SECTION 1

SECTION 1

STREETS

SECTION 1

STREETS
(continued)

PAVEMENT THICKNESS DESIGN PROCEDURE

THE FOLLOWING PROCEDURES WILL BE USED FOR ALL CITY OF EL PASO STREET PAVING PROJECTS, INCLUDING THOSE CONTRACTED BY THE CITY AND THOSE CONTRACTED BY THE DEVELOPER WITHIN A DISTANCE OF 5 MILES OUTSIDE THE CITY LIMITS. THE SOIL STUDY ANALYSIS REPORT FOR ALL PROJECTS SHALL INCLUDE THE FOLLOWING:

1. ESTABLISH CLASSIFICATION OF SUBGRADE SOILS.

   A. DRILL SOIL BORINGS WITH STANDARD PENETRATION TESTS (SURFACE AND 2-1/2 FOOT INTERVALS) TO 6.5 FT BELOW PAVING SUBGRADE AT LOCATIONS DETEMINED BY THE CITY ENGINEER OR AT INTERVALS NOT TO EXCEED 800 FT. WITH A MINIMUM OF 2 SOIL BORINGS PER PROJECT.

   B. OBSERVE AND LOG SAMPLES TO IDENTIFY SOILS IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.

   C. OBSERVE AND REPORT FREE GROUNDWATER CONDITIONS.

2. ESTABLISH INDEX PROPERTIES OF SUBGRADE.

   A. MAKE TESTS TO DETERMINE ATTERBERG LIMITS AND PERCENT OF SOIL PASSING 200-MESH SIEVE FOR EACH MAJOR SOIL TYPE.

   B. DETERMINE GRAIN SIZE CURVES FOR COARSE GRAINED SOILS BY SIEVE ANALYSIS.

PAVEMENT THICKNESS DESIGN PROCEDURE
(continued)

3. ESTABLISH IN-PLACE CONDITIONS AND STRENGTH OF SUBGRADE.

   A. DETERMINE MOISTURE CONTENTS AND UNIT DRY WEIGHTS OF UNDISTURBED AND/OR RELATIVELY UNDISTURBED SAMPLES OF SOILS.

   B. DETERMINE STRENGTH OF COHESIVE SOILS BY UNCONFINED COMPRESSION TESTS ON SELECTED UNDISTURBED SHELBY TUBE SAMPLES.

4. OBTAIN STRENGTH OF SUBGRADE SOILS.

   A. USE THE CALIFORNIA BEARING RATION (CBR). CBR VALUES SHALL BE OBTAINED BY TEST METHODS OUTLINED IN EITHER ASHTO T193 OR ASTM D1883.

5. DETERMINE THICKNESS OF BASE MATERIALS AND PAVEMENT IN ACCORDANCE WITH AASHTO INTERIM GUIDE FOR DESIGN OF PAVEMENT STRUCTURES 1972, CHAPTER III, REVISED 1981; PUBLISHED BY: AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 444 N. CAPITAL STREET, N.W. SUITE 225, WASHINGTON, D.C. 20001.

   A. THE NECESSARY DESIGN DATA FOR HOT MIXED ASPHALTIC CONCRETE PAVEMENTS MUST BE OBTAINED AND USED AS FOLLOWS:

      1. TERMINAL SERVICEABILITY INDEX (PT) MUST BE 2.0.

      2. EQUIVALENT 18-KIP SINGLE-AXLE LOADS (EAL) MUST BE OBTAINED FROM TABLE 1, STREET DESIGN CRITERIA, DESIGN STANDARD SHEET NO. 3-25. THE DEPARTMENT OF ENGINEERING SHALL DETERMINE APPLICABLE STREET CLASSIFICATION.

PAVEMENT THICKNESS DESIGN PROCEDURE
(continued)

3. SOIL SUPPORT VALUE (S) MUST BE DETERMINED FROM FIGURE 1 ATTACHED. SOIL STRENGTH VALUES MUST BE AS OBTAINED FROM CBR TESTS.

4. REGIONAL FACTOR (R) MUST BE 0.5.

5. STRUCTURAL NUMBER (SN) MUST BE DETERMINED FROM THE NOMOGRAPH, FIGURE 2. ATTACHED.

6. LAYER COEFFICIENT (A_1 , A_2 , A_3) MUST BE ESTABLISHED FROM TABLE 2. (ATTACHED) .

7. USE THE FOLLOWING EQUATION TO DETERMINE THE MOST EFFICIENT PAVEMENT STRUCTURE.

$$SN = A_1 D_1 + A_2 D_2 + A_3 D_3$$

WHERE D_1 = THICKNESS OF SURFACE COURSE
D_2 = THICKNESS OF BASE COURSE
D_3 = THICKNESS OF SUBBASE COURSE

PAVEMENT THICKNESS DESIGN PROCEDURE
(continued)

DEFINITIONS:

CALIFORNIA BEARING RATION (CBR) - THIS IS A MEASURE OF THE STRENGTH OF A SOIL AS DETERMINED BY FORCING A 3 SQUARE INCH PLUNGER INTO A CYLINDER OF THE SOIL. CBR VALUES MAY RANGE FROM 1-100.

TERMINAL SERVICEABILITY INDEX (PT) - THE SERVICEABILITY OF A PAVEMENT IS DEFINED AS THE ABILITY TO SERVE HIGH-SPEED, HIGH VOLUME AUTOMOBILE AND TRUCK TRAFFIC AND IS MEASURED BY USE OF AN INDEX. THE PT IS THE LOWEST INDEX THAT WILL BE TOLERATED BEFORE RESURFACING OR RECONSTRUCTION BECOMES NECESSARY. FOR EL PASO, THE PT MUST BE 2.0.

EQUIVALENT 18-KIP SINGLE AXLE LOADS (EAL) - TO ASSESS TRAFFIC LOADS, THE VARYING AXLE LOADS OF DIFFERENT VEHICLES ARE CONVERTED TO A COMMON UNIT. IN THIS PROCEDURE THE 18 KIP SINGLE AXLE LOAD IS USED.

SOIL SUPPORT VALUE (S) - AN INDEX NUMBER WHICH EXPRESSES THE ABILITY OF A SOIL OR AGGREGATE MIXTURE TO SUPPORT TRAFFIC LOADS THROUGH A FLEXIBLE PAVEMENT STRUCTURE.

REGIONAL FACTOR (R) - A NUMERICAL FACTOR THAT IS USED TO ADJUST THE STRUCTURAL NUMBER FOR CLIMATIC AND ENVIRONMENTAL CONDITIONS. FOR EL PASO, THE (R) MUST BE 0.5.

STRUCTURAL NUMBER (SN) - AN INDEX NUMBER DERIVED FROM AN ANALYSIS OF TRAFFIC, SUBGRADE SOIL CONDITIONS, AND REGIONAL FACTOR WHICH MAY BE CONVERTED TO THICKNESS OF FLEXIBLE PAVEMENT LAYERS THROUGH THE USE OF SUITABLE LAYER COEFFICIENTS RELATED TO THE TYPE OF MATERIAL BEING USED IN EACH LAYER OF THE PAVEMENT STRUCTURE.

LAYER COEFFICIENTS - A NUMBER WHICH RELATES SN AND THICKNESS.

A_1 REPRESENTS THE SURFACE COURSE.
A_2 REPRESENTS THE BASE COURSE.
A_3 REPRESENTS THE SUBBASE COURSE.

PAVEMENT THICKNESS DESIGN PROCEDURE
(continued)

EXAMPLE:

DESIGN A PAVEMENT STRUCTURE FOR A 36' ROADWAY WITH CBR = 12, 95% COMPACTED SUBGRADE, ASTM D1557.

A. $P_t = 2.0$

B. CITY ENGINEER DETERMINES THIS STREET IS A RESIDENTIAL COLLECTOR ACCORDING TO TABLE 1. THEREFORE, EAL=269,000

C. FROM FIGURE 1, WITH CBR = 12 , S = 6.35

D. R = 0.5

E. FROM FIGURE 2, SN = 1.70

F. FROM TABLE 2 , $a_1 = 0.44$, $a_2 = 0.14$, $a_3 = 0.11$

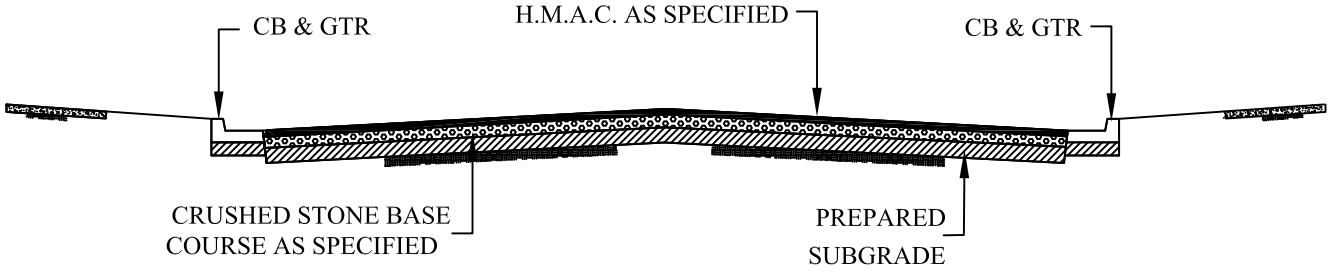
G. USE $D_1 = 2"$, $D_3 = 6$ IN EQU -1 AND SOLVE FOR D_2

$1.70 = (0.44)(2) + (0.14) D_2 + (0.11)(6)$

$D_2 = 1.14"$

EXAMPLE:

MINIMUM "D" FOR RESIDENTIAL SUBCOLLECTOR ACCESS STREET IS 4 1/2". THIS PAVEMENT STRUCTURE WOULD CONSIST OF 2" H.M.A.C., 4 1/2" C.S.B. AND 6" COMPACTED SUB-BASE



TYPICAL ROAD SECTION

PAVEMENT THICKNESS DESIGN CHART
(continued)

STREET CLASSIFICATION	AVERAGE DAILY TRAFFIC E.A.L. (20 YRS)	ROADWAY WIDTH (FT.)	ROW WIDTH (FT.)	MINIMUM PAVEMENT THICKNESS (IN.) ** HMAC CSB SUBGRADE
MULTI-FAMILY/ COMMERCIAL/ INDUSTRIAL	6,000 *	36	56	2
LOCAL STREET 2	630,000			8 10
NON-RESIDENTIAL COLLECTOR	6,000 *	50	70	2
	630,000			8 10
NON-RESIDENTIAL COLLECTOR WITH BIKE LANES	6,000 *	62	82	2-1/2
	630,000			8 10
BOULEVARD	14,000 *	44	120	2-1/2
	1,300,000			10 12
MINOR ARTERIAL	14,000 *	58	78	2-1/2
	1,500,000			8 10
MINOR ARTERIAL W/BIKE LANES	14,000 *	58	88	2-1/2
	1,500,000			8 10
MAJOR ARTERIAL	26,000 *	66	110	2-1/2
	3,100,000			10 12
MAJOR ARTERIAL W/BIKE LANES	26,000 *	66	120	2-1/2
	3,100,000			10 12

* ADT FOR PURPOSES OF ESTIMATING AXLE LOADS ONLY

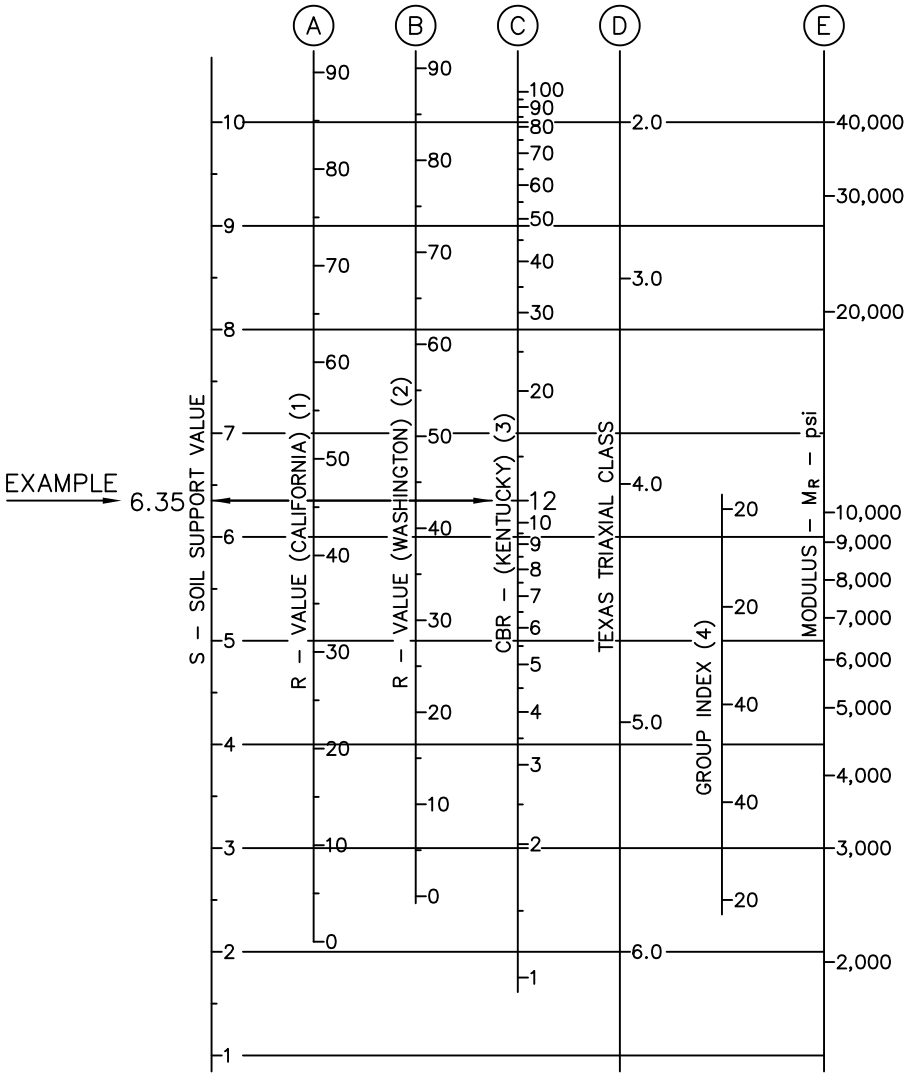
** IF THE RESULTS FOR "CBR" VALUES ARE HIGHER THAN THE MINIMUM PAVEMENT THICKNESS, THE HIGHER VALUES SHALL BE USED.

INTENTIONALLY LEFT BLANK FOR FUTURE USE

PAVEMENT THICKNESS DESIGN PROCEDURE				
STREET CLASSIFICATION	AVER. DAILY TRAFFIC E. A. L. (20 YRS.)	ROADWAY WIDTH (FT.)	R. O. W. WIDTH (FT.)	MINIMUM PAVEMENT THICKNESS (IN.) ** HMAC CSB SUBGRADE
COLLECTOR ARTERIAL**	7,000* 1,800,000	90	98	2 1/2 8 10
MINOR ARTERIAL**	14,000* 2,200,000	98	120	2 1/2 10 12
MAJOR ARTERIAL**	28,000* 4,600,000	98	136	2 1/2 10 12
COLLECTOR ARTERIAL** W/ BIKE LANES	7,000* 1,800,000	98	136	2 1/2 8 10
MINOR ARTERIAL** W/ BIKE LANES	14,000* 2,200,00	98	136	2 1/2 10 12
MAJOR ARTERIAL** W/ BIKE LANES	28,000* 4,600,000	98	136	2 1/2 10 12

*ADT FOR PURPOSES OF ESTIMATING AXLE LOADS ONLY.

**MINIMUM PAVEMENT THICKNESS FOR ARTERIAL STREETS, WITHIN HEAVY COMMERCIAL AND INDUSTRIAL DEVELOPMENTS (PROPERTIES ZONED C-4, M-1, M-2, M-3 AND P.I.) SHALL BE SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.



PAVEMENT THICKNESS

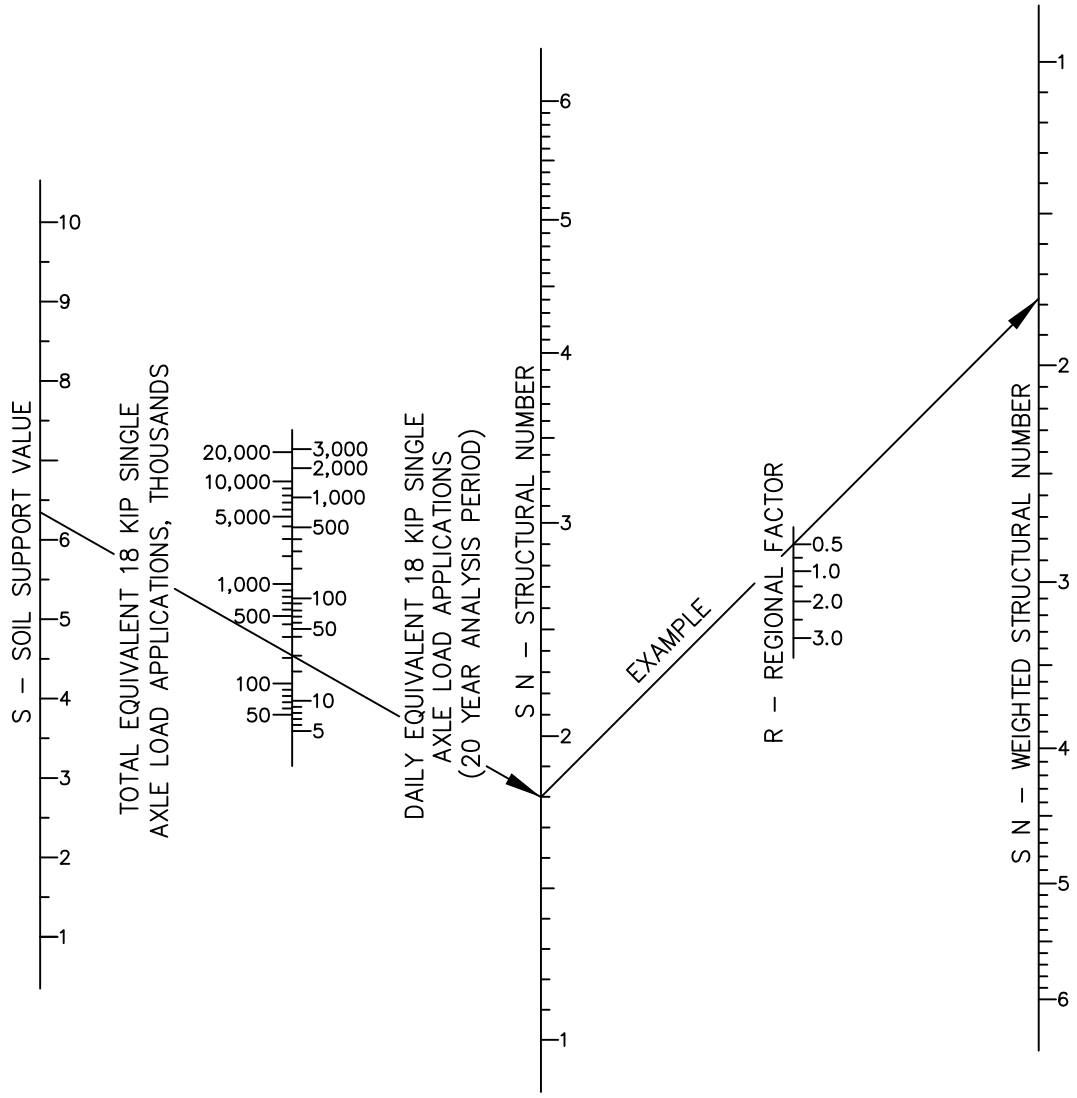
(1) THE CORRELATION IS WITH THE DESIGN CURVES USED BY CALIFORNIA; AASHO DESIGNATIONS T–173–60, AND EXUDATION PRESSURE IS 240 psi. SE HVEEM, F.M., AND CARMANY, R.M., "THE FACTORS UNDERLYING THE RATIONAL DESIGN OF PAVEMENTS." PROC. HRB, VOL. 28 (1948) PP. 10–136.

(2) THE CORRELATION IS WITH THE DESIGN CURVES USED BY WASHINGTON DEPT. OF HIGHWAYS; EXUDATION PRESSURE IS 300 psi. SEE "FLEXIBLE PAVEMENT DESIGN CORRELATION STUDY." HRB BULL. 133 (1956).

(3) THE CORRELATION IS WITH THE CBR DESIGN CURVES BY KENTUCKY. SEE DRAKE, W.B., AND HAVENS, J.H., "RE–EVALUATION OF KENTUCKY FLEXIBLE PAVEMENT DESIGN CRITERION." HRB BULL. 233 (1959) PP. 33–56. THE FOLLOWING CONDITIONS APPLY TO THE LABORATORY–MODIFIED CBR: SPECIMEN IS TO BE MOLDED AT OR NEAR THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY AASHTO T–99; DYNAMIC COMPACTION IS TO BE USED WITH A HAMMER WEIGHT OF 10 LB. DROPPED FROM A HEIGHT OF 18 IN.; SPECIMEN IS TO BE COMPACTED IN FIVE EQUAL LAYERS WITH EACH LAYER RECEIVING 10 BLOWS; SPECIMEN IS TO BE SOAKED FOR 4 DAYS.

(4) THIS SCALE HAS BEEN DEVELOPED BY COMPARISON BETWEEN THE CALIFORNIA R–VALUE AND THE GROUP INDEX DETERMINED BY THE PROCEDURE IN PROC. HRB VOL. 25 (1945) PP. 376–392.

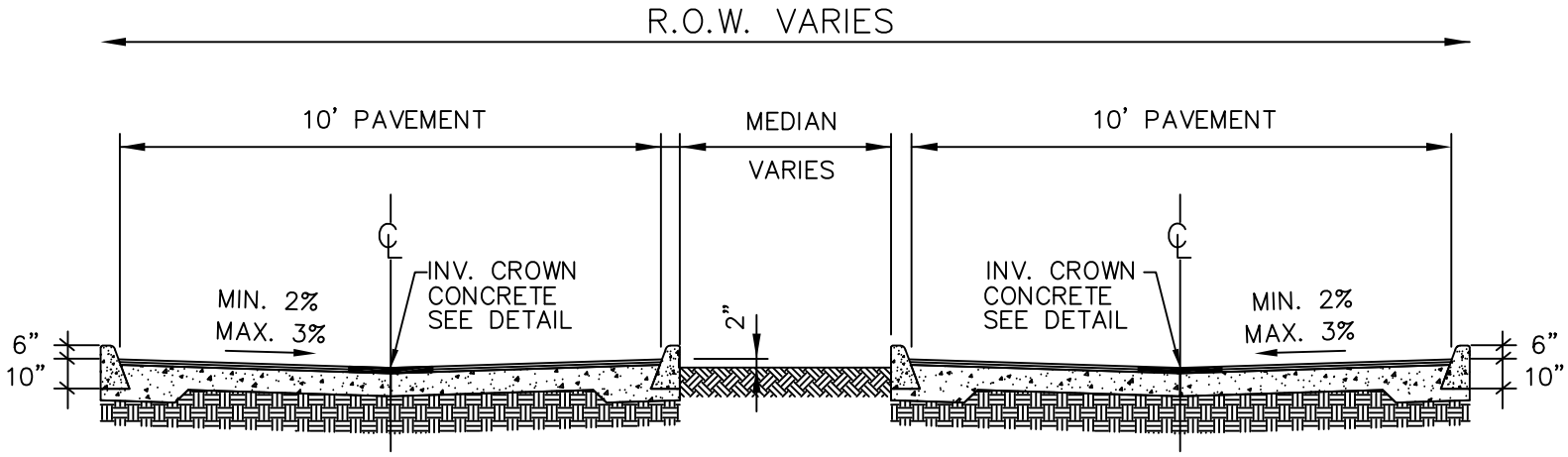
FIGURE 1



STRUCTURAL NUMBER FOR Pt = 20
FIGURE 2

PAVEMENT COMPONENT	COEFFICIENT[3]	
SURFACE COURSE		
ROADMIX (LOW STABILITY)	0.20	
PLANTMIX (HIGH STABILITY)	0.44*	← EXAMPLE
SAND ASPHALT	0.40	
BASE COURSE		
SANDY GRAVEL	0.07 *[2]	← EXAMPLE
CRUSHED STONE	0.14	
CEMENT-TREATED (NO SOIL - CEMENT)		
COMPRESSIVE STRENGTH @ 7 DAYS		
650 PSI OR MORE (4.48 MPA)	0.23[2]	
400 TO 650 PSI (2.76 TO 4.48 MPA)	0.20	
400 PSI OR LESS (2.76 MPA)	0.15	
BITUMINOUS - TREATED		
COARSE - GRADED	0.34[2]	
SAND ASPHALT	0.30	
LIME - TREATED	0.15 - 0.30	
SUBBASE COURSE		
SANDY GRAVEL	0.11 *	← EXAMPLE
SAND OR SANDY-CLAY	0.15 - 0.10	

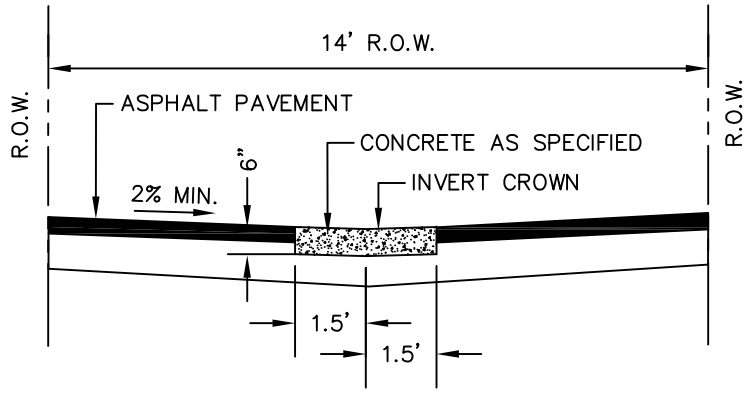
LAYER COEFFICIENTS
TABLE 2



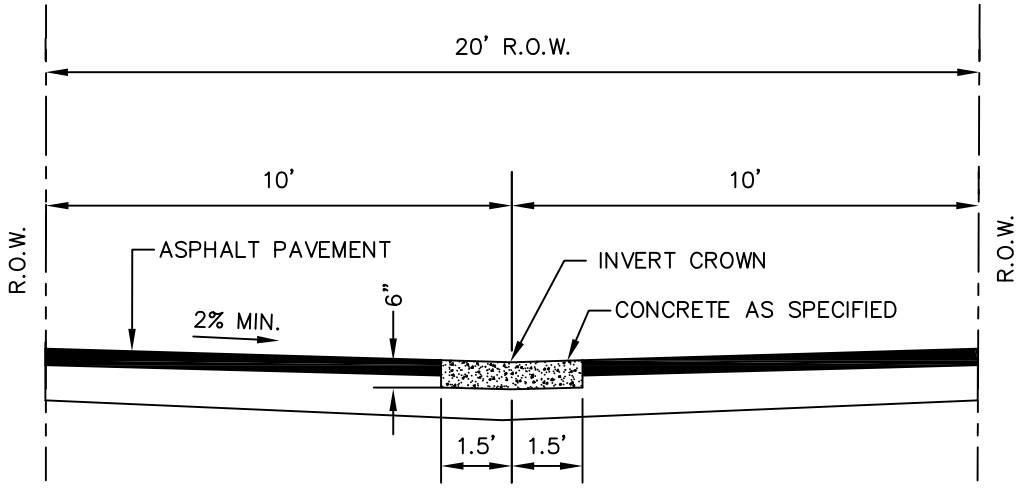
DIVIDED MOUNTAIN RESIDENTIAL STREET

NOTES:

1. WITHIN A DIVIDED RESIDENTIAL STREET, THE MEDIAN MAY BE DESIGNED TO PERMIT A SWALE FOR DRAINAGE PURPOSES.
2. HEADER CURBING AS A MINIMUM SHALL BE REQUIRED, HOWEVER, STANDARD CURBING SHALL BE ALLOWED.
3. STREET CROSS–SECTION TO BE INVERTED CROWN.
4. GRADES IN EXCESS OF 11% MUST BE APPROVED BY THE CITY ENGINEER AND FIRE DEPARTMENT, BUT IN NO CASE SHALL GRADES EXCEED 15%.
5. GRADES AT INTERSECTION IN EXCESS OF 3% SHALL HAVE THE APPROVAL OF THE CITY ENGINEER.
6. MINIMUM MEDIAN WIDTH – FOUR (4') FEET.



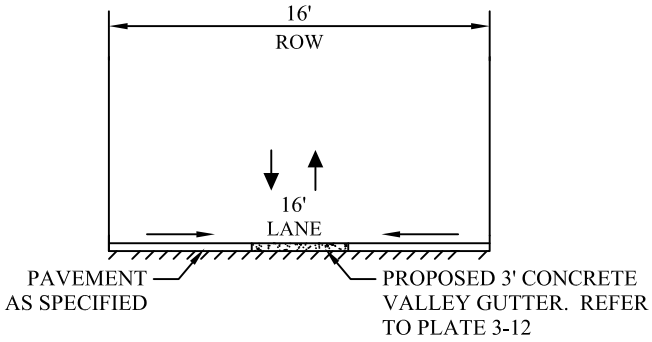
ALLEY
ONE (1) WAY LANE



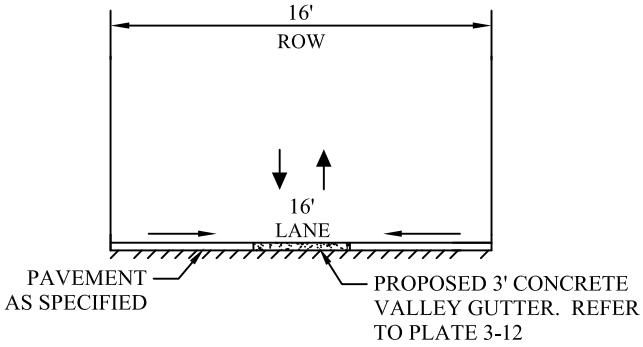
ALLEY
TWO (2) LANES

NOTES:

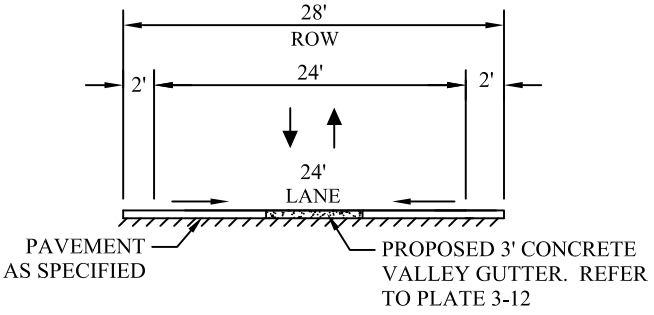
1. ONE (1)–THREE FOOT CONCRETE VALLEY GUTTER LOCATED AT THE CENTERLINE OF THE RIGHT–OF–WAY WHEN THE LONGITUDINAL SLOPE OF THE ALLEY IS LESS THAN ONE (1) PERCENT, AND DRAINAGE IS TO BE CARRIED WITHIN THE ALLEY.
2. NO CONCRETE VALLEY GUTTER REQUIRED WHEN LONGITUDINAL SLOPE OF THE ALLEY IS EQUAL OR GREATER THAN ONE (1) PERCENT.



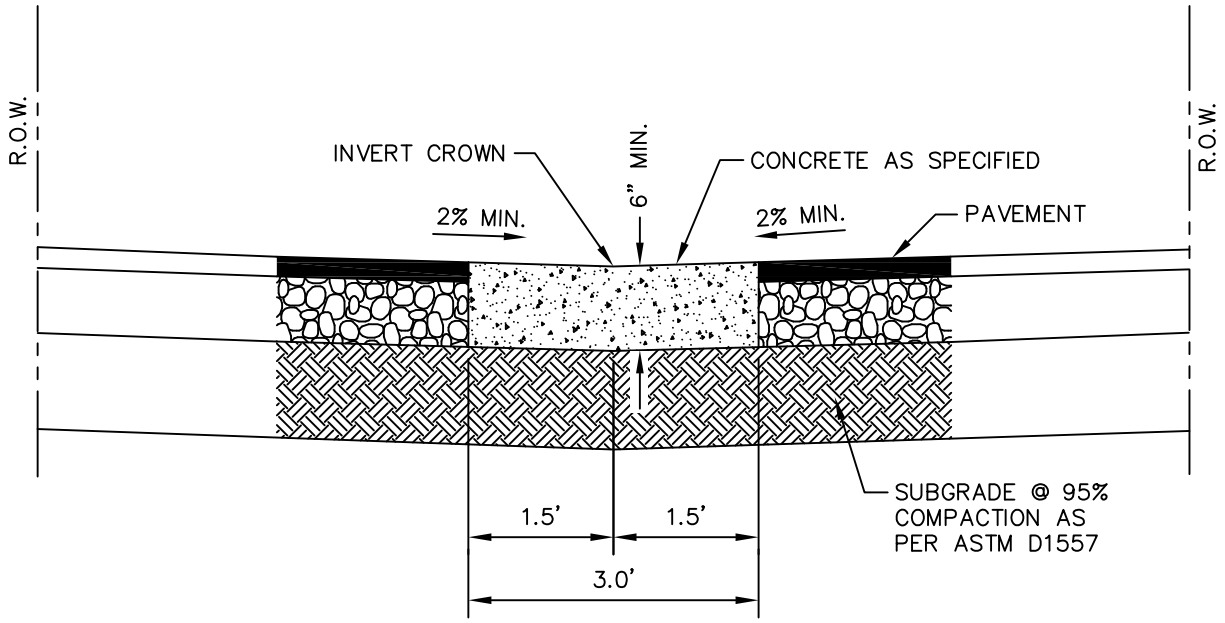
16' ALLEY NO PARKING



16' ALLEY
SINGLE FAMILY RESIDENTIAL



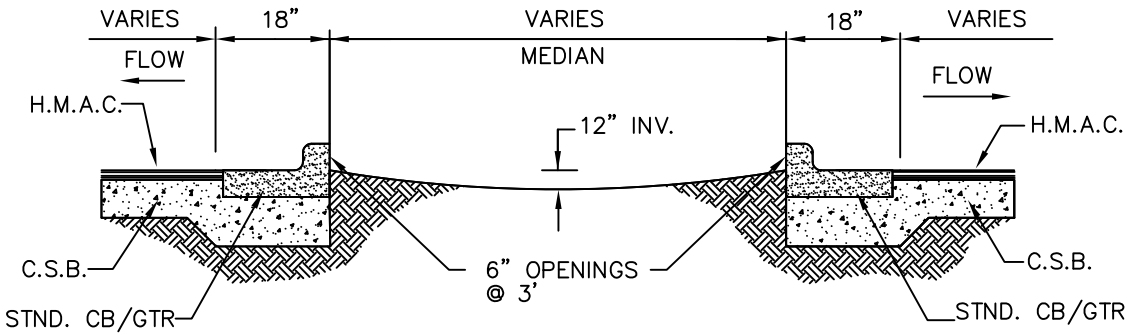
28' ALLEY
COMMERCIAL/INDUSTRIAL/MULTI-FAMILY



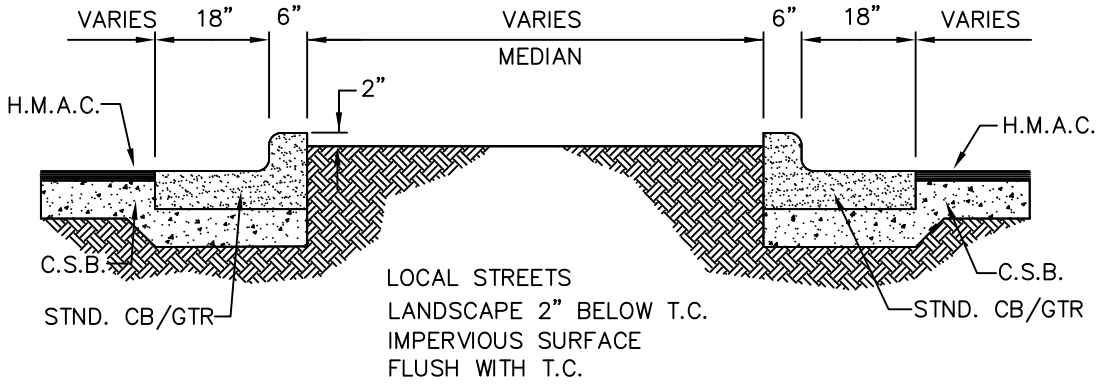
VALLEY GUTTER

NOTES:

COMPRESSIVE STRENGTH OF CONCRETE SHALL BE F_C= 3000 P.S.I. MINIMUM

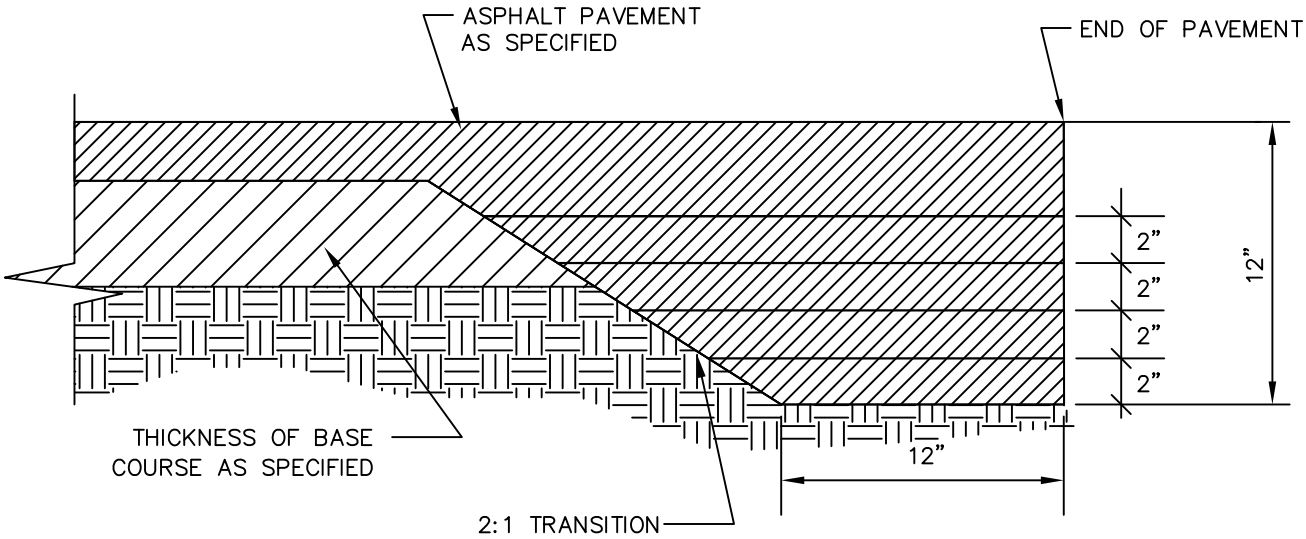


REQUIRED CURB OPENING FOR STORM WATER



RAISED MEDIAN DESIGN

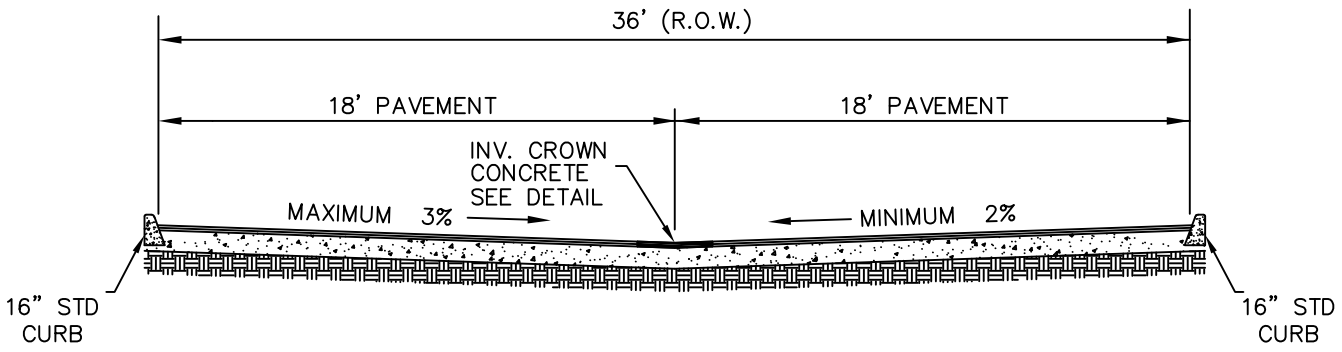
NOTE:
THE MEDIAN MAY BE DESIGNED TO PERMIT A SWALE FOR DRAINAGE PURPOSES.



TERMINUS OF STREET

NOTE:

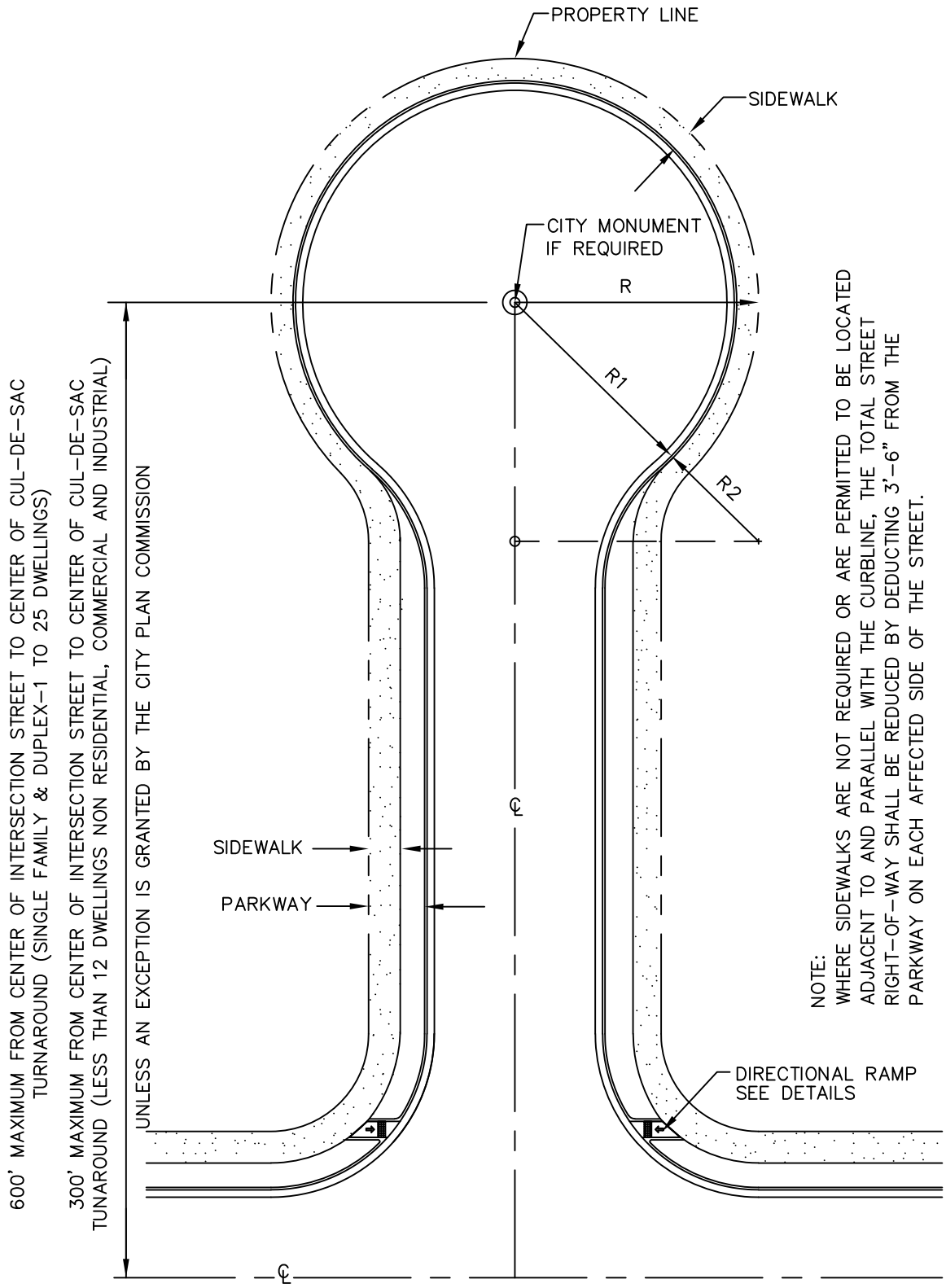
TERMINUS MUST BE CONSTRUCTED IN 2" LIFTS. FINAL LIFT MUST BE PLACED WITH FINAL PAVEMENT COURSE. COMPACTION REQUIREMENTS SHALL BE 98% MINIMUM AS PER ASTM D1557 OR AS RECOMMENDED BY THE PROJECT GEOTECHNICAL ENGINEER.



MOUNTAIN RESIDENTIAL STREET

TWO (2) LANES ONLY ON (M.D.A.)

1. 18" x 6" HEADER CURB.
2. MINIMUM 23 FOOT RIGHT-OF-WAY.
3. STREET CROSS-SECTION TO BE INVERTED CROWN. (REFER TO NOTE No. 7).
4. GRADES IN EXCESS OF 11% MUST BE APPROVED BY THE CITY ENGINEER AND FIRE DEPARTMENT, BUT IN NO CASE SHALL GRADES EXCEED 18%.
5. GRADES AT INTERSECTIONS IN EXCESS OF 3% SHALL HAVE THE APPROVAL OF THE CITY ENGINEER.
6. HEADER CURBING AS A MINIMUM SHALL BE REQUIRED, HOWEVER, STANDARD CURBING SHALL BE PERMITTED.
7. A CROWNED SECTION CAN BE USED IN LIEU OF AN INVERTED CROWN WITH THE APPROVAL OF THE CITY ENGINEER.



CUL-DE-SAC

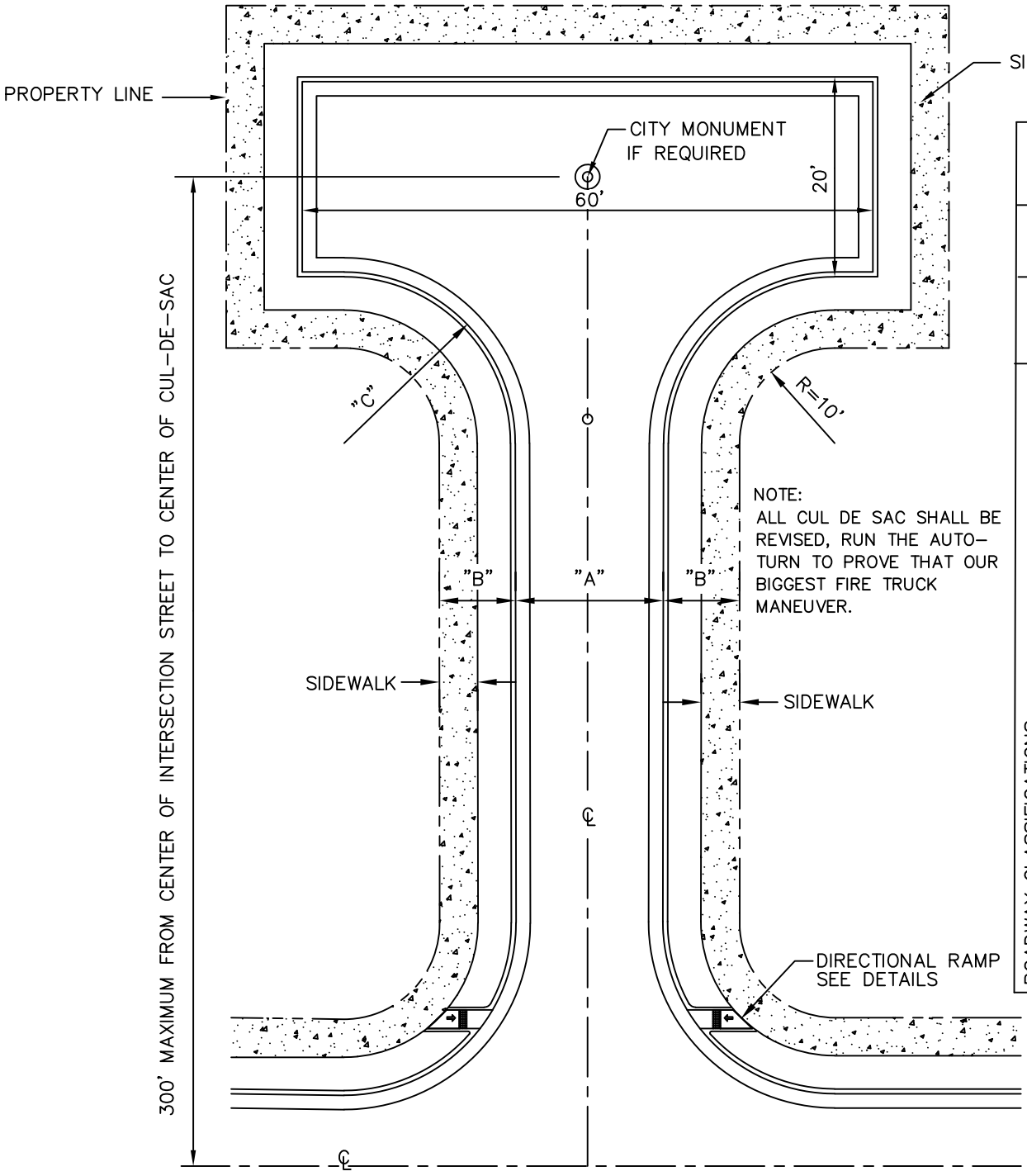
TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

CUL-DE-SAC

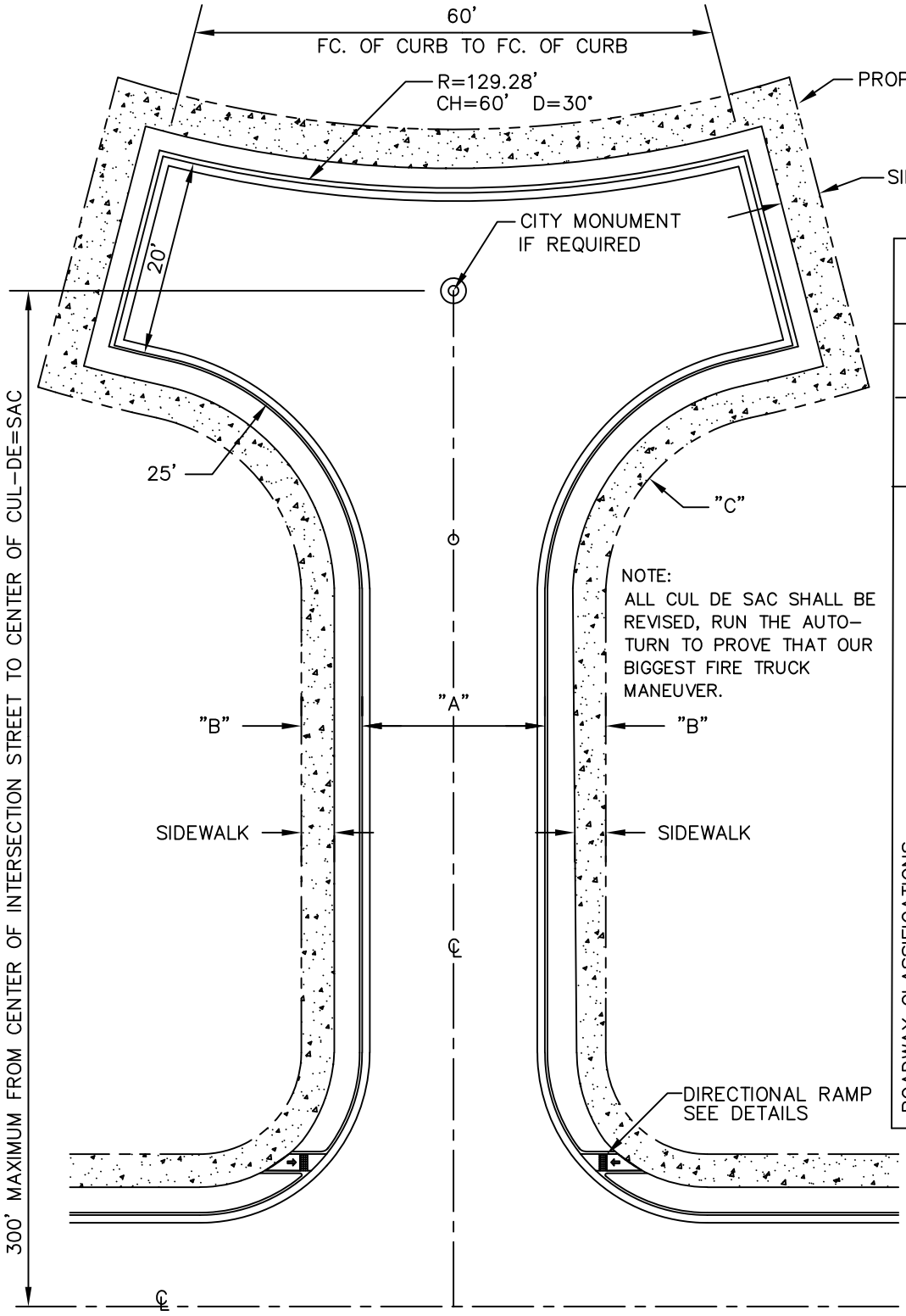
9-1-19

NOTE:
WHERE SIDEWALKS ARE NOT REQUIRED OR ARE PERMITTED TO BE LOCATED ADJACENT TO AND PARALLEL WITH THE CURBLINE, THE TOTAL STREET RIGHT-OF-WAY SHALL BE REDUCED BY DEDUCTING 3'-6" FROM THE PARKWAY ON EACH AFFECTED SIDE OF THE STREET.



ROADWAY CLASSIFICATIONS	"A"	"B"	"C"
MINOR RESIDENTIAL ACCESS /MOUNTAIN RESIDENTIAL	20 FT.	8'	18'
MAJOR RESIDENTIAL ACCESS	28 FT.	8'	18'

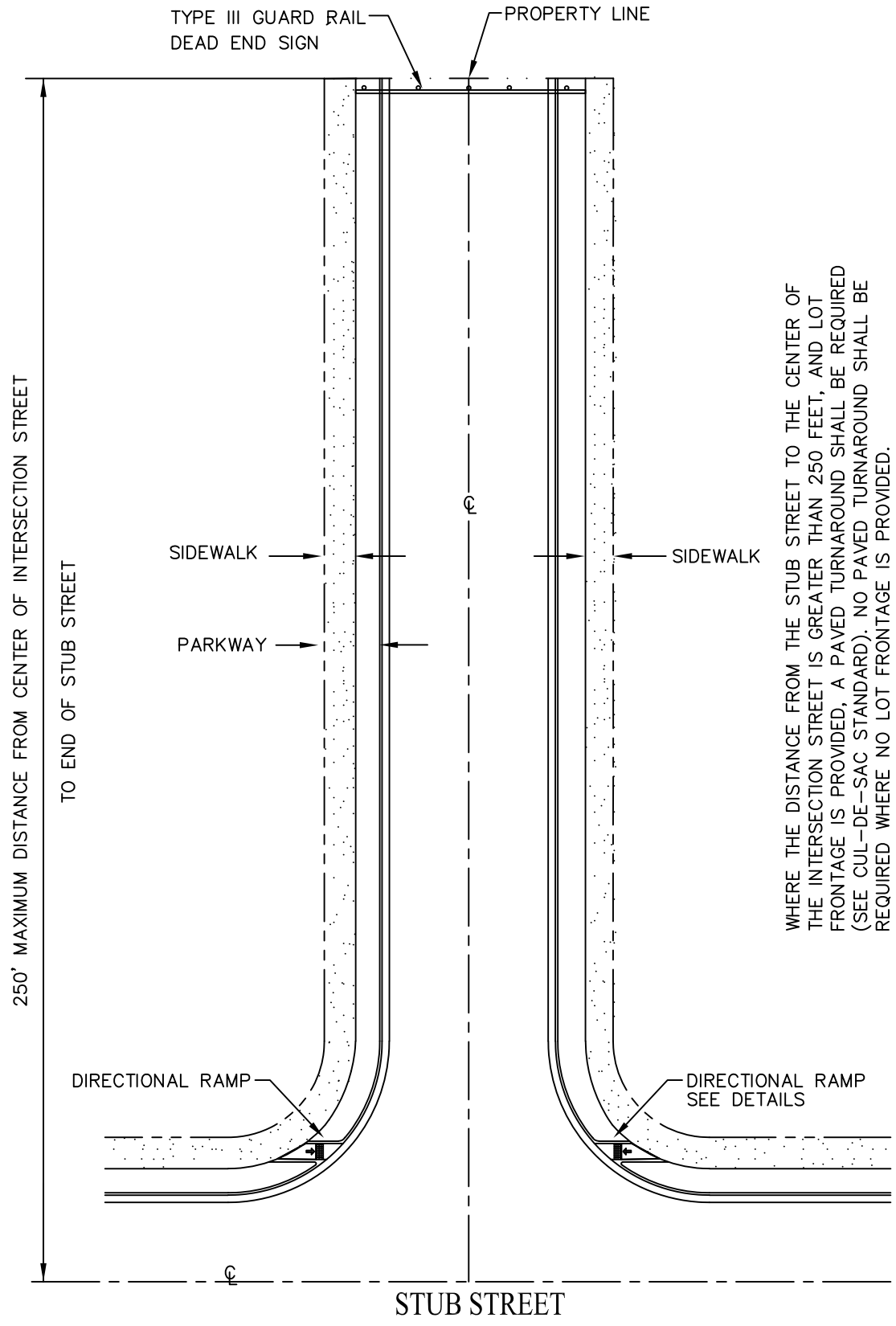
"T" CUL-DE-SAC

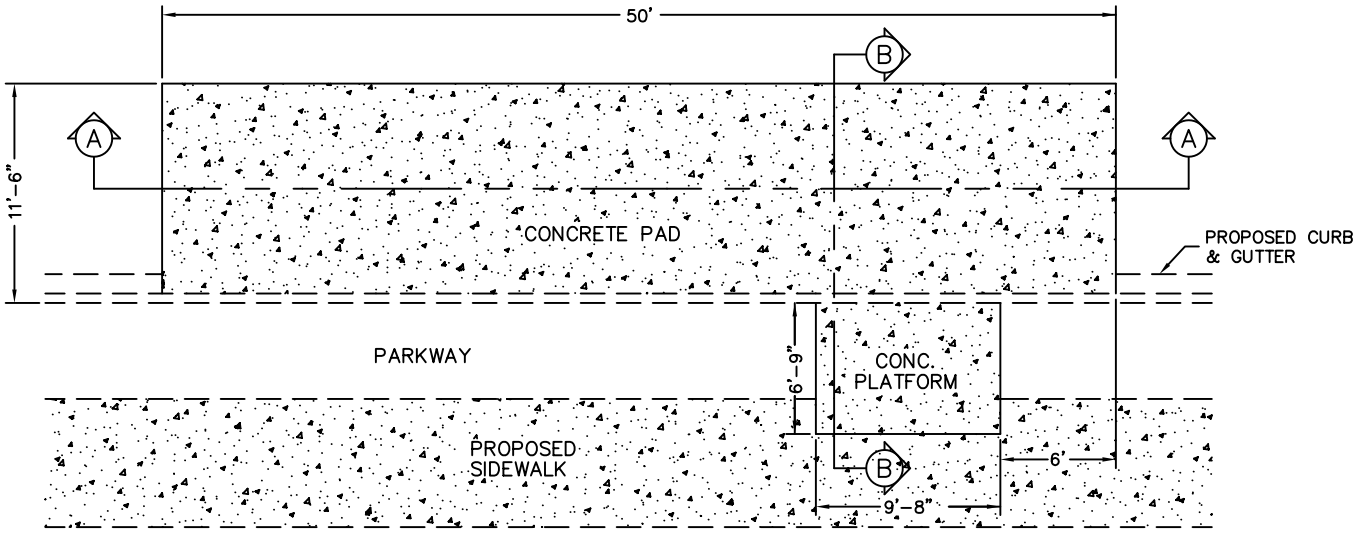


ROADWAY CLASSIFICATIONS	"A"	"B"	"C"
MINOR RESIDENTIAL ACCESS /MOUNTAIN RESIDENTIAL	20 FT.	8'	17'
MAJOR RESIDENTIAL ACCESS	28 FT.	8'	17'

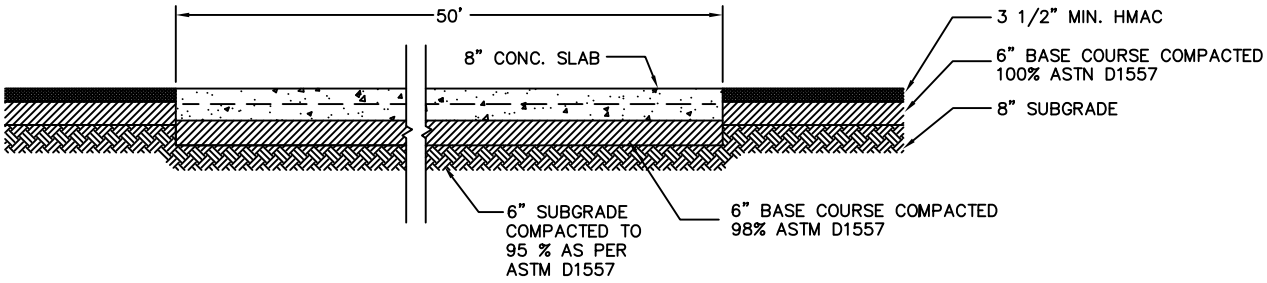
NOTE:
WHERE SIDEWALKS ARE NOT REQUIRED OR ARE PERMITTED TO BE LOCATED ADJACENT TO AND PARALLEL WITH THE CURBLINE, THE TOTAL STREET RIGHT-OF-WAY SHALL BE REDUCED BY DEDUCTING 3'-6" FROM THE PARKWAY ON EACH AFFECTED SIDE OF THE STREET.

"Y" CUL-DE-SAC

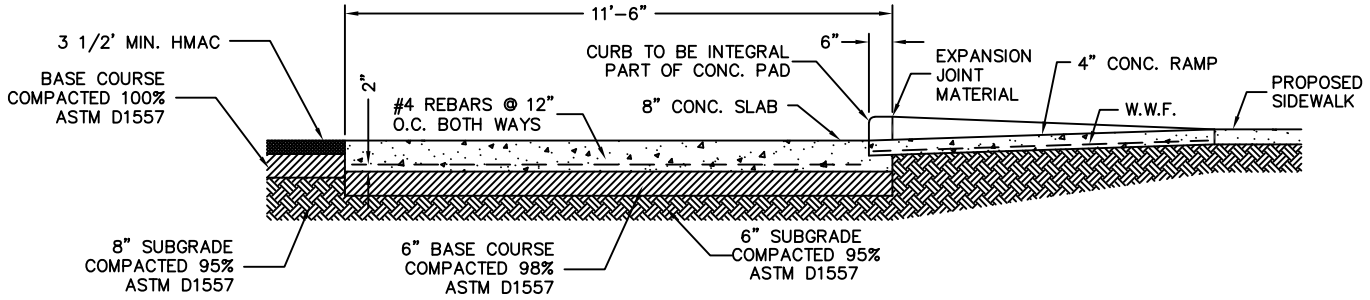

TYPE III GUARD RAIL
DEAD END SIGN
PROPERTY LINE
250' MAXIMUM DISTANCE FROM CENTER OF INTERSECTION STREET
TO END OF STUB STREET
SIDEWALK
PARKWAY
SIDEWALK
DIRECTIONAL RAMP
DIRECTIONAL RAMP
SEE DETAILS
WHERE THE DISTANCE FROM THE STUB STREET TO THE CENTER OF THE INTERSECTION STREET IS GREATER THAN 250 FEET, AND LOT FRONTAGE IS PROVIDED, A PAVED TURNAROUND SHALL BE REQUIRED (SEE CUL-DE-SAC STANDARD). NO PAVED TURNAROUND SHALL BE REQUIRED WHERE NO LOT FRONTAGE IS PROVIDED.
STUB STREET



PLAN : CONC. BUS PAD



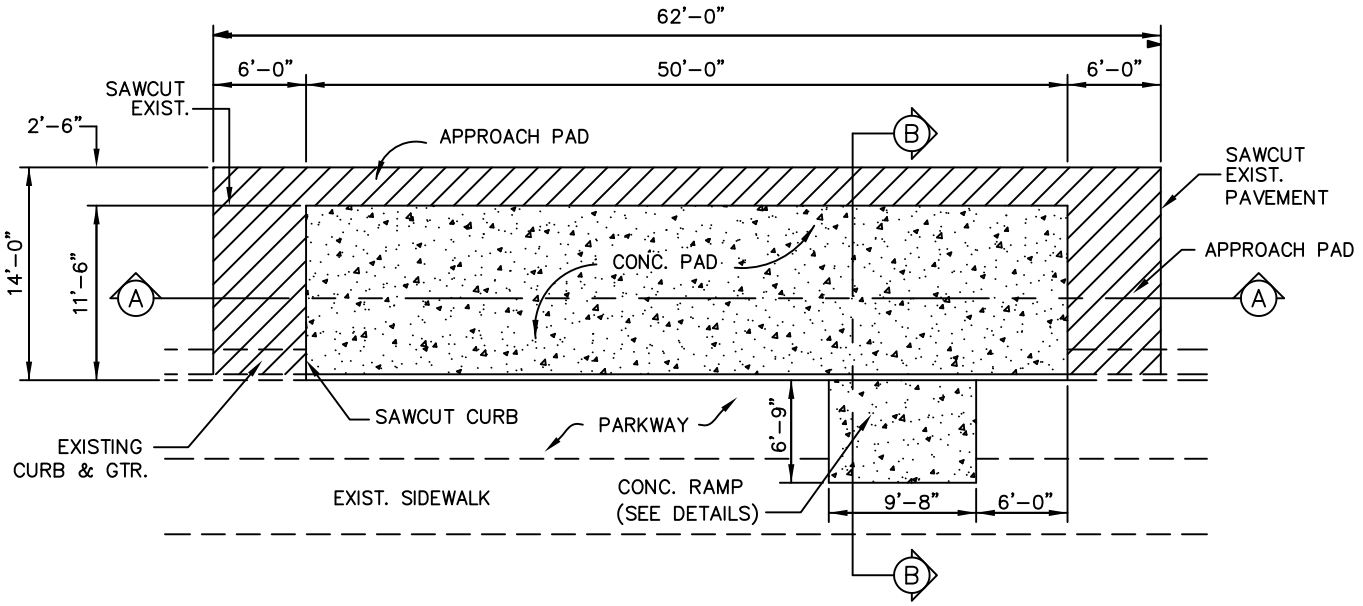
SECTION A–A



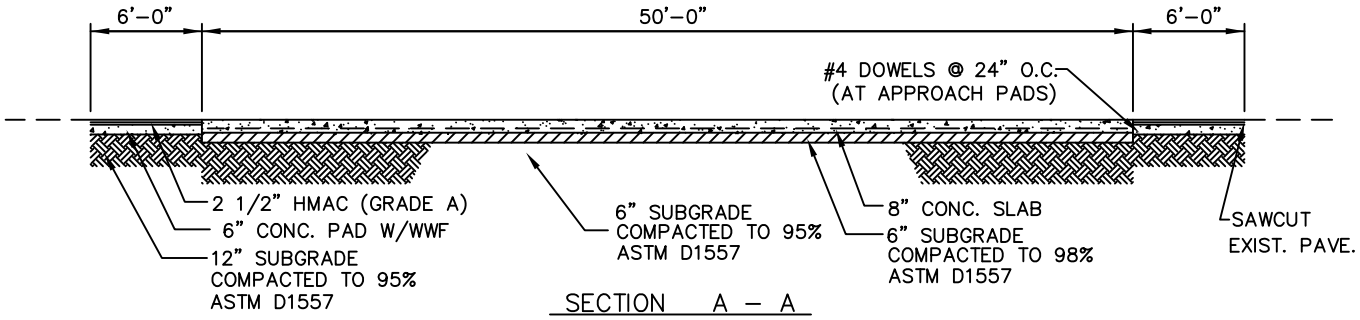
SECTION B–B

NOTE

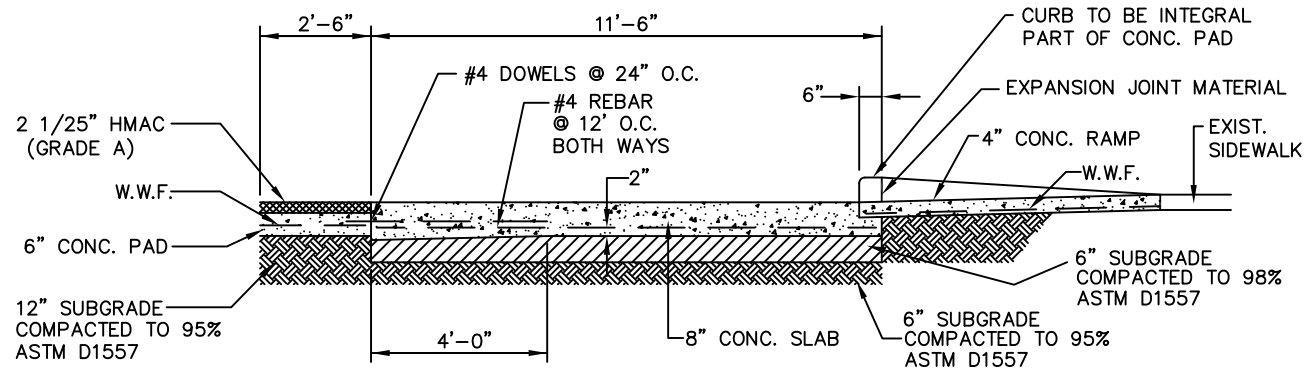
WHERE NEW BUS STOP PADS ARE CONSTRUCTED AT BUS STOPS, BAY OR OTHER AREAS WHERE A LIFT OR RAMP IS TO BE DEPLOYED, THEY SHALL HAVE A FIRM, STABLE SURFACE; A MIN. CLEAR LENGTH OF 96 INCHES (MEASURED FROM THE CURB OR VEHICLE ROADWAY EDGE) AND A MIN. CLEAR WIDTH OF 60 INCHES (MEASURED PARALLEL TO THE VEHICLE ROADWAY) TO THE MAXIMUM EXTENT ALLOWED BY LEGAL OR SITE CONSTRAINTS; AND SHALL BE CONNECTED TO STREETS, SIDEWALK OR PEDESTRIAN PATHS BY AN ACCESSIBLE ROUTE COMPLYING WITH TAS. THE SLOPE OF THE PAD PARALLEL TO THE ROADWAY SHALL, TO THE EXTENT PRACTICABLE, BE THE SAME AS THE ROADWAY. FOR WATER DRAINAGE A MAXIMUM SLOPE OF 1:50 (2%) PERPENDICULAR TO THE ROADWAY IS ALLOWED.



PLAN : CONC. BUS PAD

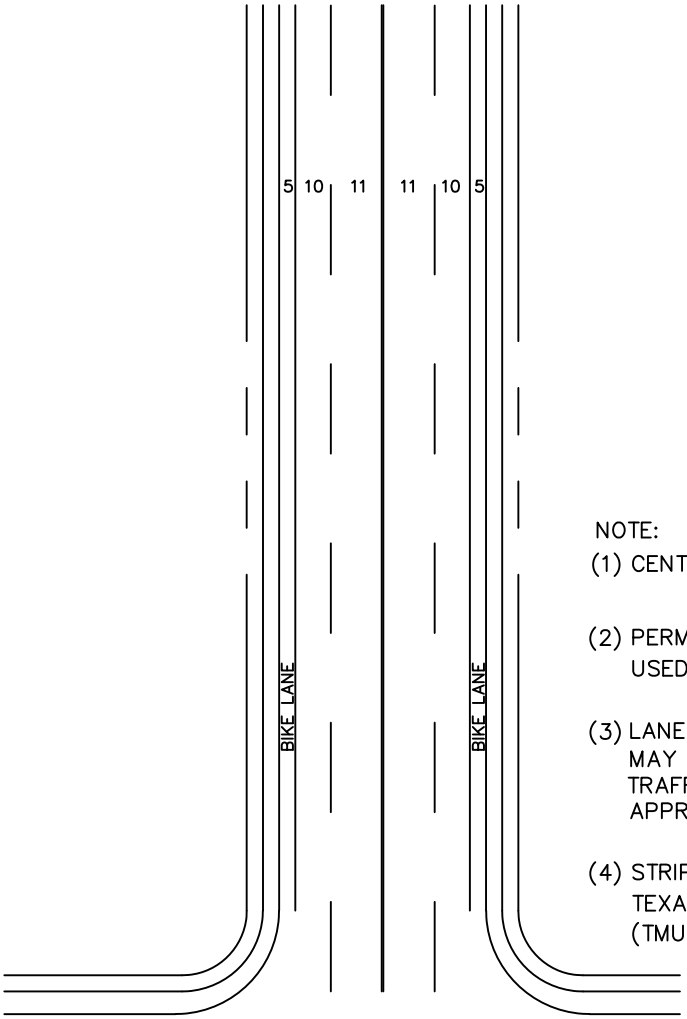


SECTION A – A



SECTION B – B

CENTERLINE STRIPING WITH BIKE LANES



NOTE:

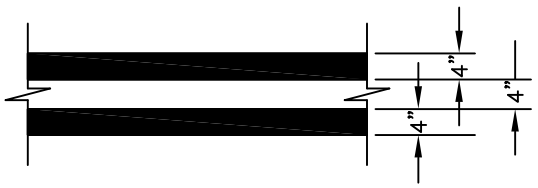
(1) CENTER LINE STRIPING FOR COLLECTOR ARTERIAL.

(2) PERMANENT PAVEMENT MARKING MATERIALS TO BE USED AS PER CITY SPECIFICATIONS.

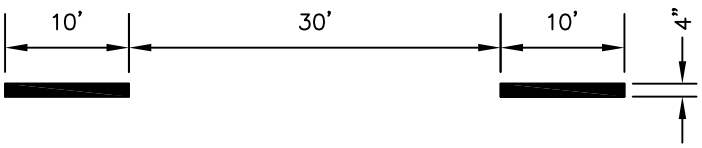
(3) LANE MARKINGS TO BE FURNISHED AND INSTALLED MAY INCLUDE PERMANENT THERMO–PLASTIC MARKINGS, TRAFFIC BUTTONS OR OTHER STRIPING MATERIALS APPROVED BY THE CITY ENGINEER.

(4) STRIPES SHALL FOLLOW THE LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)

DOUBLE YELLOW LINE



LANE LINES



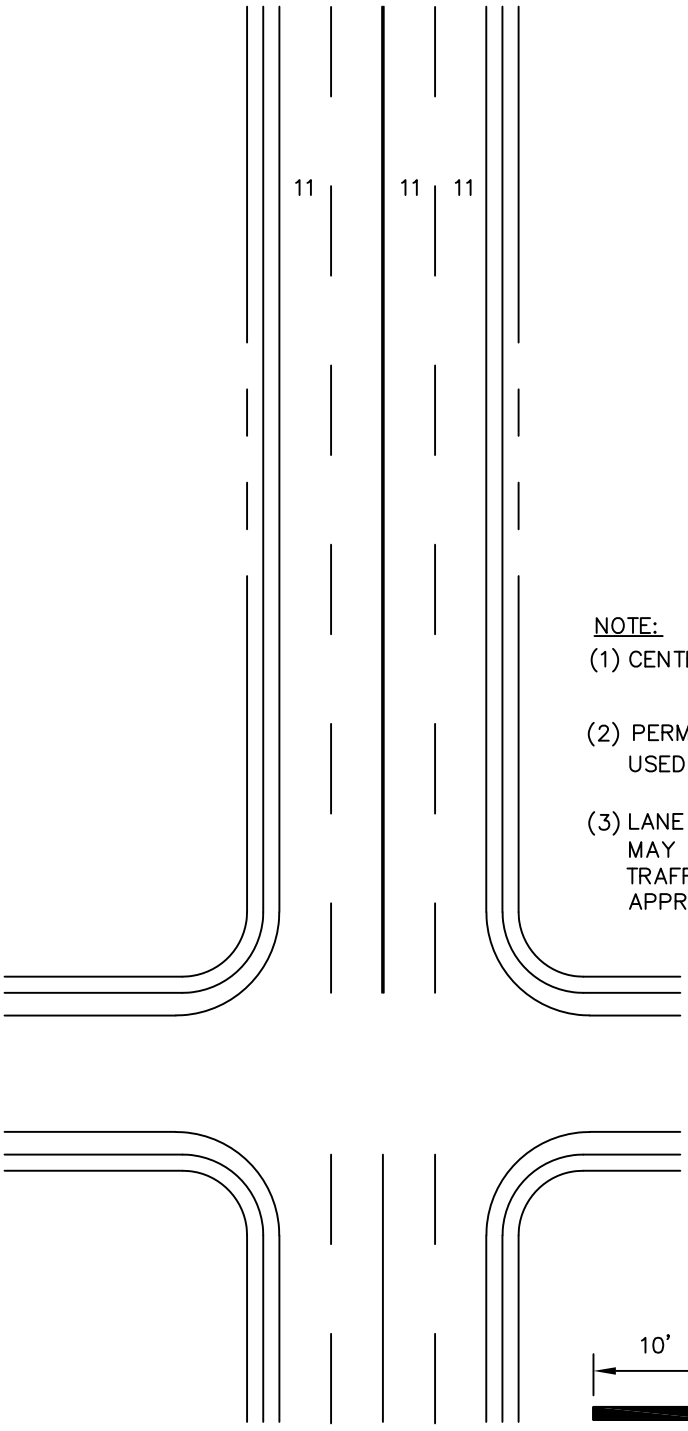
TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

CENTERLINE STRIPING WITH BIKE LANES

9-1-25

CENTERLINE STRIPING WITHOUT BIKE LANES



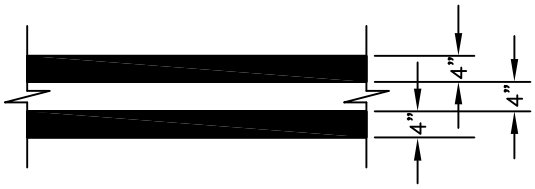
NOTE:

(1) CENTER LINE STRIPING FOR COLLECTOR ARTERIAL.

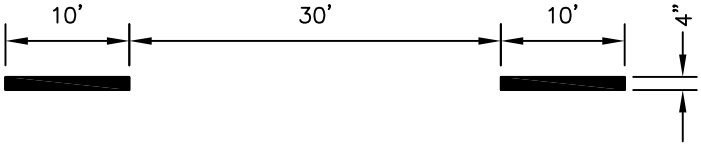
(2) PERMANENT PAVEMENT MARKING MATERIALS TO BE USED AS PER CITY SPECIFICATIONS.

(3) LANE MARKINGS TO BE FURNISHED AND INSTALLED MAY INCLUDE PERMANENT THERMO–PLASTIC MARKINGS, TRAFFIC BUTTONS OR OTHER STRIPING MATERIALS APPROVED BY THE CITY ENGINEER.

DOUBLE YELLOW LINE



LANE LINES



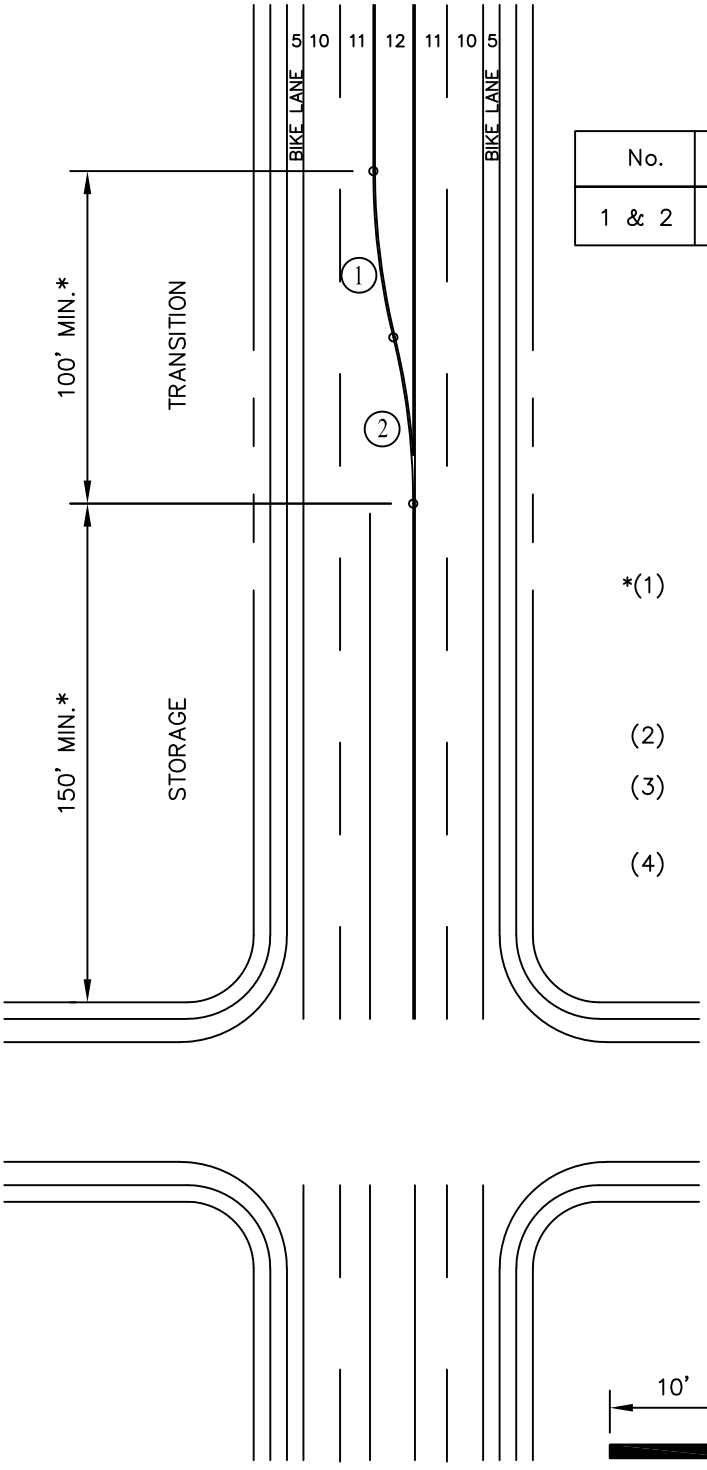
TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

CENTERLINE STRIPING
WITHOUT BIKE LANES

9-1-26

MEDIAN STRIPING WITH BIKE LANES



TYPICAL CURVE DATA

No.	Δ	R	L	T	CH
1 & 2	13°41'08"	211.34'	50.48'	25.36'	50.36'

$$T = R \tan \frac{\Delta}{2}$$

$$C = 2R \sin \frac{\Delta}{2} = 2T \cos \frac{\Delta}{2}$$

$$L = \frac{\Delta R \pi}{2}$$

NOTE:

*(1) LENGTH OF R, STORAGE, AND TRANSITION TO BE INCREASED BASED UPON TRAFFIC DENSITY, ROAD DESIGN, SPEED, AND PRESENCE OR ABSENCE OF TRAFFIC SIGNALS.

(2) MEDIAN STRIPING FOR MINOR ARTERIAL.

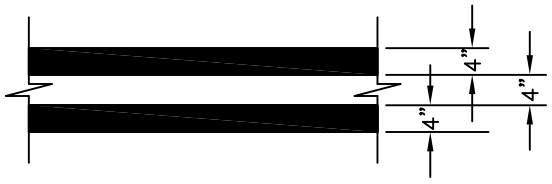
(3) PERMANENT PAVEMENT MARKING MATERIALS TO BE USED AS PER CITY SPECIFICATIONS.

(4) LANE MARKINGS TO BE FURNISHED AND INSTALLED MAY INCLUDE PERMANENT THERMO-PLASTIC MARKINGS, TRAFFIC BUTTONS OR OTHER STRIPING MATERIALS APPROVED BY THE CITY ENGINEER.

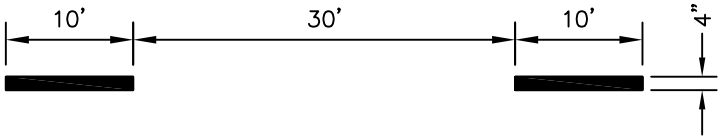
NOTE:

AS PER AASHTO LATEST ADDITION

DOUBLE YELLOW LINE



LANE LINES



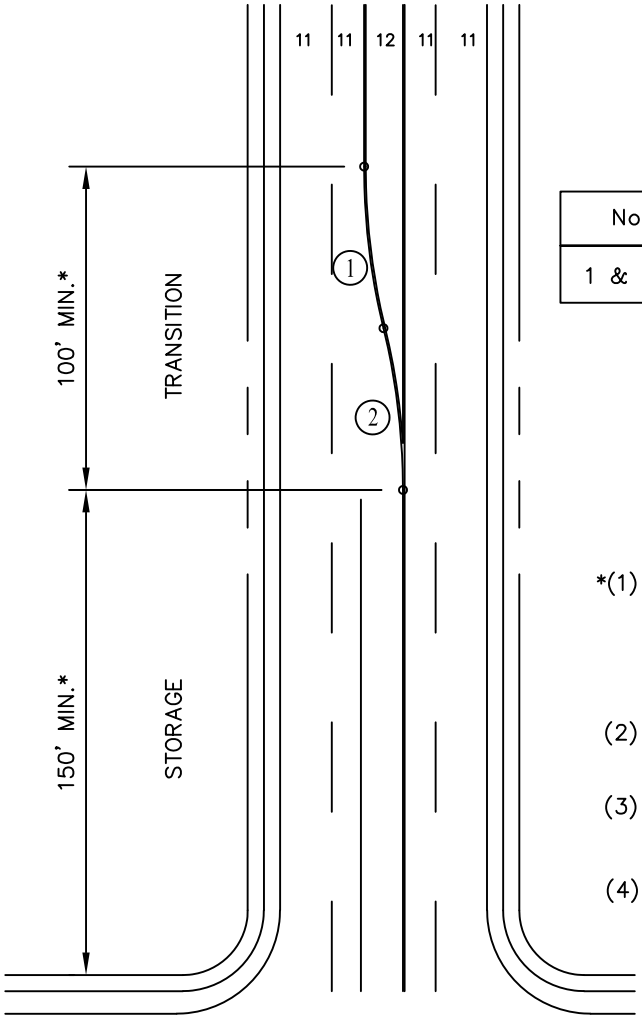
TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

MEDIAN STRIPING WITH BIKE LANES

9-1-27

MEDIAN STRIPING WITHOUT BIKE LANES



TYPICAL CURVE DATA

No.	Δ	R	L	T	CH
1 & 2	13°41'08"	211.34'	50.48'	25.36'	50.36'

$$T = R \tan \frac{\Delta}{2}$$

$$C = 2R \sin \frac{\Delta}{2} = 2T \cos \frac{\Delta}{2}$$

$$L = \frac{\Delta R \pi}{2}$$

NOTE:

*(1) LENGTH OF R, STORAGE, AND TRANSITION TO BE INCREASED BASED UPON TRAFFIC DENSITY, ROAD DESIGN, SPEED, AND PRESENCE OR ABSENCE OF TRAFFIC SIGNALS.

(2) MEDIAN STRIPING FOR MINOR ARTERIAL.

(3) PERMANENT PAVEMENT MARKING MATERIALS TO BE USED AS PER CITY SPECIFICATIONS.

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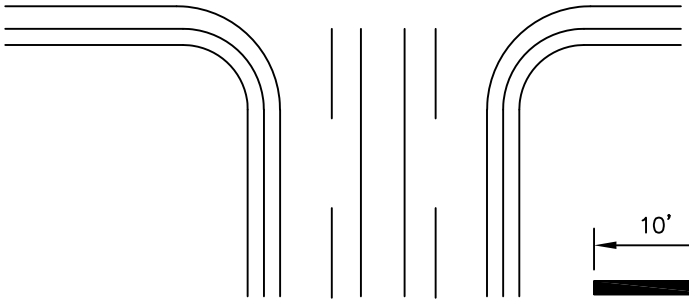
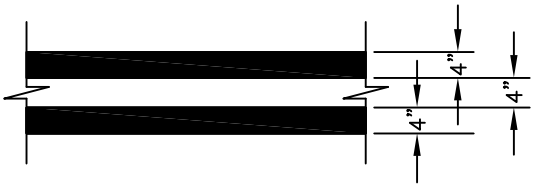
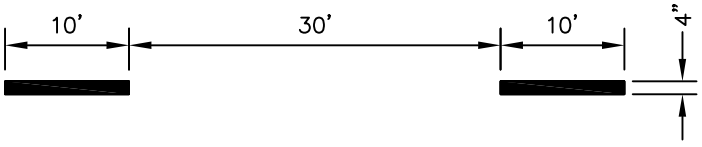


DOUBLE YELLOW LINE



LANE LINES



TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

MEDIAN STRIPING
WITHOUT BIKE LANES

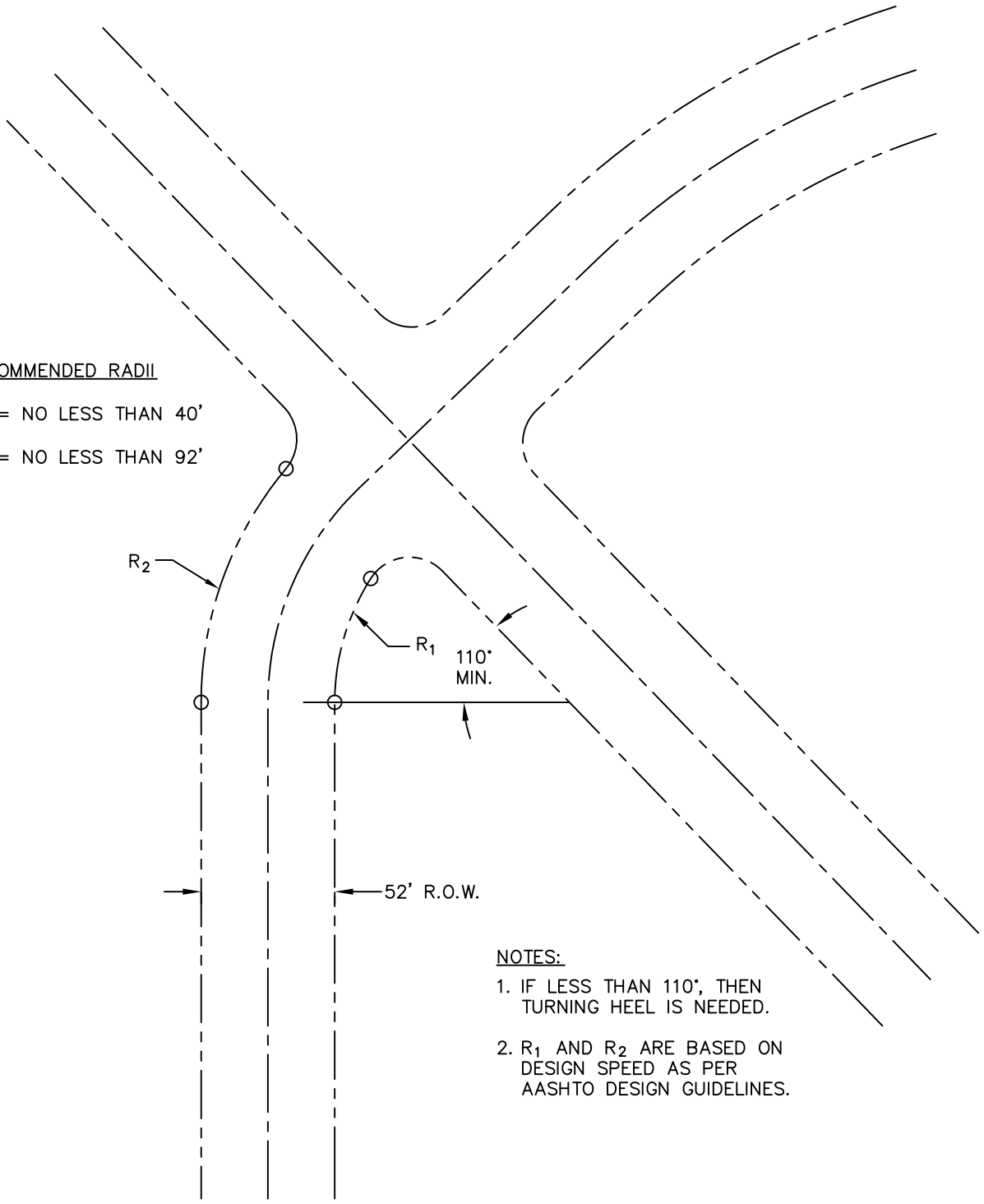
9-1-28

INTERSECTION DESIGN

1. STREETS SHALL BE LAID OUT SO AS TO INTERSECT AS NEARLY AS POSSIBLE AT RIGHT ANGLES. NO INTERSECTION SHALL BE LESS THAN AN INCLUDED ANGLE OF SEVENTY DEGREES AND NO MORE THAN ONE HUNDRED TEN DEGREES.

2. THE RIGHT-OF-WAY LINE AT STREET INTERSECTIONS SHALL HAVE A MINIMUM RADIUS OF TWENTY (20) FEET.

3. WHERE PARALLEL STREETS INTERSECT ANOTHER STREET, THE CENTERLINE OF THOSE STREETS SHALL BE OFFSET A MINIMUM OF ONE HUNDRED TWENTY (120) FEET. THIS OFFSET SHALL NOT APPLY TO MINOR ARTERIAL STREETS INTERSECTING A HIGHER ORDER ARTERIAL, IF A RAISED MEDIAN IS PROVIDED AND NO MEDIAN OPENING IS ALIGNED WITH OR RAISED BETWEEN THE OFFSET STREETS. FUTURE MEDIAN OPENINGS SHALL NOT BE PERMITTED WHERE TWO (2) MINOR ARTERIAL STREETS OFFSET AND INTERSECT A MAJOR ARTERIAL STREET AT A DISTANCE OF LESS THAN ONE HUNDRED TWENTY(120) FEET; PROVIDED, HOWEVER MEDIAN OPENINGS MAY BE ALLOWED FOR ONEWAY TRAFFIC CIRCULATION SUBJECT TO THE APPROVAL OF THE DIRECTOR OF TRAFFIC AND TRANSPORTATION DEPT.



TITLE 19 - SUBDIVISION ORDINANCE

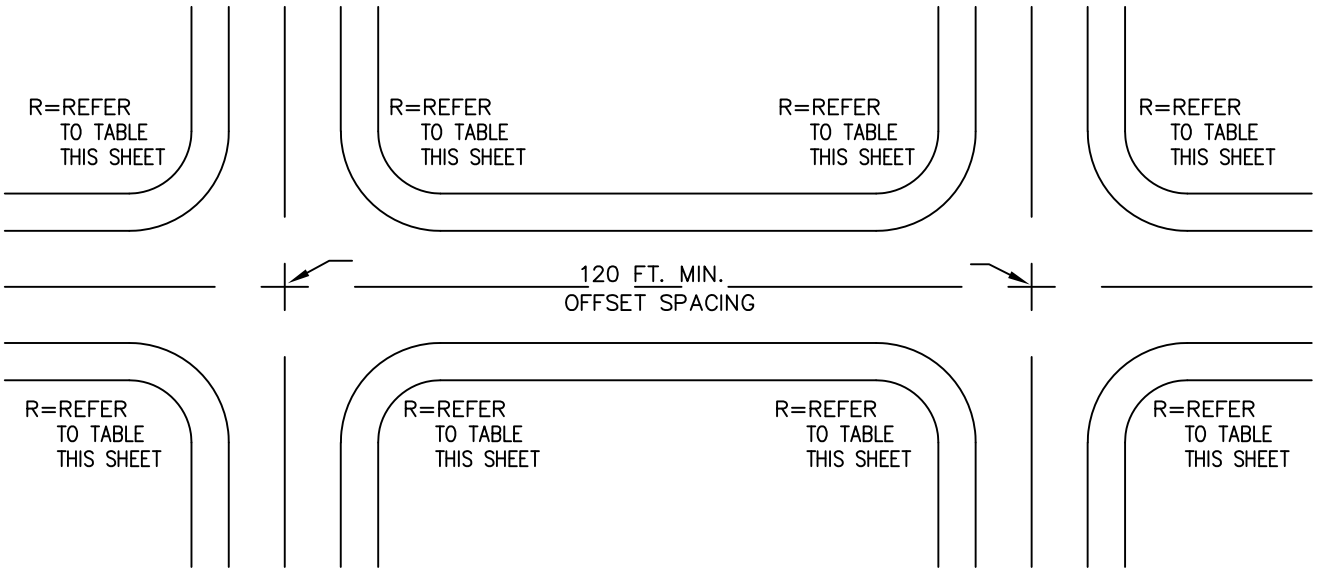
STREET DESIGN MANUAL

MINIMUM RADII AT INTERSECTION APPROACH

9-1-30

GEOMETRIC DESIGN OF ROADWAYS

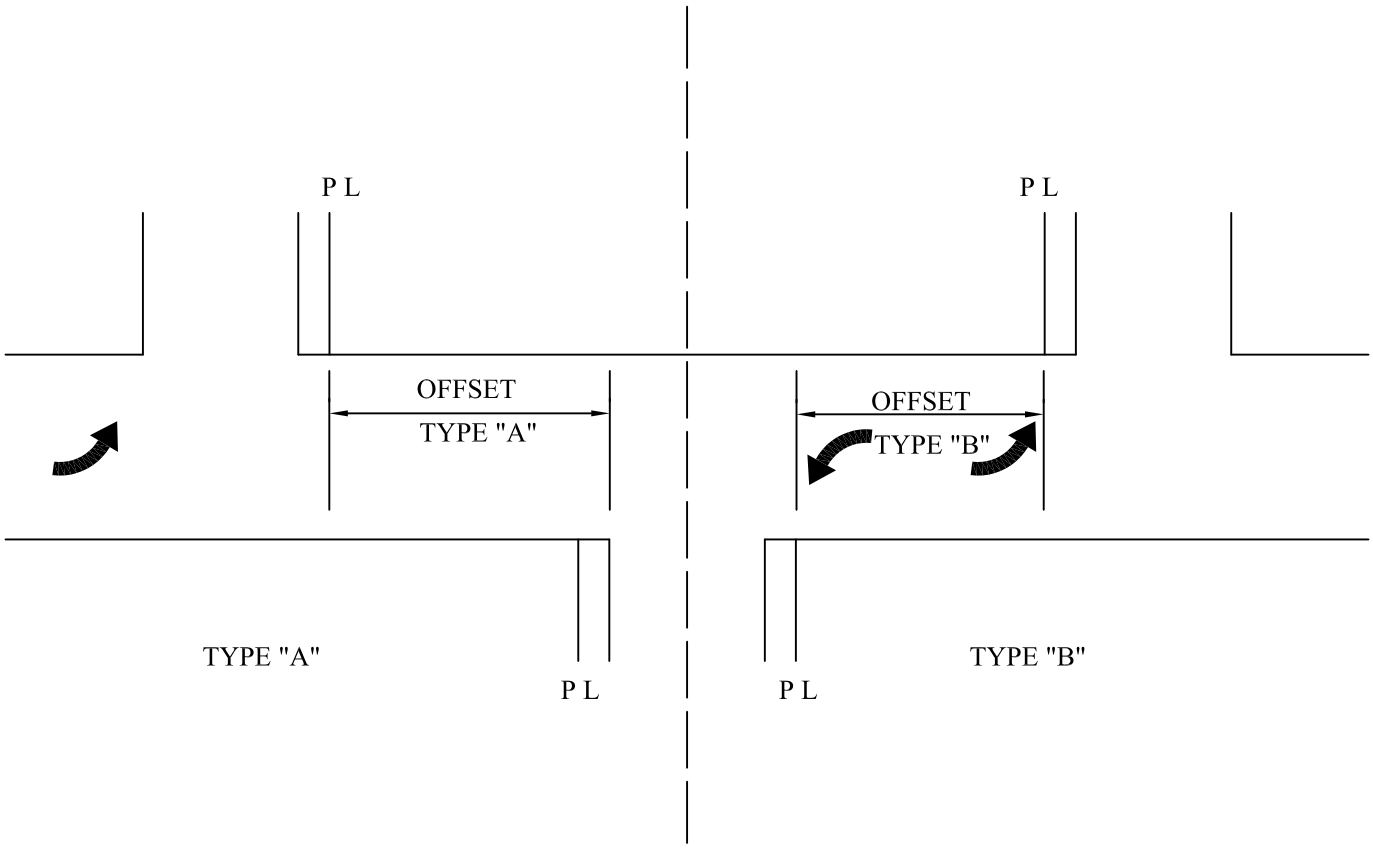
DESIGN SPEED (m.p.h.)	HORIZONTAL ALIGNMENT MINIMUM CURVE RADIUS (ft)	VERTICAL ALIGNMENT RATE OF VERTICAL CURVATURE (K–VALUE)		INTERSECTION SIGHT DISTANCE MINIMUM SIGHT DISTANCE (ft)
		CREST	SAG	
15	180	20	30	125
25	(INFORMATION TO BE INCORPORATED AT A LATER DATE)			
30	300	30	40	325
35	475	50	50	400
40	675	80	70	500
45	1,100	120	90	500
50	1,400	160	110	600



INTERSECTION DESIGN

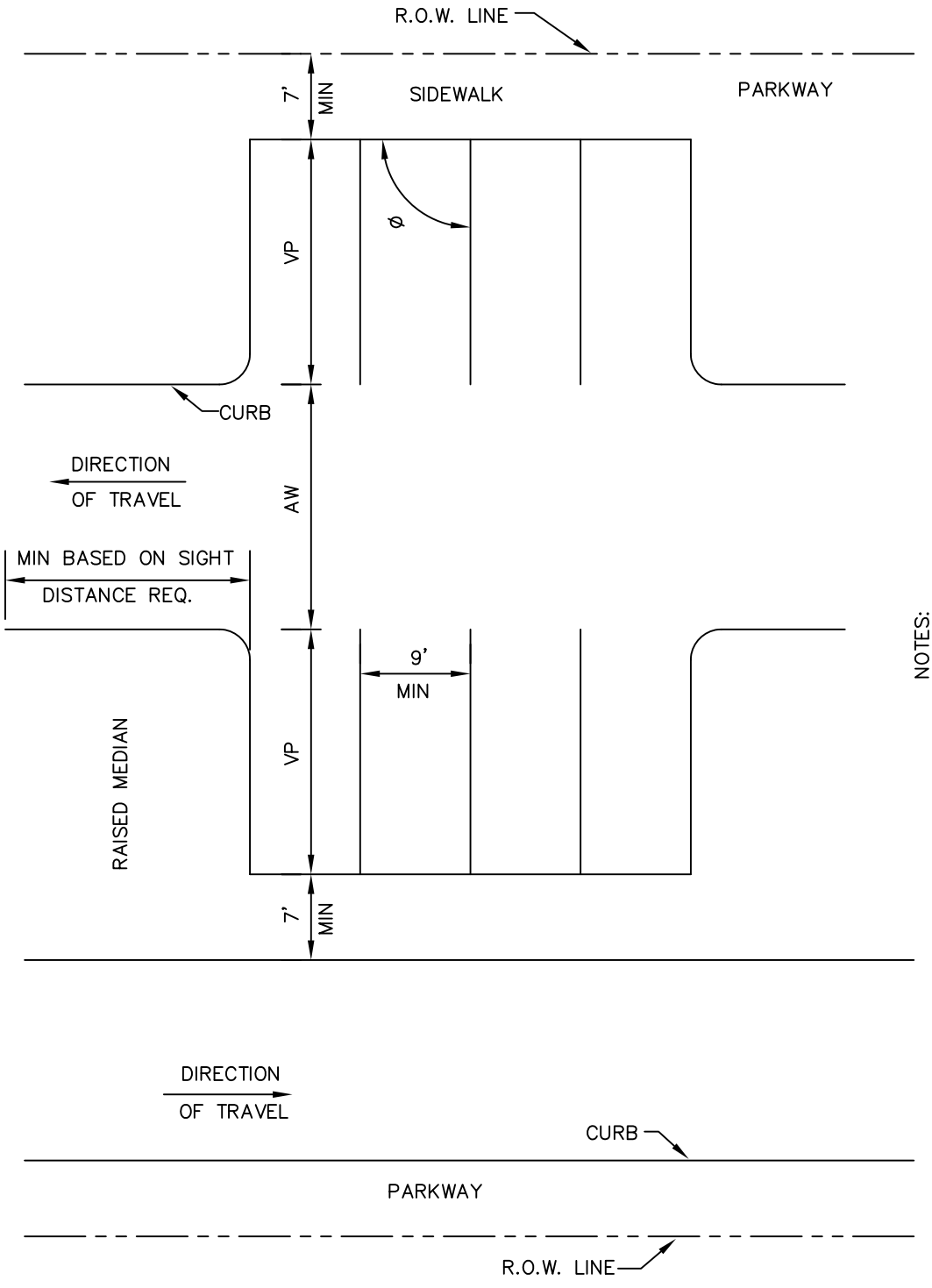
ROADWAY CLASSIFICATION	DESIGN SPEED
ALLEY	15
(INFORMATION TO BE INCORPORATED AT A LATER DATE)	25
MINOR RESIDENTIAL ACCESS	30
MAJOR RESIDENTIAL ACCESS	30
RESIDENTIAL SUBCOLLECTOR	30
DIVIDED RESIDENTIAL	30
MOUNTAIN RESIDENTIAL & DIVIDED MOUNTAIN RESIDENTIAL:	
< 200 ADT	20
≥ 200 ADT	25
STUB STREET	25
COLLECTOR ARTERIAL	35
MINOR ARTERIAL	40
MAJOR ARTERIAL	45
SUPER ARTERIAL	50

Minimum Curvature of Curbs at Street Intersections	
Intersection	Curb Turn Radius
Local with: Local, Subcollector, or Collector	25'
Local with: Arterial or Freeway	25'
Subcollector with: Subcollector, or Collector	20'
Subcollector with: Arterial or Freeway	25'
Collector with: Collector	25'
Collector with: Arterial or Freeway	30'
Arterial with: Arterial or Freeway	40'



INTERSECTION OFFSET

NOTE:
REFER TO SECTION 19.15.12 - STREET OFFSETS, TABLE 19.15-4 OF THE SUBDIVISION ORDINANCE FOR MINIMUM OFF-SET DISTANCES



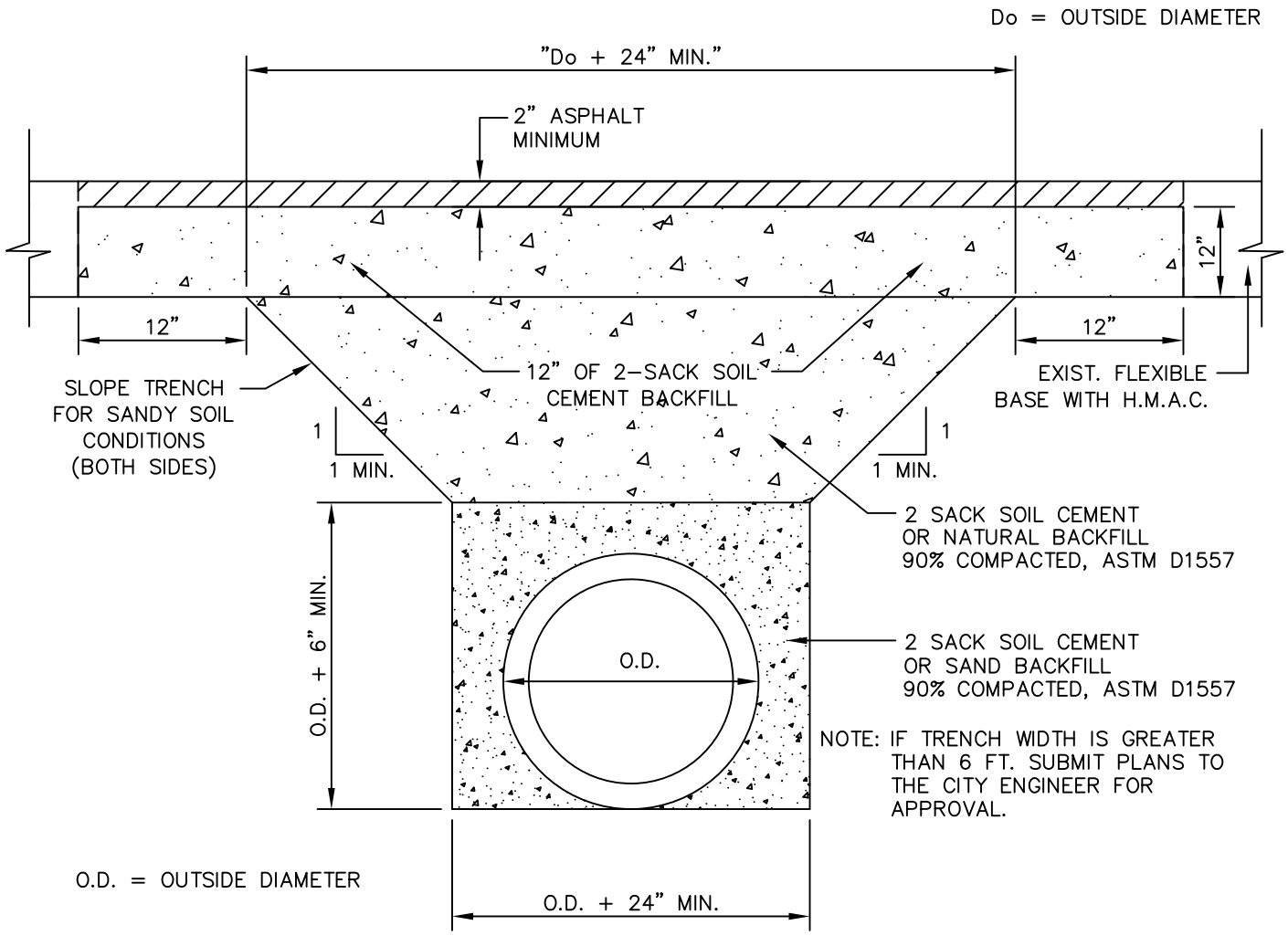
NOTES:

1) FOR TWO-WAY CIRCULATION ON A STREET, ROADWAY SHALL BE A MINIMUM OF 2 x AW WIDTH.
2) CLUSTER PARKING ON PARKWAY OR MEDIAN SHALL MEET MINIMUM SIGHT DISTANCE REQUIREMENTS OF INTERSECTIONS.
3) OTHER APPLICATIONS FOR CLUSTER PARKING SHALL BE PERMITTED UPON THE APPROVAL OF THE CITY ENGINEER BASED ON AASHTO GUIDELINES.

ANGLE ø	VEHICLE PROJECTION VP	AISLE WIDTH AW
45°	18'-0"	13'-0"
60°	19'-6"	16'-0"
75°	19'-9"	20'-0"
90°	20'-0"	20'-0"

CLUSTER PARKING

TRENCH BACKFILL & PAVEMENT REPLACEMENT



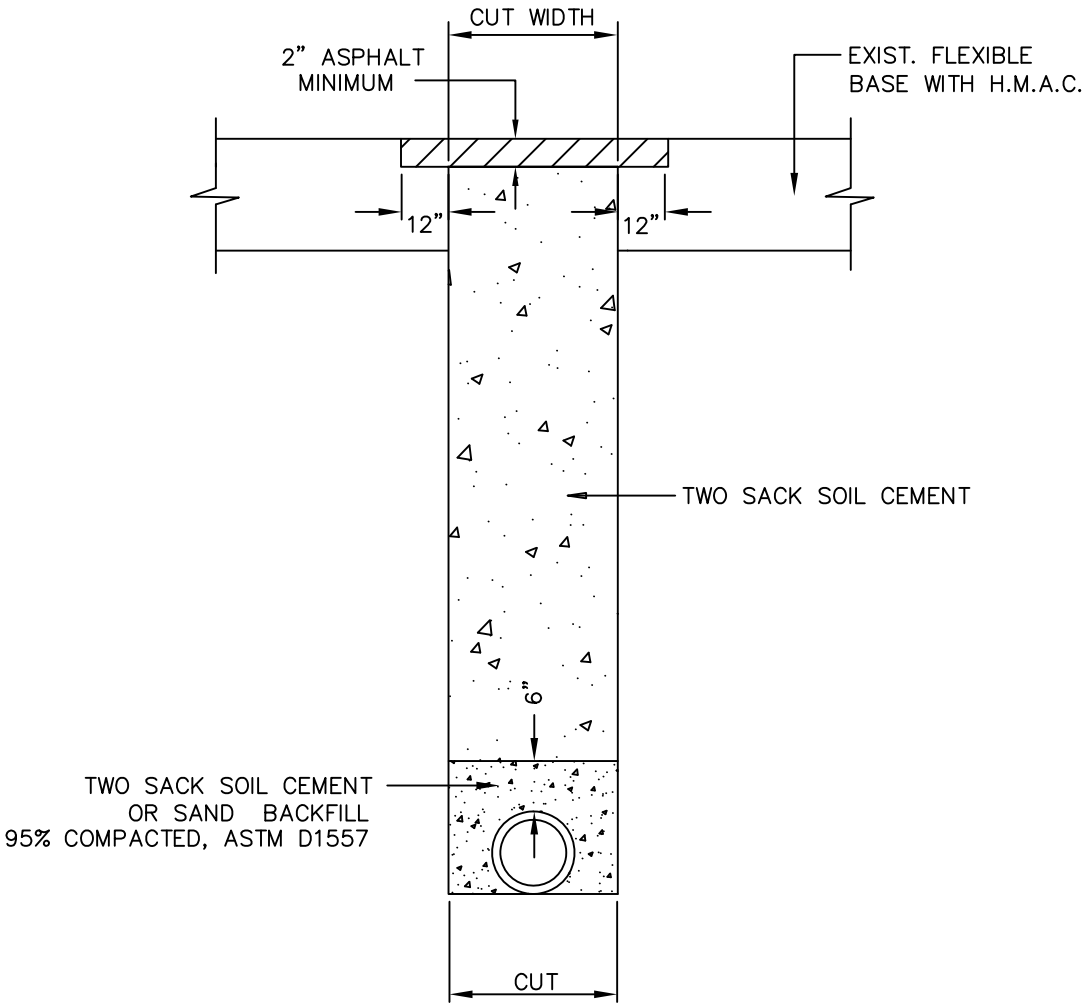
TYPICAL SECTION FLEXIBLE BASE WITH H.M.A.C. SURFACE

A. ALL ASPHALT CUTS MUST BE SAW CUT.

B. TWO SACK SOIL CEMENT MIX MUST BE 2 SACKS OF CEMENT PER ONE CUBIC YARD OF SOIL.

C. PLACE BACKFILL MATERIAL IN 8" MAX. LIFTS AND COMPACT AS SPECIFIED.

CONDUIT TRENCHING



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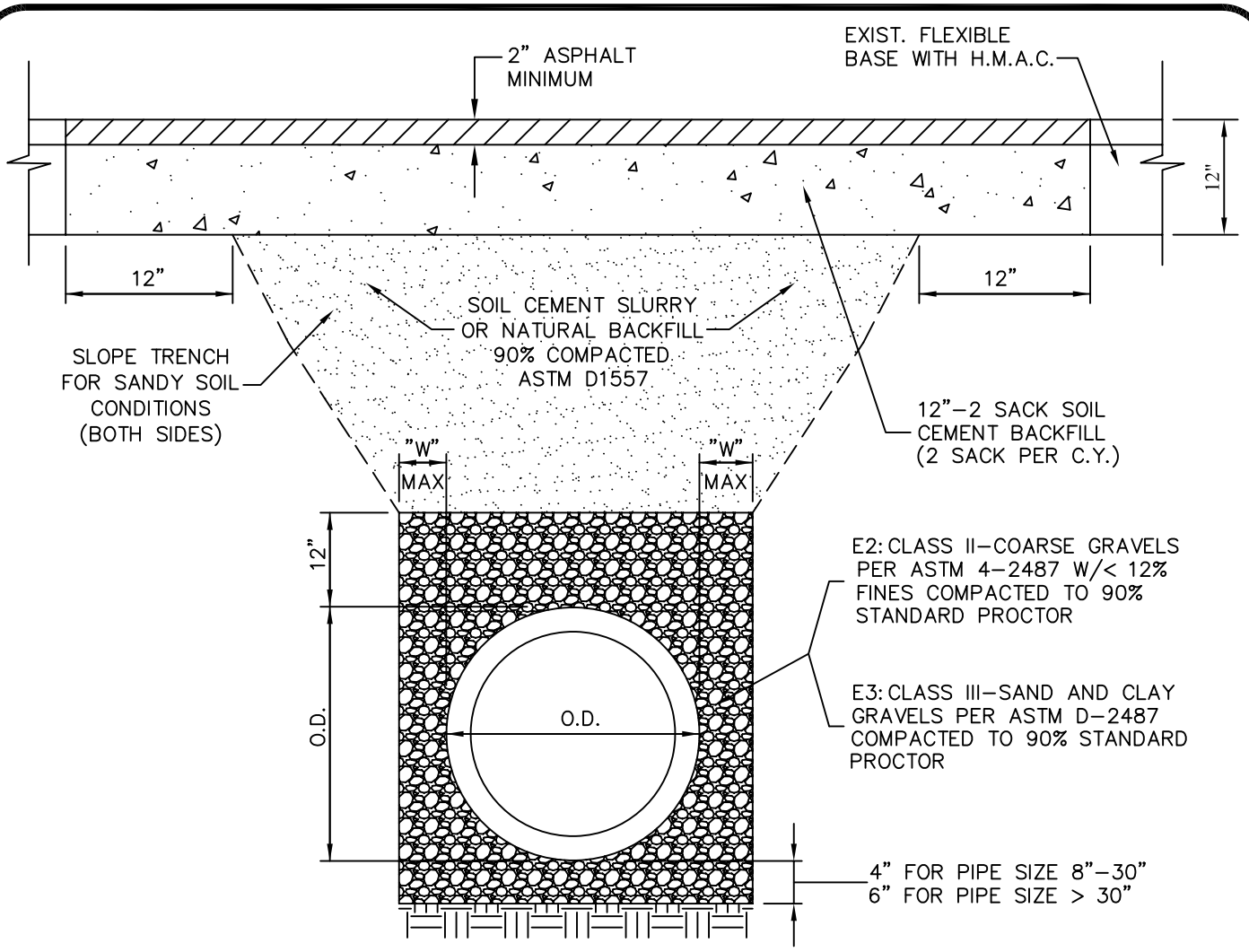


GENERAL NOTES

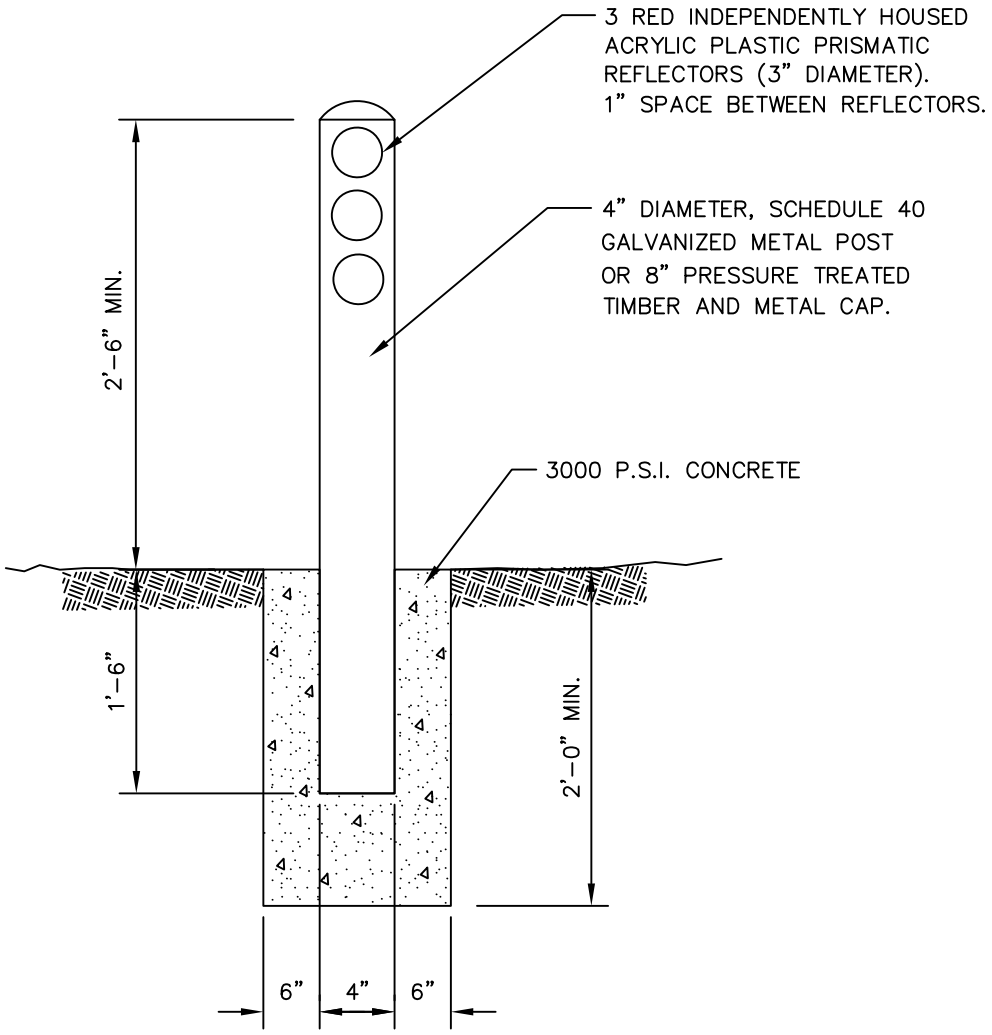
1. NATURAL MATERIAL MAY BE USED PROVIDED IT MEETS THE SPECIFICATONS FOR CLASS II OR III MATERIALS.
2. EMBEDMENT CONDITIONS SHOWN FOR DRY TRENCH.

CONSTRUCTION KEY NOTES

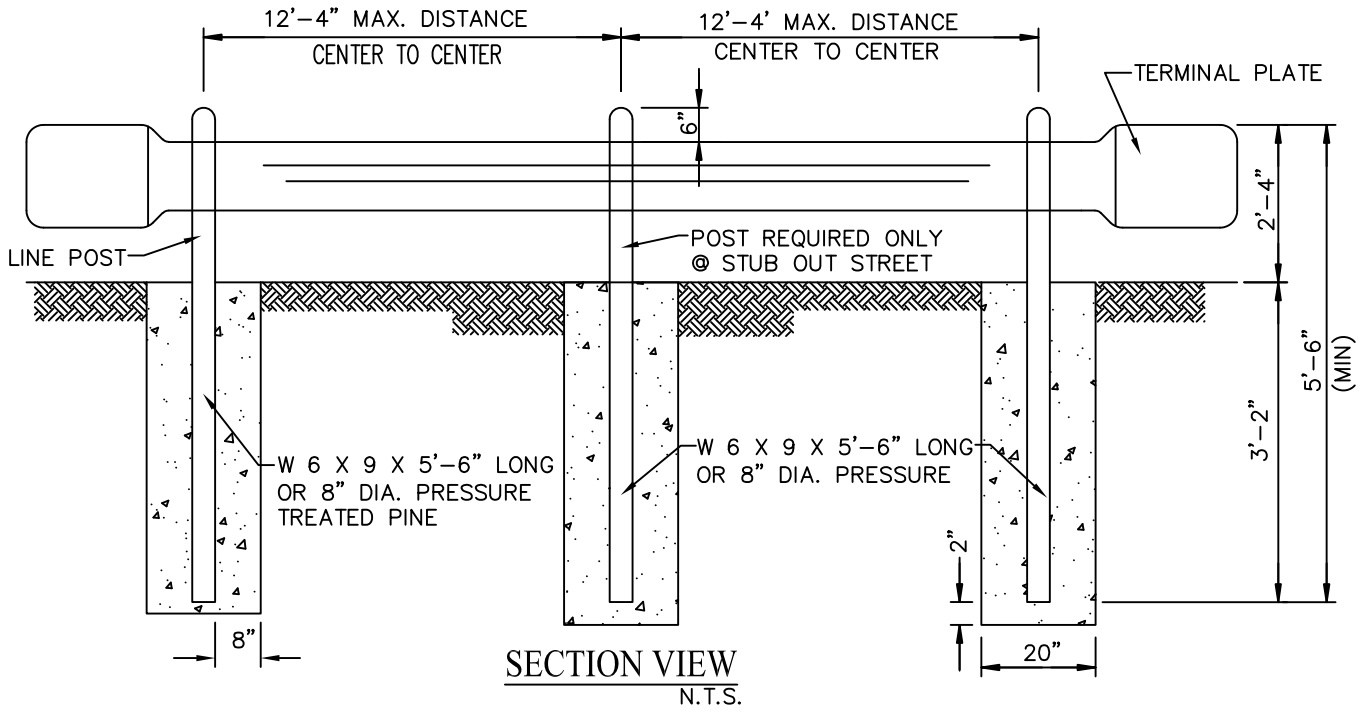
A. PLACE EMBEDMENT MATERIAL IN 8" MAX. LIFTS AND COMPACT AS SPECIFIED.
B. TRENCH DIMENSION "W" AS FOLLOWS

PIPE DIAMETER	"W"
LESS THAN 24'	9"
24' THRU 48"	12"
GREATER THAN 48"	O.D./4

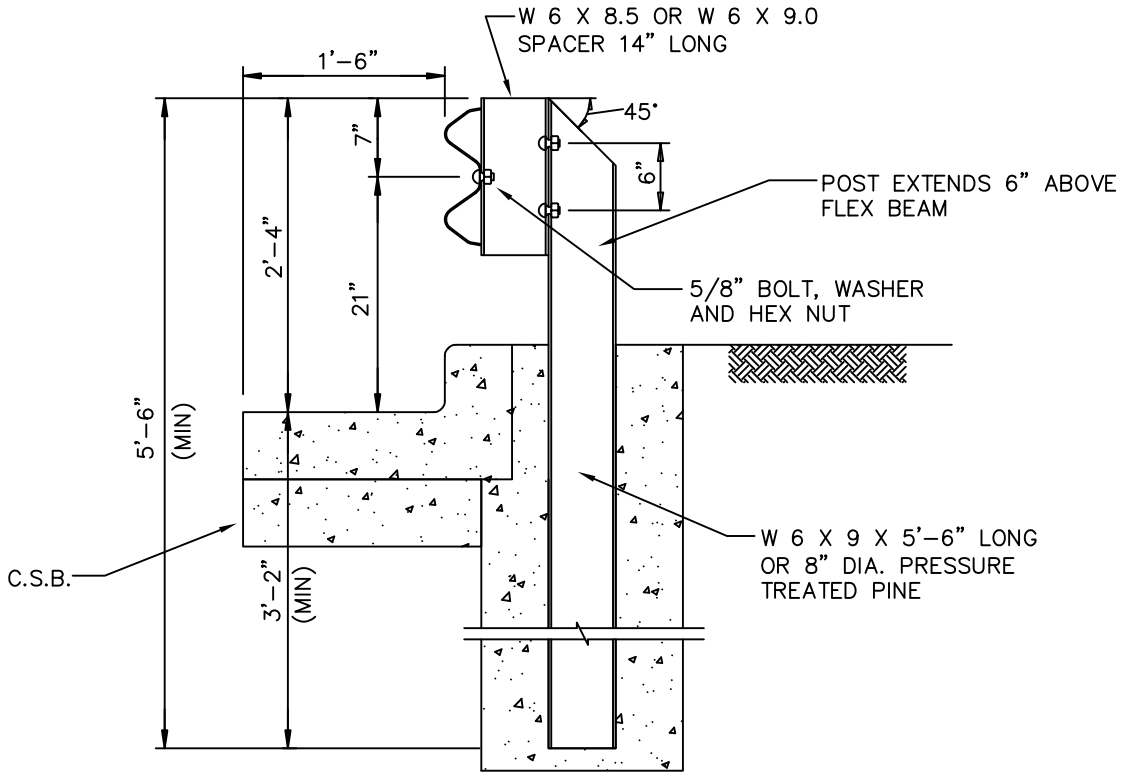
STREET PAVING CUT FOR FLEXIBLE PIPE



METAL GUARD POST DETAIL



SECTION VIEW
N.T.S.



LINE POST DETAIL
N.T.S.

TITLE 19 - SUBDIVISION ORDINANCE

THE CITY OF EL PASO TEXAS

STREET DESIGN MANUAL

GUARD RAIL

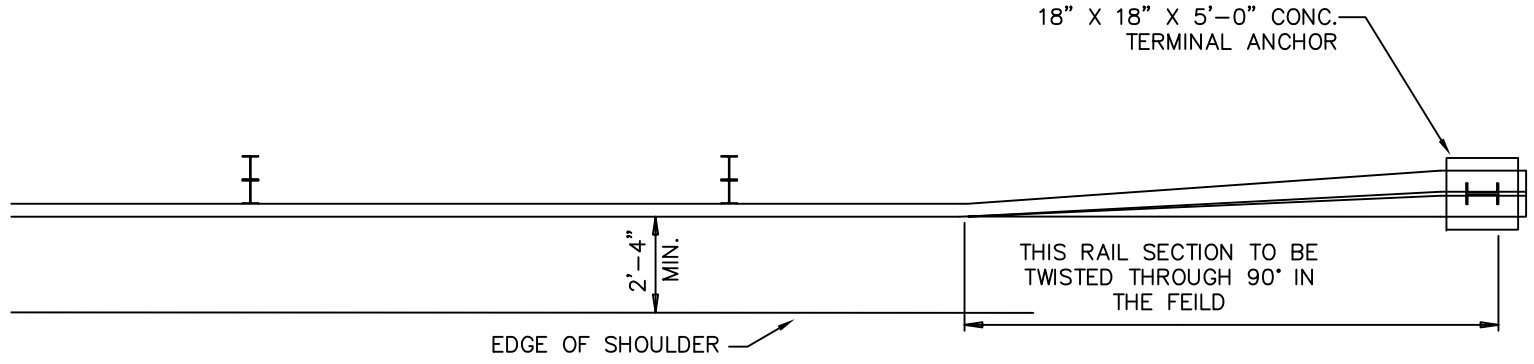
9-1-39

STREET DESIGN MANUAL

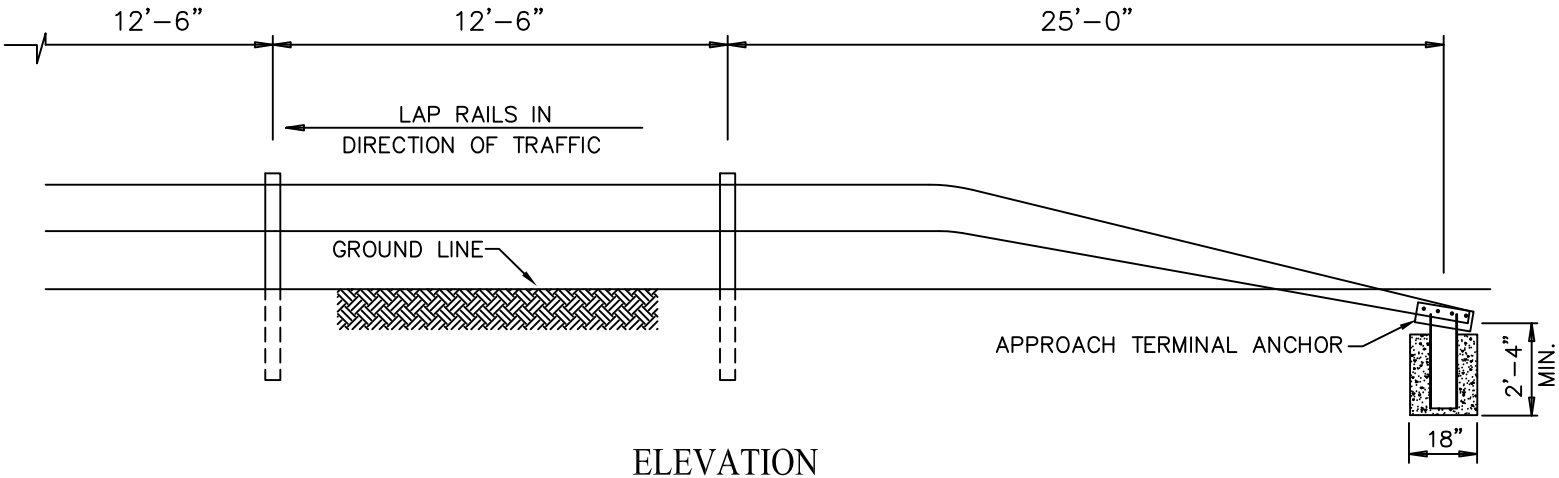
TITLE 19 - SUBDIVISION ORDINANCE

TERMINUS METAL BEAM GUARD FENCE

9-1-40



PLAN
N.T.S.



ELEVATION
N.T.S.

NOTE:

1. ALL STEEL FITTINGS SHALL BE GALVANIZED.
2. SEE NO. 3-44 FOR LINE POST DETAIL.

PROPOSED CITY MONUMENT LOCATIONS

A. MONUMENTS SHALL BE INSTALLED SO THAT ALL FRONT PROPERTY CORNERS OF ALL LOTS IN THE SUBDIVISION ARE WITHIN LINE OF SIGHT OF A MONUMENT, OR WITHIN SIGHT OF THE LINE BETWEEN TWO ADJACENT MONUMENTS

B. EACH MONUMENT SHALL BE WITHIN LINE OF SIGHT OF ANOTHER MONUMENT

C. MONUMENTS SHALL BE NO FARTHER THAN 2000 FEET APART

D. AT LEAST ONE (1) MONUMENT SHALL BE PLACED ON EACH HORIZONTAL CURVE (PI) OF THE TANGENTS LEADING INTO THE CURVE FALLS OUTSIDE THE CURB LINE

E. NO FEWER THAN TWO MONUMENTS SHALL BE PLACED IN ONE (1) STREET SUBDIVISIONS.

PLANE SURVEYS AND GEODETIC CONTROL
SUBMISSION REQUIREMENTS ON
ALL ENGINEERING AND GIS MAP DRAWINGS

SCOPE:

THESE SUBMISSION REQUIREMENTS APPLY TO ALL WORK DONE IN THE CITY AND COUNTY OF EL PASO. IT IS PUT FORTH TO FACILITATE PERSONNEL TO ACCESS AND UPDATE MAP INFORMATION MORE EFFICIENTLY.

ALL FIELD WORK WHICH REQUIRES A SURVEY SHALL BE REQUIRED TO ABIDE TO THE FOLLOWING:

- BENCHMARK(S) ARE TO BE TIED TO THE PUBLISHED CITY OF EL PASO'S GEODETIC CONTROL POINTS, AND REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (TXC SPCS), FIPS 4203. HORIZONTAL DATA WILL BE REFERENCED TO NAD83, AND ELEVATIONS TO NAVD88.
- DETAILED CAD DRAWINGS ILLUSTRATING THE SPATIAL LAYOUT OF THE OVERHEAD (PORTION OF A PARCEL MAP AND/OR UTILITY INFRASTRUCTURE) SHALL HAVE ALL BENCHMARKS REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (TXC SPCS), FIPS 4203. HORIZONTAL DATA WILL BE REFERENCED TO NAD83, AND ELEVATIONS TO NAVD88. THIS WILL ALLOW THE ELECTRONIC DRAWING(S) TO CONFORM AND OVERLAY TO ALL EXISTING ENGINEERING COMPUTER AIDED DESIGNS, GIS LAYERS AND IMAGERY.

DELIVERY

1. A DIGITAL COPY(S) OF THE COMPUTER AIDED DESIGN DRAWING REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM , CENTRAL ZONE, FIPS 4203, NAD83, AND ELEVATIONS TO NAVD88; ELEVATIONS WILL BE NOTED (ANNOTATED) NEXT TO THE BENCHMARK(S) IN BOTH NAVD88 AND GROUND/SURFACE COORDINATES.
2. A HARD COPY.
3. A REPORT ON THE ELEVATIONS OF SURVEYED BENCHMARKS IN GROUND COORDINATES AND REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988

AN ADDITIONAL REPORT IS REQUIRED WHEN A NEW BENCHMARK IS TIED INTO THE SURVEY. THE REPORT WILL INCLUDE THE SURVEYED COORDINATES AND THE TIED COORDINATES AS THEY READ FROM THE CITY OF EL PASO'S GEODETIC CONTROL SYSTEM.

TEXAS COORDINATE SYSTEM MONUMENTATION: SUBDIVISION PLATS INTRODUCED TO THE CITY OF EL PASO SHALL BE TIED TO TEXAS STATE PLANE COORDINATE SYSTEM CONTROL ZONE, IN CONFORMANCE WITH THE REQUIREMENTS OF DIVISION X, CHAPTER X, SECTION XXX ET SEQ. OF THE PUBLIC RESOURCES CODE OF THE STATE OF TEXAS, UNLESS WAIVED IN WRITING BY THE CITY ENGINEER. COORDINATES AND BEARINGS MAY BE BASED UPON TEXAS CENTRAL STATE PLANE COORDINATE SYSTEM AND SHALL BE BASED UPON THE HORIZONTAL DATUM OF 1983 AND VERTICAL DATUM OF 1988. ALL TIES SHALL BE IDENTIFIED WITH GRID BEARINGS AND GROUND LEVEL DISTANCES, AND THE FOLLOWING NOTE SHALL APPEAR ON ALL SHEETS OF THE MAP UPON WHICH ANY PARCEL IS SHOWN:

TEXAS STATE PLANE COORDINATE SYSTEM: COORDINATES AND BEARINGS SHOWN HEREON ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, FIPS 4203, US SURVEY FEET (NAD 83, NAVD 88) AND TIED TO THE CITY OF EL PASO'S GEODETIC CONTROL POINT SURVEY. DISTANCES SHOWN ARE GROUND LEVEL DISTANCE. TO OBTAIN GRID DISTANCE, MULTIPLY GROUND LEVEL DISTANCE BY (COMBINATION FACTOR). THE NORTH ARROW SHALL INDICATE GRAPHICALLY THE DIVERGENCE BETWEEN GEODETIC NORTH AND GRID NORTH, AND THE THETA (0) ANGLE SHALL BE SHOWN NOTING AT WHICH MONUMENT SAID ANGLE WAS COMPUTED. THE ONLY COORDINATES APPEARING ON THE FINAL MAP SHALL BE FOR THE PRIMARY GEODETIC CONTROL STATIONS.

BOUNDARY MONUMENTS: MONUMENTS SHALL BE SET OR REFERENCED ON THE EXTERIOR BOUNDARY OF THE SUBDIVISION AT ALL CORNERS, ANGLE POINTS, BEGINNING AND ENDS OF CURVES AND AT INTERMEDIATE POINTS NOT TO EXCEED 1,000 FEET APART. THE LOCATION OF INACCESSIBLE POINTS SHALL BE ESTABLISHED BY TIES TO THE CITY OF EL PASO'S GEODETIC CONTROL POINT SURVEY AND SHALL BE NOTED ON THE FINAL MAP OR PARCEL MAP. IF ANY OR ALL OF THE BOUNDARY MONUMENTS ARE TO BE SET AFTER FILING OF THE FINAL MAP OR PARCEL MAP WITH THE COUNTY RECORDER, THE SURVEYOR MAKING THE SURVEY SHALL FURNISH EVIDENCE ACCEPTABLE TO THE CITY ENGINEER TO SUBSTANTIATE HIS REASONS FOR DEFERRING THE SETTING OF SUCH MONUMENTS UNTIL AFTER FILING OF SUCH MAP WITH THE COUNTY RECORDER.

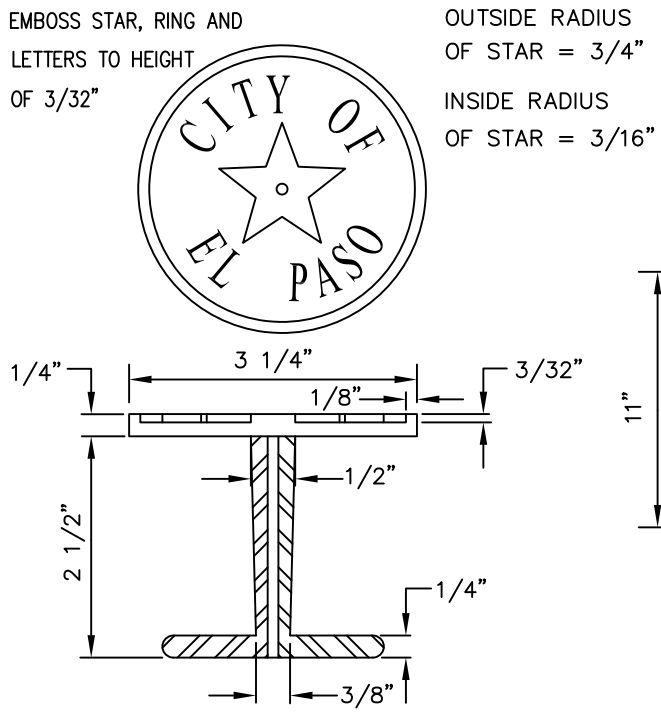
INTERIOR MONUMENTS: MONUMENTS SHALL BE SET AT ALL BLOCK, LOT OR PARCEL CORNERS AND ANGLE POINTS AND AT THE BEGINNINGS AND ENDS OF CURVES AND WITHIN STREET RIGHTS-OF-WAY. IF THE INTERIOR MONUMENTS ARE NOT SET WITHIN THE PERIOD OF TIME SPECIFIED ON THE SURVEYOR'S CERTIFICATE, THE CITY ENGINEER SHALL BY WRITTEN NOTICE FORTHWITH DIRECT THE SURVEYOR OF RECORD TO SET SUCH MONUMENTS WITHIN SIXTY (60) DAYS OF NOTICE, AND FURNISH SUCH FIELD NOTES AS WERE AGREED TO BE SET AND FURNISHED ON SAID CERTIFICATE. IF THE SURVEYOR FAILS TO COMPLY WITH SAID DIRECTIVE AFTER 60 DAYS, THE CITY ENGINEER SHALL WITHOUT FURTHER NOTICE SUBMIT A WRITTEN COMPLAINT AND REQUEST FOR DISCIPLINARY ACTION AGAINST SAID SURVEYOR TO THE TEXAS BOARD OF PROFESSIONAL LAND SURVEYING.

MONUMENT TYPE: ALL BOUNDARY MONUMENTS AND MONUMENTS SET WITHIN EXISTING AND PROPOSED CITY RIGHTS-OF-WAY SHALL BE STANDARD CITY MONUMENTS AND SHALL BE SET TO THE DEPTH AND IN THE MANNER PRESCRIBED IN THE SUBDIVISION STANDARDS.

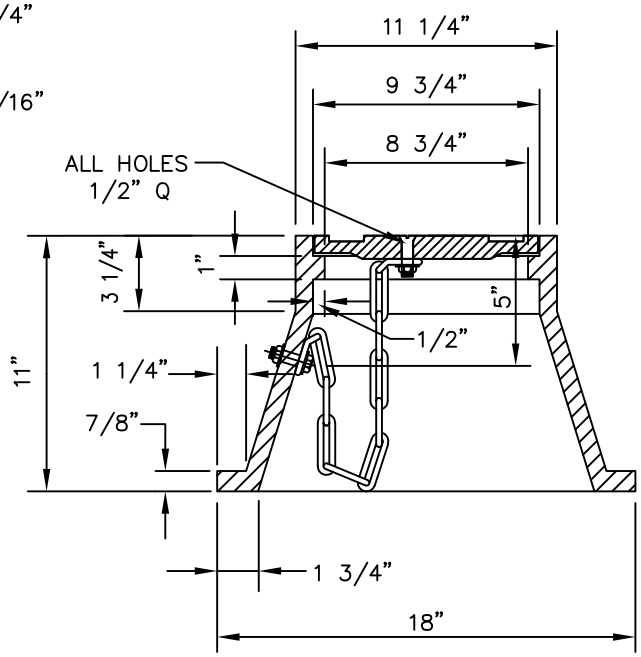
MONUMENT IDENTIFICATION MARKS: ALL MONUMENTS SET AS REQUIRED HEREIN SHALL BE PERMANENTLY AND VISIBLY MARKED OR TAGGED WITH THE REGISTRATION OR LICENSE NUMBER OF THE SURVEYOR WHO SIGNS THE SURVEYOR'S CERTIFICATE AND UNDER WHOSE SUPERVISION THE SURVEY WAS MADE.

REPLACEMENT OF DESTROYED MONUMENTS: ANY MONUMENT SET AS REQUIRED HEREIN WHICH IS DISTURBED OR DESTROYED BEFORE ACCEPTANCE OF ALL IMPROVEMENTS BY THE CITY SHALL BE REPLACED BY THE SUBDIVIDER'S SURVEYOR AND NEW MONUMENT CERTIFICATION SHALL BE SUBMITTED.

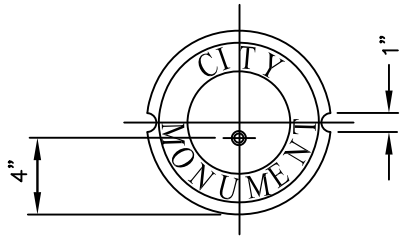
SURVEY DATA AND INFORMATION TO BE SHOWN ON FINAL MAP OR PARCEL MAP: THE FOLLOWING SURVEY DATA AND INFORMATION SHALL BE SHOWN ON EACH FINAL MAP OR PARCEL MAP BASED UPON A FIELD SURVEY: 1) STAKES, MONUMENTS OR OTHER EVIDENCE FOUND ON THE GROUND TOGETHER WITH THEIR PRECISE POSITIONS TO DETERMINE THE BOUNDARIES OF THE SUBDIVISION; AND 2) CORNERS OF ALL ADJOINING PROPERTIES IDENTIFIED BY LOT AND BLOCK NUMBERS, SUBDIVISION NAMES, NUMBERS AND PAGE OF RECORD OR BY SECTION, TOWNSHIP AND RANGE OR OTHER PROPER DESIGNATION.



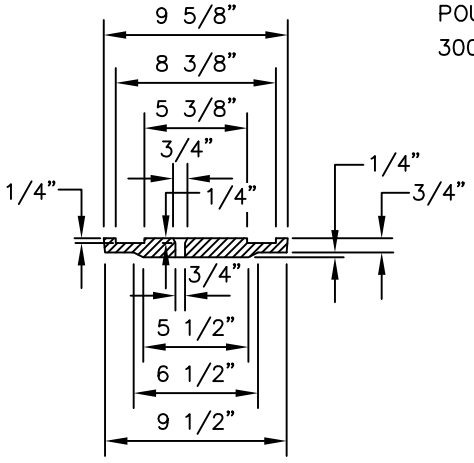
BRONZE MONUMENT CAP



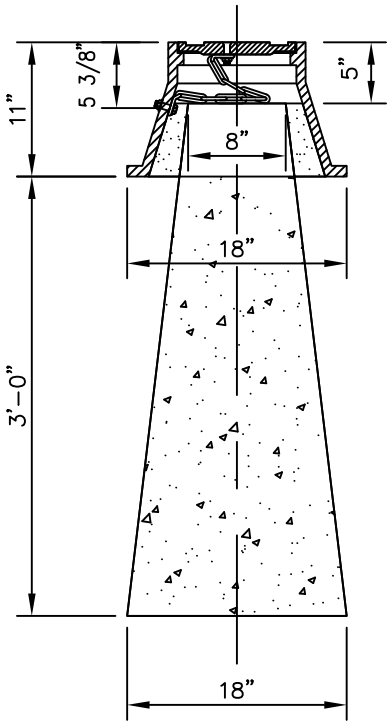
MONUMENT BOX



NO FORMS REQUIRED
CONCRETE TO BE
POURED IN PLACE.
3000 P.S.I. CONCRETE.



BOX COVER



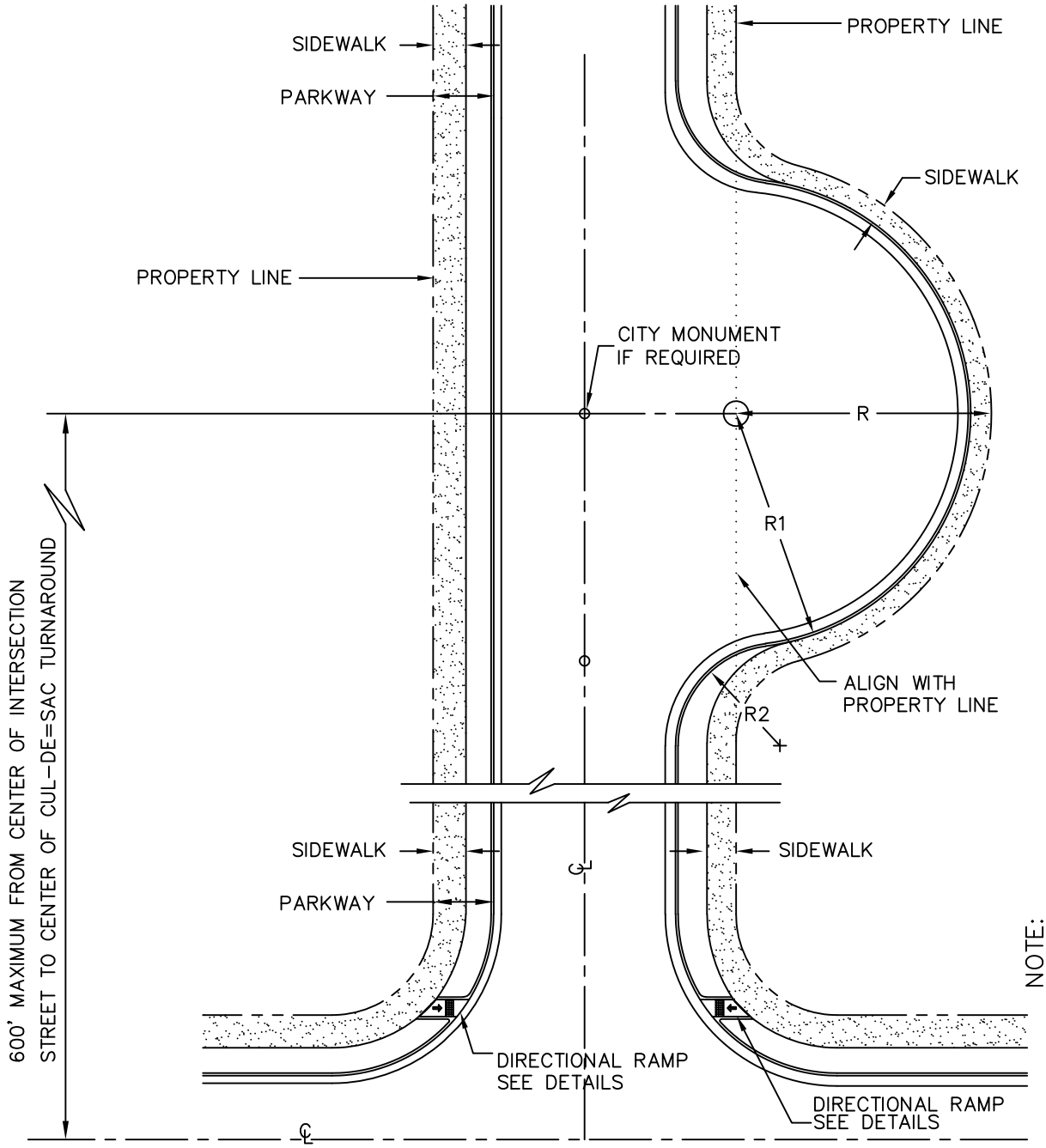
SECTION VIEW

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

CITY SURVEY
MONUMENT

9-1-44



NOTE:
WHERE SIDEWALKS ARE NOT REQUIRED OR ARE PERMITTED TO BE LOCATED ADJACENT TO AND PARALLEL WITH THE CURB LINE, THE TOTAL STREET RIGHT-OF-WAY SHALL BE REDUCED BY DEDUCTING 3'-6" FROM THE PARKWAY ON EACH AFFECTED SIDE OF THE STREET.

	R	R1	R2
32' LOCAL	58'	54'	20'
RESIDENTIAL COLLECTOR = (36' RDWY.)	50'	46'	20'
MINOR\DIVIDED\MOUNTAIN RESIDENTIAL = (20' RDWY.)	66'	62'	20'
* DIVIDED MOUNTAIN RESIDENTIAL = (10' RDWY.)	–	–	–

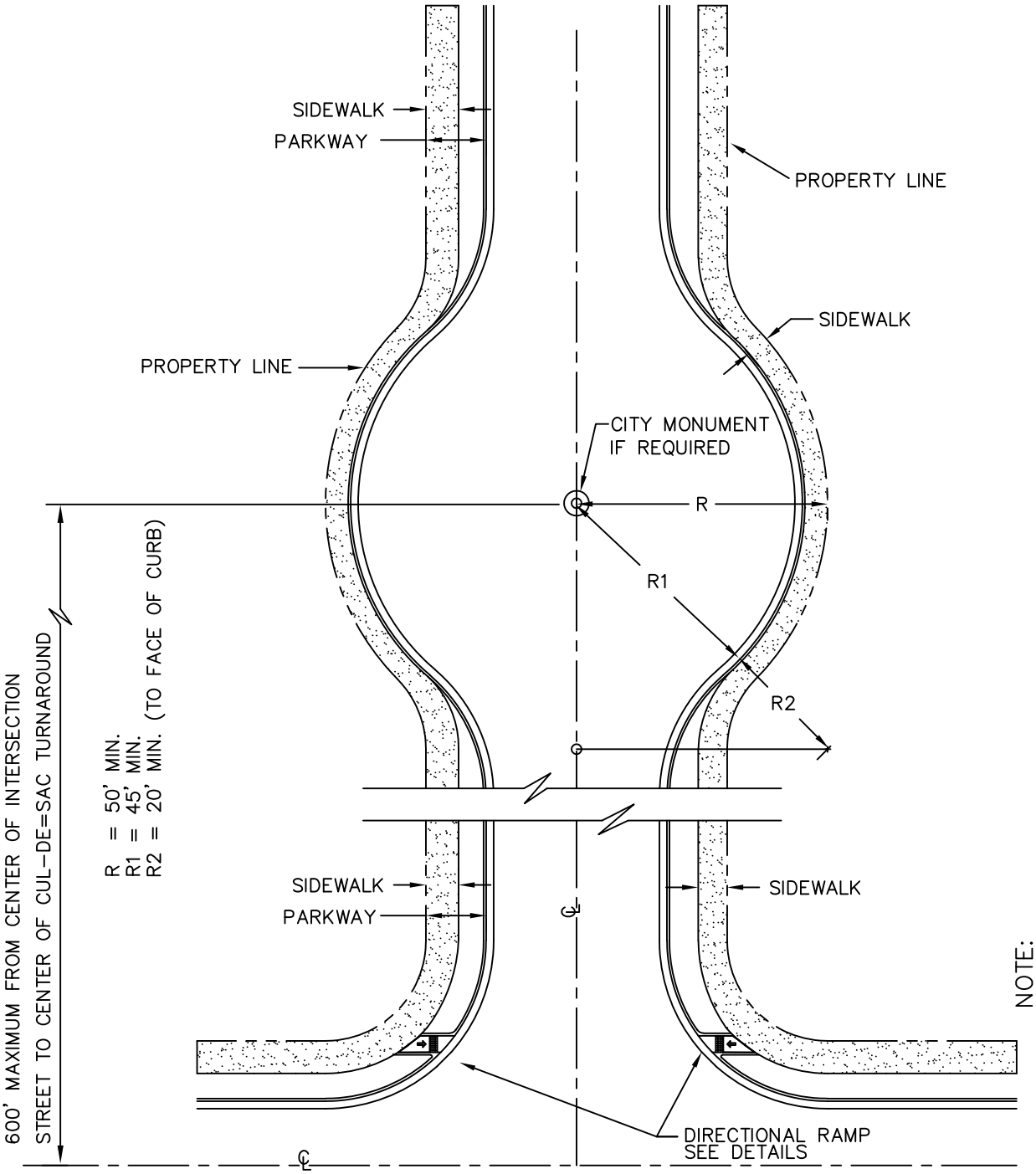
* SINGLE EYEBROW CUL-DE-SAC SHALL NOT BE PERMITTED

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

SINGLE EYEBROW
CUL-DE-SAC

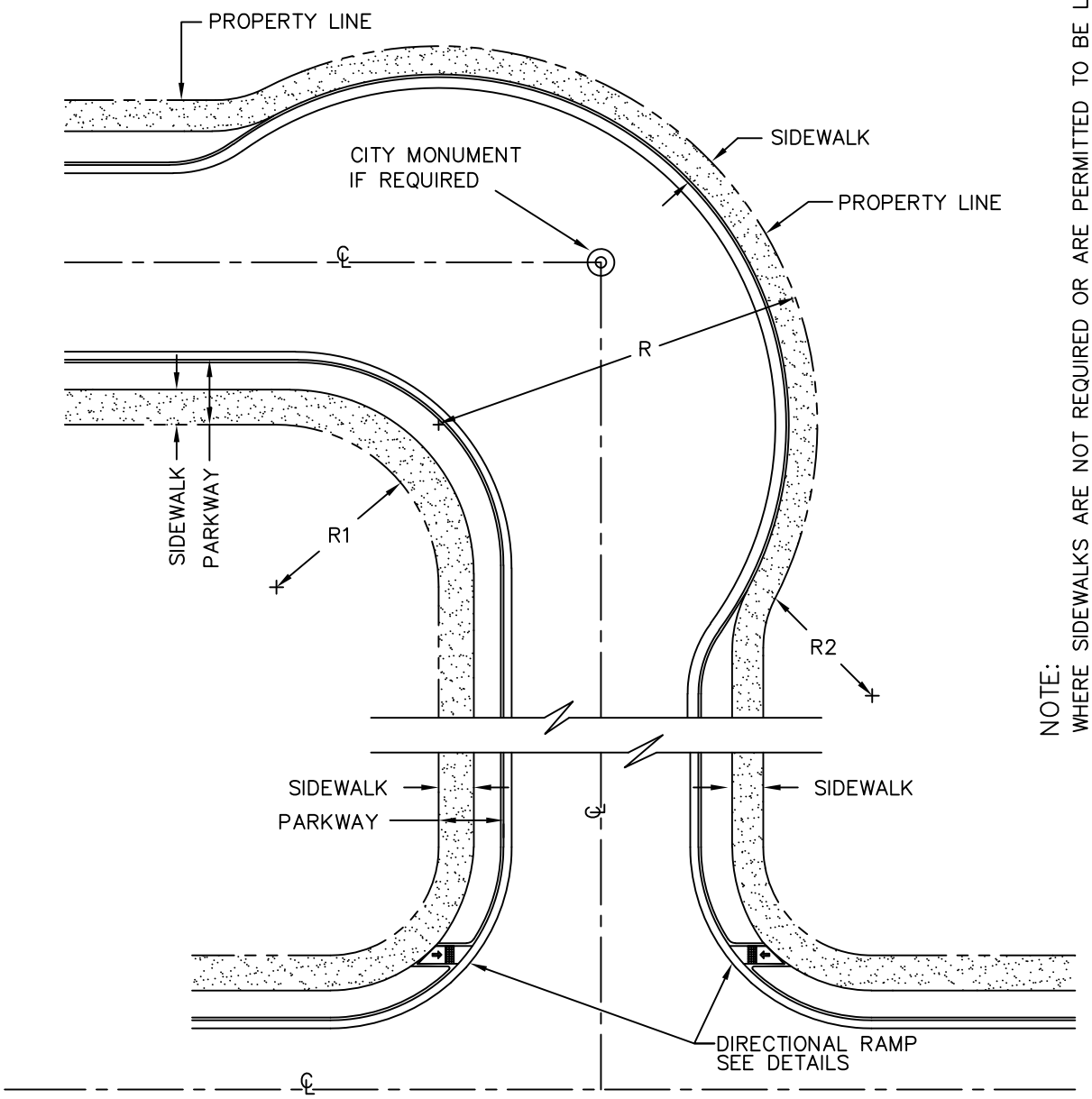
9-1-45



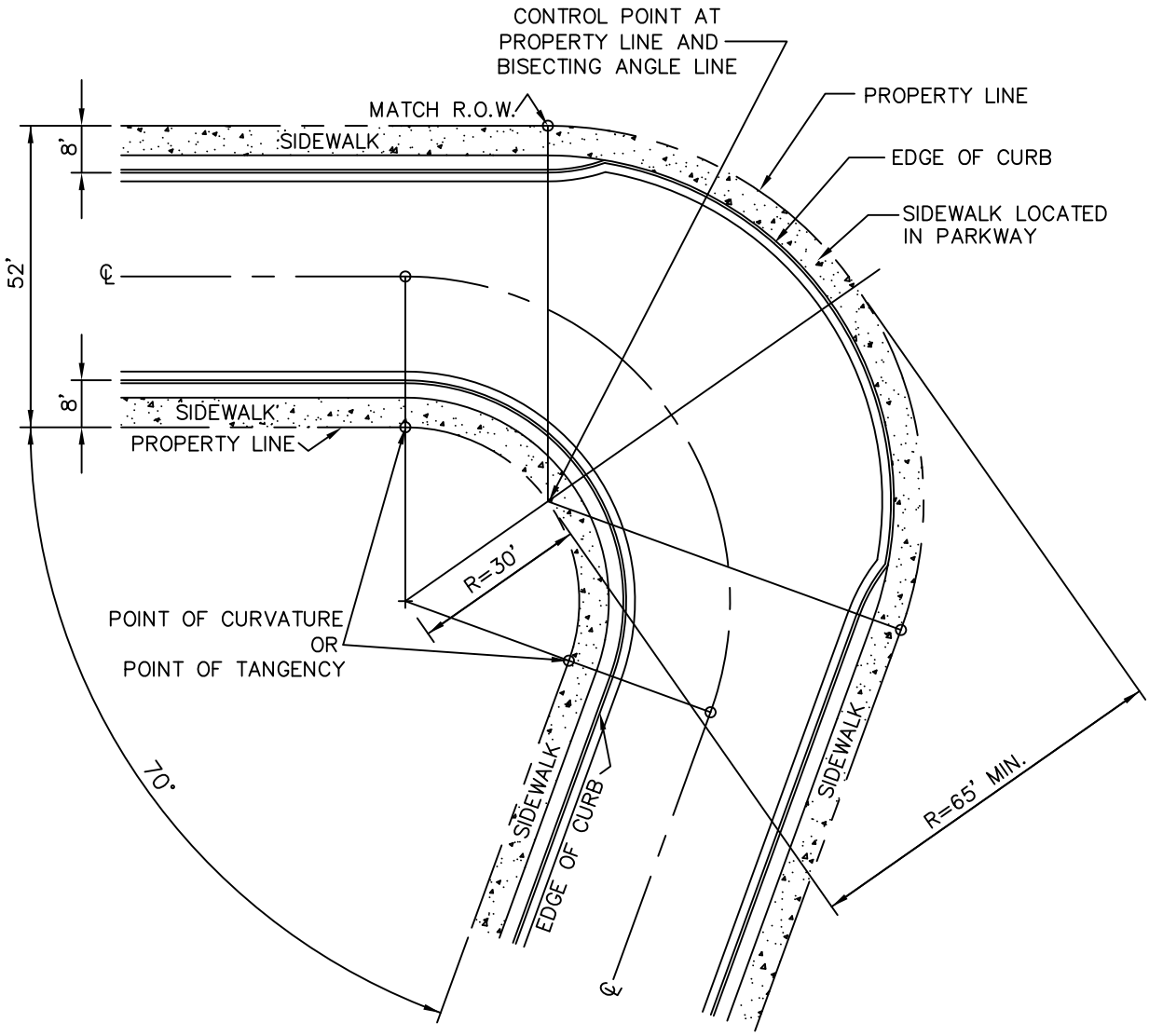
NOTE:
WHERE SIDEWALKS ARE NOT REQUIRED OR ARE PERMITTED TO BE LOCATED ADJACENT TO AND PARALLEL WITH THE CURB LINE, THE TOTAL STREET RIGHT-OF-WAY SHALL BE REDUCED BY DEDUCTING 3'-6" FROM THE PARKWAY ON EACH AFFECTED SIDE OF THE STREET.

DIVIDED MOUNTAIN RESIDENTIAL DUAL EYEBROW CUL-DE-SAC'S MAY BE PERMITTED SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.

R = 70' MIN.
R1 = 30' MIN.
R2 = 20' MIN. (TO FACE OF CURB)



NOTE:
WHERE SIDEWALKS ARE NOT REQUIRED OR ARE PERMITTED TO BE LOCATED ADJACENT TO AND PARALLEL WITH THE CURB LINE, THE TOTAL STREET RIGHT-OF-WAY SHALL BE REDUCED BY DEDUCTING 3'-6" FROM THE PARKWAY ON EACH AFFECTED SIDE OF THE STREET.



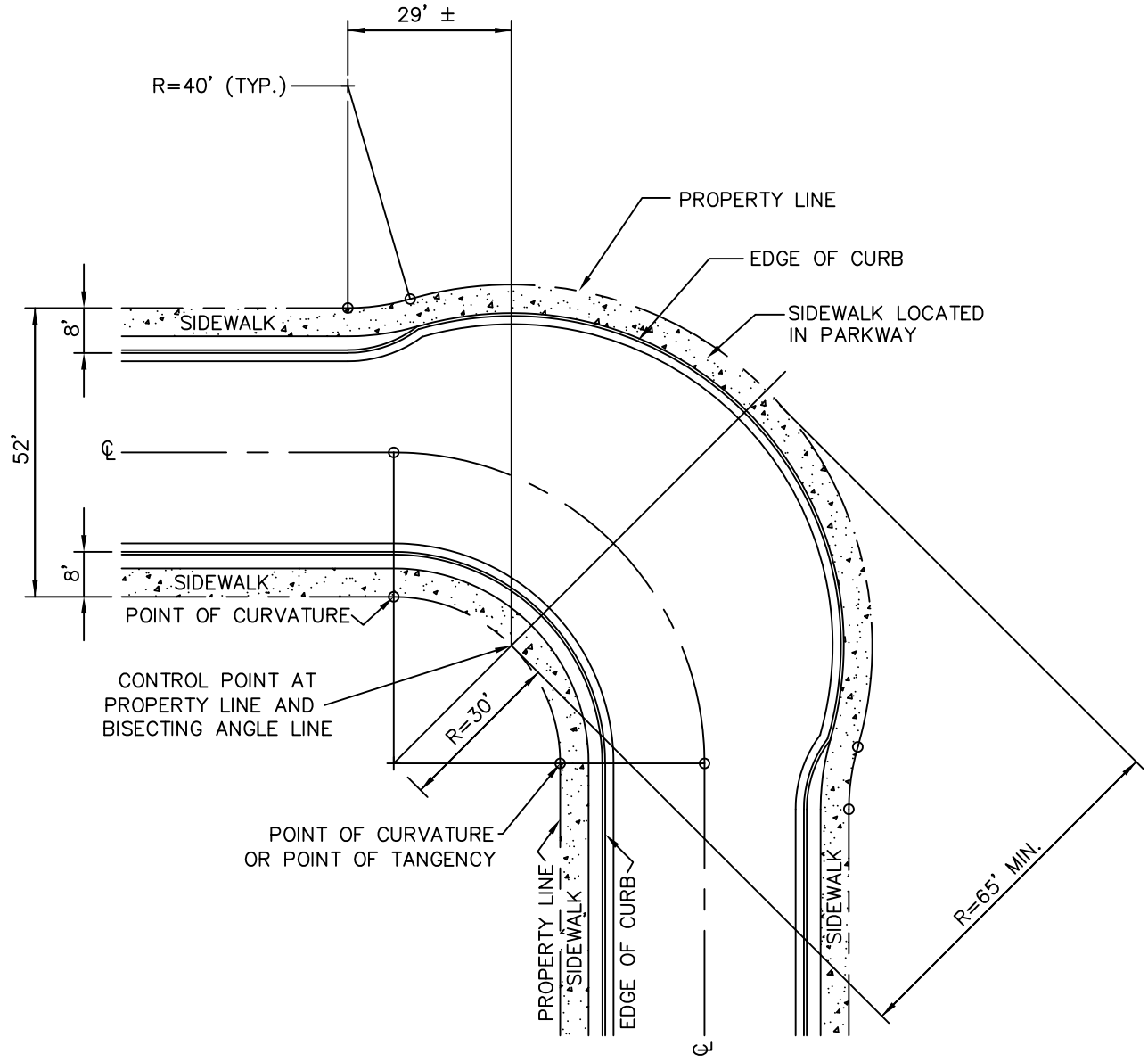
PROPOSED 70 DEGREE ANGLE (MIN.) TURNING HEEL.

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

PROPOSED 70 DEGREE
ANGLE (MIN.) TURNING HEEL

9-1-48



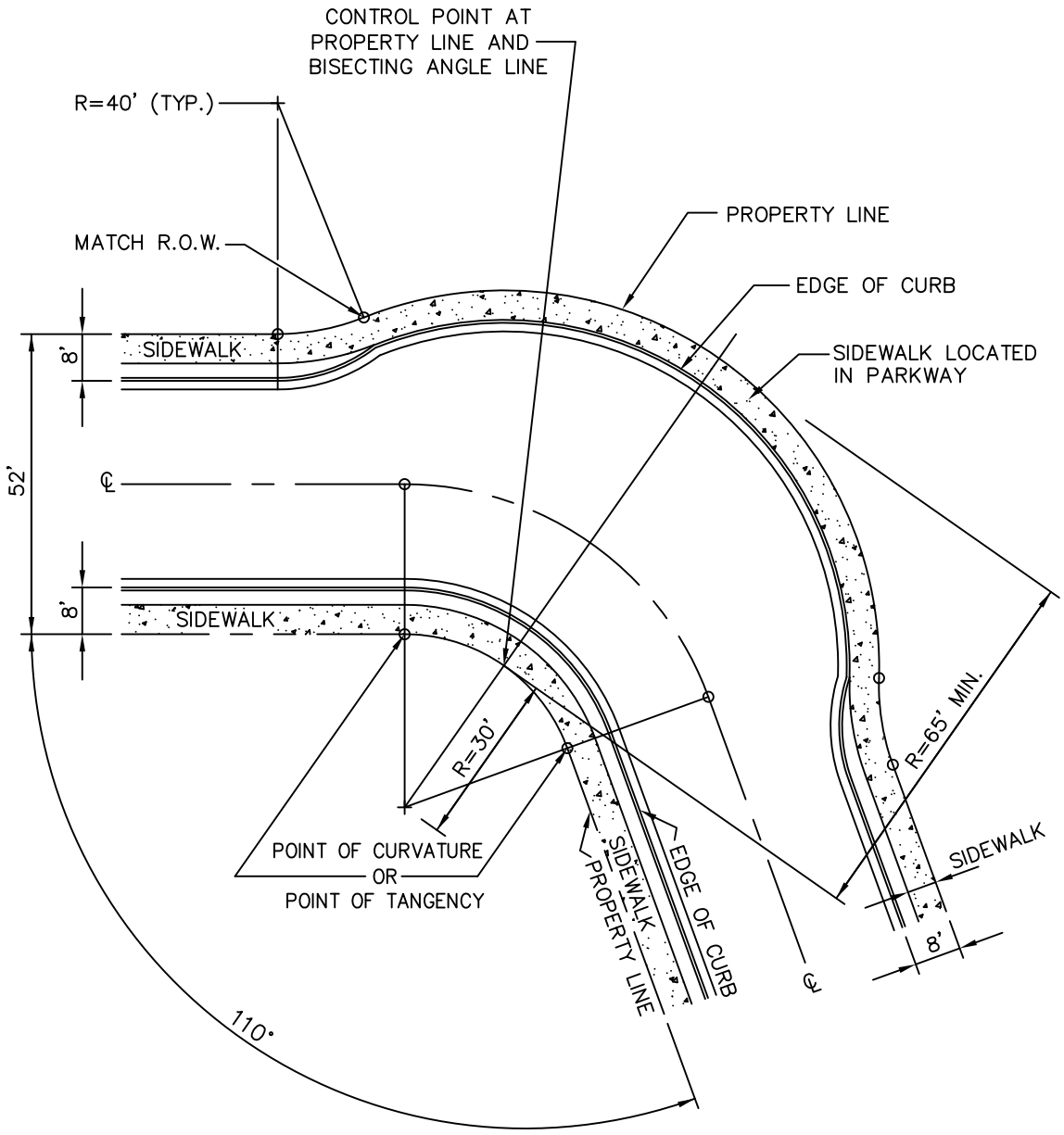
PROPOSED 90 DEGREE ANGLE TURNING HEEL.

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

PROPOSED 90 DEGREE
ANGLE TURNING HEEL

9-1-49

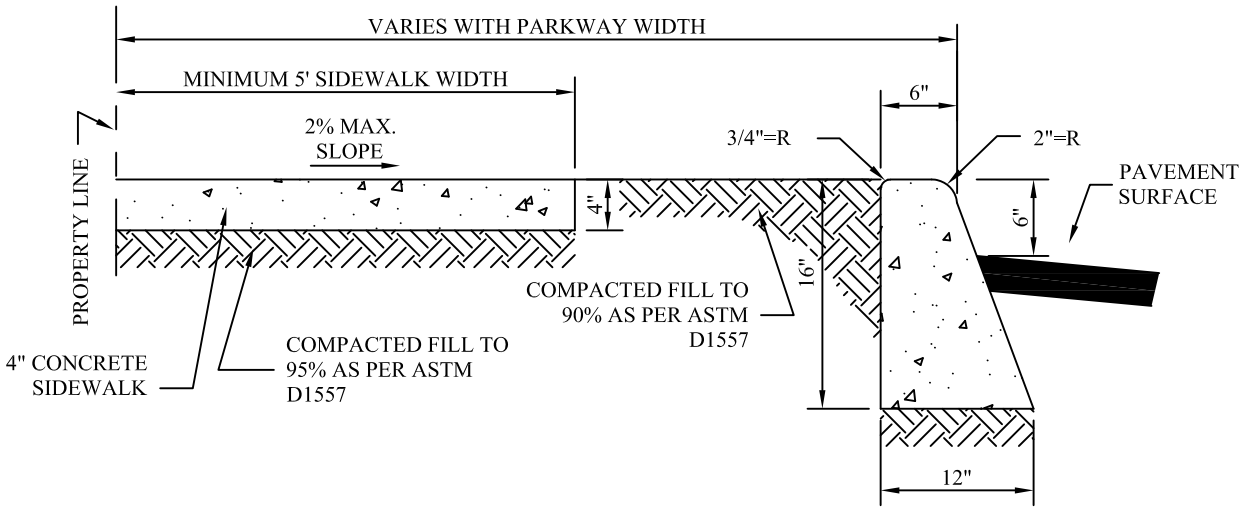


PROPOSED 110 DEGREE ANGLE (MAX.) TURNING HEEL.

SECTION 2

SECTION 2

SIDEWALKS AND ACCESSIBILITY GUIDELINES

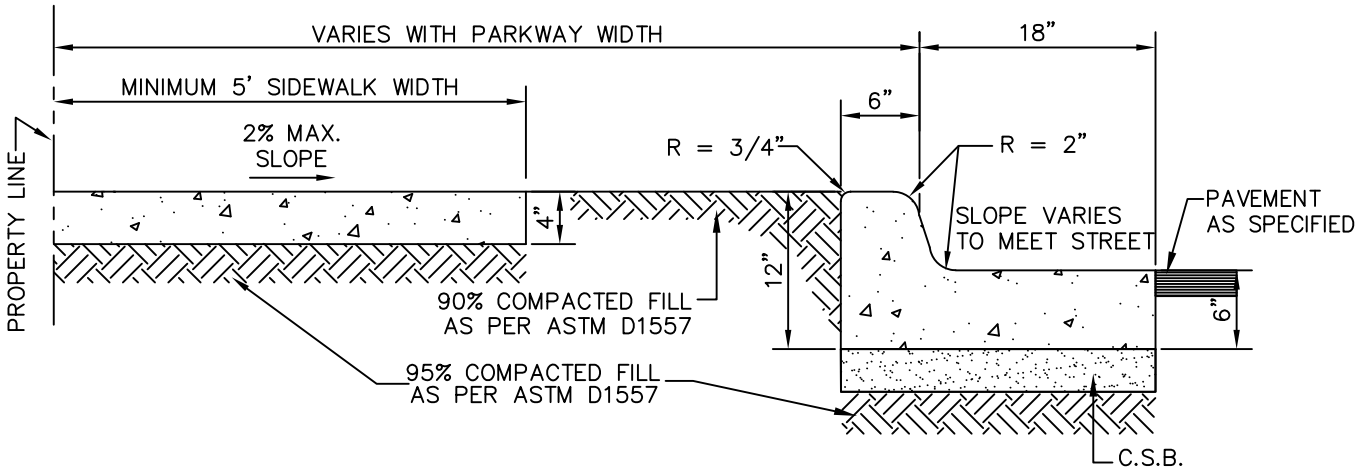


STANDARD CURB & SIDEWALK SECTION

NOTES:

1. CONCRETE SHALL BE 3000 P.S.I. MIN.
2. DUMMY JOINT REQUIRED AT 10' O.C. FOR CURB & GUTTER AND 5' O.C. FOR SIDEWALK.
3. EXPANSION MATERIAL REQUIRED AT CURB RETURNS AND AT 20' ON CENTER FOR SIDEWALKS WITH 1/2" PREMOLDED ASPHALT IMPREGNATED EXPANSION MATERIAL OR EQUAL.
4. EXPANSION JOINTS REQUIRED AT 50' O.C. WHEN FORMING FOR CURBS.
5. INVERT CROWN IS REQUIRED WITH STANDARD CURB.

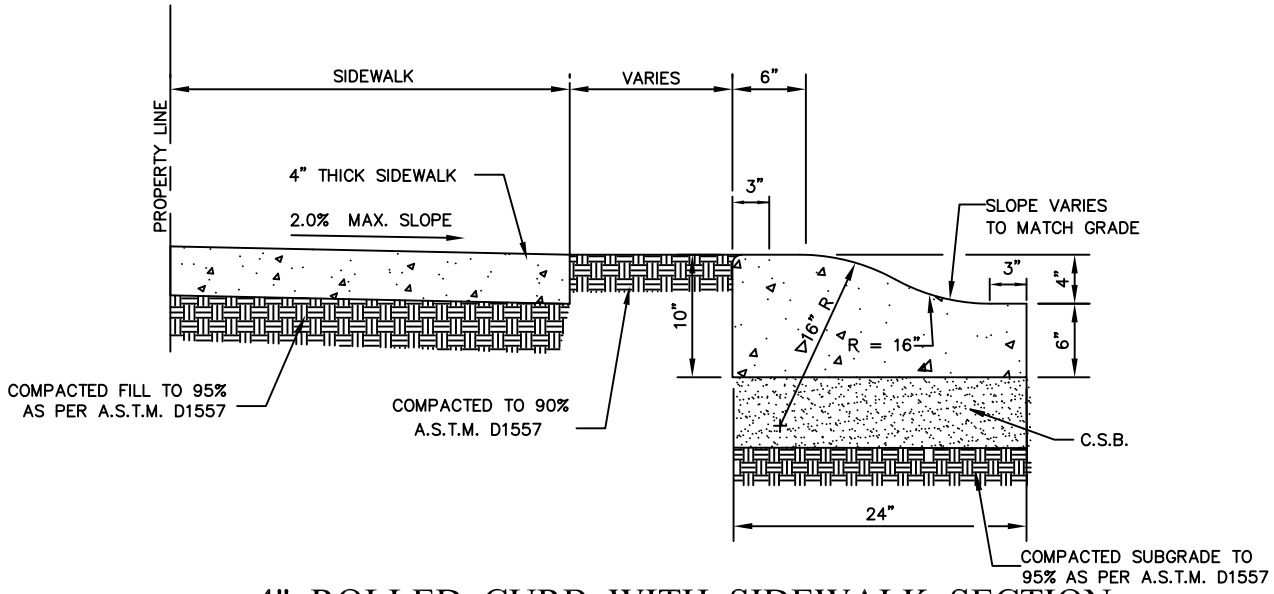
INTENTIONALLY LEFT BLANK FOR FUTURE USE



CURB & GUTTER WITH SIDEWALK SECTION

NOTES:

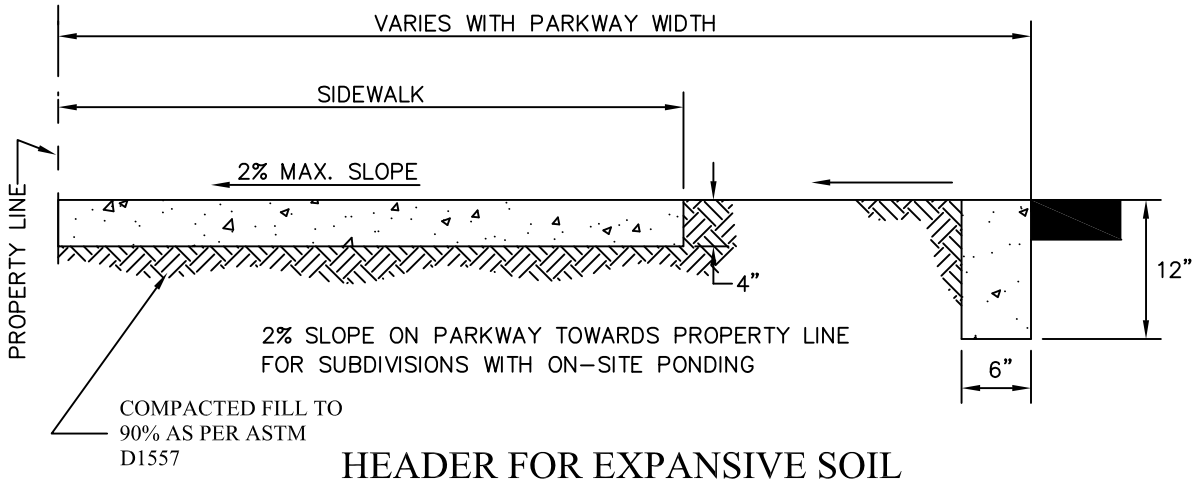
1. CONCRETE SHALL BE 3000 P.S.I. MIN.
2. DUMMY JOINT REQUIRED AT 10' O.C. FOR CURB & GUTTER AND 5' O.C. FOR SIDEWALK.
3. EXPANSION MATERIAL REQUIRED AT CURB RETURNS AND AT 20' ON CENTER FOR SIDEWALKS WITH 1/2" PREMOLDED ASPHALT IMPREGNATED EXPANSION MATERIAL OR EQUAL.
4. EXPANSION JOINTS REQUIRED AT 50' O.C. WHEN FORMING FOR CURBS.



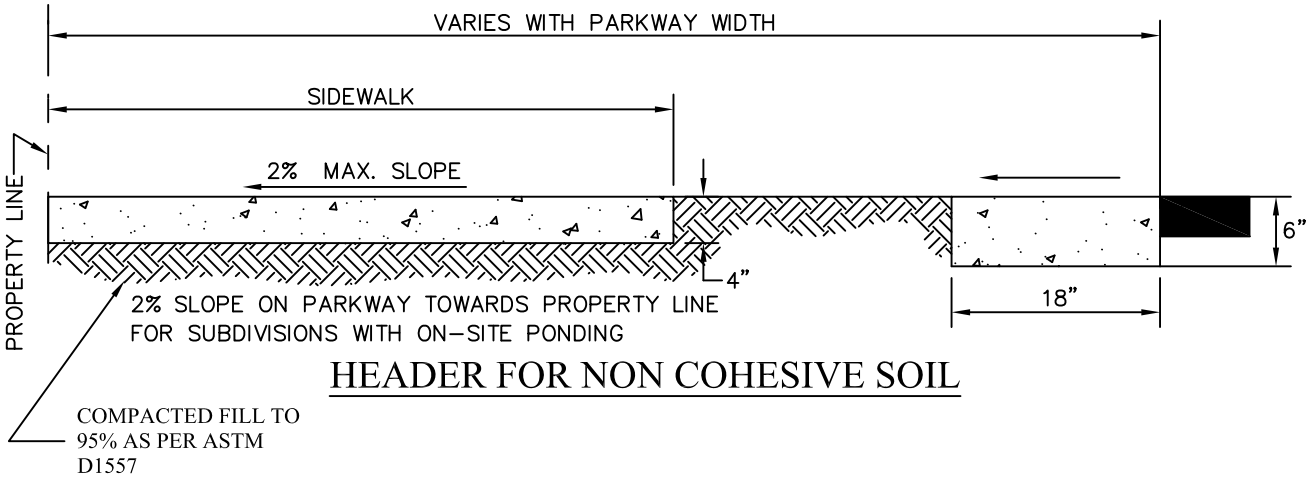
4" ROLLED CURB WITH SIDEWALK SECTION

NOTES:
1. CONCRETE SHALL BE 3000 P.S.I. MINIMUM.
2. DUMMY JOINT REQUIRED AT 10' O.C. FOR HEADERS AND 5' O.C. FOR SIDEWALK.
3. EXPANSION JOINT MATERIAL REQUIRED AT CURB RETURNS, AND AT 20' O.C. FOR SIDEWALKS WITH 1/2" PRE-MOLDED ASPHALT IMPREGNATED EXPANSION MATERIAL.
4. EXPANSION JOINTS REQUIRED AT 50' O.C. WHEN FORMING FOR HEADERS.
5. PROVIDE EXPANSION JOINT MATERIAL WHERE SIDEWALK MEETS CURB, AND AT ALL SIDES WHERE CONCRETE PARKWAY MEETS SIDEWALK AND CURB.
6. INVERT CROWN IS REQUIRED FOR THE ROLLED CURB

INTENTIONALLY LEFT BLANK FOR FUTURE USE



HEADER FOR EXPANSIVE SOIL



HEADER FOR NON COHESIVE SOIL

NOTES:

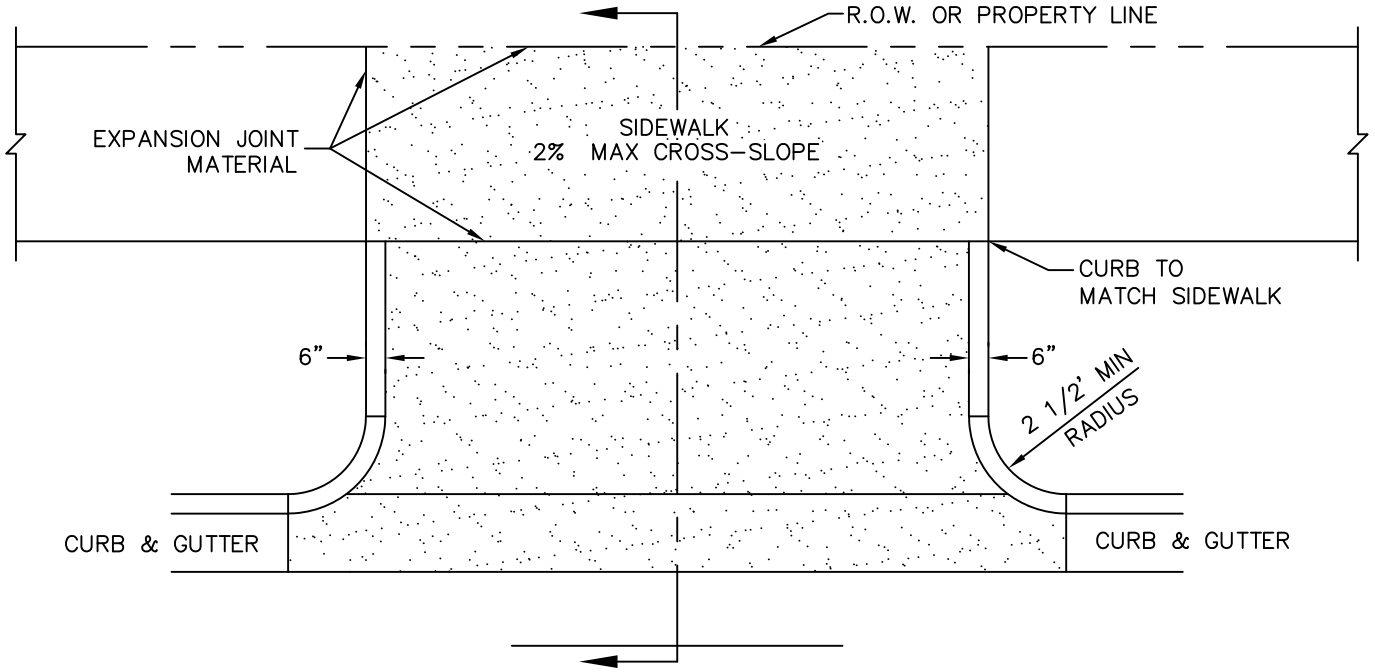
1. CONCRETE TO BE 3000 P.S.I. MIN.
2. DUMMY JOINT REQUIRED AT 10' O.C. FOR HEADERS AND 5' O.C. FOR SIDEWALKS.
3. EXPANSION MATERIAL REQUIRED AT CURB RETURNS AND AT 20" O.C. FOR SIDEWALKS WITH 1/2" PREMOLDED ASPHALT IMPREGNATED EXPANSION MATERIAL OR EQUAL.
4. EXPANSION JOINTS REQUIRED AT 50' O.C. WHEN FORMING FOR HEADERS.
5. EXPANSION JOINTS REQUIRED FOR SIDEWALK AT 20' O.C.

Type I and Type II Two-Way Driveway Standards

Driveway	Type of Development	Curb				Minimum Edge to Edge Spacing Between Drives (ft.)
		Width (ft.)		Radius (ft.)		
		Min.	Max.	Min.	Max.	
Type I	Single-Family-60' lots	10	20	5	5	10
	Less than 60' lots, Duplex and Townhouse	15	25	10	10	20
	Multi-Resident Apartments	25	30*	10	10	20
Type II	Office, Commercial and Parking Lots	25	35	10	15	20
	Industrial	25	45	10	15	20
	Banks, Service Stations, and Convenience Stores with Gasoline Pumps	25	35**	10	15	1/3 x Frontage

* On 50 MPH streets

** Special approval required by City Traffic Engineer, or designee depending on location, traffic count, speed and angle of driveway



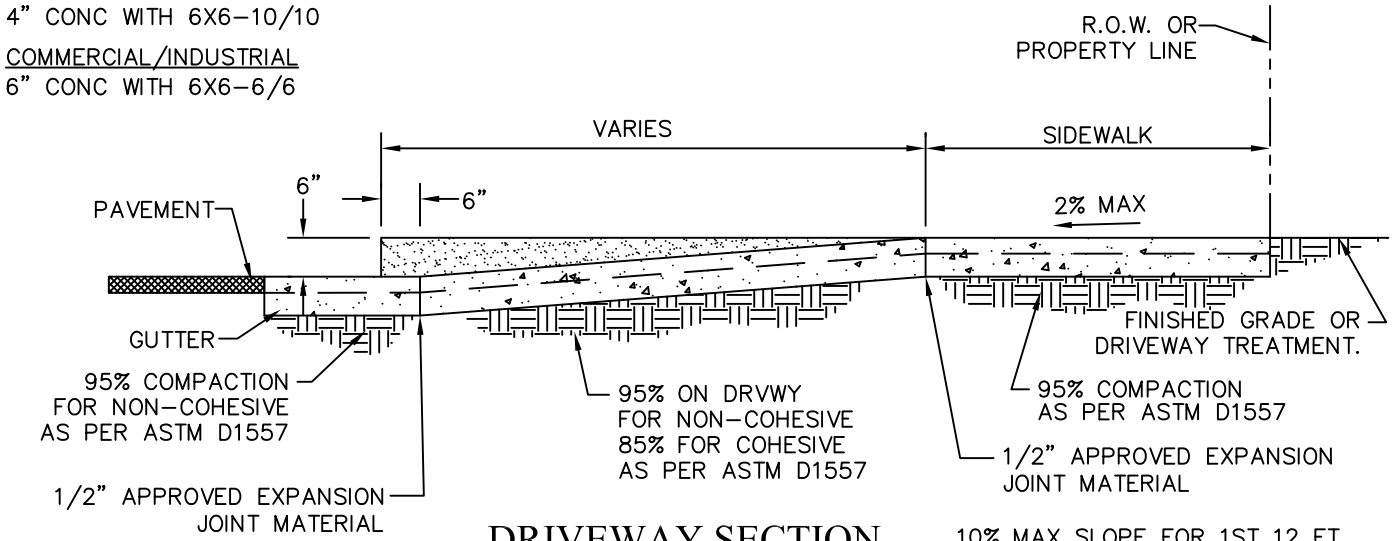
DRIVEWAY PLAN

NTS

(SEE TABLE 6-16)

RESIDENTIAL
6" CONC WITHOUT W.W.F.
4" CONC WITH 6X6-10/10

COMMERCIAL/INDUSTRIAL
6" CONC WITH 6X6-6/6



DRIVEWAY SECTION

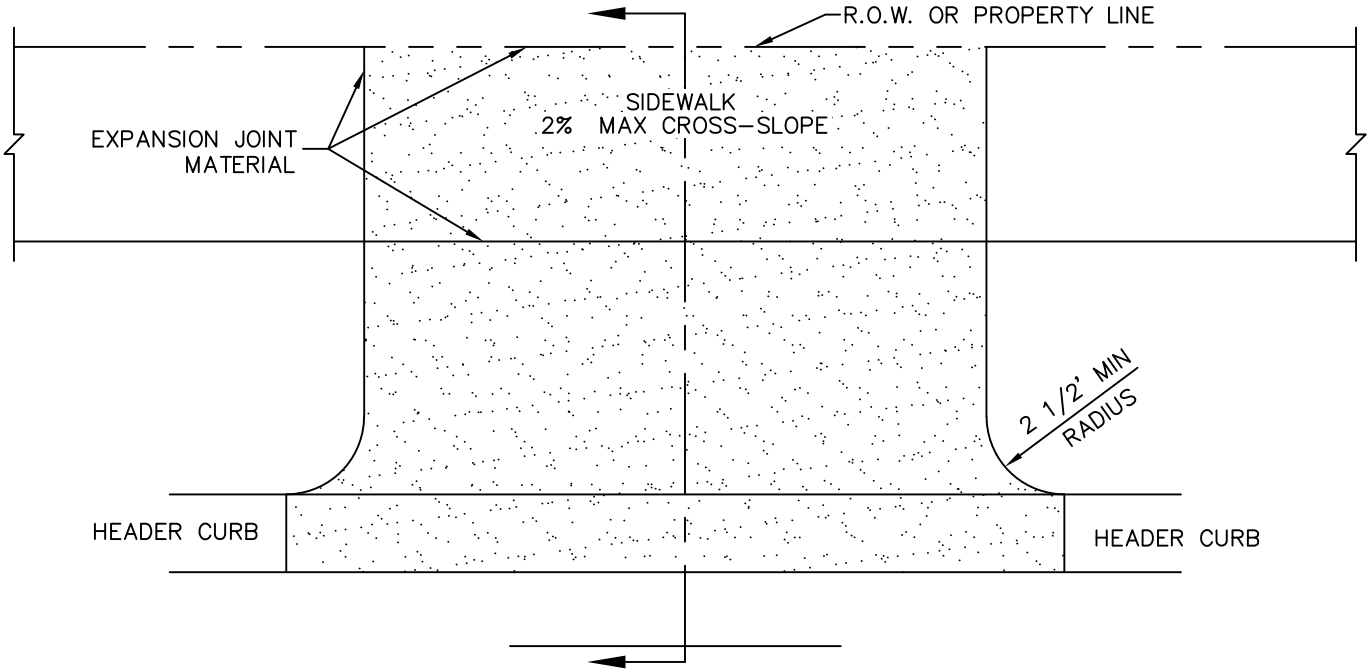
NTS

10% MAX SLOPE FOR 1ST 12 FT,
14% MAX THEREAFTER

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

CONCRETE APRON FOR DRIVEWAYS/ALLEYWAYS
9-2-8



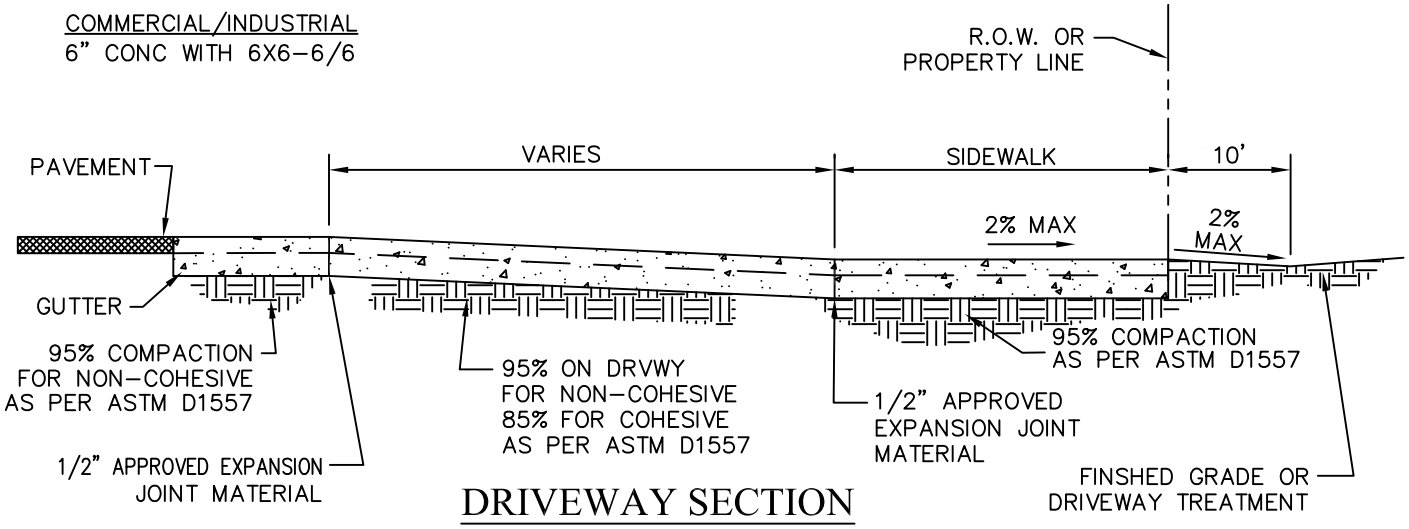
DRIVEWAY PLAN

NTS

(SEE TABLE 6-16)

RESIDENTIAL
6" CONC WITHOUT W.W.F.
4" CONC WITH 6X6-10/10

COMMERCIAL/INDUSTRIAL
6" CONC WITH 6X6-6/6



DRIVEWAY SECTION

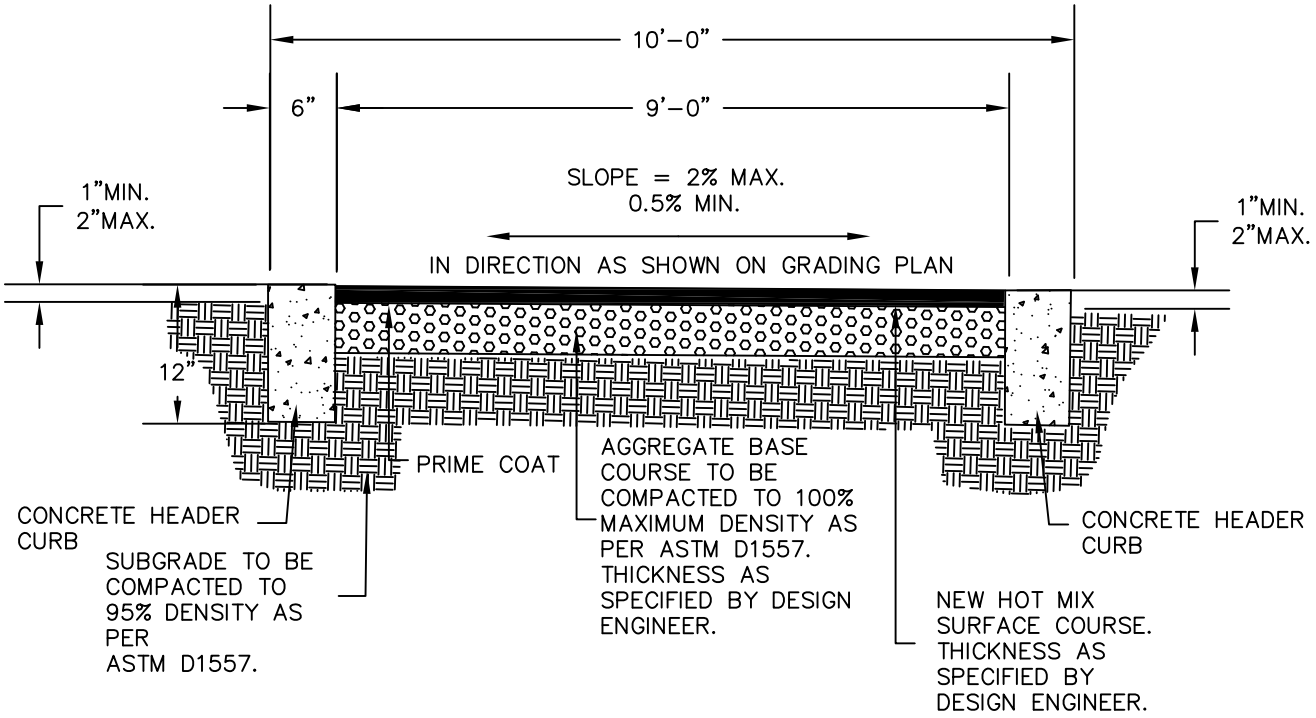
NTS

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

DRIVEWAY WITH ON-SITE PONDING
9-2-9

NOTE: 8' MINIMUM WIDTH ONLY BY APPROVAL OF THE CITY ENGINEER



NOTES:

1. CONCRETE HEADER CURBS SHALL BE 3,600 P.S.I. MIN.
2. DUMMY JOINT REQUIRED AT 10' O.C.
3. 1/2" PREMOLDED BITUMINOUS EXPANSION JOINT (AASHTO M–33) IS REQUIRED FOR ALL CURB RETURNS.
4. SUBGRADE UNDER CURB MUST BE FORMED AND COMPACTED TO 95% ASTM D1557.
5. EXPANSION JOINTS REQUIRED AT 50' O.C. WHEN FORMING FOR CURBS.
6. REFER TO GRADING & DRAINAGE PLAN FOR DIRECTION OF FLOW.

ASPHALTIC WALKWAY/JOGGING/BIKE & HIKE PATH

SCALE: N.T.S.

R304 Curb Ramps and Blended Transitions

R304.1 General

Curb ramps and blended transitions shall comply with R304.

Advisory R304.1 General. There are two types of curb ramps:

- Perpendicular curb ramps have a running slope that cuts through or is built up to the curb at right angles or meets the gutter break at right angles where the curb is curved. On large corner radiuses, it will be necessary to indent the gutter break on one side of the curb ramp in order for the curb ramp to meet the gutter break at right angles.
- Parallel curb ramps have a running slope that is in-line with the direction of sidewalk travel and lower the sidewalk to a level turning space where a turn is made to enter the pedestrian street crossing.

Perpendicular curb ramps can be provided where the sidewalk is at least 3.7 m (12.0 ft) wide. Parallel curb ramps can be provided where the sidewalk is at least 1.2 m (4.0 ft) wide. Parallel and perpendicular curb ramps can be combined. A parallel curb ramp is used to lower the sidewalk to a mid-landing and a short perpendicular curb ramp connects the landing to the street. Combination curb ramps can be provided where the sidewalk is at least 1.8 m (6.0 ft) wide.

Blended transitions are raised pedestrian street crossings, depressed corners, or similar connections between pedestrian access routes at the level of the sidewalk and the level of the pedestrian street crossing that have a grade of 5 percent or less. Blended transitions are suitable for a range of sidewalk conditions.

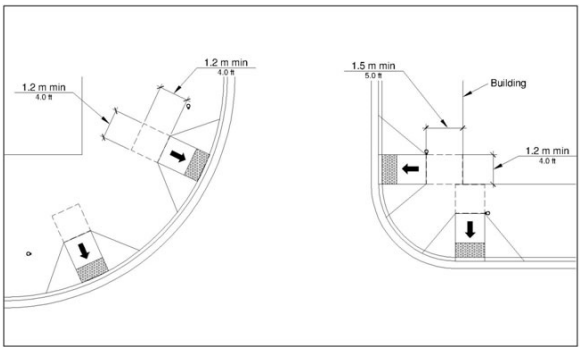
R304.2 Perpendicular Curb Ramps

Perpendicular curb ramps shall comply with R304.2 and R304.5.

R304.2.1 Turning Space

A turning space 1.2 m (4.0 ft) minimum by 1.2 m (4.0 ft) minimum shall be provided at the top of the curb ramp and shall be permitted to overlap other turning spaces and clear spaces. Where the turning space is constrained at the back-of-sidewalk, the turning space shall be 1.2 m (4.0 ft) minimum by 1.5 m (5.0 ft) minimum. The 1.5 m (5.0 ft) dimension shall be provided in the direction of the ramp run.

Figure R304.2.1 Turning Space



R304.2.2 Running Slope

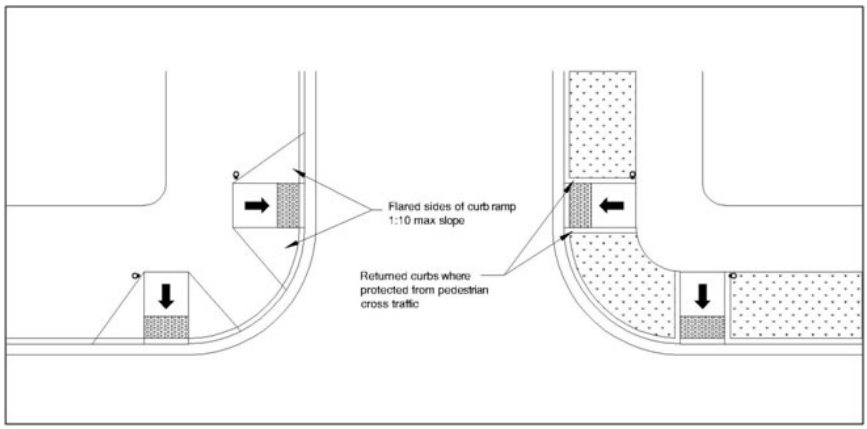
The running slope of the curb ramp shall cut through or shall be built up to the curb at right angles or shall meet the gutter grade break at right angles where the curb is curved. The running slope of the curb ramp shall be 5 percent minimum and 8.3 percent maximum but shall not require the ramp length to exceed 4.5 m (15.0 ft). The running slope of the turning space shall be 2 percent maximum.

U.S. Access Board PROWAG

R304.2.3 Flared Sides

Where a pedestrian circulation path crosses the curb ramp, flared sides shall be sloped 10 percent maximum, measured parallel to the curb line.

Figure 304.2.3 Flared Sides



Advisory R304.2.3 Flared Sides. The flared sides are part of the pedestrian circulation path, but are not part of the pedestrian access route. Curb ramps whose sides have returned curbs provide useful directional cues where they are aligned with the pedestrian street crossing and are protected from cross travel by landscaping, street furniture, chains, fencing, or railings.

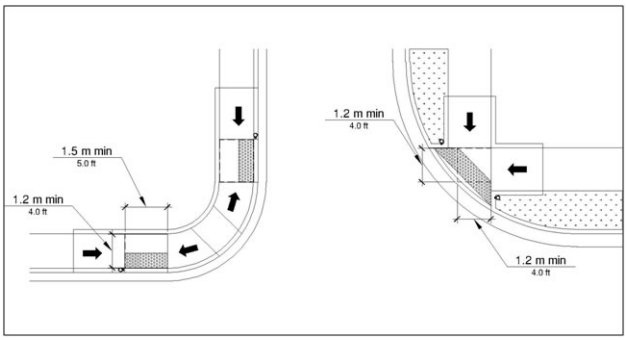
R304.3 Parallel Curb Ramps

Parallel curb ramps shall comply with R304.3 and R304.5.

R304.3.1 Turning Space

A turning space 1.2 m (4.0 ft) minimum by 1.2 m (4.0 ft) minimum shall be provided at the bottom of the curb ramp and shall be permitted to overlap other turning spaces and clear spaces. If the turning space is constrained on 2 or more sides, the turning space shall be 1.2 m (4.0 ft) minimum by 1.5 m (5.0 ft). The 1.5 m (5.0 ft) dimension shall be provided in the direction of the pedestrian street crossing.

Figure R304.3.1 Turning Space



U.S. Access Board PROWAG

R304.3.2 Running Slope

The running slope of the curb ramp shall be in–line with the direction of sidewalk travel. The running slope of the curb ramp shall be 5 percent minimum and 8.3 percent maximum but shall not require the ramp length to exceed 4.5 m (15.0 ft) minimum. The running slope of the turning space shall be 2 percent maximum.

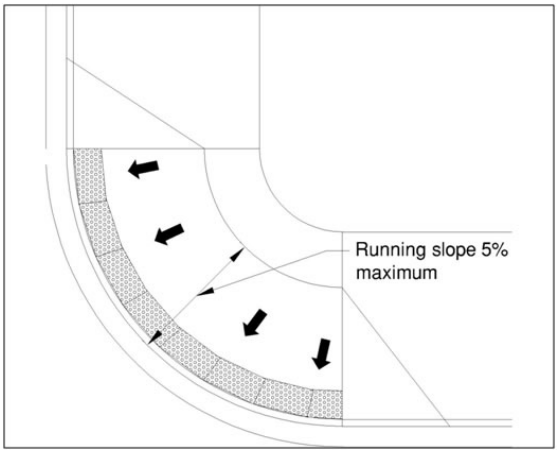
R304.4 Blended Transitions

Blended transitions shall comply with R304.4 and R304.5.

R304.4.1 Running Slope

The running slope of blended transitions shall be 5 percent maximum.

Figure R304.4.1 Running Slope



R304.5 Common Requirements

Curb ramps and blended transitions shall comply with R304.5.

R304.5.1 Width

The width of curb ramps and blended transitions shall comply with 304.5.1.1 or 304.5.1.2, as applicable. If provided, flared sides of curb ramp runs and blended transitions shall be located outside the width of the curb ramp run or blended transition.

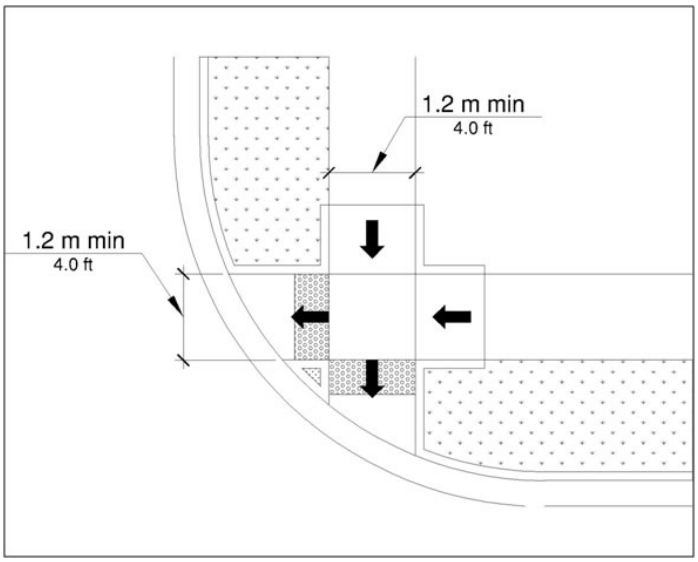
R304.5.1.1 Pedestrian Circulation Paths Other Than Shared Use Paths

In pedestrian circulation paths other than shared use paths, the clear width of curb ramp runs, blended transitions, and turning spaces shall be 1.2 m (4.0 ft) minimum.

R304.5.1.2 Shared Use Paths

In shared use paths, the width of curb ramp runs and blended transitions shall be equal to the width of the shared use path.

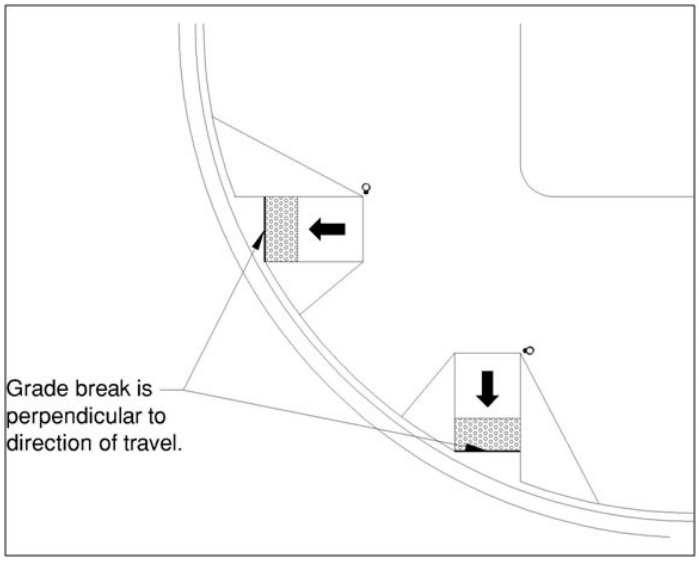
Figure R304.5.1 Width



R304.5.2 Grade Breaks

Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.

Figure R304.5.2 Grade Breaks



R304.5.3 Cross Slope

The cross slope of curb ramps, blended transitions, and turning spaces shall be 2 percent maximum. At pedestrian street crossings without yield or stop control and at midblock pedestrian street crossings, the cross slope shall be permitted to equal the street or highway grade.

Advisory R304.5.3 Cross Slope. Pedestrian street crossings without yield or stop control are crossings where there is no yield or stop sign, or where there is a traffic signal that is designed for the green phase. At pedestrian street crossings without yield or stop control, vehicles can proceed through the intersection without slowing or stopping.

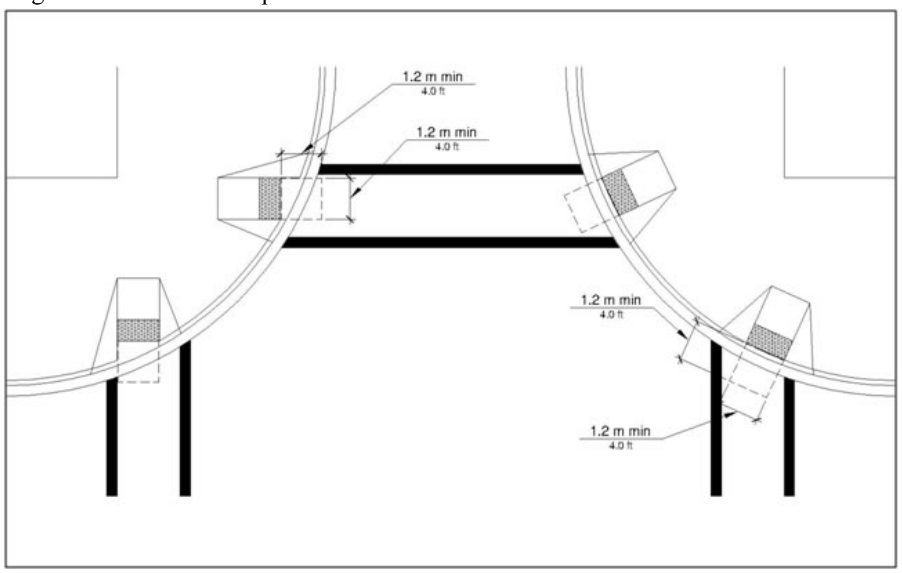
R304.5.4 Counter Slope

The counter slope of the gutter or street at the foot of curb ramp runs, blended transitions, and turning spaces shall be 5 percent maximum.

R304.5.5 Clear Space

Beyond the bottom grade break, a clear space 1.2 m (4.0 ft) minimum by 1.2 m (4.0 ft) minimum shall be provided within the width of the pedestrian street crossing and wholly outside the parallel vehicle travel lane.

Figure R304.5.5 Clear Space



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R305 Detectable Warning Surfaces

R305.1 General

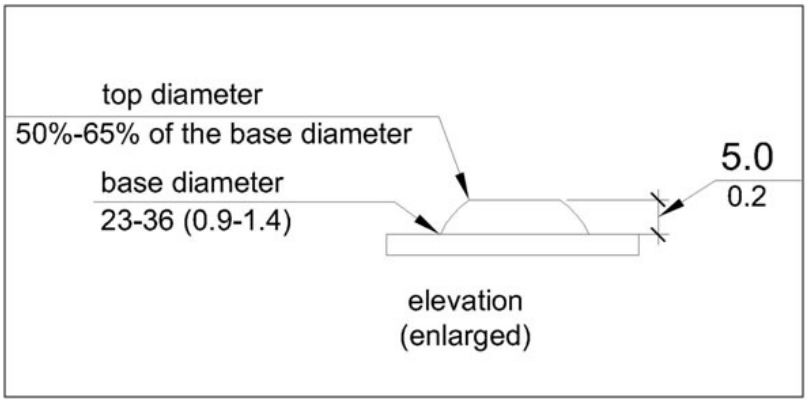
Detectable warning surfaces shall consist of truncated domes aligned in a square or radial grid pattern and shall comply with R305.

Advisory R305.1 Dome Size. Where the truncated domes are arrayed radially, they may differ in diameter and center–to–center spacing within the ranges specified in R305.1.1 and R305.1.2.

R305.1.1 Dome Size

The truncated domes shall have a base diameter of 23 mm (0.9 in) minimum and 36 mm (1.4 in) maximum, a top diameter of 50 percent of the base diameter minimum and 65 percent of the base diameter maximum, and a height of 5 mm (0.2 in).

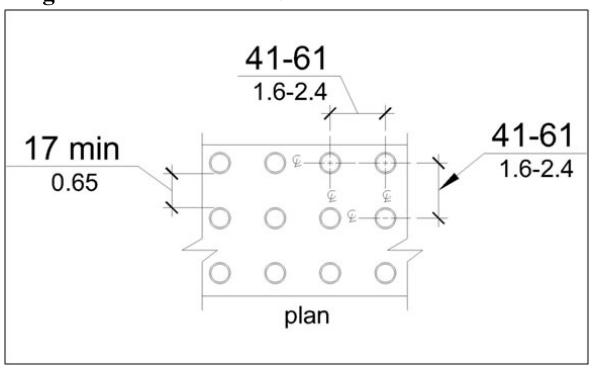
Figure R305.1.1 Dome Size



R305.1.2 Dome Spacing

The truncated domes shall have a center–to–center spacing of 41 mm (1.6 in) minimum and 61 mm (2.4 in) maximum, and a base–to–base spacing of 17 mm (0.65 in) minimum, measured between the most adjacent domes

Figure R305.1.1 Dome Size



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R305.1.3 Contrast

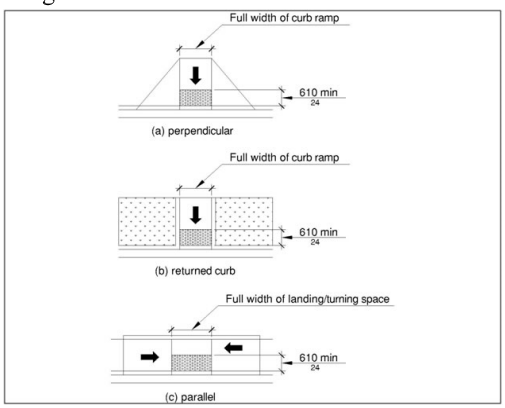
Detectable warning surfaces shall contrast visually with adjacent gutter, street or highway, or pedestrian access route surface, either light–on–dark or dark–on–light.

Advisory R305.1.3 Contrast. Visual contrast may be provided on the full surface of the curb ramp but should not extend to flared sides. Visual contrast also helps pedestrians who use wheelchairs to locate the curb ramp from the other side of the street.

R305.1.4 Size

Detectable warning surfaces shall extend 610 mm (2.0 ft) minimum in the direction of pedestrian travel. At curb ramps and blended transitions, detectable warning surfaces shall extend the full width of the ramp run (excluding any flared sides), blended transition, or turning space. At pedestrian at–grade rail crossings not located within a street or highway, detectable warnings shall extend the full width of the crossing. At boarding platforms for buses and rail vehicles, detectable warning surfaces shall extend the full length of the public use areas of the platform. At boarding and alighting areas at sidewalk or street level transit stops for rail vehicles, detectable warning surfaces shall extend the full length of the transit stop.

Figure R305.1.4 Size



R305.2 Placement

The placement of detectable warning surfaces shall comply with R305.2.

Advisory R305.2 Placement. Some detectable warning products require a concrete border for proper installation. The concrete border should not exceed 51 mm (2 in). Where the back of curb edge is tooled to provide a radius, the border dimension should be measured from the end of the radius.

R305.2.1 Perpendicular Curb Ramps

On perpendicular curb ramps, detectable warning surfaces shall be placed as follows:

1. Where the ends of the bottom grade break are in front of the back of curb, detectable warning surfaces shall be placed at the back of curb.
2. Where the ends of the bottom grade break are behind the back of curb and the distance from either end of the bottom grade brake to the back of curb is 1.5 m (5.0 ft) or less, detectable warning surfaces shall be placed on the ramp run within one dome spacing of the bottom grade break.
3. Where the ends of the bottom grade break are behind the back of curb and the distance from either end of the bottom grade brake to the back of curb is more than 1.5 m (5.0 ft), detectable warning surfaces shall be placed on the lower landing at the back of curb.

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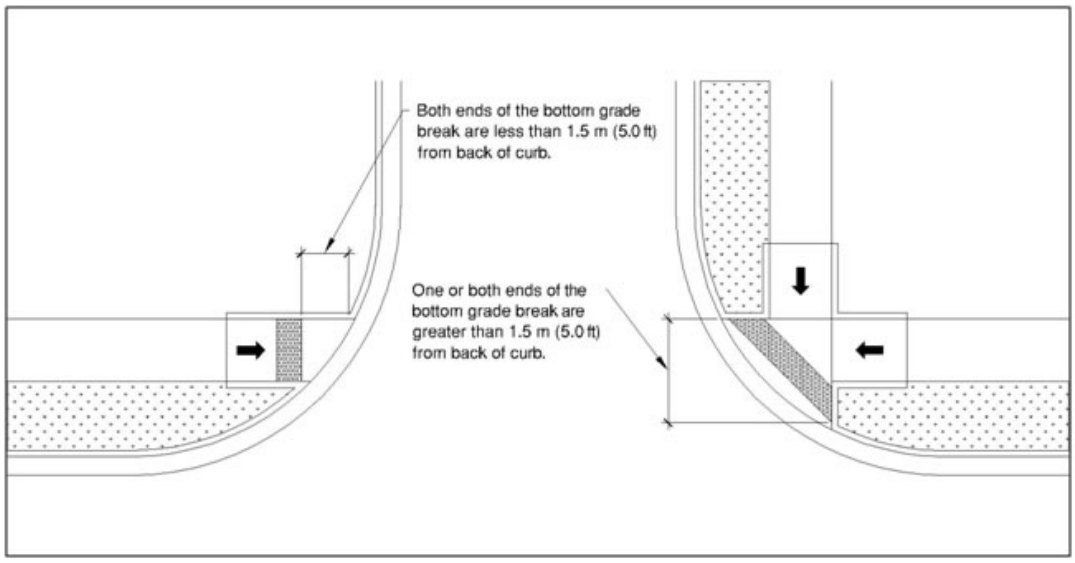
Figure R305.2.1 Perpendicular Curb Ramps

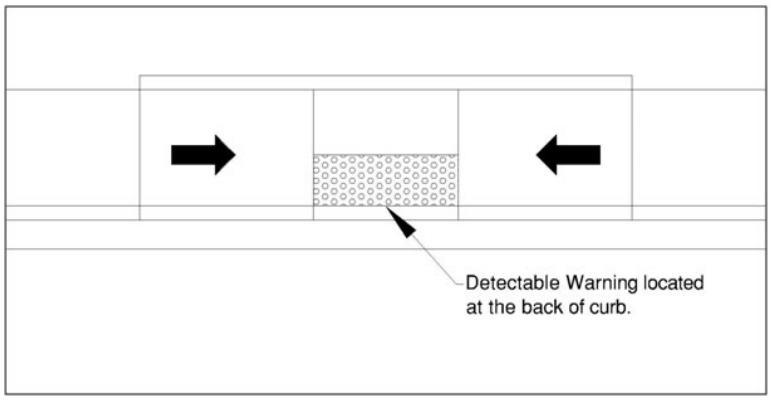


Advisory R305.2.1 Perpendicular Curb Ramps. Detectable warning surfaces are intended to provide a tactile equivalent underfoot of the visible curb line. If detectable warning surfaces are placed too far from the curb line because of a large curb radius, the location may compromise effective crossing. Detectable warning surfaces should not be placed on paving or expansion joints. The rows of truncated domes in detectable warning surfaces should be aligned perpendicular to the grade break between the ramp run and the street so pedestrians who use wheelchairs can "track" between the domes. Where detectable warning surfaces are provided on a surface with a slope that is less than 5 percent, dome orientation is less critical.

R305.2.2 Parallel Curb Ramps

On parallel curb ramps, detectable warning surfaces shall be placed on the turning space at the flush transition between the street and sidewalk.

Figure R305.2.2 Parallel Curb Ramps



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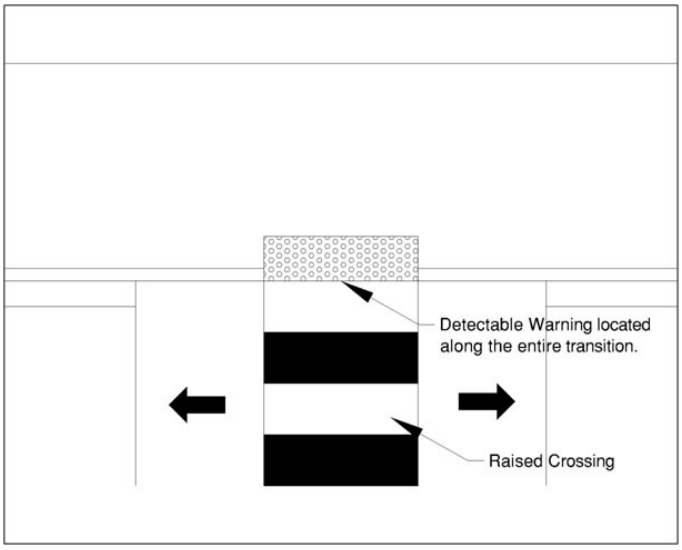
R305.2.3 Blended Transitions

On blended transitions, detectable warning surfaces shall be placed at the back of curb. Where raised pedestrian street crossings, depressed corners, or other level pedestrian street crossings are provided, detectable warning surfaces shall be placed at the flush transition between the street and the sidewalk.

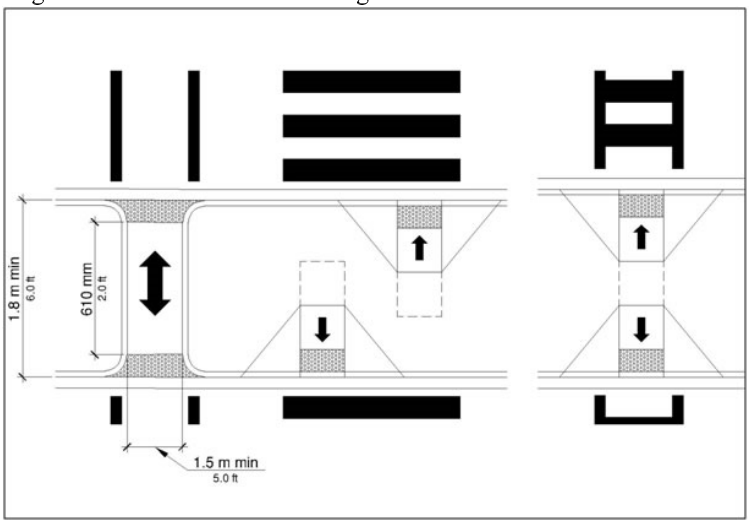
Figure R305.2.3 Blended Transitions



R305.2.4 Pedestrian Refuge Islands

At cut–through pedestrian refuge islands, detectable warning surfaces shall be placed at the edges of the pedestrian island and shall be separated by a 610 mm (2.0 ft) minimum length of surface without detectable warnings.

Figure R 305.2.4 Pedestrian Refuge Island



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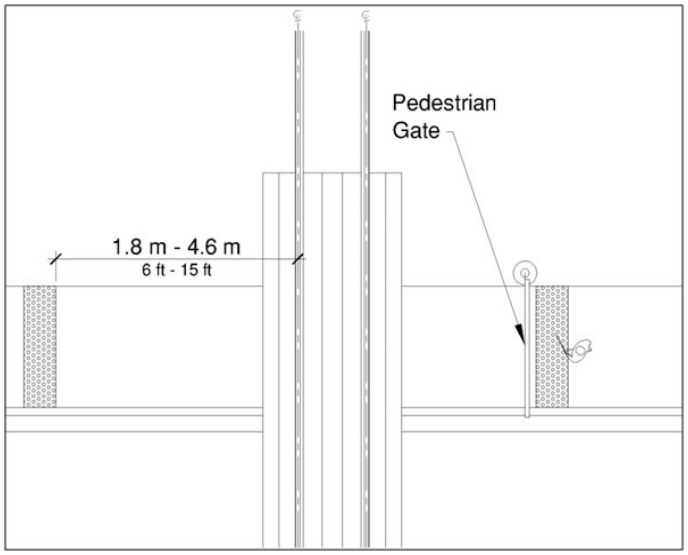
Advisory R305.2.4 Pedestrian Refuge Islands. The edges of cut–through pedestrian refuge islands can provide useful cues to the direction of the crossing.

R305.2.5 Pedestrian At-Grade Rail Crossings

At pedestrian at–grade rail crossings not located within a street or highway, detectable warning surfaces shall be placed on each side of the rail crossing. The edge of the detectable warning surface nearest the rail crossing shall be 1.8 m (6.0 ft) minimum and 4.6 m (15.0 ft) maximum from the centerline of the nearest rail. Where pedestrian gates are provided, detectable warning surfaces shall be placed on the side of the gates opposite the rail.

Figure R305.2.5 Pedestrian At-Grade Rail Crossings



R305.2.6 Boarding Platforms

At boarding platforms for buses and rail vehicles, detectable warning surfaces shall be placed at the boarding edge of the platform.

R305.2.7 Boarding and Alighting Areas

At boarding and alighting areas at sidewalk or street level transit stops for rail vehicles, detectable warning surfaces shall be placed at the side of the boarding and alighting area facing the rail vehicles.

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R306 Pedestrian Street Crossings

R306.1 General

Pedestrian street crossings shall comply with R306.

R306.2 Pedestrian Signal Phase Timing

All pedestrian signal phase timing shall comply with section 4E.06 of the TMUTCD (incorporated by reference, see R104.2 and shall be based on a pedestrian clearance time that is calculated using a pedestrian walking speed of 1.1 m/s (3.5 ft/s) or less.

R306.3 Roundabouts

Where pedestrian facilities are provided at roundabouts, they shall comply with R306.3.

Advisory R306.3 Roundabouts. Pedestrian street crossings at roundabouts can be difficult for pedestrians who are blind or have low vision to identify because the crossings are located off to the side of the pedestrian circulation path around the street or highway. The continuous traffic flow at roundabouts removes many of the audible cues that pedestrians who are blind use to navigate pedestrian street crossings. Water fountains and other features that produce background noise should not be placed in the middle island of a roundabout because pedestrians who are blind use auditory cues to help detect gaps in traffic. Multi–lane pedestrian street crossings at roundabouts involve an increased risk of pedestrian exposure to accident.

R306.3.1 Separation

Where sidewalks are flush against the curb and pedestrian street crossing is not intended, a continuous and detectable edge treatment shall be provided along the street side of the sidewalk. Detectable warning surfaces shall not be used for edge treatment. Where chains, fencing, or railings are used for edge treatment, they shall have a bottom edge 380 mm (15 in) maximum above the sidewalk.

Advisory R306.3.1 Separation. Carefully delineated pedestrian street crossing approaches with plantings or other defined edges provide effective non–visual cues for identifying pedestrian street crossings at roundabouts. European and Australian roundabouts provide a 610 mm (24 inch) width of tactile surface treatment from the centerline of the curb ramp or blended transition across the full width of the sidewalk to provide an underfoot cue for identifying pedestrian street crossings. Detectable warning surfaces should not be used to guide pedestrians who are blind or have low vision to pedestrian street crossings because detectable warning surfaces indicate the flush transition between the sidewalk and the street or highway. Schemes that remove cyclists from the street or highway by means of a ramp that angles from the curb lane to the sidewalk and then provide re–entry by means of a similar ramp beyond pedestrian street crossings can provide false cues to pedestrians who are using the edge of the sidewalk for wayfinding about the location of pedestrian street crossings.

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R306.3.2 Pedestrian Activated Signals

At roundabouts with multi–lane pedestrian street crossings, a pedestrian activated signal complying with R209 shall be provided for each multi–lane segment of each pedestrian street crossing, including the splitter island. Signals shall clearly identify which pedestrian street crossing segment the signal serves.

Advisory R306.3.2 Pedestrian Activated Signals. Roundabouts with single–lane approach and exit legs are not required to provide pedestrian activated signals. Pedestrian activated signals must comply with the requirements for accessible pedestrian signals and pedestrian pushbuttons (see R209). Pedestrian activated signals installed at splitter islands should be carefully located and separated so that signal spillover does not give conflicting information about which pedestrian street crossing has the WALK indication displayed. Pedestrian Hybrid Beacons can be used at roundabouts (see TMUTCD sections 4F.01 through 4F.03). Pedestrian Hybrid Beacons are traffic signals that consist of a yellow signal centered below two horizontally aligned red signals. The signals are normally not illuminated. The signals are initiated only upon pedestrian activation and can be timed to minimize the interruption of traffic. The signals cease operation after the pedestrian clears the crosswalk. When activated by a pedestrian, the following signals are displayed to drivers: a flashing yellow signal, then a steady yellow signal, then two steady red signals during the pedestrian walk interval, and then alternating flashing red signals during the pedestrian clearance interval. The following signals are displayed to pedestrians: a steady upraised hand (symbolizing DON'T WALK) when the flashing or steady yellow signal is operating, then a walking person (symbolizing WALK) when the steady red signals are operating, and then a flashing upraised hand (symbolizing DON'T WALK) when the alternating flashing red signals are operating

R306.4 Channelized Turn Lanes at Roundabouts

At roundabouts with pedestrian street crossings, pedestrian activated signals complying with R209 shall be provided at pedestrian street crossings at multi–lane channelized turn lanes.

R306.5 Channelized Turn Lanes at Other Signalized Intersections

At signalized intersections other than roundabouts with pedestrian street crossings, pedestrian activated signals complying with R209 shall be provided at pedestrian street crossings at multi–lane channelized turn lanes.

R307 Accessible Pedestrian Signals and Pedestrian Pushbuttons

(See R209)

R209 Accessible Pedestrian Signals and Pedestrian Pushbuttons

R209.1 General. Where pedestrian signals are provided at pedestrian street crossings, they shall include accessible pedestrian signals and pedestrian pushbuttons complying with sections 4E.08 through 4E.13 of the MUTCD (incorporated by reference, see R104.2). Operable parts shall comply with R403.

Advisory R209 Accessible Pedestrian Signals and Pedestrian Pushbuttons. An accessible pedestrian signal and pedestrian pushbutton is an integrated device that communicates information about the WALK and DON'T WALK intervals at signalized intersections in non-visual formats (i.e., audible tones and vibrotactile surfaces) to pedestrians who are blind or have low vision.

R209.2 Alterations. Existing pedestrian signals shall comply with R209.1 when the signal controller and software are altered, or the signal head is replaced.

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R308 Transit Stops and Transit Shelters

R308.1 Transit Stops

Transit stops shall comply with R308.1.

Advisory R308.1 Transit Stops. Transit stops should be located so that there is a level and stable surface for boarding vehicles. Locating transit stops at signalized intersections increases the usability for pedestrians with disabilities. Where security bollards are installed at transit stops, they must not obstruct the clear space at boarding and alighting areas or reduce the required clear width at pedestrian access routes (see R210).

R308.1.1 Boarding and Alighting Areas

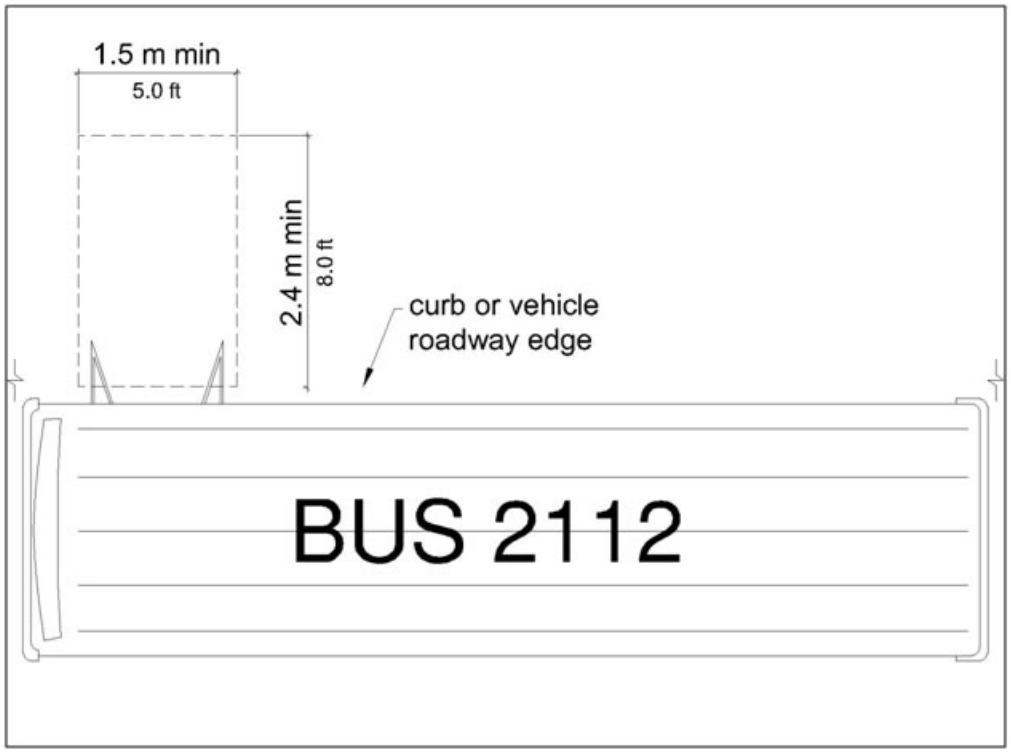
Boarding and alighting areas at sidewalk or street level transit stops shall comply with R308.1.1 and R308.1.3. Where transit stops serve vehicles with more than one car, boarding and alighting areas serving each car shall comply with R308.1.1 and R308.1.3.

Advisory R308.1.1 Boarding and Alighting Areas. Where a transit shelter is provided, the boarding and alighting area can be located either within or outside of the shelter.

R308.1.1.1 Dimensions

Boarding and alighting areas shall provide a clear length of 2.4 m (8.0 ft) minimum, measured perpendicular to the curb or street or highway edge, and a clear width of 1.5 m (5.0 ft) minimum, measured parallel to the street or highway.

Figure R308.1.1.1 Dimensions



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R308.1.1.2 Grade

Parallel to the street or highway, the grade of boarding and alighting areas shall be the same as the street or highway, to the extent practicable. Perpendicular to the street or highway, the grade of boarding and alighting areas shall not be steeper than 2 percent.

R308.1.2 Boarding Platforms

Boarding platforms at transit stops shall comply with R308.1.2 and R308.1.3.

R308.1.2.1 Platform and Vehicle Floor Coordination

Boarding platforms shall be positioned to coordinate with vehicles in accordance with the applicable requirements in 49 CFR parts 37 and 38.

Advisory R308.1.2.1 Platform and Vehicle Floor Coordination. The Department of Transportation regulations (49 CFR parts 37 and 38) require the height of the vehicle floor and the station platform to be coordinated so as to minimize the vertical and horizontal gaps.

R308.1.2.2 Slope

Boarding platforms shall not exceed a slope of 2 percent in any direction. Where boarding platforms serve vehicles operating on existing track or existing street or highway, the slope of the platform parallel to the track or the street or highway is permitted to be equal to the grade of the track or street or highway.

R308.1.3 Common Requirements

Boarding and alighting areas and boarding platforms shall comply with R308.1.3.

R308.1.3.1 Surfaces

The surfaces of boarding and alighting areas and boarding platforms shall comply with R302.7.

Advisory R308.1.3.1 Surfaces. Detectable warning surfaces are required at boarding and alighting areas for rail vehicles and at boarding platforms for buses and rail vehicles (see R208).

R308.1.3.2 Connection

Boarding and alighting areas and boarding platforms shall be connected to streets, sidewalks, or pedestrian circulation paths by pedestrian access routes complying with R302.

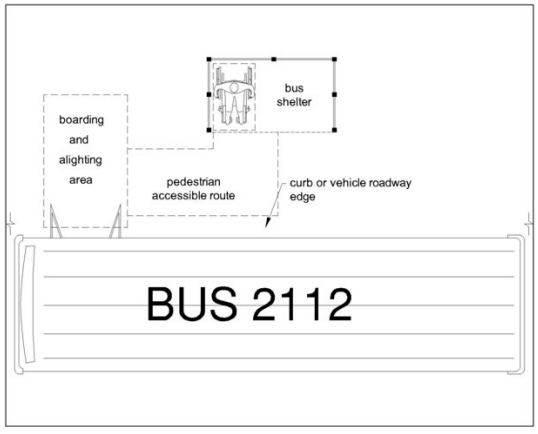

Figure R308.1.3.2 Connection

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R210 Protruding Objects.
R210.1 General. Protruding objects shall comply with the applicable requirements in R210.

Advisory R210.1 General. Protruding objects can be hazardous for pedestrians, especially pedestrians who are blind or have low vision. The requirements for protruding objects in R402 apply across the entire width of the pedestrian circulation path, not just the pedestrian access route. In addition, objects must not reduce the clear width required for pedestrian access routes. State and local governments must comply with the requirements for protruding objects and maintain the clear width of pedestrian access routes when installing or permitting the installation of street furniture on sidewalks, including street lights, utility poles and equipment cabinets, sign posts and signs, parking meters, trash receptacles, public telephones, mailboxes, newspaper vending machines, benches, transit shelters, kiosks, bicycle racks, planters and planted trees, and street sculptures. The American Association of State Highway and Transportation Officials (AASHTO) recommends that local governments use an encroachment permit process to regulate the use of sidewalks by private entities for activities such as outdoor dining, vending carts and stands, and street fairs in order to control protruding objects and maintain the clear width of pedestrian access routes. See AASHTO, Guide for the Planning, Design, and Operation of Pedestrian Facilities (2004), section 3.2.3. R210.2 Pedestrian Circulation Paths Other Than Shared Use Paths. Objects along or overhanging any portion of a pedestrian circulation path other than a shared use path shall comply with R402 and shall not reduce the clear width required for pedestrian access routes.
R210.3 Shared Use Paths. Objects shall not overhang or protrude into any portion of a shared use path at or below 2.4 m (8.0 ft) measured from the finish surface.

R308.2 Transit Shelters

Transit shelters shall be connected by pedestrian access routes complying with R302 to boarding and alighting areas or boarding platforms complying with R308.1. Transit shelters shall provide a minimum clear space complying with R404 entirely within the shelter. Where seating is provided within transit shelters, the clear space shall be located either at one end of a seat or shall not overlap the area within 460 mm (1.5 ft) from the front edge of the seat. Environmental controls within transit shelters shall be proximity–actuated. Protruding objects within transit shelters shall comply with R402.

Advisory R308.2 Transit Shelters. The clear space must be located entirely within the transit shelter and not interfere with other persons using the seating.

R309 On-Street Parking Spaces

R309.1 General

On–street parking spaces shall comply with R309.

Advisory R309.1 General. R214 specifies how many accessible parking spaces must be provided on the block perimeter where on–street parking is marked or metered. Accessible parking spaces must be identified by signs displaying the International Symbol of Accessibility (see R211.3 and R411). Accessible parking spaces should be located where the street has the least crown and grade and close to key destinations.

R211.3 Transit Signs. Signs that identify the routes served by transit stops shall comply with R410.

Advisory R211.3 Transit Signs. Transit schedules, timetables, and maps are not required to comply with R410.

R411 International Symbol of Accessibility. The International Symbol of Accessibility shall comply with Figure 411. The symbol and its background shall have a non–glare finish. The symbol shall contrast with its background with either a light symbol on a dark background or a dark symbol on a light background.

R309.2 Parallel Parking Spaces

Parallel parking spaces shall comply with R309.2.

Advisory R309.2 Parallel Parking Spaces. The sidewalk adjacent to accessible parallel parking spaces should be free of signs, street furniture, and other obstructions to permit deployment of a van side–lift or ramp or the vehicle occupant to transfer to a wheelchair or scooter. Accessible parallel parking spaces located at the end of the block face are usable by vans that have rear lifts and cars that have scooter platforms.

R309.2.1 Wide Sidewalks

Where the width of the adjacent sidewalk or available right–of–way exceeds 4.3 m (14.0 ft), an access aisle 1.5 m (5.0 ft) wide minimum shall be provided at street level the full length of the parking space and shall connect to a pedestrian access route. The access aisle shall comply with R302.7 and shall not encroach on the vehicular travel lane.

Figure R309.2.1 Wide Sidewalks

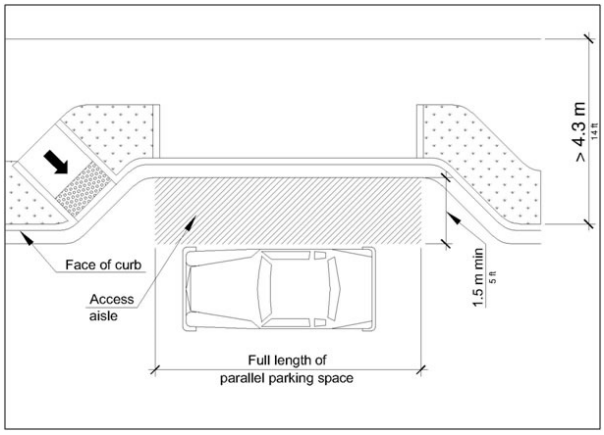

Figure R411
International Symbol of Accessibility

Advisory R309.2.1 Wide Sidewalks. Vehicles may park at the curb or at the parking lane boundary and use the space required by R309.2.1 on either the driver or passenger side of the vehicle to serve as the access aisle.

R309.2.1.1 Alterations

In alterations where the street or sidewalk adjacent to the parking spaces is not altered, an access aisle shall not be required provided the parking spaces are located at the end of the block face.

R309.2.2 Narrow Sidewalks

An access aisle is not required where the width of the adjacent sidewalk or the available right–of–way is less than or equal to 4.3 m (14.0 ft). When an access aisle is not provided, the parking spaces shall be located at the end of the block face.

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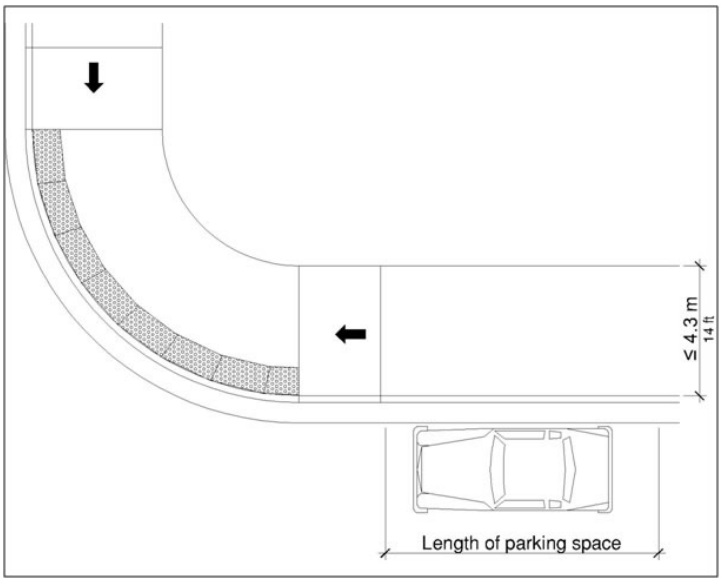
Figure R309.2.2 Narrow Sidewalks

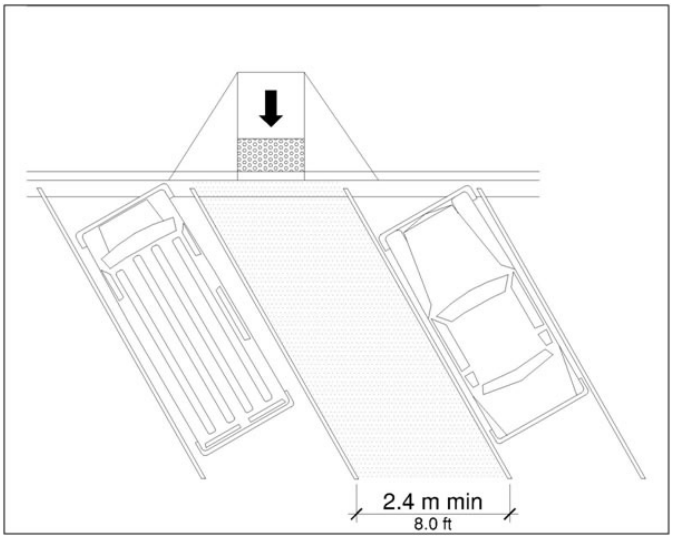


Advisory R309.2.2 Narrow Sidewalks. Vehicle lifts or ramps can be deployed on a 2.4 m (8.0 ft) sidewalk if there are no obstructions.

R309.3 Perpendicular or Angled Parking Spaces

Where perpendicular or angled parking is provided, an access aisle 2.4 m (8.0 ft) wide minimum shall be provided at street level the full length of the parking space and shall connect to a pedestrian access route. The access aisle shall comply with R302.7 and shall be marked so as to discourage parking in the access aisle. Two parking spaces are permitted to share a common access aisle.

Figure R309.3 Perpendicular or Angled Parking Spaces



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R302.7 Surfaces. The surfaces of pedestrian access routes and elements and spaces required to comply with R302.7 that connect to pedestrian access routes shall be firm, stable, and slip resistant and shall comply with R302.7.

Advisory R302.7 Surfaces. The surface requirements in R302.7 apply to sidewalks and other pedestrian circulation paths, pedestrian street crossings and at-grade rail crossings, pedestrian overpasses and underpasses and similar structures, and curb ramps and blended transitions (see R302.2). The surface requirements in R302.7 also apply to surfaces at the following accessible elements and spaces that connect to pedestrian access routes:

- Clear spaces (see R404.2), including clear spaces at operable parts (see R403.2) such as accessible pedestrian signals and pedestrian pushbuttons (see R209), clear spaces at street furniture such as benches (see R212.6), and clear spaces within transit shelters (see R308.2);
- Boarding and alighting areas and boarding platforms at transit stops (see R308.1.3.1);
- Access aisles at accessible parking spaces (see R309.2.1 and R309.3) and accessible passenger loading zones (see R310.3.4); and ramp runs and landings (see R407.7).

Advisory R309.3 Perpendicular or Angled Parking Spaces. Perpendicular and angled parking spaces permit the deployment of a van side–lift or ramp.

R309.4 Curb Ramps or Blended Transitions

Curb ramps or blended transitions complying with R304 shall connect the access aisle to the pedestrian access route. Curb ramps shall not be located within the access aisle.

Advisory R309.4 Curb Ramps or Blended Transitions. At parallel parking spaces, curb ramps and blended transitions should be located so that a van side–lift or ramp can be deployed to the sidewalk and the vehicle occupant can transfer to a wheelchair or scooter. Parking spaces at the end of the block face can be served by curb ramps or blended transitions at the pedestrian street crossing. Detectable warning surfaces are not required on curb ramps and blended transitions that connect the access aisle to the sidewalk, including where the sidewalk is at the same level as the parking spaces, unless the curb ramps and blended transitions also serve pedestrian street crossings (see R208).

R309.5 Parking Meters and Parking Pay Stations

Parking meters and parking pay stations that serve accessible parking spaces shall comply with R309.5. Operable parts shall comply with R403.

R309.5.1 Location

At accessible parallel parking spaces, parking meters shall be located at the head or foot of the parking space.

Advisory R309.5.1 Location. Locating parking meters at the head or foot of the parking space permits deployment of a van side–lift or ramp or the vehicle occupant to transfer to a wheelchair or scooter.

R309.5.2 Displays and Information

Displays and information shall be visible from a point located 1.0 m (3.3 ft) maximum above the center of the clear space in front of the parking meter or parking pay station.

R208 Detectable Warning Surfaces

R208.1 Where Required. Detectable warning surfaces complying with R305 shall be provided at the following locations on pedestrian access routes and at transit stops:

1. Curb ramps and blended transitions at pedestrian street crossings;
2. Pedestrian refuge islands;
3. Pedestrian at-grade rail crossings not located within a street or highway;
4. Boarding platforms at transit stops for buses and rail vehicles where the edges of the boarding platform are not protected by screens or guards; and
5. Boarding and alighting areas at sidewalk or street level transit stops for rail vehicles where the side of the boarding and alighting areas facing the rail vehicles is not protected by screens or guards.

Advisory R208.1 Where Required. On pedestrian access routes, detectable warning surfaces indicate the boundary between pedestrian and vehicular routes where there is a flush rather than a curbed connection. Detectable warning surfaces should not be provided at crossings of residential driveways since the pedestrian right-of-way continues across residential driveway aprons. However, where commercial driveways are provided with yield or stop control, detectable warning surfaces should be provided at the junction between the pedestrian route and the vehicular route. Where pedestrian at-grade rail crossings are located within a street or highway, detectable warning surfaces at the curb ramps or blended transitions make a second set of detectable warning surfaces at the rail crossing unnecessary.

Detectable warning surfaces are not intended to provide wayfinding for pedestrians who are blind or have low vision. Wayfinding can be made easier by:

- Sidewalks that provide a clear path free of street furniture;
- Visual contrast between walking and non-walking areas (e.g., planted borders);
- Route edges that are clear and detectable by cane;
- Direct pedestrian street crossings and curb ramps that are in-line with direction of travel;
- Small corner radiuses that permit pedestrian street crossings to be as short and direct as possible;
- Orthogonal intersections that facilitate navigation using parallel and perpendicular vehicle sound cues;
- and barriers where pedestrian travel or crossing is not permitted.

R208.2 Where Not Required. Detectable warning surfaces are not required at pedestrian refuge islands that are cut-through at street level and are less than 1.8 meters (6.0 ft) in length in the direction of pedestrian travel.

Advisory R208.2 Where Not Required. Detectable warning surfaces are not required at cut-through pedestrian refuge islands that are less than 1.8 meters (6.0 ft) in length because detectable warning surfaces must extend 610 millimeters (2.0 ft) minimum on each side of the island and be separated by 610 millimeters (2.0 ft) minimum length of island without detectable warning surfaces (see R305.1.4 and R305.2.4). Installing detectable warning surfaces at cut-through pedestrian islands that are less than 1.8 meters (6.0 ft) in length would compromise the effectiveness of detectable warning surfaces. Where a cut-through pedestrian refuge island is less than 1.8 m (6.0 ft) in length and the pedestrian street crossing is signalized, the signal should be timed for a complete crossing of the street.

R310 Passenger Loading Zones

R310.1 General

Passenger loading zones shall comply with R310.

Advisory R310.1 General. Accessible passenger loading zones must be identified by signs displaying the International Symbol of Accessibility (see R211.3 and R411).

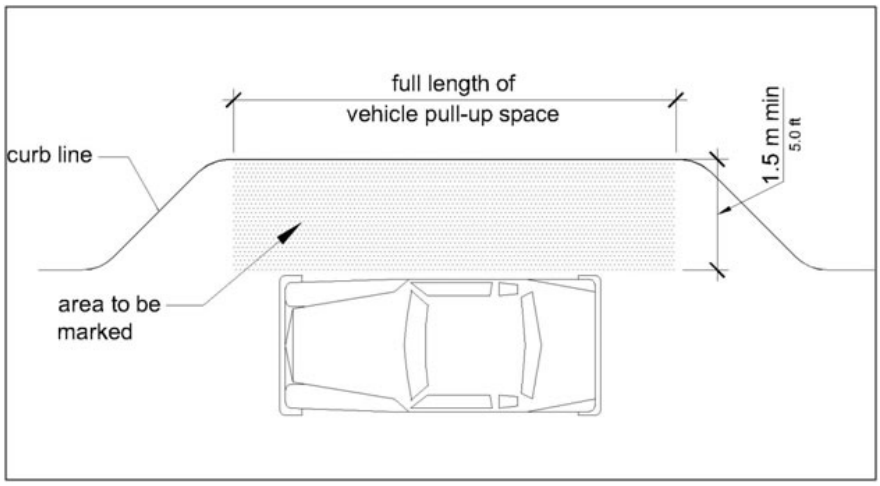
R310.2 Vehicle Pull-Up Space

Passenger loading zones shall provide a vehicular pull–up space 2.4 m (8.0 ft) wide minimum and 6.1 m (20.0 ft) long minimum.

R310.3 Access Aisle

Passenger loading zones shall provide access aisles complying with R310.3 adjacent to the vehicle pull–up space. Access aisles shall be at the same level as the vehicle pull–up space they serve and shall not overlap the vehicular travel lane. Curb ramps or blended transitions complying with R304 shall connect the access aisle to the pedestrian access route. Curb ramps are not permitted within the access aisle.

Figure R310.3 Access Aisle



R310.3.1 Width

Access aisles serving vehicle pull–up spaces shall be 1.5 m (5.0 ft) wide minimum.

R310.3.2 Length

Access aisles shall extend the full length of the vehicle pull–up spaces they serve.

R310.3.3 Marking

Access aisles shall be marked so as to discourage parking in them.

R310.3.4 Surfaces

Access aisle surfaces shall comply with R302.7.

SECTION 3

SECTION 3

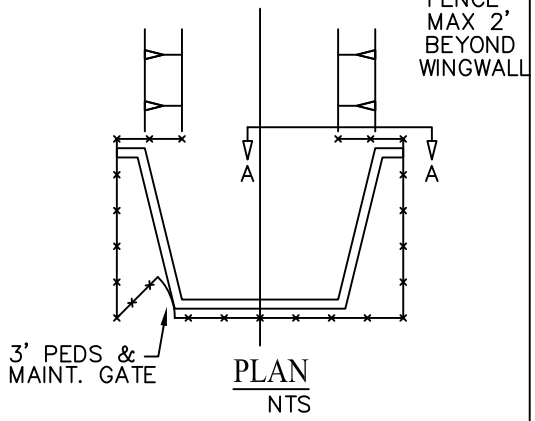
FENCING

THE CITY OF EL PASO TEXAS

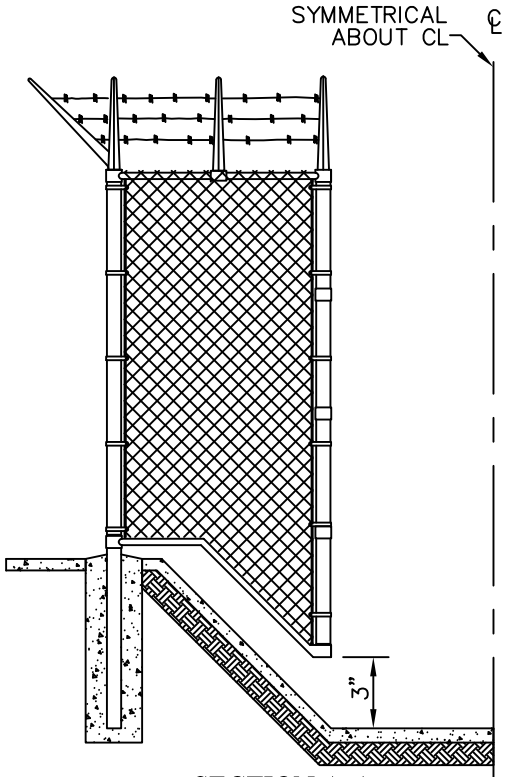
STREET DESIGN MANUAL (FENCING)

TITLE 19 - SUBDIVISION ORDINANCE

CHAINLINK
STANDARD DETAILS
9-3-1



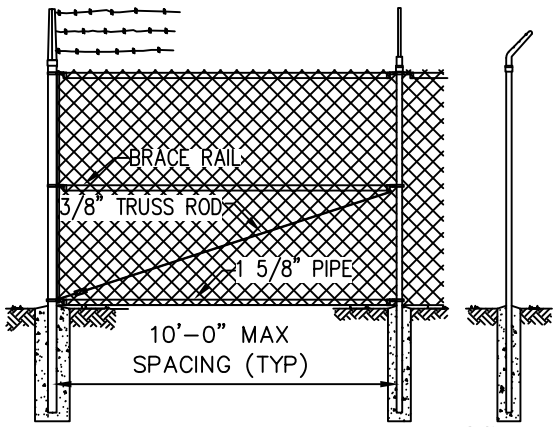
PLAN
NTS



SECTION A-A
NTS

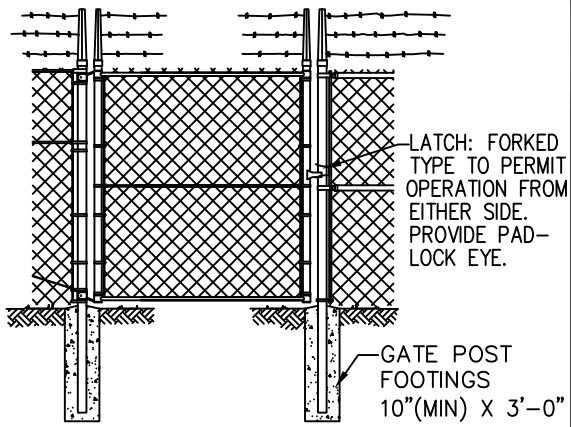
SPECIAL APPLICATION OF FENCING AROUND USBR FACILITIES. DIMENSIONS WILL BE DETERMINED BY FIELD CONDITIONS.

1. ALL PIPE TO BE SCHEDULE 40 GALVANIZED. CONSULT AMERICAN FENCE CO., U.S. STEEL OR APPROVED EQUAL DATA FOR SPECIFICATIONS

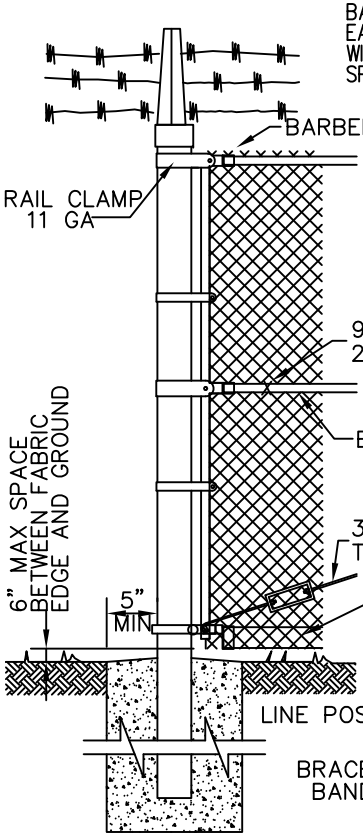


CORNER POST

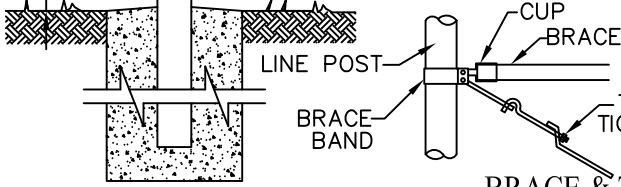
LINE POST



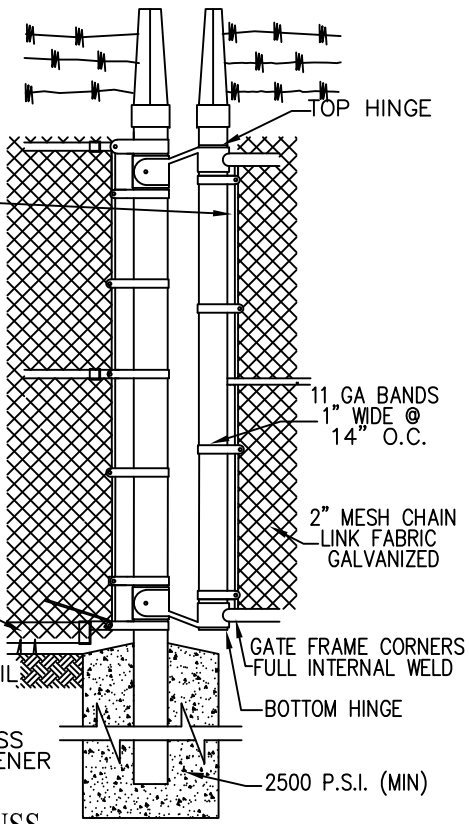
GATE



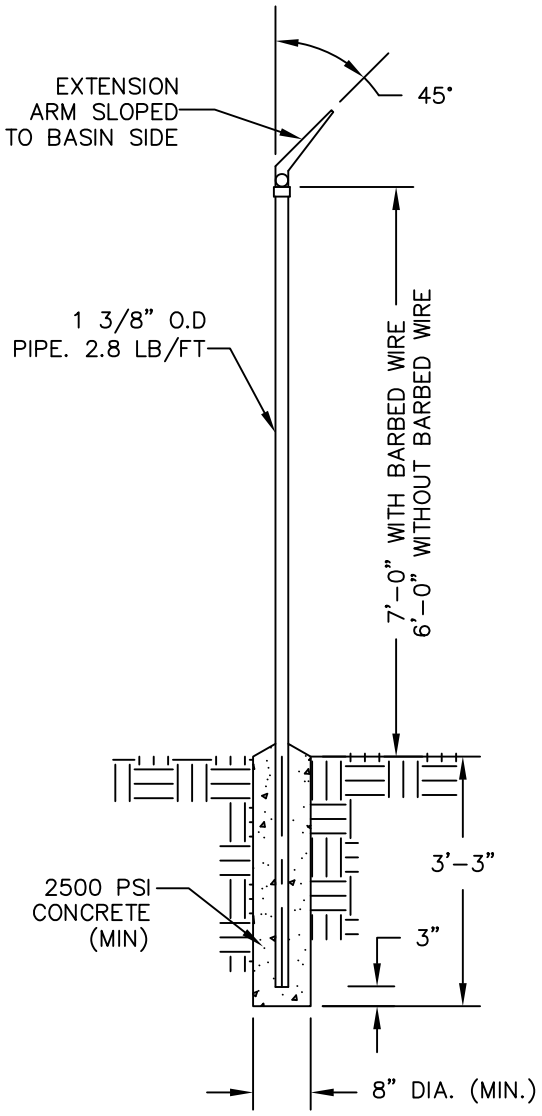
CORNER POST



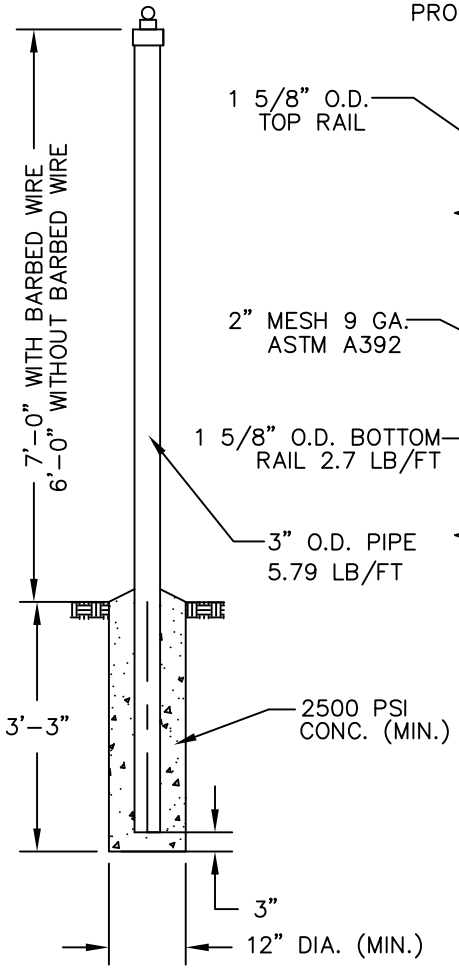
BRACE & TRUSS CONNECTION



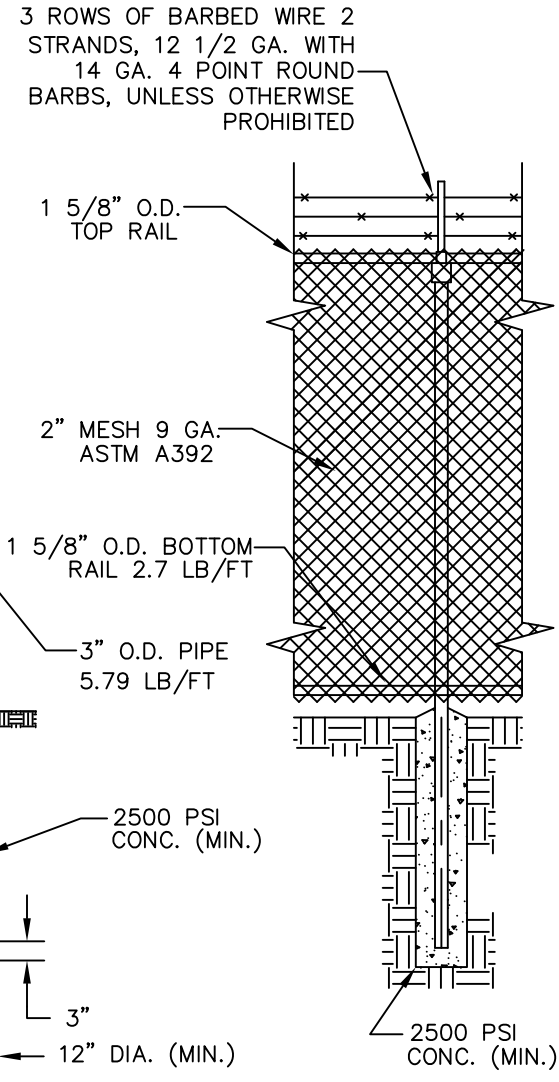
GATE DETAIL



LINE POST
NTS



END POST & GATE POST
NTS



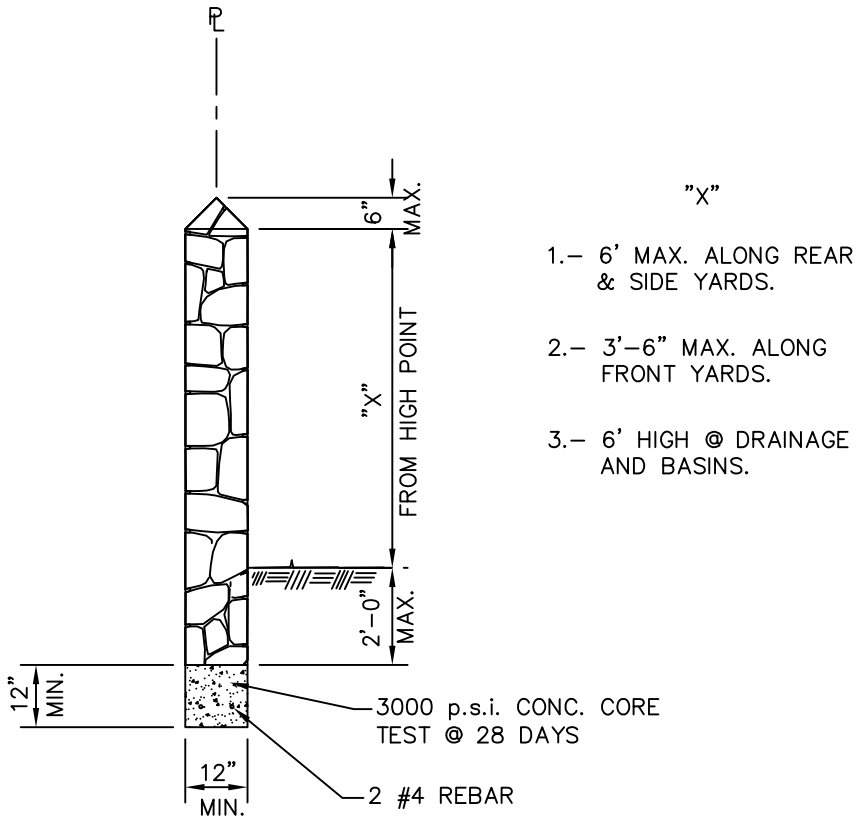
LINE POST W/MESH
NTS

NOTE : ALL PIPE TO BE SCHEDULE 40

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL (FENCING)

CHAINLINK FENCE
POSTS
9-3-2



"X"

1.– 6' MAX. ALONG REAR & SIDE YARDS.

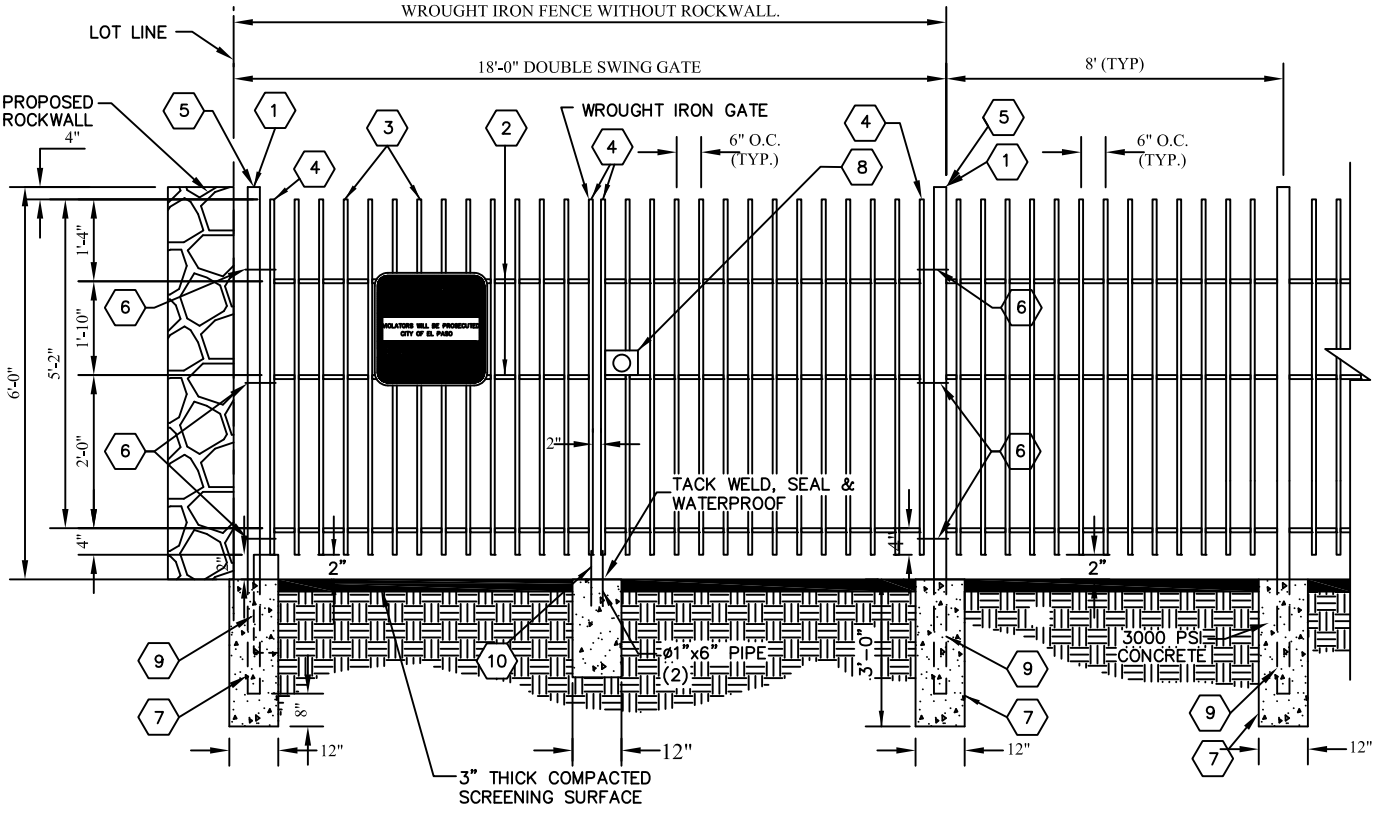
2.– 3'–6" MAX. ALONG FRONT YARDS.

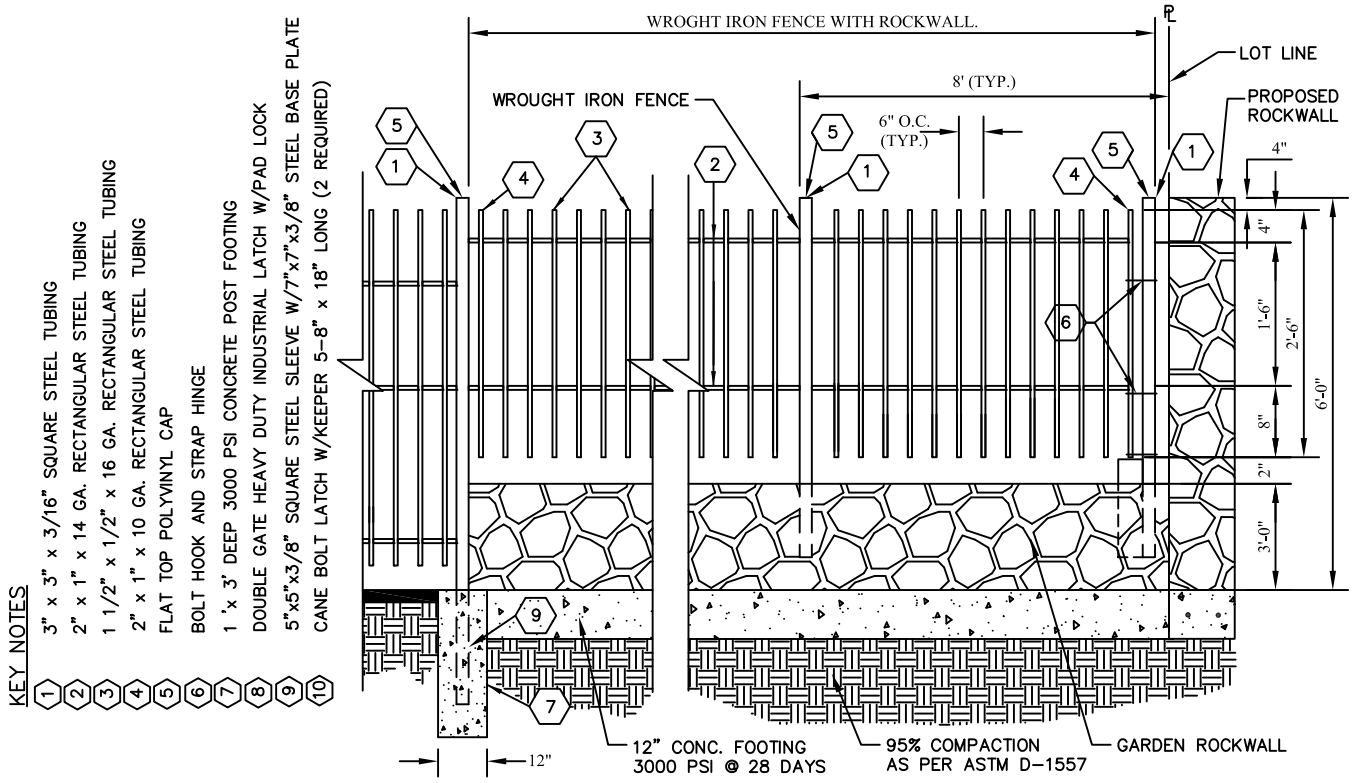
3.– 6' HIGH @ DRAINAGE AND BASINS.

ROCKWALL
ADJACENT TO RESIDENTIAL LOTS

NOTES:

1. STONE FOR ROCKWALL SHALL BE AS NEARLY UNIFORM IN SECTIONS AS IS PRACTICABLE. THE STONE SHALL BE DENSE AND RESISTANT TO AIR AND WATER.
2. MORTAR SHALL BE TYPE "S" 1800 P.S.I. AS PER ASTM C270
3. MASONRY WALLS OVER SIX (6) FEET IN HEIGHT AND THOSE USED FOR EARTH RETENTION OVER TWO (2) FEET SHALL BE DESIGNED AS STRUCTURAL WALLS.
4. WALLS ADJACENT TO PONDING AREAS OR DRAINAGE DITCHES MAY BE CONSTRUCTED OF BRICK OR CINDER BLOCK AND SHALL NOT BE LESS THAN SIX (6) FEET HIGH.
5. ROCKWALL MORTAR JOINTS SHALL NOT EXCEED TWO (2) INCHES.
6. PROVIDE ONE (1) INCH EXPANSION JOINTS AT EVERY 100 FEET.
7. ALL STONE SHALL BE THOROUGHLY SOAKED BEFORE BEING PLACED.
8. NO RIVER ROCK SHALL BE ALLOWED FOR ROCKWALLS.





KEY NOTES

1. 3" x 3" x 3/16" SQUARE STEEL TUBING
2. 2" x 1" x 14 GA. RECTANGULAR STEEL TUBING
3. 1 1/2" x 1/2" x 16 GA. RECTANGULAR STEEL TUBING
4. 2" x 1" x 10 GA. RECTANGULAR STEEL TUBING
5. FLAT TOP POLYVINYL CAP
6. BOLT HOOK AND STRAP HINGE
7. 1 '-x 3' DEEP 3000 PSI CONCRETE POST FOOTING
8. DOUBLE GATE HEAVY DUTY INDUSTRIAL LATCH W/PAD LOCK
9. 5"x5"x3/8" SQUARE STEEL SLEEVE W/7"x7"x3/8" STEEL BASE PLATE
10. CANE BOLT LATCH W/KEEPER 5-8" x 18" LONG (2 REQUIRED)

WROUGHT IRON FENCE N.T.S.

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL (FENCING)

WROUGHT IRON FENCE AND GATE DETAIL 4-4

SECTION 4

SECTION 4

SIGNAGE AND SIGNALIZATION

SPECIFICATIONS FOR ALUMINUM SIGN BLANKS

THESE SPECIFICATIONS DESCRIBE DETAILS AND MINIMUM REQUIREMENTS FOR ALUMINUM SIGN BLANKS, TO WHICH REFLECTIVE SHEETING WILL BE APPLIED.

1. ALL MATERIALS SHALL BE NEW AND UNWEATHERED AND SHALL BE OF DOMESTIC ORIGIN, MILLED, ROLLED, AND FINISHED IN DOMESTIC MILLS.

2. SIGN BLANKS SHALL BE 0.080 GAUGE ALODIZED-TREATED ALUMINUM, 5052-H38 ALLOY, FREE OF BURRS, CORROSION, WHITE RUST, AND DIRT, SUITABLE FOR APPLICATION OF REFLECTIVE SHEETING WITHOUT FURTHER PREPERATION.

3. EDGES OF BLANKS SHALL BE CUT TRUE AND SQUARE. CORNER RADII, HOLE DIAMETERS AND HOLE LOCATIONS SHALL BE AS DESCRIBED IN THE ALUMINUM SIGN BLANK BID D.H.T. STANDARDS.

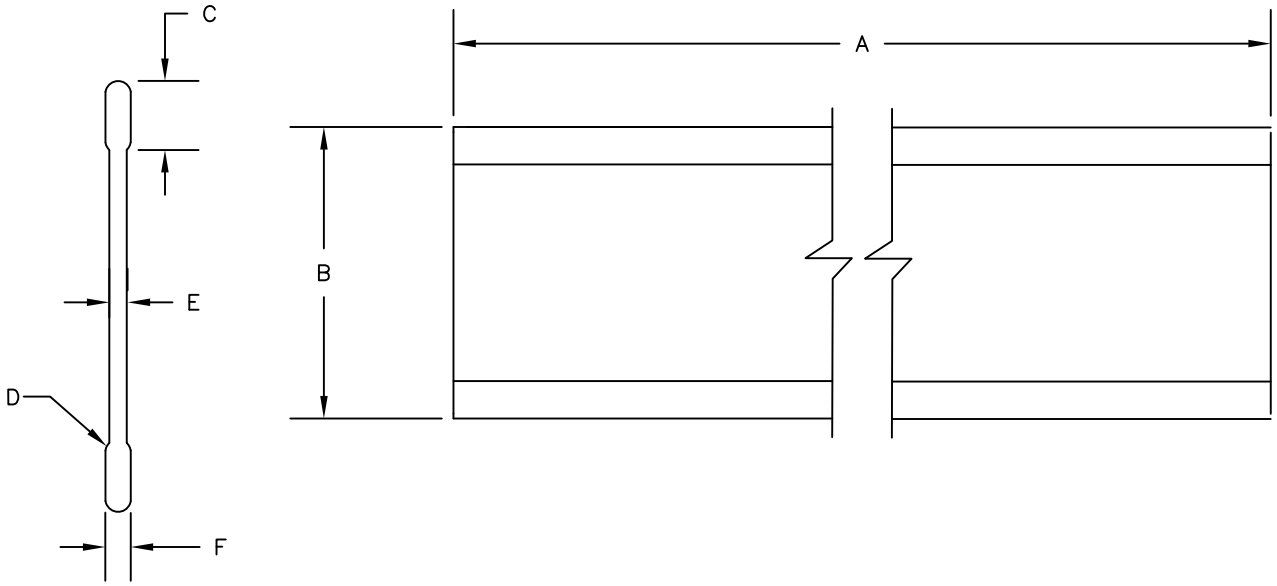
4. ALL SIGN BLANKS WILL BE TREATED AS FOLLOWS:

A. DEGREASING

(1) VAPOR DEGREASING - BY TOTAL IMMERSION OF THE SIGN BLANK IN A SATURATED VAPOR OF TRICHLORETHYLENE OR PERCHLOROETHYLENE . TRADEMARK PRINTING SHALL BE REMOVED WITH LACQUER THINNER BEFORE DEGREASING.

OR

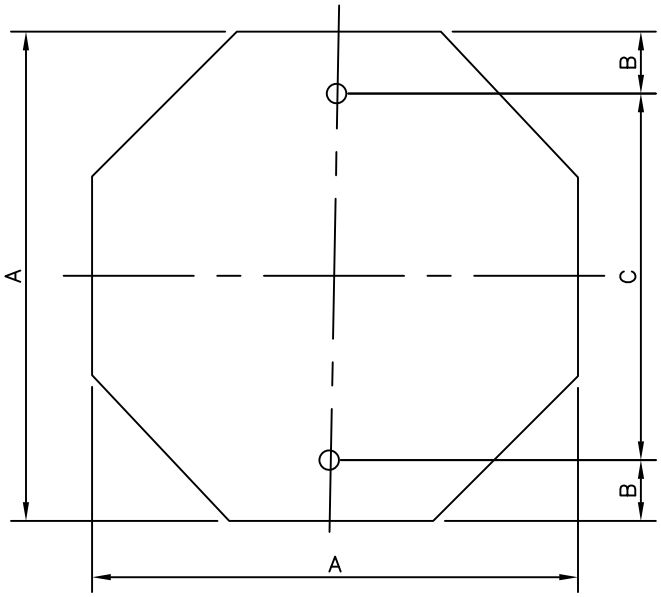
(2) ALKALINE DEGREASING - BY TOTAL IMMERSION OF THE SIGN BLANK IN A TANK CONTAINING ALKALINE SOLUTIONS, CONTROLLED AND TITRATED TO THE SOLUTION MANUFACTURER'S SPECIFICATIONS FOR TIME, TEMPERATURE, AND CONCENTRATION. IMMERSION TIME SHALL DEPEND UPON THE AMOUNT OF SOIL PRESENT, GAUGE OF THE METAL AND SOLUTION STRENGTH. RINSE THOROUGHLY WITH RUNNING WATER.



9" STREET NAME SIGN
EXTRUDED ALUMINUM SIGN BLANK

DIMENSIONS (INCHES)

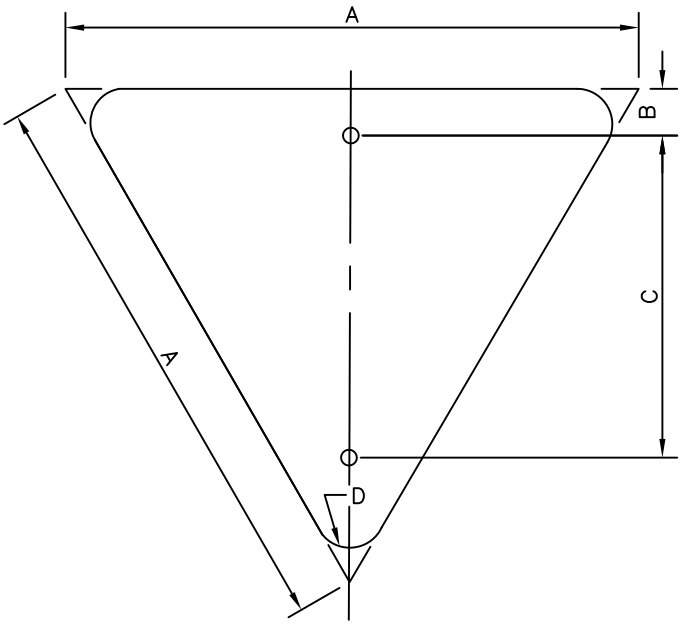
A	B	C	D	E	F
30	9	0.800	1/4R	0.091	0.25
36	9	0.800	1/4R	0.091	0.25
42	9	0.800	1/4R	0.091	0.25
48	9	0.800	1/4R	0.091	0.25



3/8" HOLE DIA.

A	B	C
24	3	18
30	3	24
36	3	30

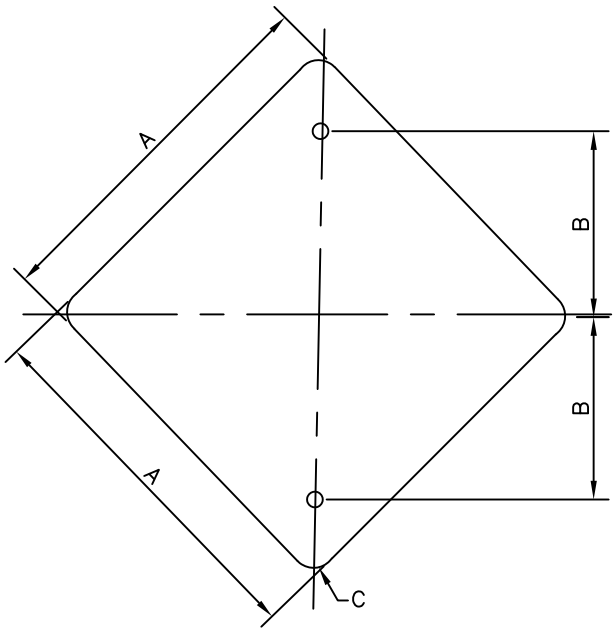
OCTAGON
N.T.S.



3/8" HOLE DIA.

A	B	C	D
36	3	21	2
42	3	24	2 1/2
48	3	35	3

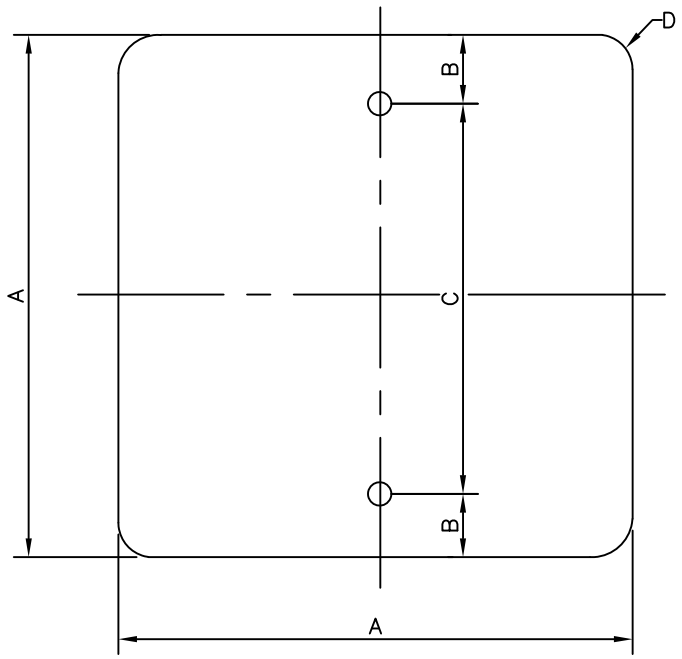
EQUILATERAL TRIANGLE
N.T.S.



DIAMOND
N.T.S.

3/8" HOLE DIA.

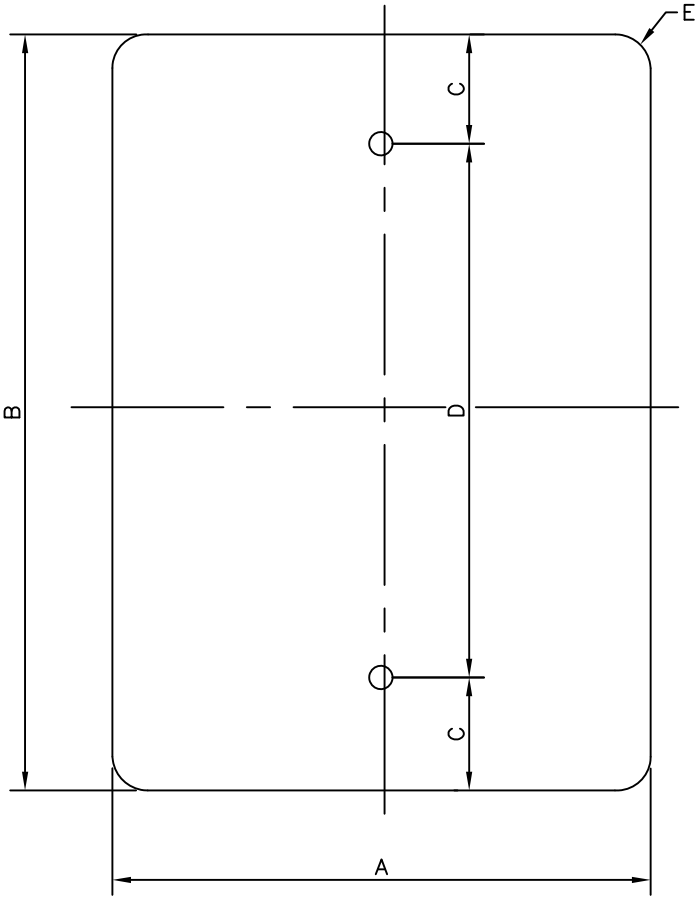
A	B	C
24	12	1 1/2
30	15	1 7/8
36	18	2 1/4



SQUARE
N.T.S.

3/8" HOLE DIA.

A	B	C	D
9	1	7	–
12	3	6	1 1/2
18	3	12	1 1/2
24	3	18	1 1/2
30	3	24	1 7/8
36	3	30	2 1/4



VERTICAL RECTANGLE
N.T.S.

3/8" HOLE DIA.

A	B	C	D	E
9	12	3	6	1 1/2
10	18	2	14	1 1/2
10	27	2	23	1 1/2
10	36	2	32	1 1/2
12	18	1–1/2	15	1 1/2
12	24	2	20	1 1/2
12	30	1–1/8	27–3/4	1 1/2
12	36	2	32	1 1/2
12	48	2	44	1 1/2
18	24	3	18	1 1/2
18	30	1–1/2	27	1 1/2
24	30	3	24	1 1/2
24	36	3	30	1 1/2
24	48	3	42	1 1/2
30	36	3	30	1 7/8
30	42	3	36	1 7/8

CITY OF EL PASO
SPECIFICATIONS FOR REFLECTORIZED
STREET NAME SIGNS

1. COLOR OF SIGNS : THE FINISHED SIGN MUST HAVE A REFLECTORIZED GREEN BACKGROUND. THE GREEN MUST CONFORM WITH THE BUREAU OF PUBLIC ROADS HIGHWAY GREEN. THE LEGEND MUST BE REFLECTORIZED SILVER WHITE (GREEN REVERSE SCREENED BACKGROUND WITH SILVER COPY).

2. LETTER DESIGN: THE LETTERING OF ALL LEGENDS MUST BE UPPER CASE LETTERS IN ACCORDANCE WITH "STANDARD ALPHABETS FOR HIGHWAY SIGNS" PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION.

3. LETTER SPACING: THE CONTROL FOR THE SPACING VALUES IN TRAFFIC LAYOUT IS THE DISTANCE RECOGNIZED AS AESTHETIC SPACING BETWEEN TWO STRAIGHT LETTERS (HN). A SPACING CONTROL OF TWO TIMES THE WIDTH OF THE STROKE OF THE LETTER SERIES TO BE USED MUST BE THE AESTHETIC CONTROL (100%). TWO AND ONE-HALF TIMES (2-1/2) THIS CONTROL MUST BE USED AS THE AESTHETIC WORD SPACE BETWEEN ELEMENTS IN THE PRIMARY LEGEND.

4. LAYOUT: THE MAXIMUM NUMBER OF LETTERS TO BE ACCOMMODATED ON A GIVEN LENGTH STREET NAME FACE MUST BE DETERMINED BY THE WIDEST LETTER SERIES POSSIBLE FOR THAT LEGEND AND THE SPACING CONTROL (100%) FOR THE SERIES USED MUST BE EXPANDED OR CONDENSED UP TO 25% IN 5% INCREMENTS.

5. THE SPACING CONTROL (100%) FOR THE SERIES USED MUST BE EXPANDED OR CONDENSED UP TO 25% IN 5% INCREMENTS FOR THE END MARGIN WITH MINIMUM OF 1".

6. THE WORD SPACE MUST BE EXPANDED UP TO 25% IN 5% INCREMENTS BUT NOT CONDENSED.

7. SPACE BETWEN PRIMARY AND BLOCK NUMBER AREA MUST BE 1/2 THE AESTHETIC WORK SPACE USED IN THE PRIMARY LEGEND.

8. SUFFIX LETTER SIZE FOR ALL LENGTHS MUST BE 2" CAPITALS, "C" SERIES, EXCEPT THAT SERIES "A" OR "B" WHERE SUFFIX ABBREVIATION EXCEEDS TWO LETTERS, MAY BE USED.

9. SIZE OF LEGEND: FOR 9" STREET NAME SIGNS, THE PRIMARY LEGEND, OR STREET NAME MUST HAVE CAPITAL LETTERS SIX INCHES (6") HIGH AND ALL SECONDARY LEGENDS, INCLUDING THE SUFFIX, BLOCK NUMBERS, MUST HAVE UPPER CASE LETTERS TWO AND ONE-HALF INCHES (2 1/2") HIGH.

10. SUFFIX LETTER SIZE FOR ALL LENGTHS MUST BE 2 1/2" CAPITALS, "C" SERIES, EXCEPT THAT SERIES "A" OR "B" WHERE SUFFIX ABBREVIATION EXCEEDS TWO LETTERS, MAY BE USED.

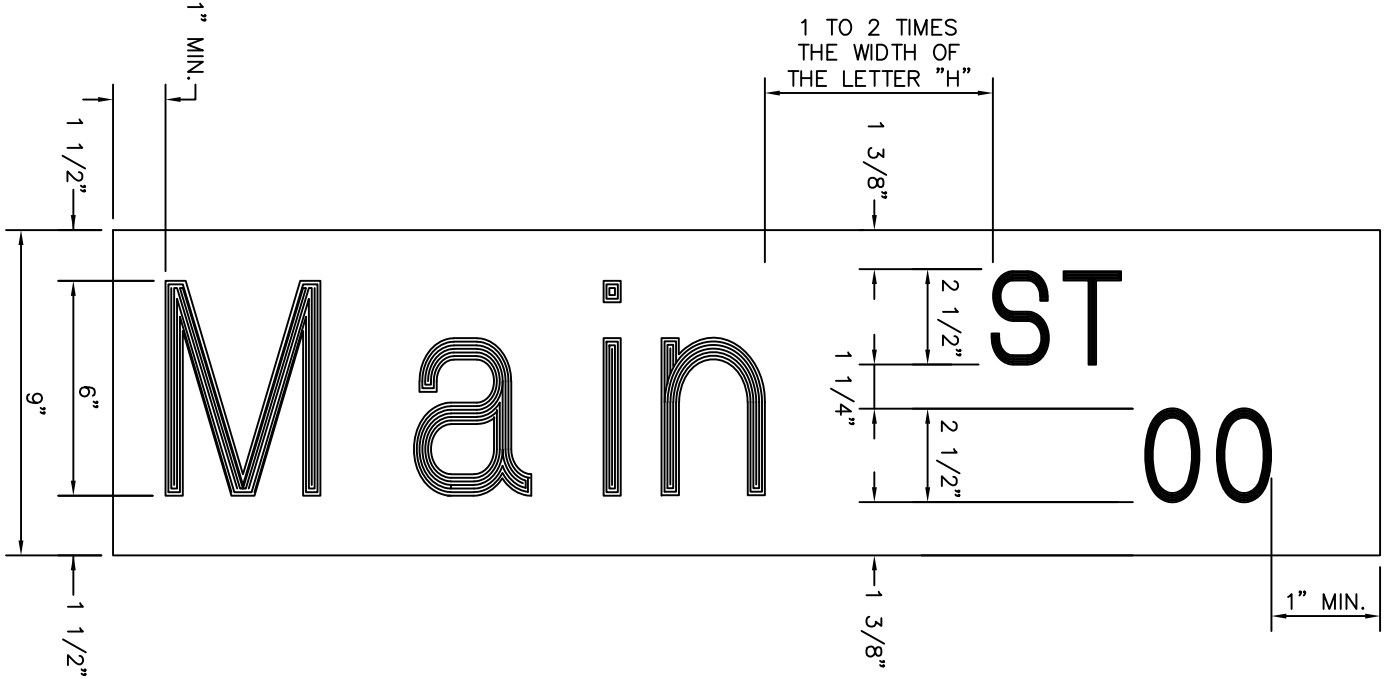
11. POSITION OF LEGEND: EACH SIGN FACE WILL CONSIST OF THE STREET NAME, SUFFIX, AND TWO ZEROS OF THE BLOCK NUMBER . THE ADDITIONAL NUMBERS OF THE BLOCK NUMBER WILL BE APPLIED BY THE CITY OF EL PASO. THE SUFFIX WILL BE LOCATED IN THE UPPER RIGHT CORNER AND THE BLOCK NUMBER IN THE LOWER RIGHT CORNER OF THE SIGN FACE AND THE STREET NAME CENTERED IN THE REMAINING SPACE.

12. SIGN FABRICATION: THE SIGN FACE MUST BE FABRICATED BY REVERSE SCREENING GREEN TRANSPARENT COLOR OVER SILVER REFLECTIVE SHEETING. TRANSPARENT PROCESS COLORS MUST BE AS RECOMMENDED BY THE SHEETING MANUFACTURER. CUT-OUT OR APPLIED LEGENDS ARE NOT PERMITTED. SIGN FACES MUST BE COMPRISED OF ONE PIECE OR PANEL OF REFLECTIVE SHEETING.

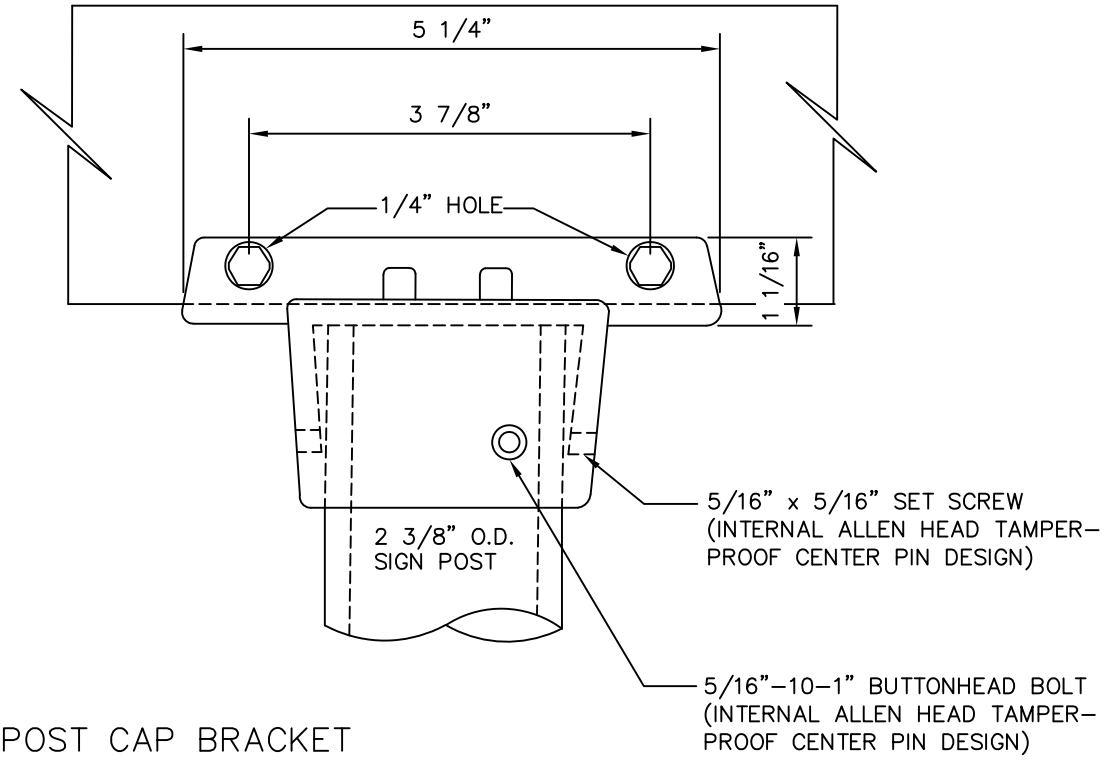
13. TYPE OF SHEETING: ENGINEER GRADE REFLECTIVE SHEETING MUST BE USED IN THE FABRICATION OF THE STREET NAME SIGN FACES.

CITY OF EL PASO

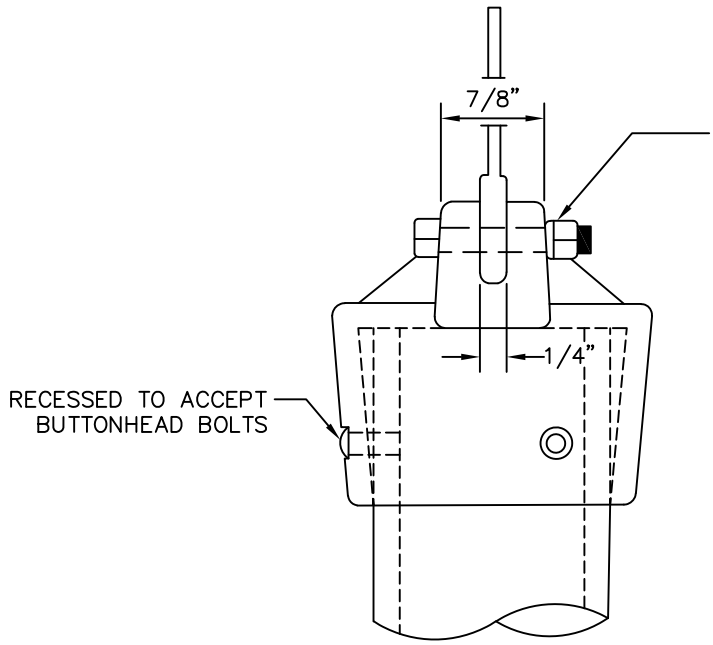
LAYOUT FOR 9" STREET NAME SIGNS



SIGN CLASS	SIGN LENGTH	PRIMARY LETTERS SIZE & SERIES	SUFFIX & BLOCK NUMBER SIZE & SERIES
9" ARTERIAL STREETS	36"	6" C,D SERIES	3" C SERIES
	42"	6" C,D SERIES	3" C SERIES
	48"	6" A,B,C,D SERIES	3" C SERIES



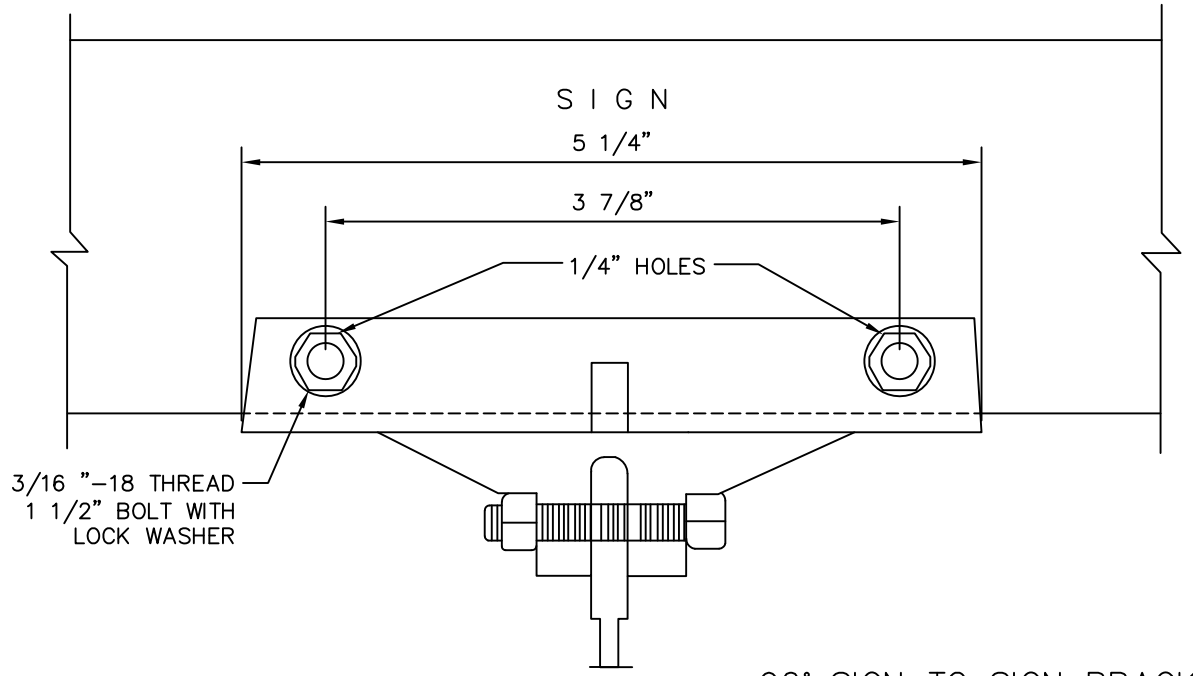
POST CAP BRACKET
(FOR EXTRUDED BLADES)



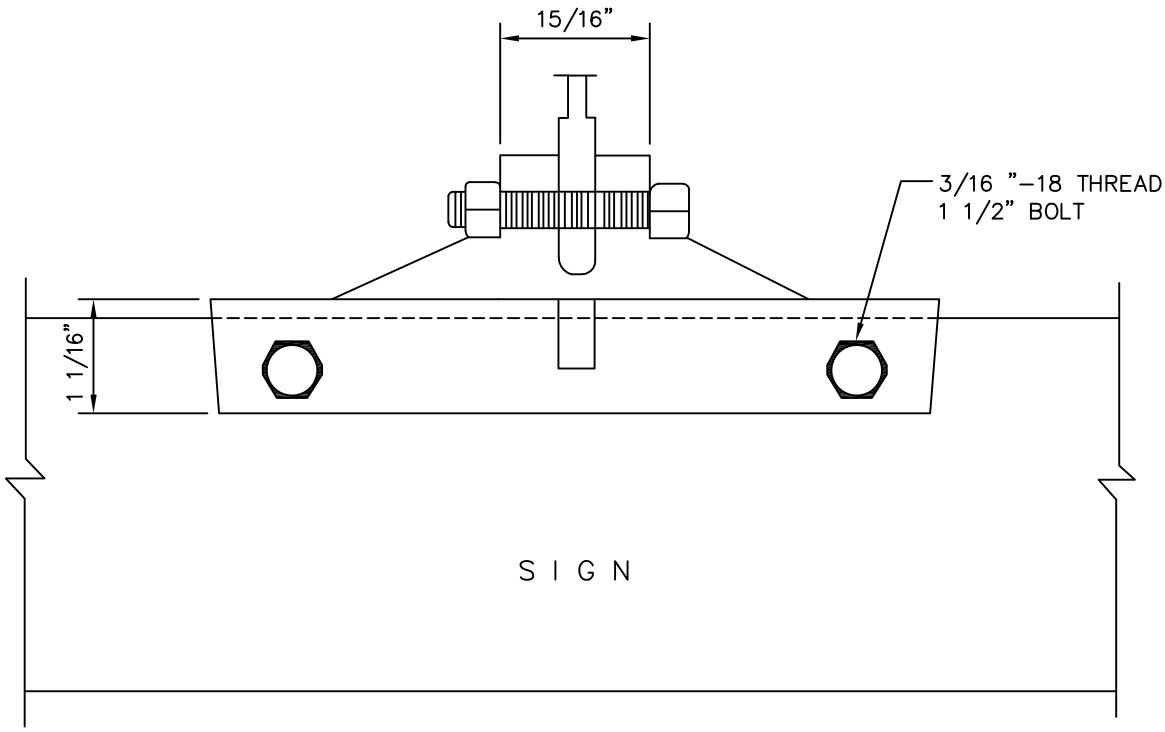
GENERAL NOTES

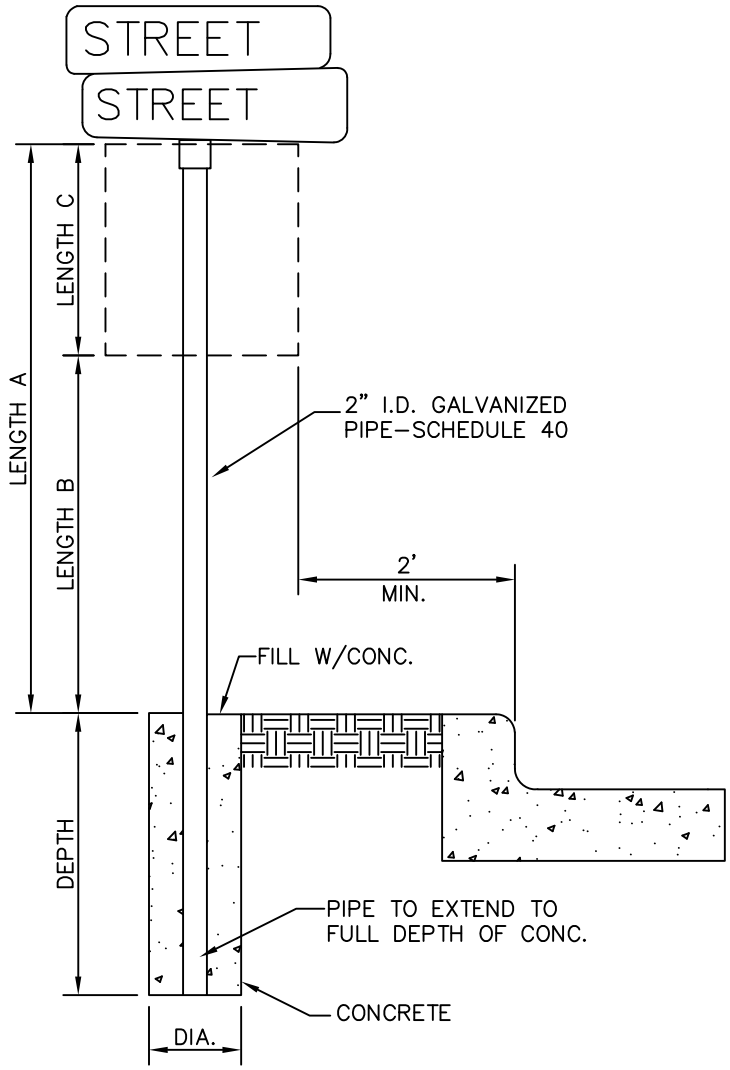
BRACKET MATERIALS TO BE
385 ALUMINUM ALLOY
TENSILE STRENGTH 4900 P.S.I.

DIE CAST FREE OF BURRS,
PITS, & HOLES



90° SIGN TO SIGN BRACK
(FOR EXTRUDED BLADES)

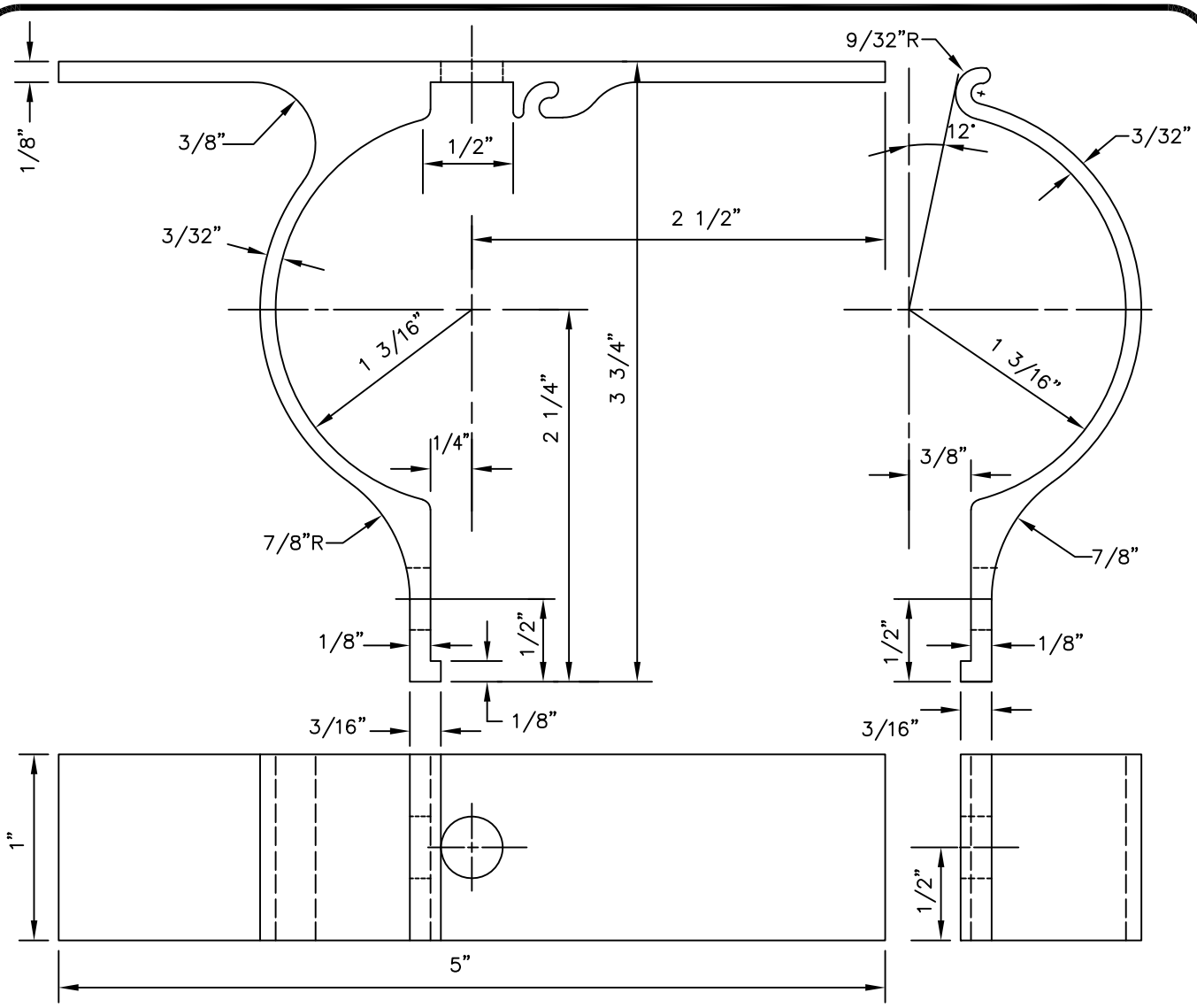




DIA.= 8" MIN IN SOIL OR GRAVEL
3" MIN. UNDER CONC SIDEWALK

SIGN POST INSTALLATION

LENGTH A	LENGTH B	LENGTH C	DEPTH
10 FT	6 FT	LARGER THAN 24"	2 FT
9 FT	6 FT	SMALLER THAN 24"	1 1/2 FT



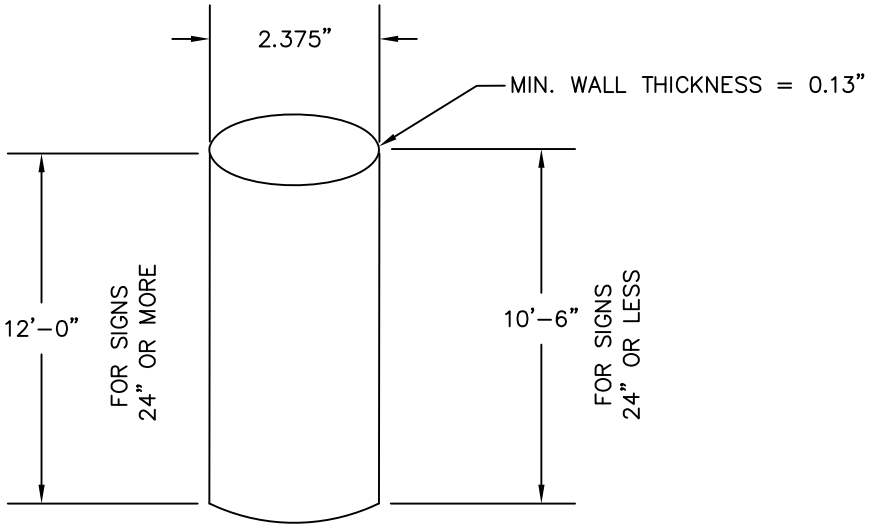
ALUMINUM SIGN CLAMP BRACKET FOR TRAFFIC CONTROL SIGNS

N.T.S.

NOTES:

1. ALL HOLES 3/8" PUNCH
2. FILLETS & ROUNDS 1/16"=R
3. FURNISH THE FOLOWING HARDWARE FOR EACH BRACKET:
   1 – 5/16"x 3/4" BOLTS
   1 – 5/16"x 1 1/4" BOLT
   2 – 5/16"x NUTS & LOCK WASHERS
   2 – FLAT WASHERS
4. THE BRACKET IS TO BE MADE FROM HIGH STRENGTH ALUMINUM ALLOY. THE BRACKET IS TO EMPLOY AN EXTRUDED INTERLOCKING FEATURE OFFERING A RIGID MEANS OF ATTACHING A FLAT SIGN TO A STANDARD 2" (2/8" O.D.) TUBULAR POST.

SIGN POST SPECIFICATIONS



NOTES:

1. WELD ALONG ITS LENGTH TO FORM VIRTUALLY SEAMLESS.

2. POST SHALL BE HOT–DIPPED ZINC GALVANIZED UNIFORMLY ON THE OUTSIDE WITH A NOMINAL ZINC WEIGHT OF 1.0 OUNCE PER SQUARE FOOT.

3. THE ZINC COATING IS TO BE OVER–COATED WITH A CHROMITE CONVERSION AND ACRYLIC COATING TO PROVIDE RESISTANCE TO RUSTING AND CORROSION.

4. THE INSIDE OF THE POST SHALL BE COATED WITH AN ORGANIC MATERIAL FOR PROTECTION AGAINST RUST.

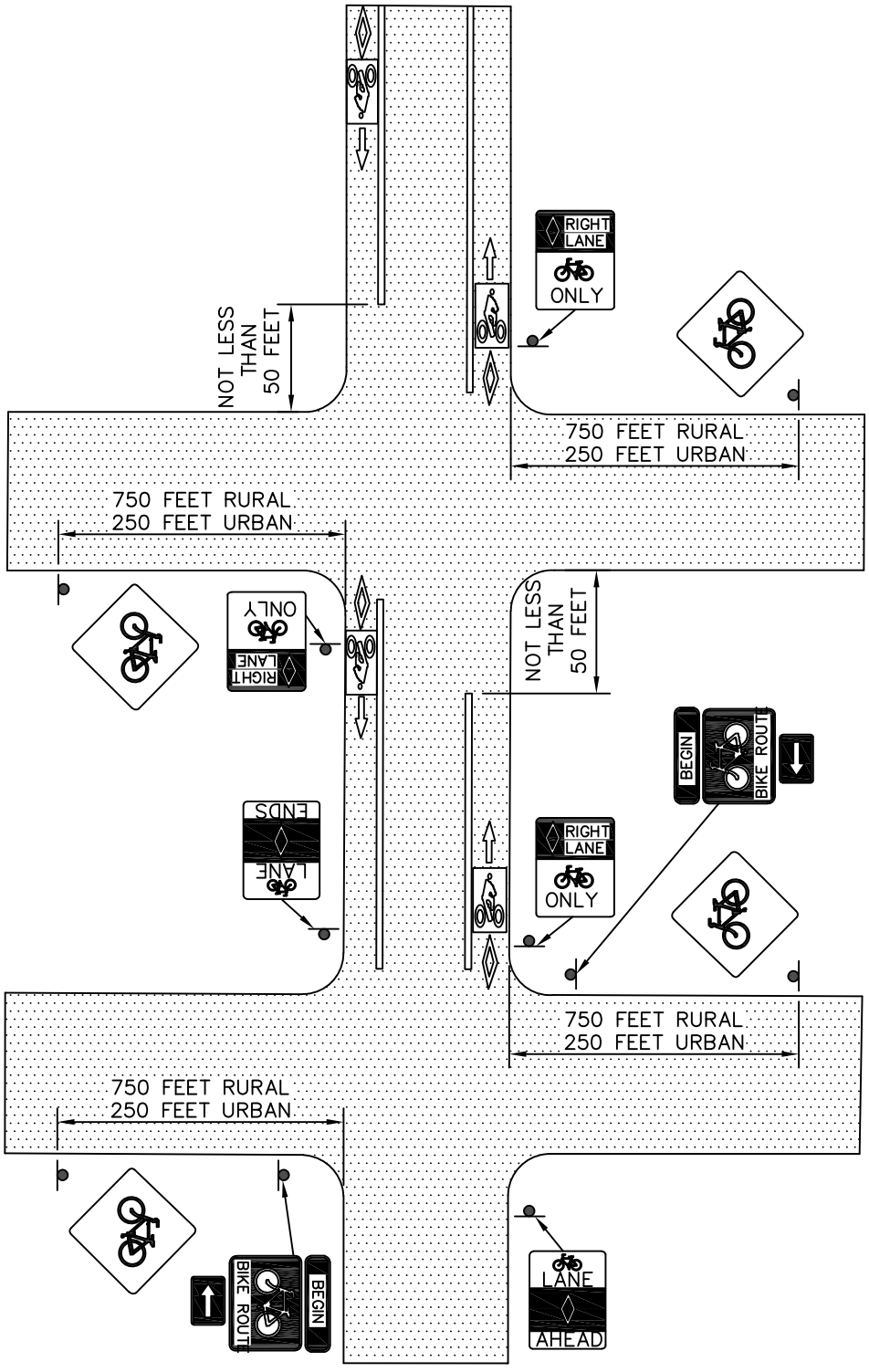
5. BOTH ENDS ARE TO BE SQUARELY CUT WITHOUT FLARE.

6. POST SHALL BE FREE OF WARPS, CORROSION, OR OTHER DEFECTS.

7. RING WELDS OR SPLICES WILL NOT BE ACCEPTABLE.

8. BENDING STRENGTH AS SPECIFIED BY AASHTO FOR SCHEDULE 40 PIPE.

9. POST SHALL BE BUNDLED WITH METAL STRAPS AND SHALL NOT EXCEED 37 POST PER BUNDLE.

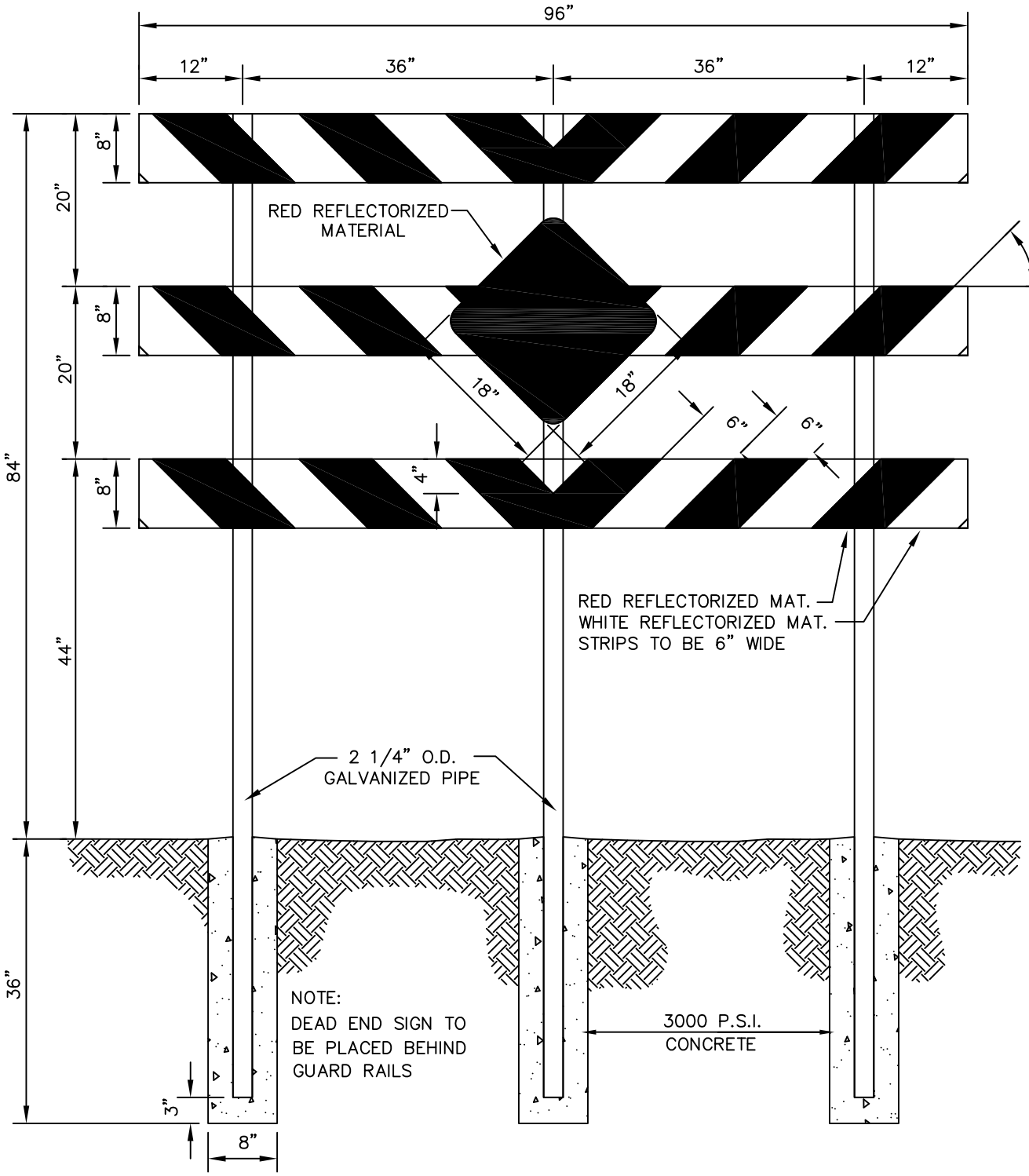


TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

BIKE LANE SIGNS AND MARKINGS

9-4-16



DEAD END SIGN

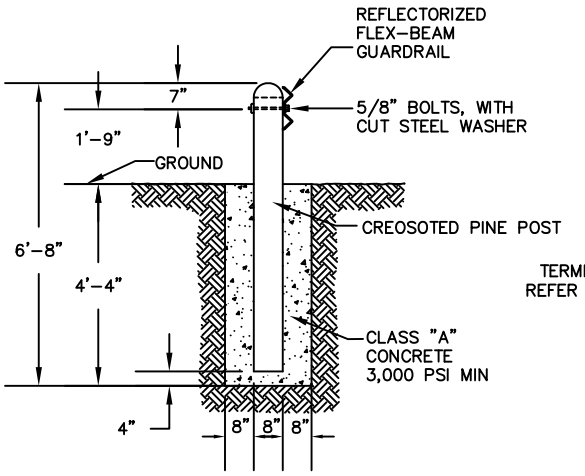
TITLE 19 - SUBDIVISION ORDINANCE

THE CITY OF EL PASO TEXAS

STREET DESIGN MANUAL

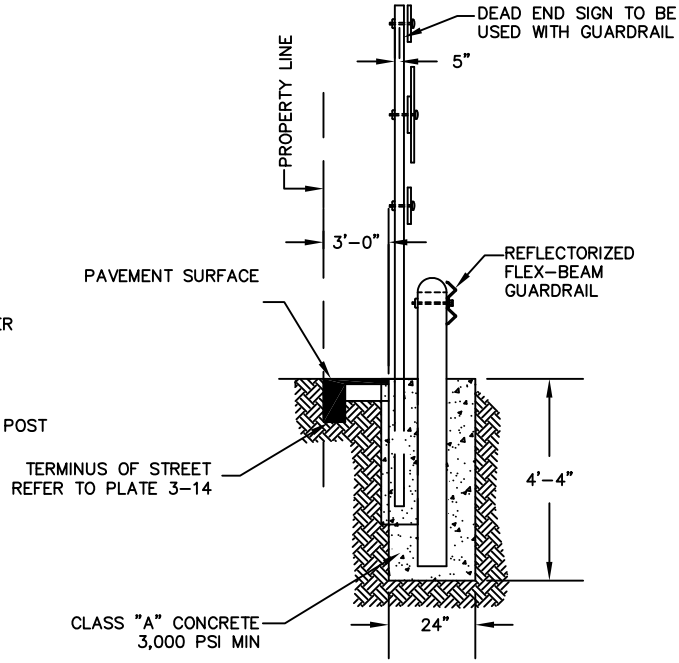
DEAD END SIGN

9-4-17A



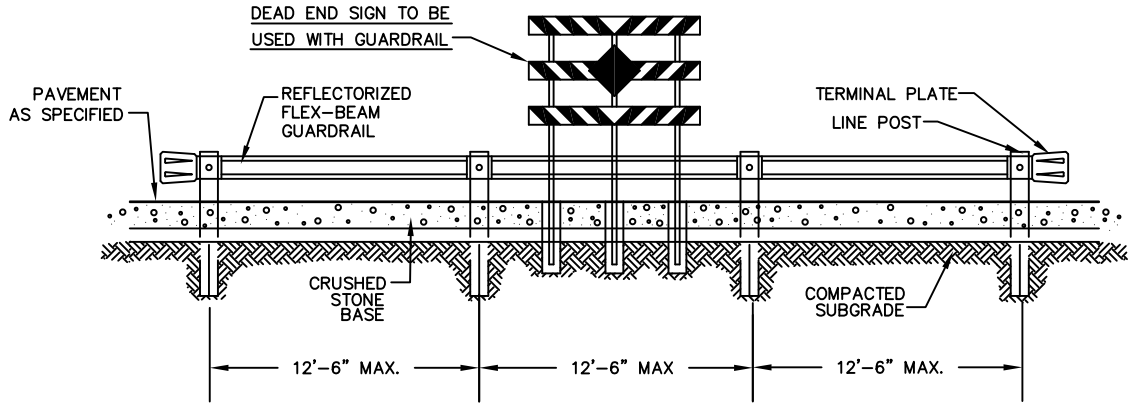
POST DETAIL

SCALE: N.T.S.



SECTION

SCALE: N.T.S.

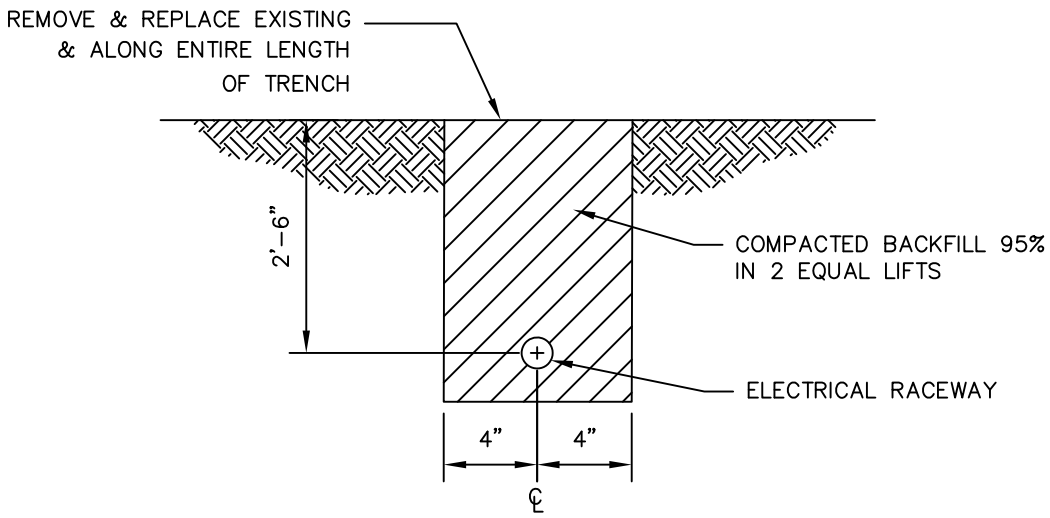


GUARDRAIL/SIGN ASSEMBLY AT DEAD END STREET DETAIL

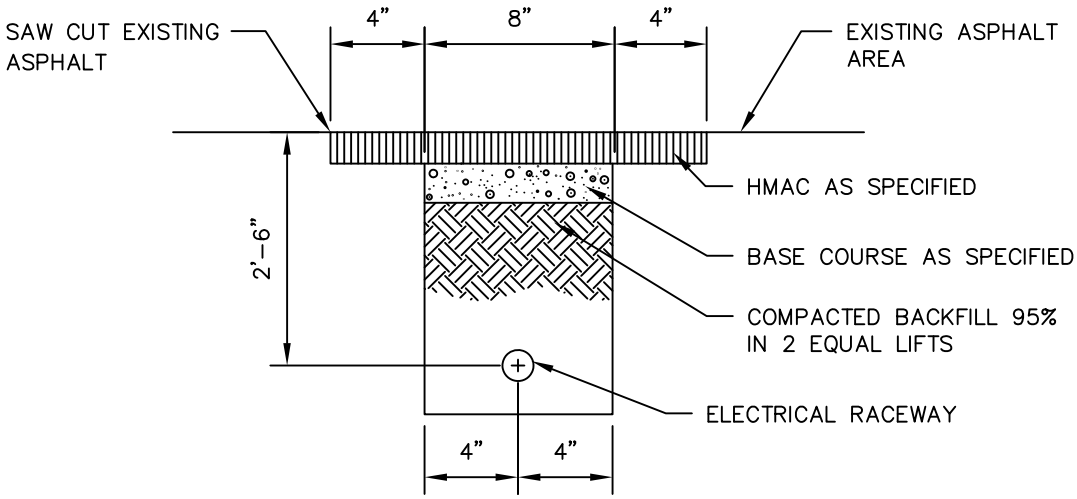
TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

GUARDRAIL SIGN
ASSEMBLY AT DEAD END
9-4-17B



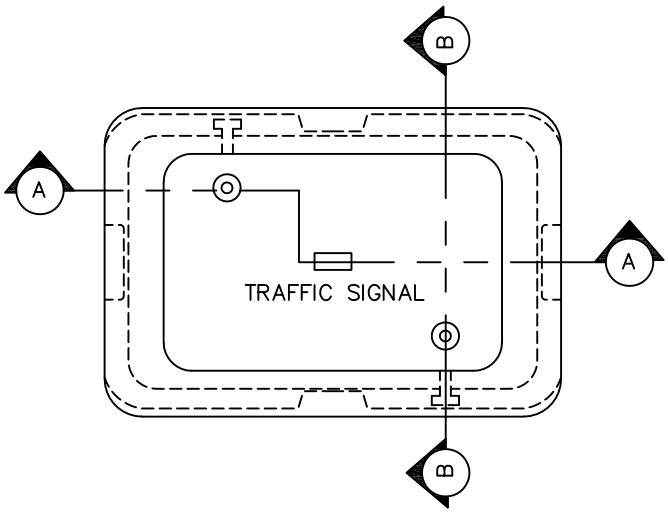
TYPICAL ELECTRICAL RACEWAY TRENCH DETAIL



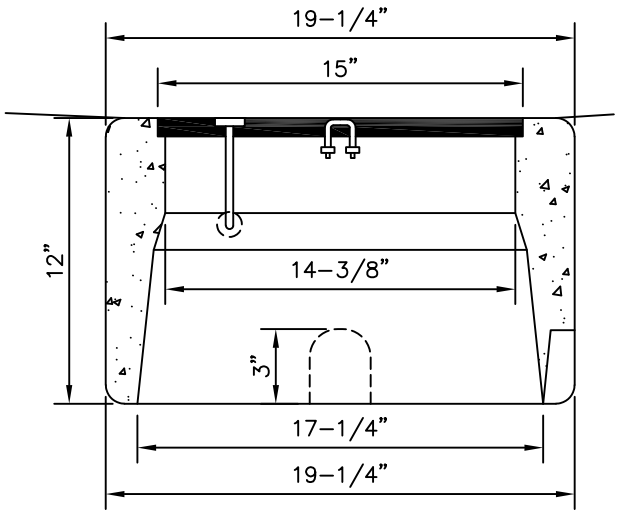
TYPICAL ELECTRICAL RACEWAY TRENCH DETAIL

KEYED NOTES:

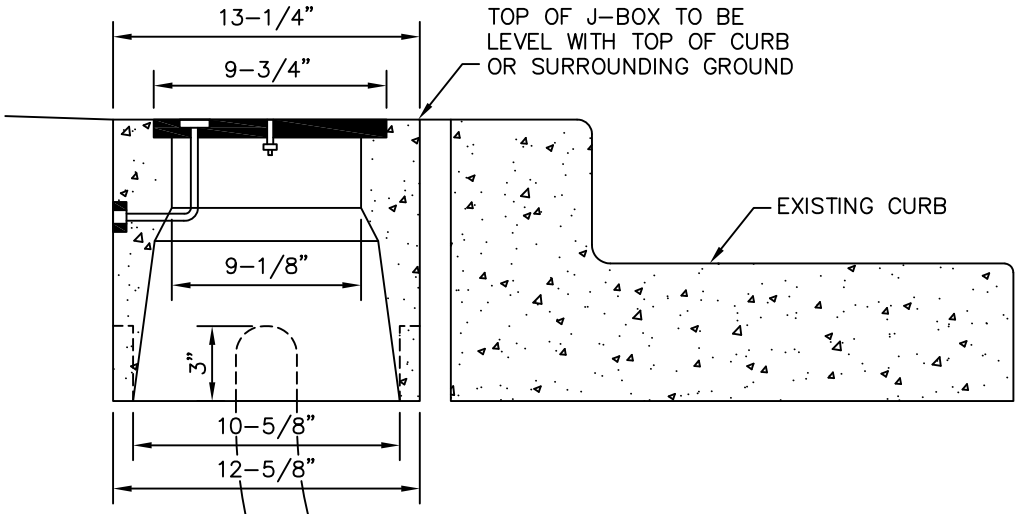
1. TRENCHES IN AREAS WITH GRASS, DIRT, PAVERS, ETC. SHALL BE REPLACED ALONG ENTIRE LENGTH OF TRENCH.



PLAN VIEW

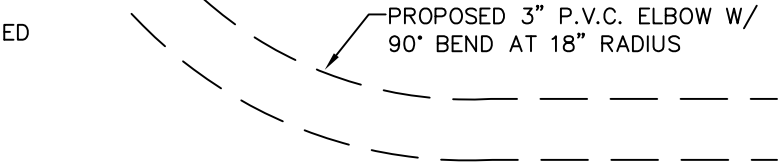


SECTION A–A



SECTION B–B

NOTE:
PROPOSED J–BOXES TO BE PLACED EVERY 150 FEET UNLESS OTHERWISE SPECIFIED BY ENGINEER.



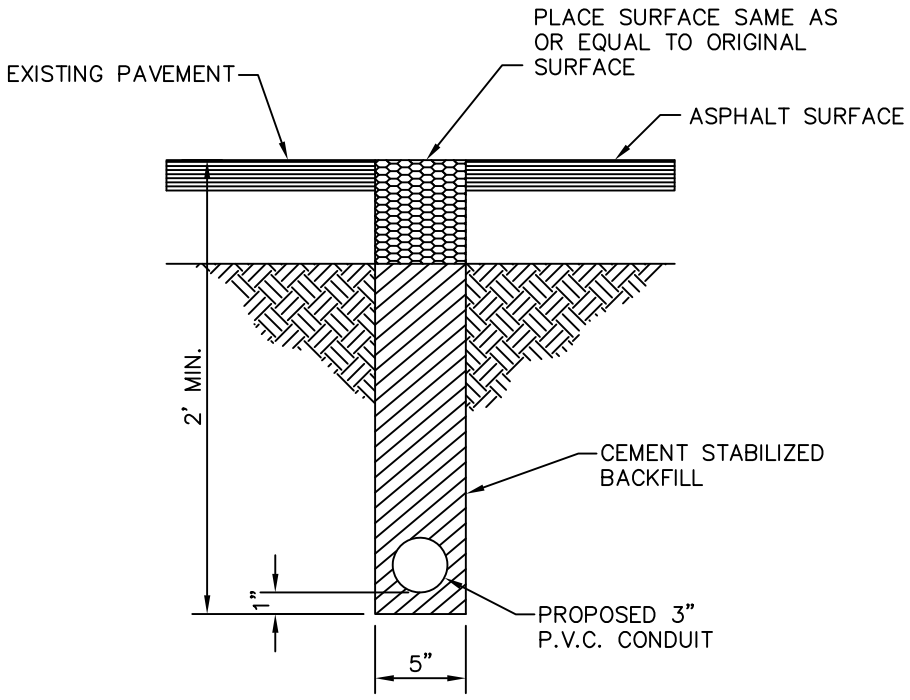
TYPICAL JUNCTION BOX

TITLE 19 - SUBDIVISION ORDINANCE

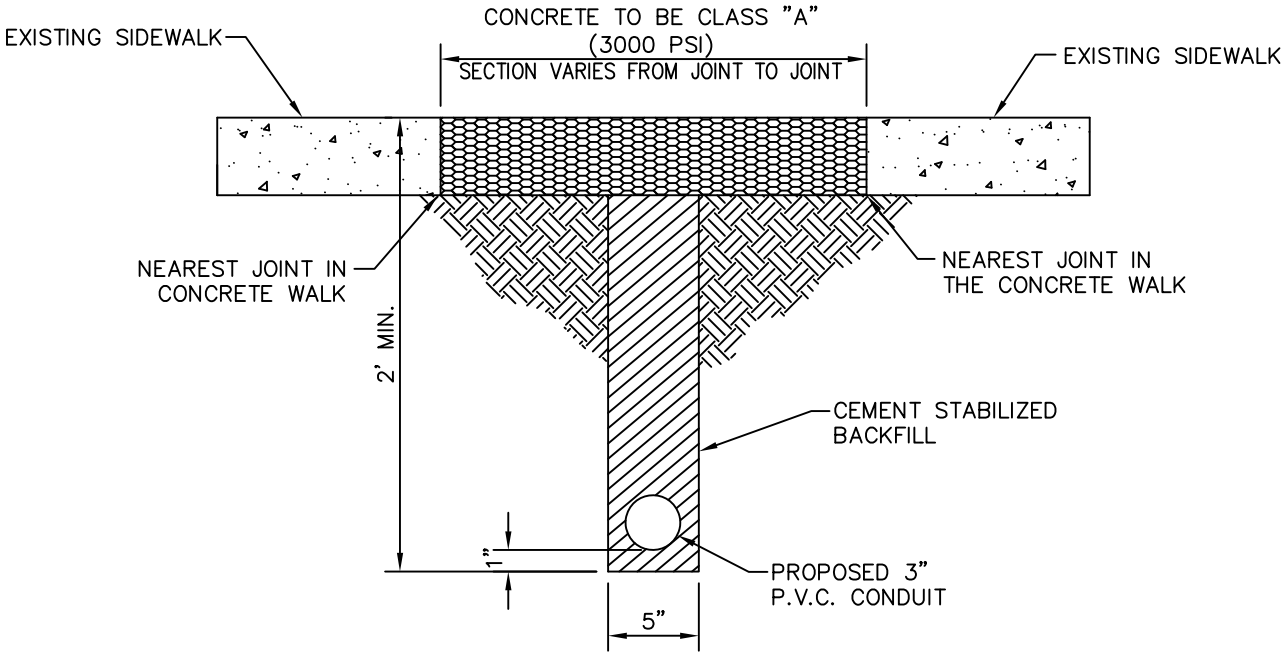
STREET DESIGN MANUAL

TYPICAL TRAFFIC SIGNAL JUNCTION BOX

9-4-21



PAVEMENT CUT FOR CONDUIT PLACEMENT

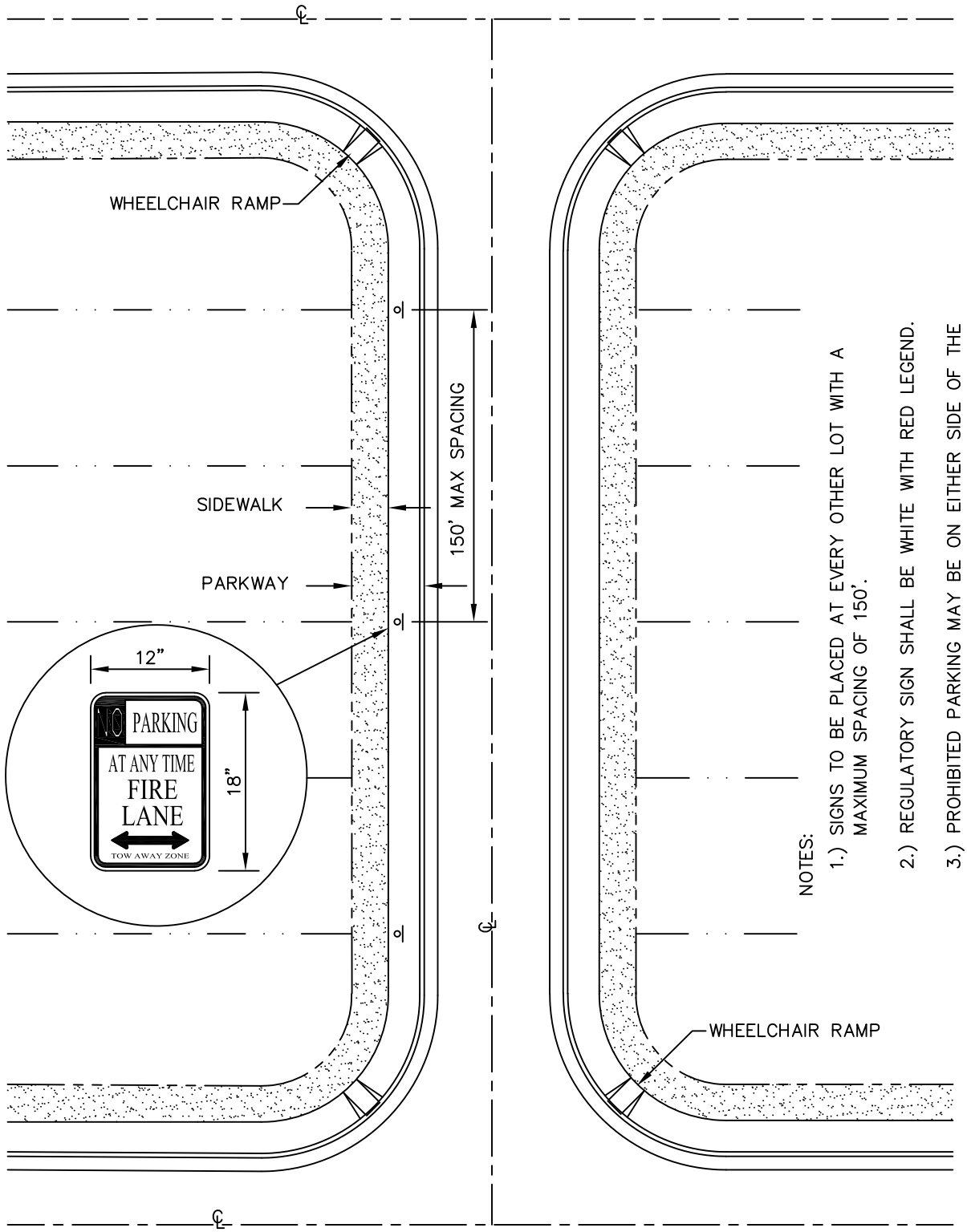


SIDEWALK CUT FOR CONDUIT PLACEMENT

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

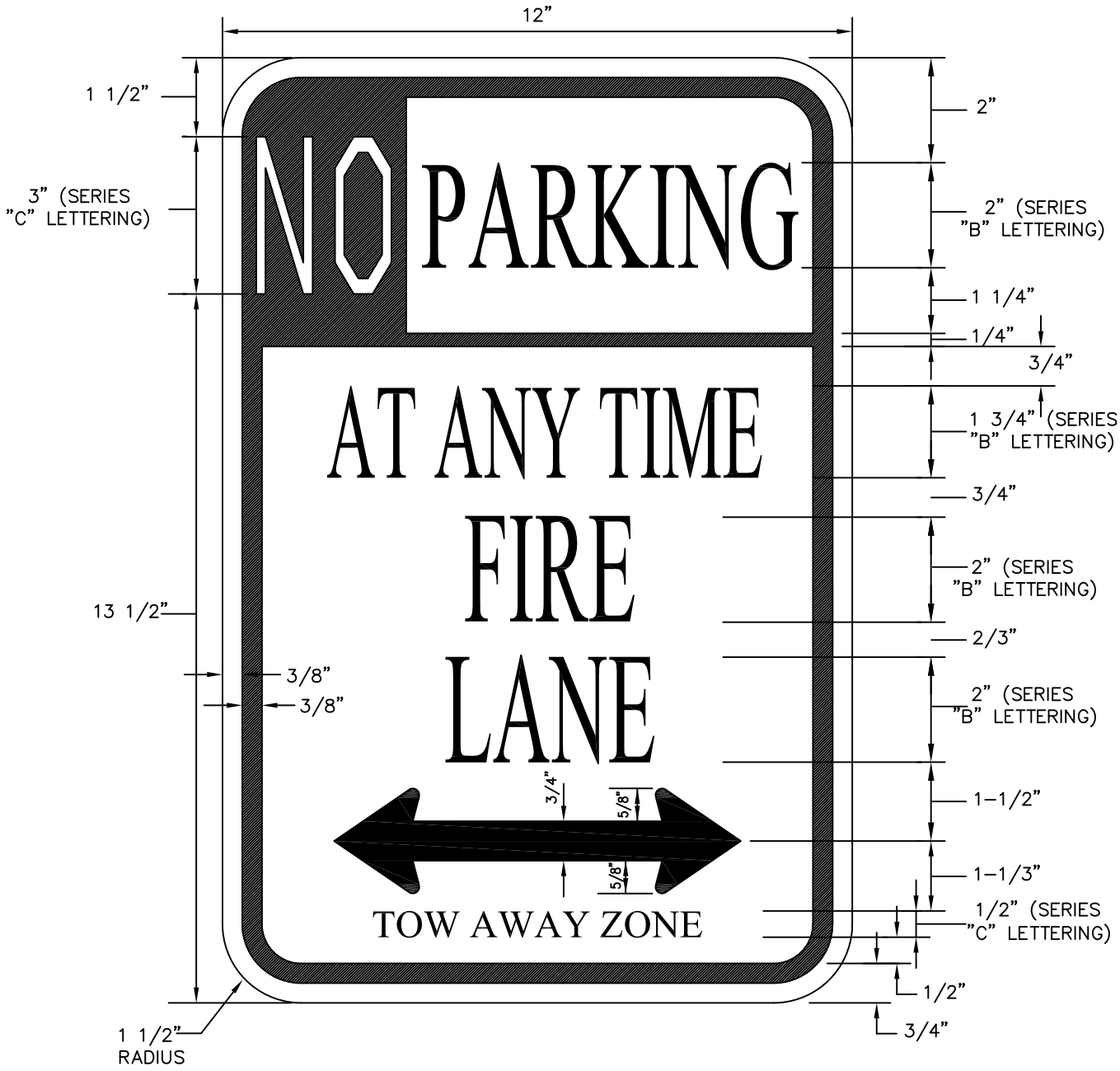
TYPICAL CUTS FOR
CONDUIT PLACEMENT OF
TRAFFIC SIGNALS
9-4-22



TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

PROHIBITED PARKING
SIGNAGE (FIRE-LANE)
9-4-23



COLORS

LEGEND ---------- RED

BACKGROUND ---------- WHITE

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

NO PARKING
FIRE LANE SIGN

9-4-24

SECTION 5

SECTION 5

STREET LIGHTING

The Subdivider shall furnish and install street lights along all public and private streets, whether within the corporate limits or within the extraterritorial jurisdiction. Such street lights shall comply with the City of El Paso lighting ordinance found at Chapter 18.18 of the El Paso Municipal Code. The following standards shall apply in determining the number of street lights required, and are based on approved standards of the American National Standards Institute and the Illuminating Engineering Society of North America, a copy of which is maintained by the City Engineer:

Street Type	**Required Spacing**	**Pole Type**	**Lamp Type[(1)]**	**Inst. Height**
Local streets	At intervals of not more than three hundred feet (300')	Wood or Metal	100 watt high pressure sodium LED or Equivalent to 100 Watt HPS.	30 feet
Collector arterials	At intervals of not more than three hundred feet (300')	Wood or Metal	100 watt high pressure sodium LED or Equivalent to 100 Watt HPS.	30feet

(1) LUMINAIRE TYPE REQUIREMENTS:

LED (100W HPS EQUIV.)

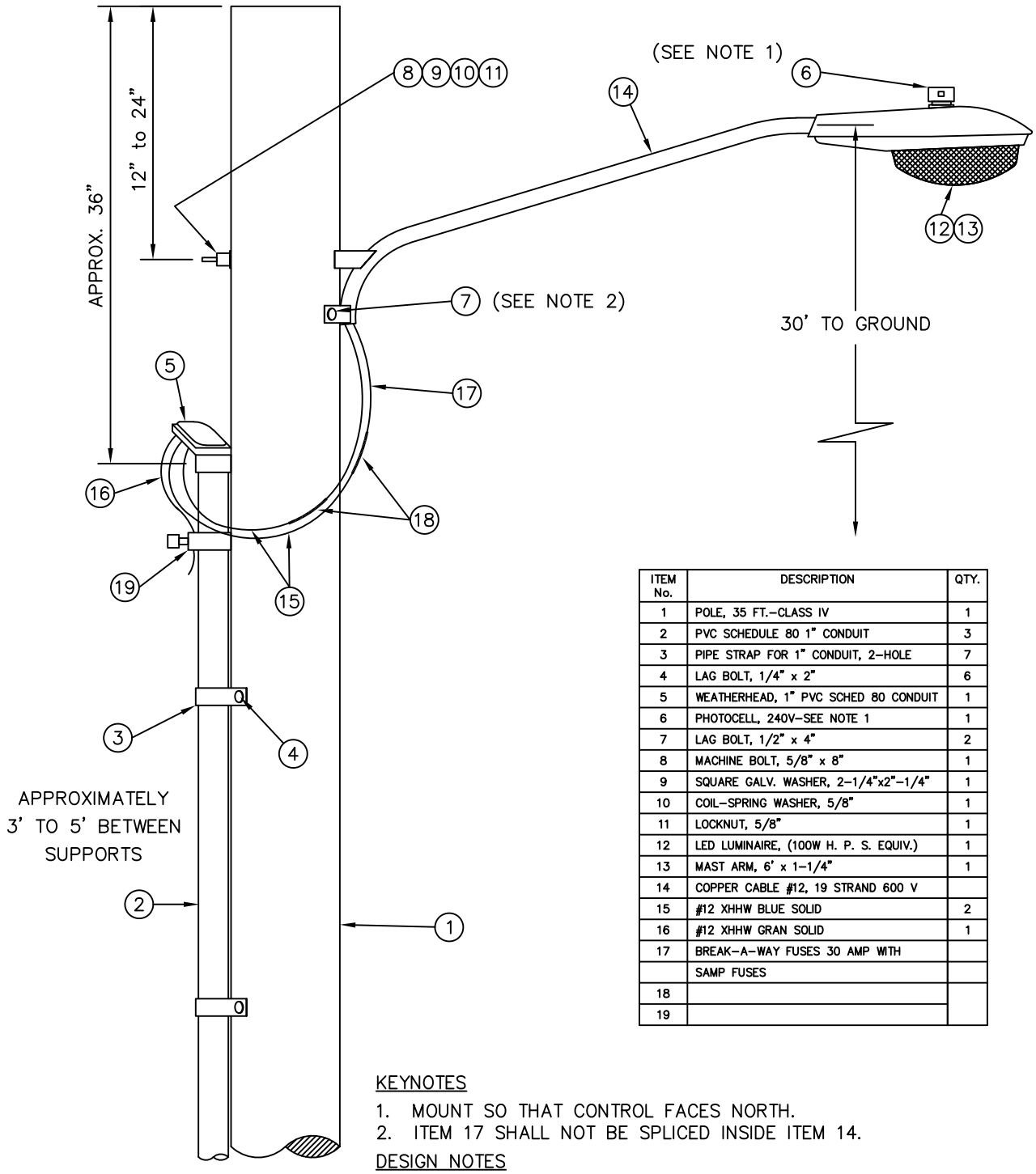
COLOR TEMPERATURE (CCT) ≤ 3000 K CCT, 70 CRI MIN

MINIMUM 3 PIN NEMA PHOTO CONTROL RECEPTACLE

NEMA LABEL

LUMINAIRE TO MEET DARK SKY COMPLIANCE

EXTERIOR BUBBLE LEVEL



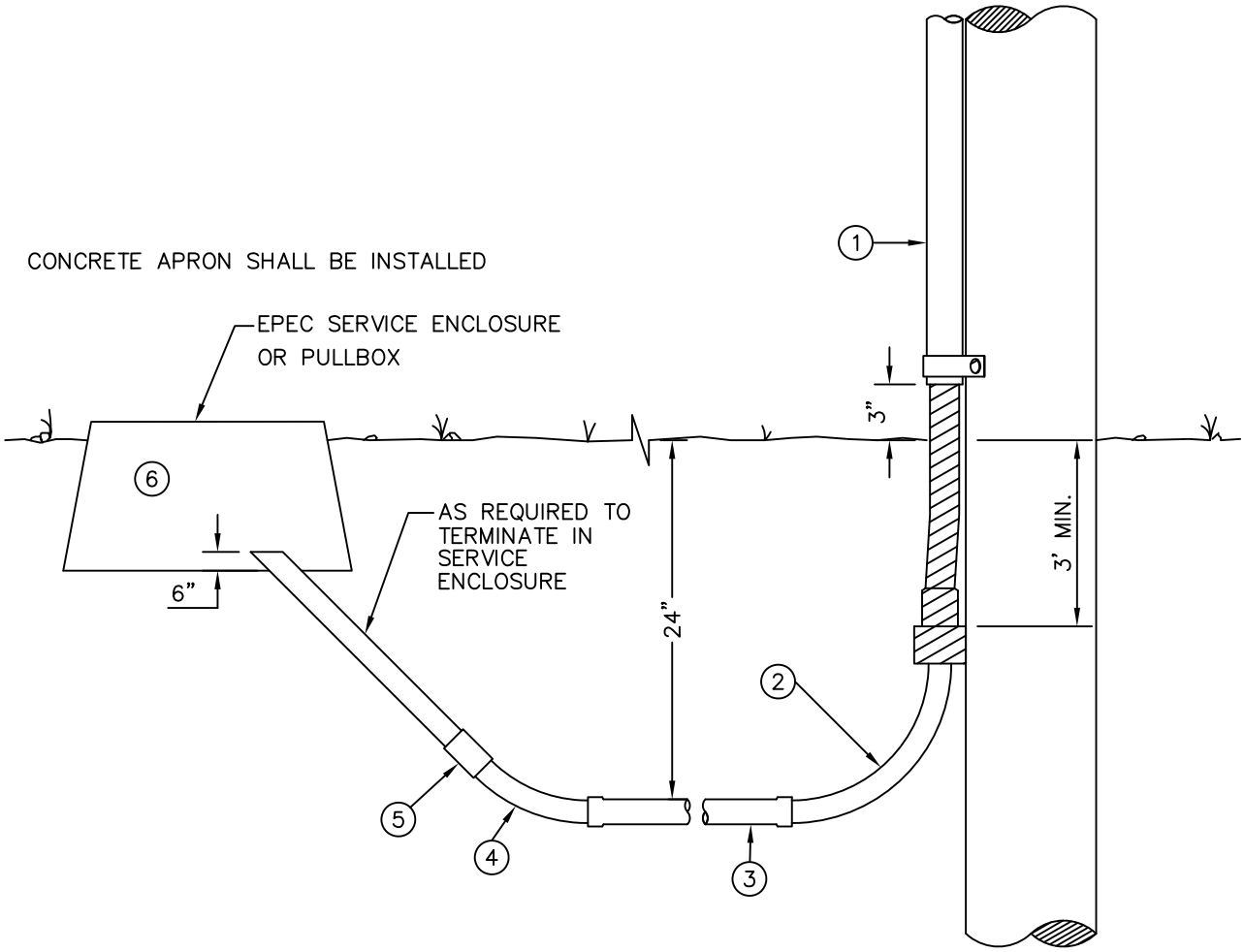
ITEM No.	DESCRIPTION	QTY.
1	POLE, 35 FT.–CLASS IV	1
2	PVC SCHEDULE 80 1" CONDUIT	3
3	PIPE STRAP FOR 1" CONDUIT, 2–HOLE	7
4	LAG BOLT, 1/4" x 2"	6
5	WEATHERHEAD, 1" PVC SCHED 80 CONDUIT	1
6	PHOTOCELL, 240V–SEE NOTE 1	1
7	LAG BOLT, 1/2" x 4"	2
8	MACHINE BOLT, 5/8" x 8"	1
9	SQUARE GALV. WASHER, 2–1/4"x2"–1/4"	1
10	COIL–SPRING WASHER, 5/8"	1
11	LOCKNUT, 5/8"	1
12	LED LUMINAIRE, (100W H. P. S. EQUIV.)	1
13	MAST ARM, 6' x 1–1/4"	1
14	COPPER CABLE #12, 19 STRAND 600 V	
15	#12 XHHW BLUE SOLID	2
16	#12 XHHW GRAN SOLID	1
17	BREAK–A–WAY FUSES 30 AMP WITH	
	SAMP FUSES	
18		
19		

KEYNOTES

1. MOUNT SO THAT CONTROL FACES NORTH.
2. ITEM 17 SHALL NOT BE SPLICED INSIDE ITEM 14.

DESIGN NOTES

1. FOR ANY CLARIFICATION, EXCEPTIONS RO QUESTIONS REGARDING CODE INTERPRETATION CALL EL PASO ELECTRIC CO. DISTRIBUTION DEVELOPMENT DEPARTMENT.
2. INSTALLATION SHALL COMPLY WITH ALL LOCAL CODE REQUIREMENTS.



KEY NOTES:

1. 1" PVC SCHEDULE 80 CONDUIT
2. 1" PVC 90° ELBOW
3. 1" PVC CONDUIT
4. 1" PVC 45° ELBOW
5. 1" PVC COUPLING
6. 30 AMP. FUSE HOLDERS (WATER RESISTANT) WITH 5 AMP. CERAMIC MIDGET FUSES
7. GRAVEL ON PULL BOX 6" INCHES

ITEM No.	DESCRIPTION	QTY.
1	POLE, 35 FT.–CLASS IV	1
2	PVC SCHEDULE 80 1" CONDUIT	3
3	PIPE STRAP FOR 1" CONDUIT, 2–HOLE	7
4	LAG BOLT, 1/4" x 2"	6
5	WEATHERHEAD, 1" PVC SCHED 80 CONDUIT	1
6	PHOTOCELL, 240V–SEE NOTE 1	1
7	LAG BOLT, 1/2" x 4"	2
8	MACHINE BOLT, 5/8" x 8"	1
9	SQUARE GALV. WASHER, 2–1/4"x2"–1/4"	1
10	COIL–SPRING WASHER, 5/8"	1
11	LOCKNUT, 5/8"	1
12	LED LUMINAIRE, (100W H. P. S. EQUIV.)	1
13	MAST ARM, 6' x 1–1/4"	1
14	COPPER CABLE #12, 19 STRAND 600 V	
15	#12 XHHW BLUE SOLID	2
16	#12 XHHW GRAN SOLID	1
17	BREAK–A–WAY FUSES 30 AMP WITH	
	SAMP FUSES	

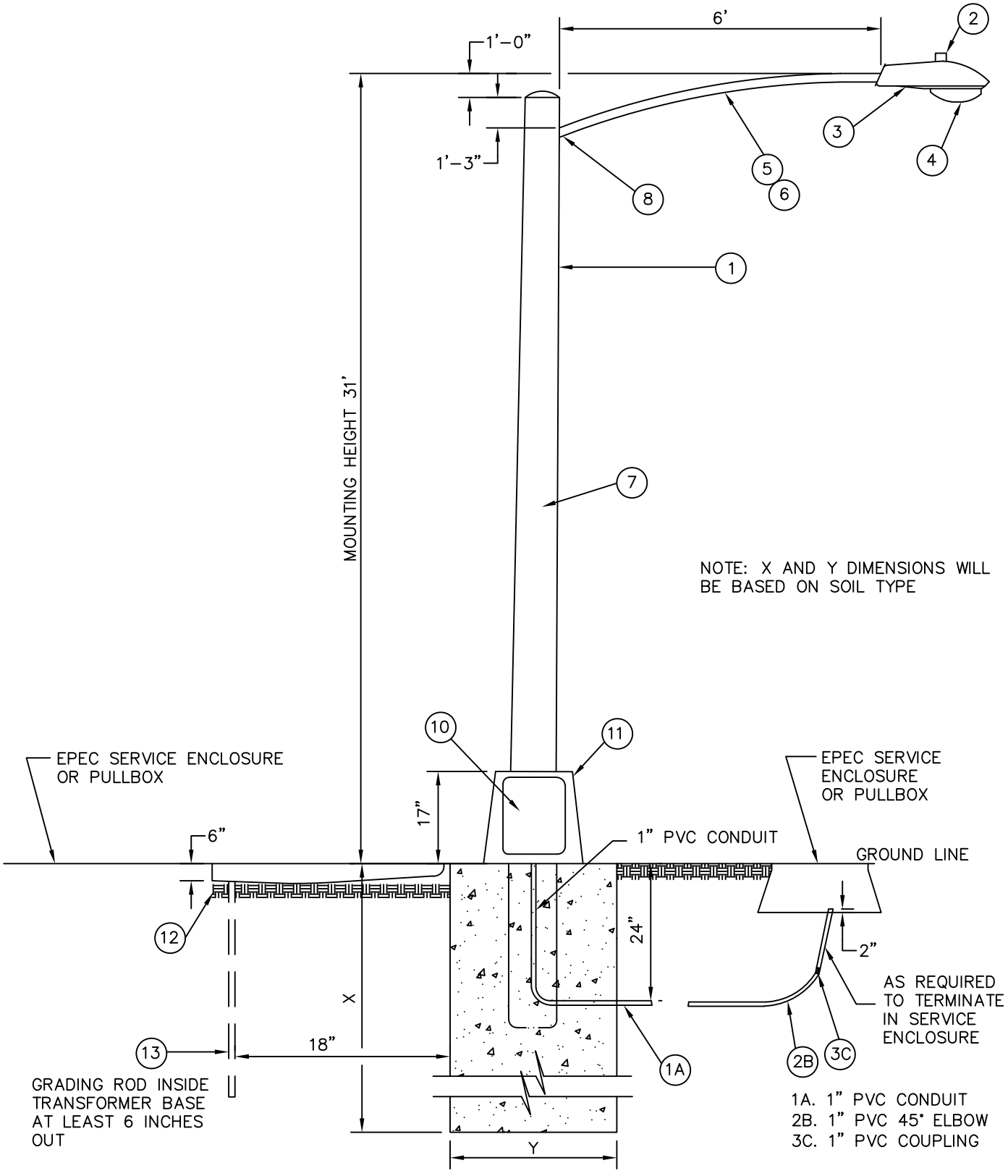
KEYNOTES

1. MOUNT SO THAT CONTROL FACES NORTH.

2. ITEM 17 SHALL NOT BE SPLICED INSIDE ITEM 14.

DESIGN NOTES

1. FOR ANY CLARIFICATION, EXCEPTIONS RO QUESTIONS REGARDING CODE INTERPRETATION, CALL EL PASO ELECTRIC CO. DISTRIBUTION DEVELOPMENT DEPARTMENT.
2. INSTALLATION SHALL COMPLY WITH ALL LOCAL CODE REQUIREMENTS.



TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

RESIDENTIAL STREET
LIGHT STEEL POLE

9-5-5

ITEM No.	DESCRIPTION	QTY.
1	POLE, 35 FT.	1
2	PHOTOCELL, 240V–SEE NOTE 1	1
3	LED LUMINAIRE (100W H. P. S. EQUIV.)	1
4	MAST ARM, 6' x 1–1/4"	1
5	#10 SOLID CABLE 600 V	AS PEQ'D.
6	BREAK–A–WAY HOLDERS 30 AMP	2
	SOMP FUSES	
7	ALUMINUM TRANSFORMER BASE WITH	1
	GRAND CLAMP	
8	5/8' GROUND ROD CLAMP	1
9	5/8" x 10' CU BONDED GROUND ROD	1
10	5 AMP CERAMIC MEDLEY FUSES	2
11	#12 XHHW BLUE SOLID	2
12	#12 XHHW GRAN SOLID	1

KEYNOTES

1. MOUNT SO THAT CONTROL FACES NORTH.

2. ITEM 7 SHALL NOT BE SPLICED INSIDE ITEM 5.

DESIGN NOTES

1. INSTALLATION SHALL COMPLY WITH ALL LOCAL CODE REQUIREMENTS.

2. A GROUND ROD MUST BE USED,

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High–Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory–installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two–hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one–hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure–mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre–stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub–grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub–base of new roadways, backfill all trenches with cement–stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

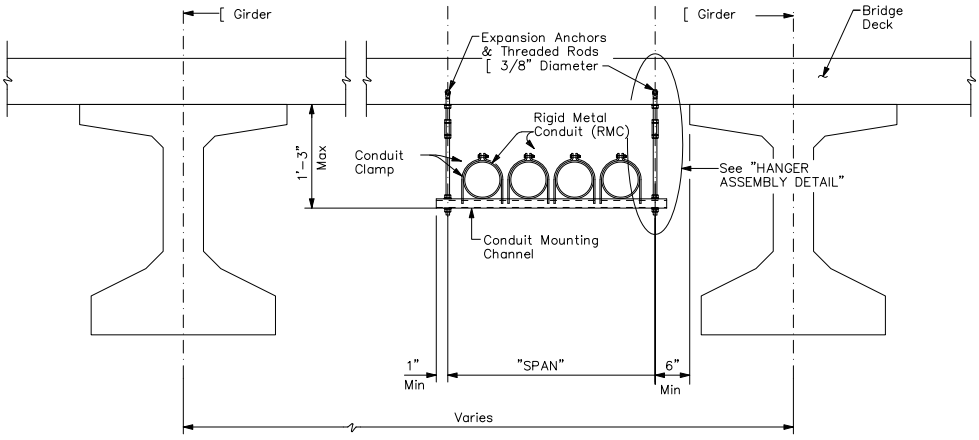
10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

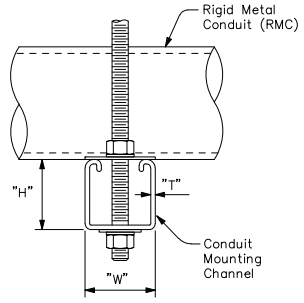
14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non–threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non–galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

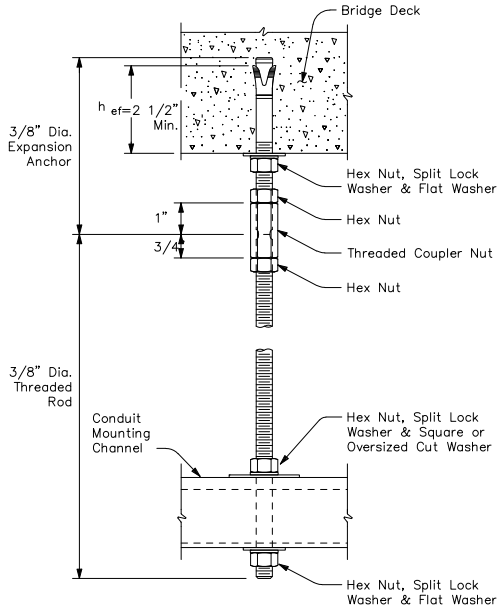


CONDUIT HANGING DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.





HANGER ASSEMBLY DETAIL

ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT

Texas Department of Transportation | Traffic Operations Division Standard

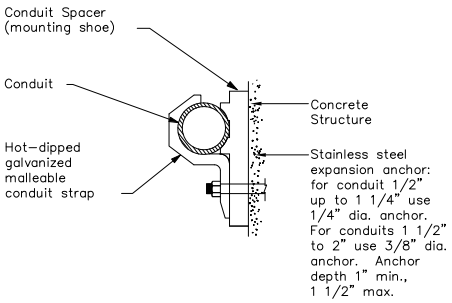
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

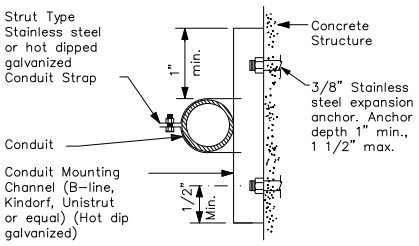
TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

ELECTRICAL DETAILS
CONDUIT SUPPORTS

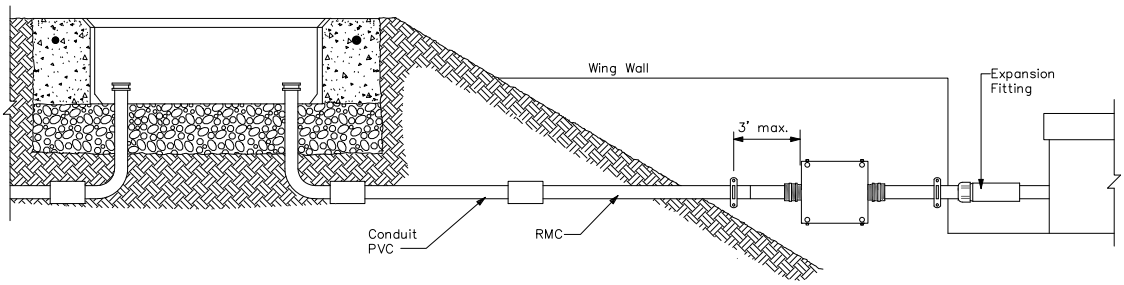
9-5-8A





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC–ES). The chosen anchor product shall have a designated ICC–ES Evaluation Report number, and its approval status shall be maintained on the ICC–ES website under Division 031600 for Concrete Anchors.

2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC–ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc–plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.

4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.

5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef})as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.

6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation | Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non–metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel–filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel–filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel–filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J–hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non–conductive coatings such as concrete splatter from the rod at the clamp location.

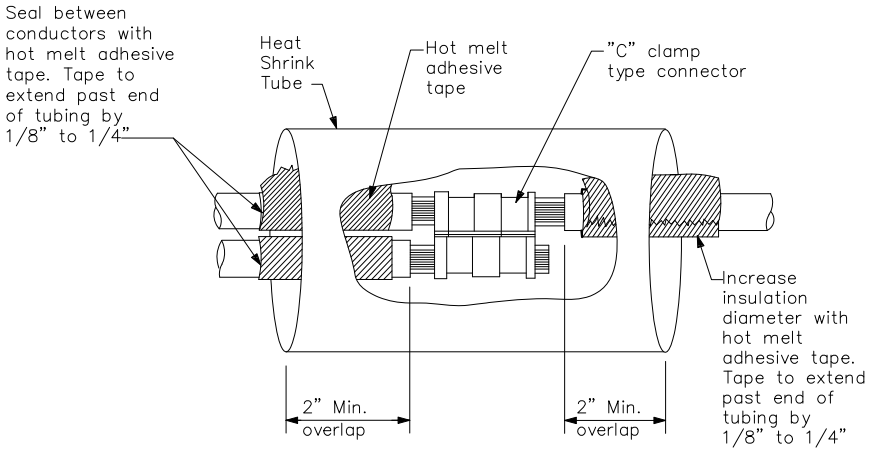
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non–metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

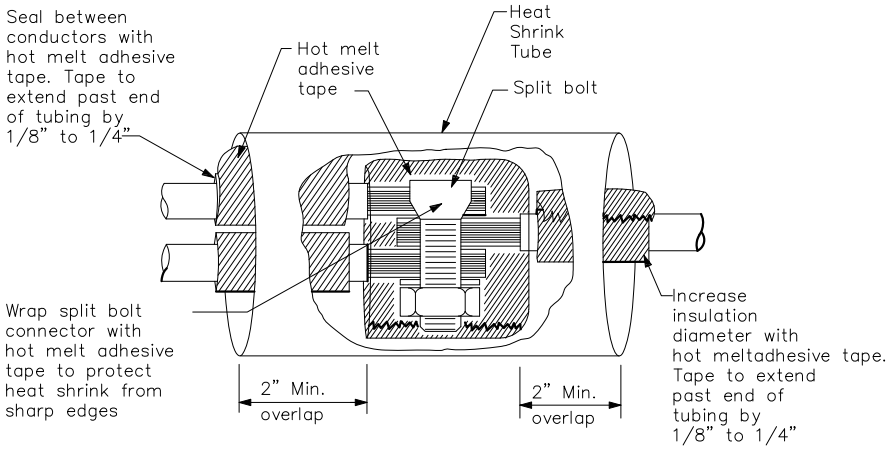
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.

Texas Department of Transportation | Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm



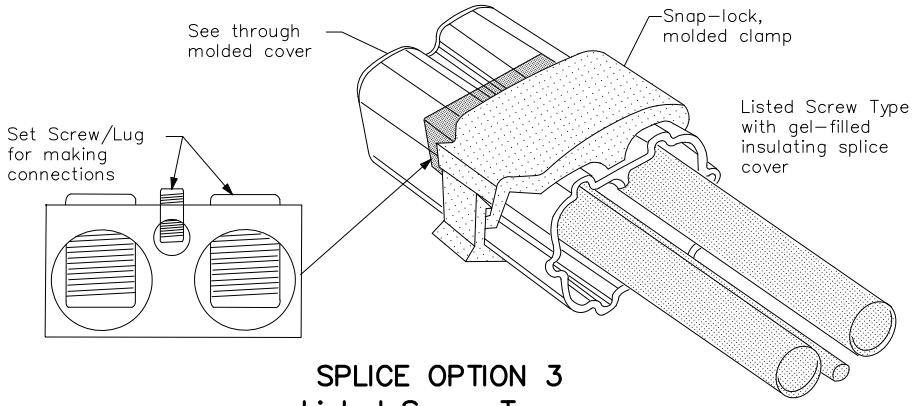
SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type

Texas Department of Transportation | Traffic Operations Division Standard

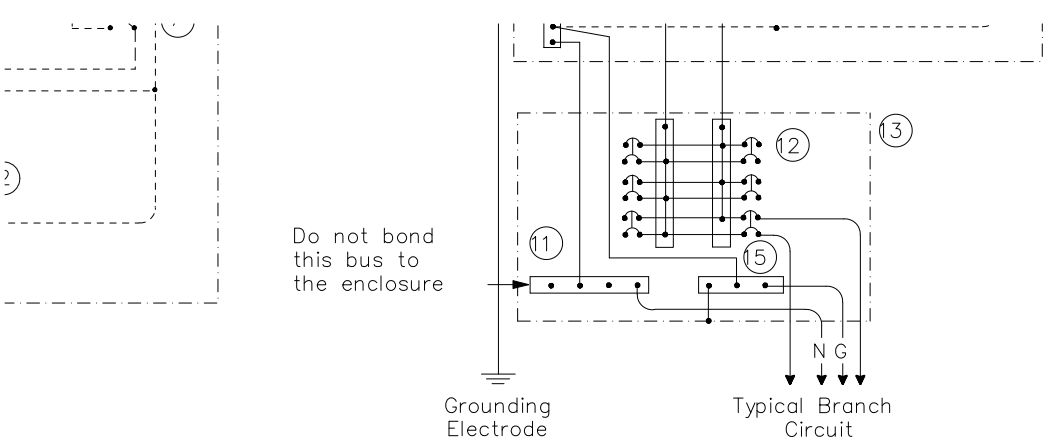
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation | Traffic Operations Division Standard

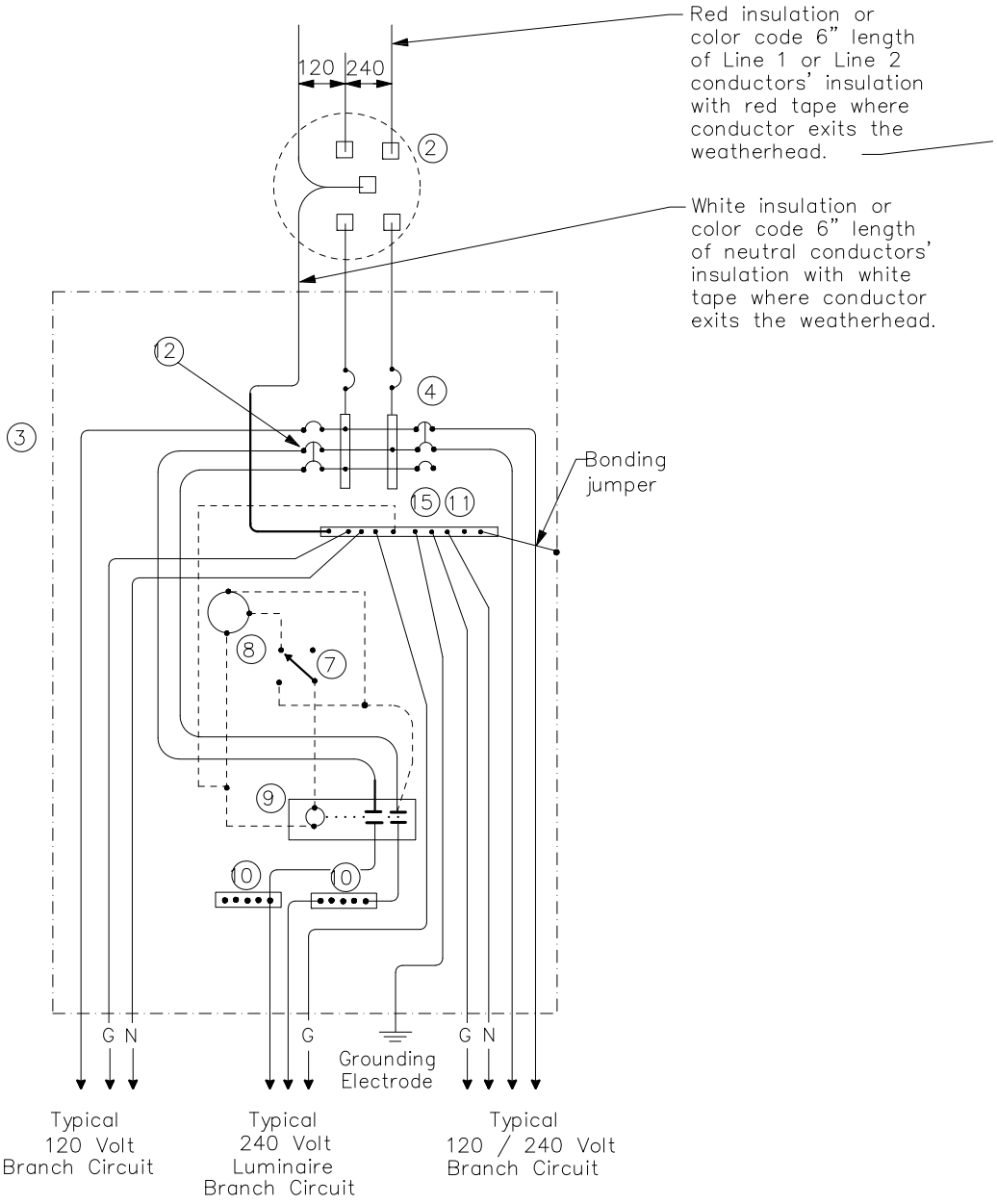
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm



	mounted shown
9	Lighting Contac
10	Power Distributi
11	Neutral Bus
12	Branch Circuit (See Electrical
13	Separate Circui
14	Load Center
15	Ground Bus

SCHEMATIC TYPE C
THREE WIRE

WIRING LEGEND
Wiring
ol Wiring
al Conductor
nent grounding conductor—always ed



SCHEMATIC TYPE D – CUSTOM

TIMBER POLE(TP)SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.

2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.

3. Install pole–top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.

4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.

5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 11/2 in. to 15/8 in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, 1/4 in. minimum diameter by 11/2 in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.

6. When excess length must be trimmed from poles, trim from the top end only.

Texas Department of Transportation
Traffic Operations Division Standard
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC)and service entrance conductors – One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in 1/2 in. PVC to ground rod – extend 1/2 in. PVC 6 in. underground.

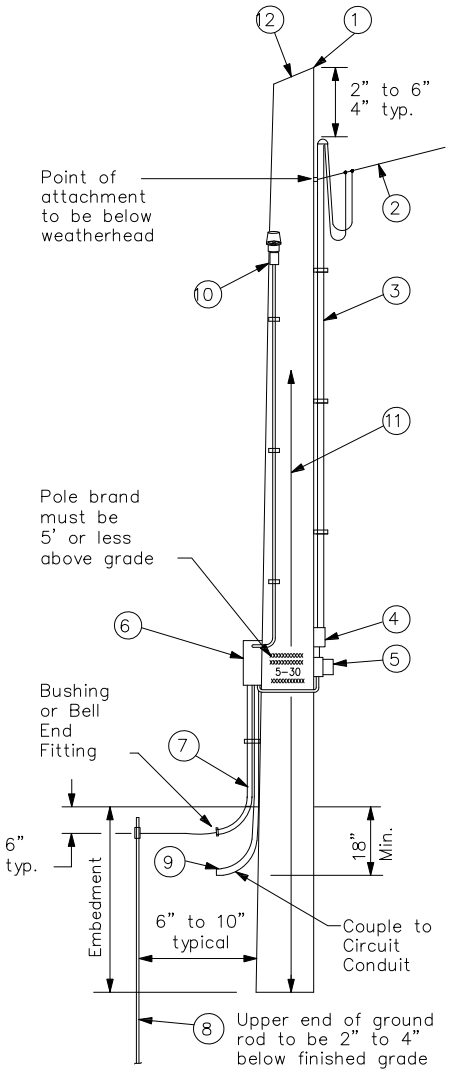
(8) 5/8 in. x 8 ft. Copper clad ground rod – drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole–top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non–conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.



SERVICE SUPPORT TYPE TP (O)

Texas Department of Transportation | Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

GRANITE CONCRETE(GC)& OTHER CONCRETE(OC)NOTES

Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."

2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.

3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two–point pickup locations when handling pole in horizontal position, and one–point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.

4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.

5. Ensure all installation details of services are in accordance with utility company specifications.

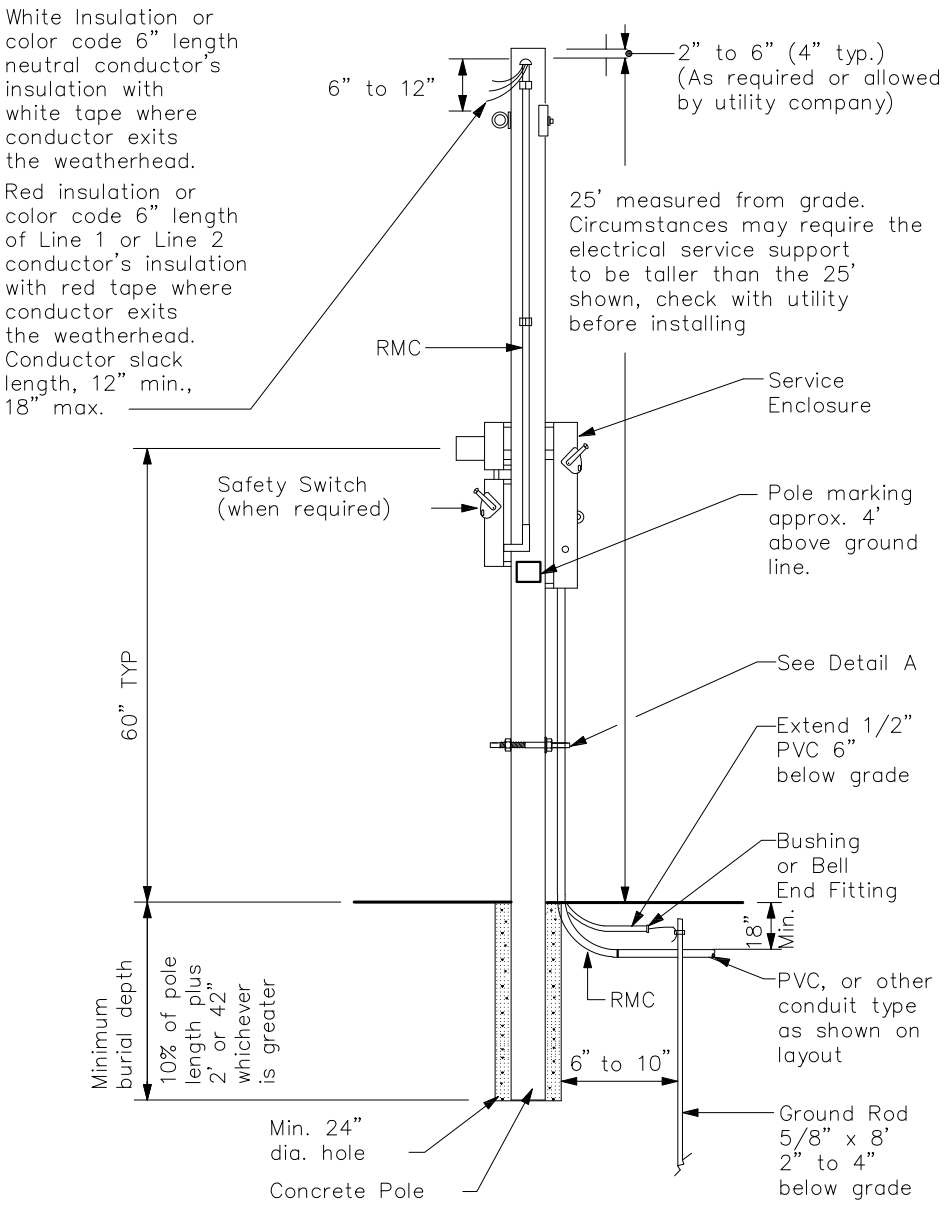
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.

7. Furnish and install galvanized or stainless steel channel strut 1 1/2 in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep (Unistrut, Kindorf, B–line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U–bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.

8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.

Texas Department of Transportation | Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm



CONCRETE SERVICE SUPPORT

Overhead(O)

Texas Department of Transportation | Traffic Operations Division Standard

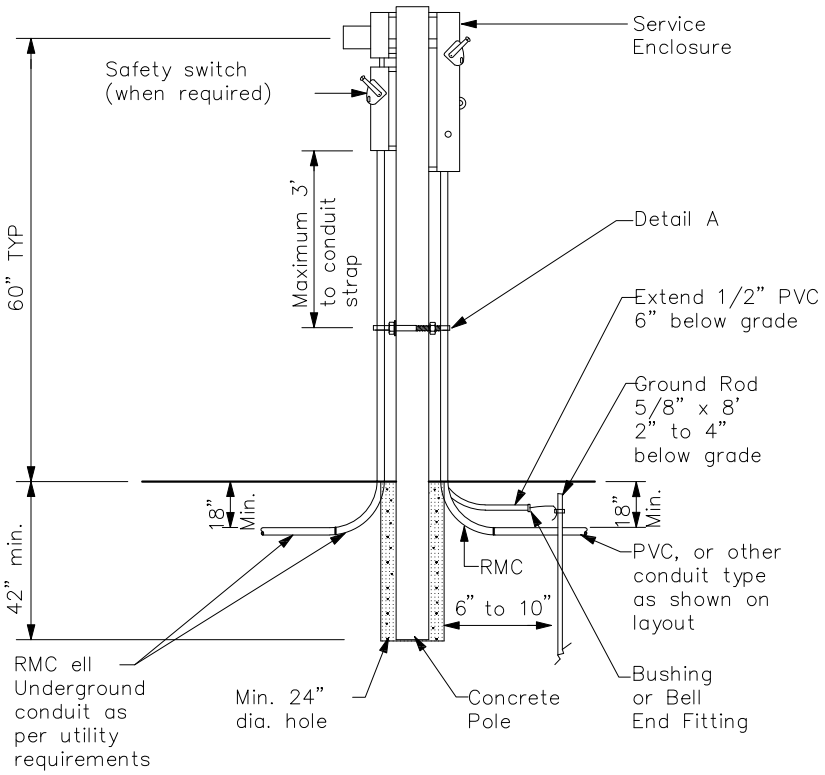
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

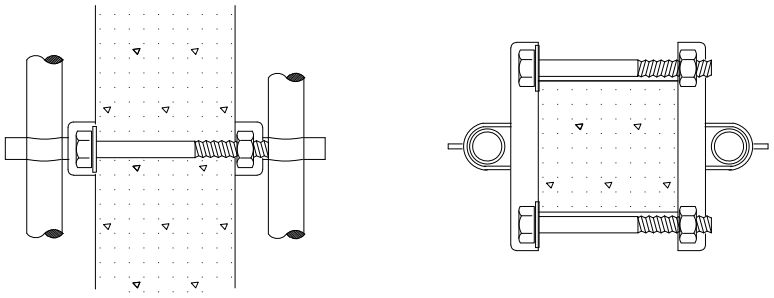
ELECTRICAL DETAILS
SERVICE SUPPORT
TYPES GC, OC, & TP

9-5-11D



CONCRETE SERVICE SUPPORT

Underground(U)



Side View

Top View

DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc–rich paint. Ensure there is no paint splatter on the pole.

Texas Department of Transportation | Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

ELECTRICAL DETAILS
SERVICE SUPPORT
TYPES GC, OC, & TP

9-5-11E

SHIPPING PARTS LIST – POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base			T-Base			CSB/SSCB Mounted		
	Designation		Quantity	Designation		Quantity	Designation		Quantity
	Pole A1 A2	Luminaire		Pole A1 A2	Luminaire		Pole A1 A2	Luminaire	
20	(Type SA 20 S – 4)	(150W EQ) LED		(Type SA 20 T – 4)	(150W EQ) LED				
	(Type SA 20 S – 4 – 4)	(150W EQ) LED		(Type SA 20 T – 4 – 4)	(150W EQ) LED				
30	(Type SA 30 S – 4)	(250W EQ) LED		(Type SA 30 T – 4)	(250W EQ) LED		(Type SP 28 S – 4)	(250W EQ) LED	
	(Type SA 30 S – 4 – 4)	(250W EQ) LED		(Type SA 30 T – 4 – 4)	(250W EQ) LED		(Type SP 28 S – 4 – 4)	(250W EQ) LED	
	(Type SA 30 S – 8)	(250W EQ) LED		(Type SA 30 T – 8)	(250W EQ) LED		(Type SP 28 S – 8)	(250W EQ) LED	
	(Type SA 30 S – 8 – 8)	(250W EQ) LED		(Type SA 30 T – 8 – 8)	(250W EQ) LED		(Type SP 28 S – 8 – 8)	(250W EQ) LED	
40	(Type SA 40 S – 4)	(250W EQ) LED		(Type SA 40 T – 4)	(250W EQ) LED		(Type SP 38 S – 4)	(250W EQ) LED	
	(Type SA 40 S – 4 – 4)	(250W EQ) LED		(Type SA 40 T – 4 – 4)	(250W EQ) LED		(Type SP 38 S – 4 – 4)	(250W EQ) LED	
	(Type SA 40 S – 8)	(250W EQ) LED		(Type SA 40 T – 8)	(250W EQ) LED		(Type SP 38 S – 8)	(250W EQ) LED	
	(Type SA 40 S – 8 – 8)	(250W EQ) LED		(Type SA 40 T – 8 – 8)	(250W EQ) LED		(Type SP 38 S – 8 – 8)	(250W EQ) LED	
	(Type SA 40 S – 10)	(250W EQ) LED		(Type SA 40 T – 10)	(250W EQ) LED		(Type SP 38 S – 10)	(250W EQ) LED	
	(Type SA 40 S – 10 – 10)	(250W EQ) LED		(Type SA 40 T – 10 – 10)	(250W EQ) LED		(Type SP 38 S – 10 – 10)	(250W EQ) LED	
	(Type SA 40 S – 12)	(250W EQ) LED		(Type SA 40 T – 12)	(250W EQ) LED		(Type SP 38 S – 12)	(250W EQ) LED	
	(Type SA 40 S – 12 – 12)	(250W EQ) LED		(Type SA 40 T – 12 – 12)	(250W EQ) LED		(Type SP 38 S – 12 – 12)	(250W EQ) LED	
50	(Type SA 50 S – 4)	(400W EQ) LED		(Type SA 50 T – 4)	(400W EQ) LED		(Type SP 48 S – 4)	(400W EQ) LED	
	(Type SA 50 S – 4 – 4)	(400W EQ) LED		(Type SA 50 T – 4 – 4)	(400W EQ) LED		(Type SP 48 S – 4 – 4)	(400W EQ) LED	
	(Type SA 50 S – 8)	(400W EQ) LED		(Type SA 50 T – 8)	(400W EQ) LED		(Type SP 48 S – 8)	(400W EQ) LED	
	(Type SA 50 S – 8 – 8)	(400W EQ) LED		(Type SA 50 T – 8 – 8)	(400W EQ) LED		(Type SP 48 S – 8 – 8)	(400W EQ) LED	
	(Type SA 50 S – 10)	(400W EQ) LED		(Type SA 50 T – 10)	(400W EQ) LED		(Type SP 48 S – 10)	(400W EQ) LED	
	(Type SA 50 S – 10 – 10)	(400W EQ) LED		(Type SA 50 T – 10 – 10)	(400W EQ) LED		(Type SP 48 S – 10 – 10)	(400W EQ) LED	
	(Type SA 50 S – 12)	(400W EQ) LED		(Type SA 50 T – 12)	(400W EQ) LED		(Type SP 48 S – 12)	(400W EQ) LED	
	(Type SA 50 S – 12 – 12)	(400W EQ) LED		(Type SA 50 T – 12 – 12)	(400W EQ) LED		(Type SP 48 S – 12 – 12)	(400W EQ) LED	

OTHER				
Designation				Quantity
Pole	A1	A2	Luminaire	

Texas Department of Transportation

Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.
4. Optional Steel Pole Designs. Multi–sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.
   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre–approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre–approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre–approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3–second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25–year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non–hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12–foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60–pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.
5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.
   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code–Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063–T6, ASTM B209 Alloy 5086–H34, ASTM B221 Alloy 6005–T5.
         Base Flange: ASTM B26 Alloy 356.0–T6 or ASTM B108 Alloy 356.0–T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061–T6 or ASTM B221 Alloy 6005–T5.
         Mast Arms: ASTM B241 Alloy 6061–T6 or Alloy 6063–T6.
         Pole Cap: ASTM B209 Alloy 5086–H32 or ASTM B108 or B26 Alloy 356.0–T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti–seize compound, Never–Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole–arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'–0" lower than the nominal height, unless otherwise shown or directed.

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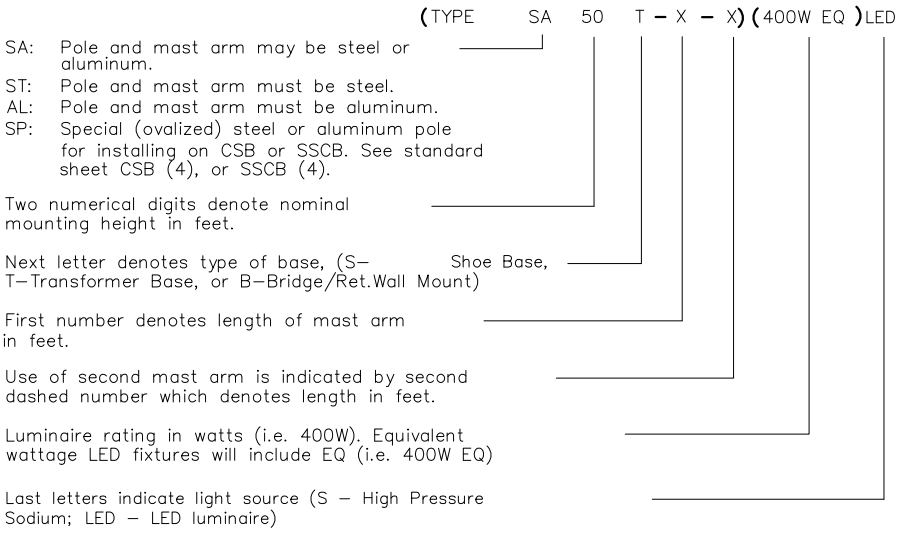
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS



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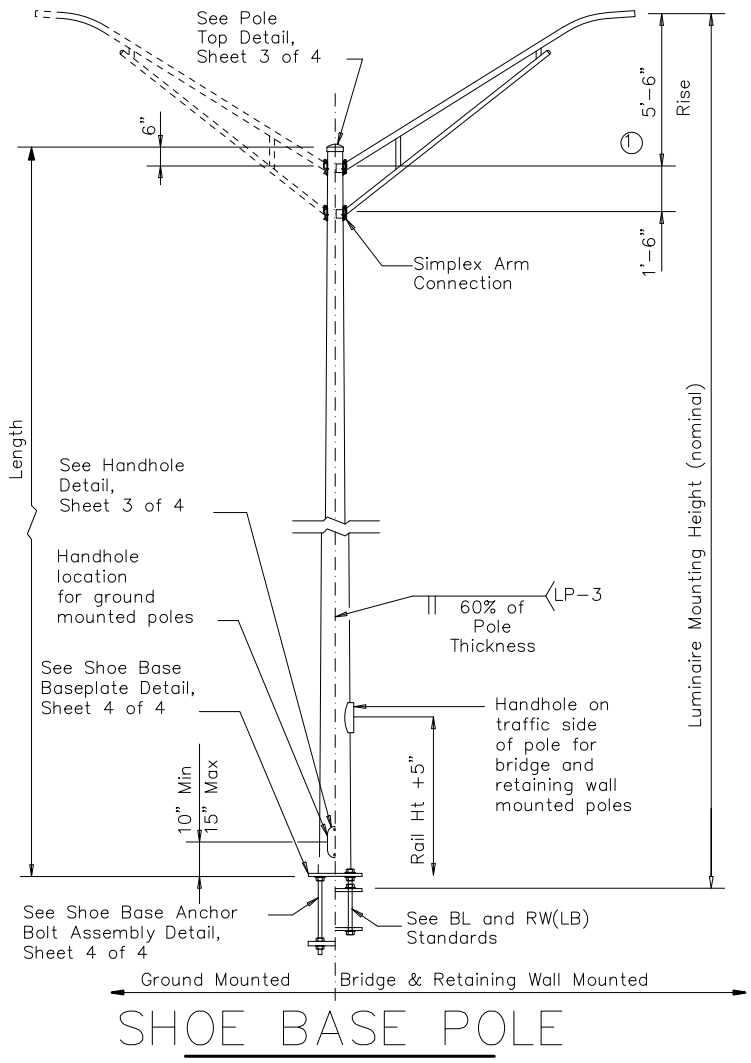
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

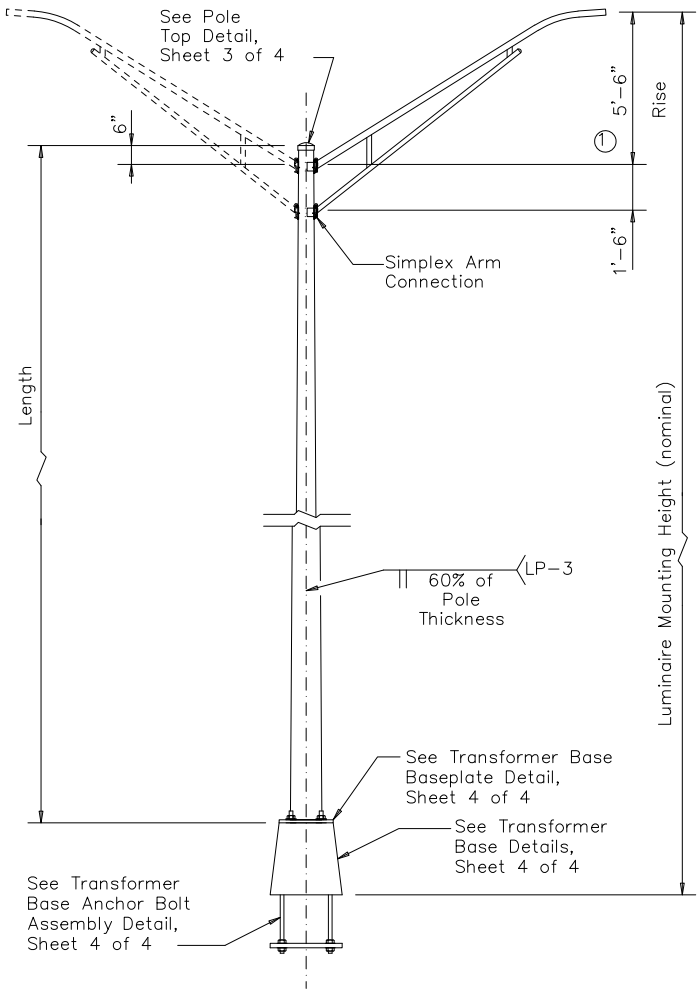


SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal)(ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3

Texas Department of Transportation | Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal)(ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3

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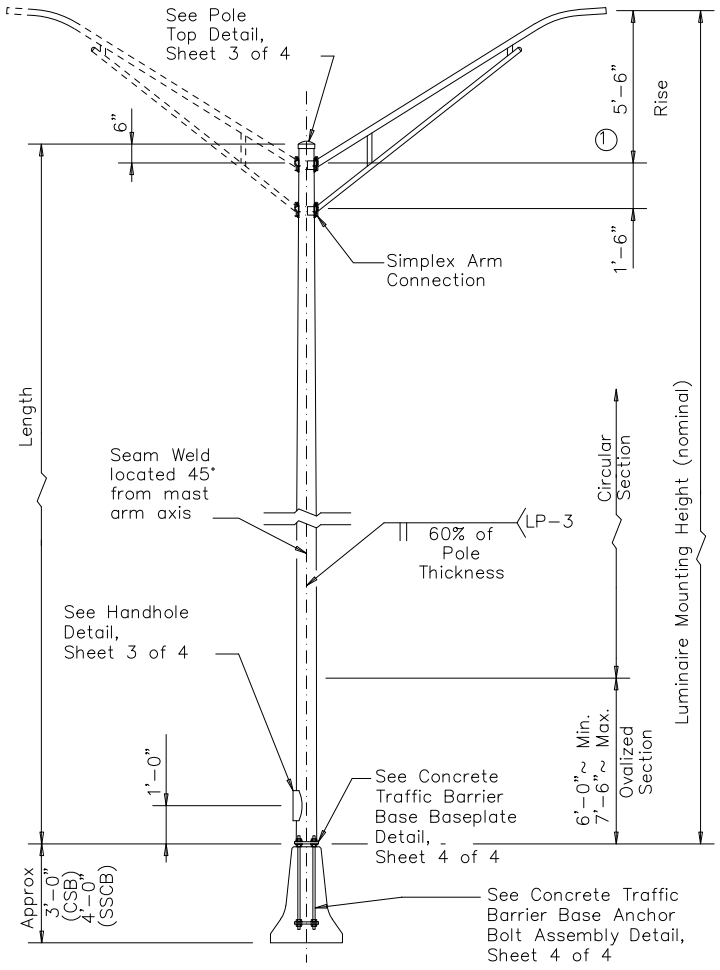

CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal)(ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

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MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③ or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T–Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193–B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H,or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'–6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", −1/16"
O.D. of inside piece of slip fitting pieces	+1/32", −1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi–sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

Texas Department of Transportation | Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3–Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.

2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60–pound luminaire having an effective projected area of 1.6 square feet.

3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.

5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."

6. Steel poles shall be fabricated in accordance with Item 441,"Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code–Steel.

7. Two–section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field–assembled by the lap–joint method. The two sections shall telescope together with a lap length of not less than 1–1/2 times the shaft diameter at the lap joint.

8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.

9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."

10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.

11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."

12. Pole length is based on a 5'–6" luminaire arm rise. 4 ft. luminaire arms have a 2'–6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'–0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.

13. Erect transformer base poles in accordance with sheet RID(1).

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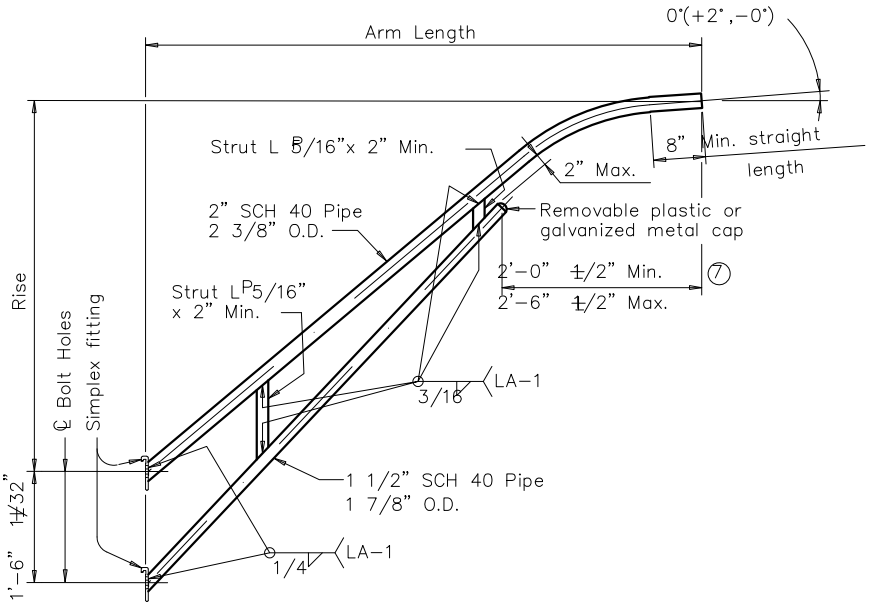
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm



LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"

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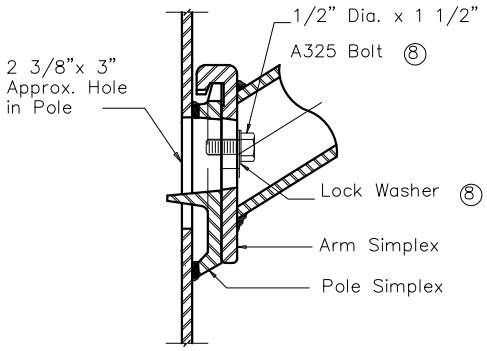
TITLE 19 - SUBDIVISION ORDINANCE

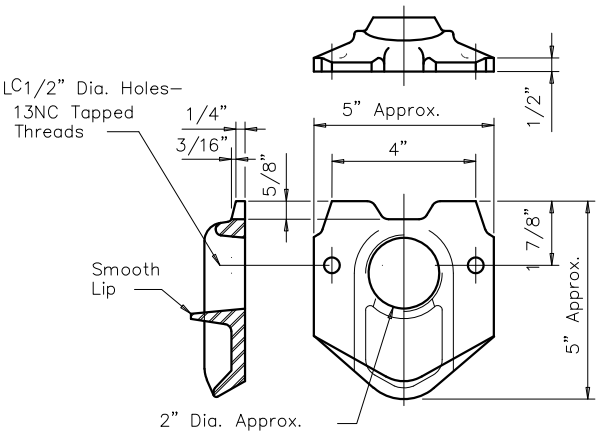
STREET DESIGN MANUAL

ROADWAY ILLUMINATION POLES
RIP (3)-19

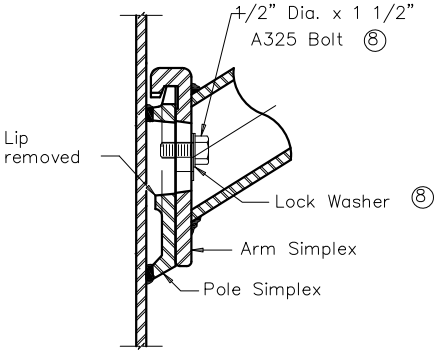
9-5-14A



UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

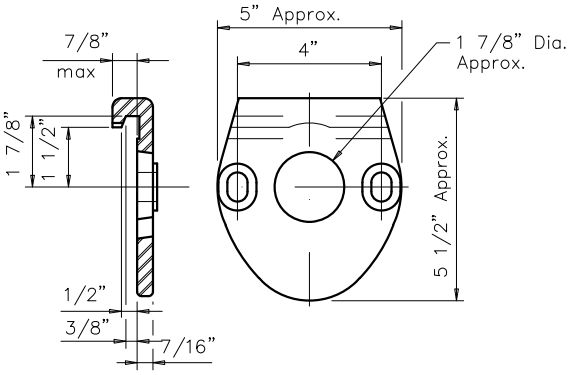


POLE SIMPLEX DETAIL ⑧



LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B–B



ARM SIMPLEX DETAIL ⑨

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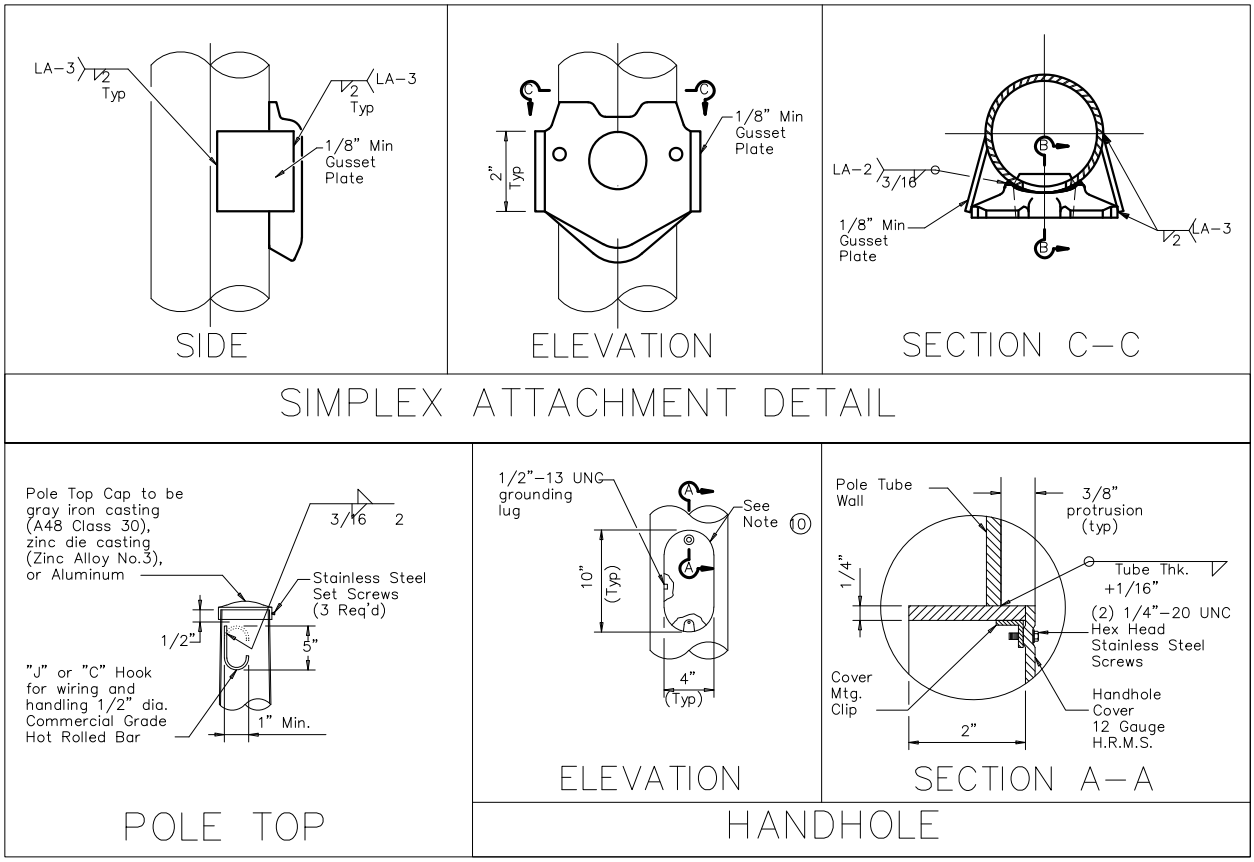
TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

ROADWAY
ILLUMINATION
POLES
RIP (3)-19

9-5-14B



NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 5 or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 6, or A1011 HSLAS-F Gr 50 6
Arm Struts and Gusset Plates 4	ASTM A36, A572 Gr 50 6, or A588
Misc.	ASTM designations as noted

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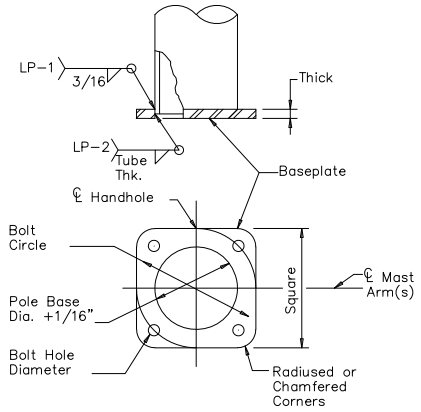
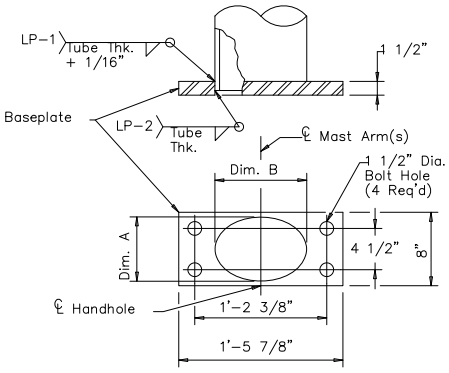


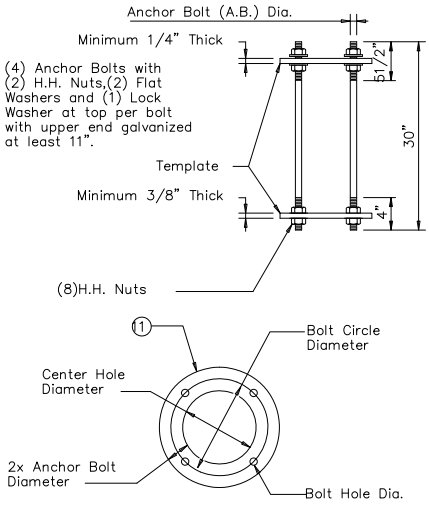
SHOE BASE
BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20'– 39'	13"	13"	1 1/4"	1 1/4"
40'	15"	15"	1 1/4"	1 1/2"
50'	15"	15"	1 1/2"	1 1/2"

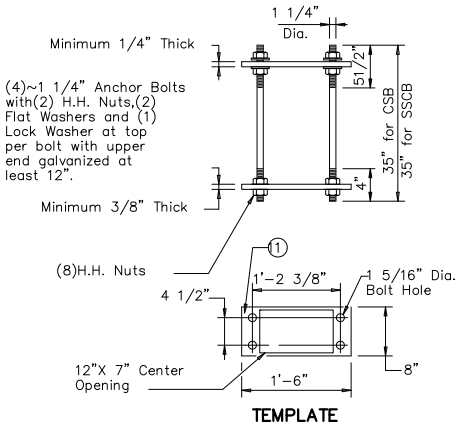


CONCRETE TRAFFIC
BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA. ②	DIM. A	DIM. B
28'– 38'	9"	7"+_1/4"	10"+_1/4"
48'	10 1/2"	7"+_1/4"	13"+_1/4"



SHOE BASE
ANCHOR BOLT ASSEMBLY



TEMPLATE

CONCRETE TRAFFIC BARRIER
BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20'–39'	1"	13"	11"	1 1/16"
40'–50'	1 1/4"	15"	12 1/2"	1 5/16"

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20'– 39'	1"	14"	12"	1 1/16"
40'– 50'	1 1/4"	17 1/4"	14 3/4"	1 5/16"

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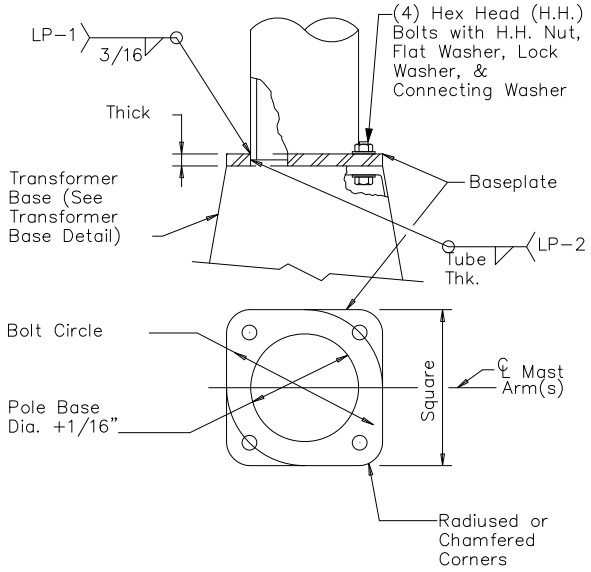
THE CITY OF EL PASO TEXAS

TITLE 19 - SUBDIVISION ORDINANCE

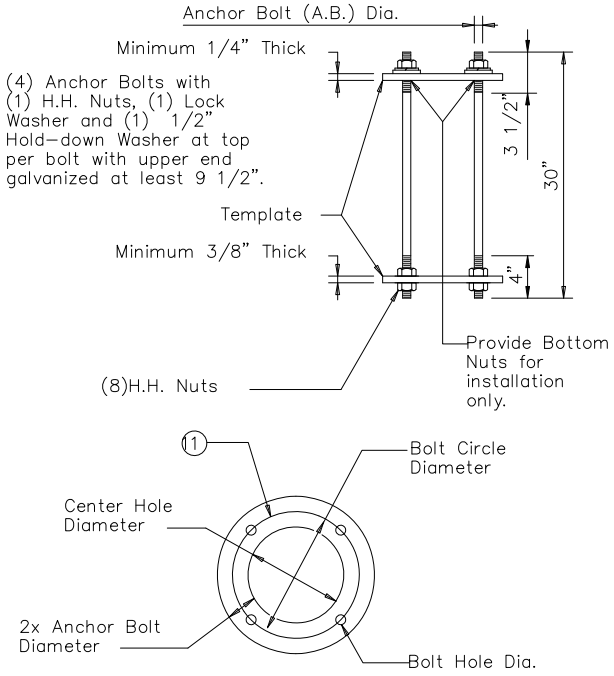
STREET DESIGN MANUAL

ROADWAY
ILLUMINATION
POLES
RIP (4)-19

9-5-15A



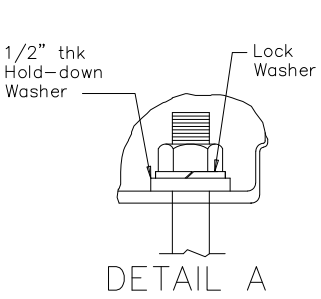
TRANSFORMER BASE BASEPLATE



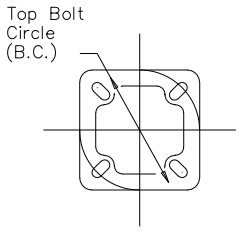
TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20'– 39'	13"	13"	1 1/4"	1"	1 1/4"	A
40'	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50'	15"	15"	1 1/2"	1 1/4"	1 1/2"	B

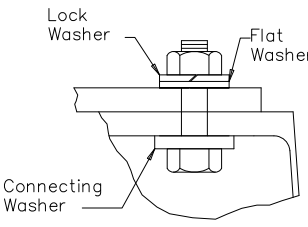
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



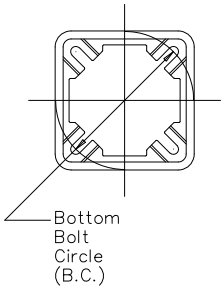
DETAIL A



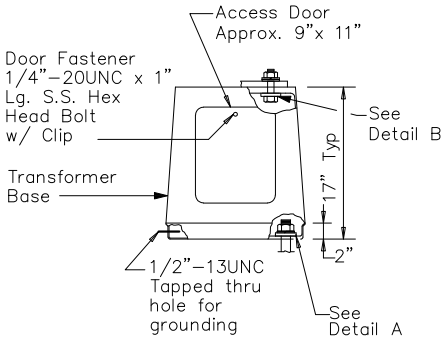
TOP PLAN



DETAIL B



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

Texas Department of Transportation

Traffic Operations Division Standard

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TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

ROADWAY ILLUMINATION POLES
RIP (4)-19

9-5-15B

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.

2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA–approved methods. All bases shall have been structurally tested to resist 150% of the design moment.

3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0–T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers,and connecting and hold–down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.

4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.

5. Doors for transformer bases shall be made of plastic, fiberglass or other non–metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	+_1/2"
Threaded length	+_1/2"
Galvanized length (if required)	– 1/4"

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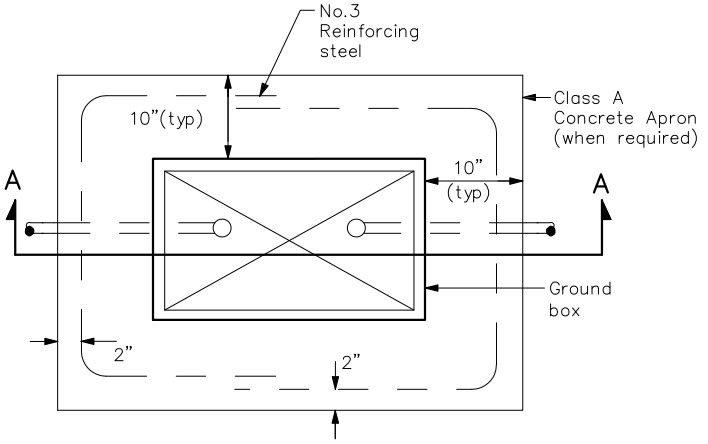
THE CITY OF EL PASO TEXAS

TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

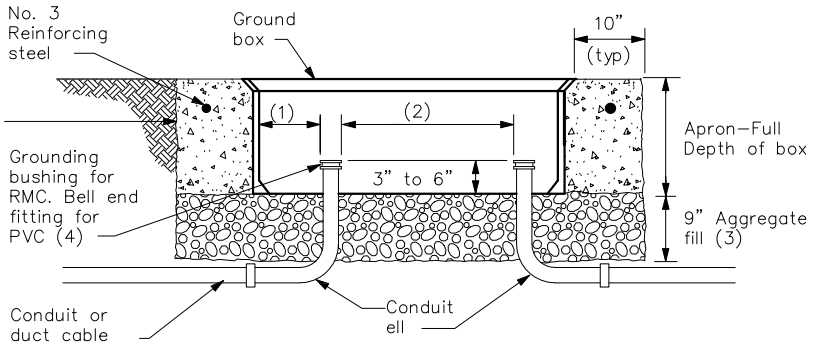
ROADWAY
ILLUMINATION
POLES
RIP (4)-19

9-5-15C



PLAN VIEW

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17



SECTION A – A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

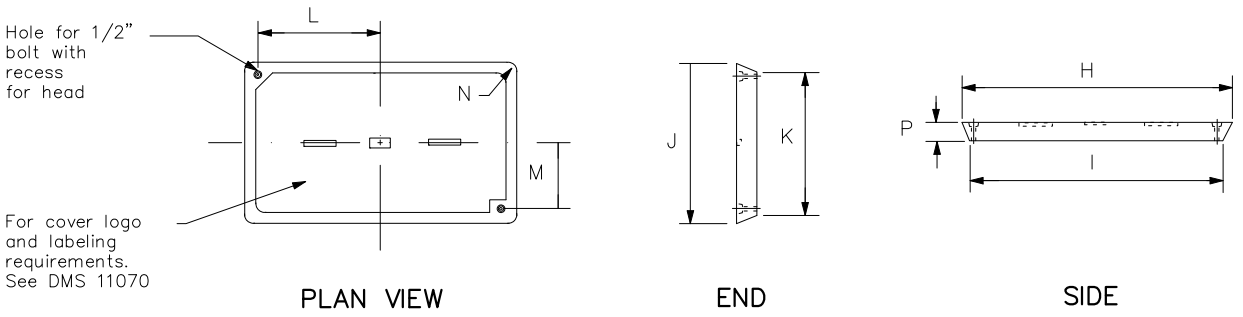
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

(5) Install expansion joint between ground box and concrete apron.

Texas Department of Transportation | Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



GROUND BOX COVER

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TITLE 19 - SUBDIVISION ORDINANCE

STREET DESIGN MANUAL

ELECTRICAL
DETAILS
GROUND BOXES

9-5-16B

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

ELECTRICAL SERVICES NOTES

1.Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2.Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services—Type A," DMS 11082 "Electrical Services—Type C," DMS 11083 "Electrical Services—Type D," DMS 11084 "Electrical Services—Type T," DMS 11085 "Electrical Services—Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3.Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4.Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5.The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6.Enclosures with external disconnects that de—energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7.When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8.Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non—metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9.All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10.Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11.Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12.Ensure all mounting hardware and installation details of services conform to utility company specifications.

13.For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14.When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15.Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit ** Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 1/4"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 1/4"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.
2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.
4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.
2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

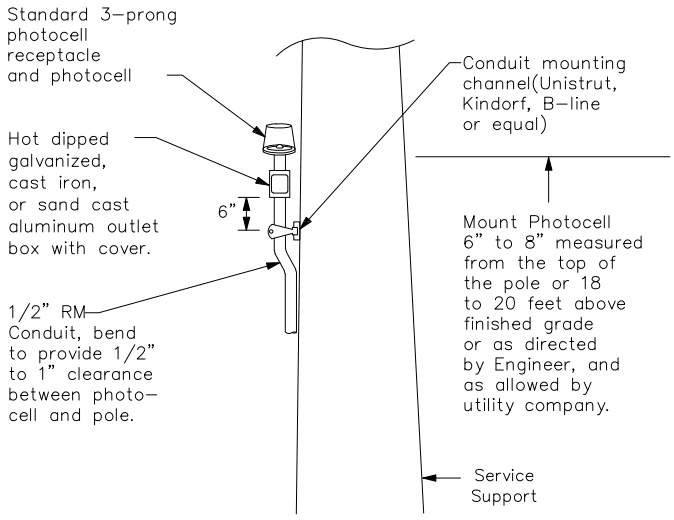
(SS)= Safety Switch Ahead of Meter–Check with Utility
(NS)= No safety Switch Ahead of Meter–Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

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http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

ROADWAY ILLUMINATION LIGHT FIXTURES

Fixture Housing:

A. Provide UL listed fixture suitable for use in wet locations. Ensure optical compartment meets IEC Standard 60529-IP 65. Place a permanent label inside fixture indicating fixture meets *UL, IP 65 optical, and shows date of manufacture. Meet ANSI136.15 wattage label requirements.

B. Construct fixture housing, lens, frame, and door from 96%copper-free, die cast aluminum. Provide fixture mounting to a 2-in. pipe arm. Equip fixture with a 4-bolt clamp capable of adjustments plus or minus 5 degrees From level. Meet ANSI 136.31 3.0 G vibration requirements.

C. Attach a level bubble to the fixture housing. Ensure the level bubble is sensitive to 1 degree changes in Position at any point within 5 degrees of the level position. Ensure the level bubble is clearly visible from The ground up to a 50 ft. mounting height. Ensure level bubble corresponds to level position of fixture.

D. Do not exceed 1.6 sq. ft. effective projected area. Do not exceed 60 lb. maximum weight.

E. Equip fixture with a 3-prong photocell receptacle with shorting clamp installed.

F. Paint inside and outside of fixture light gray, when installing on galvanized poles. For all other fixtures Paint to match color of the pole as directed by the department.

G. Use a thermoset powder coat system. Ensure paint exceeds 1000-hr. salt-spray test in accordance with ASTM B117. Ensure a nominal thickness of 2.5 mil and no pigment loss upon 50 double-rubs using Methyl Ethyl Ketone (MEK) solvent in accordance with ASTM D5402,. “Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs”.

H. Fabricate brackets, nuts, bolts, washers, ballast tray, and parts from stainless steel, or aluminum of adequate thickness as approved by the Department except that:

1. The 4 bolts/studs, 4 flat washers, 4 lock washers, and clamp that attach the luminaire to the arm may be galvanized in accordance with ASTM 123, A153, or B633. Provide means to ensure clamp is in the open position.
2. Glass lens retainer spring clips may be fabricated from galvanized steel in accordance with ASM A153.
3. Provide nylon and throat or other approved locking means for all stainless steel nuts.

I. Provide optical assemblies which meet the following:

1. Polished aluminum reflectors with Alzak or equal coating.
2. Do not point reflectors, except that, when approved by the engineer, some surfaces may be painted with 92% reflective white paint.
3. Reflectors may be one piece or segmented as follows.
   a. One piece reflectors:
      1. Seal photometric compartment by the use of a seamless or vulcanized seam, closed-cell silicone gasket, or other method approved by the Department.
      2. Provide a non-adjustable lamp socket mounting metal so the lamp center is consistent with the reflector.

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http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

b. Segment reflectors:

1. Attach segments at both ends (or opposite sides if segments are square) of the segment to a ridged aluminum base plate and side wall support assembly. Seal glass lens to lens frame with a one piece seamless silicone gasket.
2. Reflectors may be one piece or segmented as follows.
1. Equip the optical assembly with a lamp support in addition to the lamp socket to ensure the outer envelope is positioned as intended.

J. Provide 5/32 in. thick (min.) clear heat tempered or borosilicate glass.

Electrical Components:

K. Need the following ballast requirements and pass test in accordance with Test Metal Tex-1130-T, "Ballast of Lighting Assemblies".

1. Mount electrical components on removable stainless steel or aluminum tray of adequate thickness.
2. Provide a fixture wiring diagram on or near the Ballast.
3. Use a copper wound magnetic regulating three isolated coil ballast.
4. Provide ballast factor between 0.95 and 1.0.
5. When the circuit voltage indicated on the plans is applied, the ballast input wattage during fluctuations of the test voltage of plus 10 percent and minus 10 percent, do not exceed the following:
   a. 220 watts for 150 watt nominal lamp rating.
   b. 440 watts for 250 watt nominal lamp rating.
   c. 552 watts for 400 watt nominal lamp rating.
6. During fluctuation of the test voltage of plus 10 percent and minus 10 percent, ensure the lamp wattage fluctuation does not exceed a total of 20 percent and ballast maintains lamp wattage within the following limits.
   a. 110 watts minimum and 180 watts minimum for 150 watt nominal lamp rating.
   b. 175 watts minimum and 370 watts minimum for 250 watt nominal lamp rating.
   c. 280 watts minimum and 475 watts minimum for 400 watt nominal lamp rating.
7. Ensure the ballast power factor, when tested at circuit voltage indicated on the plans, is not less than 90%.
8. Permanently and clearly mark ballast or fixture to indicate the following:
   a. Lamp type
   b. Catalog number
   c. Voltage rating
   d. Connection diagram
   e. Manufacturer
   f. *UL listing

I. Meet the following electronic aid requirements and pass tests accordance with Test Metal Tex-1140-T, “Electronic Starting Aids of High Pressure Sodium Vapor Lighting Assemblies”.

1. Provide a starting pulse with an amplitude of 2500 volts minimum, 4000 colts minimum.
2. Ensure the pulse width is a minimum of 0.8 microseconds and 2250 volts.
3. Ensure the pulse occurs when the circuit voltage is equal to or greater than 90 percent of peak open circuit voltage.
4. Ensure pulse repetition rate is a minimum of one per cycle.
5. Provide a pulse current of 0.18 amperes (min.).
6. Discontinue to pulse when, either,
   a. The lamp starts, or
   b. After a minimum of three minutes and a maximum of ten minutes if the lamp fails to start.

M. Do not place fuses inside pole mounted luminaires. For wall mount or underpass mounted luminaries, provide internal ten amp time-delay fuses.

N. Provide a two position terminal block for connecting supply wires which meet the following requirements:

1. Insulate using nylon, porcelain, or phenolic material. Ensure phenolic terminal block is of adequate construction as approved by the Department.
2. Fabricate terminals from nickel, tin plated brass, or aluminum.

O. Equip fixture with MOV surge protection in accordance with IEEE recommendation.

1. Connect MOV from line to natural or from line to line.
2. Install MOV on the terminal block.

Lamp & Socket:

P. Provide *UL listed mogul base lamp socket rated for 600 V, 1500 W that can withstand a 5000 V pulse. Meet *UL 496 requirements. Use porcelain-insulated lamp sockets with nickel platted copper alloy or stainless steel for the spring and contact.

Q. Supply and secure lamps inside the fixture that meet the following:

1. Use pre-qualified high pressure sodium (HPS) lamps from TxDOT's materials producers list of the wattages shown on the plans. No alternatives allowed.
2. Average rated lamp life 30,000 hours.
3. Fully extinguished at end of usable lamp life and remain extinguished without cycling.
4. Do not provide lamps that burned at reduced output at end of life.
5. Meet the federal Toxic Characteristic Leachate Procedure (TCLP) limits.

Performance:

R. Meet the following photometric requirements using published photometric data and photometric data obtained by testing sampled fixtures.

1. 150 watt mast arm (underpass) mounted luminaire. Meet IESNA cutoff requirements. Provide a minimum intensity of 0.20 foot-candle in a rectangular area measuring 110.0 ft. by 30.0 ft., when mounted in a level position as indicated on the properly mounted fixture level bubble 20.0 ft. above the midpoint of either long side of the surface area. Do not exceed 50:1 maximum to minimum horizontal illuminance uniformity ratio within the rectangular area.
2. 250 watt mast arm mounted luminaire. Meet IESNA cutoff requirements. Provide a minimum intensity of 0.20 foot-candle in a rectangular area measuring 190.0 ft. by 45.0 ft. when mounted properly in a level position as indicated on the level bubble 40.0 ft. above the midpoint either long side of the surface area. Ensure light intensities along the line parallel to and 20.0 ft. in from the long side of this rectangular area do not decrease by more than 0.50 foot-candle in any 5.0 ft. interval along the line from 10.0 ft. to 90.0 ft. on both sides of the luminaire and provide illuminance uniformity ratio within the rectangular area.
3. 400 watt mast arm mounted luminaire. Meet IESNA cutoff requirements. Provide a minimum intensity of 0.20 foot-candle in a rectangular area measuring 220 ft. by 60.0 ft. when mounted properly in a level position as indicated on the level bubble 50.0 ft. above the midpoint either long side of the surface area. Ensure light intensities along the line parallel to and 30.0 ft. in from the long side of this rectangular area do not decrease by more than 0.75 foot-candle in any 10.0 ft. interval along the line from 10.0 ft. to 90.0 ft. on both sides of the luminaire and provide illuminance uniformity ratio within the rectangular area.

S. Ensure photometric data is consistent from fixture to fixture. Match published photometric data (or approved photometric reports submitted during the prequalification process as the typical photometric output instead of published data) as follows:

1. Point of maximum candela within 5 degrees horizontally and vertically.
2. Maximum candela within 20% of published maximum candela.
3. Fixture efficiency within 10% of published efficiency.

*When reference is made to UL, it can be considered to mean Nationally Recognized Independent Testing Lab (NRTL). Compatible Standards of Canadian Standard Association, Electrical Testing Laboratories of Factory Mutual can be equal to referenced UL standard.

Pre qualification:

T. Use only pre-Qualified fixtures. No alternates will be considered.

1. Only materials with approved product codes or designations from pre qualified producers are accepted on bids.

The Construction Division lCSTI of the Texas Department of Transportation lTxDOTl maintains the material producers list of approved producer product codes or designations. use the following website to view this list:

http://www.dot.stote.tx.us/business/producer_1 ist.ntm

Use of pre qualified material does not relieve the contractor of the responsibility to provide materials that meet the specifications. All materials, including those shown on the pre qualified material list, may be inspected and tested at any time and may be rejected if not in compliance with the specifications.

2.Notify the Department in writing as to which fixture from the pre qualified list of approved fixtures will be supllied on each project.

3. To have a fixture listed as pre-qualified:

a.Submit a sample of each type of luminaire and all pertinent data, including published photometric data and recently tested photometric data (IES format, both "averaged" and both sides of "un-averaged" data) to:

TXDOT - TRF 116 East Riverside Dr, Austin, TX 78704

b. Demonstrate a commitment to quality.

c. Submit the following documentation:

1. QA/QC program documentation with the following minimum requirements;

a. Written statement of the companies QA/QC policy.

b. QA/QC person employed that has special QA/QC training and has QA/QC as their primary job responsibility.

c. A written procedure specifically for handling orders for fixtures built to TxDOT specifications.

d. A written procedure for keeping track of fixtures built, certified, and tested for TxDOT orders.

e. A check list of features for TxDOT fixtures with QA/QC person signature.

2. Fixture UL certification

3. IP 65 certification

4. 3G certification

5. Aluminum casting and point analysis

6. Socket, MOV, and shutoff ignitor data

7. Stainless steel and aluminum bracket data

8. Ballast electrical data

9. Photometric data

10. Lamp data

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d. Prequalification samples, if approved, will not be returned to the manufacturer but will be retained by the Department for comparison testing. Once a fixture has been approved, do not change any material or manufacturing method without prior approval of the Department. Unapproved changes will result in rejection of the fixture.

e. In addition, luminaires will be tested for compliance with this specification. Luminaires that inconsistently pass testing or that are inconsistent with published photometric information will be removed from the pre-qualified list at the discretion of the Department.

Sampling:

U. Sample in accordance with Test Method Tex-1110-T, "Sampling Lighting Assemblies"

Manufacturer warranty:

V. Replace failed fixtures, when non-operable due to defects in materials or workmanship within five years of installation with a fixture that passes all testing, delivered to the project location, Lamps and photocells are subject to the warranties of their respective manufacturers.

Testing:

W. Conduct electrical testing required in the Ballast section. Provide photometric testing of fixtures. Test fixtures at the following rates.

1. Manufacturer Testing. Before fixtures are shipped from the manufacturer, test fixtures as follows. From each lot or manufacturing run, select one completed fixture of each 25, with a minimum of 2 and a maximum of 5. Test photometrics at an independent test lab inspected and approved by TxDOT. Electrical testing may be performed at manufacturer's facility.

a. Provide IES photometric report in two formats:

1. Standard averaged format for asymmetric fixtures.

2. Un-averaged format showing both sides. Un-averaged data may be supplied in two files or as approved by the department.

b. Provide electrical and photometric test data directly to TRF- TE electronically for evaluation prior to shipping fixtures to the project. Do not ship fixtures until test data for each lot is approved by TRF-TE.

c. Provide the following information on test reports:

1. TxDOT's Control-Section-Job number, maintenance contract number, or purchase order number the fixtures are assigned to.

2. a unique fixture test number per fixture type.

3. date of manufacture, and

4. quantities supplied and lot number per fixture type.

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http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

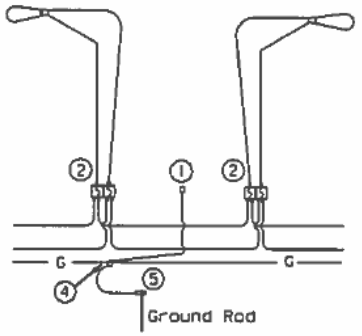
d. Write the unique lab report number on the top of the fixture housing with permanent marker. Ensure the test lab retains the results for 5 years. Provide the Department access to documentation.

e. Retain records of manufacturing lots, test reports, lot quantities, and other pertinent details. Submit records to the Department upon request.

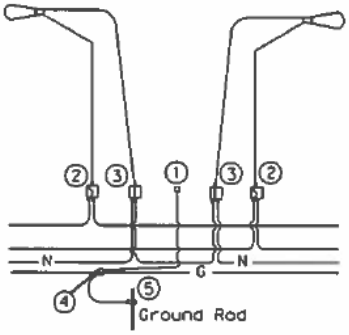
f. Submit to TRF-TE a daily shipment report for shipments to each job.

g. Make available to TxDOT inspectors upon request, all manufacturing facilities involved in the production of fixtures for use on Department projects, inventories of fixtures produced to Department specifications, and records of fixture testing and tracking.

2. Departmental Test Reporting. Departmental test report will be issued in accordance with Tex 1110-T.



FOR THREE-WIRE CIRCUIT-CENTER GROUNDED
LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR FOR 120/240 VOLT SERVICE.



FOUR-WIRE CIRCUIT-CENTER GROUNDED
LUMINAIRES SERVED AT 240V
(240/480 VOLT SERVICE)

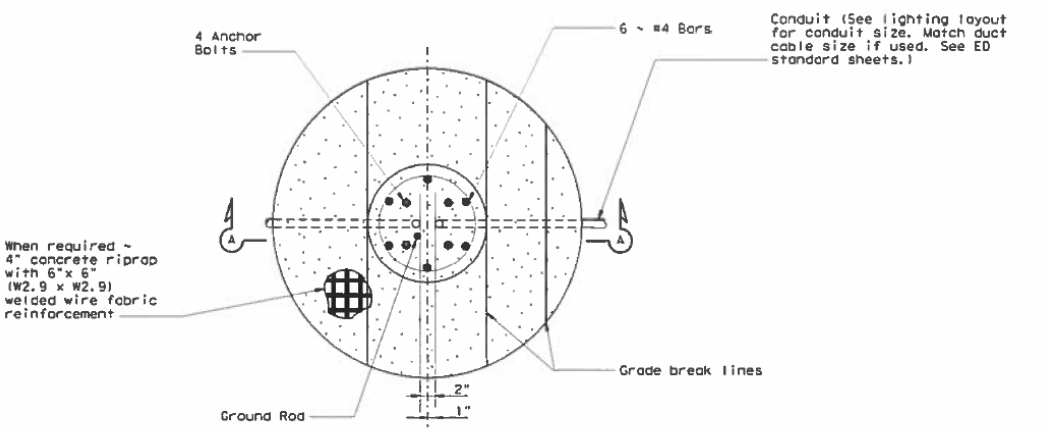
NOTES:

1.- Use $\frac{1}{2}$ in. - 13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors.

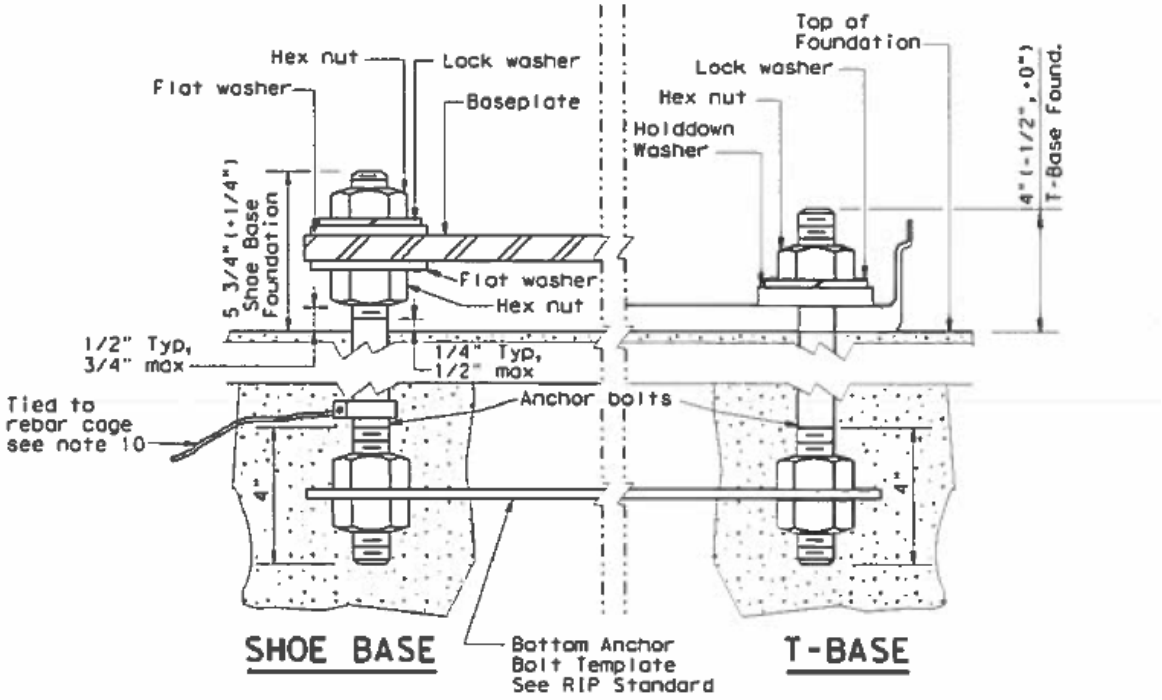
2.- 3.- Use pre-qualified Breakaway Connectors for both T-Base and Shoe-Base installations.

4.- Split Bolt or other connector.

5.- Use Ground Rod Clamp listed for its intended purpose (i. e. concrete, direct burial...)



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

Texas Department of Transportation

Traffic Operations Division Standard

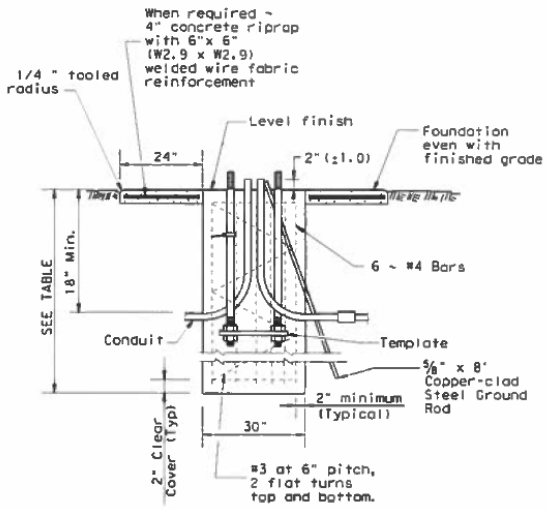
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

TITLE 19 - SUBDIVISION ORDINANCE

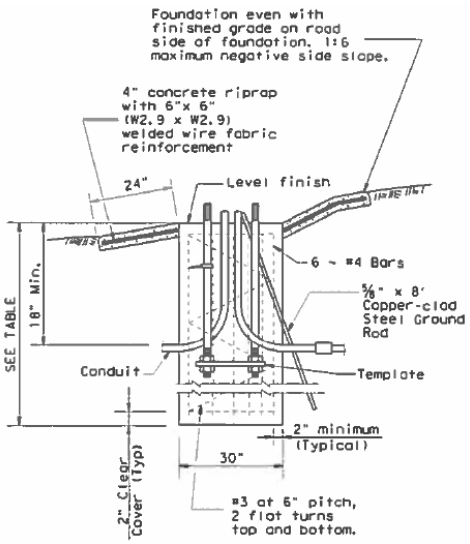
STREET DESIGN MANUAL

ROADWAY ILLUMINATION DETAILS

8-18H



SECTION A-A
SHOWING CONSTANT GRADE



SECTION A-A
SHOWING SLOPED GRADE

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)		
Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

RECOMMENDED FOUNDATION LENGTHS (See note 1)			
MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6'	6'	6'
>20 ft. to 30 ft.	8'	6'	6'
>30 ft. to 40 ft.	8'	8'	6'
>40 ft. to 50 ft.	10'	8'	6'

ANCHOR BOLTS			
POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in. x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

BREAKAWAY POLE PLACEMENT (See note 6)	
Roadway Functional Classification	** Pole offset (distance to transformer base, tolerance + 6in.-0in.)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.

Texas Department of Transportation

Traffic Operations Division Standard

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under item 416, "Drilled Shoft Foundations", unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i. e. 2 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45mph or less, see design guidelines for further information.
7. Use 8 hold down washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with *6 bore stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete.
11. Use rip rap on T-base foundations that are located on a sloped grades.

Texas Department of Transportation

Traffic Operations Division Standard

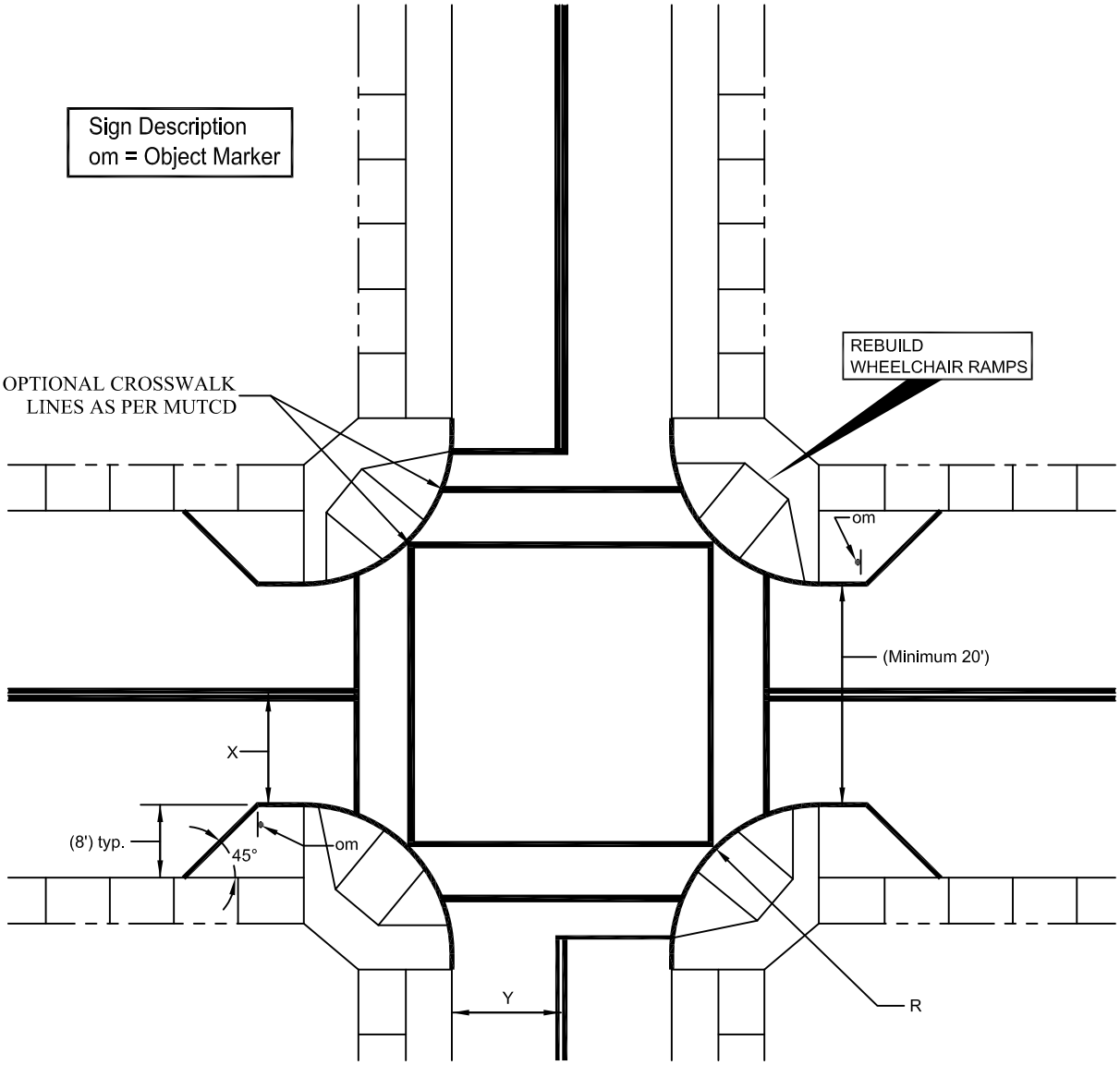
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/toc.htm

SECTION 6

SECTION 6

TRAFFIC CALMING STANDARDS

Bulbout
(Intersection Treatment)

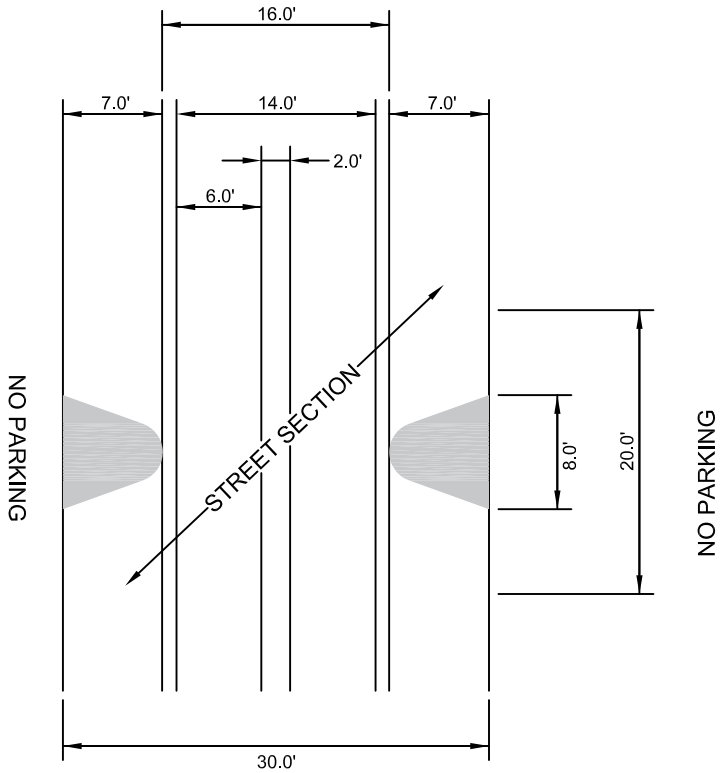


For The Street Widths:		Use This Curb Radius
X	Y	R
12'	12'	40'
12'	14'	32'
12'	16'	26'
14'	12'	37'
14'	14'	35'
14'	16'	24'

NOTES:

1. Distance X is referenced from the center of the roadway to the lip of gutter.

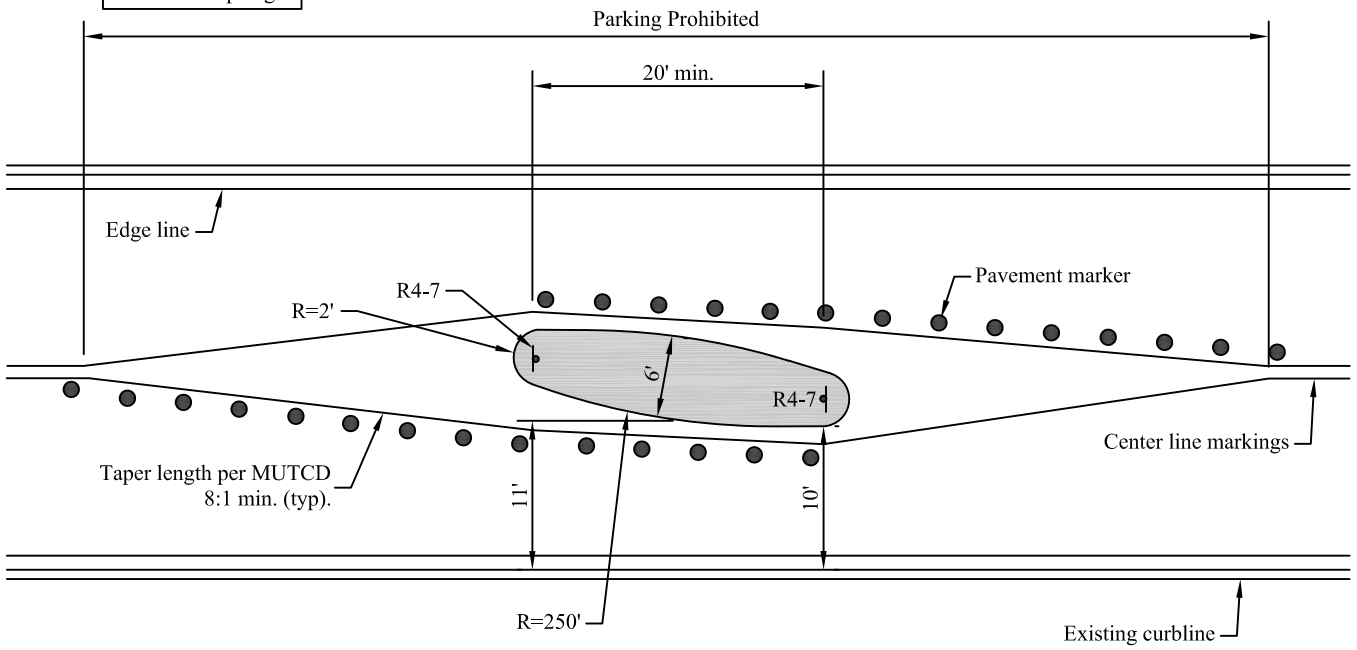
Bulbout
(Midblock Treatment)



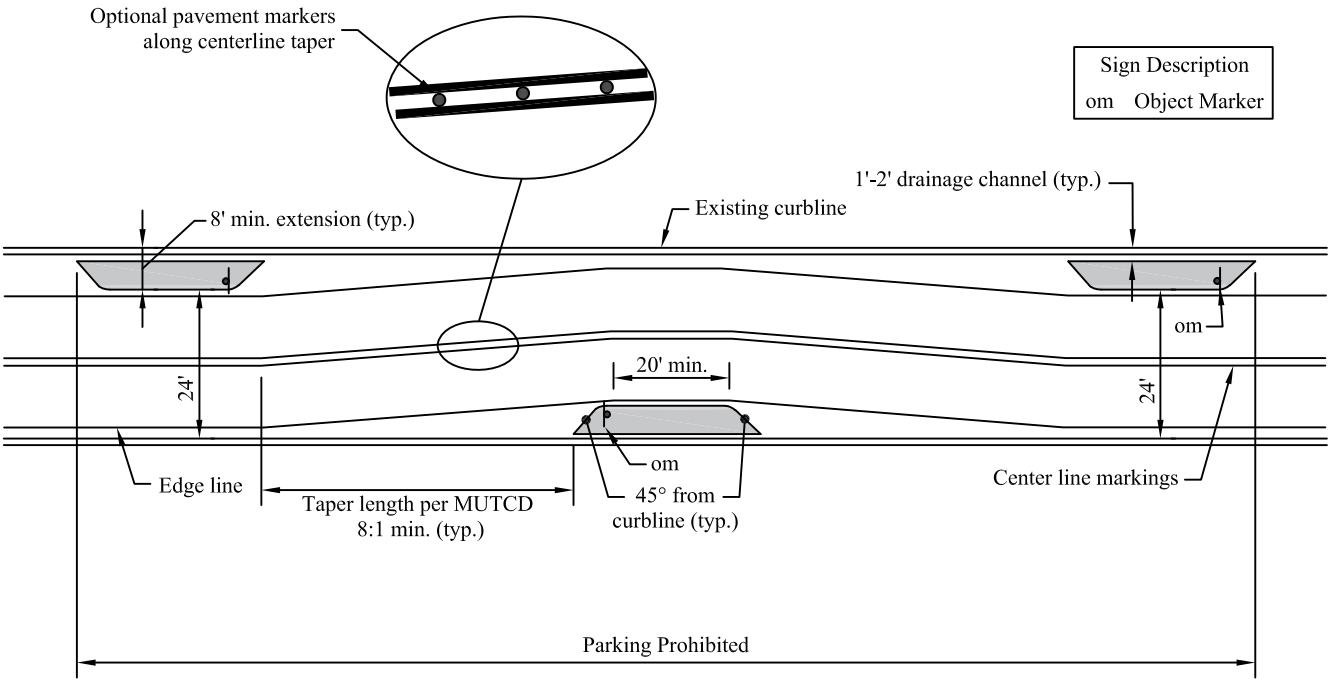
MIN. 30' WIDE STREET
FOR WIDER STREETS
MAKE BULB DEEPER

THE BULB-OUT DRAWING SHOWN IS FOR A 30 FOOT WIDE STREET. IF A STREET IS WIDER, THE BULB WOULD BE DEEPER; EACH BULB SHOWN IS SEVEN FEET DEEP. THE WIDTH BETWEEN BULBS SHOULD BE 16 FEET, WHICH ALLOWS FOR ONE FOOT BETWEEN BULB AND CAR, SIX FEET PER CAR AND TWO FEET BETWEEN CARS. THIS WOULD REQUIRE CARS TO SLOW DOWN SUBSTANTIALLY IN ORDER TO PASS. THE BULB WOULD RESTRICT PARKING FOR APPROXIMATELY 20 FEET (ONE CAR LENGTH FOR PARKING PURPOSES) IN ORDER FOR THE BULB TO BE VISIBLE, ALLOW WIDER VEHICLES TO PULL TO THE RIGHT AND ALLOW AN OPPOSING VEHICLE TO PASS. IT MAY BE POSSIBLE TO PLANT A TREE IN EACH BULB.

Center Island Narrowing



Chicane



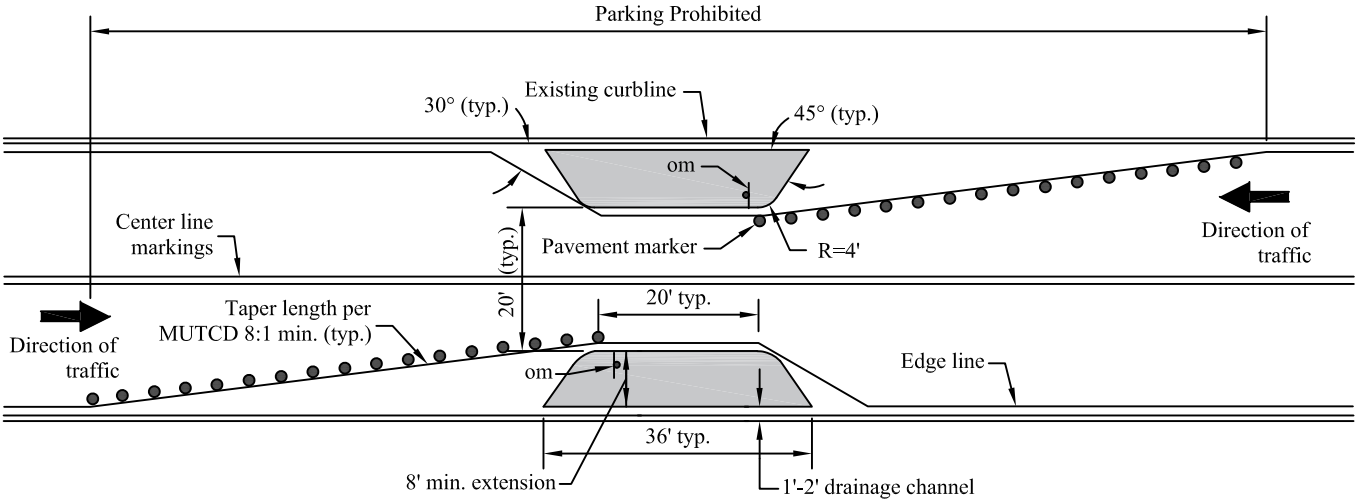
TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

CENTER ISLAND
NARROWING AND CHICANE

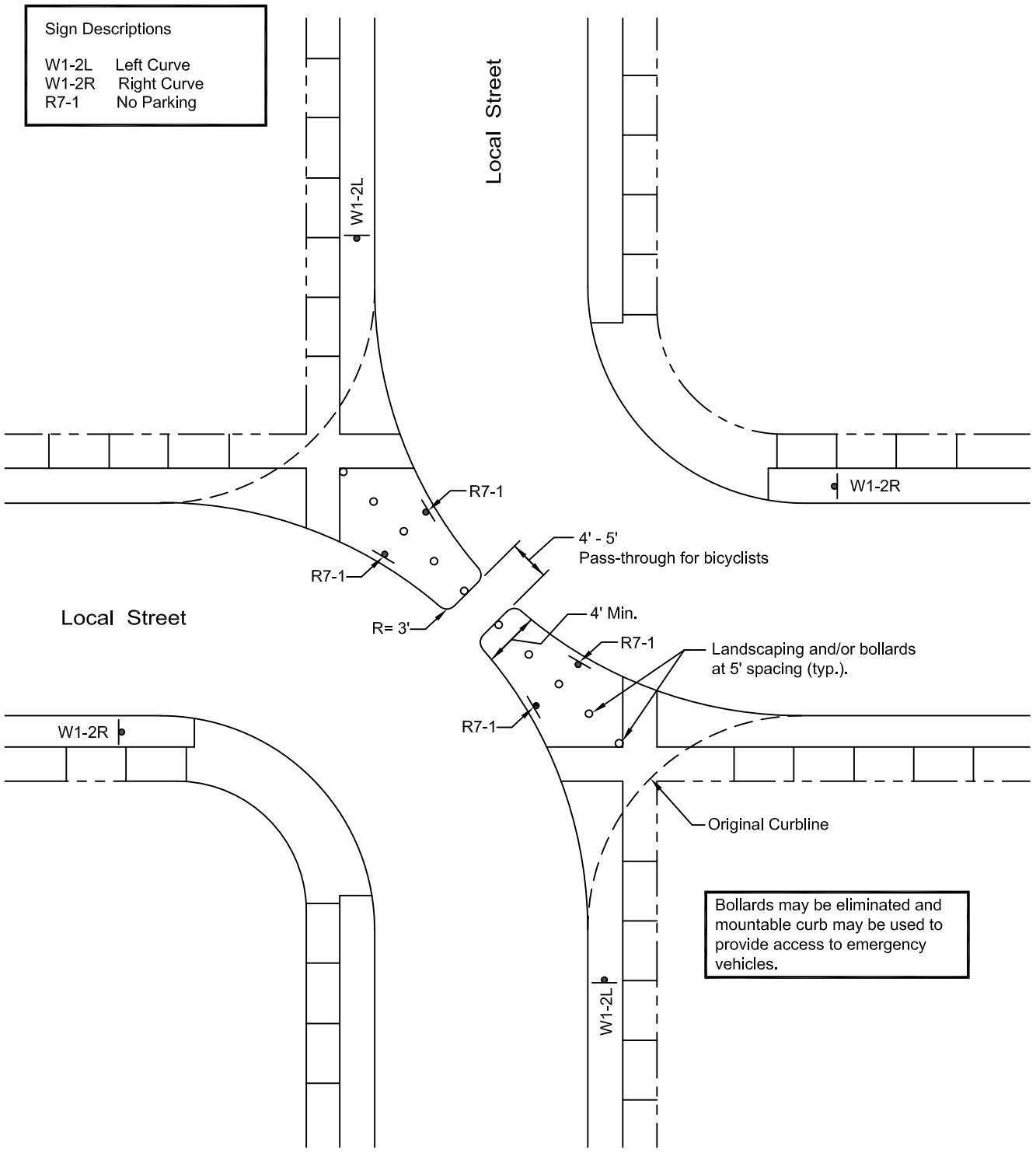
9-6-3

CHOKER



Sign Description
om = Object Marker

Diagonal Diverter



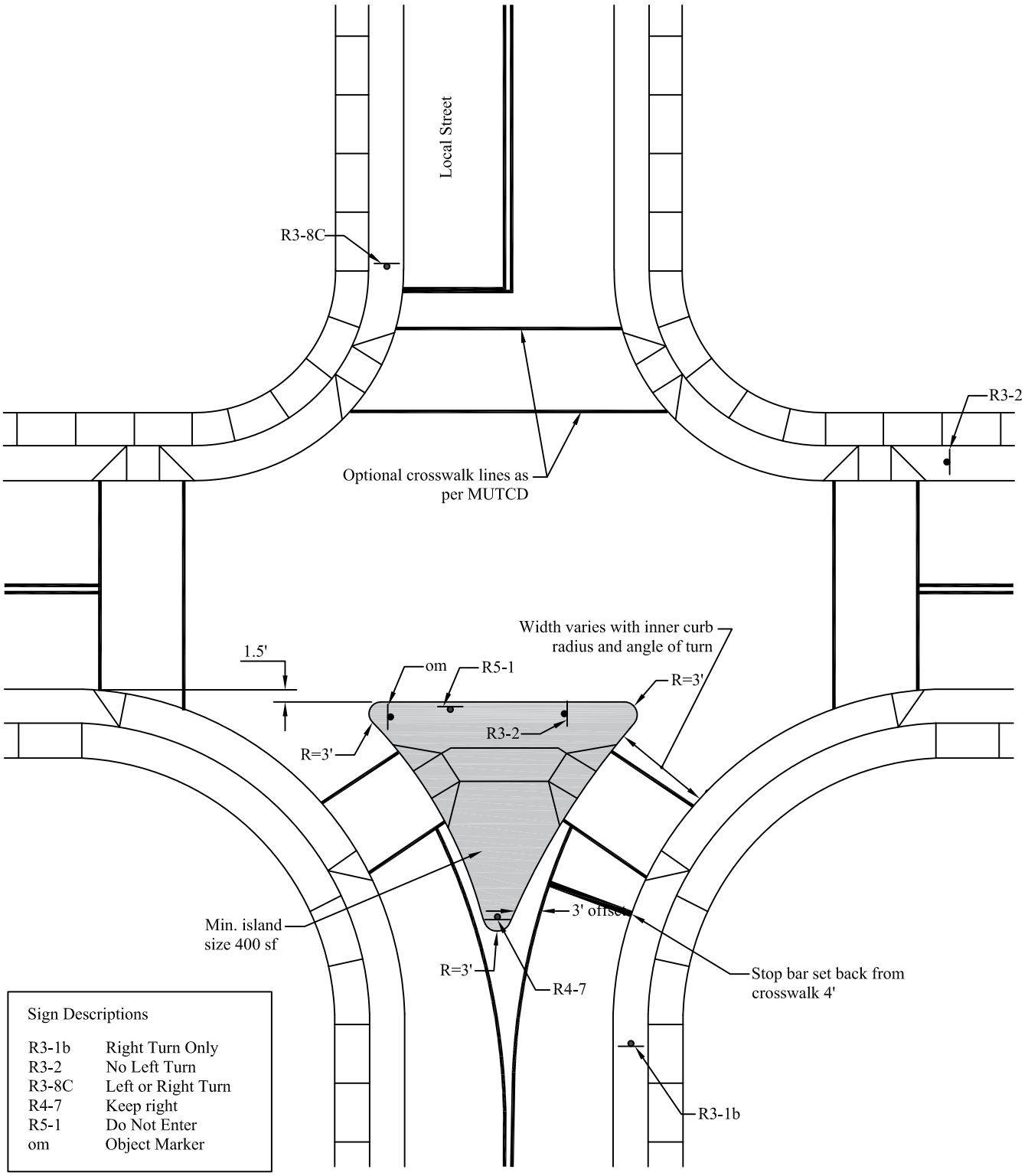
TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

DIAGONAL DIVERTER

9-6-5

FORCED TURN ISLAND



Sign Descriptions	
R3-1b	Right Turn Only
R3-2	No Left Turn
R3-8C	Left or Right Turn
R4-7	Keep right
R5-1	Do Not Enter
om	Object Marker

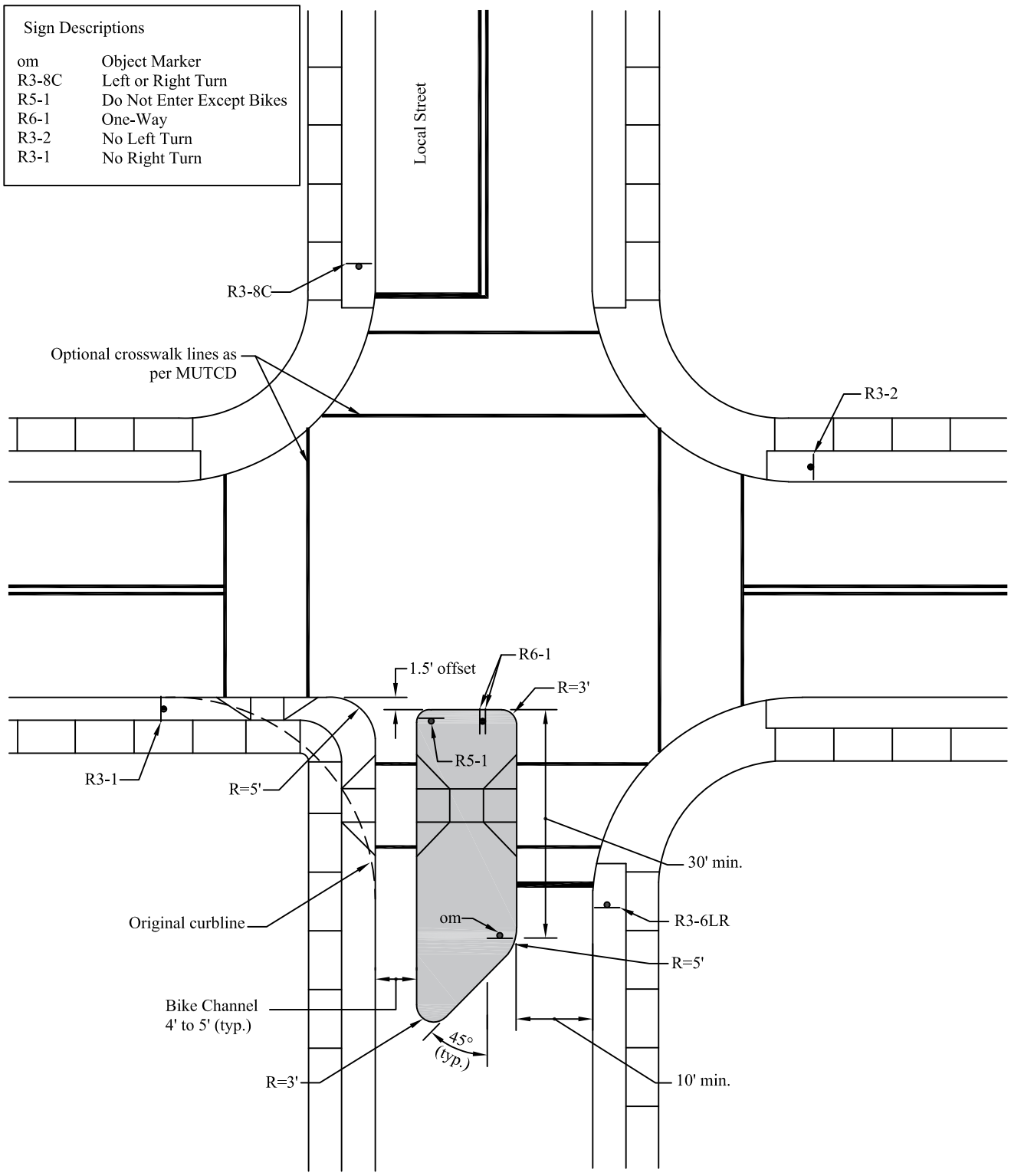
TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

FORCED TURN ISLAND

9-6-6

HALF CLOSURE



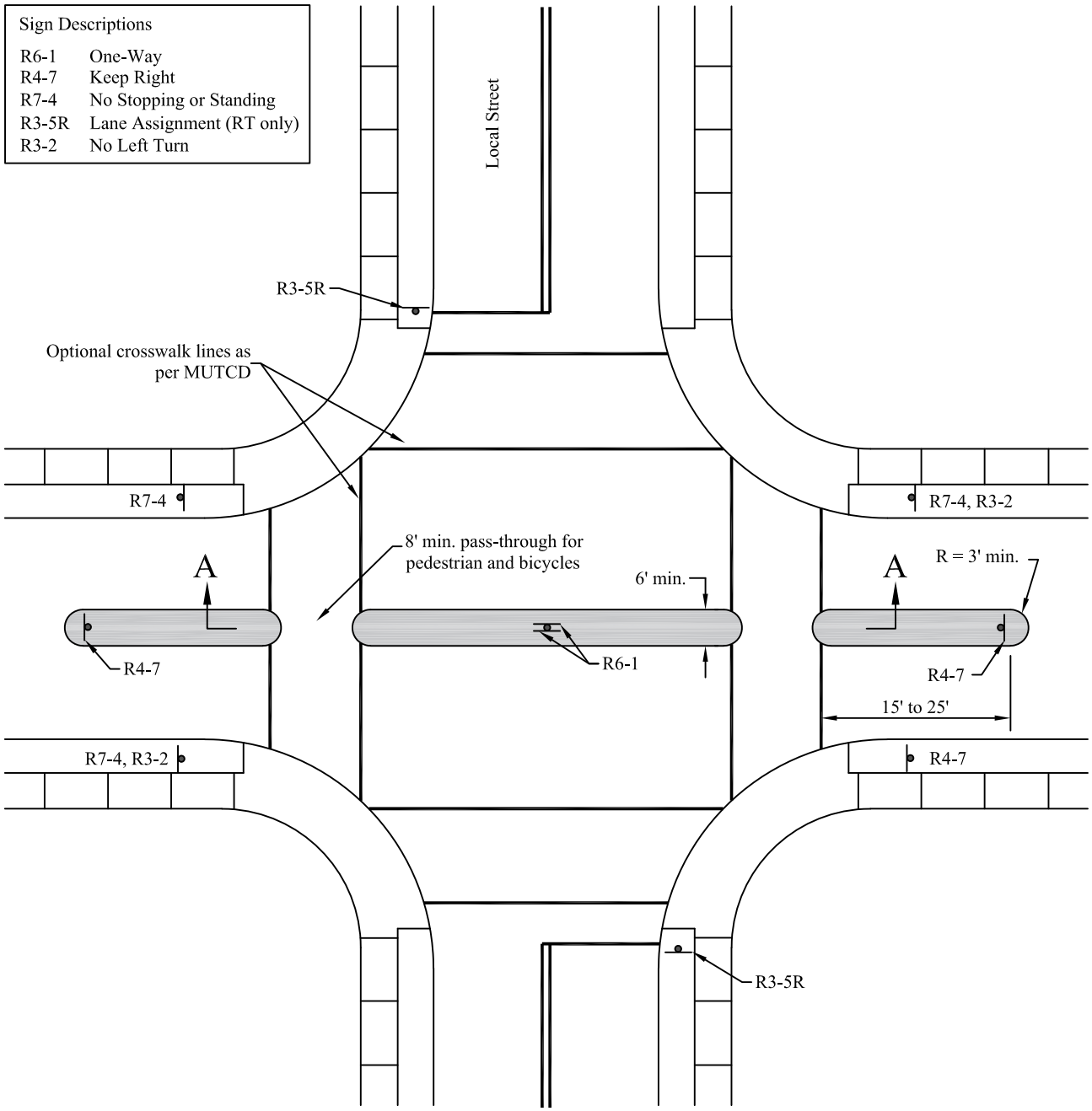
TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

HALF CLOSURE

9-6-7

Median Barrier



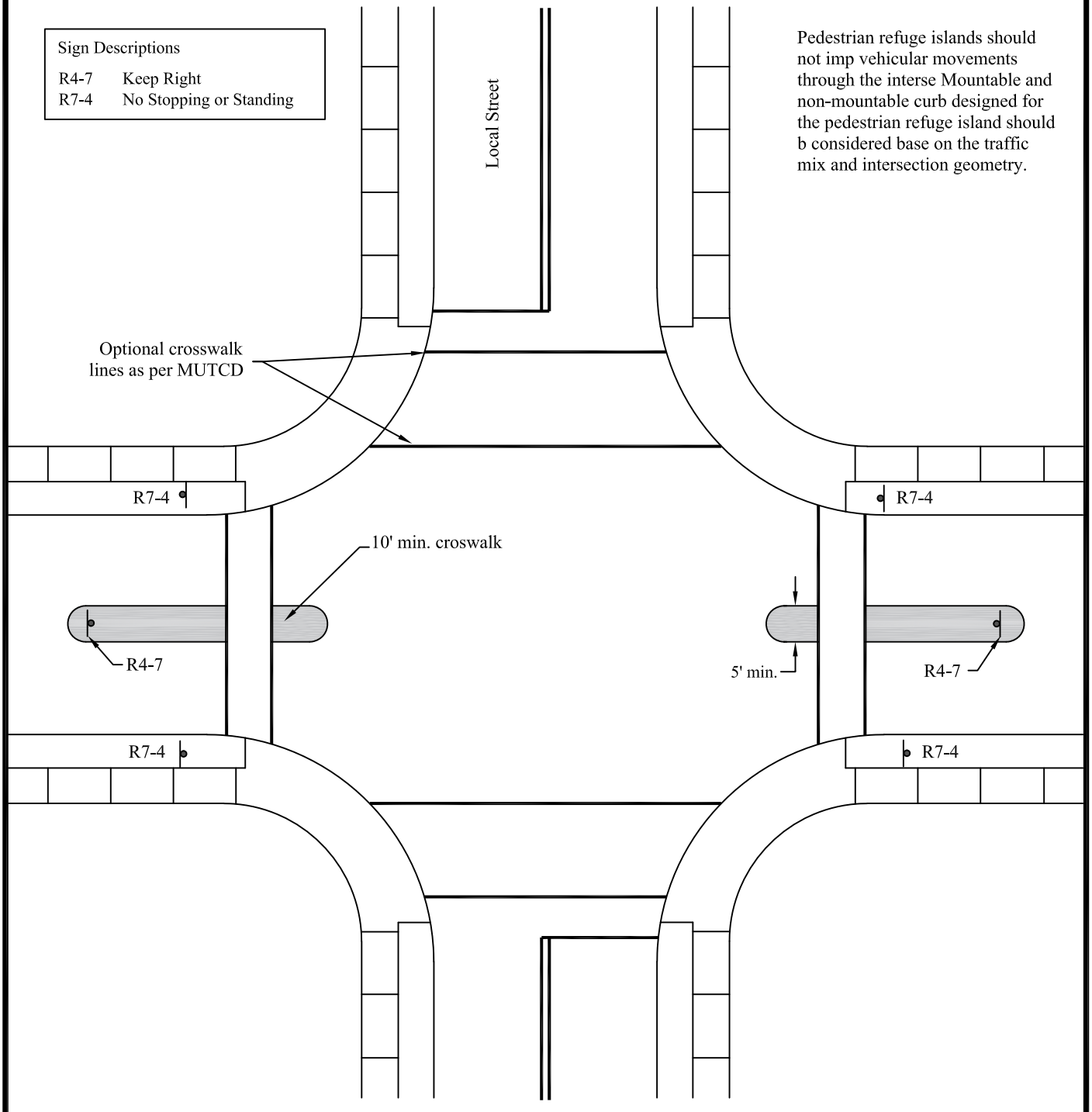
TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

MEDIAN BARRIER

9-6-8

Pedestrian Refuge Island



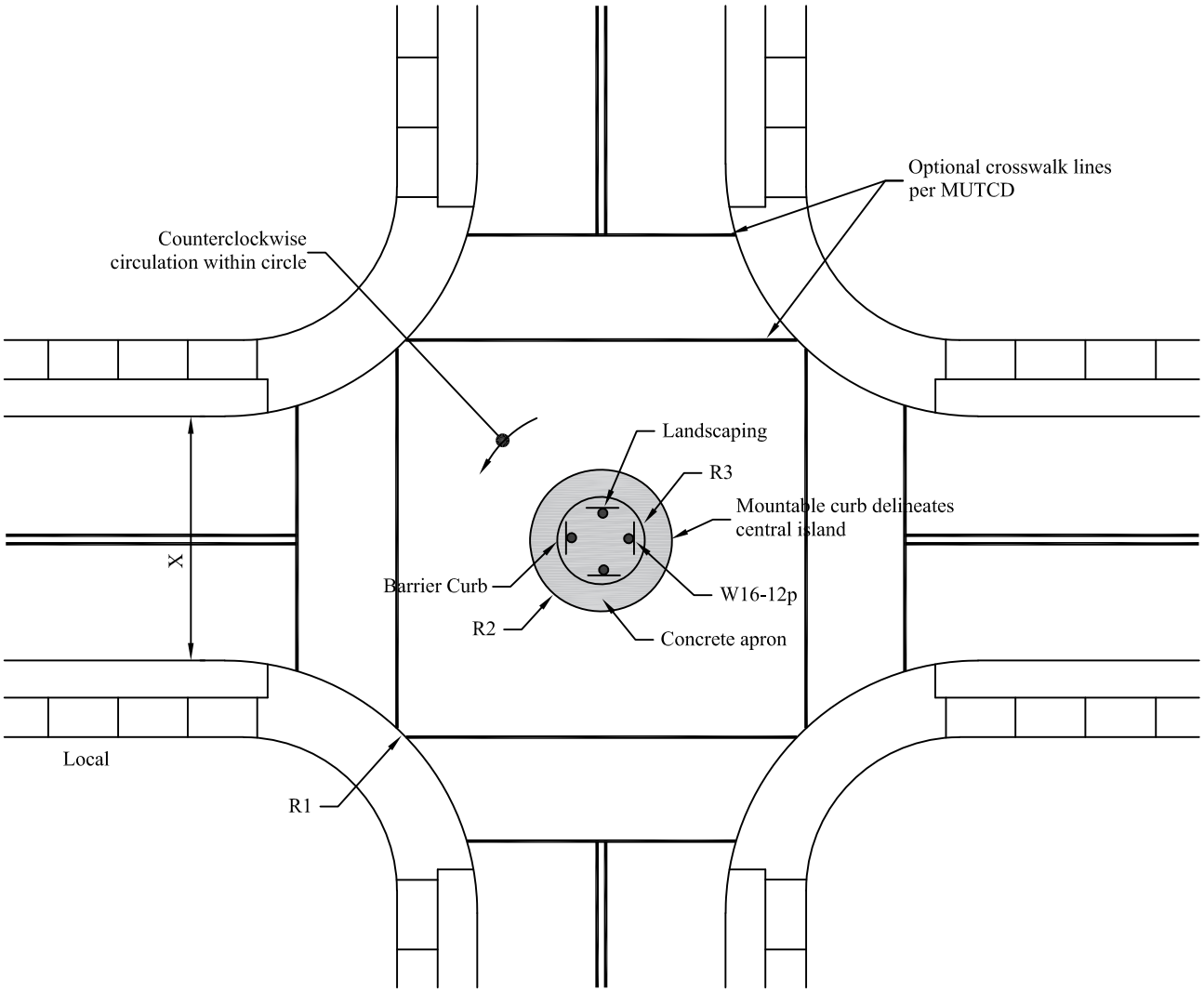
TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

PEDESTRIAN REFUGE ISLAND

9-6-9

Traffic Circle



Sign Descriptions	
W16-12p	Traffic Circle

NOTE:

1. Assumes equal street widths; For unequal street widths, use Autoturn to ensure adequate turning radii for the desired design vehicle.

For The Street Width:	Use This Curb Radius		
X	R1	R2	R3
34'	20'	20'	8'
	25'	24'	8'
32'	15'	12'	7'
	20'	18'	7'
	25'	20'	7'
30'	15'	11'	6'
	20'	15'	6'
	25'	16'	6'

TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

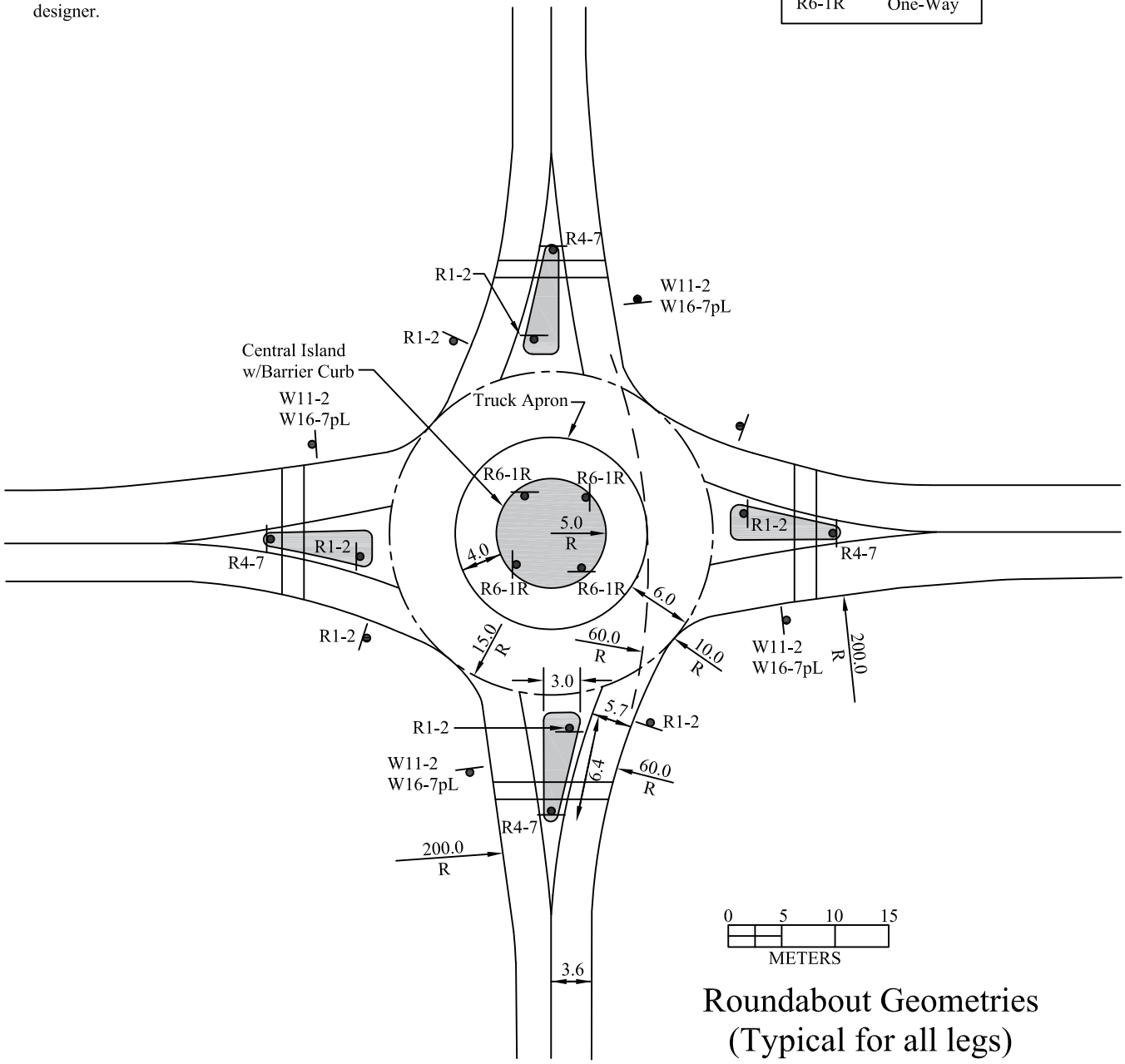
TRAFFIC CIRCLE

9-6-10

ROUNDABOUT

This figure illustrates the minimum roundabout configuration for a 90 degree intersection of two roadways with one lane in each direction. It is designed to accommodate a WB-15 design vehicle, or automobile traffic at a 25 mph speed. This is only an example and not a recommended design. Each intersection requires thorough analysis and a unique design by a roundabout designer.

Sign Descriptions	
R1-2	Yield
W11.2	Pedestrian
W16-7pL	Arrow
R4-7	Keep Right
R6-1R	One-Way



Roundabout Geometries (Typical for all legs)

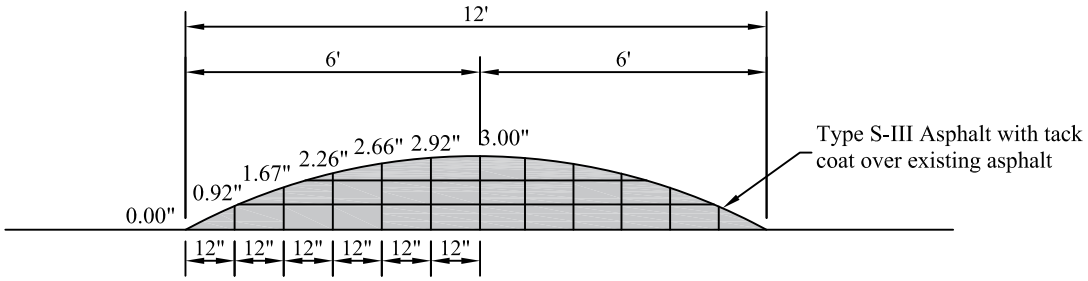
TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

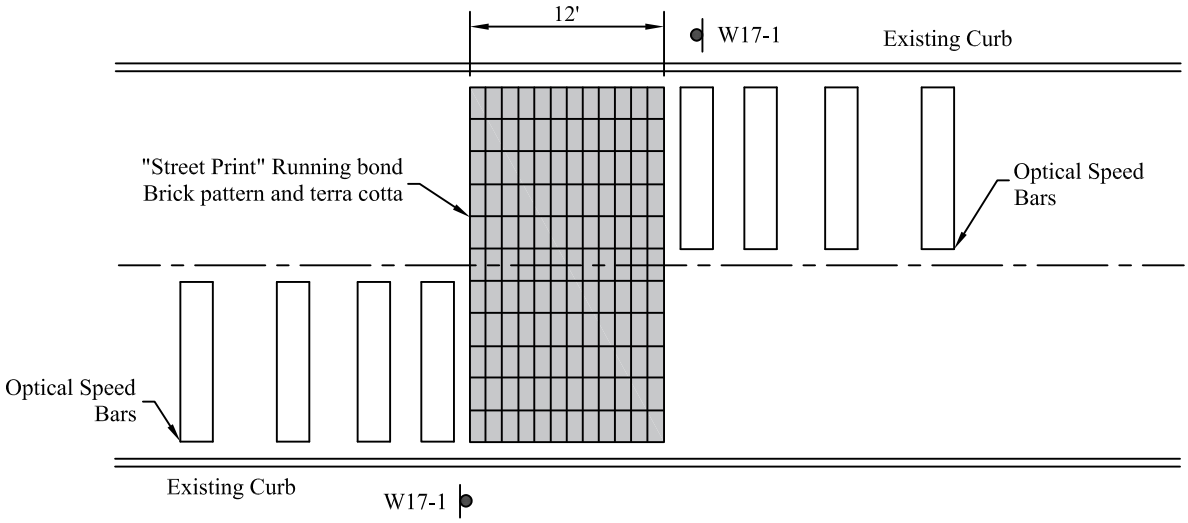
ROUNDABOUT

9-6-11

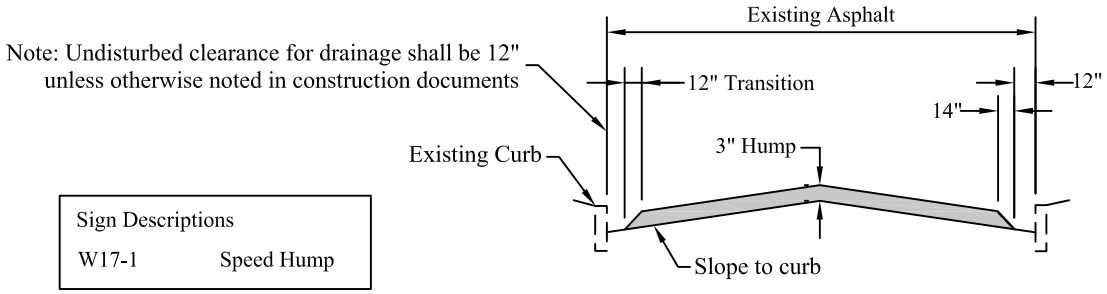
Speed Hump



Driving Profile



Plan View



Sign Descriptions	
W17-1	Speed Hump

Typical Section

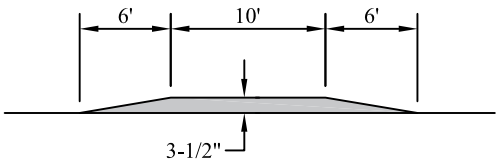
TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

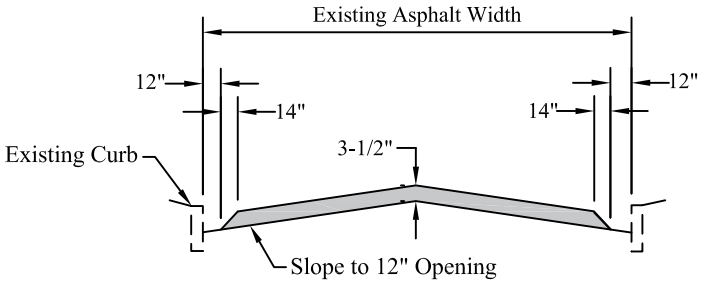
SPEED HUMP

9-6-12

Speed Table

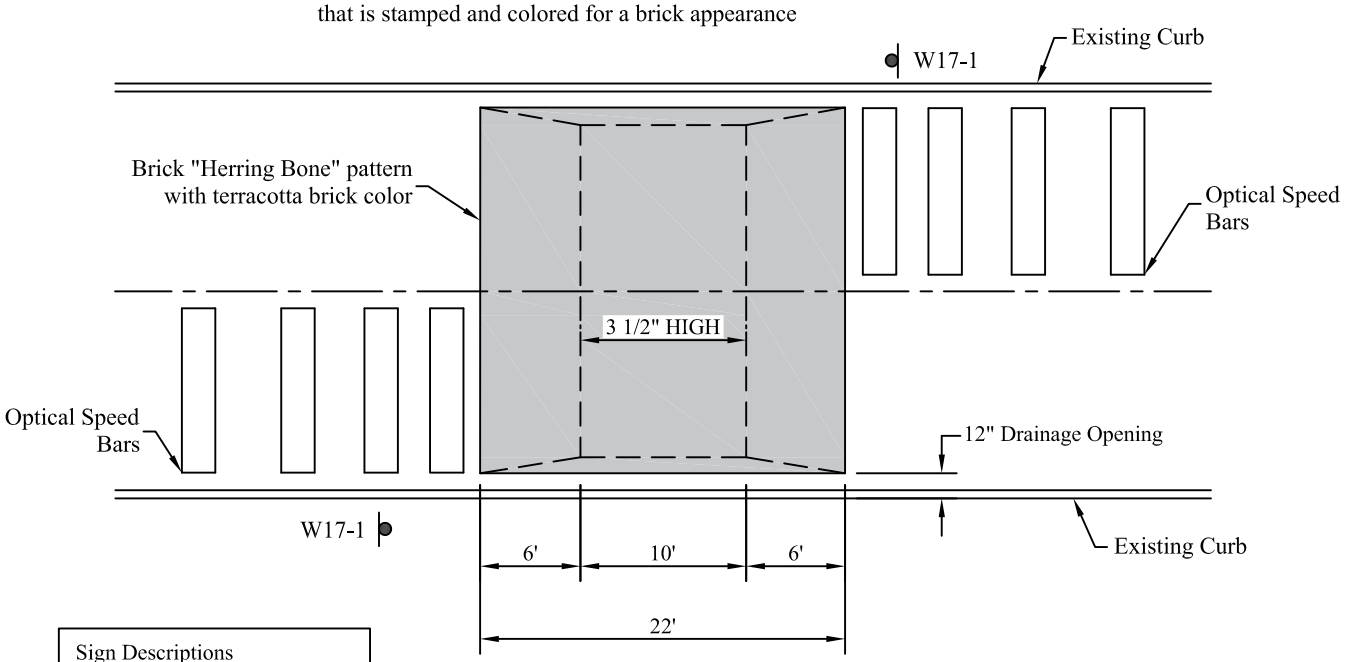


Driving Profile



Typical Section

The speed table is made with "Street Print", asphalt that is stamped and colored for a brick appearance



Sign Descriptions	
W17-1	Speed Hump

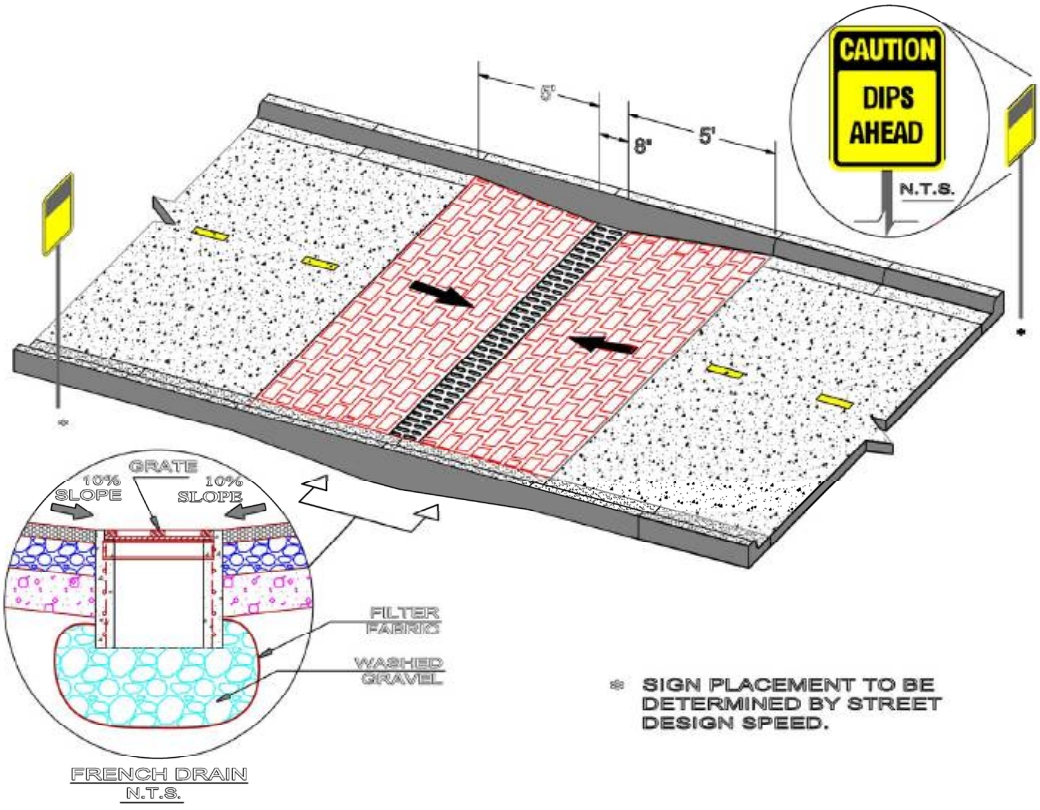
Plan View

TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

SPEED TABLE

9-6-13



TITLE 19 - SUBDIVISION ORDINANCE

TRAFFIC CALMING STANDARDS

TRAFFIC CALMING DIP

9-6-14