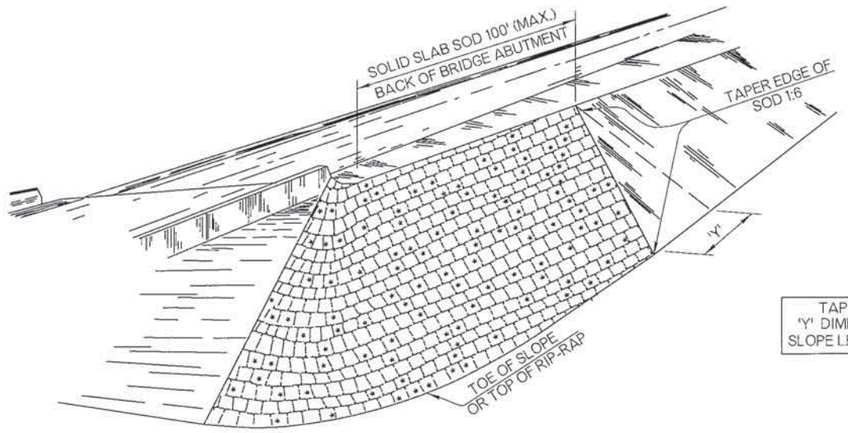
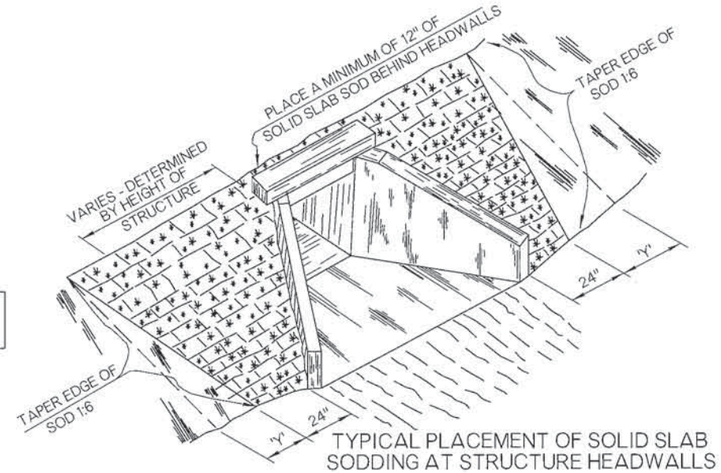
OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE

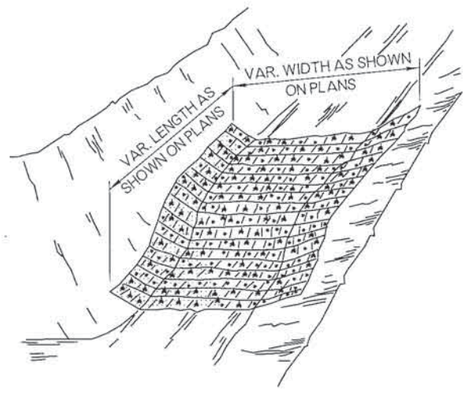


TYPICAL PLACEMENT OF SOLID SLAB SODDING
ON FILL SLOPES, APPROACHES TO OVERPASSES AND BRIDGES.

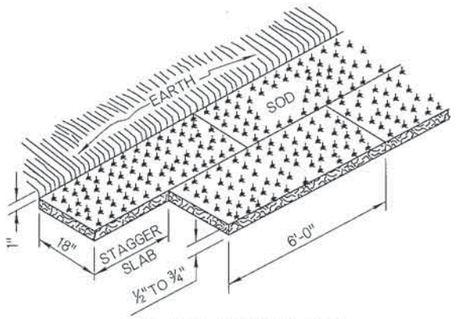
TAPER NOTE
'Y' DIMENSION =
SLOPE LENGTH x 0.17



TYPICAL PLACEMENT OF SOLID SLAB
SODDING AT STRUCTURE HEADWALLS



TYPICAL PLACEMENT OF
SOLID SLAB SODDING IN DITCHES



SOLID SLAB SODDING
(MARCH 1 THRU AUGUST 31)

THE PLACEMENT OF SOLID SLAB SOD SHALL BE RESTRICTED TO THE PERIOD FROM MARCH 1 THRU AUGUST 31, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. SOLID SLAB SOD SHALL BE PLACED IN HORIZONTAL ROWS WITH THE LONGEST SIDE OF EACH SLAB RUNNING PARALLEL TO THE ROADWAY, AND THE SLABS IN ALTERNATE ROWS STAGGERED HALF THE LENGTH OF EACH INDIVIDUAL SLAB. ENSURE THE ROWS RUN PARALLEL TO THE ROADWAY.
3. SLABS SHALL BE CUT AND HARVESTED WITH A COMMERCIAL SOD CUTTER TO THE DIMENSIONS SHOWN, THEN LOADED, TRANSPORTED AND HANDLED ON PALLETS.
4. AFTER PLACEMENT OF SOLID SLAB SOD, EARTH AT THE OUTER EDGES OF THE PLACEMENT SHALL BE BACKFILLED AND LOOSELY COMPACTED TO AT LEAST 1" ABOVE THE TOP OF THE SOLID SLAB SODDING.
5. STAKE SOD ON ALL SLOPES 1:2 OR STEEPER, AND ON ANY AREAS THAT ARE IN SUCH CONDITION THAT THERE IS DANGER OF SOD SLIPPING. PERFORM STAKING CONCURRENTLY WITH SOD PLACEMENT AND PRIOR TO TAMPING WITH SOUND WOODEN STAKES APPROXIMATELY 1 INCH SQUARE OR 1 INCH IN DIAMETER AND NOT LESS THAN 12 INCHES IN LENGTH, OR USE METAL STAPLES IN PLACE OF WOODEN STAKES. PLACE, STAKE AND STAPLE THE SOD WHERE NECESSARY, AND AS DETERMINED BY THE ENGINEER.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
230(A)	SOLID SLAB SODDING	SY

APPROVED BY
ROADWAY ENGINEER: _____ DATE: 04/16/15

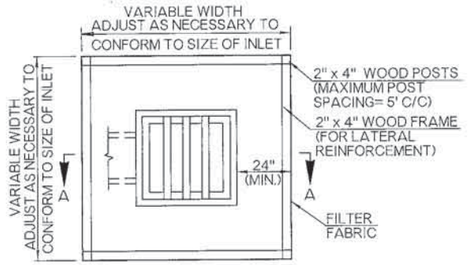
ROADWAY DESIGN DIVISION STANDARD

SOLID SLAB SODDING

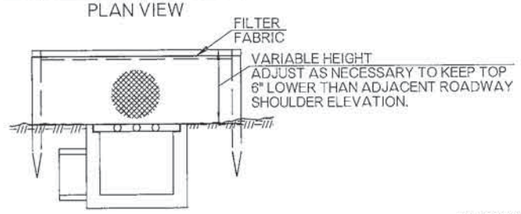
OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

SSS-1	1
	R-3

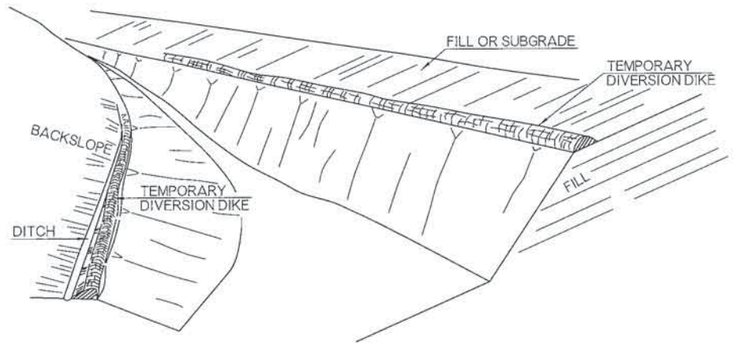
OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE



PLAN VIEW



SECTION A - A
SEDIMENT FILTER



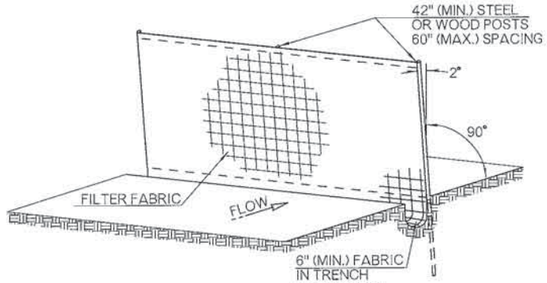
DIVERSION DIKES

TEMPORARY SEDIMENT FILTER

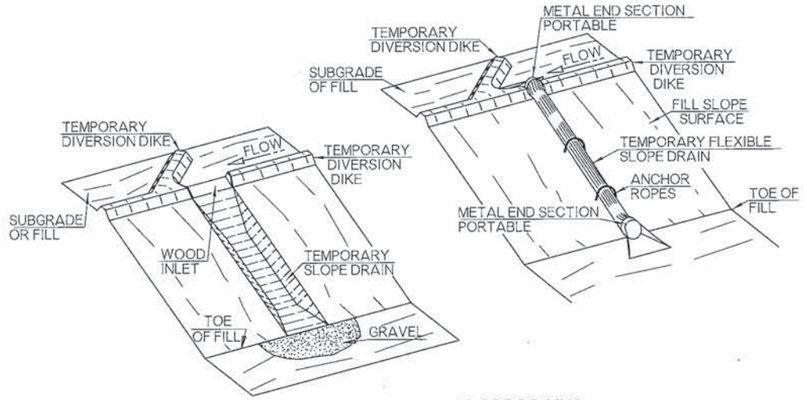
SYMBOLOGY

SYMBOL TO BE USED TO DENOTE DEVICE ON PLANS

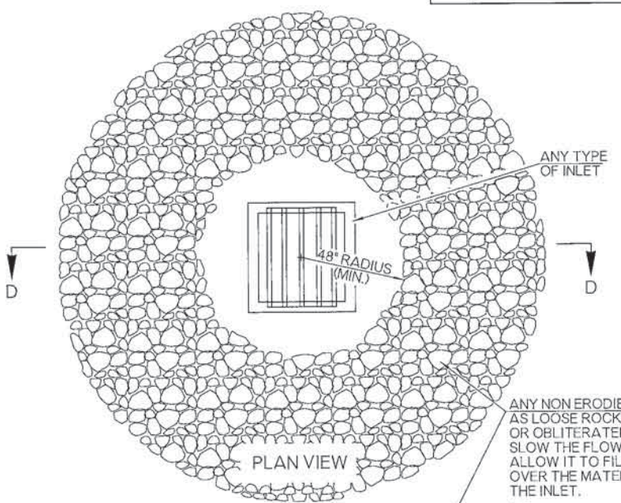
TSF
#



TEMPORARY SILT FENCE
RECOMMENDED TOE-IN METHOD



SLOPE DRAINS



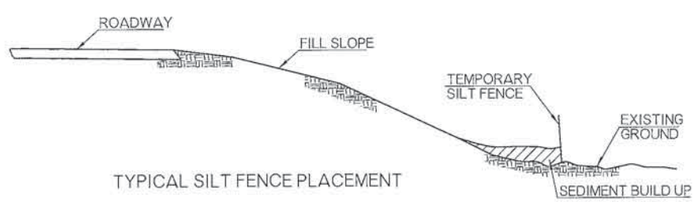
SECTION D-D

SEDIMENT FILTER
(TYPE II)

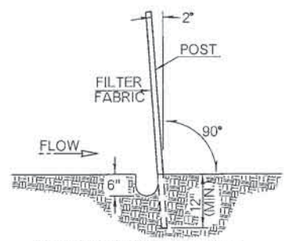
TEMPORARY SILT FENCE

SYMBOLOGY

SYMBOL TO BE USED TO DENOTE DEVICE ON PLANS



TYPICAL SILT FENCE PLACEMENT



TEMPORARY SILT FENCE
SECTION

TEMPORARY SLOPE DRAIN

SYMBOLOGY

SYMBOL TO BE USED TO DENOTE DEVICE ON PLANS

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. COST OF TEMPORARY DIVERSION DIKES TO BE INCLUDED IN PRICE BID FOR OTHER ITEMS OF WORK.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
221 (A)	TEMPORARY SLOPE DRAINS	LF
221 (C)	TEMPORARY SILT FENCE	LF
221 (D)	TEMPORARY SEDIMENT FILTER	EA

APPROVED BY
ROADWAY ENGINEER: Caleb F. H DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

TEMPORARY SEDIMENT CONTROLS

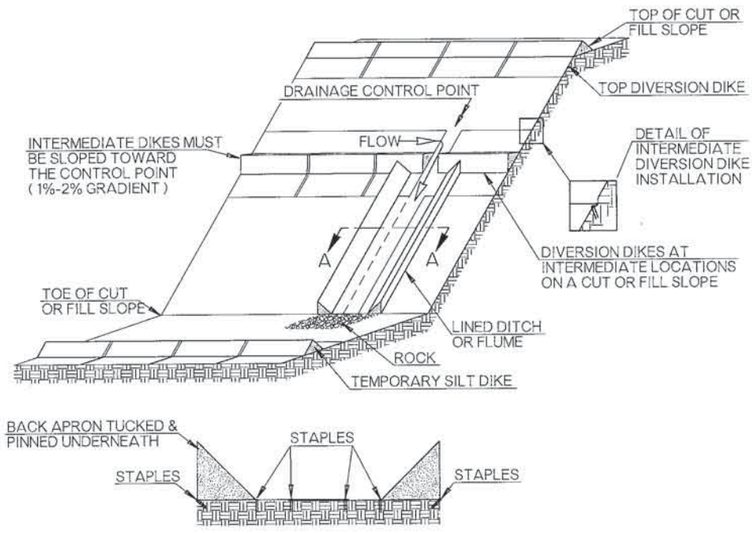
OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

TSC2-3 | 2

R-5

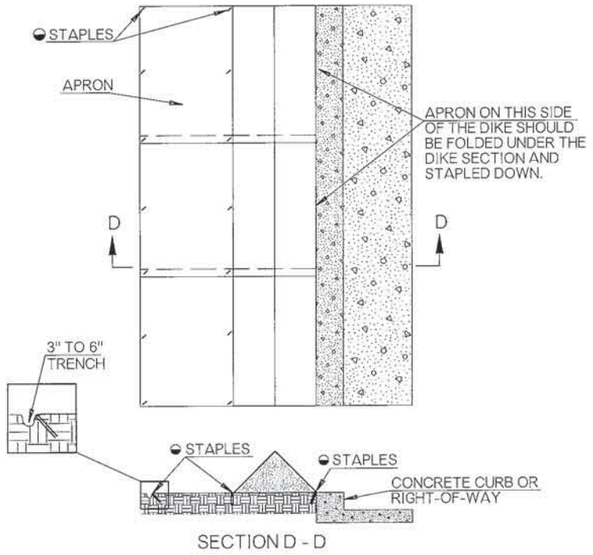
OKLAHOMA DEPARTMENT OF TRANSPORTATION
STANDARD REVISIONS

DESCRIPTION	DATE



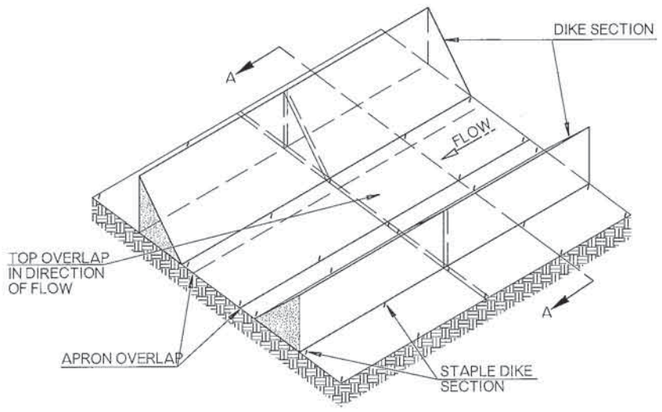
TEMPORARY DITCH LINER
SECTION A - A

TEMPORARY SILT DIKE INSTALLATION FOR DIVERSION DIKES AND / OR DITCH LINER

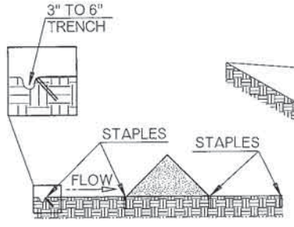


SECTION D - D

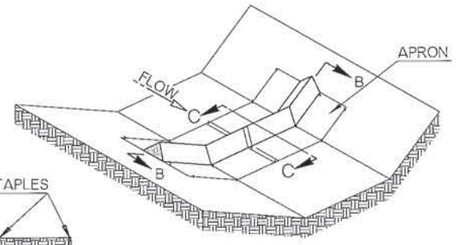
TEMPORARY SILT DIKE INSTALLATION FOR CONTINUOUS BARRIER



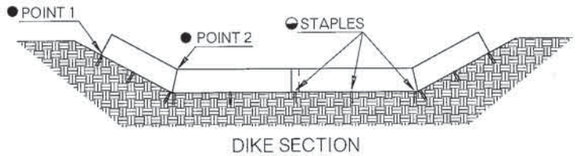
TEMPORARY SILT DIKE INSTALLATION FOR TEMPORARY DITCH LINER



SECTION C - C



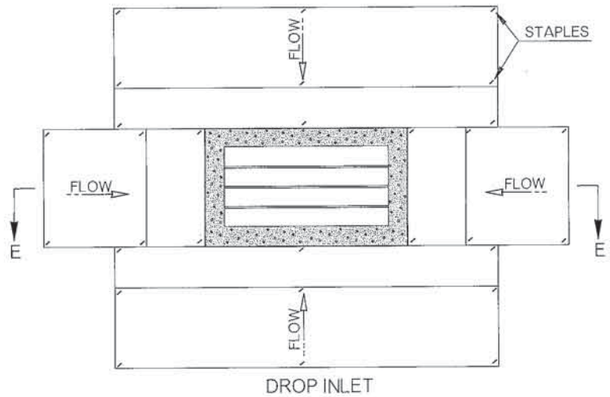
SILT DIKE UNIT
ISOMETRIC / CUT SECTION



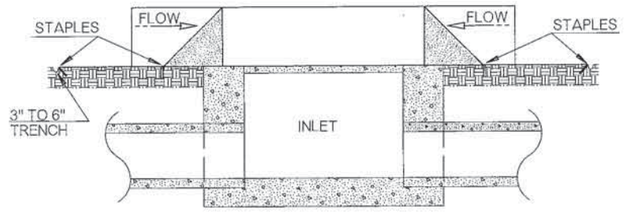
DIKE SECTION
SECTION B - B

TEMPORARY SILT DIKE INSTALLATION FOR ROADWAY DITCH OR DRAINAGE DITCH

- POINT "1" MUST BE HIGHER THAN POINT "2" TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS.
- STAPLES SHALL BE PLACED WHERE THE UNITS OVERLAP AND IN THE CENTER OF THE UNIT AS SHOWN ON THE DIAGRAM.



DROP INLET



SECTION E - E

TEMPORARY SILT DIKE INSTALLATION FOR DROP INLETS

SYMBOLOGY
SYMBOL TO BE USED TO DENOTE DEVICE ON PLANS

NOTE: SILT DIKE SHOULD ONLY BE USED FOR DROP INLETS IN SUMP LOCATIONS. FOR DROP INLETS ON GRADE, USE SEDIMENT TRAPS OR OTHER CONTROLS.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. THIS WORK SHALL CONSIST OF FURNISHING, INSTALLING, AND MAINTAINING THE TEMPORARY SILT DIKE. THE DIKES SHALL BE USED AS A CONTINUOUS LINE BARRIER AT THE TOE OF SLOPE OR ACROSS THE ROADWAY DITCH TO CONTAIN SEDIMENT AND MINIMIZE EROSION, OR AS DIRECTED BY THE ENGINEER. THESE DIKES SHALL BE INSTALLED AND LOCATED AS SOON AS CONSTRUCTION WILL ALLOW OR AS DIRECTED BY THE ENGINEER.
3. TEMPORARY SILT DIKE SHALL BE TRIANGULAR SHAPED HAVING A HEIGHT OF AT LEAST 8" TO 10" IN THE CENTER WITH EQUAL SIDES AND A 16" TO 20" BASE. THE TRIANGULAR SHAPED INNER MATERIAL SHALL BE URETHANE FOAM MEETING THE REQUIREMENTS FOR ASTM D3574. THE OUTER COVER SHALL BE A WOVEN GEOTEXTILE FABRIC PLACED AROUND THE INNER MATERIAL & ALLOWED TO EXTEND BEYOND BOTH SIDES OF THE TRIANGLE 24" TO 36". THIS FABRIC SHOULD BE MILDEW RESISTANT, ROT-PROOF AND RESISTANT TO HEAT AND ULTRAVIOLET RADIATION MEETING REQUIREMENTS FOR SEDIMENT CONTROL IN AASHTO M 288. THE DIKES SHALL BE ATTACHED TO THE GROUND WITH WIRE STAPLES. THE STAPLES SHALL BE NO. 11 GAUGE WIRE AND BE AT LEAST 6" TO 8" LONG. STAPLES SHALL BE PLACED AS SHOWN ON THESE DETAILS.
4. ACCEPTED TEMPORARY SILT DIKE, MEASURED AS PROVIDED ABOVE, WILL BE PAID FOR AT THE CONTRACT UNIT PRICE BID FOR TEMPORARY SILT DIKE. PRICE BID WILL INCLUDE THE COST OF FURNISHING THE DIKES, INSTALLING, MAINTAINING AND REMOVAL WHEN DIRECTED BY THE ENGINEER.

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
221 (F)	TEMPORARY SILT DIKE	LF

NOTE: SILT DIKES ARE ONLY FURNISHED IN 7' INCREMENTS.

APPROVED BY ROADWAY ENGINEER: Caleb F. H DATE 04/16/15

ROADWAY DESIGN DIVISION STANDARD

ODOT

TEMPORARY SILT DIKE

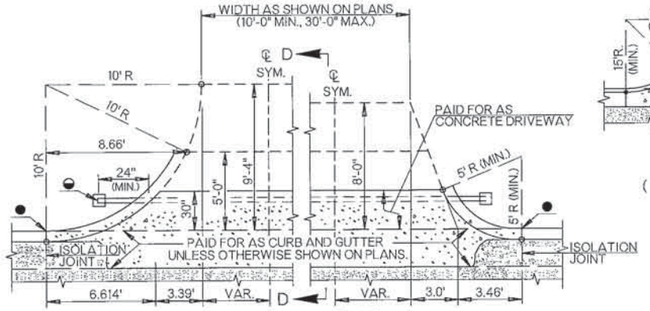
OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

TSD-2	0

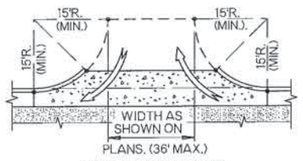
R-6

OKLAHOMA DEPARTMENT OF TRANSPORTATION

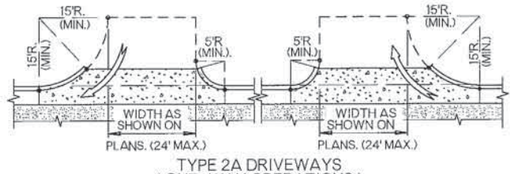
STANDARD REVISIONS	
DESCRIPTION	DATE



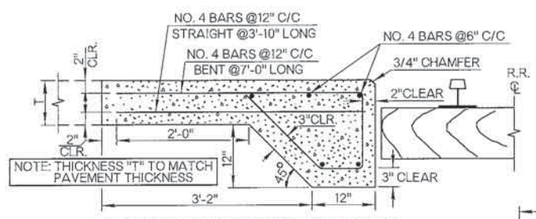
TYPE I DRIVEWAYS
(PRIVATE OR RESIDENTIAL)



TYPE 2 DRIVEWAY
(TWO -WAY OPERATION)

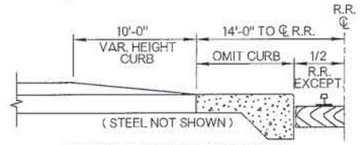


TYPE 2A DRIVEWAYS
(ONE -WAY OPERATIONS)



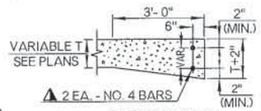
P. C. RAILROAD APPROACH SLAB WITH
THICKENED EDGE AT RAILROAD CROSSING

THICKENED EDGE OF CONCRETE RAILROAD APPROACH SLAB SHALL EXTEND FROM OUTSIDE TO OUTSIDE OF SHOULDERS. COST OF CLASS A CONCRETE & REINFORCING STEEL TO BE INCLUDED IN THE PRICE BID FOR RAILROAD APPROACH SLAB.

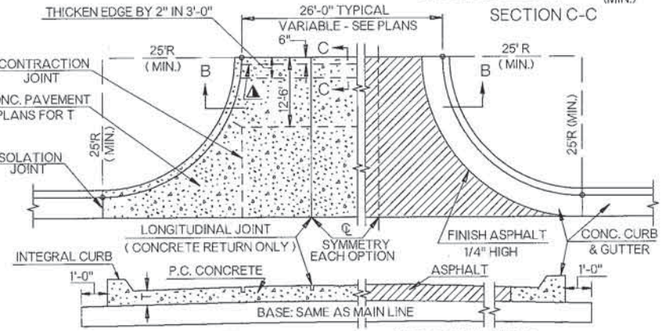


DETAIL OF CURBS ADJACENT
TO RAILROAD CROSSINGS

- IF SPECIFIED IN THE PLANS, CONSTRUCT CONDUIT CROSSING OF THE SPECIFIC SIZE AND TYPE AT APPROXIMATELY 30" BELOW FINISHED GRADE OF THE RAMP. SEE GENERAL NOTES FOR DETAILS.
- BEGIN ROLL CURB. TERMINATE CURB & GUTTER.



SECTION C-C

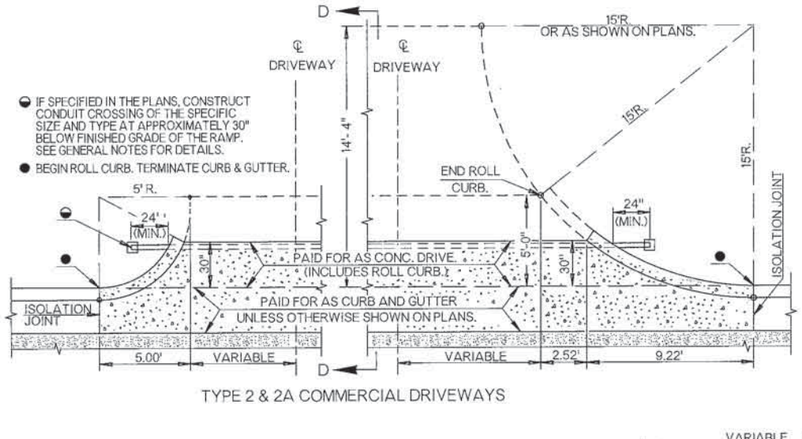


ALT. SECTION B-B
CONCRETE RETURN

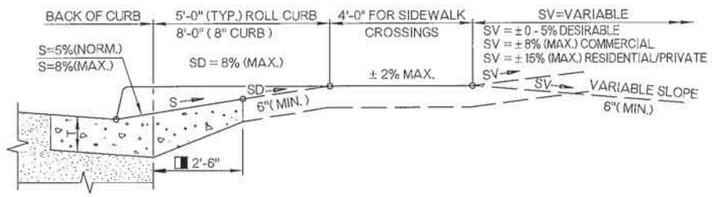
ALT. SECTION B-B
ASPHALT RETURN
(WHERE CURB AND GUTTER IS USED)

TYPICAL STREET RETURN

- IF SPECIFIED IN THE PLANS, CONSTRUCT CONDUIT CROSSING OF THE SPECIFIC SIZE AND TYPE AT APPROXIMATELY 30" BELOW FINISHED GRADE OF THE RAMP. SEE GENERAL NOTES FOR DETAILS.
- BEGIN ROLL CURB. TERMINATE CURB & GUTTER.

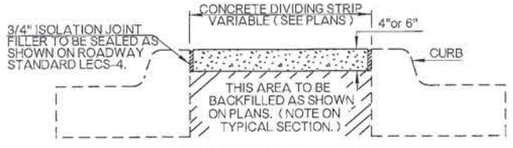


TYPE 2 & 2A COMMERCIAL DRIVEWAYS

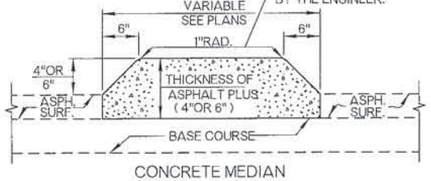


SECTION D-D ALONG ℄ DRIVE

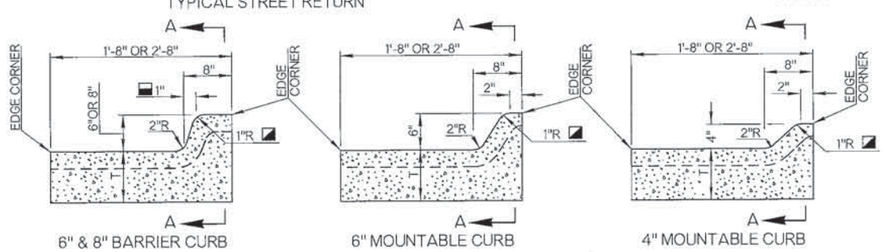
◨ WHEN SIDEWALK IS BUILT DIRECTLY BEHIND CURB, THE CONCRETE DRIVEWAY SHOULD BE CONSTRUCTED & EXTENDED TO THE BACK EDGE OF SIDEWALK.

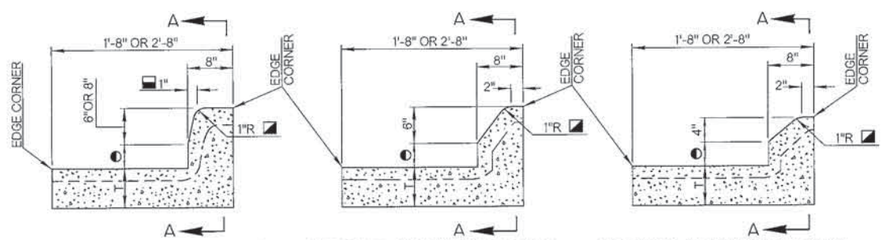


CONCRETE DIVIDING STRIP



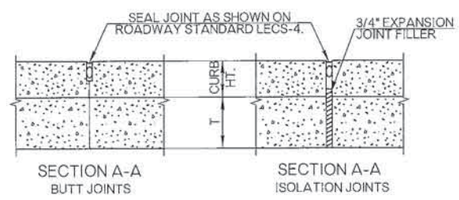
CONCRETE MEDIAN
MOUNTABLE CURB TYPE
(TO BE PAID FOR AS CLASS A CONCRETE.)



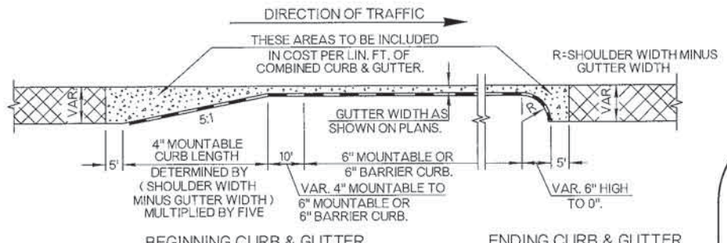


COMBINED CURB & GUTTER TYPICAL SECTIONS

NOTE: T DIMENSION EQUALS THE THICKNESS SHOWN ON TYPICAL SECTION. (MIN.=6")
◐ DIMENSION EQUALS THE THICKNESS ASPHALT CONC. SHOWN ON TYPICAL SECTION. (MIN.=2"; MAX.=4")
◪ RADIUS OF 2" MAY BE USED IF APPROVED BY THE ENGINEER.
▬ BATTER OF 2" MAY BE USED IF APPROVED BY THE ENGINEER.



CURB & GUTTER JOINTS
BUTT & ISOLATION JOINTS TO EXTEND THROUGH CURB & GUTTER TO BACK OF CURB



BEGINNING CURB & GUTTER

ENDING CURB & GUTTER

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. COST OF JOINT FILLERS, SEALING AND REINFORCING STEEL SHALL BE INCLUDED IN PRICE BID FOR OTHER ITEMS OF WORK.
3. TRANSVERSE ISOLATION JOINTS FOR CONCRETE DIVIDING STRIP AND CONCRETE MEDIAN (MOUNTABLE CURB TYPE) TO BE 1/2" ISOLATION JOINT FILLER AT 50' C/C, 1/4" ISOLATION JOINT MATERIAL AT 1/3 POINTS BETWEEN 1/2" ISOLATION JOINTS. FILLER MATERIAL TO BE PREMOLDED AND JOINTS TO BE SEALED AS SHOWN ON ROADWAY STANDARD LECS-4.
4. COMBINED CURB & GUTTER SHALL HAVE 3/4" ISOLATION JOINTS AT DRAINAGE STRUCTURES, STREET CURB RETURNS AND AT THOSE LOCATIONS SHOWN ON THE PLANS. BUTT OR SAWED JOINTS SHALL BE SPACED AT 20'-0" CENTERS MAX. JOINT FILLER IN THE CURBS SHALL EXTEND TO WITHIN 2" OF THE FACE & TOP OF CURB. ALL JOINTS SHALL BE SEALED AS SHOWN ON ROADWAY STANDARD LECS-4.
5. ALL CONDUIT CROSSINGS ARE TO BE TRENCHED, PLACED, BACKFILLED AND COMPACTED PRIOR TO SURFACING. BORING OR PUSHING PROCEDURES MAY BE USED WHERE SURFACING IS ALREADY IN PLACE AND IF APPROVED BY THE ENGINEER.
6. IF CONDUIT IS NOT CONTINUOUS BETWEEN DRIVEWAYS OR RAMPS, CAP BOTH ENDS OF EACH CONDUIT CROSSING AND PLACE MARKER TO PREVENT DAMAGE DURING CONSTRUCTION.
7. CONDUIT SHALL NOT TERMINATE BELOW A SURFACED AREA, BUT SHALL EXTEND A MINIMUM OF 2'-0" PAST EDGE OF PAVING.
8. FOR PULL BOX INSTALLATION DETAILS, SEE TRAFFIC STANDARD PBDI-1 (PULL BOX DETAILS).

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
414 (H)	P. C. RAILROAD APPROACH SLABS	SY
509 (B)	CLASS A CONCRETE	CY
609 (B)	■ COMBINED CURB & GUTTER (▲)	LF
610 (B)	▼ CONCRETE DRIVEWAY	SY
610 (C)	▼ CONCRETE DIVIDING STRIP	SY
610 (H)	▼ ASPHALT DIVIDING STRIP	SY

■ WIDTH OF CURB & GUTTER WILL BE SPECIFIED.
▲ HEIGHT & TYPE OF CURB SHALL BE SPECIFIED.
▼ THICKNESS WILL BE SPECIFIED.

APPROVED BY ROADWAY ENGINEER: Caleb L-A DATE 04/14/15

ROADWAY DESIGN DIVISION STANDARD

ODOT

ASPHALT SURFACING
CONSTRUCTION DETAILS

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

ASCD-5 | 2
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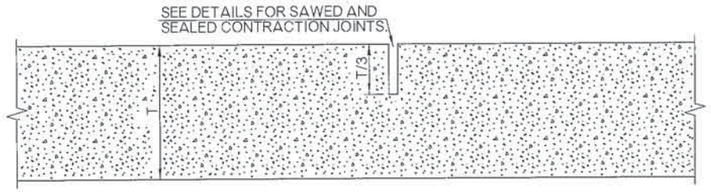
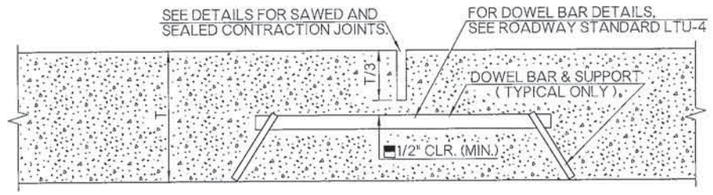
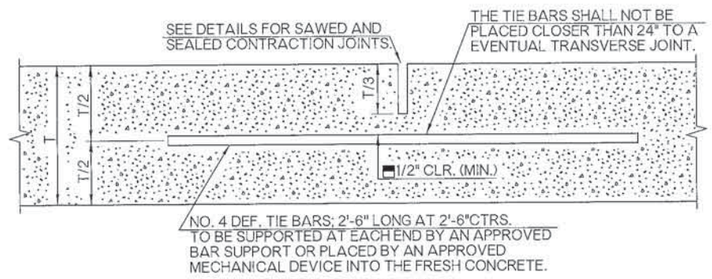
OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE



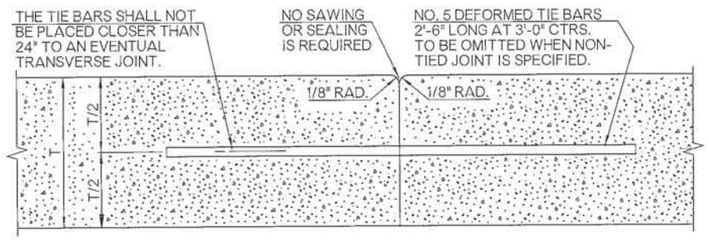
NON-DOWELED CONTRACTION JOINT



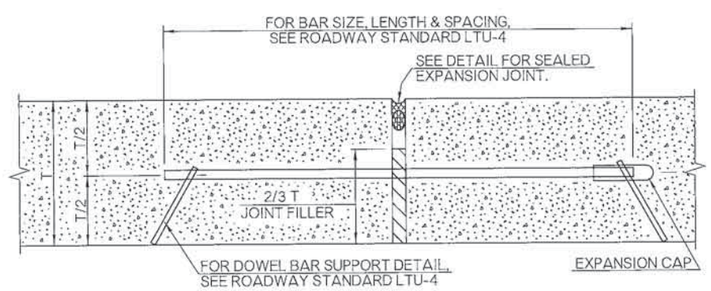
◒DOWELED CONTRACTION JOINT



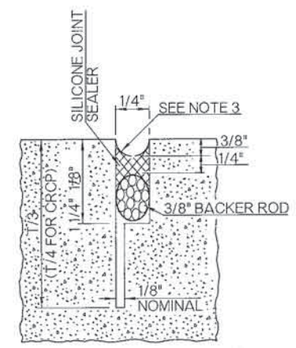
LONGITUDINAL JOINT



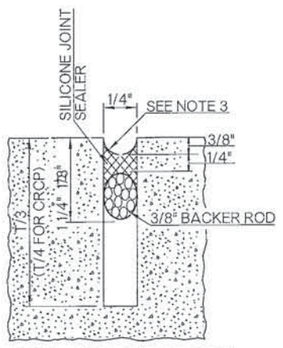
TIED BUTT JOINT AND
LONGITUDINAL CONSTRUCTION JOINT



EXPANSION JOINT / ISOLATION JOINT
OMIT DOWEL BARS, CAPS & SUPPORTS FOR ISOLATION JOINTS



SILICONE SEALANT OPTION



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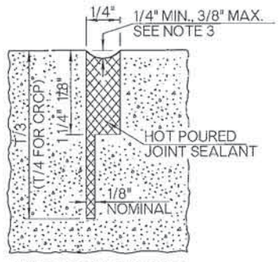
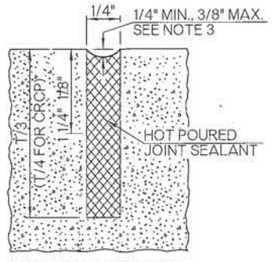
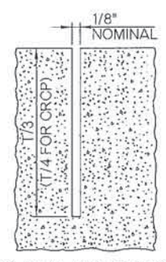


HOT POUR OPTION

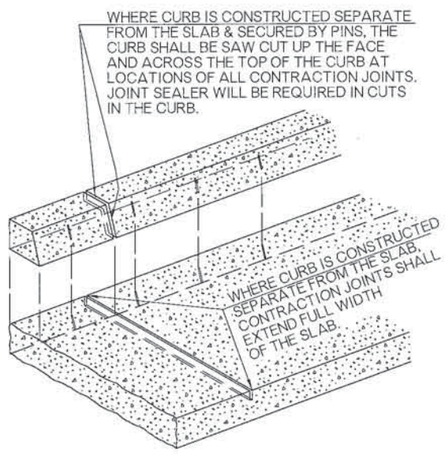


HOT POUR OPTION

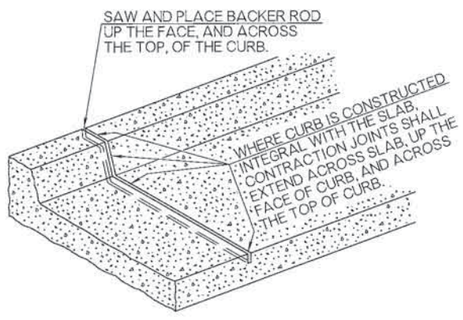


NO SEALANT OPTION

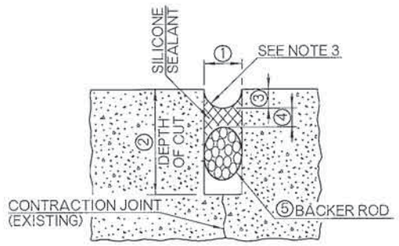
SAWED AND SEALED, CONTRACTION AND LONGITUDINAL JOINTS ALTERNATE DETAILS
UNLESS OTHERWISE SPECIFIED IN THE PLANS, ONLY THE SILICONE SEALANT OPTIONS WILL BE ALLOWED.



CONTRACTION JOINT WITH
SEPARATE CURB



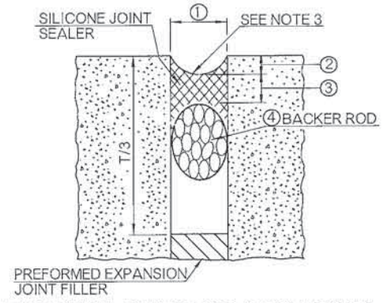
CONTRACTION JOINT WITH
INTEGRAL CURB



JOINT REHABILITATION DETAILS

JOINT REHABILITATION TREATMENT TABLE

SILICONE SEALANT				
JOINT WIDTH ①	DEPTH OF CUT ②	SEALANT RECESS DEPTH ③	SEALANT THICKNESS ④	BACKER ROD DIAMETER ⑤
3/8"	1 1/4"	3/8"	3/16"	1/2"
1/2"	1 3/4"	3/8"	1/4"	5/8"
3/4"	1 3/4"	3/8"	3/8"	7/8"
7/8"	1 3/4"	1/2"	7/16"	1"
1"	2"	1/2"	1/2"	1 1/8"
OVER 1"	OVER 2"	1/2"	1/2"	1 1/4"



EXPANSION JOINTS / ISOLATION JOINTS
HOT POURED JOINT SEALANT MAY BE USED IN LIEU OF BACKER ROD AND SILICONE SEALANT, IF APPROVED BY THE ENGINEER

EXPANSION JOINT / ISOLATION JOINT TREATMENT TABLE

JOINT WIDTH ①	SEALANT RECESS DEPTH ②	SILICONE SEALANT THICKNESS ③	BACKER ROD DIAMETER ④
1/2"	3/8"	1/4"	5/8"
3/4"	3/8"	3/8"	7/8"
1"	3/8"	1/2"	1 1/4"
1 1/2"	1/2"	3/4"	2"
2"	1/2"	3/4"	2 1/2"

EXPANSION OR ISOLATION JOINT WIDTH SHALL BE 1/2", UNLESS OTHERWISE SPECIFIED ON THE PLANS. TABLE VALUES, AS SHOWN THIS TABLE, SHALL BE USED IN THOSE SPECIFIED CASES.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. ALL CONCRETE JOINT SEALING SHALL BE IN ACCORDANCE WITH SECTION 415 OF THE SPECIFICATIONS.
3. THE SHAPE FACTOR, COMBINED WITH THE JOINT CLEANLINESS, IS THE CRITICAL COMBINATION NECESSARY TO GUARANTEE DESIRED BONDING AND FUNCTION OF SEALED JOINTS. THE JOINT SHAPE FACTOR IS DEFINED AS THE FINAL PRESSED SHAPE OF THE SILICONE MATERIAL. THE TOOLING OPERATION WILL FIRMLY PRESS THE FRESHLY APPLIED MATERIAL INTIMATELY AGAINST THE CUT SIDES OF THE RECESS AND THE BACKER ROD SURFACES. THE ROUNDED SHAPE ON TOP AND BOTTOM OF THE SILICONE ALLOWS THE SEALANT TO PROPERLY FLEX BUT MAINTAIN ADHERENCE TO THE PAVING. SELF LEVELING SEALANTS WILL BE INSTALLED TO BE FLUSH WITH THE PAVEMENT SURFACE.
- ◒ 4. ON JOINTED PORTLAND CEMENT CONCRETE PAVEMENTS, DOWELLED CONTRACTION JOINTS SHALL BE USED ON DRIVING LANES ONLY. CONCRETE SHOULDERS SHALL NOT BE DOWELLED UNLESS SPECIFIED ON THE PLANS.
5. LONGITUDINAL JOINTS BETWEEN PAVEMENT AND TIED CONCRETE SHOULDERS SHALL NOT BE SAWED OR SEALED UNLESS OTHERWISE SHOWN ON THE PLANS.
- ⬒ 6. ON ALL SAWED JOINTS, THE KERF DEPTH SHALL CLEAR DOWEL BARS, TIE BARS AND/OR REINFORCING STEEL BY A MINIMUM OF 1/2".
7. CONTRACTION JOINTS IN JOINTED P. C. PAVEMENT SHALL BE AT APPROXIMATELY 15'-0" CENTERS, UNLESS OTHERWISE SPECIFIED ON THE PLANS.
8. TRANSVERSE GROOVING SHALL BE CONSTRUCTED TO THE FOLLOWING DIMENSIONS: 1/8" TO 3/16" WIDE, 1/8" TO 3/16" DEEP, AND EQUALLY SPACED AT 1/2" TO 1" APART. GROOVES SHALL BE NEAT IN APPEARANCE, OF UNIFORM DEPTH, AND LOCATED 1" TO 3" FROM NEAREST CONTRACTION JOINTS.

APPROVED BY ROADWAY ENGINEER: Caleb E. A. DATE 04/16/15
ROADWAY DESIGN DIVISION STANDARD

ODOT JOINTS AND SEALERS - LONGITUDINAL, EXPANSION, & CONTRACTION

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

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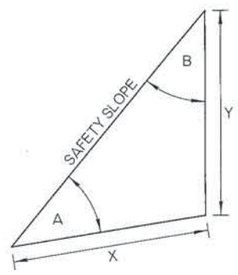
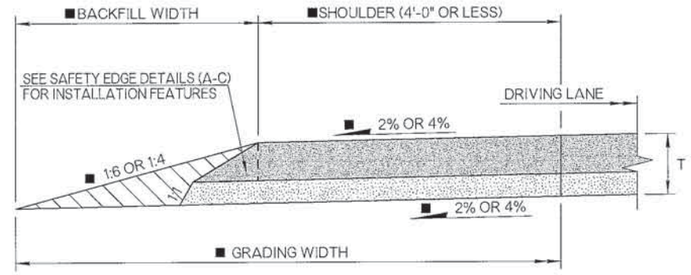
OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE

X - ASPHALT PAVEMENT SAFETY EDGE WIDTH			
Y	X (2% SLOPE)		X (-4% SLOPE)
	2%	-2%	
IN	IN	IN	IN
0.50	0.86	0.88	0.89
0.75	1.28	1.31	1.33
1.00	1.71	1.75	1.77
1.50	2.57	2.63	2.66
2.00	3.42	3.50	3.54
2.50	4.28	4.38	4.43
3.00	5.14	5.26	5.31
3.50	5.99	6.13	6.20
4.00	6.85	7.01	7.08
4.50	7.70	7.88	7.97
5.00	8.56	8.76	8.85



$X = \frac{Y \cdot SIN(B)}{SIN(A)}$

CALCULATE X USING 30° FOR ANGLE A.

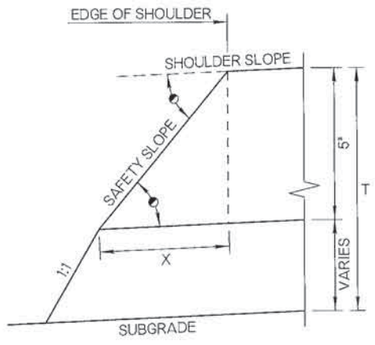


TYPICAL SECTION VIEW OF AN ASPHALT PAVEMENT SAFETY EDGE

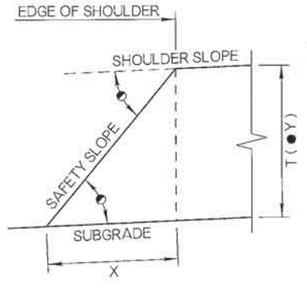
NOTE: SAFETY EDGE SHALL BE INSTALLED ON SHOULDERS OF WIDTH 4'-0" OR LESS.

■ SEE TYPICAL SECTION FOR DIMENSIONS AND SLOPES.

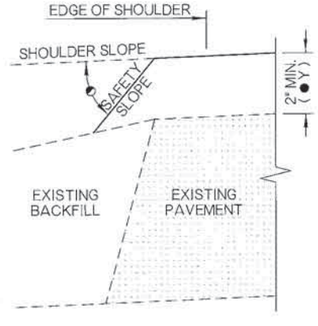
DETAIL A (T>5")



DETAIL B (T ≤ 5")



DETAIL C (OVERLAY)



SAFETY EDGE DETAILS (A-C)

- ● VARIES BETWEEN 2" AND 5" WITH A 5" MAXIMUM HEIGHT.
- ◐ 30°±5° (ANGLE IS MEASURED FROM SLOPED EDGE OF SHOULDER.)

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. SAFETY EDGE SHALL BE CONSTRUCTED IN UNION WITH THE ASPHALT CONCRETE PAVEMENT.
3. THE SAFETY EDGE, AS SHOWN, CAN BE APPLIED TO NEW CONSTRUCTION AND TO OVERLAYS OF AT LEAST 2".
4. INSTALLATION OF SAFETY EDGE IS NOT REQUIRED IN CURB AND GUTTER AREAS.
5. ALL SAFETY EDGES MUST MEET THE APPROVAL OF THE ENGINEER. THE ENGINEER MAY REQUIRE PROOF THAT THE SYSTEM HAS BEEN USED ON PREVIOUS PROJECTS WITH ACCEPTABLE RESULTS OR MAY REQUIRE THAT A TEST SECTION BE CONSTRUCTED PRIOR TO THE BEGINNING OF WORK TO DEMONSTRATE THAT THE EDGE SHAPE AND COMPACTION IS TO THE SATISFACTION OF THE ENGINEER.
6. PRIOR TO PAVING SAFETY EDGE, GRADE AN AREA 10" WIDE BEGINNING AT EDGE OF PAVED SHOULDER TO PROVIDE A LEVEL SURFACE FREE OF VEGETATION.

APPROVED BY ROADWAY ENGINEER: Caleb F. H DATE 04/16/15

ROADWAY DESIGN DIVISION STANDARD

PAVEMENT SAFETY EDGE

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

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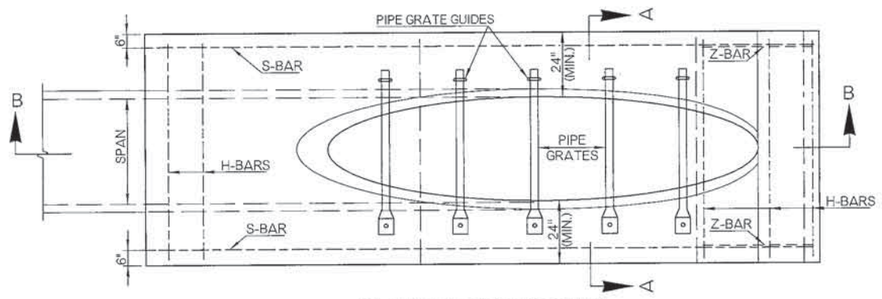
OKLAHOMA DEPARTMENT OF TRANSPORTATION

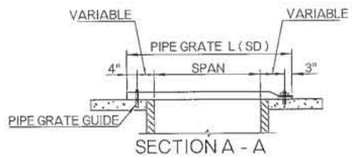
STANDARD REVISIONS	
DESCRIPTION	DATE

TABLE A - SCHEDULE OF PIPE SAFETY GRATES

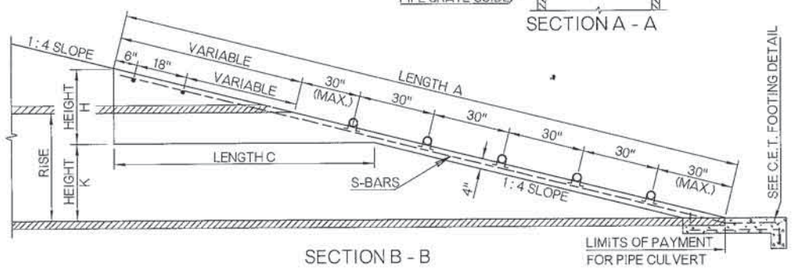
C. E. T. TYPE	CULVERT TYPE: REINF. CONC., STEEL OR ALUMINUM ROUND PIPE	REINF. CONC. ARCH PIPE	REINF. CONC. ELLIPTICAL PIPE (RISE x SPAN)	STEEL OR ALUMINUM ARCH PIPE	SIDE DRAIN: NO. OF GRATES	SIDE DRAIN: GRATE LENGTH L (SD)	CROSS DRAIN: NO. OF GRATES	CROSS DRAIN: GRATE LENGTH L (CD)
A4	18"				2	36"		NONE
		22" x 13"	14" x 23"	21" x 15"	2	42"		NONE
				24" x 18"	2	45"		NONE
B4	24"				2	45"		NONE
		28" x 18"	19" x 30"		2	48"	1	10'-9"
				28" x 20"	2	48"		NONE
		36" x 22"	22" x 34"		3	54"	1	12'-0"
				35" x 24"	3	54"	1	12'-6"
			24" x 38"		3	57"	1	12'-6"
C4	30"				5	50"		NONE
		43" x 26"			3	64"	1	13'-6"
				42" x 29"	3	64"	1	14'-3"
			29" x 45"		3	64"	1	14'-3"
		51" x 31"			4	70"	1	15'-3"
				49" x 33"	4	70"	1	15'-9"
			34" x 53"		4	72"	1	15'-9"
D4	36"				4	54"	1	16'-6"
	42"				5	60"	1	18'-9"
		58" x 36"	38" x 60"	57" x 38"	5	78"	1	17'-3"
		65" x 40"			5	84"	2	18'-0"
				64" x 43"	5	84"	2	19'-0"
E4	48"				6	66"	1	20'-9"
			43" x 68"		5	88"	2	19'-0"
		73" x 45"		71" x 47"	6	92"	2	20'-6"
			48" x 76"		6	96"	2	20'-9"



PLAN (SIDE DRAIN SHOWN)



SECTION A - A

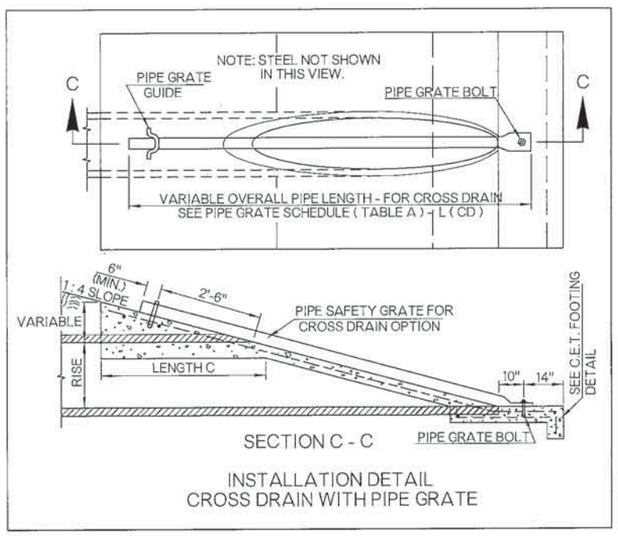


SECTION B - B

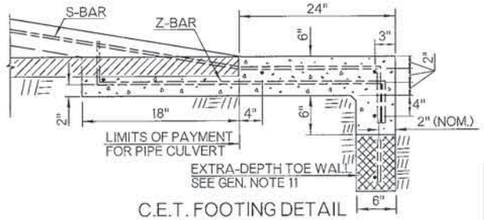
TABLE B - SCHEDULE OF DIMENSIONS

CET TYPE	LENGTH A	Ⓡ WIDTH B	ⒶⒺ WIDTH B	LENGTH C	HEIGHT H	HEIGHT K	Ⓡ CONC. CY	ⒶⒺ CONC. CY	REINF. BAR LENGTH: Ⓡ H-BARS	ⒶⒺ H-BARS	S-BARS
A4	10'-4"	5'- 6"	6'- 2"	5'- 8"	21"	9"	1.70	2.00	5'- 2"	5'-10"	12'- 4"
B4	12'-4"	6'- 0"	7'- 2"	6'- 0"	22"	14"	2.00	2.60	5'- 8"	6'-10"	15'- 4"
C4	15'-9"	6'- 6"	8'- 5"	7'- 4"	26"	20"	2.85	3.95	6'- 2"	8'- 1"	19'- 6"
D4	19'-3"	7'- 6"	9'- 6"	8'- 0"	28"	27"	3.50	5.05	7'- 2"	9'- 2"	21'- 6"
E4	20'-8"	8'- 0"	10'- 4"	8'- 8"	30"	30"	4.05	5.75	7'- 8"	10'- 0"	23'- 4"

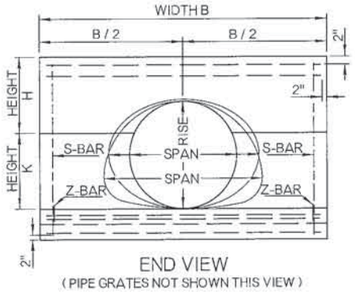
Ⓡ ROUND SHAPE CULVERT OPTIONS
Ⓐ ARCH SHAPE CULVERT OPTIONS
Ⓔ HORIZONTAL ELLIPSE SHAPE CULVERT OPTIONS



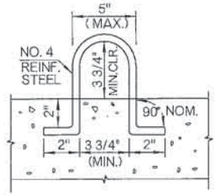
INSTALLATION DETAIL
CROSS DRAIN WITH PIPE GRATE



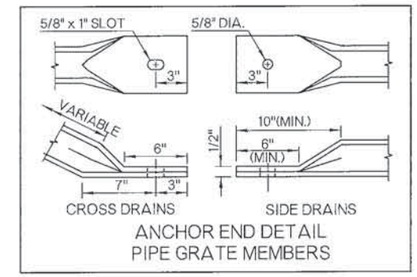
C.E.T. FOOTING DETAIL



END VIEW
(PIPE GRATES NOT SHOWN THIS VIEW)



PIPE GRATE GUIDE (U-BOLT)



ANCHOR END DETAIL
PIPE GRATE MEMBERS

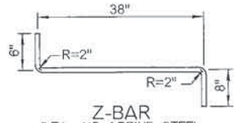
GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. QUANTITIES SHOWN IN TABLE B ARE FOR ONE END ONLY. CLASS A CONCRETE SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF SECTION 509 OF THE SPECIFICATIONS.
3. TYPES A4 THROUGH E4 END SECTIONS, AS SHOWN IN TABLE B, MAY BE USED WITH ANY AASHTO DESIGNATED METAL, ALUMINUM & CONCRETE PIPE SIZES, AS SHOWN IN TABLE A. END SECTION QUANTITIES ARE BASED ON METAL PIPE DIMENSIONS, NO PIPE WALL THICKNESS AND SMALLEST LISTED CULVERT ROUND OR ARCH PIPE WITHIN TYPE.
4. SLOPED END OF CULVERT PIPE SHALL BE SHOP CUT. TWO COATS OF COLD GALVANIZATION WILL BE APPLIED TO CUT EDGES OF STEEL CULVERT PIPE. COST OF CUTTING AND GALVANIZING IS INCLUDED IN THE PRICE BID FOR PIPE CULVERT.
5. ALL SIZES OF CULVERT PIPE WILL BE CUT ON 1 TO 4 SLOPE.
6. PIPE FOR SAFETY GRATES SHALL BE 3" x 7.58 LBS./FT. STANDARD WEIGHT STEEL PIPE, SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F1083. COST OF GRATES TO BE INCLUDED IN PRICE BID FOR THE C.E.T.
7. ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC RICH PAINT.
8. REINFORCING STEEL AND PIPE GRATE GUIDES SHALL BE NO. 4 DEFORMED BARS. COST OF STEEL SHALL BE INCLUDED IN PRICE BID FOR THE CULV. END TREATMENT.
9. CRITERIA FOR USE OF PIPE SAFETY GRATE MEMBERS:
   (A) ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE.
   (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 30" OR LARGER WITHIN THE CLEARZONE.
   (C) ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME AND SIZE OF CULVERT.
   NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES.
10. ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A 1/2" x 5 1/2" GALVANIZED BOLT, NUT AND WASHER. THREADS, 1 3/4" (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.
11. FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH B TIMES 0.0185 FOR EACH FOOT OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.

PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE ENGINEER.

TYPICAL ABBREVIATIONS
RS - ROUND SIDE DRAIN
RC - ROUND CROSS DRAIN
AS - ARCH SIDE DRAIN
AC - ARCH CROSS DRAIN
GR - GRATED
NG - NON-GRATED

S-BAR
2 EA. - NO. 4 REINF. STEEL



Z-BAR
2 EA. - NO. 4 REINF. STEEL

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
613 (M)	◒ CULVERT END TREATMENT	EA

◒ SPECIFY TYPE OF END TREATMENT (EXAMPLE: TYPE B4 CULVERT END TREATMENT)
■ CET ORIENTATION AND SAFETY GRATE REQUIREMENTS SHALL BE SPECIFIED ON THE SUMMARY OF DRAINAGE STRUCTURES. (SEE TYPICAL ABBREVIATIONS)

APPROVED BY ROADWAY ENGINEER: _____ DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

CULVERT END TREATMENT
SINGLE PIPE INSTALLATION
1 TO 4 SAFETY SLOPE

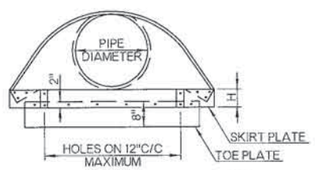
OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

CET4S-3 | 2

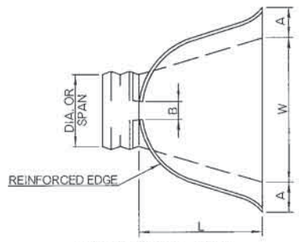
R-26

OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE

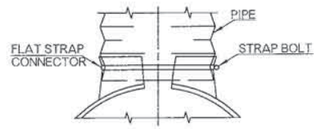
DIMENSIONS OF END SECTIONS FOR ROUND METAL PIPE								
PIPE DIA.	GA.	A	B	H	L	W	APPROX. SLOPE	BODY TYPE
12"	16	6"	6"	6"	21"	24"	1:2 1/2	1 PC.
15"	16	7"	8"	6"	26"	30"	1:2 1/2	1 PC.
18"	16	8"	10"	6"	31"	36"	1:2 1/2	1 PC.
21"	16	9"	12"	6"	36"	42"	1:2 1/2	1 PC.
24"	16	10"	13"	6"	41"	48"	1:2 1/2	1 PC.
30"	14	12"	16"	8"	51"	60"	1:2 1/2	1 PC.
36"	14	14"	19"	9"	60"	72"	1:2 1/2	2 PC.
42"	12	16"	22"	11"	69"	84"	1:2 1/2	2 PC.
48"	12	18"	27"	12"	78"	90"	1:2 1/4	2 PC.
54"	12	18"	30"	12"	84"	102"	1:2	2 PC.
60"	12	18"	33"	12"	87"	114"	1:1 3/4	3 PC.
66"	12	18"	36"	12"	87"	120"	1:1 1/2	3 PC.
72"	12	18"	39"	12"	87"	126"	1:1 1/3	3 PC.
78"	12	18"	42"	12"	87"	132"	1:1 1/4	3 PC.
84"	12	18"	45"	12"	87"	138"	1:1 1/6	3 PC.



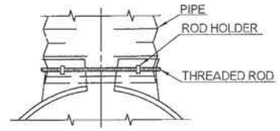
ROUND METAL PIPE END SECTION
END VIEW



METAL END SECTION
PLAN VIEW



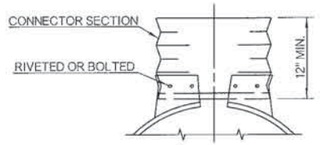
TYPE 1
FOR 12" TO 24" ROUND AND
EQUIVALENT ROUND PIPE ARCH SIZES.



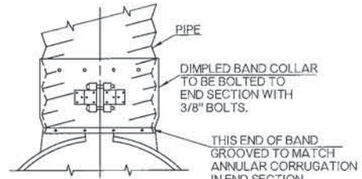
TYPE 2
FOR 30" TO 36" ROUND AND
30" TO 48" EQUIVALENT ROUND
PIPE - ARCH SIZES.

COUPLING BAND

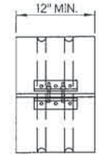
STANDARD
COUPLING BAND



TYPE 3
FOR 42" TO 84" ROUND AND
54" TO 72" EQUIVALENT ROUND
PIPE - ARCH SIZES.



TYPE 4
FOR USE WITH ALL ROUND
AND PIPE ARCH SIZES.

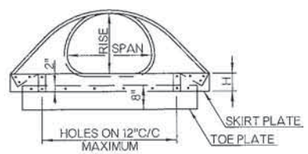


DIMPLED
COUPLING BAND

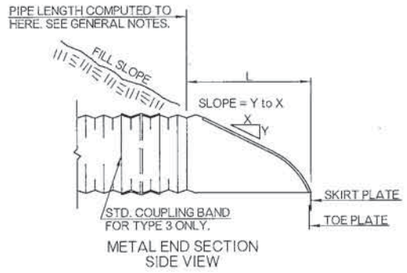
TYPICAL METAL END SECTION CONNECTIONS

DIMENSIONS OF END SECTIONS FOR METAL PIPE - ARCH									
SPAN x RISE	EQUIV. ROUND	GA.	A	B	H	L	W	APPROX. SLOPE	BODY TYPE
17" x 13"	15"	16	7"	9"	6"	19"	30"	1:2 1/2	1 PC.
21" x 15"	18"	16	7"	10"	6"	23"	36"	1:2 1/2	1 PC.
24" x 18"	21"	16	8"	12"	6"	28"	42"	1:2 1/2	1 PC.
28" x 20"	24"	#16	9"	14"	6"	32"	48"	1:2 1/2	1 PC.
35" x 24"	30"	14	10"	16"	6"	39"	60"	1:2 1/2	1 PC.
42" x 29"	36"	#14	12"	18"	8"	46"	75"	1:2 1/2	1 PC.
49" x 33"	42"	12	13"	21"	9"	53"	85"	1:2 1/2	2 PC.
57" x 38"	48"	12	18"	26"	12"	63"	90"	1:2 1/2	2 PC.
64" x 43"	54"	12	18"	30"	12"	70"	102"	1:2 1/4	2 PC.
71" x 47"	60"	12	18"	33"	12"	77"	114"	1:2 1/4	3 PC.
77" x 52"	66"	12	18"	36"	12"	77"	126"	1:2	3 PC.
83" x 57"	72"	12	18"	39"	12"	77"	138"	1:2	3 PC.

FOR ALUMINUM END SECTIONS THE 28" x 20" SHALL BE 14 GAGE AND THE 42" x 29" SHALL BE 12 GAGE.



ARCH METAL PIPE END SECTION
END VIEW

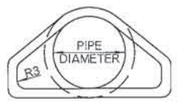


METAL END SECTION
SIDE VIEW

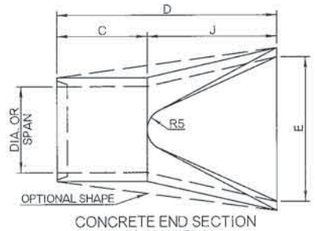
GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. CULVERT END SECTIONS SHALL BE OF THE SAME MATERIAL AND SHAPE (ROUND, ARCH, OR ELLIPTICAL) AS THE PIPE ON WHICH THEY ARE INSTALLED.
3. DIMENSIONS SHOWN FOR END SECTIONS ARE SUBJECT TO MANUFACTURER TOLERANCES.
4. TOE PLATE WILL BE REQUIRED ON ALL METAL END SECTIONS UNLESS SOLID ROCK IS ENCOUNTERED. HOLES IN TOE PLATE TO BE PUNCHED TO MATCH HOLES IN SKIRT PLATE. 3/8" BOLTS TO BE FURNISHED. LENGTH OF TOE PLATES FOR ROUND PIPE END SECTIONS SHALL BE W=10" FOR 12" TO 30" DIAMETER PIPE, W=20" FOR 36" TO 84" DIAMETER PIPE. LENGTH OF TOE PLATES FOR ARCH PIPE END SECTIONS SHALL BE W=10" FOR A RISE OF 13" TO 29" AND W=20" FOR A RISE OF 33" TO 57".
5. CONNECTOR SECTION, SKIRT PLATE, AND TOE PLATE ON METAL END SECTIONS SHALL BE THE SAME GAGE AND MATERIAL AS THE SKIRT AND SHALL BE INCLUDED IN PRICE BID FOR END SECTION.
6. IF TYPE 3 METAL END SECTION IS USED AS OPTIONAL PIPE, THE LENGTH OF PIPE TO BE REDUCED BY 12" FOR EACH END SECTION. IF CONCRETE PIPE OPTION IS USED, THE LENGTH OF PIPE TO BE REDUCED BY THE C DIMENSION FOR EACH END SECTION.

DIMENSIONS OF PRECAST END SECTIONS FOR ROUND PIPE										
DIAMETER	R3	R4	R5	T	K	J	C	D	E	SLOPE
18"	3"	3"	6"	2 1/2"	9"	2.25'	3.83'	6.08'	3.00'	1:3
24"	3"	3"	7"	3"	9 1/2"	3.63'	2.50'	6.12'	4.00'	1:3
30"	3"	3"	8"	3 1/2"	12"	4.50'	1.65'	6.16'	5.00'	1:3
36"	3"	3"	10 1/2"	4"	15"	5.25'	2.90'	8.15'	6.00'	1:3
42"	3"	3"	10 1/2"	4 1/2"	21"	5.25'	2.92'	8.17'	6.50'	1:3
48"	6"	6"	14"	5"	24"	6.00'	2.17'	8.17'	7.00'	1:3
54"	6"	6"	-	5 1/2"	27"	5.42'	2.92'	8.33'	7.50'	1:2 1/2
60"	6"	6"	-	6"	30"	5.00'	3.25'	8.25'	8.00'	1:2
66"	6"	6"	-	6 1/2"	24"	6.50'	1.75'	8.25'	8.50'	1:2
72"	6"	6"	-	7"	24"	6.50'	1.75'	8.25'	9.00'	1:2

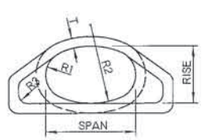


ROUND CONCRETE PIPE
END SECTION
END VIEW

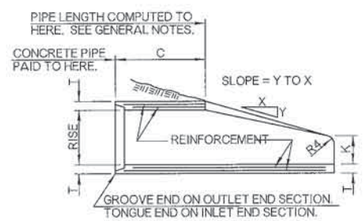


CONCRETE END SECTION
PLAN VIEW

DIMENSIONS OF PRECAST END SECTIONS FOR ELLIPTICAL PIPE												
APPROX. EQUIV. DIAMETER	RISE	SPAN	R1	R2	R3	R4	R5	T	K	J	C	D	E	SLOPE
18"	14"	23"	6"	20"	3"	3"	6"	2 3/4"	8"	2.25'	3.75'	6.00'	3.00'	1:3
24"	19"	30"	8 1/4"	26 1/4"	3"	3"	7"	3 1/4"	8 1/2"	3.25'	2.75'	6.00'	4.00'	1:3
30"	24"	38"	10 1/4"	32 3/4"	3"	3"	9"	3 3/4"	9 1/2"	4.50'	1.50'	6.00'	5.00'	1:3
36"	29"	45"	12 1/4"	39 1/4"	3"	3"	12"	4 1/2"	11 1/4"	5.00'	3.00'	8.00'	6.00'	1:3
42"	34"	53"	14 1/2"	46"	6"	6"	13"	5"	15 3/4"	5.00'	3.00'	8.00'	6.50'	1:3
48"	38"	60"	16 1/2"	51 1/2"	6"	6"	14"	5 1/2"	21"	5.00'	3.00'	8.00'	7.00'	1:3
54"	43"	68"	18 3/4"	58 1/2"	6"	6"	16"	6"	25 1/2"	5.00'	3.00'	8.00'	7.50'	1:3
60"	48"	76"	20 3/4"	65"	6"	6"	36 11/16"	6 1/2"	30"	5.00'	3.25'	8.25'	8.00'	1:2
66"	53"	83"	22 3/4"	71 1/2"	6"	6"	36 1/8"	7 1/2"	24"	6.50'	1.75'	8.25'	8.50'	1:2
72"	58"	91"	24 3/4"	78"	6"	6"	38"	7 1/2"	24"	6.50'	1.75'	8.25'	9.00'	1:2



ELLIPTICAL CONCRETE PIPE
END SECTION
END VIEW

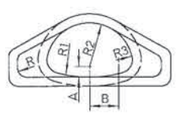


CONCRETE END SECTION
SIDE VIEW

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
613 (L)	▼ PREFAB. CULVERT END SECTION, ROUND	EA
613 (L)	▼ PREFAB. CULVERT END SECTION, ARCH	EA
613 (L)	▼ PREFAB. CULVERT END SECTION, ELLIPTICAL	EA

▼END SECTION DIMENSION(S) SHALL BE SPECIFIED.

DIMENSIONS OF PRECAST END SECTIONS FOR ARCH PIPE																		
APPROX. EQUIV. DIAMETER	SPAN	RISE	A	B	R	R1	R2	R3	R4	R5	T	K	J	C	D	E	SLOPE
18"	22"	13"	-1/4"	5 3/4"	2"	27 1/2"	13 3/4"	5 1/4"	3"	13"	2 1/2"	7"	2.25'	3.75'	6.08'	3.00'	1:3
24"	28"	18"	3 7/16"	9 21/32"	3"	40 1/16"	14 9/16"	4 19/32"	3"	16 13/16"	3"	9 1/2"	3.58'	2.50'	6.08'	4.00'	1:3
30"	36"	22"	3 3/4"	12 3/32"	3"	51"	18 3/4"	6 1/32"	3"	18 1/2"	3 1/2"	12"	4.50'	1.58'	6.08'	5.00'	1:3
36"	43"	26"	4 1/8"	15 1/2"	6"	62"	22 1/2"	6 3/8"	3"	24 5/16"	4"	15"	5.25'	2.90'	8.15'	6.00'	1:3
42"	51"	31"	5 1/16"	18"	6"	73"	26 1/4"	7 9/16"	3"	27 1/2"	4 1/2"	21"	5.25'	2.92'	8.17'	6.50'	1:3
48"	58"	36"	6"	20 1/2"	6"	84"	30"	8 3/4"	3"	28 1/2"	5"	24"	6.00'	2.17'	8.17'	7.00'	1:3
54"	65"	40"	6 5/8"	22 11/16"	6"	92 1/2"	33 3/8"	9 13/16"	6"	33 1/8"	5 1/2"	27"	5.42'	2.92'	8.34'	7.50'	1:2.4
60"	73"	45"	7 1/2"	25 9/32"	6"	105"	37 1/2"	11 7/32"	6"	33 11/16"	6"	30"	5.00'	3.25'	8.25'	8.00'	1:2
72"	88"	54"	9"	31 7/16"	6"	126"	45"	12 9/16"	6"	38 15/16"	7"	24"	6.50'	1.75'	8.25'	9.00'	1:2



ARCH CONCRETE PIPE
END SECTION
END VIEW

APPROVED BY
ROADWAY ENGINEER: Calvin F. H DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

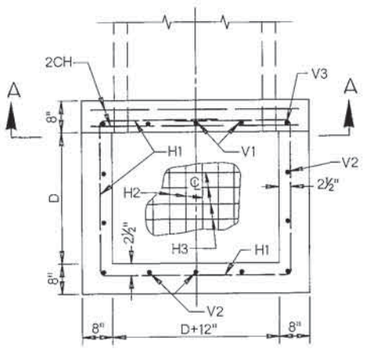
PREFABRICATED CULVERT END SECTIONS

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

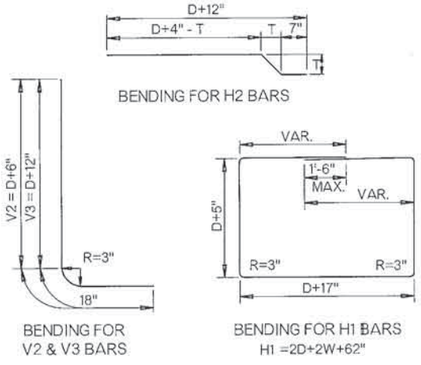
PCES-4 | 1

R-30

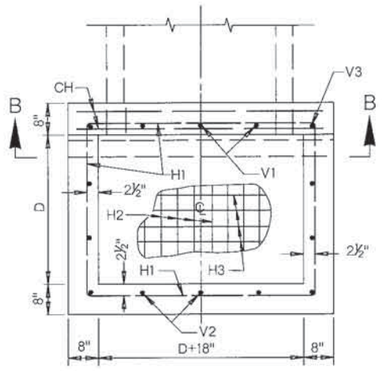
OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE



PLAN



■ BAR BENDING DIAGRAMS



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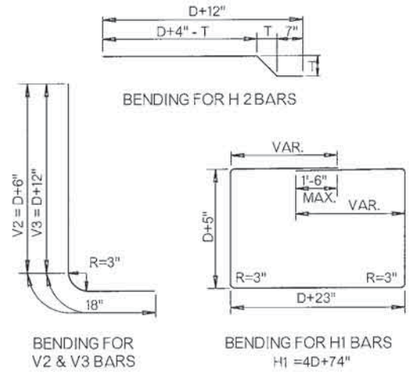
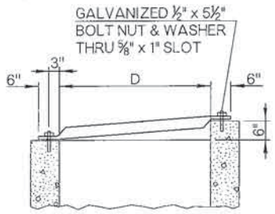
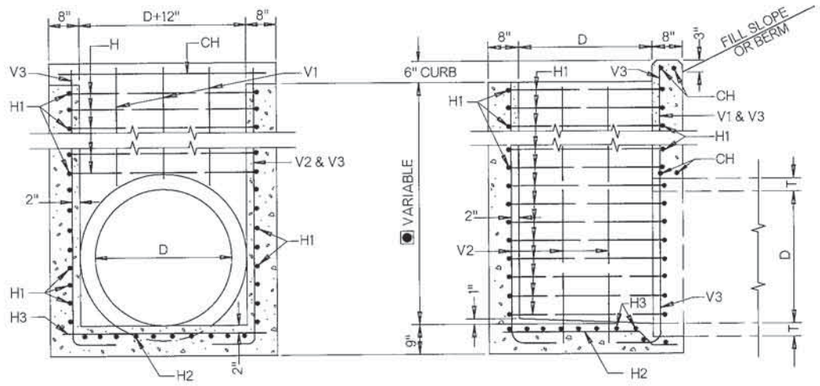


■ BAR BENDING DIAGRAMS

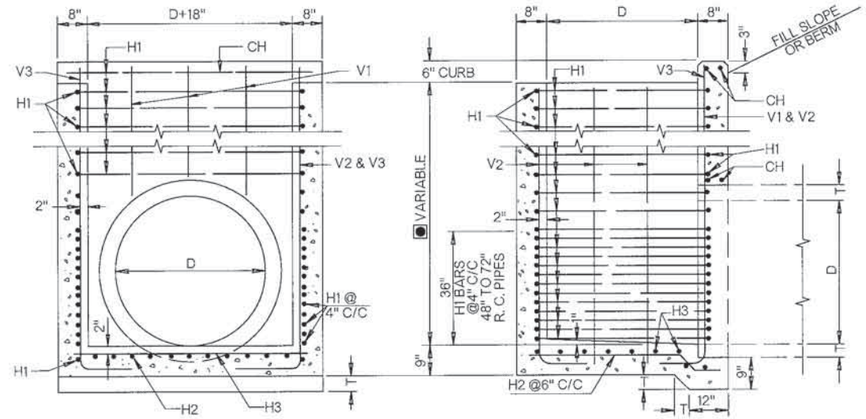


TYPICAL GRATE DETAIL



DROP INLET FOR 18" TO 42" REINF. CONCRETE PIPE

●DIMENSION FOR STD. HEIGHT DROP INLET TO BE (D+T+3")



DROP INLET FOR 48" TO 72" REINF. CONCRETE PIPE

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. HORIZONTAL REINFORCING BARS SHALL BE PLACED AT 6" CENTERS EXCEPT AS SHOWN FOR 48" TO 72" R.C. PIPE. VERTICAL BARS ARE TIE BARS SPACED AS SHOWN.
3. MAXIMUM DEPTHS OF DROP INLET FOR 48" TO 72" PCP SHALL BE AS FOLLOWS: 48" RCP - 18'-0"
   54" RCP - 16'-0"
   66" RCP - 12'-0"
   72" RCP - 10'-0".
4. TOTAL QUANTITIES AS SHOWN IN TABLE ARE COMPUTED TO TOP OF PIPE AND INCLUDE CURB. FOR DROP INLETS OF GREATER DEPTH, MULTIPLY THE FIGURE IN PER FOOT COLUMN BY THE HEIGHT FROM TOP OF PIPE TO TOP OF DROP INLET AND ADD THE RESULT TO THE QUANTITY IN THE PRECEDING COLUMN.
5. INLET TOP OPENING SHALL HAVE 3" x 7.58 LBS/FT STD. WEIGHT STEEL PIPE, GALVANIZED, SCHEDULE 40, PIPE SAFETY GRATES INSTALLED PERPENDICULAR TO THE DIRECTION OF TRAFFIC AT 12" (MAXIMUM) CENTERS WITH THE COST OF PIPE SAFETY GRATES & ALL HARDWARE NEEDED FOR THE INSTALLATION TO BE INCLUDED IN THE PRICE BID FOR THE INLET.
6. PIPE GRATE ENDS SHALL BE HELD DOWN WITH 1/2" x 5 1/2" GALVANIZED BOLT, WASHER & NUT MEETING THE REQUIREMENTS OF ASTM A325. BOLT THREADS, 1 3/4", SHALL REMAIN EXPOSED FOR INSTALLING GRATE.
7. ■ BAR BENDING DIAGRAMS AND DIMENSIONS FOR DESIGNS 1 THROUGH 10, AS SHOWN THIS SHEET, ARE FOR STANDARD DEPTH DROP INLETS.
8. ARCH PIPES MAY BE USED INSTEAD OF ROUND PIPES AT THE DISCRETION OF THE ENGINEER.

DIMENSIONS REINFORCING STEEL & QUANTITIES

DESIGN NUMBER	DIMENSIONS			REINFORCING STEEL														CLASS A CONCRETE		REINFORCING STEEL		PIPE GRATES
	D DIAM. OF PIPE	AREA OF PIPE	T= THICKNESS OF WALL	CH #4 BARS STRAIGHT		H1 #4 BARS BENT		H2 #4 BARS BENT		H3 #4 BARS STRAIGHT		V1 #4 BARS STRAIGHT		V2 #4 BARS BENT		V3 #4 BARS BENT		TOTAL TO TOP OF PIPE INCLUDING CURB	PER FOOT OF ADDITIONAL HEIGHT	TOTAL TO TOP OF PIPE INCLUDING CURB	PER FOOT OF ADDITIONAL HEIGHT	NO. OF PIPE GRATES
				NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.	NO.	LGTH.					
	IN	SQ.FT	IN	EA	IN	EA	IN	EA	IN	EA	IN	EA	IN	EA	IN	EA	IN	CY	CY/VF	LBS	LBS/VF	EA
1	18"	1.77	2½"	4	29"	5	134"	7	30"	7	26"	2	12"	6	42"	2	48"	0.58	0.21	77	24	2
2	24"	3.14	3"	4	35"	6	158"	8	36"	8	32"	3	13"	6	48"	2	54"	0.86	0.26	104	29	2
3	30"	4.91	3½"	4	41"	7	182"	9	42"	9	38"	4	14"	7	54"	2	60"	1.20	0.30	138	35	3
4	36"	7.07	4"	4	47"	8	206"	10	48"	10	44"	4	16"	8	60"	2	66"	1.58	0.35	176	42	3
5	42"	9.62	4½"	4	53"	9	230"	11	54"	11	50"	5	18"	10	66"	2	72"	2.11	0.40	223	49	4
6	48"	12.57	5"	4	59"	15	254"	12	60"	12	56"	5	19"	10	72"	2	78"	2.60	0.45	333	52	4
7	54"	15.90	5½"	4	65"	16	278"	13	66"	13	62"	6	21"	10	78"	2	84"	3.18	0.49	385	60	5
8	60"	19.63	6"	4	71"	17	302"	14	72"	14	68"	6	22"	11	84"	2	90"	3.79	0.54	448	66	5
9	66"	13.76	6½"	4	77"	18	326"	15	78"	15	74"	7	24"	12	90"	2	96"	4.47	0.59	517	74	6
10	72"	28.27	7"	4	83"	19	350"	16	84"	16	80"	7	25"	14	96"	2	102"	5.21	0.64	594	83	6

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
611 (G)	INLET CDI RCP DES.●	EA
611 (H)	ADD'L. DEPTH IN INLET CDI RCP DES.●	VF

● DESIGN NUMBER SHALL BE SPECIFIED.

APPROVED BY ROADWAY ENGINEER: Caleb F. H DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

ODOT

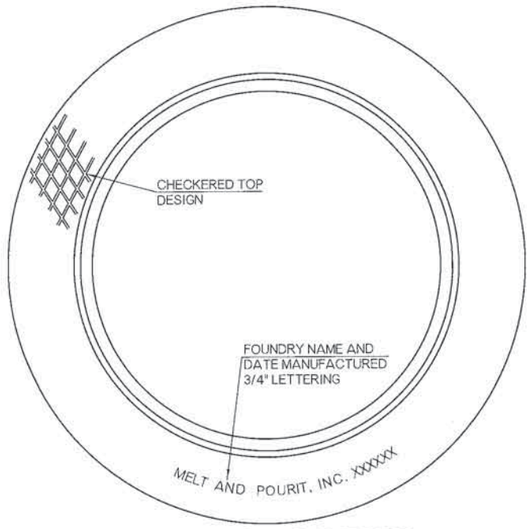
CONCRETE DROP INLETS FOR 18" TO 72" R.C. PIPES

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

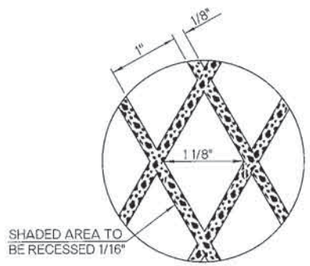
CDIP-1 | 1

R-34

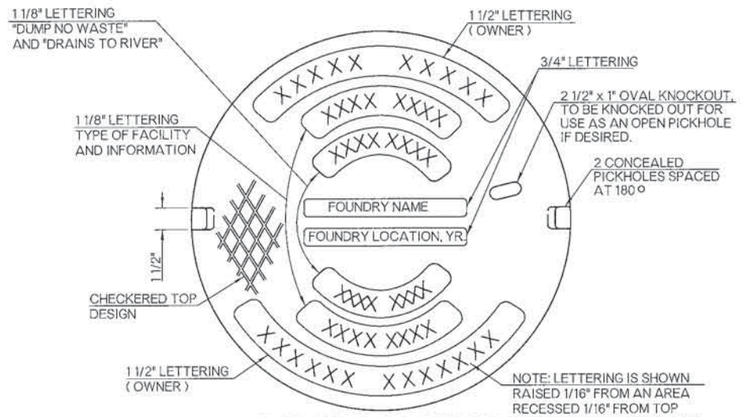
OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE



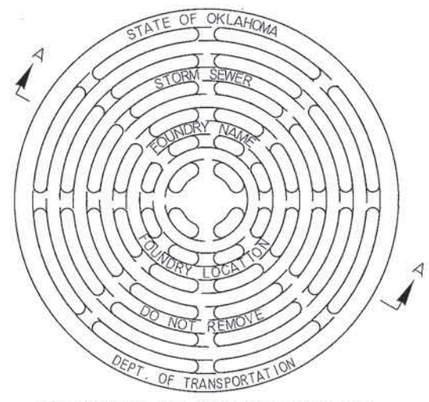
TOP SIDE OF FRAME FOR OUT OF PAVING INSTALLATION



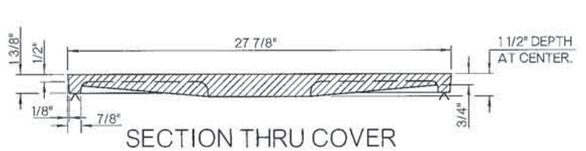
CHECKERED DESIGN DETAIL



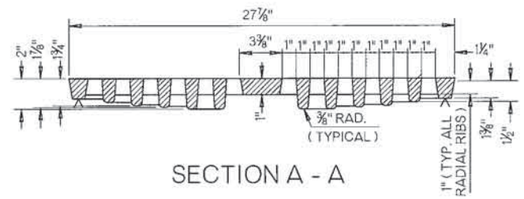
TOP SIDE OF COVER



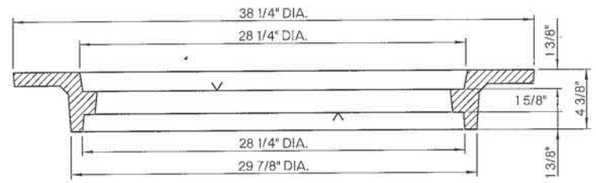
TOP SIDE OF COVER GRATE



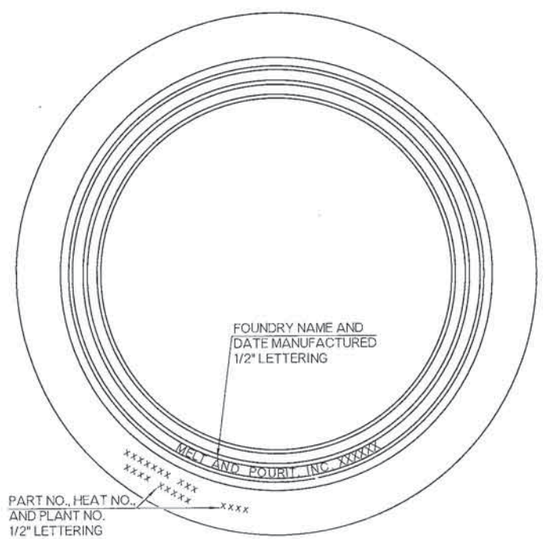
SECTION THRU COVER



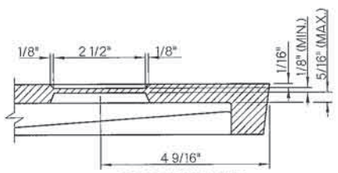
SECTION A - A



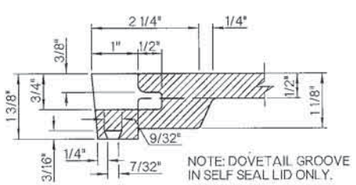
REVERSIBLE FRAME



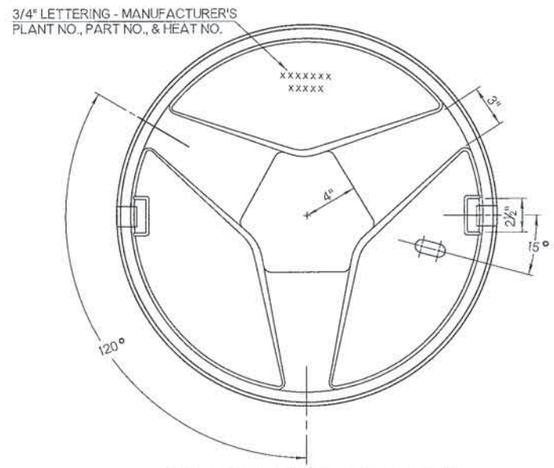
TOP SIDE OF FRAME FOR IN PAVING INSTALLATION



SECTION THRU OVAL KNOCKOUT



SECTION THRU PICKHOLE



BOTTOM SIDE OF COVER

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. COVERS WILL BE FURNISHED WITH A PLAIN SEAT, UNLESS A SELF-SEAL SEAT OR A LOCKING DEVICE IS SPECIFIED IN THE PLANS.
3. LETTERING TO DENOTE OWNERSHIP AND TYPE OF USAGE WILL BE AT THE DISCRETION OF THE OWNER.
4. FRAMES AND COVERS SHALL BE CAST STEEL, DUCTILE IRON, OR GRAY IRON CONFORMING TO SECTION 725 OF THE SPECIFICATIONS.
5. MANHOLE FRAMES, COVERS AND COVER GRATES INSTALLED DURING ORIGINAL CONSTRUCTION SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE OF THE ORIGINAL MANHOLE.

NOTE: MACHINING (SYMBOL ^) MAY BE ACCOMPLISHED BY MILLING OR BY LEVEL GRINDING.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
611 (C)	REPLACEMENT OF MANHOLE FRAME AND COVER	EA
611 (D)	REPLACEMENT MANHOLE FRAME	EA
611 (E)	REPLACEMENT OF MANHOLE COVER	EA
611 (F)	REPLACEMENT OF MANHOLE COVER GRATE	EA

APPROVED BY ROADWAY ENGINEER: Calista F. K DATE 04/16/15

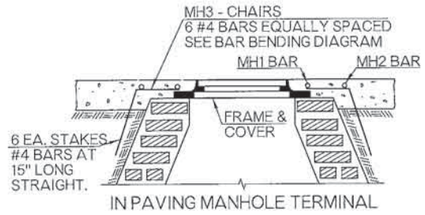
ROADWAY DESIGN DIVISION STANDARD

ODOT

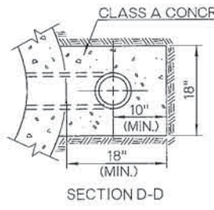
MANHOLE FRAME AND COVER

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

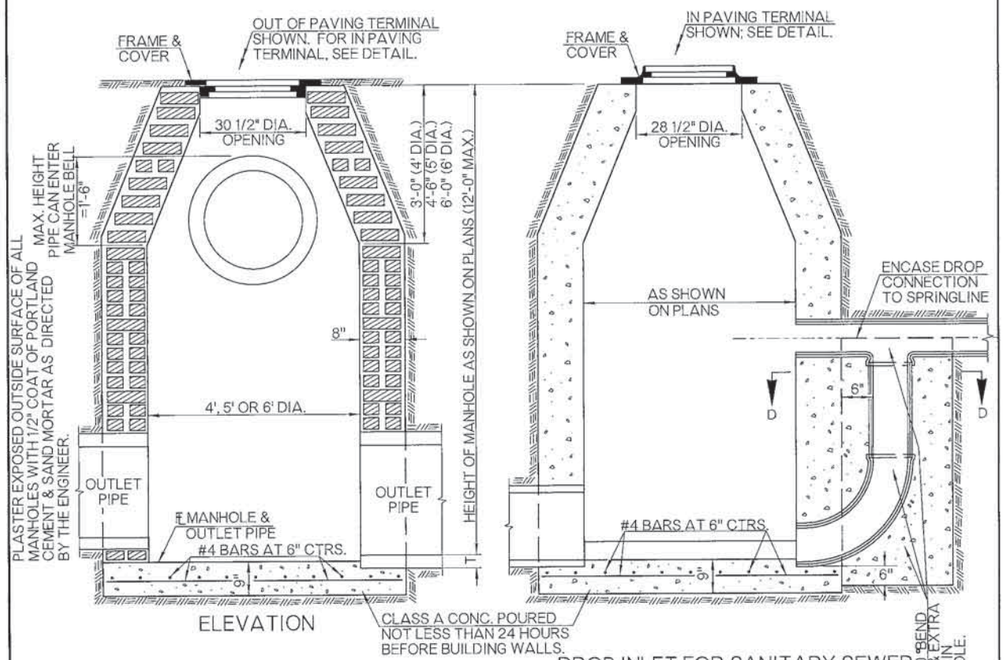
MFC-4	1
	R-42



IN PAVING MANHOLE TERMINAL



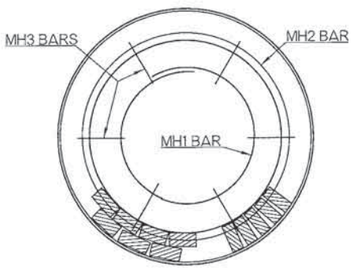
SECTION D-D



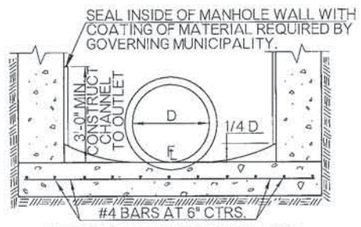
ELEVATION

DROP INLET FOR SANITARY SEWER
WHERE DIFFERENCE IN FLOW LINES IS 4' AND OVER

NOTE: ALL SANITARY SEWER MANHOLES SHALL BE CONSTRUCTED ONLY OF CLASS A CONCRETE OR PRECAST CONCRETE UNITS. TYPICAL BRICK MASONRY CONSTRUCTION MAY BE USED FOR STORM SEWER MANHOLES, CURB INLETS AND JUNCTION BOXES.



PLAN WITH SECTION
(FRAME REINFORCING SHOWN)

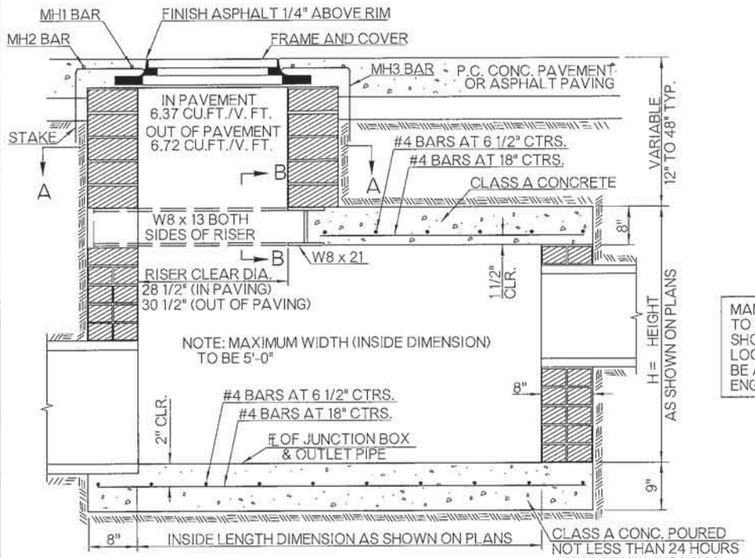


SECTION AT BOTTOM OF SANITARY SEWER MANHOLE

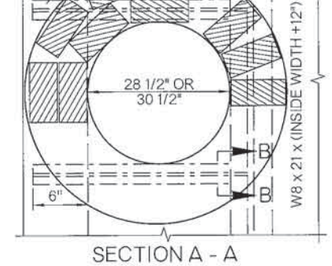
BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
611 (A)	MANHOLE (▼DIA.)	EA
611 (B)	ADDITIONAL DEPTH IN MANHOLE (▼DIA.)	VF

▼DIAMETER SHALL BE SPECIFIED (SEE PAY ITEM LIST)

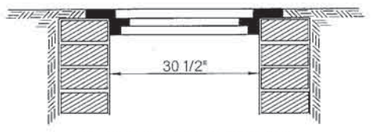
STANDARD MANHOLES



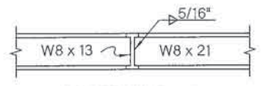
SECTION THRU JUNCTION BOX
(SHOWN IN PAVING WITH RISER)



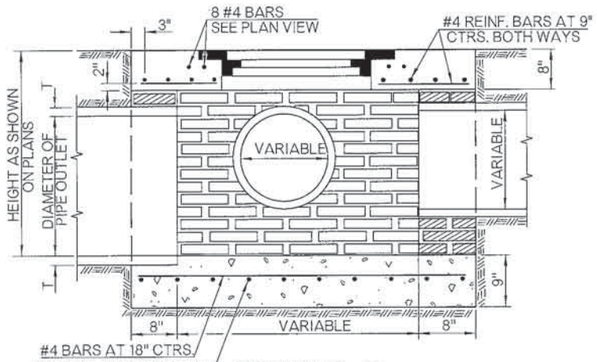
SECTION A - A



JUNCTION BOX RISER
OUT OF PAVING



SECTION B - B

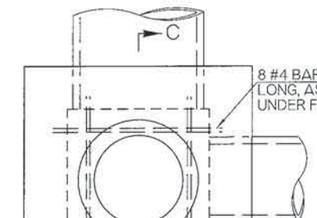


SECTION C - C
DETAIL OF JUNCTION BOX
(SHOWN OUTSIDE OF PAVING AND NO RISER)

STANDARD JUNCTION BOXES

OKLAHOMA DEPARTMENT OF TRANSPORTATION

STANDARD REVISIONS	
DESCRIPTION	DATE



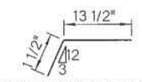
PLAN

MANHOLE FRAME & COVER TO BE USED ONLY WHEN SHOWN IN SUMMARIES. LOCATION OF FRAME TO BE AS DIRECTED BY THE ENGINEER.

JUNCTION BOX TO HAVE INSIDE DIMENSIONS AND HEIGHT SHOWN IN THE PLANS.

DEDUCTIONS FOR PIPE OPENING	
PIPE DIA.	VOLUME (CU. FT.)
18"	1.92
24"	3.24
30"	4.93
36"	6.97
42"	9.36
48"	12.11
54"	15.21
60"	18.66
66"	22.47
72"	26.62
78"	31.45
84"	36.36
90"	41.63

MH1 AND MH2 #4 BAR
FOR MANHOLE & JUNCTION BOX RISERS IN PAVING.



MH3 #4 BAR (CHAIR)

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. ALL MANHOLES SHALL BE 4 FOOT DIAMETER UNLESS A LARGER DIAMETER IS REQUIRED.
3. FOR DETAILS OF FRAME AND COVER, SEE ROADWAY STANDARD MFC-4.
4. CAST-IN-PLACE CONCRETE WALLS WITH THE SAME DIMENSIONS SHOWN ON THIS STANDARD, MAY BE USED IN LIEU OF THE BRICK MASONRY. CAST-IN-PLACE WALLS EXCEEDING 5 FEET IN DEPTH (GUTTERLINE TO FLOWLINE), WILL REQUIRE NO. 4 REINFORCING BARS SPACED AT 30 INCH CTRS. VERTICALLY AND 12 INCHES CTRS. HORIZONTALLY.
5. WHERE A MORTAR COAT IS REQUIRED IT SHALL BE 1/2" THICK AND SHALL BE APPLIED WHILE BRICK MASONRY IS CLEAN AND DAMP.
6. MANHOLES UP TO 5 FEET IN HEIGHT, SHALL BE PAID FOR AS 'MANHOLE' (EA.). ANY ADDITIONAL HEIGHT OF MANHOLE SHALL BE PAID FOR AS 'ADDITIONAL DEPTH IN MANHOLE' (VF).
7. JUNCTION BOX WALL CONSTRUCTION SHALL BE MEASURED BY CF OF WALL MATERIAL AND TO BE PAID FOR AS 'JUNCTION BOXES' (CF). DEDUCTIONS IN VOLUME WILL BE MADE FOR ALL PIPE OPENINGS 18 INCHES IN DIAMETER AND LARGER (SEE TABLE). COST OF FRAME & COVER SHALL BE INCLUDED IN COST OF JUNCTION BOX.
8. REINFORCING STEEL AND STRUCTURAL STEEL, WILL BE INCLUDED AS PART OF THE COST OF THE STRUCTURE COMPLETE, AND WILL NOT BE MEASURED AS A PAY ITEM.

OPTIONAL PRECAST MANHOLE & JUNCTION BOXES

9. WHEN PRECAST STORM SEWER OR JUNCTION BOX UNITS ARE SUBSTITUTED FOR BRICK MASONRY OR CAST-IN-PLACE UNITS:
   A. THE MATERIAL COMPONENTS SHALL MEET AASHTO DESIGNATION M 199, AND SHOP DRAWINGS SHALL BE SUBMITTED TO ODOT FOR APPROVAL.
   B. ALL LIFT HOLES SHALL BE SEALED WITH FIRMLY PACKED MIXTURE OF CEMENT AND SAND GROUT.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
▲ 509 (C)	CLASS A CONCRETE, SMALL STRUCTURES	CY
611 (L)	JUNCTION BOXES	CF

▲ FOR QUANTITIES OF CLASS A CONCRETE LESS THAN 20.0 CY

APPROVED BY ROADWAY ENGINEER: Caleb F. H DATE: 04/10/15

ROADWAY DESIGN DIVISION STANDARD

MANHOLES AND JUNCTION BOXES

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

MJB-3 | 1

R-43

OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE

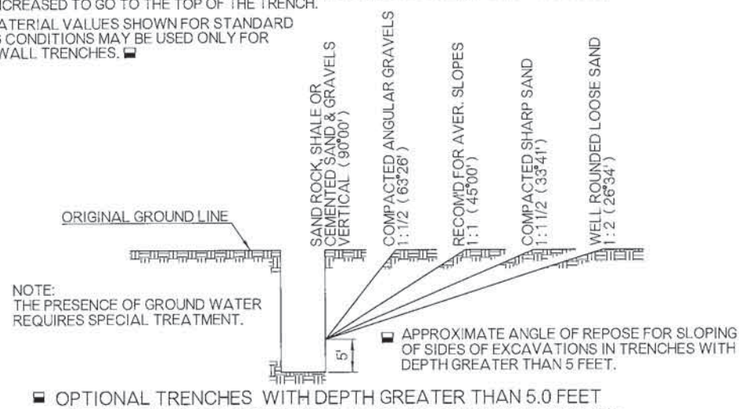
TRENCHING DIMENSIONS AND STANDARD BEDDING MATERIAL QUANTITIES

	PIPE DIAM. OR DESIGN EQUIV.	H ■	T	SINGLE PIPE STANDARD TRENCHING W	SINGLE PIPE STANDARD TRENCHING STANDARD BEDDING MATERIAL ■	DOUBLE PIPE STANDARD TRENCHING W	DOUBLE PIPE STANDARD TRENCHING STANDARD BEDDING MATERIAL ■	TRIPLE PIPE STANDARD TRENCHING W	TRIPLE PIPE STANDARD TRENCHING STANDARD BEDDING MATERIAL ■	SPECIAL TRENCHING SINGLE, DOUBLE & TRIPLE PIPE OPTIONS W+12" ADD'L STANDARD BEDDING MATERIAL
	IN.	FT.	FT.	FT.	CY/LF	FT.	CY/LF	FT.	CY/LF	CY/LF
ROUND PIPE	18	3.25	0.208	3.17	0.274	5.67	0.468	8.17	0.663	0.120
	24	3.83	0.25	4.00	0.386	7.00	0.629	10.00	0.873	0.142
	30	4.42	0.292	4.58	0.474	8.33	0.811	12.08	1.146	0.163
	⊠ 36	5	0.333	6.17	0.751	10.67	1.193	15.17	1.636	0.185
	⊠ 42	5.58	0.375	6.75	0.870	12.00	1.429	17.25	1.989	0.207
	⊠ 48	6.17	0.417	7.33	0.996	13.33	1.688	19.33	2.379	0.228
	⊠ 54	6.75	0.458	7.92	1.126	14.67	1.960	21.42	2.794	0.250
	⊠ 60	7.33	0.5	9.50	1.532	17.00	2.521	24.50	3.510	0.271
	⊠ 66	8.08	0.542	10.08	1.757	18.33	2.965	26.58	4.173	0.299
	⊠ 72	8.67	0.583	10.67	1.931	19.67	3.327	28.67	4.724	0.321
	⊠ 78	9.25	0.625	11.25	2.107	20.75	3.615	30.25	5.122	0.343
	⊠ 84	9.83	0.667	11.83	2.288	21.83	3.908	31.83	5.529	0.364
	⊠ 90	10.42	0.708	12.42	2.479	22.92	4.219	33.42	5.959	0.386
	⊠ 96	11	0.75	13.00	2.671	24.00	4.527	35.00	6.383	0.407
ARCH PIPE	18	2.88	0.208	3.50	0.271	6.33	0.471	9.17	0.671	0.106
	21	3.08	0.229	4.12	0.338	7.29	0.567	10.46	0.796	0.114
	24	3.33	0.250	4.38	0.374	7.75	0.624	11.13	0.874	0.123
	30	3.79	0.291	6.10	0.603	10.13	0.915	14.16	1.227	0.140
	36	4.20	0.333	6.81	0.700	11.67	1.097	16.53	1.493	0.156
	42	4.69	0.375	7.50	0.813	13.17	1.308	18.83	1.802	0.173
	⊠ 48	5.17	0.416	9.21	1.180	15.71	1.842	22.21	2.504	0.191
	⊠ 54	5.58	0.458	9.83	1.243	17.05	1.946	24.28	2.649	0.207
	⊠ 60	6.08	0.500	10.58	1.392	18.69	2.228	26.81	3.064	0.225
	⊠ 66	6.75	0.542	11.00	1.488	19.56	2.365	28.11	3.242	0.250
	⊠ 72	7.00	0.583	12.00	1.690	21.78	2.803	31.55	3.917	0.259
	⊠ 78	7.83	0.625	12.42	1.854	22.64	3.071	32.86	4.288	0.272
	⊠ 84	7.83	0.667	13.33	1.983	24.67	3.385	36.00	4.788	0.290
	⊠ 90	8.92	0.708	14.50	2.382	27.08	4.131	39.67	5.881	0.330
	⊠ 96	9.46	0.750	15.17	2.625	28.33	4.549	41.50	6.473	0.350
HORIZONTAL ELLIPTICAL PIPE	18	2.96	0.229	3.62	0.282	6.54	0.487	9.46	0.691	0.109
	24	3.46	0.27	4.54	0.387	8.04	0.640	11.54	0.893	0.128
	30	3.96	0.312	6.29	0.629	10.51	0.954	14.74	1.28	0.147
	36	4.50	0.375	7.00	0.743	12.00	1.153	17.00	1.564	0.167
	⊠ 42	5.00	0.416	7.75	0.862	13.64	1.379	19.53	1.896	0.185
	⊠ 48	5.42	0.458	9.42	1.170	16.08	1.788	22.75	2.406	0.200
	⊠ 54	5.92	0.5	10.17	1.311	17.72	2.050	25.28	2.789	0.219
	⊠ 60	6.42	0.541	10.92	1.478	19.36	2.368	27.81	3.259	0.238
	⊠ 66	6.91	0.583	11.58	1.626	20.81	2.648	30.03	3.67	0.256
	⊠ 72	7.41	0.625	12.33	1.807	22.44	3.004	32.56	4.201	0.275
	⊠ 78	7.91	0.667	13.00	1.962	23.89	3.305	34.78	4.649	0.293
	⊠ 84	8.58	0.708	13.75	2.239	25.53	3.850	37.31	5.462	0.318
	⊠ 90	9.00	0.75	14.42	2.364	26.83	4.062	39.25	5.759	0.333
	⊠ 96	9.5	0.791	15.17	2.570	28.25	4.408	41.33	6.245	0.352

NOTE: QUANTITIES FOR 66" & 78" EQUIV. DIAM. ARCH PIPE BASED ON METAL PIPE & ESTIMATED WALL THICKNESS.

■ FOR PIPES UNDER PAVEMENT, THE H DIMENSION AND THE STANDARD BEDDING MATERIAL QUANTITY, SHALL BE INCREASED TO GO TO THE TOP OF THE TRENCH.

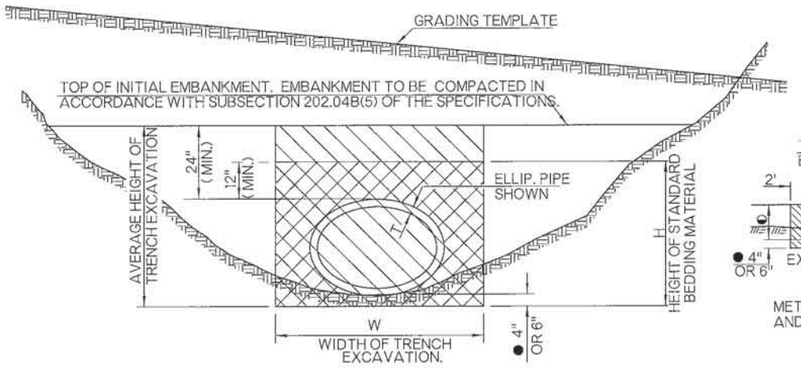
▨ BEDDING MATERIAL VALUES SHOWN FOR STANDARD TRENCHING CONDITIONS MAY BE USED ONLY FOR VERTICAL WALL TRENCHES. ⬓



⬓ APPROXIMATE ANGLE OF REPOSE FOR SLOPING OF SIDES OF EXCAVATIONS IN TRENCHES WITH DEPTH GREATER THAN 5 FEET.

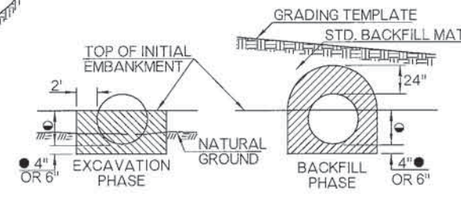
⬓ OPTIONAL TRENCHES WITH DEPTH GREATER THAN 5.0 FEET

EXCAVATION AND BEDDING MATERIAL WILL BE MEASURED AND PAID FOR AS IF SHEETING & SHORING WAS USED. (SPECIAL TRENCHING=STD. WIDTH TRENCH+12")



METHOD NO. 1

◒ EMBANKMENT HEIGHT PRIOR TO EXCAVATION
PIPE SIZES FROM 18" TO 42" =30"
PIPE SIZES FROM 48" TO 84" =2/3 DIAM.
PIPE SIZES LARGER THAN 84" =60"

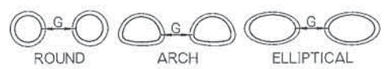


METHOD NO. 1 PAY QUANTITIES WILL BE CALCULATED AND PAID FOR WHEN METHOD NO. 2 IS USED.

METHOD NO. 2
(OPTIONAL INSTALLATION FOR R. C. PIPE)

TRENCH EXCAVATION IN EMBANKMENT SECTIONS

	CONDUIT SHAPE			DIST.
	ROUND	ARCH	ELLIPTICAL	G
FOR DIA. OR SPAN	UP TO 24"	UP TO 36"	UP TO 36"	12"
	25" TO 72"			D/2"
		37" TO 108"	37" TO 108"	D/3"
	OVER 73"	OVER 108"	OVER 108"	36"

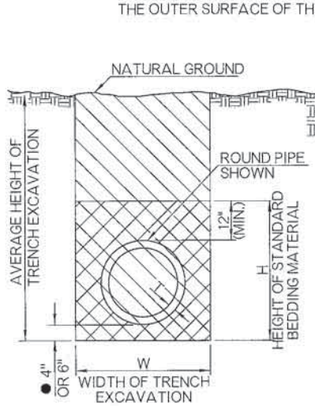


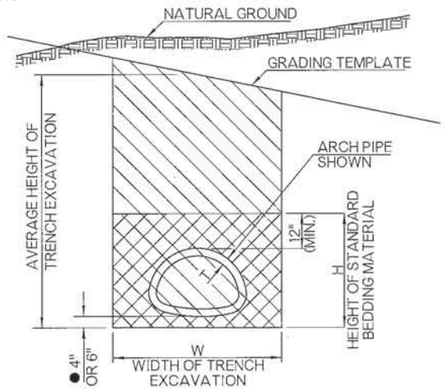
DOUBLE PIPE INSTALLATION
(USED WITH CET END TREATMENTS)

LIMITS OF STANDARD BEDDING MATERIAL

QUANTITIES FOR BEDDING MATERIAL DO NOT INCLUDE THE SPACE WITHIN AND BOUNDED BY THE OUTER SURFACE OF THE PIPE CONDUIT.

LIMITS OF TRENCH EXCAVATION





TRENCH EXCAVATION IN CUT SECTIONS

TABLE OF EQUIVALENT PIPES

EQUIV. DIA.	REINF. CONC. ARCH PIPE	STEEL ARCH PIPE	ALUMINUM ARCH PIPE	REINF. CONC. ELLIPTICAL PIPE ◑
18"	22" x 13"	21" x 15"	21" x 15"	14" x 23"
21"		24" x 18"	24" x 18"	
24"	28" x 18"	28" x 20"	28" x 20"	19" x 30"
27"				22" x 34"
30"	36" x 22"	35" x 24"	35" x 24"	24" x 38"
36"	43" x 26"	42" x 29"	42" x 29"	29" x 45"
42"	51" x 31"	49" x 33"	49" x 33"	34" x 53"
48"	58" x 36"	57" x 38"	57" x 38"	38" x 60"
54"	65" x 40"	64" x 43"	64" x 43"	43" x 68"
60"	73" x 45"	71" x 47"	71" x 47"	48" x 76"
66"		77" x 52"	77" x 52"	53" x 83"
72"	88" x 54"	83" x 57"	83" x 57"	58" x 91"
78"		87" x 63"	92" x 65" ▲	63" x 98"
84"	102" x 62"	95" x 67"	95" x 67" ▲	68" x 106"
90"	115" x 72"	103" x 71"	103" x 71" ▲	72" x 113"
96"	122" x 77"	112" x 75"	112" x 75" ▲	77" x 121"

▲ STRUCTURAL PLATE ARCH.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. TRENCH EXCAVATION AND BEDDING MATERIAL WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS OF SIDE DRAINS UNLESS OTHERWISE NOTED ON THE PLANS.
3. FOR PIPE UNDERDRAIN INSTALLATIONS, SEE ROADWAY STANDARD PUD-3.
4. ⬓ SPECIAL TRENCHING CONDITIONS ARE THOSE AS DEFINED BY O.S.H.A. REGULATIONS, TITLE 29 CFR CHAPTER XVII, PART 1926.650, 1926.651 & 1926.652, SO DEFINED WILL APPLY UNTIL THEY ARE IN CONFLICT WITH CURRENT SPECIFICATIONS, FOR TRENCH DEPTHS OVER FIVE FEET. WHERE O.S.H.A. REGULATIONS FOR SPECIAL TRENCHING ARE APPLIED, QUANTITIES AND DIMENSIONS FOR SPECIAL TRENCHING WILL BE USED FOR COMPUTING QUANTITIES. SEE TABLE OF TRENCHING DIMENSIONS AND STANDARD BEDDING MATERIAL QUANTITIES.
5. NORMAL BACKFILLING OPERATIONS SHALL FOLLOW BEDDING AND PIPE INSTALLATION AS CLOSELY AS PRACTICAL. IN NO CASE SHALL A PIPE INSTALLATION SUBJECT TO SUDDEN FLOW DEVELOPMENT BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT AND PREVENT JOINT SEPARATION AND/OR PIPING SCOUR. PHYSICALLY RESTRAINING THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKFILL REQUIREMENT.
6. ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF, BY HIM, IN A MANNER APPROVED BY THE ENGINEER.
7. ○ STANDARD BEDDING QUANTITIES FOR ROUND PIPE ARE BASED ON AASHTO DESIGNATED CLASS III (WALL B) REINFORCED CONCRETE PIPE.
8. ⬓ WHEN REQUIRED, THE SIDES OF THE TRENCHES SHALL BE SHEETED AND SHORED OR OTHERWISE SUPPORTED WHEN THE TRENCH IS MORE THAN 5.0 FEET IN DEPTH. IN LIEU OF SHEETING, THE SIDES OF THE TRENCH ABOVE THE 5.0 FOOT LEVEL MAY BE SLOPED TO PRECLUDE COLLAPSE, SEE OPTIONAL TRENCHES DETAIL THIS SHEET.
9. ⊠ PROPER COMPACTION OF BACKFILL REQUIRES A VERTICAL WALLED TRENCH TO 24 INCHES ABOVE TOP OF PIPE, REGARDLESS OF EXCAVATION ABOVE THAT ELEVATION.
10. ● EQUIVALENT PIPE SIZES 66 INCHES AND LARGER REQUIRE 6 INCHES OF BEDDING MATERIAL BELOW PIPE CONDUIT.
11. ◑ ELLIPTICAL PIPE DIMENSIONS CONFORM TO AASHTO M 207, AS DESIGNATED RISE BY SPAN.
12. FOR COMPUTING TRENCH EXCAVATION & STANDARD BEDDING QUANTITIES, THE LENGTH OF THE CULVERT SHALL INCLUDE END SECTION AND END TREATMENT LENGTHS.
13. MULTIPLE PIPE INSTALLATIONS WILL REQUIRE A MINIMUM OF 12" BETWEEN PIPES FOR PROPER COMPACTION.

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
613 (R)	STANDARD BEDDING MATERIAL, CLASS A	CY
613 (S)	STANDARD BEDDING MATERIAL, CLASS B	CY
613 (T)	STANDARD BEDDING MATERIAL, CLASS C	CY
613 (V)	TRENCH EXCAVATION	CY

APPROVED BY ROADWAY ENGINEER: Caleb F. H DATE 04/16/15

ROADWAY DESIGN DIVISION STANDARD

STANDARD PIPE INSTALLATION

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

SPI-4 | 1

R-47

OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE

TABLE OF TRENCHING AND STANDARD BEDDING MATERIAL QUANTITIES

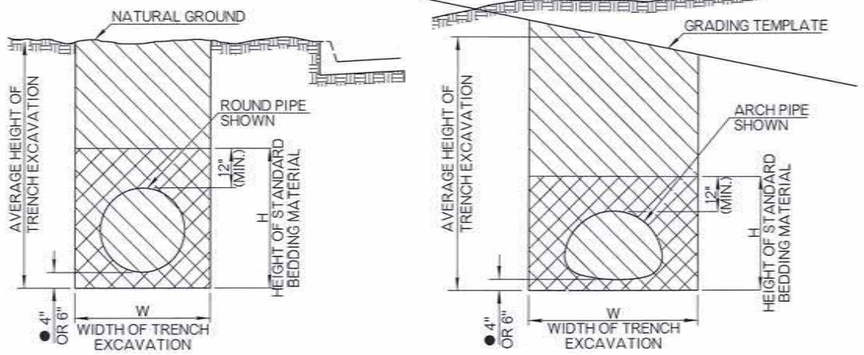
	PIPE DIAM. OR DESIGN EQUIV.	H ■	SINGLE PIPE INSTALLATION		DOUBLE PIPE INSTALLATION		TRIPLE PIPE INSTALLATION		CLEAR SPACE BETWEEN PIPES
			W	STANDARD BEDDING MATERIAL ■	W	STANDARD BEDDING MATERIAL ■	W	STANDARD BEDDING MATERIAL ■	
		FT.	FT.	CY/LF	FT.	CY/LF	FT.	CY/LF	INCHES
◈ ROUND PIPE	18"	3.10	3.20	0.28	6.10	0.52	9.00	1.00	14
	24"	3.60	4.00	0.39	7.70	0.73	11.40	1.50	17
	30"	4.20	4.80	0.51	9.30	0.97	13.80	2.15	20
	36"	4.75	5.50	0.63	10.80	1.23	16.20	2.85	23
	42"	5.30	7.00	0.92	13.20	1.67	19.30	3.80	26
	48"	6.20	7.50	1.03	14.75	2.00	21.70	4.70	29
	54"	6.20	8.00	1.20	15.30	2.20	22.70	5.10	32
	60"	6.75	9.50	1.60	17.60	2.75	25.90	6.30	35
	66"	7.20	10.00	1.70	18.80	3.10	27.70	7.35	38
METAL ARCH PIPE	18"	2.80	3.20	0.27	6.20	0.52	9.20	0.77	14
	24"	3.25	4.00	0.38	7.83	0.74	11.67	1.09	17
	30"	3.60	5.50	0.57	10.20	1.03	14.87	1.49	20
	36"	4.00	6.25	0.69	11.75	1.27	17.25	1.84	23
	42"	4.40	7.00	0.82	13.33	1.53	19.66	2.24	26
	48"	4.80	8.10	1.02	15.35	1.88	22.60	2.75	29
	54"	5.25	9.50	1.32	17.58	2.36	25.66	3.40	32
	60"	5.60	10.00	1.40	18.92	2.62	27.84	3.82	35
	66"	6.00	10.90	1.63	20.65	3.00	30.40	4.39	38

■ FOR PIPES UNDER PAVEMENT, THE H DIMENSION AND THE STANDARD BEDDING MATERIAL QUANTITY, SHALL BE INCREASED TO GO TO THE TOP OF THE TRENCH.

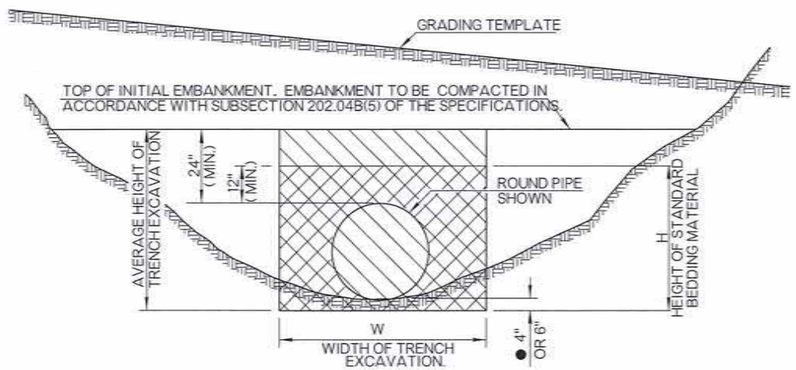
TABLE OF FILL HEIGHTS

	PIPE SIZE		MINIMUM COVER OVER TOP OF PIPE (BUOYANCY)	MAXIMUM COVER		MINIMUM METAL PIPE GAGE REQUIREMENT	
	POLYETH. ROUND	EQUIVALENT METAL ARCH		POLYETHYLENE	METAL	UNDER PAVEMENT	ALL OTHERS
ROUND PIPE	18"	21" x 15"	15"	10'	REFER TO RDY. STANDARD FHTMPP-1	14 ◒	REFER TO RDY. STANDARD FHTMPP-1
	24"	28" x 20"	20"	10'		14 ◒	
	30"	35" x 24"	25"	10'		14 ◒	
	36"	42" x 29"	30"	10'		14	
	42"	49" x 33"	35"	10'		12	
	48"	57" x 38"	40"	10'		12	
	54"	64" x 43"	45"	10'		12	
	60"	71" x 47"	50"	10'		10	
	66"	77" x 52"	55"	N/A		10	

◒ UNDER PAVEMENT IS DEFINED TO INCLUDE ALL P.C. OR A.C. SURFACING UNDER MAINLINE TRAFFIC AND MAJOR STREET RETURNS. A MINIMUM PIPE GAGE OF 16 MAY BE USED FOR INSTALLATIONS REQUIRING 30 INCH EQUIVALENT ROUND CONDUITS (MAX.) AND LIMITED TO LOW VOLUME COUNTY OR OFF-SYSTEM ROADS, MINOR STREET RETURNS, DRIVEWAYS OR TEMPORARY DETOURS, AS APPROVED BY THE ENGINEER.



TRENCH EXCAVATION IN CUT SECTIONS



TRENCH EXCAVATION IN EMBANKMENT SECTIONS

LIMITS OF STANDARD BEDDING MATERIAL. QUANTITIES FOR BEDDING MATERIAL DO NOT INCLUDE THE SPACE WITHIN AND BOUNDED BY THE OUTER SURFACE OF THE PIPE CONDUIT.

LIMITS OF TRENCH EXCAVATION.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. TRENCH EXCAVATION & STANDARD BEDDING WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS ON SIDE DRAINS UNLESS OTHERWISE SPECIFIED ON THE PLANS.
3. TRENCH EXCAVATION WILL BE PAID FOR ON PIPE UNDERDRAIN. SEE ROADWAY STANDARD PUD-3.
4. TRENCHING REQUIREMENTS FOR DEPTHS OVER 5 FEET SHALL BE IN ACCORDANCE WITH, & DEFINED BY, O.S.H.A. REGS., TITLE 29 CFR, STANDARDS 1926.650, 1926.651 & 1926.652.
5. NORMAL BACKFILLING OPERATIONS SHALL FOLLOW BEDDING AND PIPE INSTALLATION AS CLOSELY AS PRACTICAL. IN NO CASE SHALL A PIPE INSTALLATION SUBJECT TO SUDDEN FLOW DEVELOPMENT BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT AND PREVENT JOINT SEPARATION AND/OR PIPING SCOUR. PHYSICALLY RESTRAINING THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKFILL REQUIREMENT.
6. ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF, BY HIM, IN A MANNER APPROVED BY THE ENGINEER.
7. INSTALLATION OF FLEXIBLE PIPE SHALL CONFORM TO SECTION 26 - DIVISION II OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
8. JOINTS IN METAL PIPES SHALL CONFORM TO SECTION 26.4.2.4 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES. IF A WATERTIGHT JOINT IS SPECIFIED ON THE PLANS, A 12" WIDE BY 3/4" THICK NEOPRENE SLEEVE GASKET MEETING ASTM D1056 REQUIREMENT SHALL BE USED.
9. JOINTS IN CORRUGATED POLETHYLENE PIPES SHALL CONSIST OF A GASKETED SYSTEM WHICH CAN PASS MINIMUM OF 2 PSI HYDROSTATIC TEST WITHOUT LEAKAGE AND CONFORM TO AASHTO M 294▲& SECTION 26.4.2.4 OF AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES. GASKET MATERIAL SHALL CONFORM TO EITHER ASTM D1056 OR ASTM F477 REQUIREMENTS. SIDE DRAINS ARE EXCLUDED FROM THE LEAKAGE RESISTANCE REQUIREMENTS UNLESS OTHERWISE SPECIFIED.
10. TYPE C POLYETHYLENE PIPE SHALL BE USED ONLY IN SIDE-DRAIN & SLIPLINING APPLICATIONS.

◈ 11. STANDARD BEDDING MATERIAL QUANTITIES ARE BASED ON THE TRENCH WIDTH (W), TRENCH HEIGHT (H) AND EFFECTIVE DIAMETER (D) OF ROUND CORRUGATED POLYETHYLENE PIPE MEETING THE REQUIREMENTS OF AASHTO M 294 (18"-60").

▲ 12. SPLIT COLLAR COUPLERS ARE NOT APPROVED FOR USE IN ALL CORRUGATED POLYETHYLENE PIPE INSTALLATIONS.

● 13. EQUIVALENT PIPE SIZES 66 INCHES AND LARGER REQUIRE 6 INCHES OF BEDDING MATERIAL BELOW PIPE CONDUIT.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
613 (R)	STANDARD BEDDING MATERIAL, CLASS A	CY
613 (S)	STANDARD BEDDING MATERIAL, CLASS B	CY
613 (T)	STANDARD BEDDING MATERIAL, CLASS C	CY
613 (V)	TRENCH EXCAVATION	CY

APPROVED BY ROADWAY ENGINEER: _____ DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

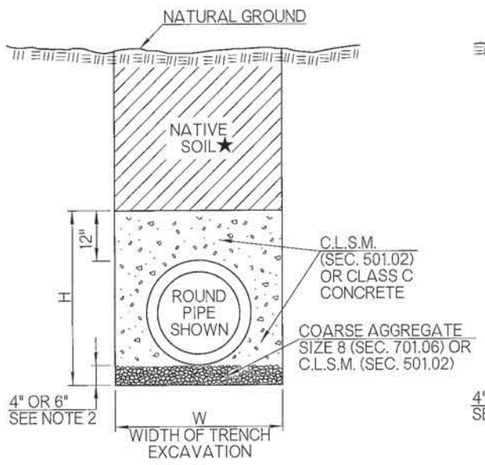
FLEXIBLE PIPE INSTALLATION

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

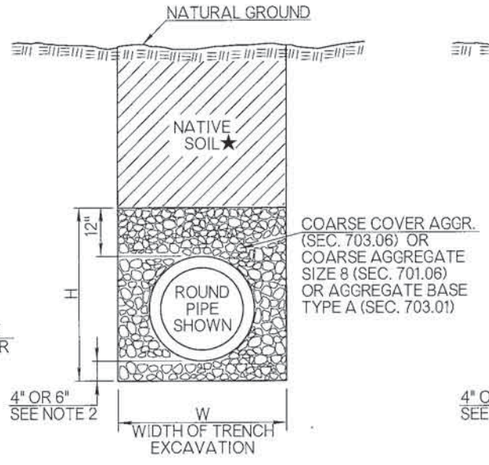
FPI-3 | 3

R-48

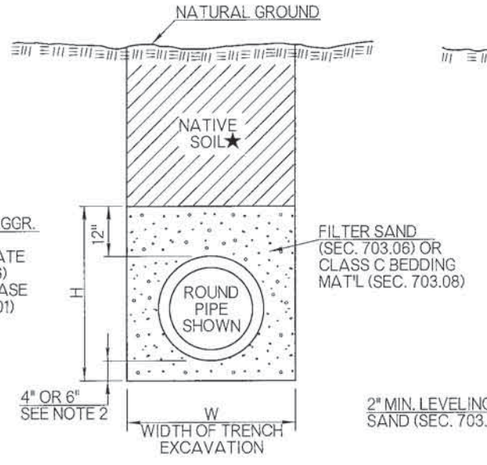
OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE



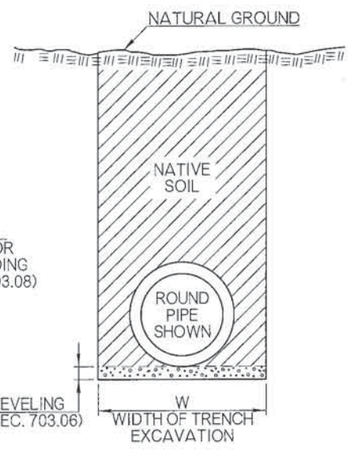
CLASS A BEDDING



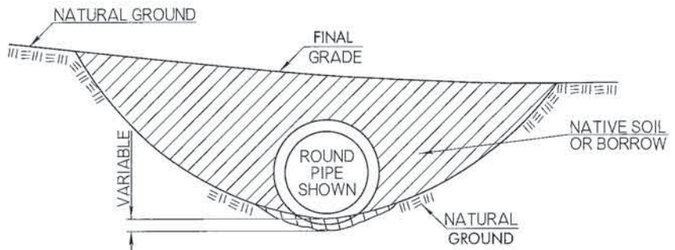
CLASS B BEDDING



CLASS C BEDDING



CLASS D BEDDING
ALTERNATE 1



NATIVE SOIL OR SAND (SEC. 703.06) MAY BE USED TO ADJUST FLOWLINE OF NATURAL DITCH TO PROVIDE SMOOTH BEDDING SURFACE FOR PIPE CONDUIT AND ATTAIN PROPER DESIGN GRADE. SEE SECTION 613.04.G

CLASS D BEDDING
ALTERNATE 2

PIPE BEDDING CLASS/DESIGN TABLE							
	■ UNDER PAVING				OUTSIDE PAVING		
TYPE OF PIPE	CROSS DRAIN (NHS OR ADT > 6000 VPD)	CROSS DRAIN (OTHER)	STORM SEWER (NHS OR ADT > 6000 VPD)	STORM SEWER (OTHER)	CROSS DRAIN	SIDE DRAIN	STORM SEWER
REINFORCED CONCRETE PIPE	B	C	B	C	C	D	C
CORRUGATED GALV. STEEL PIPE (CGSP)	NA	B	NA	B	C	D	C
MILL PRECOATED CGSP	NA	B	NA	B	C	D	C
CORRUGATED GALV. STRUCT. PLATE	NA	B	NA	B	C	D	C
ALUMINIZED TYPE II CSP	NA	B	NA	B	C	D	C
CORRUGATED POLYETHYLENE / PVC	NA	A	NA	A	B	B	B
POLYVINYL CHLORIDE (SC 40/80 PVC)	NA	NA	NA	NA	NA	NA	NA
POLYPROPYLENE PIPE (PP) ▲	NA	B	NA	B	C	D	C

■ WHEN THERE IS ANY POSSIBILITY OF THE PAVEMENT BEING WIDENED DURING THE LIFE OF THE DRAINAGE STRUCTURE, THE BEDDING SHALL MEET THE 'UNDER PAVING SECTION' CRITERIA FOR THE FULL EXTENT OF ANY ANTICIPATED EXPANSION TO THE FACILITY.

▲ BACKFILL WITH A MINIMUM OF TWO (2) FEET OF APPROVED BACKFILL MATERIAL.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. EQUIVALENT PIPE SIZES 66 INCHES AND LARGER REQUIRE 6 INCHES OF BEDDING MATERIAL BELOW PIPE CONDUIT.
3. NATIVE SOIL FOR BACKFILL, TO BE COMPACTED IN ACCORDANCE WITH SECTION 202.04 OF THE STANDARD SPECIFICATIONS.
4. A BETTER CLASS OF BEDDING MAY BY SUBSTITUTED FOR THE NEXT LOWER CLASS. EXAMPLE: CLASS A STANDARD BEDDING CAN BE USED IN LIEU OF CLASS B STANDARD BEDDING.
5. FOR TRENCH WIDTH (W), BEDDING HEIGHT (H), PIPE DATA, MULTIPLE PIPE SPACING & BEDDING DATA, SEE ROADWAY STANDARDS SPI-4 & FPI-3.
6. DATA TABLE WILL DISPLAY 'NA' WHEN PIPE MATERIALS ARE NOT ALLOWED.
7. STANDARD BEDDING CLASS D MATERIAL(S) (ALTERNATE 1) WILL BE CONSIDERED AS INCIDENTAL AND NOT BE PAID FOR SEPARATELY. COST FOR BORROW OR FILL MATERIAL, NEEDED FOR ALTERNATE 2, WILL BE INCLUDED IN THE PRICE OF THE PIPE.
8. PIPE MATERIAL(S)/PRODUCT(S) NOT SHOWN IN THE PIPE BEDDING TABLE WILL BE EVALUATED AND APPROVED ON A CASE BY CASE BASIS.
9. ALL TEMPORARY PIPES SHALL HAVE CLASS D BEDDING UNLESS OTHERWISE SHOWN IN THE PLANS.
10. BEDDING MATERIAL TYPE B, C, AND D, SHALL BE PLACED IN 6" LAYERS AND COMPACTED TO THE SPECIFIED DENSITY USING HAND OPERATED EQUIPMENT ONLY.

★11. WHEN PIPE INSTALLATION IS UNDER PAVING, IN LIEU OF BACKFILLING WITH NATIVE SOIL, PLACE BEDDING MATERIAL ALL THE WAY TO TOP OF TRENCH.

12. THE USE OF AN ALTERNATE PIPE AND ITS CORRESPONDING BEDDING MATERIAL WILL BE ACCEPTABLE PROVIDED THE CRITERIA IN THE DESIGN TABLE IS MET
13. POLYPROPYLENE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
613 (R)	STANDARD BEDDING MATERIAL, CLASS A	CY
613 (S)	STANDARD BEDDING MATERIAL, CLASS B	CY
613 (T)	STANDARD BEDDING MATERIAL, CLASS C	CY

APPROVED BY ROADWAY ENGINEER: Caleb F. A DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

STANDARD PIPE BEDDING

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

SPB-1 | 4

R-49

FULL CIRCLE STEEL PIPE CULVERT

PIPE DIAMETER FOR CORRUGATION PATTERN				MIN. COVER TOP OF PIPE TO TOP OF SUBGRADE	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE						
					EQUIV. STANDARD GAGE						
2 2/3" x 1/2"	3" x 1"	5" x 1"	6" x 2"		16	14	12	10	8	7	5
18"				12"	61'	67'	86'	90'	94'		
21"				12"	53'	57'	74'	77'	81'		
24"				12"	46'	50'	65'	68'	71'		
27"				12"	41'	44'	57'	60'	63'		
30"				12"	37'	40'	52'	54'	56'		
36"				12"	30'	33'	43'	45'	47'		
	36"			12"	53'	66'	77'	89'	100'		
42"				12"	34'	44'	46'	47'	49'		
	42"			12"	45'	56'	64'	71'	78'		
48"				12"		41'	44'	45'	46'		
	48"			12"	39'	49'	56'	61'	66'		
		48"		12"	49'	52'	56'	61'	66'		
54"				12"		36'	43'	44'	45'		
	54"			12"	35'	44'	51'	55'	58'		
		54"		12"	47'	48'	52'	55'	58'		
60"				12"			42'	43'	43'		
	60"			12"	31'	39'	49'	51'	53'		
		60"		12"	43'	46'	49'	51'	53'		
			60"	12"			46'	68'	90'	96'	106'
66"				12"				42'	43'		
	66"			12"	29'	36'	47'	48'	50'		
		66"		12"	39'	45'	47'	48'	50'		
			66"	12"			42'	62'	78'	82'	90'
72"				12"				42'	42'		
	72"			12"	26'	33'	45'	47'	48'		
		72"		12"	36'	44'	45'	47'	48'	73'	78'
			72"	12"			38'	57'	69'		
78"				12"					42'		
	78"			12"	24'	30'	44'	45'	46'		
		78"		12"	33'	42'	44'	45'	46'		
			78"	12"			35'	53'	63'	66'	70'
84"				12"					42'		
	84"			12"	22'	28'	42'	44'	45'		
		84"		12"	31'	39'	43'	44'	45'		
			84"	12"			33'	49'	59'	61'	64'
	90"			12"		26'	39'	44'	44'		
		90"		12"	29'	36'	43'	44'	44'		
			90"	12"			31'	45'	55'	57'	60'
	96"			12"		24'	36'	43'	44'		
		96"		12"		34'	43'	43'	44'		
			96"	12"			29'	43'	53'	54'	57'
	102"			24"			34'	41'	43'		
		102"		24"		32'	42'	43'	43'		
	108"			24"			32'	39'	43'		
		108"		24"			42'	42'	43'		
			108"	24"			25'	38'	49'	50'	52'
	114"			24"			31'	37'	41'		
		114"		24"			40'	42'	42'		
	120"			24"			29'	35'	39'		
		120"		24"			38'	42'	42'		
			120"	24"			23'	34'	45'	48'	49'

FULL CIRCLE ALUMINUM PIPE CULVERT

PIPE DIAMETER FOR CORRUGATION PATTERN			MIN. COVER TOP OF PIPE TO TOP OF SUBGRADE	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE				
				EQUIV. STANDARD GAGE				
2 2/3" x 1/2"	3" x 1"	6" x 1"		16	14	12	10	8
18"			12"	36'	36'	63'		
24"			12"	27'	27'	47'	50'	
27"			12"	24'	24'	42'	44'	
30"			12"	22'	21'	37'	39'	
	30"		12"	40'	50'	68'		
36"			12"		18'	32'	33'	
	36"		12"	33'	41'	57'	85'	
		36"	12"	20'				
42"			12"			54'	57'	
	42"		12"	27'	35'	48'	73'	
48"			12"			47'	49'	51'
	48"		12"	24'	30'	42'	63'	82'
54"			12"			41'	44'	45'
	54"		12"	21'	27'	37'	56'	73'
		54"	12"		29'	42'	67'	66'
60"			12"				39'	41'
	60"		12"	19'	24'	33'	24'	66'
		60"	12"		25'	37'	59'	58'
66"			12"				36'	37'
	66"		12"	14'	18'	26'	40'	51'
		66"	12"		23'	33'	53'	52'
	72"		12"		28'	27'	41'	54'
		72"	15"		19'	27'	36'	43'
	78"		15"		18'	25'	38'	50'
		78"	15"		17'	25'	32'	40'
	84"		18"		17'	23'	35'	47'
		84"	18"			23'	30'	37'
	90"		18"			21'	33'	43'
		90"	18"			21'	28'	34'
	96"		18"			20'	31'	40'
		96"	18"			19'	26'	32'
	102"		21"			18'	28'	37'
		102"	21"			18'	25'	29'
	108"		21"				27'	35'
		108"	21"			17'	23'	28'
	114"		24"				25'	34'
		114"	24"			16'	21'	26'
	120"		24"				24'	32'
		120"	24"				20'	25'

METAL PIPE ARCH - FILLS TO 10 FT. MAX.

APPROX. EQUIV. ROUND PIPE	SIZE SPAN x RISE	2 2/3" x 1/2" CORRUGATION PATTERN			
		STEEL		ALUMINUM	
		MIN. GAGE	MIN. COVER	MIN. GAGE	MIN. COVER
15"	17" x 13"	16	12"	16	12"
18"	21" x 15"	16	12"	16	12"
21"	24" x 18"	16	12"	16	12"
24"	28" x 20"	16	12"	14	12"
30"	35" x 24"	14◒	12"	14	12"
36"	42" x 29"	14	12"	12	15"
42"	49" x 33"	14	12"	12	15"
48"	57" x 38"	12	12"	10	15"
54"	64" x 43"	12	12"	10	18"
60"	71" x 47"	10	12"	8	18"
66"	77" x 52"	8	12"	8	18"
72"	83" x 57"	8	12"	8	18"
3" x 1" & 5" x 1" CORRUGATION PATTERN					
36"	40" x 31"	14	12"		
42"	46" x 36"	14	12"		
48"	53" x 41"	14	12"		
54"	60" x 46"	14	12"	14	15"
60"	66" x 51"	14	12"	14	18"
66"	73" x 55"	14	12"	14	18"
72"	81" x 59"	14	12"	12	21"
78"	87" x 63"	14	12"	12	21"
84"	95" x 67"	12	12"	12	24"
90"	103" x 71"	12	18"	10	24"
96"	112" x 75"	12	18"	10	27"
102"	117" x 79"	12	18"		
108"	128" x 83"	10	24"		
114"	137" x 87"	10	24"		
120"	142" x 91"	10	24"		

◒ WHEN INSTALLED UNDER PAVEMENT INCLUDING ALL P.C. OR A.C. SURFACING UNDER MAINLINE TRAFFIC AND MAJOR STREET RETURNS. A MINIMUM PIPE GAGE OF 16 MAY BE USED FOR INSTALLATION REQUIRING 30 INCH EQUIVALENT ROUND CONDUITS (MAX.) AND LIMITED TO LOW VOLUME COUNTY OR OFF-SYSTEM ROADS, MINOR STREET RETURNS, DRIVEWAYS OR TEMPORARY DETOURS, AS APPROVED BY THE ENGINEER.

POLY-PROPYLENE PIPE DIAMETER	MAXIMUM FILL HEIGHT OVER CULVERT (FT.) ◑			
	UNDER PAVEMENT		OUTSIDE PAVEMENT	
	95% COMPACT	90% COMPACT	Class C - 85% COMPACT	Class D - 85% COMPACT
18	25	18	16	13
24	22	16	14	12
30	23	17	13	12
36	22	16	11	11
42	22	15	11	11
48	21	15	11	10
60	23	16	11	10

◑ REFER TO ROADWAY DESIGN STANDARD SPB-1 FOR MINIMUM FILL HEIGHT AND OTHER POLYPROPYLENE INSTALLATION DETAILS.

EQUIVALENT METAL THICKNESS AND GAGE		
GAGE NUMBER	METAL THICKNESS (INCHES)	
	■ STEEL	♦ ALUMINUM
16	0.064	0.060
14	0.079	0.075
12	0.109	0.105
10	0.138	0.135
8	0.168	0.164
7	0.188	----
5	0.218	----

■ THE THICKNESS OF THE SHEET INCLUDES BOTH THE BASE STEEL AND THE COATING.

♦ THE THICKNESS SHOWN REFERS TO THE CLAD SHEET.

GENERAL NOTES

1. METAL PIPE FILL HEIGHT DESIGNS ARE BASED ON A CLASS B BEDDING, NEGATIVE PROJECTION, HS-20 LIVE LOADING AND 120 LBS/C.F. SOIL WEIGHT. POLYPROPYLENE PIPE FILL HEIGHTS ARE BASED ON AASHTO M330 FOR POLYPROPYLENE, TYPE S, PIPE WITH OUTER CORRUGATED WALL AND SMOOTH INNER WALL.
2. IN THE EVENT LOADS IN EXCESS OF HS-20 ARE TO BE OPERATED OVER OR ADJACENT TO THE PIPE INSTALLATION DURING THE CONSTRUCTION PHASE, THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A MINIMUM OF FOUR FEET OF COVER OVER THE PIPE AT WHEEL OR TRACK PATHS.
3. PROPER INSTALLATION PRACTICES MUST BE ADHERED TO AS SHOWN ON ROADWAY STANDARDS SPI-4, FPI-3 AND SPB-1. POLYPROPYLENE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321.
4. ANY PIPE DEFORMED PRIOR TO FINAL ACCEPTANCE SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE. SURFACE DISTRESS MUST BE REPAIRED TO THE SATISFACTION OF THE ENGINEER OR REPLACED AT THE CONTRACTOR'S EXPENSE.
5. MAXIMUM FILL HEIGHTS ARE MEASURED TO TOP OF SUBGRADE (OR BOTTOM OF ASPHALT OR PC PAVEMENT) FOR METAL AND POLYPROPYLENE PIPES.

APPROVED BY ROADWAY ENGINEER: Caleb F. H DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

FILL HEIGHT TABLES (METAL & POLYPROPYLENE PIPES)

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

FHTMPP-1 | 0

R-50

OKLAHOMA DEPARTMENT OF TRANSPORTATION

STANDARD REVISIONS

DESCRIPTION	DATE

OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE

REQUIRED PIPE CLASS FOR REINFORCED CONCRETE ROUND PIPE IN CUT SECTIONS

PIPE DIAMETER	●MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE												
	1' TO 2'	2' THRU 10'	12'	14'	16'	18'	20'	25'	30'	35'	40'	45'	50'
12" 15" 18"	IV III III	II II II	II II II	II II II	II II II	II II II	III II II	III III III	III III III	III III III	III III III	III III III	III III III
24" 27" 30" 36"	III II II II	II II II II	II II II III	III III III III	III III III IV	III III III IV	III III III IV	IV IV IV IV	IV IV IV IV	IV IV IV/V	IV IV IV/V	IV IV IV/V	IV IV IV/V
42" 48" 54" 60"	II II II II	II II II II	III III III III	III III III III	III III III IV	IV IV IV IV	IV IV IV IV	IV IV IV IV	IV IV IV IV/V	IV/V IV/V IV/V IV/V	V V V V	IV/V IV/V IV/V V	IV/V IV/V IV/V V
66" 72" 78" 84"	II II II II	II II II II	III III III III	III III III III	IV IV III III	IV IV IV IV	IV IV IV IV	IV IV IV IV	IV/V IV/V IV/V IV/V	IV/V IV/V IV/V IV/V	V V V V	V V V V	V V V V
90" 96" 102" 108"	II II II II	II II II II	II II II II	III III III III	III III III III	IV IV IV IV	IV IV IV IV	IV IV IV IV	IV/V IV/V IV/V IV/V	IV/V IV/V IV/V IV/V	V V V V	V V V V	V V V V

REQUIRED PIPE CLASS FOR REINFORCED CONCRETE ROUND PIPE IN FILL SECTIONS

PIPE DIAMETER	●MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE												
	1' TO 2'	2' THRU 10'	12'	14'	16'	18'	20'	25'	30'	35'	40'	45'	50'
12" 15" 18"	IV III III	II II II	III III III	III III III	IV IV IV	IV IV IV	IV IV IV	IV/V IV/V IV/V	V V V	* * *	* * *	* * *	* * *
24" 27" 30" 36"	III II II II	II II II II	III III III III	III III III III	IV IV IV IV	IV IV IV IV	IV IV IV IV	IV/V IV/V IV/V IV/V	V V V V	* * * *	* * * *	* * * *	* * * *
42" 48" 54" 60"	II II II II	II II II II	III III III II	III III III III	IV IV IV III	IV IV IV IV	IV IV IV IV	IV/V IV/V IV/V IV/V	V V V V	* * * *	* * * *	* * * *	* * * *
66" 72" 78" 84"	II II II II	II II II II	II II II II	III III III III	III III III III	IV IV IV IV	IV IV IV IV	IV/V IV/V IV/V IV/V	V V V V	V V V V	* * * *	* * * *	* * * *
90" 96" 102" 108"	II II II II	II II II II	II II II II	III III III III	III III III III	IV IV IV IV	IV IV IV IV	IV/V IV/V IV/V IV/V	V V V V	V V V V	* * * *	* * * *	* * * *

* SPECIAL DESIGN PIPE. DESIGN METHOD TO CONFORM TO CURRENT AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.

● FILL HEIGHT MEASURED FROM TOP OF PIPE TO TOP OF SUBGRADE.

REINFORCED CONCRETE ARCH/ELLIPTICAL PIPE

▲ CLASS A - III ARCH
CLASS HE - III HORIZONTAL ELLIPTICAL
CLASS VE - IVVERTICAL ELLIPTICAL

APPROXIMATE EQUIVALENT ROUND PIPE	ARCH SIZE SPAN x RISE	HORIZONTAL ELLIPTICAL SIZE RISE x SPAN	VERTICAL ELLIPTICAL SIZE RISE x SPAN	MINIMUM COVER	MAXIMUM COVER
15"	18" x 11"			12"	10'
18"	22" x 13"	14" x 23"	23" x 14"	12"	10'
24"	28" x 18"	19" x 30"	30" x 19"	12"	10'
30"	36" x 22"	24" x 38"	38" x 24"	12"	10'
36"	43" x 26"	29" x 45"	45" x 29"	12"	10'
42"	51" x 31"	34" x 53"	53" x 34"	12"	10'
48"	58" x 36"	38" x 60"	60" x 38"	12"	10'
54"	65" x 40"	43" x 68"	68" x 43"	12"	10'
60"	73" x 45"	48" x 76"	76" x 48"	12"	10'
66"		53" x 83"	83" x 53"	12"	10'
72"	88" x 54"	58" x 91"	91" x 58"	12"	10'
78"		63" x 98"	98" x 63"	12"	10'
84"	102" x 62"	68" x 106"	106" x 68"	12"	10'
90"	115" x 72"	72" x 113"	113" x 72"	12"	10'
96"	122" x 77"	77" x 121"	121" x 77"	12"	10'
102"		82" x 128"	128" x 82"	12"	10'
108"	138" x 87"	87" x 136"	136" x 87"	12"	10'
114"		92" x 143"	143" x 92"	12"	10'
120"		97" x 151"	151" x 97"	12"	10'

▲ DIMENSIONS LISTED FOR ARCH PIPE IN PAY ITEMS SHOW TRUNCATED INCHES.

GENERAL NOTES

1. FILL HEIGHT DESIGNS ARE BASED ON A CLASS B BEDDING, NEGATIVE PROJECTION, HS-20 LIVE LOADING, AND 120 LBS/C.F. SOIL WEIGHT.
2. MINIMUM HEIGHT OF COVER FROM TOP OF PIPE TO TOP OF SUBGRADE FOR REINFORCED CONCRETE PIPE SHALL BE 12 INCHES.
3. IN THE EVENT LOADS IN EXCESS OF HS-20 ARE TO BE OPERATED OVER OR ADJACENT TO THE PIPE INSTALLATION DURING THE CONSTRUCTION PHASE, THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A MINIMUM OF FOUR FEET OF COVER OVER THE PIPE AT WHEEL OR TRACK PATHS.
4. PROPER INSTALLATION PRACTICES MUST BE ADHERED TO AS SHOWN ON ROADWAY STANDARDS SPI-4, FPI-3 AND SPB-1.
5. ANY PIPE CRACKED PRIOR TO FINAL ACCEPTANCE SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE. SURFACE DISTRESS MUST BE REPAIRED TO THE SATISFACTION OF THE ENGINEER, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
6. PIPE DIMENSIONS LISTED IN TABLES CONFORM TO 2005 AASHTO DESIGNATIONS.
7. CLASS IV/V REINFORCED CONCRETE PIPE SHALL MEET STRENGTH TEST REQUIREMENTS OF A MAXIMUM 2000 POUNDS FOR CLASS IV AND 3000 POUNDS FOR CLASS V PIPE - FORCE PER LINEAR FOOT PER FOOT OF DIAMETER TO PRODUCE A 0.01 INCH CRACK, CONFORMING TO TEST PROCEDURE REFERENCES IN AASHTO M 170.

APPROVED BY ROADWAY ENGINEER: Caleb F. H DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

FILL HEIGHT TABLES (CONCRETE PIPES)

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

FHTCP-3 | 1

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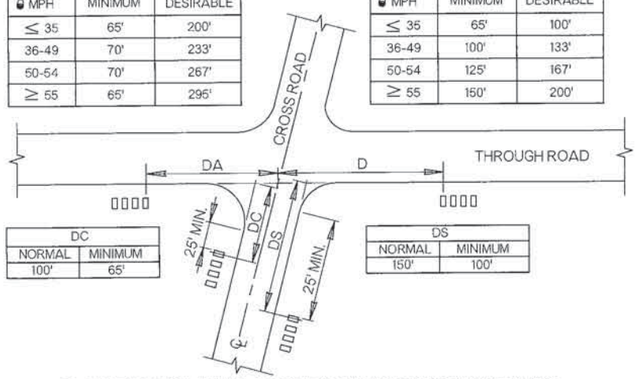
OKLAHOMA DEPARTMENT OF TRANSPORTATION

STANDARD REVISIONS	
DESCRIPTION	DATE

● SPEED FACTOR MAY BE DESIGN SPEED, OBSERVED SPEED OR ASSIGNED SPEED BASED UPON PREDICTABLE GROWTH FACTORS OR PENDING IMPROVEMENTS.

THRU ROAD SPEED ● MPH	DA	
	MINIMUM	DESIRABLE
≤ 35	65'	200'
36-49	70'	233'
50-54	70'	267'
≥ 55	65'	295'

THRU ROAD SPEED ● MPH	D	
	MINIMUM	DESIRABLE
≤ 35	65'	100'
36-49	100'	133'
50-54	125'	167'
≥ 55	150'	200'



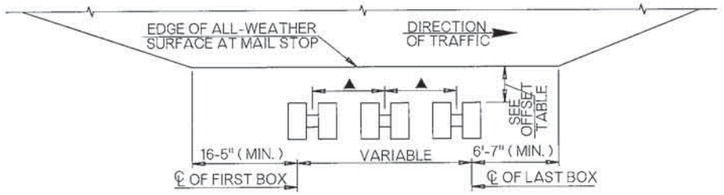
DC	
NORMAL	MINIMUM
100'	65'

DS	
NORMAL	MINIMUM
150'	100'

SUGGESTED MINIMUM CLEARANCE DISTANCES TO NEAREST MAILBOX IN MAIL STOPS AT INTERSECTIONS

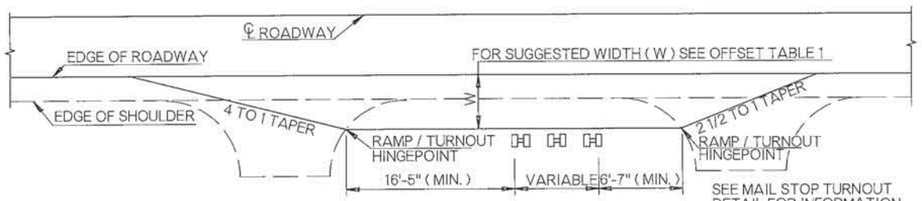
OFFSET TABLE				
HIGHWAY TYPE AND TRAFFIC CONDITIONS	WIDTH OF ALL-WEATHER SURFACE OF TURNOUT OR AVAILABLE SHOULDER AT MAILBOX		DISTANCE ROADSIDE FACE OF MAILBOX IS TO BE OFFSET BEHIND EDGE OF TURNOUT OR USABLE SHOULDER	
	PREFERRED	MINIMUM	PREFERRED	MINIMUM
RURAL HIGHWAY ADT OVER 10,000 VPD	12'	8'	8" TO 12"	0
RURAL HIGHWAY ADT 1,500 TO 10,000 VPD	12'	8'	8" TO 12"	0
RURAL HIGHWAY ADT 400 TO 1,500 VPD	10'	8'	8" TO 12"	0
RURAL ROAD ADT UNDER 400 VPD	8'	6'	8" TO 12"	10"
RURAL ROAD ADT UNDER 50 VPD SPEED 40 MPH OR LESS	6'	2'	8" TO 12"	0
RESIDENTIAL STREET WITHOUT CURB OR ALL-WEATHER SHOULDER	6'	0	8" TO 12"	10" ●
CURBED STREET	NOT APPLICABLE		8" TO 12" BEHIND FACE OF CURB	6" BEHIND FACE OF CURB

ADT-AVERAGE DAILY TRAFFIC, THROUGH ROAD ONLY
VPD-VEHICLES PER DAY
● IF TURNOUT IS PROVIDED, THIS MAY BE REDUCED TO ZERO.



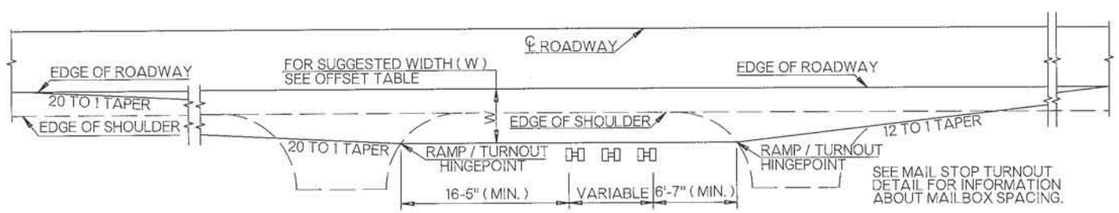
MAIL STOP TURNOUT DETAIL

▲ RECOMMENDED MINIMUM SPACING IS 3/4 OF THE DIMENSION FROM THE GROUND LINE TO THE BOTTOM OF THE MAILBOX



MAIL STOP LAYOUT

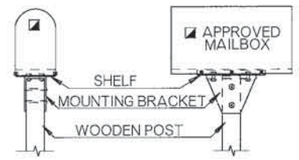
FOR ROADS CARRYING TRAFFIC AT 40 MPH OR LESS OR FOR LOCAL AND COLLECTOR ROADS



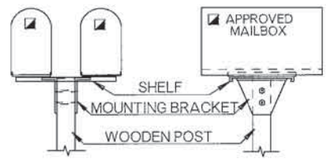
MAIL STOP LAYOUT

ROADS CARRYING TRAFFIC AT SPEED OVER 40 MPH

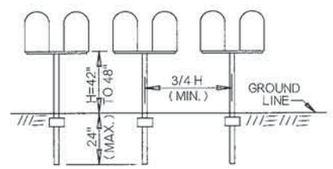
☑ MAILBOX DIMENSIONS & SIZES			
MAILBOX DESIGN TYPE	DIMENSIONS (NOM.)		
	LENGTH	WIDTH	HEIGHT
1	19"	6 1/2"	8 1/2"
1-A	21"	8"	10 1/2"
2	23 1/2"	11 1/2"	13 1/2"



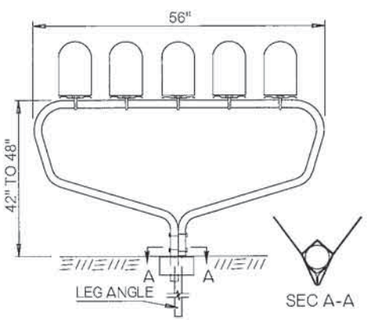
MAILBOX INSTALLATION - SINGLE WOODEN POST SUPPORT & BRACKET ASSEMBLY DETAILS



MAILBOX INSTALLATION - MULTIPLE (DOUBLE OR TWIN BOX)



POST SPACING DETAIL
MULTIPLE BOX INSTALLATION
SINGLE POST SERIES



MAILBOX INSTALLATION - MULTIPLE (MULTIPLE BOX SUPPORT DETAILS)

MAXIMUM NUMBER OF MAILBOXES = 5

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. MAILBOX INSTALLATION, SINGLE OR MULTIPLE TYPE, SHALL BE OF A DESIGN AND MATERIAL THAT HAS BEEN CRASH TESTED AND APPROVED. OTHER DESIGNS OR MAILBOX TYPES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
3. IF MAILBOX IS INSTALLED IN AN AREA WITH GUARDRAIL, MAILBOX AND/OR POST ASSEMBLY SHOULD BE BEHIND OR FLUSH WITH FACE OF RAIL.
4. PRODUCER AND CONTRACTOR SHALL AVOID PATENT INFRINGEMENT OF THE MAILBOX SUPPORT ASSEMBLY AND SHALL SAVE THE STATE HARMLESS IN THE USE OF ANY MAILBOX SUPPORT ASSEMBLY.
5. ALTERNATE WOODEN POST SUPPORT INSTALLATIONS MAY BE USED IN LIEU OF METAL PIPE SUPPORT UNITS IF WOODEN COMPONENTS CONFORM TO CURRENT SPECIFICATIONS.
6. PRICE OF EACH MAILBOX INSTALLATION, SINGLE OR MULTIPLE, INCLUDES PAYMENT FOR INSTALLATION OF THE POST SYSTEM, SUPPORT POST, ALL ATTACHMENT HARDWARE AND MOUNTING OF THE MAILBOX. PAYMENT FOR THE MAILBOX WILL BE PAID FOR BY THE EACH AND SEPARATELY FROM THE SUPPORT SYSTEM.
7. IF MAILBOX IS INSTALLED BEHIND CURB, ANY SIDEWALKS WILL REQUIRE A MINIMUM 3'-0" OF USABLE SPACE BEHIND THE MAILBOX.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
☐ 629 (A)	MAILBOX INSTALLATION - SINGLE	EA
☐ 629 (B)	MAILBOX INSTALLATION - MULTIPLE	EA
629 (C)	MAILBOX	EA
629 (D)	REMOVAL OF MAILBOX INSTALLATION	EA
629 (E)	REMOVE AND RESET MAILBOX	EA

☐ MAILBOX DESIGN TYPE(S) AND LOCATION(S) SHALL BE SPECIFIED IN THE PLANS.

APPROVED BY ROADWAY ENGINEER: Caleb A. DATE 04/16/15

ROADWAY DESIGN DIVISION STANDARD

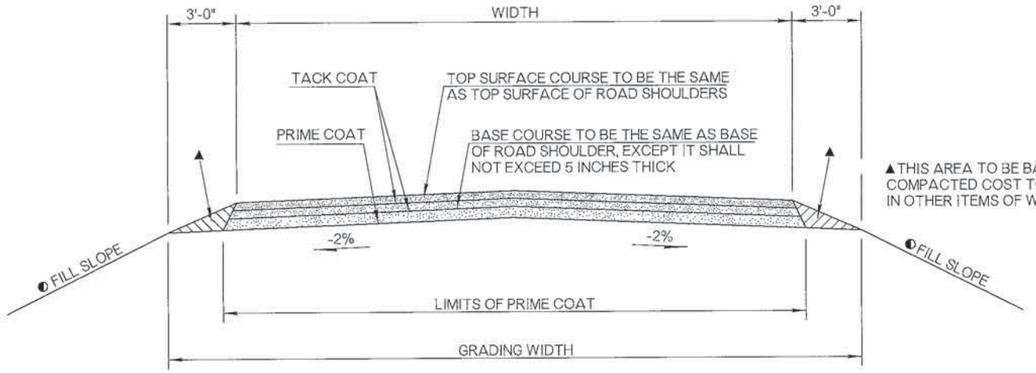
MAILBOX INSTALLATION

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

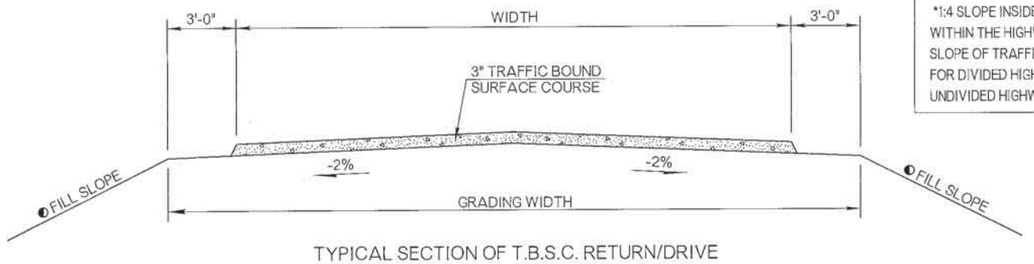
MI-3 | 0

R-62

OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE

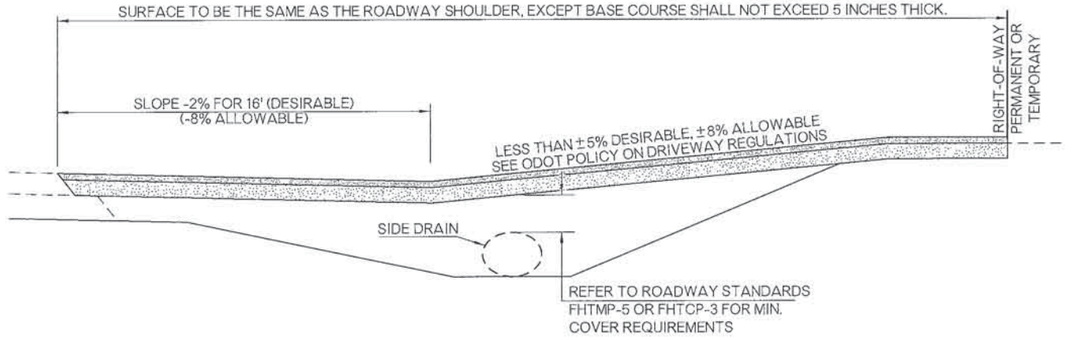


TYPICAL SECTION OF ASPHALT RETURN/DRIVE

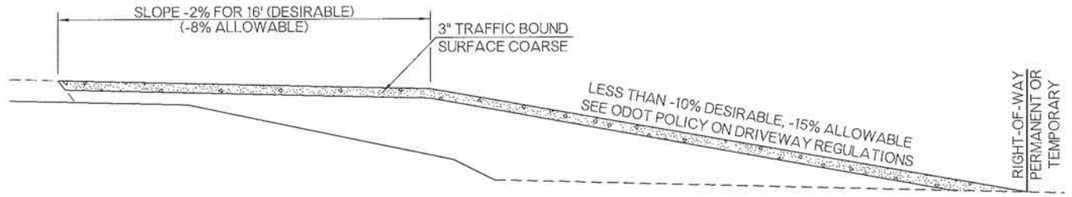


TYPICAL SECTION OF T.B.S.C. RETURN/DRIVE

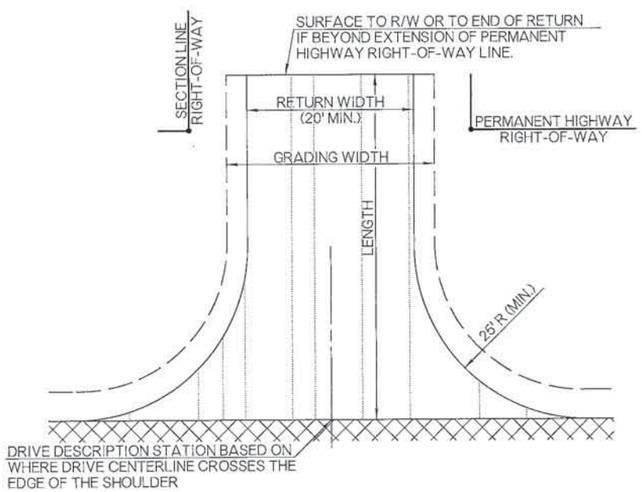
◐FILL SLOPE NOTES:
FILL SLOPE AS SHOWN IN TYPICAL SECTIONS SHALL NOT EXCEED:
*1:3 SLOPE OUTSIDE HIGHWAY CLEARZONE
*1:4 SLOPE INSIDE HIGHWAY CLEARZONE
WITHIN THE HIGHWAY CLEARZONE, ADJUST SLOPE OF TRAFFIC APPROACH END TO 1:10 FOR DIVIDED HIGHWAYS AND 1:6 FOR UNDIVIDED HIGHWAYS.



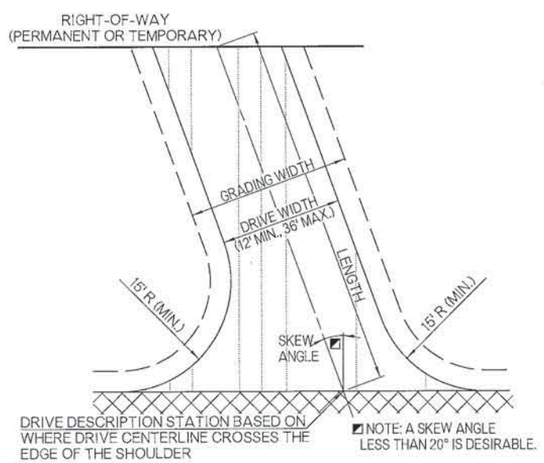
PROFILE OF TYPICAL ASPHALT RETURN/DRIVE ON ROADWAY CUT SECTION



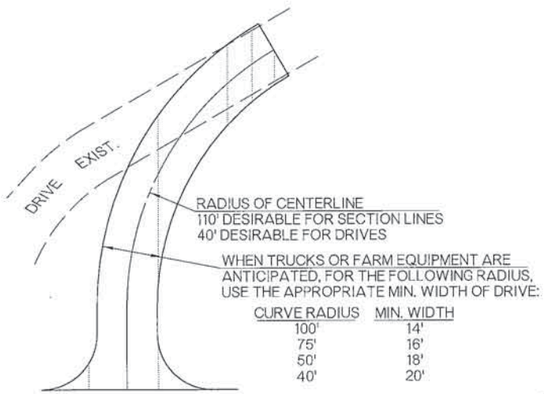
PROFILE OF TYPICAL T.B.S.C. RETURN/DRIVE ON ROADWAY FILL SECTION



PLAN TYPICAL SECTION LINE RETURN



PLAN TYPICAL DRIVE ON SKEW



SECTION LINE OR DRIVE WITH CURVED ALIGNMENT

PROPOSED DRIVES AND RETURNS SHALL MATCH EXISTING EXCEPT WHEN SKEW ANGLE EXCEEDS 20 DEGREES; IT IS THEN DESIRED TO SHIFT THE LOCATION AND CONSTRUCT USING CURVED ALIGNMENT

USEFUL ABBREVIATIONS FOR PLAN SHEETS:

ASPH.	ASPHALT
T.B.S.C.	TRAFFIC BOUND SURFACE COARSE
CONC.	CONCRETE
SEC. RET.	SECTION LINE RETURN
FIELD ENT.	FIELD ENTRANCE
PVT. DRIVE	PRIVATE DRIVE
COMM. DRIVE	COMMERCIAL DRIVE
W/S.D.	WITH SIDE DRAIN
AS DIKE	AS DIKE ACROSS DITCH

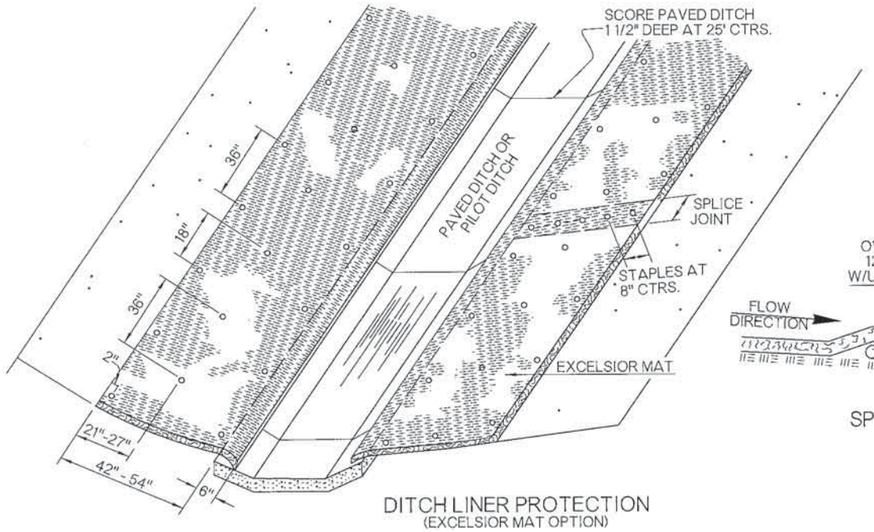
APPROVED BY ROADWAY ENGINEER: Calvin F. A DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

RURAL DRIVEWAY INSTALLATION

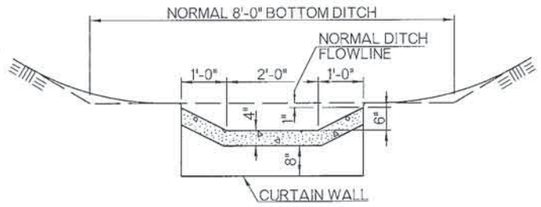
OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

OKLAHOMA DEPARTMENT OF TRANSPORTATION	
STANDARD REVISIONS	
DESCRIPTION	DATE

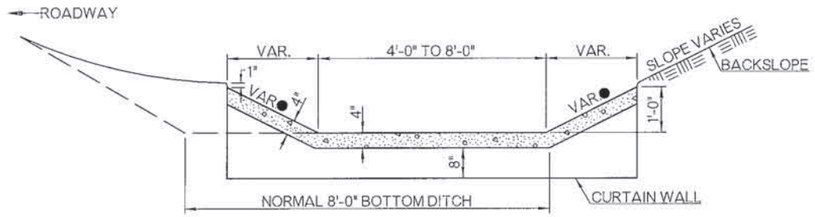


DITCH LINER PROTECTION
(EXCELSIOR MAT OPTION)

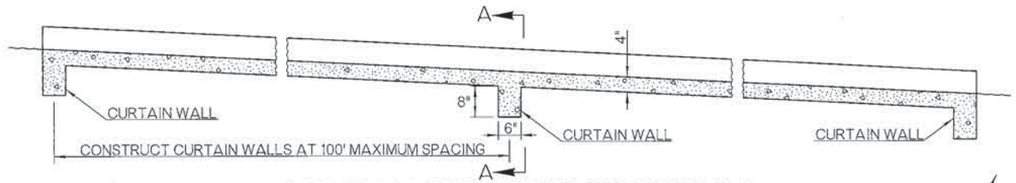
SPLICE JOINT



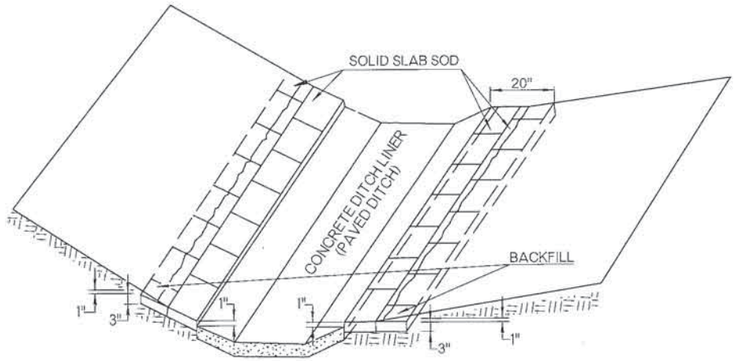
SECTION A - A
DESIGN NO. 1



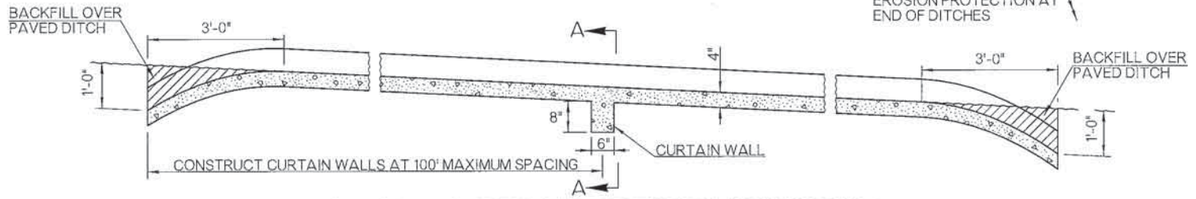
SECTION A - A
DESIGN NO. 2



LONGITUDINAL SECTION WITH CURTAIN WALLS



DITCH LINER PROTECTION
(SOLID SLAB SOD OPTION)



OPTIONAL LONGITUDINAL SECTION WITH BURIED ENDS
(BURIED ENDS SHALL NOT BE USED ADJACENT TO DRAINAGE STRUCTURES)

DESIGN NO. 1 - A PAVED PILOT DITCH TO BE PLACED 6" BELOW THE NORMAL FLOWLINE AND IN THE CENTER OF A STANDARD DITCH

DESIGN NO. 2 - A DITCH THAT IS PAVED AND HAVING THE SAME FLOWLINE AS A STANDARD UNPAVED DITCH

QUANTITIES OF CLASS C CONCRETE PER LF OF PAVED DITCH
QUANTITIES IN CUBIC YARDS

	DESIGN NO. 1					DESIGN NO. 2					
BOTTOM WIDTH	2'-0"	3'-0"	4'-0"	5'-0"	6'-0"	4'-0"	5'-0"	6'-0"	7'-0"	8'-0"	
K1	.0522	.0645	.0769	.0892	.1016	.1274	.1397	.1521	.1644	.1768	DES. 2A
K2	.0586	.0709	.0832	.0955	.1078	.1790	.1913	.2036	.2159	.2282	
● VARIABLE AS SHOWN ON PLANS DESIGN 2A = 1:3 SLOPES DESIGN 2B = 1:2 SLOPES DESIGN 2C = 1:1 SLOPES					K1	.1045	.1168	.1292	.1415	.1539	DES. 2B
					K2	.1357	.1480	.1603	.1726	.1850	
					K1	.0923	.1048	.1172	.1295	.1479	DES. 2C
					K2	.1105	.1228	.1352	.1476	.1600	

TOTAL CLASS C CONC.= (LENGTH OF PAVED DITCH) (K1) + (NO. OF CURT. WALLS) (K2)
K1=CU. YDS. OF CONCRETE PER LINEAR FOOT
K2=CU. YDS. OF CONCRETE PER CURTAIN WALL

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. ALL COST OF ADDITIONAL BORROW OR EXCAVATION, REQUIRED FOR INSTALLING PAVED DITCH, SHALL BE INCLUDED IN PRICE BID FOR CLASS C CONCRETE.
3. THE DITCH SHALL BE WATERED, AND COMPACTED, BEFORE PLACING CLASS C CONCRETE.
4. DITCH LINER PROTECTION MAY BE EITHER EXCELSIOR MAT, OR SOLID SLAB SOD, AND SHALL BE MEASURED BY THE LINEAR FOOT OF DITCH (PAVED DITCH), IN PLACE.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
509 (D)	CLASS C CONCRETE	CY
229	DITCH LINER PROTECTION	LF

APPROVED BY
ROADWAY ENGINEER: Caleb A. DATE: 04/16/15

ROADWAY DESIGN DIVISION STANDARD

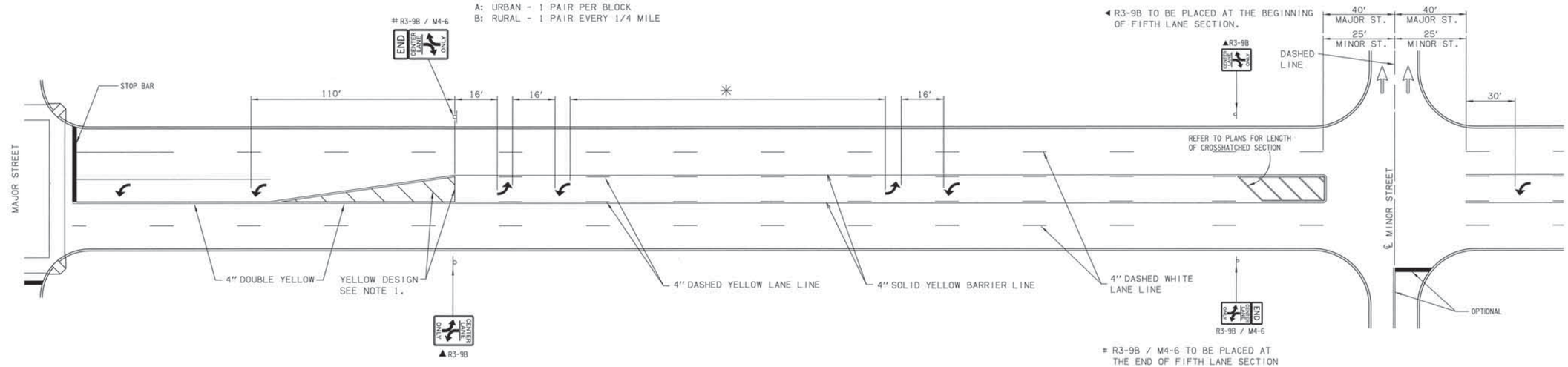
PAVED DITCHES AND FLUMES

OKLAHOMA DEPARTMENT OF TRANSPORTATION
2009 SPECIFICATIONS

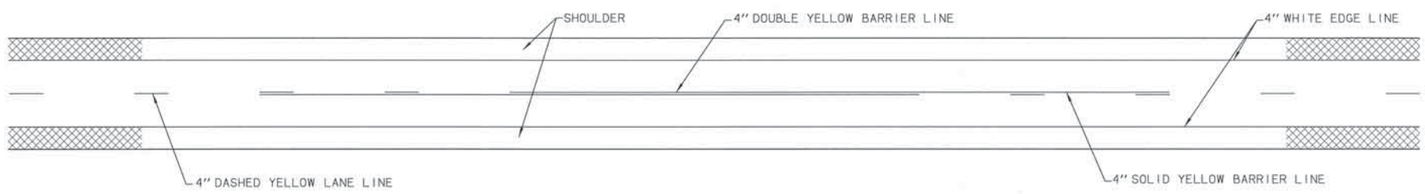
REVISIONS	
DESCRIPTION	DATE
ADDED GENERAL NOTE 1.	7/08/2011
MODIFIED SIGNS	4/10/2012

✳ ARROW SYMBOL PAIRS FOR TWO-WAY LEFT TURN LANES SHALL BE PLACED AS FOLLOWS:

A: URBAN - 1 PAIR PER BLOCK
B: RURAL - 1 PAIR EVERY 1/4 MILE



FIFTH LANE PAVEMENT MARKING DETAIL (URBAN)



TWO LANE RURAL ROADWAY PAVEMENT MARKINGS

GENERAL NOTE

1. WIDTH OF DIAGONALS ARE AS FOLLOWS:
≥ 45 MPH - 12" WIDE
< 45 MPH - 8" WIDE

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
854(A)	TRAFFIC STRIPE (PAINT) (4" WIDE)	LF
854(B)	TRAFFIC STRIPE (PAINT) (ARROW, WORDS, OR SYMBOLS)	EA
855(A)	TRAFFIC STRIPE (PLASTIC) (4" WIDE)	LF
855(A)	TRAFFIC STRIPE (PLASTIC) (6" WIDE)	LF
855(A)	TRAFFIC STRIPE (PLASTIC) (8" WIDE)	LF
855(A)	TRAFFIC STRIPE (PLASTIC) (24" WIDE)	LF
855(B)	TRAFFIC STRIPE (PLASTIC) (ARROW)	EA
856(A)	TRAFFIC STRIPE (MULTI-POLYMER) (4" WIDE)	LF
856(A)	TRAFFIC STRIPE (MULTI-POLYMER) (6" WIDE)	LF
856(A)	TRAFFIC STRIPE (MULTI-POLYMER) (8" WIDE)	LF
856(A)	TRAFFIC STRIPE (MULTI-POLYMER) (24" WIDE)	LF
856(B)	TRAFFIC STRIPE (MULTI-POLYMER) (SYMBOLS, WORDS, ETC)	EA

APPROVED BY TRAFFIC ENGINEER: [signature] DATE: 4/9/12

TRAFFIC STANDARD

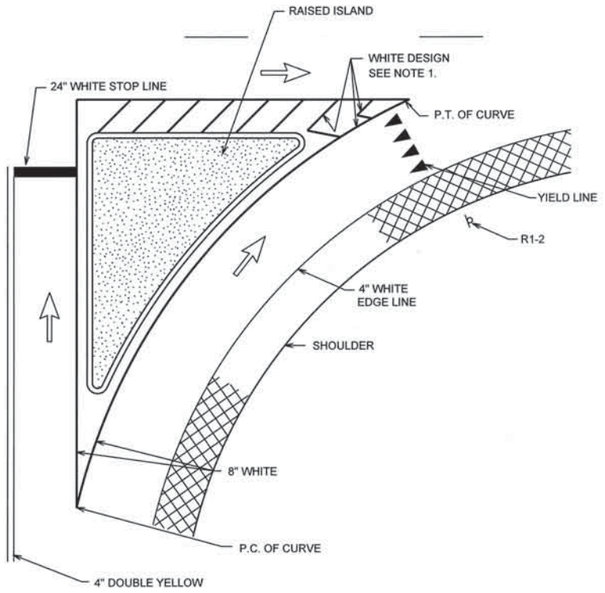
PAVEMENT MARKING
(FIFTH LANE AND TWO LANE RURAL)

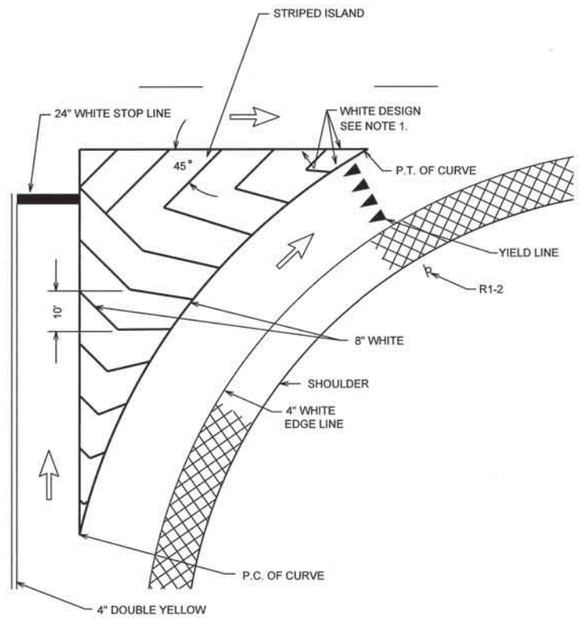
2009 SPECIFICATIONS

PM3-1 | 02

T-103

REVISIONS	
DESCRIPTION	DATE
ADDED GENERAL NOTE 1.	7/08/2011



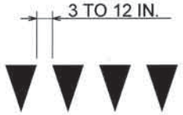


GENERAL NOTE

1. WIDTH OF DIAGONALS ARE AS FOLLOWS:
   ≥45 MPH - 12" WIDE
   <45 MPH - 8" WIDE

SUGGESTED STRIPING FOR ISLANDS

PAVEMENT MARKING FOR TRAFFIC CHANNELIZING ISLANDS SHALL BE APPLIED FROM P.C. TO P.T. OF CURVE.



YIELD LINE

4" DOUBLE YELLOW BARRIER LINE

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
854(A)	TRAFFIC STRIPE (PAINT) (4" WIDE)	LF
854(B)	TRAFFIC STRIPE (PAINT) (ARROW, WORDS, OR SYMBOLS)	EA
855(A)	TRAFFIC STRIPE (PLASTIC) (4" WIDE)	LF
855(A)	TRAFFIC STRIPE (PLASTIC) (8" WIDE)	LF
855(A)	TRAFFIC STRIPE (PLASTIC) (24" WIDE)	LF
855(B)	TRAFFIC STRIPE (PLASTIC) (ARROW)	EA
855(B)	TRAFFIC STRIPE (PLASTIC) (SYMBOLS)	EA
856(A)	TRAFFIC STRIPE (MULTI-POLYMER) (4" WIDE)	LF
856(A)	TRAFFIC STRIPE (MULTI-POLYMER) (8" WIDE)	LF
856(A)	TRAFFIC STRIPE (MULTI-POLYMER) (24" WIDE)	LF
856(B)	TRAFFIC STRIPE (MULTI-POLYMER) (SYMBOLS, WORDS, ETC)	EA

APPROVED BY TRAFFIC ENGINEER: Chuck Graney DATE: 7/22/2011

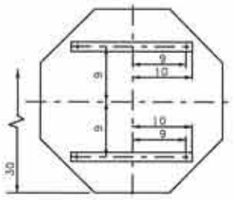
TRAFFIC STANDARD

PAVEMENT MARKING (ISLANDS)

2009 SPECIFICATIONS

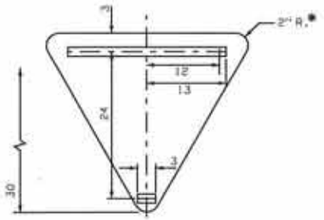
PM2-1	01
	T-102

DESCRIPTION	REVISIONS	DATE



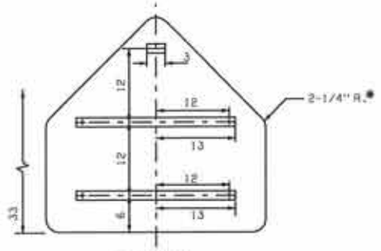
B-30(0)

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



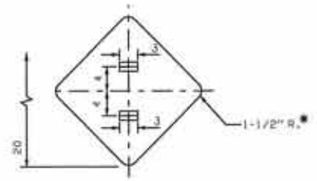
B-36(T)

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



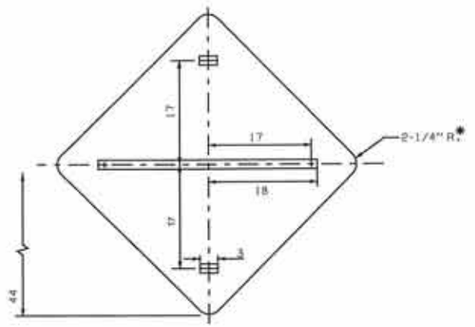
B-36(P)

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



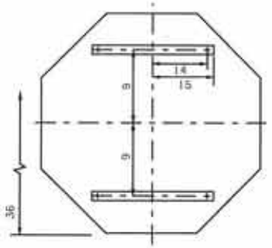
B-18(D)

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



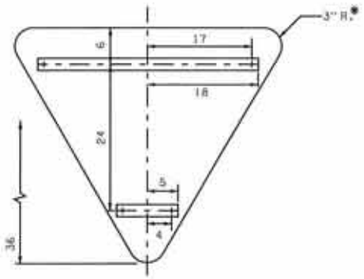
B-36(D)

(1) 2" SQUARE TUBE POST
(1) 2-1/2" PIPE POST



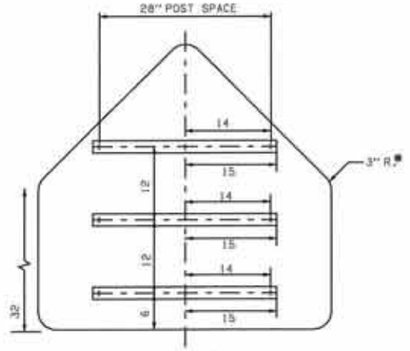
B-36(0)

(1) 2" SQUARE TUBE POST
(1) 2-1/2" PIPE POST



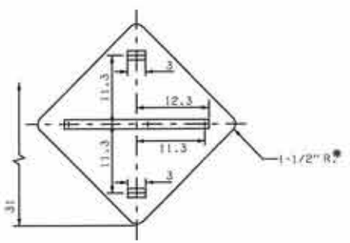
B-48(T)

(2) 2" SQUARE TUBE POSTS
(1) 2-1/2" PIPE POST



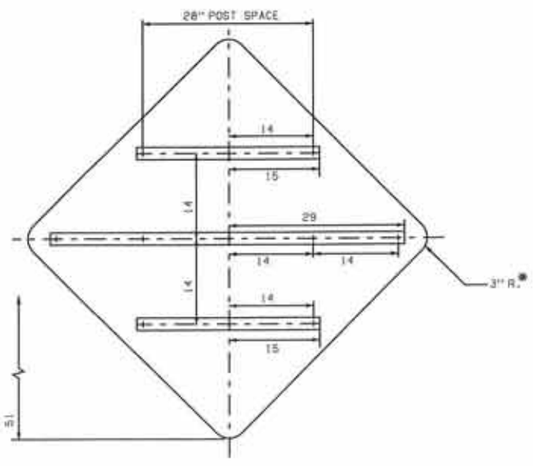
B-48(P)

(2) 2" SQUARE TUBE POSTS
(2) 2" PIPE POSTS



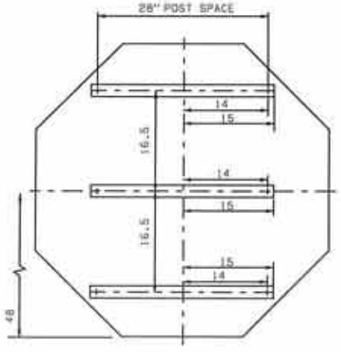
B-24(D)

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



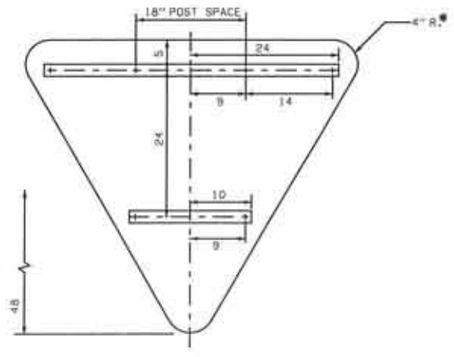
B-48(D)

(2) 2" SQUARE TUBE POSTS
(2) 2-1/2" PIPE POSTS



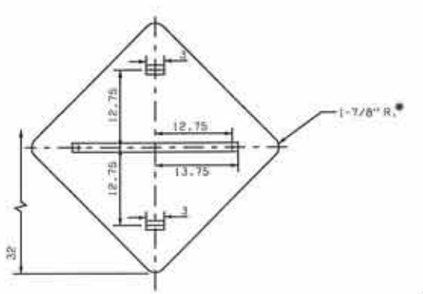
B-48(O)

(2) 2" SQUARE TUBE POSTS
(2) 2-1/2" PIPE POSTS



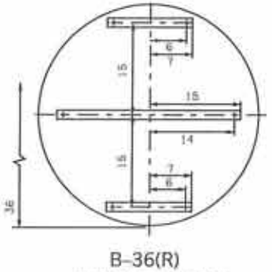
B-60(T)

(2) 2" SQUARE TUBE POSTS
(2) 2" PIPE POSTS



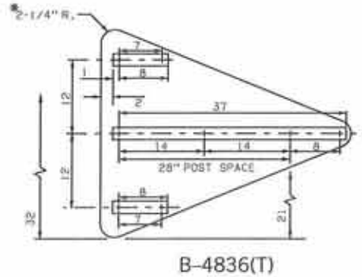
B-30(D)

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



B-36(R)

(1) 2" SQUARE TUBE POST
(1) 2-1/2" PIPE POST



B-4836(T)

(2) 2" SQUARE TUBE POSTS
(2) 2" PIPE POSTS

CONSTRUCTION NOTES:

(1) ALL FLAT SHEET SIGNS SHALL USE GALVANIZED STEEL POSTS.

(2) THICKNESS OF MATERIALS FOR FLAT SHEET SIGNS SHALL BE AS FOLLOWS, DETERMINED BY THE LONGEST DIMENSION OF THE SIGN UNLESS OTHERWISE SPECIFIED.

ALUMINUM ALLOY 6061-T6 OR 5052-H38	GALVANIZED STEEL
0.063" FOR SIGNS THROUGH 24"	16 GAUGE FOR SIGNS THROUGH 24"
0.080"FOR SIGNS 25" THROUGH 35"	14 GAUGE FOR SIGNS 25" THROUGH 35"
0.100" FOR SIGNS 36" AND LARGER	12 GAUGE FOR SIGNS 36" AND LARGER

(3) SIGN BRACKETS SHALL BE GALVANIZED STEEL OR ALUMINUM. HOLES FOR MOUNTING BRACKETS TO SIGN SHALL BE 5/16"D. HOLES FOR MOUNTING SIGN AND BRACKETS TO POST SHALL BE 3/8"D. HOLES SHALL BE PUNCHED BEFORE GALVANIZING. SIZE OF BRACKETS SHALL BE AS FOLLOWS: SIGNS THROUGH 36" SHALL USE A GALVANIZED STEEL OR ALUMINUM CHANNEL 1-1/8" X 1/2" X 1/8". SIGNS LARGER THAN 36" SHALL USE A GALVANIZED STEEL OR ALUMINUM CHANNEL 2" X 1/2" X 1/8". ALUMINUM SIGN BRACKETS SHALL BE ALLOY 6061-T6, 6062-T6 OR 6063-T6.

(4) ALL BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED STEEL OR CADMIUM PLATED. ALL BOLT ENDS SHALL BE SUFFICIENTLY BRADDED AFTER INSTALLATION TO MINIMIZE REMOVAL BY VANDALISM.

(5) ALL POSTS SHALL EXTEND 2" ABOVE THE TOP SIGN BRACKET, BUT NOT ABOVE THE TOP OF THE SIGN.

* (6) CORNER RADIUS FOR ALL FLAT SHEET SIGNS SHALL BE AS SHOWN.

(7) ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

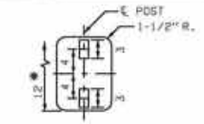
APPROVED BY TRAFFIC ENGINEER: Rudolf Umscheid DATE: 2/5/10

TRAFFIC STANDARD

SIGN BLANK AND BRACKET DETAILS

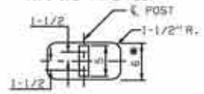
2009 SPECIFICATIONS

SBS1-1	00
	T-130

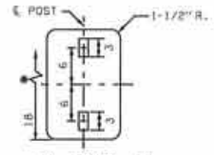


B-0912 ■

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST

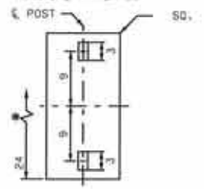


B-1206 ■



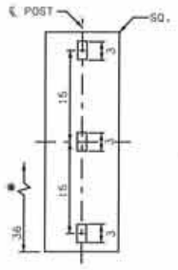
B-1218 ■

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



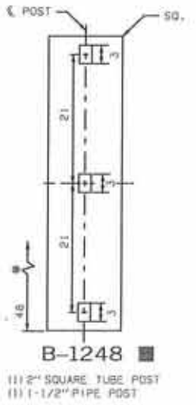
B-1224 ■

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



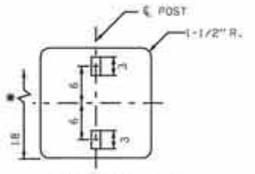
B-1236 ◢ ■

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



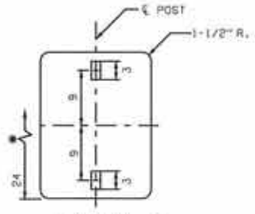
B-1248 ■

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



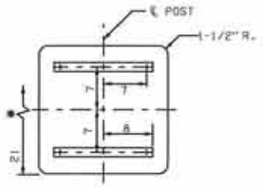
B-18(S) ■

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



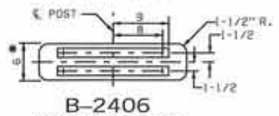
B-1824 ■

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



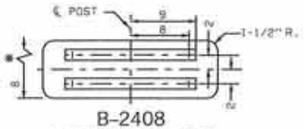
B-21(S)

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



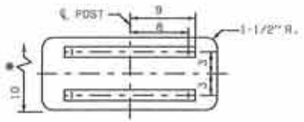
B-2406

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



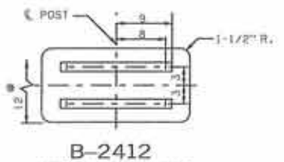
B-2408

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



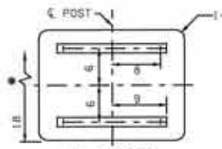
B-2410

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



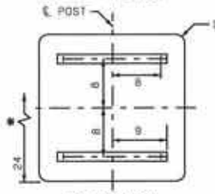
B-2412

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



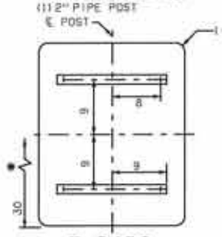
B-2418

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



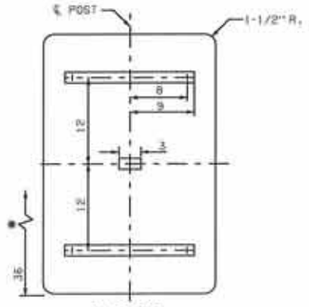
B-24(S)

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



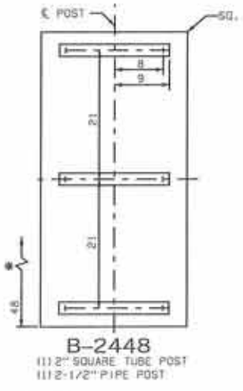
B-2430

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



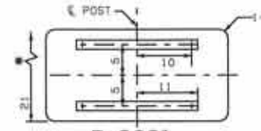
B-2436

(1) 2" SQUARE TUBE POST
(1) 2-1/2" PIPE POST



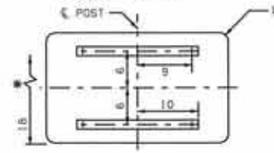
B-2448

(1) 2" SQUARE TUBE POST
(1) 2-1/2" PIPE POST



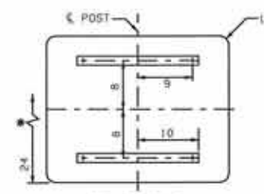
B-3021

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



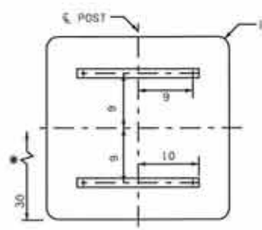
B-3018

(1) 2" SQUARE TUBE POST
(1) 1-1/2" PIPE POST



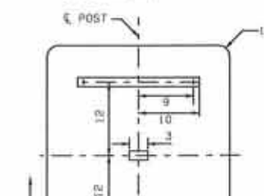
B-3024

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



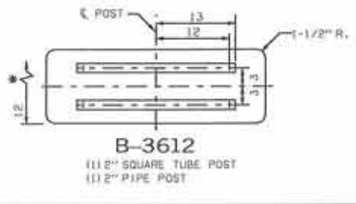
B-30(S)

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



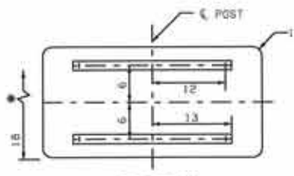
B-3036

(1) 2" SQUARE TUBE POST
(1) 2-1/2" PIPE POST



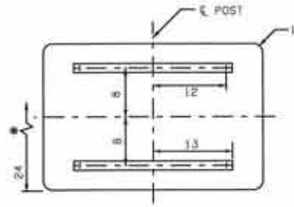
B-3612

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



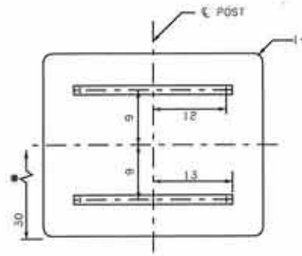
B-3618

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



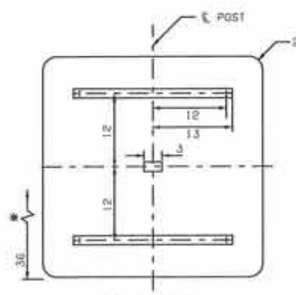
B-3624

(1) 2" SQUARE TUBE POST
(1) 2" PIPE POST



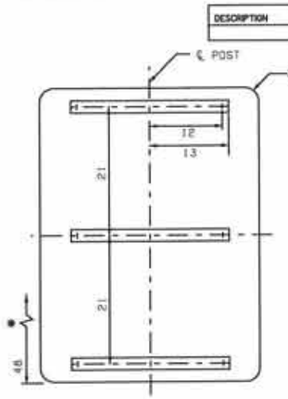
B-3630

(1) 2" SQUARE TUBE POST
(1) 2-1/2" PIPE POST



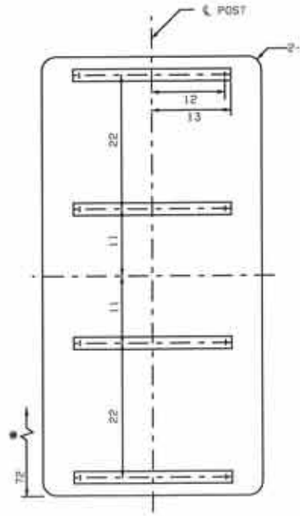
B-36(S)

(1) 2" SQUARE TUBE POST
(1) 2-1/2" PIPE POST



B-3648

(2) 2" SQUARE TUBE POSTS
(1) 3" PIPE POST



B-3672

(1) 3-1/2" PIPE POST

NOTES:

* ALL POSTS SHALL EXTEND 2" ABOVE THE TOP SIGN BRACKET, BUT NOT ABOVE THE TOP OF THE SIGN.

◢ SIGN BLANK THICKNESS SHALL BE .060" ALUMINUM OR 16 GAUGE STEEL.

■ VERTICAL SIGN BRACKET ONLY.

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

REVISIONS	
DESCRIPTION	DATE

APPROVED BY TRAFFIC ENGINEER: Harold Smith DATE 12/10

TRAFFIC STANDARD

SIGN BLANK AND BRACKET DETAILS

2009 SPECIFICATIONS

SBS2-1 | 00

T-131

STOP

R1-1 30 x 30 5.18 SF
R1-1E 36 x 36 7.46 SF
R1-1F 48 x 48 13.26 SF

COLOR:
LEGEND AND BORDER:
WHITE (REFLECTORIZED)
BACKGROUND:
RED (TRANSPARENT REFLECTORIZED)

YIELD

R1-2 36 x 36 x 36 3.90 SF
R1-2E 48 x 48 x 48 6.93 SF
R1-2F 60 x 60 x 60 10.83 SF

COLOR:
LEGEND AND BORDER:
RED (TRANSPARENT REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

ALL-WAY

R1-3P 18 x 6 0.75 SF
R1-3PE 30 x 12 2.50 SF

COLOR:
LEGEND AND BORDER:
WHITE (REFLECTORIZED)
BACKGROUND:
RED (TRANSPARENT REFLECTORIZED)

SPEED LIMIT

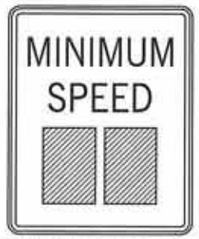
R2-1(SPEED) 24 x 30 5.00 SF
R2-1E( ) 36 x 48 12.00 SF
R2-1F( ) 48 x 60 20.00 SF

COLOR:
LEGEND AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

TRUCK SPEED LIMIT

R2-2P(SPEED) 24 x 24 4.00 SF
R2-2PE( ) 36 x 36 9.00 SF
R2-2PF( ) 48 x 48 16.00 SF

COLOR:
LEGEND AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)



MINIMUM SPEED LIMIT

R2-4P(SPEED) 24 x 30 5.00 SF
R2-4PE( ) 36 x 48 12.00 SF
R2-4PF( ) 48 x 60 20.00 SF

COLOR:
LEGEND AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

NO RIGHT TURN

R3-1 24 x 24 4.00 SF
R3-1E 36 x 36 9.00 SF
R3-1F 48 x 48 16.00 SF

COLOR:
ARROW AND BORDER:
BLACK (NON-REFLECTORIZED)
CIRCLE AND DIAGONAL:
RED (TRANSPARENT REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

NO LEFT TURN

R3-2 24 x 24 4.00 SF
R3-2E 36 x 36 9.00 SF
R3-2F 48 x 48 16.00 SF

COLOR:
ARROW AND BORDER:
BLACK (NON-REFLECTORIZED)
CIRCLE AND DIAGONAL:
RED (TRANSPARENT REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

NO TURN

R3-3 24 x 24 4.00 SF
R3-3E 36 x 36 9.00 SF
R3-3F 48 x 48 16.00 SF

COLOR:
LEGEND AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

NO U TURN

R3-4 24 x 24 4.00 SF
R3-4E 36 x 36 9.00 SF
R3-4F 48 x 48 16.00 SF

COLOR:
ARROW AND BORDER:
BLACK (NON-REFLECTORIZED)
CIRCLE AND DIAGONAL:
RED (TRANSPARENT REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

LEFT TURN ONLY

R3-5(L) 30 x 36 7.50 SF

COLOR:
LEGEND AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

RIGHT TURN ONLY

R3-5(R) 30 x 36 7.50 SF

COLOR:
LEGEND AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

LANE-LEFT

R3-6(L) 30 x 36 7.50 SF

COLOR:
LEGEND AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

LANE-RIGHT

R3-6(R) 30 x 36 7.50 SF

COLOR:
LEGEND AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
WHITE (REFLECTORIZED)

DESCRIPTION	REVISIONS	DATE

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
850(A)	SHEET ALUMINUM SIGNS	SF

APPROVED BY TRAFFIC ENGINEER: Thad Smart DATE: 2/5/10

TRAFFIC STANDARD
REGULATORY SIGN DETAILS
(R-SERIES)

2009 SPECIFICATIONS

RSD1-1 00

T-114

TURN LEFT

W1-1(L)	30 x 30	6.25 SF
W1-1E(L)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

TURN RIGHT

W1-1(R)	30 x 30	6.25 SF
W1-1E(R)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

CURVE LEFT

W1-2(L)	30 x 30	6.25 SF
W1-2E(L)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

CURVE RIGHT

W1-2(R)	30 x 30	6.25 SF
W1-2E(R)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

LEFT REVERSE TURN

W1-3(L)	30 x 30	6.25 SF
W1-3E(L)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

DESCRIPTION	REVISIONS	DATE

SIGNS	MARGIN	BORDER	BLANK
30 x 30	.500	.750	B-30(D)
36 x 36	.625	.875	B-36(D)

RIGHT REVERSE TURN

W1-3(R)	30 x 30	6.25 SF
W1-3E(R)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

LEFT REVERSE CURVE

W1-4(L)	30 x 30	6.25 SF
W1-4E(L)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

RIGHT REVERSE CURVE

W1-4(R)	30 x 30	6.25 SF
W1-4E(R)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

WINDING ROAD

W1-5(R)	30 x 30	6.25 SF
W1-5E(R)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

WINDING ROAD

W1-5(L)	30 x 30	6.25 SF
W1-5E(L)	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

ARROW

W1-6	48 x 24	8.00 SF
W1-6E	60 x 30	12.50 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

DOUBLE ARROW

W1-7	48 x 24	8.00 SF
W1-7E	60 x 30	12.50 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

CHEVRON

W1-8	18 x 24	3.00 SF
W1-8E	30 x 36	7.50 SF
W1-8F	36 x 48	12.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

CROSS ROAD

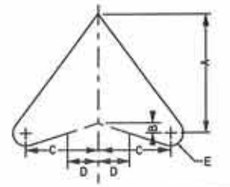
W2-1	30 x 30	6.25 SF
W2-1E	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)

SIDE ROAD

W2-2	30 x 30	6.25 SF
W2-2E	36 x 36	9.00 SF

COLOR:
SYMBOL AND BORDER:
BLACK (NON-REFLECTORIZED)
BACKGROUND:
FLUORESCENT YELLOW
(REFLECTORIZED)



SIGN SIZE	DIMENSIONS				
	A	B	C	D	E
30" X 20"	8-7/8"	11/16"	5"	2-3/16"	7/8"
36" X 36"	10-5/8"	13/16"	6"	2-5/8"	1-1/16"
48" X 48"	14-5/16"	1-1/16"	8"	3-1/4"	1-3/8"

* ARROW DETAIL

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
850(A)	SHEET ALUMINUM SIGNS	SF

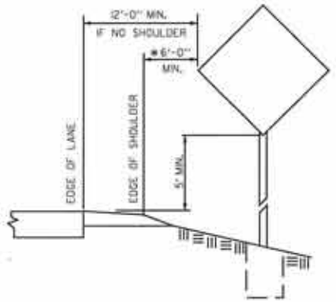
APPROVED BY TRAFFIC ENGINEER: [signature] DATE: 3/5/10

TRAFFIC STANDARD
WARNING SIGN DETAILS
(W-SERIES)

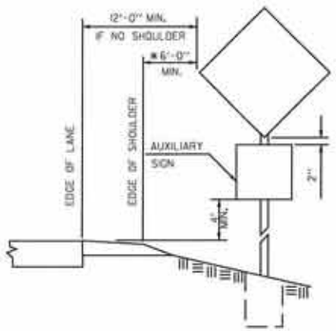
2009 SPECIFICATIONS

WSD1-1 | 00

T-116

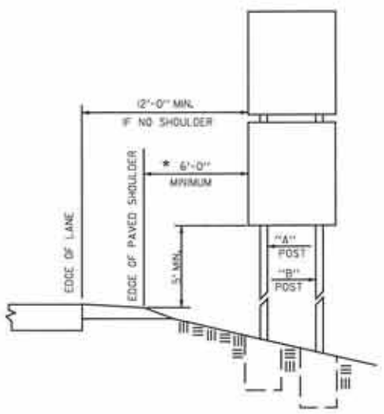


SINGLE POST (RURAL)

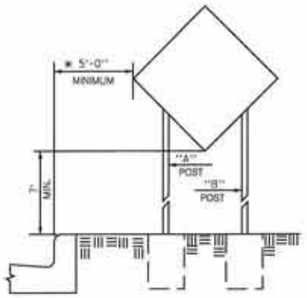


SINGLE POST WITH
AUXILIARY SIGN (RURAL)

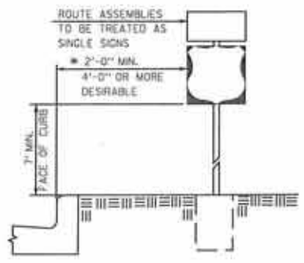
ROADSIDE ASSEMBLY
(RURAL)



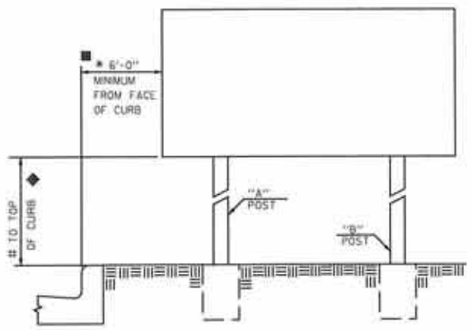
DOUBLE POST MAXIMUM &
MINIMUM SPEED LIMIT SIGNS (RURAL)



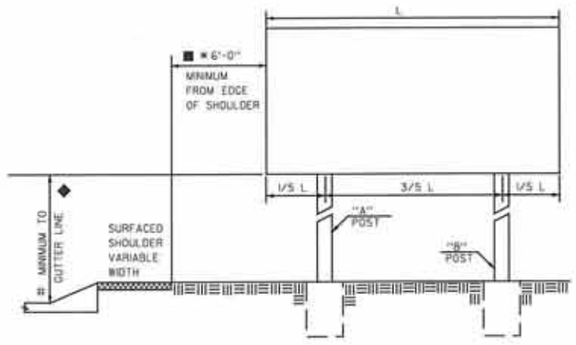
BUSINESS, COMMERCIAL OR
RESIDENTIAL AREA



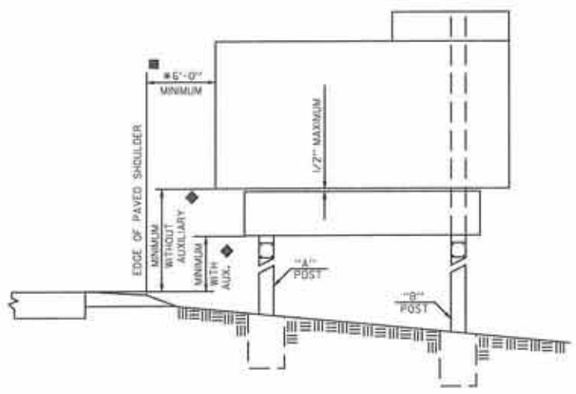
BUSINESS, COMMERCIAL OR
RESIDENTIAL AREA



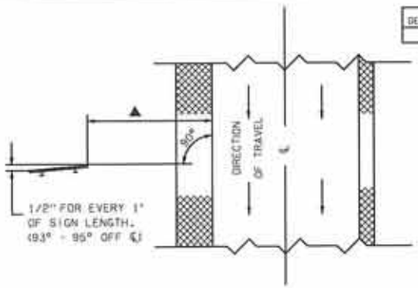
INFORMATION SIGN WITH
NON-MOUNTABLE CURB



INFORMATION SIGN WITH
MOUNTABLE CURB



FREEWAY OR EXPRESSWAY SIGN
(WITH OR WITHOUT AUXILIARY SIGN)



SIGN POSITIONING DETAIL

DESCRIPTION	REVISIONS	DATE

*1 SIGNS SHALL BE SO POSITIONED TO ELIMINATE OR MINIMIZE SPECULAR REFLECTION. DUE TO THE NUMEROUS VARIATIONS IN ROAD CURVES AND GRADES, THIS GENERAL RULE MAY NOT ALWAYS BE APPLICABLE, AND SIGNS SHALL BE POSITIONED AS DETERMINED BY THE ENGINEER.

*2 IF FURTHER CLARIFICATION OF VERTICAL AND LATERAL CLEARANCES IS REQUIRED, SEE THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (LATEST REVISION).

◆ WHEN LATERAL CLEARANCE OF STANDARD OR SPECIAL INFORMATION GUIDE SIGNS IS 30' OR GREATER (AS REQUIRED BY CLEAR ZONE) FROM THE EDGE LINE, THE MINIMUM VERTICAL CLEARANCE IS 7'. IF AN AUXILIARY SIGN IS MOUNTED BELOW A STANDARD OR SPECIAL INFORMATION GUIDE SIGN, THE RECOMMEND VERTICAL CLEARANCE FOR THE STANDARD OR SPECIAL INFORMATION GUIDE SIGN IS MINIMUM 8' AND THE AUXILIARY SIGN IS MINIMUM 5'.

* THE MINIMUM LATERAL CLEARANCE OF THE SIGN FROM THE EDGE OF SHOULDER OR FACE OF CURB SHALL BE AS SHOWN ON THIS STANDARD DRAWING UNLESS OTHERWISE SHOWN OR NOTED ON PLANS. WHEN SIGNS ARE NOTED TO BE PLACED 5' TO 9' FROM SHOULDER, THE TOLERANCE SHALL BE THE DISTANCE SHOWN ±2'.

IN INSTANCES WHERE THE LATERAL CLEARANCE SHOWN CAUSES THE FOOTING TO BE LOCATED UNDESIREABLY, SUCH AS THE BOTTOM OF DITCHES, ETC., THE LOCATION MAY BE ADJUSTED OUTWARD FROM THE ROADWAY IF NECESSARY AT THE DISCRETION OF THE ENGINEER.

IN RURAL AREAS THERE SHALL BE A 12' MINIMUM FROM TRAVELWAY (EDGELINE) TO THE EDGE OF THE SIGN IF NO SHOULDER EXISTS.

■ NORMALLY, ON FREEWAY AND EXPRESSWAY MAINLINE, STANDARD OR SPECIAL INFORMATION SIGNS SHALL BE LOCATED WITH A LATERAL CLEARANCE OF 10' FROM THE FACE OF NON-MOUNTABLE CURBS OR GUARD RAILS, 20' FROM EDGE OF SHOULDER. IN ALL CASES EXCEPT WHEN SIGN SUPPORTS ARE PROTECTED BY BARRIERS, SIGNS SHALL HAVE A LATERAL CLEARANCE OF 30' OR GREATER (AS REQUIRED BY CLEAR ZONE) FROM EDGE OF DRIVING LANE.

ALONG INTERCHANGE RAMPS THE LATERAL CLEARANCE SHALL NORMALLY BE 10' OR GREATER (AS REQUIRED BY CLEAR ZONE).

▲ WHEN LATERAL CLEARANCE IS 30'-0" OR GREATER FROM EDGE OF PAVEMENT, THE SIGN IS TO BE APPROXIMATELY PERPENDICULAR TO ROADWAY.

APPROVED BY
TRAFFIC ENGINEER _____ DATE 8/5/10

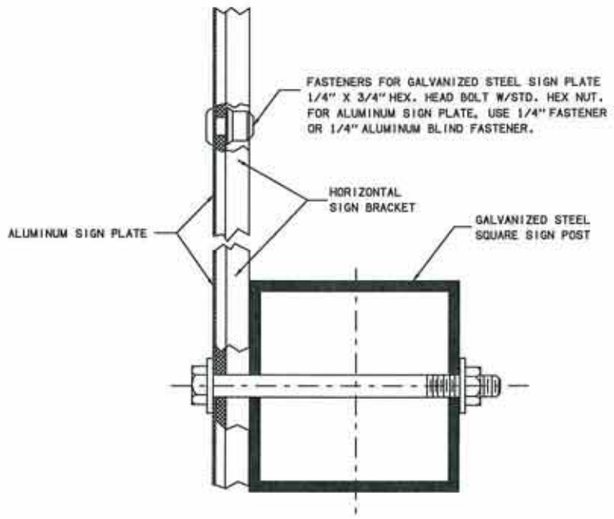
TRAFFIC STANDARD

TYPICAL INSTALLATIONS OF GROUND MOUNTED SIGNS

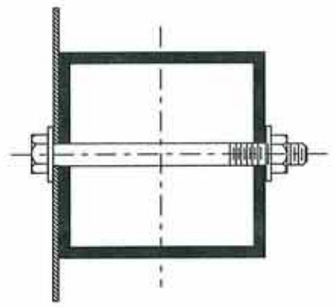
2009 SPECIFICATIONS

GMS1-1	00
	T-136

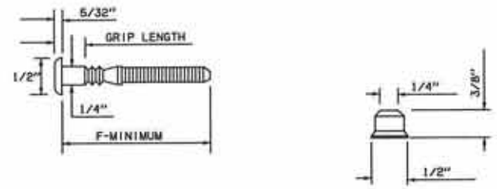
DESCRIPTION	REVISIONS	DATE



TOP VIEW

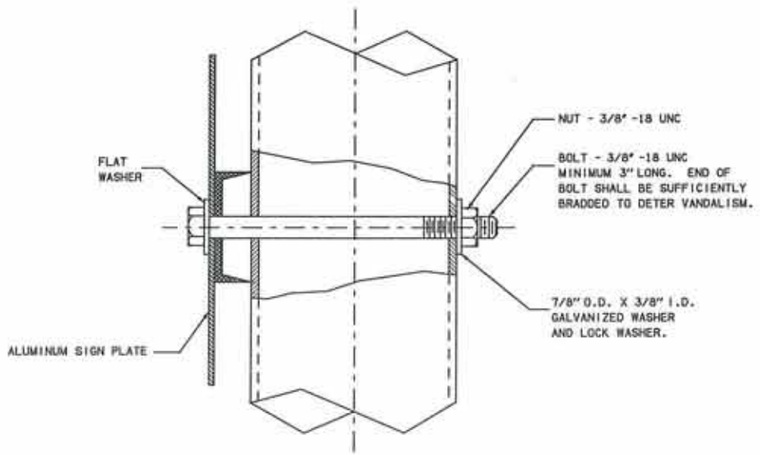


TOP VIEW



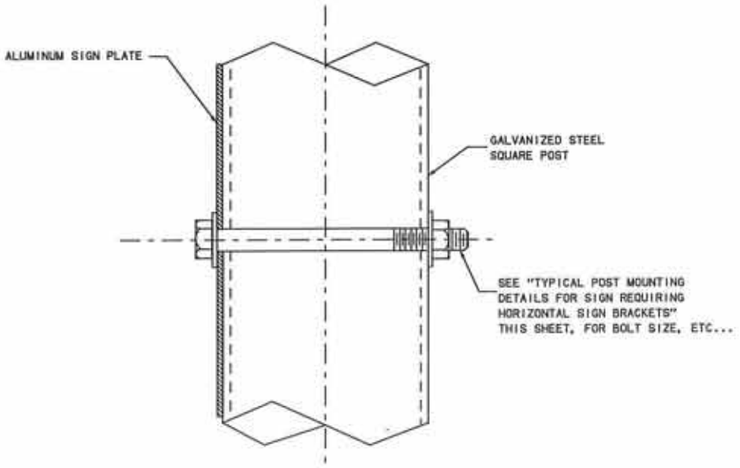
1/4" FASTENER AND 1/4" COLLAR (TYPICAL)

GRIP NO.	GRIP LENGTH (INCHES)	F-MIN.
2	0.094 - 0.156	1-7/16"
3	0.157 - 0.218	1-1/2"
4	0.219 - 0.281	1-9/16"
5	0.282 - 0.343	1-5/8"
6	0.344 - 0.406	1-11/16"
17	0.407 - 1.093	2-3/8"



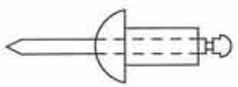
SIDE VIEW

TYPICAL POST MOUNTING DETAILS FOR SIGN REQUIRING HORIZONTAL SIGN BRACKETS



SIDE VIEW

TYPICAL POST MOUNTING DETAILS FOR SIGN 18" WIDE AND UNDER



ALUMINUM ALLOY BODY AND MANDREL. GRIP RANGE 1/16" TO 1/4".

1/4" BLIND FASTENERS

NOTE: ALL NUTS SHALL BE SELF-LOCKING.

APPROVED BY TRAFFIC ENGINEER: Harold Smith DATE: 8/5/10

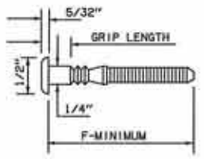
TRAFFIC STANDARD

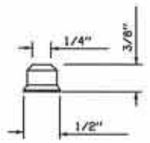
SHEET SIGN ASSEMBLY DETAILS (SQUARE TUBE)

2009 SPECIFICATIONS

SSA1-1	00
	T-139

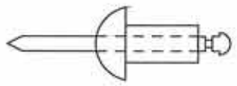
DESCRIPTION	REVISIONS	DATE





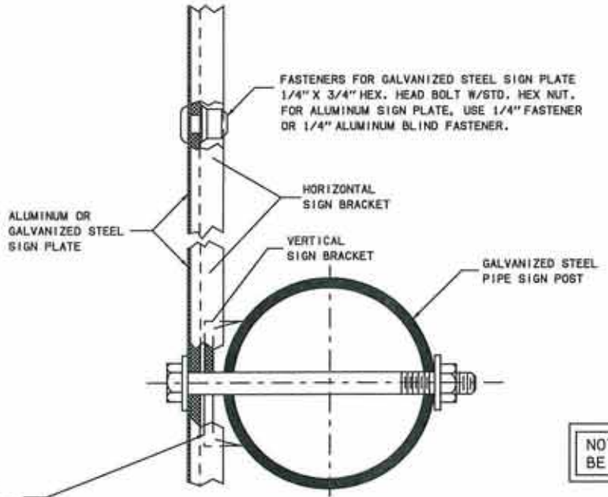
1/4" FASTENER AND 1/4" COLLAR (TYPICAL)

GRIP NO.	GRIP LENGTH	F-MIN.
2	0.094 - 0.156	1-7/16"
3	0.157 - 0.218	1-1/2"
4	0.219 - 0.281	1-9/16"
5	0.282 - 0.343	1-5/8"
6	0.344 - 0.406	1-11/16"
17	0.407 - 1.093	2-3/8"



ALUMINUM ALLOY BODY AND MANDREL. GRIP RANGE 1/16" TO 1/4"

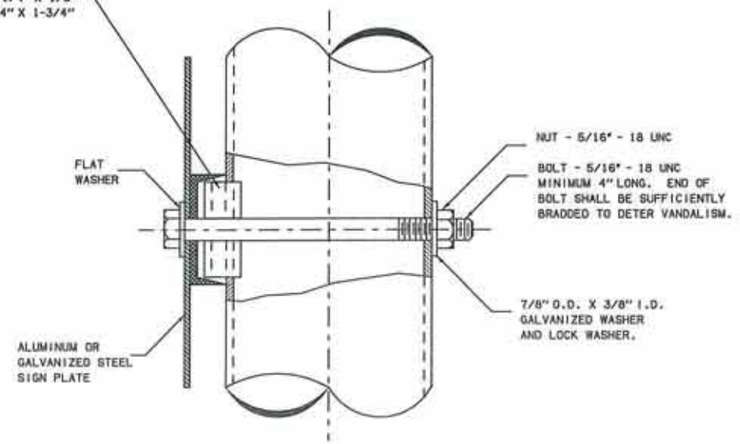
1/4" BLIND FASTENERS



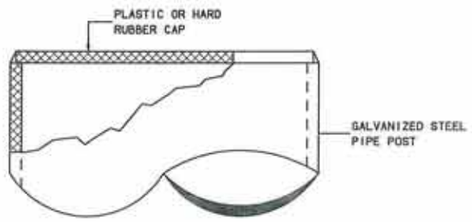
TOP VIEW

NOTE: ALL NUTS SHALL BE SELF-LOCKING.

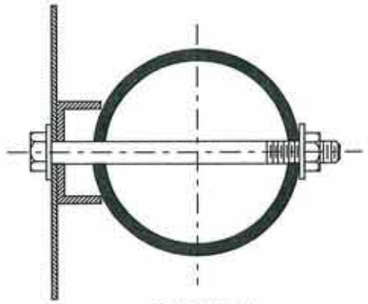
WHEN CONSTANT THICKNESS EXTRUDED ALUMINUM SIGN BRACKETS ARE USED THE HORIZONTAL SIGN BRACKET MAY CONTACT THE SIGN POST PREVENTING A SNUG AND PROPER FIT. WHEN THIS OCCURS AN ALUMINUM SPACER EITHER 1-1/4" X 1-1/4" X 1/8" THICK FOR 1-1/2" BRACKETS, OR 1-3/4" X 1-3/4" X 1/8" THICK FOR 2" BRACKETS SHALL BE USED.



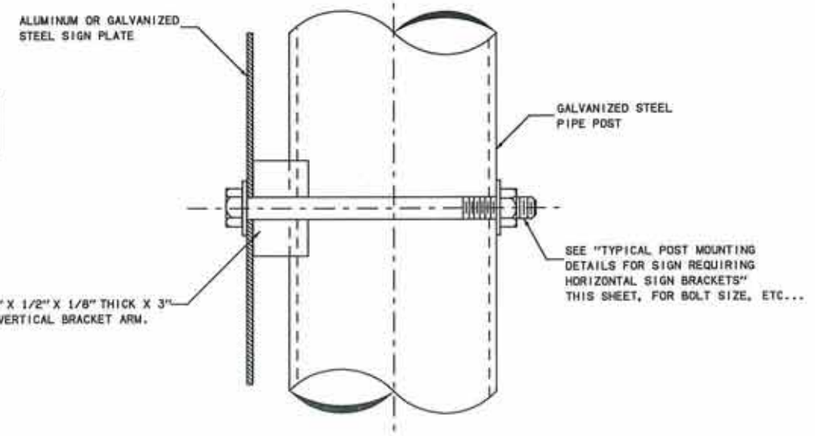
SIDE VIEW
TYPICAL POST MOUNTING DETAILS FOR SIGN REQUIRING HORIZONTAL SIGN BRACKETS



POST CAP NOT REQUIRED FOR 1-1/2" AND 2" PIPE POSTS



TOP VIEW



SIDE VIEW
TYPICAL POST MOUNTING DETAILS FOR SIGN REQUIRING VERTICAL SIGN BRACKETS ONLY

APPROVED BY TRAFFIC ENGINEER: Ronald Lynch DATE: 8/5/10

TRAFFIC STANDARD

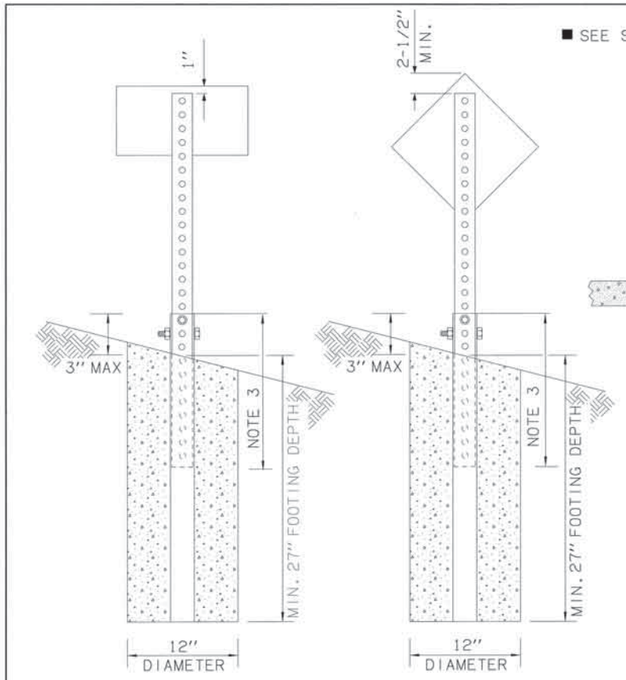
SHEET SIGN ASSEMBLY DETAIL (GALVANIZED PIPE)

2009 SPECIFICATIONS

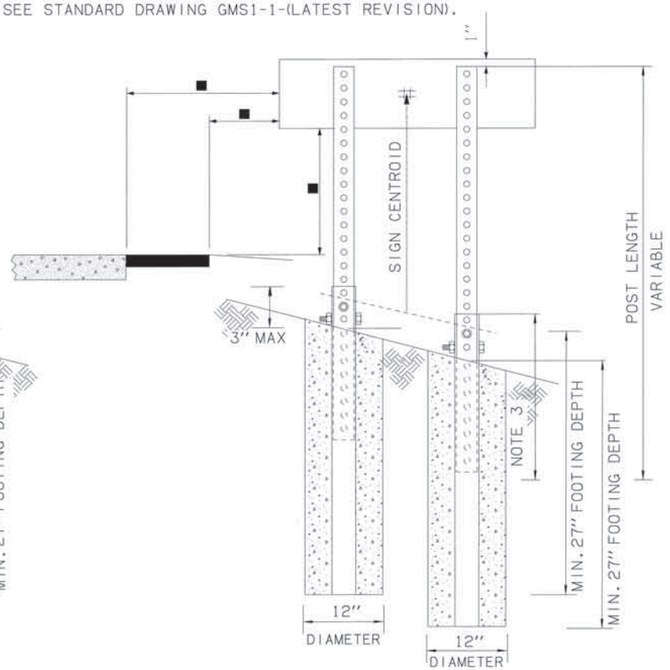
SSA2-1	00
	T-140

REVISIONS	
DESCRIPTION	DATE
MODIFIED GENERAL NOTE 4.	7/08/2011
REISSUED	4/10/2012

■ SEE STANDARD DRAWING GMS1-1-(LATEST REVISION).



TYPICAL SINGLE POST INSTALLATION



TYPICAL DOUBLE POST INSTALLATION

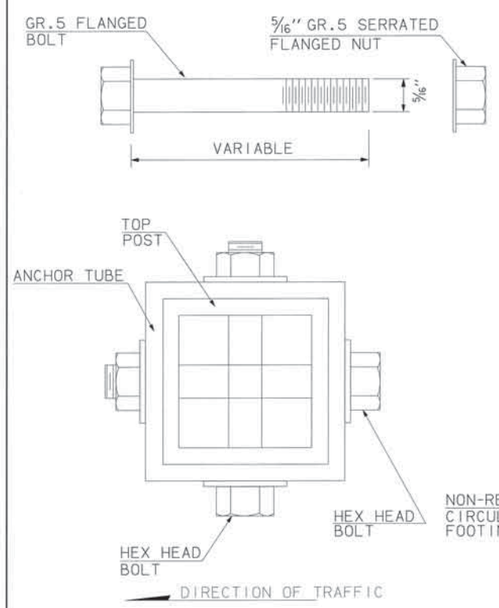
WINDLOAD COORDINATES FOR SQUARE POST AT 90 MPH

SIGN CENTROID	ALLOWABLE SIGN AREA (FT^2) PER SINGLE POST *							
	FHWA APPROVED FOR: 2 POST PER SIGN					FHWA APPROVED FOR: 1 POST PER SIGN		
	1½"x12ga perf.	1¾"x14ga perf.	1¾"x12ga perf.	2"x14ga perf.	2"x12ga perf.	2¼"x14ga perf.	2¼"x12ga perf.	2½"x12ga perf.
16.5'	3.46	3.90	4.85	5.19	6.48	6.67	8.34	10.44
16'	3.57	4.02	5.00	5.36	6.68	6.88	8.60	10.76
15.5'	3.68	4.15	5.17	5.53	6.90	7.11	8.88	11.11
15'	3.81	4.29	5.34	5.71	7.13	7.34	9.17	11.48
14.5'	3.94	4.44	5.52	5.91	7.37	7.60	9.49	11.87
14'	4.08	4.59	5.72	6.12	7.64	7.87	9.83	12.30
13.5'	4.23	4.76	5.93	6.35	7.92	8.16	10.19	12.75
13'	4.39	4.95	6.16	6.59	8.22	8.47	10.59	13.24
12.5'	4.57	5.15	6.41	6.86	8.55	8.81	11.01	13.77
12'	4.76	5.36	6.67	7.14	8.91	9.18	11.47	14.35
11.5'	4.96	5.59	6.96	7.45	9.30	9.58	11.97	14.97
11'	5.19	5.85	7.28	7.79	9.72	10.01	12.51	15.65
10.5'	5.44	6.13	7.63	8.16	10.18	10.49	13.11	16.40
10'	5.71	6.43	8.01	8.57	10.69	11.01	13.76	17.22
9.5'	6.01	6.77	8.43	9.02	11.25	11.59	14.49	18.12
9'	6.34	7.15	8.90	9.52	11.88	12.24	15.29	19.13
8.5'	6.72	7.57	9.42	10.08	12.58	12.96	16.19	20.26
8'	7.14	8.04	10.01	10.71	13.36	13.77	17.20	21.52

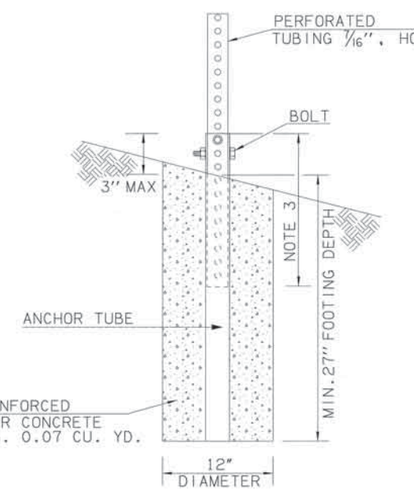
* USE A MULTIPLIER OF 2 OR 3 FOR 2 & 3 POST INSTALLATIONS.

GENERAL NOTES

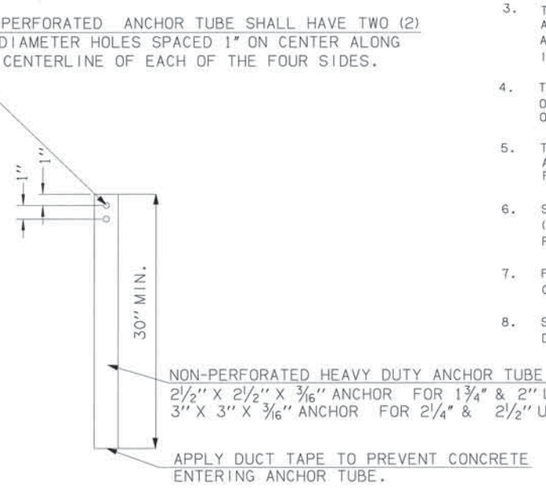
1. POST TUBE SHALL MEET ASTM A1011 GRADE 50.
   POST TUBE GALVANIZED AS PER ASTM A653 GRADE 90.
2. HEAVY DUTY ANCHOR TUBE SHALL MEET ASTM A500 GRADE B STRUCTURAL TUBE AND STEEL SHALL BE HOT DIP GALVANIZED PER ASTM A123.
3. THE UPPER SIGN POST SHALL TELESCOPE INSIDE THE ANCHOR TUBE A MINIMUM OF 12".
   ANCHOR TUBE SHALL BE MINIMUM OF 30" WITH 3" MAXIMUM AS SHOWN IN DETAILS.
4. THE CONCRETE FOOTING SHALL BE CLASS "C" CONCRETE OR AS DIRECTED BY THE ENGINEER. CONCRETE INCLUDED IN THE COST OF SQUARE TUBE POST.
5. THE NON-REINFORCED CIRCULAR CONCRETE FOOTING, ANCHOR TUBE AND HARDWARE SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE SQUARE TUBE POST.
6. SEE STANDARD DRAWINGS SSA1-1, MSD5-1, MSD6-1, SBS1-1, SBS2-1, AND SBS3-1 (LATEST REVISION) FOR PROPER BRACKET PLACEMENT ON THE SIGN AND POST SPACING FOR TWO POST INSTALLATION.
7. FOR VERTICAL AND LATERAL CLEARANCE, SEE STANDARD DRAWING GMS1-1-, AND GMS2-1-(LATEST REVISION).
8. SIGNS SHALL BE ATTACHED TO THE POSTS WITH BOLTS AS SHOWN ON STANDARD DRAWING SSA1-1-(LATEST REVISION).



BOLT DESIGN



ANCHOR TUBE DETAILS WITH CONCRETE FOOTING



HEAVY DUTY ANCHOR TUBE

– DRAWING NOT TO SCALE –

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
851(C)	SQUARE TUBE POST	LF

APPROVED BY TRAFFIC ENGINEER: Chris Smith DATE: 4/9/12

TRAFFIC STANDARD

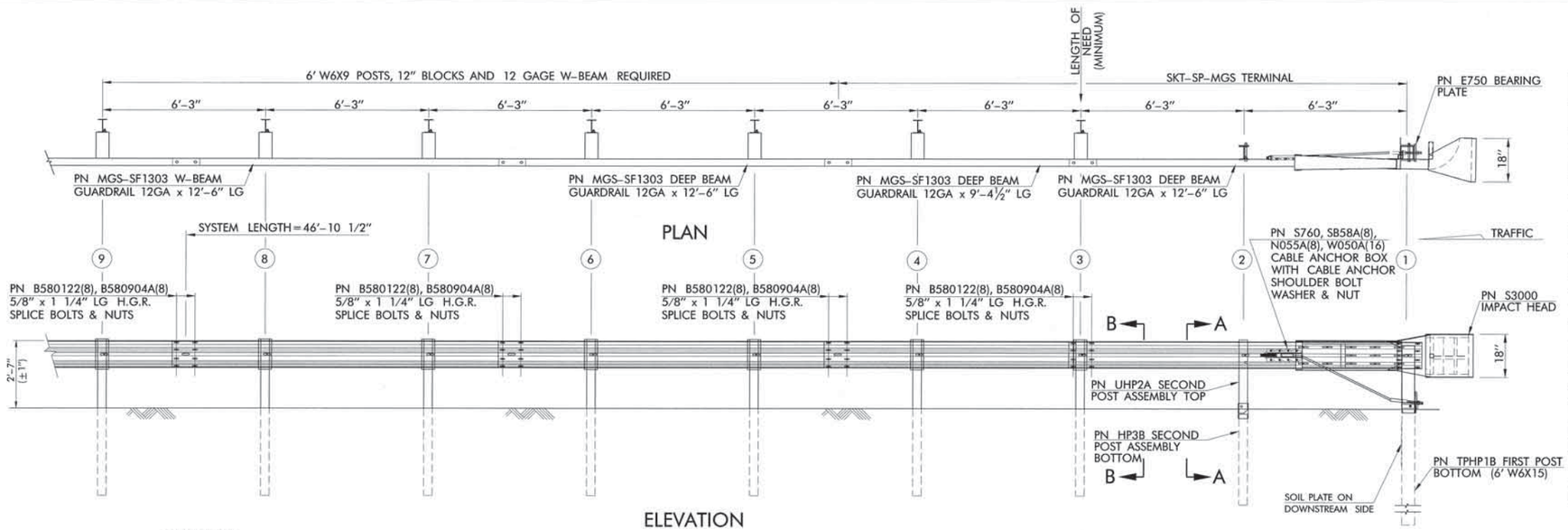
SQUARE TUBE POST DETAILS

2009 SPECIFICATIONS

SSP1-1 | 02

T-138

REVISIONS	
DESCRIPTION	DATE

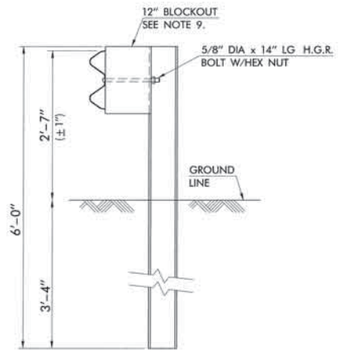


BILL OF MATERIAL

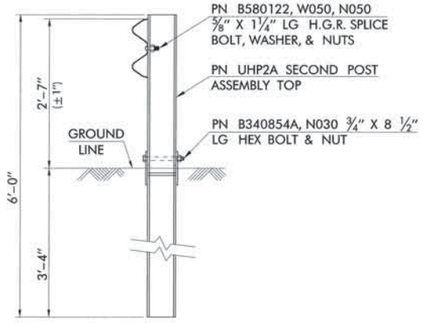
PN	QTY	DESCRIPTION
S3000	1	IMPACT HEAD
MGS-SF1303	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.
TPHP1A	1	FIRST POST TOP (6X6X⅛" Tube)
TPHP1B	1	FIRST POST BOTTOM (6' W6X15)
UHP2A	1	SECOND POST ASSEMBLY TOP
HP3B	1	SECOND POST ASSEMBLY BOTTOM
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
B5160104A	2	5/16 x 1 HEX BOLT GRD 5
W0516	4	5/16 WASHER
N0516	2	5/16 HEX NUT
B580122	25	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)
B580904A	2	5/8 Dia. x 9 HEX BOLT GRD 5
W050	3	5/8 WASHER
N050	26	5/8 Dia. H.G.R NUT
B340854A	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449
N030	1	3/4 Dia. HEX NUT
N100	1	1 ANCHOR CABLE HEX NUT
W100	1	1 ANCHOR CABLE WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	1/2 A325 STRUCTURAL NUT
W050A	16	1 1/16 OD x 9/16 ID A325 STR. WASHER

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. ALL BOLTS, NUTS, CABLE ASSEMBLIES, CABLE ANCHORS AND BEARING PLATES SHALL BE GALVANIZED.
3. THE LOWER SECTIONS OF THE POSTS 1 & 2 SHALL NOT PROTRUDE MORE THAN 4 IN ABOVE THE GROUND (MEASURED ALONG A 5' CORD). SITE GRADING MAY BE NECESSARY TO MEET THIS REQUIREMENT.
4. THE LOWER SECTIONS OF THE HINGED POSTS SHOULD NOT BE DRIVEN WITH THE UPPER POST ATTACHED. IF THE POST IS PLACED IN A DRILLED HOLE, THE BACKFILL MATERIAL MUST BE SATISFACTORILY COMPACTED TO PREVENT SETTLEMENT.
5. WHEN COMPETENT ROCK IS ENCOUNTERED, A 12" DIA POST HOLE, 20 IN. DEEP CORED INTO THE ROCK SURFACE MAY BE USED IF APPROVED BY THE ENGINEER FOR POST 1. GRANULAR MATERIAL WILL BE PLACED IN THE BOTTOM OF THE HOLE, APPROXIMATELY 2.5" DEEP TO PROVIDE DRAINAGE. THE FIRST POST CAN BE FIELD CUT TO LENGTH, PLACED IN THE HOLE AND BACKFILLED WITH SUITABLE BACKFILL. THE SOIL PLATE MAY BE TRIMMED IF REQUIRED.
6. A SITE EVALUATION SHOULD BE CONSIDERED IF THERE IS LESS THAN 25' BETWEEN THE OUTLET SIDE OF THE TERMINAL AND ANY ADJACENT DRIVING LANE.
7. THE BREAKAWAY CABLE ASSEMBLY MUST BE TAUT. A LOCKING DEVICE (VICE GRIPS OR CHANNEL LOCK PLIERS) SHOULD BE USED TO PREVENT THE CABLE FROM TWISTING WHEN TIGHTENING NUTS.
8. EXTRUDER TYPE TERMINALS SHALL NOT BE INSTALLED WHEN ADJACENT DRIVING LANES ARE WITHIN 25 FEET (HORIZONT.) OF EXTRUSION SIDE OF THE EXTRUDER TERMINAL.
9. RECYCLED COMPOSITE (PLASTIC) OR WOOD BLOCKOUTS MAY BE USED THROUGHOUT THE LENGTH OF THE TERMINAL, IF APPROVED BY THE ENGINEER.



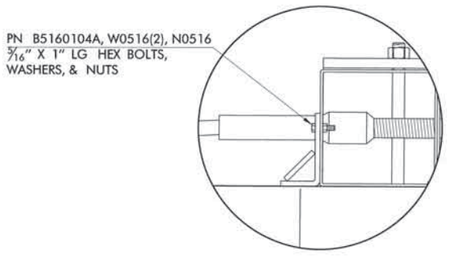
SECTION B–B
TYP AT POSTS #3 THRU #8



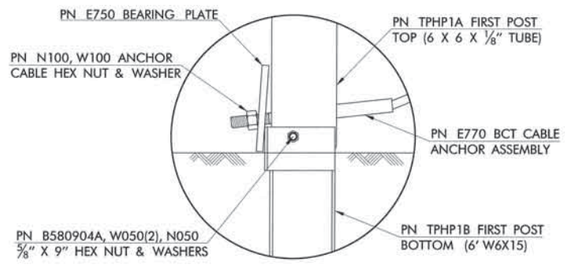
SECTION A–A
POST #2

OPTIONAL FLARED INSTALLATION

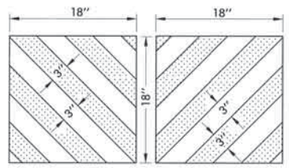
25:1 MAXIMUM FLARE RATE



IMPACT HEAD CONNECTION DETAIL



POST #1 CONNECTION DETAIL



REFLECTIVE MARKER DETAIL

REFLECTIVE MARKER

A. REFLECTORIZED MARKER(S) SHOULD BE ATTACHED TO THE VERTICAL END (12" x 24" FACE – TYP.) OF THE G.E.T PRIOR TO INSTALLATION.
B. ATTACHMENT SURFACE SHOULD BE THOROUGHLY CLEANED & DRY BEFORE ATTACHING ADHESIVE MARKER (STICK-ON SHEETING).
C. ATTACHED ADHESIVE SHEETING SHOULD BE FREE OF AIR BUBBLES WITH ALL EDGES FIRMLY BONDED.
D. STRIPING PATTERN MAY CONSIST OF 3" OR 4" STRIPES.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
623(G)	GUARDRAIL END TREATMENT (31")	EA.

APPROVED BY TRAFFIC ENGINEER: David Gasaway DATE: 4/9/12

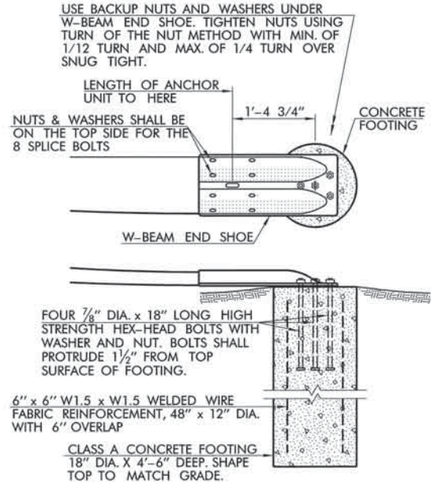
TRAFFIC STANDARD

GUARDRAIL END TREATMENT
(SKT-SP-MGS EXTRUDER TERMINAL)
(31" SYSTEM)

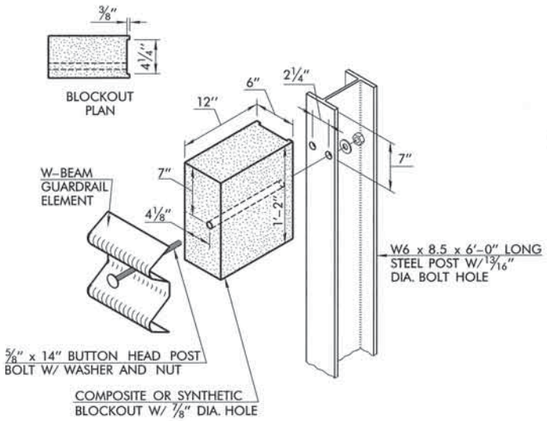
2009 SPECIFICATIONS

SKT-1	00
	T-602

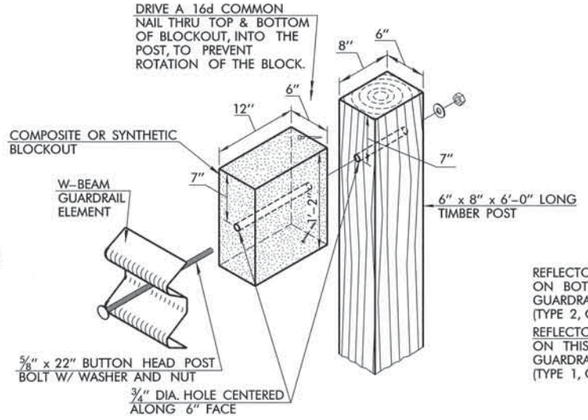
REVISIONS	
DESCRIPTION	DATE



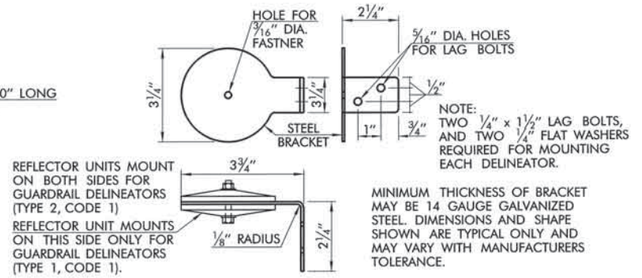
GROUND ANCHOR FOOTING DETAIL



STEEL POST AND COMPOSITE OR SYNTHETIC BLOCKOUT

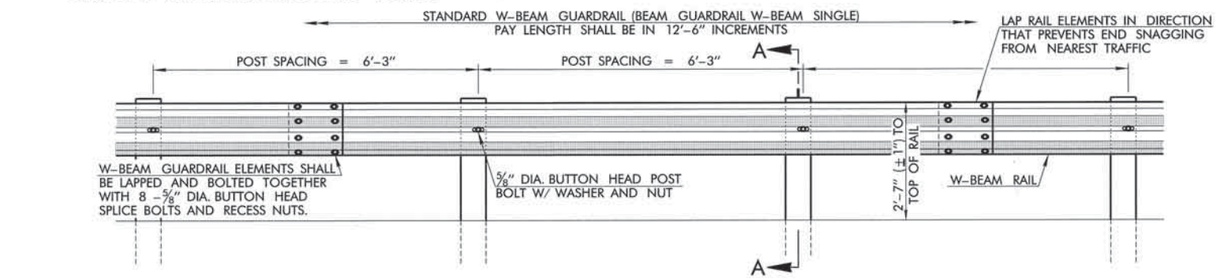


OPTIONAL WOOD POST AND COMPOSITE OR SYNTHETIC BLOCKOUT

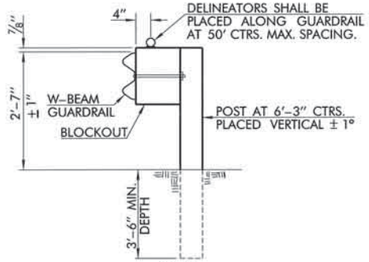


TYPICAL BRACKET FOR MOUNTING 3 1/4" ROUND DELINEATOR TO GUARD RAIL BLOCKOUT

CONTRACTOR MAY USE ALTERNATE DELINEATORS LISTED ON TRAFFIC ENGINEERING DIVISIONS QUALIFIED PRODUCTS LIST (QPL). THE USE OF ALTERNATE DELINEATORS (NOT DESCRIBED IN THIS STANDARD) MUST BE APPROVED BY THE RESIDENT ENGINEER.

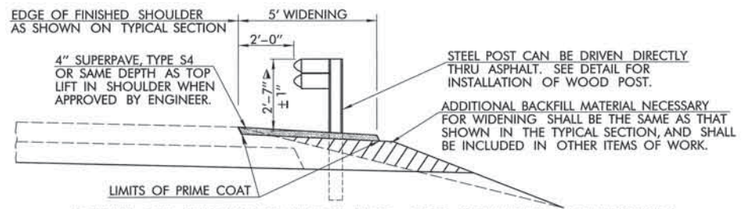


STANDARD W-BEAM GUARDRAIL ELEVATION



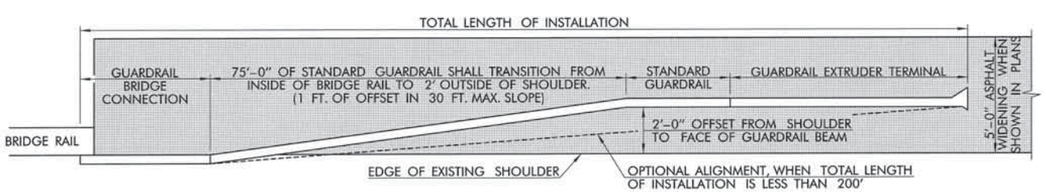
A–A

STANDARD W-BEAM GUARDRAIL SECTION

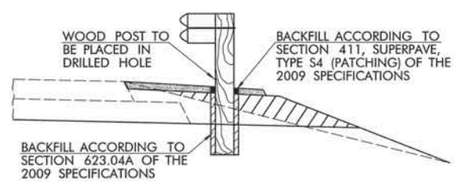


DETAIL OF SHOULDER WIDENING FOR STANDARD GUARDRAIL

Δ MEASURE FROM TOP OF RAIL, GUARDRAIL TO BE INSTALLED WITH THIS DIMENSION. WHEN INSTALLING GUARDRAIL IN AN AREA WITH NO SHOULDER WIDENING, THE RAIL HEIGHT SHALL BE MEASURED AS FOLLOWS:
- –FOR NEGATIVE GRADE SHOULDERS, MEASURE TO A LINE FROM THE SHOULDER ON THE SAME SLOPE AS THE SHOULDER.
- –FOR POSITIVE GRADE & LEVEL SHLDRS, MEASURE FROM A LINE LEVEL WITH THE EDGE OF SHOULDER.



TYPICAL GUARDRAIL INSTALLATION AT BRIDGE



INSTALLATION OF WOOD POST IN ASPHALT WIDENING

OPTIONAL TYPE POSTS OR BLOCKOUTS FOR STANDARD GUARDRAIL

THE CONTRACTOR MAY, AT HIS OPTION, SELECT AND USE ONE OF THE TYPE POSTS AND BLOCKOUTS SHOWN ABOVE, OR AN APPROVED ALTERNATE. THIS POST & BLOCKOUT CHOICE MUST BE USED ON THE ENTIRE PROJECT. ALTERNATE POST (INCLUDING SPECIAL SHAPES) MAY BE USED UPON THE APPROVAL OF THE ENGINEER. ALTERNATE BLOCKOUTS SUCH AS WOOD MAY BE USED IF PRODUCT HAS BEEN EVALUATED AND APPROVED BY ODOT.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. STANDARD GUARDRAIL WITH 6'–3" POST SPACING MEETS NHCRP–350, TEST LEVEL 3. IF A RIGID HAZARD IS TO BE LEFT BEHIND THE GUARDRAIL, WITHIN 3'–0" OF THE RAIL, CONSIDER USING A DIFFERENT TREATMENT.
3. IF OPTIONAL WOOD POSTS AND BLOCKOUTS ARE USED, THEN THEY SHALL BE STRESS GRADE 1200F.
4. ALL STANDARD GUARDRAIL AND GUARDRAIL EXTRUDER TERMINALS SHALL BE OFFSET SO THAT RAIL FACE IS TWO FEET OUTSIDE THE SHOULDER. FOR TRANSITION FROM BRIDGE RAIL TO TWO FOOT OFFSET, BEGINNING AT THE GUARDRAIL BRIDGE CONNECTION, TRANSITION THE STANDARD GUARDRAIL, AT A 30:1 TAPER, UNTIL THE RAIL REACHES THE OFFSET DISTANCE.
5. ALL GUARDRAIL, METAL POSTS, PLATES AND HARDWARE SHALL BE GALVANIZED AFTER FABRICATION.
6. ANY FIELD CUTS OR HOLES DRILLED IN GALVANIZED MATERIALS SHALL BE COATED WITH A ZINC OXIDE PAINT. SEE SECTION 730 OF THE 2009 SPECIFICATIONS.
7. GUARDRAIL DELINEATORS (TYPE 2, CODE 1) WILL BE REQUIRED FOR ALL TWO–LANE ROADWAYS. ALL OTHER ROADWAYS WILL REQUIRE GUARDRAIL DELINEATORS (TYPE 1, CODE 1).

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
623(A)	BEAM GUARDRAIL W–BEAM SINGLE	L.F.
623(F)	GUARDRAIL TRAIL END TURNDOWN (31")	EA.
853	GUARDRAIL DELINEATORS (TYPE 1, CODE 1)	EA.
853	GUARDRAIL DELINEATORS (TYPE 2, CODE 1)	EA.

NOTE: PAY ITEM GUARDRAIL ANCHOR UNIT–TURN DOWN INCLUDES ALL LABOR AND MATERIALS TO INSTALL 25'–0" TWISTED RAIL ELEMENT, W–BEAM END SHOE, CONC. FOOTING, AND FOUR ANCHOR BOLTS.

APPROVED BY TRAFFIC ENGINEER: [signature] DATE: 8/9/2012

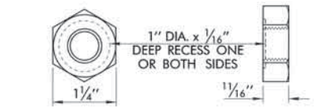
TRAFFIC STANDARD

GUARDRAIL AND HARDWARE
(1 OF 2)
(31" SYSTEM)

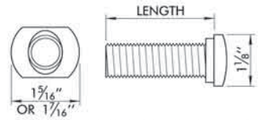
2009 SPECIFICATIONS

GHW1–1	00
T–605	

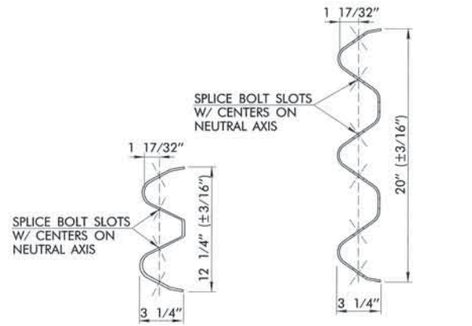
REVISIONS	
DESCRIPTION	DATE



5/8" DIA. BUTTON HEAD BOLT & RECESS NUT

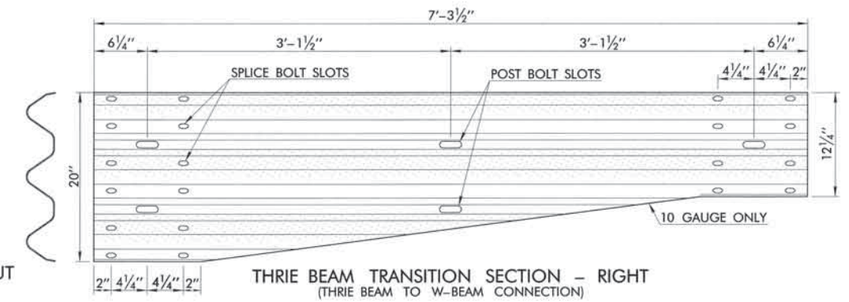


ALTERNATE BUTTON HEAD BOLT

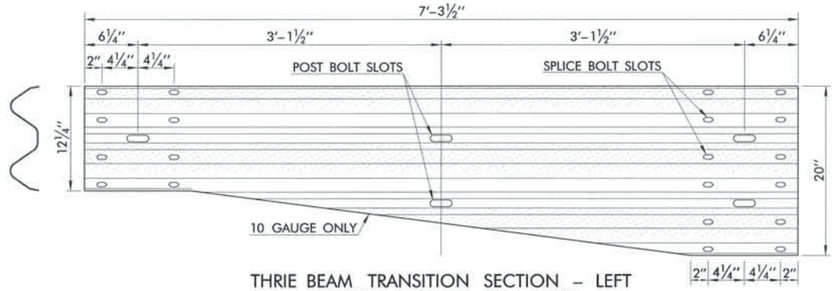


W-BEAM GUARDRAIL SECTION

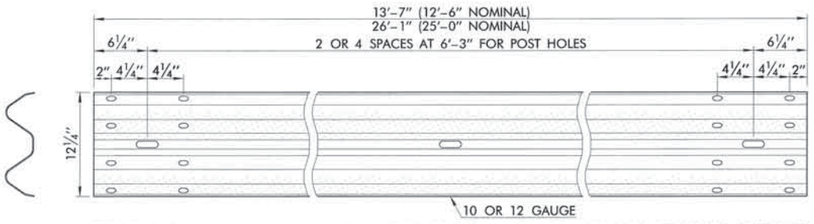
THRIE BEAM GUARDRAIL SECTION



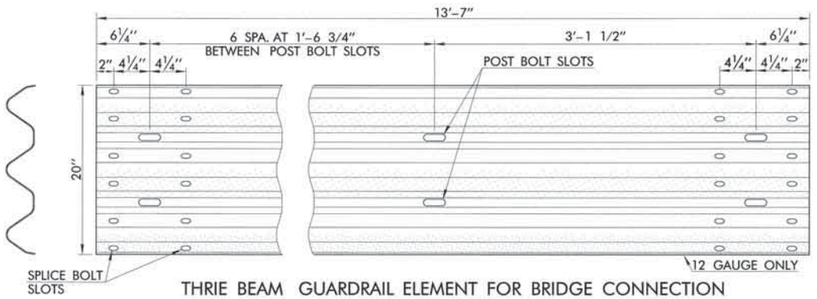
THRIE BEAM TRANSITION SECTION – RIGHT
(THRIE BEAM TO W-BEAM CONNECTION)



THRIE BEAM TRANSITION SECTION – LEFT
(THRIE BEAM TO W-BEAM CONNECTION)

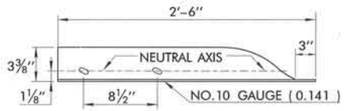


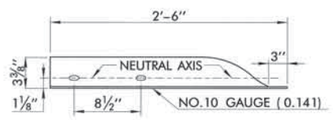
STANDARD W-BEAM GUARDRAIL ELEMENT (12'-6" OR 25'-0" NOMINAL LENGTH)

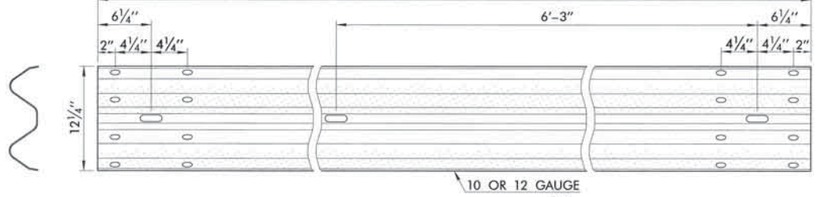


THRIE BEAM GUARDRAIL ELEMENT FOR BRIDGE CONNECTION

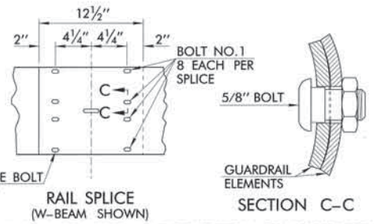
3" x 1 3/4" x 3/16" BEAM WASHER







SPECIAL W-BEAM GUARDRAIL ELEMENT (9'-4½" NOMINAL LENGTH)

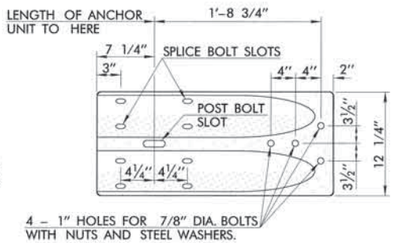


RAIL SPLICE
(W-BEAM SHOWN)

SECTION C-C

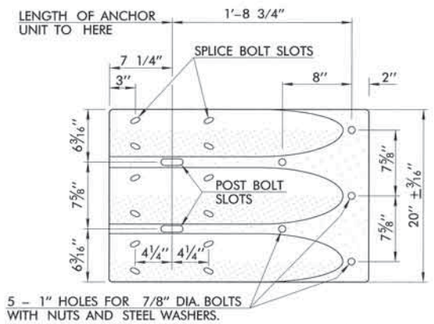
GUARDRAIL SHALL BE LAPPED IN THE DIRECTION OF NEAREST TRAFFIC AT ALL LOCATIONS WHERE SPLICES OCCUR (EXCEPT AT NARROW OR ONE LANE BRIDGE APPROACHES, WHERE LAPS SHALL BE TOWARD THE BRIDGE ON BOTH SIDES OF THE APPROACH ROADWAY).

RAIL SPLICE



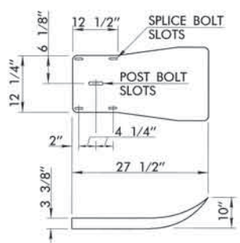
4 – 1" HOLES FOR 7/8" DIA. BOLTS WITH NUTS AND STEEL WASHERS.

W-BEAM TERMINAL CONNECTION
10 GAUGE ONLY (END SHOE)



5 – 1" HOLES FOR 7/8" DIA. BOLTS WITH NUTS AND STEEL WASHERS.

THRIE BEAM TERMINAL CONNECTION
10 GAUGE ONLY (END SHOE)



W-BEAM END SECTION (FLARED)

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. ALL GUARDRAIL BEAMS, END SHOES, AND END SECTIONS ON THIS STANDARD DRAWING SHALL BE IN ACCORDANCE WITH AASHTO M 180.
3. ALL SPLICE BOLT SLOTS SHALL BE 29/32" WIDE x 1 1/8" LONG.
4. ALL POST BOLT SLOTS SHALL BE 3/4" WIDE x 2 1/2" LONG.

APPROVED BY TRAFFIC ENGINEER: Richard Staats DATE: 4/9/12

TRAFFIC STANDARD

GUARDRAIL AND HARDWARE
(2 OF 2)
(31" SYSTEM)

2009 SPECIFICATIONS

GHW2-1	00
	T-606