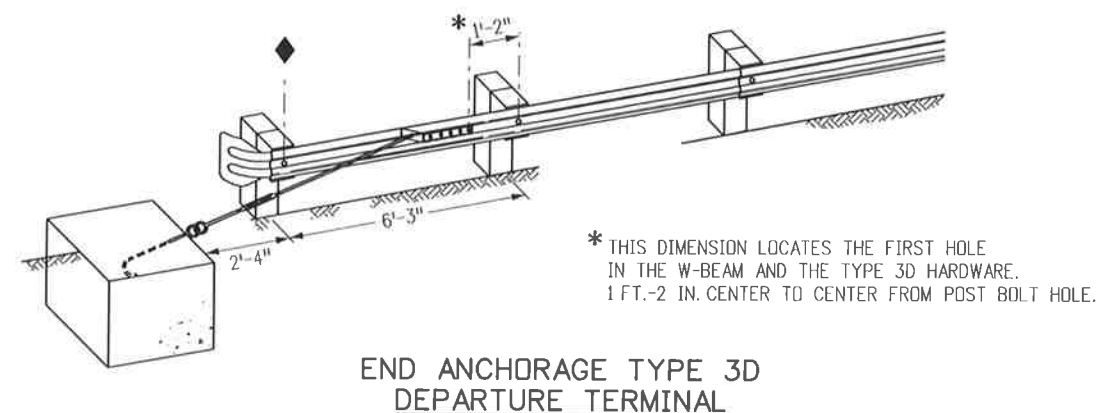


TYPE 3D HARDWARE DETAILS

NOTE: ALL PARTS SHALL BE GALVANIZED



TYPE 3D ANCHOR BLOCK DETAIL



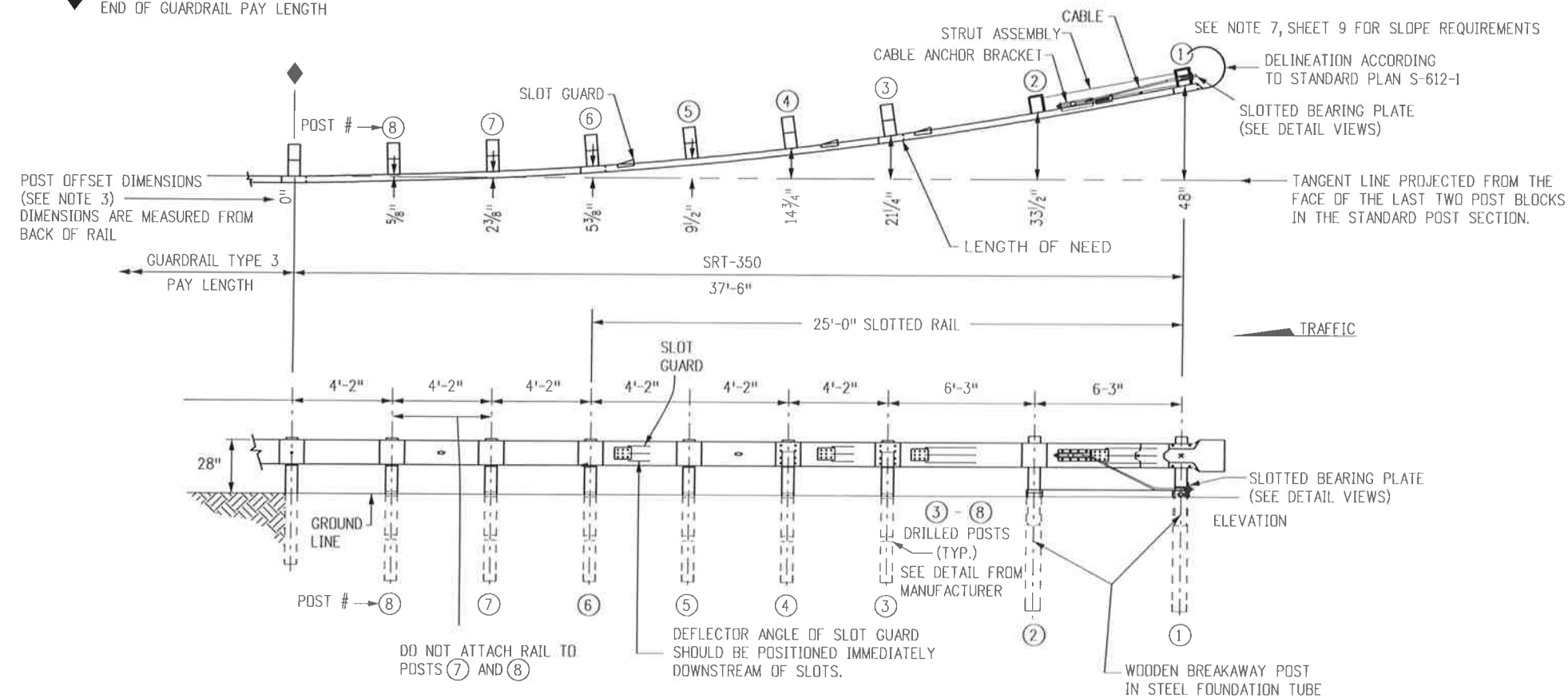
END ANCHORAGE TYPE 3D
DEPARTURE TERMINAL

* THIS DIMENSION LOCATES THE FIRST HOLE IN THE W-BEAM AND THE TYPE 3D HARDWARE. 1 FT.-2 IN. CENTER TO CENTER FROM POST BOLT HOLE.

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Creation Date: 07/04/12	Initials: DLM	Date:	Comments:			M-606-1 Sheet No. 4 of 20	
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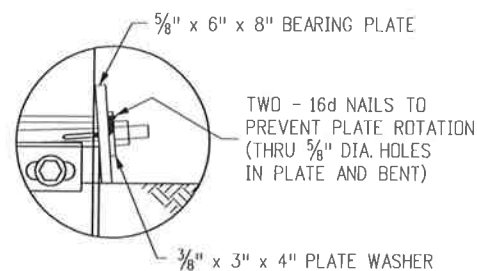
◆ END OF GUARDRAIL PAY LENGTH

NOTES FOR FLARED

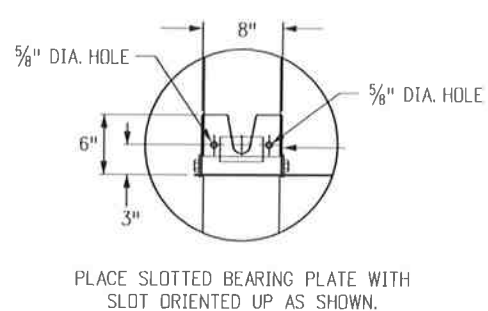


SLOTTED RAIL TERMINAL (SRT)

1. THE END ANCHORAGE (FLARED) SHALL EITHER BE THE SLOTTED RAIL TERMINAL (SRT-350), AS MANUFACTURED BY TRINITY INDUSTRIES, INC. (TELEPHONE #: 800-772-7976), THE FLEAT-350, AS MANUFACTURED BY ROAD SYSTEMS INC. (TELEPHONE #: 432-263-2435), OR THE X-LITE AS MANUFACTURED BY BARRIER SYSTEMS, INC. (TELEPHONE #: 888-800-3691). ONE END ANCHORAGE (FLARED) SHALL INCLUDE ALL POST, RAIL, AND ALL HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END ANCHORAGE (FLARES) SHALL BE INSTALLED CONFORMING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LIST TO THE ENGINEER PRIOR TO INSTALLATION OF THE DEVICE.
2. IN HEAVY SNOW LOCATIONS, TRIM POSTS (1) AND (2) FLUSH WITH RAIL TOP AND TREAT END WITH SEALANT, IN CONFORMANCE WITH AASHTO M 133.
3. THE POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE BLOCKOUTS FROM THE PROJECTED RAIL TANGENT LINE, EXCEPT AT THE FIRST TWO POSTS WHERE THE DIMENSION IS TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS SHALL BE LOCATED BY CHORD MEASUREMENTS AT THE BACK OF THE RAIL AND BE EQUAL TO THE NOMINAL POST SPACINGS SHOWN. POSTS ARE TO BE SET APPROXIMATELY RADIAL TO THE RAILING AT EACH POST LOCATION.
4. THE SRT SLOTTED BEARING PLATE SHALL BE INSTALLED WITH THE SLOT FACING UP.
5. POSTS SHALL BE DRILLED FOR BREAKAWAY ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
6. SEE SHEETS 1, 3 AND 4 FOR STANDARD GUARDRAIL TYPE 3 AND INSTALLATION DETAILS.
7. RETROREFLECTOR TABS SHALL NOT BE USED ON POSTS (1) THROUGH (8).
8. SRT PANELS SHALL BE SUPPLIED IN EITHER THREE 12 FT. - 6 IN. RAIL PANELS, OR ONE 25 FT. - 0 IN. AND ONE 12 FT. - 6 IN. RAIL PANELS.
9. SRT - STRAIGHT FLARED OPTION. SEE MANUFACTURER'S DETAILS.
10. HINGED BREAK AWAY (HBA) STEEL POSTS MAY BE USED AS AN ALTERNATIVE ON THE SRT FOR POSTS (2) THRU (8). SEE MANUFACTURER'S DETAILS.
11. HINGED BREAK AWAY (HBA) STEEL POSTS OR WELDED POSTS (PW) MAY BE USED AS AN ALTERNATIVE ON THE FLEAT FOR POSTS (3) THRU (7). SEE MANUFACTURER'S DETAILS.
12. USE MANUFACTURE'S SUPPLIED POSTS FOR X-LITE END ANCHORAGE AS FOLLOWS:
POST 1 - X-LITE, CRIMPED POST SLOTS, GALVANIZED.
POST 2 - X-LITE, POST II, GALVANIZED.
POSTS 3 THRU 6 - X-LITE, CRIMPED POST HOLES, GALVANIZED.
13. DELINEATION SHALL BE APPLIED TO THE END PIECE, AND SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.




SRT DETAIL VIEW



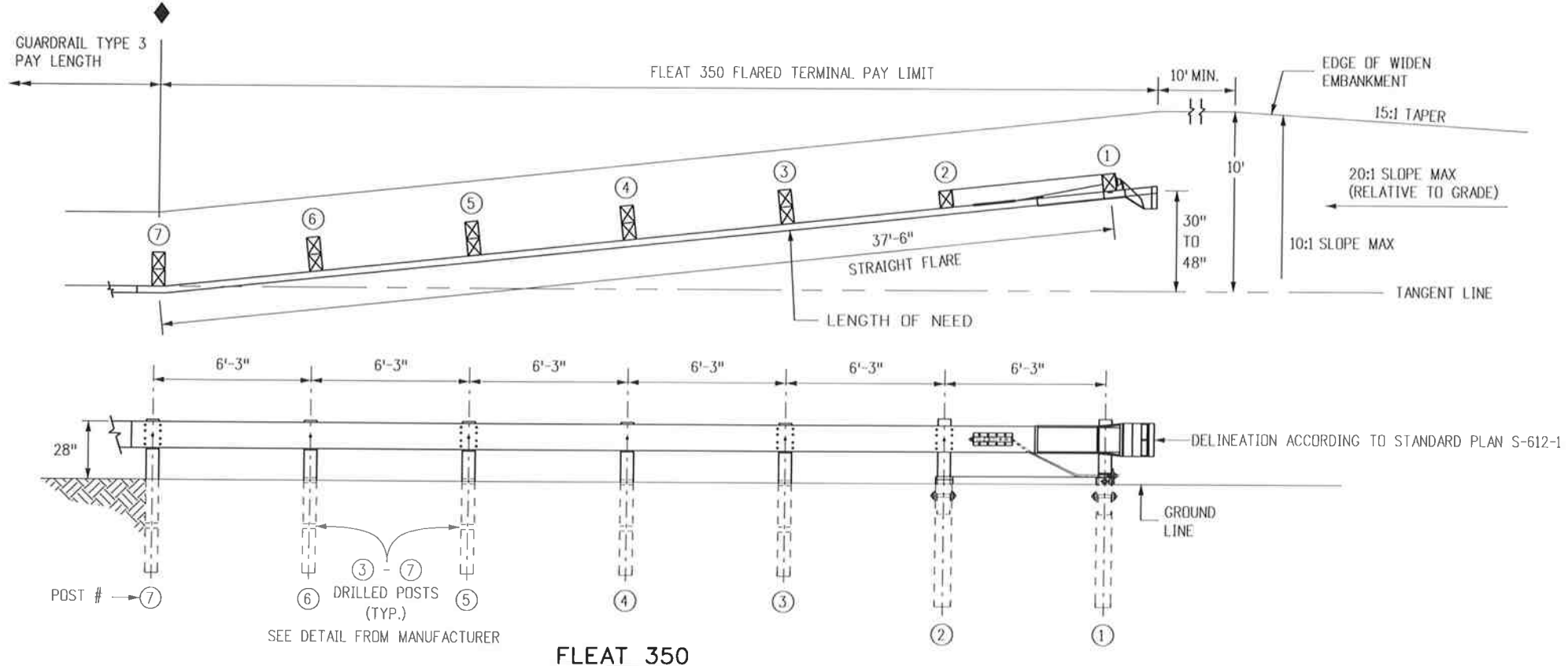
SRT FRONT VIEW

SLOTTED BEARING PLATE DETAIL

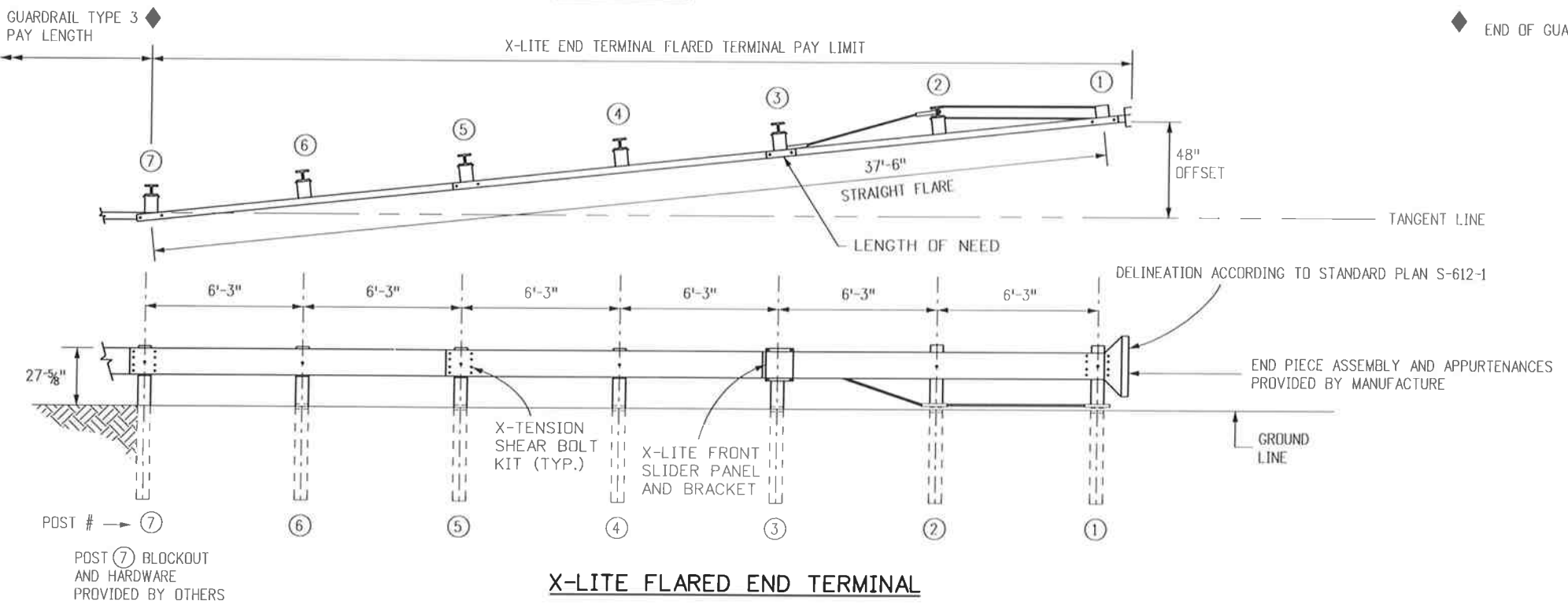
END ANCHORAGE (FLARED)

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Date:	Comments														
10/09/14	Moved FLEAT 350 To Sheet 6.														
10/09/14	Added Gen Note 12.														
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SEE M-606-1, SHEET 5 OF 20, FOR "NOTES".



FLEAT 350



X-LITE FLARED END TERMINAL

END ANCHORAGES (FLARED)

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Date	Comments
10/09/14	Added X-Lite End Terminal
10/09/14	Moved Notes to Sheet 5 of 20

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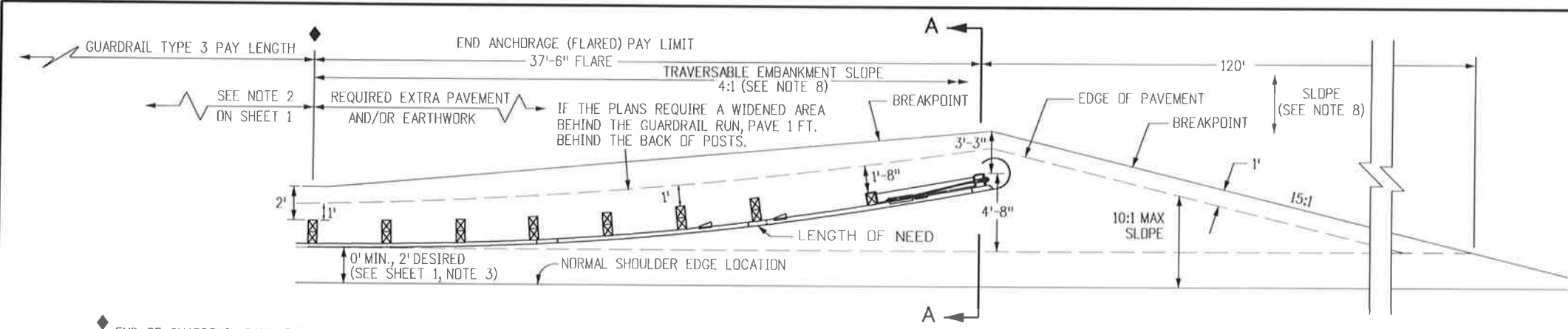
Division of Project Support DLM/LTA

GUARDRAIL TYPE 3

W-BEAM

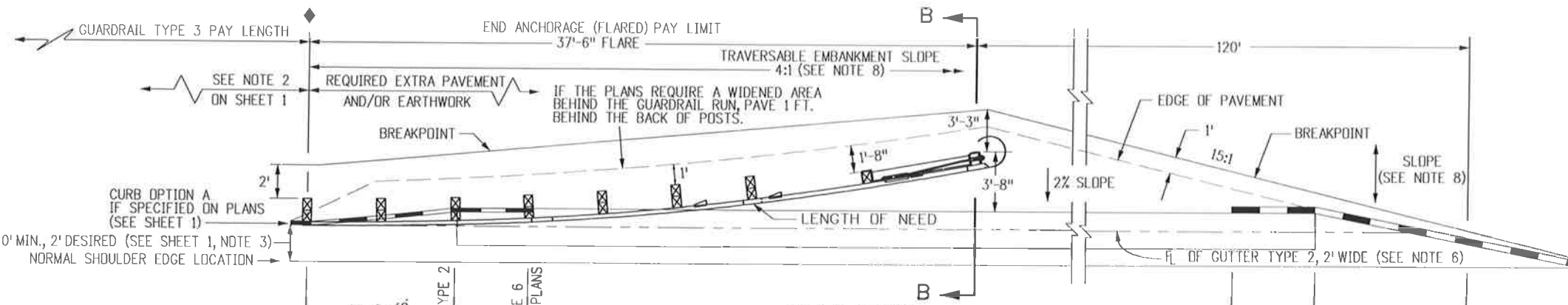
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Sheet No. 6 of 20

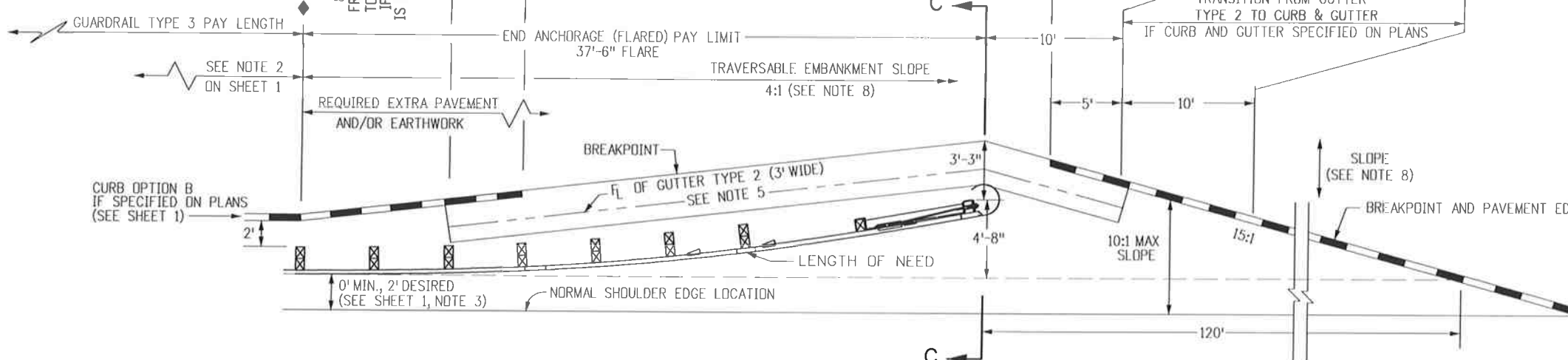


PLAN VIEW
WIDENING FOR END ANCHORAGE (FLARED) *

* THIS PLAN VIEW SHOWS ONLY THE SRT. THE FLEAT-350 USES THE SAME WIDENING DETAILS.

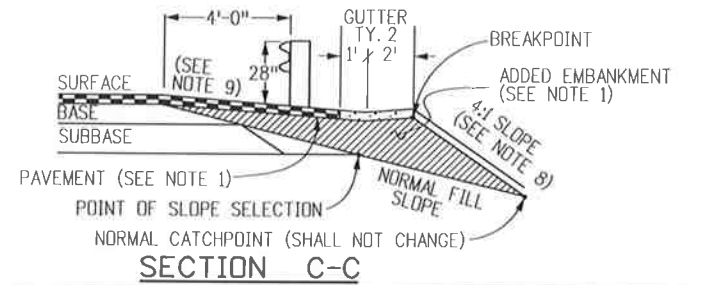
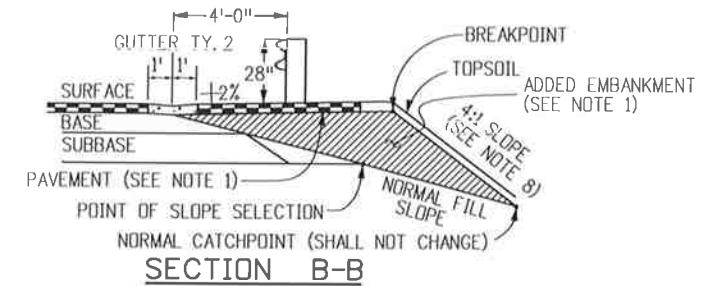
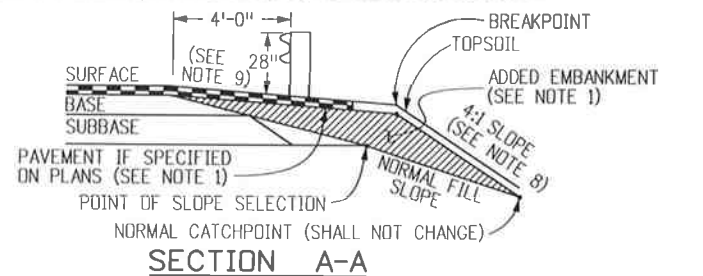


PLAN VIEW
WIDENING FOR END ANCHORAGE (FLARED)
WITH CURB OPTION A *



PLAN VIEW
WIDENING FOR END ANCHORAGE (FLARED) WITH CURB OPTION B *

- ### NOTES
- PAYMENT FOR THE ADDED EMBANKMENT (APPROXIMATELY 45 CU. YDS.) FOR THE FLARE SHALL BE AS FOLLOWS:
A. UNDER PAY ITEM 203 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 203
B. INCLUDED IN THE COST OF THE END ANCHORAGE (FLARED) WHEN THE CONTRACT PLANS DO NOT INCLUDE PAY ITEM 203. THE ADDED EMBANKMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH SUBSECTION 203.07, AASHTO T 99.
 - WHEN THE WIDENED AREA IS PAVED, PAYMENT FOR THE PAVEMENT (APPROX. 70 SQ. YDS.) SHALL BE AS FOLLOWS:
A. UNDER PAY ITEM 403 OR 412 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 403 OR 412
B. INCLUDED IN THE COST OF THE END ANCHORAGE (FLARED) WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 403 OR 412 (SEE SHEET 1, NOTE 2 FOR PAVEMENT TYPES)
 - CONCRETE PAVED AREAS SHALL HAVE THEIR TAPERED ENDS SQUARED OFF AS DIRECTED BY THE ENGINEER.
 - WHEN OVERLAY PAVING, THE FINISHED SURFACE AT EACH POST SHALL NOT BE ABOVE THE TOP BREAKAWAY HOLE OR STRUT ASSEMBLY. THE WIDENED AREA AT THE FLARED END ANCHORAGE SHOULD NOT BE OVERLAYED UNLESS PAVEMENT CONDITIONS WARRANT IT BEING OVERLAYED. ANY OVERLAY PAVEMENT ABUTTING THE FLARED END ANCHORAGE SHALL BE TAPERED TO PREVENT A DROP IN THE PAVED SURFACE BELOW THE RAIL.
 - SEE SHEETS 1, 3 AND 4 FOR STANDARD TYPE 3 GUARDRAIL AND INSTALLATION DETAILS.
 - THE COST OF THE GUTTER WILL BE PAID FOR AS "GUTTER TYPE 2 (2 FT.)" FOR A LENGTH OF 134 FT. OR "GUTTER TY. 2 (3 FT.)" FOR A LENGTH OF 40 FT.
 - INLETS OR RUNDOWNS MAY BE USED INSTEAD OF THE GUTTER IF SPECIFIED ON THE PLANS. NO ADDITIONAL CURB SHALL BE ADDED IN THE VICINITY OF THE END ANCHORAGE.
 - 4:1 OR FLATTER SLOPES IN THE TRAVERSABLE AREA SHALL BE USED BEHIND THE END ANCHORAGE, AND IN ADVANCE OF POST (1). IF THIS IS NOT POSSIBLE, A MINIMUM 3:1 SLOPE MAY BE USED IF APPROVED BY THE ENGINEER.
 - THE WIDENED AREA, EXCEPT FOR CURB OPTION A, SHALL HAVE THE SAME GRADING AS THE ADJACENT GUARDRAIL: 10:1 OR FLATTER IF MORE THAN 2 FT. FROM SHOULDER OR SLOPE EQUAL TO ROADWAY SLOPE IF 2 FT. OR LESS FROM SHOULDER.
 - WIDENING FOR END ANCHORAGES SHALL BE PAVED ON INTERSTATES AND FREEWAYS. FOR OTHER HIGHWAYS, PAVING SHALL BE AS SHOWN ON THE PLANS.



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Last Modification Date: 10/09/14	Initials: LTA
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Drawing File Name: 6060107020.dgn	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

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Date:	Comments
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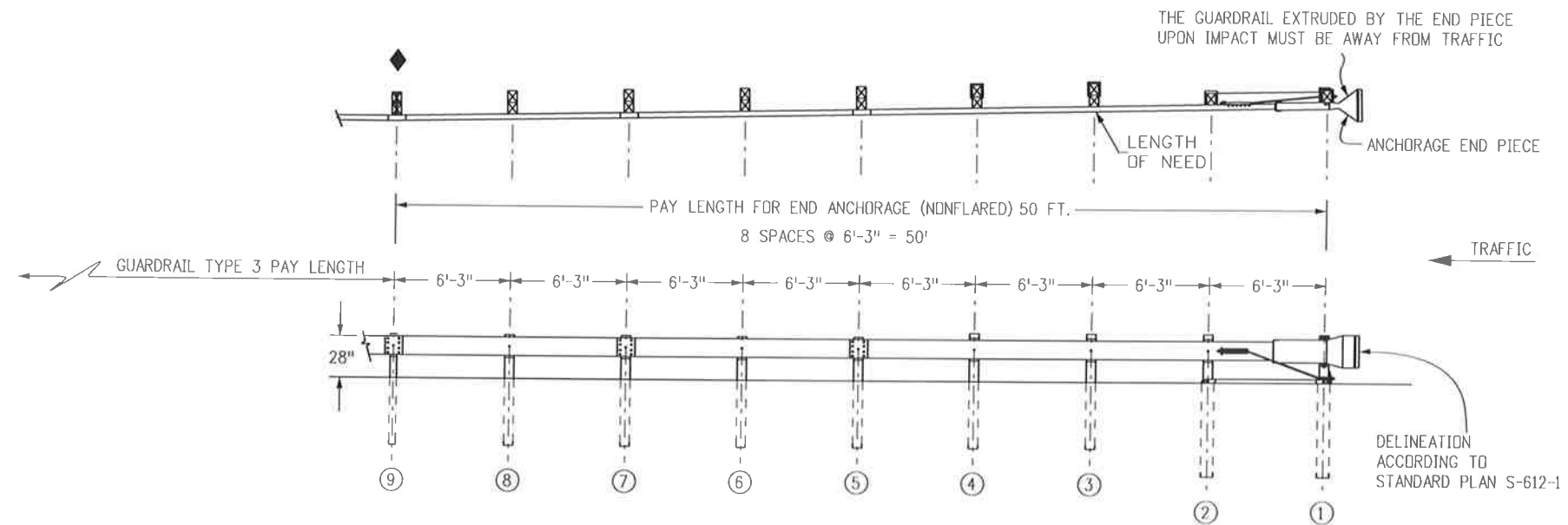
Colorado Department of Transportation
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 Denver, CO 80222
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 Division of Project Support DLM/LTA

GUARDRAIL TYPE 3
W-BEAM
 Issued By: Project Development Branch July 4, 2012

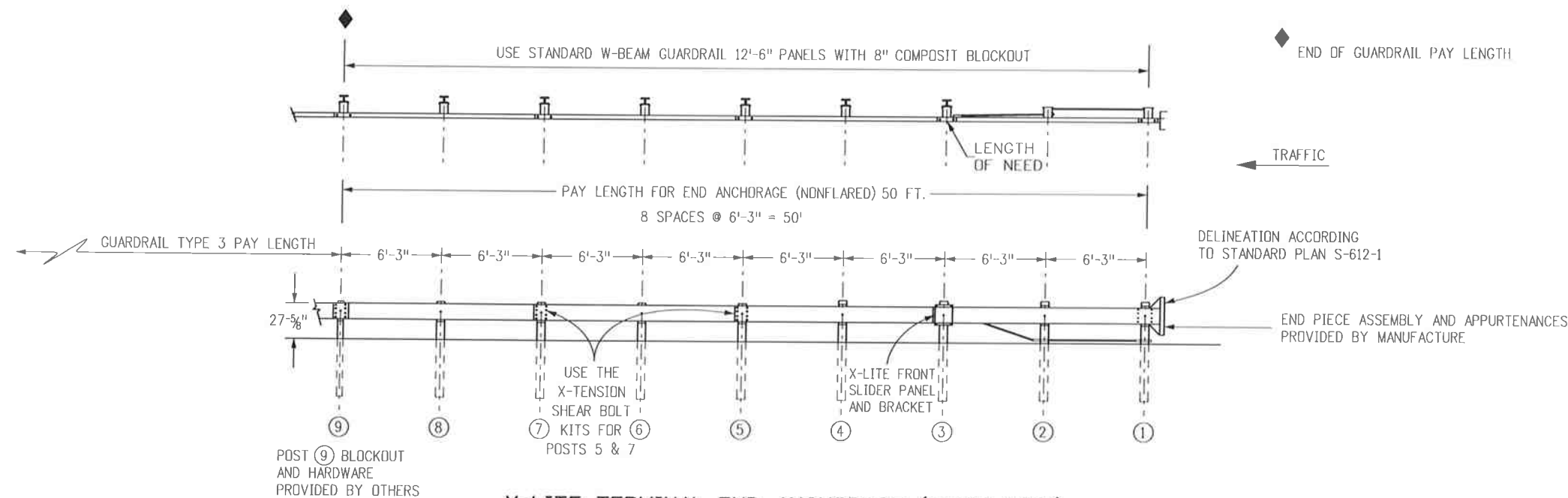
STANDARD PLAN NO.
M-606-1
 Sheet No. 7 of 20

NOTES FOR NONFLARED

1. THE END ANCHORAGE (NONFLARED) SHALL EITHER BE THE SKT GUARDRAIL AS MANUFACTURED BY ROAD SYSTEMS, INC. (TEL. #: 432-263-2435), OR THE X-LITE AS MANUFACTURED BY BARRIER SYSTEMS, INC. (TEL. #: 888-800-3691). THE END ANCHORAGE (NONFLARED) SHALL INCLUDE ALL POST, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END ANCHORAGE (NONFLARED) SHALL BE INSTALLED CONFORMING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LIST TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE DEVICE.
2. WOOD POSTS SHALL BE DRILLED FOR BREAKAWAY CONFORMING TO THE MANUFACTURER'S INSTRUCTIONS.
3. HINGED BREAK AWAY (HBA) STEEL POSTS MAY BE USED CONFORMING TO THE MANUFACTURER'S INSTRUCTIONS.
4. RETROREFLECTOR TABS SHALL NOT BE USED ON THE LAST SEVEN POSTS OF THE END ANCHORAGE (NONFLARED).
5. USE THE MANUFACTURER'S SPECIFIED STEEL FOUNDATION TUBE FOR POSTS ① AND ② FOR SKT END ANCHORAGES (NONFLARED).
6. USE THE MANUFACTURER'S SUPPLIED POSTS FOR X-LITE END ANCHORAGE AS FOLLOWS:
 POST 1 - X-LITE, CRIMPED POST SLOTS, GALVANIZED.
 POST 2 - X-LITE, POST II, GALVANIZED.
 POST 3 - X-LITE, CRIMPED POST HOLES, GALVANIZED.
 FOR POSTS 4 THRU 8 - USE STANDARD LINE POST, GALVANIZED.
7. DELINEATION SHALL BE APPLIED TO THE END PIECE AND SHALL NOT BE PAID FOR SEPARATELY BUT BE INCLUDED IN THE COST OF THE WORK. SEE STANDARD PLAN S-612-1.



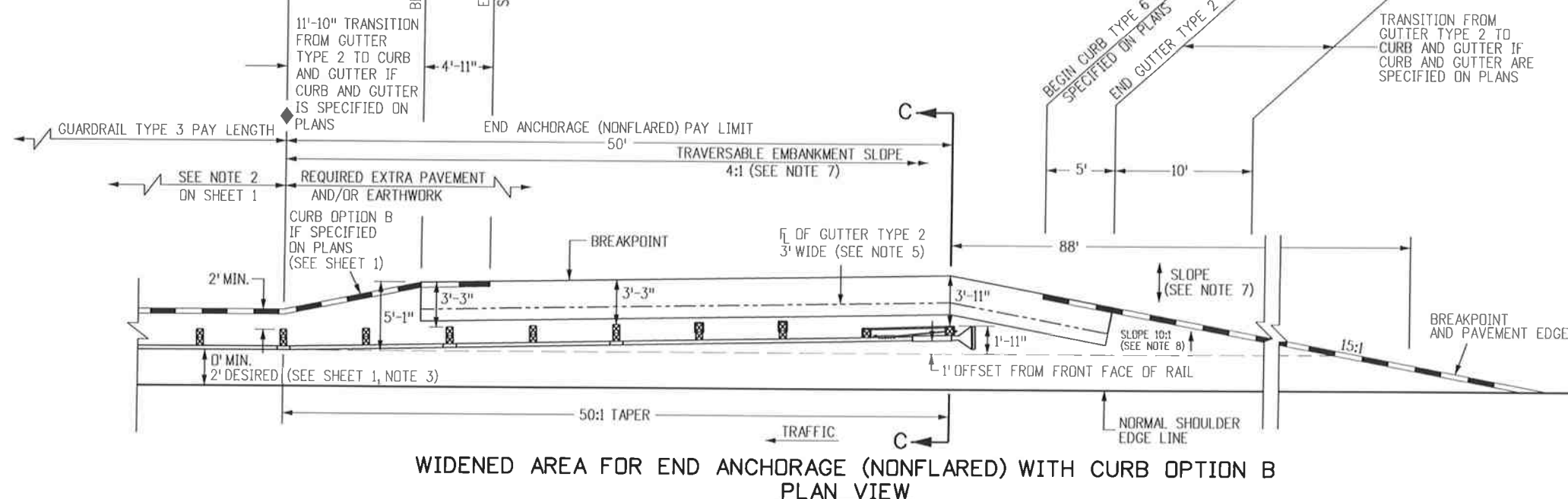
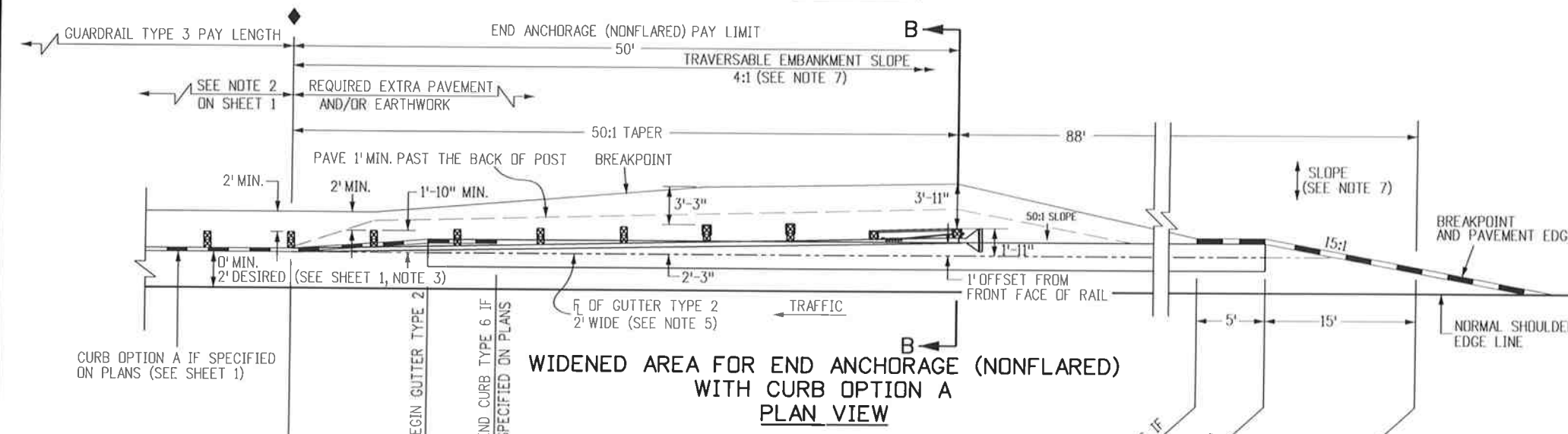
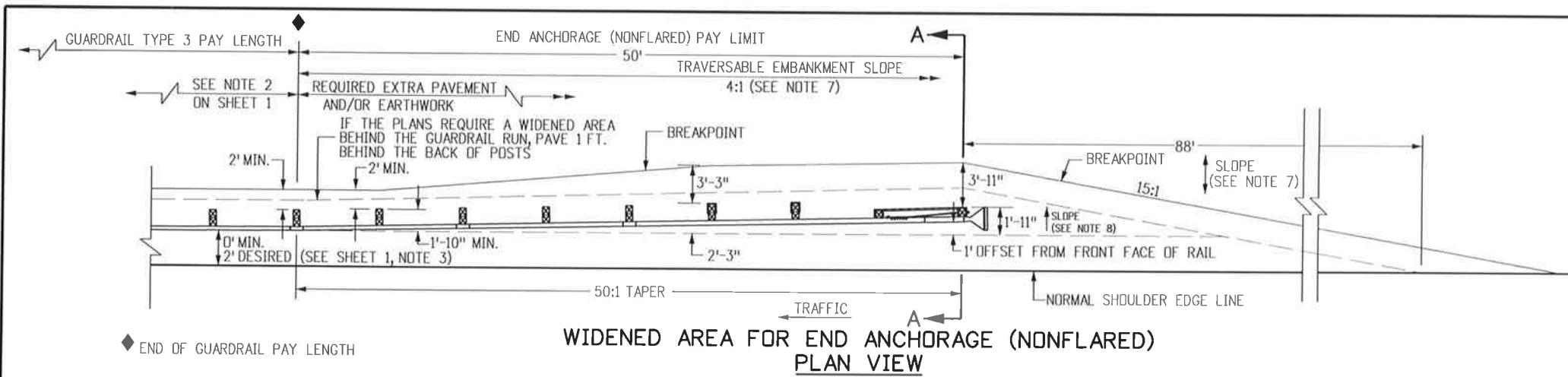
SKT END ANCHORAGE (NONFLARED)



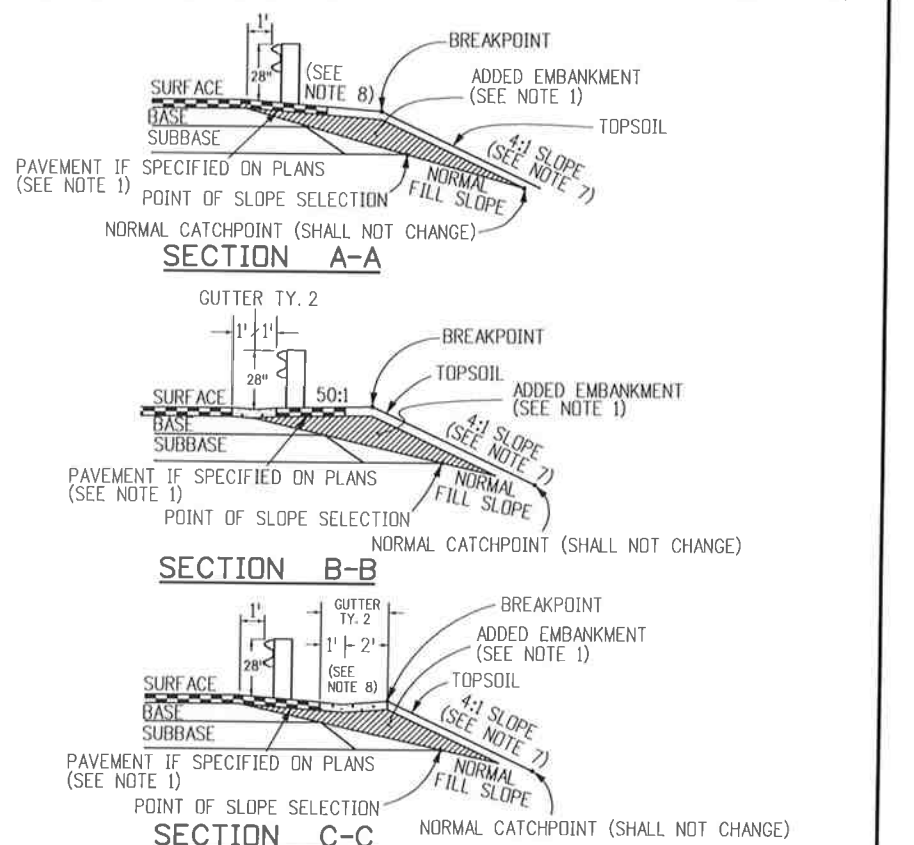
X-LITE TERMINAL END ANCHORAGE (NONFLARED)

END ANCHORAGES (NONFLARED)

Computer File Information		Sheet Revisions		Colorado Department of Transportation  4201 East Arkansas Avenue CDDT HQ, 4th Floor Denver, CO 80222 Phone: 303-757-9021 FAX: 303-757-9868 Division of Project Support	GUARDRAIL TYPE 3 W-BEAM Issued By: Project Development Branch July 4, 2012	STANDARD PLAN NO. M-606-1		
Creation Date: 07/04/12	Initials: DLM	Date:	Comments				DLM/LTA	Sheet No. 8 of 20
Last Modification Date: 10/27/14	Initials: LTA	10/09/14	Added X-Lite End Terminal					
Full Path: www.coloradodot.info/business/designsupport	(R-X)	10/09/14	Added Gen Note 6			10/27/14	Removed the ET-Plus End Anchorage (non-flared).	
Drawing File Name: 60600108020.dgn	(R-X)							
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English	(R-X)					



- ### NOTES
- PAYMENT FOR THE ADDED EMBANKMENT (APPROXIMATELY 25 CU. YDS.) FOR THE FLARE SHALL BE AS FOLLOWS:
 - UNDER PAY ITEM 203 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 203.
 - INCLUDED IN THE COST OF THE END ANCHORAGE (NONFLARED) WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 203. THE ADDED EMBANKMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH SUBSECTION 203.07, AASHTO T 99.
 - WHEN THE WIDENED AREA IS PAVED, PAYMENT FOR THE PAVEMENT (APPROX. 39 SQ. YDS.) SHALL BE AS FOLLOWS:
 - UNDER PAY ITEM 403 OR 412 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 403 OR 412.
 - INCLUDED IN THE COST OF THE END ANCHORAGE (NONFLARED) WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 403 OR 412, (SEE SHEET 1, NOTE 2 FOR PAYMENT TYPES).
 - WHEN OVERLAY PAVING, THE FINISHED SURFACE AT EACH POST SHALL NOT BE ABOVE THE TOP BREAKWAY HOLE OR STRUT ASSEMBLY. THE WIDENED AREA AT THE END ANCHORAGE (NONFLARED) SHALL NOT BE OVERLAYED UNLESS PAVEMENT CONDITIONS WARRANT IT BEING OVERLAYED. ANY OVERLAY PAVEMENT ABUTTING THE END ANCHORAGE (NONFLARED) SHALL BE TAPERED TO PREVENT A DROP IN THE PAVED SURFACE BELOW THE RAIL.
 - SEE SHEETS 1, 2 AND 3 FOR STANDARD TYPE 3 GUARDRAIL AND INSTALLATIONS DETAILS.
 - THE COST OF THE GUTTER WILL BE PAID FOR AS "GUTTER TYPE 2 (2 FT.)" FOR A LENGTH OF 111 FT., OR "GUTTER TY. 2 (3 FT.)" FOR A LENGTH OF 50 FT.
 - INLETS OR RUNDOWNS MAY BE USED INSTEAD OF THE GUTTER IF SPECIFIED ON THE PLANS. NO ADDITIONAL CURB SHALL BE ADDED IN THE VICINITY OF THE END TREATMENT.
 - 4:1 OR FLATTER SLOPES IN THE TRAVERSABLE AREA SHALL BE USED BEHIND THE END ANCHORAGE AREA, AND IN ADVANCE OF POST (1). IF THIS IS NOT POSSIBLE A MINIMUM 3:1 SLOPE MAY BE USED IF APPROVED BY THE ENGINEER.
 - THE WIDENED AREA, EXCEPT FOR CURB OPTION A, SHALL HAVE THE SAME GRADING AS BENEATH THE ADJACENT GUARDRAIL: 10:1 OR FLATTER IF MORE THAN 2 FT. FROM SHOULDER, OR SLOPE EQUAL TO ROADWAY SLOPE IF 2 FT. OR LESS FROM SHOULDER.
 - WIDENING FOR END ANCHORAGES SHALL BE PAVED ON INTERSTATES AND FREEWAYS. FOR OTHER HIGHWAYS, PAVING SHALL BE AS SHOWN ON THE PLANS.
 - HINGED BREAK AWAY (HBA) STEEL POSTS MAY BE USED. SEE MANUFACTURER'S DETAILS.



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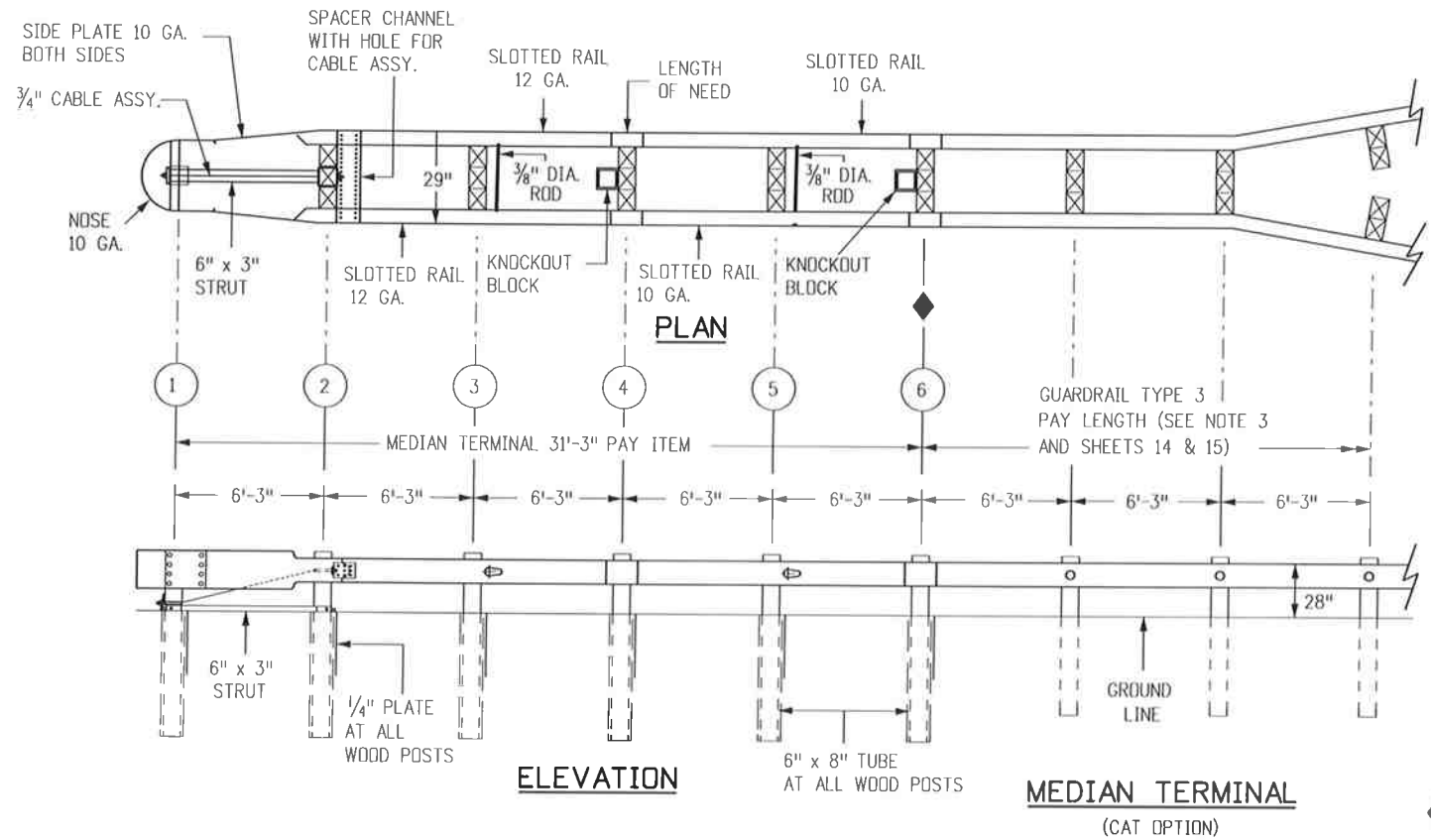
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**GUARDRAIL TYPE 3
W-BEAM**

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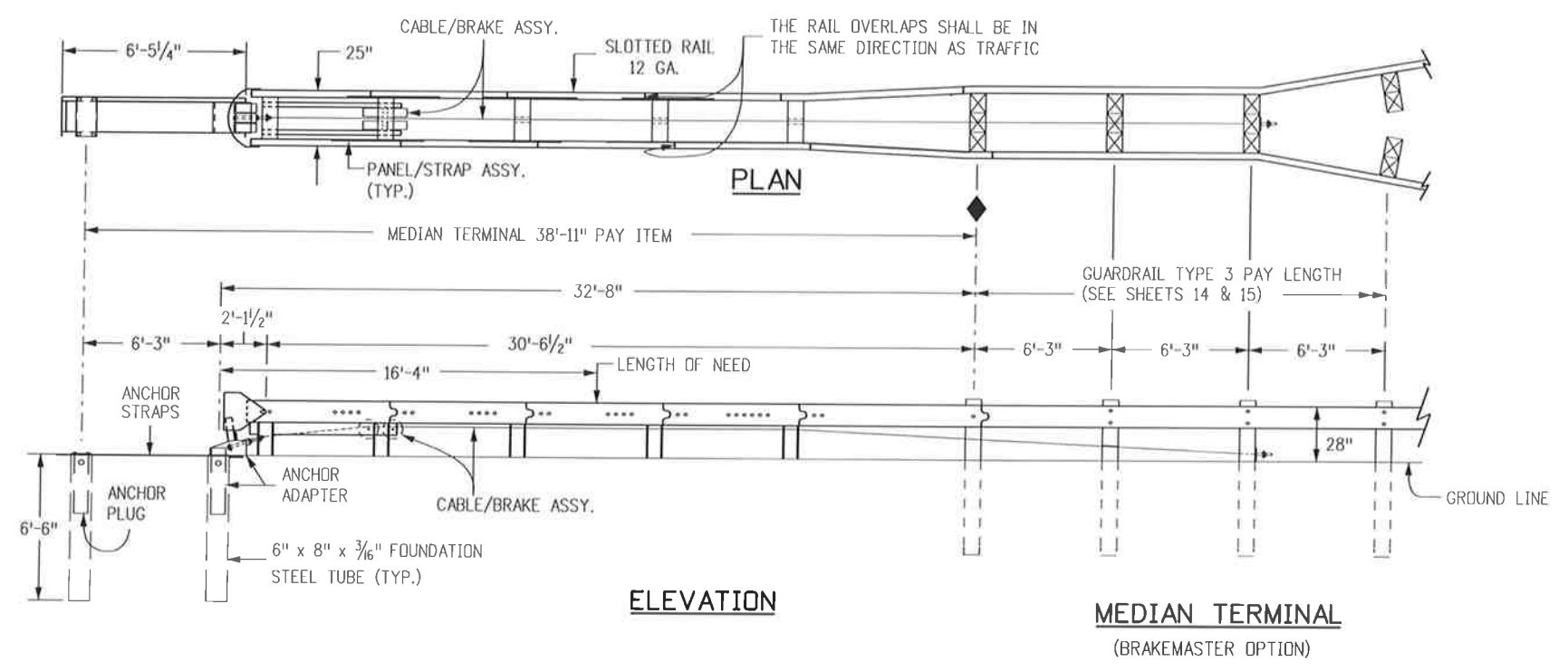
**STANDARD PLAN NO.
M-606-1**

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MEDIAN TERMINAL NOTES

1. THE MEDIAN TERMINAL SHALL BE THE CAT 350 AS MANUFACTURED BY TRINITY INDUSTRIES INC. (TEL #: 800-722-7976), OR THE BRAKEMASTER AS MANUFACTURED BY ENERGY ABSORPTION SYSTEMS, INC. AS DISTRIBUTED BY INTERWEST SAFETY SUPPLY (TEL #: 303-733-8447), OR THE FLEAT-MT MEDIAN TERMINAL AS MANUFACTURED BY ROAD SYSTEM INC. (TEL. #: 432-263-2435).
2. ONE MEDIAN TERMINAL SHALL INCLUDE ALL POSTS, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE DEVICE SHALL BE INSTALLED IN CONFORMANCE WITH THE MANUFACTURER'S INSTRUCTIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LISTS TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE DEVICE.
3. UNLESS OTHERWISE SPECIFIED ON THE PLANS, THE MEDIAN TERMINAL SHALL BE INSTALLED FOR BIDIRECTIONAL TRAFFIC APPLICATION.
4. MEDIAN GUARDRAIL POSTS MAY BE STEEL OR WOOD.
5. EACH INSTALLATION SHALL BE SUPERVISED AND CERTIFIED AS CORRECT UPON COMPLETION BY A REPRESENTATIVE OF THE DEVICE MANUFACTURER OR BY AN EMPLOYEE OF THE CONTRACTOR WHO IS A CERTIFIED INSTALLER. THE CERTIFIED INSTALLER SHALL HAVE COMPLETED DEVICE TRAINING AND SHALL BE REGISTERED WITH THE MANUFACTURER AS A CERTIFIED INSTALLER.
6. DELINEATION, IF REQUIRED, SHALL BE APPLIED TO THE END PIECE AND WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK. SEE STANDARD PLAN S-612-1.



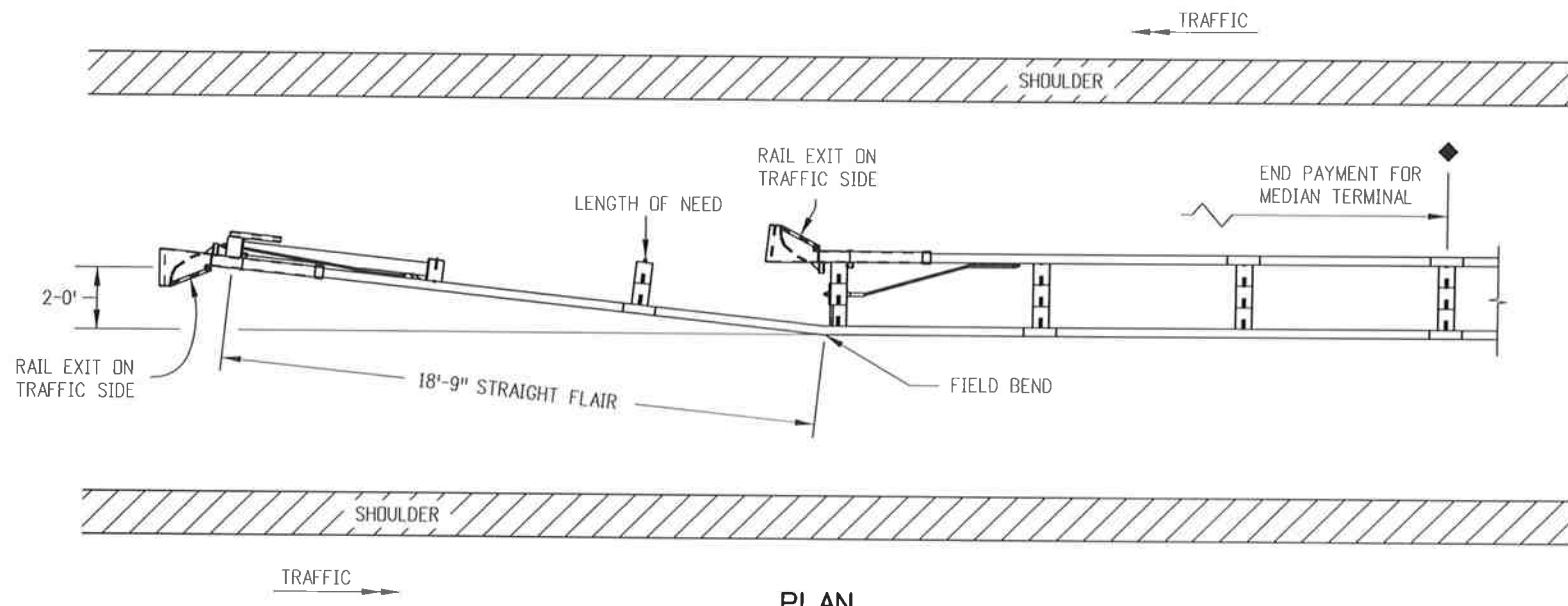
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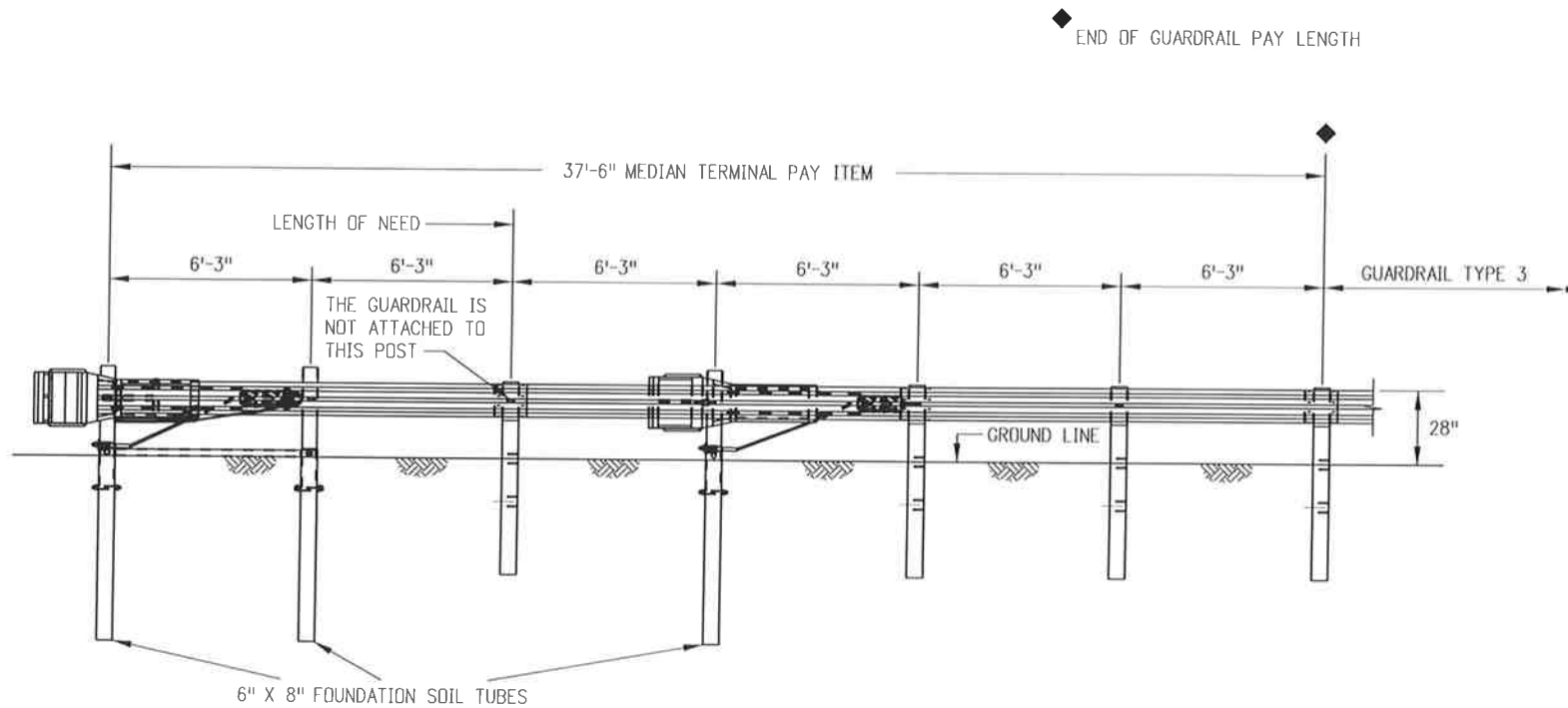
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**GUARDRAIL TYPE 3
 W-BEAM**
 Issued By: Project Development Branch July 4, 2012

**STANDARD PLAN NO.
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PLAN



ELEVATION

MEDIAN TERMINAL
(FLEAT-MT OPTION)

FLEAT- MT NOTES

1. THE FLEAT-MT MAY BE SELECTED AS A MEDIAN TERMINAL UNLESS OTHERWISE SHOWN IN THE PLANS.
2. BREAKAWAY POSTS ARE REQUIRED WITH THE FLEAT-MT.
3. THE SOIL TUBES SHALL NOT PROTRUDE MORE THAN 4 INCHES ABOVE GROUND (MEASURED ALONG A 5 FEET CORD). SITE GRADING MAY BE NECESSARY TO MEET THIS REQUIREMENT.
4. THE SOIL TUBES SHALL BE DRIVEN WITH AN APPROVED DRIVING HEAD AND NOT BE DRIVEN WITH THE POST IN THE TUBE. IF THE TUBES ARE PLACED IN DRILLED HOLES, THE BACKFILL MATERIAL MUST BE SATISFACTORILY COMPACTED TO PREVENT SETTLEMENT.
5. WHEN ROCK IS ENCOUNTERED DURING EXCAVATION, A 12 INCH DIA. POST HOLE, 20 INCH DEEP MAY BE USED IF APPROVED BY THE ENGINEER. GRANULAR MATERIAL SHALL BE PLACED IN THE BOTTOM OF THE HOLE APPROX. 2 1/2 INCH DEEP TO PROVIDE DRAINAGE. THE SOIL TUBES SHALL BE FIELD CUT TO LENGTH, PLACED IN THE HOLE AND BACKFILLED WITH ADEQUATELY COMPACTED MATERIAL EXCAVATED FROM THE HOLE.
6. THE BREAKAWAY CABLE ASSEMBLY MUST BE TAUT. DO NOT TWIST THE CABLE WHEN TIGHTENING NUTS.

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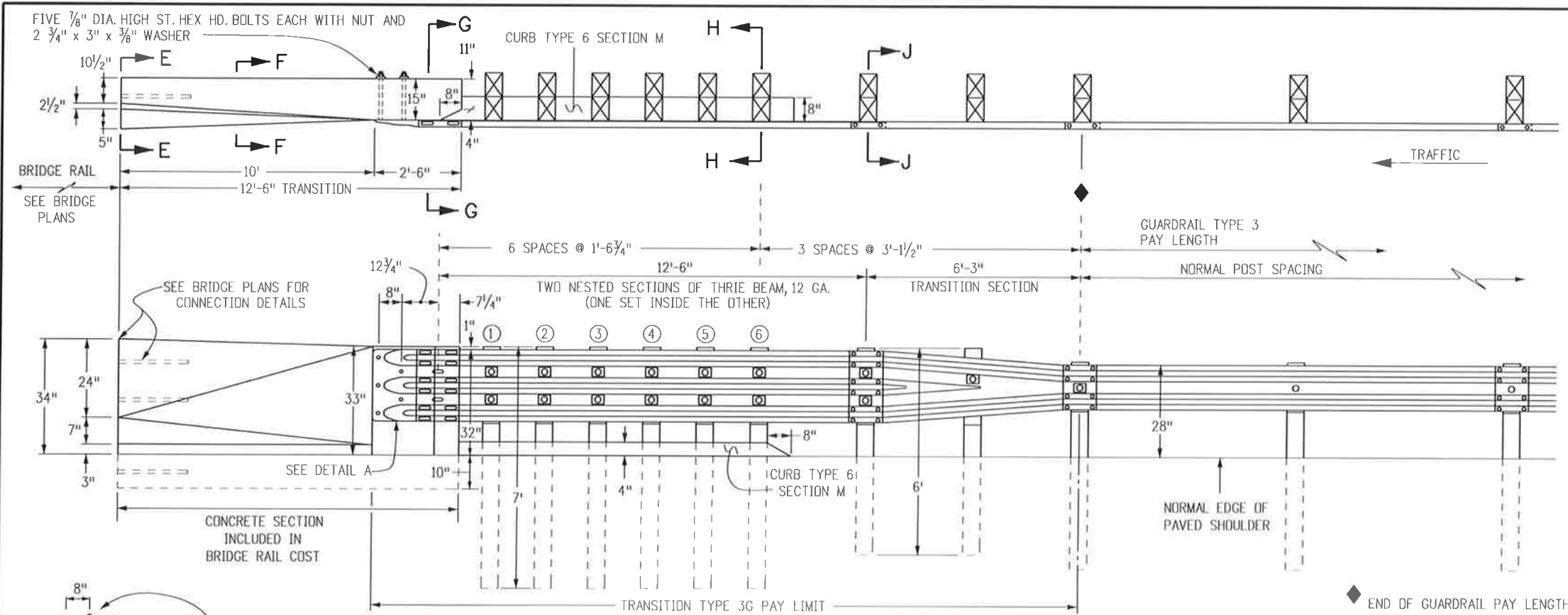
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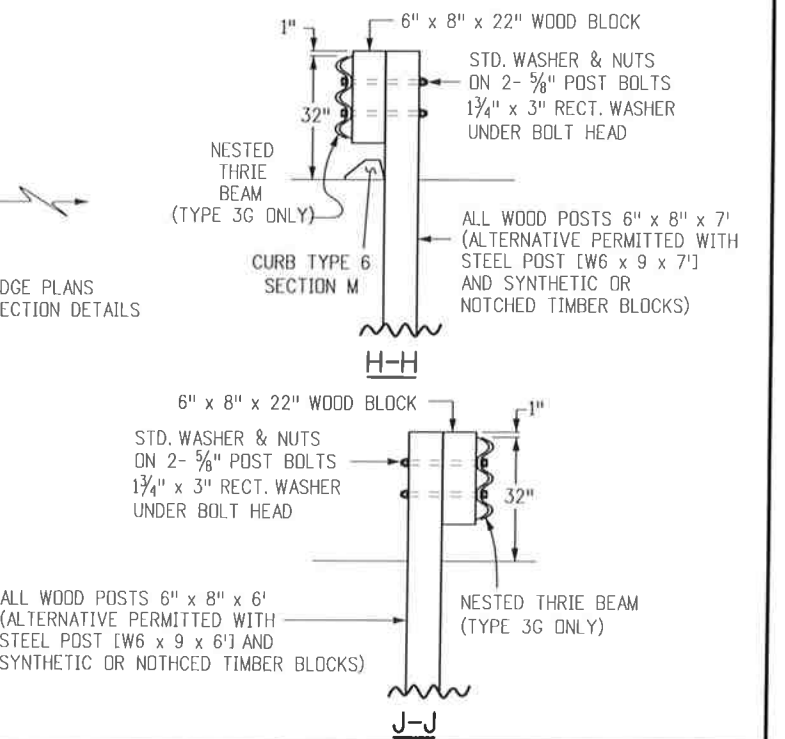
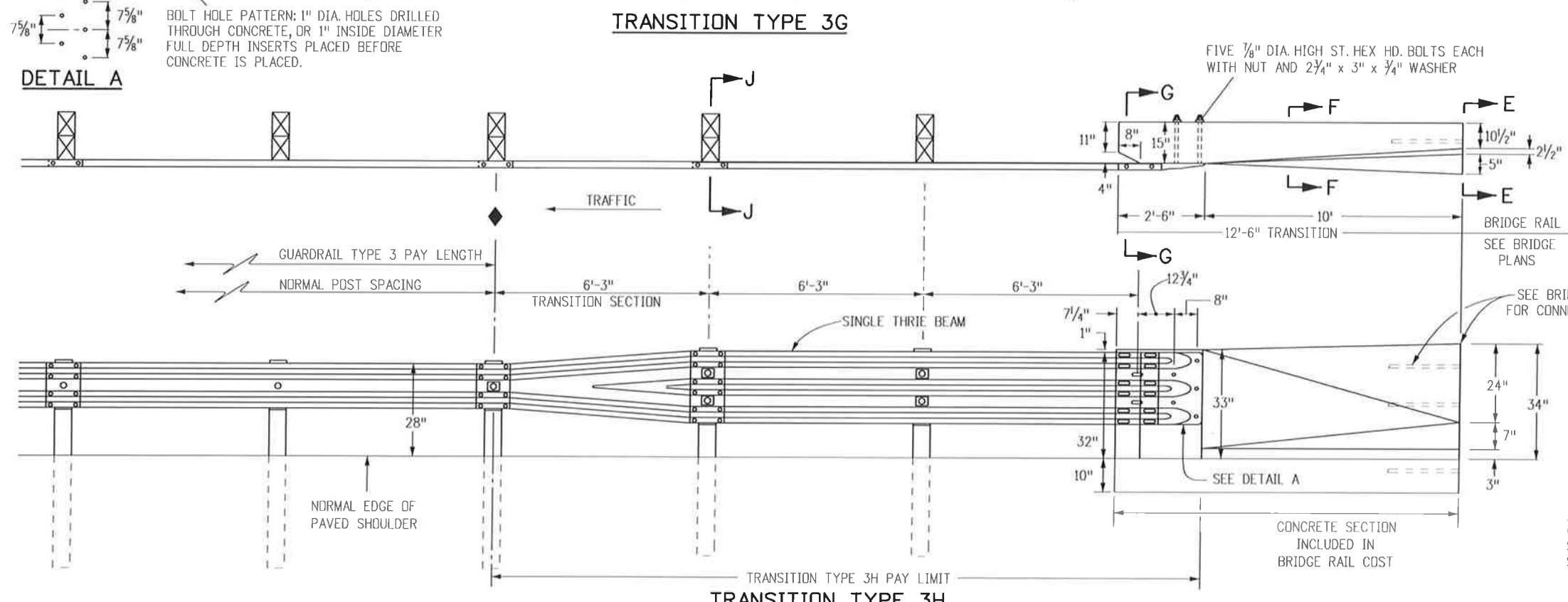
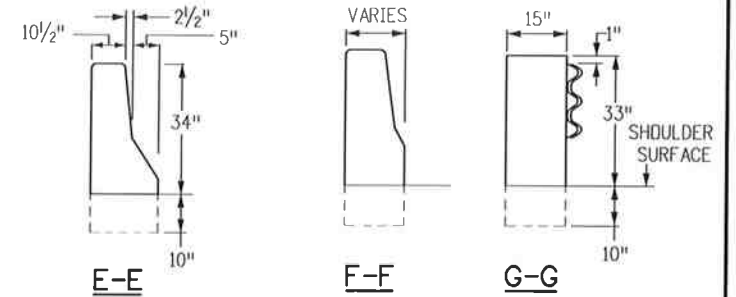
GUARDRAIL TYPE 3
W-BEAM

Issued By: Project Development Branch July 4, 2012

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M-606-1
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- NOTES**
1. TRANSITION TYPE 3G IS FOR USE AT BOTH ENDS OF BRIDGES ON TWO-WAY HIGHWAYS AND AT THE APPROACH END OF BRIDGES ON ONE-WAY HIGHWAYS.
 2. TRANSITION TYPE 3H IS FOR USE AT THE TRAILING END OF BRIDGES ON ONE-WAY HIGHWAYS.
 3. THE THRIE BEAM SECTION IN TRANSITIONS TYPES 3G AND 3H MAY BE SHOP BENT TO FIT CURVES THAT ARE GREATER THAN OR EQUAL TO A 10 FT. RADIUS. HOWEVER, THE 6 FT.-3 IN. TRANSITION SECTION SHALL NOT BE BENT.
 4. A 12 FT.-6 IN. CONCRETE TRANSITION IS REQUIRED BETWEEN THE TYPE 3G OR 3H AND TYPE 7 BRIDGE RAIL. SEE STANDARD PLAN M-606-13 FOR THE TRANSITION BETWEEN TYPE 3 GUARDRAIL AND TYPE 7 GUARDRAIL.
 5. TRANSITIONS TYPE 3G AND TYPE 3H ARE ALSO USED TO CONNECT TO TYPE 8 AND TYPE 10 BRIDGE RAIL. SEE BRIDGE PLANS FOR CONNECTION DETAILS.
 6. BACKUP PLATE IS NOT REQUIRED AT POSTS ON TYPE 3G AND 3H.
 7. [Symbol] THIS SYMBOL IN THE ELEVATION DRAWINGS SHOWS THE LOCATIONS WHERE A RECTANGULAR WASHER IS REQUIRED UNDER THE POST BOLT HEAD.
 8. CURB TYPE 6 SECTION M, MAY BE ASPHALT OR CONCRETE. THE COST OF CURB IS INCLUDED IN THE WORK, UNLESS A SEPARATE PAY ITEM IS INCLUDED IN THE BID SCHEDULE.
 9. POSTS ① THRU ⑥ ARE 7 FT. LONG. ALL OTHER POSTS SHALL BE STANDARD 6 FT. IN LENGTH UNLESS OTHERWISE SPECIFIED IN THE CONTRACT.
 10. NOTCHED RAIL BLOCKS MANUFACTURED FROM SYNTHETIC MATERIAL WILL BE ACCEPTED AS ALTERNATIVES TO WOOD NOTCHED BLOCKS FOR USE WITH STEEL POSTS PROVIDED THAT THE BLOCKS HAVE RECEIVED FHWA APPROVAL AND ARE CERTIFIED AS IDENTICAL TO THE SPECIMENS USED FOR TESTING AND APPROVAL. STEEL BLOCKS ARE NOT ALLOWED.



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GUARDRAIL TYPE 3

W-BEAM

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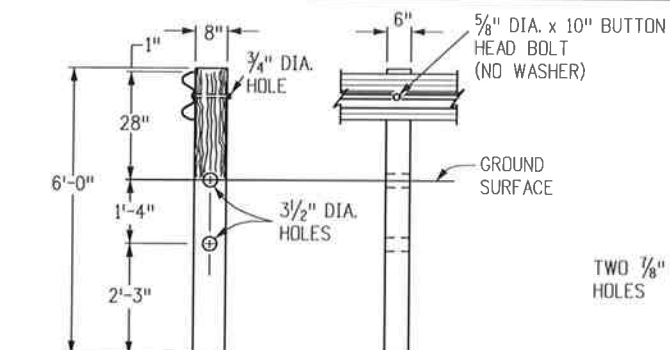
Sheet No. 12 of 20

NOTES

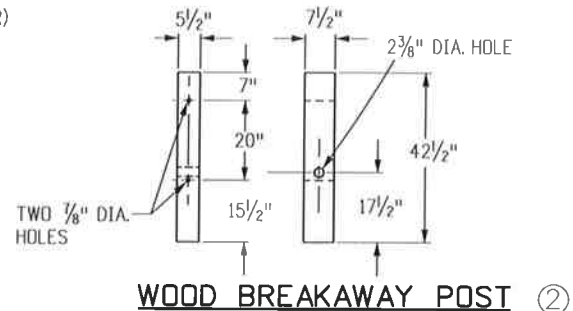
- APPLICATION: THE TRANSITION TYPE 3J MAY BE USED TO SHIELD HAZARDS AT THE INTERSECTION OF TWO ROADWAYS. TYPICAL APPLICATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
 - A. CANAL SERVICE ROADS AT BRIDGE ENDS.
 - B. INTERRUPTIONS IN GUARDRAIL RUNS BY INTERSECTING ROADWAYS, ETC..

THE LOW SPEED (<45 MPH) END ANCHORAGE TYPE 3K SHALL BE USED ONLY ON DRIVEWAYS AND LOW SPEED SERVICE ROADS. WHEN AN APPROVED CRASH-TESTED END TREATMENT IS REQUIRED USE THE END ANCHORAGE (FLARED) OR (NONFLARED) WITH 37 FT.-6 IN. LENGTH.

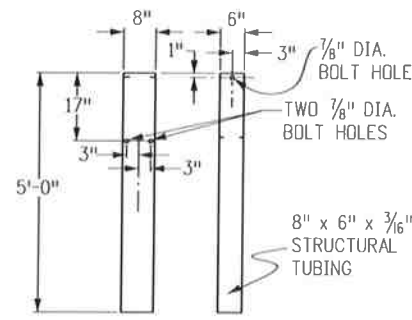
- GRADING AND PAVING FOR THE 3J & 3K SHALL MATCH THE GRADING AND PAVING OF THE GUARDRAIL TO WHICH THEY ARE ATTACHED, AND SHALL BE IN ACCORDANCE WITH SHEET ONE OF THIS STANDARD. MAXIMUM FILL SLOPE SHALL BE 2:1.
- THE RAIL IS NOT BOLTED TO THE CRT POST AT THE CENTER OF THE CURVE FOR THE 8 FT.-6 IN., 17 FT., AND 25 FT.-6 IN. RADII. PLATES SHALL CONFORM TO ASTM A 36, AND THE STRUCTURAL TUBING TO ASTM A 500.
- THE 3/4 IN. GALVANIZED WIRE ROPE (CABLE) SHALL CONFORM TO AASHTO M 30 TYPE II.
- PLATES SHALL CONFORM TO ASTM A 36, AND STRUCTURAL TUBING TO ASTM A 500. WELDING SHALL MEET ALL REQUIREMENTS OF THE AMERICAN WELDING SOCIETY.
- ALL STRUCTURAL STEEL SHALL BE GALVANIZED IN CONFORMANCE WITH ASTM A 123. POSTS SHALL NOT BE PUNCHED, DRILLED, CUT, OR WELDED AFTER GALVANIZING.
- WHEN THE SOIL PLATE CONNECTION OPTION IS SELECTED, SOIL PLATE CONNECTION BOLT HOLES ARE NOT REQUIRED.
- OUTSIDE NUT SHALL BE TORQUED AGAINST INSIDE NUT WITH THE CABLE INSTALLED TAUT BETWEEN THE ANCHOR PLATE AND FIRST POST.
- ALL CURVED GUARDRAIL SHALL BE SHOP BENT.
- SEE SHEET 4 FOR ANCHOR PLATE AND OTHER DETAILS.
- THE STEEL TUBE MAY BE DRIVEN WITH WOOD POST INSERTED IF NO DAMAGE OCCURS TO THE POST OR BOLTS.



CONTROLLED RELEASING TERMINAL (CRT) POST ①



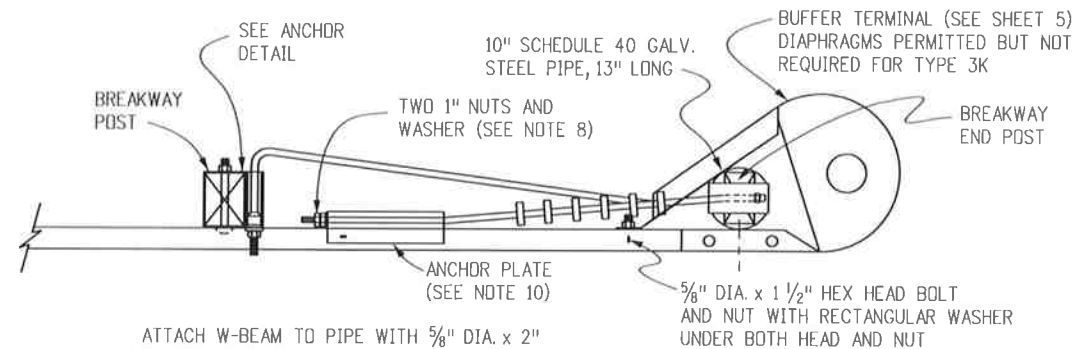
WOOD BREAKAWAY POST ②



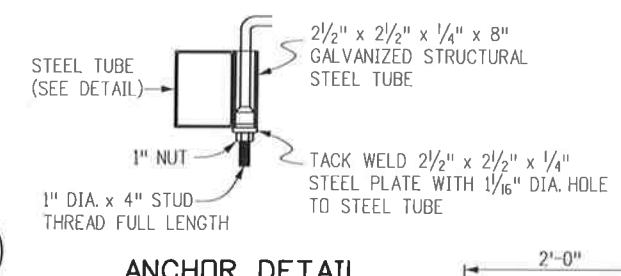
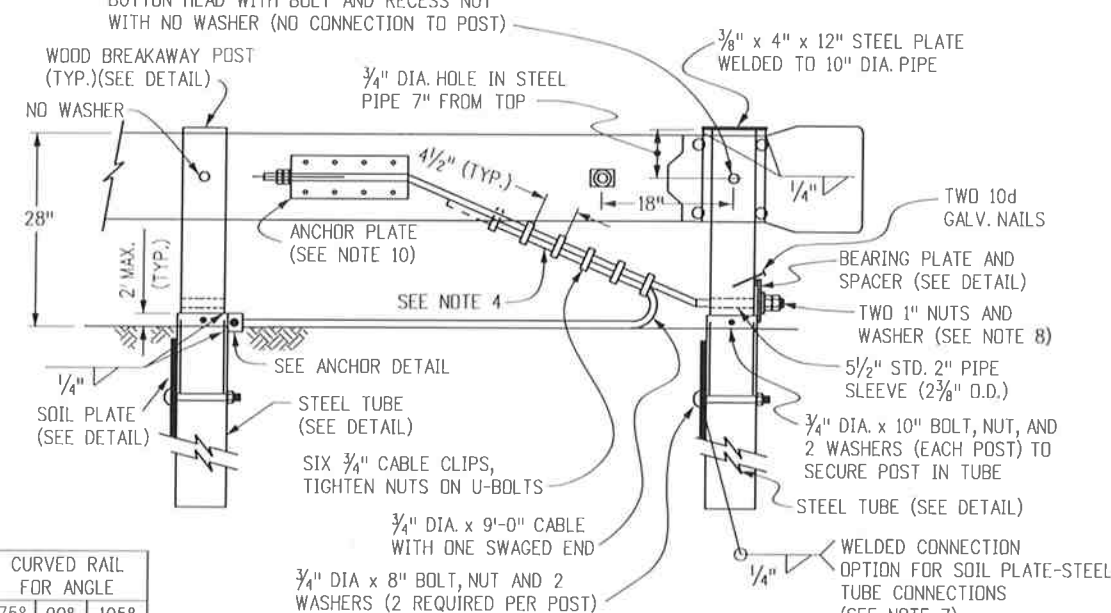
STEEL TUBE

POST	DIMENSIONS	TYPE
①	6" x 8" x 6'	CRT
②	5 1/2" x 7 1/2" x 42 1/2"	BREAKAWAY

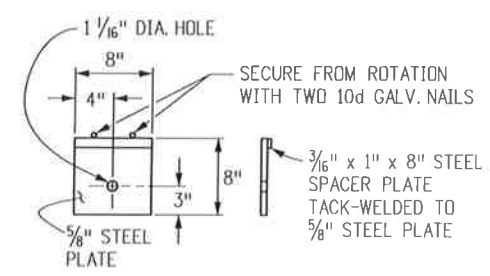
POSTS



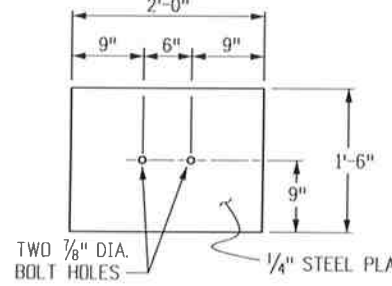
LOW SPEED TERMINAL - TYPE 3K



ANCHOR DETAIL



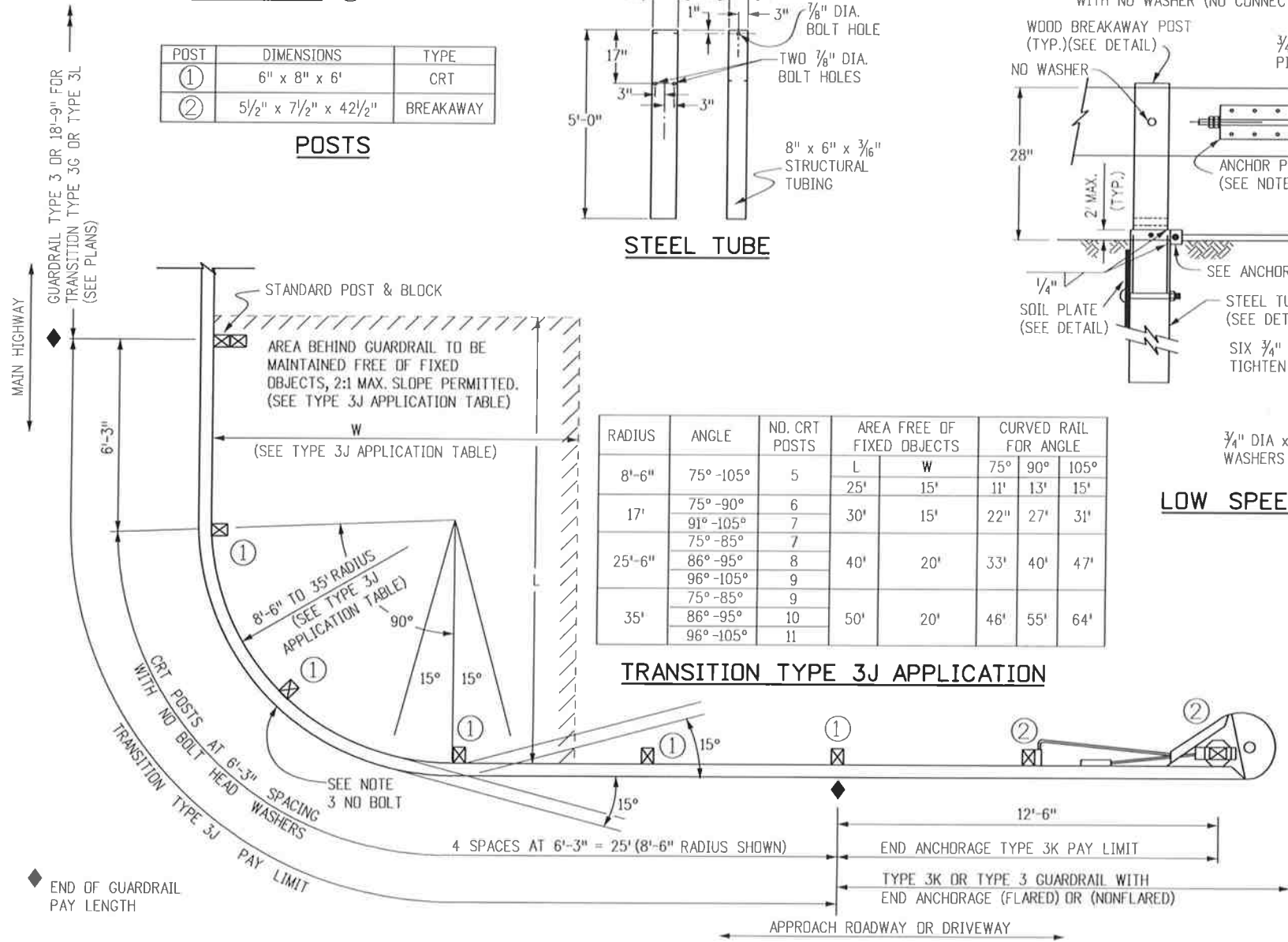
BEARING PLATE FOR STEEL TUBE



SOIL PLATE

RADIUS	ANGLE	NO. CRT POSTS	AREA FREE OF FIXED OBJECTS		CURVED RAIL FOR ANGLE		
			L	W	75°	90°	105°
8'-6"	75°-105°	5	25'	15'	11'	13'	15'
			30'	15'	22'	27'	31'
17'	75°-90°	6	40'	20'	33'	40'	47'
	91°-105°	7					
	75°-85°	7					
25'-6"	86°-95°	8	50'	20'	46'	55'	64'
	96°-105°	9					
	75°-85°	9					
35'	86°-95°	10	50'	20'	46'	55'	64'
	96°-105°	11					

TRANSITION TYPE 3J APPLICATION



INTERSECTING ROADWAYS TRANSITION - TYPE 3J TRANSITION

Computer File Information

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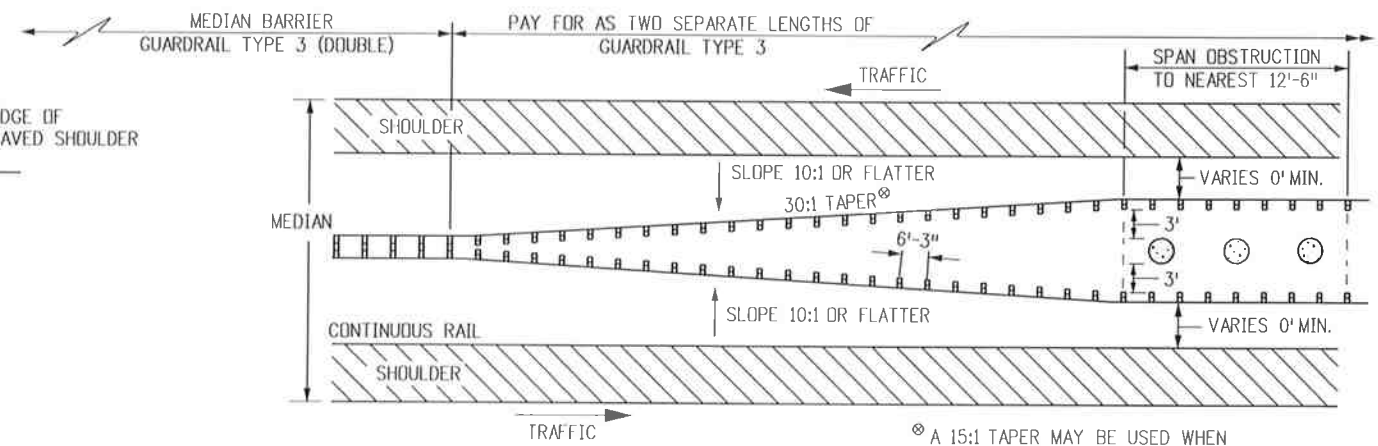
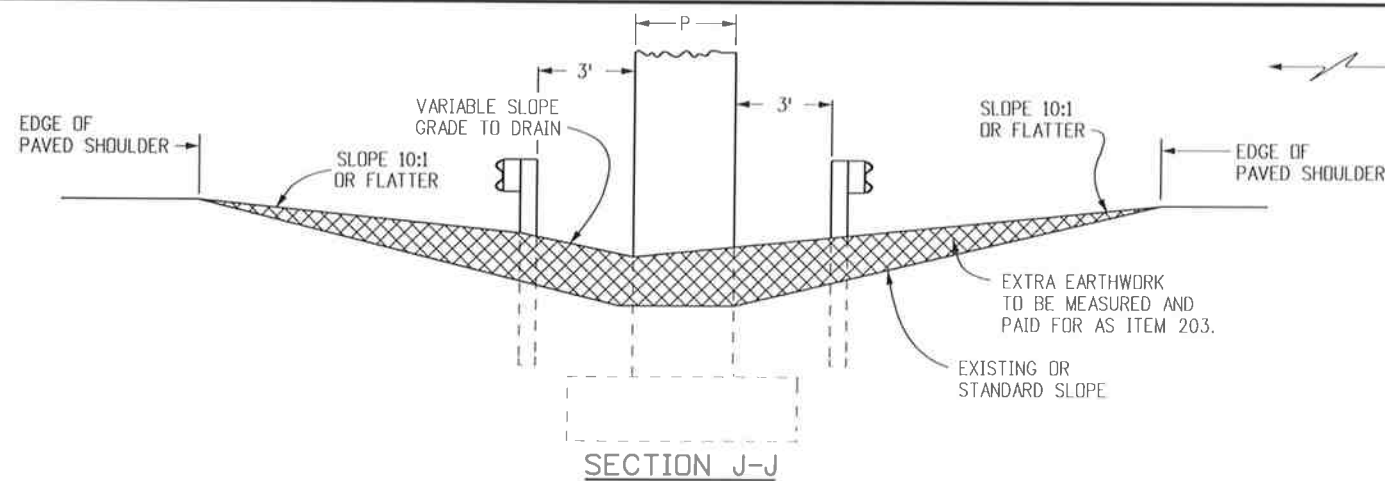
GUARDRAIL TYPE 3 W-BEAM

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STANDARD PLAN NO.

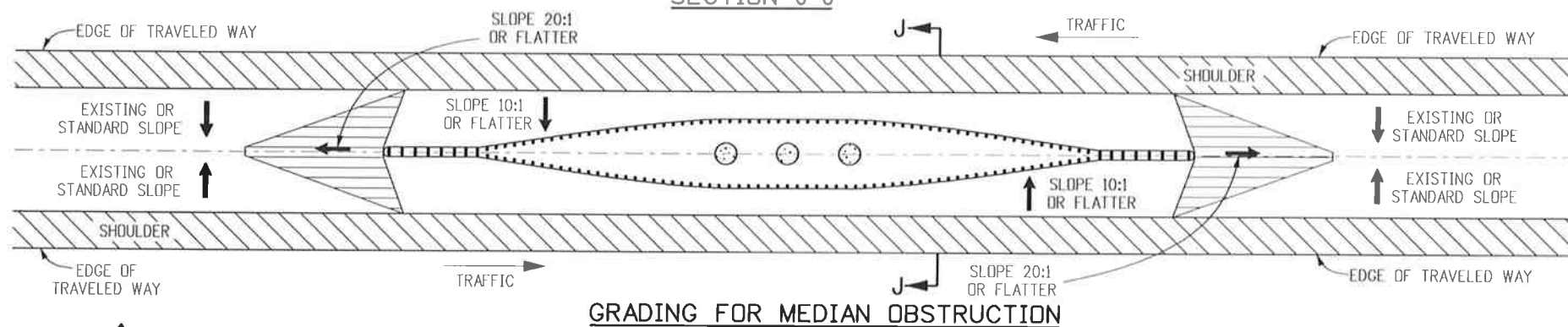
M-606-1

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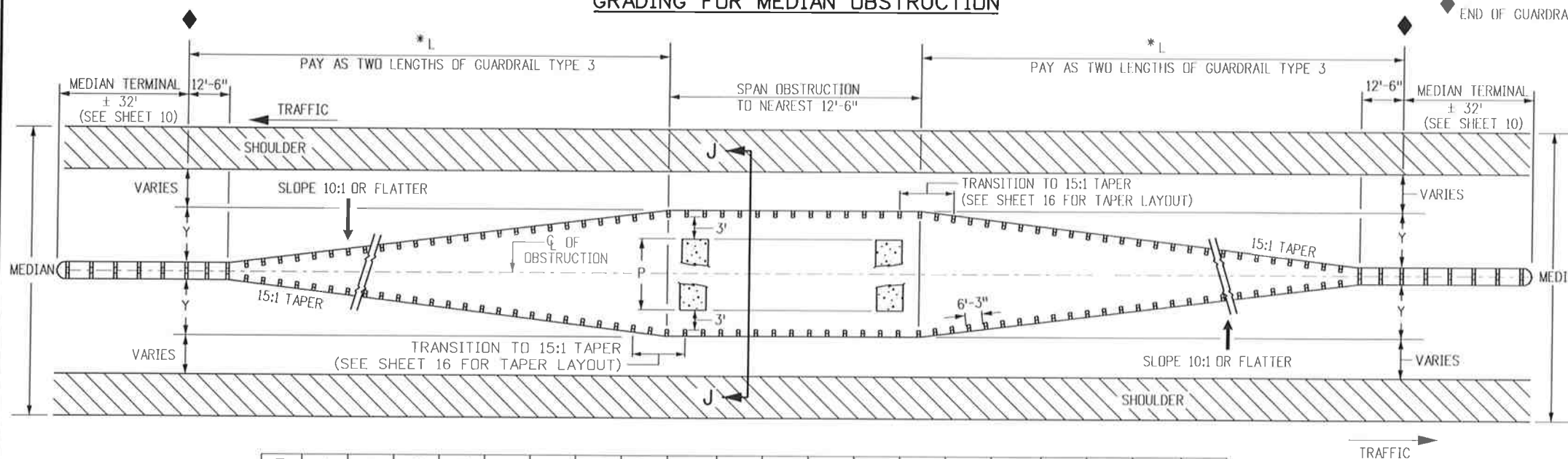


⊗ A 15:1 TAPER MAY BE USED WHEN THE BARRIER ENDS IN THE MEDIAN TERMINAL

OBSTRUCTION IN MEDIAN 30 FT. WIDE OR LESS



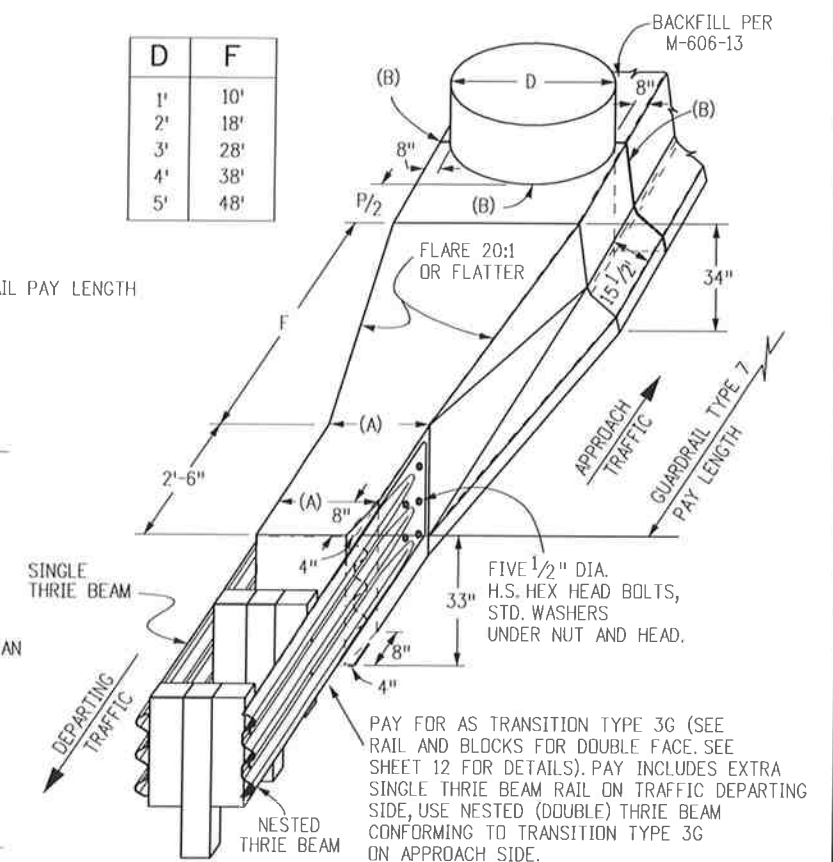
GRADING FOR MEDIAN OBSTRUCTION



P	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
Y	4'-1"	4'-7"	5'-1"	5'-7"	6'-1"	6'-7"	7'-1"	7'-7"	8'-1"	8'-7"	9'-1"	9'-7"	10'-1"	10'-7"	11'-1"	11'-7"	12'-1"	12'-7"	13'-1"	13'-7"
L	75'	87'-6"	100'	112'-6"	125'	137'-6"	150'	162'-6"	175'	187'-6"	200'	212'-6"	225'							

GUARDRAIL FOR OBSTRUCTION IN MEDIANS WIDER THAN 30 FT.

NOTE: FOR OBSTRUCTIONS (P) THAT ARE WIDER THAN 20 FT. IN MEDIANS USE SHEET 17.



(A). TIMBER POSTS 2 FT., STEEL POSTS 1 FT.-9 1/2 IN.
 (B). 1/2 IN. PREFORMED JOINT MATERIAL

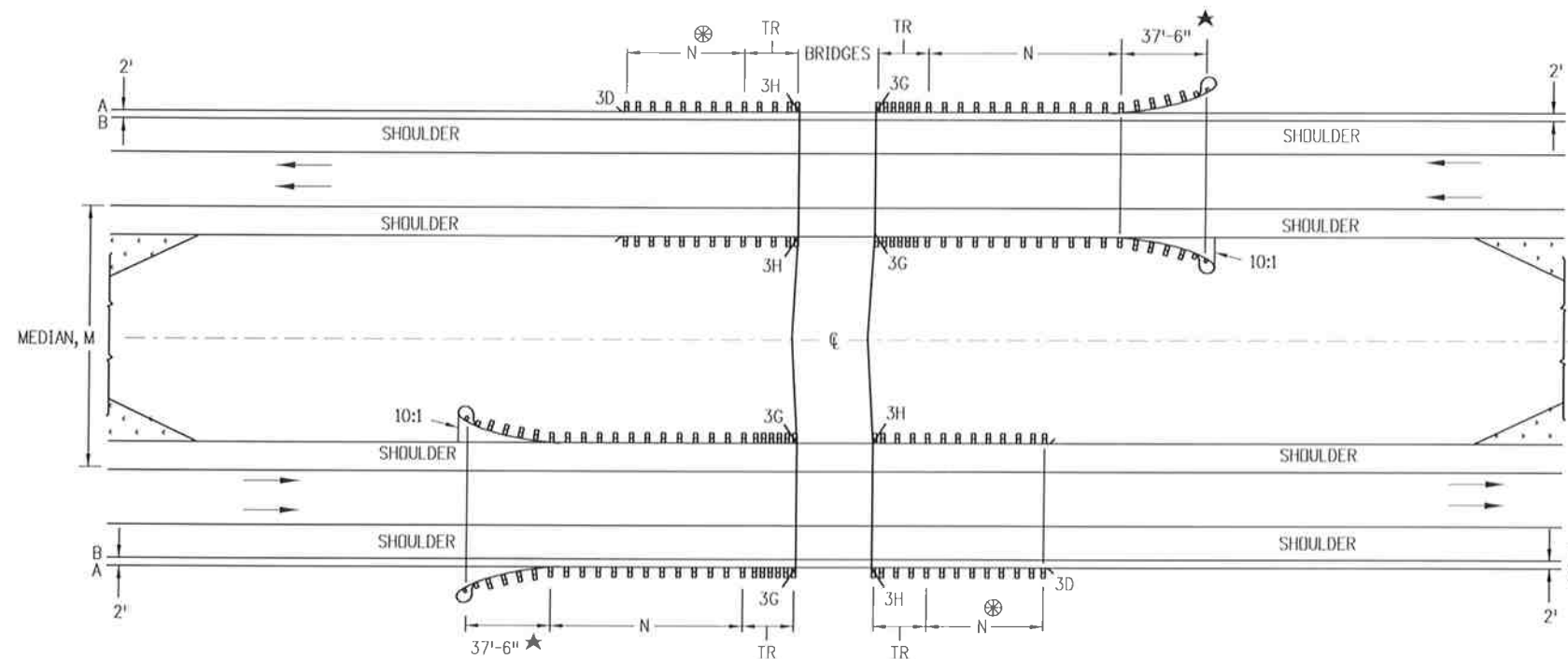
NARROW MEDIAN DETAIL

USUALLY LESS THAN 30 FT. WIDE MEDIAN WITH ALL PAVED SURFACE

*L IS MEASURED ALONG FACE OF GUARDRAIL

OBSTRUCTIONS IN MEDIANS

Computer File Information		Sheet Revisions		Colorado Department of Transportation		GUARDRAIL TYPE 3 W-BEAM		STANDARD PLAN NO.	
Creation Date: 07/04/12	Initials: DLM	Date:	Comments:	4201 East Arkansas Avenue CDOT HQ, 4th Floor Denver, CO 80222 Phone: 303-757-9021 FAX: 303-757-9868		GUARDRAIL TYPE 3 W-BEAM		STANDARD PLAN NO. M-606-1 Sheet No. 14 of 20	
Last Modification Date: 10/09/14	Initials: LTA								
Full Path: www.coloradodot.info/business/designsupport									
Drawing File Name: 60601014020.dgn									
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English		Division of Project Support		DLM/LTA		Issued By: Project Development Branch July 4, 2012	



MULTILANE DIVIDED HIGHWAYS FOR STEEP EMBANKMENTS IN MEDIAN

NOTES:

1. MEDIAN BARRIERS TANGENT TO THE ROADWAY MAY BE USED WHERE THE SHOULDER SLOPES IN THE MEDIAN ARE STEEP.
2. BARRIER LENGTHS SHALL BE INCREASED TO ACCOUNT FOR STEEP EMBANKMENTS OR OTHER HAZARDS WITHIN CLOSE PROXIMITY OF BRIDGES.

⊗ — DO NOT CONSTRUCT THE TR AND GUARDRAIL ON THE TRAILING BRIDGE ENDS IF SITE CONDITIONS DO NOT WARRANT THE USE OF GUARDRAIL.

N — SHOWN ON PLANS, LENGTH TO SHIELD ALL HAZARDS IS BASED ON GUARDRAIL'S LENGTH OF NEED COMPUTATION. SEE AASHTO ROADWAY DESIGN GUIDE. THE MINIMUM SHALL BE 12 FT. - 6 IN., WHERE SITE CONDITIONS ALLOW. THE TOTAL LENGTH OF NEED WILL INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.

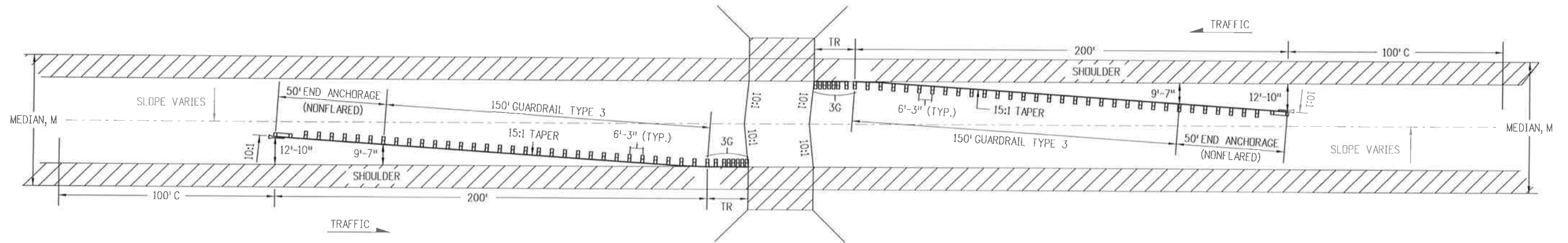
TR — 18 FT.-9 IN. FOR 3G AND 3H.

A — EDGE OF 8 FT. OR 10 FT. SHOULDER.

B — EDGE OF 6 FT. OR LESS SHOULDER.

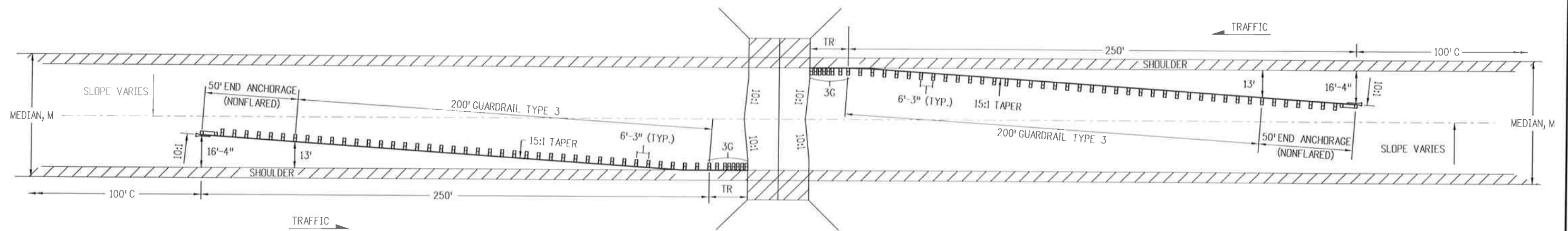
★ — END ANCHORAGE CAN BE FLARED OR NONFLARED.

Computer File Information		Sheet Revisions		Colorado Department of Transportation  4201 East Arkansas Avenue CDOT HQ, 4th Floor Denver, CO 80222 Phone: 303-757-9021 FAX: 303-757-9868 Division of Project Support DLM/LTA	GUARDRAIL TYPE 3 W-BEAM	STANDARD PLAN NO.
Creation Date: 07/04/12	Initials: DLM	Date:	Comments:			M-606-1
Last Modification Date: 10/09/14	Initials: LTA					
Full Path: www.coloradodot.info/business/designsupport	(R-X)					
Drawing File Name: 60601015020.dgn	(R-X)					
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English			Issued By: Project Development Branch July 4, 2012	Sheet No. 15 of 20

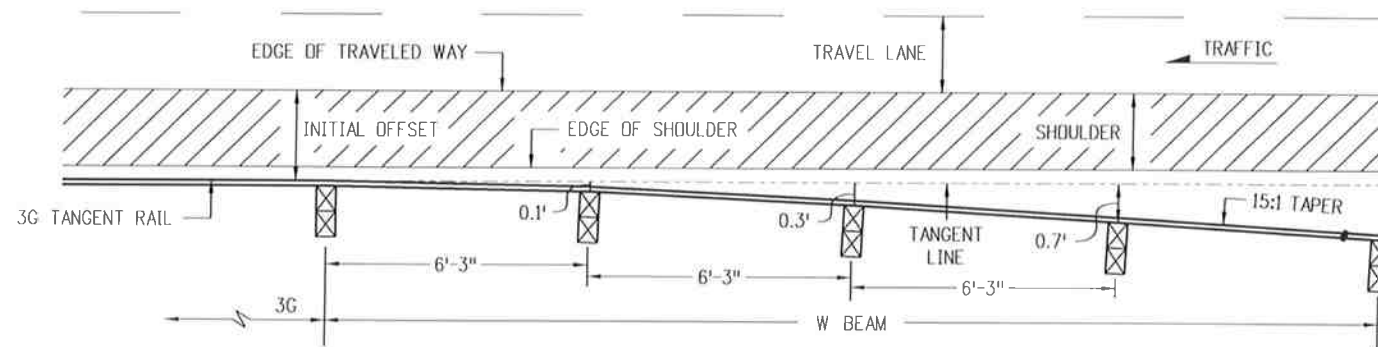


MEDIANS 60 FT. AND OVER WITH 10 FT. OR WIDER SHOULDERS.

TR = 18 FT.-9 IN FOR TRANSITION TYPE 3G.
 C = CHANGE: 100 FT. TRANSITION TO NORMAL SLOPE.
 M = WIDTH OF MEDIAN.



MEDIANS 60 FT. AND OVER WITH 4 to 8 FT. SHOULDERS.



TRANSITION TO TYPICAL 15:1 TAPER

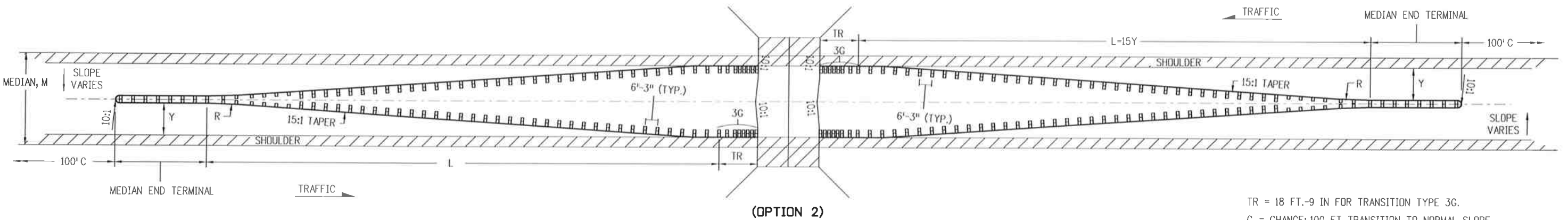
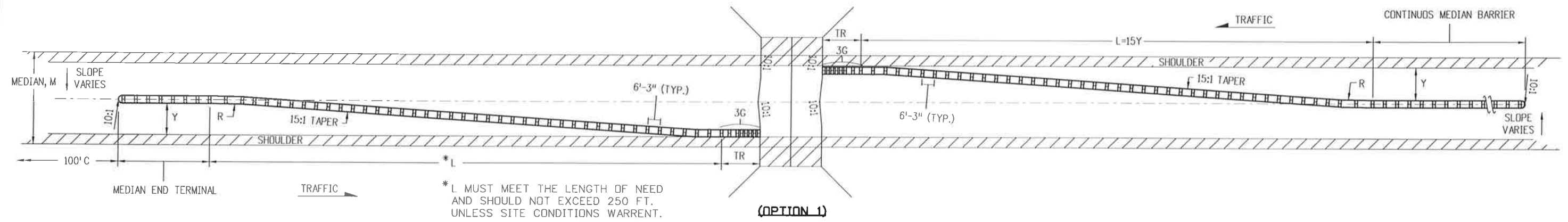
- NOTES:
1. GUARDRAIL TRANSITIONS FROM PARALLEL TO ROADWAY SHOULDER AT 3G SEGMENT TO 15:1 TAPER WITHIN 18'-9" BASED ON POST OFFSET DIMENSIONS SHOWN.
 2. SEE SHEET 15 FOR THE RIGHT SHOULDER GUARDRAIL LAYOUT.

MULTILANE DIVIDED HIGHWAYS - (DEPRESSED MEDIANS, 60 FT. AND OVER WITH OPEN HAZARDS OR OBSTRUCTIONS)

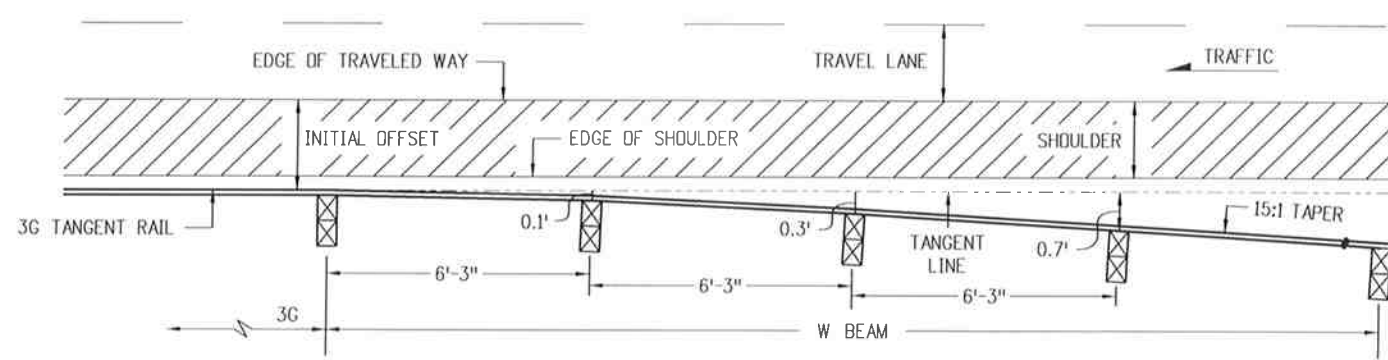
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Creation Date: 07/04/12	Initials: DLM	Date:	Comments:			M-606-1	
Last Modification Date: 10/09/14	Initials: LTA					Sheet No. 16 of 20	
Full Path: www.coloradodot.info/business/designsupport	(R-X)						
Drawing File Name: 60601016020.dgn	(R-X)						
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English	(R-X)				

NOTES

1. GUARDRAIL TRANSITIONS FROM PARALLEL TO ROADWAY SHOULDER AT 3G SEGMENT TO 15:1 TAPER WITHIN 18'-9" BASED ON POST OFFSET DIMENSIONS SHOWN.
2. THE OPTION 1 LAYOUT SHALL BE USED WHEN "Y" EXCEEDS 16 FEET OR WHEN MEDIAN BARRIER IS CONTINUOUS.
3. THE OPTION 2 LAYOUT SHALL BE USED WHEN "Y" IS 16 FEET OR LESS.
4. SEE SHEET 15 FOR RIGHT SHOULDER GUARDRAIL LAYOUT.



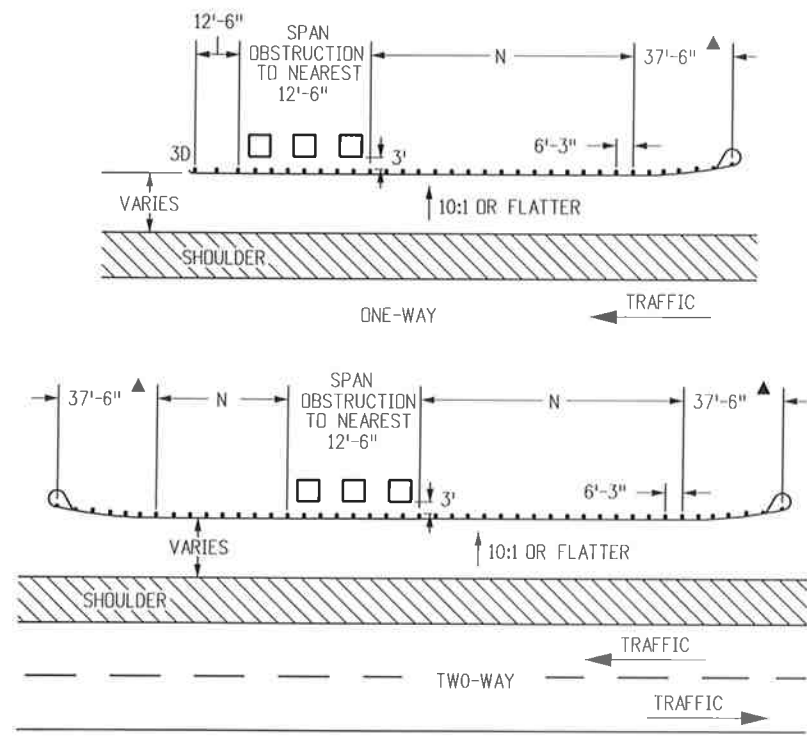
TR = 18 FT.-9 IN FOR TRANSITION TYPE 3G.
 C = CHANGE: 100 FT. TRANSITION TO NORMAL SLOPE.
 M = WIDTH OF MEDIAN.
 L = TOTAL LENGTH PAID AS GUARDRAIL TYPE 3.
 Y = FINAL OFFSET AT END.



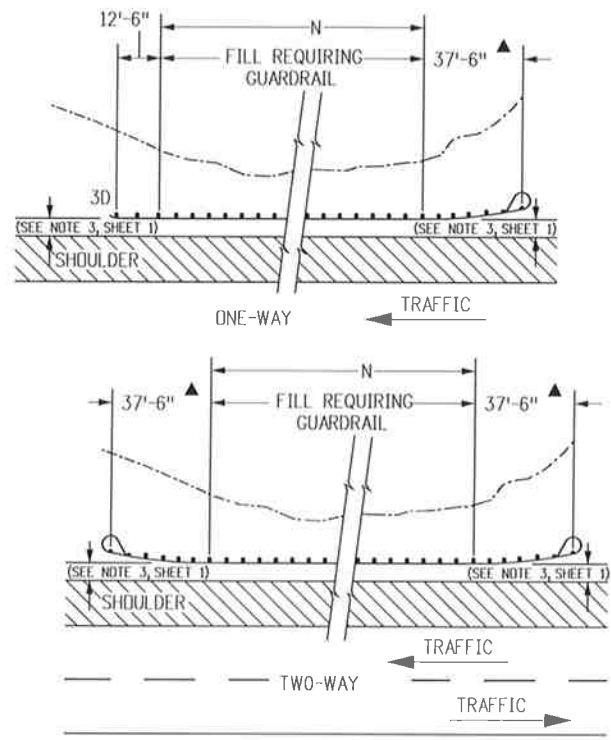
TRANSITION TO TYPICAL 15:1 TAPER

MULTILANE DIVIDED HIGHWAYS - (DEPRESSED MEDIANS, 21 - 59 FT. WITH OPEN HAZARDS OR OBSTRUCTIONS)

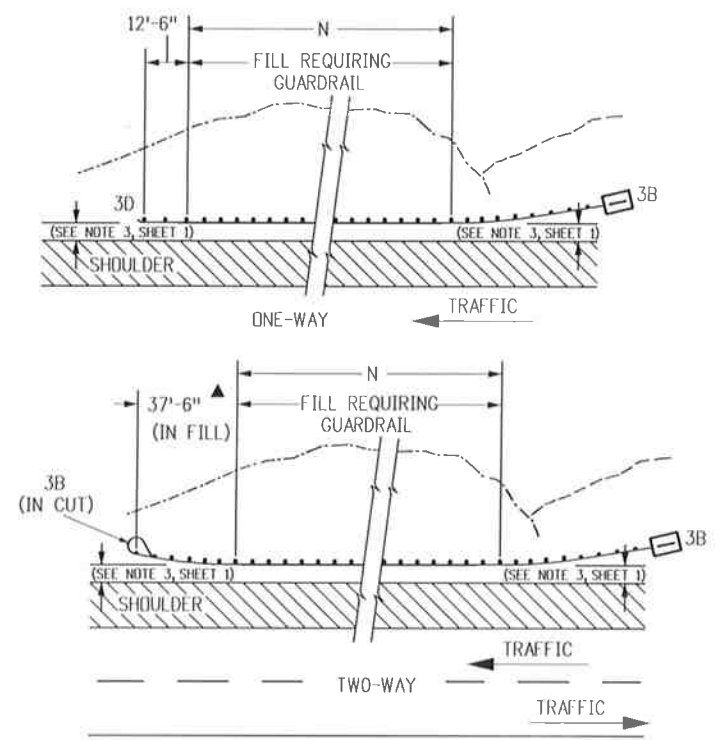
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GUARDRAIL FOR ROADSIDE OBSTRUCTIONS



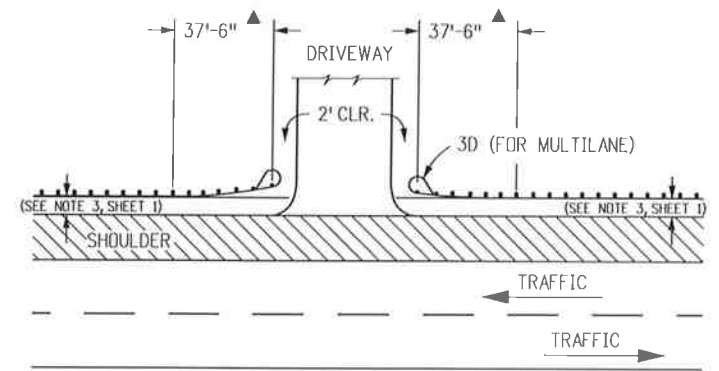
GUARDRAIL FOR ROADSIDE FILL CONSTRUCTION



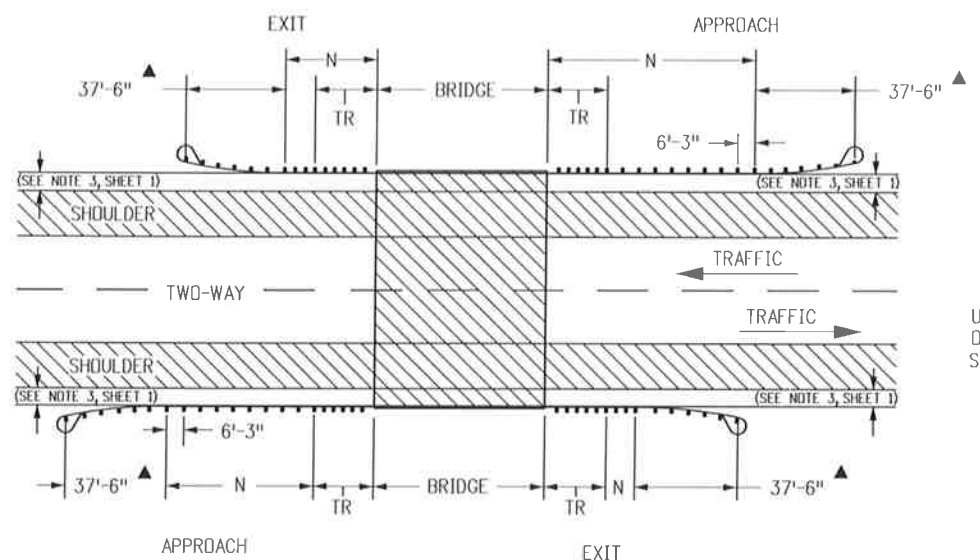
GUARDRAIL FOR ROADSIDE CUT-TO-FILL CONDITION

- NOTES**
1. THE TYPE 3G OR 3H TRANSITIONS (SEE SHEET 12) SHALL BE USED TO CONNECT A TYPE 3 W-BEAM TO TYPE 7 CONCRETE BARRIER OR TO A TYPE 7, 8, OR 10 BRIDGE RAIL. FOR A TRANSITION FROM A ROADWAY TYPE 3 W-BEAM TO A BRIDGE RAIL TYPE 3 WITH BACKING TUBES, THE TRANSITION TYPE 3L SHOWN ON SHEET 20 SHALL BE USED.
 2. "TR" WILL BE 18 FT.-9 IN. FOR THE TRANSITIONS TYPE 3G AND 3H, AND 25 FT. FOR THE TRANSITION TYPE 3L.
 3. THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT. A TRAVERSABLE SLOPE SHALL BE PROVIDED BEHIND THE TERMINAL DIMENSION "N" PRIOR TO THE OBSTRUCTION UNLESS OTHERWISE APPROVED BY THE ENGINEER.

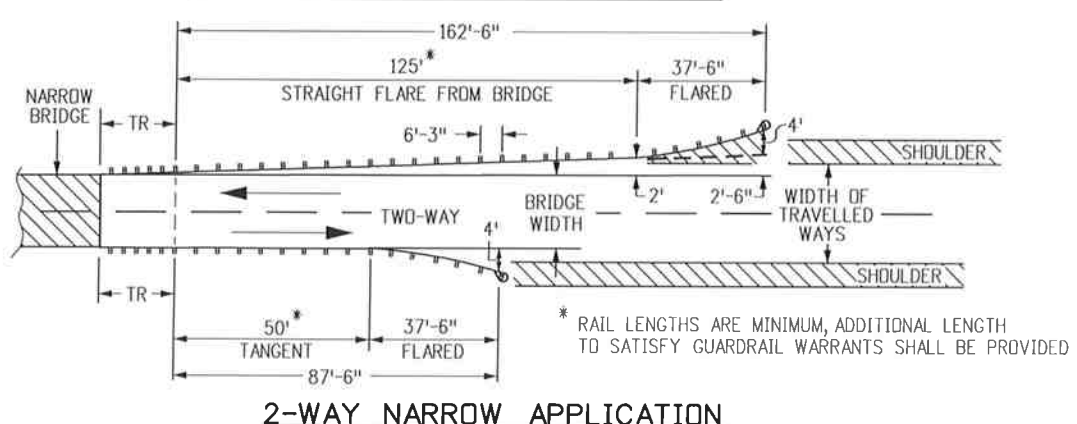
▲ END ANCHORAGE CAN BE FLARED OR NONFLARED



LAYOUT FOR DRIVEWAY APPROACH

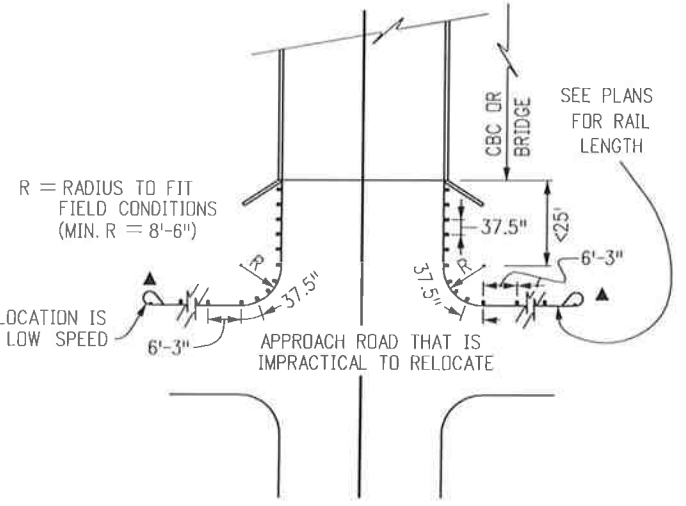


2-WAY NORMAL BRIDGE APPLICATION



2-WAY NARROW APPLICATION

* RAIL LENGTHS ARE MINIMUM, ADDITIONAL LENGTH TO SATISFY GUARDRAIL WARRANTS SHALL BE PROVIDED



GUARDRAIL TYPE 3 WITH BLOCKED OUT POSTS SPACED AT 3'-1/2" FROM STRUCTURE AROUND CURVE.

INTERRUPTED STRUCTURE APPROACH

(USE TYPE 3J ON SHEET 13 WHEN PRACTICAL)

USE 3K IF THIS LOCATION IS ON DRIVEWAY OR LOW SPEED SERVICE ROAD.

Computer File Information

Creation Date: 07/04/12	Initials: DLM
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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)

Sheet Revisions

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Division of Project Support DLM/LTA

**GUARDRAIL TYPE 3
 W-BEAM**

Issued By: Project Development Branch July 4, 2012

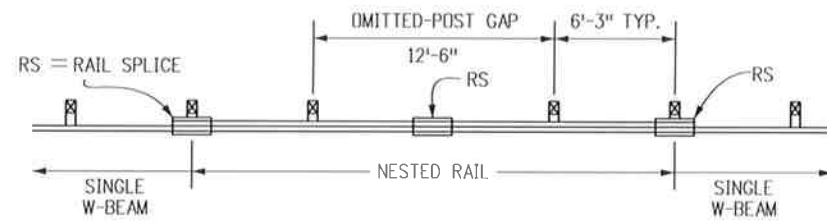
STANDARD PLAN NO.

M-606-1

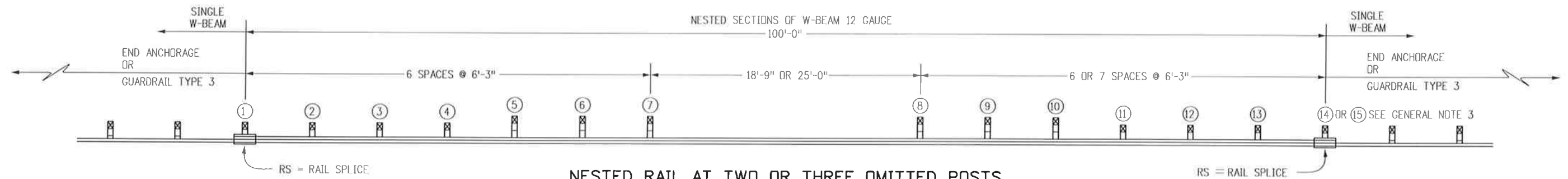
Sheet No. 18 of 20

NOTES

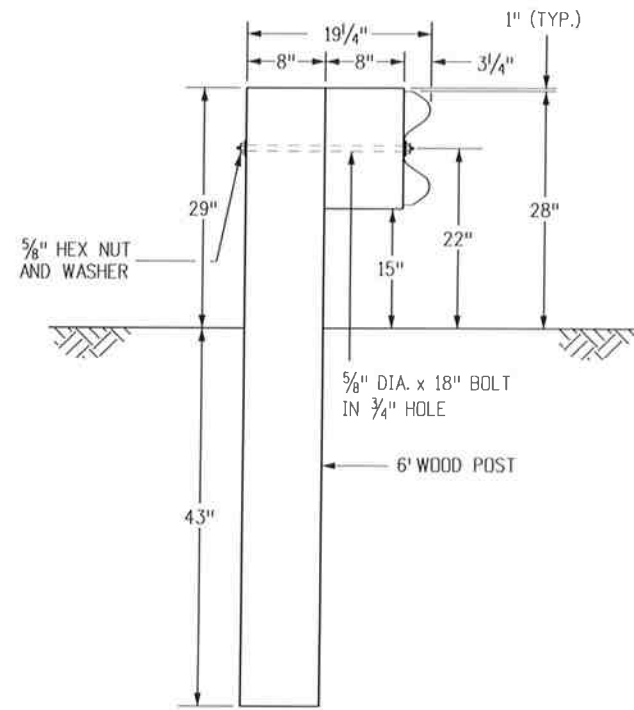
- FOR ONE OMITTED POST IN THE GUARDRAIL RUN, i.e. AT A PIPE CULVERT WITH MINIMUM COVER, SEE THE "NESTED RAIL AT ONE OMITTED POST" DETAIL ON THIS SHEET. THE W-BEAM RAILS SPANNING THE OMITTED-POST GAP SHALL BE DOUBLED (ONE RAIL NESTED IN THE OTHER), AND SHALL EXTEND A MINIMUM OF 6 FT.-3 IN. ON EITHER SIDE OF THE GAP. USING 12 FT.-6 IN. SECTIONS OF RAIL, AND DEPENDING ON THE SPLICE LOCATION, ONE OMITTED POST SECTION REQUIRES EITHER 25 FT. OR 37 FT. - 6 IN. OF NESTED RAIL.
- FOR TWO OR THREE OMITTED POSTS, SEE THE "NESTED RAIL AT TWO OR THREE OMITTED POSTS" DETAIL ON THIS SHEET. RAIL SPLICES IN THE 100 FT. NESTED SECTION MAY BE PLACED TO FACILITATE CONSTRUCTABILITY. HOWEVER ONLY ONE RAIL SPLICE MAY BE PLACED IN THE OMITTED POSTS SECTION, AND ONLY AT THE MIDPOINT OF THE 25 FT. LENGTH.
- POST (15) REQUIRED WHEN TWO POSTS ARE OMITTED FOR THE 18 FT.-9 IN. LENGTH.
- ONLY TIMBER POSTS AND BLOCKS ARE ALLOWED FOR WEAKENED POSTS 5 THROUGH 10.



NESTED RAIL AT ONE OMITTED POST

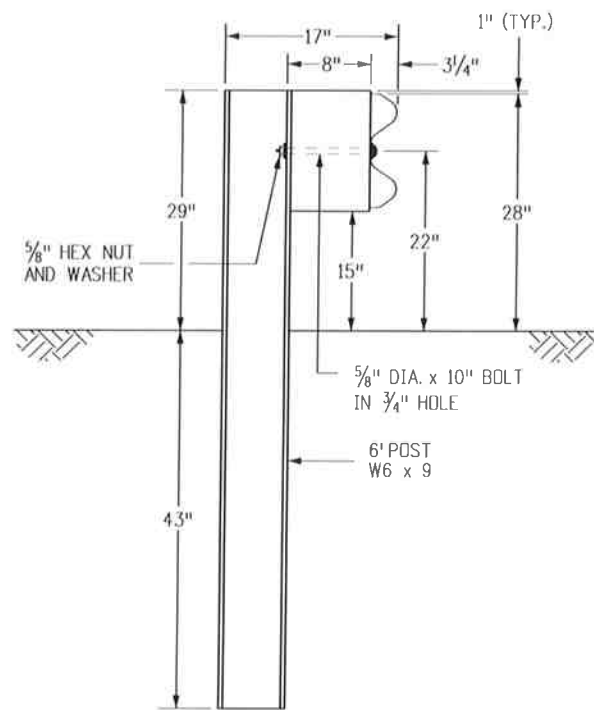


NESTED RAIL AT TWO OR THREE OMITTED POSTS



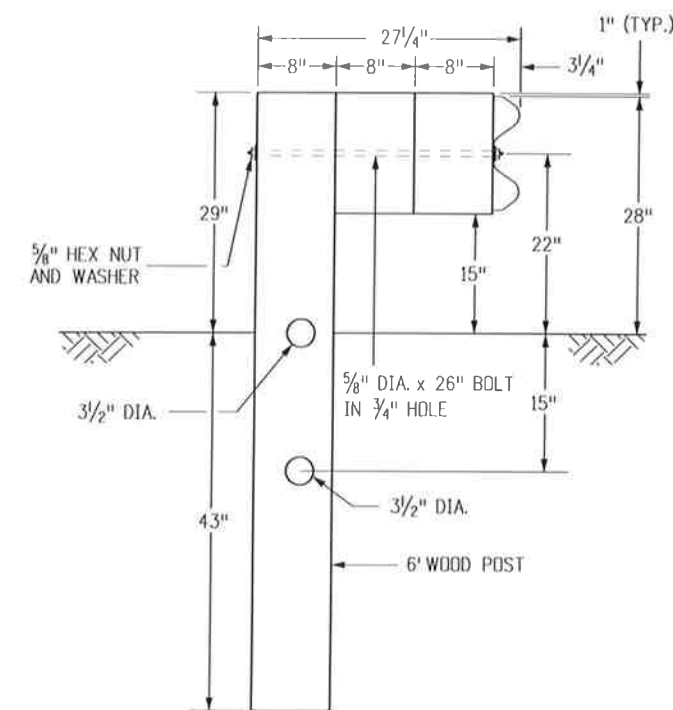
TIMBER

POSTS (1) - (4) AND (11) - (15)



STEEL

POSTS (1) - (4) AND (11) - (15)



TIMBER

POSTS (5) - (10)

Computer File Information

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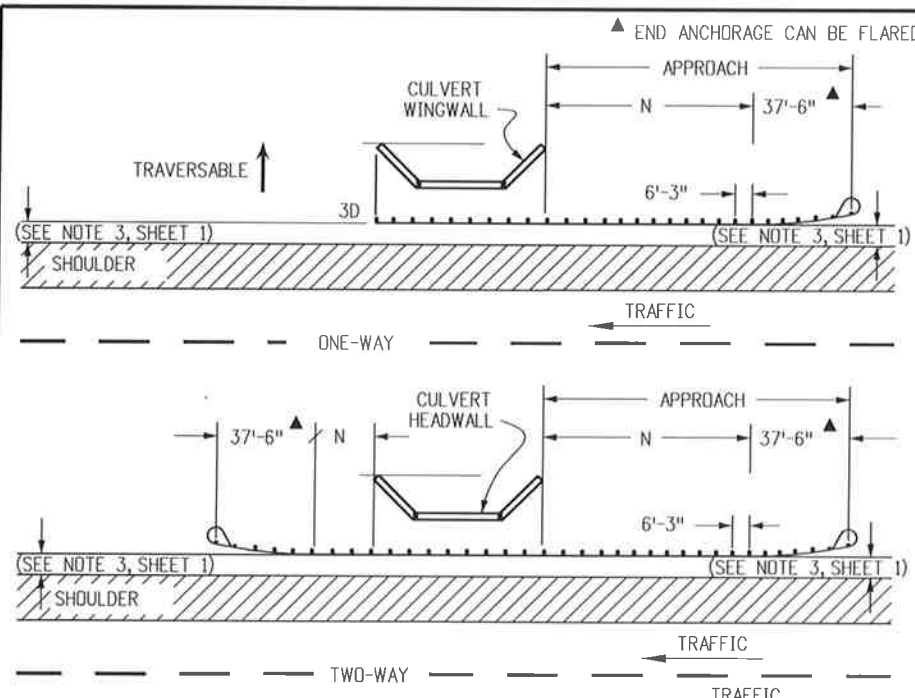
**GUARDRAIL TYPE 3
 W-BEAM**

Issued By: Project Development Branch July 4, 2012

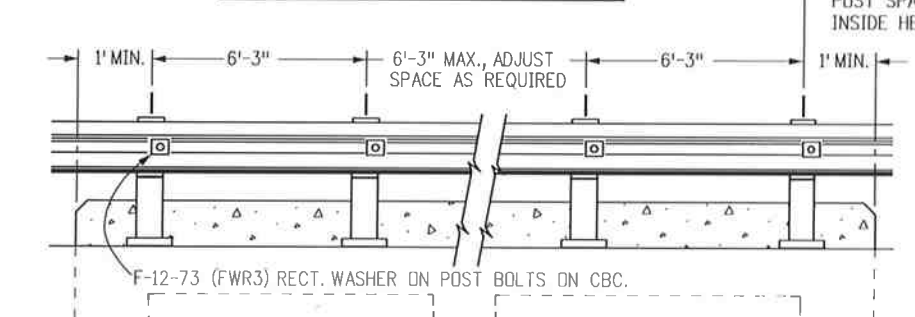
STANDARD PLAN NO.

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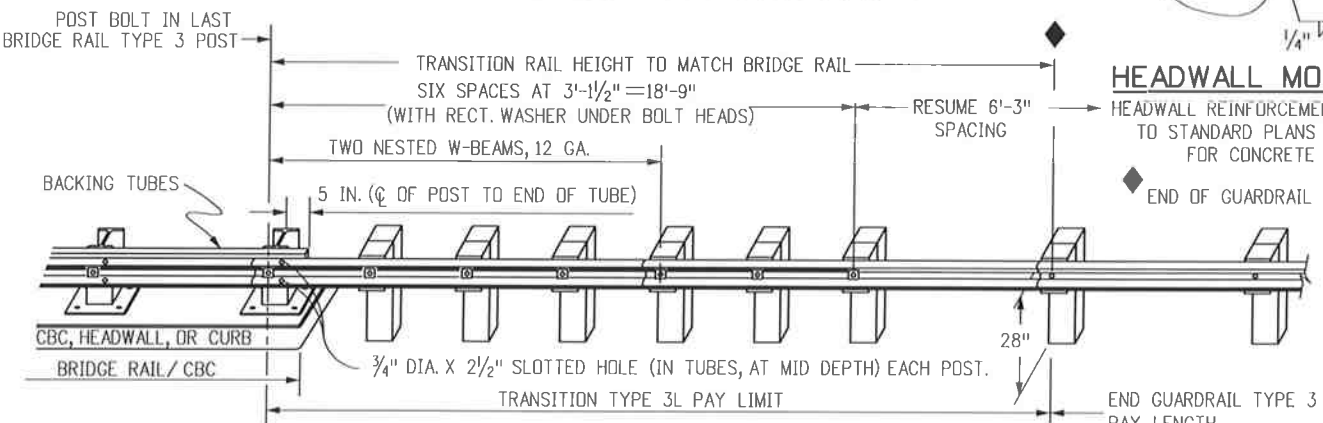


GUARDRAIL FOR CULVERTS

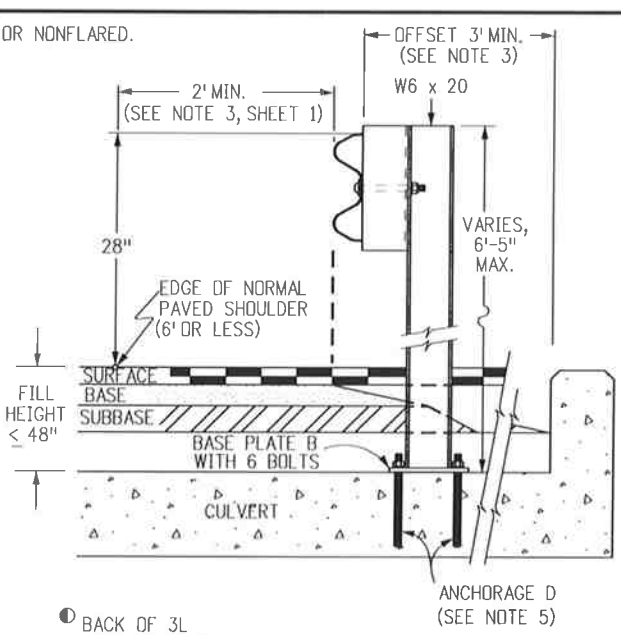


RAIL PLACEMENT FOR INSIDE OR HEADWALL MOUNT

* USE 3L TRANSITION AT BOTH APPROACH AND EXIT ENDS OF BRIDGE RAIL TYPE 3 (HEADWALL MOUNT)

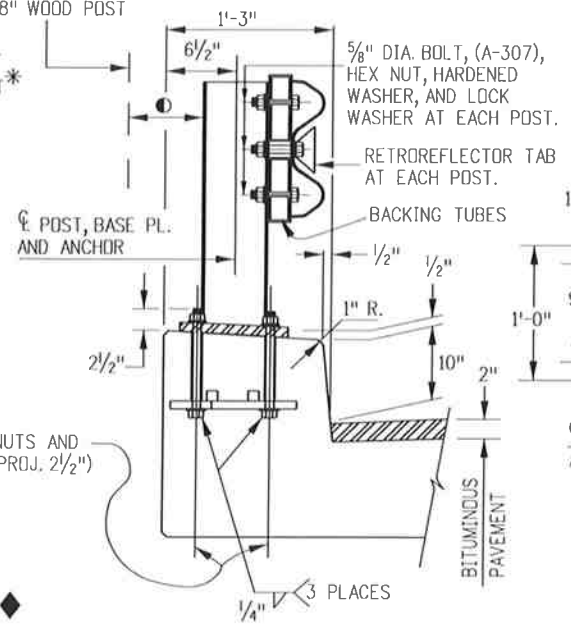


TRANSITION TYPE 3L AND GUARDRAIL TYPE 3 APPROACH



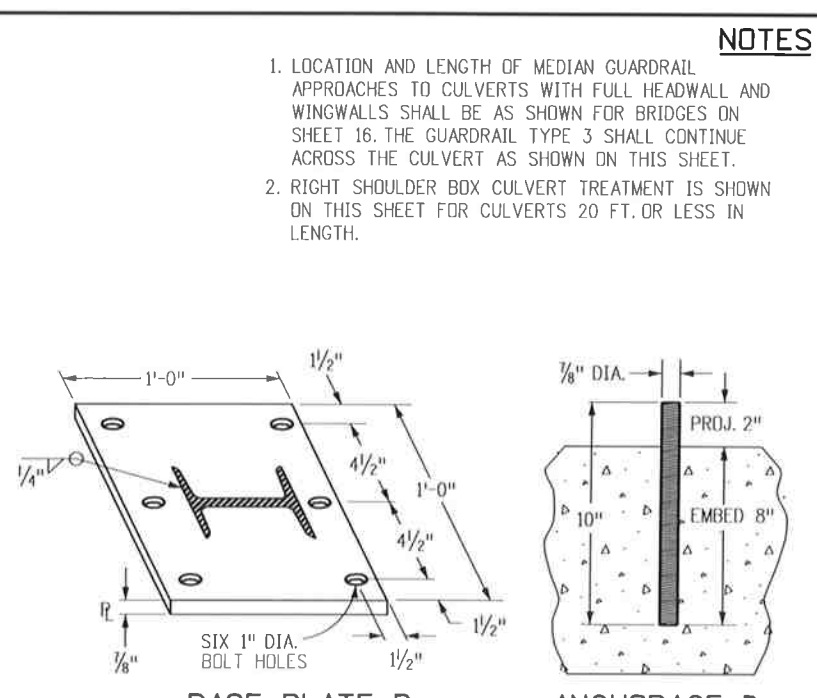
INSIDE MOUNT ON CBC

BACK OF 3L TRANSITION POST 5.75" STEEL POST OR 8" WOOD POST



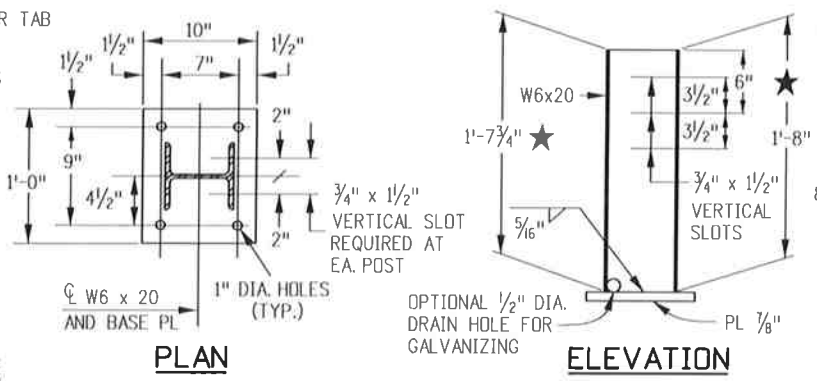
HEADWALL MOUNT ON CBC

HEADWALL REINFORCEMENT SHALL BE ACCORDING TO STANDARD PLANS M-601-1, 2, AND 3 FOR CONCRETE BOX CULVERTS.



BASE PLATE B (FOR INSIDE MOUNT)

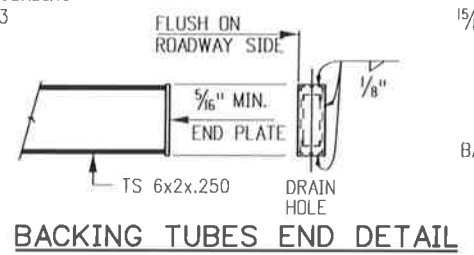
ANCHORAGE D (FOR INSIDE MOUNT)



PLAN

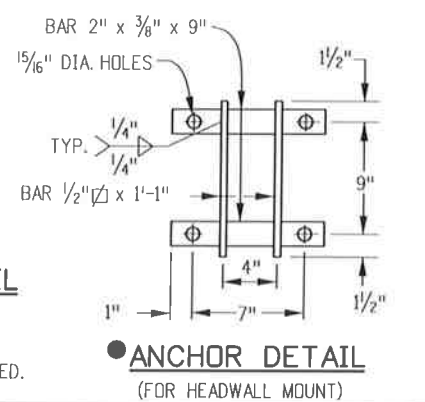
HEADWALL MOUNT POST DETAIL

ELEVATION



BACKING TUBES END DETAIL

TUBES SHALL BE CONTINUOUS. NEITHER BOLTED NOR WELDED SPLICES WILL BE ALLOWED.



ANCHOR DETAIL (FOR HEADWALL MOUNT)

NOTES

- LOCATION AND LENGTH OF MEDIAN GUARDRAIL APPROACHES TO CULVERTS WITH FULL HEADWALL AND WINGWALLS SHALL BE AS SHOWN FOR BRIDGES ON SHEET 16. THE GUARDRAIL TYPE 3 SHALL CONTINUE ACROSS THE CULVERT AS SHOWN ON THIS SHEET.
- RIGHT SHOULDER BOX CULVERT TREATMENT IS SHOWN ON THIS SHEET FOR CULVERTS 20 FT. OR LESS IN LENGTH.
- GUARDRAIL ACROSS CULVERTS WITH A LENGTH OF 20 FT. OR LESS SHALL BE AS FOLLOWS:
 - FILL HEIGHT AT GUARDRAIL POST 48 IN. OR GREATER: CONSTRUCTION AND PAYMENT WILL BE AS GUARDRAIL TYPE 3.
 - FILL HEIGHT AT GUARDRAIL POST LESS THAN 48 IN. AND BLOCK FACE TO HEADWALL OFFSET OF 3 FT. OR GREATER: CONSTRUCTION AND PAYMENT AS GUARDRAIL TYPE 3.
 - FILL HEIGHT AT GUARDRAIL POST 48 IN. OR LESS AND BLOCK FACE TO HEADWALL OFFSET LESS THAN 3 FT.: CONSTRUCTION ACCORDING TO HEADWALL MOUNT DETAILS AND PAYMENT AS BRIDGE RAIL TYPE 3.
- GUARDRAIL ACROSS CULVERTS WITH LENGTH GREATER THAN 20 FT. SHALL BE AS FOLLOWS:
 - FILL HEIGHT AT GUARDRAIL POSTS 48 IN. OR GREATER: CONSTRUCTION AND PAYMENT WILL BE FOR STANDARD GUARDRAIL TYPE 3.
 - FILL HEIGHT AT GUARDRAIL POSTS 48 IN. OR LESS: CONSTRUCTION AND PAYMENT IN ACCORDANCE WITH THE CONTRACT BRIDGE PLANS. WHEN BLOCK FACE TO HEADWALL OFFSET IS 3 FT. OR GREATER: CONSTRUCTION AND PAYMENT AS GUARDRAIL TYPE 3.
- ANCHORAGE D: SIX BOLTS FOR BASE PLATE "B" WITH INSIDE MOUNT. THE BOLTS SHALL BE 7/8 IN. DIA X 10 IN. HIGH STRENGTH RODS THREADED FULL LENGTH AND ALL GALVANIZED. RODS SHALL BE CAST-IN-PLACE FOR A NEW STRUCTURE. FOR AN EXISTING STRUCTURE, THE RODS SHALL BE INSTALLED IN 1-1/4 IN. DIA HOLES WITH NON-SHRINK GROUT OR EPOXY CONFORMING TO ASTM C 881.
- TYPE 3L POSTS SHALL BE STEEL OR WOOD TO MATCH POSTS USED ON THE APPROACH GUARDRAIL.
- THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.
- ALL BRIDGE RAIL TYPE 3 BACKING TUBES SHALL BE FABRICATED FROM ASTM A 500 GRADE B. ALL POSTS, BASE PLATES, AND ANCHOR BOLTS SHALL BE FABRICATED FROM ASTM A 36 STEEL. THE ABOVE MATERIAL, W-BEAM, AND ALL ANCHOR BOLTS AND MISCELLANEOUS BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 509. CONCRETE, REINFORCING STEEL, AND STRUCTURAL STEEL ELEMENTS SHALL BE IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.
- POST ANCHORS, ENCASED IN CONCRETE, SHALL BE ASTM A 36 STEEL, AND NEED NOT BE GALVANIZED.
- PRIOR TO FABRICATION OF BRIDGE RAIL, THREE SETS OF WORKING DRAWINGS WHICH COMPLY WITH THE REQUIREMENTS OF SECTION 105 SHALL BE SUBMITTED TO THE ENGINEER FOR INFORMATION ONLY.
- IF HEADWALL MOUNT GUARDRAIL IS USED, SEE STANDARD PLAN M-601, AND NOTES BELOW:
 - ALL ITEMS ABOVE TOP OF CBC HEADWALL WILL BE MEASURED AND PAID FOR AS LINEAR FEET OF BRIDGE RAIL TYPE 3.
 - HEADWALL MOUNTING OF RAIL WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

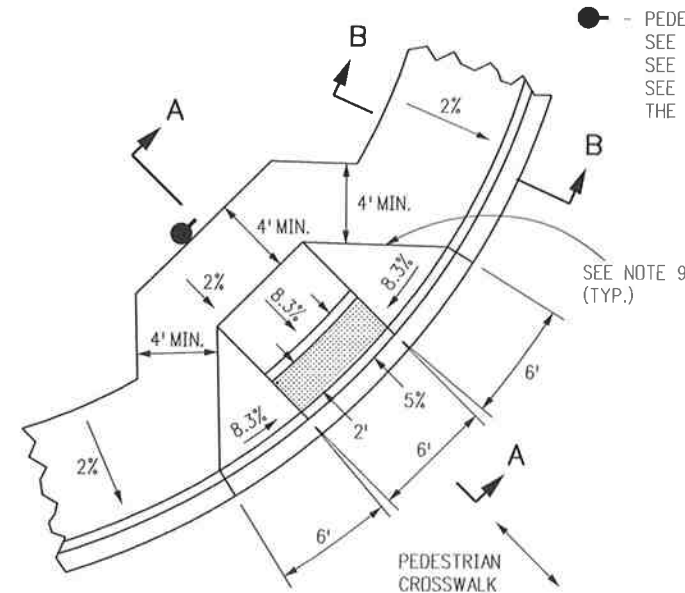
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Drawing File Name: 60601020020.dgn	(R-X)
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)

Sheet Revisions	
Date:	Comments

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 Phone: 303-757-9021 FAX: 303-757-9868
 Division of Project Support DLM/LTA

GUARDRAIL TYPE 3
W-BEAM
 Issued By: Project Development Branch July 4, 2012

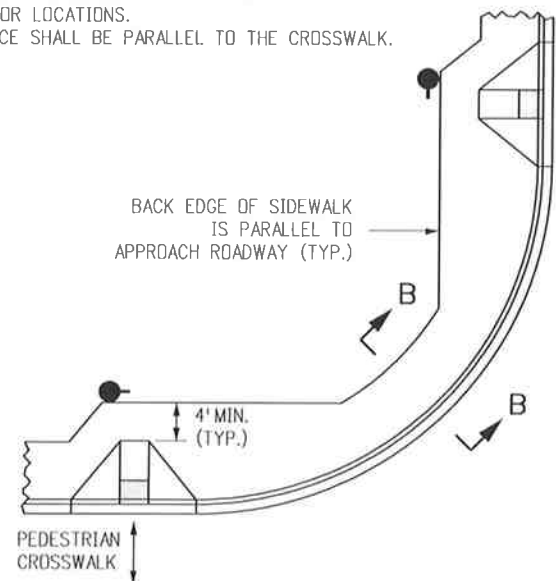
STANDARD PLAN NO.
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CURB RAMP TYPE 1A

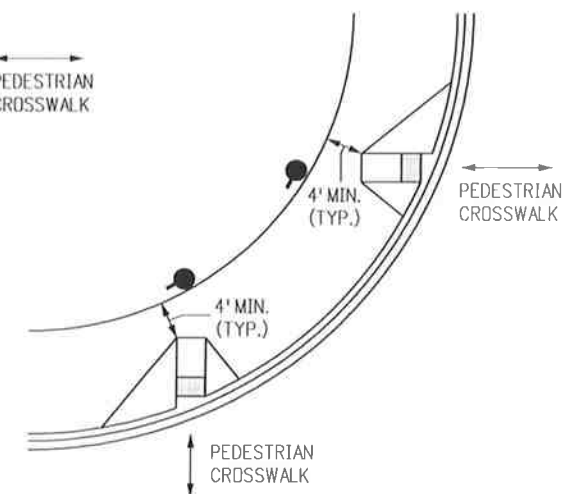
● - PEDESTRIAN PUSH BUTTON POST ASSEMBLY (PPBPA).
 SEE NOTE 8.
 SEE STANDARD PLAN S-614-9 FOR PPBPA DETAILS.
 SEE PLANS FOR LOCATIONS.
 THE SIGN FACE SHALL BE PARALLEL TO THE CROSSWALK.

SEE NOTE 9 (TYP.)



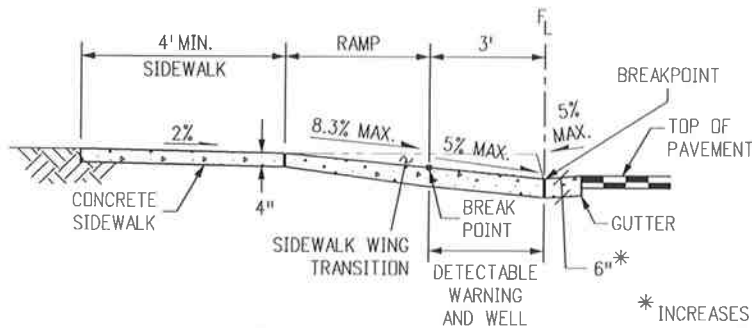
CURB RAMP TYPE 1B

SEE NOTE 11



CURB RAMP TYPE 1B MODIFIED

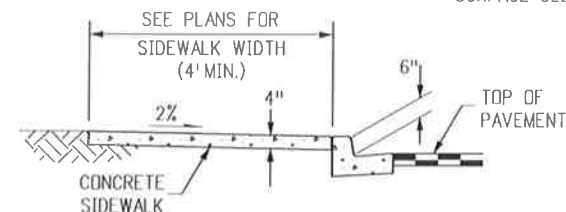
USE ONLY IF EXISTING ROW DICTATES.
 GRADE BREAKS SHALL NOT BE PERMITTED ON THE SURFACE OF THE RAMP RUNS AND TURNING SPACES.
 SURFACE SLOPES THAT MEET AT GRADE BREAKS SHALL BE FLUSH.
 SEE NOTE 11.



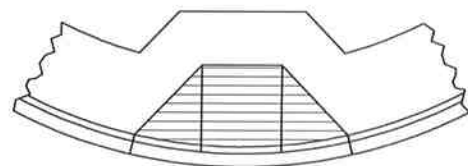
SECTION A-A

(PPBPA NOT SHOWN IN SECTION VIEWS AS IT MAY NOT BE REQUIRED.)

* INCREASES TO 8" FOR BRICK PAVERS.

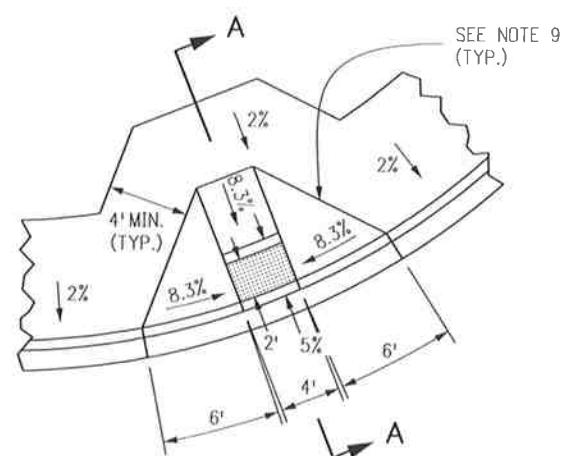


SECTION B-B



RAMP PAY AREA

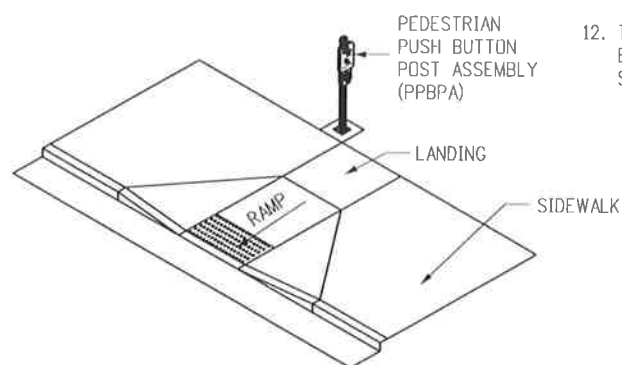
FOR CURB RAMPS
 TYPES 1A AND 1B



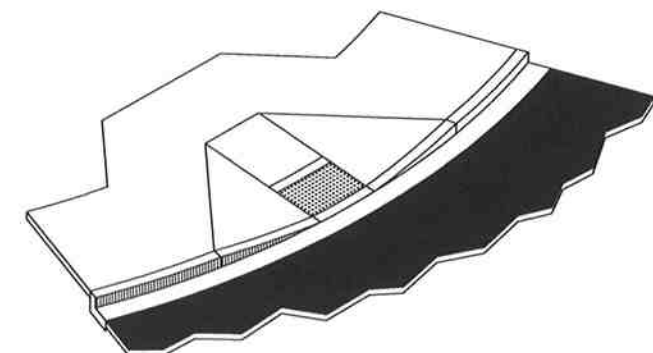
RAMP DETAIL

FOR CURB RAMP
 TYPE 1B

SEE NOTE 9 (TYP.)



**CURB RAMP WITH
 PEDESTRIAN PUSH BUTTON POST**

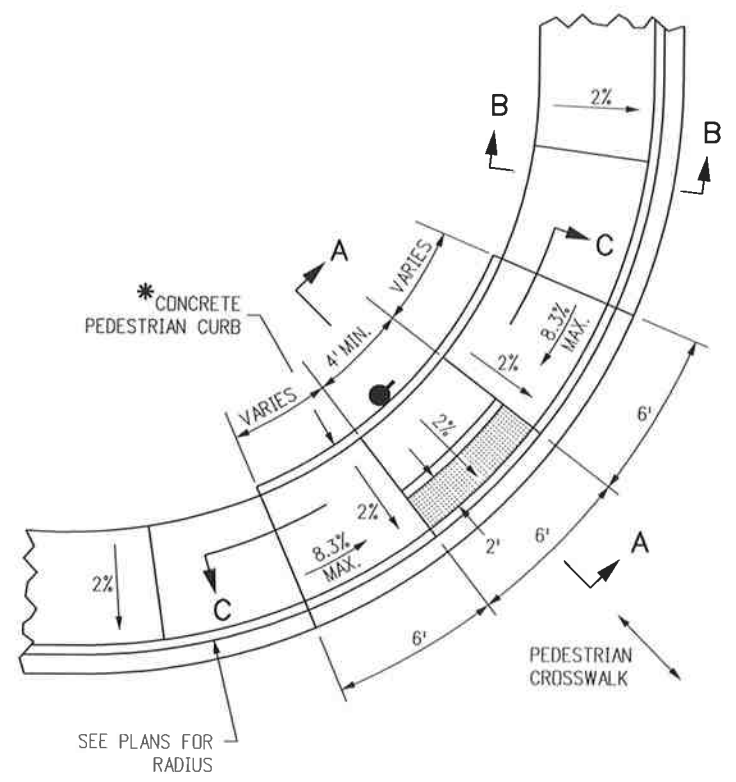


ISOMETRIC VIEW

GENERAL NOTES

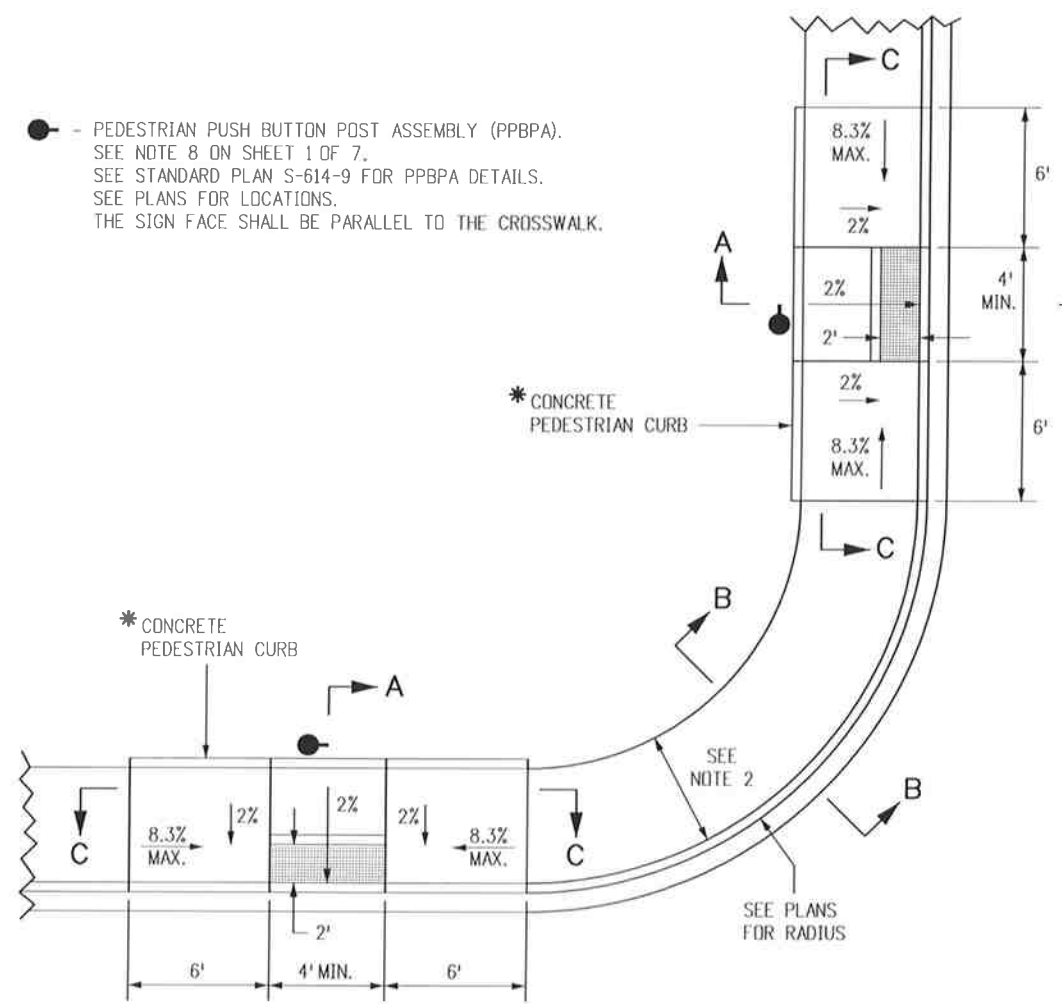
1. THE DETECTABLE WARNINGS SHALL BE INSTALLED AT SIDEWALK TO STREET TRANSITIONS. THEY SHALL HAVE A TRUNCATED DOME SURFACE. THE DOMES SHALL BE IN A SQUARE GRID PATTERN.
2. ALL DETECTABLE WARNING AREAS SHALL START A MINIMUM OF 6 IN. FROM THE FLOW LINE OF THE CURB AND NOT BE MORE THAN A MAXIMUM OF 8 IN. (WITH EXCEPTION FOR THE TYPE 1B MODIFIED AND TYPE 3B MODIFIED AS THIS DIMENSION MAY BE GREATER THAN 8 INCHES ON ONE SIDE OF THE RADIUS) FROM ANY POINT ON THE FLOW LINE OF THE CURB. ALL DETECTABLE WARNING AREAS SHALL BE 2 FT. IN LENGTH AND COVER THE COMPLETE WIDTH OF THE RAMP AREA ONLY.
3. RAMP SLOPES SHALL BE 8.3% OR FLATTER. THE DETECTABLE WARNING SLOPES SHALL BE 5% OR FLATTER.
4. MINIMUM SIDEWALK WIDTH IS 4 FT.
5. DO NOT INSTALL DRAINAGE STRUCTURES, TRAFFIC SIGNAL EQUIPMENT, JUNCTION BOXES, AND OTHER OBSTRUCTIONS IN FRONT OF THE RAMP ACCESS AREAS.
6. CONSTRUCTION OF THE CONCRETE PEDESTRIAN CURB ADJACENT TO THE RAMP AREAS SHALL BE INCLUDED IN THE BID PRICE OF THE CONCRETE CURB RAMP.
7. DETECTABLE WARNINGS SHALL MEET SECTION 705 OF THE USDDT ADA STANDARDS FOR TRANSPORTATION FACILITIES.
8. IF THE PLACEMENT OF A PEDESTRIAN PUSH BUTTON ASSEMBLY ON A TRAFFIC SIGNAL MAST POLE WILL NOT BE WITHIN EASY REACH (10" OR LESS AND UNOBSTRUCTED) OF PEDESTRIANS (IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT), THEN A SEPERATE PEDESTRIAN PUSH BUTTON POST ASSEMBLY (PPBPA) SHALL BE INSTALLED WITHIN EASY REACH. THE PPBPA SHALL MEET THE PROVISIONS FOUND IN "SECTION 4E.08 THROUGH 4E.13 - PEDESTRIAN DETECTORS" OF THE 2009 MUTCD MANUAL WITH REVISIONS 1 AND 2.
9. WHERE SPACE IS LIMITED OR GRADE IS AN ISSUE, A 10% SLOPE MAY BE USED ON FLARED SIDES.
10. THE SLOPES CAN BE LOWER THAN WHAT IS SHOWN BUT THEY SHALL NOT EXCEED THESE VALUES.
11. CURB RAMP TYPE 1A DIAGONAL (ON THE APEX) IS UNACCEPTABLE IN NEW CONSTRUCTION. TYPICALLY, TWO CURB RAMPS AS IN TYPE 1B, MUST BE PROVIDED AT EACH STREET CORNER. ADA TITLE II 28 C.F.R. SECTION 35.151(B) STATES:
 ALTERATIONS HAVE TO BE MADE READILY ACCESSIBLE, WITHIN THE IMPACTING PROJECT, TO THE MAXIMUM EXTENT FEASIBLE (MEF).
 THEREFORE, A SINGLE, DIAGONAL CURB RAMP TYPE 1A WILL ONLY BE PERMITTED ON ALTERATION PROJECTS WITH MEF JUSTIFICATION DOCUMENTATION IN ACCORDANCE TO CDOT PROCEDURAL DIRECTIVE 605.1 AND IN COORDINATION WITH THE ADA TITLE II COORDINATOR.
12. THE CURB RAMP (EXCLUDING ANY FLARED SIDES) OR BLENDED TRANSITION SHALL BE CONTAINED WHOLLY WITHIN THE WIDTH OF THE CROSSWALK AND/OR PEDESTRIAN STREET CROSSING THE RAMP SERVES.

Computer File Information Creation Date: 07/04/12 Initials: DLM Last Modification Date: 05/06/14 Initials: LTA Full Path: www.coloradodot.info/business/designsupport Drawing File Name: 608010107.dgn CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		Sheet Revisions <table border="1"> <tr> <th>Date:</th> <th>Comments</th> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>		Date:	Comments							Colorado Department of Transportation  4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 Fax: (303) 757-9820 Project Development Branch DLM/LTA		CURB RAMPS Issued By: Project Development Branch on July 4, 2012		STANDARD PLAN NO. M-608-1 Sheet No. 1 of 7	
Date:	Comments																



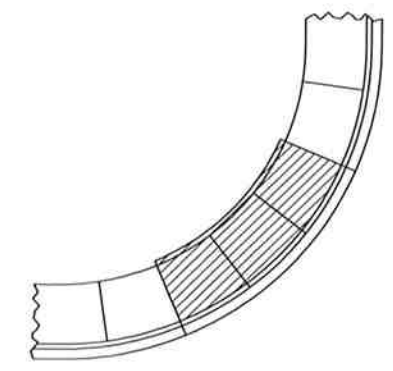
CURB RAMP TYPE 2A
SEE NOTE 3.

● - PEDESTRIAN PUSH BUTTON POST ASSEMBLY (PPBPA).
SEE NOTE 8 ON SHEET 1 OF 7.
SEE STANDARD PLAN S-614-9 FOR PPBPA DETAILS.
SEE PLANS FOR LOCATIONS.
THE SIGN FACE SHALL BE PARALLEL TO THE CROSSWALK.



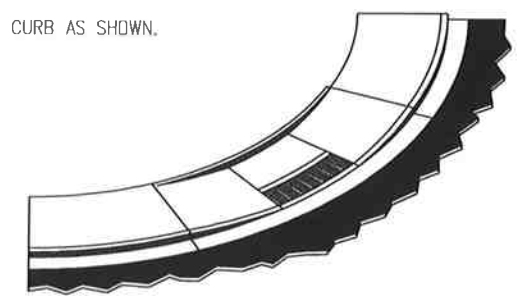
CURB RAMP TYPE 2B
SEE NOTE 3.

- NOTES**
- CURB RAMP TYPE 2A MAY BE USED IN MID-BLOCK.
 - SEE PLANS FOR SIDEWALK WIDTH. THE MINIMUM SIDEWALK WIDTH IS 4 FT.
 - CURB RAMP TYPE 2A DIAGONAL (ON THE APEX) IS UNACCEPTABLE IN NEW CONSTRUCTION. TYPICALLY, TWO CURB RAMPS AS IN TYPE 2B, MUST BE PROVIDED AT EACH STREET CORNER. ADA TITLE II 28 C.F.R. SECTION 35.151(B) STATES:
ALTERATIONS HAVE TO BE MADE READILY ACCESSIBLE, WITHIN THE IMPACTING PROJECT, TO THE MAXIMUM EXTENT FEASIBLE (MEF). THEREFORE, A SINGLE, DIAGONAL CURB RAMP TYPE 2A WILL ONLY BE PERMITTED ON ALTERATION PROJECTS WITH MEF JUSTIFICATION DOCUMENTATION IN ACCORDANCE TO CDOT PROCEDURAL DIRECTIVE 605.1 AND IN COORDINATION WITH THE ADA TITLE II COORDINATOR.

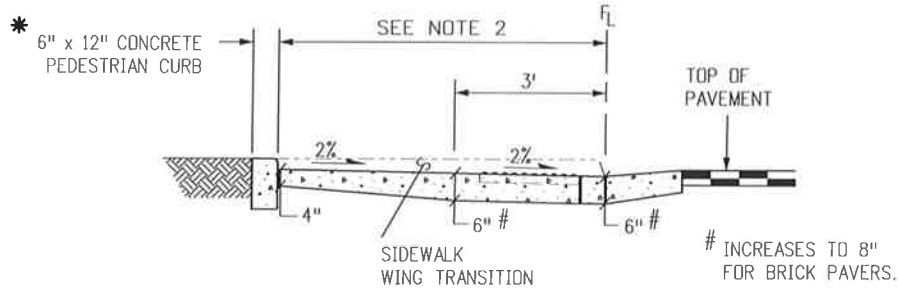


RAMP PAY AREA
FOR CURB RAMP TYPES 2A AND 2B.

* INCLUDES CONCRETE PEDESTRIAN CURB AS SHOWN.

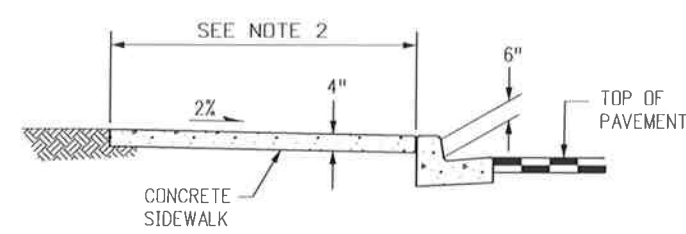


ISOMETRIC VIEW

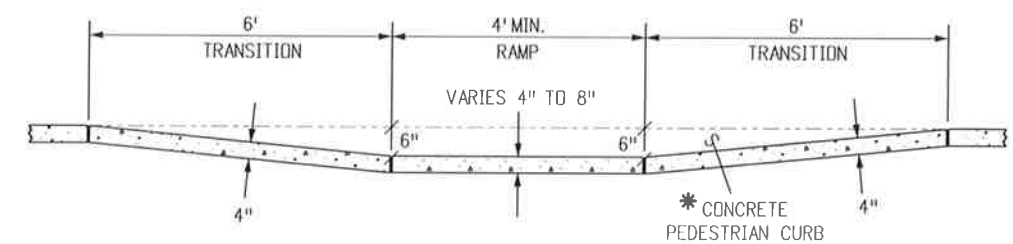


SECTION A-A

(PPBPA NOT SHOWN IN SECTION VIEWS AS IT MAY NOT BE REQUIRED.)



SECTION B-B



SECTION C-C

Computer File Information	
Creation Date: 07/04/12	Initials: DLM
Last Modification Date: 04/28/14	Initials: LTA
Full Path: www.coloradodot.info/business/designsupport	
Drawing File Name: 608010207.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
04/22/14	Made ramps perpendicular in 2B. Added note 3.

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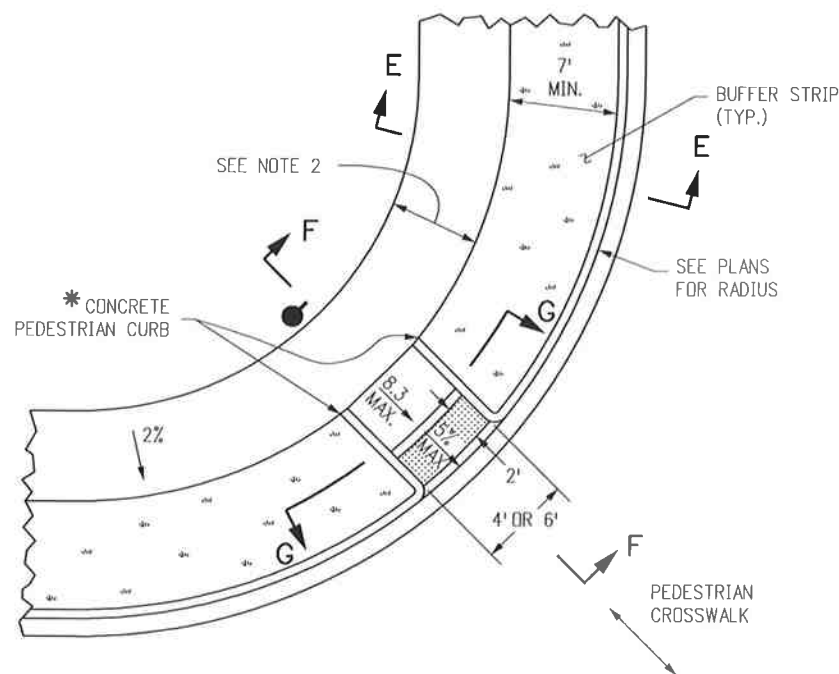
Project Development Branch **DLM/LTA**

CURB RAMPS

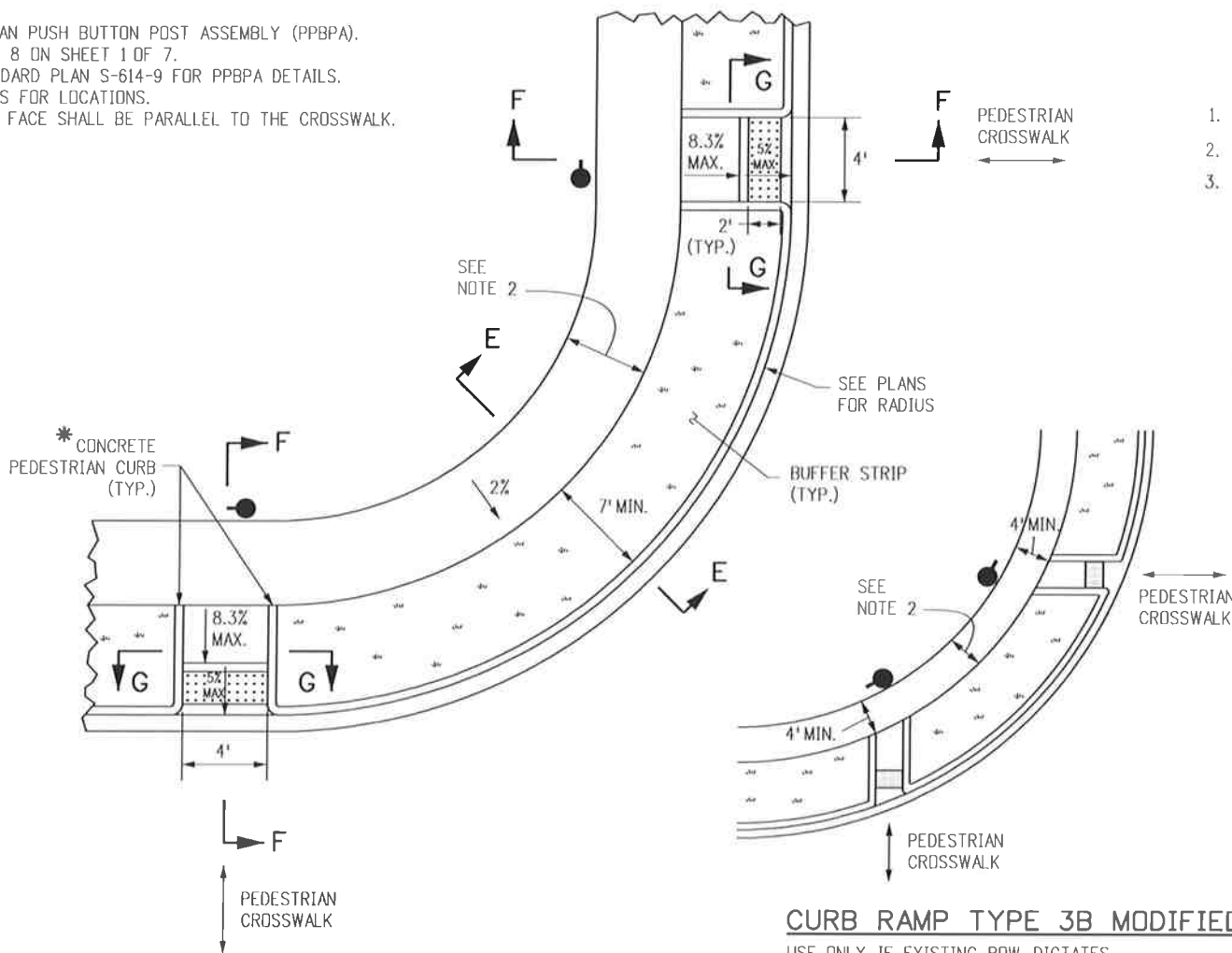
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M-608-1
Sheet No. 2 of 7

● = PEDESTRIAN PUSH BUTTON POST ASSEMBLY (PPBPA).
 SEE NOTE 8 ON SHEET 1 OF 7.
 SEE STANDARD PLAN S-614-9 FOR PPBPA DETAILS.
 SEE PLANS FOR LOCATIONS.
 THE SIGN FACE SHALL BE PARALLEL TO THE CROSSWALK.



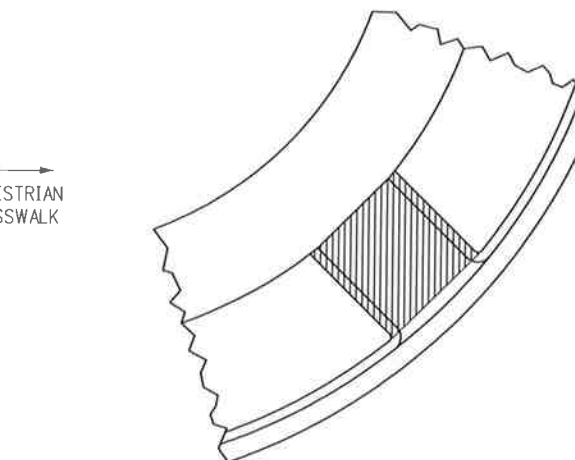
CURB RAMP TYPE 3A
 SEE NOTE 3.



CURB RAMP TYPE 3B
 SEE NOTE 3.

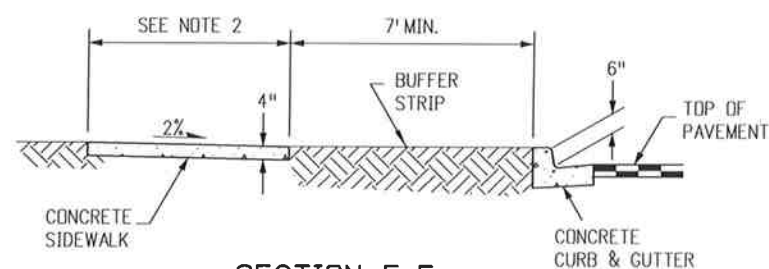
CURB RAMP TYPE 3B MODIFIED

USE ONLY IF EXISTING ROW DICTATES.
 GRADE BREAKS SHALL NOT BE PERMITTED ON THE SURFACE OF THE RAMP RUNS AND TURNING SPACES.
 SURFACE SLOPES THAT MEET AT GRADE BREAKS SHALL BE FLUSH. SEE NOTE 3.

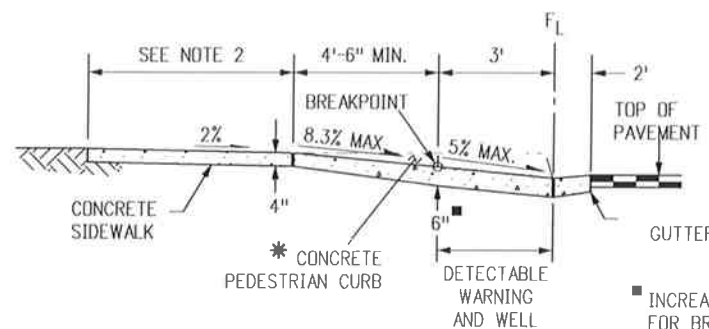


RAMP PAY AREA

FOR CURB RAMP TYPES 3A AND 3B.
 * INCLUDES CONCRETE PEDESTRIAN CURB AS SHOWN.

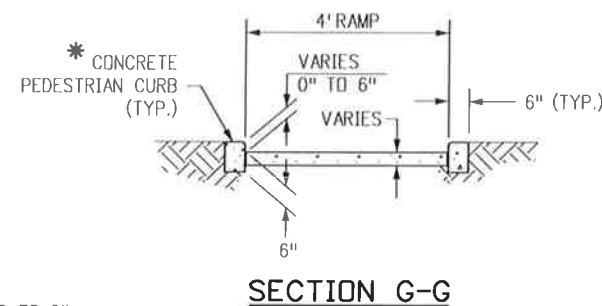


SECTION E-E

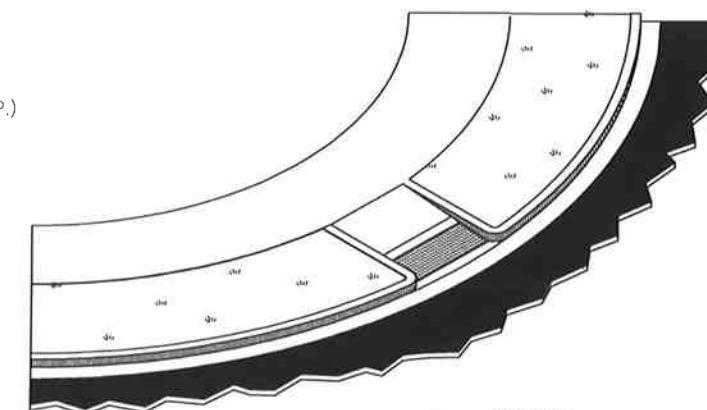


SECTION F-F

(PPBPA NOT SHOWN IN SECTION VIEWS AS IT MAY NOT BE REQUIRED.)



SECTION G-G



ISOMETRIC VIEW

- NOTES**
- CURB RAMP TYPE 3A MAY BE USED IN MID-BLOCK.
 - SEE PLANS FOR SIDEWALK WIDTH. THE MINIMUM SIDEWALK WIDTH IS 4 FT.
 - CURB RAMP TYPE 3A DIAGONAL (ON THE APEX) IS UNACCEPTABLE IN NEW CONSTRUCTION. TYPICALLY, TWO CURB RAMPS AS IN TYPE 3B, MUST BE PROVIDED AT EACH STREET CORNER.
 ADA TITLE II 28 C.F.R. SECTION 35.151(B) STATES:
 ALTERATIONS HAVE TO BE MADE READILY ACCESSIBLE, WITHIN THE IMPACTING PROJECT, TO THE MAXIMUM EXTENT FEASIBLE (MEF).
 THEREFORE, A SINGLE, DIAGONAL CURB RAMP TYPE 3A WILL ONLY BE PERMITTED ON ALTERATION PROJECTS WITH MEF JUSTIFICATION DOCUMENTATION IN ACCORDANCE TO CDOT PROCEDURAL DIRECTIVE 605.1 AND IN COORDINATION WITH THE ADA TITLE II COORDINATOR.

Computer File Information	
Creation Date: 07/04/12	Initials: DLM
Last Modification Date: 04/28/14	Initials: LTA
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Drawing File Name: 608010307.dgn	(R-X)
CAD Ver.: MicroStation V8	(R-X)
Scale: Not to Scale	Units: English

Sheet Revisions	
Date:	Comments

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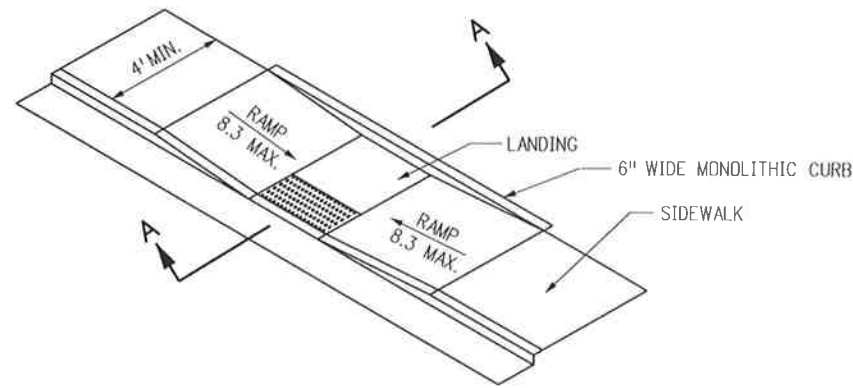
CURB RAMPS

Issued By: Project Development Branch on July 4, 2012

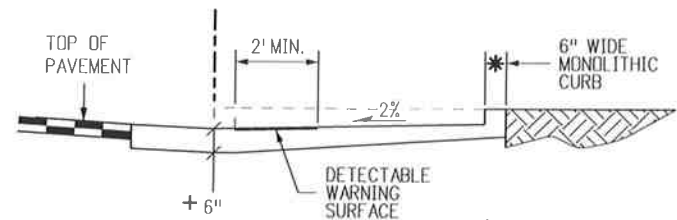
STANDARD PLAN NO.

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Sheet No. 3 of 7



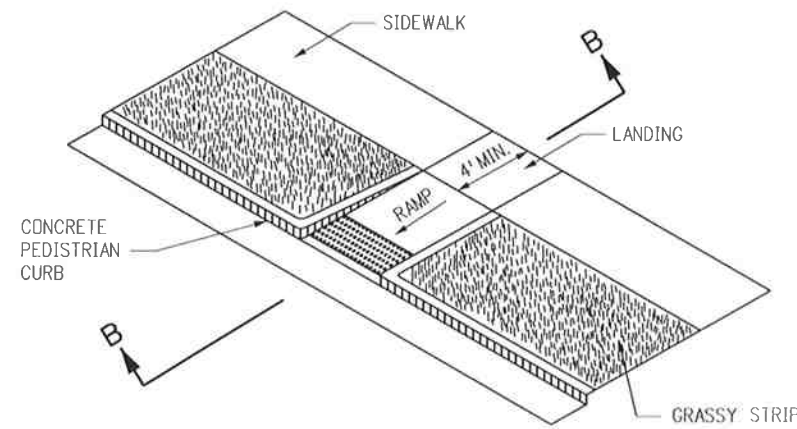
PARALLEL CURB RAMP WITHIN 4 FT. MIN. SIDEWALK



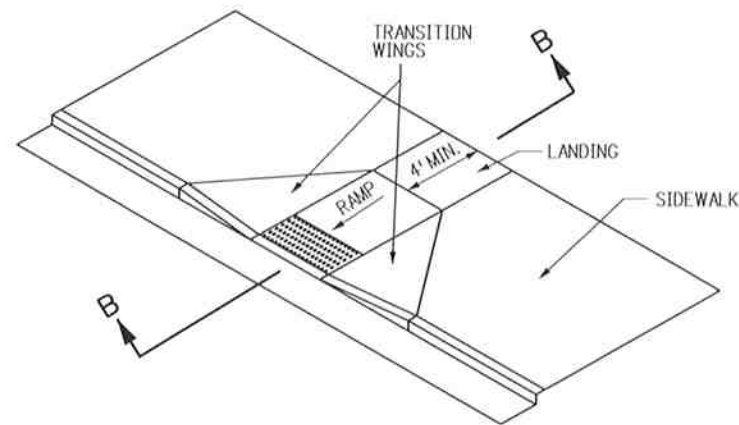
SECTION A-A

+ INCREASES TO 8" FOR BRICK PAVERS.

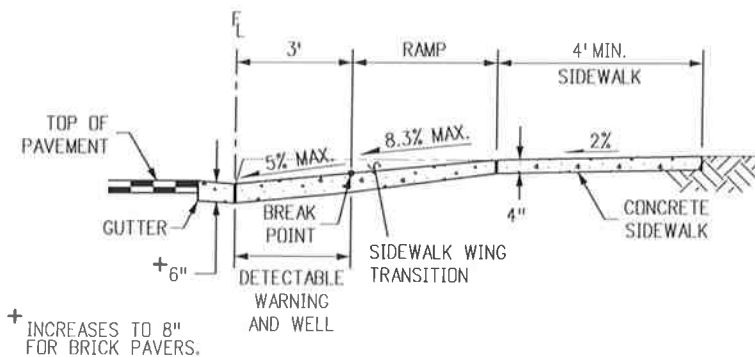
* INCLUDES CONCRETE PEDESTRIAN CURB AS SHOWN.



PERPENDICULAR CURB RAMP



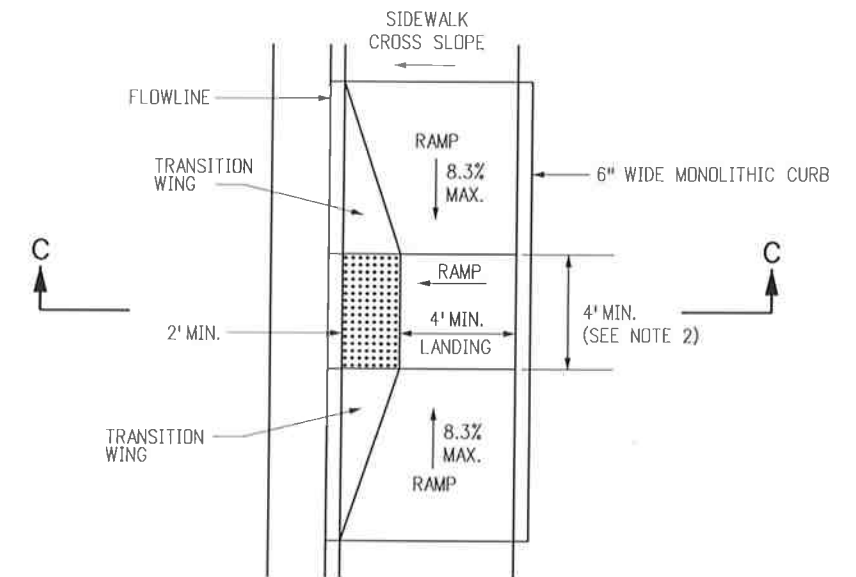
PERPENDICULAR CURB RAMP WITHIN SIDEWALK



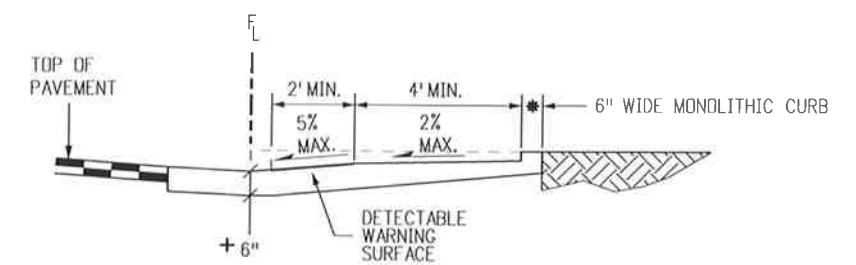
SECTION B-B

+ INCREASES TO 8" FOR BRICK PAVERS.

- NOTES**
1. PERPENDICULAR AND PARALLEL CURB RAMPS SHOWN ON THIS DRAWING ARE ACCEPTABLE FOR USE AT MID-BLOCK INSTALLATIONS.
 2. SITE CONDITIONS WILL VARY. CONFIGURATION OF RAMPS, LANDINGS, AND TRANSITIONS MAY BE CHANGED BUT THEY MUST MEET THE DIMENSIONS AND SLOPES SHOWN HERE. THE USE OF FLARES, CURBWALLS, ETC. ARE AT THE DISCRETION OF THE ENGINEER.
 3. PROVIDE DETECTABLE WARNING SURFACE FOR FULL WIDTH OF CURB CUT. SEE "PLAN VIEW OF DETECTABLE WARNING" DETAIL ON SHEET 5 FOR DETECTABLE WARNING SURFACE DIMENSIONS.
 4. LOCATE CURB CUT WITHIN CROSSWALK.
 5. RAMP GRADE BREAK MUST BE PERPENDICULAR TO THE RUNNING SLOPE.



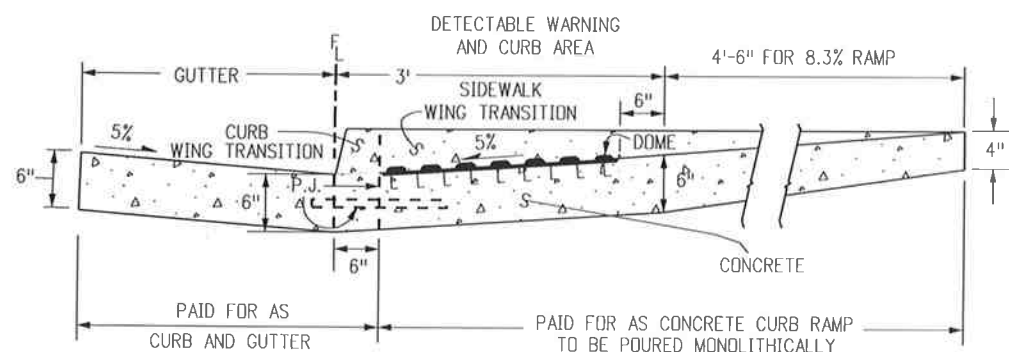
CURB RAMP WITHIN 6 FT. MIN. SIDEWALK



SECTION C-C

+ INCREASES TO 8" FOR BRICK PAVERS.

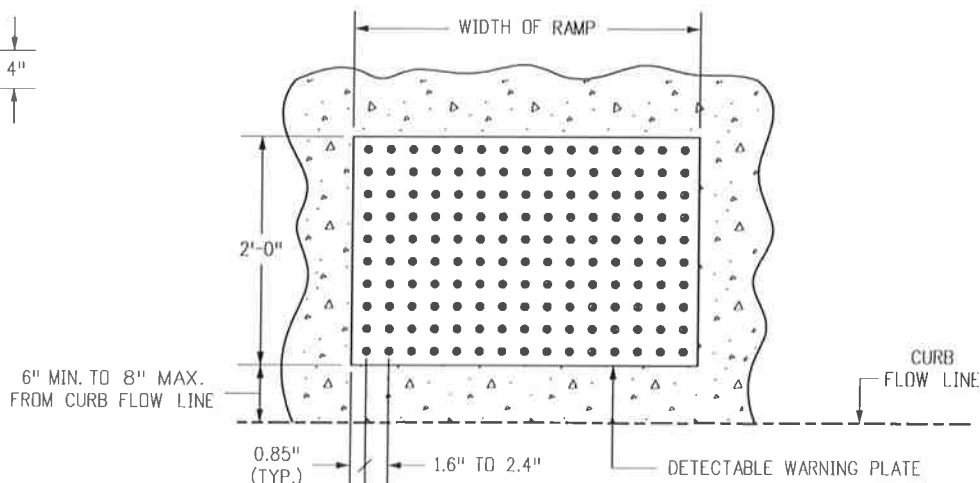
Computer File Information		Sheet Revisions		 <p>Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 Fax: (303) 757-9820</p>	<p>CURB RAMPS</p>	STANDARD PLAN NO.
Creation Date: 07/04/12	Initials: DLM	Date:	Comments:			M-608-1
Last Modification Date: 04/28/14	Initials: LTA					
Full Path: www.coloradodot.info/business/designsupport	(R-X)					
Drawing File Name: 608010407.dgn	(R-X)					
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English			Issued By: Project Development Branch on July 4, 2012	Sheet No. 4 of 7



DETAIL FOR TYPES 1 AND 3 CURB RAMPS

P.J. = PERMISSIBLE JOINT WITH EPOXY-COATED DEFORMED NO. 4 BY 18 IN. BARS CONFORMING TO AASHTO M 284 AT 18 IN. SPACING.

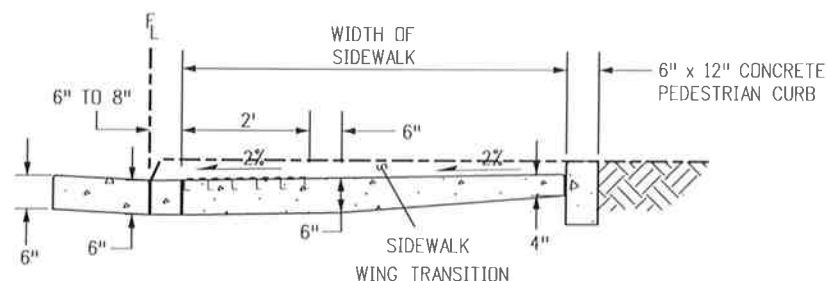
**SIDE CROSS SECTION VIEW OF
DETECTABLE WARNING, CURB, AND GUTTER**



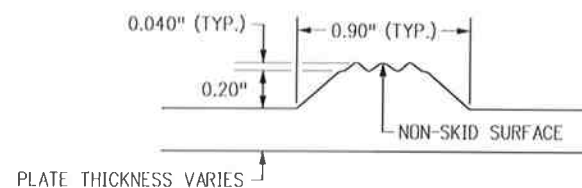
**PLAN VIEW OF
DETECTABLE WARNING**

NOTES

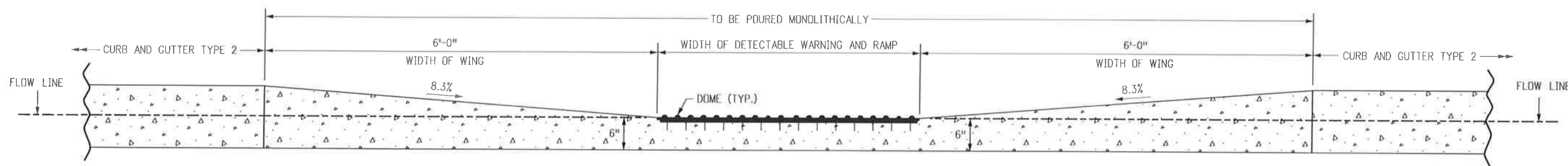
1. THE TRUNCATED DOME PLATE SHALL BE EMBEDDED IN THE CONCRETE CURB RAMP WHILE CONCRETE IS PLASTIC.
2. THE TRUNCATED DOME PLATE TO BE USED SHALL BE ON THE CDOT APPROVED PRODUCT LIST.
3. WHEN THE DETECTABLE WARNING SURFACE IS CUT, GRIND OFF REMAINING PORTION OF ANY CUT DOMES. SEAL ALL CUT PANEL EDGES TO PREVENT WATER DAMAGE.
4. THE DETECTABLE WARNING SURFACE SHALL SPAN THE ENTIRE WIDTH OF THE RAMP. IF CONDITIONS DO NOT ALLOW THE ENTIRE SPAN, THE DETECTABLE WARNING SURFACE SPAN SHALL NOT BE MORE THAN 2 INCHES AWAY FROM EACH SIDE OF RAMP.



DETAIL FOR TYPE 2 CURB RAMP



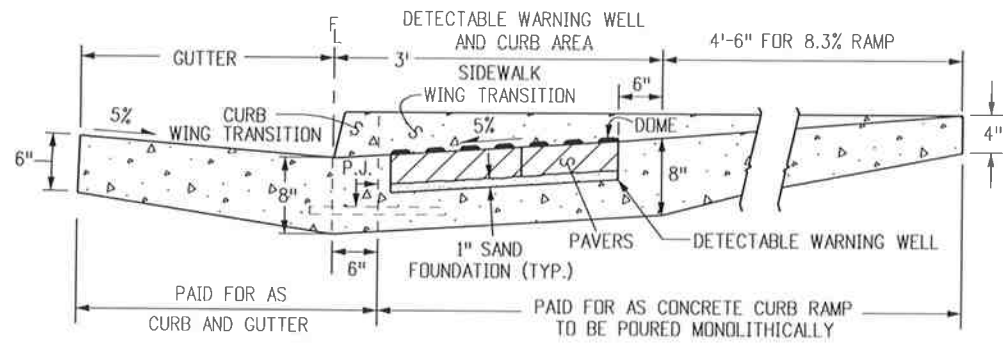
ELEVATION VIEW OF DETECTABLE WARNING PLATE



**FRONT SECTION VIEW OF
DETECTABLE WARNING, CURB, AND GUTTER**

CURB RAMP WITH A TRUNCATED DOME SURFACE PLATE

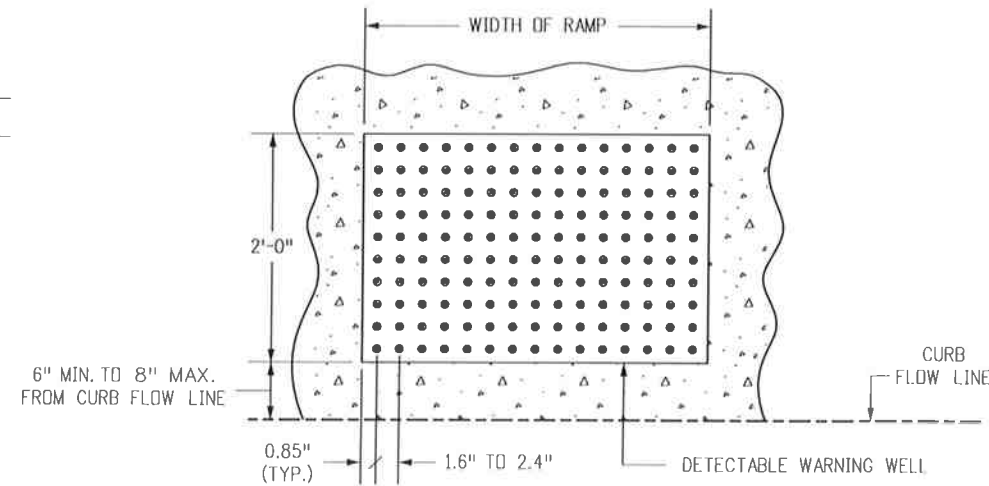
Computer File Information		Sheet Revisions		Colorado Department of Transportation  4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 Fax: (303) 757-9820 Project Development Branch DLM/LTA	<h1>CURB RAMPS</h1>	STANDARD PLAN NO.
Creation Date: 07/04/12	Initials: DLM	Date:	Comments:			M-608-1
Last Modification Date: 4/28/14	Initials: LTA					
Full Path: www.coloradodot.info/business/designsupport	(R-X)					Sheet No. 5 of 7
Drawing File Name: 608010507.dgn	(R-X)					
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English	(R-X)		Issued By: Project Development Branch on July 4, 2012	



DETAIL FOR TYPES 1 AND 3 CURB RAMPS

P.J. = PERMISSIBLE JOINT WITH EPOXY-COATED DEFORMED NO. 4 BY 18 IN. BARS CONFORMING TO AASHTO M 284 AT 18 IN. SPACING.

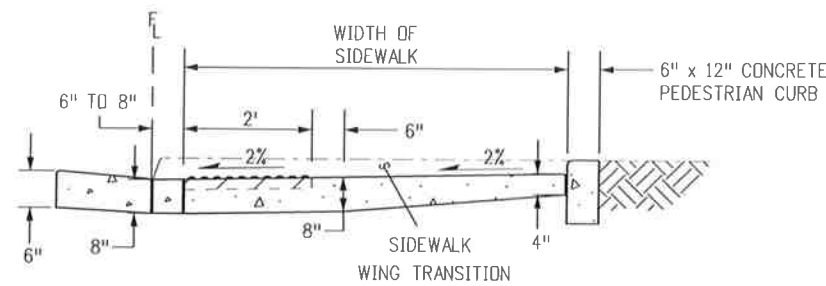
**SIDE CROSS SECTION VIEW OF
DETECTABLE WARNING, WELL, CURB, AND GUTTER**



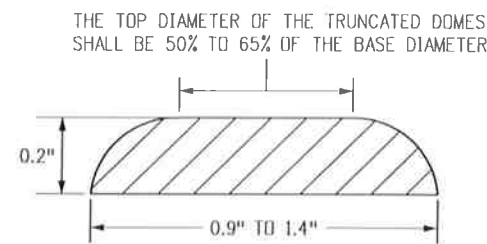
**PLAN VIEW OF
DETECTABLE WARNING AND WELL**
(PAVERS NOT DRAWN TO SCALE)

NOTES

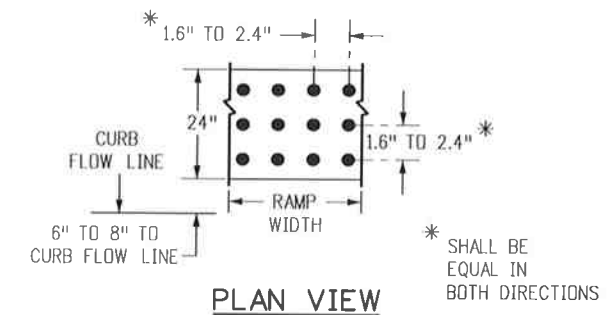
1. THE DETECTABLE WARNINGS SHALL BE MADE OF PAVERS WITH A TRUNCATED DOME SURFACE.
2. THE TOP OF THE DRAINAGE WEEP HOLE SHALL BE LOCATED AT THE LOWEST POINT OF THE DETECTABLE WARNING WELL.
3. RAMP SLOPES SHALL BE 12:1 OR FLATTER. THE DETECTABLE WARNING AND WELL AREA SLOPES SHALL BE 20:1 OR FLATTER.
4. THE DETECTABLE WARNING SURFACE SHALL SPAN THE ENTIRE WIDTH OF THE RAMP. IF CONDITIONS DO NOT ALLOW THE ENTIRE SPAN, THE DETECTABLE WARNING SURFACE SPAN SHALL NOT BE MORE THAN 2 INCHES AWAY FROM EACH SIDE OF RAMP.



DETAIL FOR TYPE 2 CURB RAMP

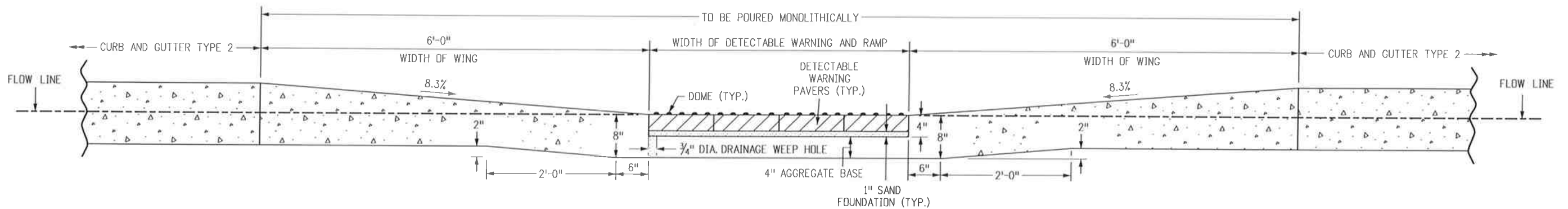


ELEVATION VIEW OF SINGLE DOME



PLAN VIEW

DOME AND DETECTABLE WARNING DETAILS



**FRONT SECTION VIEW OF
DETECTABLE WARNING, WELL, CURB, AND GUTTER
CURB RAMP WITH DOME PAVER OPTION**

Computer File Information	
Creation Date: 07/04/12	Initials: DLM
Last Modification Date: 4/28/14	Initials: LTA
Full Path: www.coloradodot.info/business/designsupport	
Drawing File Name: 608010607.dgn	
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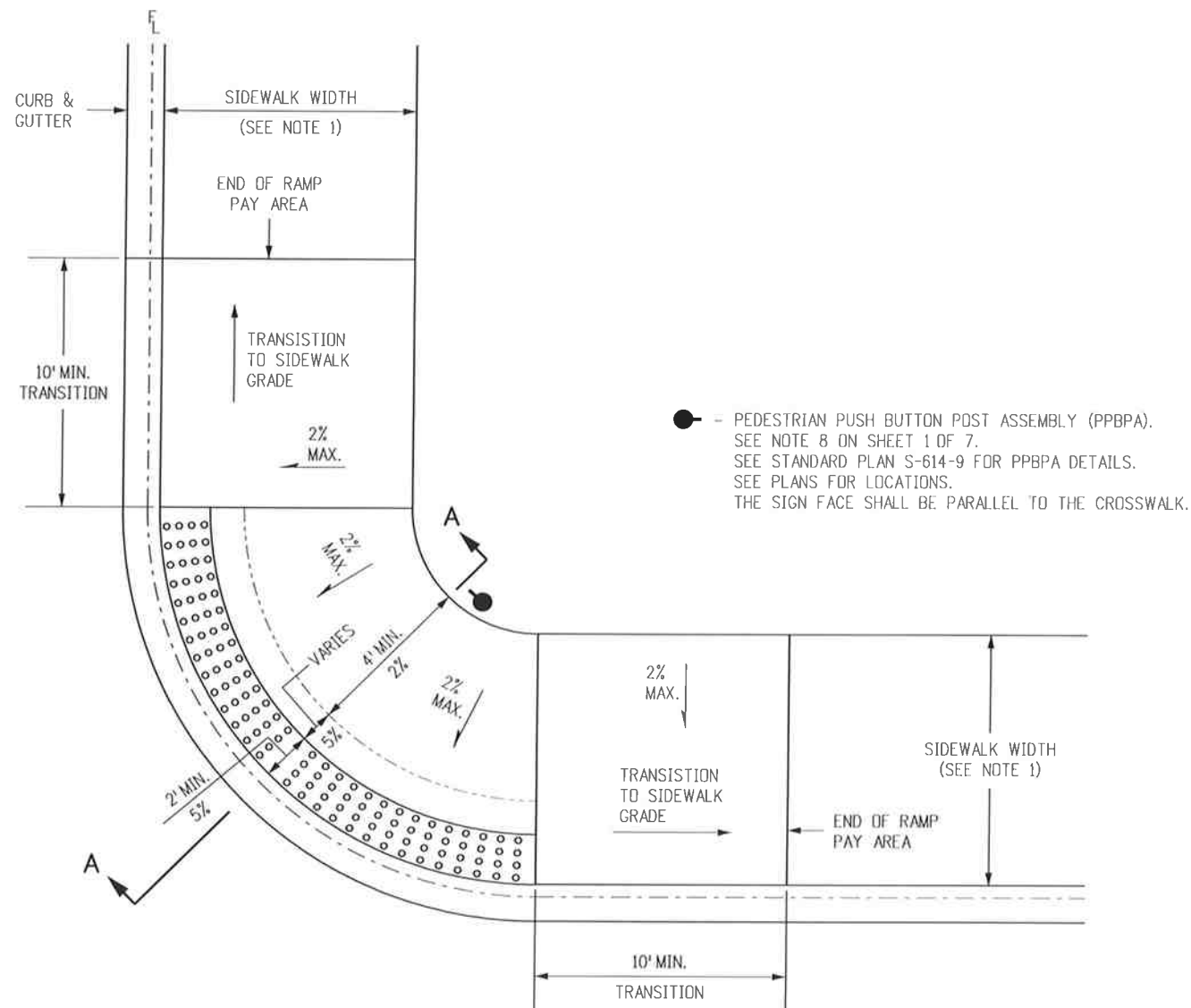
Sheet Revisions	
Date:	Comments
(R-X)	
(R-X)	
(R-X)	
(R-X)	

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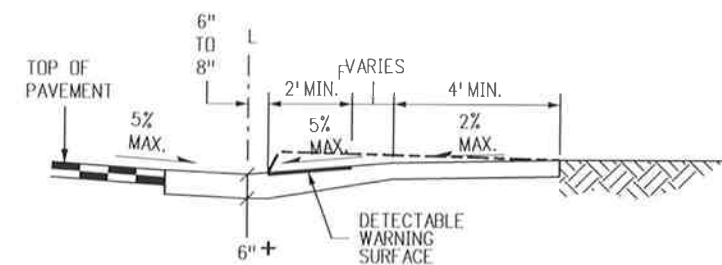
CURB RAMPS
 Issued By: Project Development Branch on July 4, 2012

STANDARD PLAN NO.
M-608-1
 Sheet No. 6 of 7



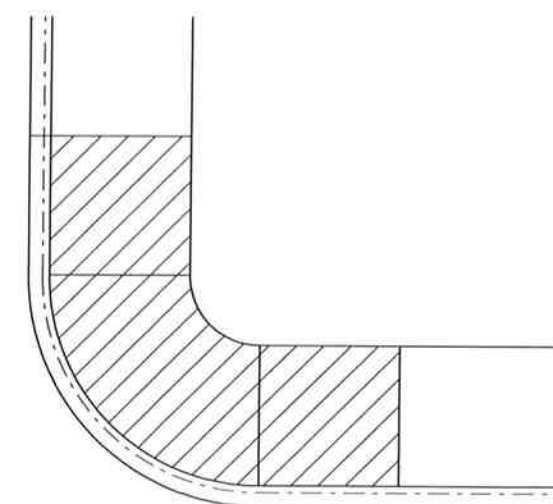
● = PEDESTRIAN PUSH BUTTON POST ASSEMBLY (PPBPA).
 SEE NOTE 8 ON SHEET 1 OF 7.
 SEE STANDARD PLAN S-614-9 FOR PPBPA DETAILS.
 SEE PLANS FOR LOCATIONS.
 THE SIGN FACE SHALL BE PARALLEL TO THE CROSSWALK.

CORNER BLENDED TRANSITION CURB RAMP



SECTION A-A

(PPBPA NOT SHOWN IN SECTION VIEWS AS IT MAY NOT BE REQUIRED.)



RAMP PAY AREA

FOR CORNER BLENDED TRANSITION CURB RAMP

NOTES

1. IF THE EXISTING SIDEWALK WIDTHS ARE DIFFERENT, MATCH THE SMALLEST WIDTH TO 4 FT. MIN.
2. SLOPES SHOWN AS TYPICAL IN SECTION A-A MAY BE ADJUSTED IF NECESSARY TO FIT EXISTING CONDITIONS, BUT MAY NOT EXCEED 5% SLOPE UNDER ANY CONDITIONS.
3. ALL TRUNCATED DOME PANELS OR PAVERS PLACED AT THE SAME CORNER SHALL BE MADE UP OF THE SAME UNIFORM MATERIAL TYPE.

+ INCREASES TO 8" FOR BRICK PAVERS.

Computer File Information	
Creation Date: 07/04/12	Initials: DLM
Last Modification Date: 04/24/14	Initials: LTA
Full Path: www.coloradodot.info/business/designsupport	
Drawing File Name: 608010707.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

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Date:	Comments
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(R-X)	

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Project Development Branch **DLM/LTA**

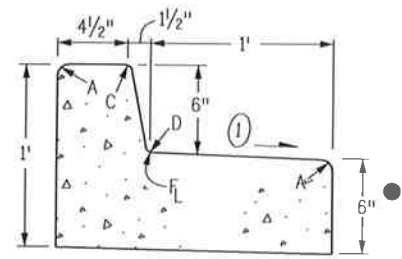
CURB RAMPS

Issued By: Project Development Branch on July 4, 2012

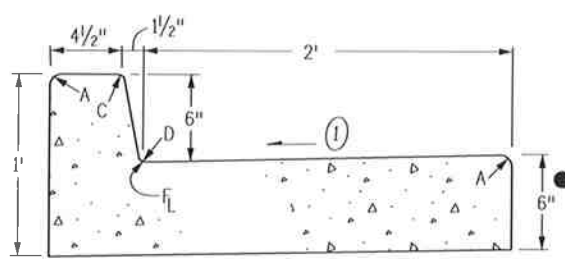
STANDARD PLAN NO.

M-608-1

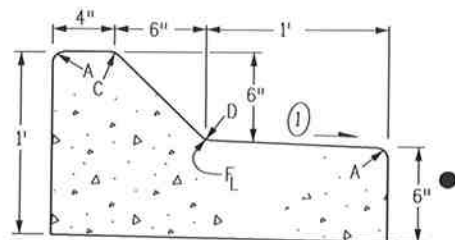
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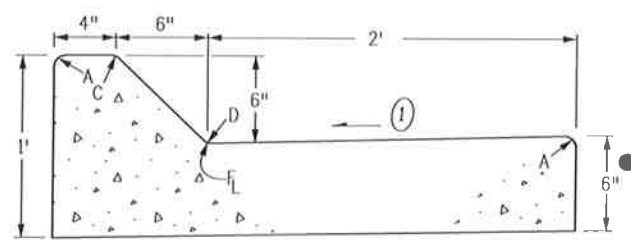
**CURB AND GUTTER TYPE 2
(SECTION IB)
(6 IN. BARRIER - 1 FT. GUTTER)**



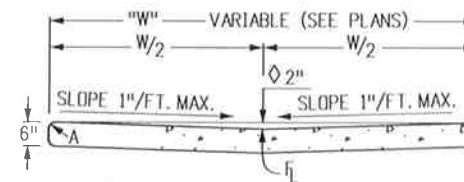
**CURB AND GUTTER TYPE 2
(SECTION IIB)
(6 IN. BARRIER - 2 FT. GUTTER)**



**CURB AND GUTTER TYPE 2
(SECTION IM)
(6 IN. MOUNTABLE - 1 FT. GUTTER)**

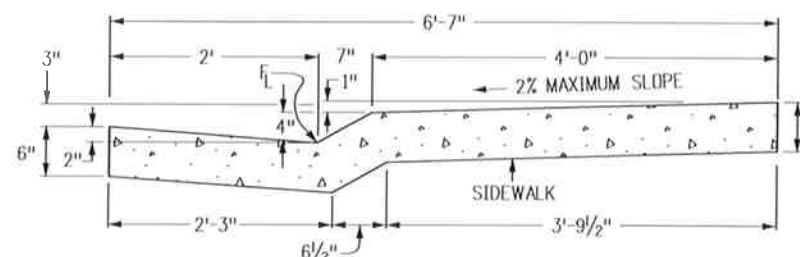


**CURB AND GUTTER TYPE 2
(SECTION IIM)
(6 IN. MOUNTABLE - 2 FT. GUTTER)**

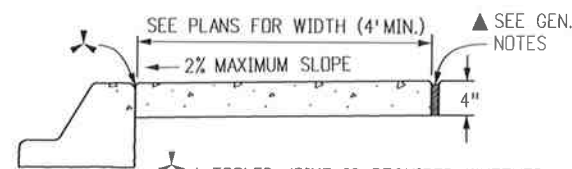


2 IN. DEPTH WHEN USED AS A
CROSSSPAN IN AN INTERSECTION

GUTTER TYPE 2

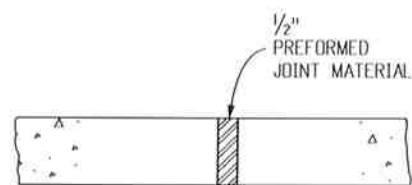


**CURB AND GUTTER TYPE 2
(SECTION MS)
(4 IN. MOUNTABLE WITH SIDEWALK)**



SEE PLANS FOR CURB & GUTTER TYPE
A TOOLED JOINT IS REQUIRED WHETHER THE CURB AND SIDEWALK ARE POURED SEPARATELY OR MONOLITHICALLY.

CONCRETE SIDEWALK



NOTES: 1. EXPANSION JOINTS SHALL BE PLACED IN THE SIDEWALK AT INTERVALS OF NOT MORE THAN 500 FT.

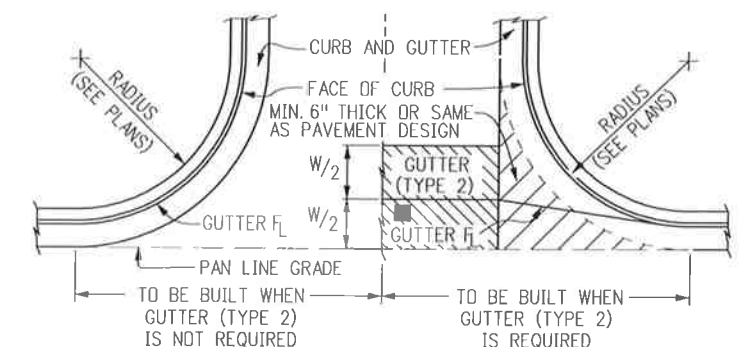
2. EXPANSION JOINTS MAY BE SEALED WHEN SPECIFIED ON THE PLANS.

SIDEWALK EXPANSION JOINT

GENERAL NOTES

- ON ROADWAY CURVES WITH A RADIUS OF 1,900 FT. OR LESS, CURBS AND GUTTERS ARE TO BE PLACED ON THE ARC OF THE CURVE, UNLESS OTHERWISE NOTED ON THE PLANS. A MAXIMUM CHORD LENGTH OF 10 FT. MAY BE USED WHEN THE CURVE RADIUS IS GREATER THAN 1,900 FT.
 - CONCRETE SHALL BE CLASS B.
 - PROFILE GRADE OF CURBS AND GUTTERS SHALL BE LOCATED AT THE FLOW LINE.
 - CURB TYPE 4 (KEY-WAY) MAY BE USED IN LIEU OF CURB AND GUTTER TYPE 2 (SECTIONS IB AND IM) UNLESS OTHERWISE SPECIFIED ON THE PLANS.
 - GUTTER CROSS SLOPES MAY BE ADJUSTED TO FACILITATE DRAINAGE FOR PROFILE GRADES AS SHOWN ON THE PLANS.
 - THICKNESS OF CURB AND GUTTER SECTION SHALL MATCH CONCRETE PAVEMENT THICKNESS IF SHOWN ON THE PLANS. CURB AND GUTTER SHALL BE CLASS P CONCRETE IF PLACED MONOLITHICALLY WITH CONCRETE PAVEMENT.
 - INCREASE SIDEWALK THICKNESS TO 6 IN. AT LOCATIONS SHOWN ON THE PLANS.
 - MINIMUM SIDEWALK WIDTH IS 4 FT.
- ▲ EXPANSION JOINTS SHALL BE INSTALLED WHEN ABUTTING EXISTING CONCRETE OR FIXED STRUCTURE. EXPANSION JOINT MATERIAL SHALL BE 1/2 IN. THICK AND SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE.
- ① GUTTER CROSS SLOPES SHALL BE 1/2 IN./FT. WHEN DRAINING AWAY FROM CURB AND 1 IN./FT. WHEN DRAINING TOWARD CURB.
- WHEN TIE BARS ARE REQUIRED, THE GUTTER THICKNESS SHALL BE INCREASED TO THE PAVEMENT THICKNESS (T). BARS SHALL BE EPOXY-COATED #4 CONFORMING TO AASHTO M 284 AND SPACED AT 3 FT. INTERVALS. THEY SHALL BE INSERTED 1/2 AND 1#2 LENGTH INTO THE GUTTER.

LEGEND FOR RADII	
A	= 1/8" TO 1/4"
B	= 1"
C	= 1 1/2"
D	= 1 1/2" TO 2"



THIS AREA SHALL BE POURED MONOLITHICALLY WITH CURB AND GUTTER AND PAID FOR AS "CONCRETE PAVEMENT".

■ FLOW LINE LOCATION WILL BE ESTABLISHED BY W/2 SHOWN ON PLANS.

CONSTRUCTION OF CONCRETE GUTTERS AT INTERSECTION

Computer File Information	
Creation Date: 07/04/12	Initials: DD
Last Modification Date: 07/24/12	Initials: LTA
Full Path: www.coloradodot.info/business/designsupport	
Drawing File Name: 609010104.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
07/24/12	Changed Tie Bar spacing from 30" to 36".

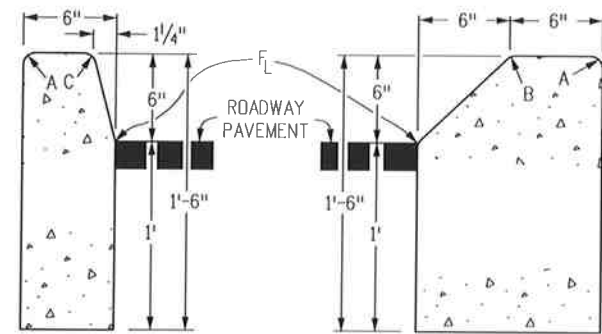
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Project Development Branch DD/LTA

**CURB, GUTTERS,
AND SIDEWALKS**

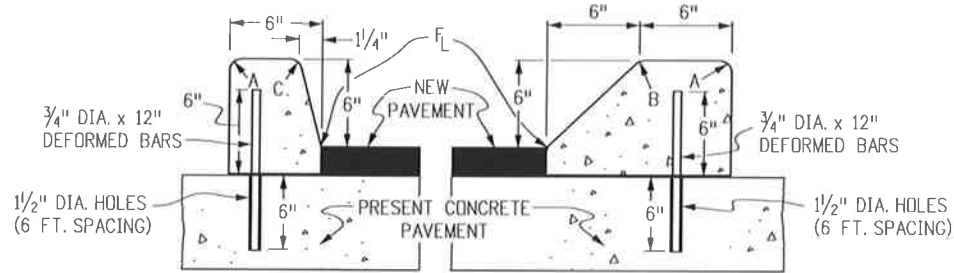
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STANDARD PLAN NO.
M-609-1
Sheet No. 1 of 4



CURB TYPE 2
(SECTION B)
6 IN. BARRIER

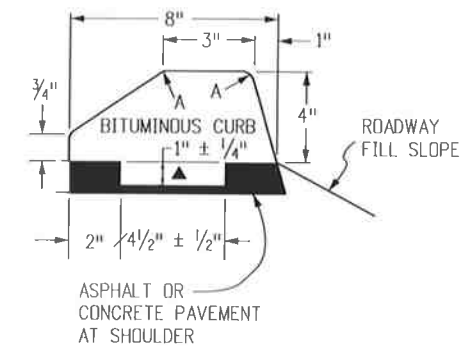
CURB TYPE 2
(SECTION M)
6 IN. MOUNTABLE



CURB TYPE 4
(SECTION B)
6 IN. BARRIER

CURB TYPE 4
(SECTION M)
6 IN. MOUNTABLE

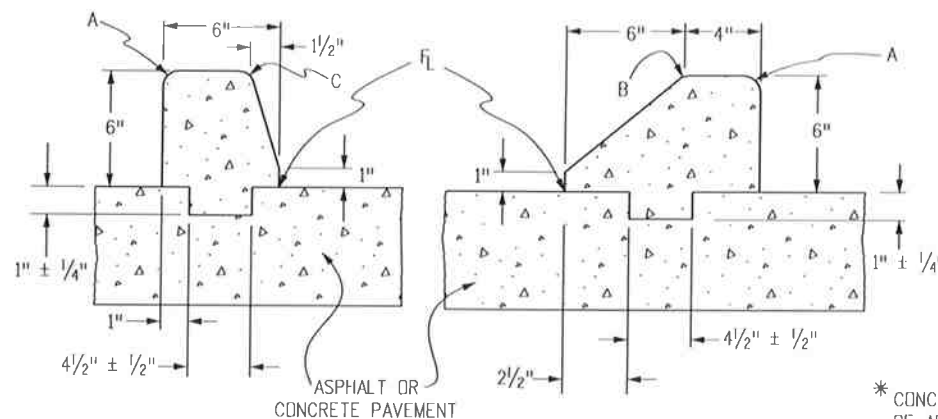
3/4" DIA. x 12" DEFORMED REINFORCING BARS AT 6 FT. SPACING SHALL BE GROUTED IN 1/4" DIA. HOLES IN EXISTING CONCRETE. GROUT SHALL CONSIST OF 2 PARTS CLEAN SAND AND 1 PART CEMENT. COST OF INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR CURB.



CURB TYPE 6
(SECTION M)
4 IN. MOUNTABLE

NOTE: BITUMINOUS OR CONCRETE * UNLESS OTHERWISE SPECIFIED ON THE PLANS.

▲ KEY-WAY MAY BE OMITTED WHEN PLACED UNDER GUARDRAIL.



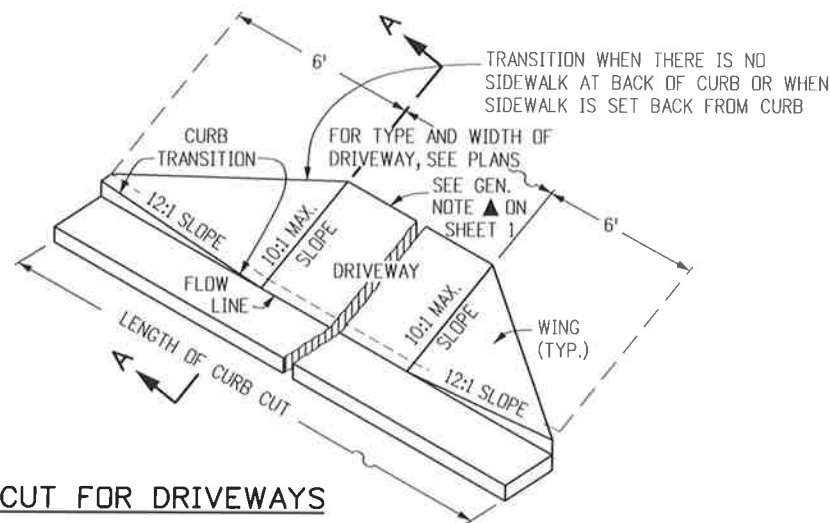
(SECTION B)

(SECTION M)

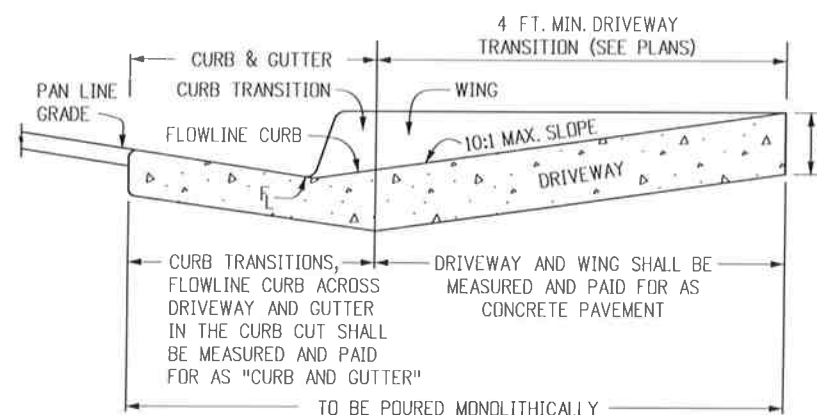
CURB TYPE 4 (KEY-WAY)*

* CONCRETE CLASS B SHALL CONTAIN 1.5 POUNDS PER CUBIC YARD OF APPROVED POLYPROPYLENE FIBERS AND MAY HAVE A NOMINAL AGGREGATE SIZE OF 3/8 IN.

LEGEND FOR RADII	
A	= 1/8 TO 1/4"
B	= 1"
C	= 1 1/2"
D	= 1 1/2" TO 2"

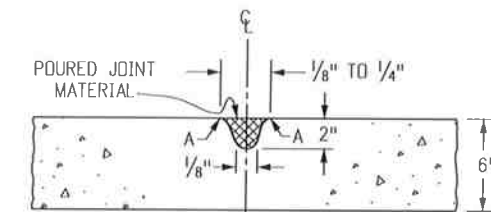


CURB CUT FOR DRIVEWAYS
(WITHOUT ATTACHED SIDEWALK)



SECTION A-A

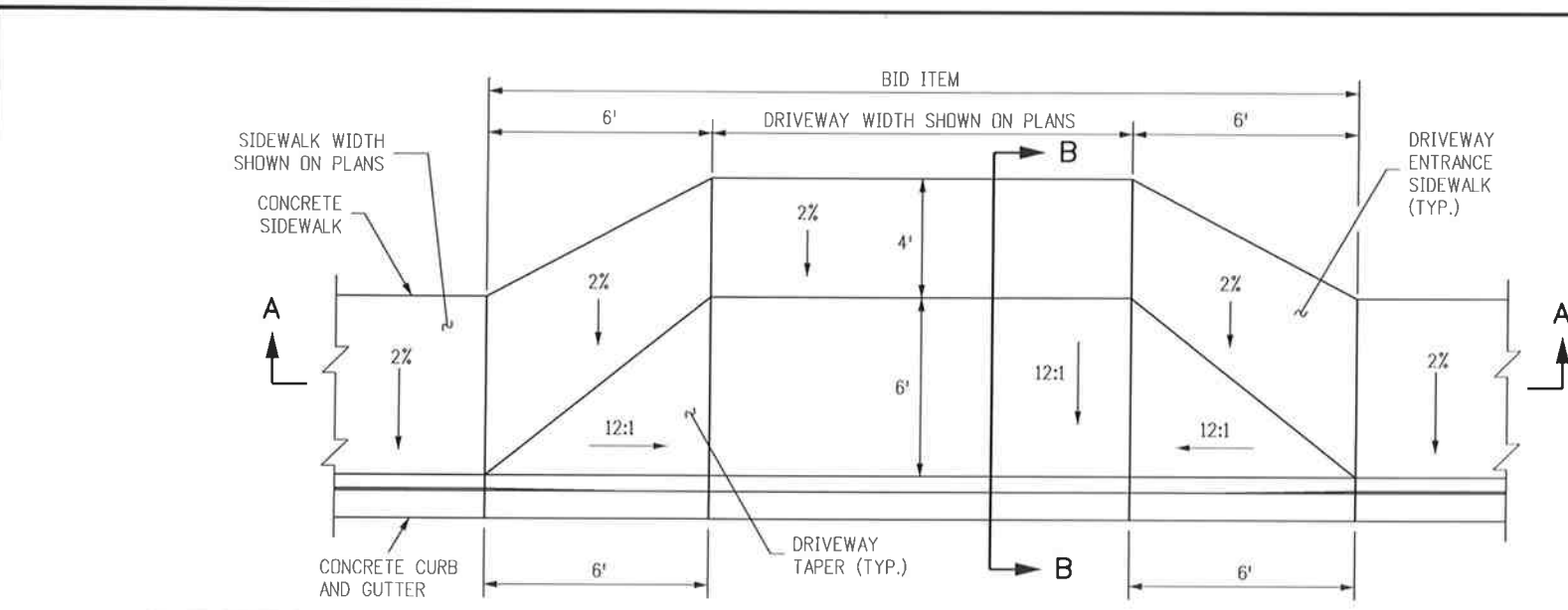
CONCRETE PAVEMENT (DRIVEWAYS)



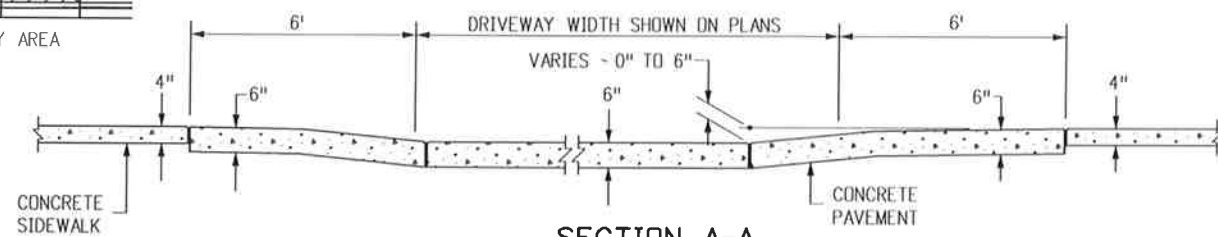
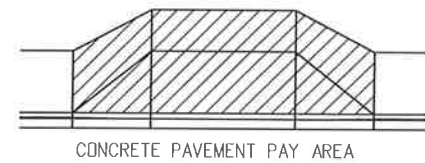
NOTE: RECOMMENDED JOINT SPACING IS EVERY 8 FOOT ALONG THE WIDTH AND LENGTH OF DRIVEWAY. FOR DRIVEWAYS WIDER THAN 12 FEET, JOINTS ARE REQUIRED.

TRANSVERSE CONTRACTION JOINT
FOR CONCRETE PAVEMENT (DRIVEWAYS)

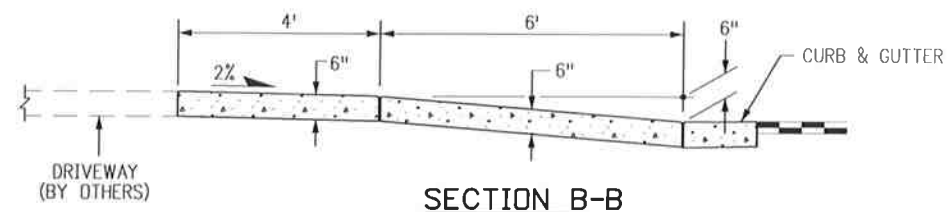
Computer File Information		Sheet Revisions		Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 Fax: (303) 757-9820 Project Development Branch DD/LTA	CURB, GUTTERS, AND SIDEWALKS	STANDARD PLAN NO.	
Creation Date: 07/04/12	Initials: DD	Date:	Comments:				
Last Modification Date: 07/04/12	Initials: LTA	(R-X)				Sheet No. 2 of 4	
Full Path: www.coloradodot.info/business/designsupport	(R-X)						
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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)						
Issued By: Project Development Branch on July 4, 2012							



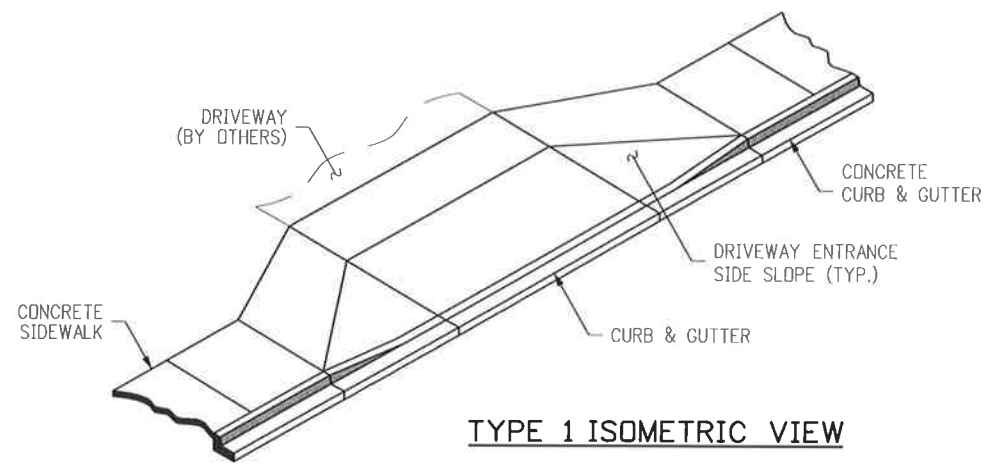
CONCRETE DRIVEWAY ENTRANCE TYPE 1



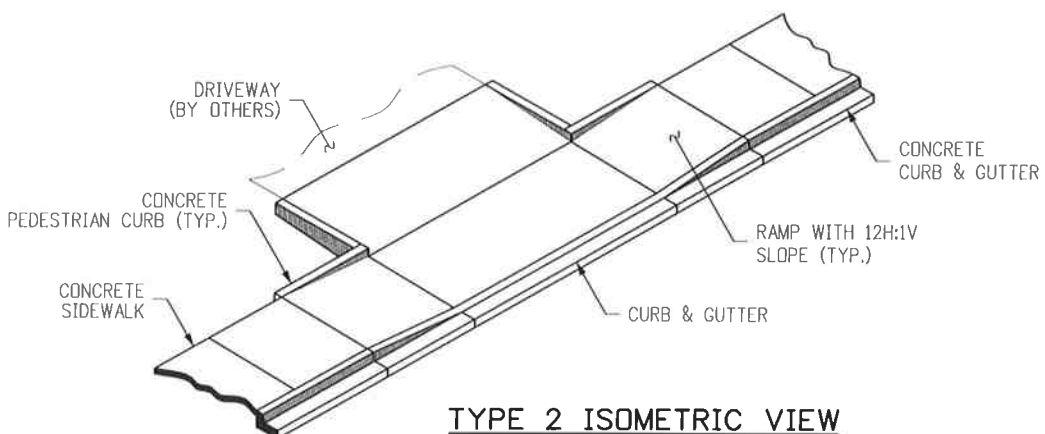
SECTION A-A



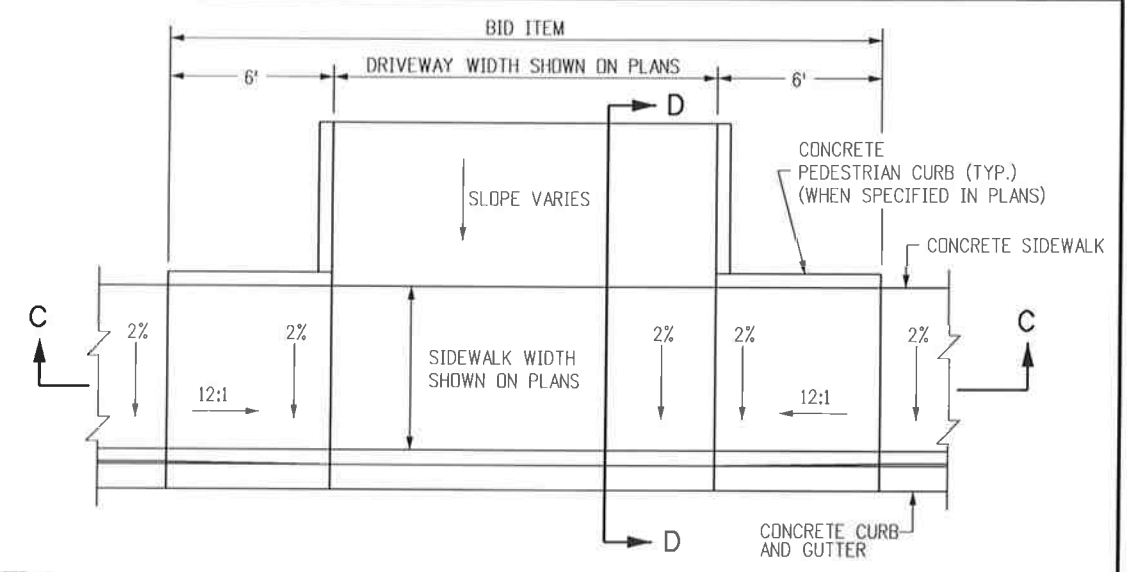
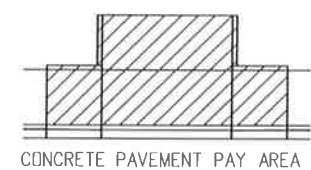
SECTION B-B



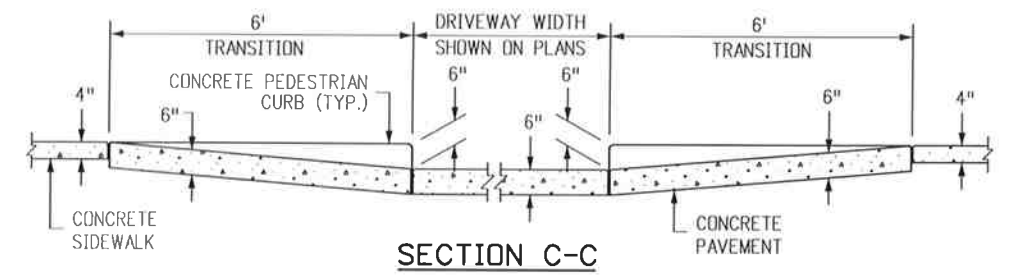
TYPE 1 ISOMETRIC VIEW



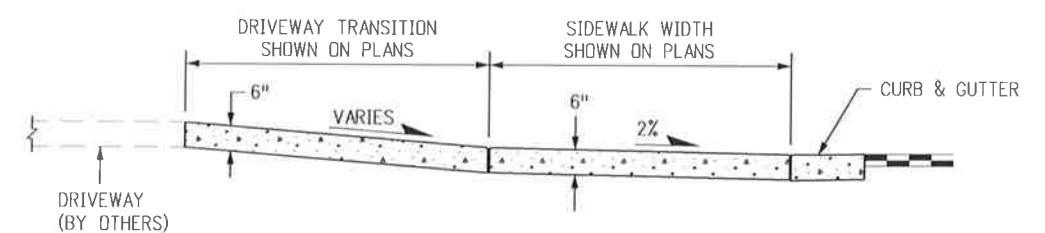
TYPE 2 ISOMETRIC VIEW



CONCRETE DRIVEWAY ENTRANCE TYPE 2



SECTION C-C



SECTION D-D

NOTES

1. DRAINAGE STRUCTURES, TRAFFIC SIGNAL EQUIPMENT, JUNCTION BOXES, AND OTHER OBSTRUCTIONS SHOULD NOT BE PLACED IN FRONT OF THE DRIVEWAY RAMP ACCESS AREAS.
2. FOR THE CURB AND GUTTER SHOWN, SEE PLANS FOR CURB TYPE.
3. RAMP SLOPES SHALL BE 12:1 OR FLATTER.
4. CONSTRUCTION OF THE CONCRETE PEDESTRIAN CURB SHALL BE INCLUDED IN THE BID PRICE OF THE CONCRETE PAVEMENT.

Computer File Information	
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Full Path: www.coloradodot.info/business/designsupport	
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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

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(R-X)	

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Project Development Branch DD/LTA

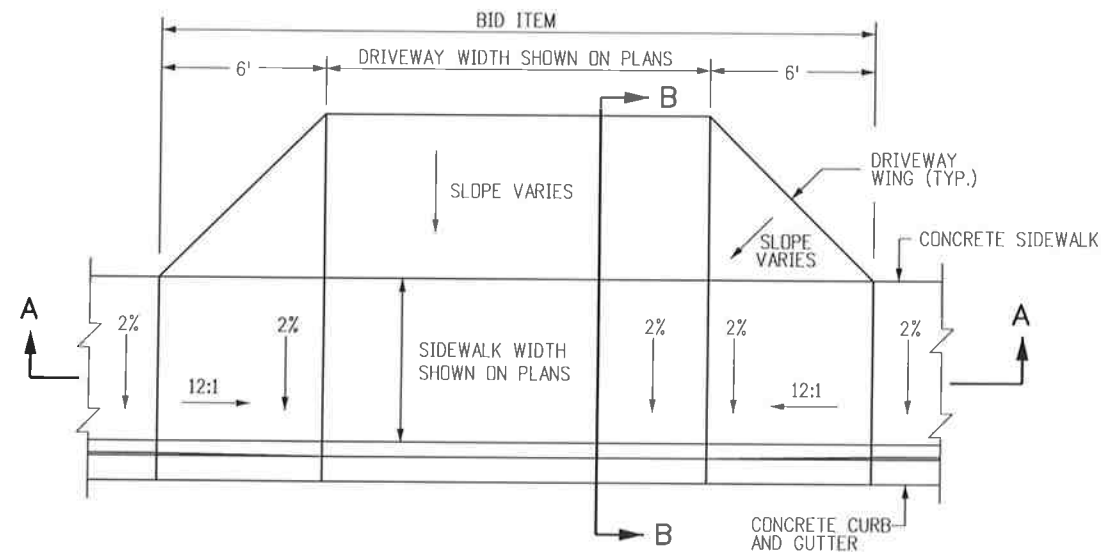
**CURB, GUTTERS,
AND SIDEWALKS**

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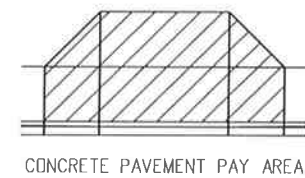
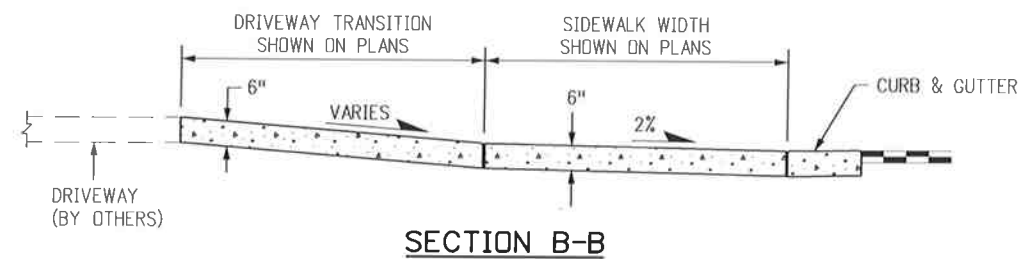
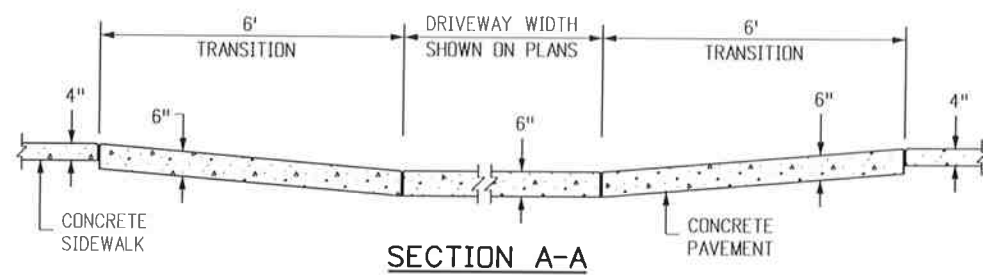
STANDARD PLAN NO.

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Sheet No. 3 of 4

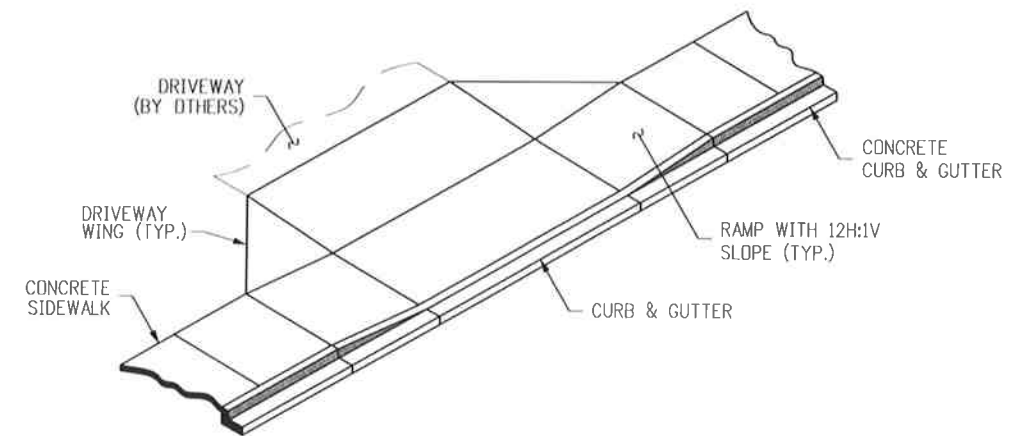


CONCRETE DRIVEWAY ENTRANCE TYPE 3



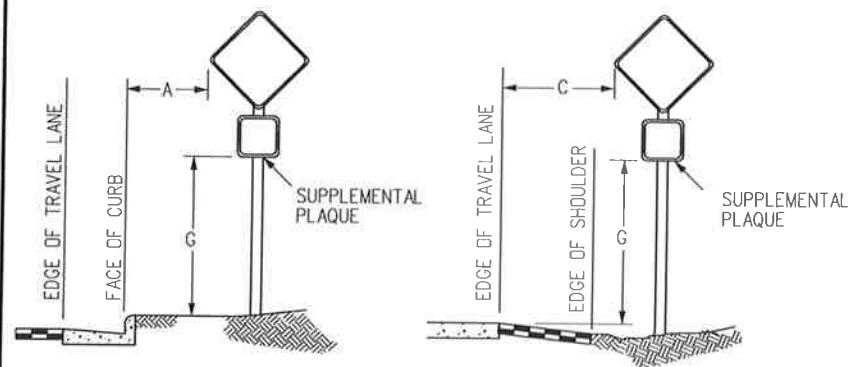
NOTES

1. DRAINAGE STRUCTURES, TRAFFIC SIGNAL EQUIPMENT, JUNCTION BOXES, AND OTHER OBSTRUCTIONS SHOULD NOT BE PLACED IN FRONT OF THE DRIVEWAY RAMP ACCESS AREAS.
2. FOR THE CURB AND GUTTER SHOWN, SEE PLANS FOR CURB TYPE.
3. RAMP SLOPES SHALL BE 12:1 OR FLATTER.

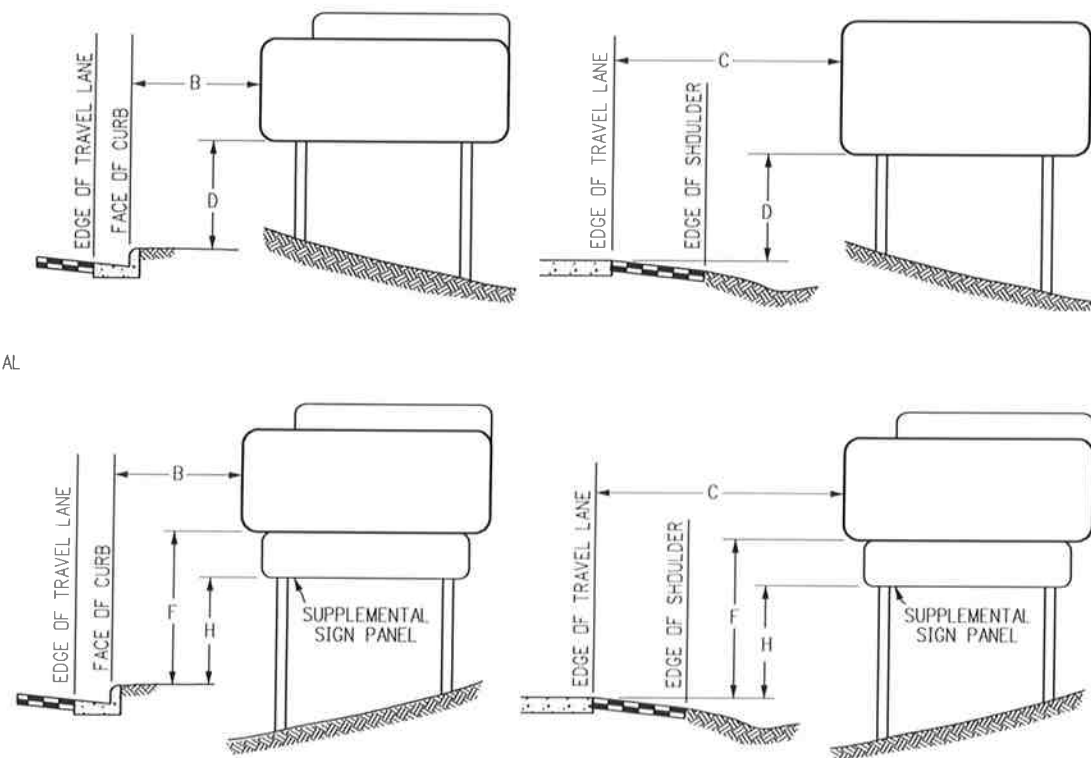


TYPE 3 ISOMETRIC VIEW

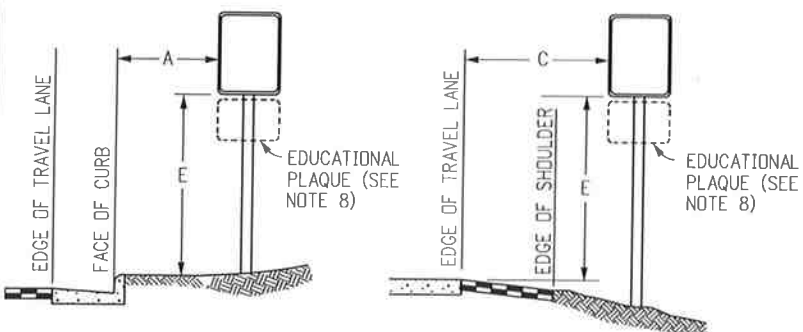
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Creation Date: 07/04/12	Initials: DD	Date:	Comments:			M-609-1
Last Modification Date: 07/04/12	Initials: LTA					Sheet No. 4 of 4
Full Path: www.coloradodot.info/business/designsupport	(R-X)				Issued By: Project Development Branch on July 4, 2012	
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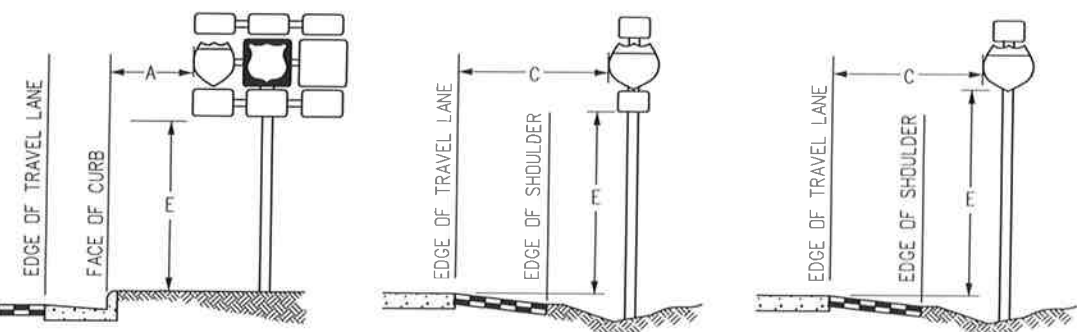
WARNING SIGN PLACEMENT



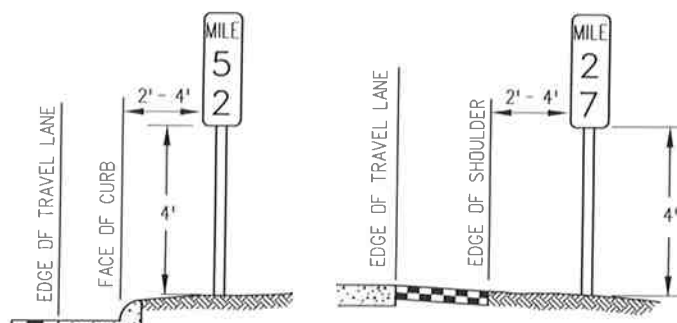
CLASS III SIGN PLACEMENT



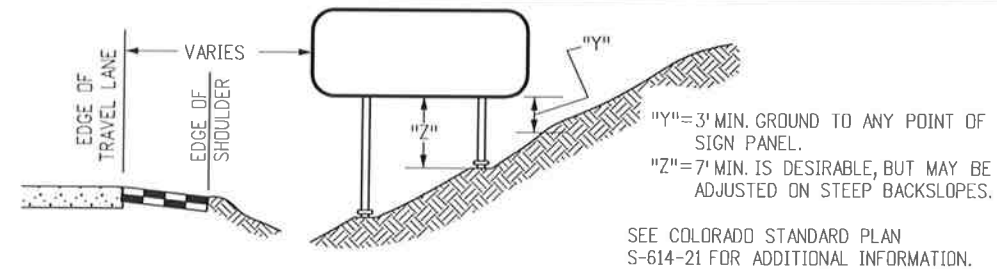
REGULATORY, RECREATIONAL AND CULTURAL INFORMATION SIGN PLACEMENT



ROUTE MARKER ASSEMBLY PLACEMENT



MILE MARKER PLACEMENT



CLASS III SIGNS, PANEL GROUND CLEARANCE

GENERAL NOTES

1. THE ENGINEER WILL ESTABLISH GRADES AND LOCATIONS FOR ALL SIGN POSTS IN ACCORDANCE WITH DETAILS SHOWN ON THE PLANS.
2. SPECIAL CARE SHALL BE TAKEN IN SIGN LOCATION TO ENSURE AN UNOBSTRUCTED VIEW OF EACH SIGN.
3. MINIMUM POST EMBEDMENT SHALL BE 3 FT. FOR U-2 POSTS AND 4 IN. X 4 IN. TIMBER POSTS, AND 5 FT. FOR 6 IN. X 6 IN. TIMBER POSTS. FOR FOOTING DEPTH SEE THE APPLICABLE STANDARD.
4. IF A SHOULDER IS WIDER THAN 6 FEET, THE MINIMUM LATERAL OFFSET DISTANCE SHOULD BE 6 FEET FROM EDGE OF SHOULDER, EXCEPT FOR MILE MARKER SIGNS. SEE FIGURE 2A-2(B) OF THE 2009 MUTCD.
5. NORMAL LATERAL PLACEMENT IS MEASURED FROM THE EDGE OF TRAVEL LANE.
6. IN URBAN AREAS, A LATERAL CLEARANCE OF 1 FT. FROM THE CURB FACE IS PERMISSIBLE WHERE SIDEWALK WIDTH IS LIMITED OR WHERE EXISTING POLES ARE CLOSE TO THE CURB.
7. TYPICAL POST MOUNTING HEIGHTS FROM GROUND TO BOTTOM OF SIGN PANEL ARE 7, OR 8 FEET. OTHER HEIGHTS MAY BE REQUIRED WHEN SIGNS ARE MOUNTED ON STEEPER FILL OR CUT SLOPES.
8. "EDUCATIONAL PLAQUES" FOR SYMBOL SIGNS WILL NOT BE CONSIDERED WHEN DETERMINING VERTICAL PLACEMENT. FOR INFORMATION OF EDUCATIONAL PLAQUE, SEE PAGE 3 OF THE 2012 CDOT GUIDE SIGNING POLICIES & PROCEDURES, AND SECTION 2M.06 OF THE 2009 MUTCD.
9. WHEN LATERAL PLACEMENT IS 30 FT. OR MORE FOR SIGNS WITHOUT A SUPPLEMENTAL PANEL, VERTICAL PLACEMENT D MAY BE REDUCED TO 5 FT. WHEN LATERAL PLACEMENT IS 30 FT. OR MORE, FOR SIGNS WITH A SUPPLEMENTAL PANEL, VERTICAL PLACEMENT E DOES NOT APPLY - USE ONLY VERTICAL PLACEMENT H.
10. NORMAL ANGULAR PLACEMENT IS 0 DEG. SIGNS CLOSER THAN 30 FT. SHOULD BE TURNED SLIGHTLY AWAY TO MINIMIZE SPECULAR REFLECTION. SIGNS PLACED 30 FT. OR MORE SHOULD GENERALLY BE TURNED TOWARD THE ROAD.
11. THE EXIT PANEL IS MOUNTED ON THE RIGHT HAND SIDE FOR RIGHT HAND EXITS AND THE LEFT SIDE FOR LEFT HAND EXITS.
12. POST SHALL BE INSTALLED PLUMB, VERTICAL DEVIATION SHALL NOT EXCEED 1/2 IN. IN 10 FT.
13. ON ALL TWO-LANE, UNDIVIDED HIGHWAYS, THE MILE MARKER AND POST SHALL BE INSTALLED ON THE RIGHT SHOULDER IN THE ASCENDING DIRECTION, WITH THE MILE MARKER PANELS DISPLAYED ON THE FRONT AND BACK SIDE OF THE POST.
14. ON ALL UNDIVIDED MULTI-LANE AND DIVIDED HIGHWAYS, AND INTERSTATES, THE MILE MARKER AND POST SHALL BE INSTALLED ON THE OUTSIDE SHOULDER (OR SIDEWALK IF APPLICABLE) IN BOTH DIRECTIONS OF TRAVEL.
15. VERTICAL SPACING BETWEEN SIGN PANELS SHALL BE 1 TO 1 1/2 IN., TYPICAL.

PLACEMENT TABLES

LATERAL PLACEMENT			VERTICAL PLACEMENT			
KEY	ALL CLASSES OF STREETS AND HIGHWAYS		FREEWAYS AND EXPRESSWAYS		CONVENTIONAL STREETS AND HIGHWAYS	
	MINIMUM	NORMAL	MIN.	MAX.	URBAN MIN.	RURAL MAX.
A	2'-0"	15'-0" PLUS CURB	D	7'-0" OR NOTE NO. 9	12'-0"	7'-0" 8'-0" 5'-0" 8'-0"
B	2'-0"	30'-0" OR MORE INCLUDES CURB	E	7'-0"	8'-0"	7'-0" 8'-0" 5'-0" 8'-0"
C	2'-0"	6'-0" PLUS EDGE OF 6'+ WIDE SHOULDER. IF NONE, 15'-0" FROM EDGE OF TRAVEL LANE.	F	8'-0" OR NOTE NO. 9	12'-0"	8'-0" 9'-0" 5'-0" 9'-0"
			G	6'-0"	7'-0"	6'-0" 7'-0" 4'-0" 7'-0"
			H	5'-0"	10'-0"	6'-0" 7'-0" 4'-0" 7'-0"

Computer File Information

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Last Modification Date: 03/07/14	Initials: KEN
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
Drawing File Name: S-614-01_1of2.dgn	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments
07/24/12	ADDED NOTES 14 AND 15 ON SHEET 1
03/07/14	SHEET 1 - UPDATED DIMENSIONS TO MUTCD STDS

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Safety & Traffic Engineering Branch **KCM/KEN**

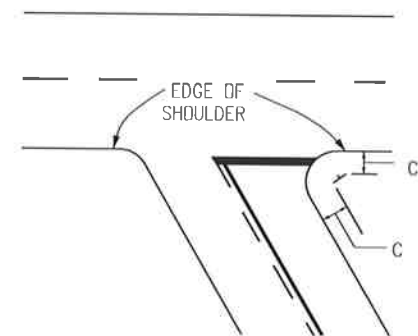
GROUND SIGN PLACEMENT

Issued By: Safety & Traffic Engineering Branch July 4, 2012

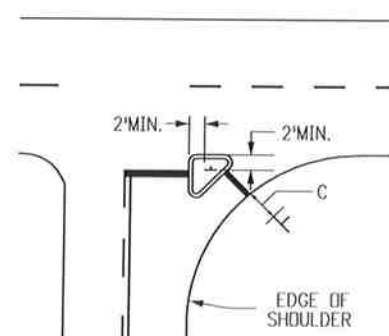
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S-614-1

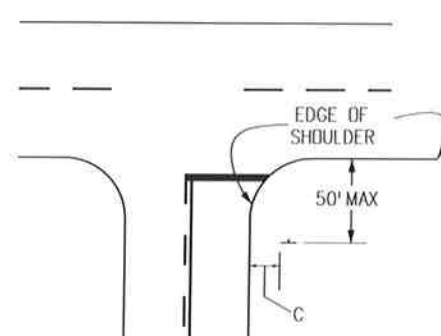
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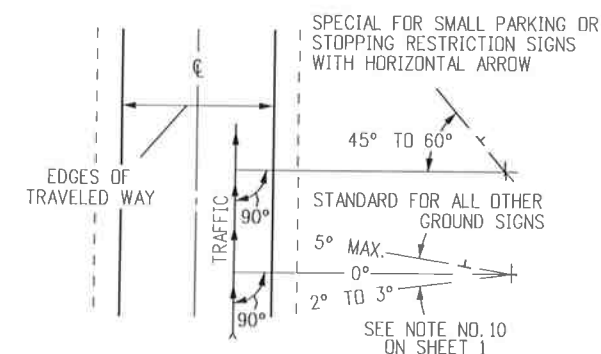
ACUTE ANGLE INTERSECTION



CHANNELIZED INTERSECTION

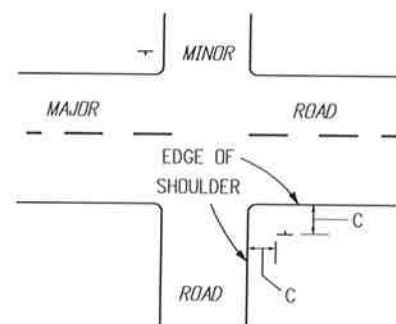


WIDE THROAT INTERSECTION

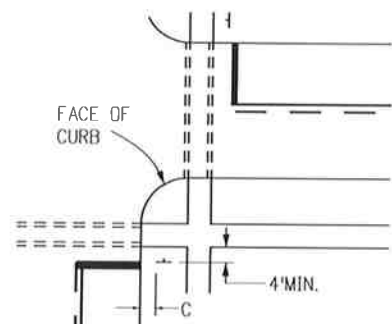


NORMAL ANGULAR PLACEMENT IS 0°. SIGNS CLOSER THAN 30 FT. SHOULD BE TURNED SLIGHTLY AWAY TO MINIMIZE SPECULAR REFLECTION. SIGNS PLACED 30' OR MORE SHOULD GENERALLY BE TURNED TOWARD THE ROAD.

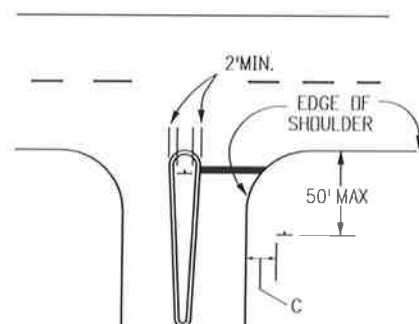
ANGULAR PLACEMENT



MINOR CROSSROAD



URBAN INTERSECTION



DIVISIONAL ISLAND

TYPICAL LOCATIONS-STOP SIGNS AND YIELD SIGNS

PLACEMENT TABLES

LATERAL PLACEMENT			VERTICAL PLACEMENT (MINIMUM) (9' MAXIMUM)			
KEY	ALL CLASSES OF STREETS AND HIGHWAYS		KEY	FREEWAYS AND EXPRESSWAYS	CONVENTIONAL STREETS AND HIGHWAYS	
	MINIMUM	NORMAL			URBAN	RURAL
*A	2'-0" & NOTE NO.4	15'-0" PLUS CURB OR SHOULDER WIDTH	D	7'-0" OR NOTE NO. 10	7'-0"	5'-0"
*B	2'-0" & NOTE NO.4	30'-0" OR MORE INCLUDES CURB OR SHOULDER	E	6'-0"	7'-0"	5'-0"
*C	2'-0" & NOTE NO.4	6'-0" PLUS CURB OR SHOULDER WIDTH OR IF NONE 15'-0"	F	8'-0" OR NOTE NO. 10	7'-0"	5'-0"
			G	6'-0"	6'-0"	4'-0"
			H	5'-0"	6'-0"	4'-0"

* SEE NOTE NO. 6 ON SHEET 1

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Sheet Revisions	
Date:	Comments

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Safety & Traffic Engineering Branch **KCM/KEN**

GROUND SIGN PLACEMENT

Issued By: Safety & Traffic Engineering Branch July 4, 2012

STANDARD PLAN NO.

S-614-1

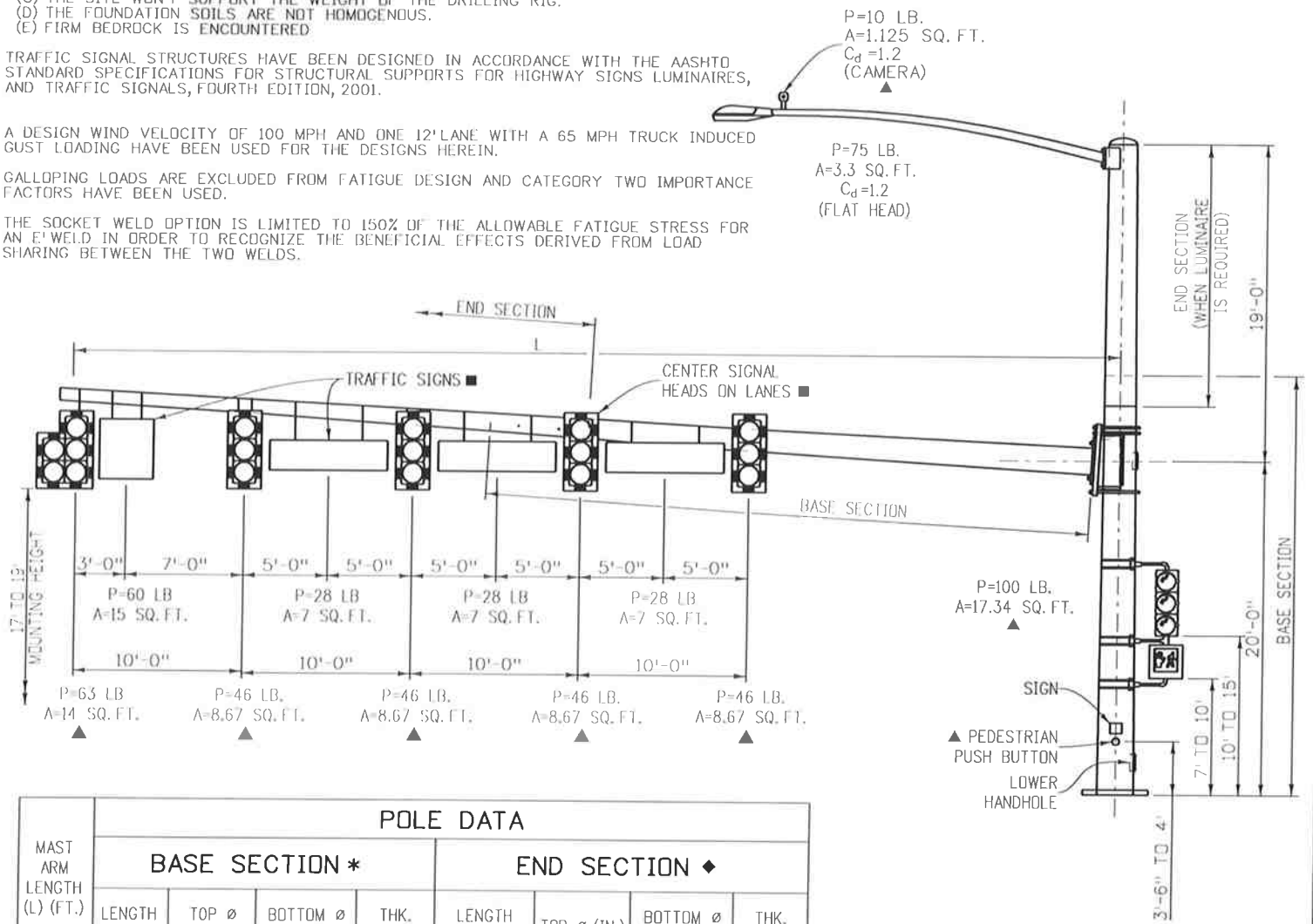
Sheet No. 2 of 2

GENERAL NOTES

- REFER TO THE ROADWAY PLANS FOR THE ACTUAL CONFIGURATION AND LOCATION OF TRAFFIC SIGNAL HEADS AND SIGNS MARKED WITH A ■.
- ALL POLES SHALL BE FABRICATED WITH ASTM A572 GRADE 65 STEEL.
- ALL ARMS SHALL BE FABRICATED WITH ASTM A572 GRADE 65 STEEL OR ASTM A595 GRADE A STEEL WITH A MINIMUM YIELD POINT OF 55 KSI.
- ALL POLES AND ARMS SHALL COMPLY WITH THE DIMENSIONAL TOLERANCES SPECIFIED IN ASTM A500, A501, OR A595.
- ALL POLES AND ARMS SHALL BE ROUND OR DODECAGONAL TUBES WITH A 0.14 IN/FT TAPER.
- HARDENED WASHERS SHALL CONFORM TO ASTM F436.
- ALL POLES AND ARMS SHALL BE GALVANIZED INSIDE AND OUTSIDE AFTER FABRICATION IN ACCORDANCE WITH ASTM A123, UNLESS PAINTING IS CALLED FOR ON THE PLANS. PAINTING SHALL CONFORM TO SECTION 522, DUPLEX COATING SYSTEM.
- POLE AND MAST ARM SPLICES SHALL BE MECHANICALLY FORCED TOGETHER FOR A SNUG FIT.
- ALL MAST ARMS MORE THAN 35 FT IN LENGTH SHALL BE TWO PIECE CONSTRUCTION TO LIMIT ARM WEIGHTS.
- GALVANIZED ASTM A325 H.S. BOLTS SHALL BE USED FOR ATTACHING MAST ARMS. A LUBRICATED TIGHTENING TORQUE OF 178 FT-LBS FOR 3/4" DIAMETER BOLTS, AND 1300 FT-LBS FOR 1 1/2" INCH DIAMETER BOLTS SHALL BE USED TO TIGHTEN ALL H.S. BOLTS. MAST ARMS SHALL BE TEMPORARILY SUPPORTED TO TAKE LOAD OFF OF FIELD CONNECTIONS WHILE BOLTS ARE TIGHTENED IN ORDER TO FIRMLY SEAT THE FLANGE PLATE. BOLTS SHALL BE SEQUENTIALLY TIGHTENED.
- CAST POLE END CAP TO BE SECURED IN PLACE WITH 3 SET SCREWS.
- ALL SIGNAL HEADS, SIGNS, AND HARDWARE SHALL BE FIELD POSITIONED.
- ACCESSORIES TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.
- ALL PLATES SHALL BE FABRICATED WITH AASHTO M270 (ASTM A709) GRADE 36 STEEL AND SHALL COMPLY WITH THE DIMENSIONAL TOLERANCES SPECIFIED IN ASTM A6. ALL HANDHOLES SHALL BE FABRICATED WITH ASTM A572 GRADE 42 STEEL.
- LEVELING CONCRETE SHALL BE 3000 PSI AIR ENTRAINED CONCRETE VIBRATED IN PLACE BELOW THE POLE BASE PLATE.
- CAISSONS SHALL BE PLACED AGAINST UNDISTURBED EARTH. WET OR CAVING HOLES SHALL BE BACKFILLED WITH FLOW-FILL AND REDRILLED AFTER A THREE DAY CURING PERIOD WITHOUT THE USE OF A CASING.
- CAISSONS SHALL BE CONSTRUCTED WITH AIR ENTRAINED CLASS B2 CONCRETE IN ACCORDANCE WITH SECTION 503 OF THE STANDARD SPECIFICATIONS. REINFORCING STEEL SHALL BE GRADE 60.
- CAISSON CONCRETE SHALL REACH THE SEVEN DAY PREDICTED STRENGTH PRIOR TO INSTALLING THE SIGNAL STRUCTURE.
- U-BOLTS AND ANCHOR BOLTS SHALL BE FABRICATED WITH AASHTO M314-90 GRADE 55 STEEL.
- ANCHOR BOLTS SHALL BE FABRICATED WITH HEAVY HEX NUTS AND FLAT WASHERS. THREAD UPPER 12 INCHES AND GALVANIZE UPPER 13 INCHES OF THE ANCHOR BOLTS. FIELD WELDING OF ANCHOR BOLTS TO REBAR DURING ERECTION WILL NOT BE ALLOWED. ANCHOR BOLTS SHALL BE SET WITH A STEEL TEMPLATE UNTIL THE CONCRETE HAS CURED AT LEAST TWO DAYS. THEY SHALL BE TIGHTENED USING THE TURN-OF-NUT METHOD BY FIRST TIGHTENING THEM TO SNUG TIGHT, WHICH IS DEFINED AS THE TIGHTNESS THAT EXISTS WHEN THE UPPER AND LOWER NUTS ARE IN FIRM CONTACT WITH THE BASE PLATE. WITH MAST ARMS FREE TO DEFLECT, THE UPPER AND LOWER NUTS SHALL THEN EACH BE ROTATED AN ADDITIONAL 1/12 TURN (30° ± 5°) WITH A SLUGGING, HYDRAULIC OR AIR IMPACT WRENCH.
- WELDING OF STEEL SHALL CONFORM TO THE REQUIREMENTS OF ANSI/AWS D1.1. ALL AREAS TO BE WELDED SHALL BE GROUND TO BRIGHT METAL. ALL WELDING AND REQUIRED TESTING SHALL BE COMPLETE BEFORE ANY MATERIAL IS GALVANIZED. ALL CIRCUMFERENTIAL WELDS SHALL BE NON-DESTRUCTIVELY TESTED USING THE ENHANCED MAGNETIC PARTICLE METHOD IN ACCORDANCE WITH SUBSECTION 509.18 (d) OF THE STANDARD SPECIFICATIONS. THE ACCEPTANCE CRITERIA IS STATED IN TABLE 6.1 OF ANSI/AWS D1.1. ALL LONGITUDINAL WELDS WITHIN 6 INCHES OF FULL PENETRATION CIRCUMFERENTIAL GROOVE WELDS AND FULL PENETRATION GROOVE WELDS SHALL BE INSPECTED AS SPECIFIED ABOVE. MAXIMUM WELD UNDERCUT SHALL BE 0.01 INCHES.
- ALL ELECTRICAL CONNECTIONS TO THE SIGNALS SHALL BE GROUNDED IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES.
- CERTIFIED MILL TEST REPORTS INCLUDING CHARPY V-NOTCH (CVN) TEST RESULTS, WELD INSPECTION REPORTS AND ENHANCED MAGNETIC PARTICLE TEST REPORTS SHALL BE SUBMITTED TO CDOT STAFF BRIDGE, 4201 E. ARKANSAS AVE., DENVER COLORADO 80222 AS SOON AS THEY BECOME AVAILABLE. CVN TEST RESULTS FOR ASTM A572 GRADES 42, 55 AND 65 STEEL SHALL HAVE A MINIMUM VALUE OF 15 FT-LBS AT 40°F AS PER THE H FREQUENCY TEST REQUIREMENTS IN AASHTO T243 (ASTM A673).
- SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW IN ACCORDANCE WITH SUBSECTION 105.02 OF THE STANDARD SPECIFICATIONS.
- TRAFFIC SIGNALS MOUNTED ON MAST ARMS SHALL BE FURNISHED WITH ASTRO TYPE MOUNTING BRACKETS.
- END SECTION DIAMETERS MUST BE INCREASED TO ACCOMMODATE OUT-OF-ROUNDNESS, GALVANIZING THICKNESS AND SEAM WELD PROFILES TO PROVIDE THE MINIMUM REQUIRED ARM SLIP SPLICE LENGTHS AND POLE MEMBER OVERLAPS.
- SECURE ARM FLANGE PLATE, POLE BASE PLATE, AND CONNECTION FACE PLATE DURING WELDING TO PREVENT DISTORTION.
- IF THE VERTICAL DEFLECTIONS DURING A 10 TO 20 MPH WIND EXCEED THE GALLOPING DEFLECTION LIMITS LISTED IN THE TABLE ON SHEET 2 OF 4, THE OWNER SHALL INSTALL AN ALUMINUM SIGN BLANK (16" X 66" OR LARGER) NEAR THE FREE END OF THE TRAFFIC SIGNAL MAST ARM. SAID SIGN BLANK SHALL BE ROTATED ABOUT THE LONGITUDINAL AXIS OF THE ARM WHILE THE WIND BLOWS TO MINIMIZE THE GALLOPING DEFLECTIONS. CONTACT STAFF BRIDGE FOR MORE INFORMATION.
- ONE DRILLED HOLE WITH A MAXIMUM DIAMETER OF 3/4" IS ALLOWED AT LOCATIONS MARKED WITH A ▲ TO ACCOMMODATE ELECTRICAL WIRING.
- SEE S-614-42 AND S-614-43 FOR "CABINET FOUNDATION DETAILS" AND "TRAFFIC LOOP AND MISC. SIGNAL DETAILS" RESPECTIVELY.

DESIGN DATA

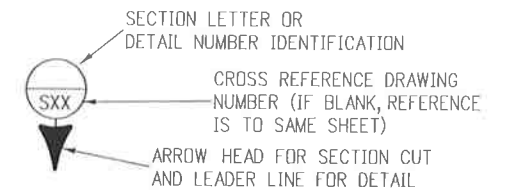
- DRAWING SHOWN HAS 5 SIGNAL HEADS, SHORTER ARM LENGTHS MAY HAVE FEWER HEADS. THIS CONFIGURATION IS INTENDED TO REPRESENT A WORST CASE LOADING SITUATION.
 (55'), 50' 5 SIGNAL HEADS (45'), 40' 4 SIGNAL HEADS (35'), 30' 3 SIGNAL HEADS (25') 2 SIGNAL HEADS
 THE DESIGN LENGTH "L" FOR EACH SERIES IS SHOWN IN PARENTHESIS.
- THE DESIGNS HEREIN ASSUME THAT SIGNALS ARE INSTALLED WITHIN THE ROADWAY EARTHWORK PRISM WITH THE FOLLOWING SOIL PARAMETERS:
 SOIL DENSITY $\gamma = 110$ LB./CU.FT.
 SOIL COHESION $c = 750$ LB./SQ.FT. FOR MEDIUM STIFF COHESIVE SOIL
 SOIL ϕ ANGLE = 30° FOR MEDIUM DENSE COHESIONLESS SOIL
 SF = 1.25 FOR TORSIONAL RESISTANCE AND 3.0 FOR FLEXURAL RESISTANCE
- CONTACT THE ENGINEER IF ANY OF THE FOLLOWING SOIL CONDITIONS ARE ENCOUNTERED DURING DRILLING:
 (A) SIGNALS WILL NOT BE INSTALLED WITHIN THE ROADWAY EARTHWORK PRISM.
 (B) THE SOIL HAS A HIGH ORGANIC CONTENT OR CONSISTS OF SATURATED SILT AND CLAY.
 (C) THE SITE WON'T SUPPORT THE WEIGHT OF THE DRILLING RIG.
 (D) THE FOUNDATION SOILS ARE NOT HOMOGENOUS.
 (E) FIRM BEDROCK IS ENCOUNTERED
- TRAFFIC SIGNAL STRUCTURES HAVE BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS LUMINAIRES, AND TRAFFIC SIGNALS, FOURTH EDITION, 2001.
- A DESIGN WIND VELOCITY OF 100 MPH AND ONE 12' LANE WITH A 65 MPH TRUCK INDUCED GUST LOADING HAVE BEEN USED FOR THE DESIGNS HEREIN.
- GALLOPING LOADS ARE EXCLUDED FROM FATIGUE DESIGN AND CATEGORY TWO IMPORTANCE FACTORS HAVE BEEN USED.
- THE SOCKET WELD OPTION IS LIMITED TO 150% OF THE ALLOWABLE FATIGUE STRESS FOR AN E' WELD IN ORDER TO RECOGNIZE THE BENEFICIAL EFFECTS DERIVED FROM LOAD SHARING BETWEEN THE TWO WELDS.



MAST ARM LENGTH (L) (FT.)	POLE DATA							
	BASE SECTION *				END SECTION ♦			
	LENGTH (FT.)	TOP Ø (IN.)	BOTTOM Ø (IN.)	THK. (IN.)	LENGTH (FT.)	TOP Ø (IN.)	BOTTOM Ø (IN.)	THK. (IN.)
ALL ARMS	24.47	11.57	15.00	0.3125	16.00	9.90	12.14	0.1793

* BASE SECTION LENGTHS INCLUDE THE SPLICE LENGTH AS PER THE "MAST ARM SLIP SPLICE DETAIL" ON SHEET 2 OF 4

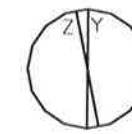
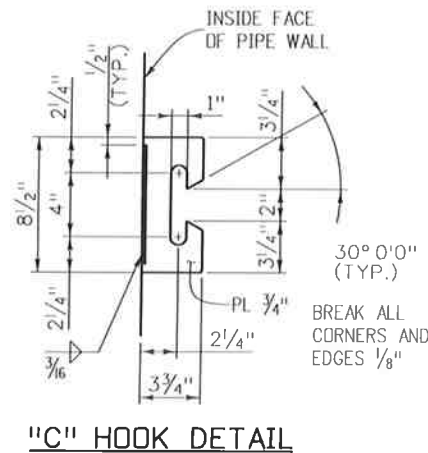
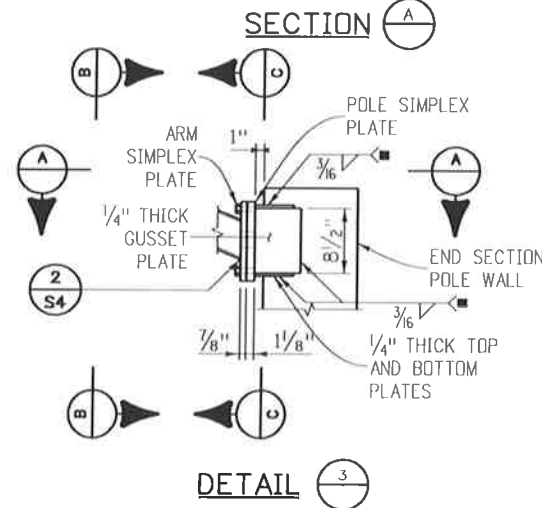
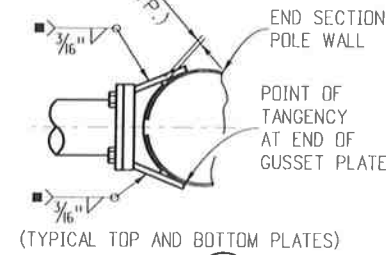
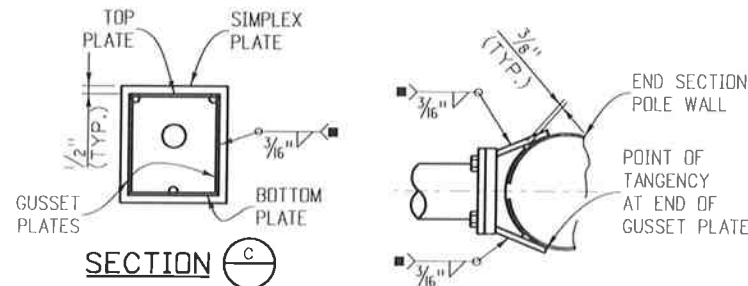
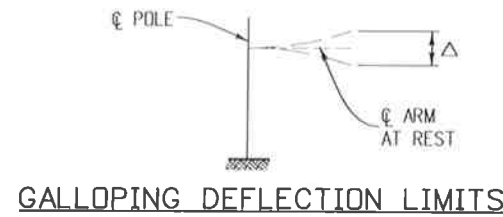
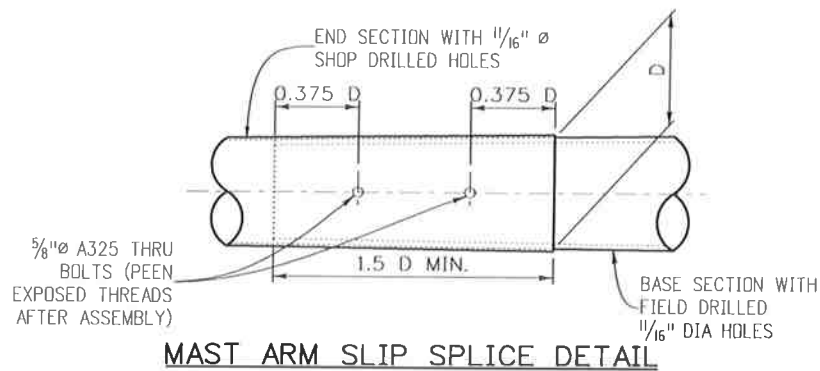
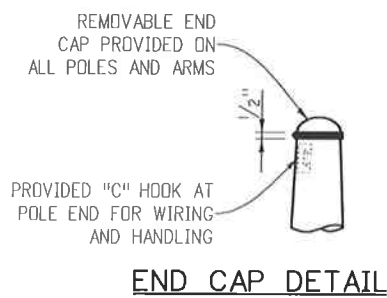
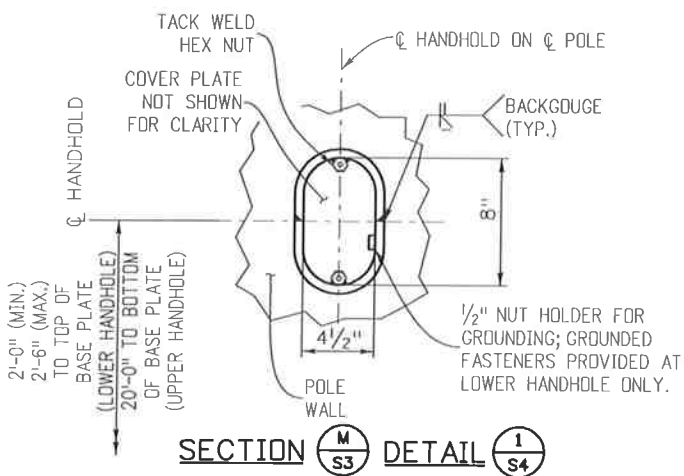
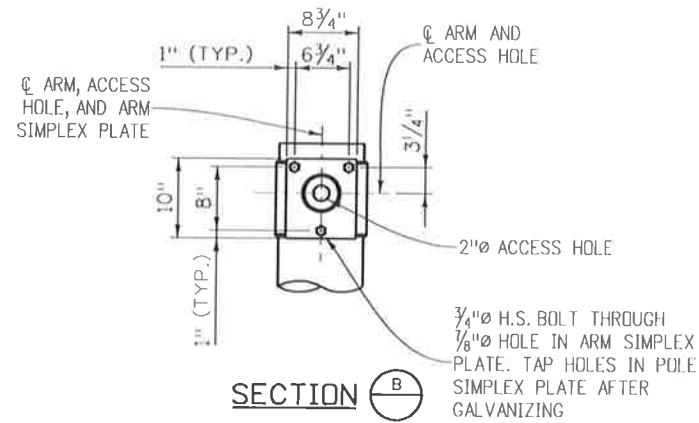
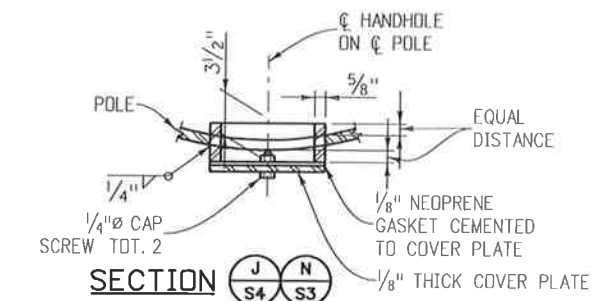
♦ SEE GENERAL NOTE 26



Computer File Information		Sheet Revisions		Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219 Safety & Traffic Engineering Branch	ALTERNATE TRAFFIC SIGNAL INSTALLATION DETAILS Issued By: Safety & Traffic Engineering Branch July 4, 2012	STANDARD PLAN NO. S-614-40A Sheet No. 1 of 4
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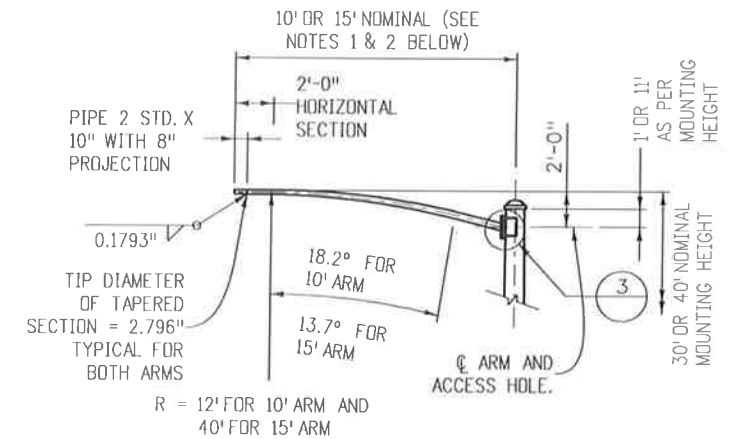
MAST ARM LENGTH (L) (FT.)	MAST ARM DATA								GALLOPING DEFLECTION LIMITS (Δ) (IN) ●
	BASE SECTION ★				END SECTION ◆				
	LENGTH (FT.)	TIP ϕ (IN.)	TRUNK ϕ (IN.)	THK (IN.)	LENGTH (FT.)	TIP ϕ (IN.)	TRUNK ϕ (IN.)	THK (IN.)	
25	23.92	6.65	10.00	0.2391	N.A.	N.A.	N.A.	N.A.	★
35	33.92	7.50	12.25	0.2391	N.A.	N.A.	N.A.	N.A.	★
45	25.16	9.73	13.25	0.3125	20.00	7.46	10.26	0.1793	6"
55	25.34	11.20	14.75	0.3125	30.00	7.56	11.76	0.1793	11"

- ★ BASE SECTION LENGTH INCLUDES THE SPLICE LENGTH AS PER THE "MAST ARM SLIP SPLICE DETAIL" BELOW.
- ◆ SEE GENERAL NOTE 26 ON SHEET 1 OF 4.
- SEE GENERAL NOTE 28 ON SHEET 1 OF 4.
- ★ DEFLECTION TOO SMALL TO MEASURE.
- STOP ALL WELDS 1/2" SHORT OF PLATE EDGES AND BOLT HOLES.



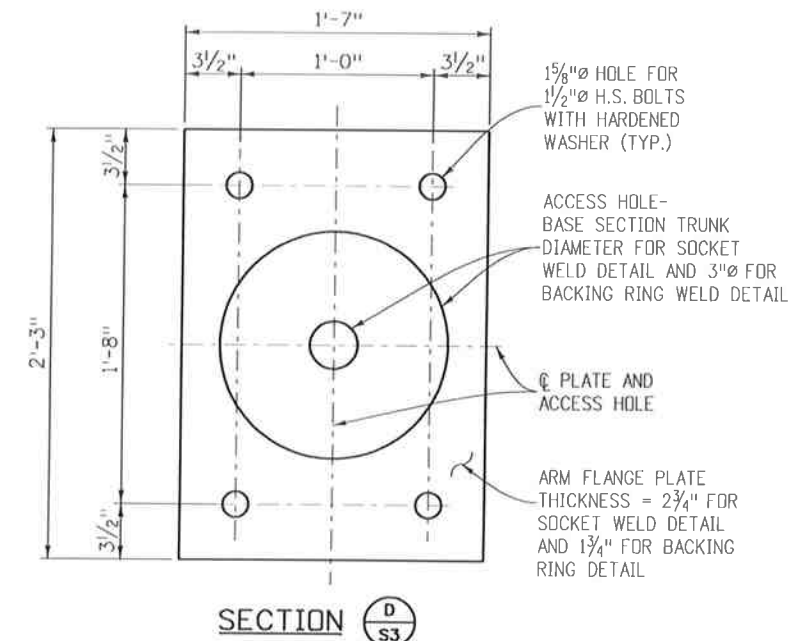
Y = DIAMETER OF A ROUND TUBE.
Z = PERPENDICULAR DISTANCE BETWEEN FLATS.
Y AND Z ARE OUTSIDE DIAMETER DIMENSIONS.
Z/Y RATIO MUST BE .98 MINIMUM.

OPTIONAL MULTI-SIDED POLE OR MAST ARM



LUMINAIRE ARM NOTES

- 10' LUMINAIRE ARM SHAFT: WALL THICKNESS = 0.1793"; LINEAR TAPER = 0.14 IN./FT.; DIAMETER AT ARM SIMPLEX PLATE = 4.066".
- 15' LUMINAIRE ARM SHAFT: WALL THICKNESS = 0.1793"; LINEAR TAPER = 0.14 IN./FT.; DIAMETER AT ARM SIMPLEX PLATE = 4.679".



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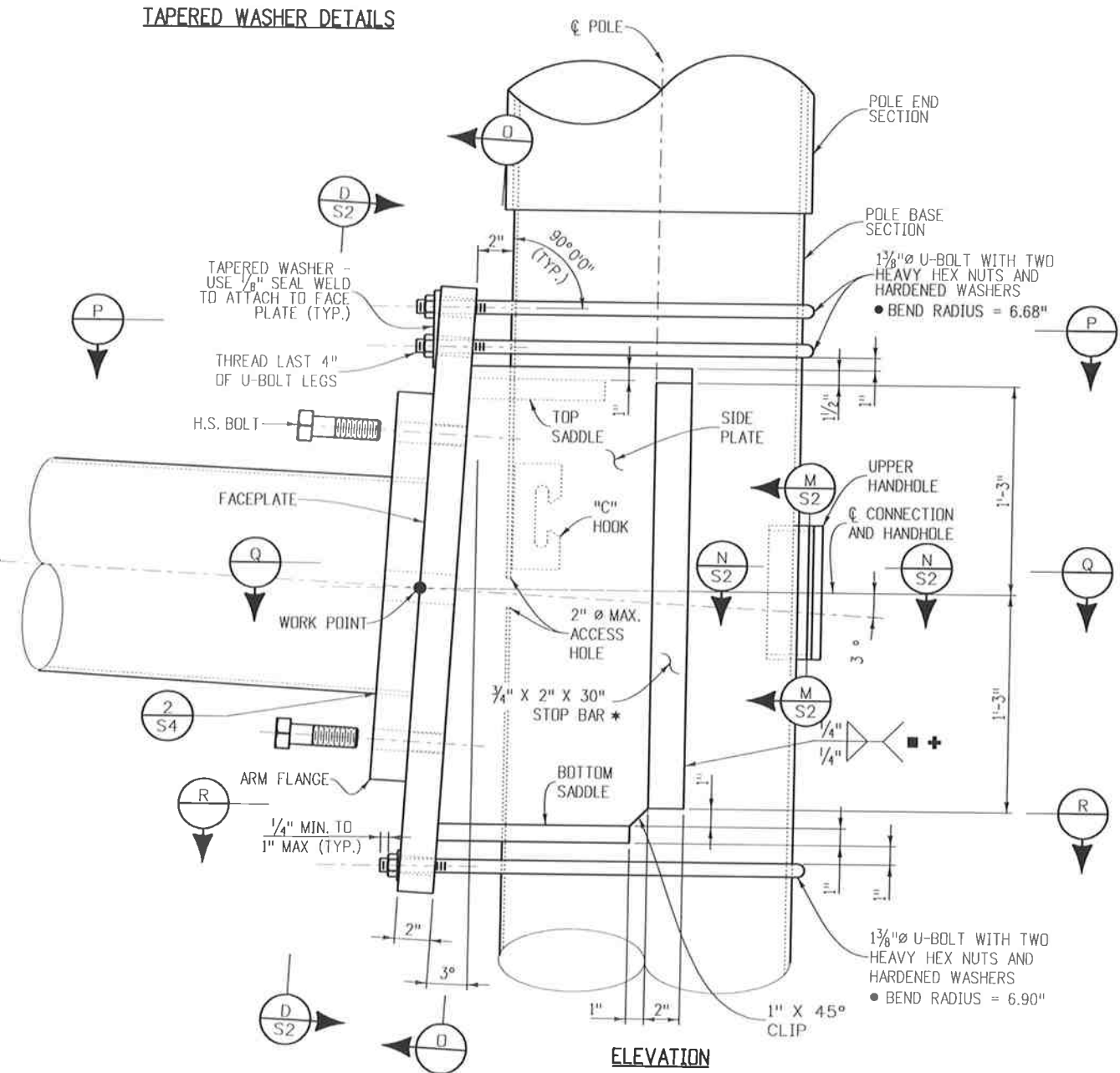
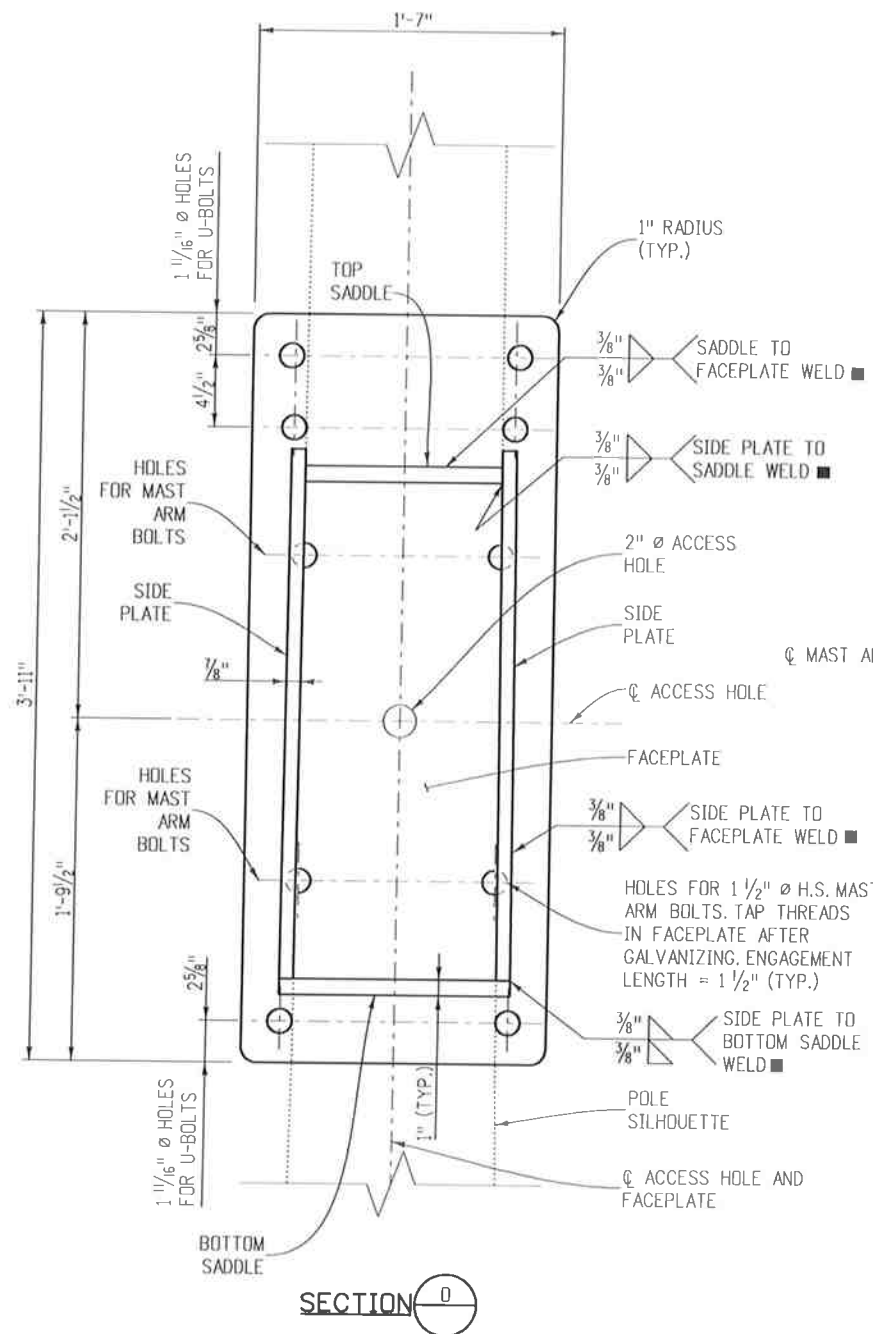
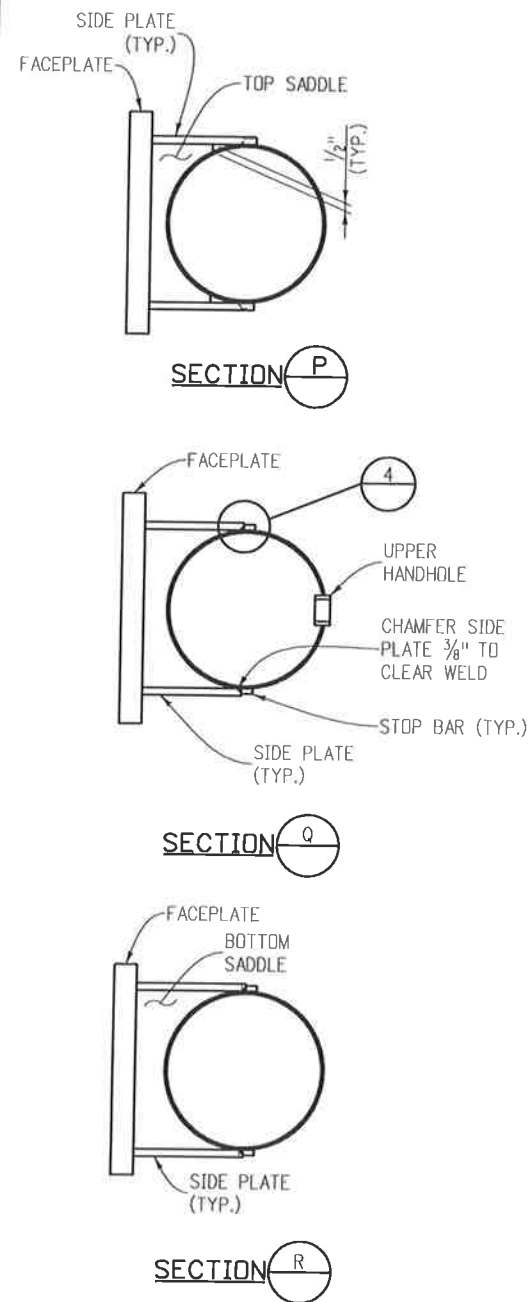
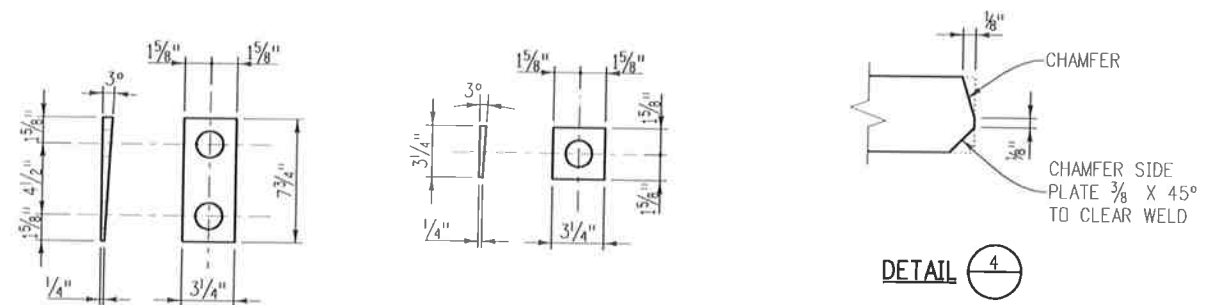
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Safety & Traffic Engineering Branch KCM/RLD

ALTERNATE TRAFFIC SIGNAL INSTALLATION DETAILS

Issued By: Safety & Traffic Engineering Branch July 4, 2012

STANDARD PLAN NO.
S-614-40A
Sheet No. 2 of 4

- BEND RADIUS MEASURED TO THE ϕ OF EACH U-BOLT. INCREASE RADII AS NEEDED TO ACCOMMODATE OUT-OF-ROUNDNESS, GALVANIZING THICKNESS AND SEAM WELD PROFILES. U-BOLTS SHALL BE TIGHTENED $\frac{1}{2}$ TURN ($30^\circ \pm 5^\circ$) PAST SNUG TIGHT; PEEN THREADS AFTER TIGHTENING. U-BOLTS AND FACEPLATE SHALL BE MOUNTED ON BASE SECTION PRIOR TO SHIPMENT.
- + MATCH FIT STOP BAR TO SIDE PLATE USING TACK WELDS TO ENSURE UNIFORM REARING.
- STOP ALL WELDS $\frac{1}{2}$ " SHORT OF PLATE EDGES AND BOLT HOLES.
- * BEND STOP BAR TO MATCH POLE CURVATURE.



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**ALTERNATE TRAFFIC SIGNAL
INSTALLATION DETAILS**

Issued By: Safety & Traffic Engineering Branch July 4, 2012

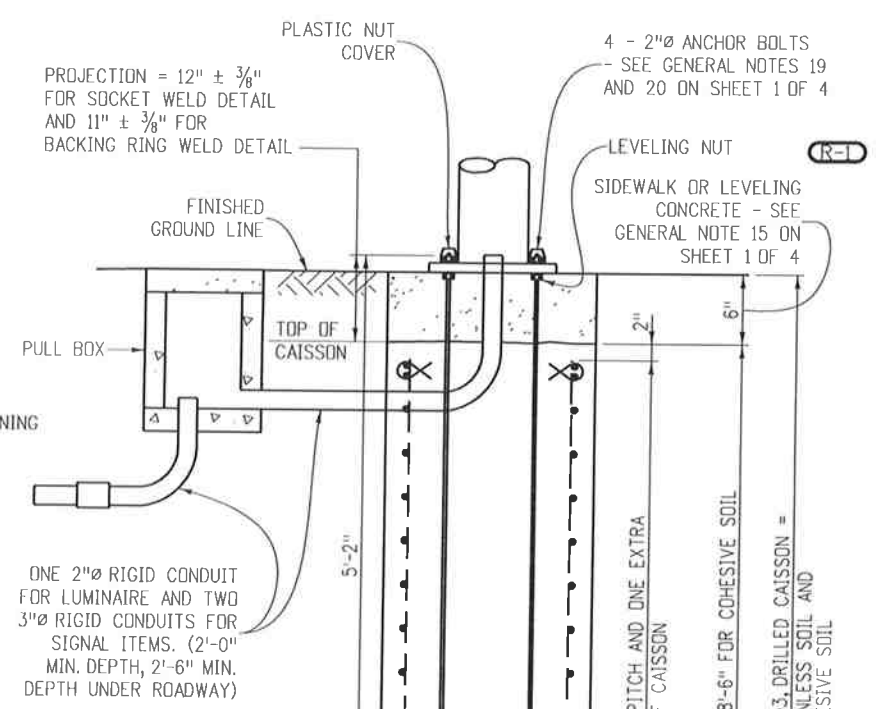
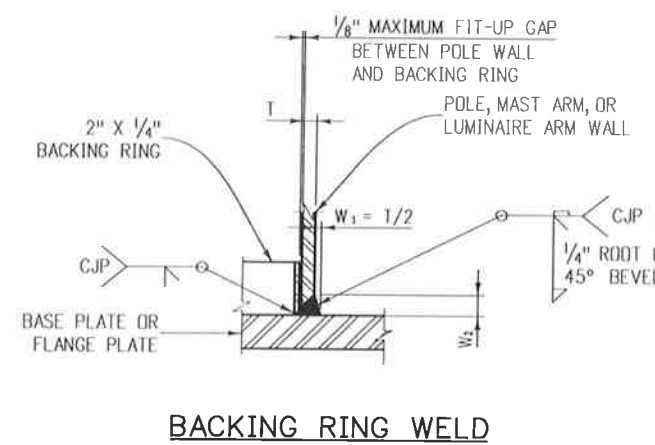
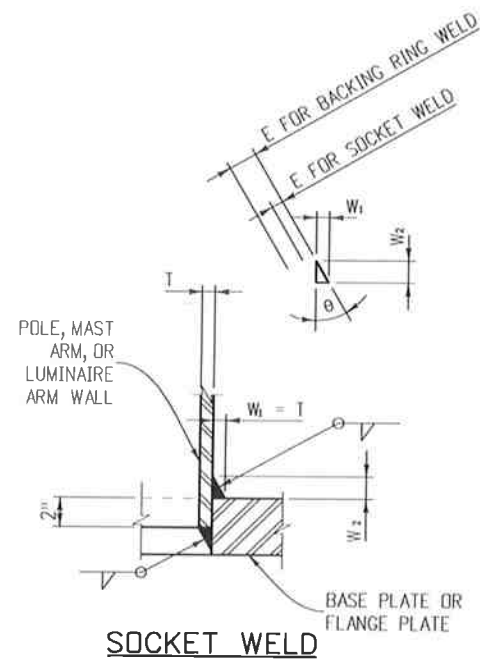
STANDARD PLAN NO.

S-614-40A

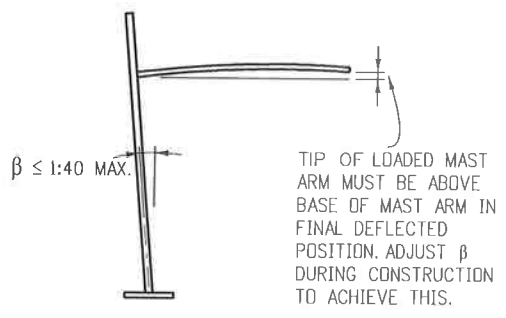
Sheet No. 3 of 4

SOCKET WELD DATA					
	ARM LENGTH (FT.)	W ₁ (IN.)	W ₂ (IN.)	E (IN.)	θ (DEG.)
MAST ARMS	25	0.2391	0.285	0.183	40
	35	0.2391	0.285	0.183	40
	45	0.3125	0.372	0.239	40
	55	0.3125	0.372	0.239	40
POLE	ALL	0.3125	0.372	0.239	40
LUMINAIRE ARMS	ALL	0.1793	0.214	0.138	40

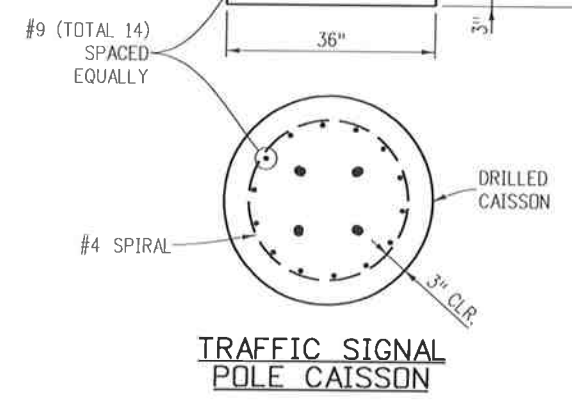
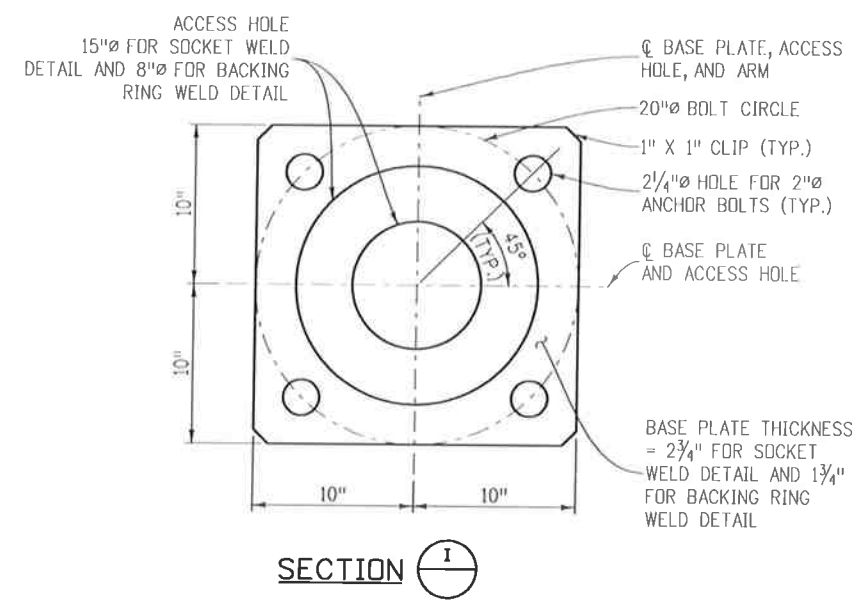
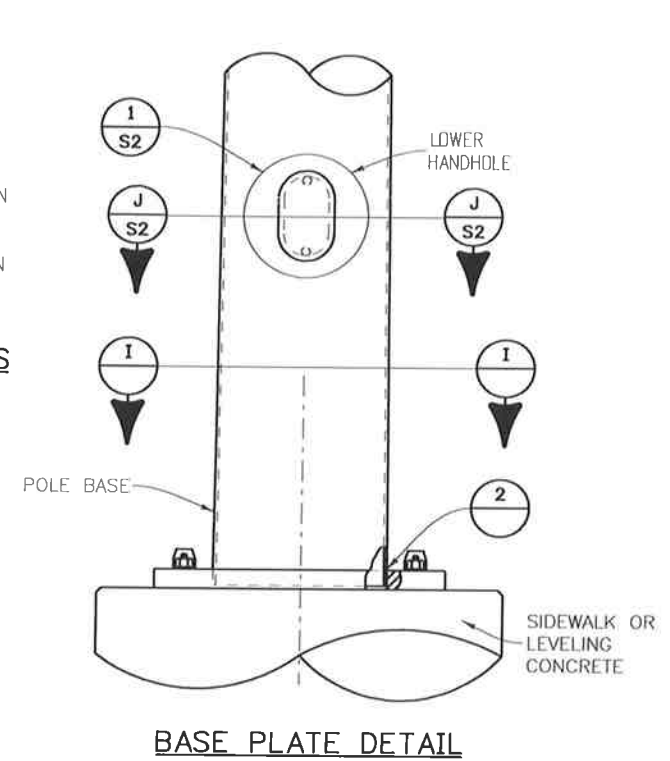
BACKING RING WELD DATA					
	ARM LENGTH (FT.)	W ₁ (IN.)	W ₂ (IN.)	E (IN.)	θ (DEG.)
MAST ARMS	25	0.1196	0.489	0.289	14
	35	0.1196	0.489	0.289	14
	45	0.1566	0.563	0.385	16
	55	0.1566	0.563	0.385	16
POLE	ALL	0.1566	0.563	0.385	16
LUMINAIRE ARMS	ALL	0.0897	0.429	0.212	12



DETAIL 2 S2 S3



CONSTRUCTION REQUIREMENTS



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Issued By: Safety & Traffic Engineering Branch July 4, 2012

STANDARD PLAN NO. S-614-40A

Sheet No. 4 of 4

GENERAL NOTES

- ALL STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS SHOWN IN THE MATERIALS TABLE ON SHEET 2.
- HIGH-STRENGTH BOLTED CONNECTIONS SHALL CONFORM TO THE PROVISIONS IN SECTION 509.28 OF THE STANDARD SPECIFICATIONS. ASSEMBLY OF HIGH-STRENGTH BOLTED CONNECTIONS FOR SIGN STRUCTURES MAY BE MADE WITH GALVANIZING OR PAINT ON THE CONTACT (FAYING) SURFACES.
- ALL SIGN STRUCTURES SHALL BE FABRICATED INTO THE LARGEST PRACTICAL SECTIONS PRIOR TO GALVANIZING. SPLICE LOCATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND THE CONTRACTOR SHALL NOT COMMENCE FABRICATION UNTIL SUCH SPLICE LOCATIONS ARE APPROVED.
- ALL CONCRETE SHALL BE CLASS BZ WITH AIR ENTRAINMENT; REINFORCING STEEL SHALL BE GRADE 60. CAISSON FOUNDATIONS SHALL REACH THE SEVEN DAY PREDICTED STRENGTH BEFORE SIGN STRUCTURES ARE ERECTED THEREON.
- A DISCONNECT FOR THE POWER SUPPLY TO THE DMS SHALL BE PROVIDED AS SHOWN IN THE ROADWAY PLANS.
- STRUCTURES SHALL BE GROUNDED IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES.

GENERAL NOTES (CONTINUED)

- SHEETS IN THE INDEX MARKED WITH A ■ PROVIDE INSTRUCTIONS TO DESIGNERS FOR THEIR USE IN THE PREPARATION OF THE SIGN X-SECTION SHEETS IN THE ROADWAY PLANS.
- NPS = NOMINAL PIPE SIZE; O.D. = OUTSIDE DIAMETER; DMS = DYNAMIC MESSAGE SIGN.
- SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW IN ACCORDANCE WITH SUBSECTION 105.02 OF THE STANDARD SPECIFICATIONS.
- CAISSONS, STEEL SUPPORTS AND SURVEY WORK SHALL BE PAID FOR IN ACCORDANCE WITH BID ITEMS 503, 614 AND 625 RESPECTIVELY.
- THERE SHALL BE NO PENETRATIONS OF MAST/CROSS ARMS OR POST OTHER THAN AS SHOWN ON THESE PLANS UNLESS APPROVED BY THE ENGINEER PRIOR TO FABRICATION.
- ATTACH REMOTE ACCESS CABINET(S) TO POST WITH TWO 1/2" WIDE STAINLESS STEEL BANDS AND STAINLESS STEEL FLARED LEG BRACKETS WITH HEX HEAD BOLTS (BAND-IT D315 OR EQUIVALENT).
- INSTALL STRUCTURE IDENTIFICATION PANEL IN ACCORDANCE WITH M AND S STANDARD S-614-12 USING TWO 1/2" WIDE STAINLESS STEEL BANDS AND STAINLESS STEEL FLARED LEG BRACKETS WITH HEX HEAD BOLTS (BAND-IT D315 OR EQUIVALENT).

GENERAL NOTES (CONTINUED)

- WELDING OF STEEL SHALL CONFORM TO THE REQUIREMENTS OF AWS D 1.1. ALL AREAS TO BE WELDED SHALL BE GROUND TO BRIGHT METAL. NO BUTT WELD SPLICES WILL BE PERMITTED. ALL WELDING AND REQUIRED TESTING SHALL BE COMPLETE BEFORE ANY MATERIAL IS GALVANIZED.

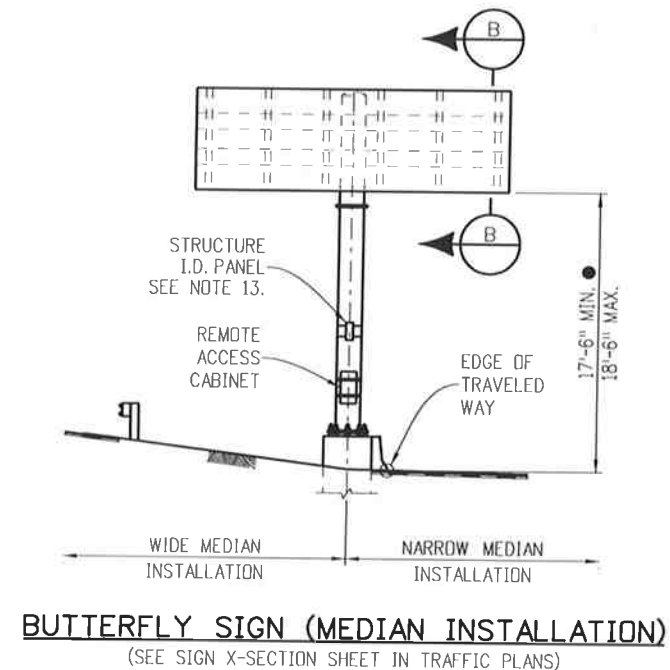
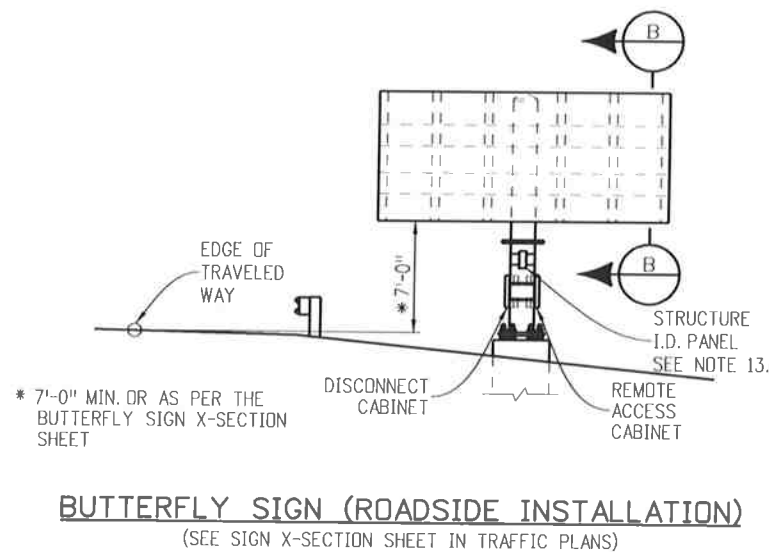
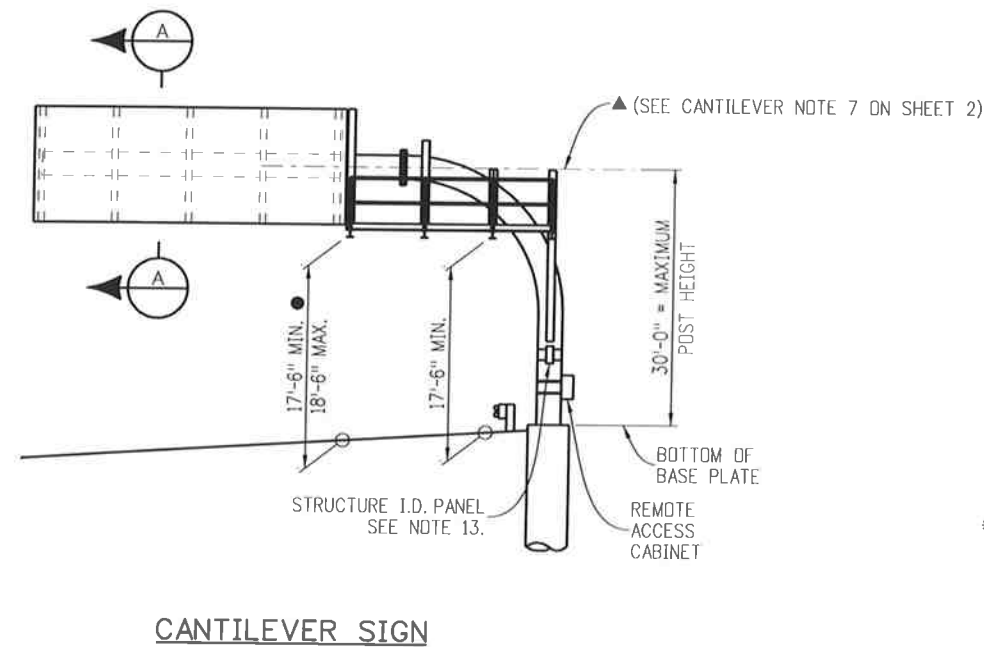
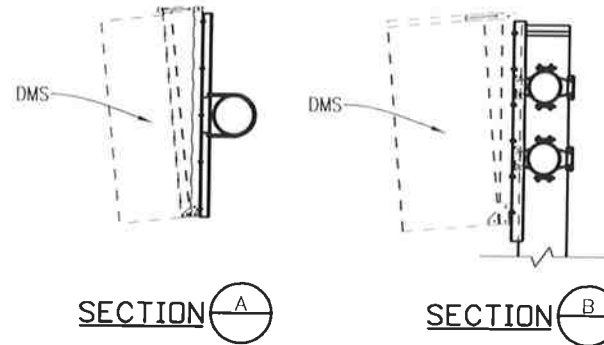
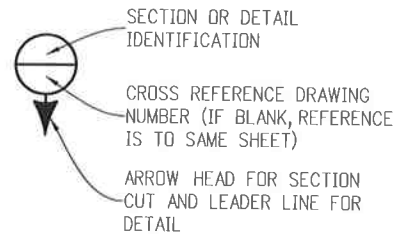
ENHANCED MAGNETIC PARTICLE TESTING SHALL BE PERFORMED ON AREAS DEFINED IN AWS D1.1 AND HEREIN. ENHANCED MAGNETIC PARTICLE TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH ASTM E 709 AND AWS D 1.1, EXCEPT AS AMENDED HEREIN. ALTERNATING CURRENT SHALL BE USED. THE YOKE SPACING SHALL BE BETWEEN 2 AND 4 INCHES. THE MINIMUM LIFTING POWER SHALL BE 10 LBS. RED DRY PARTICLES SHALL BE USED. THE LIGHT INTENSITY SHALL MEET ASTM E 709, SECTION 7. PARTICLE APPLICATION AND SPECIMEN PREPARATION SHALL MEET THE REQUIREMENTS OF ASTM E 709 SECTIONS 9 AND 15, EXCEPT WHITE NON-AQUEOUS DEVELOPER MEETING ASTM E 165, TYPE 3, SHALL BE APPLIED TO THE TEST SURFACE PRIOR TO TESTING.

THE YOKES SHALL BE SET IN TWO POSITIONS WHEN TESTING THE WELD OR BASE METAL. THEY SHALL BE POSITIONED BOTH NORMAL AND PARALLEL WITH RESPECT TO THE WELD AXIS AND ROLLING DIRECTION OF THE BASE METAL.

ENHANCED MAGNETIC PARTICLE TESTS SHALL BE PERFORMED AT THE FOLLOWING LOCATIONS:
 - BASE METAL. ALL AREAS CONTACTED BY THE CARBON ARC GOUGE ELECTRODE, THE ELECTRODE CUP, AND THE WELDING ELECTRODE. ALL THREE CONDITIONS ARE ARC STRIKES.
 - FILLET WELDS. EACH DESIGN WELD SIZE ON MAIN MEMBER TO MAIN MEMBER AND SECONDARY MEMBER TO MAIN MEMBER WELDMENTS. ALL STOP-STARTS AND WELD TERMINI. ALL LINEAR INDICATIONS SHALL FURTHER BE EVALUATED WITH 10X OR 30X MAGNIFICATION. VERIFICATION SHALL BE RESOLVED BY EXCAVATION.
 - GROOVE WELDS. ALL THROUGH THICKNESS EDGES ON TRANSVERSE BUTT JOINT WELDMENTS IN TENSION AREAS.
 - REPAIRS. ALL REPAIR WELDS TO CORRECT DEFECTS IN GROOVE AND FILLET WELDS, PLATE CUT EDGES, CORRECTION OF FABRICATION ERRORS IN CUTTING, PUNCHING, DRILLING, OR FITTING, AND MEMBERS WHICH ARE TACKED OR WELDED AND SUBSEQUENTLY CUT APART AND REWELDED.
- ALL CIRCUMFERENTIAL AND ALL LONGITUDINAL PIPE SEAM WELDS WITHIN 5" OF FULL PENETRATION CIRCUMFERENTIAL GROOVE WELDS SHALL BE FULL PENETRATION GROOVE WELDS AND SHALL BE INSPECTED AS SPECIFIED HEREIN. THE ACCEPTABLE MAXIMUM WELD UNDERCUT IS 0.01".
- SEE TABLE ON SHEET 4 FOR CABINET ROTATION ADJUSTMENTS TO VERTICAL CLEARANCES MARKED WITH A ●.

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- CANTILEVER BASE PLATE DETAILS
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CANTILEVER NOTES

- SIGN STRUCTURES SHALL BE CONSTRUCTED TRUE TO THE SPECIFIED DIMENSIONS, SHALL BE FREE FROM KINKS, TWISTS OR BENDS, AND SHALL BE UNIFORM IN APPEARANCE. THE COMPLETED SECTIONS SHALL BE ASSEMBLED IN THE SHOP AND SHALL BE CHECKED FOR STRAIGHTNESS, ALIGNMENT, AND DIMENSIONAL ACCURACY. ANY VARIATIONS SHALL BE CORRECTED TO THE SATISFACTION OF THE ENGINEER.
- MAST ARMS SHALL BE TEMPORARILY SUPPORTED TO TAKE ALL LOAD OFF OF THE FIELD SPLICES WHILE BOLTS ARE BEING TIGHTENED IN ORDER TO FIRMLY SEAT THE FLANGE PLATES.
- POST MEMBERS SHALL BE FORMED TO THE RADII SHOWN ON THE PLANS BY HEAT TREATMENT OR BY FABRICATION TO SUCH RADII BY METHODS WHICH WILL NOT CRIMP OR BUCKLE THE INTERIOR RADIUS OF THE PIPE BEND.
- CLIPS, EYES, OR REMOVABLE BRACKETS SHALL BE AFFIXED TO POST AND MAST ARM, AS NECESSARY, TO SECURE THE SIGN DURING SHIPPING AND FOR LIFTING AND MOVING DURING ERECTION. THIS IS TO PREVENT DAMAGE TO THE FINISHED GALVANIZED OR PAINTED SURFACES. BRACKETS ON TUBULAR SIGN STRUCTURES SHALL BE REMOVED AFTER ERECTION. DETAILS OF SUCH DEVICES SHALL BE SHOWN ON THE SHOP DRAWINGS.
- WALKWAYS SHALL LEAD UP TO THE CABINET ACCESS DOOR AS SPECIFIED ON THE SIGN X-SECTION SHEETS IN THE ROADWAY PLANS.
- ALL PIPE MEMBERS SHALL BE HOT-DIP GALVANIZED INSIDE AND OUTSIDE AFTER FABRICATION AS PER ASTM A123, UNLESS PAINTING IS CALLED FOR ON THE PLANS. PAINTING SHALL CONFORM TO SECTION 522, DUPLEX COATING SYSTEM. WALKWAY GRATINGS, WALKWAY BRACKETS, SAFETY RAILINGS AND ALL NUTS, BOLTS AND WASHERS FOR SIGN STRUCTURES SHALL BE GALVANIZED AFTER FABRICATION AS PER ASTM A123 OR ASTM A153, AS APPROPRIATE, AND SHALL NOT BE PAINTED. TENSION CONTROL BOLTS OR DIRECT TENSION INDICATING WASHERS USED IN HIGH-STRENGTH BOLTED CONNECTIONS SHALL BE MECHANICALLY GALVANIZED PER ASTM B695, COATING CLASS 55.
- CANTILEVER ARMS MARKED WITH A ▲ MUST BE LEVEL OR TILTED UPWARD NO MORE THAN 1° MAXIMUM AFTER INSTALLATION OF THE SIGN.

BUTTERFLY NOTES

- SIGN STRUCTURES SHALL BE CONSTRUCTED TRUE TO THE SPECIFIED DIMENSIONS, SHALL BE FREE OF KINKS, TWISTS OR BENDS, AND SHALL BE UNIFORM IN APPEARANCE. THE POST TO CROSS ARM CONNECTIONS SHALL BE PREASSEMBLED IN THE SHOP AFTER GALVANIZING. ASSEMBLIES WITH THE OPTIONAL FIELD SPLICE SHALL BE PREASSEMBLED ABOVE THE SPLICE FOR SHIPPING TO THE JOB SITE.
- POST AND CROSS ARMS SHALL BE FABRICATED IN SINGLE SECTIONS PRIOR TO GALVANIZING. SPLICING OF SECTIONS IS NOT PERMITTED.
- CLIPS, EYES, OR REMOVABLE BRACKETS SHALL BE AFFIXED TO POST AND CROSS ARMS, AS NECESSARY, TO SECURE FOR SHIPPING AND FOR LIFTING AND MOVING DURING ERECTION IN ORDER TO PREVENT DAMAGE TO THE FINISHED GALVANIZED SURFACES. TEMPORARY BRACKETS ON SIGN STRUCTURE SHALL BE REMOVED AFTER ERECTION. DETAILS OF SUCH DEVICES SHALL BE SHOWN ON THE SHOP DRAWINGS. ERECTION LUGS ARE REQUIRED ON ONE END OF THE CROSS ARMS TO FACILITATE PULLING OF THE CROSS ARMS THROUGH THE POST. THE ERECTION LUGS SHALL BE POSITIONED TO FORCE THE "PULL" TO OCCUR ON THE CENTERLINE OF THE CROSS ARM. ERECTOR SHALL SUPPORT THE POST ON EITHER SIDE OF THE CROSS-ARM PRIOR TO PULLING THE CROSS-ARM THROUGH THE HOLE IN THE POST.
- ALL PIPE MEMBERS SHALL BE HOT-DIP GALVANIZED INSIDE AND OUTSIDE AFTER FABRICATION AS PER ASTM A123, UNLESS PAINTING IS CALLED FOR ON THE PLANS. PAINTING SHALL CONFORM TO SECTION 522, DUPLEX COATING SYSTEM. ALL NUTS, BOLTS AND WASHERS FOR SIGN STRUCTURES SHALL BE GALVANIZED AFTER FABRICATION AS PER ASTM A123 OR ASTM A153, AS APPROPRIATE, AND SHALL NOT BE PAINTED. TENSION CONTROL BOLTS OR DIRECT TENSION INDICATING WASHERS USED IN HIGH-STRENGTH BOLTED CONNECTIONS SHALL BE MECHANICALLY GALVANIZED PER ASTM B695, COATING CLASS 55.
- SEE THE BUTTERFLY MOUNTED SIGN X-SECTION SHEET IN THE TRAFFIC PLANS FOR THE DMS PANEL WIDTH, HEIGHT, DEPTH, AND WEIGHT; TOP OF CAISSON ELEVATION, STATION AND OFFSET; DMS PANEL OFFSET FROM SHOULDER; SUPPORT POST HEIGHT, ANGLE θ , AND GUARDRAIL PROTECTION LIMITS. DO NOT USE ANY POST HEIGHT WHICH EXCEEDS THE MAXIMUM POST HEIGHT SHOWN IN THE POST AND CROSS ARM PIPE DATA TABLE ON SHEET 11. STRUCTURES OVER TRAFFIC AND STRUCTURES THAT COULD FALL INTO THE TRAVELED WAY OR ONTO THE SHOULDER SHALL BE ASSIGNED A STAFF BRIDGE GENERATED STRUCTURE NUMBER.

CANTILEVER DESIGN DATA

SPECIFICATIONS:
 DESIGN: "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS", AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (2001 AASHTO). **(R-1)**
 SUBSECTION 17.4, SIGNS, IN THE STAFF BRIDGE BRANCH BRIDGE DESIGN MANUAL.
 CONSTRUCTION: CDDT STANDARD SPECIFICATIONS, THESE STANDARD SHEETS AND THE PROJECT PLANS.
 WIND LOADING: 100 MPH VELOCITY

BUTTERFLY DESIGN DATA

SPECIFICATIONS:
 DESIGN: "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS", AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (2009 AASHTO).
 SUBSECTION 17.4, SIGNS, IN THE STAFF BRIDGE BRANCH BRIDGE DESIGN MANUAL.
 CONSTRUCTION: CDDT STANDARD SPECIFICATIONS, THESE STANDARD SHEETS AND THE PROJECT PLANS.
 WIND LOADING: 110 MPH VELOCITY (3-SECOND GUST).

MATERIALS

ELEMENT	SPECIFICATION			CLARIFICATIONS
	ASTM	AASHTO	AISI	
POSTS, MAST/CROSS ARMS	A53			#1
BARS, PLATES AND SHAPES	A709	M-270		#2
HOLLOW STRUCTURAL SECTIONS (HSS)	A500			#3
HIGH-STRENGTH BOLTS (H.S. BOLTS)	A325	M-164		#4
HIGH-STRENGTH NUTS	A563	M-291		
HIGH-STRENGTH WASHERS	F436	M-292		#5
U-BOLTS (RODS)	F1554	M-314		GRADE 55 STEEL
ANCHOR BOLTS	F1554	M-314		GRADE 55 STEEL
SPHERICAL WASHER SETS	A29		4140	#6
COLLAR NUTS	A29		4140	#6, #7

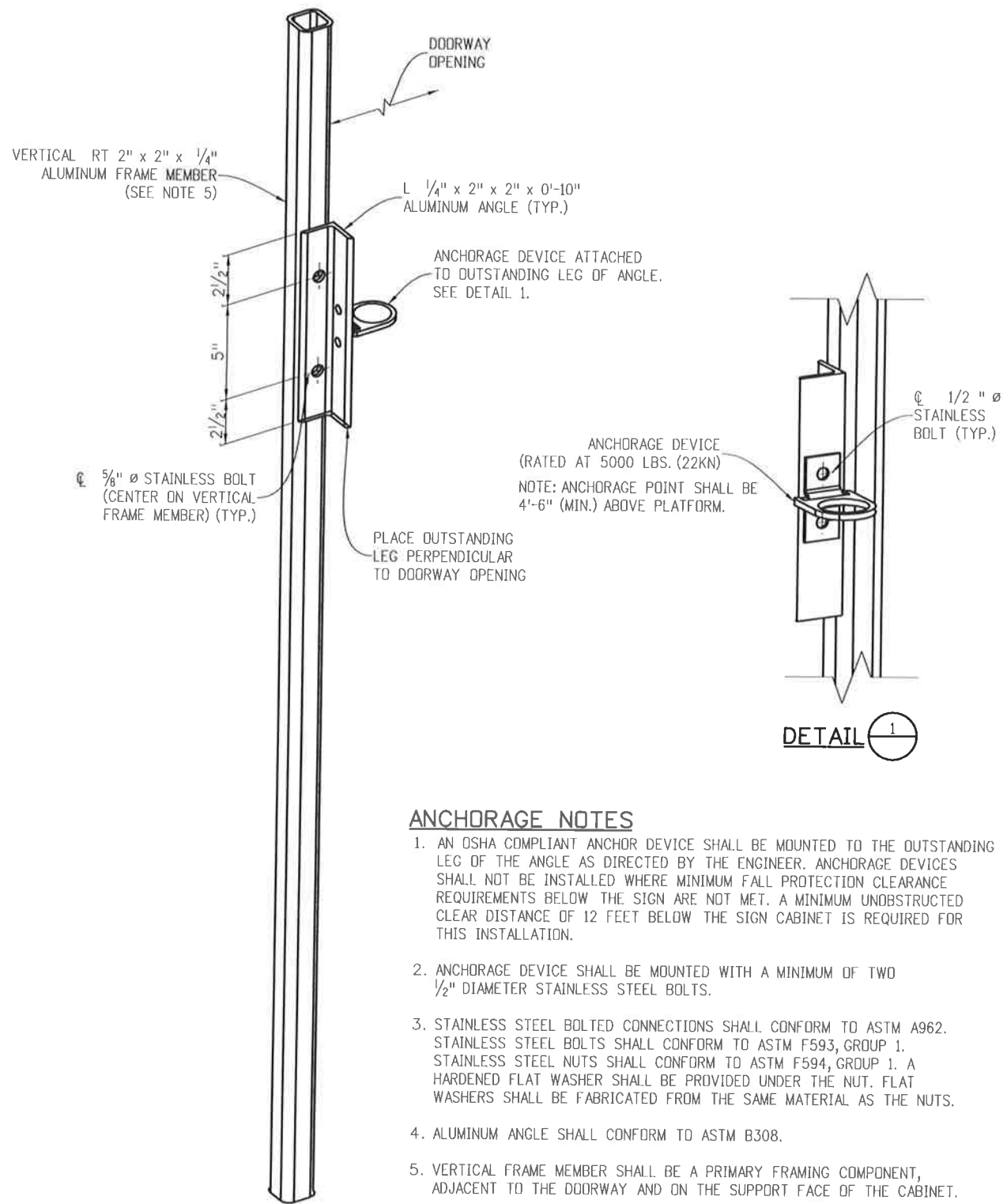
- #1 PIPE POSTS AND MAST/CROSS ARMS SHALL BE WELDED OR SEAMLESS STEEL PIPE FOR BUTTERFLY SIGNS AND SEAMLESS FOR CANTILEVER SIGNS CONFORMING TO THE SPECIFICATIONS OF ASTM DESIGNATION: A53, GRADE B. **(R-2)**
- #2 GRADES 36 OR 50. ASTM A992 SHAPES MAY BE SUBSTITUTED.
- #3 HOLLOW STRUCTURAL SECTION SPECIFICATIONS APPLY TO THE STRUCTURAL TUBING SECTIONS (TS) USED AT HANDHOLES AND SAFETY RAILINGS.
- #4 TENSION CONTROL (TC) BOLTS CONFORMING TO ASTM F1852 MAY BE SUBSTITUTED FOR ASTM A325 BOLTS. ALL OTHER BOLTS AND NUTS SHALL CONFORM TO THE SPECIFICATIONS OF ASTM DESIGNATION: A307. INSTALL A307 BOLTS WITH COMMERCIAL QUALITY WASHERS.
- #5 ASTM F959, COMPRESSIBLE-WASHER-TYPE DIRECT TENSION INDICATORS MAY BE SUBSTITUTED FOR ASTM F436 WASHERS AT HIGH-STRENGTH BOLTED CONNECTIONS.
- #6 SPHERICAL WASHER SETS AND COLLAR NUTS SHALL BE HARDENED IN ACCORDANCE WITH ASTM F436 AND HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.
- #7 A SPHERICAL WASHER SET AND AN A325 NUT MAY BE SUBSTITUTED FOR A COLLAR NUT.

OVERHEAD SIGN X-SECTION SHEET(S) SHALL SHOW:

- SIGN STRUCTURE LOCATION (HIGHWAY, STATION AND DIRECTION)
- LENGTH OF STRUCTURE SPAN
- DMS SIZE (WIDTH, HEIGHT, DEPTH AND WEIGHT) AND LOCATION ON STRUCTURE
- OFFSET FROM SHOULDER
- POST HEIGHT FROM TOP OF CAISSON TO ϕ MAST ARM
- CAISSON DIAMETER AND MINIMUM EMBEDMENT
- TOP OF CAISSON ELEVATION
- CAISSON PAY LENGTH
- STATIONS AND OFFSETS TO CAISSON
- ANGLE θ FOR BUTTERFLY INSTALLATIONS
- GUARDRAIL PROTECTION LIMITS
- WALKWAY LOCATION IF REQUIRED
- LANE LINE LOCATION(S) IF STRUCTURE IS OVER TRAFFIC
- LOCATION OF DISCONNECT FOR THE POWER SUPPLY
- LOCATION OF REMOTE ACCESS CABINET ON POLE
- AS CONSTRUCTED BLOCK

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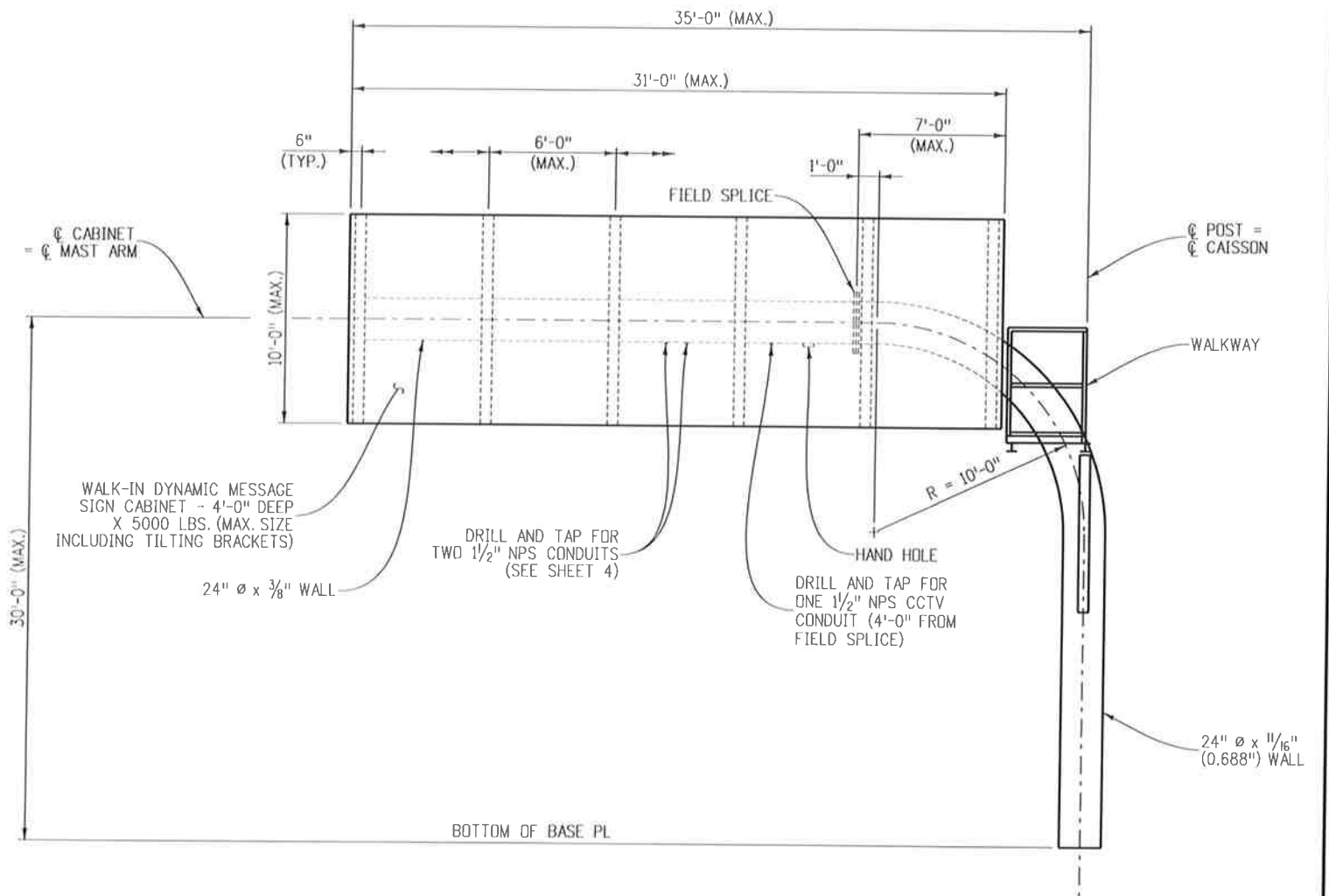
-CANTILEVER INSTALLATION DETAILS-



ANCHORAGE NOTES

1. AN OSHA COMPLIANT ANCHOR DEVICE SHALL BE MOUNTED TO THE OUTSTANDING LEG OF THE ANGLE AS DIRECTED BY THE ENGINEER. ANCHORAGE DEVICES SHALL NOT BE INSTALLED WHERE MINIMUM FALL PROTECTION CLEARANCE REQUIREMENTS BELOW THE SIGN ARE NOT MET. A MINIMUM UNOBSTRUCTED CLEAR DISTANCE OF 12 FEET BELOW THE SIGN CABINET IS REQUIRED FOR THIS INSTALLATION.
2. ANCHORAGE DEVICE SHALL BE MOUNTED WITH A MINIMUM OF TWO 1/2" DIAMETER STAINLESS STEEL BOLTS.
3. STAINLESS STEEL BOLTED CONNECTIONS SHALL CONFORM TO ASTM A962. STAINLESS STEEL BOLTS SHALL CONFORM TO ASTM F593, GROUP 1. STAINLESS STEEL NUTS SHALL CONFORM TO ASTM F594, GROUP 1. A HARDENED FLAT WASHER SHALL BE PROVIDED UNDER THE NUT. FLAT WASHERS SHALL BE FABRICATED FROM THE SAME MATERIAL AS THE NUTS.
4. ALUMINUM ANGLE SHALL CONFORM TO ASTM B308.
5. VERTICAL FRAME MEMBER SHALL BE A PRIMARY FRAMING COMPONENT, ADJACENT TO THE DOORWAY AND ON THE SUPPORT FACE OF THE CABINET.

OSHA COMPLIANT ANCHORAGE DETAILS



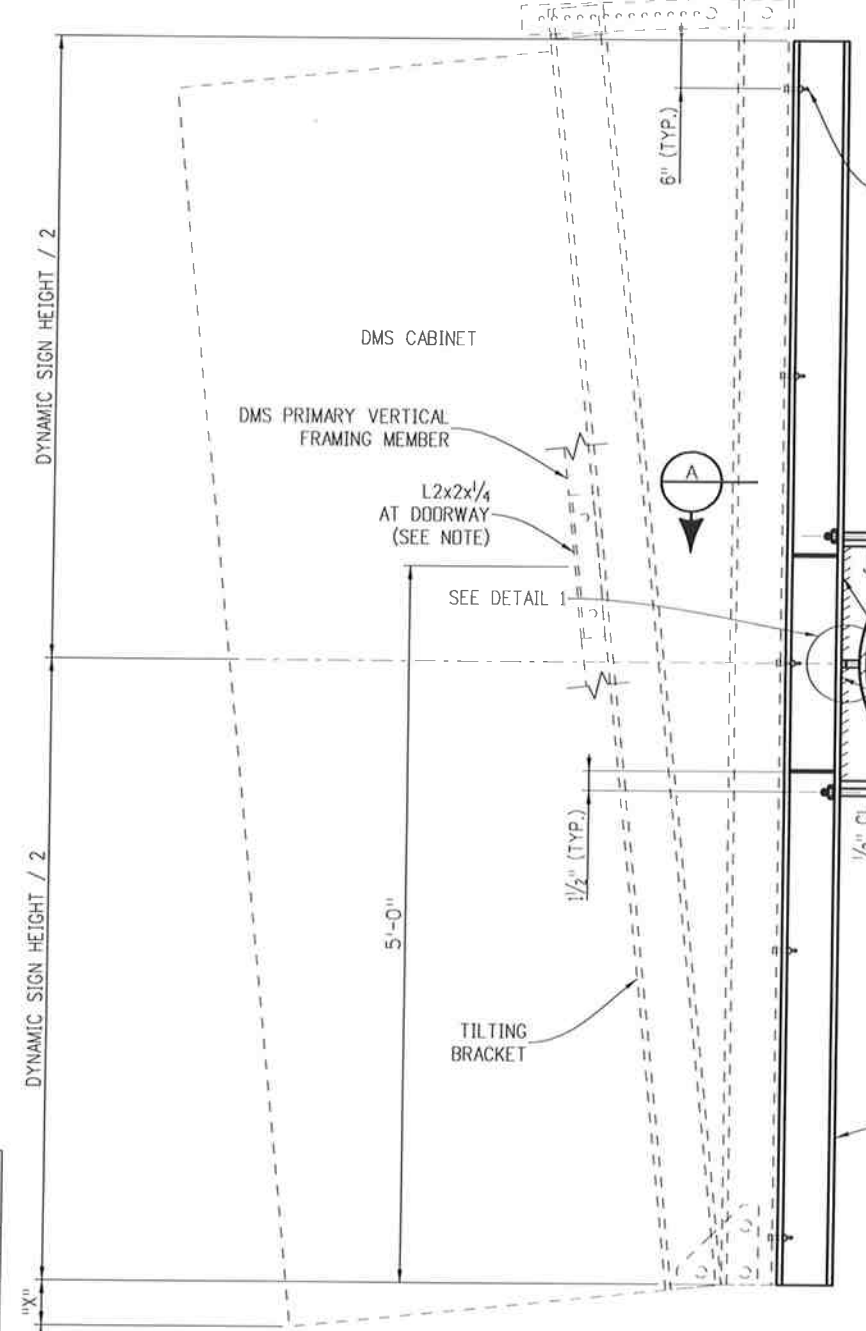
CANTILEVER NOTES

1. THE MAXIMUM CABINET OVERLAP ONTO ELBOW SHALL NOT EXCEED 7'-0" FROM THE FIELD SPLICE.
2. ALL POSTS BETWEEN BASE PLATE AND FIELD SPLICE SHALL HAVE A TUBE WALL THICKNESS OF 1/16" (0.688"). ALL MAST ARMS SHALL HAVE A TUBE WALL THICKNESS OF 3/8".
3. SEE SHEET 6 FOR FIELD SPLICE DETAILS.

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CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English			Issued By: Safety and Traffic Engineering Branch on July 4, 2012		

-CANTILEVER SIGN MOUNTING BRACKETS-

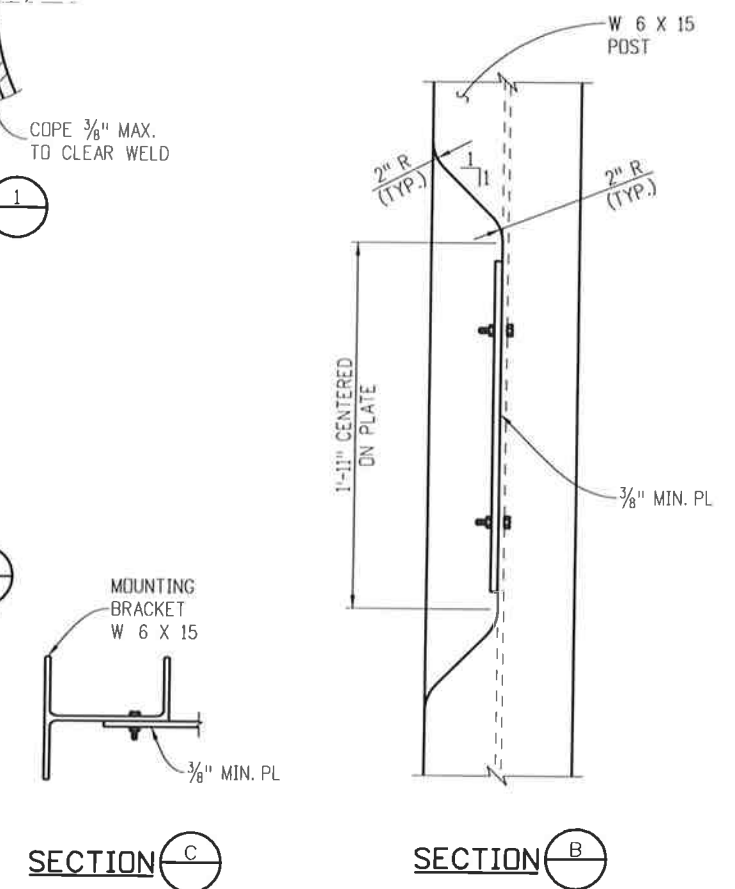
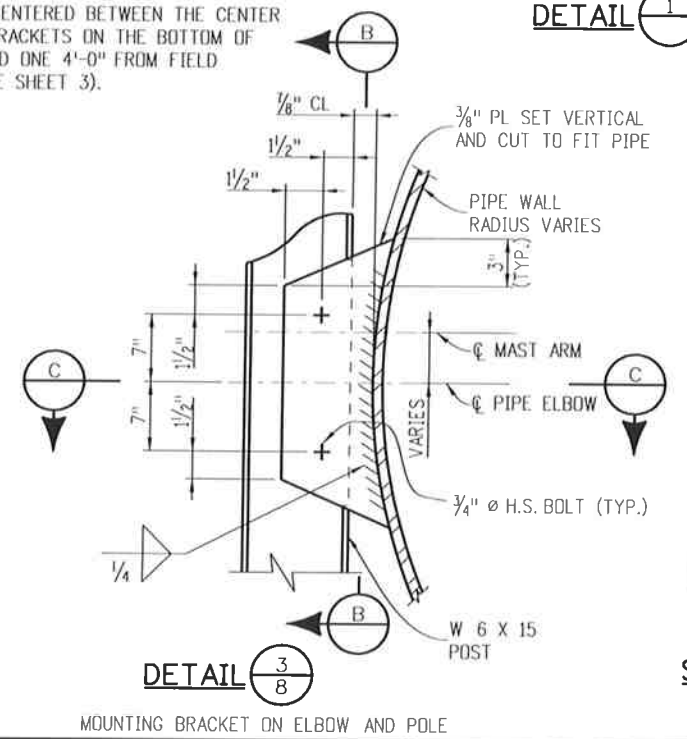
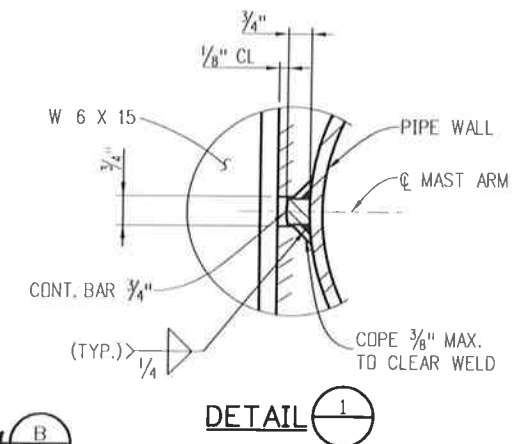
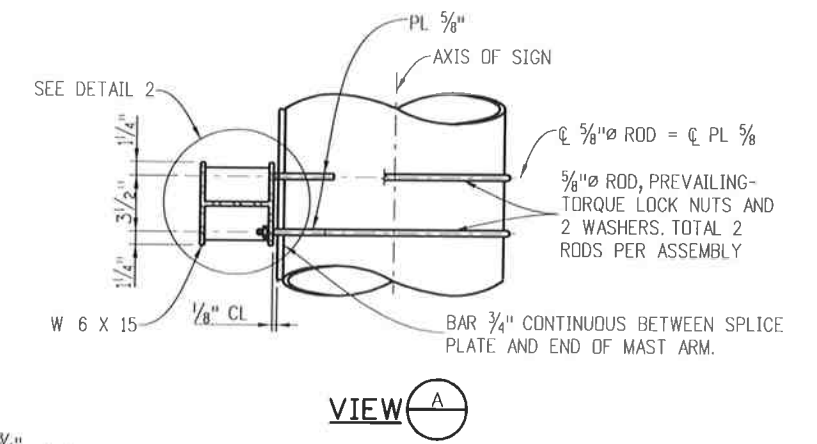
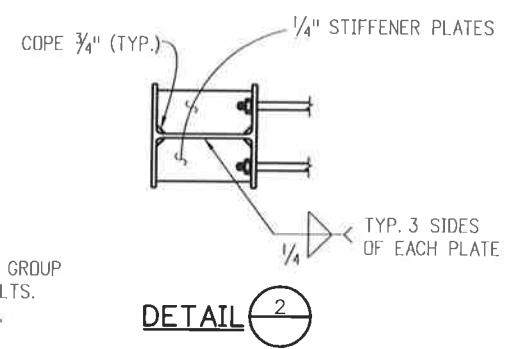
DYNAMIC MESSAGE SIGN CABINET, TILTING BRACKET, AND MOUNTING BOLTS SUPPLIED BY OTHERS. BARRIER TAPE SHALL BE POLYETHYLENE PROTECTIVE TAPE (3M TYPE 8179 CLEAR, OR EQUAL). TAPE SHALL BE INSTALLED AT ANY POINT OF CONTACT BETWEEN ALUMINUM MOUNTING BRACKETS AND STEEL SIGN STRUCTURE.



MOUNTING BOLTS
5- $\frac{5}{8}$ " \varnothing ASTM F593 ALLOY GROUP 304 STAINLESS STEEL BOLTS.
SPACE EVENLY AS SHOWN.

PL $\frac{5}{8}$ " CUT TO FIT PIPE CURVATURE. TOTAL 4 PER BRACKET ASSEMBLY.

DRILL AND TAP FOR THREE $\frac{1}{2}$ " NPS SHORT NIPPLES AND PLUG WITH RECESSED PIPE PLUGS. LOCATE TWO OF THE NIPPLES 12" APART CENTERED BETWEEN THE CENTER MOUNTING BRACKETS ON THE BOTTOM OF THE ARM AND ONE 4'-0" FROM FIELD SPLICE. (SEE SHEET 3).



θ	"X" FOR A 4'-2" DEEP CABINET	"X" FOR A 2'-2" DEEP CABINET
0°	0"	0"
1°	$\frac{7}{8}$ "	$\frac{1}{2}$ "
2°	$1\frac{3}{4}$ "	1"
3°	$2\frac{5}{8}$ "	$1\frac{3}{8}$ "
4°	$3\frac{1}{2}$ "	$1\frac{7}{8}$ "
5°	$4\frac{3}{8}$ "	$2\frac{1}{4}$ "
6°	$5\frac{1}{4}$ "	$2\frac{3}{4}$ "
7°	$6\frac{1}{8}$ "	$3\frac{1}{4}$ "
8°	7"	$3\frac{3}{4}$ "
9°	$7\frac{7}{8}$ "	$4\frac{1}{8}$ "

"X"
17'-6" (MIN.)
18'-6" (MAX.)
VERTICAL CLEARANCE

NOTE:
DMS CABINET FABRICATOR SHALL FASTEN AN ALUMINUM ANGLE TO THE PRIMARY VERTICAL FRAME MEMBER ADJACENT TO THE DOOR AS SHOWN. ANGLE PLACEMENT SHALL PRESENT A BLANK VERTICAL FACE PARALLEL TO THE FRONT FACE OF THE DMS CABINET FOR FIELD MOUNTING AN OSHA COMPLIANT ANCHORAGE POINT. A MINIMUM OF TWO $\frac{5}{8}$ " DIAMETER STAINLESS STEEL BOLTS ARE REQUIRED TO FASTEN ANGLE TO FRAME AS SHOWN IN THE OSHA COMPLIANT ANCHORAGE DETAILS ON SHEET 3 OF 14.

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Sheet Revisions

Date:	Comments

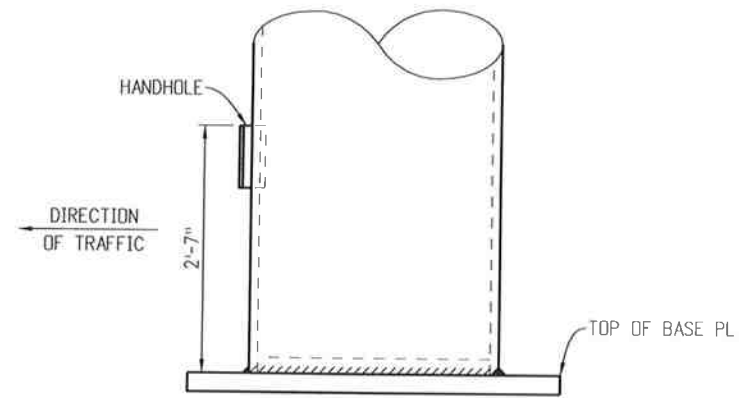
Colorado Department of Transportation

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 Denver, Colorado 80222
 Phone: (303) 757-9543
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Safety & Traffic Engineering Branch KCM/RLD

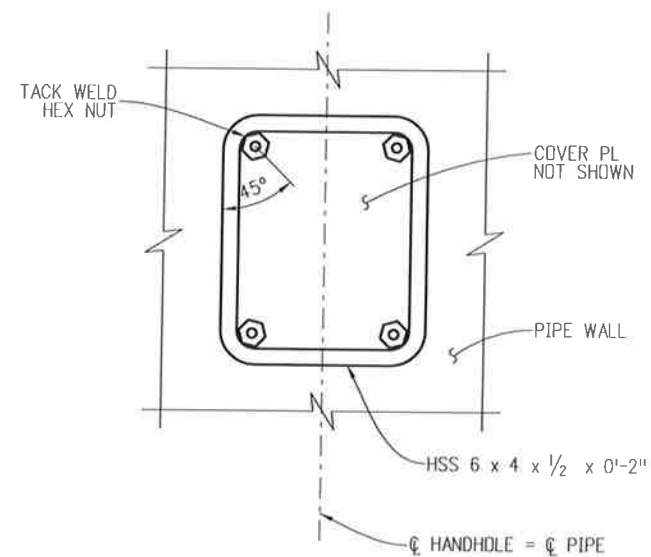
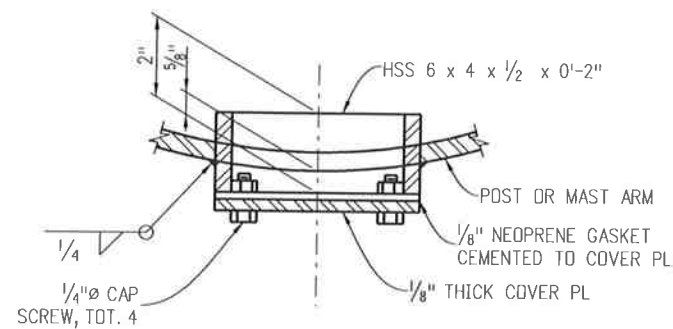
DYNAMIC SIGN MONOTUBE STRUCTURES
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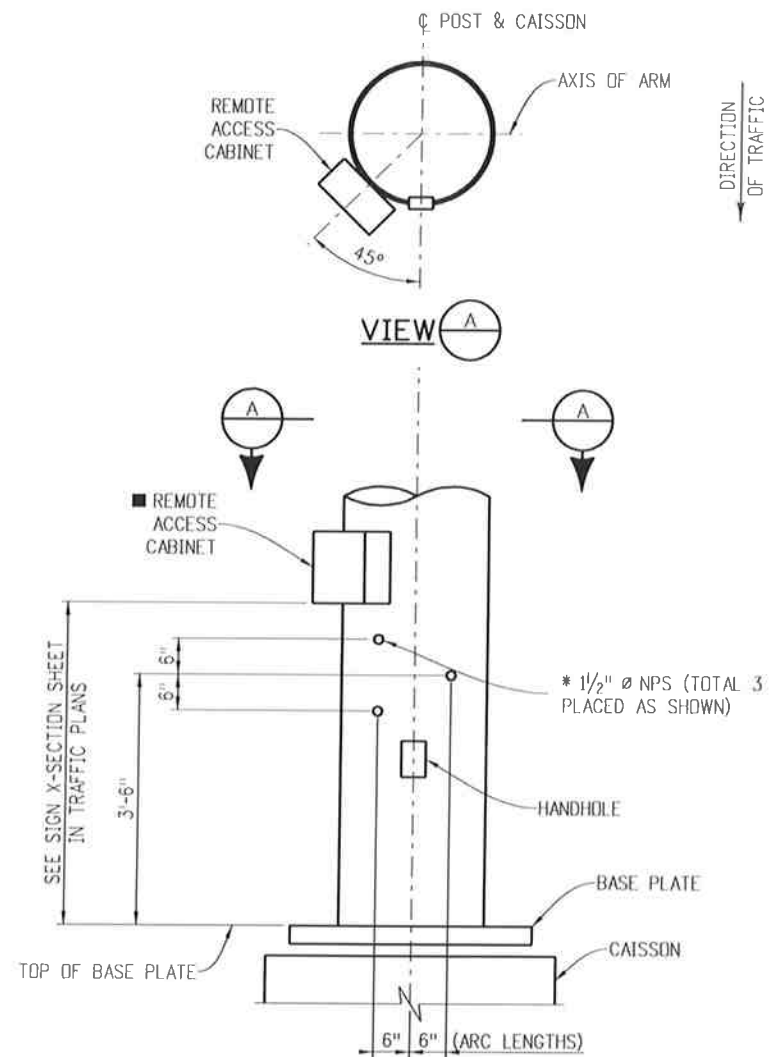
-CANTILEVER POST AND ARM DETAILS-



POST BASE ELEVATION
(FOR BASE PL DETAILS SEE SHEET 7)

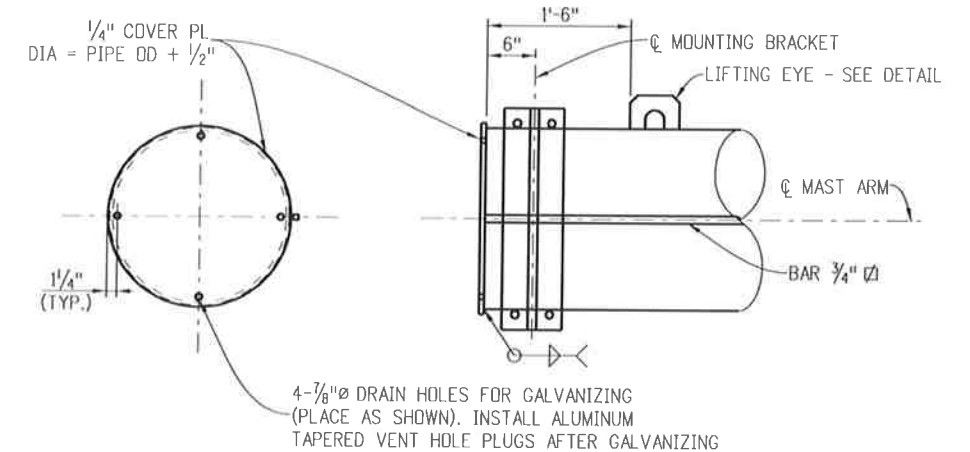


HANDHOLE AND COVER DETAILS

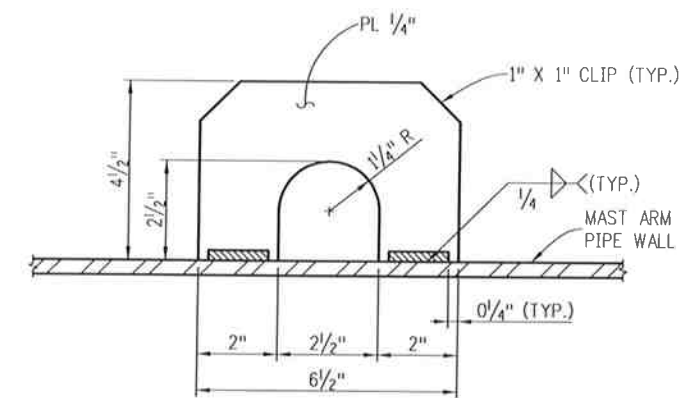


CONDUIT PENETRATION DETAILS

- * PLUG WITH RECESSED PIPE PLUGS
- DISCONNECT CABINET FOR THE POWER SUPPLY SHALL BE LOCATED OUTSIDE OF THE CLEAR-ZONE.



MAST ARM END DETAIL



LIFTING EYE DETAIL

Computer File Information

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Drawing File Name: S-614-60_05of14.dgn	
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Sheet Revisions

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Safety & Traffic Engineering Branch

KCM/RLD

**DYNAMIC SIGN
MONOTUBE STRUCTURES**

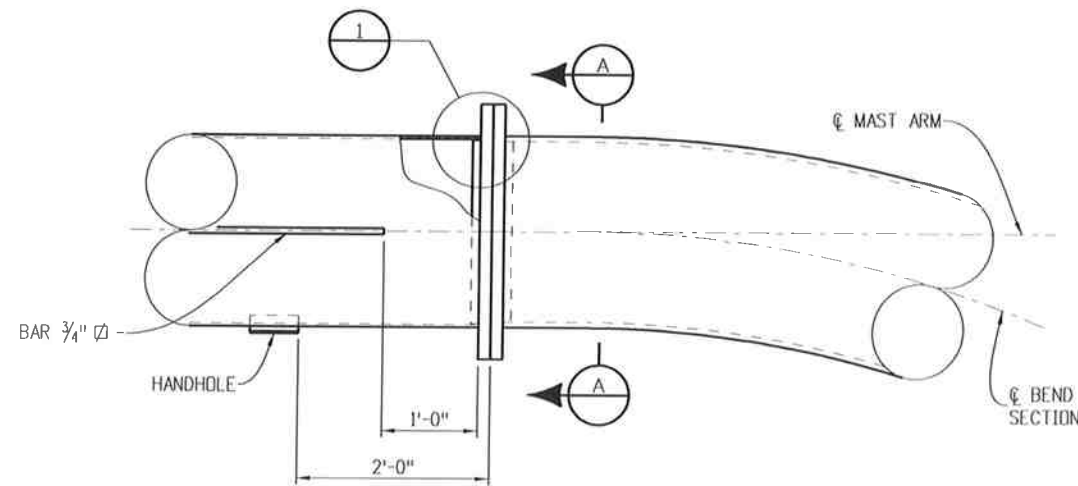
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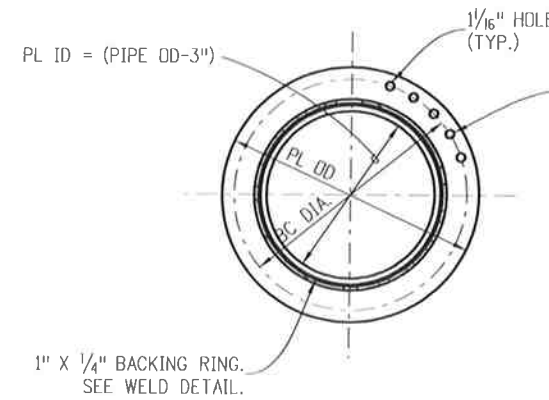
S-614-60

Sheet No. 5 of 14

-CANTILEVER FIELD SPLICE DETAILS-

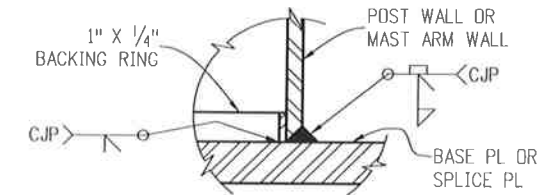


FIELD SPLICE

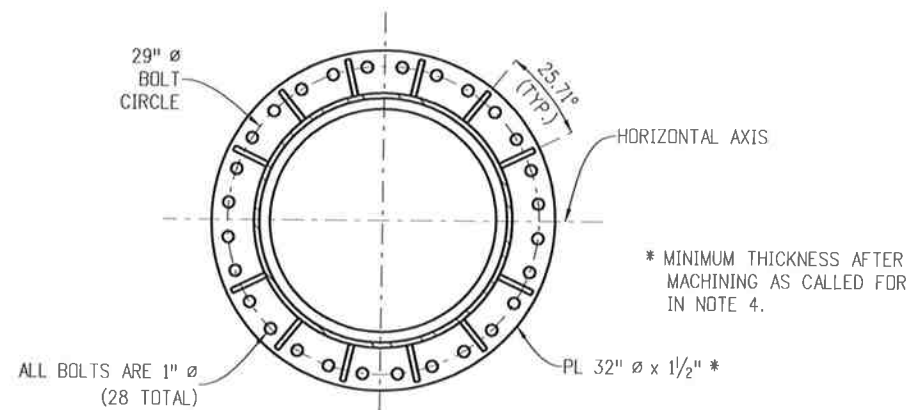


SECTION A

1" \varnothing H.S. BOLTS (GALVANIZED) EQUALLY SPACED. BOLTS SHALL BE SEQUENTIALLY TIGHTENED. ASSUMING 12 BOLTS AND A CLOCK FACE, THE TIGHTENING SEQUENCE WOULD BE 12, 6, 1, 7 ETC. THIS PROCESS SHALL BE CONTINUED UNTIL NO LOOSE BOLTS ARE FOUND AFTER ALL BOLTS HAVE BEEN INITIALLY TIGHTENED.

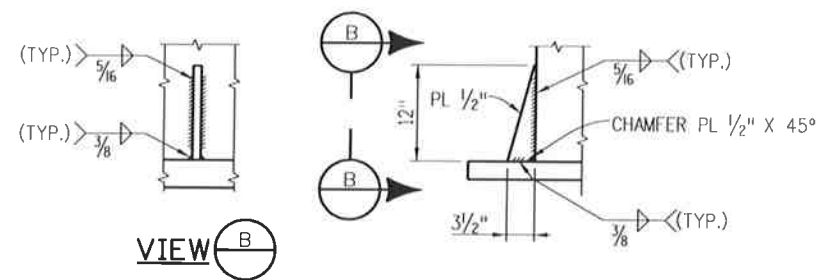


DETAIL 1



FIELD SPLICE DETAILS

STIFFENERS SHALL BE LOCATED ON BOTH SIDES OF THE FIELD SPLICE. CLIP WASHERS AS NEEDED TO AVOID INTERFERENCE WITH STIFFENER WELDS.



VIEW B

STIFFENER DETAILS

NOTES:

1. STIFFENERS ARE TO BE PLACED ON ALL CANTILEVER FIELD SPLICES. STIFFENERS ARE NOT SHOWN ELSEWHERE IN THESE SHEETS FOR CLARITY.
2. TERMINATE WELD 1/2" SHORT OF THE TOP OF THE STIFFENER PLATE. AT THE OTHER 3 WELD TERMINATIONS ON THESE TWO TYPICAL WELDS, STOP THE WELD 1/4" SHORT OF THE END OF THE PLATE.
3. SPLICE DESIGN BASED ON ARM CAPACITY.
4. THE MATING SURFACES OF THE FLANGE SPLICE PLATES SHALL BE MACHINED TO A COMMON PLANE WITHIN A TOLERANCE OF 1/64" USING A PORTABLE FLANGE FACER AFTER WELDING AND PRIOR TO GALVANIZING.

Computer File Information	
Creation Date: 07-04-12	Initials: JRM
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**DYNAMIC SIGN
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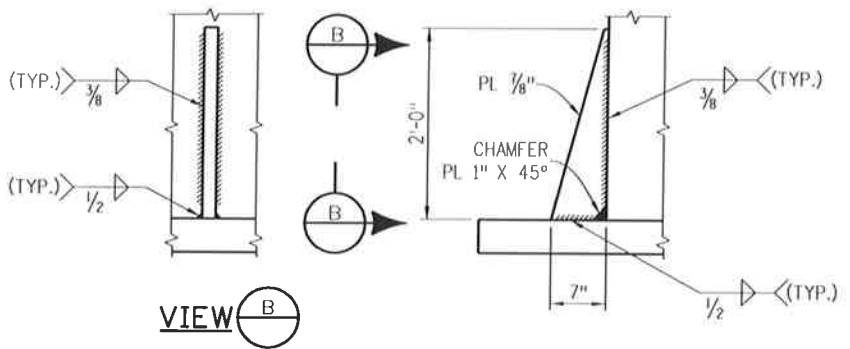
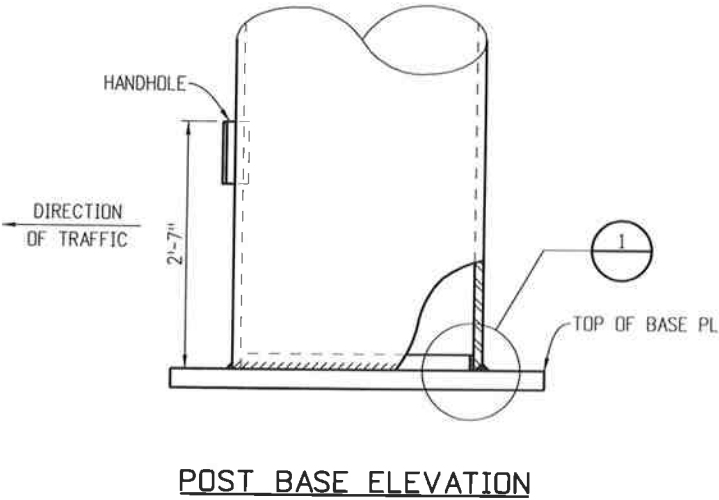
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STANDARD PLAN NO.

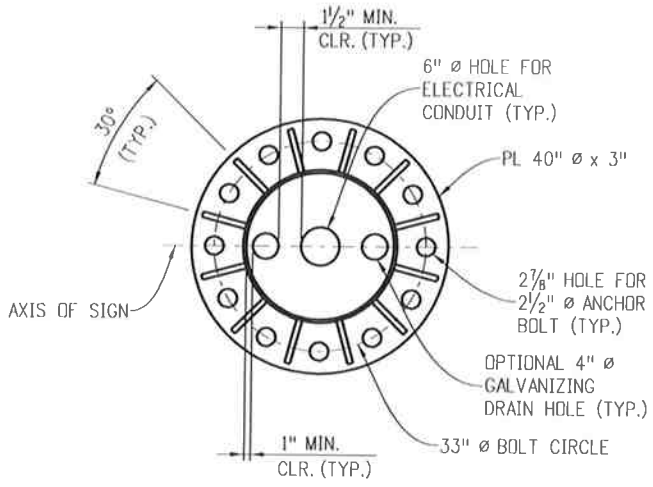
S-614-60

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-CANTILEVER BASE PLATE DETAILS-

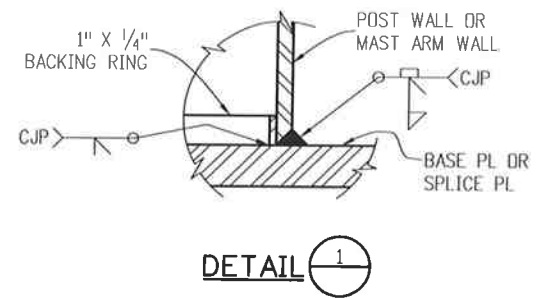


STIFFENER DETAILS
(AT POST BASE - SEE NOTES)



BASE PLATE DETAILS

- NOTES:**
1. STIFFENERS ARE NOT SHOWN ELSEWHERE IN THESE SHEETS FOR CLARITY.
 2. TERMINATE WELD $\frac{1}{2}$ " SHORT OF THE TOP OF THE STIFFENER PLATE. AT THE OTHER 3 WELD TERMINATIONS ON THESE TWO TYPICAL WELDS STOP THE WELD $\frac{1}{4}$ " SHORT OF THE END OF THE PLATE.



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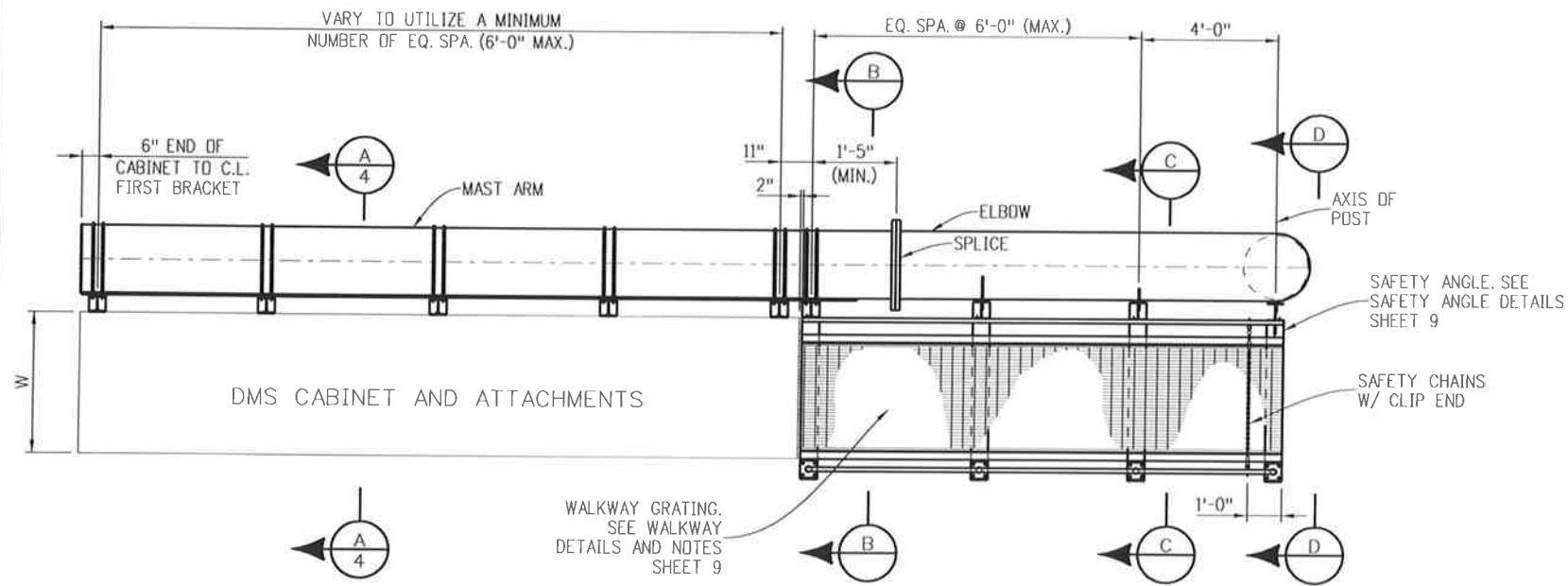
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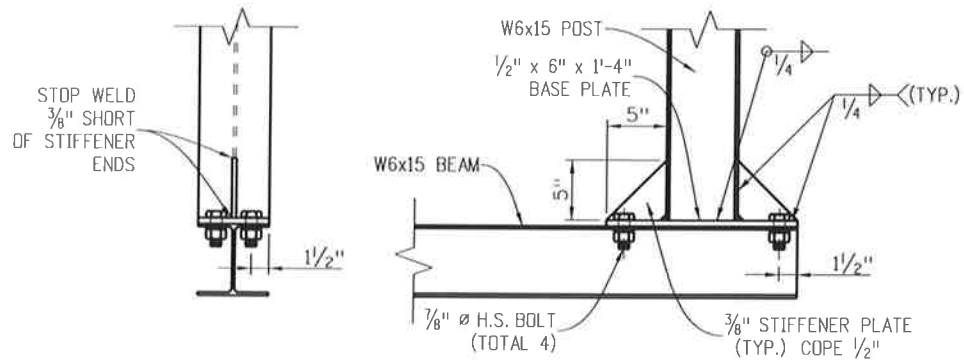
S-614-60

Sheet No. 7 of 14

-CANTILEVER SIGN WALKWAY DETAILS (1 OF 2)-



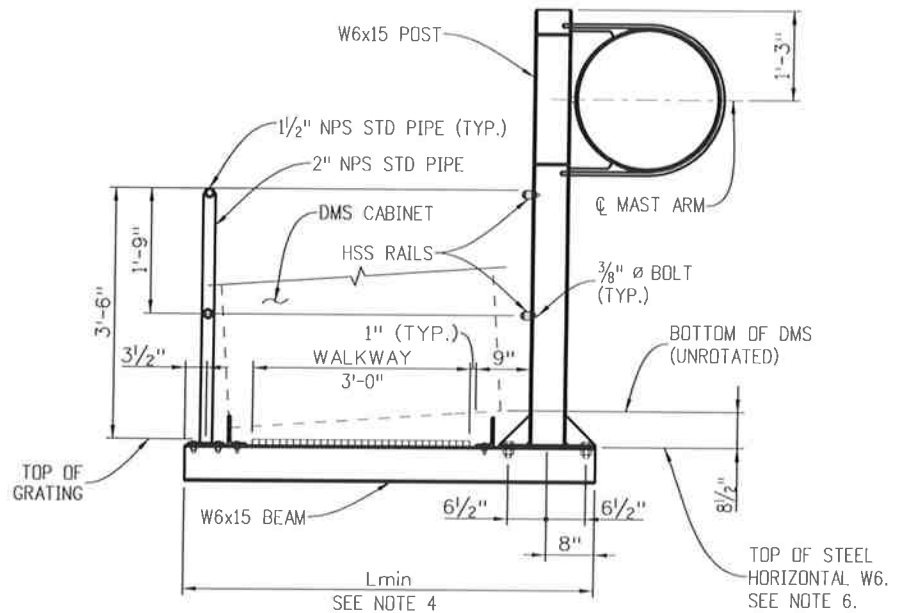
WALKWAY PLAN
WALKWAY LEADING TO CABINET



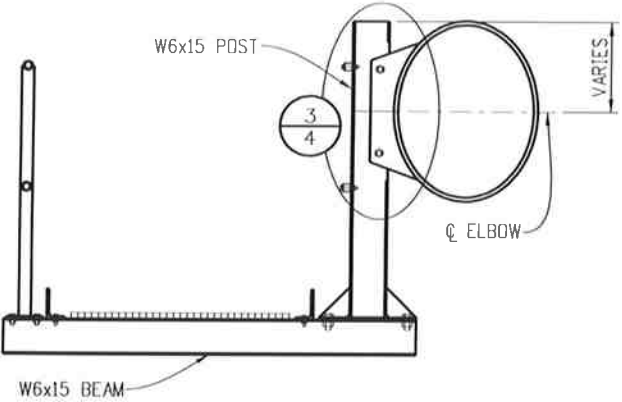
BEAM TO POST CONNECTION DETAIL

NOTES

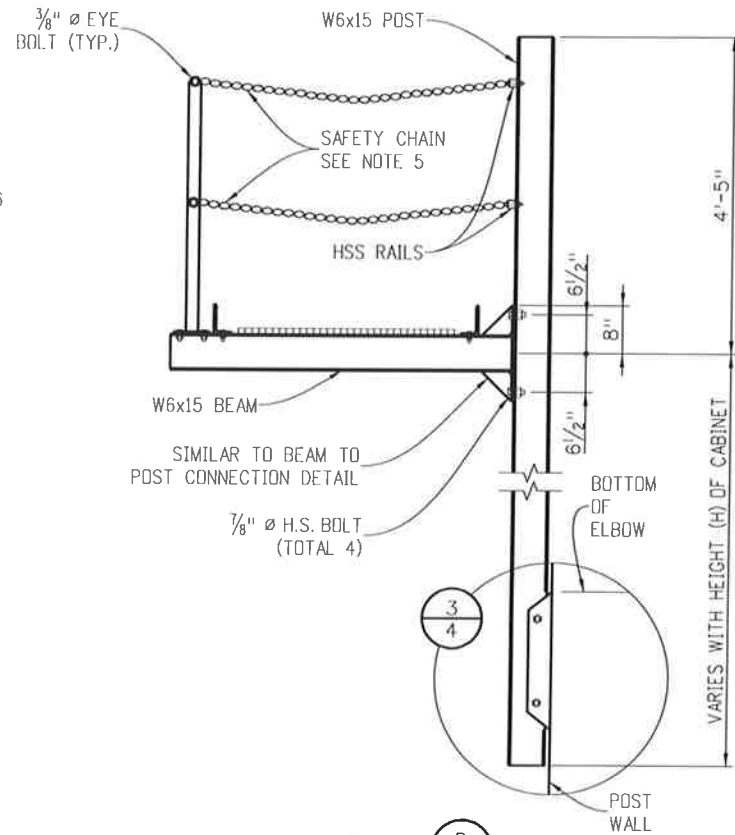
1. MAINTAIN UNIFORM POST SPACING WHERE POSSIBLE.
2. MAXIMUM POST SPACING SHALL NOT EXCEED 6'-0".
3. SEE SHEETS 4 AND 9 FOR ADDITIONAL DETAILS NOT SHOWN HEREON.
4. LENGTH OF BEAM SHALL BE BASED ON DMS WIDTH (W) TO PERMIT CLEARANCE BETWEEN RAILS FOR UNOBSTRUCTED OPENING OF DMS ACCESS DOOR.
 $L_{min} = W + 27$ INCHES.
5. SAFETY CHAIN SHALL BE 1/4" GALVANIZED STEEL COIL CHAIN, APPROXIMATELY 36 LINKS PER YARD.
6. TOP OF HORIZONTAL W6x15 ELEVATION SHALL BE 8 1/2" BELOW BOTTOM OF DMS CABINET WITH THE TILTING BRACKET IN THE 0° (UNROTATED) POSITION.



SECTION B



SECTION C



VIEW D

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Creation Date: 07-04-12	Initials: JRM
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**DYNAMIC SIGN
MONOTUBE STRUCTURES**

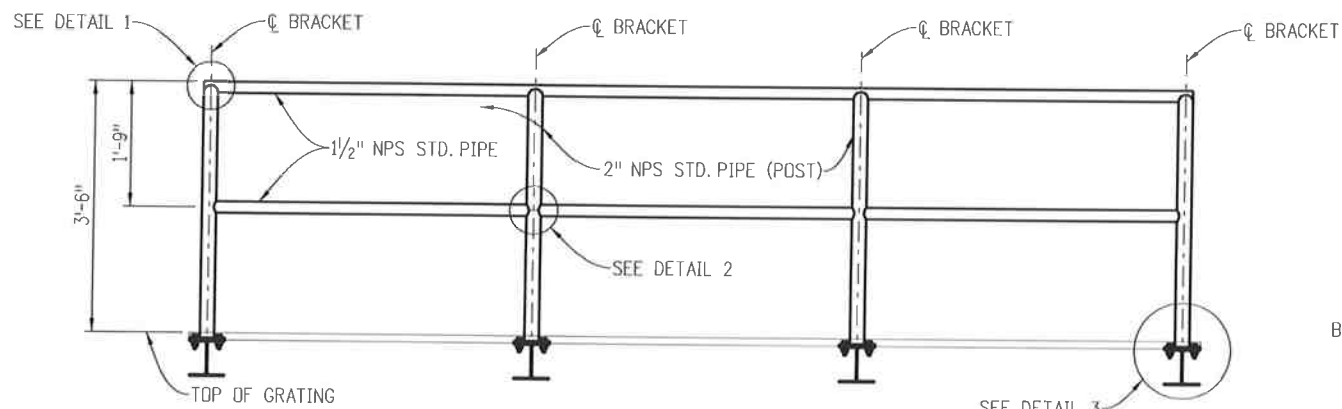
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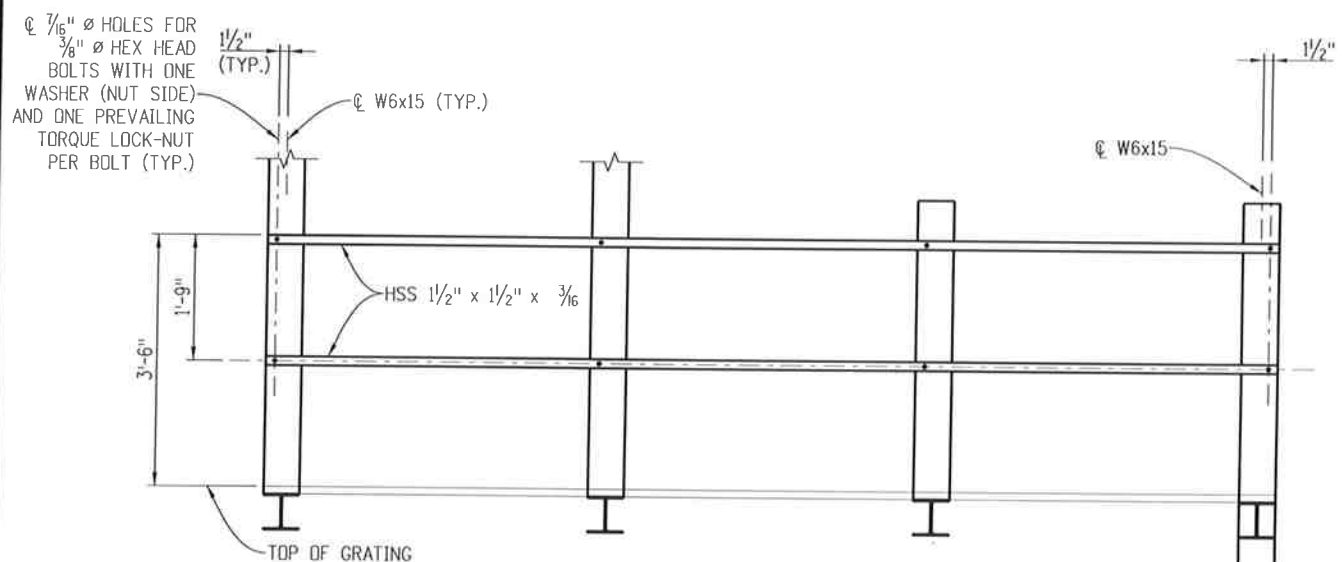
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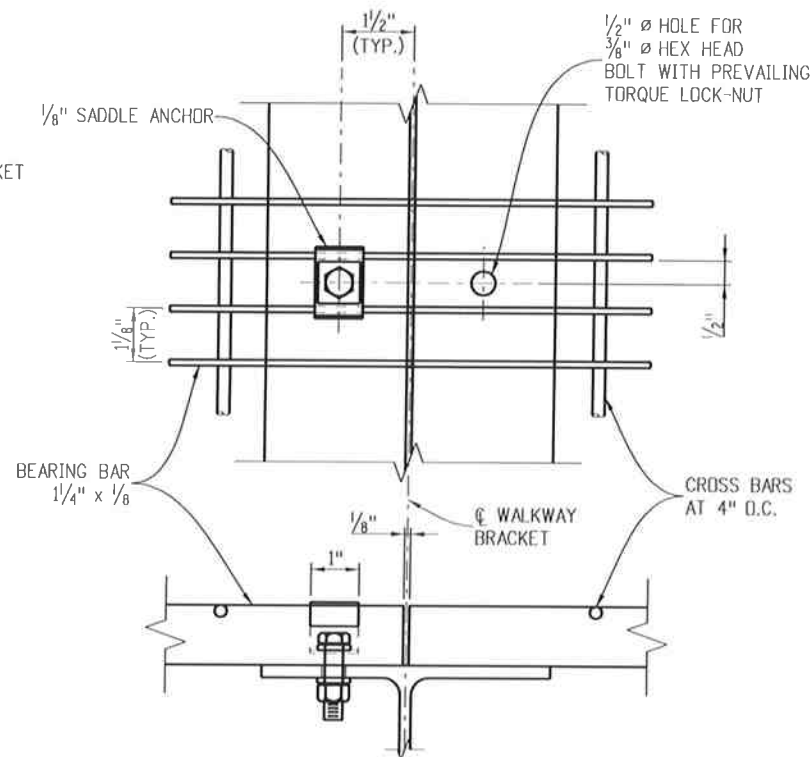
-CANTILEVER SIGN WALKWAY DETAILS (2 OF 2)-



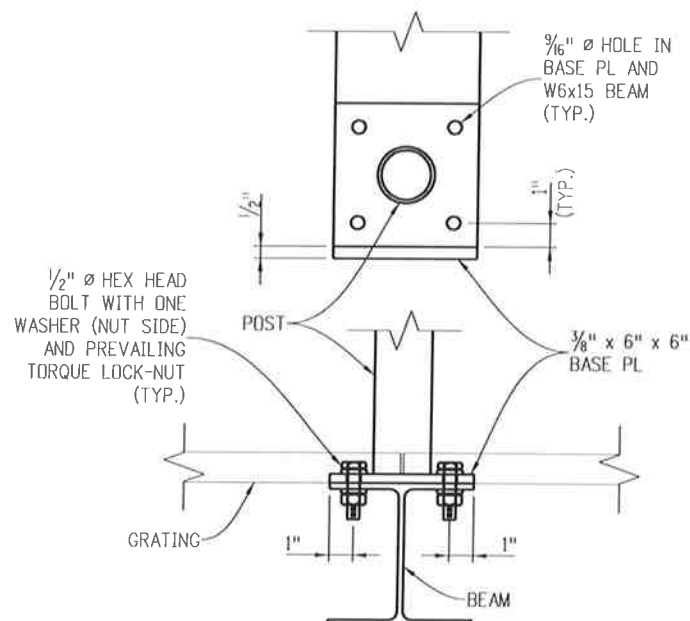
SAFETY RAILING ELEVATION
 (OUTSIDE SAFETY RAILING LOCATION - SAFETY ANGLES NOT SHOWN FOR CLARITY)



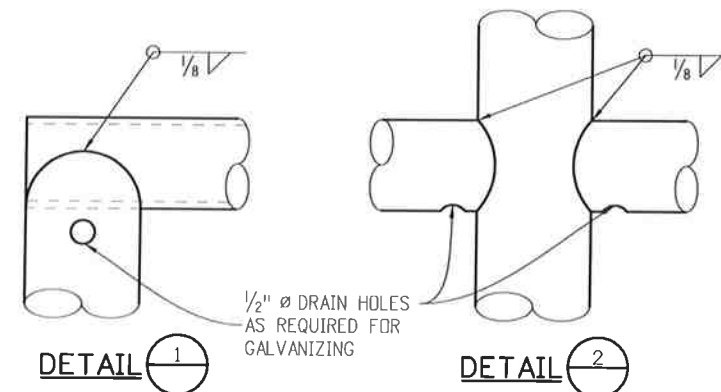
SAFETY RAILING ELEVATION
 (INSIDE SAFETY RAILING LOCATION - SAFETY ANGLES NOT SHOWN FOR CLARITY)



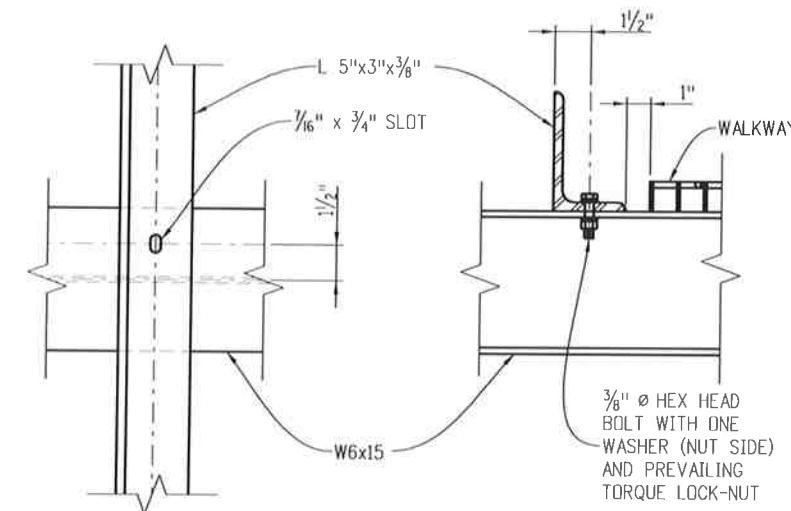
WALKWAY DETAILS



DETAIL 3



NOTES
 ALTERNATIVE VENTING METHODS MAY BE USED IF APPROVED BY THE ENGINEER

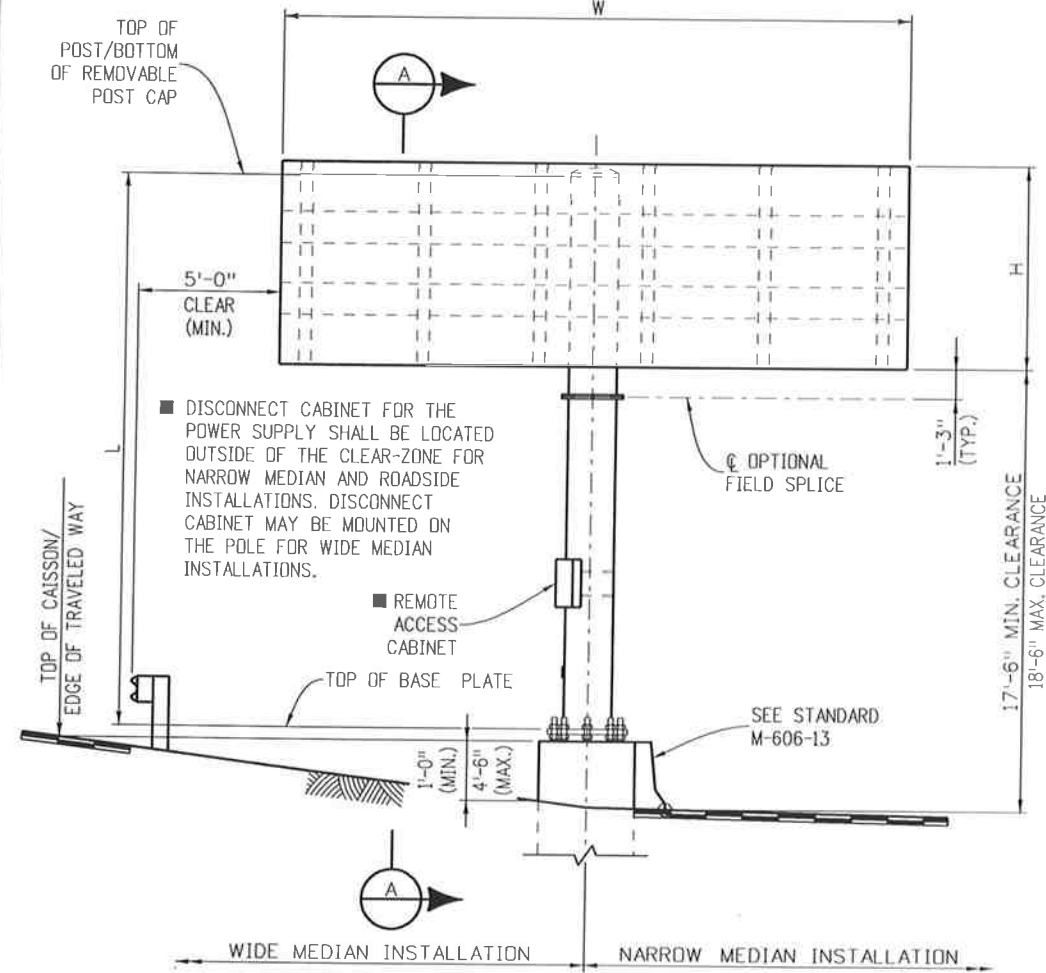


SAFETY ANGLE DETAILS

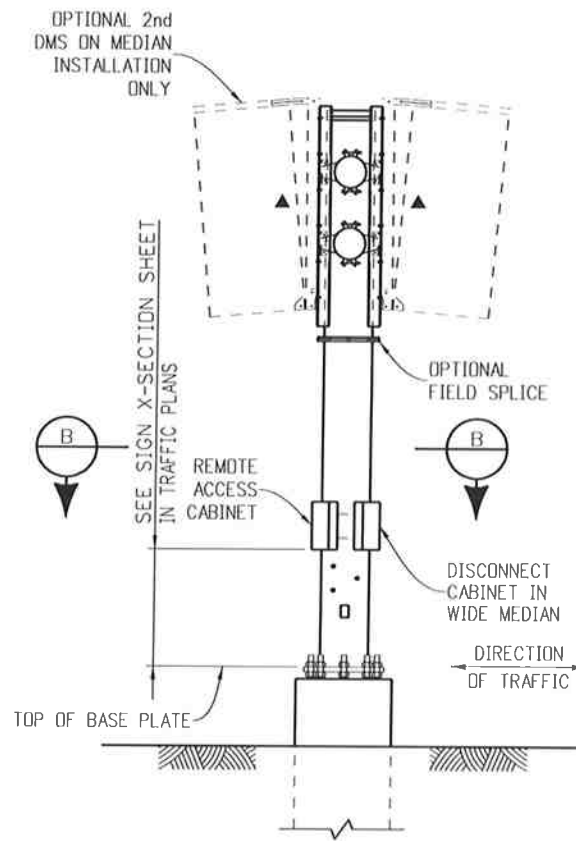
- NOTES**
1. WELDED TYPE GRATING SHALL HAVE 1/4" x 1/8" BEARING BARS AT 1 1/8" CENTERS WITH 1/4" DIAMETER (OR EQUAL) CROSS BARS AT 4" CENTERS. IF MECHANICAL LOCK GRATING IS USED, IT SHALL BE EQUAL IN STRENGTH TO THE WELDED TYPE. ALTERNATE HOLD-DOWN CLIPS MAY BE SUBMITTED FOR APPROVAL.
 2. WALKWAY GRATING TO BE CONTINUOUS (NO SPLICES) OVER AS MANY WALKWAY BRACKETS AS PRACTICAL CONSISTENT WITH FABRICATION, EASE OF HANDLING AND ASSEMBLY.
 3. ALL BOLTS SHOWN ON THIS SHEET SHALL BE ASTM A-307. THE TIGHTENING TORQUE IS 16 FT-LBS. FOR 3/8" Ø BOLTS AND 40 FT-LBS. FOR 1/2" Ø BOLTS. DO NOT OVER TIGHTEN BOLTS AT WALKWAY SADDLE ANCHOR LOCATIONS.

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Creation Date: 07-04-12	Initials: JRM	Date:	Comments:			S-614-60
Last Modification Date: 07-04-12	Initials: JRM					Sheet No. 9 of 14
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-BUTTERFLY INSTALLATION DETAILS-

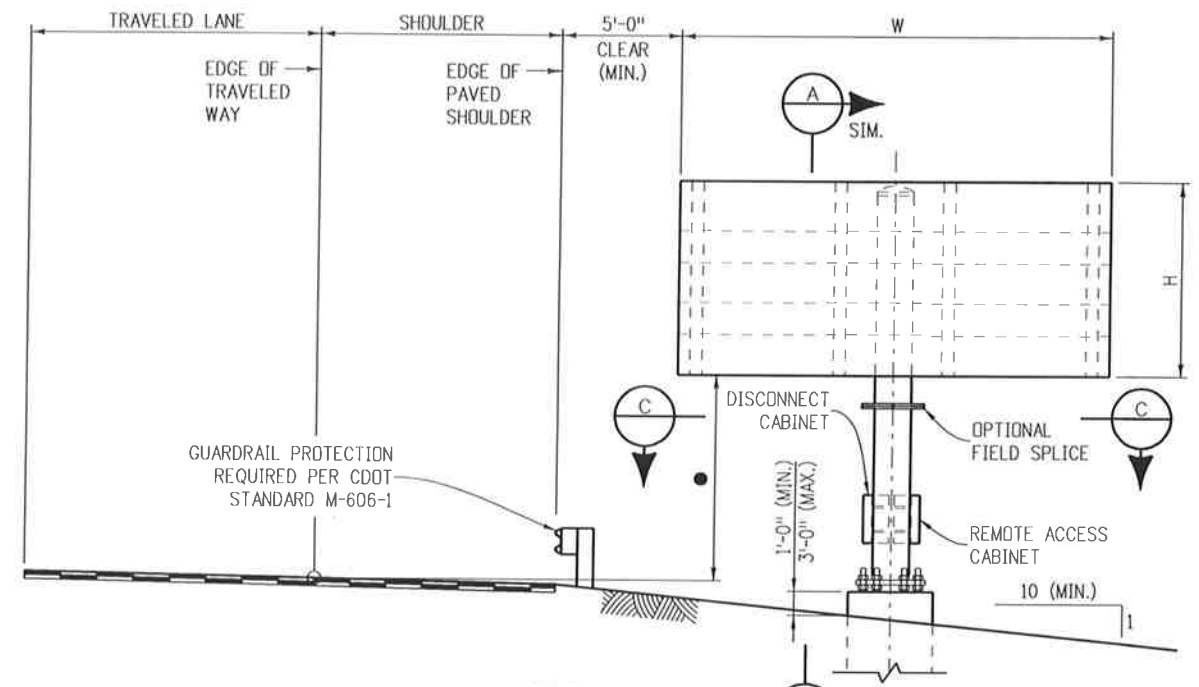


ELEVATION
(MEDIAN INSTALLATION)



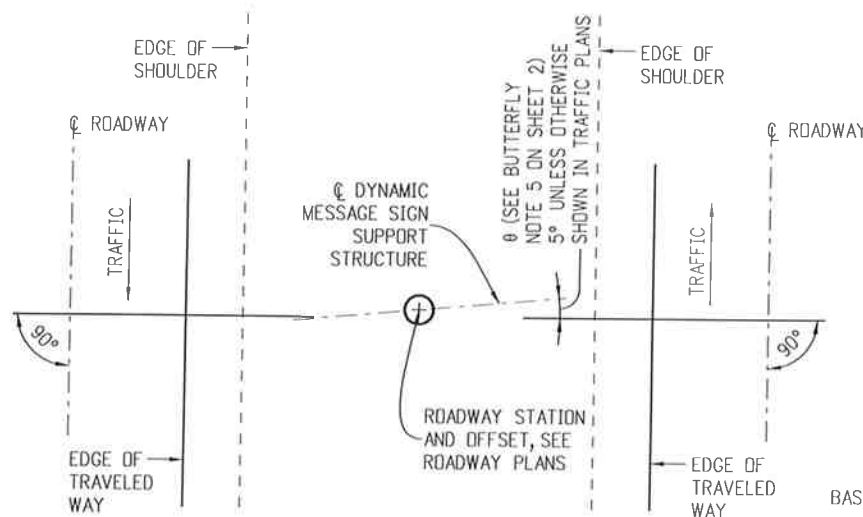
SECTION A

▲ PROVIDE DSHA COMPLIANT ANCHORAGE POINT AS DIRECTED BY THE ENGINEER. SEE SHEETS 3 & 4 FOR MOUNTING INFORMATION.

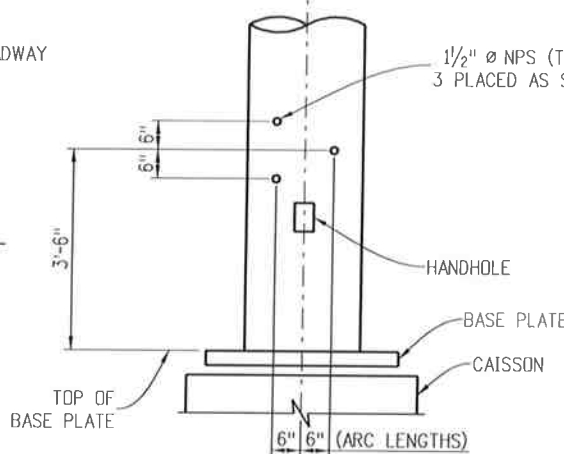


ELEVATION
(ROADSIDE INSTALLATION)

● 7'-0" MIN. OR AS PER THE BUTTERFLY SIGN X-SECTION SHEET

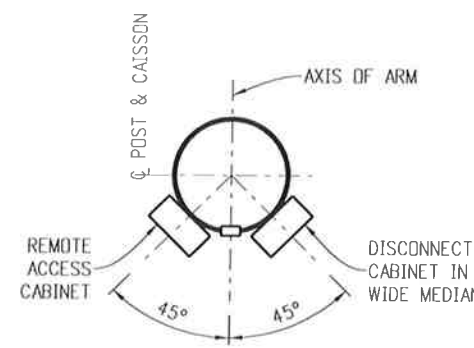


MEDIAN INSTALLATION PLAN

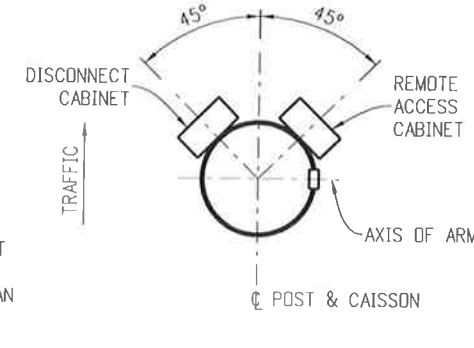


CONDUIT PENETRATION DETAILS

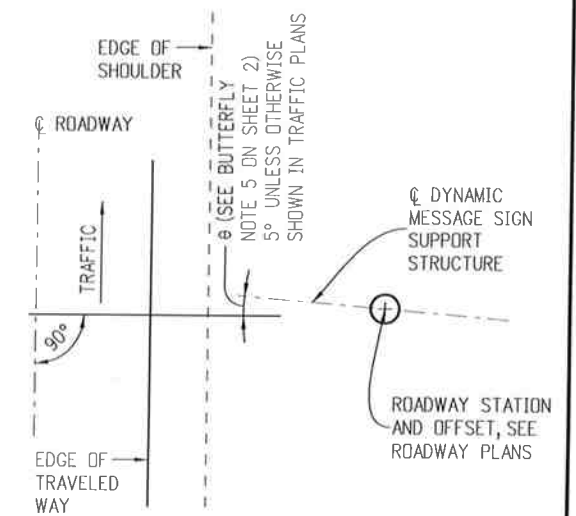
● PLUG WITH RECESSED PIPE PLUGS



SECTION B



SECTION C



ROADSIDE INSTALLATION PLAN

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CAD Ver.: MicroStation V8	(R-X)
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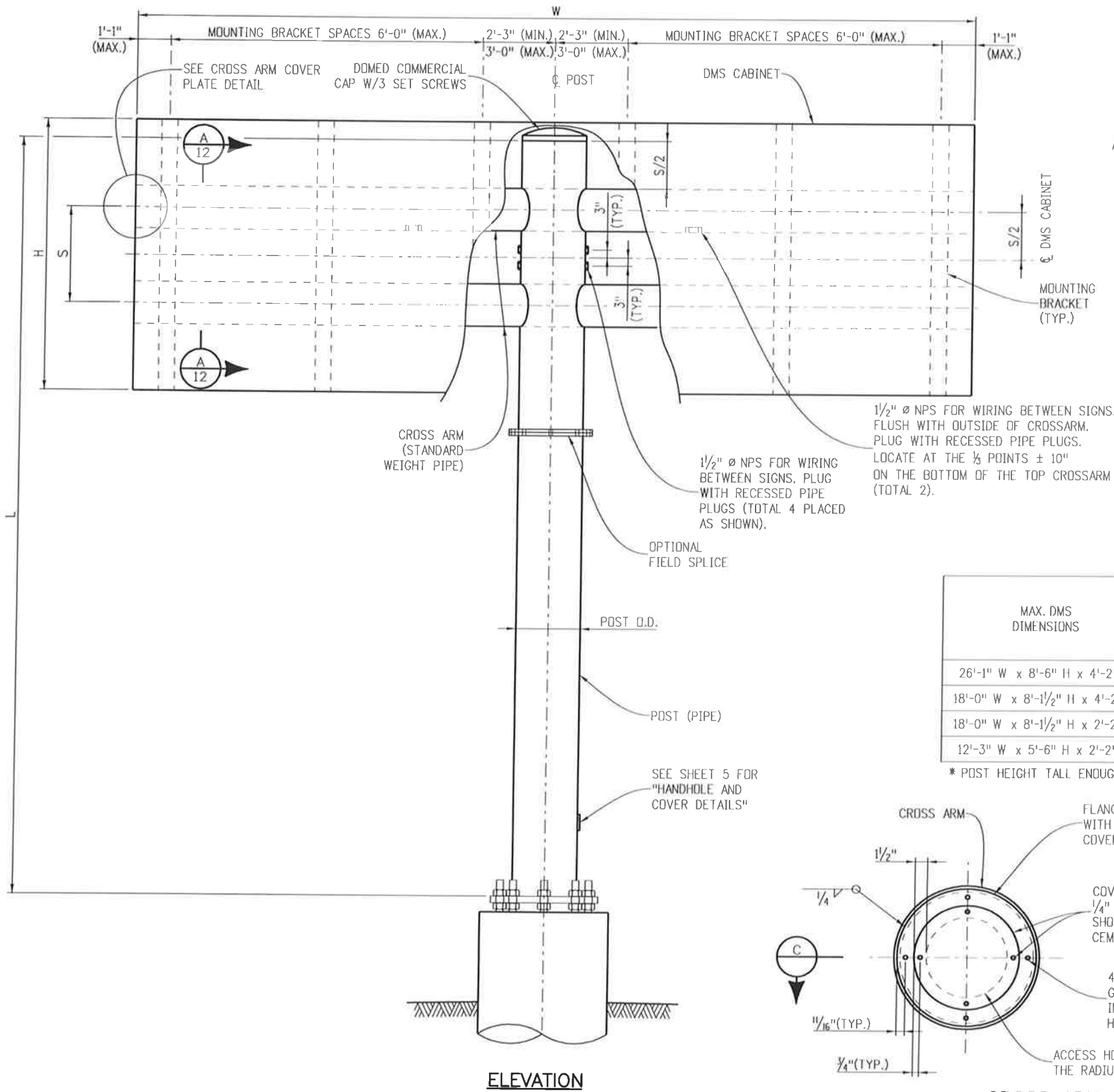
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**DYNAMIC SIGN
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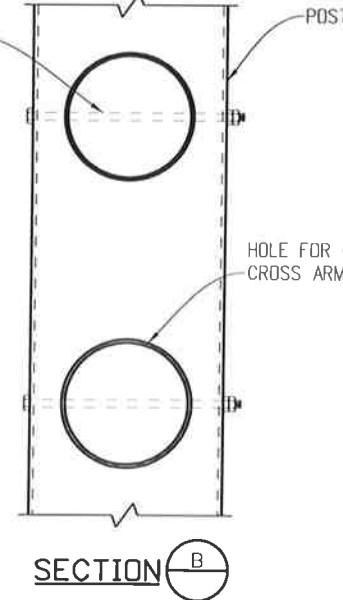
STANDARD PLAN NO.
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-BUTTERFLY ASSEMBLY DETAILS-



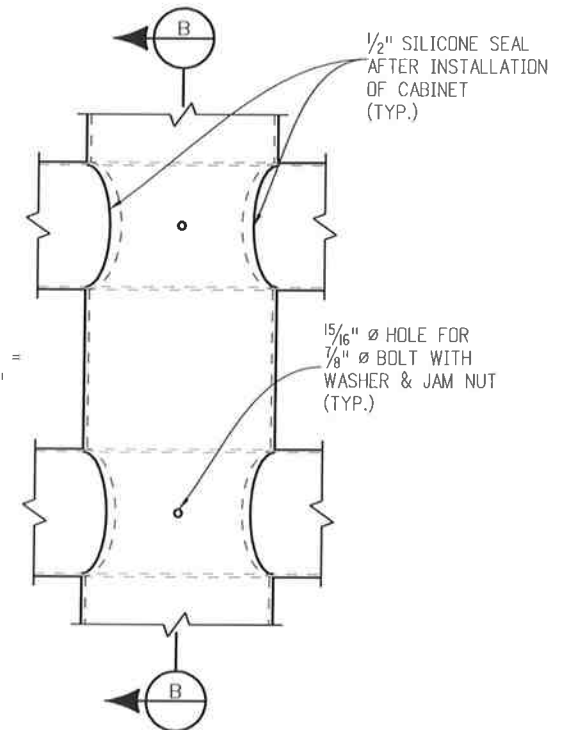
ELEVATION

7/8" Ø x PIPE O.D. + 2"
A307 BOLT w/ WASHER
& JAM NUT (TYP.)



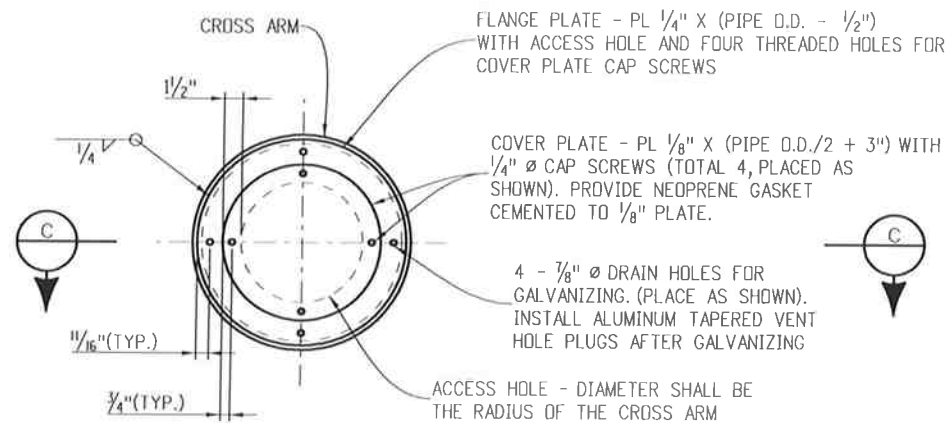
SECTION B

ARMS TO POST CONNECTION

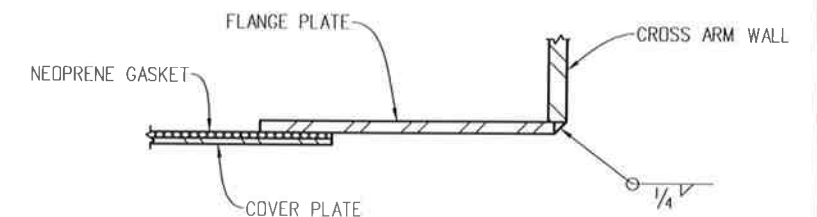


MAX. DMS DIMENSIONS	MAX. DMS WEIGHT	POST PIPE DATA			CROSS ARM PIPE DATA			
		PIPE O.D. (IN)	MIN. WALL THICKNESS (IN)	MAX. POST HEIGHT (FT) "L"	PIPE O.D. (IN)	MIN. WALL THICKNESS (IN)	CROSS ARM LENGTH (FT) "W"	CROSS ARM SPACING (FT) "S"
26'-1" W x 8'-6" H x 4'-2" D	4100 LBS.	24.0	0.50	24.0 *	16.0	0.375	26.0	3.0
18'-0" W x 8'-1 1/2" H x 4'-2" D	3000 LBS.	18.0	0.50	17.0	12.75	0.375	18.0	3.0
18'-0" W x 8'-1 1/2" H x 2'-2" D	2280 LBS.	18.0	0.375	17.0	12.75	0.375	18.0	3.0
12'-3" W x 5'-6" H x 2'-2" D	1520 LBS.	18.0	0.375	14.0	12.75	0.375	12.25	2.5

* POST HEIGHT TALL ENOUGH TO ACCOMMODATE TRAFFIC UNDERNEATH SIGN.



CROSS ARM COVER PLATE DETAIL



SECTION C

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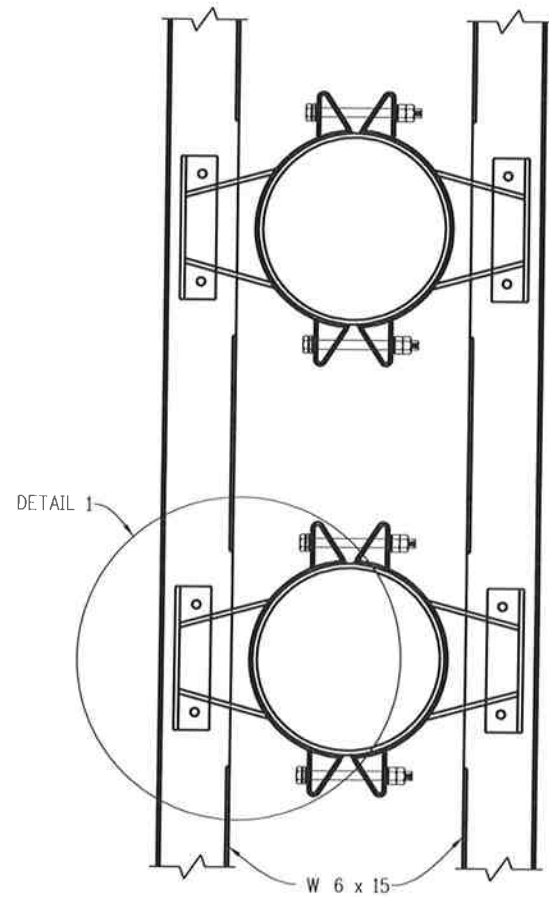
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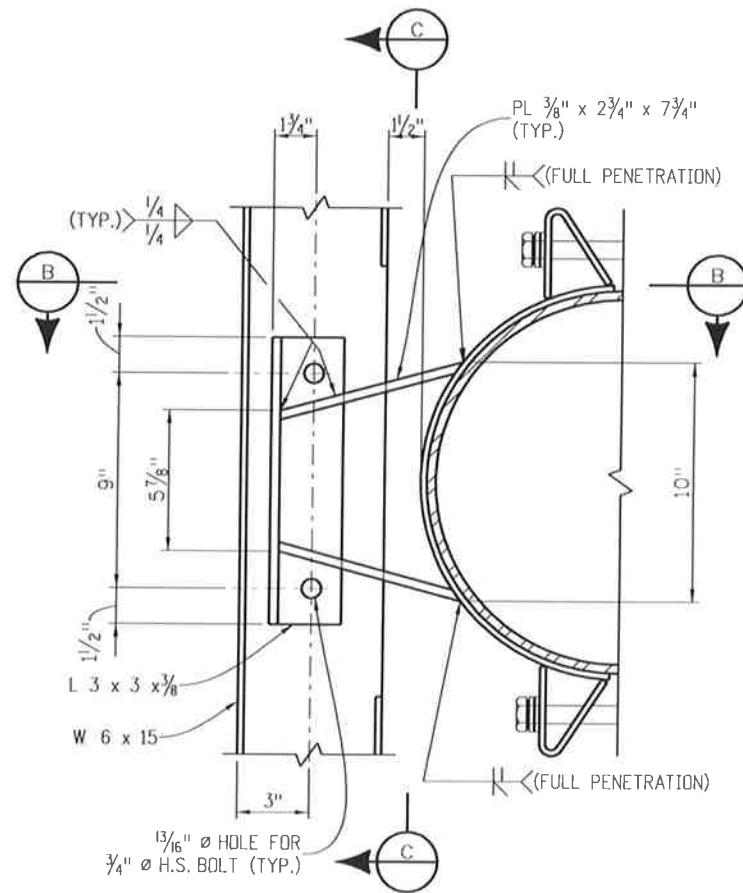
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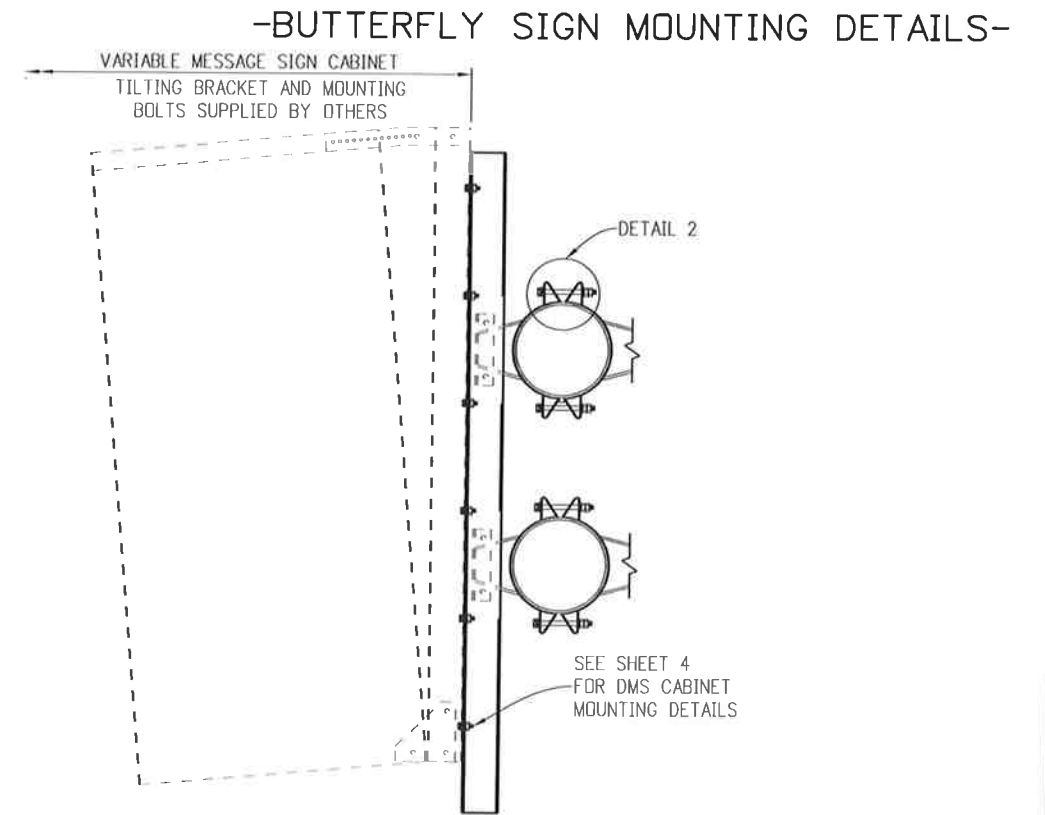
Sheet No. 11 of 14



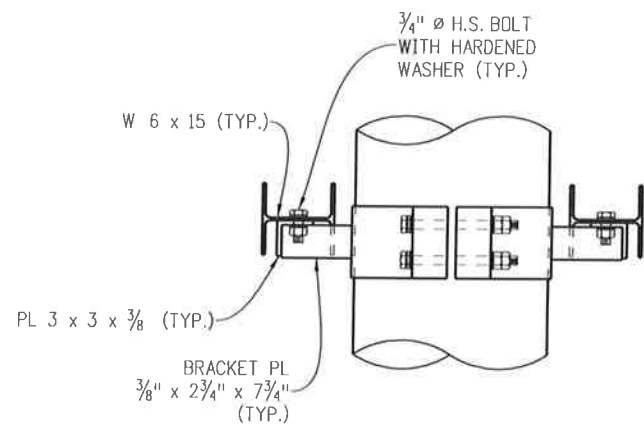
SECTION A
11



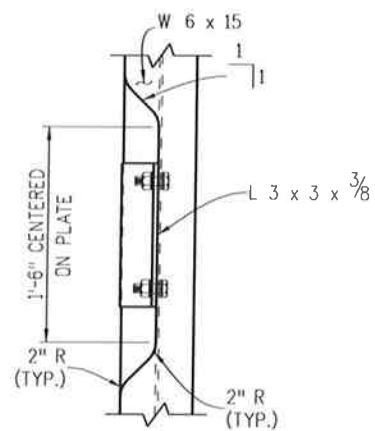
DETAIL 1



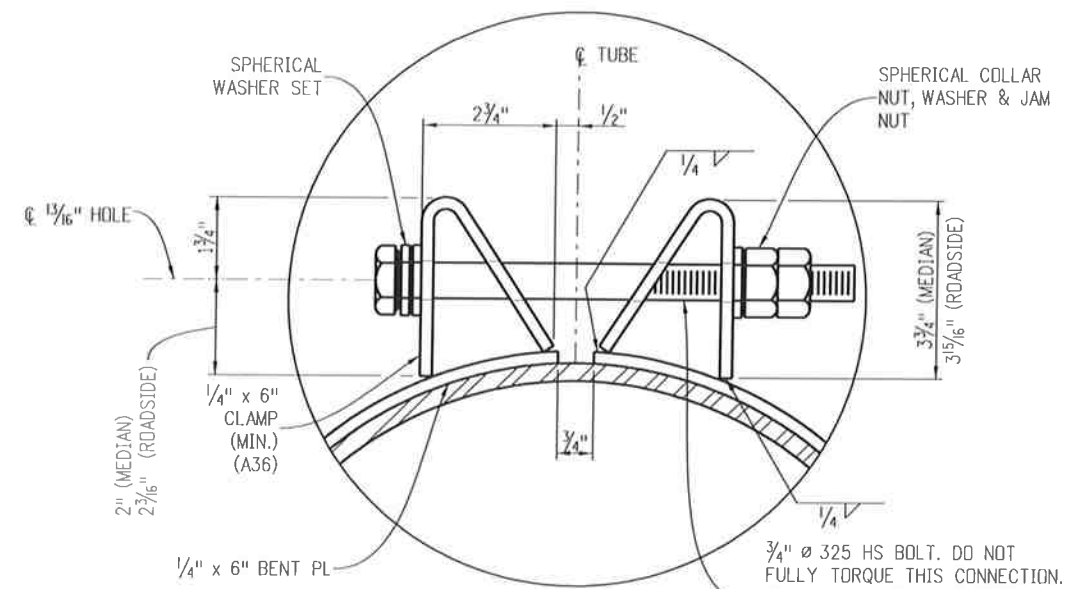
TYPICAL BRACKET CONNECTION



SECTION B
SEE DETAIL 2 FOR CLAMP DETAILS.



SECTION C



DETAIL 2

3/4" ϕ 325 HS BOLT. DO NOT FULLY TORQUE THIS CONNECTION. COLLAR NUT SHALL BE SNUG TIGHT ONLY. PROJECT BOLT 3" BEYOND CLAMP. PROVIDE 5" THREAD LENGTH MINIMUM.

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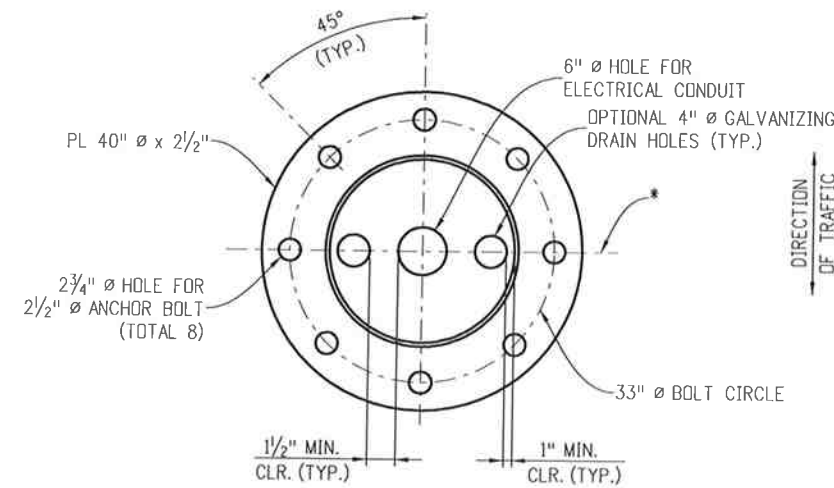
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MONOTUBE STRUCTURES**

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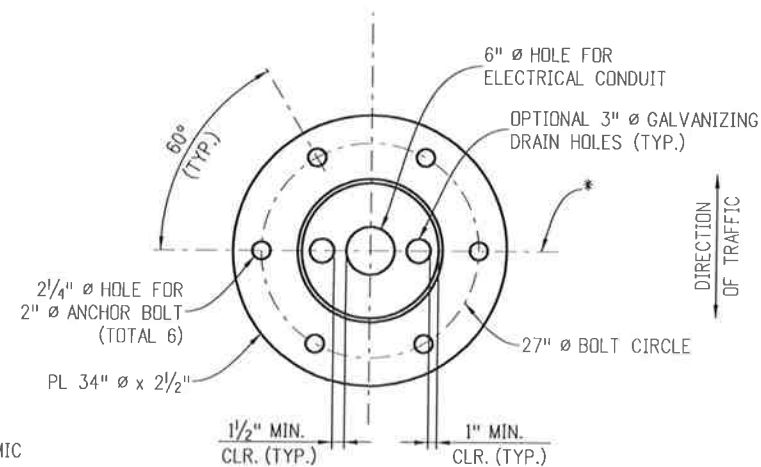
STANDARD PLAN NO.
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 Sheet No. 12 of 14

-BUTTERFLY POST DETAILS-

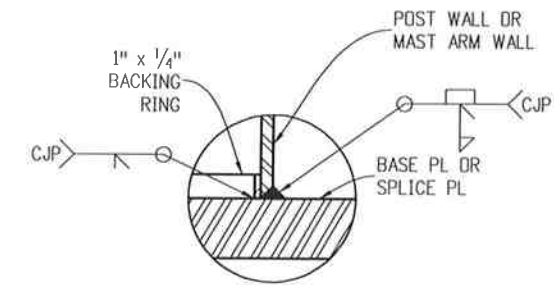


BASE PLATE DETAIL
24" PIPE POST

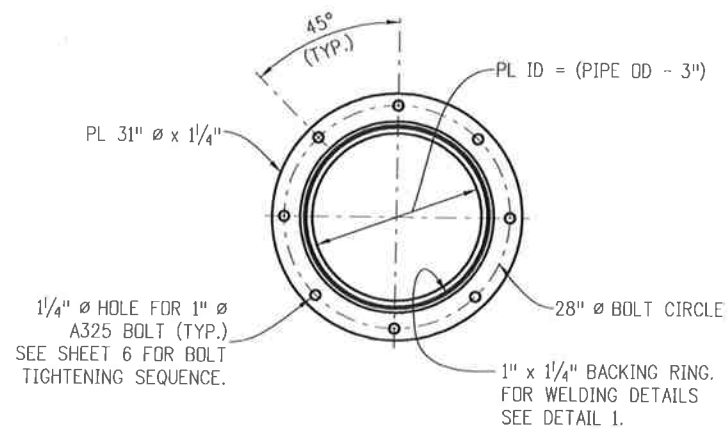
* CENTERLINE OF DYNAMIC MESSAGE SIGN SUPPORT STRUCTURE, SEE SHEET 10.



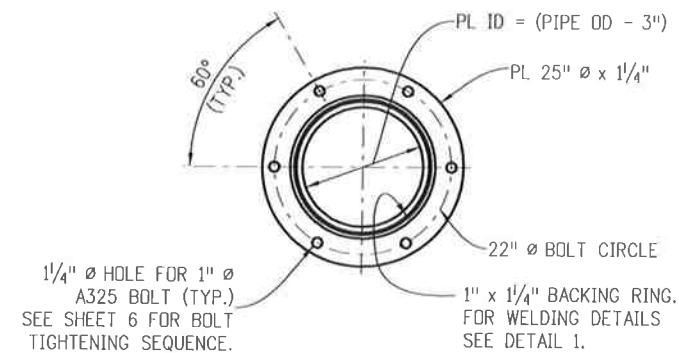
BASE PLATE DETAIL
18" PIPE POST



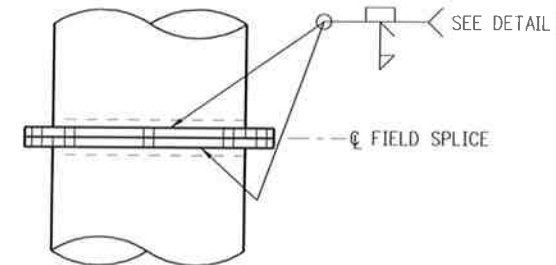
DETAIL 1



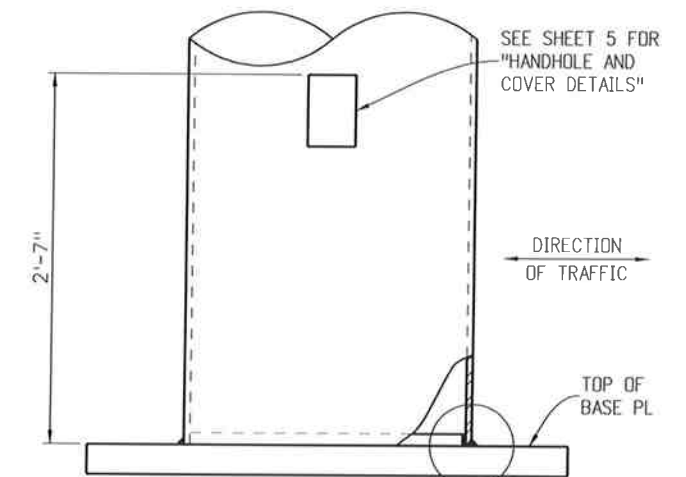
OPTIONAL FIELD SPLICE
24" PIPE POST



OPTIONAL FIELD SPLICE
18" PIPE POST



OPTIONAL FIELD SPLICE



POST BASE ELEVATION

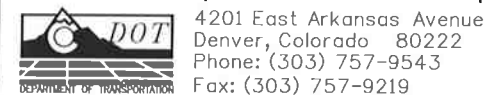
Computer File Information

Creation Date: 07-04-12	Initials: JRM
Last Modification Date: 07-04-12	Initials: JRM
Full Path: www.coloradodot.info/business/designsupport	
Drawing File Name: S-614-60_13of14.dgn	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments

Colorado Department of Transportation



Safety & Traffic Engineering Branch

KCM/RLD

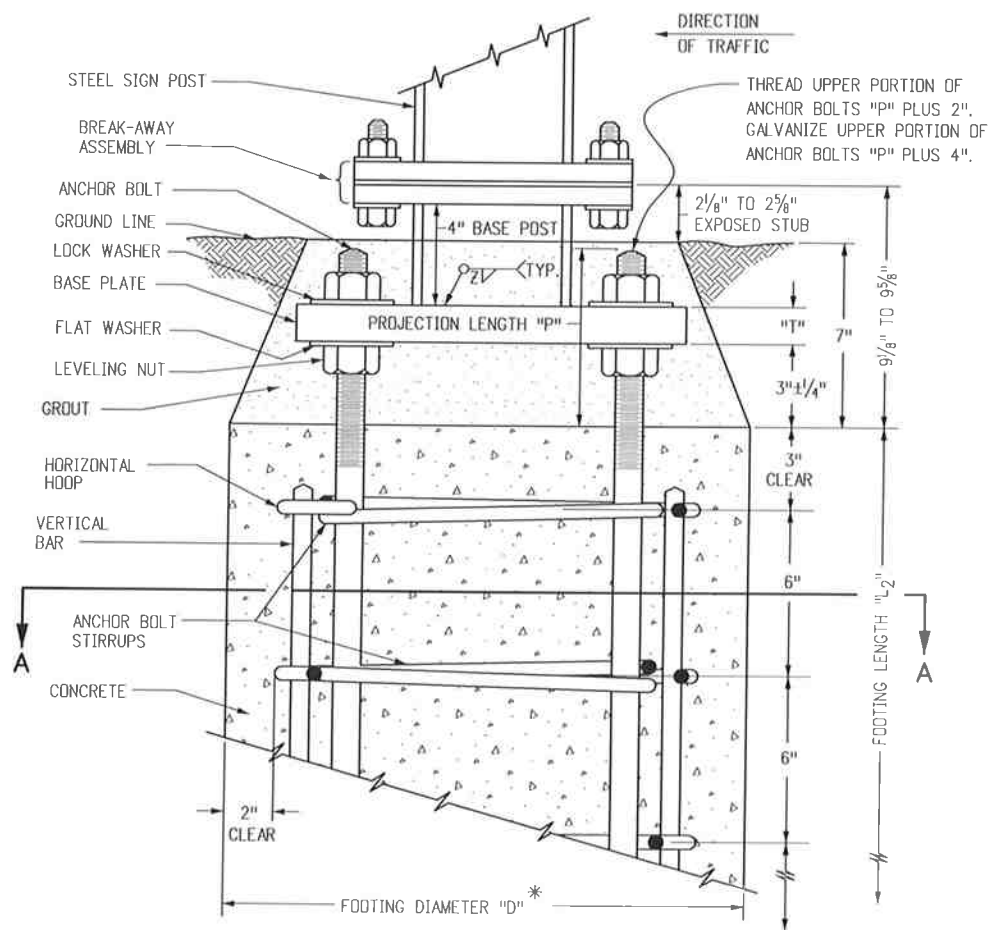
**DYNAMIC SIGN
MONOTUBE STRUCTURES**

Issued By: Safety and Traffic Engineering Branch on July 4, 2012

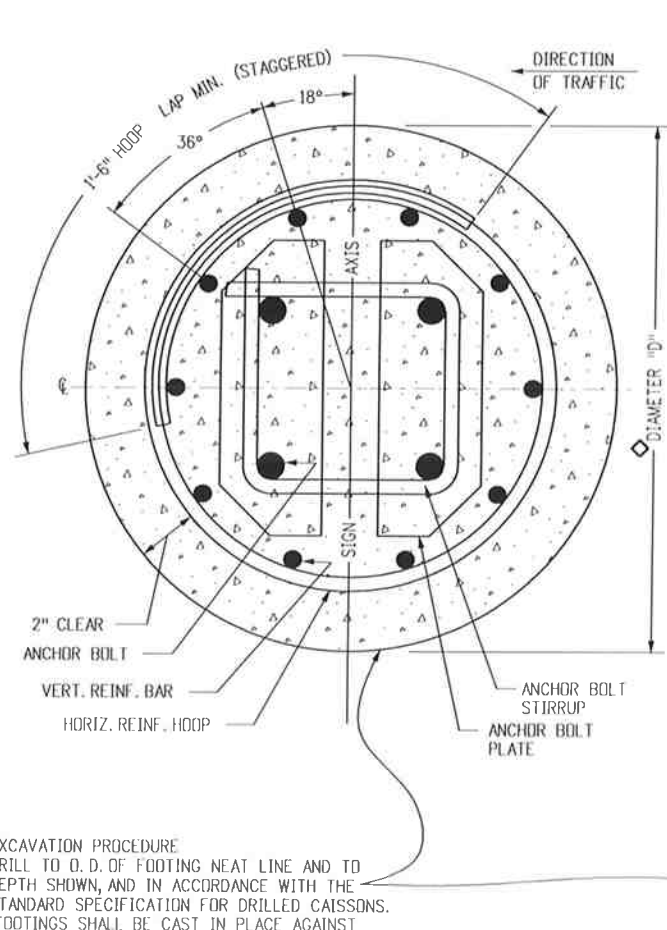
STANDARD PLAN NO.

S-614-60

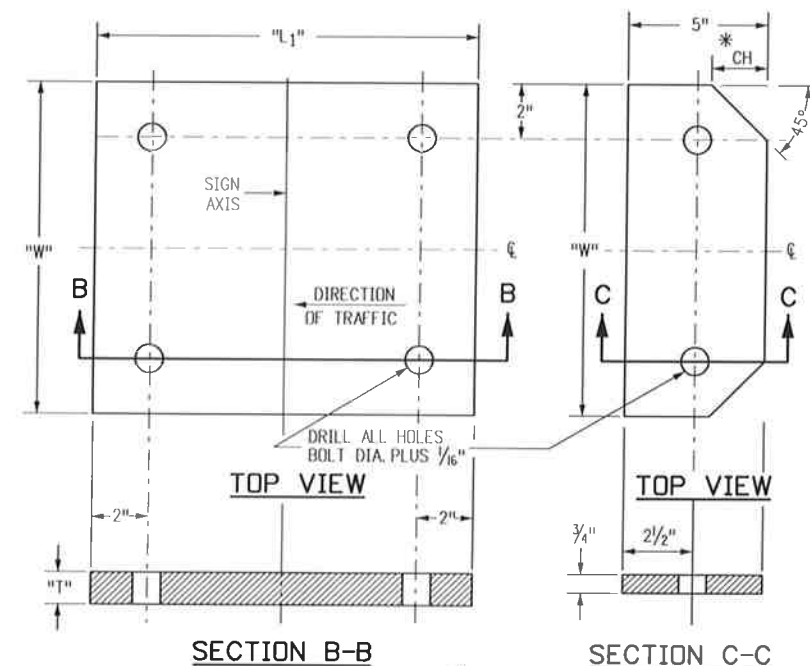
Sheet No. 13 of 14



TYPICAL CONCRETE FOOTING ASSEMBLY



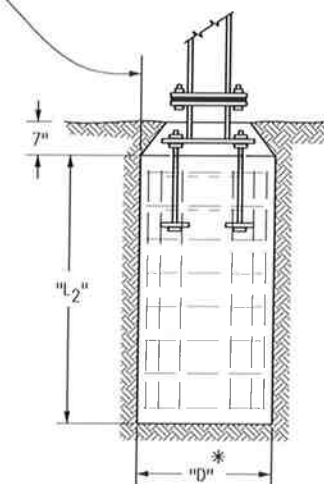
SECTION A-A



BASE PLATE TYPICAL DETAILS

BOLT PLATE TYPICAL DETAILS

* OUTSIDE CORNERS OF BOLT PLATES CHAMFERED AS SHOWN FOR FOOTING TYPES 1-4 ONLY. PLATES FOR TYPES 5-7 HAVE SQUARE CORNERS.



CONCRETE FOOTING TABLE															
POST BASE STRUCTURAL DATA															
SIZE	MAXIMUM ALLOWABLE MOMENT	POST TO BASE WELD Z	BASE PLATE			ANCHOR COMPONENTS					FOOTING STRUCTURAL DATA				
			"L1"	"W"	"T"	ANCHOR BOLTS	BOLT PLATES	"CH"	STIRRUPS	"P"	SIZE	REINFORCING	VERT. BAR	HORIZ. HOOP	
W 12X26	46.5 KIP FT.	3/8" FILLET	20 1/4"	14"	1 1/8"	4-1 1/4"ØX2'-6"	2-5"X3/4"X14"	N/A	2-1/2"Ø	6 5/8"	7	36"	10"	10-#9X9'-6"	20-#4Ø6"
W 10X26	38.9 KIP FT.	3/8" FILLET	17"	14"	1 1/4"	4-1"ØX2'-6"	2-5"X3/4"X14"	N/A	2-1/2"Ø	6 1/4"	6	30"	9"	10-#9X8'-6"	18-#4Ø6"
W 10X22	32.3 KIP FT.	3/8" FILLET	16 1/4"	14"	1 1/4"	4-1"ØX2'-6"	2-5"X3/4"X14"	N/A	2-1/2"Ø	6 1/4"	5	30"	8"	10-#8X7'-6"	16-#4Ø6"
W 8X21	24.4 KIP FT.	3/8" FILLET	15"	13 1/4"	1 1/8"	4-3/8"ØX2'-0"	2-5"X3/4"X13 1/4"	2-1/2"	2-1/2"Ø	6"	4	24"	7"	10-#8X6'-6"	14-#4Ø6"
W 8X18	20.4 KIP FT.	3/8" FILLET	14"	13 1/4"	1 1/8"	4-3/8"ØX2'-0"	2-5"X3/4"X13 1/4"	2-1/2"	2-1/2"Ø	6"	3	24"	6"	10-#7X5'-6"	12-#4Ø6"
W 6X15	13.8 KIP FT.	3/8" FILLET	14"	12 1/4"	1"	4-3/4"ØX1'-6"	2-5"X3/4"X12 1/4"	2"	2-1/2"Ø	5 3/4"	2	24"	5"	10-#6X4'-6"	10-#4Ø6"
W 6X12	8.3 KIP FT.	1/4" FILLET	13"	12"	7/8"	4-3/4"ØX1'-6"	2-5"X3/4"X12"	2"	2-1/2"Ø	5 5/8"	1	24"	4"	10-#5X3'-6"	8-#4Ø6"
6X6 TIMBER	5.0 KIP FT.	TIMBER POSTS SHALL BE SET IN DRILLED OR EXCAVATED HOLES—DEPTH SHALL BE 5 FT. FOR 6X6 POSTS AND 3 FT. FOR 4X4 POSTS UNLESS OTHERWISE NOTED ON THE TABULATION OF SIGNS IN THE PLANS. POSTS SHALL BE PLACED PLUMB, BACKFILLED WITH EXCAVATED MATERIALS, AND THOROUGHLY TAMPED INTO PLACE.													
4X4 TIMBER	1.4 KIP FT.	TIMBER POSTS SHALL BE SET IN DRILLED OR EXCAVATED HOLES—DEPTH SHALL BE 5 FT. FOR 6X6 POSTS AND 3 FT. FOR 4X4 POSTS UNLESS OTHERWISE NOTED ON THE TABULATION OF SIGNS IN THE PLANS. POSTS SHALL BE PLACED PLUMB, BACKFILLED WITH EXCAVATED MATERIALS, AND THOROUGHLY TAMPED INTO PLACE.													

* FOR MULTI-DIRECTIONAL BREAKAWAY ONLY: TYPE 1 THRU TYPE 6 FOOTINGS REQUIRE A 6 IN. INCREASE IN DIAMETER ("D") TO ACCOMMODATE ANCHORS SHOWN ON THE DETAILS INCLUDED IN THE PLANS. ALSO, HORIZONTAL REINFORCING HOOP DIAMETER WILL BE INCREASED TO MAINTAIN A 2 IN. CLEARANCE FROM THE FOOTING SIDES. VERTICAL BARS AND OTHER STRUCTURAL DATA REMAIN THE SAME. TYPE 7 FOOTINGS REQUIRE NO CHANGES.

Computer File Information	
Creation Date: 07/04/12	Initials: KCM
Last Modification Date: 09/16/13	Initials: NNC
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
Drawing File Name: S-614-06_1of2.dgn	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

Sheet Revisions	
Date:	Comments
09/16/13	SHEET 2 - REVISED NOTE 1

Colorado Department of Transportation

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Denver, Colorado 80222
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Fax: (303) 757-9219

DOT
DEPARTMENT OF TRANSPORTATION

Safety & Traffic Engineering Branch KCM/KEN

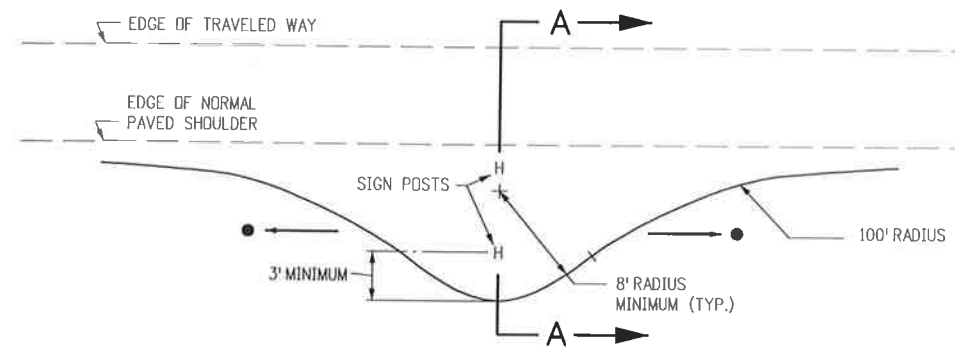
CONCRETE FOOTINGS AND SIGN ISLANDS FOR CLASS III SIGNS

Issued By: Safety & Traffic Engineering Branch July 4, 2012

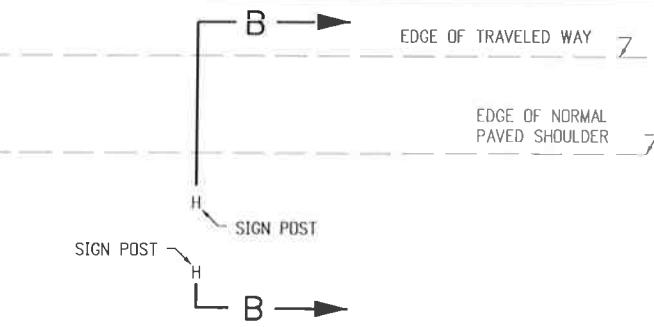
STANDARD PLAN NO.

S-614-6

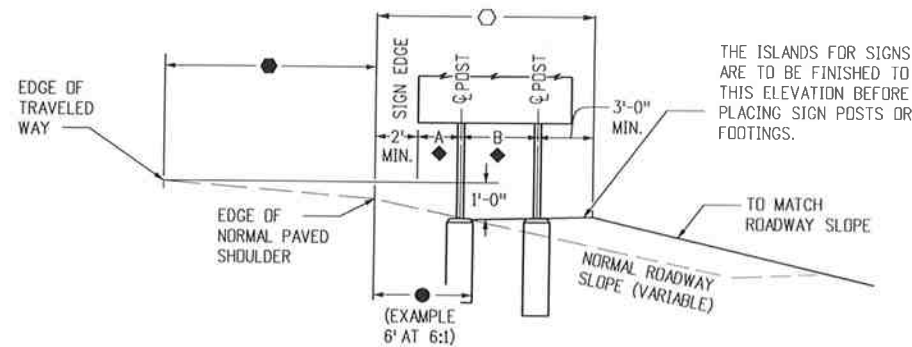
Sheet No. 1 of 2



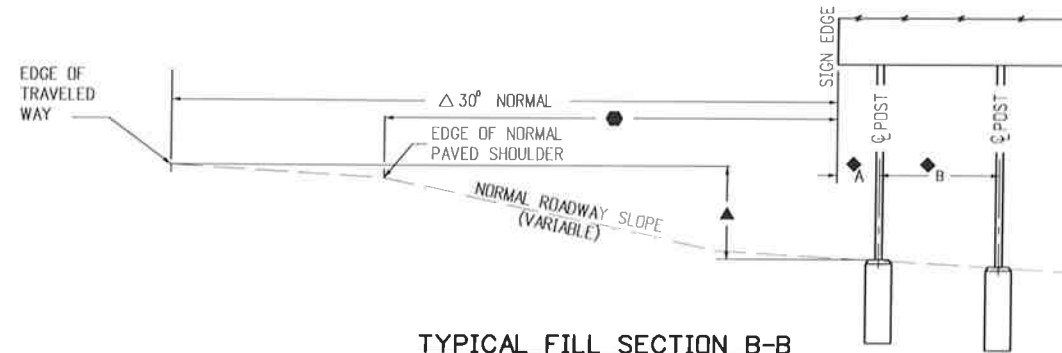
TYPICAL SIGN ISLAND PLAN



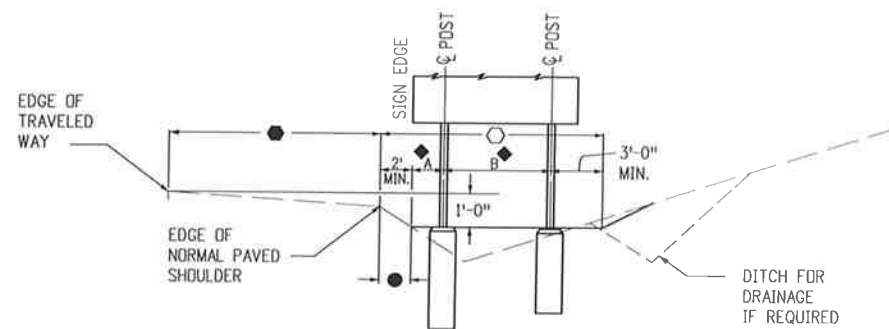
NORMAL CLEARANCE PLAN



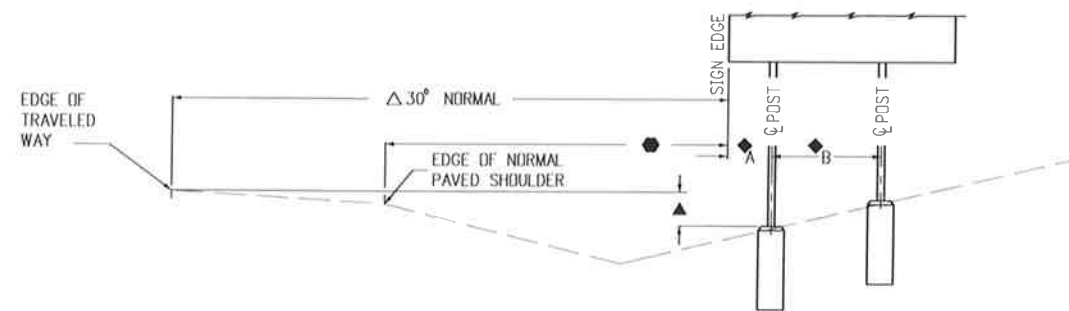
TYPICAL FILL SECTION A-A



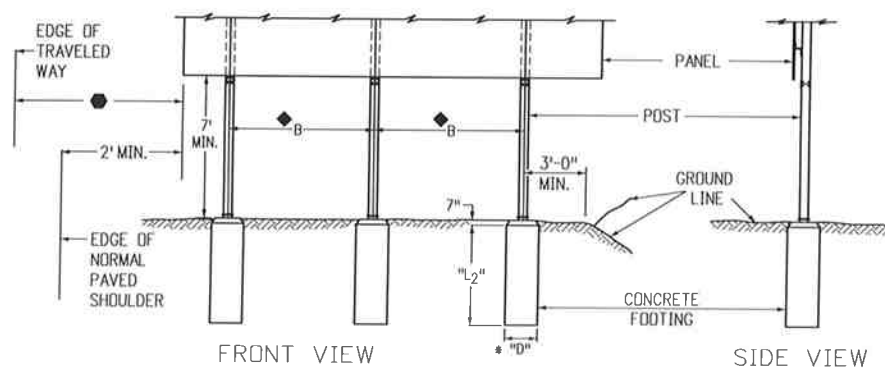
TYPICAL FILL SECTION B-B



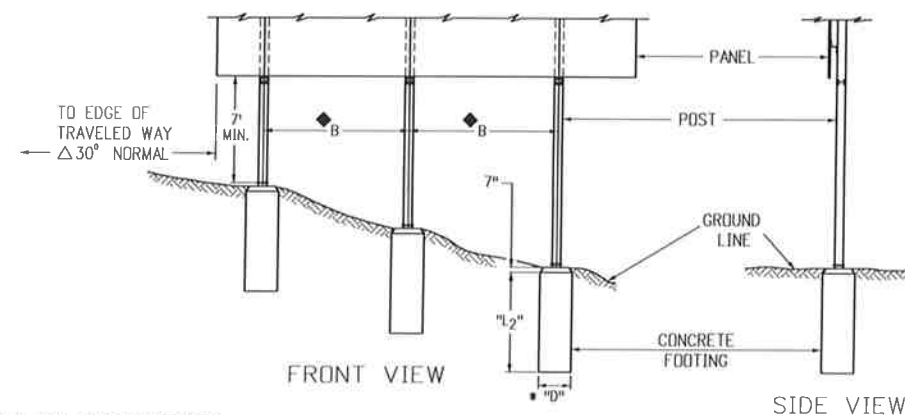
TYPICAL CUT SECTION A-A



TYPICAL CUT SECTION B-B



TYPICAL SIGN ISLAND ELEVATIONS



DETAILS OF SIGN PLACEMENT

TYPICAL ELEVATIONS

GENERAL NOTES

1. ALL CONCRETE IS TO BE CLASS "B2" AIR ENTRAINED. GROUT SHALL CONFORM TO "JOINT MORTAR".
2. USE AASHTO M270 (ASTM A709) GRADE 36 STEEL FOR BASE PLATES AND BOLT PLATES. USE ASTM-A307 STEEL FOR ANCHOR BOLTS.
3. USE GRADE 60 FOR REINFORCING STEEL VERTICAL BARS, HORIZONTAL HOOPS, AND ANCHOR BOLT STIRRUPS.
4. FOR ALL STEEL WORK ABOVE THE BASE PLATE, AND FOR ANGULAR PLACEMENT OF SIGNS, SEE APPLICABLE STANDARDS INCLUDED IN THE PLANS.
5. FOR ADDITIONAL INFORMATION, REFER TO "TABULATION OF SIGNS" AND "CROSS SECTIONS FOR CLASS III SIGNS" INCLUDED IN THE PLANS.
6. ◆ FOR "A" AND "B" DIMENSIONS. SEE COLORADO STANDARD PLAN S-614-4.
7. ● THE SIGN ISLAND SIDE SLOPE PARALLEL TO THE ROADWAY SHALL BE 6:1 OR FLATTER. SEE TYPICAL SECTIONS.
8. ○ THE SIGN ISLAND SIDE SLOPE PARALLEL TO THE ROADWAY SHALL BE 6:1 OR FLATTER. SEE TYPICAL SECTIONS.
9. ● VARIABLE DIMENSIONS. SEE CROSS SECTIONS.
10. ▲ VARIABLE FOOTING ELEVATIONS, SEE CROSS SECTIONS FOR PLACEMENT.
11. △ THE LATERAL PLACEMENT MAY BE REDUCED TO A MINIMUM OF 2 FT. FROM THE EDGE OF NORMAL PAVED SHOULDER TO FIT FIELD CONDITIONS WHEN 30 FT. FROM THE EDGE OF THE TRAVELED WAY IS NOT FEASIBLE. SEE THE CROSS SECTIONS AND/OR TYPICAL GROUND SIGN PLACEMENT STANDARD.
12. EMBANKMENT FOR SIGN ISLANDS IS TO BE COMPACTED AS REQUIRED UNDER ITEM 203 OF THE STANDARD SPECIFICATIONS.
13. FOR ANGULAR PLACEMENT OF SIGNS, SEE COLORADO STANDARD PLAN S-614-1.
14. THE 4-INCH "BASE POST" AND LOWER "BREAK-AWAY PLATE" SHALL BE PAID FOR AS PART OF THE FOOTING.

Computer File Information

Sheet Revisions

Colorado Department of Transportation

CONCRETE FOOTINGS AND SIGN ISLANDS FOR CLASS III SIGNS

STANDARD PLAN NO.

Creation Date: 07/04/12 Initials: KCM
 Last Modification Date: 09/16/13 Initials: NNC
 Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans
 Drawing File Name: S-614-06_2of2.dgn
 CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English

Date:	Comments
8/26/2013	REVISED NOTE 1

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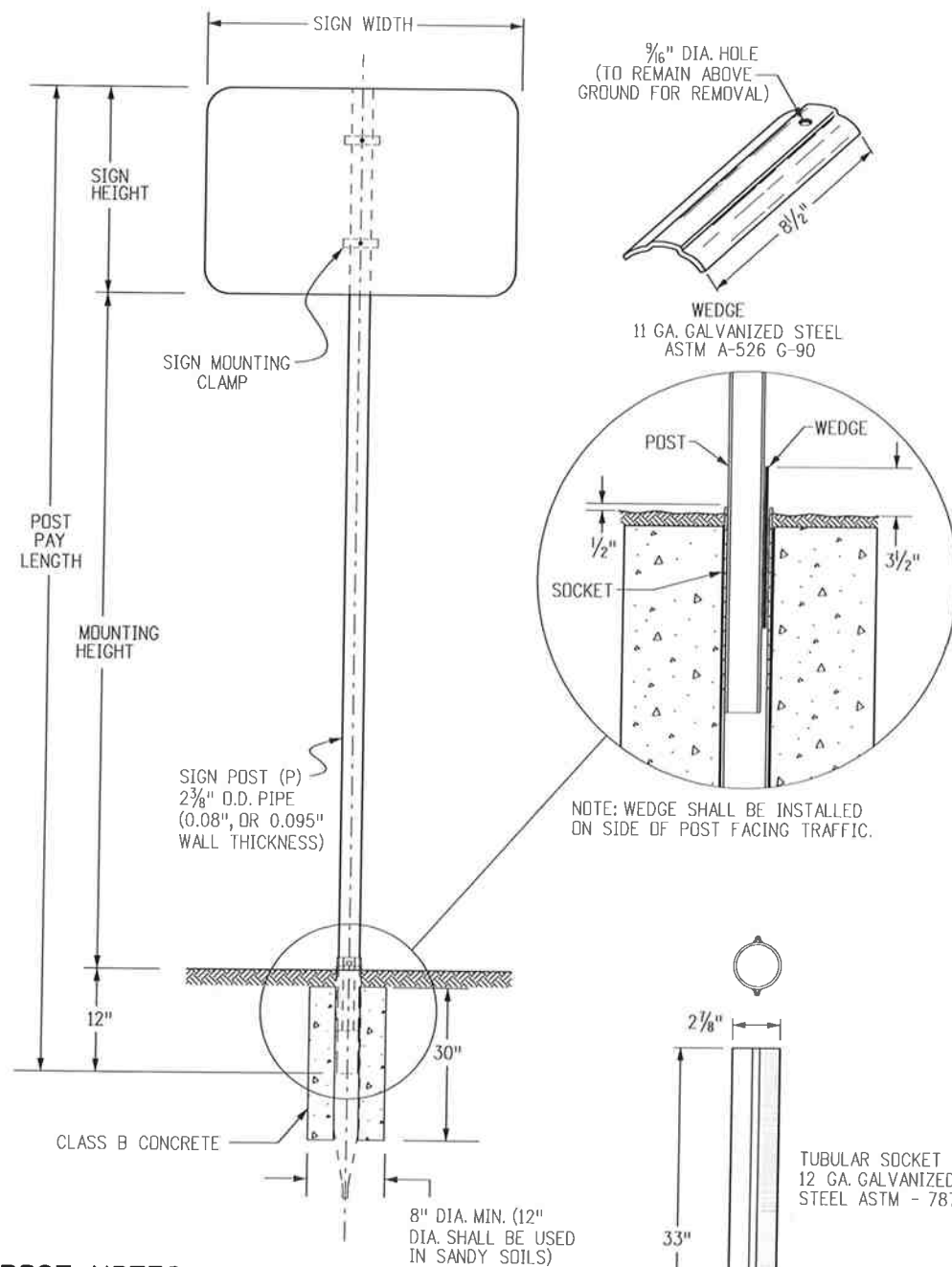
Safety & Traffic Engineering Branch KCM/NNC

Issued By: Safety & Traffic Engineering Branch July 4, 2012

S-614-6

Sheet No. 2 of 2

**TUBULAR STEEL POSTS
(SOCKET SYSTEM) (FOR USE WITH ALL P-POST INSTALLATIONS)
(SEE SHEET 2 FOR P1 AND P2 POST INSTALLATIONS)**



POST NOTES

THE POST MAY BE PRE-PUNCHED WITH 3/8" DIA. HOLES AND THE SIGN MOUNTED DIRECTLY TO THE POST, OR AN APPROVED MOUNTING CLAMP MAY BE USED TO MOUNT THE SIGN TO THE POST. IF THE POST IS PRE-PUNCHED, THE HOLES SHALL BE SPACED THE FOLLOWING DISTANCES FROM THE TOP:

- 1", 3", 10", 16", 21", 23", 24", 27",
33", 37", 39", AND 45"

**SIGNPOST SELECTION GUIDE (90 MPH WIND LOAD DESIGN)
(FOR SOCKET SYSTEM AND SLIPBASE INSTALLATIONS USING P, P1 OR P2 POSTS)**

SIGN HEIGHT (FT)	7' MOUNTING HEIGHT									8' MOUNTING HEIGHT									9' MOUNTING HEIGHT											
	SIGN WIDTH (FT)									SIGN WIDTH (FT)									SIGN WIDTH (FT)											
	1	2	2.5	3	4	5	6	7	8	9	1	2	2.5	3	4	5	6	7	8	9	1	2	2.5	3	4	5	6	7	8	9
1	P	P	P	P	P	P1	SIZES NOT USED			1	P	P	P	P	P	P1	SIZES NOT USED			1	P	P	P	P	P	P1	SIZES NOT USED			
2	P	P	P	P	P	P1	SIZES NOT USED			2	P	P	P	P	P1	P1	SIZES NOT USED			2	P	P	P	P	P1	P1	SIZES NOT USED			
2.5	P	P	P	P	P1	P1	SIZES NOT USED			2.5	P	P	P	P1	P1	P1	SIZES NOT USED			2.5	P	P	P	P1	P1	P1	SIZES NOT USED			
3	P	P	P	P1	P1	P1	SIZES NOT USED			3	P	P	P1	P1	P1	P1	SIZES NOT USED			3	P	P	P1	P1	P1	P1	SIZES NOT USED			
4	P	P1	P1	P1	P1	P1	SIZES NOT USED			4	P	P1	P1	P1	P1	P1	SIZES NOT USED			4	P	P1	P1	P1	P1	P1	SIZES NOT USED			
5	SIZES NOT USED		P1	P1	P1	P1	SIZES NOT USED			5	SIZES NOT USED		P1	P1	P1	P2	SIZES NOT USED			5	SIZES NOT USED		P1	P1	P1	P2	SIZES NOT USED			
6	SIZES NOT USED		P1	P1	P1	P2	SIZES NOT USED			6	SIZES NOT USED		P1	P1	P1	P2	SIZES NOT USED			6	SIZES NOT USED		P1	P1	P2	TWO P1'S	TWO P2'S			
7	SIZES NOT USED		P1	P1	P2	TWO P1'S	TWO P2'S		SIZES NOT USED		7	SIZES NOT USED		P1	P1	TWO P1'S	TWO P1'S	TWO P2'S		SIZES NOT USED		7	SIZES NOT USED		P1	P2	TWO P1'S	TWO P1'S	TWO P2'S	

SEE CHART NOTE 4.

CHART NOTES

- TYPICAL POST MOUNTING HEIGHTS FROM GROUND TO BOTTOM OF SIGN PANEL ARE 7, 8 OR 9 FEET. OTHER HEIGHTS MAY BE REQUIRED WHEN SIGNS ARE MOUNTED ON STEEPER HILL OR CUT SLOPES.
- FOR SIGNS MOUNTED ON TWO POSTS, THE MINIMUM DISTANCE BETWEEN POSTS SHALL BE 2 FEET AND THE MAXIMUM DISTANCE SHALL BE 8 FEET. DISTANCE FROM POST TO EDGE OF SIGN PANEL(S) SHALL BE 0 TO 4 INCHES. WHEN BACKING ZEES ARE USED, POSTS SHALL BE INSTALLED WITH A MINIMUM OF 2 INCHES TO THE EDGE OF THE BACKING ZEE.
- ALL SIGN PANELS GREATER THAN 60 INCHES IN WIDTH MUST BE MOUNTED ON TWO POSTS TO PREVENT TURNING.
- THE POST SIZES SHOWN ARE THE MINIMUM SIZES REQUIRED. TWO P1 POSTS MAY BE SUBSTITUTED WHERE ONE P2 POST IS INDICATED. P2 POSTS MAY BE SUBSTITUTED FOR P1 POSTS WHEN DIRECTED BY THE ENGINEER.

GENERAL NOTES

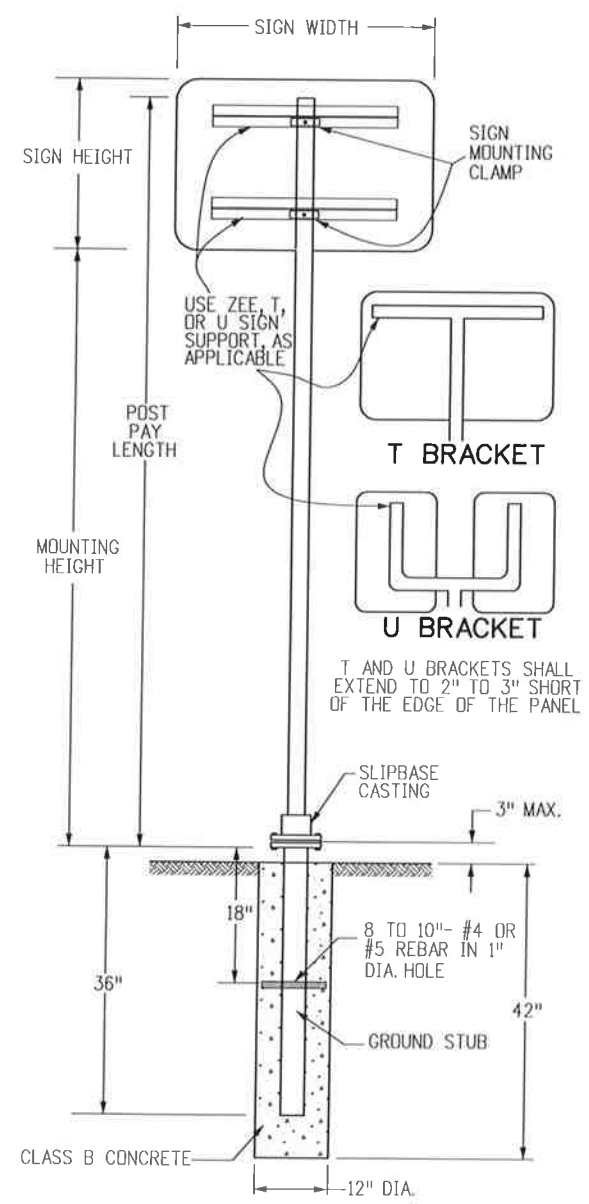
- SIGNS BETWEEN 37 IN. AND 60 IN. WIDTH WITH ONE POST INSTALLATION REQUIRE A T OR U SIGN SUPPORT BRACKET IN ADDITION TO THE BACKING ZEE REQUIREMENTS. WHEN DIRECTED BY THE ENGINEER, SIGN PANELS LESS THAN 48 IN. IN WIDTH MAY ATTACHED DIRECTLY TO T OR U BRACKETS WITHOUT ZEES.
- U-BRACKETS MAY BE USED FOR MULTIPLE SIGN INSTALLATIONS.
- FOR BACKING ZEE REQUIREMENTS AND DETAILS, SEE STANDARD PLANS S-614-3 AND S-614-4.

POST SPECIFICATIONS

POST SIZE	OUTSIDE DIAMETER	WALL THICKNESS	MATERIAL	** COATING	MAX ALLOW MOMENT	PAID FOR AS:
P	2.375"	.080"	ASTM-513	ASTM A-653 G-210 WITH 3.0 MIL POLYMER COATING PER ASTM A123 CLEAR COATING	1.47 KIP FT	STEEL SIGN SUPPORT (2 INCH ROUND)
P1	2.875"	.160"	ASTM-513	GC HOT DIPPED PER ASTM-123	4.02 KIP FT	STEEL SIGN SUPPORT (2 1/2 INCH ROUND NP-40)
P2	2.875"	.276"	ASTM-500	GC HOT DIPPED PER ASTM-123	5.13 KIP FT	STEEL SIGN SUPPORT (2 1/2 INCH ROUND SCH 80)

** COLOR POWDER COATING MAY BE ADDED ACCORDING TO MANUFACTURER SPECIFICATIONS FOR SPECIAL LOCATIONS WHEN SHOWN ON THE PLANS.

Computer File Information		Sheet Revisions		Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219 Safety & Traffic Engineering Branch KCM/KEN	TUBULAR STEEL SIGN SUPPORT DETAILS	STANDARD PLAN NO. S-614-8 Sheet No. 1 of 6
Creation Date: 07/04/12	Initials: KEN	Date: 03/05/13	Comments: SHTS 1 & 2 - UPDATED DETAIL TITLES			
Last Modification Date: 10/23/14	Initials: KEN	Date: 10/23/14	Comments: SHT 2 - MOVED SLIPBASE DETAILS TO SHEET 3, AND ADDED 4" BASE PLATE DETAIL TO NEW SHEET 1.			
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans						
Drawing File Name: S-614-08_1of6.dgn						
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English			Issued By: Safety & Traffic Engineering Branch July 4, 2012	



**TUBULAR STEEL POST
(WITH SLIPBASE)
(FOR USE WITH ALL P1 AND
P2 POST INSTALLATIONS)
(SEE SHEET 1 FOR P-POST INSTALLATIONS)**

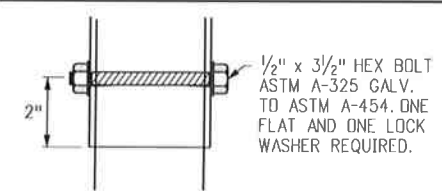
GENERAL NOTE

THE CONTRACTOR SHALL INSTALL THE POSTS PER THE MANUFACTURER'S RECOMMENDATIONS WITHOUT ADDITIONAL COMPENSATION.

DIMENSIONS FOR MOUNTING CLAMP (ALL DIMENSION ARE IN INCHES)

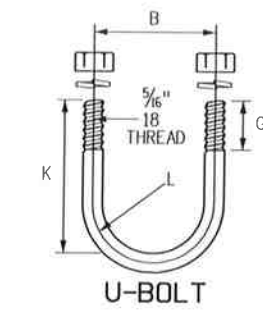
STANDARD PIPE SIZE	A	B	C	D	E	F	G	K	L	R ₁	R ₂
2	3 3/4	2 3/4	1 1/2	1 1/8	1/2	3/16	1	2 1/16	1 1/32	1 1/4	1 3/16
2 1/2	4 1/4	3 1/4	2	1 1/4	1/2	1/4	1	3 3/16	1 5/32	1 1/2	1 1/16

T AND U BRACKET ATTACHMENT



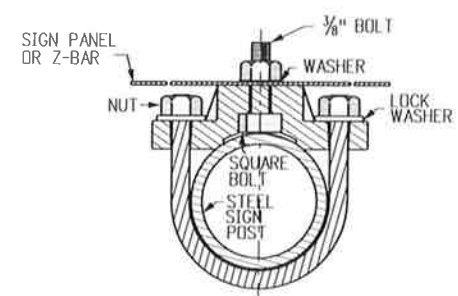
PIPE CLAMP CASTING

PIPE CLAMP CASTING SHALL BE ASTM B26 OR B108 ALUMINUM ALLOY A444.0-T4 OR 356.0-F. ALL SIGN MOUNTING CLAMP PARTS NOT MADE FROM ALUMINUM SHALL BE GALVANIZED STEEL IN CONFORMANCE WITH ASTM A153 OR STAINLESS STEEL.

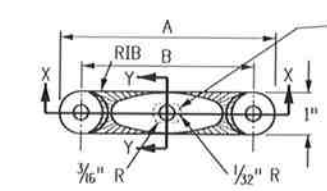
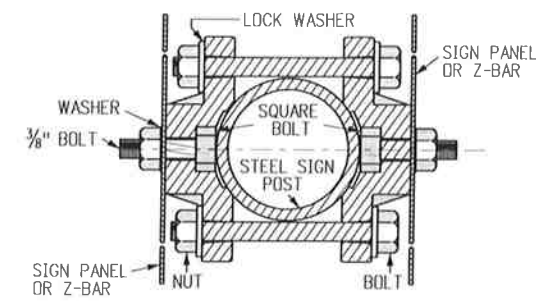


U-BOLT TO BE MADE IN ACCORDANCE WITH STANDARD MANUFACTURING PROCEDURE. 1/4" OR 5/16" DIAMETER STOCK IS PERMISSIBLE. AMERICAN STANDARD REGULAR SEMI-FINISHED HEX NUTS AND SPRING LOCKWASHERS.

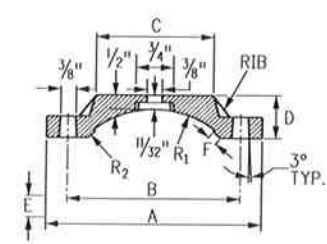
TYPICAL SINGLE BRACKET



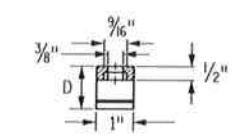
TYPICAL BACK TO BACK



SLOT TO HOLD HEAD OF 3/8" HEX HEAD BOLT. THE BOLT SHALL BE 1/4" LONG, WITH FULL THREADS, A MEDIUM WASHER, AND GALVANIZED STEEL OR ALUMINUM SELF-LOCKING HEX HEAD NUT. THE BOLT HEAD MUST NOT TURN IN THE SLOT.



SECTION X-X

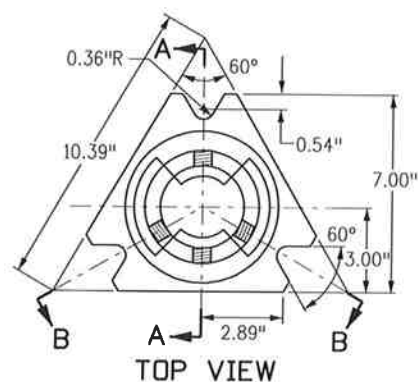


SECTION Y-Y

DETAILS FOR SIGN PANEL ATTACHMENT

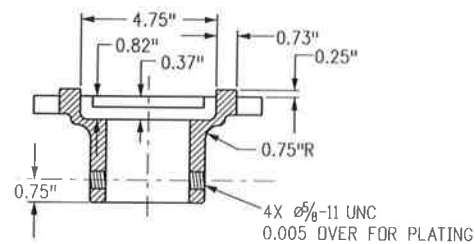
MOUNTING CLAMP FOR SOCKET OR SLIPBASE

Computer File Information		Sheet Revisions		Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219 Safety & Traffic Engineering Branch KCM/KEN	TUBULAR STEEL SIGN SUPPORT DETAILS	STANDARD PLAN NO.
Creation Date: 07/04/12	Initials: SCL	Date:	Comments			S-614-8
Last Modification Date: 10/23/14	Initials: KEN	03/05/13	UPDATED DETAIL TITLES			Sheet No. 2 of 6
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	(R-D)	10/23/14	MOVED SLIPBASE DETAILS TO SHEET 3			
Drawing File Name: S-614-08_2of6.dgn	(R-Z)					
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)					
	(R-X)					
				Issued By: Safety & Traffic Engineering Branch July 4, 2012		



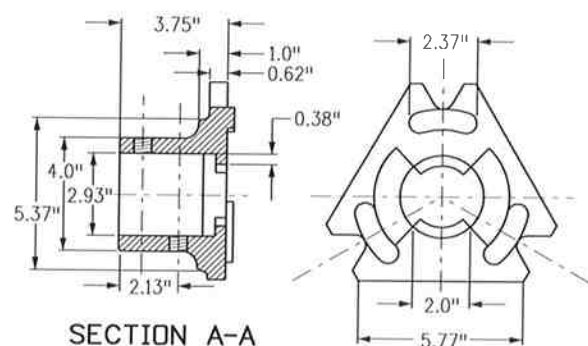
TOP VIEW

DIRECTION OF TRAVEL



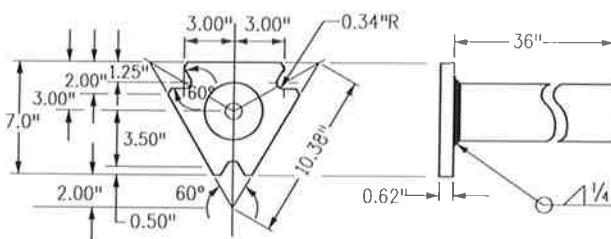
SECTION B-B

SLIPBASE CASTING

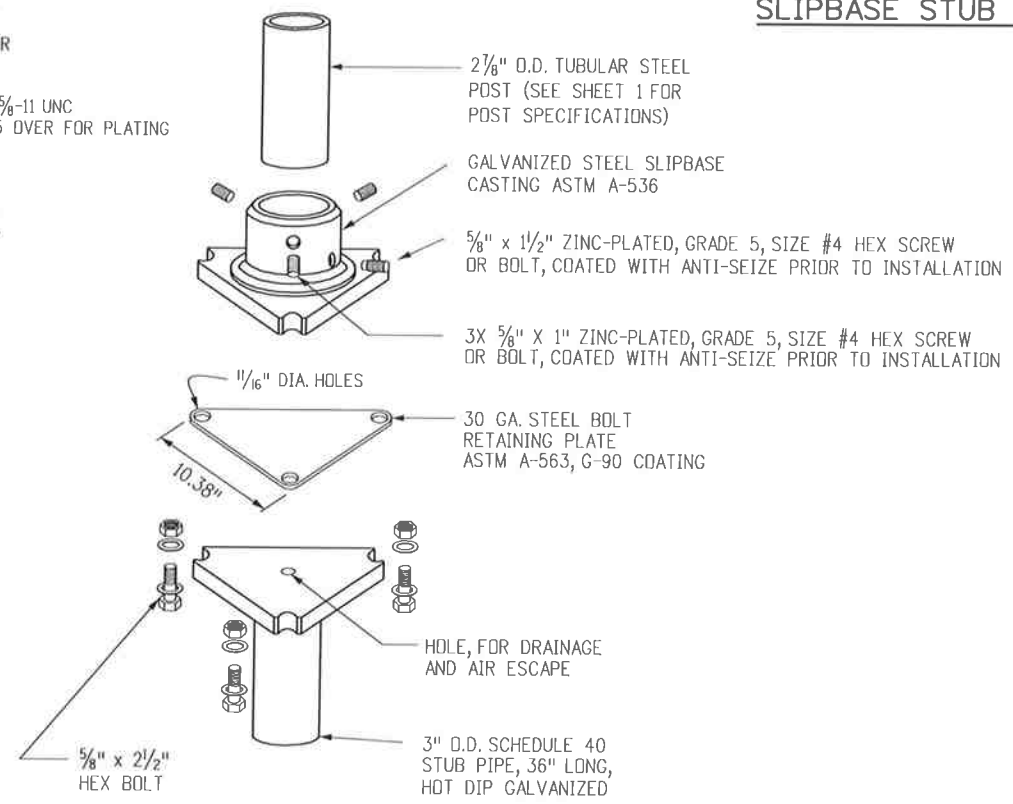


SECTION A-A

BOTTOM VIEW

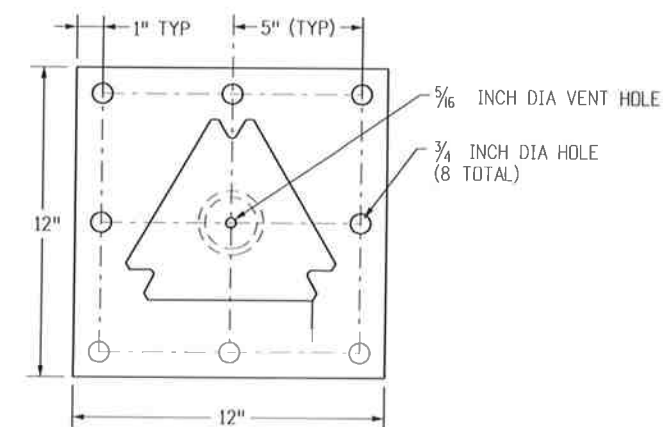


SLIPBASE STUB POST



TYPICAL ASSEMBLY

BASE PLATE FABRICATION REQUIREMENTS:
 BASE PLATE: 3/4 INCH ASTM A 36 PLATE STEEL
 PIPE STUB: 3 INCH NOMINAL SCHEDULE 80, ASTM A 500 GR B
 TOP PLATE: MEET REQUIREMENTS OF STD PLAN NO. S-614-8, SHT 2 OF 5
 MEET ASTM A 123 GALVANIZING AFTER FABRICATION IS COMPLETED.



BASE PLATE DETAIL

SLIPBASE WILL MEET REQUIREMENTS OF STD PLAN NO. S-614-8 SLIPBASE STUB POST DETAIL EXCEPT FOR OVERALL HEIGHT

SLIPBASE TUBULAR STEEL SIGN BASE SURFACE MOUNT

FOR 2-7/8 INCH POSTS (P1 OR P2 POSTS)
 FOR CONCRETE SURFACES GREATER THAN 7 INCHES THICK

MOUNTING HARDWARE

- 8 - EACH 5/8 x 6 INCH LG MECHANICAL WEDGE ANCHORS
- 16 - EACH 5/8 INCH FLAT WASHERS
- 8 - EACH 5/8 INCH LOCK WASHERS
- 8 - EACH 5/8 INCH NUTS

INSTALLATION REQUIREMENTS:

DRILL: (8) - 5/8 INCH HOLES 6 INCH DEEP, CLEAN HOLE PRIOR TO INSTALLING ANCHORS

USE ADDITIONAL WASHERS FOR SHIMMING TO LEVEL BASE PLATE.

ALL HARDWARE WILL BE GALVANIZED OR ZINC PLATED.

SLIPBASE TUBULAR STEEL SIGN BASE SURFACE MOUNT NOTES:

1. USE P1 OR P2 POST. SEE STD PLAN S-614-8, SHT 1 OF 5.
2. REFER TO STD PLAN S-614-8, SHT 2 OF 5 FOR ACCEPTABLE TOP CASING ASSEMBLY REQUIREMENTS.
3. REFER TO STD PLAN NO. S-614-8 SHEETS FOR SIGN MOUNTING AND HARDWARE REQUIREMENTS.
4. REFER TO SIGNING PLANS FOR SIGN LOCATIONS AND SIGN HEIGHT.
5. MINIMUM ALLOWABLE TENSION CAPACITY FOR WEDGE ANCHORS = 3000 LBS.
6. MAXIMUM ALLOWABLE MOMENT FOR SIGN BASE = 5.13 Kip-ft.

Computer File Information	
Creation Date: 07/04/12	Initials: KEN
Last Modification Date: 10/23/14	Initials: KEN
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
Drawing File Name: S-614-08_3of6.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
10/23/14	NEW SHEET. INCLUDES SLIP BASE DETAILS PLUS 4\"/>

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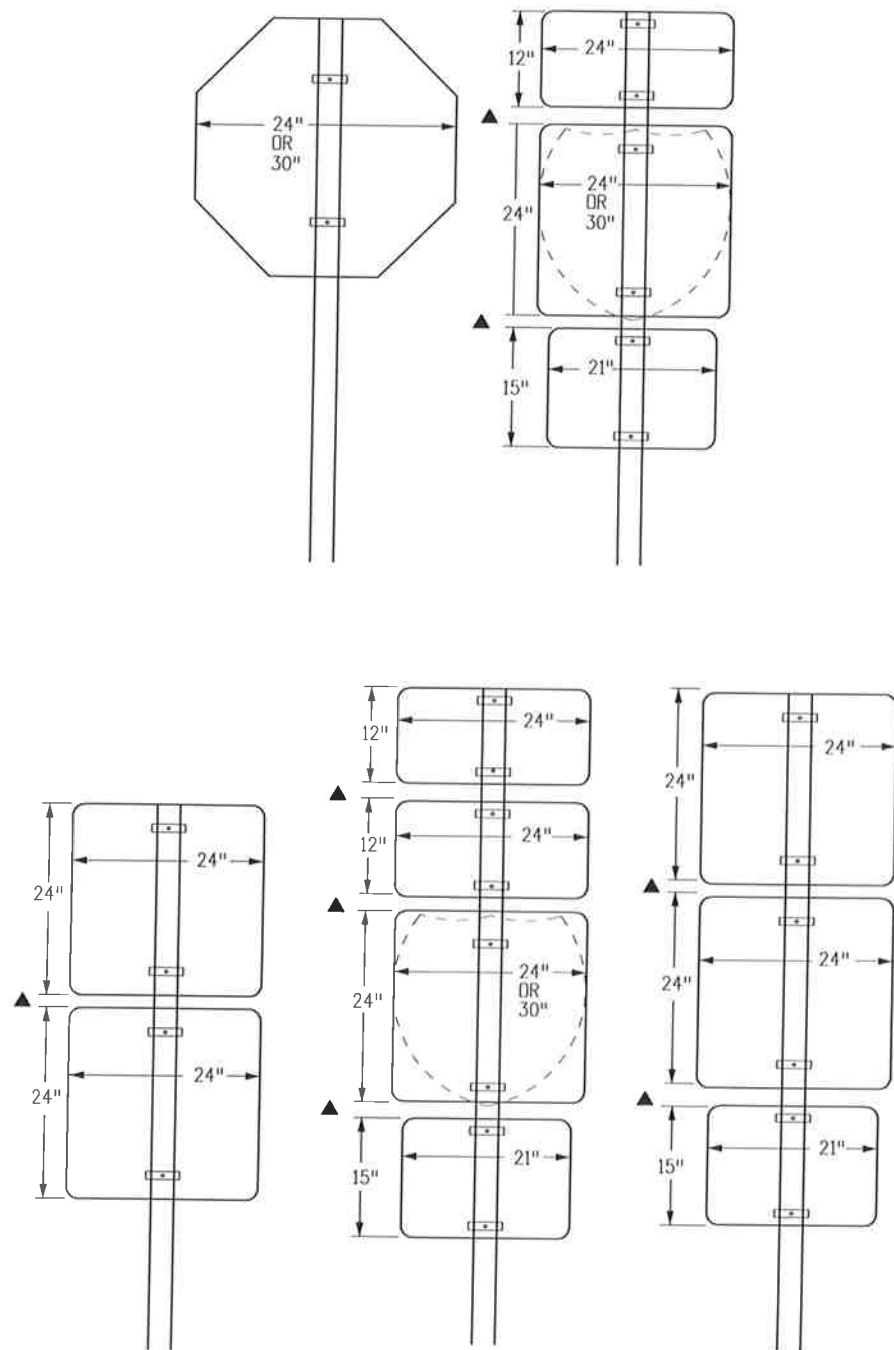
TUBULAR STEEL SIGN SUPPORT DETAILS

Issued By: Safety & Traffic Engineering Branch July 4, 2012

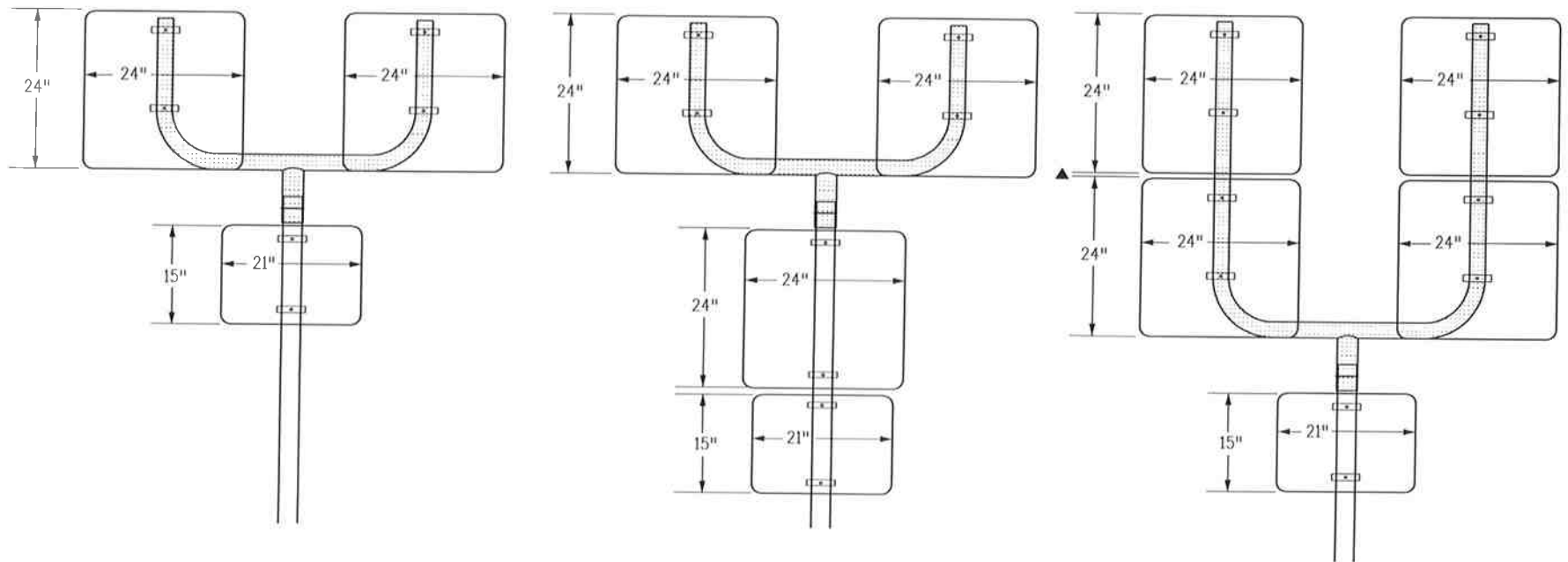
STANDARD PLAN NO.

S-614-8

Sheet No. 3 of 6



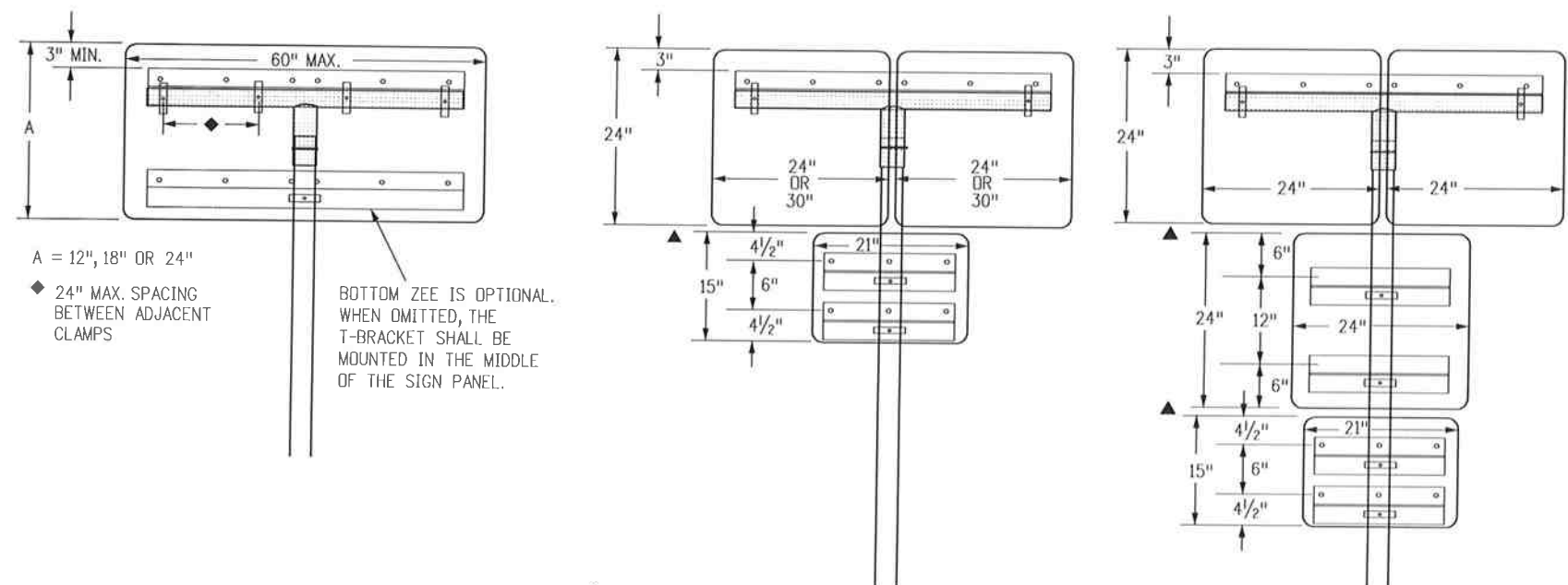
CLASS I SIGN COMBINATIONS (DIRECT ATTACHMENT)



CLASS I SIGN COMBINATIONS USING U-BRACKETS

▲ SEE NOTE 6 ON SHEET 5

Computer File Information		Sheet Revisions		 <p>Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219</p>	<p>TUBULAR STEEL SIGN SUPPORT DETAILS</p>	<p>STANDARD PLAN NO.</p>	
Creation Date: 07/04/12	Initials: KEN	Date:	Comments:				S-614-8
Last Modification Date:	Initials:						Sheet No. 4 of 6
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Drawing File Name: S-614-08_4of6.dgn							
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English		Safety & Traffic Engineering Branch	KCM/KEN	Issued By: Safety & Traffic Engineering Branch July 4, 2012	

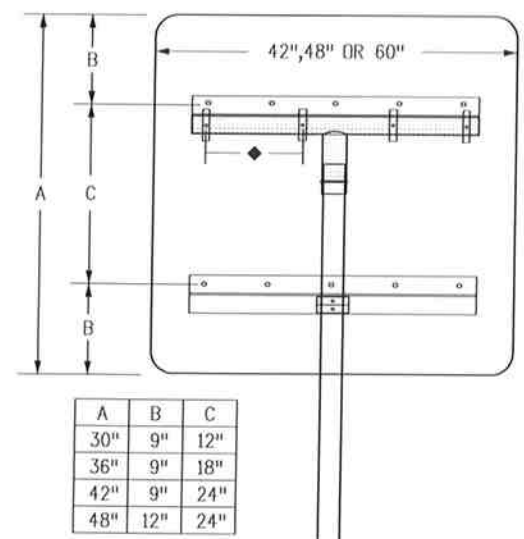
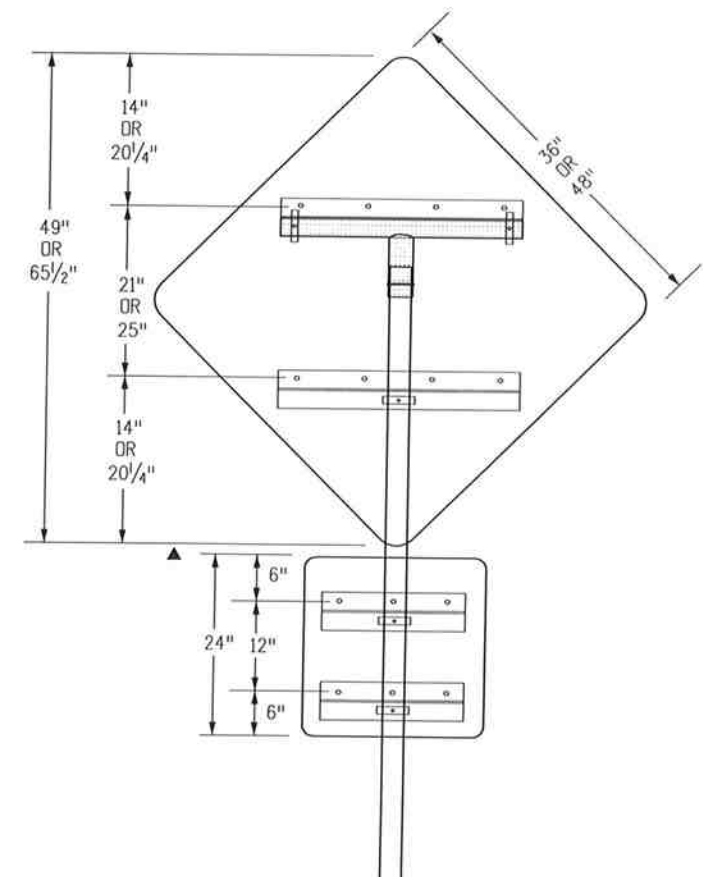


A = 12", 18" OR 24"
 ◆ 24" MAX. SPACING BETWEEN ADJACENT CLAMPS
 BOTTOM ZEE IS OPTIONAL. WHEN OMITTED, THE T-BRACKET SHALL BE MOUNTED IN THE MIDDLE OF THE SIGN PANEL.

PANEL WIDTHS	ZEE LENGTH
21"	15"
24"	18"
30"	24"
36"	30"
42"	36"
45"	39"
48"	42"
54"	48"
60"	54"
36" DIAMOND	22"
48" DIAMOND	36"
24" & 24"	43"
24" & 30"	49"
30" & 30"	55"
36" & 36"	67"
45" & 36"	76"
24" & 24" & 24"	68"
24" & 24" & 30"	74"
24" & 30" & 24"	74"
30" & 24" & 30"	80"
24" & 30" & 30"	80"
30" & 30" & 30"	86"

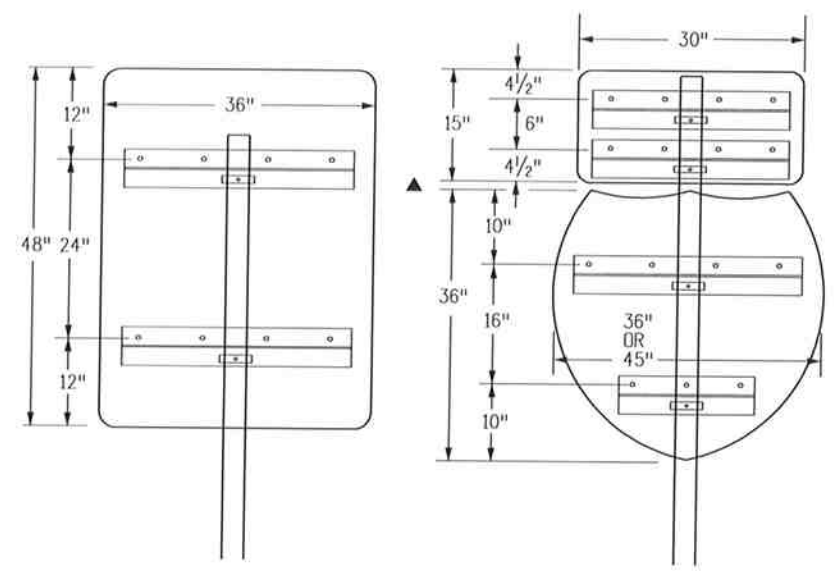
GENERAL NOTES

- Z-BAR LENGTH SHALL BE 3 IN. (± 1/2 IN.) SHORT OF THE EDGE OF THE SIGN OR ROW OF SIGNS ON BOTH SIDES. THE ACCOMPANYING TABLE GIVES THE Z-BAR LENGTH FOR MOST TYPICAL PANEL COMBINATIONS.
- FIRST AND LAST HOLES SHALL BE 2 IN. FROM EDGE OF Z-BAR. THE HOLES IN BETWEEN SHALL BE 6 IN. TO 8 IN. APART.
- T AND U BRACKETS SHALL TERMINATE 2 IN. TO 3 IN. FROM EDGE OF SIGN PANEL. WHEN A ZEE IS CONNECTED TO A T-BRACKET, THEY SHALL BE THE SAME LENGTH EXCEPT WHEN THE ZEE MUST EXTEND BEYOND THE MAXIMUM LENGTH OF A T-BRACKET.
- TWO MOUNTING CLAMPS ARE REQUIRED ON ZEES WHERE THERE IS ONLY ONE ZEE FOR THE PANEL AND THE ZEE IS ATTACHED TO ONLY ONE POST.
- ZEES SHALL BE ATTACHED TO T-BRACKETS AND U-BRACKETS WITH U-BOLTS OR MOUNTING CLAMPS.
- ▲ VERTICAL SPACING BETWEEN SIGN PANELS SHALL BE 1 IN. TO 1 1/2 IN. TYPICAL.
- IN SPECIAL CASES U-BRACKETS MAY BE USED TO MOUNT SIGNS THAT FACE DIFFERENT DIRECTIONS. THE ENGINEER SHALL DETERMINE THE ORIENTATION OF THE SIGN PANELS AND VERIFY THAT THE MAXIMUM ALLOWABLE WIND LOADS FOR THE POST ARE NOT EXCEEDED.



A	B	C
30"	9"	12"
36"	9"	18"
42"	9"	24"
48"	12"	24"

◆ 24" MAX. SPACING BETWEEN ADJACENT CLAMPS



CLASS II SIGN COMBINATIONS USING T-BRACKETS WITH Z-BAR

SINGLE POST CLASS II SIGNS USING Z-BAR

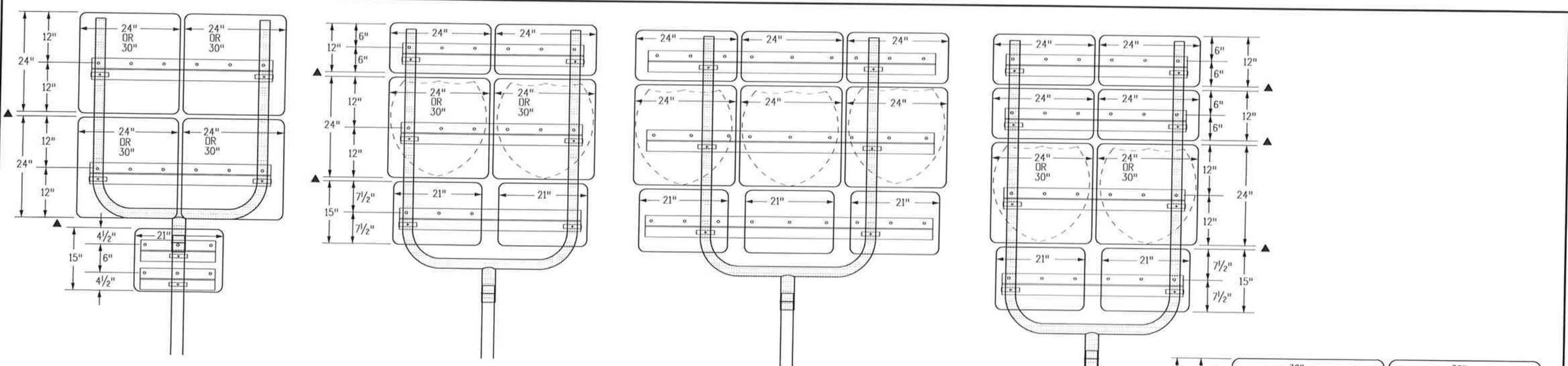
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Last Modification Date:	Initials:
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Date:	Comments

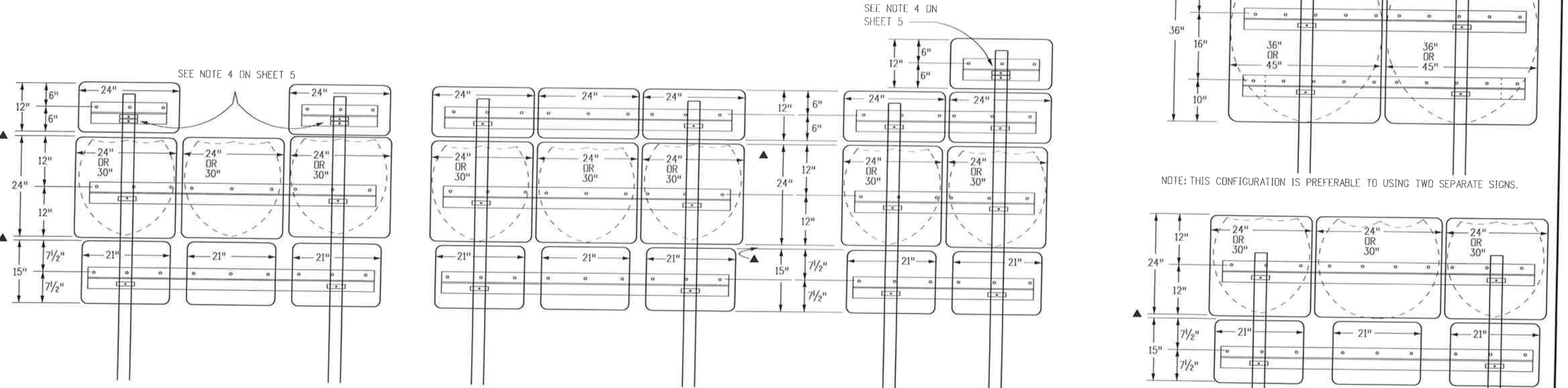
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STANDARD PLAN NO.
 S-614-8
 Sheet No. 5 of 6



CLASS II SIGN COMBINATIONS USING U-BRACKETS

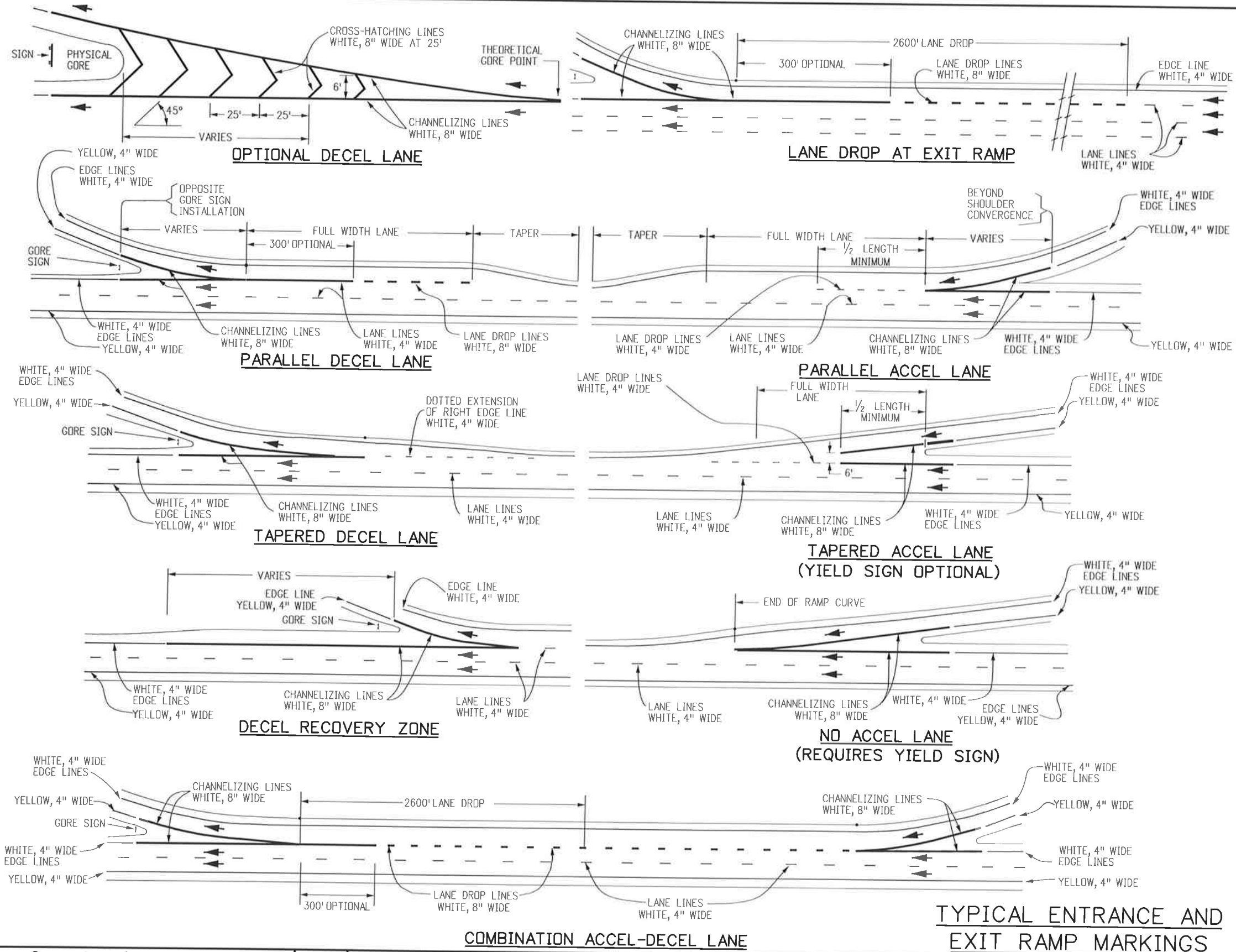


CLASS II SIGN COMBINATIONS USING TWO POSTS

NOTE: THIS CONFIGURATION IS PREFERABLE TO USING TWO SEPARATE SIGNS.

▲ SEE NOTE 6 ON SHEET 5

Computer File Information		Sheet Revisions		Colorado Department of Transportation  4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219	TUBULAR STEEL SIGN SUPPORT DETAILS	STANDARD PLAN NO. S-614-8 Sheet No. 6 of 6
Creation Date: 07/04/12	Initials: KEN	Date:	Comments:			
Last Modification Date:	Initials:					
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans						
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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		Safety & Traffic Engineering Branch		KCM/KEN	Issued By: Safety & Traffic Engineering Branch July 4, 2012	



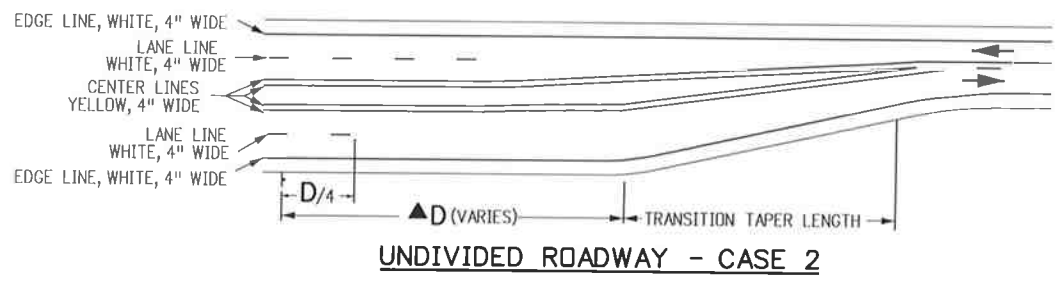
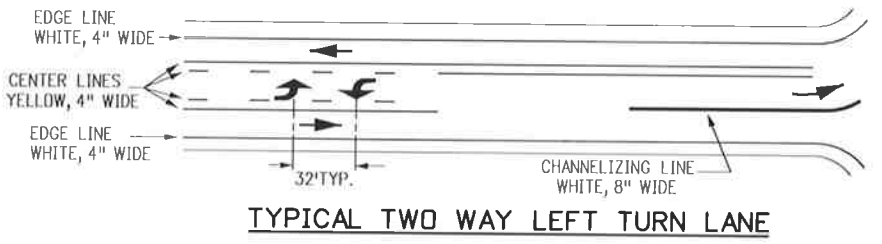
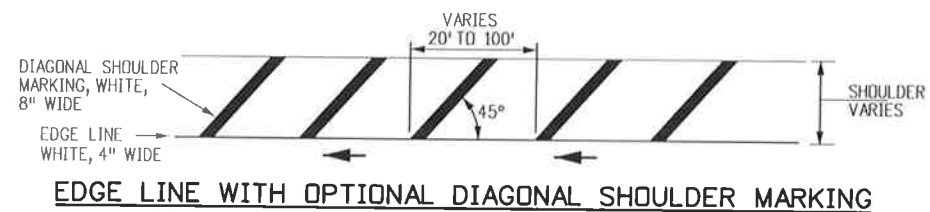
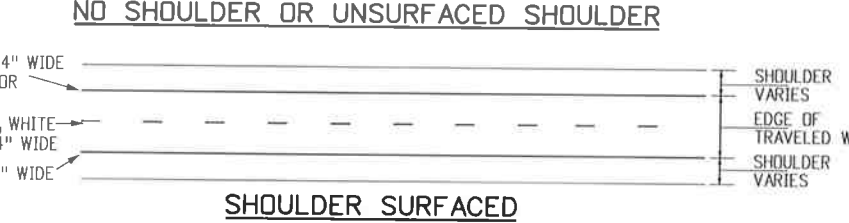
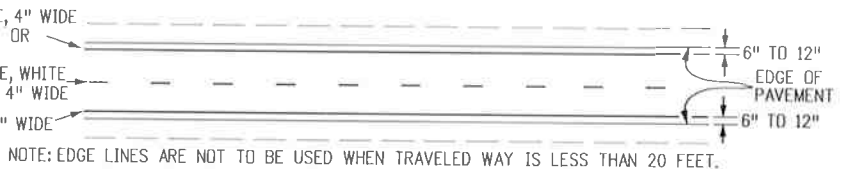
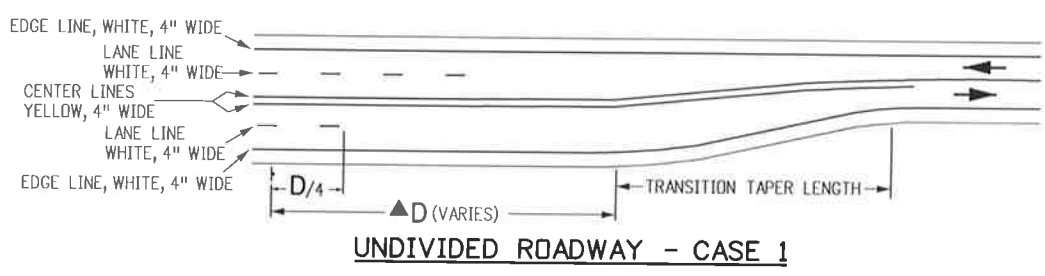
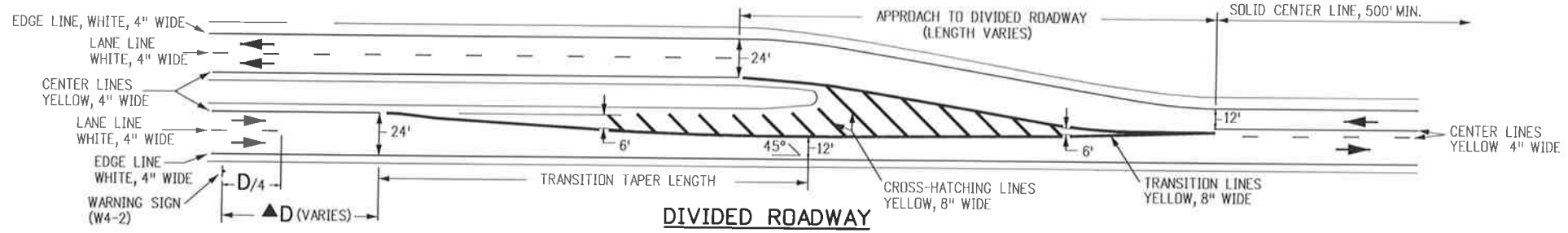
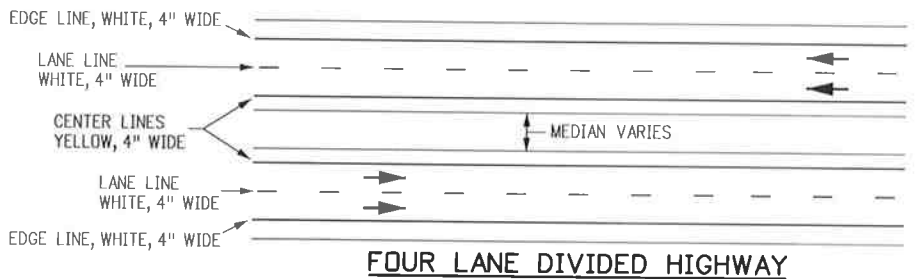
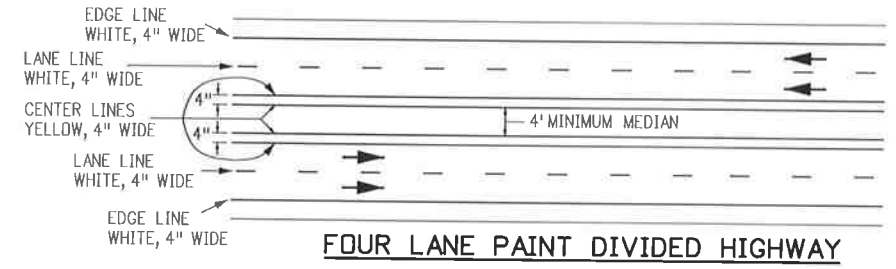
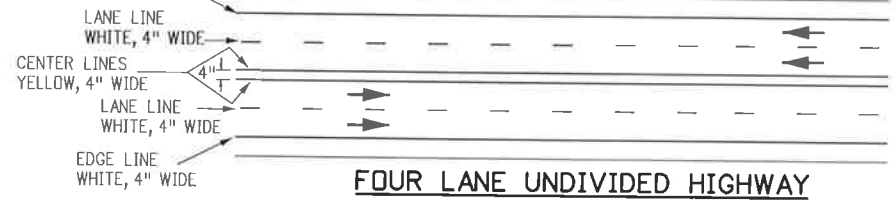
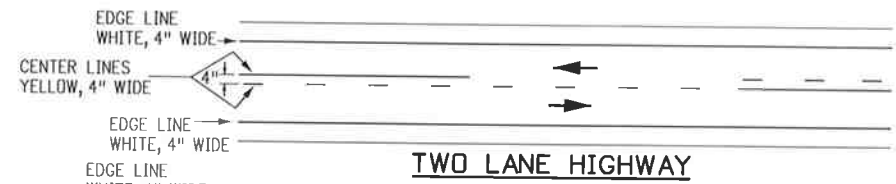
GENERAL NOTES

1. **CENTER LINES**
 BROKEN YELLOW, 4 IN. WIDE - 10 FT. SEGMENTS WITH 30 FT. GAPS.
 SOLID YELLOW, 4 IN. WIDE.
 THESE LINES SEPARATE ADJACENT-OPPOSITE DIRECTION TRAFFIC LANES. DOUBLE LINES SHALL BE SPACED 4 IN. APART.
2. **LANE LINES**
 BROKEN WHITE, 4 IN. WIDE - 10 FT. SEGMENTS WITH 30' GAPS.
 SOLID WHITE, 4 IN. WIDE.
 THESE LINES SEPARATE ADJACENT-SAME DIRECTION TRAFFIC LANES. A SOLID LINE MAY BE USED TO DISCOURAGE LANE CHANGING, WHILE TWO PARALLEL SOLID WHITE LINES ARE REQUIRED TO PROHIBIT LANE CHANGING.
3. **EDGE LINES**
 SOLID WHITE OR YELLOW EDGE LINES SHALL BE 4 IN. WIDE. YELLOW EDGE LINES SHALL BE USED ONLY FOR LEFT EDGE, IN THE DIRECTION OF TRAVEL OF DIVIDED STREETS AND HIGHWAYS (SEPARATED BY OTHER THAN A PAINTED MEDIAN) AND ONE-WAY ROADWAYS (INCLUDING RAMP).
 EDGE LINES ARE NOT CONTINUED THROUGH INTERSECTIONS AND ARE NOT BROKEN FOR DRIVEWAYS. CARE MUST BE TAKEN TO AVOID EDGE LINE APPEARING AS LANE LINE ALONG ROADWAYS WITH WIDE SHOULDERS AND/OR CLOSELY SPACED DRIVEWAYS.
4. **DOTTED LINES**
 BROKEN WHITE, WIDTH MATCHING THE LINE BEING EXTENDED-2 FT. SEGMENTS WITH 4 FT. GAPS. THESE LINES ARE USED TO DELINEATE THE EXTENSION OF A LINE THROUGH AN INTERSECTION OR INTERCHANGE AREA.
5. **CHANNELIZING LINES**
 SOLID WHITE, 8 IN. WIDE. THESE LINES ARE USED WITH ACCELERATION-DECELERATION LANES, PAVEMENT WIDTH TRANSITIONS, AND LEFT-RIGHT TURN SLOTS OR ISLANDS.
6. **CROSS-HATCHING LINES**
 SOLID WHITE OR YELLOW, 8 IN. WIDE-45 DEGREE DIAGONAL, SPACED AT 25 FT. INTERVALS. THESE LINES ARE OPTIONAL AND MAY BE PLACED AT LOCATIONS INDICATED ON THE PLANS OR DETERMINED BY THE ENGINEER. YELLOW SHALL BE USED FOR PAINTED MEDIANS OR PAVEMENT WIDTH TRANSITIONS ONLY.
 OPTIONAL DIAGONAL SHOULDER MARKINGS SHALL BE SOLID WHITE, 8 IN. WIDE, SPACED AT INTERVALS OF 20 FT. MINIMUM TO 100 FT. MAXIMUM.
7. **PARKING LINES**
 SOLID WHITE, 3 IN. WIDE-DIAGONAL OR PARALLEL AS SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER.
8. **STOP LINES**
 SOLID WHITE, 24 IN. WIDE-EXTEND PARALLEL TO INTERSECTED ROADWAY ACROSS ALL APPROACH LANES OR AS INDICATED AT LOCATIONS ON THE PLANS. LOCATE AT THE DESIRED STOPPING POINT, NOT MORE THAN 30 FT. NOR LESS THAN 4 FT. FROM THE NEAREST EDGE OF THE INTERSECTED TRAFFIC LANE.
9. **LANE DROP MARKINGS**
 BROKEN WHITE, 8 IN. WIDE - 3 FT. SEGMENTS WITH 9 FT. GAPS. THESE LINES SHOULD BEGIN 2600 FT. IN ADVANCE OF THE THEORETICAL GORE POINT TO DISTINGUISH THE LANE DROP FROM A CONTINUOUS LANE. THE CHANNELIZING LINE MAY BE EXTENDED APPROXIMATELY 300 FT. UPSTREAM.

TYPICAL ENTRANCE AND EXIT RAMP MARKINGS

(CONTINUED ON SHEET NO. 2)

Computer File Information Creation Date: 07/04/12 Initials: SCL Last Modification Date: 06/10/14 Initials: KEN Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans Drawing File Name: S-627-01_1of5.dgn CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English		Sheet Revisions <table border="1"> <thead> <tr> <th>Date:</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>10/18/12</td> <td>SHEET 2 - ADDED "D" NOTE</td> </tr> <tr> <td>06/27/13</td> <td>SHEET 5 - UPDATED BICYCLIST SYMBOL</td> </tr> <tr> <td>09/16/13</td> <td>SHEET 3 - UPDATED TYPICAL ISLAND MARKINGS DETAIL</td> </tr> <tr> <td>06/16/14</td> <td>SHEET 1 - CORRECTED STRIPING ERROR IN PARALLEL ACCEL LANE DETAIL</td> </tr> </tbody> </table>		Date:	Comments	10/18/12	SHEET 2 - ADDED "D" NOTE	06/27/13	SHEET 5 - UPDATED BICYCLIST SYMBOL	09/16/13	SHEET 3 - UPDATED TYPICAL ISLAND MARKINGS DETAIL	06/16/14	SHEET 1 - CORRECTED STRIPING ERROR IN PARALLEL ACCEL LANE DETAIL	Colorado Department of Transportation  4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219 Safety & Traffic Engineering Branch		PAVEMENT MARKINGS Issued By: Safety & Traffic Engineering Branch July 4, 2012		STANDARD PLAN NO. S-627-1 Sheet No. 1 of 5	
Date:	Comments																		
10/18/12	SHEET 2 - ADDED "D" NOTE																		
06/27/13	SHEET 5 - UPDATED BICYCLIST SYMBOL																		
09/16/13	SHEET 3 - UPDATED TYPICAL ISLAND MARKINGS DETAIL																		
06/16/14	SHEET 1 - CORRECTED STRIPING ERROR IN PARALLEL ACCEL LANE DETAIL																		



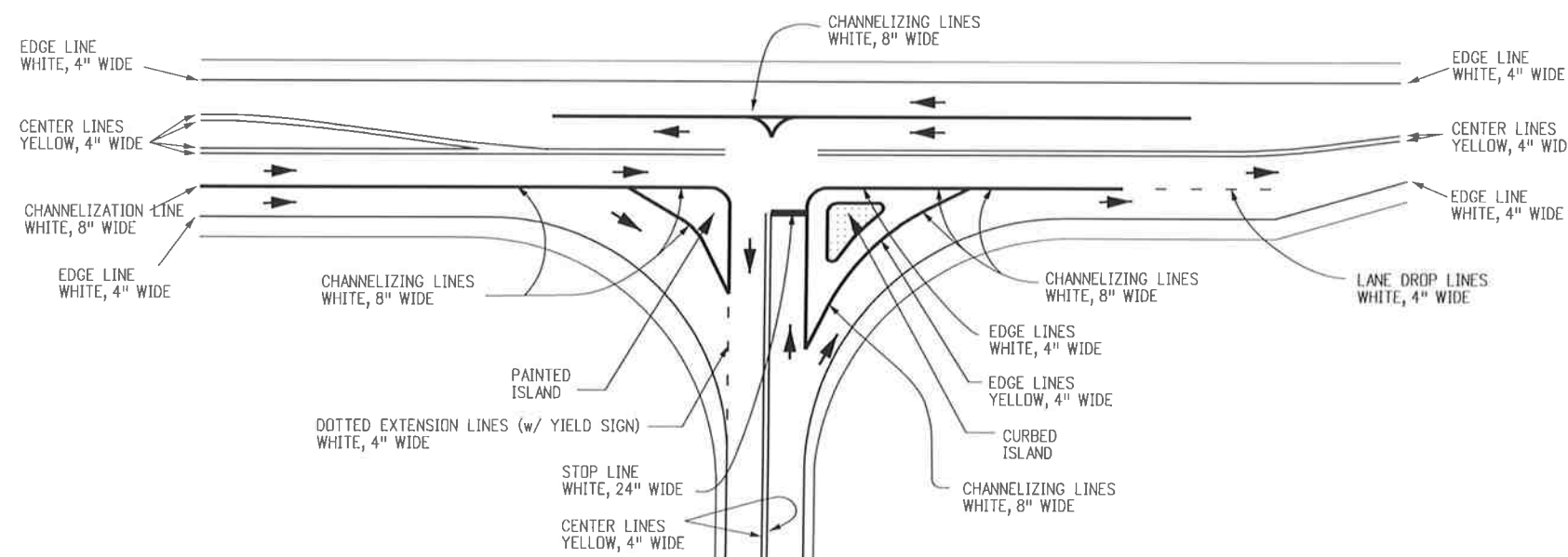
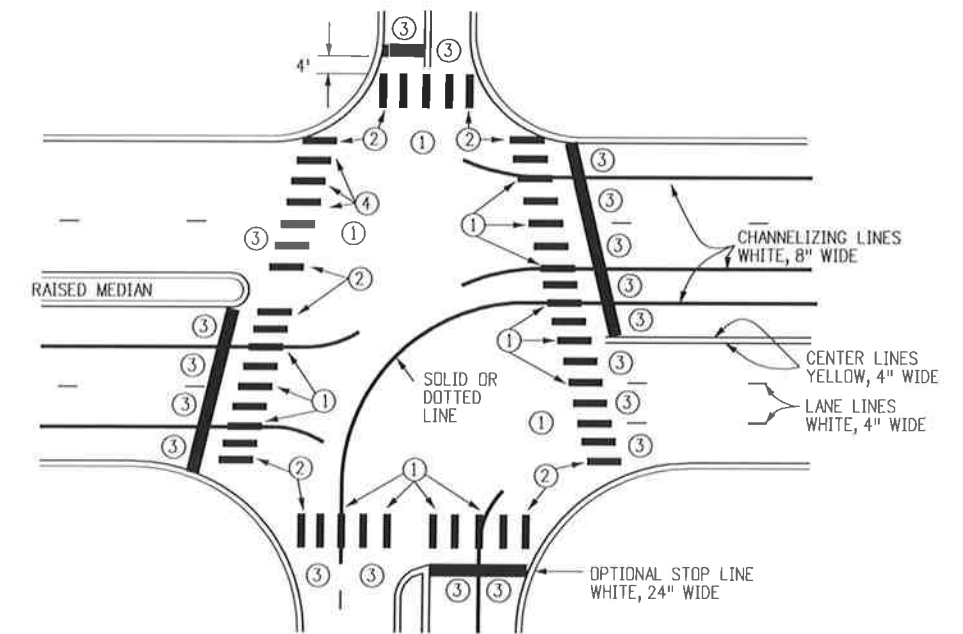
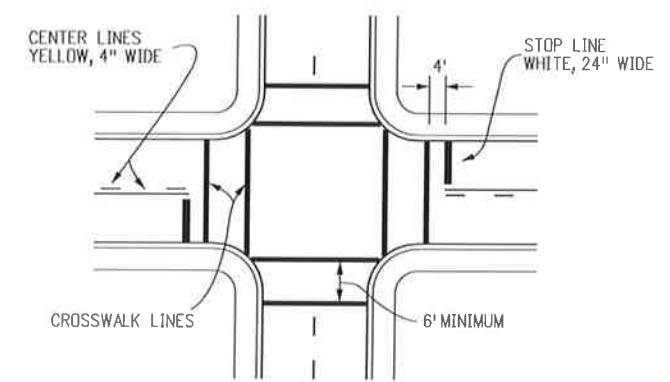
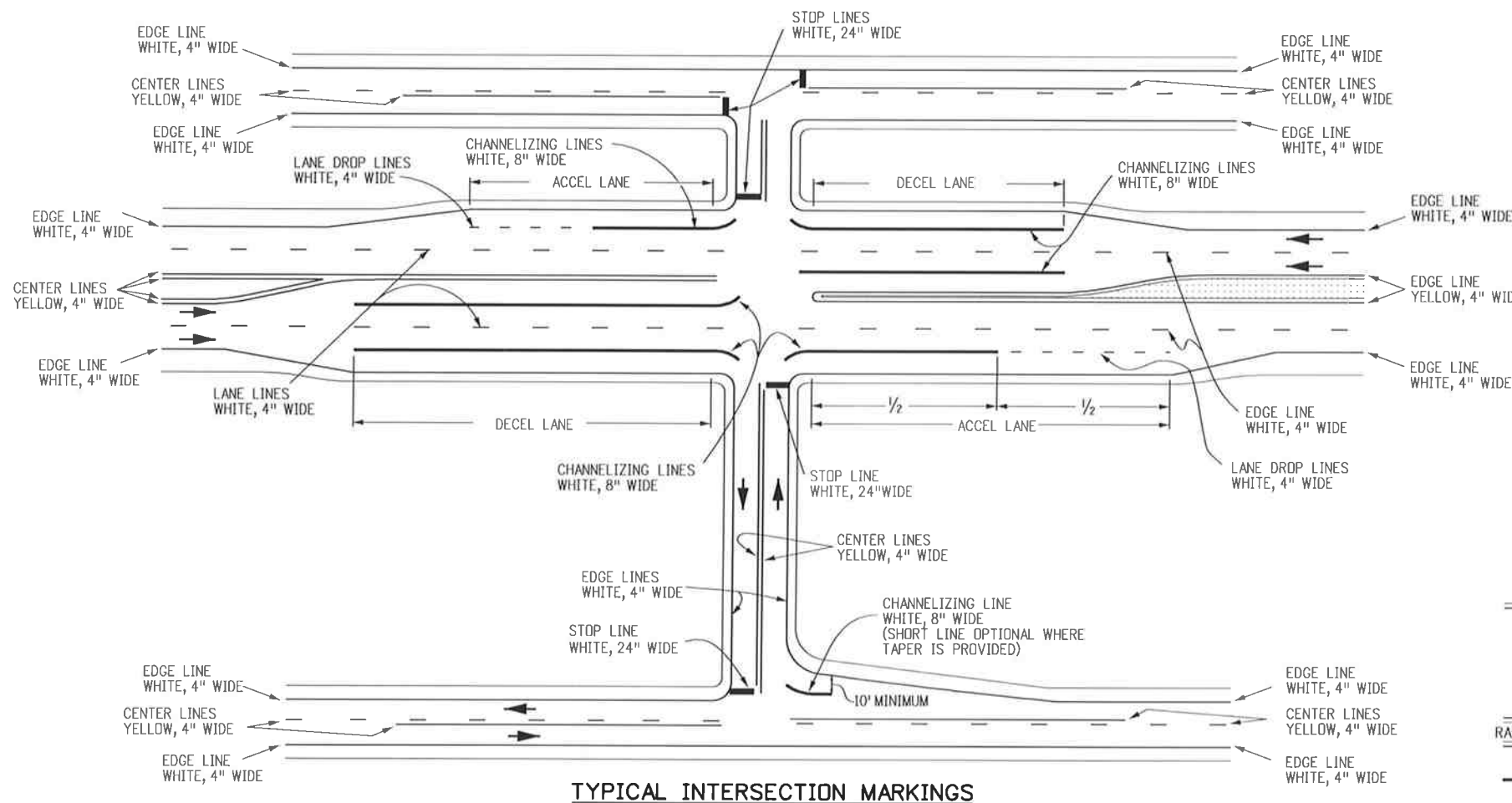
GENERAL NOTES
(CONTINUED FROM SHEET NO. 1)

- CROSSWALK LINES**
SOLID WHITE, 12 IN. WIDE FOR TRANSVERSE LINE TYPE - EXTEND ACROSS ENTIRE WIDTH OF PAVEMENT. IF NO ADVANCE STOP LINE IS PROVIDED, INCREASE THE WIDTH OF THE CROSSWALK LINES TO 24 IN. THE DISTANCE BETWEEN THE LINES IS USUALLY DETERMINED BY THE WIDTH OF THE SIDEWALKS SO CONNECTED, HOWEVER, IN NO CASE SHALL THIS BE LESS THAN 6 FT.
- WORD, ARROW AND SYMBOL MARKINGS**
ALL LETTERS, ARROWS AND SYMBOLS SHALL BE IN CONFORMANCE WITH "THE STANDARD ALPHABETS FOR HIGHWAY SIGNS AND PAVEMENT MARKINGS" ADOPTED BY THE FEDERAL HIGHWAY ADMINISTRATION.
- TRANSITION TAPER LENGTH**
L = MINIMUM LENGTH OF TAPER.
S = DESIGN SPEED FOR NEW CONSTRUCTION OR NUMERICAL VALUE OF THE POSTED SPEED LIMIT OF THE 85TH PERCENTILE SPEED OF EXISTING TRAFFIC.
W = WIDTH TRANSITIONED
FORMULA: FOR SPEED 45 MPH OR MORE, $L = S \times W$
FOR SPEED 40 MPH OR LESS, $L = \frac{WS^2}{60}$
- TRANSITION LINES**
SOLID YELLOW, 8 IN. WIDE. THESE LINES ARE USED WHERE ADDITIONAL EMPHASIS OR VISIBILITY IS DESIRABLE AT PAVEMENT WIDTH TRANSITIONS. PLACE AT LOCATIONS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
- SPEED MEASURING MARKING**
SOLID WHITE, 24 IN. - EXTEND 4 FT. FROM OUTSIDE OF EDGE LINES ON SHOULDERS.

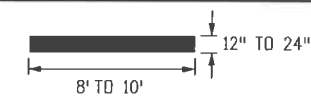
NOTE:
D = THE DISTANCE FROM THE PAVEMENT WIDTH TRANSITION SIGN (W4-2) TO THE BEGINNING OF THE TRANSITION TAPER. FOR MORE INFORMATION ON THE "D" VALUE REGARDING SIGN AND PAVEMENT MARKING PLACEMENT, SEE THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", TABLE 2C-4, CONDITION A: SPEED REDUCTION AND LANE CHANGING IN HEAVY TRAFFIC AND FOOTNOTE 2 REGARDING TYPICAL CONDITIONS.

TYPICAL PAVEMENT WIDTH TRANSITION MARKINGS

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Creation Date: 07/04/12	Initials: KEN	Date:	Comments			S-627-1
Last Modification Date: 10/18/12	Initials: SCL	10/18/12	ADDED MORE NOTES ON "D" VALUE			Sheet No. 2 of 5
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	(R-D)					
Drawing File Name: S-627-01_2of5.dgn	(R-X)					
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English	(R-X)		Issued By: Safety & Traffic Engineering Branch July 4, 2012	



LONGITUDINAL LINE DETAIL



CROSSWALK NOTES

- CENTER CROSSWALKS ON CURB RAMPS. IF SUCH RAMPS ARE NOT PROVIDED CENTER ON SIGNAL POLES WHEREVER PRACTICAL.
- ① CENTER ON LANE, CENTER OR CHANNELIZING LINE.
- ② CENTER OR EXTENDED FLOW LINE.
- ③ CENTER BETWEEN ADJACENT LINES.
- ④ LINES AND SPACES TO APPROXIMATE ADJACENT PATTERN.

TYPICAL ISLAND MARKINGS

INTERSECTIONS, ISLANDS AND CROSSWALKS

Computer File Information	
Creation Date: 07/04/12	Initials: JSW
Last Modification Date: 09/16/13	Initials: KEN
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
Drawing File Name: S-627-01_3of5.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
09/16/13	ADDED ACCEL LANE IN TYP. ISLAND MARKING DETAIL

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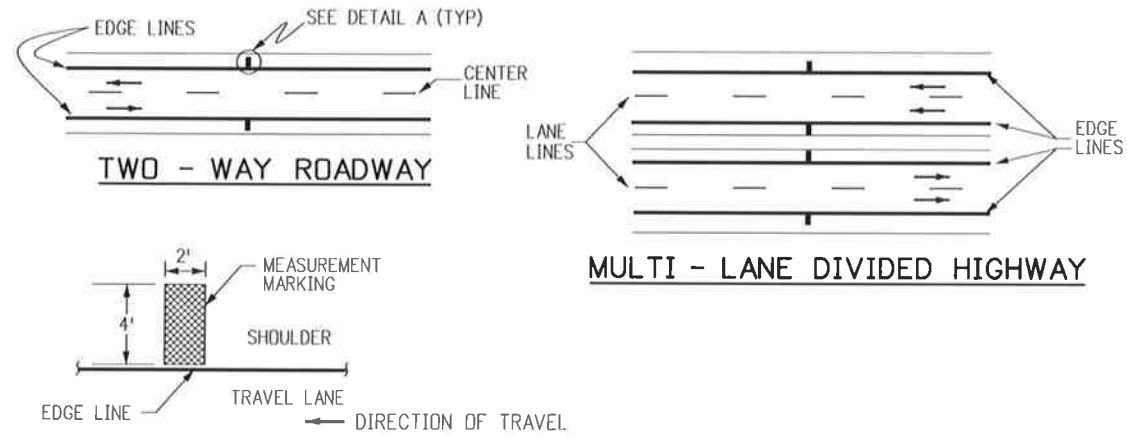
PAVEMENT MARKINGS

Issued By: Safety & Traffic Engineering Branch July 4, 2012

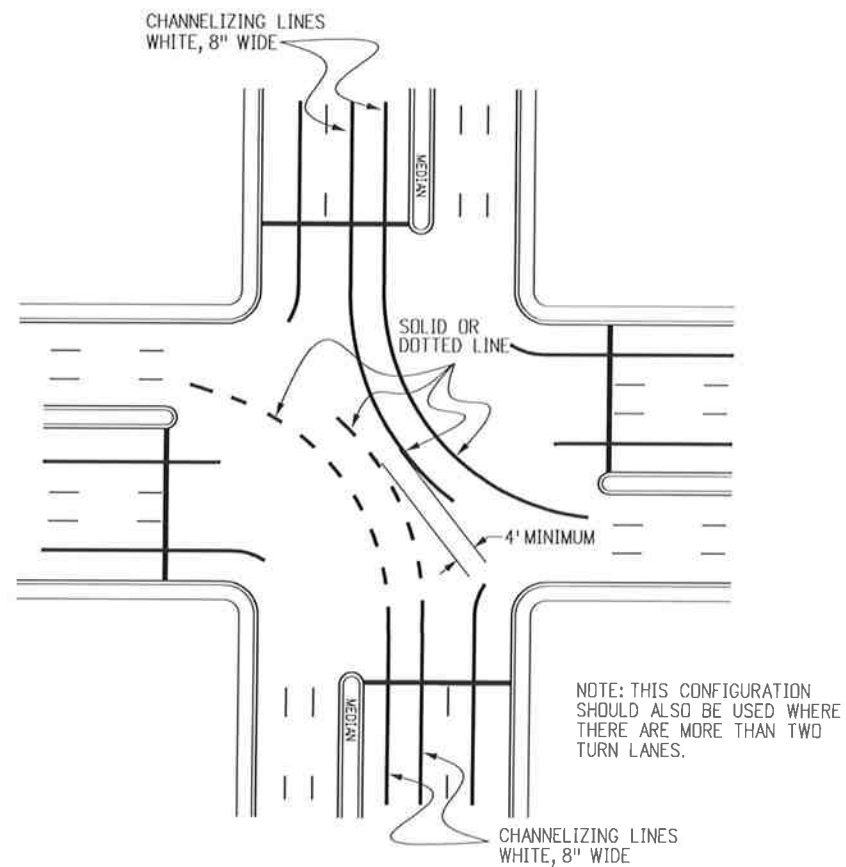
STANDARD PLAN NO.

S-627-1

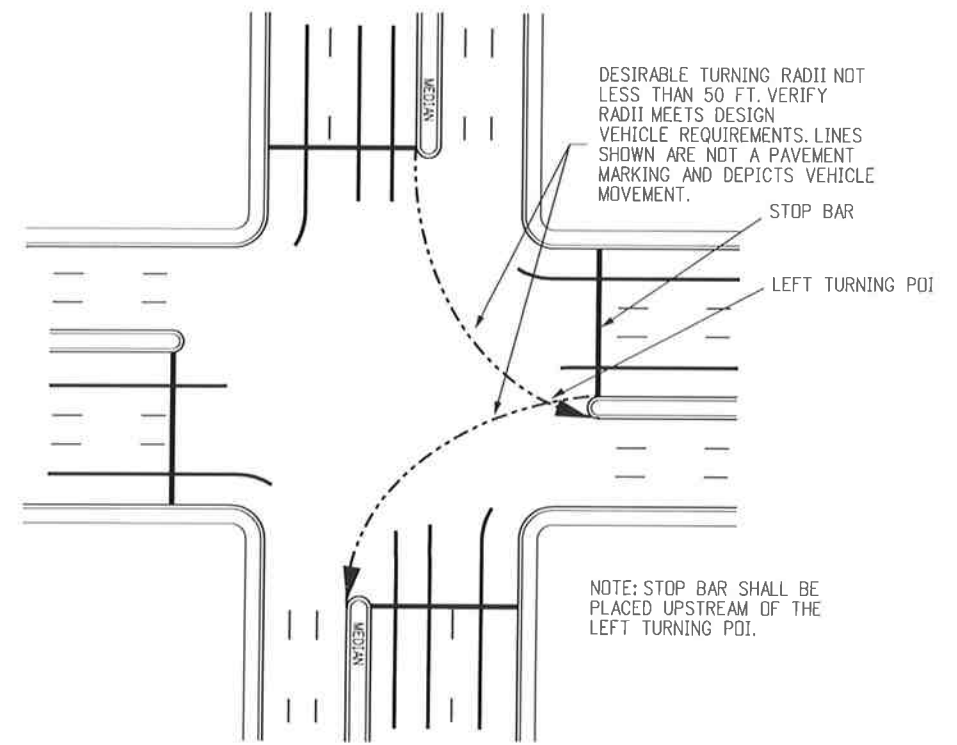
Sheet No. 3 of 5



DETAIL A
TYPICAL SPEED MEASUREMENT MARKING



TYPICAL DOUBLE LEFT TURN MARKINGS



TYPICAL STOP BAR PLACEMENT

Computer File Information	
Creation Date: 07/04/12	Initials: SCL
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Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
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Sheet Revisions	
Date:	Comments
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(R-X)	
(R-X)	
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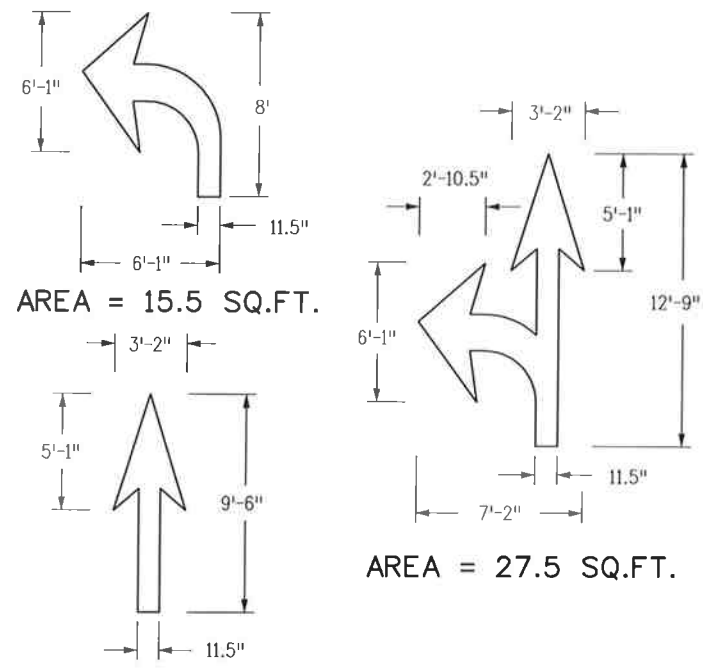
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PAVEMENT MARKINGS

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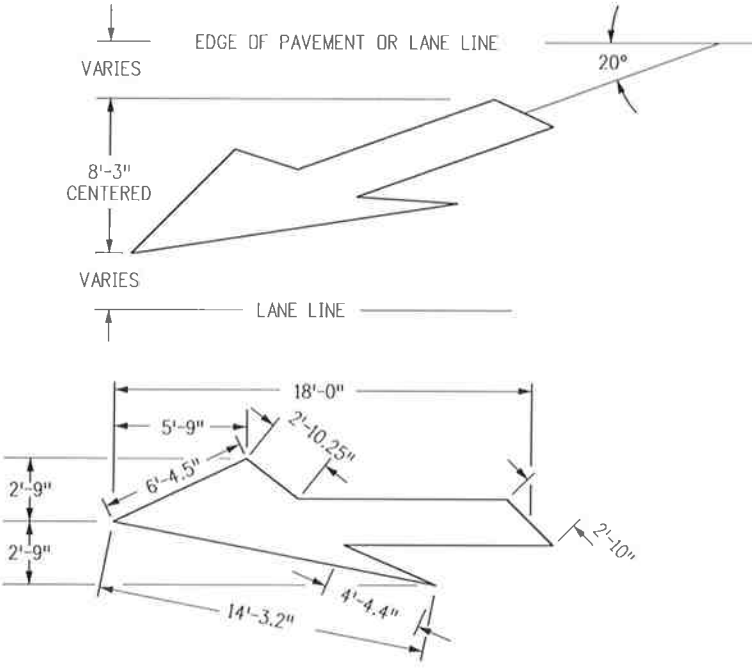
STANDARD PLAN NO.
S-627-1
Sheet No. 4 of 5



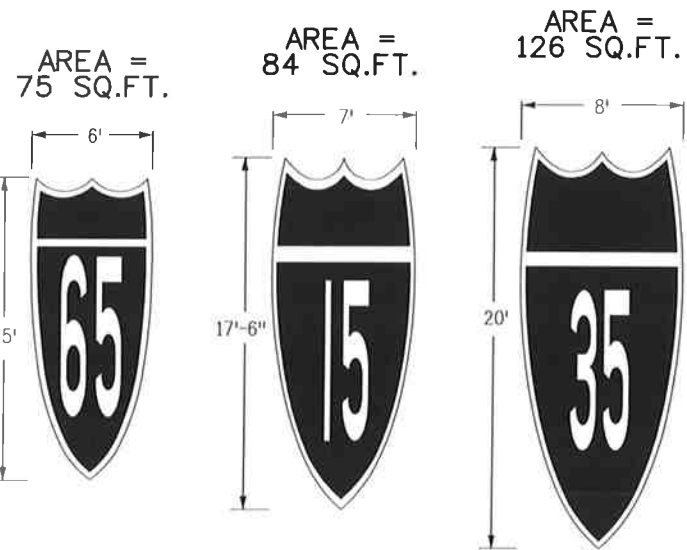
AREA = 15.5 SQ.FT.

AREA = 27.5 SQ.FT.

AREA = 12.5 SQ.FT.



AREA = 58 SQ.FT.



ELONGATED ROUTE SHIELDS

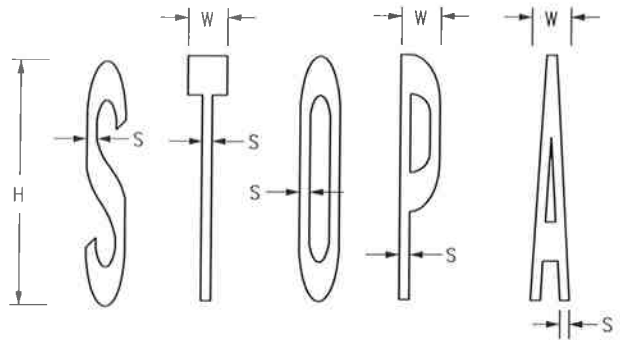
ELONGATED ROUTE SHIELD NOTES

ELONGATED ROUTE SHIELDS SHALL BE AT LEAST 8'x20' WHEN USED ON HIGH SPEED ROADWAYS (45 MPH OR MORE).
PER FIGURE 3B-25 OF THE 2009 MUTCD ELONGATED ROUTE SHIELD COLORS SHALL CONFORM WITH THE STANDARD HIGHWAY SIGNS AND MARKINGS BOOK.

DESIGNATED PAYMENT AREAS

FOR THE FOLLOWING H, W, AND S DIMENSIONS PAY:

H = 4' WORDS	
BIKE - 5.5 SQ.FT.	LANE - 6.0 SQ.FT.
ONLY - 6.0 SQ.FT.	XING - 5.0 SQ.FT.
H = 8' WORDS	
STOP - 23.0 SQ.FT.	XING - 20.0 SQ.FT.
ONLY - 22.5 SQ.FT.	LANE - 22.5 SQ.FT.
AHEAD - 29.0 SQ.FT.	BIKE - 21.0 SQ.FT.
BUS - 18.5 SQ.FT.	HWY - 16.5 SQ.FT.
THRU - 22.0 SQ.FT.	SCHDOL(1L) - 33.0 SQ.FT.
PED - 17.5 SQ.FT.	SCHDOL(2L) - 85.0 SQ.FT.



H = HEIGHT
W = WIDTH
S = STROKE

H = 8'
W = 1'-3.4" TO 1'-4"
S = 3.8" TO 4"

H = 4'
W = 7.7" TO 8"
S = 1.9" TO 2"

TYPICAL LETTER MEASUREMENTS

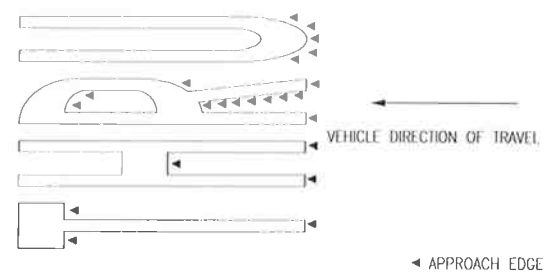
WORD AND SYMBOL NOTES

IF HEIGHT IS INCREASED OR DECREASED THEN ALL MEASUREMENTS CHANGE PROPORTIONATELY. EXAMPLE: "H" MEASUREMENT FOR STOP IS REDUCED TO 4' FROM 8' THEN SQUARE FEET = 5.75 (1/4 OF 23.0 SQ. FT.).

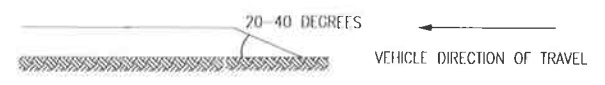
PAVEMENT WORD AND SYMBOL MARKINGS, TRANSVERSE AND LONGITUDINAL (CONTINENTAL) CROSSWALK LINES, AND STOP LINES WILL BE PAID FOR IN SQUARE FEET USING THEIR SPECIFIC BID ITEMS.

TAPERING NOTES

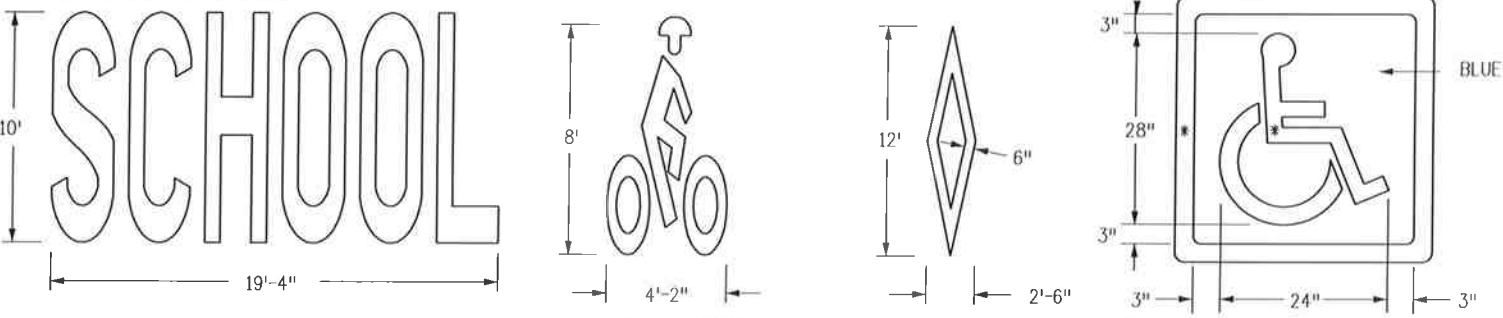
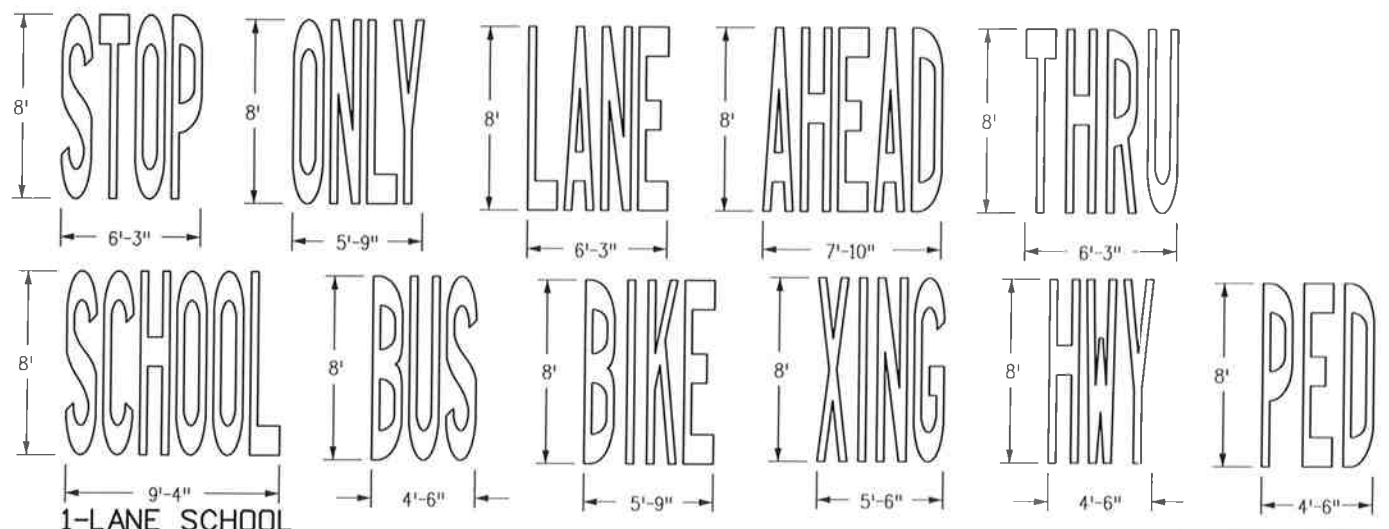
ALL PAVEMENT MARKING APPROACH EDGES FROM THE VEHICLE DIRECTION OF TRAVEL SHALL BE TAPERED USING A PUTTY KNIFE OR SIMILAR TOOL.



TYPICAL APPROACH EDGE TAPERING VIEW



TYPICAL APPROACH EDGE TAPERING PROFILE VIEW



STROKE = 8"
2-LANE SCHOOL

AREA = 11.9 SQ.FT. AREA = 10 SQ.FT.

* WHITE 3" STROKE WIDTH (BORDER MAY BE 4" STROKE WIDTH)

PAVEMENT MARKING WORDS AND SYMBOLS

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06/27/13	UPDATED BICYCLIST SYMBOL

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Safety & Traffic Engineering Branch KCM/KEN

PAVEMENT MARKINGS

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STANDARD PLAN NO.
S-627-1
Sheet No. 5 of 5

GENERAL NOTES

1. ALL CONSTRUCTION ZONE TRAFFIC CONTROL DEVICES, INCLUDING BUT NOT LIMITED TO BARRICADES, SIGNS, ARROW PANELS, FLASHING BEACON (PORTABLE), AND CHANNELIZING DEVICES, SHALL BE FURNISHED, INSTALLED, MAINTAINED (INCLUDING WASHING), REPLACED IF DAMAGED, REMOVED WHEN TEMPORARILY NOT IN USE AND RETURNED WHEN REQUIRED, RESET AS NECESSARY DURING THE PROGRESS OF CONSTRUCTION, AND REMOVED ENTIRELY WHEN THE PROJECT IS COMPLETED. ALL DEVICES SHALL MEET THE REQUIREMENTS OF THE LATEST EDITION OF THE ATSSA "QUALITY GUIDELINES FOR TEMPORARY TRAFFIC CONTROL DEVICES & FEATURES".
2. WORK ON THE PROJECT SHALL NOT BE STARTED UNTIL ALL REQUIRED TRAFFIC CONTROL DEVICES ARE IN PLACE, AND APPROVED BY THE ENGINEER.
3. WHEN SPEED LIMIT REDUCTION IS REQUIRED, SUCH REDUCTION SHALL BE IN ACCORDANCE WITH CDDT FORM 56B, "AUTHORIZATION AND DECLARATION OF TEMPORARY SPEED LIMITS".

WHEN A CHANGE IN AN EXISTING SPEED LIMIT IS REQUIRED, THE R2-1 SIGNS, SHOWN ON THE SCHEDULE OF CONSTRUCTION TRAFFIC CONTROL DEVICES, SHOULD BE INSTALLED AT THE LOCATIONS SHOWN ON THE TYPICAL CASES BY R2-1 (OPTIONAL) SIGNS.

AN ADVISORY SPEED PLATE (W13-1P) MAY BE USED WITH A WARNING SIGN WHEN THE MAXIMUM RECOMMENDED SPEED FOR CONDITION NAMED IS LOWER THAN THE POSTED SPEED LIMIT.

THE REGULATORY OR ADVISORY SPEED REDUCTION DISPLAYED SHALL NOT EXCEED 15 MPH PER SIGN INSTALLATION.
4. ANY TRAFFIC CONTROL DEVICE THAT IS DAMAGED, WEATHERED, WORN, OR OTHERWISE DEEMED UNACCEPTABLE BY THE ENGINEER, SHALL BE REPLACED.
5. CONTRACTOR AND PERSONAL VEHICLE PARKING IS PROHIBITED WITHIN THE RIGHT-OF-WAY UNLESS DESIGNATED ON THE PLANS, OR APPROVED BY THE ENGINEER.
6. CONSTRUCTION TRAFFIC SIGNS SHALL BE MEASURED BY THE FOLLOWING SIZES AND DESCRIPTIONS:

PANEL SIZE A	0.01 TO 9.00 SQ. FT. (INCLUDING TYPE 1 AND TYPE 2 BARRICADES).
PANEL SIZE B	9.01 TO 16.00 SQ. FT.
PANEL SIZE C	GREATER THAN 16 SQ. FT.

 CONSTRUCTION TRAFFIC SIGN (SPECIAL), SQ. FT., MAY BE USED FOR SOME PROJECT SPECIFIC INFORMATION SIGNS.

 FOR DETAILED DIMENSIONS OF SIGNS WITH SIGN CODE NUMBERS, SEE "STANDARD HIGHWAY SIGNS" AND THE "COLORADO SUPPLEMENT" THERETO. SIGN LAYOUTS FOR OTHER SIGNS WILL BE FURNISHED IN THE PLANS, TRANSMITTED TO THE ENGINEER AFTER AWARD, OR MAY BE AVAILABLE UPON REQUEST.

 W20-5 WARNING SIGNS SHALL BE FURNISHED WITH EXCHANGEABLE PLAQUES READING "RIGHT", "LEFT", "CENTER", "RIGHT 2", ETC. AT NO ADDITIONAL COST.
7. ALL WARNING AND REGULATORY SIGNS SHALL BE POSTED ON BOTH SIDES OF THE ROADWAY ON DIVIDED HIGHWAYS, MULTI-LANE RAMPS, ONE-WAY STREETS, AND AS DIRECTED BY THE ENGINEER, EXCEPT WHERE ONLY ONE SHOULDER IS CLOSED (EX: CASE 11 ON SHEET 7).
8. ADDITIONAL TRAFFIC CONTROL DEVICES ADDRESSING FLAGGING, SPEED REDUCTION, ETC. WILL BE NECESSARY FOR SET-UP AND TAKE-DOWN OF MOST CASE APPLICATIONS; DAILY WORK SITE ACCESS; AND PAVEMENT MARKING REMOVAL AND INSTALLATION OPERATIONS.
9. BASED ON SIGHT DISTANCE AND OTHER CONSIDERATIONS, THE FINAL LOCATIONS OF SIGNS ARE SUBJECT TO APPROVAL OF THE ENGINEER.
10. IF CONSTRUCTION RELATED TRAFFIC CONGESTION BACKS UP BEYOND THE INSTALLED ADVANCE SIGN SEQUENCE, ADDITIONAL ADVANCE SIGNING SHALL BE PLACED BEYOND THE CONGESTION.
11. ALL SIGN MATERIAL SHALL BE SOUND AND DURABLE TO THE DEGREE NECESSARY FOR MAINTAINING EFFECTIVE AND NEAT APPEARING TRAFFIC CONTROLS, AND:
 - a. SIGN PANELS MAY BE FABRICATED FROM PLYWOOD, STEEL, ALUMINUM, OR OTHER SUITABLE MATERIAL.
 - b. REFLECTIVE SHEETING SHALL CONFORM TO ASTM D4956. THE TYPE SHALL BE AS DESCRIBED IN THE STANDARD SPECIFICATIONS AND/OR AS SHOWN ON THE PLANS.
 - c. SYMBOLS AND LEGEND SHALL BE OF GOOD WORKMANSHIP (UNEVEN OR HAND LETTERING WILL NOT BE ACCEPTED).
 - d. PORTABLE OR TEMPORARY MOUNTING SHALL NOT BE CONSTRUCTED OR WEIGHTED BY ANY METHOD OR MATERIAL THAT MAKES THEM HAZARDOUS TO TRAFFIC.
 - e. CERTAIN POST SIZES AND SHAPES REQUIRE A "BREAK-AWAY" DEVICE. SEE THE APPLICABLE STANDARD PLAN. OTHER POST DESIGNS OR SYSTEMS REQUIRE THE SUBMITTAL OF AN FHWA LETTER OF ACCEPTANCE TO THE ENGINEER, AND MUST BE APPROVED BY THE ENGINEER PRIOR TO THEIR USE.
12. ALL CONSTRUCTION SIGN PLACEMENT SHALL BE IN ACCORDANCE WITH STANDARD PLAN "TYPICAL GROUND SIGN PLACEMENT" UNLESS OTHERWISE APPROVED.

SIGNS APPROVED TO BE MOUNTED ON PORTABLE SUPPORTS, OR APPROPRIATE SIGNS MOUNTED ON BARRICADES, MAY BE AT LOWER HEIGHTS, BUT THE BOTTOM OF THE SIGNS SHALL NOT BE LESS THAN ONE FOOT ABOVE THE PAVEMENT ELEVATION.
13. SIGNS MOUNTED ON THE MEDIAN OF DIVIDED HIGHWAYS WHERE MEDIAN BARRIER IS IN PLACE MAY BE MOUNTED ON THE BARRIER WITH A SADDLE TYPE BRACKET. IF THE BRACKET ALLOWS THE SIGN PANEL TO BE TURNED PARALLEL TO THE ROADWAY, THE SIGN MAY REMAIN IN PLACE WHEN NOT APPLICABLE, BUT LAYING THE SIGN PANEL DOWN IN A HORIZONTAL POSITION IS NOT PERMITTED.
14. TRAFFIC CONES SHALL BE AT LEAST 28 INCHES IN HEIGHT. HOWEVER, THE MINIMUM SIZE SHALL BE 36 INCHES WHEN THEY ARE USED ON FREEWAYS AND EXPRESSWAYS, OR DURING NIGHT TIME WORKING HOURS. THEY SHOULD ALSO BE 36 INCHES WHEN USED ON OTHER HIGH SPEED ROADWAYS (45 MPH OR MORE) WITH AN ADT OF 6,000 OR MORE.
15. TYPE 1 BARRICADES SHALL NOT BE USED ON FREEWAYS, EXPRESSWAYS, OR OTHER HIGH SPEED ROADWAYS (55 MPH OR MORE).
16. WHEN TWO-WAY TRAFFIC IS PLACED ON ONE ROADWAY OF A NORMALLY DIVIDED HIGHWAY, OPPOSING TRAFFIC SHALL BE SEPARATED EITHER WITH CONCRETE BARRIER (TEMPORARY), OR WITH CHANNELIZING DEVICES APPROVED FOR THIS APPLICATION, THROUGHOUT THE LENGTH OF TWO-WAY OPERATION. THE TRANSITION ZONES SHALL HAVE CONCRETE BARRIER (TEMPORARY). THE BARRIER SHALL BE TIED TO AN EXISTING STRUCTURE OR GUARD RAIL, FLARED OR EXTENDED, TO MEET CLEAR ZONE REQUIREMENTS, OR FITTED WITH AN IMPACT ATTENUATION DEVICE.
17. CHANNELIZING DEVICE SPACING, IN FEET, SHALL BE AS FOLLOWS:
 - a. FOR TAPERS AND TRANSITIONS, SPACING EQUALS THE NUMERICAL VALUE OF THE SPEED LIMIT.
(e.g. 45 MPH = 45 FEET)
 - b. FOR TANGENTS ALONG THE BUFFER SPACE OR WORK AREA, SPACING MAY NOT BE GREATER THAN TWO TIMES THE SPEED LIMIT. (e.g. 50 MPH = 50 FEET TO 100 FEET MAXIMUM)
18. FOR DETAILS ON BARRICADES, CONCRETE BARRIER (TEMPORARY), VERTICAL PANELS, AND FLASHING BEACON (PORTABLE), SEE THE APPLICABLE STANDARD PLANS.
19. FLOOD LIGHTS SHALL BE USED TO ILLUMINATE FLAGGER STATIONS DURING THE HOURS OF DARKNESS UNLESS OTHERWISE APPROVED. A TYPICAL LIGHT SHOULD PROVIDE THE FOLLOWING: A FULLY DIRECTIONAL SWIVEL MOUNT QUARTZ LIGHT SOURCE (500 WATT MINIMUM), SELF-SUPPORTING STAND WITH VARIABLE LIGHT HEIGHT FROM A MINIMUM OF EIGHT FEET ABOVE THE ROADWAY, AND A POWER SOURCE. IT SHALL ILLUMINATE THE STATION AREA AND A FLAGGER ESCAPE PATH, BUT SHALL NOT PRESENT ANY GLARE TO TRAFFIC.
20. FOR TEMPORARY PAVEMENT MARKINGS AND CONTROL POINTS FOR INSTALLING THOSE PAVEMENT MARKINGS FOR UNDIVIDED ROADWAYS THAT ARE BEING CONSTRUCTED UNDER TRAFFIC, FULL COMPLIANCE CENTER LINE, LANE LINE, AND EDGE LINE TEMPORARY MARKINGS SHALL BE IN PLACE AT THE END OF EACH WORK DAY IN ACCORDANCE WITH SECTION 627.03(d)2.

FOR ADDITIONAL PAVEMENT MARKING DETAILS, SEE STANDARD PLAN "TYPICAL PAVEMENT MARKINGS".
21. BUFFER SPACE IS OPTIONAL. NEED MUST BE DETERMINED ON A PROJECT OR SITE SPECIFIC BASIS AS DIRECTED BY THE ENGINEER. WHEN A BUFFER SPACE IS USED, DIMENSIONS AND/OR DEVICES USED ARE TO BE INCORPORATED IN THE TRAFFIC CONTROL PLAN (TCP) OR THE CONTRACTOR'S METHOD OF HANDLING TRAFFIC (MHT).
22. ADDITIONAL VMS SIGNAGE SHOULD BE CONSIDERED AT LEAST A MILE IN ADVANCE OF THE SIGNING SHOWN IN THE DETAIL FOR ANY LANE CLOSURES ON INTERSTATE AND OTHER HIGH SPEED FACILITIES ESPECIALLY WHEN THE LEVEL OF SERVICE IS SIGNIFICANTLY REDUCED AS A RESULT OF CONSTRUCTION. THE LEGENDS SHOULD BE CHANGED TO ADVISE MOTORISTS OF UPCOMING TRAFFIC CONDITIONS AND TO ALERT THEM OF UPCOMING LANE USAGE.

ADDITIONAL ADVANCE WARNING SIGNAGE IS ENCOURAGED IN ALL CASES WHERE TRAFFIC VOLUMES AND SPEEDS ARE HIGH AND/OR WHERE THERE ARE INFREQUENT EXITS. ADDITIONAL SIGNAGE IS ALSO ENCOURAGED IN LOCATIONS WHERE DRIVERS' LINE OF SIGHT TO ADVANCE WARNING SIGNS IS OBSTRUCTED.
23. WHEN ARROW BOARDS ARE USED TO CLOSE MULTIPLE LANES, A SEPARATE ARROW BOARD SHALL BE USED FOR EACH CLOSED LANE.

IF ARROW BOARDS ARE USED 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, USE THE ARROW BOARDS ONLY IN THE CAUTION MODE.
24. RAISED PAVEMENT MARKERS MAY BE USED TO SUPPLEMENT TEMPORARY STRIPING DURING NON-SNOW PERIODS. THEIR USE IS ENCOURAGED ON HIGHER SPEED FACILITIES WHEN TRAFFIC IS BEING DIVERTED FROM ITS USUAL COURSE.
25. THE TYPICAL CASES DEPICTED IN THIS STANDARD REFLECT THE MINIMUM REQUIREMENTS, UNLESS AS OTHERWISE DIRECTED BY THE PROJECT PLANS AND SPECIFICATIONS, AND/OR THE PROJECT ENGINEER.
26. A SIGNIFICANT PROJECT IS DEFINED AS ONE THAT, ALONE OR IN COMBINATION WITH OTHER CONCURRENT PROJECTS NEARBY, IS ANTICIPATED TO CAUSE SUSTAINED WORK ZONE IMPACTS AT A LOCATION FOR THREE OR MORE CONSECUTIVE DAYS WITH EITHER INTERMITTENT OR CONTINUOUS LANE CLOSURES.

Sheet Revisions	
Date:	Comments
(R-1) 02/06/13	SHEET 13 - UPDATE TO 2009 MUTCD STD
(R-2) 02/26/13	SHEET 1 - UPDATE TO NOTE 1
(R-3) 02/27/13	SHEET 4 - UPDATE TAPER TO MUTCD STD
(R-4) 07/26/13	SHTS 9, 10, 15 & 20 - CORRECTED SIGN CODE DESIGNATION
(R-5) 03/27/14	SHTS 17 & 18 - UPDATED SIGNS AND TMA'S
(R-6) 07/22/14	SHEET 1 - UPDATE TO NOTE 20

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Safety & Traffic Engineering Branch **KCM/KEN**

TRAFFIC CONTROLS
FOR HIGHWAY
CONSTRUCTION

Issued By: Safety & Traffic Engineering Branch July 4, 2012

STANDARD PLAN NO.

S-630-1

Sheet No. 1 of 20

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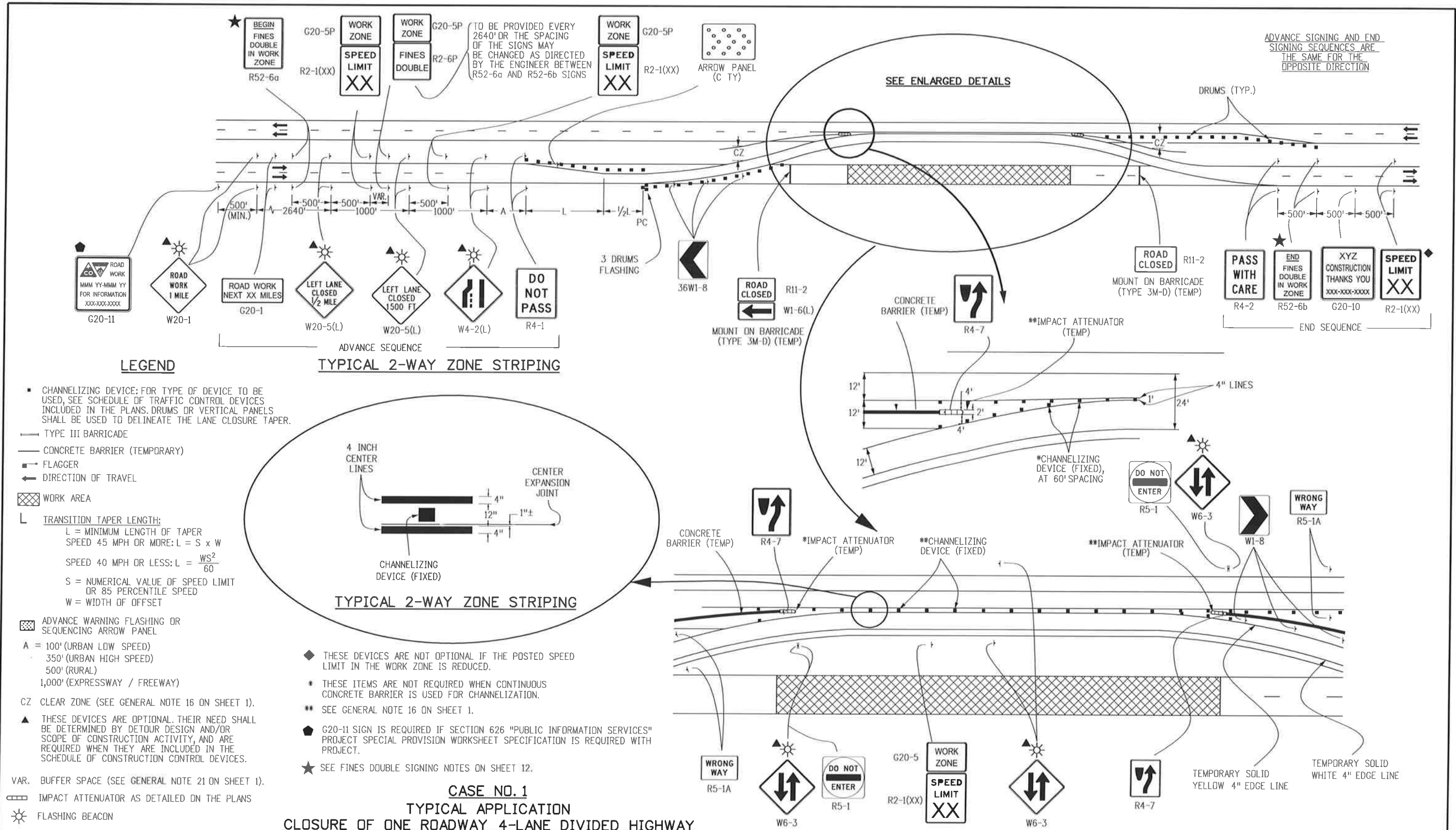
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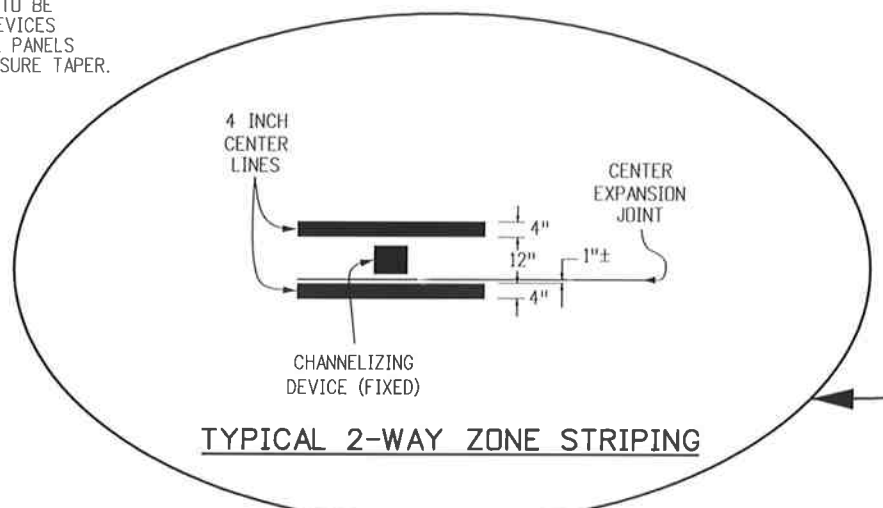
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LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
- TYPE III BARRICADE
- CONCRETE BARRIER (TEMPORARY)
- FLAGGER
- ← DIRECTION OF TRAVEL
- ▨ WORK AREA
- L TRANSITION TAPER LENGTH:
 L = MINIMUM LENGTH OF TAPER
 SPEED 45 MPH OR MORE: $L = S \times W$
 SPEED 40 MPH OR LESS: $L = \frac{WS^2}{60}$
 S = NUMERICAL VALUE OF SPEED LIMIT OR 85 PERCENTILE SPEED
 W = WIDTH OF OFFSET
- ▨ ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL
- A = 100' (URBAN LOW SPEED)
 350' (URBAN HIGH SPEED)
 500' (RURAL)
 1,000' (EXPRESSWAY / FREEWAY)
- CZ CLEAR ZONE (SEE GENERAL NOTE 16 ON SHEET 1).
- ▲ THESE DEVICES ARE OPTIONAL. THEIR NEED SHALL BE DETERMINED BY DETOUR DESIGN AND/OR SCOPE OF CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE SCHEDULE OF CONSTRUCTION CONTROL DEVICES.
- VAR. BUFFER SPACE (SEE GENERAL NOTE 21 ON SHEET 1).
- ▨ IMPACT ATTENUATOR AS DETAILED ON THE PLANS
- ☀ FLASHING BEACON

TYPICAL 2-WAY ZONE STRIPING



TYPICAL 2-WAY ZONE STRIPING

- ◆ THESE DEVICES ARE NOT OPTIONAL IF THE POSTED SPEED LIMIT IN THE WORK ZONE IS REDUCED.
- * THESE ITEMS ARE NOT REQUIRED WHEN CONTINUOUS CONCRETE BARRIER IS USED FOR CHANNELIZATION.
- ** SEE GENERAL NOTE 16 ON SHEET 1.
- G20-11 SIGN IS REQUIRED IF SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

**CASE NO. 1
TYPICAL APPLICATION
CLOSURE OF ONE ROADWAY 4-LANE DIVIDED HIGHWAY**

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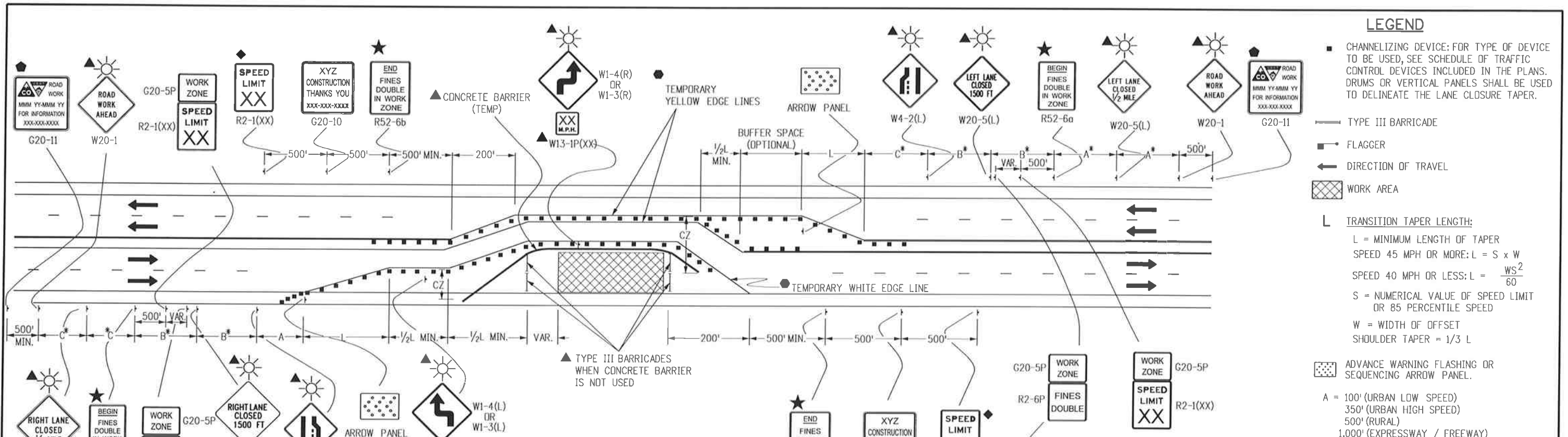
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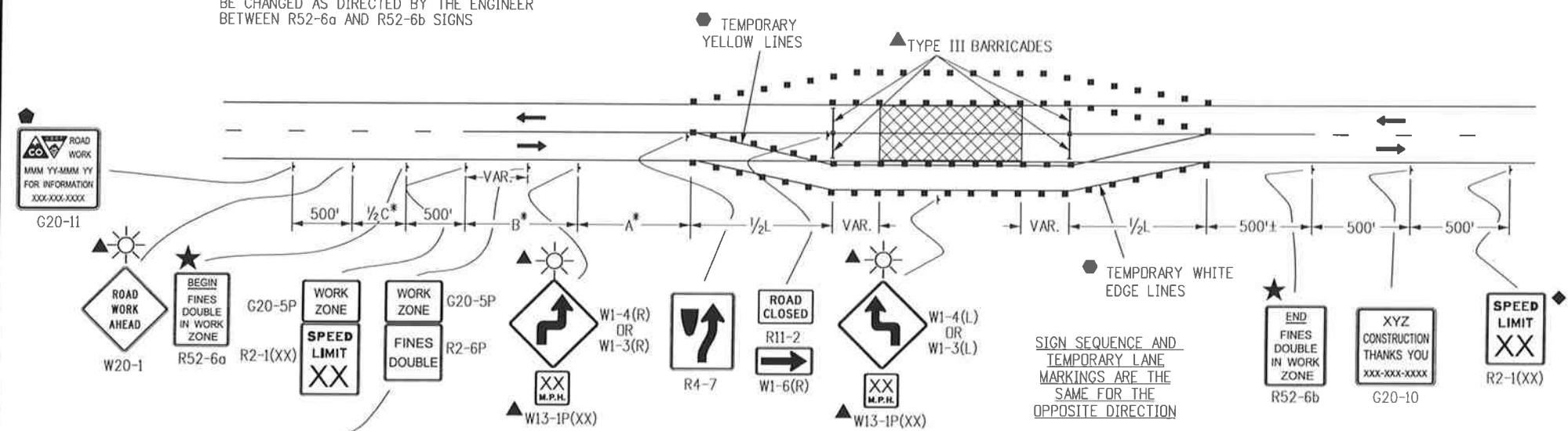
TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

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 S-630-1
 Sheet No. 3 of 20



CASE NO. 2
TYPICAL APPLICATION
CLOSURE OF HALF OF 4-LANE UNDIVIDED HIGHWAY



CASE NO. 3
TYPICAL APPLICATION
ROAD CLOSURE, USE OF ADJACENT SHOULDERS

LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
- TYPE III BARRICADE
- FLAGGER
- ← DIRECTION OF TRAVEL
- ▨ WORK AREA
- L TRANSITION TAPER LENGTH:
L = MINIMUM LENGTH OF TAPER
SPEED 45 MPH OR MORE: $L = S \times W$
SPEED 40 MPH OR LESS: $L = \frac{WS^2}{60}$
S = NUMERICAL VALUE OF SPEED LIMIT OR 85 PERCENTILE SPEED
W = WIDTH OF OFFSET
SHOULDER TAPER = 1/3 L
- ▨ ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL.
- A = 100' (URBAN LOW SPEED)
350' (URBAN HIGH SPEED)
500' (RURAL)
1,000' (EXPRESSWAY / FREEWAY)
- CZ CLEAR ZONE (SEE GENERAL NOTE 16 ON SHEET 1)
- ▲ THESE DEVICES ARE OPTIONAL. THEIR NEED SHALL BE DETERMINED BY DETOUR DESIGN AND/OR SCOPE OF CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE SCHEDULE OF CONSTRUCTION CONTROL DEVICES.
- ◆ THESE DEVICES ARE NOT OPTIONAL IF THE POSTED SPEED LIMIT IN THE WORK ZONE IS REDUCED.
- VAR. BUFFER SPACE (SEE GENERAL NOTE 21 ON SHEET 1).
- REQUIRED WHEN WORK OCCUPIES THE LOCATION FOR MORE THAN 3 DAYS.
- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- ☀ FLASHING BEACON
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

*** KEY TO ADVANCE SIGNING DISTANCES**

ROAD TYPE	DISTANCE BETWEEN SIGNS		
	A	B	C
URBAN (<=40 MPH)	100	100	100
URBAN (>=45 MPH)	350	350	350
RURAL	500	500	500
EXPRESSWAY/FREEWAY	1000	1500	2640

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Drawing File Name: S-630-01_4of20.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions

Date:	Comments
02/27/13	UPDATE TAPER TO MUTCD STD

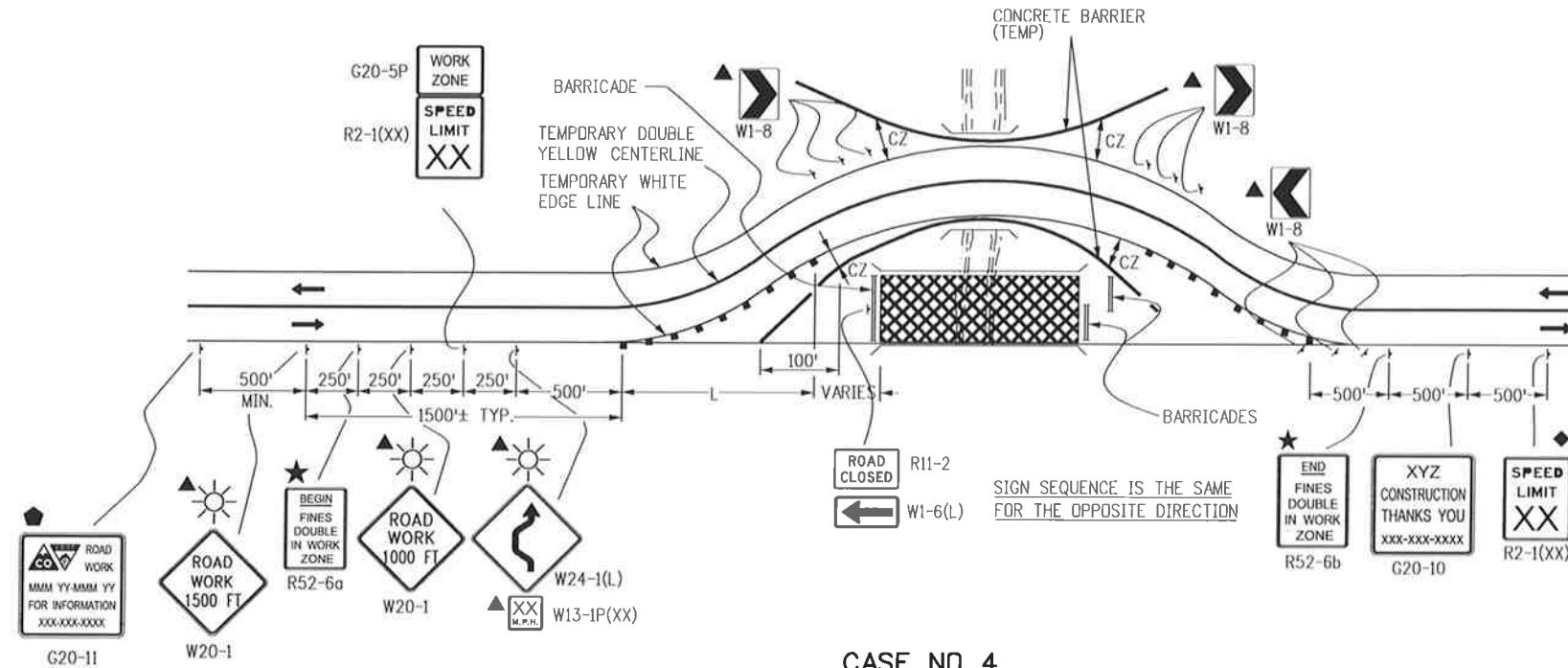
Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222
Phone: (303) 757-9543
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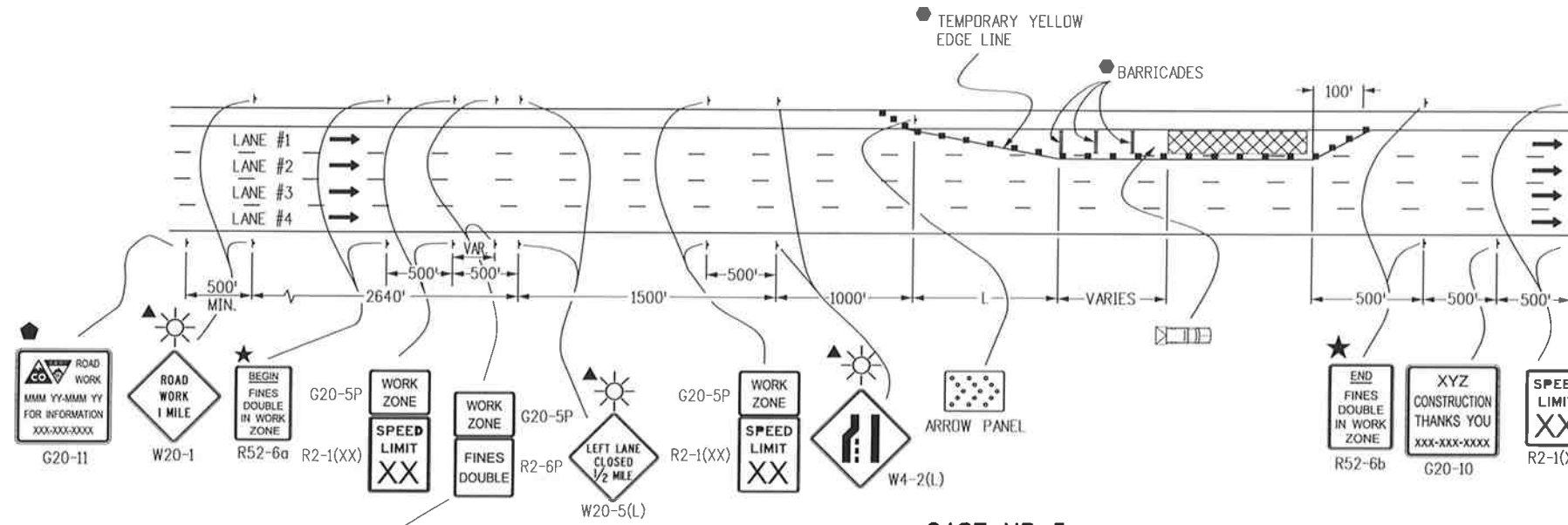
TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

Issued By: Safety & Traffic Engineering Branch July 4, 2012

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S-630-1
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CASE NO. 4
TYPICAL APPLICATION
ROAD CLOSURE, BYPASS DETOUR PROVIDED



CASE NO. 5
TYPICAL APPLICATION
LANE #1 CLOSURE, MULTI-LANE FREEWAY

TO BE PROVIDED EVERY 2640' OR THE SPACING OF THE SIGNS MAY BE CHANGED AS DIRECTED BY THE ENGINEER BETWEEN R52-6a AND R52-6b SIGNS

LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
- TYPE III BARRICADE
- CONCRETE BARRIER (TEMPORARY)
- FLAGGER
- ← DIRECTION OF TRAVEL
- ▨ WORK AREA
- L TRANSITION TAPER LENGTH:
 L = MINIMUM LENGTH OF TAPER
 SPEED 45 MPH OR MORE: $L = S \times W$
 SPEED 40 MPH OR LESS: $L = \frac{WS^2}{60}$
 S = NUMERICAL VALUE OF SPEED LIMIT OR 85 PERCENTILE SPEED
 W = WIDTH OF OFFSET
 SHOULDER TAPER = 1/3 L
- ▨ ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL
- CZ CLEAR ZONE (SEE GENERAL NOTE 16 ON SHEET 1).
- ▲ THESE DEVICES ARE OPTIONAL. THEIR NEED SHALL BE DETERMINED BY DETOUR DESIGN AND/OR SCOPE OF CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE SCHEDULE OF CONSTRUCTION CONTROL DEVICES.
- ◆ THESE DEVICES ARE NOT OPTIONAL IF THE POSTED SPEED LIMIT IN THE WORK ZONE IS REDUCED.
- VARIES BUFFER SPACE (SEE GENERAL NOTE 21 ON SHEET 1).
- REQUIRED WHEN WORK OCCUPIES THE LOCATION FOR MORE THAN 3 DAYS.
- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- ▨ TRUCK MOUNTED ATTENUATOR (TMA)
- ☀ FLASHING BEACON
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

Computer File Information	
Creation Date: 07/04/12	Initials: RRR
Last Modification Date:	Initials:
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
Drawing File Name: S-630-01_5of20.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
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(R-X)	
(R-X)	
(R-X)	

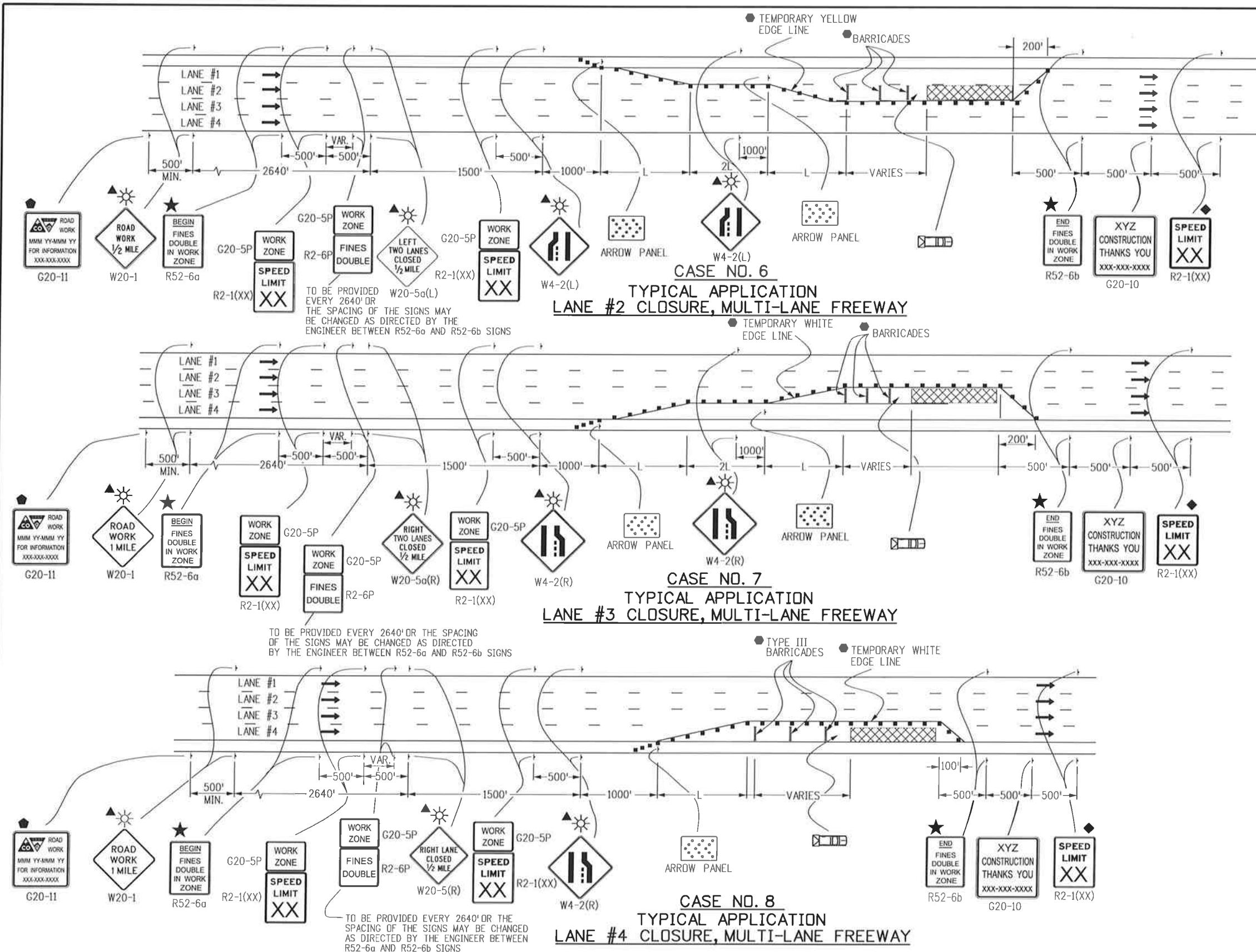
Colorado Department of Transportation
 4201 East Arkansas Avenue
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TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

Issued By: Safety & Traffic Engineering Branch July 4, 2012

STANDARD PLAN NO.
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LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS, DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
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- FLAGGER
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- ▨ WORK AREA
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- REQUIRED WHEN WORK OCCUPIES THE LOCATION FOR MORE THAN 3 DAYS.
- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- ▨ TRUCK MOUNTED ATTENUATOR (TMA)
- ☀ FLASHING BEACON
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

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Sheet Revisions

Date:	Comments
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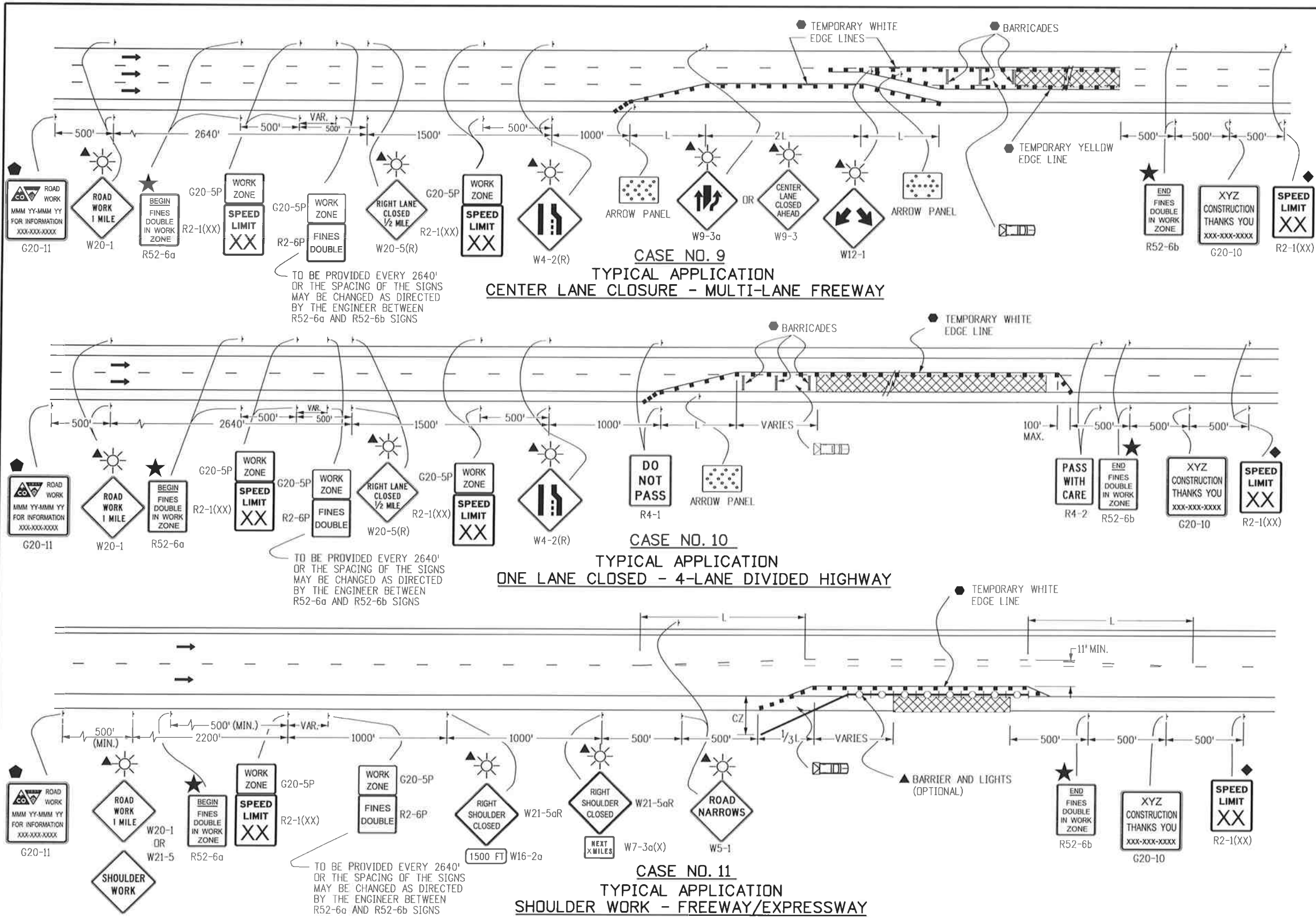
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TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

Issued By: Safety & Traffic Engineering Branch July 4, 2012

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LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
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- FLAGGER
- ← DIRECTION OF TRAVEL
- ▨ WORK AREA
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- REQUIRED WHEN WORK OCCUPIES THE LOCATION FOR MORE THAN 3 DAYS.
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- ▨ TRUCK MOUNTED ATTENUATOR (TMA)
- CONCRETE BARRIER (TEMPORARY) WITH LIGHTS
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

Computer File Information

Creation Date: 07/04/12	Initials: RRR
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Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
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CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments
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(R-X)	
(R-X)	

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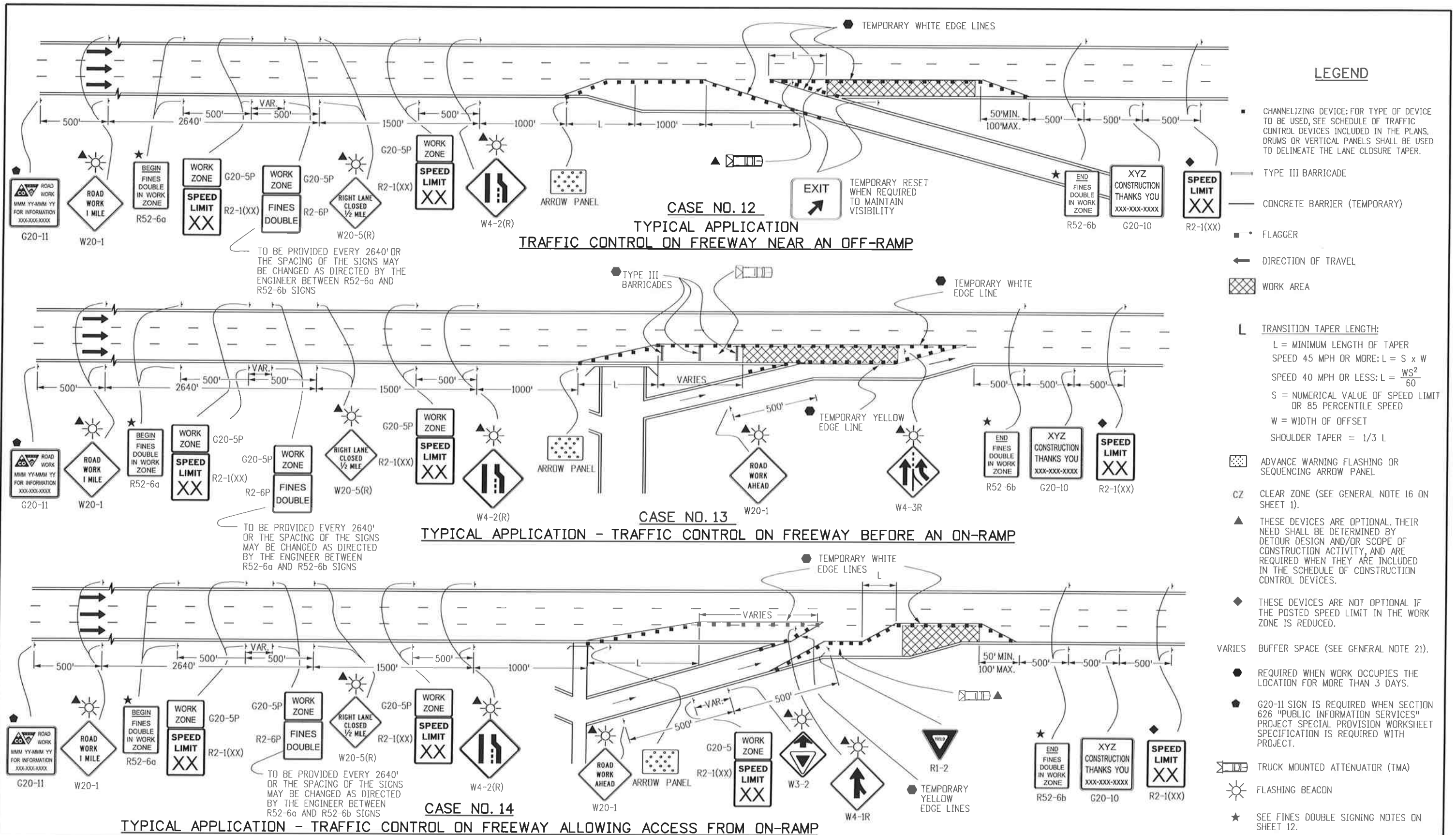
TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

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STANDARD PLAN NO.

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LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
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- FLAGGER
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- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- ▨ TRUCK MOUNTED ATTENUATOR (TMA)
- ☀ FLASHING BEACON
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

Computer File Information

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Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
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Sheet Revisions

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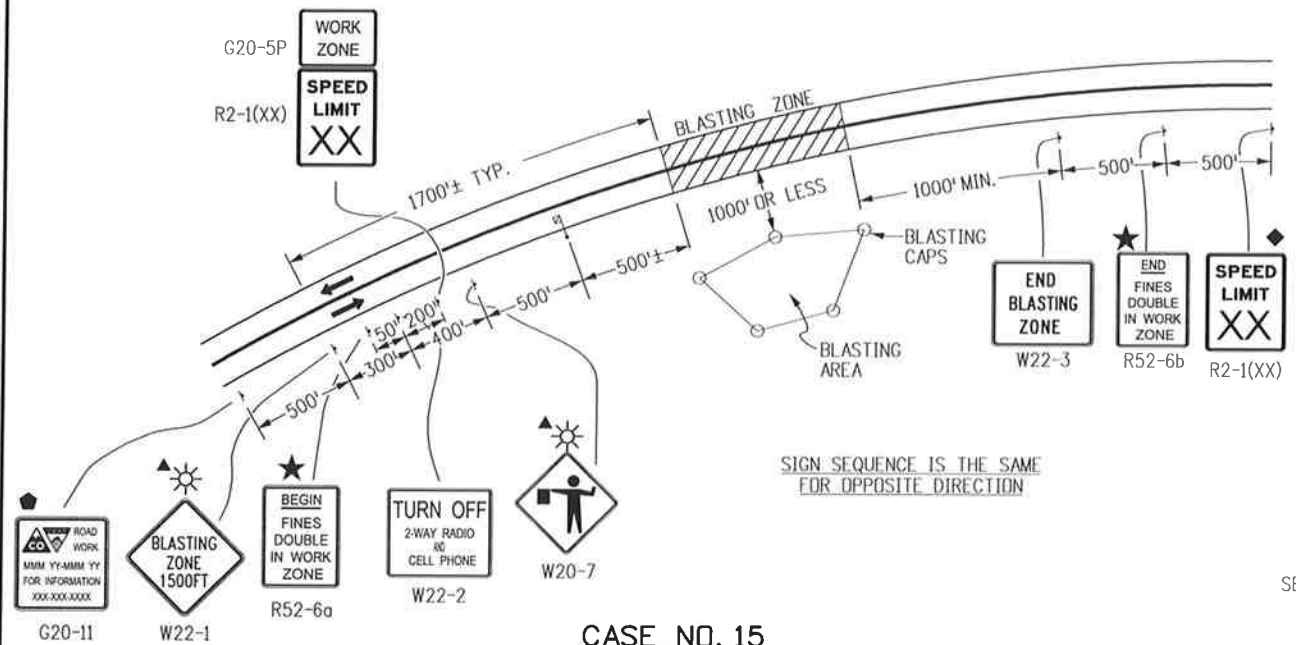
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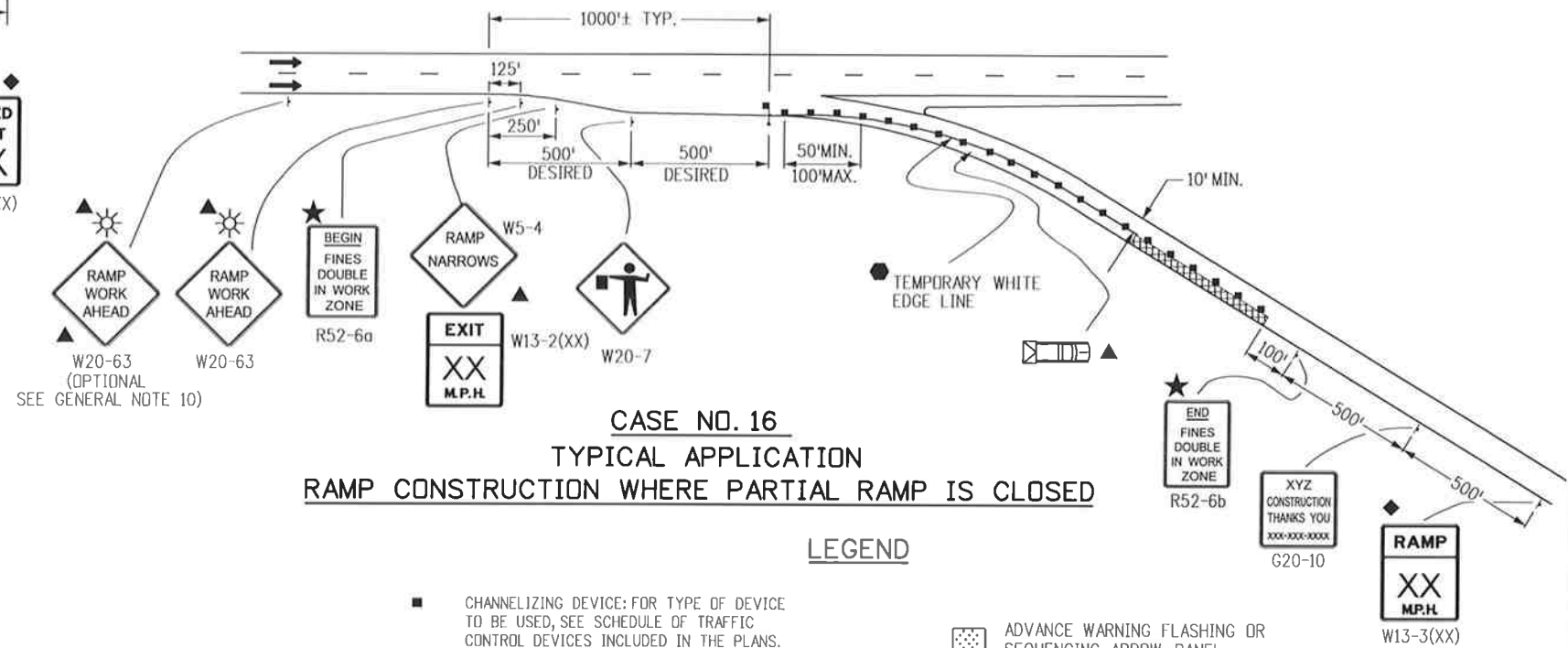
TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

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S-630-1
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CASE NO. 15
TYPICAL APPLICATION
BLASTING ZONE



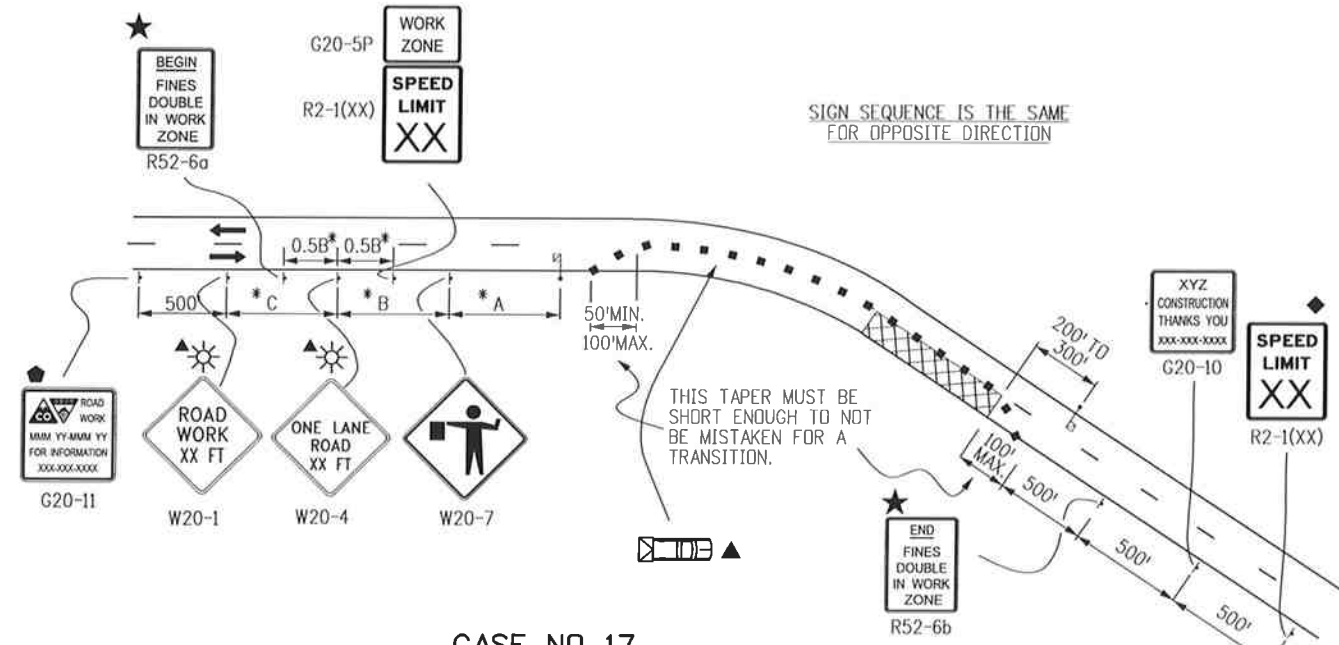
CASE NO. 16
TYPICAL APPLICATION
RAMP CONSTRUCTION WHERE PARTIAL RAMP IS CLOSED

LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
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- CONCRETE BARRIER (TEMPORARY)
- FLAGGER
- ← DIRECTION OF TRAVEL
- ▨ WORK AREA
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SPEED 40 MPH OR LESS: $L = \frac{WS^2}{60}$
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W = WIDTH OF OFFSET
SHOULDER TAPER = 1/3 L
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- ◆ THESE DEVICES ARE NOT OPTIONAL IF THE POSTED SPEED LIMIT IN THE WORK ZONE IS REDUCED.
- ☀ FLASHING BEACON
- REQUIRED WHEN WORK OCCUPIES THE LOCATION FOR MORE THAN 3 DAYS.
- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- ☐ XYZ CONSTRUCTION THANKS YOU XXXX-XXXX-XXXX
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12

***KEY TO ADVANCE SIGNING DISTANCES**

ROAD TYPE	DISTANCE BETWEEN SIGNS		
	A	B	C
URBAN (<= 40 MPH)	100	100	100
URBAN (>= 45 MPH)	350	350	350
RURAL	500	500	500
EXPRESSWAY/FREEWAY	1000	1500	2640



CASE NO. 17
TYPICAL APPLICATION
LANE CLOSURE, 2-LANE HIGHWAY, AT CURVE

Computer File Information

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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions

Date:	Comments
07/26/13	CORRECTED SIGN CODE DESIGNATION FOR FLAGGER (SYMBOL) SIGN TO W20-7

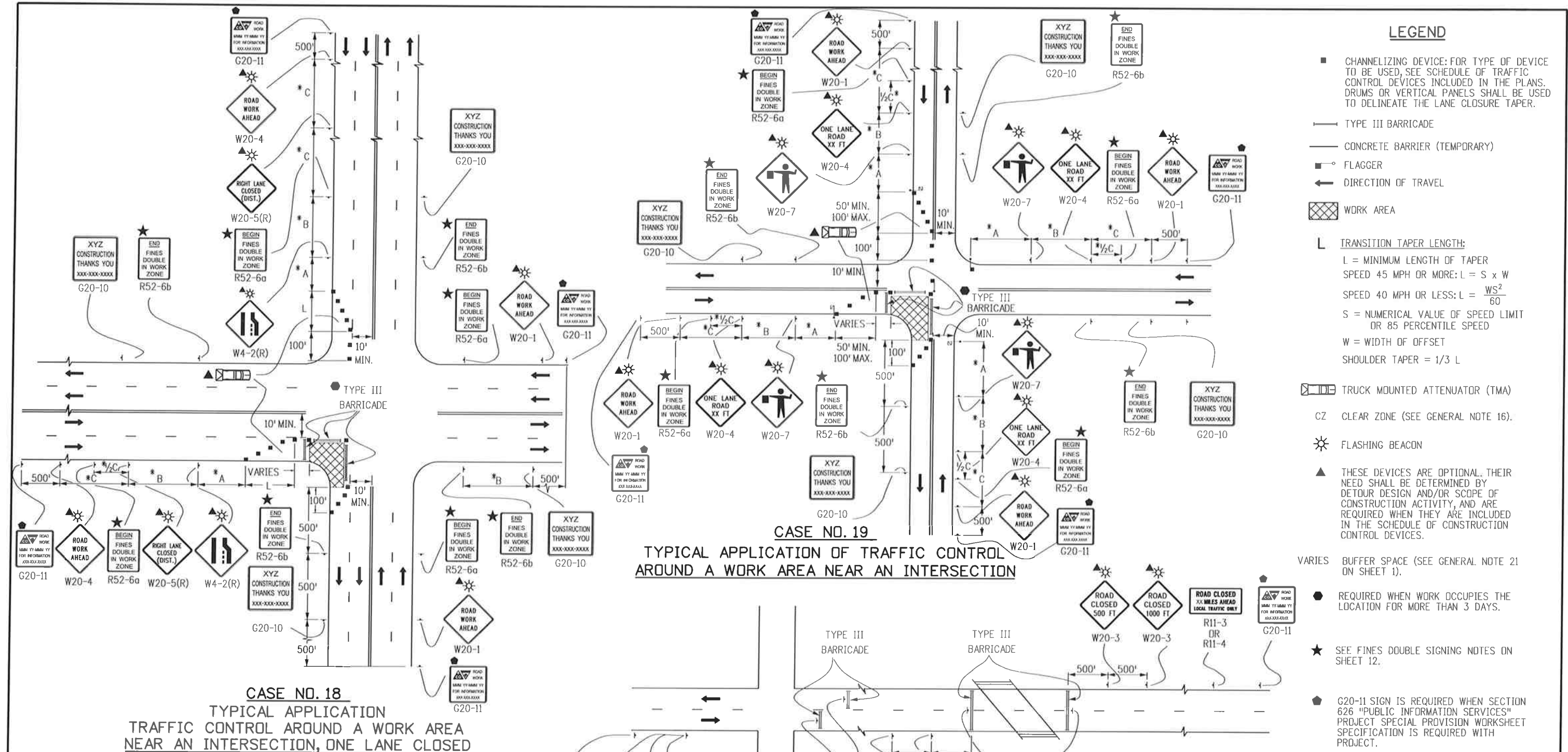
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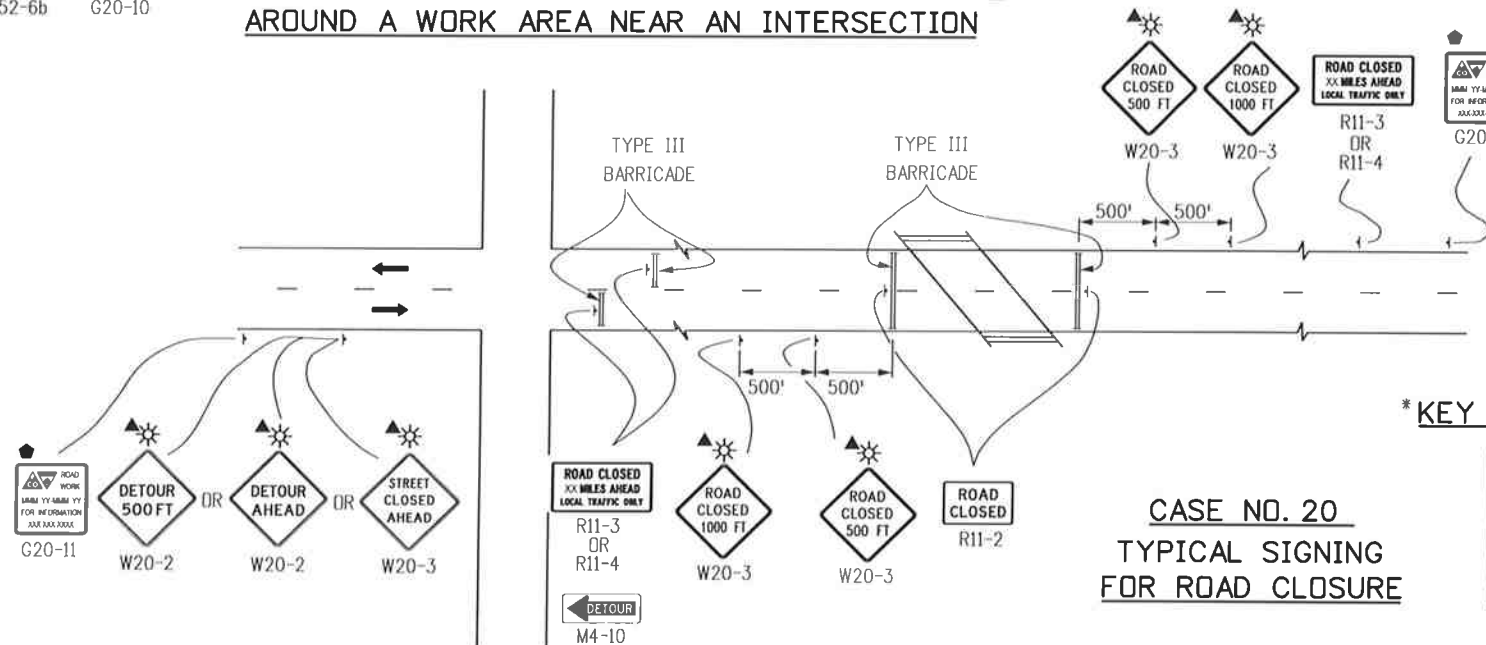
LEGEND

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- TYPE III BARRICADE
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- FLAGGER
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- ▨ WORK AREA
- L TRANSITION TAPER LENGTH:
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SPEED 40 MPH OR LESS: $L = \frac{WS^2}{60}$
S = NUMERICAL VALUE OF SPEED LIMIT OR 85 PERCENTILE SPEED
W = WIDTH OF OFFSET
SHOULDER TAPER = 1/3 L
- ▭ TRUCK MOUNTED ATTENUATOR (TMA)
- CZ CLEAR ZONE (SEE GENERAL NOTE 16).
- ☀ FLASHING BEACON
- ▲ THESE DEVICES ARE OPTIONAL, THEIR NEED SHALL BE DETERMINED BY DETOUR DESIGN AND/OR SCOPE OF CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE SCHEDULE OF CONSTRUCTION CONTROL DEVICES.
- VARIES BUFFER SPACE (SEE GENERAL NOTE 21 ON SHEET 1).
- REQUIRED WHEN WORK OCCUPIES THE LOCATION FOR MORE THAN 3 DAYS.
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.
- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.

- NOTES:**
- SIGN PLACEMENT SHOWN ON CASES 18 AND 19 TYPIFIES RURAL APPLICATIONS. URBAN APPLICATIONS REQUIRE THE SIGNS TO BE PLACED WITHIN ONE, OR PERHAPS TWO, BLOCKS.
 - TRUCK-MOUNTED ATTENUATORS (TMA) OPTIONAL FOR ALL CASES AS DETERMINED BY THE ENGINEER.

***KEY TO ADVANCE SIGNING DISTANCES**

ROAD TYPE	DISTANCE BETWEEN SIGNS		
	A	B	C
URBAN (<= 40 MPH)	100	100	100
URBAN (>= 45 MPH)	350	350	350
RURAL	500	500	500
EXPRESSWAY/FREEWAY	1000	1500	2640



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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions

Date:	Comments
07/26/13	CORRECTED SIGN CODE DESIGNATION FOR FLAGGER (SYMBOL) SIGN TO W20-7

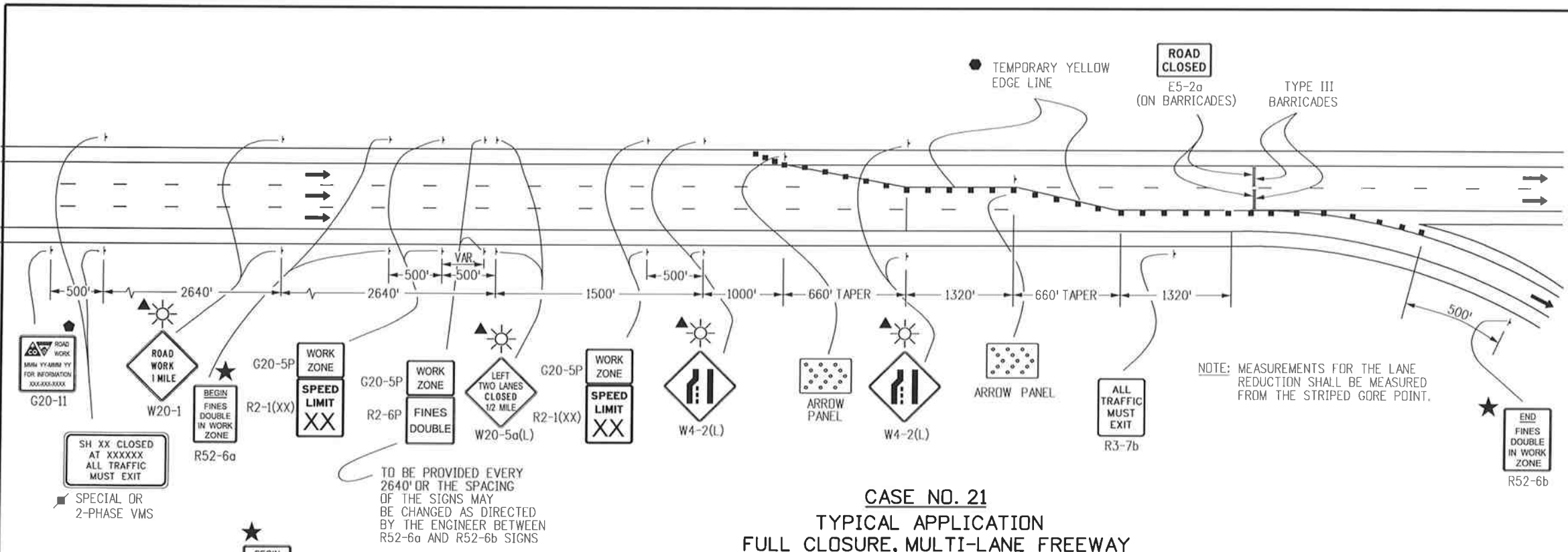
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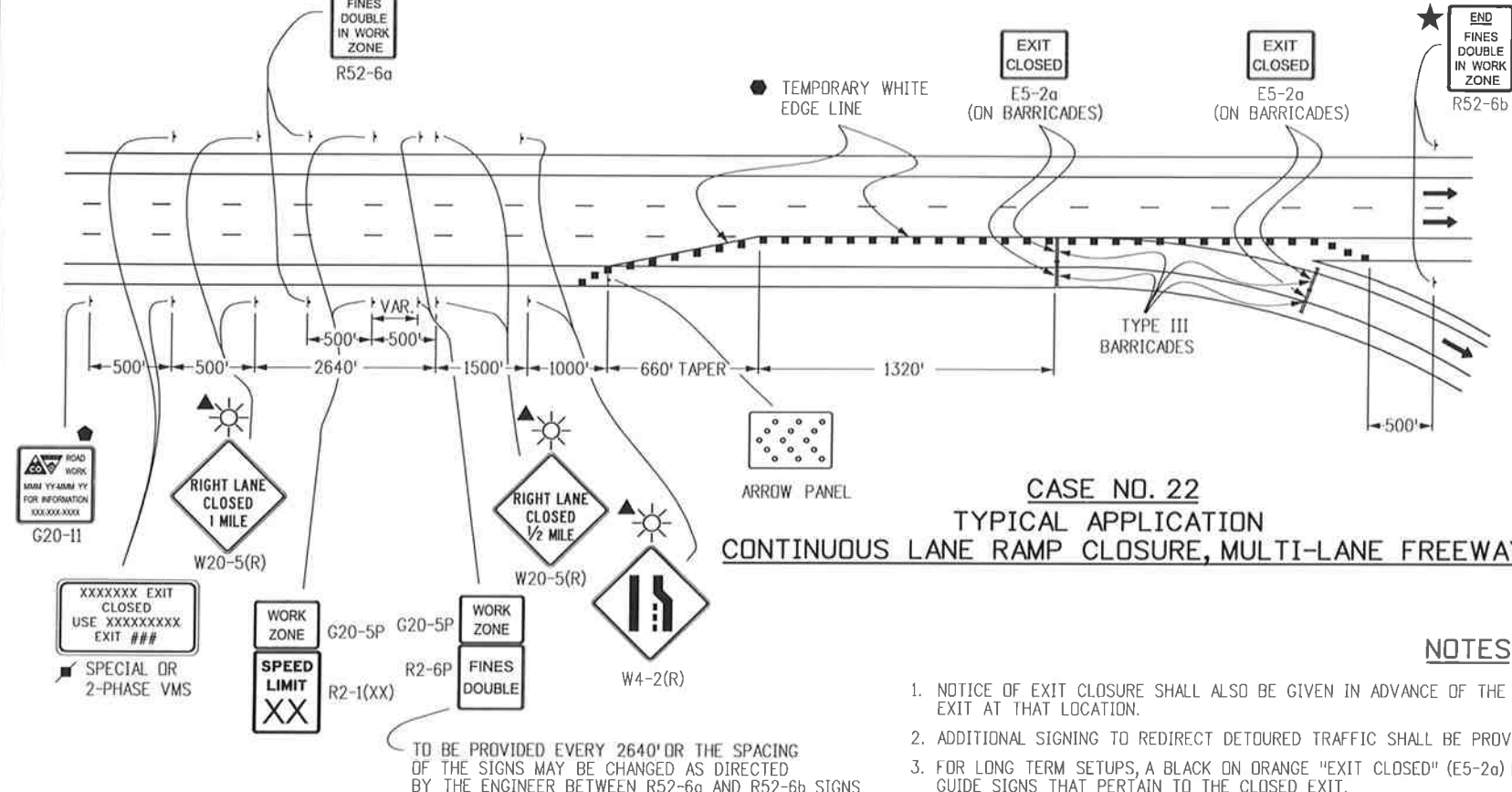
TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

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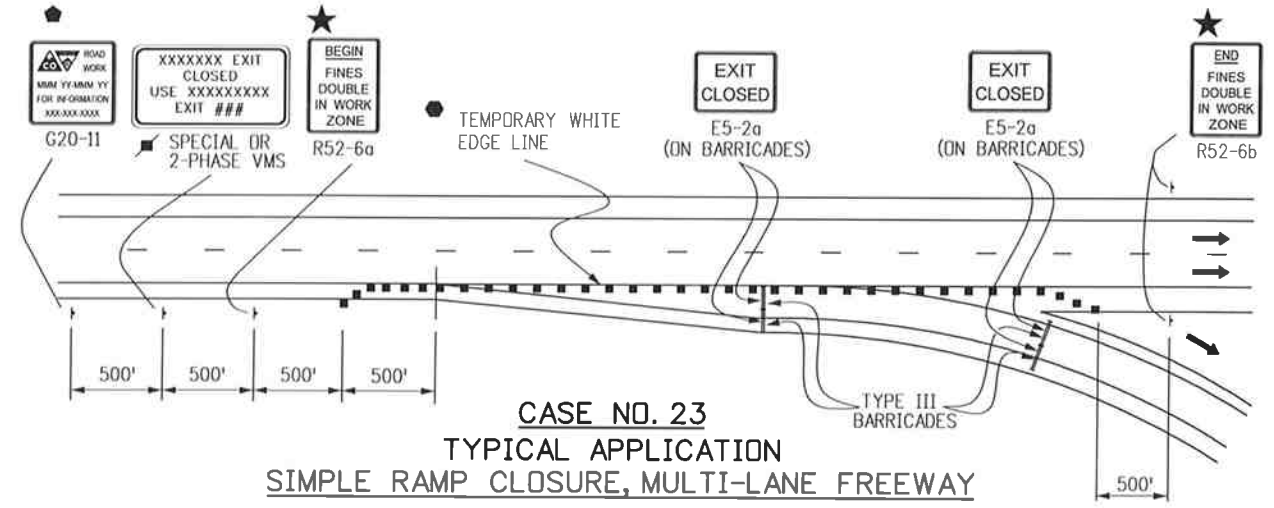
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CASE NO. 21
TYPICAL APPLICATION
FULL CLOSURE, MULTI-LANE FREEWAY



CASE NO. 22
TYPICAL APPLICATION
CONTINUOUS LANE RAMP CLOSURE, MULTI-LANE FREEWAY



CASE NO. 23
TYPICAL APPLICATION
SIMPLE RAMP CLOSURE, MULTI-LANE FREEWAY

NOTES

1. NOTICE OF EXIT CLOSURE SHALL ALSO BE GIVEN IN ADVANCE OF THE PREVIOUS EXIT TO PROVIDE MOTORISTS WITH THE OPTION TO EXIT AT THAT LOCATION.
2. ADDITIONAL SIGNING TO REDIRECT DETOURED TRAFFIC SHALL BE PROVIDED FOR IN THE PROJECT'S METHOD OF HANDLING TRAFFIC.
3. FOR LONG TERM SETUPS, A BLACK ON ORANGE "EXIT CLOSED" (E5-2a) PANEL SHALL BE MOUNTED DIAGONALLY ACROSS ALL EXISTING GUIDE SIGNS THAT PERTAIN TO THE CLOSED EXIT.

LEGEND

- ▣ ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL
- ▲ THESE DEVICES ARE OPTIONAL. THEIR NEED WILL BE DETERMINED BY THE DESIGNER BASED ON DETOUR DESIGN AND/OR SCOPE OF THE CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE PLANS.
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- ← DIRECTION OF TRAVEL
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 SPEED 40 MPH OR LESS: $L = \frac{WS^2}{60}$
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 W = WIDTH OF OFFSET
 SHOULDER TAPER = 1/3 L
- ▣ CLOSURE AND EXIT MESSAGES ON SIGN LEGEND(S) SHOULD BE MODIFIED TO FIT THE SITUATION.
- ☀ FLASHING BEACON
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

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Sheet Revisions

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(R-X)	

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TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

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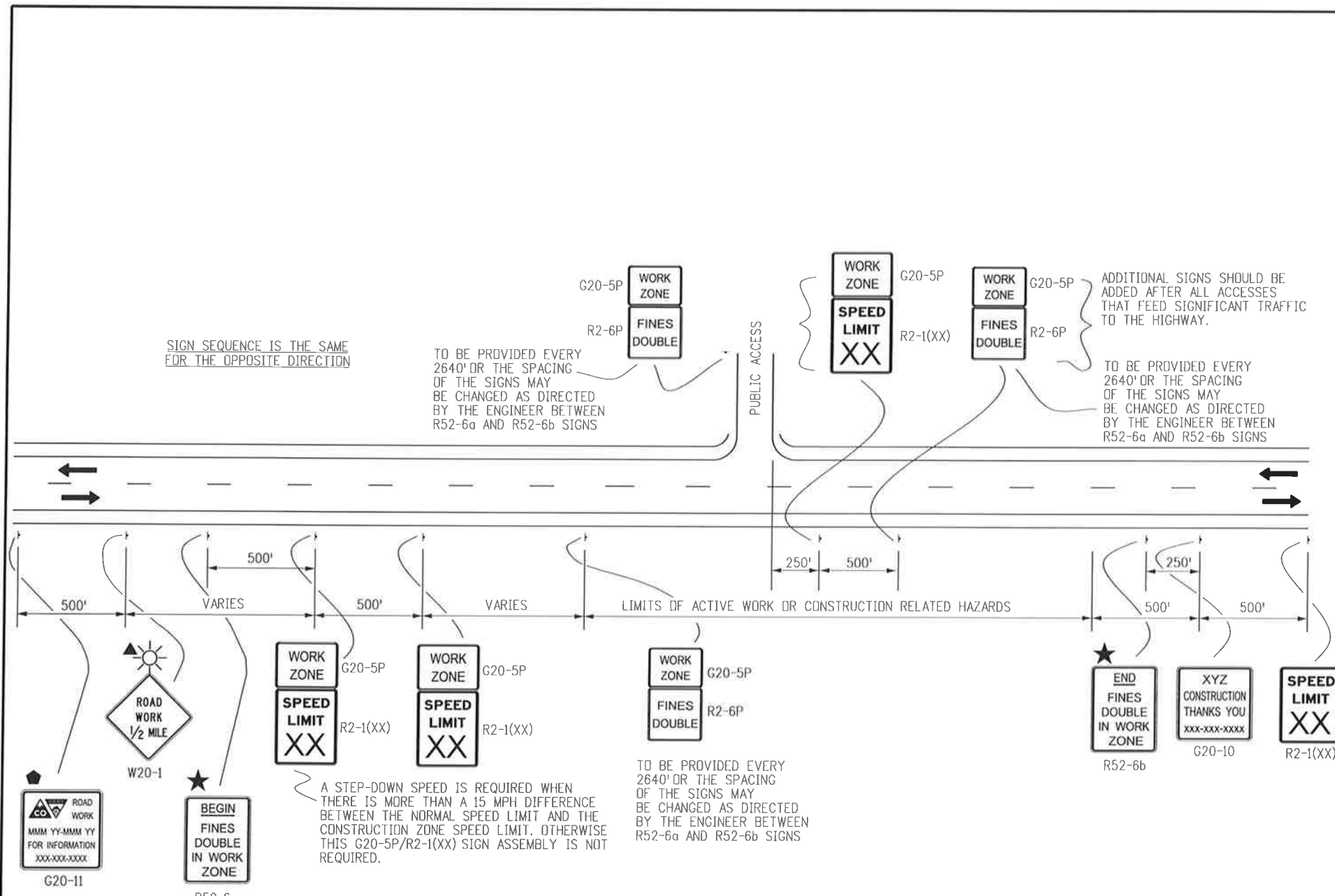
STANDARD PLAN NO.
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LEGEND

- ← DIRECTION OF TRAVEL
- ▲ THESE DEVICES ARE OPTIONAL. THEIR NEED WILL BE DETERMINED BY THE DESIGNER BASED ON DETOUR DESIGN AND/OR SCOPE OF THE CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE PLANS.
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- ☀ FLASHING BEACON
- ★ FINES DOUBLE SIGNING NOTES, SEE BELOW

FINES DOUBLE SIGNING NOTES:

1. SIGNS SHALL NOT BE PLACED SOONER THAN FOUR HOURS BEFORE WORK IS TO BEGIN AND SHALL BE REMOVED AS SOON AS WORK ACTIVITIES ARE CONCLUDED, UNLESS POTENTIAL HAZARDS INTRODUCED AS A RESULT OF THE WORK ARE STILL PRESENT AT THE END OF THE WORK DAY. IF SIGNS ARE LEFT IN PLACE AFTER WORK ACTIVITIES, THE TRAFFIC CONTROL SUPERVISOR SHALL MAKE AN ENTRY IN THEIR DAILY DIARY THAT JUSTIFIES THEIR USE.
- "HAZARDS" INCLUDE BUT ARE NOT LIMITED TO:
EDGE DROP OFFS
EQUIPMENT, WORKERS OR NON-SHIELDED OBJECTS IN THE CLEAR ZONE
ROUGH PAVEMENT
MAJOR CHANGE IN ALIGNMENT
REDUCED SHOULDER WIDTH
TEMPORARY GUARD RAIL OR BARRIER
LANE CLOSURE
2. SIGNS SHALL ONLY BE PLACED WHERE WORKERS ARE PRESENT IN THE ROADWAY OR CLEAR ZONE OR ARE AT RISK, OR WHERE THERE ARE HAZARDS IN THE TRAVELWAY, SHOULDERS OR CLEAR ZONE.
3. SIGNS SHOULD BE PLACED SO THAT MOTORISTS IMMEDIATELY ASSOCIATE THE SIGNS WITH PRESENT WORK ACTIVITIES. IF THE ZONE OF WORK ACTIVITY MOVES, THE SIGNS SHOULD BE MOVED ACCORDINGLY.
4. SIGNING SHOWN IS REQUIRED TO ENFORCE DOUBLE FINES IN A WORK ZONE. ADDITIONAL SIGNING SHALL BE IN ACCORDANCE WITH THAT NORMALLY REQUIRED FOR THE PARTICULAR WORK ZONE. PLACEMENT OF "FINES DOUBLE" SIGNING MAY BE ADJUSTED AS NEEDED TO PROVIDE A MINIMUM 250' SPACING BETWEEN OTHER SIGNING REQUIRED FOR THE SPECIFIC WORK ZONE SETUP.



SIGN SEQUENCE IS THE SAME FOR THE OPPOSITE DIRECTION

TO BE PROVIDED EVERY 2640' OR THE SPACING OF THE SIGNS MAY BE CHANGED AS DIRECTED BY THE ENGINEER BETWEEN R52-6a AND R52-6b SIGNS

ADDITIONAL SIGNS SHOULD BE ADDED AFTER ALL ACCESSES THAT FEED SIGNIFICANT TRAFFIC TO THE HIGHWAY.

TO BE PROVIDED EVERY 2640' OR THE SPACING OF THE SIGNS MAY BE CHANGED AS DIRECTED BY THE ENGINEER BETWEEN R52-6a AND R52-6b SIGNS

A STEP-DOWN SPEED IS REQUIRED WHEN THERE IS MORE THAN A 15 MPH DIFFERENCE BETWEEN THE NORMAL SPEED LIMIT AND THE CONSTRUCTION ZONE SPEED LIMIT. OTHERWISE THIS G20-5P/R2-1(XX) SIGN ASSEMBLY IS NOT REQUIRED.

TO BE PROVIDED EVERY 2640' OR THE SPACING OF THE SIGNS MAY BE CHANGED AS DIRECTED BY THE ENGINEER BETWEEN R52-6a AND R52-6b SIGNS

R52-6a SHALL BE PLACED NOT MORE THAN 500' BEFORE THE FIRST SPEED LIMIT SIGN ARRAY.

**CASE NO. 24
TYPICAL APPLICATION
"FINES DOUBLE IN WORK ZONE" SIGNING
(WITH SPEED REDUCTION)**

Computer File Information	
Creation Date: 07/04/12	Initials: RRR
Last Modification Date:	Initials:
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
Drawing File Name: S-630-01_12of20.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
(R-X)	
(R-X)	
(R-X)	
(R-X)	

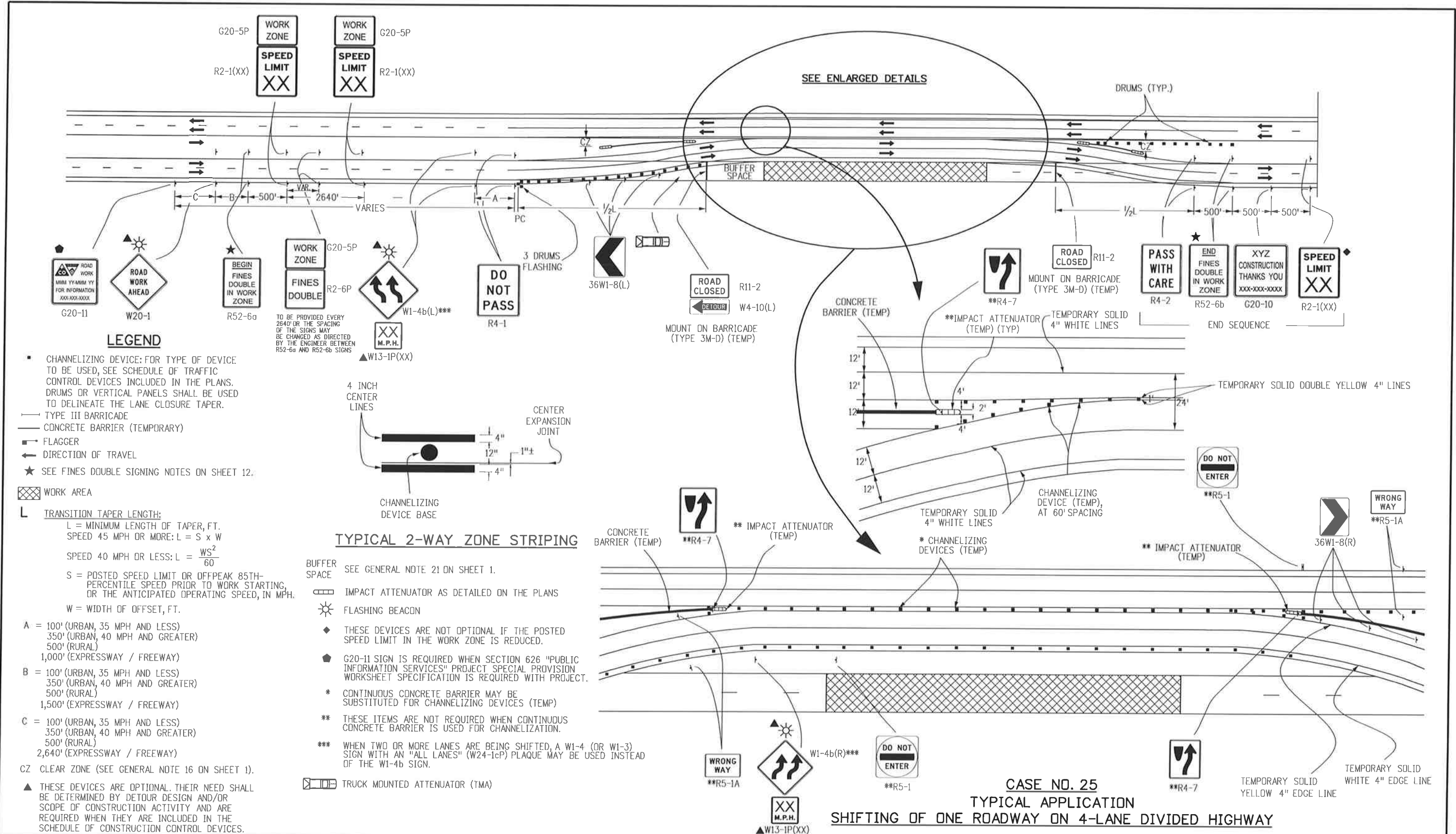
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**TRAFFIC CONTROLS
FOR HIGHWAY
CONSTRUCTION**

Issued By: Safety & Traffic Engineering Branch July 4, 2012

STANDARD PLAN NO.
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LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
- TYPE III BARRICADE
- CONCRETE BARRIER (TEMPORARY)
- FLAGGER
- ← DIRECTION OF TRAVEL
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

WORK AREA

L TRANSITION TAPER LENGTH:

L = MINIMUM LENGTH OF TAPER, FT.
 SPEED 45 MPH OR MORE: $L = S \times W$
 SPEED 40 MPH OR LESS: $L = \frac{WS^2}{60}$
 S = POSTED SPEED LIMIT OR OFFPEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED, IN MPH.
 W = WIDTH OF OFFSET, FT.

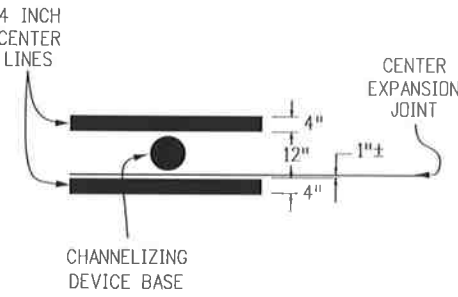
- A = 100' (URBAN, 35 MPH AND LESS)
 350' (URBAN, 40 MPH AND GREATER)
 500' (RURAL)
 1,000' (EXPRESSWAY / FREEWAY)
- B = 100' (URBAN, 35 MPH AND LESS)
 350' (URBAN, 40 MPH AND GREATER)
 500' (RURAL)
 1,500' (EXPRESSWAY / FREEWAY)
- C = 100' (URBAN, 35 MPH AND LESS)
 350' (URBAN, 40 MPH AND GREATER)
 500' (RURAL)
 2,640' (EXPRESSWAY / FREEWAY)

CZ CLEAR ZONE (SEE GENERAL NOTE 16 ON SHEET 1).

▲ THESE DEVICES ARE OPTIONAL. THEIR NEED SHALL BE DETERMINED BY DETOUR DESIGN AND/OR SCOPE OF CONSTRUCTION ACTIVITY AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE SCHEDULE OF CONSTRUCTION CONTROL DEVICES.

TYPICAL 2-WAY ZONE STRIPING

- BUFFER SPACE SEE GENERAL NOTE 21 ON SHEET 1.
- IMPACT ATTENUATOR AS DETAILED ON THE PLANS
- FLASHING BEACON
- ◆ THESE DEVICES ARE NOT OPTIONAL IF THE POSTED SPEED LIMIT IN THE WORK ZONE IS REDUCED.
- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- * CONTINUOUS CONCRETE BARRIER MAY BE SUBSTITUTED FOR CHANNELIZING DEVICES (TEMP)
- ** THESE ITEMS ARE NOT REQUIRED WHEN CONTINUOUS CONCRETE BARRIER IS USED FOR CHANNELIZATION.
- *** WHEN TWO OR MORE LANES ARE BEING SHIFTED, A W1-4 (OR W1-3) SIGN WITH AN "ALL LANES" (W24-1cP) PLAQUE MAY BE USED INSTEAD OF THE W1-4b SIGN.
- TRUCK MOUNTED ATTENUATOR (TMA)



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Sheet Revisions	
Date:	Comments
02/06/13	UPDATE TO 2009 MUTCD STANDARD

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TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

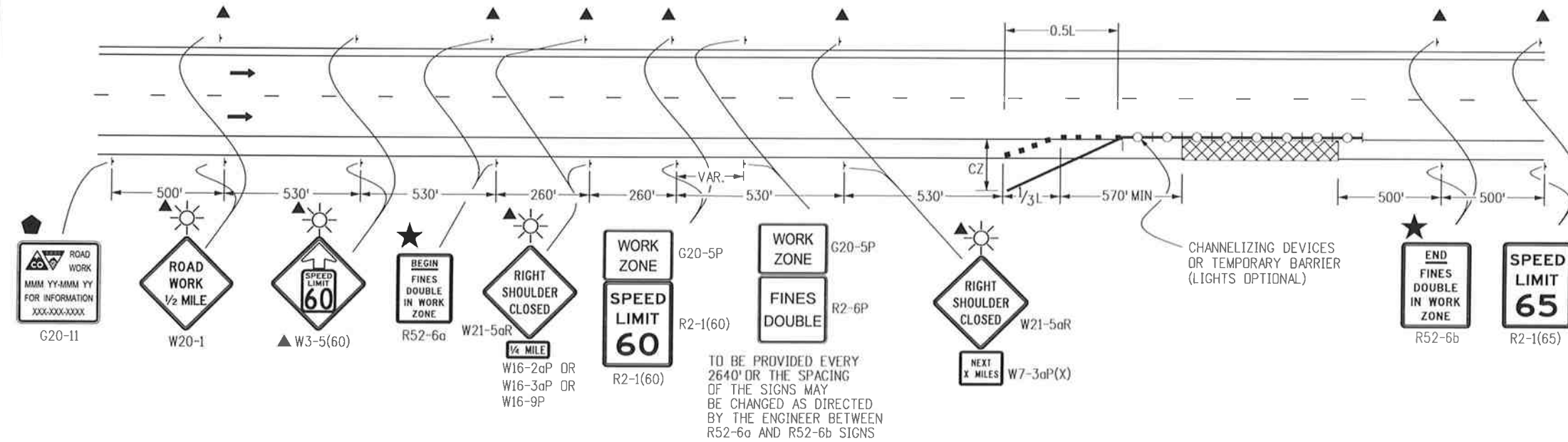
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STANDARD PLAN NO. S-630-1

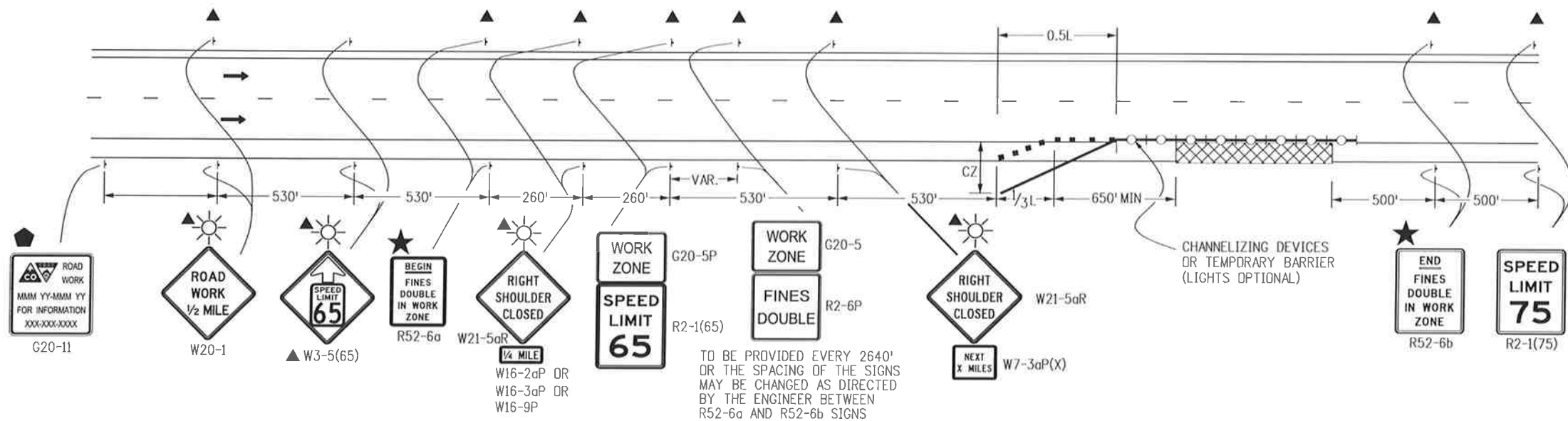
Sheet No. 13 of 20

LEGEND

- CHANNELIZING DEVICE; FOR TYPE OF DEVICE TO BE USED, SEE SCHEDULE OF TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. DRUMS OR VERTICAL PANELS SHALL BE USED TO DELINEATE THE LANE CLOSURE TAPER.
- TYPE III BARRICADE
- CONCRETE BARRIER (TEMPORARY)
- FLAGGER
- ← DIRECTION OF TRAVEL
- ▨ WORK AREA
- L TRANSITION TAPER LENGTH:
L = MINIMUM LENGTH OF TAPER
SPEED 45 MPH OR MORE: $L = S \times W$
S = NUMERICAL VALUE OF SPEED LIMIT OR 85 PERCENTILE SPEED
W = WIDTH OF OFFSET
SHOULDER TAPER = $1/3 L$
- ▤ ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL
- CZ CLEAR ZONE (SEE GENERAL NOTE 16 ON SHEET 1).
- ▲ THESE DEVICES ARE OPTIONAL. THEIR NEED SHALL BE DETERMINED BY TRAFFIC VOLUMES AND/OR SCOPE OF CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE SCHEDULE OF CONSTRUCTION CONTROL DEVICES.
- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- REQUIRED WHEN WORK OCCUPIES THE LOCATION FOR MORE THAN 3 DAYS.
- ▧ TRUCK MOUNTED ATTENUATOR
- ☀ FLASHING BEACON
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.



CASE NO. 26
TYPICAL APPLICATION
SHOULDER WORK - FREEWAY/EXPRESSWAY w/ 65 MPH SPEED LIMIT
 WHEN HAZARDS (WORKERS, EQUIPMENT, OR TEMPORARY BARRIER) ARE WITHIN 8 FT OF TRAVEL WAY



CASE NO. 27
TYPICAL APPLICATION
SHOULDER WORK - FREEWAY/EXPRESSWAY w/ 75 MPH SPEED LIMIT
 WHEN HAZARDS (WORKERS, EQUIPMENT, OR TEMPORARY BARRIER) ARE WITHIN 10 FT OF TRAVEL WAY

Computer File Information	
Creation Date: 07/04/12	Initials: RRR
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Drawing File Name: S-630-01_14of20.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

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Date:	Comments
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(R-X)	
(R-X)	
(R-X)	

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TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

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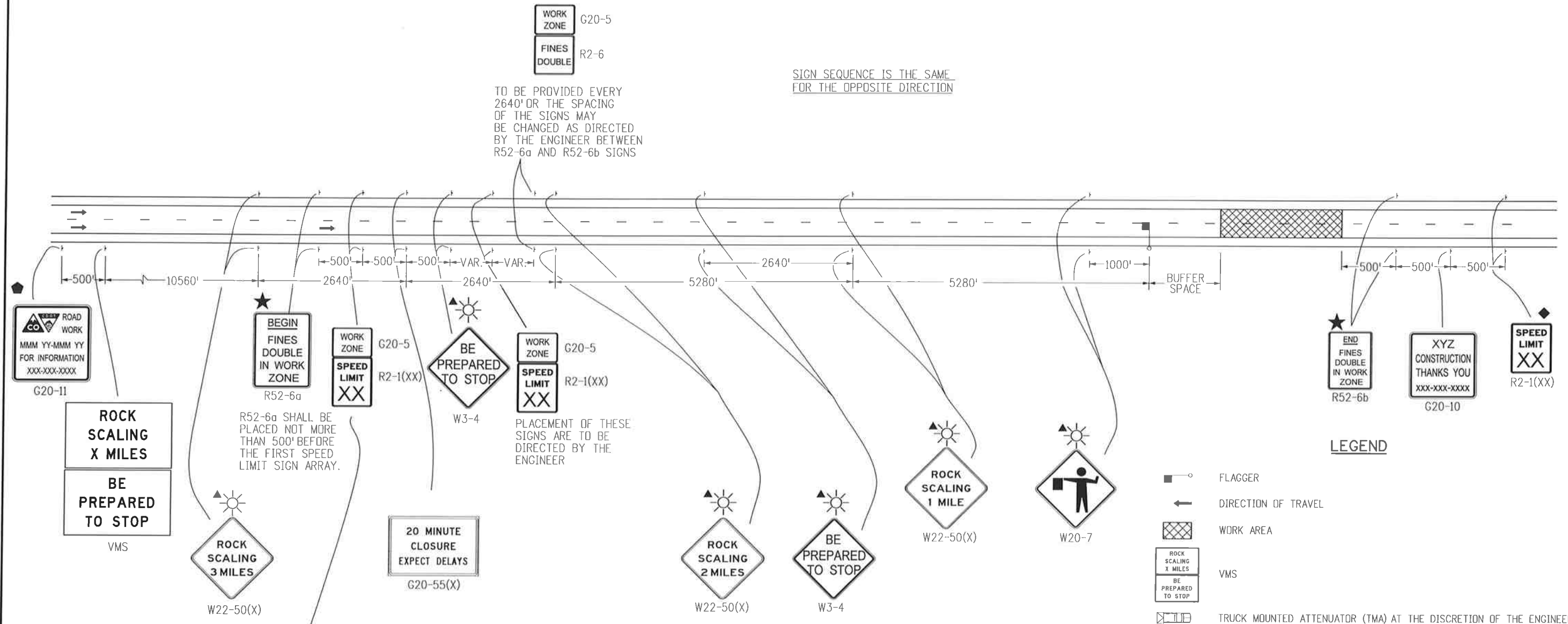
STANDARD PLAN NO.

S-630-1

Sheet No. 14 of 20

SIGN SEQUENCE IS THE SAME FOR THE OPPOSITE DIRECTION

TO BE PROVIDED EVERY 2640' OR THE SPACING OF THE SIGNS MAY BE CHANGED AS DIRECTED BY THE ENGINEER BETWEEN R52-6a AND R52-6b SIGNS



R52-6a SHALL BE PLACED NOT MORE THAN 500' BEFORE THE FIRST SPEED LIMIT SIGN ARRAY.

PLACEMENT OF THESE SIGNS ARE TO BE DIRECTED BY THE ENGINEER

A STEP-DOWN SPEED LIMIT IS REQUIRED WHEN THERE IS MORE THAN A 15 MPH DIFFERENCE BETWEEN THE NORMAL SPEED LIMIT AND THE CONSTRUCTION ZONE SPEED LIMIT. OTHERWISE THIS G20-5P/R2-1(XX) SIGN ASSEMBLY IS NOT REQUIRED.

CASE NO. 28
TYPICAL APPLICATION
ROCK SCALING - ROAD CLOSURE, 4-LANE DIVIDED HIGHWAY

- LEGEND**
- ◻ FLAGGER
 - ← DIRECTION OF TRAVEL
 - ▨ WORK AREA
 - ROCK SCALING X MILES
BE PREPARED TO STOP VMS
 - TRUCK MOUNTED ATTENUATOR (TMA) AT THE DISCRETION OF THE ENGINEER
 - ▲ THESE DEVICES ARE OPTIONAL. THEIR NEED SHALL BE DETERMINED BY DETOUR DESIGN AND/OR SCOPE OF CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE SCHEDULE OF CONSTRUCTION CONTROL DEVICES.
 - ◆ THESE DEVICES ARE NOT OPTIONAL IF THE POSTED SPEED LIMIT IN THE WORK ZONE IS REDUCED.
 - G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
 - BUFFER SPACE SEE GENERAL NOTE 21 ON SHEET 1.
 - ☀ FLASHING BEACON
 - ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.

Computer File Information	
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Last Modification Date: 07/26/13	Initials: KEN
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	
Drawing File Name: S-630-01_15of20.dgn	
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Sheet Revisions	
Date:	Comments
07/26/13	CORRECTED SIGN CODE DESIGNATION FOR FLAGGER (SYMBOL) SIGN TO W20-7

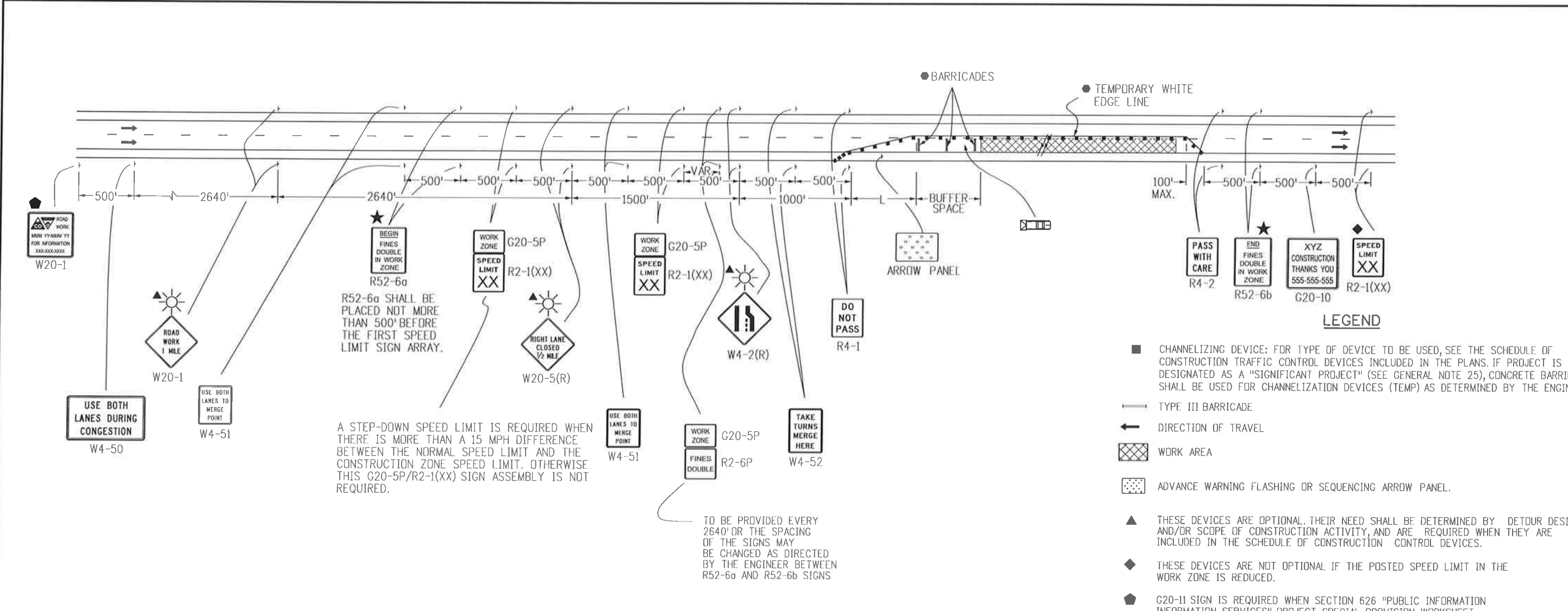
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TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

Issued By: Safety & Traffic Engineering Branch July 4, 2012

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R52-6a SHALL BE PLACED NOT MORE THAN 500' BEFORE THE FIRST SPEED LIMIT SIGN ARRAY.

A STEP-DOWN SPEED LIMIT IS REQUIRED WHEN THERE IS MORE THAN A 15 MPH DIFFERENCE BETWEEN THE NORMAL SPEED LIMIT AND THE CONSTRUCTION ZONE SPEED LIMIT. OTHERWISE THIS G20-5P/R2-1(XX) SIGN ASSEMBLY IS NOT REQUIRED.

TO BE PROVIDED EVERY 2640' OR THE SPACING OF THE SIGNS MAY BE CHANGED AS DIRECTED BY THE ENGINEER BETWEEN R52-6a AND R52-6b SIGNS

LEGEND

- CHANNELIZING DEVICE: FOR TYPE OF DEVICE TO BE USED, SEE THE SCHEDULE OF CONSTRUCTION TRAFFIC CONTROL DEVICES INCLUDED IN THE PLANS. IF PROJECT IS DESIGNATED AS A "SIGNIFICANT PROJECT" (SEE GENERAL NOTE 25), CONCRETE BARRIER SHALL BE USED FOR CHANNELIZATION DEVICES (TEMP) AS DETERMINED BY THE ENGINEER.
- TYPE III BARRICADE
- ← DIRECTION OF TRAVEL
- ▨ WORK AREA
- ▤ ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL.
- ▲ THESE DEVICES ARE OPTIONAL. THEIR NEED SHALL BE DETERMINED BY DETOUR DESIGN AND/OR SCOPE OF CONSTRUCTION ACTIVITY, AND ARE REQUIRED WHEN THEY ARE INCLUDED IN THE SCHEDULE OF CONSTRUCTION CONTROL DEVICES.
- ◆ THESE DEVICES ARE NOT OPTIONAL IF THE POSTED SPEED LIMIT IN THE WORK ZONE IS REDUCED.
- ◆ G20-11 SIGN IS REQUIRED WHEN SECTION 626 "PUBLIC INFORMATION INFORMATION SERVICES" PROJECT SPECIAL PROVISION WORKSHEET SPECIFICATION IS REQUIRED WITH PROJECT.
- ☀ FLASHING BEACON
- REQUIRED WHEN WORK OCCUPIES THE LOCATION FOR MORE THAN 3 DAYS.
- ★ SEE FINES DOUBLE SIGNING NOTES ON SHEET 12.
- ▤ TRUCK MOUNTED ATTENUATOR (TMA)
- L TRANSITION TAPER LENGTH:
 L = MINIMUM LENGTH OF TAPER
 SPEED 45 MPH OR MORE: $L = S \times W$
 SPEED 40 MPH OR LESS: $L = \frac{WS^2}{60}$
 S = NUMERICAL VALUE OF SPEED LIMIT OR 85 PERCENTILE SPEED
 W = WIDTH OF OFFSET
 SHOULDER TAPER = 1/3 L
- BUFFER SPACE SEE GENERAL NOTE 21 ON SHEET 1.

**CASE NO. 29
TYPICAL APPLICATION
LATE MERGING - ONE LANE CLOSED, 4-LANE DIVIDED HIGHWAY**

Computer File Information		Sheet Revisions		<p>Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219</p> <p>Safety & Traffic Engineering Branch KCM/KEN</p>	<p>TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION</p> <p>Issued By: Safety & Traffic Engineering Branch July 4, 2012</p>	<p>STANDARD PLAN NO.</p> <p>S-630-1</p> <p>Sheet No. 16 of 20</p>
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Last Modification Date:	Initials:					
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans						
Drawing File Name: S-630-01_16of20.dgn						
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English				

LEGEND

 VEHICLE WITH TRUCK-MOUNTED ATTENUATORS (TMA), TWO 360-DEGREE YELLOW FLASHING BEACONS, AND YELLOW FLASHING VEHICLE LIGHTS OR STROBES.

VMS VARIABLE MESSAGE SIGN (VMS).

▲ WHEN VMS IS USED, THE "SHOULDER CLOSED" SIGN BECOMES OPTIONAL.

■ THE "PICK-UP VEHICLES" OR "WARNING VEHICLE" MAY ENCRDACH INTO THE TRAFFIC LANE WHEN THE SHOULDER IS TOO NARROW TO DRIVE ON.

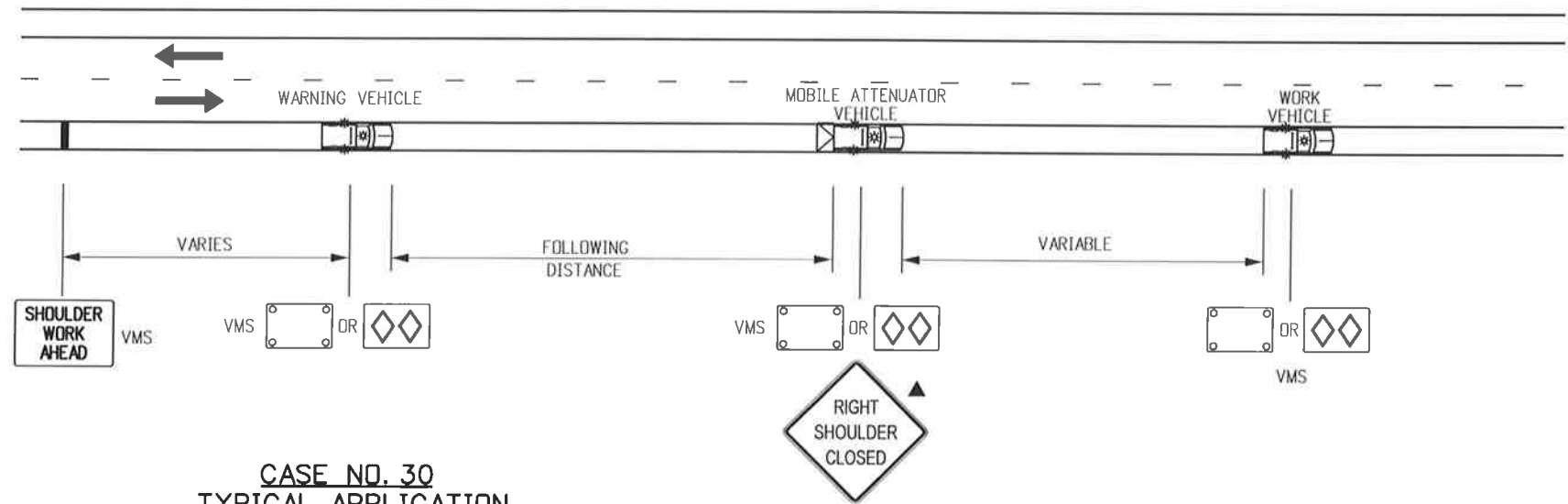
● IF TRACKING OF THE WET PAINT IS ANTICIPATED, THE USE OF CONES OR STATIONARY "WET PAINT" SIGNS SHALL BE POSTED.

● THE VARIABLE SEPARATION DISTANCE BETWEEN THE "CONE PLACEMENT VEHICLE" AND "CONE PICKUP VEHICLE" SHALL BE DETERMINED BY THE TRACK DRYING TIME OF THE PAVEMENT MARKING MATERIAL.

● OPTIONAL

FOLLOWING DISTANCE CHART FOR WARNING AND MOBILE ATTENUATOR (OR CONE PICKUP) VEHICLE

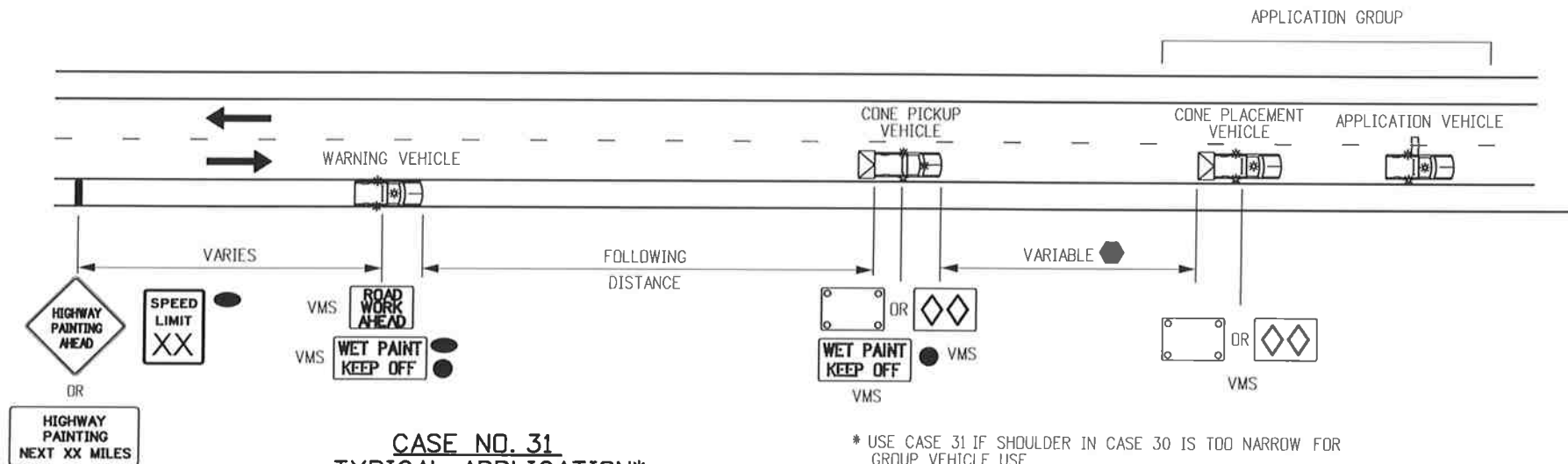
POSTED WZ SPEED LIMIT (MPH)	FOLLOWING DISTANCE (FEET)
0 - 30	250 - 550
35 - 40	325 - 700
45 - 50	600 - 900
55	750 - 1200
60 - 65	1000 - 1400
70 - 75	1200 - 1600



CASE NO. 30
TYPICAL APPLICATION
MOBILE WORK ZONE
MOBILE SHOULDER CLOSURE ON 2-LANE UNDIVIDED HIGHWAY

NOTE

THE VARIABLE SEPARATION DISTANCE BETWEEN THE "CONE PLACEMENT VEHICLE" AND "CONE PICKUP VEHICLE" SHALL BE DETERMINED BY THE TRACK DRYING TIME OF THE PAVEMENT MARKING MATERIAL.










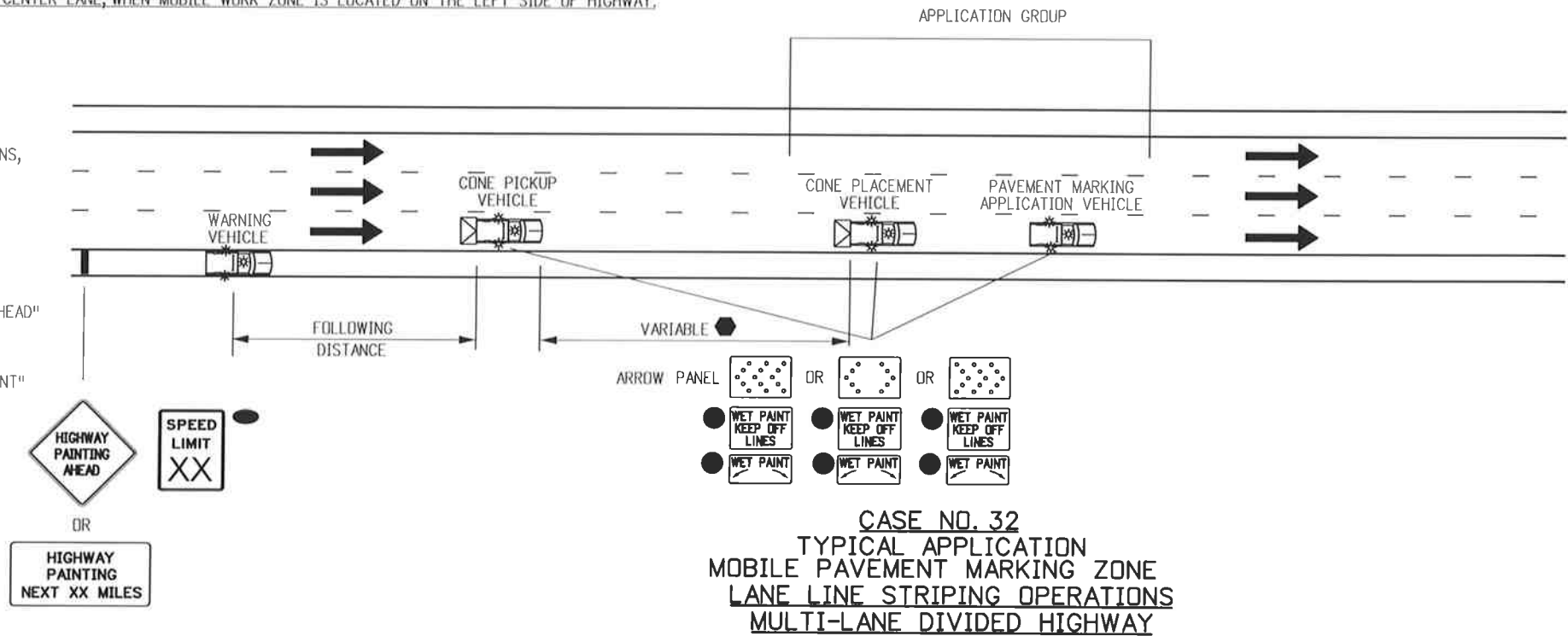
CASE NO. 31
TYPICAL APPLICATION*
MOBILE PAVEMENT MARKING ZONE
CENTERLINE STRIPING ON 2-LANE UNDIVIDED HIGHWAY

Computer File Information		Sheet Revisions		Colorado Department of Transportation  4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219 Safety & Traffic Engineering Branch KCM/KEN	TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION Issued By: Safety & Traffic Engineering Branch July 4, 2012	STANDARD PLAN NO.	
Creation Date: 07/04/12	Initials: KEN	Date: 3/27/14	Comments: REDUCED NUMBER OF TMA VEHICLES; REVISE VMS AND ADD STATIONARY SIGNS			S-630-1	
Last Modification Date: 03/27/14	Initials: KEN					Sheet No. 17 of 20	
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans							

EOR CASE #32, VEHICLE/SIGN SEQUENCE IS THE SAME FOR THE LEFT SIDE OF HIGHWAY, WHILE TAPER IS MIRRORED ABOUT THE CENTER LANE, WHEN MOBILE WORK ZONE IS LOCATED ON THE LEFT SIDE OF HIGHWAY.

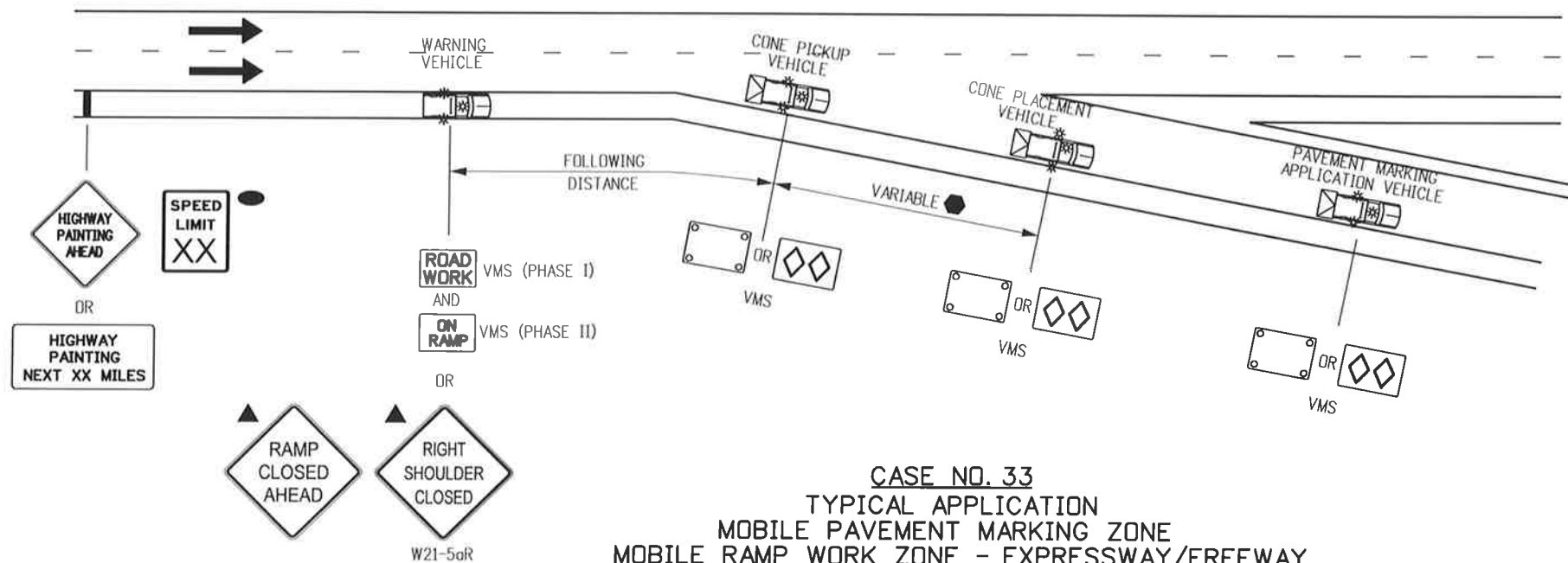
LEGEND

-  VEHICLE WITH TRUCK-MOUNTED ATTENUATORS (TMA), TWO 360-DEGREE YELLOW FLASHING BEACONS, AND YELLOW FLASHING VEHICLE LIGHTS OR STROBES.
-  ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL.
-  PORTABLE VARIABLE MESSAGE SIGN (VMS).
-  WHEN THE VMS IS USED, THE "SHOULDER CLOSED" (W21-5aX) OR W21-5bX), AND "RAMP CLOSED AHEAD" SIGNS BECOME OPTIONAL.
-  IF TRACKING OF THE WET PAINT IS ANTICIPATED, THE USE OF CONES OR STATIONARY "WET PAINT" SIGNS SHALL BE POSTED.
-  THE VARIABLE SEPARATION DISTANCE BETWEEN THE "CONE PLACEMENT VEHICLE" AND "CONE PICKUP VEHICLE" SHALL BE DETERMINED BY THE TRACK DRYING TIME OF THE PAVEMENT MARKING MATERIAL.
-  OPTIONAL



FOLLOWING DISTANCE CHART FOR WARNING VEHICLE AND CONE PICKUP VEHICLES

POSTED WZ SPEED LIMIT (MPH)	FOLLOWING DISTANCE (FEET)
0 - 30	250 - 550
35 - 40	325 - 700
45 - 50	600 - 900
55	750 - 1200
60 - 65	1000 - 1400
70 - 75	1200 - 1600








NOTES

1. THE SIGNING VEHICLES MAY ENCRDACH INTO THE TRAFFIC LANE WHEN THE SHOULDER IS TOO NARROW TO DRIVE ON.
2. IF THE RAMP CANNOT BE REOPENED WITHIN 15 MINUTES, USE CASE NO. 22 OF THE S-630-1 STANDARD PLAN.

Computer File Information		Sheet Revisions		 Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9219 Safety & Traffic Engineering Branch	TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION Issued By: Safety & Traffic Engineering Branch July 4, 2012	STANDARD PLAN NO.	
Creation Date: 07/04/12	Initials: KEN	Date:	Comments:			S-630-1	
Last Modification Date: 3/27/14	Initials: KEN	3/27/14	REDUCE NUMBER OF TMA VEHICLES, REVISE VMS, AND ADD STATIONARY SIGNS			Sheet No. 18 of 20	
Full Path: www.coloradodot.info/library/traffic/traffic-s-standard-plans	(R-5)						
Drawing File Name: S-630-1_18of20.dgn	(R-X)						
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English		KCM/KEN			

LEGEND

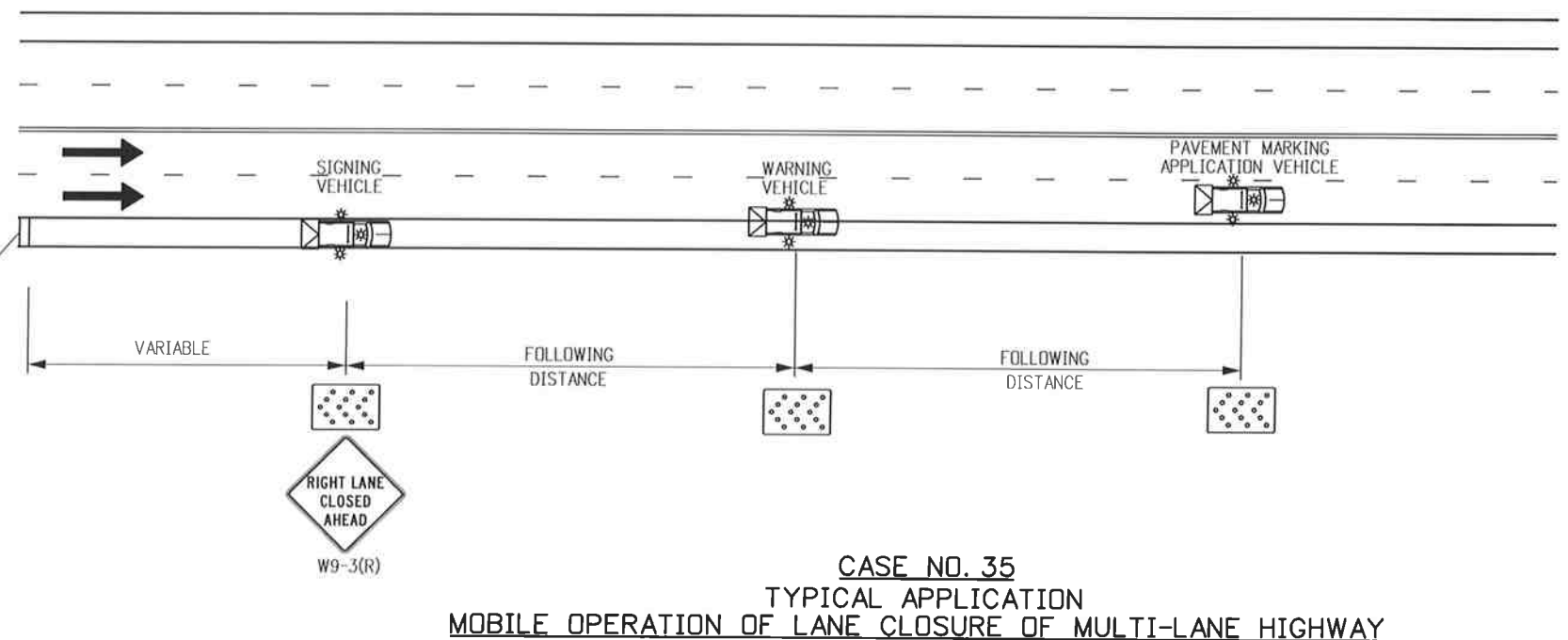
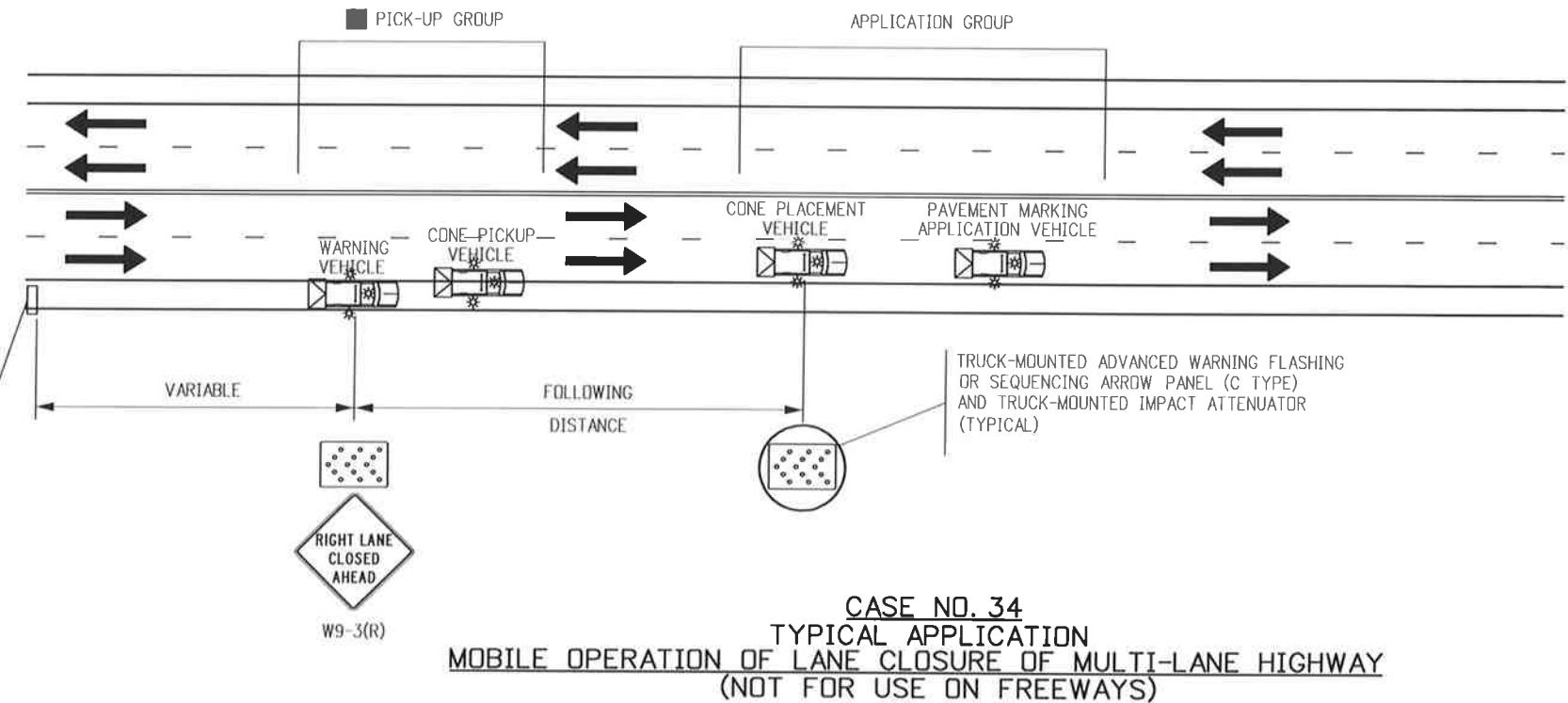
-  VEHICLE WITH TRUCK-MOUNTED ATTENUATORS (TMA), TWO 360-DEGREE YELLOW FLASHING BEACONS, AND YELLOW FLASHING VEHICLE LIGHTS OR STROBES.
-  ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL.
-  PORTABLE VARIABLE MESSAGE SIGN (VMS).
-  WHEN THE VMS IS USED, THE "RIGHT LANE CLOSED AHEAD" (W9-3X) SIGN BECOMES OPTIONAL.
-  THE "CONE PICK-UP VEHICLE" OR "WARNING VEHICLE" MAY ENCRDACH INTO THE TRAFFIC LANE WHEN THE SHOULDER IS TOO NARROW TO DRIVE ON.

NOTES

1. IN ROADWAY WHERE THE AADT IS 2,000 OR LESS, A SINGLE WORK VEHICLE WITH APPROPRIATE WARNING DEVICES ON THE VEHICLE MAY BE USED.
2. RADIO COMMUNICATIONS BETWEEN THE WORKCREW AND THE MOVING BLOCKADE ARE REQUIRED TO ADJUST THE BLOCKADE TO INCREASE OR DECREASE THE CLOSURE TIME. RELEASE TRAFFIC ONLY AFTER CONFIRMATION THAT ALL WORKERS AND THEIR VEHICLES ARE CLEAR OF THE ROADWAY.
3. IF APPLICABLE, ALL RAMP(S) AND ACCESS BETWEEN THE MOVING BLOCKADE AND WORK OPERATION AREA SHALL BE TEMPORARILY CLOSED USING TRAFFIC CONTROL EQUIPMENT AND PERSONNEL. EACH RAMP MUST REMAIN CLOSED UNTIL THE CREW DOING THE WORK GIVES THE "ALL CLEAR" SIGNAL OR UNTIL THE FRONT OF THE MOVING BLOCKADE PASSES THE CLOSED RAMP(S).

FOLLOWING DISTANCE CHART FOR WARNING VEHICLE AND SIGNING VEHICLES

POSTED WZ SPEED LIMIT (MPH)	FOLLOWING DISTANCE (FEET)
0 - 30	250 - 550
35 - 40	325 - 700
45 - 50	600 - 900
55	750 - 1200
60 - 65	1000 - 1400
70 - 75	1200 - 1600



Computer File Information

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Sheet Revisions

Date:	Comments

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Safety & Traffic Engineering Branch **KCM/KEN**

TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

Issued By: Safety & Traffic Engineering Branch July 4, 2012

STANDARD PLAN NO.
S-630-1
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TYPICAL CONSTRUCTION ZONE SIGNS

THESE SIGNING NOTES ARE INTENDED AS A QUICK REFERENCE FOR TYPICAL SIGN USE AND PLACEMENT IN CONSTRUCTION ZONES.

- G20-1 "ROAD/WORK/NEXT XX MILES" - THIS SIGN SHALL BE ERECTED AT THE LIMITS OF ANY ROAD CONSTRUCTION OR MAINTENANCE PROJECT OF MORE THAN TWO (2) MILES IN LENGTH WHERE TRAFFIC IS MAINTAINED THROUGH THE PROJECT.
- G20-4 "PILOT CAR/FOLLOW ME" - THIS SIGN SHALL BE MOUNTED IN A CONSPICUOUS POSITION ON THE REAR OF A VEHICLE USED FOR GUIDING ONE-WAY TRAFFIC THROUGH OR AROUND THE PROJECT.
- G20-5P "WORK ZONE" - THIS PLAQUE SHALL BE MOUNTED JUST ABOVE THE WORK ZONE SPEED LIMIT SIGNS PRIOR TO THE WORK ZONE AREA.
- G20-10 THANK YOU SIGN - THIS SIGN SHOULD BE ERECTED APPROXIMATELY 500 FEET BEYOND THE END OF THE PROJECT.
- G20-11 CONSTRUCTION PROJECT INFORMATION SIGN - THIS SIGN SHOULD BE ERECTED AS DESCRIBED IN THE SECTION 626 STANDARD SPECIFICATION.
- G20-55(X) "X MINUTE CLOSURE, EXPECT DELAYS" - THIS SIGN IS INTENDED FOR USE 500 FEET PAST THE "WORK ZONE"/SPEED LIMIT SIGN.
- M4-9() "DETOUR/XXXX" - THIS SIGN IS USED FOR UNNUMBERED ROUTES; FOR USE IN EMERGENCY SITUATIONS; FOR PERIODS OF SHORT DURATION; OR WHERE, OVER RELATIVELY SHORT DISTANCES, IT IS NOT NECESSARY TO SHOW ROUTE MARKERS TO GUIDE TRAFFIC ALONG THE DETOUR AND BACK TO ITS AUTHORIZED ROUTE.
- M4-10() "DETOUR ARROW" - THIS SIGN SHOULD BE MOUNTED JUST BELOW THE ROAD CLOSED SIGN AT THE POINT WHERE THE DETOUR ROADWAY OR ROUTE HAS BEEN ESTABLISHED DUE TO THE CLOSURE OF THE STREET OR HIGHWAY TO THROUGH TRAFFIC.
- R2-1() "SPEED/LIMIT/XX" - THESE SIGNS ARE INTENDED TO REDUCE TRAFFIC SPEED IN ADVANCE OF THE DAILY WORK AREA WITHIN THE OVERALL PROJECT LIMITS.
- R2-1(XX) "SPEED/LIMIT/XX" - THIS SIGN IS INTENDED FOR USE 500 FEET PAST THE "THANK YOU" SIGN TO BRING TRAFFIC BACK TO ORIGINAL POSTED SPEED.
- R2-6P "FINES DOUBLE" - THIS SIGN IS INTENDED FOR USE WITHIN WORK ZONES TO PROVIDE NOTICE OF INCREASED FINES FOR TRAFFIC VIOLATIONS WITHIN WORK ZONES.
- R4-1 "DO NOT PASS" - THIS SIGN SHOULD BE PLACED AT TRANSITION TAPER POINT.
- R4-2 "PASS WITH CARE" - THIS SIGN SHOULD BE PLACED AT TRANSITION TAPER POINT.
- R11-2 "ROAD/CLOSED" - THIS SIGN IS TO BE MOUNTED ON THE BARRICADE THAT IS PLACED BEFORE THE WORK ZONE ENTRANCE TO PROHIBIT TRAFFIC FROM ENTERING THE WORK ZONE.
- R11-3 "ROAD CLOSED/X MILES AHEAD/L.T.O." - THIS SIGN SHOULD BE PLACED WHERE THROUGH TRAFFIC MUST DETOUR TO AVOID THE CLOSURE OF THE ROAD SOME DISTANCE BEYOND, BUT WHERE THE ROAD IS OPEN TO LOCAL TRAFFIC UP TO THE POINT OF CLOSURE.
- R11-4 "ROAD CLOSED/TO/THRU TRAFFIC" FOR URBAN USE - THIS SIGN SHOULD BE PLACED WHERE THROUGH TRAFFIC MUST DETOUR TO AVOID THE CLOSURE OF THE ROAD SOME DISTANCE BEYOND, BUT WHERE THE ROAD IS OPEN TO LOCAL TRAFFIC UP TO THE POINT OF CLOSURE.
- R52-6a "BEGIN FINES DOUBLE IN WORK ZONE" SIGN IS PLACED AT THE BEGINNING OF THE ADVANCED WARNING AREA OF THE TRAFFIC CONTROL ZONE.
- R52-6b "END FINES DOUBLE IN WORK ZONE" SIGN IS PLACED AFTER WORK ZONE AREA, PAST DOWNSTREAM TAPER SECTION.
- W1-1() "TURN ARROW" - THIS SIGN IS INTENDED FOR USE WHERE ENGINEERING INVESTIGATIONS OF ROADWAY CONDITIONS SHOW THE RECOMMENDED SPEED ON THE TURN TO BE 30 MPH OR LESS. *
- W1-2() "CURVE ARROW" - THIS SIGN IS INTENDED FOR USE WHERE ENGINEERING INVESTIGATIONS OF ROADWAY CONDITIONS SHOW THE RECOMMENDED SPEED ON THE CURVE TO BE IN THE RANGE BETWEEN 30 AND 60 MILES PER HOUR. *
- W1-3() "REVERSE TURN ARROW" - THIS SIGN IS INTENDED FOR USE WHERE TWO TURNS OR THE CURVE AND A TURN IN OPPOSITE DIRECTIONS ARE SEPARATED BY A TANGENT OF LESS THAN 600 FEET. *
- W1-4() "REVERSE CURVE ARROW" - THIS SIGN IS INTENDED FOR USE WHERE TWO CURVES IN OPPOSITE DIRECTIONS ARE SEPARATED BY A TANGENT OF LESS THAN 600 FEET. *
- W1-6() "ARROW" - THIS SIGN SHOULD BE MOUNTED JUST BELOW THE ROAD CLOSED SIGN AT THE POINT WHERE THE DIVERSION HAS BEEN ESTABLISHED DUE TO THE LANE CLOSURE.
- W3-2 "YIELD AHEAD" - THIS SIGN IS INTENDED FOR USE AT THE APPROACH TO THE YIELD SIGN THAT IS NOT VISIBLE FOR A SUFFICIENT DISTANCE TO PERMIT THE DRIVER TO BRING HIS VEHICLE TO A STOP AT THE YIELD SIGN. *
- W3-4 "BE PREPARED TO STOP" - THIS SIGN TO BE PLACED 1.5 MILES IN ADVANCED OF A FLAGGER.
- W4-2(X) "LEFT (RIGHT) LANE TRANSITION SYMBOL" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF THE REDUCTION IN THE NUMBER OF TRAFFIC LANES IN THE DIRECTION OF TRAVEL ON THE MULTILANE HIGHWAY. *
- W4-50 "USE BOTH LANES DURING CONGESTION" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF THE "ROAD WORK X MILE" ADVANCED WARNING SIGN.
- W4-51 "USE BOTH LANES TO MERGE POINT" - THIS SIGN IS INTENDED TO DIRECT MOTORISTS TO USE BOTH TRAVEL LANES UNTIL THE LANES ARE REDUCED TO ONE LANE.
- W4-52 "TAKE TURNS MERGE HERE" - THIS SIGN IS INTENDED TO WARN MOTORISTS IN ADVANCED TO MOVE FROM THE CLOSED TRAVEL LANE TO THE OPEN TRAVEL LANE, USUALLY 500 FEET IN ADVANCED OF THE START OF THE TRANSITION TAPER.
- W5-1 "ROAD NARROWS" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF THE TRANSITION ON THE ROAD WHERE THE PAVEMENT WIDTH IS REDUCED ABRUPTLY TO A WIDTH SUCH THAT TWO CARS CANNOT PASS WITHOUT REDUCING SPEED. *

- W5-2a "NARROW BRIDGE SYMBOL" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF A BRIDGE OR CULVERT HAVING A CLEAR TWO-WAY ROADWAY WIDTH OF 16 TO 18 FEET OR ANY BRIDGE OR CULVERT HAVING A ROADWAY CLEARANCE LESS THAN THE WIDTH OF THE APPROACH PAVEMENT. *
- W5-3 "ONE LANE/BRIDGE" - THIS SIGN SHOULD BE PLACED ON TWO-WAY ROADWAYS IN ADVANCE OF THE BRIDGES OR CULVERTS WHERE THE ROADWAY WIDTH IS LESS THAN 16 FEET (18 FEET FOR COMMERCIAL VEHICLES) OR WHEN THE ALIGNMENT IS POOR ON THE APPROACH TO THE STRUCTURE HAVING A CLEAR ROADWAY WIDTH OF 18 FEET OR LESS. *
- W6-1 "DIVIDED HIGHWAY SYMBOL" - THIS SIGN SHOULD BE PLACED ON THE APPROACHES TO THE SECTION OF HIGHWAY WHERE OPPOSING FLOWS OF TRAFFIC ARE SEPARATED BY A PHYSICAL MEDIAN.
- W6-2 "DIVIDED HIGHWAY ENDS SYMBOL" - THIS SIGN SHOULD BE PLACED AT THE END OF THE SECTION OF PHYSICALLY DIVIDED HIGHWAY AS A WARNING OF TWO-WAY TRAFFIC AHEAD.
- W6-3 "TWO-WAY TRAFFIC SYMBOL" - THIS SIGN IS INTENDED FOR USE TO GIVE WARNING OF TRANSITION FROM A SEPARATED ONE-WAY ROADWAY TO A TWO-WAY ROADWAY. *
- W7-1 "HILL SYMBOL" - THIS SIGN SHOULD BE PLACED AT A POINT IN ADVANCE OF THE DOWNGRADE WHERE THE LENGTH, PERCENT OF GRADE, HORIZONTAL CURVATURE, OR OTHER PHYSICAL FEATURES REQUIRE SPECIAL CONSIDERATION ON THE PART OF DRIVERS. *
- W8-1, W8-2 "BUMP"/"DIP" - THESE SIGNS ARE INTENDED FOR USE TO GIVE WARNING OF A SHARP RISE OR DEPRESSION IN THE PROFILE OF THE ROAD THAT IS SUFFICIENTLY ABRUPT TO AFFECT VEHICLE OPERATION OR CAUSE CONSIDERABLE DISCOMFORT TO PASSENGERS. *
- W8-3a "PAVEMENT ENDS SYMBOL" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF A POINT WHERE THE PAVEMENT SURFACE CHANGES FROM A HARD-SURFACED PAVEMENT TO THE LOW-TYPE SURFACE OR EARTH ROAD. *
- W8-4 "SOFT SHOULDER" - THIS SIGN IS INTENDED FOR USE TO WARN OF A SOFT SHOULDER CONDITION THAT COULD PRESENT A PROBLEM TO VEHICLES THAT MAY GET OFF THE PAVEMENT. *
- W8-5 "SLIPPERY WHEN WET SYMBOL" - THIS SIGN SHOULD BE PLACED IN ADVANCE OF THE CONDITION WHERE THE HIGHWAY SURFACE IS SLIPPERY BEYOND WHAT IS ORDINARY WHEN WET. *
- W8-9a "SHOULDER DROP-OFF" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF A SHOULDER DROP-OFF THAT EXCEEDS THREE INCHES IN HEIGHT. *
- W8-11 "UNEVEN LANES" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF AN UNEVEN ADJACENT LANE SITUATION THAT EXCEEDS ONE INCH IN HEIGHT. *
- W9-1() "LEFT (RIGHT) LANE ENDS" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF THE PAVEMENT WIDTH TRANSITION SIGN (W4-2).
- W9-2() "LANE ENDS/MERGE LEFT (RIGHT)" - THIS SIGN IS INTENDED FOR USE AS A SUPPLEMENT TO THE PAVEMENT WIDTH TRANSITION SIGN (W4-2).
- W9-3 OR W9-3a() "CENTER LANE CLOSED AHEAD" - THIS SIGN SHOULD BE USED IN ADVANCE OF THE POINT WHERE WORK OCCUPIES THE CENTER LANE AND TRAFFIC IS DIRECTED TO THE RIGHT OR LEFT OF THE WORK ZONE. *
- W12-1 "DOUBLE ARROW SYMBOL" - THIS SIGN SHOULD BE PLACED AT THE POINT OF THE OBSTRUCTION IN THE ROADWAY, WHERE TRAFFIC IS PERMITTED TO PASS ON EITHER SIDE OF THE OBSTRUCTION.
- W12-2 "LOW CLEARANCE SYMBOL" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF AN OBSTRUCTION TO WARN VEHICLE OPERATORS OF CLEARANCES LESS THAN THE MAXIMUM VEHICLE HEIGHT PERMITTED PLUS 12 INCHES. *
- W13-1P() "ADVISORY SPEED PLAQUE" - THIS PLAQUE IS INTENDED TO SUPPLEMENT WARNING SIGNS ONLY AND SHALL NOT BE MOUNTED ALONE. IT IS USED TO INDICATE THE MAXIMUM RECOMMENDED SPEED FOR THE INDICATED CONDITION.
- W13-3 "ADVISORY RAMP SPEED" - THIS SIGN IS TO BE POSTED TO INFORM MOTORISTS WHAT THE SUGGESTED SPEED LIMIT IS ON A RAMP.
- W20-1 "ROAD/WORK/AHEAD" - THIS SIGN IS TO BE LOCATED IN ADVANCE OF THE INITIAL ACTIVITY OR DETOUR A DRIVER MAY ENCOUNTER, AND IS INTENDED TO BE USED AS A WARNING OF OBSTRUCTIONS OR RESTRICTIONS.
- W20-2 "DETOUR/(DIST.)" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF THE POINT AT WHICH TRAFFIC IS DIVERTED OVER A TEMPORARY ROADWAY OR ROUTE.
- W20-3 "ROAD/CLOSED/(DIST.)" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF A POINT AT WHICH A ROADWAY IS CLOSED TO ALL TRAFFIC OR TO ALL BUT LOCAL TRAFFIC.
- W20-4 "ONE LANE/ROAD/(DIST.)" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF A POINT WHERE TRAFFIC IN BOTH DIRECTIONS MUST USE A SINGLE LANE.
- W20-5() "XXX LANE/CLOSED/(DIST.)" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF A POINT WHERE ONE LANE OF A MULTIPLE-LANE ROADWAY IS CLOSED. IT SHOULD BE PROVIDED WITH INTERCHANGEABLE PLAQUES READING "RIGHT", "LEFT", AND "CENTER" AT NO ADDITIONAL COST TO THE PROJECT.
- W20-7 "FLAGGER SYMBOL" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF ANY POINT AT WHICH A FLAGGER HAS BEEN STATIONED TO CONTROL TRAFFIC THROUGH OR AROUND THE PROJECT. *
- W20-52 "GROOVED/PAVEMENT/AHEAD" - THIS SIGN IS INTENDED TO BE USED IN ADVANCE OF A ROADWAY THAT HAS BEEN GROOVED AND/OR ROTO MILLED.
- W21-1a "WORKER SYMBOL" - THIS SIGN IS INTENDED FOR USE IN CONJUNCTION WITH MINOR MAINTENANCE AND PUBLIC UTILITY OPERATIONS FOR THE PROTECTION OF MEN WORKING IN OR NEAR THE ROADWAY.

- W21-2 "FRESH/OIL" - THIS SIGN IS INTENDED FOR USE WHERE RE-SURFACING OPERATIONS HAVE RENDERED THE SURFACE OF THE PAVEMENT TEMPORARILY WET, AND OBJECTIONABLE SPLASHING ON VEHICLES MAY OCCUR. *
- W21-3 "ROAD/MACHINERY/AHEAD" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF THE AREAS WHERE HEAVY EQUIPMENT IS OPERATING IN OR ADJACENT TO THE ROADWAY. *
- W21-4 "ROAD/WORK/(DIST.)" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF MAINTENANCE FOR MINOR RECONSTRUCTION OPERATIONS IN THE ROADWAY.
- W21-5 "SHOULDER/WORK" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF THE PROJECT INVOLVING THE SHOULDER, WHERE THE TRAVELED WAY REMAINS UNOBSTRUCTED.
- W21-6 "SURVEY/CREW" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF A POINT WHERE A SURVEYING CREW IS WORKING IN OR ADJACENT TO THE ROADWAY. *
- W22-1 "BLASTING/ZONE/(DIST.)" - THIS SIGN IS INTENDED FOR USE IN ADVANCE OF ANY POINT OR WORK SITE WHERE THERE ARE EXPLOSIVES BEING USED. THE W22-2 AND W22-3 SIGNS MUST BE USED IN SEQUENCE WITH THIS SIGN.
- W22-2 "TURN OFF/2-WAY RADIOS/AND/CELLULAR/PHONES" - THIS SIGN IS TO BE USED IN SEQUENCE WITH THE W22-1 AND W22-3 SIGNS AND PLACED AT LEAST 1000 FEET FROM THE BEGINNING OF THE BLASTING ZONE.
- W22-3 "END/BLASTING/ZONE" - THIS SIGN IS TO BE USED TO DENOTE THE END OF THE RADIO INFLUENCE AREA AND SHALL BE PLACED A MINIMUM OF 1000 FEET FROM THE BLASTING ZONE, EITHER WITH OR PRECEDING THE END CONSTRUCTION SIGN.
- W22-50(X) "ROCK SCALING X MILE(S)" - THIS SIGN IS INTENDED TO BE USED IN ADVANCE OF A FLAGGER IN ADVANCED OF THE WORK ZONE AREA.

ADVANCE PLACEMENT OF WARNING SIGNS

POSTED OR 85TH PERCENTILE SPEED	ADVANCE PLACEMENT DISTANCE (FEET)								
	CONDITION A	CONDITION B: DECLARATION TO THE LISTED ADVISORY SPEED (MPH) FOR THE CONDITION							
		MPH							
	+	0	10	20	30	40	50	60	70
20	225	●	●	--	--	--	--	--	--
25	325	●	●	●	--	--	--	--	--
30	450	●	●	●	●	--	--	--	--
35	550	●	●	●	●	--	--	--	--
40	650	125	●	●	●	--	--	--	--
45	750	175	125	●	●	●	--	--	--
50	850	250	200	150	100	●	--	--	--
55	950	325	275	225	175	100	●	--	--
60	1100	400	350	300	250	175	●	--	--
65	1200	475	425	400	350	275	175	●	--
70	1250	550	525	500	425	350	250	150	--
75	1350	650	625	600	525	450	350	250	100

+ CONDITION A: SPEED REDUCTION AND LANE CHANGING IN HEAVY TRAFFIC. TYPICAL SIGNS ARE "MERGE" AND "RIGHT LANE ENDS".

++ CONDITION B: TYPICAL CONDITIONS ARE THE WARNING OF A POTENTIAL STOP SITUATION AND LOCATIONS WHERE THE ROAD USER MUST DECREASE SPEED TO MANEUVER THROUGH THE WARNED CONDITION. TYPICAL SIGNS ARE "STOP AHEAD", "SIGNAL AHEAD", "YIELD AHEAD", "CURVE", "REVERSE CURVE", "TURN".

● NO SUGGESTED DISTANCES ARE PROVIDED AT THESE SPEEDS, AS THE PLACEMENT IS DEPENDENT ON SITE CONDITIONS AND OTHER SIGNING.

A SUPPLEMENTAL PLAQUE MAY BE USED WITH WARNING SIGNS SPECIFYING THE DISTANCE TO THE CONDITION IF THERE IS AN IN-BETWEEN INTERSECTION THAT MIGHT CONFUSE THE MOTORIST.

* PLACEMENT SHOULD BE IN ACCORDANCE WITH WARNING SIGN PLACEMENT TABLE.

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Safety & Traffic Engineering Branch **KCM/KEN**

TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION

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STANDARD PLAN NO.

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