TITLE 19 - SUBDIVISION ORDINANCE

DESIGN STANDARDS FOR CONSTRUCTION

JUNE 3, 2008
DESIGN STANDARDS FOR CONSTRUCTION

SECTION 1   SUBDIVISION IMPROVEMENT PLAN PREPARATION GUIDELINES
SECTION 2   DRAINAGE AND DRAINAGE STRUCTURES
SECTION 3   STREETS
SECTION 4   FENCING
SECTION 5   EARTH RETENTION AND EROSION CONTROL
SECTION 6   SIDEWALKS, DRIVEWAYS AND CURB RAMPS
SECTION 7   SIGNAGE AND SIGNALIZATION
SECTION 8   STREET LIGHTING
SECTION 9   TYPICAL LOT LAYOUT
SECTION 10  TRAFFIC CALMING STANDARDS

APPENDIX   APPLICATION FORMS AND CHECKLISTS
SECTION 1
# SECTION 1

**SUBDIVISION IMPROVEMENT PLAN**  
**PREPARATION GUIDELINES**

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN STANDARDS</td>
<td>1-1</td>
</tr>
<tr>
<td>TITLE SHEET</td>
<td>1-2</td>
</tr>
<tr>
<td>GRADING PLAN</td>
<td>1-3A thru 1-3B</td>
</tr>
<tr>
<td>DRAINAGE PLAN</td>
<td>1-4A thru 1-4E</td>
</tr>
<tr>
<td>DRAINAGE COMPUTATION TABLES</td>
<td>1-5</td>
</tr>
<tr>
<td>STREET PLAN &amp; PROFILE</td>
<td>1-6A thru 1-6B</td>
</tr>
<tr>
<td>STORM SEWER PLAN &amp; PROFILE</td>
<td>1-7A thru 1-7D</td>
</tr>
<tr>
<td>DETAIL SHEET</td>
<td>1-8</td>
</tr>
<tr>
<td>CONSTRUCTION PHASING PLAN</td>
<td>1-9</td>
</tr>
</tbody>
</table>

[BACK TO SECTION INDEX PAGE]
PLAN STANDARDS

A. LETTERS AND NUMBERS SHALL BE VERTICAL OR SLANTED CAPITAL. THE MINIMUM SIZE SHALL BE 1/16-INCH - GUIDELINES ARE REQUIRED FOR FREEHAND.

B. REFERENCE CROSS-SECTION SYMBOLS SHALL BE AS SHOWN

\[
\begin{array}{c}
\frac{4}{5}
\end{array}
\]

1. TOP NUMBER: SECTIONAL DETAIL NUMBER

2. BOTTOM NUMBER: SHEET DETAIL NUMBER
TITLE SHEET

A. LOCATION PLANS - SCALE ONE (1) INCH = SIX HUNDRED (600) FEET

B. TITLE SHALL COMPLY WITH THE CITY'S ENGINEERING DEPARTMENT'S STANDARD TITLE SHEET

C. VICINITY MAP - N. T. S.

D. INDEX OF DRAWINGS
   1. TITLE SHEET
   2. FINAL APPROVED PLAT FOR REFERENCE ONLY (IF APPLICABLE)
   3. GRADING PLAN
   4. DRAINAGE PLAN
   5. STREET PLAN & PROFILES
   6. CROSS-SECTIONS
   7. DETAILS
   8. ILLUMINATION PLAN; INCLUDING STREET SIGNAGE & NDCBU LOCATIONS
   9. LANDSCAPE & IRRIGATION PLAN
   10. STORMWATER POLLUTION PREVENTION PLANS AND ASSOCIATED SPECIFICATIONS

E. DESIGN FIRM NAME
GRADING PLAN

A. NORTH ARROW UP OR LEFT TO RIGHT, A SCALE OF ONE (1) INCH = ONE HUNDRED (100) FEET

B. GRADING PLAN SHALL BE REFERENCED TO THE PRELIMINARY PLAT VERTICAL CONTROL. VERTICAL CONTROL TO NORTH AMERICAN VERTICAL DATUM (NAVD) 1988.

C. BOUNDARIES OF SUBDIVISION OR SITE

D. CONTOUR LINES OF THE PROPOSED SUBDIVISION, AND TWO HUNDRED (200) FEET OUTSIDE AND ABUTTING THE SUBDIVISION UNLESS THE AREA IS MODIFIED BY THE CITY ENGINEER, HAVING THE FOLLOWING INTERVALS:

1. ONE FOOT (1') CONTOUR INTERVALS FOR GROUND SLOPES BETWEEN LEVEL AND THREE (3) PERCENT;

2. TWO FOOT (2') CONTOUR INTERVALS FOR GROUND SLOPES MORE THAN THREE (3) PERCENT AND UP TO AND INCLUSIVE OF ELEVEN (11) PERCENT;

3. FIVE FOOT (5') COUNTOUR INTERVALS FOR GROUND SLOPES OVER ELEVEN (11) PERCENT;

4. DASHED LINES FOR EXISTING CONTOUR LINES;

5. SOLID (BOLD) LINES FOR PROPOSED CONTOUR LINES; AND

6. INDEX CONTOURS AT FIVE (5) FEET INTERVALS.

E. LOCATE ALL EXISTING STRUCTURES WITHIN AND ONE HUNDRED (100) FEET OUTSIDE OF THE SUBDIVISION UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

F. TYPICAL GRADING PLAN FOR LOT SHALL SHOW DIRECTION OF RUNOFF OR ON-SITE PONDING.

G. FINISHED FLOOR AND FINISHED GROUND ELEVATION FOR ALL LOTS.
H. TOP OF CURB, HEADER CURB AND DRIVEWAY ELEVATIONS.
I. SLOPE STABILIZATION PLAN, WHERE REQUIRED BY CITY ENGINEER.
J. EROSION CONTROL PLAN
K. CONCENTRATED STORM RUNOFF OVER UNPROTECTED AREAS, INCLUDING SLOPES SHALL NOT BE PERMITTED
L. CROSS SECTIONS AS REQUESTED BY CITY ENGINEER
M. REQUIRED Retaining Walls (Location only, unless to be built by Subdivider)
   Design of Retaining Walls Four (4) Feet or Higher shall be Signed and Sealed by a Professional Engineer
N. Plans shall show Flood Zone Areas as per current Flood Insurance Rate Maps (FIRM) or Letter of Map Revision (if Applicable), Reference Panel Number and Date
O. Finished Floor Elevations shall comply with Driveway Ordinance and/or FEMA Regulations.
DRAINAGE PLAN
(REFER TO DRAINAGE DESIGN MANUAL FOR DRAINAGE CRITERIA, DESIGN METHODS AND METHODOLOGIES)

A. SCALE ONE (1) INCH = ONE HUNDRED (100) FEET - NORTH ARROW

B. DRAINAGE PLANS SHALL CONFORM TO THE APPROVED MASTER DRAINAGE PLAN, IF APPLICABLE

C. SHOW BOUNDARIES OF SUBDIVISION AND CONTRIBUTING DRAINAGE AREAS

D. IDENTIFY LIMITS OF CONTRIBUTING WATERSHED AREAS WITHIN SUBDIVISION AND OUTSIDE THE SUBDIVISION

E. CALCULATION TABLE TO INCLUDE TIMES OF CONCENTRATION (Tc), INTENSITIES (I), COEFFICIENT VALUES (C) AND EXPECTED RUNOFFS OF ALL WATERSHED AREAS - EXPECTED RUNOFF QUANTITIES, CARRYING CAPACITIES, AND RUNOFF VELOCITIES FOR DRAINAGE STRUCTURES SHALL BE SHOWN ON PLANS FOR 25, 50 AND 100 YEAR EVENTS.

F. SHOW LOCATION AND SIZES OF ALL PROPOSED AND EXISTING DROP INLETS, PIPES, CULVERTS, CHANNELS, BASINS, AND OTHER DRAINAGE STRUCTURES

G. SHOW EXISTING AND PROPOSED DRAINAGE FLOW PATTERNS

H. SHOW HIGH AND LOW POINTS OF STREET WITH FLOW PATTERNS
I. STORAGE FACILITIES (DAMS, PONDS, ETC.) INDICATING:

1. MAXIMUM CAPACITY
2. EXPECTED RUNOFF
3. BOTTOM ELEVATION
4. HIGH WATER SURFACE
5. FREE BOARD
6. SPILLWAY AND OUTLET STRUCTURE
   (A) MAXIMUM CAPACITY
   (B) DESIGN OUTFLOWS
7. SEDIMENT AND EMERGENCY VOLUMES
8. APPROVAL FROM TEXAS WATER BOARD AND U.S. ARMY CORPS OF
   ENGINEERS FOR DAMS, WHEN APPLICABLE
9. SOIL TESTS TO DETERMINE SPECIAL STABILIZED SLOPES
10. PERCOLATION RATE TESTS TO BE PERFORMED AT PROPOSED POND INVERT
    (RETENTION BASINS ONLY). TO BE PERFORMED WHEN THE WATER TABLE
    (ELEVATION) IS AT ITS HIGHEST.
11. EXISTING WATER TABLE ELEVATION DURING OFF-PEAK PERIOD AND HIGH
    WATER TABLE ELEVATION, IF APPLICABLE.
DRAINAGE PLAN
(continued)

J. ON LOTS WITH ON-SITE PONDING THE FOLLOWING INFORMATION SHALL BE SUBMITTED

1. PRELIMINARY SOILS TEST, FINAL PERCOLATION RATE TEST, SOILS TESTS, AND WATER TABLE ELEVATION INFORMATION TO BE SUBMITTED PRIOR TO STREET ACCEPTANCE AND/OR BUILDING PERMITS. PERCOLATION TESTS TO BE PERFORMED AT THE INVERT WHERE STORMWATER WILL BE RETAINED AND WHEN THE WATER TABLE IS AT ITS HIGHEST.

2. TYPICAL LOT CROSS SECTION DETAIL SHOWING ON-SITE PONDING STORAGE CAPACITY

3. PERMANENT ELEVATION MARKER DETAIL (REFER TO PLATE 2-7)

4. DRAINAGE COMPUTATIONS BASED ON 100-YEAR STORM

5. MINIMUM OF 2.0% CROSS SLOPE ON STREET

6. LOTS AND/OR MEDIANS SHALL ALSO ACCOMMODATE ALL STREET RUNOFF

7. FIFTY (50) PERCENT OF THE RESIDENTIAL LOT AREA SHALL REMAIN WITHOUT STRUCTURES OR OTHER IMPERMEABLE SURFACES

8. ADDITIONAL EMERGENCY AND SILT/DEBRIS CAPACITY NOT REQUIRED FOR RESIDENTIAL ON-SITE PONDING LOTS

K. STREET DESIGN REQUIREMENTS

1. GENERAL STANDARDS

   (A) MAXIMUM STANDARD CURB HEIGHT - 6 INCHES UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER

   (B) CROWN ON STREET TO BE FROM ZERO (0) TO THREE (3) PERCENT SLOPE

BACK TO TITLE INDEX PAGE
DRAINAGE PLAN
(continued)

(C) INVERT STREET CROSS SECTION ALLOWED WITH APPROVAL BY CITY ENGINEER

(D) NO PONDING (UNDRAINED LOW POINTS) TO BE ALLOWED ON STREETS TO PREVENT PAVEMENT DETERIORATION

2. STANDARDS FOR 25-YEAR STORM

(A) MAXIMUM FLOW DEPTH IN ANY STREET: FIVE (5) INCHES OR CURB HEIGHT, WHICHEVER IS LESS

(B) MINOR ARTERIALS; ONE HALF (1/2) OF ONE (1) LANE WIDTH TO REMAIN FREE OF WATER IN EACH DIRECTION

(C) MAJOR ARTERIALS AND SUPER ARTERIALS; ONE (1) FULL LANE WIDTH ON EACH SIDE OF RAISED MEDIAN TO REMAIN FREE OF WATER

(D) AT ROAD BENDS AND INTERSECTIONS, MAXIMUM FLOW DEPTH IN STREETS TO BE FIVE (5) INCHES

(E) PRODUCT NUMBER (DEPTH X AVERAGE VELOCITY) TO BE A MAXIMUM OF 6.5 FT³/S UNLESS APPROVED BY THE CITY ENGINEER

(F) ANY HYDRAULIC JUMPS (E.G. SAG VERTICAL CURVES OR CHANGES IN SLOPE) TO BE CONTAINED WITHIN CURB HEIGHTS WITH APPROPRIATE FREE BOARD

BACK TO TITLE INDEX PAGE
DRAINAGE PLAN
(continued)

(G) THE HYDRAULIC GRADE LINE FOR THE DRAINAGE STRUCTURE(S) DISCHARGING INTO A 100-YEAR RETENTION OR DETENTION BASIN SHALL BE BASED ON THE 100-YEAR WATER SURFACE ELEVATION (WSEL) WHICH EXCLUDES THE SILT/DEBRIS AND 25% EMERGENCY CAPACITY VOLUMES AND:

(i.) THE 25-YEAR WSEL SHALL NOT EXCEED THE TOP OF CURB ELEVATION

(ii.) IF THE 100-YEAR WSEL EXCEEDS THE TOP OF CURB ELEVATION, THE ENGINEER SHALL ALSO CONSIDER THE EFFECT ON MANHOLES.

3. STANDARDS FOR 100-YEAR STORM

(A) PRODUCT NUMBER (DEPTH X AVERAGE VELOCITY) TO BE A MAXIMUM OF 8 FT²/S UNLESS APPROVED BY THE CITY ENGINEER
### DRAINAGE COMPUTATION TABLES

#### DETENTION OR RETENTION BASINS

<table>
<thead>
<tr>
<th>BASIN NO.</th>
<th>REQUIRED CAPACITY (AC.FT)</th>
<th>AVAILABLE CAPACITY (AC.FT)</th>
<th>PEAK INFLOW (CFS)</th>
<th>OUTLET TOWER FLOW (CFS)</th>
<th>HIGH WATER SURFACE ELEVATION (FT)</th>
<th>BOTTOM ELEVATION</th>
<th>FREE BOARD (FT)</th>
</tr>
</thead>
</table>

#### WATERSHED AREAS

<table>
<thead>
<tr>
<th>DRAINAGE AREA NO.</th>
<th>DRAINAGE AREA (AC)</th>
<th>DESIGN STORM INTENSITY</th>
<th>TIME OF CONCENTRATION</th>
<th>RUNOFF COEFF. (C)</th>
<th>Q (CFS)</th>
</tr>
</thead>
</table>

#### DROP INLETS

<table>
<thead>
<tr>
<th>DROP INLET NO.</th>
<th>REQ. FLOW CAPACITY Q (CFS)</th>
<th>AVAIL. FLOW CAPACITY Q (CFS)</th>
<th>FLOW BYPASS</th>
</tr>
</thead>
</table>
STREET PLAN AND PROFILE

A. PLAN

1. STREET NAMES

2. VERTICAL CONTROL TO NORTH AMERICAN VERTICAL DATUM (NAVD) 1988 AND SHOWN ON EVERY SHEET

3. SCALE ONE (1) INCH = THIRTY (30) FEET MAXIMUM HORIZONTAL VERTICAL SCALE OF ONE (1) INCH = FIVE 95 FEET FOR SLOPES OF ZERO (0) PERCENT TO THREE (3) PERCENT AND ONE (1) INCH = TEN (10) FEET FOR SLOPES GREATER THAN THREE (3) PERCENT

4. EXISTING STRUCTURES AND TOPOGRAPHIC FEATURES

5. SURVEY CONTROL LINE

6. RIGHT-OF-WAY LINES, CURB LINES AND CENTERLINES

7. RIGHT-OF-WAY AND ROADWAY WIDTHS

8. CURB RETURN DATA

9. CENTERLINES AND CURB DATA

10. STATIONING ALONG CENTERLINE

11. STATION AT SPECIAL POINTS (PC, PT, PRC, CB, RET, CL INTERSECTIONS, LC, ETC.)

12. TOP OF CURB ELEVATION AT SPECIAL POINTS (PC, PT, PRC, CB, RET)

13. PROPOSED AND EXISTING DRAINAGE STRUCTURES

14. DIRECTION OF FLOW AND HIGH AND LOW POINTS

15. FIFTY (50) FOOT (MINIMUM) TRANSITIONS FROM CROWN - FLAT - INVERT

16. LIMITS OF CONSTRUCTION

17. LOCATION OF GUARDRAIL AND DEAD END SIGNS

18. MATCH STATIONS FOR FOLLOWING PAGE

19. SHOW ALL EXISTING STRUCTURES AND IMPROVEMENTS ONE HUNDRED (100) FEET PAST THE LIMITS OF CONSTRUCTION UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER

20. SIDEWALK LOCATIONS
B. PROFILE

1. EXISTING AND PROPOSED PROFILES AT CURB LINES

2. PROPOSED PERCENT GRADE FOR ALL PROFILES

3. MINIMUM OF FIVE TENTHS (0.5) PERCENT GRADE AND A MAXIMUM OF ELEVEN (11) PERCENT GRADE; EXCEPT THAT UP TO FIFTEEN (15) PERCENT GRADE IN THE MOUNTAIN DEVELOPMENT AREA MAY BE PERMITTED WITH APPROVAL OF FIRE DEPARTMENT AND CITY ENGINEER

4. VERTICAL CURVE INFORMATION. THE ENTIRE LENGTH OF VERTICAL CURVE SHALL BE SHOWN ON SAME SHEET

5. EXISTING AND PROPOSED ELEVATIONS AT EVERY FIFTY (50) FEET AND SPECIAL STATIONS

6. STREET PROFILE SHALL EXTEND ONE HUNDRED (100) FEET BEYOND LIMITS OF CONSTRUCTION UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER

7. EXISTING AND PROPOSED DRAINAGE STRUCTURES AS THEY RELATE TO PROFILES

8. PROPOSED STREET PROFILE SHALL MATCH EXISTING STREET PROFILE FOR A SMOOTH TRANSITION

9. OPPOSITE CURB ELEVATIONS SHALL MATCH AT EACH STATION, EXCEPT IN A SUPERELEVATED ROADWAY OR AS APPROVED BY CITY ENGINEER

10. STREET CROWN SHALL NOT EXCEED THREE (3) PERCENT
A. STORM SEWER PLAN
   1. PROPOSED RIGHT-OF-WAY LINE AND WIDTHS
   2. LIMITS OF CONSTRUCTION AND MATCH-LINE STATIONING
   3. NORTH ARROW AND SCALE
   4. NAME OF STREET
   5. SURVEY CONTROL LINE
   6. STORM SEWER ALIGNMENT TIED TO SURVEY CONTROL LINE
   7. BEARINGS (DIRECTION AND HORIZONTAL CURVE DATA)
   8. STATIONING
   9. SIZE, TYPE, AND CLASSIFICATION OF PIPE
  10. MANHOLES - JUNCTION BOXES (CAST-IN-PLACE OR PRE-CAST)
      (A) STATIONING AND A MAXIMUM OF FIVE HUNDRED (500) FEET ON CENTER - MANHOLE REQUIRED AT CHANGE OF DIRECTION
      (B) TOP OF COVER ELEVATION
      (C) INVERT ELEVATION
      (D) TYPE, SIZE, AND NUMBER OF MANHOLE
STORM SEWER PLAN AND PROFILE
(continued)

11. DROP INLETS

(A) STATIONING

(B) TOP OF GRATE AND TOP OF CURB/NOSE AT GRATE ELEVATION

(C) INVERT ELEVATION

(D) TYPE, NUMBER OF GRATES, AND DROP INLET NUMBER (TWO (2) GRATE MINIMUM)

(E) STORMWATER DISCHARGE - EXPECTED AND CAPACITY

12. DROP INLET PIPE (LATERALS)

(A) SIZE AND TYPE OF PIPE

(B) TYPE OF CONNECTOR

(C) STORMWATER DISCHARGE - EXPECTED, CAPACITY, AND VELOCITY(IES)

13. SHOW EXISTING DRAINAGE STRUCTURES IN DASHED LINE AND INDICATE SIZE AND TYPE OF STRUCTURE

B. STORM SEWER PROFILE

1. STATIONING ALONG CENTERLINE OF STREET AT EVERY 100 FEET

2. TYPE AND SIZE OF EXISTING DRAINAGE STRUCTURES

3. EXISTING GROUND PROFILE AND PROPOSED TOP OF PAVEMENT

4. PROPOSED STORM SEWER PROFILE WITH PERCENT SLOPE

5. TYPE AND SIZE OF PIPE

6. HYDRAULIC GRADIENT LINE PROFILE WITH ELEVATION SHOWN AT EVERY MANHOLE AND/OR DROP INLETS
7. MANHOLE
   (A) SIZE, TYPE, AND MANHOLE NUMBER
   (B) TOP INVERT ELEVATION
   (C) CENTERLINE STATIONING
   (D) INVERT OF CONNECTOR LATERAL - SIZE AND TYPE OF PIPE

8. DROP INLETS
   (A) TYPE, NUMBER OF GRATES AND DROP INLET NUMBER (TWO (2) GRATE MINIMUM)
   (B) TOP OF GRATE AND INVERT ELEVATIONS
   (C) CENTERLINE STATIONING
   (D) STORMWATER DISCHARGE - EXPECTED AND CAPACITY

9. CONNECTOR PIPES (INLETS LATERALS)
   (A) TYPE AND SIZE OF PIPE
   (B) INVERT AT MAIN STORM SEWER
   (C) CENTERLINE STATIONING
   (D) STORMWATER DISCHARGE - EXPECTED, CAPACITY, AND VELOCITY(IES)
STORM SEWER PLAN AND PROFILE
(continued)

10. EXISTING SANITARY SEWER

(A) SANITARY SEWER LINE

(i.) PROFILE OF SANITARY SEWER

(ii.) TOP MANHOLE AND INVERT ELEVATIONS

(iii.) TYPE AND SIZE OF PIPE

(iv.) PERCENT GRADE

(v.) DETAIL INFORMATION OF SANITARY SEWER CONFLICTS
DETAIL SHEET

WHERE APPLICABLE, THE FOLLOWING SHALL BE PROVIDED:

A. DROP INLET(S)
B. MANHOLE(S) AND JUNCTION BOX(ES)
C. SURVEY MONUMENTS
D. STORM SEWER TRENCH CROSS-SECTION
E. PIPE CONCRETE COLLAR(S)
F. ROCKWALL FENCING
G. GUARD RAIL(S), BARRICADE(S), AND SIGNAGE
H. BOX CULVERTS
I. RETAINING WALL(S) (LOCATION ONLY, UNLESS TO BE BUILT BY SUBDIVIDER)
J. FOOTING(S)
K. CHANNEL CONCRETE LINING(S) - CROSS SECTIONS
L. SPILLWAYS
M. SEWER PIPE(S) - THRUST BLOCK(S)
N. SEEPAGE LINE(S) DETAILS
O. STORM SEWER OUTLET STRUCTURE(S)
P. BASIN(S) PLAN AND CROSS SECTIONS
Q. CONFLICTS WITH EXISTING IRRIGATION FACILITIES OR UTILITIES
CONSTRUCTION PHASING PLAN

WHERE APPLICABLE:
A. SHOW ENTIRE LIMITS OF PROJECT
B. INDICATE LIMITS OF INDIVIDUAL CONSTRUCTION PHASE BY STATIONS
C. TEMPORARY DRAINAGE PHASING PLAN
SECTION 2
# SECTION 2

## DRAINAGE AND DRAINAGE STRUCTURES

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETENTION BASIN DESIGN</td>
<td>2-1</td>
</tr>
<tr>
<td>RETENTION BASIN DESIGN REQUIREMENTS</td>
<td>2-2A thru 2-2B</td>
</tr>
<tr>
<td>RETENTION BASIN DESIGN (DRAWING)</td>
<td>2-3</td>
</tr>
<tr>
<td>DETENTION BASIN DESIGN</td>
<td>2-4</td>
</tr>
<tr>
<td>DETENTION BASIN DESIGN REQUIREMENTS</td>
<td>2-5</td>
</tr>
<tr>
<td>DETENTION BASIN DESIGN (DRAWING)</td>
<td>2-6</td>
</tr>
<tr>
<td>PERMANENT ELEVATION MARKER (FOR ON-SITE PONDING)</td>
<td>2-7</td>
</tr>
<tr>
<td>POND DEPTH GAUGE</td>
<td>2-8</td>
</tr>
<tr>
<td>LEFT BLANK FOR FUTURE USE</td>
<td>2-9</td>
</tr>
<tr>
<td>LEFT BLANK FOR FUTURE USE</td>
<td>2-10</td>
</tr>
<tr>
<td>LEFT BLANK FOR FUTURE USE</td>
<td>2-11</td>
</tr>
<tr>
<td>LEFT BLANK-FOR FUTURE USE</td>
<td>2-12</td>
</tr>
<tr>
<td>LEFT BLANK-FOR FUTURE USE</td>
<td>2-13</td>
</tr>
<tr>
<td>LEFT BLANK-FOR FUTURE USE</td>
<td>2-14</td>
</tr>
<tr>
<td>LEFT BLANK-FOR FUTURE USE</td>
<td>2-15</td>
</tr>
<tr>
<td>MANHOLE RING</td>
<td>2-16</td>
</tr>
<tr>
<td>MANHOLE COVER</td>
<td>2-17</td>
</tr>
<tr>
<td>GRATED MANHOLE COVER</td>
<td>2-18</td>
</tr>
<tr>
<td>PENETRATION APRON</td>
<td>2-19</td>
</tr>
<tr>
<td>48&quot; DIAMETER STANDARD CONICAL MANHOLE</td>
<td>2-20</td>
</tr>
<tr>
<td>48&quot; DIAMETER PRE-CAST MANHOLE</td>
<td>2-21</td>
</tr>
<tr>
<td>72&quot; DIAMETER PRE-CAST MANHOLE</td>
<td>2-22</td>
</tr>
<tr>
<td>72&quot; DIAMETER CAST-IN-PLACE MANHOLE</td>
<td>2-23</td>
</tr>
<tr>
<td>72&quot; CONCRETE MANHOLE COVER</td>
<td>2-24</td>
</tr>
<tr>
<td>CONCRETE PIPE COLLAR</td>
<td>2-25</td>
</tr>
</tbody>
</table>

[BACK TO SECTION INDEX PAGE]
# SECTION 2

## DRAINAGE AND DRAINAGE STRUCTURES

(continued)

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONNECTION AT PRE-CAST JUNCTION BOXES OR EXISTING MANHOLES</td>
<td>2-26</td>
</tr>
<tr>
<td>PRE-FABRICATED REINFORCED CONCRETE PIPE WYE</td>
<td>2-27</td>
</tr>
<tr>
<td>STANDARD MANHOLE SPECIFICATIONS</td>
<td>2-28</td>
</tr>
<tr>
<td>GRATE AND FRAME FOR DROP INLET</td>
<td>2-29</td>
</tr>
<tr>
<td>DROP INLET TYPE I</td>
<td>2-30</td>
</tr>
<tr>
<td>DROP INLET TYPE II</td>
<td>2-31</td>
</tr>
<tr>
<td>DROP INLET TYPE III</td>
<td>2-32</td>
</tr>
<tr>
<td>OFF-STREET STORM INLET DETAIL</td>
<td>2-33</td>
</tr>
<tr>
<td>FLUME DESIGN</td>
<td>2-34</td>
</tr>
<tr>
<td>CONCRETE FLUME WITHIN DRAINAGE RIGHT-OF-WAY</td>
<td>2-35A</td>
</tr>
<tr>
<td>TYPICAL CONCRETE DRAINAGE FLUMES</td>
<td>2-35B</td>
</tr>
<tr>
<td>SMALL WALL OPENING FOR DRAINAGE</td>
<td>2-35C</td>
</tr>
<tr>
<td>FLUME DESIGN SECTION</td>
<td>2-36</td>
</tr>
<tr>
<td>CONCRETE CHANNEL TYPE I</td>
<td>2-37</td>
</tr>
<tr>
<td>CONCRETE CHANNEL TYPE I END WALL DETAIL</td>
<td>2-38</td>
</tr>
<tr>
<td>CHANNEL LINING AT PIPE DISCHARGE</td>
<td>2-39</td>
</tr>
<tr>
<td>CONCRETE JOINTS</td>
<td>2-40</td>
</tr>
<tr>
<td>WATERSTOP DETAIL</td>
<td>2-41</td>
</tr>
<tr>
<td>DEBRIS TRAP/SAFETY GRATE</td>
<td>2-42</td>
</tr>
<tr>
<td>NO TRESPASSING WARNING SIGN</td>
<td>2-43</td>
</tr>
<tr>
<td>CURB OPENING FOR DRAINAGE</td>
<td>2-44</td>
</tr>
<tr>
<td>MODIFIED SIDEWALK DETAILS &quot;A&quot; &amp; &quot;B&quot;</td>
<td>2-45</td>
</tr>
</tbody>
</table>

**BACK TO TITLE INDEX PAGE**

---

**TITLE 19 - SUBDIVISION ORDINANCE**

**ENGINEERING DEPARTMENT**

**DESIGN STANDARDS FOR CONSTRUCTION**

Approved By: R. A. SHUBERT
Date: JUNE 03, 2008
Checked By: H. M. E.
Drawn By: QEC / J. R.
RETENTION BASIN DESIGN

DEFINITION: A MANMADE OR NATURAL RESERVOIR, EITHER PUBLIC OR PRIVATE, DESIGNED TO COMPLETELY RETAIN A SPECIFIED AMOUNT OF STORM WATER RUNOFF WITHOUT GRAVITY RELEASE.

DESIGN CRITERIA: THE DESIGN STORM FOR RETENTION BASINS IS 4" OF RAINFALL IN THREE HOURS OVER AN AREA OF 200 ACRES OR LESS (FOR AREAS OVER 200 ACRES SEE 2-9)

TOTAL RUNOFF FORMULA: \[ QT = \frac{ARC}{12} \]

\[ QT \] = TOTAL RUNOFF IN ACRE- FEET

\[ A \] = 100% OF CONTRIBUTING WATERSHED AREA IN ACRES

\[ R \] = RAINFALL IN INCHES

\[ C \] = RUNOFF FACTOR INCHES (SEE NO. 2-10)

STORAGE CAPACITY: A RETENTION BASIN MUST HAVE STORAGE CAPACITY AS FOLLOWS:

1. 100% OF THE DESIGN STORM
RETENTION BASIN DESIGN REQUIREMENTS

1. SIDE SLOPES SHALL NOT EXCEED FOLLOWING MAXIMUMS, UNLESS SATISFACTORY
GEOTECHNICAL REPORT IS SUBMITTED:

A. IN COHESIVE SOIL: THREE HORIZONTAL TO ONE VERTICAL (3:1)
B. IN NON-COHESIVE SOIL: THREE HORIZONTAL TO ONE VERTICAL (3:1)

NOTE: SOILS HAVING A PLASTICITY INDEX (PI) OF 8 OR ABOVE ARE CONSIDERED
COHESIVE.

2. AN EROSION CONTROL PLAN IS REQUIRED FOR NON-COHESIVE SOILS.

3. RETENTION BASINS WITH SIDE SLOPES GREATER THAN 12% SHALL BE ENCLOSED
WITH A SIX (6) FOOT HIGH CHAINLINK FENCE, EXCEPT THAT THE CHAINLINK FENCE
MAY BE SUBSTITUTED WITH MASONRY OR ROCKWALL, WROUGHT IRON FENCING OR
A COMBINATION THEREOF. THE HEIGHT SHALL BE MEASURED FROM THE GROUND
INSIDE OR OUTSIDE THE WALL WHICHEVER IS THE HIGHER.

4. BORING TESTS SHALL BE TO A DEPTH OF FIVE (5) FEET BELOW THE PROPOSED BASIN
INVERT. THE BOTTOM OF THE BASIN SHALL BE A MINIMUM OF 24 INCHES ABOVE THE
HIGH WATER TABLE. PERCOLATION TESTS IN THE VALLEY AREAS, SHALL BE
PERFORMED ACCORDING TO ASTM-5126 DURING PEAK IRRIGATION SEASON BETWEEN
AUGUST AND SEPTEMBER. STORM WATER, WITHIN THE BASIN, SHALL PERCOLATE
WITHIN 72 HOURS. A GEOTECHNICAL INVESTIGATION, PERFORMED BY A LICENSED
PROFESSIONAL GEOTECHNICAL ENGINEER, SHALL BE SUBMITTED PRIOR TO FINAL
APPROVAL OF THE DEVELOPMENT PLANS. THE REPORT SHALL CONTAIN, AT A
MINIMUM, SUBSURFACE SOIL PROFILE(S) AND PERCOLATION TEST RESULTS.

5. PROVIDE ONE (1), 18 FT MINIMUM WIDE DOUBLE GATE, ACCESSIBLE FROM PUBLIC
RIGHT-OF-WAY AND AlIGNED WITH THE ACCESS RAMP. THE GATE SHALL BE
CHAINLINK FENCE, EXCEPT THAT THE GATE SHALL BE WROUGHT IRON WHERE A
MASONRY OR ROCKWALL IS SUBSTITUTED FOR A CHAINLINK FENCE.

6. PROVIDE AN ACCESS RAMP MEETING THE FOLLOWING CRITERIA:

MAXIMUM SLOPE: 15%
MINIMUM WIDTH: 15 FT
RAMP MATERIAL: MINIMUM PI OF 8, WITH NO LOOSE MATERIAL
COMPACTION: MINIMUM 90% PER ASTM D-1557

BACK TO TITLE INDEX PAGE
7. RETENTION BASINS WITH DEPTHS OF 10 FEET OR MORE SHALL HAVE MAINTENANCE ROADS WITH A MINIMUM WIDTH OF 15 FEET. RETENTION BASINS WITH DEPTHS OF LESS THAN 10 FEET SHALL HAVE A FIVE (5) FOOT BENCH TERRACE ADJACENT TO THE PROPERTY LINE.

8. THE DESIGN WATER DEPTH IN RETENTION BASINS SHALL NOT EXCEED TWENTY (20) FEET, EXCEPT AS OTHERWISE APPROVED BY THE CITY ENGINEER WHEN BENCHING, SHALLOWER SLOPES OR OTHER MEASURES ARE PROVIDED.

9. THE ALLOWABLE CLEARANCE AT THE BOTTOM OF THE BASIN SHALL BE 25 FEET IN DIAMETER, MINIMUM.

10. IF AN ACCESS ROAD IS REQUIRED, A MINIMUM WIDTH OF TWENTY (20) FEET FOR THE ACCESS ROAD SHALL BE PROVIDED FROM THE STREET R.O.W. TO THE TOP OF THE BASIN.
Note:
Maximum design water depth is 20 feet.
Refer to Item 8, "Retention Basin Design Requirements" Section 2-2B of this manual.

RETENTION BASIN

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

Approved By: R. A. SHUBERT
Checked By: H. M. E.
Date: JUNE 03, 2008
Drawn By: QBC/ J. R.
DETENTION BASIN DESIGN

DEFINITION: A DETENTION BASIN IS A MANMADE OR NATURAL RESERVOIR, EITHER PUBLIC OR PRIVATE, DESIGNED TO RESTRICT THE FLOW OF STORMWATER TO A PRESCRIBED MAXIMUM RATE THROUGH A CONTROLLED RELEASE BY GRAVITY, AND TO CONCURRENTLY DETAIN THE EXCESS WATERS THAT ACCUMULATE BEHIND THE CONTROL STRUCTURE.

DESIGN CRITERIA: THE DESIGN STORM WILL BE A 4" RAINFALL IN THREE (3) HOURS OVER AN AREA OF 200 ACRES OR LESS. (FOR AREAS LARGER THAN 200 ACRES, SEE NO. 2-9, EXAMPLE INCLUDED).

TOTAL RUNOFF FORMULA: \[ QT = \frac{ARC}{12} \]

- \( QT \) = TOTAL RUNOFF IN ACRE-FEET
- \( A \) = 100% OF CONTRIBUTING WATERSHED AREA IN ACRES
- \( R \) = RAINFALL IN INCHES
- \( C \) = RUNOFF FACTOR (SEE CoEP "DRAINAGE DESIGN MANUAL")

THE DETENTION BASIN WILL BE DESIGNED UTILIZING GOOD ENGINEERING PRACTICES AND ACCEPTED METHODS (HEC-1) WHEREBY 100% OF THE RUNOFF VOLUME IS TO BE PROPERLY MANAGED THROUGH THE USE OF CHANNELS AND BASINS.

A GEOTECHNICAL INVESTIGATION, PERFORMED BY A LICENSED PROFESSIONAL GEOTECHNICAL ENGINEER, SHALL BE SUBMITTED PRIOR TO FINAL APPROVAL OF DEVELOPMENT PLANS. THE REPORT SHALL CONTAIN, AT A MINIMUM, SUBSURFACE SOIL PROFILE(S) AND PERCOLATION TEST RESULTS.
DETENTION BASIN DESIGN REQUIREMENTS

1. EARTH LEVEE DESIGN: THE DESIGN OF EARTH LEVEES SHALL BE IN ACCORDANCE WITH BOTH ACCEPTED ENGINEERING PRACTICE AND FEMA (FEDERAL EMERGENCY MANAGEMENT AGENCY) GUIDELINES AND SHALL INCLUDE A SEEPAGE ANALYSIS.

2. SPILLWAY: AN EMERGENCY CONCRETE SPILLWAY SHALL BE PROVIDED WITH A CAPACITY EQUAL TO THE PEAK DISCHARGE OF THE DESIGN STORM. (SEE 2-6,2-9,2-10,2-11) DEPTH OF FLOW OVER THE CREST OF THE SPILLWAY SHALL BE NO MORE THAN ONE (1) FOOT.

3. SIDE SLOPES SHALL NOT EXCEED FOLLOWING MAXIMUMS, UNLESS OTHERWISE RECOMMENDED BY A LICENSED PROFESSIONAL GEOTECHNICAL ENGINEER:
   A. IN COHESIVE SOIL, THREE (3) HORIZONTAL TO ONE (1) VERTICAL (3:1).
   B. IN NON-COHESIVE SOIL, THREE (3) HORIZONTAL TO ONE (1) VERTICAL (3:1).

4. PROVIDE AN ACCESS RAMP MEETING THE FOLLOWING CRITERIA:
   MAXIMUM SLOPE: 15%
   MINIMUM WIDTH: 15 FT
   RAMP MATERIAL: MINIMUM PI OF 8, WITH NO LOOSE MATERIAL COMPACTION: MINIMUM 90% PER ASTM D-1557

5. FOR MAINTENANCE PURPOSES, ONE (1) 18-FOOT WIDE DOUBLE SWING GATE ACCESSIBLE FROM PUBLIC RIGHT-OF-WAY SHALL BE PROVIDED.

6. DETENTION BASINS WITH DEPTHS OF 10 FEET OR MORE SHALL HAVE MAINTENANCE ROADS WITH A MINIMUM WIDTH OF 15 FEET AND A MAXIMUM SLOPE OF 15%. DETENTION BASINS WITH DEPTHS OF LESS THAN 10 FEET SHALL HAVE A FIVE (5) FOOT BENCH TERRACE ADJACENT TO THE PROPERTY LINE.

7. DETENTION BASINS SHALL BE ENCLOSED WITH A 6-FOOT CHAINLINK FENCE, EXCEPT THAT THE CHAINLINK FENCE MAY BE SUBSTITUTED WITH MASONRY OR ROCK WALL, WROUGHT IRON FENCING OR A COMBINATION THEREOF. THE HEIGHT SHALL BE MEASURED FROM THE GROUND INSIDE OR OUTSIDE THE WALL, WHICHEVER IS THE HIGHER.

8. THE DESIGN WATER DEPTH IN DETENTION BASINS SHALL NOT EXCEED TWENTY (20) FEET, EXCEPT AS OTHERWISE APPROVED BY THE CITY ENGINEER WHEN BENCHING, SHALLOWER SLOPES OR OTHER MEASURES ARE PROVIDED.

9. THE MINIMUM ALLOWABLE CLEARANCE AT THE BOTTOM OF BASIN SHALL BE 25 FEET IN DIAMETER.

10. THE OUTLET SHALL EMPTY THE BASIN WITHIN 72 HOURS FROM THE END OF DESIGN INTENSITY STORM.
Note
Maximum design water depth is 20 feet,
Refer to Item 9, "Detention Basin Design Requirements" Section 2-5 of this manual.

DETENTION BASIN

MAX. VELOCITY @ DISCHARGE POINTS
5 fps FOR UNPROTECTED GROUND
8 fps FOR OTHER GROUND COVER MATERIALS
4" PVC FILLED WITH CONCRETE

BOTTOM OF POND FINISHED GRADE

ELEVATION MARKER

BUILDING

ELEVATION MARKER

MARKERS TO BE PLACED AT CORNER OF FRONT AND BACK YARDS.

PERMANENT ELEVATION MARKER
FOR ON SITE PONDING
N.T.S.

BACK TO TITLE INDEX PAGE
NOTE
ALTERNATES WILL BE ALLOWED WITH THE PRIOR REVIEW AND APPROVAL OF THE CITY ENGINEER.

PIPE CAP

* 6" DIA. GALVANIZED STEEL PIPE WITH ANTI-RUST WHITE METAL PAINT WITH RUST INHIBITIVE RESINS (TWO COATS) WITH BASE COAT OF RUST PRIMER.

* 1' MARK ON OPPOSITE SIDES OF PIPE. USE ONE COAT OF BLACK ANTI-RUST METAL PAINT WITH RUST INHIBITIVE RESINS.

BOTTOM OF POND

CONCRETE 2500 PSI

2'-0"

POND DEPTH GAUGE

SCALE: 1/2"=1'-0"

NOTES:
1. CONSULT WITH PAINT MANUFACTURER FOR PRODUCTS THAT CAN SUSTAIN LONG PERIODS OF MOISTURE.
2. "d" = depth

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

POND DEPTH GAUGE

2-8
INTENTIONALLY LEFT BLANK FOR FUTURE USE
GENERAL NOTES:
1. MATCHING SURFACES MARKED "MF" TO BE MACHINE FINISHED OR ANY IRREGULARITIES THAT WOULD PREVENT A SNUG FIT.
2. CASTING TO BE SMOOTH AND VOID OF AIR HOLES.

ELEMTS

MANHOLE
COVER
48"
72"
WEIGHT
175 LBS.
310 LBS.
MANHOLE
A
B
C
D
E
F
G
H
COVER
1-11
6 1/2
1
5/8
1 1/4
3/8
1"

TOP VIEW
NOTE:
THIS MANHOLE COVER FITS IN A STANDARD MANHOLE RING (SEE 2-16)
### CONCRETE APRON FOR CIRCULAR PENETRATIONS IN ASPHALT PAVEMENTS

<table>
<thead>
<tr>
<th>&quot;D&quot; DIAMETER OF PENETRATION</th>
<th>&quot;A&quot; CONCRETE HORIZONTAL DIMENSION FROM PENETRATION</th>
<th>NUMBER OF NO. 3 REINFORCING STEEL BARS</th>
<th>&quot;B&quot; MINIMUM CLEARANCE FROM EDGE OF CONCRETE APRON TO CENTER OF NEAREST REBAR (INCHES)</th>
<th>&quot;C&quot; MINIMUM CLEARANCE FROM PENETRATION EDGE TO CENTER OF NEAREST REBAR (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(INCHES)</td>
<td>(INCHES)</td>
<td>(INCHES)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 TO 6.01</td>
<td>6</td>
<td>1</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>6.01 TO 18.01</td>
<td>8</td>
<td>2</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>18.01 AND OVER</td>
<td>12</td>
<td>3</td>
<td>1/2</td>
<td>1/2</td>
</tr>
</tbody>
</table>

### CONSTRUCTION NOTES:

1. ANY DISTURBED SUBGRADE UNDER THE CONCRETE APRON SHALL BE COMPACTED TO 95% DENSITY ± 3% OPTIMUM MOISTURE CONTENT IN ACCORDANCE WITH ASTM D-1557.
2. ANY DISTURBED COARSE UNDER THE CONCRETE APRON SHALL BE COMPACTED TO 100% DENSITY ± 2% OPTIMUM MOISTURE CONTENT WITHIN ASTM D-1557.
3. PROVIDE A MINIMUM OF 1 1/2" OF CONCRETE COVER FOR ALL REINFORCEMENT STEEL.
4. REINFORCEMENT SHALL MEET ASTM C-478 AND TRAFFIC LOADING (H-20).
5. NO. 3 REINFORCING STEEL HOOPS SHALL BE SPACED EQUALLY.

### GENERAL NOTES:

1. THE PENETRATION APRON SHOULD BE CAST IN-PLACE CONCRETE. (MINIMUM 28 DAY COMPRESSIVE STRENGTH 4000 PSI. HIGH EARLY CONCRETE IS REQUIRED)
2. TOPS OF PENETRATION APRON SHALL BE FLUSH WITH ROADWAY SURFACE OR FINISHED GRADE UNLESS OTHERWISE SPECIFIED BY THE CITY ENGINEER.

---

![Diagram of Penetration Apron](image)
CONCRETE PENETRATION APRON (REFER TO PLATE 2-19)

MORTAR

MORTAR ALL JOINTS OR USE "RAM-NEK" OR EQUIVALENT.

BRICK MASONRY AS REQ'D OR CONC. ADJUSTMENT RING

6x6x10x10 WWF

#3 REBAR

5" MIN.

48" DIA.

CONCRETE COLLAR

24" MAXIMUM DIA.

GROUT

POUR IN PLACE 3000 P.S.I. CONC. BASE MIN. @ 28 DAYS

48" DIAMETER STANDARD MANHOLE

NTS

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

48" DIAMETER STANDARD CONICAL MANHOLE 2-20

Approved By: R. A. SHUBERT
Date: JUNE 03, 2008
Checked By: H. M. F.
Drawn By: QBC / J. R.
CONCRETE PENETRATION APRON (REFER TO PLATE 2-19)

STD CAST IRON RING & COVER SEE DETAIL SHTS 2-16 AND 2-17

CONCRETE PENETRATION APRON (REFER TO PLATE 2-19)

VARIES

ASPHALT

#4 BARS 6" O.C. EACH WAY

2" C.L.

BRICK MASONRY AS REQD. OR CONC. ADJUSTMENT RING OR USE "RAM-NEK" OR EQUIVALENT.

MORTAR ALL JOINTS

CAST IN PLACE 3000 P.S.I. MIN. @ 28 DAYS IF PRECAST 4000 P.S.I.

CONCRETE COLLAR

INV. ELEV.

FILL WITH GROUT

#4 BARS @ 12" O.C. BOTH WAYS

8" 3" C.L.

6" 5" 48" 5" 6"

95% COMPACTION AS PER ATSM D-1557

DIA.

BASE: CAST IN PLACE 3000 P.S.I MIN. @ 28 DAYS

48" DIAMETER PRECAST MANHOLE SECTIONS

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

48" DIAMETER PRECAST MANHOLES 2-21

Approved By R. A. SHUBERT
Checked By: H. M. E
Date: JUNE 03, 2008
Drawn By: QEC / J. B.
CONCRETE PENTRATION APRON (REFER TO PLATE 2-16)

ASPHALT

#5 BARS 6" O.C. EACH WAY

48" MAX. DIA.

BASE CAST IN PLACE 3000 P.S.I. MIN. @ 28 DAYS.

95% COMPACTION AS PER ASTM D1557

MORTAR ALL JOINTS OR USE "RAM-NEK" OR EQUIVALENT

CONCRETE COLLAR

INV. ELEV.

FILL WITH GROUT

CAST IN PLACE 3000 P.S.I. MIN. @ 28 DAYS IF PRECAST 4000 P.S.I.

#4 BARS @ 12" O.C. BOTH WAYS

72" DIAMETER PRECAST MANHOLE SECTIONS

72" DIAMETER PRECAST MANHOLES

2-22

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

Approved By: R.A. SHUBERT
Checked By: H.M.E.
Date: JUNE 03, 2006
Drawn By: OEC/J.R.
SECTION A-A

SECTION B-B

72" DIAMETER CAST-IN PLACE STANDARD MANHOLE

BENDING DETAIL

72" DIAMETER CAST-IN-PLACE MANHOLE

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

Approved By: R. A. SHUBERT
Checked By: H. M. E.
Date: JUNE 03, 2008
Drawn By: OEC/J.R.
GENERAL NOTES:
1. ALL JOINTS TO BE TONGUE AND GROOVE AND SEALED WITH RAM-NEK OR EQUAL.
2. MANUFACTURER TO PROVIDE LIFTS OF ADEQUATE SIZE AS NEEDED.

CONSTRUCTION KEY NOTES:
A. 4000 P.S.I. CONCRETE 28 DAYS.
B. KEYLOCK ADDS 8" TO VERTICAL HEIGHT.
C. RING & COVER OR SPECIAL LIDS TO MEET REQUIREMENTS, MAY BE CAST IN PLACE.
D. REINFORCING SHALL MEET A.S.T.M. C478-87 AND TRAFFIC LOADING (HS-20).
E. SIZE TO ACCOMMODATE TYPE 72" DIAMETER MANHOLE RING.

MANHOLE COVER FOR TYPE 72" MANHOLE
CONCRETE PIPE COLLAR

1. A CONCRETE COLLAR IS REQUIRED WHERE PIPES CHANGE IN HORIZONTAL OR VERTICAL ALIGNMENT.
2. FOR PIPES 24" OR LESS IN DIAMETER REINFORCE WITH W.W.M.

3000 PSI CONC.
© 28 DAYS

D L
12" 12" 12"
18" 12" 18"
24" 12" 18"
36" 18" 18"
48" 18" 18"
60" 21" 18"
66" 21" 18"

BACK TO TITLE INDEX PAGE
CONNECTION AT PRECAST JUNCTION BOXES OR EXISTING MANHOLES

SCALE: N.T.S.

<table>
<thead>
<tr>
<th>D</th>
<th>L</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>18&quot;</td>
<td>18&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>18&quot;</td>
<td>18&quot;</td>
</tr>
</tbody>
</table>

BACK TO TITLE INDEX PAGE
REINFORCED CONCRETE PIPE – WYE 18" THRU 96" DIA.

PLAN VIEW SECTION
N.T.S.

NOTES:
1) THIS DRAWING IS NOT INTENDED TO SHOW REINFORCEMENT DESIGN EITHER AS TO PLACEMENT OR STEEL AREA. ACTUAL PROJECT SPECIFICATIONS WILL GOVERN.
2) STEEL AREA IN WYE CONNECTION EXCEEDS THAT REQUIRED IN ADJACENT PIPE.
3) FOR 18" DIA. TO 30" DIA. MAINLINE R.C.P. THE DIA. OF THE WYE NEEDS TO BE 6" SMALLER THAN THE MAINLINE DIA. FOR 36" DIA. TO 96" DIA. MAINLINE R.C.P. THE DIA. OF THE WYE NEEDS TO BE 12" SMALLER THAN THE MAINLINE DIA.

BACK TO TITLE INDEX PAGE
STANDARD MANHOLE SPECIFICATIONS

1. THE PRECAST MANHOLE RISER AND CONICAL SECTIONS SHALL CONFORM TO ASTM SPECIFICATIONS C-478.

2. THE PRECAST CONCRETE SHALL ATTAIN A MINIMUM ALLOWABLE COMpressive STRENGTH OF 4000 PSI @ 28 DAYS.

3. THE CONCRETE BASE SHALL ATTAIN A MINIMUM ALLOWABLE COMpressive STRENGTH OF 3000 PSI @ 28 DAYS.

4. MASONRY SHALL BE COMMON BRICK WITH ASTM TYPE 'S' MORTAR ATTAINING A MINIMUM COMpressive STRENGTH OF 1800 P.S.I. AT 28 DAYS.

5. INCLUDE DETAIL FOR CONNECTION AT PRECAST JUNCTION BOXES OR EXISTING MANHOLES (IF APPLICABLE), REFER TO PLATE 2-26.

6. MANHOLE COVER SHALL BE SET FLUSH WITH FINISHED PAVEMENT.

7. SUBGRADE FOR MANHOLES SHALL BE COMPACTED TO A MINIMUM OF 95% IN ACCORDANCE WITH ASTM D1557.
# PLAN VIEW

- **#4 REBARS @ 6" O.C. EACH WAY**
- **PIPE**
- **2-SACK CEMENT STABILIZED BACKFILL TO BE PLACED UNDER PROPOSED PAVEMENT**

## DETAIL "C"

- **L3 1/2"x3 1/2"x1/2" FRAME**
- **NELSON STUD**

## TABLE

<table>
<thead>
<tr>
<th>NUMBER OF GRATES</th>
<th>'L'</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5'-1 1/8&quot;</td>
</tr>
<tr>
<td>3</td>
<td>7'-0 1/8&quot;</td>
</tr>
<tr>
<td>4</td>
<td>8'-9 7/8&quot;</td>
</tr>
<tr>
<td>5</td>
<td>10'-8&quot;</td>
</tr>
</tbody>
</table>

**NOTES**
1. **H = 20' MAXIMUM**
2. CONCRETE TO BE 3000 psi MIN CORE TEST @ 28 DAYS.
3. **GRATE TO BE PERPENDICULAR TO TRAFFIC.**

## SECTION A

- **#4 REBARS @ 6" O.C. EACH WAY**
- **PIPE**
- **8"**
- **CONSTRUCTION JOINT MAY BE RAISED A MAXIMUM OF 6"**
- **4"**
- **8"**

**NOTES:**
- **SUBGRADE TO BE COMPACTED TO 95% AS PER ASTM D1557**

## SECTION B

- **#4 REBARS @ 6" O.C. EACH WAY**
- **4"**
- **8"**

**NOTES:**
- **SUBGRADE TO BE COMPACTED TO 95% AS PER ASTM D1557**
CONCRETE OR MORTARED ROCK RIP-RAP

PROVIDE FOR
EXPANSION JOINTS
WITH WATER-STOP
AND DOWELS
(SEE 2-40)

STILLING BASIN
OR END WALL
AS REQUIRED

END WALL
TURNDOWN

PLAN VIEW
NTS

15'-0'’
(MINIMUM)

12’ MIN.
FINISHED
GRADE

6' - 0’
(MINIMUM)

D* = 6’’ TO 18”
OVER 18’’ REQUIRES
STRUCTURAL DESIGN.
FREEBOARD 12” MIN.
REQUIRED. 3000 PSI
CORE TEST @ 28 DAYS.

95% COMPACTION
ASTM D1557

6” TYPICAL

TYPICAL END
WALL TURNDOWN

SECTION - A
NTS

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS
FOR CONSTRUCTION

CONCRETE FLUME
WITHIN DRAINAGE
R.O.W.
2-35A

Approved By: R. A. SHUBERT
Checked By: H. M. E.
Date: JUNE 03, 2008
Drawn By: QBC/1. R.
NOTES:
1. ALL CONCRETE SHALL BE 3000 PSI COMpressive STRENGTH @ 28 DAYS.
2. STEEL DIAMOND FLOOR PLATE TO HAVE A MINIMUM OF TWO COATS OF RED OXIDE PRIMER.
3. PLATE COLOR AS SPECIFIED.

CONCRETE FLUME SECTION WITHOUT PLATE

CONCRETE FLUME WITH STEEL PLATE COVER

MULTIPLE CONCRETE FLUMES WITH STEEL PLATE COVER

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

TYPICAL CONCRETE DRAINAGE FLUMES
2-35B
SMALL WALL OPENING FOR DRAINAGE

NOTE: FOR OPENINGS WIDER THAN 12", DESIGN ENGINEER SHALL SUBMIT STRUCTURAL DESIGN CALCULATIONS TO BE SUBMITTED AND APPROVED BY THE CITY ENGINEER. WIDER OPENINGS SHALL INCLUDE INTERMEDIATE VERTICAL CONCRETE SUPPORTS AND SAFETY PIPE/GATING WHERE APPROPRIATE.

SCALE: NTS
SECTION - B

See 4-3

For Rockwall
W/2-4 Rebars

6" Thick 3000 PSI
Conc With 6x6
6/6 W.W.F.

Subgrade To Be Compacted To
95% Density As Per ASTM D1557

SECTION - C

Subgrade To Be Compacted To
95% Density As Per ASTM D1557

Concrete To Be 3000 PSI
Core Test @ 28 Days,
With 6x6 6/6 W.W.F.
CONCRETE CHANNEL TYPE I

NOTE:

1. Channel is cast integral with ground.
2. Channel sections shall be poured monolithically from top of slope to top of slope.
3. See drainage design manual - June 2008 (Sec. 2-25) for required freeboard for supercritical flows.

90% Compaction of Subgrade as per ASTM D1557
90% Compaction of Subgrade as per ASTM D1557
90% Compaction of Subgrade as per ASTM D1557

Walls

Alternate Wing Wall Detail

6" Minimum

WALLS

6" MIN.

24" 4" MIN.

4" MIN.

WALLS

18" MIN.

WALLS

18" MIN.

WALLS

18" MIN.

WALLS

18" MIN.

WALLS

18" MIN.

WALLS

18" MIN.

WALLS

18" MIN.

WALLS

18" MIN.
NOTE:
END WALLS TO BE PLACED AT BEGINNING AND END OF CONCRETE CHANNELS.

END WALL ELEVATION

#4 REBAR @ 18" O.C. BOTH WAYS OR 6X6 #6 WWF MIN.
CONCRETE TO BE 3000 PSI @ 28 DAYS.

END WALL SECTIONAL VIEW
CONTRACTION JOINT AT 25' O.C.

EXPANSION JOINT

NOTES:
MAX. EXPANSION JOINT SPACING @ 100 FEET O.C. ALONG C.L. OF CHANNEL.

MINIMUM 95% COMPACTION AS PER ASTM D-1557
WATERSTOP DETAIL

NOTE:
WATERSTOP SHALL BE GREENSTREAK PVC MATERIAL, SPECIFICATIONS GRADE, 6" X 1/8" AND SERRATED WITH CENTERBULB OR APPROVED SUBSTITUTION BY CITY ENGINEER.
FINISH: GALVANIZED STEEL

NOTES:
1. 3" BAR TOP OF RACK.
2. 2 L 8" x 1/2" x5" x5"
3. STEEL PIPE 4" O.D. 2-1/2" I.D.
   LENGTH 6" LESS THEN ROD
4. U 8" x 1/2" x 5" x3" x3"
5. 1" 8 STEEL RODS THREADED
   BOTH ENDS LENGTH TO EXTEND
   THROUGH HEADWALL.
6. 2" DIA. STEEL ROD THREAD
   BOTH ENDS.
7. 2" HEX NUTS AND WASHERS.

HINGE DETAIL

FINISH: GALVANIZED STEEL

- 3/4" x 3" STEEL BAR
- 3/4" x 2" STEEL BAR
- 9" O.C. (TYPICAL)

Y = MIN OF 16.5' OR 3 (H)
X = MIN OF 6'

DEBRIS TRAP DETAIL

DEBRIS TRAP/SAFETY GRATE
2-42
NO TRESPASSING WARNING SIGN

VIOLOGERS WILL BE PROSECUTED
CITY OF EL PASO

3/4" WIDE LETTERS
WHITE ON BLACK BACKGROUND

5/8" WIDE LETTERS
WHITE ON BLACK BACKGROUND

BLACK LETTERS ON
WHITE BACKGROUND

3/4" WIDE LETTERS
WHITE ON BLACK BACKGROUND

5/8" WIDE LETTERS
WHITE ON BLACK BACKGROUND

3 1/2" x 3 1/2"

30"
* NOTE: 3' MAX UNLESS APPROVAL IS GRANTED BY THE CITY ENGINEER FOR A LARGER OPENING. IF PERMISSION IS GRANTED FOR A WIDER OPENING PROTECTIVE MEASURES SUCH AS PIPE BOLLARDS OR GUARDRAIL SHALL BE USED.
## SECTION 3
### STREETS

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STREET CROSS SECTIONS</td>
<td>3-1 thru 3-9</td>
</tr>
<tr>
<td>LOCAL STREETS</td>
<td>3-10</td>
</tr>
<tr>
<td>ALLEY CROSS-SECTIONS AND DETAILS</td>
<td>3-11</td>
</tr>
<tr>
<td>ALLEY CROSS-SECTIONS</td>
<td>3-11A</td>
</tr>
<tr>
<td>ALLEY DETAILS</td>
<td>3-12</td>
</tr>
<tr>
<td>FLUSH MEDIAN w/HEADER &amp; RAISED MEDIAN DESIGN</td>
<td>3-13</td>
</tr>
<tr>
<td>TERMINUS OF STREET</td>
<td>3-14</td>
</tr>
<tr>
<td>MOUNTAIN RESIDENTIAL STREET</td>
<td>3-15</td>
</tr>
<tr>
<td>CUL-DE-SAC</td>
<td>3-16</td>
</tr>
<tr>
<td>&quot;T&quot; CUL-DE-SAC</td>
<td>3-17</td>
</tr>
<tr>
<td>&quot;Y&quot; CUL-DE-SAC</td>
<td>3-18</td>
</tr>
<tr>
<td>STUB STREET</td>
<td>3-19</td>
</tr>
<tr>
<td>CONCRETE BUS PAD (PROPOSED PAVEMENT)</td>
<td>3-20</td>
</tr>
<tr>
<td>CONCRETE BUS PAD (EXISTING PAVEMENT)</td>
<td>3-21</td>
</tr>
<tr>
<td>PAVEMENT THICKNESS DESIGN PROCEDURE</td>
<td>3-22A thru 3-24</td>
</tr>
<tr>
<td>PAVEMENT THICKNESS DESIGN CHART</td>
<td>3-25 thru 3-26</td>
</tr>
<tr>
<td>PAVEMENT THICKNESS DESIGN CHART (HEAVY)</td>
<td>3-27</td>
</tr>
<tr>
<td>PAVEMENT THICKNESS DESIGN</td>
<td>3-28 thru 3-29B</td>
</tr>
<tr>
<td>MEDIAN OPENING SIGHT DISTANCE (2-STOP CROSSING)</td>
<td>3-30</td>
</tr>
<tr>
<td>MEDIAN OPENING SIGHT DISTANCE (1-STOP CROSSING)</td>
<td>3-31</td>
</tr>
<tr>
<td>MEDIAN OPENING SPACING</td>
<td>3-32</td>
</tr>
<tr>
<td>CENTERLINE STRIPING WITH BIKE LANES</td>
<td>3-33</td>
</tr>
<tr>
<td>CENTERLINE STRIPING WITHOUT BIKE LANES</td>
<td>3-34</td>
</tr>
<tr>
<td>MEDIAN STRIPING WITH BIKE LANES</td>
<td>3-35</td>
</tr>
<tr>
<td>MEDIAN STRIPING WITHOUT BIKE LANES</td>
<td>3-36</td>
</tr>
<tr>
<td>ACCELERATION AND DECELERATION LANES</td>
<td>3-37</td>
</tr>
<tr>
<td>MINIMUM RADII AT INTERSECTION APPROACH</td>
<td>3-38</td>
</tr>
</tbody>
</table>
# SECTION 3

**STREETS**  
(continued)

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERSECTION DESIGN REQUIREMENTS</td>
<td>3-39</td>
</tr>
<tr>
<td>GEOMETRIC DESIGN OF ROADWAYS</td>
<td>3-40</td>
</tr>
<tr>
<td>INTERSECTION DESIGN</td>
<td>3-41</td>
</tr>
<tr>
<td>INTERSECTION OFFSET</td>
<td>3-41A</td>
</tr>
<tr>
<td>CLUSTER PARKING</td>
<td>3-42</td>
</tr>
<tr>
<td>STREET PAVING CUT</td>
<td>3-43</td>
</tr>
<tr>
<td>STREET PAVING CUT (CONDUIT)</td>
<td>3-44</td>
</tr>
<tr>
<td>STREET PAVING CUT FOR FLEXIBLE PIPE</td>
<td>3-45</td>
</tr>
<tr>
<td>GUARD POST DETAIL</td>
<td>3-46</td>
</tr>
<tr>
<td>GUARD RAIL</td>
<td>3-47</td>
</tr>
<tr>
<td>TERMINUS METAL BEAM GUARD FENCE</td>
<td>3-48</td>
</tr>
<tr>
<td>PROPOSED CITY MONUMENT LOCATIONS</td>
<td>3-49</td>
</tr>
<tr>
<td>PLANE SURVEYS AND GEODETIC CONTROL</td>
<td>3-50</td>
</tr>
<tr>
<td>SURVEYS AND MONUMENTS</td>
<td>3-51</td>
</tr>
<tr>
<td>CITY SURVEY MONUMENT</td>
<td>3-52</td>
</tr>
<tr>
<td>SINGLE EYEBROW CUL-DE-SAC</td>
<td>3-53</td>
</tr>
<tr>
<td>DUAL EYEBROW CUL-DE-SAC</td>
<td>3-54</td>
</tr>
<tr>
<td>TURNING HEEL CURVE</td>
<td>3-55</td>
</tr>
<tr>
<td>PROPOSED 70 DEGREE ANGLE (MIN.) TURNING HEEL</td>
<td>3-56</td>
</tr>
<tr>
<td>PROPOSED 90 DEGREE ANGLE TURNING HEEL</td>
<td>3-57</td>
</tr>
<tr>
<td>PROPOSED 110 DEGREE ANGLE (MAX.) TURNING HEEL</td>
<td>3-58</td>
</tr>
</tbody>
</table>
MINOR ARTERIAL STREET
FOUR (4) LANES

MINOR ARTERIAL STREET WITH BIKE/HIKE
FOUR (4) LANES
NON-RESIDENTIAL COLLECTOR
CAN BE DESIGNED TO PROVIDE FOR ANGLE PARKING
MEDIAN MAY BE RAISED

NON-RESIDENTIAL COLLECTOR
WITH BIKE LANE
CAN BE DESIGNED TO PROVIDE FOR ANGLE PARKING
MEDIAN MAY BE RAISED
NON-RESIDENTIAL 4 LANE COLLECTOR

NON-RESIDENTIAL 4 LANE COLLECTOR
WITH BIKE LANE
RESIDENTIAL COLLECTOR

CAN BE DESIGNED TO PROVIDE FOR ANGLE PARKING

RESIDENTIAL COLLECTOR STREET SECTION

TWO (2) LANES

CAN BE DESIGNED TO PROVIDE FOR ANGLE PARKING
MULTI-FAMILY & COMMERCIAL/INDUSTRIAL
LOCAL STREET 1
CAN BE DESIGNED TO PROVIDE FOR ANGLE PARKING

MULTI-FAMILY & COMMERCIAL/INDUSTRIAL
LOCAL STREET 2
CAN BE DESIGNED TO PROVIDE FOR ANGLE PARKING
36' LOCAL RESIDENTIAL 1
NOTE: CROSS SECTIONS ARE MINIMUM, STANDARD REQUIREMENTS

28' LOCAL RESIDENTIAL 2
NOTE: CROSS SECTIONS ARE MINIMUM, STANDARD REQUIREMENTS
32' LOCAL RESIDENTIAL 3
NOTE: CROSS SECTIONS ARE MINIMUM, STANDARD REQUIREMENTS

20' RESIDENTIAL LANE
NO PARKING
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.
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
ALLEY PAVEMENT

VALLEY GUTTER

NOTES:

COMPRESSIVE STRENGTH OF CONCRETE SHALL BE $F_c = 3000$ P.S.I. MINIMUM
FLUSH MEDIAN WITH HEADER DESIGN

LOCAL STREETS
LANDSCAPE 2" BELOW T.C.
IMPERVIOUS SURFACE
FLUSH WITH T.C.

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 4" 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.
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.
600' maximum from center of intersection street to center of cul-de-sac turnaround (single family & duplex-1 to 25 dwellings)

300' maximum from center of intersection street to center of cul-de-sac turnaround (less than 12 dwellings non-residential, commercial and industrial)

Unless an exception is granted by the city plan commission

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.

\[ R = 55' \text{ min. or 50' min. (with 10' utility and sidewalk easement) or} \]
\[ R = 60' \text{ min. (heavy commercial and industrial districts)} \]
\[ R_1 = 45' \text{ min. (residential and non-residential districts)} \]
\[ R_2 = 50' \text{ min. (heavy commercial and industrial districts)} \]
\[ R_2 = 20' \text{ min. (to face of curb)} \]
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.
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.
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.

CONCRETE BUS PAD (PROPOSED PAVEMENT)

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

Approved By: R. A. SHUBERT
Checked By: H. M. E.
Date: JUNE 03, 2008
Drawn By: OEC / J. R.
PLAN: CONC. BUS PAD

SECTION A - A

SECTION B - B

CONCRETE BUS PAD
(EXISTING PAVEMENT)

3-21
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 DETERMINED 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 RELATIONLY 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.


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 (A₁, A₂, A₃) MUST BE ESTABLISHED FROM TABLE 2. (ATTACHED).

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

\[ SN = A₁D₁ + A₂D₂ + A₃D₃ \]

WHERE  
- \( D₁ \) = THICKNESS OF SURFACE COURSE
- \( D₂ \) = THICKNESS OF BASE COURSE
- \( D₃ \) = 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, 85% COMPACTED SUBGRADE, ASTM D1557.

A. P = 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, a1 = 0.44, a2 = 0.14, a3 = 0.11
G. USE D1 = 2", D2 = 6" IN EQU-1 AND SOLVE FOR D2
   1.70 = (0.44) (2) + (0.14) D2 + (0.11) (6)
   D2 = 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

## Street Classification

<table>
<thead>
<tr>
<th>STREET</th>
<th>AVERAGE DAILY TRAFFIC</th>
<th>ROADWAY WIDTH (FT.)</th>
<th>ROW WIDTH (FT.)</th>
<th>MINIMUM PAVEMENT THICKNESS (IN.) **</th>
<th>HMAC</th>
<th>SUBGRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.A.L.</td>
<td>CSB (20 YRS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALLEY</td>
<td>200</td>
<td>14 OR 20</td>
<td>14 OR 20</td>
<td>1-1/2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWENTY FOOT (20')</td>
<td>200</td>
<td>20</td>
<td>40</td>
<td>1-1/2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>RESIDENTIAL LANE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- NO PARKING</td>
<td>45,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THIRTY-TWO FOOT (32') RESIDENTIAL LANE</td>
<td>500</td>
<td>32</td>
<td>50</td>
<td>1-1/2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>- NO PARKING</td>
<td>45,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THIRTY-SIX FOOT (36') RESIDENTIAL 1 LANE</td>
<td>3,000</td>
<td>36</td>
<td>56</td>
<td>1-1/2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>269,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWENTY-EIGHT FOOT</td>
<td>3,000</td>
<td>28</td>
<td>46</td>
<td>1-1/2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>(28') RESIDENTIAL 2 LANE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>269,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESIDENTIAL COLLECTOR - WITH PARKING</td>
<td>3,000</td>
<td>36</td>
<td>54</td>
<td>1-1/2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>269,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESIDENTIAL COLLECTOR WITH MEDIAN</td>
<td>3,000</td>
<td>36</td>
<td>54</td>
<td>1-1/2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>269,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOUNTAIN RESIDENTIAL</td>
<td>500 *</td>
<td>20</td>
<td>23</td>
<td>1-1/2</td>
<td>4-1/2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>45,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIVIDED MOUNTAIN RESIDENTIAL</td>
<td>500 *</td>
<td>20</td>
<td>VARIES</td>
<td>1-1/2</td>
<td>4-1/2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>45,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MULTI-FAMILY/ COMMERCIAL/ INDUSTRIAL LOCAL STREET 1</td>
<td>6,000 *</td>
<td>44</td>
<td>64</td>
<td>2</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>
## PAVEMENT THICKNESS DESIGN CHART

(continued)

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

* 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.
# Pavement Thickness Design Procedure

<table>
<thead>
<tr>
<th>Street Classification</th>
<th>Aver. Daily Traffic</th>
<th>Roadway Width (ft.)</th>
<th>R.O.W. Width (ft.)</th>
<th>Minimum Pavement Thickness (in.) **&lt;br&gt;HMCR&lt;br&gt;CSB&lt;br&gt;Subgrade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector Arterial **</td>
<td>7,000* &lt;br&gt;1,800,000</td>
<td>90</td>
<td>98</td>
<td>2 1/2&lt;br&gt;8&lt;br&gt;10</td>
</tr>
<tr>
<td>Minor Arterial **</td>
<td>14,000* &lt;br&gt;2,200,000</td>
<td>98</td>
<td>120</td>
<td>2 1/2&lt;br&gt;10&lt;br&gt;12</td>
</tr>
<tr>
<td>Major Arterial **</td>
<td>28,000* &lt;br&gt;4,600,000</td>
<td>98</td>
<td>136</td>
<td>2 1/2&lt;br&gt;10&lt;br&gt;12</td>
</tr>
<tr>
<td>Collector Arterial **&lt;br&gt;W/ Bike Lanes</td>
<td>7,000* &lt;br&gt;1,800,000</td>
<td>98</td>
<td>136</td>
<td>2 1/2&lt;br&gt;8&lt;br&gt;10</td>
</tr>
<tr>
<td>Minor Arterial **&lt;br&gt;W/ Bike Lanes</td>
<td>14,000* &lt;br&gt;2,200,000</td>
<td>98</td>
<td>136</td>
<td>2 1/2&lt;br&gt;10&lt;br&gt;12</td>
</tr>
<tr>
<td>Major Arterial **&lt;br&gt;W/ Bike Lanes</td>
<td>28,000* &lt;br&gt;4,600,000</td>
<td>98</td>
<td>136</td>
<td>2 1/2&lt;br&gt;10&lt;br&gt;12</td>
</tr>
</tbody>
</table>

*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.


(2) The correlation is with the design curves used by Washington Dept. of Highways; Exudation pressure is 300 psig. 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
<table>
<thead>
<tr>
<th>PAVEMENT COMPONENT</th>
<th>COEFFICIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SURFACE COURSE</strong></td>
<td></td>
</tr>
<tr>
<td>ROADMIX (LOW STABILITY)</td>
<td>0.20</td>
</tr>
<tr>
<td>PLANTMIX (HIGH STABILITY)</td>
<td>0.44*</td>
</tr>
<tr>
<td>SAND ASPHALT</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>BASE COURSE</strong></td>
<td></td>
</tr>
<tr>
<td>SANDY GRAVEL</td>
<td>0.07</td>
</tr>
<tr>
<td>CRUSHED STONE</td>
<td>0.14</td>
</tr>
<tr>
<td>CEMENT-TREATED (NO SOIL - CEMENT)</td>
<td></td>
</tr>
<tr>
<td>COMPRESSIVE STRENGTH @ 7 DAYS</td>
<td></td>
</tr>
<tr>
<td>650 PSI OR MORE (4.48 MPa)</td>
<td>0.23</td>
</tr>
<tr>
<td>400 TO 650 PSI (2.76 TO 4.48 MPa)</td>
<td>0.20</td>
</tr>
<tr>
<td>400 PSI OR LESS (2.76 MPa)</td>
<td>0.15</td>
</tr>
<tr>
<td>BITUMINOUS - TREATED</td>
<td></td>
</tr>
<tr>
<td>COARSE - GRADED</td>
<td>0.34</td>
</tr>
<tr>
<td>SAND ASPHALT</td>
<td>0.30</td>
</tr>
<tr>
<td>LIME - TREATED</td>
<td>0.15 - 0.30</td>
</tr>
<tr>
<td><strong>SUBBASE COURSE</strong></td>
<td></td>
</tr>
<tr>
<td>SANDY GRAVEL</td>
<td>0.11</td>
</tr>
<tr>
<td>SAND OR SANDY-CLAY</td>
<td>0.15 - 0.10</td>
</tr>
</tbody>
</table>

**LAYER COEFFICIENTS**

**TABLE 2**

**TITLE 19 - SUBDIVISION ORDINANCE**

**ENGINEERING DEPARTMENT**

**DESIGN STANDARDS FOR CONSTRUCTION**

**PAVEMENT THICKNESS DESIGN**

3-29B
MEDIAN OPENING SIGHT DISTANCE

(2-STOP CROSSING)

NOTE:
MINIMUM SIGHT DISTANCE REQUIRED AT MEDIAN OPENINGS WHERE THE CROSSROAD IS CONTROLLED BY STOP SIGNS SHALL BE AS SHOWN BELOW; OTHER APPLICATIONS SHALL COMPLY WITH AASHTO REQUIREMENTS.

MEDIAN GREATER THAN OR EQUAL TO 20 FEET (2-STOP CROSSING)

<table>
<thead>
<tr>
<th>ARTERIAL DESIGN SPEED</th>
<th>30 MPH</th>
<th>35 MPH</th>
<th>40 MPH</th>
<th>45 MPH</th>
<th>50 MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 LANES (20'-24')</td>
<td>390</td>
<td>455</td>
<td>520</td>
<td>585</td>
<td>650</td>
</tr>
<tr>
<td>3 LANES (32'-36')</td>
<td>435</td>
<td>505</td>
<td>580</td>
<td>650</td>
<td>725</td>
</tr>
<tr>
<td>4 LANES (40'-48')</td>
<td>450</td>
<td>525</td>
<td>600</td>
<td>675</td>
<td>750</td>
</tr>
</tbody>
</table>

VERTICAL SIGHT DISTANCE SHALL BE MEASURED FROM A DRIVER'S EYE LEVEL (3.5 FEET) TO THE TOP OF AN ONCOMING CAR (4.5 FEET).

NO MEDIAN OPENING SHALL BE LOCATED WHERE THE GRADE BETWEEN THE LANES ON OPPOSITE SIDES OF THE MEDIAN EXCEEDS 11%.
MEDIAN OPENING SIGHT DISTANCE

(1-STOP CROSSING)

NOTE:
MINIMUM SIGHT DISTANCE REQUIRED AT MEDIAN OPENINGS WHERE THE CROSSROAD IS CONTROLLED BY STOP SIGNS SHALL BE AS SHOWN BELOW; OTHER APPLICATIONS SHALL COMPLY WITH AASHTO REQUIREMENTS.

<table>
<thead>
<tr>
<th>ARTERIAL DESIGN</th>
<th>SPEED</th>
<th>30 MPH</th>
<th>35 MPH</th>
<th>40 MPH</th>
<th>45 MPH</th>
<th>50 MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 LAKES (40'-48')</td>
<td></td>
<td>485</td>
<td>565</td>
<td>645</td>
<td>730</td>
<td>810</td>
</tr>
<tr>
<td>6 LAKES (64'-72')</td>
<td></td>
<td>530</td>
<td>620</td>
<td>705</td>
<td>795</td>
<td>880</td>
</tr>
</tbody>
</table>

VERTICAL SIGHT DISTANCE SHALL BE MEASURED FROM A DRIVER'S EYE LEVEL (3.5 FEET) TO THE TOP OF AN ONCOMING CAR (4.5 FEET).

NO MEDIAN OPENING SHALL BE LOCATED WHERE THE GRADE BETWEEN THE LAKES ON OPPOSITE SIDES OF THE MEDIAN EXCEEDS 11%. OTHER APPLICATIONS FOR SIGHT DISTANCE DESIGN SHALL BE PERMITTED, PROVIDED THEY MEET AASHTO GUIDELINES.
MEDIAN OPENING SPACING

NOTE:
MEDIAN OPENINGS SHALL BE LOCATED NO CLOSER THAN 450 FEET
FROM ARTERIAL STREET INTERSECTIONS.
MEDIAN OPENINGS SHALL BE LOCATED NO CLOSER THAN 750 FEET FROM
FREEWAY SERVICE ROAD INTERSECTIONS.
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.

DOUBLE YELLOW LINE

LANE LINES
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.
MEDIAN STRIPING WITH BIKE LANES

TYPICAL CURVE DATA

<table>
<thead>
<tr>
<th>No.</th>
<th>Δ</th>
<th>R</th>
<th>L</th>
<th>T</th>
<th>CH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>13'41'08&quot;</td>
<td>211.34'</td>
<td>50.48'</td>
<td>25.36'</td>
<td>50.36'</td>
</tr>
</tbody>
</table>

\[
T = R \tan \frac{\Delta}{2}
\]
\[
C = 2R \sin \frac{\Delta}{2} = 2T \cos \frac{\Delta}{2}
\]
\[
L = \frac{\Delta R}{2}
\]

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.

DOUBLE YELLOW LINE

LANE LINES

10'  30'  10'

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

MEDIAN STRIPING WITH BIKE LANES
3-35

Approved By: H. A. SHUBERT
Checked By: H. M. B.
Date: JUNE 03, 2008
Drawn By: CBC/ J. R.
MEDIAN STRIPING WITHOUT BIKE LANE

TYPICAL CURVE DATA

<table>
<thead>
<tr>
<th>No.</th>
<th>Δ</th>
<th>R</th>
<th>L</th>
<th>T</th>
<th>CH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>13'41&quot;8&quot;</td>
<td>211.34'</td>
<td>50.48'</td>
<td>25.36'</td>
<td>50.36'</td>
</tr>
</tbody>
</table>

\[
T = R \tan \frac{\Delta}{2} \\
C = 2R \sin \frac{\Delta}{2} = 2T \cos \frac{\Delta}{2} \\
L = \frac{\Delta R T}{2}
\]

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.

DOUBLE YELLOW LINE

LANE LINES

10'  30'  10'
RECOMMENDED RADII

R₁ = NO LESS THAN 40'
R₂ = NO LESS THAN 92'

NOTES:
1. IF LESS THAN 110°, THEN TURNINGHEEL IS NEEDED.
2. R₁ AND R₂ ARE BASED ON DESIGN SPEED AS PER AASHTO DESIGN GUIDELINES.
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.
## Geometric Design of Roadways

<table>
<thead>
<tr>
<th>Design Speed (m.p.h.)</th>
<th>Horizontal Alignment Minimum Curve Radius (ft)</th>
<th>Vertical Alignment Rate of Vertical Curvature (K-Value)</th>
<th>Intersection Sight Distance Minimum Sight Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>180</td>
<td>20 30</td>
<td>125</td>
</tr>
<tr>
<td>25</td>
<td>(Information to be incorporated at a later date)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>300</td>
<td>30 40</td>
<td>325</td>
</tr>
<tr>
<td>35</td>
<td>475</td>
<td>50 50</td>
<td>400</td>
</tr>
<tr>
<td>40</td>
<td>675</td>
<td>80 70</td>
<td>500</td>
</tr>
<tr>
<td>45</td>
<td>1,100</td>
<td>120 90</td>
<td>500</td>
</tr>
<tr>
<td>50</td>
<td>1,400</td>
<td>160 110</td>
<td>600</td>
</tr>
</tbody>
</table>
INTERSECTION DESIGN

<table>
<thead>
<tr>
<th>ROADWAY CLASSIFICATION</th>
<th>DESIGN SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLEY</td>
<td>15</td>
</tr>
<tr>
<td>(INFORMATION TO BE INCORPORATED AT A LATER DATE)</td>
<td>25</td>
</tr>
<tr>
<td>MINOR RESIDENTIAL ACCESS</td>
<td>30</td>
</tr>
<tr>
<td>MAJOR RESIDENTIAL ACCESS</td>
<td>30</td>
</tr>
<tr>
<td>RESIDENTIAL SUBCOLLECTOR</td>
<td>30</td>
</tr>
<tr>
<td>DIVIDED RESIDENTIAL</td>
<td>30</td>
</tr>
<tr>
<td>MOUNTAIN RESIDENTIAL &amp; DIVIDED MOUNTAIN RESIDENTIAL:</td>
<td></td>
</tr>
<tr>
<td>&lt; 200 ADT</td>
<td>20</td>
</tr>
<tr>
<td>≥ 200 ADT</td>
<td>25</td>
</tr>
<tr>
<td>STUB STREET</td>
<td>25</td>
</tr>
<tr>
<td>COLLECTOR ARTERIAL</td>
<td>35</td>
</tr>
<tr>
<td>MINOR ARTERIAL</td>
<td>40</td>
</tr>
<tr>
<td>MAJOR ARTERIAL</td>
<td>45</td>
</tr>
<tr>
<td>SUPER ARTERIAL</td>
<td>50</td>
</tr>
</tbody>
</table>

Minimum Curvature of Curbs at Street Intersections

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Curb Turn Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local with: Local, Subcollector, or Collector</td>
<td>25'</td>
</tr>
<tr>
<td>Local with: Arterial or Freeway</td>
<td>25'</td>
</tr>
<tr>
<td>Subcollector with: Subcollector, or Collector</td>
<td>20'</td>
</tr>
<tr>
<td>Subcollector with: Arterial or Freeway</td>
<td>25'</td>
</tr>
<tr>
<td>Collector with: Collector</td>
<td>25'</td>
</tr>
<tr>
<td>Collector with: Arterial or Freeway</td>
<td>30'</td>
</tr>
<tr>
<td>Arterial with: Arterial or Freeway</td>
<td>40'</td>
</tr>
</tbody>
</table>
NOTE:
REFER TO SECTION 19.15.12 - STREET OFFSETS, TABLE 19.15-4 OF THE SUBDIVISION ORDINANCE FOR MINIMUM OFF-SET DISTANCES
TRENCH BACKFILL & PAVEMENT REPLACEMENT

Do = OUTSIDE DIAMETER

2" ASPHALT MINIMUM

12"

6" OF 2-SACK SOIL CEMENT BACKFILL

SLOPE TRENCH FOR SANDY SOIL CONDITIONS (BOTH SIDES)

1 MIN.

O.D. + 6" MIN.

O.D. = OUTSIDE DIAMETER

O.D. + 24" MIN.

EXIST. FLEXIBLE BASE WITH H.M.A.C.

2 SACK SOIL CEMENT OR NATURAL BACKFILL
90% COMPACTED, ASTM D1557

2 SACK SOIL CEMENT OR SAND BACKFILL
90% COMPACTED, ASTM D1557

NOTE: IF TRENCH WIDTH IS GREATER THAN 6 FT. SUBMIT PLANS TO THE CITY ENGINEER FOR APPROVAL.

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.

TITLED 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

STREET PAVING CUT
3-43

Approved By: R.A. SHUBERT
Checked By: H.M.E.
Date: JUNE 03, 2008
Drawn By: OEC/J.R.
CONDUIT TRENCHING

MANDATORY FOR CUTS WITH WIDTH LESS THAN OR EQUAL TO 12" AND FOR CUTS GREATER THAN 12"

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

1. ALL ASPHALT CUTS MUST BE SAW CUT.

2. TWO SACK SOIL CEMENT MIX MUST BE
   2 SACK OF CEMENT PER ONE CUBIC YARD OF SOIL.
GENERAL NOTES
1. NATURAL MATERIAL MAY BE USED PROVIDED IT MEETS THE SPECIFICATIONS 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

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>&quot;W&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>LESS THAN 24'</td>
<td>9&quot;</td>
</tr>
<tr>
<td>24' THRU 48&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>GREATER THAN 48&quot;</td>
<td>O.D./4</td>
</tr>
</tbody>
</table>

STREET PAVING CUT FOR FLEXIBLE PIPE
3 RED INDEPENDENTLY HOUSED ACRYLIC PLASTIC PRISMATIC REFLECTORS (3" DIAMETER). 1" SPACE BETWEEN REFLECTORS.

4" DIAMETER, SCHEDULE 40 GALVANIZED METAL POST OR 8" PRESSURE TREATED TIMBER AND METAL CAP.

3000 P.S.I. CONCRETE

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

18" X 18" X 6" CONC. TERMINAL ANCHOR

THIS RAIL SECTION TO BE TWISTED THROUGH 90° IN THE FIELD

EDGE OF SHOULDER

12' 6"

25'-0"

APPROACH TERMINAL ANCHOR

GROUND LINE

LAP RAILS IN DIRECTION OF TRAFFIC

12'-6"
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.
SURVEYS AND MONUMENTS

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 GRID 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 GRID LEVEL DISTANCE. TO OBTAIN GRID DISTANCE, MULTIPLY GRID LEVEL DISTANCE BY (COMBINATION FACTOR). THE NORTH ARROW SHALL INDICATE GRAPHICALLY THE DIVERGENCE BETWEEN GEODETIC NORTH AND GRID NORTH, AND THE THETA (θ) 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.
EMBOSS STAR, RING AND LETTERS TO HEIGHT OF 3/32"

OUTSIDE RADIUS
OF STAR = 3/4"
INSIDE RADIUS
OF STAR = 3/16"

BRONZE MONUMENT CAP

MONUMENT BOX

1/4"
3 1/4"
1/8"
3/32"
2 1/2"
1/2"
1/4"
3/8"
11 1/4"
9 3/4"
8 3/4"
3 1/4"
1 1/4"
7/8"
1 3/4"
18"

ALL HOLES 1/2" Q

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

BOX COVER

SECTION VIEW

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

CITY SURVEY MONUMENT
3-52

Approved By R. A. SHUBERT
Date JUNE 03, 2008
Checked By H. M. E
Drawn By OEC/J. R.
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.

<table>
<thead>
<tr>
<th>R</th>
<th>R1</th>
<th>R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>58'</td>
<td>54'</td>
<td>20'</td>
</tr>
<tr>
<td>50'</td>
<td>46'</td>
<td>20'</td>
</tr>
<tr>
<td>66'</td>
<td>62'</td>
<td>20'</td>
</tr>
</tbody>
</table>

32' LOCAL

RESIDENTIAL COLLECTOR = (36' RDWY.)

MINOR\DIVIDED\MOUNTAIN RESIDENTIAL = (20' RDWY.)

* DIVIDED MOUNTAIN RESIDENTIAL = (10' RDWY.)

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

3-53
DIVIDED MOUNTAIN RESIDENTIAL DUAL EYEBROW CUL-DE-SAC'S MAY BE PERMITTED SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.
R₁ = 70' MIN.
R₂ = 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.

PROPERTY LINE
CITY MONUMENT IF REQUIRED
PROPERTY LINE
SIDEWALK
PARKWAY
WHEELCHAIR RAMP
SIDEWALK
PARKWAY
WHEELCHAIR RAMP

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

TURNING HEEL CURVE
3-55

Approved By: R. A. SHUBERT
Checked By: H. M. E.
Date: JUNE 03, 2008
Drawn By: QEC/J.R.
PROPOSED 70 DEGREE ANGLE (MIN.) TURNING HEEL.
PROPOSED 90 DEGREE ANGLE TURNING HEEL.

R = 40' (TYP.)

PROPERTY LINE

EDGE OF CURB

SIDEWALK LOCATED IN PARKWAY

SIDEWALK

POINT OF CURVATURE

CONTROL POINT AT PROPERTY LINE AND BISECTING ANGLE LINE

POINT OF CURVATURE OR POINT OF TANGENCY

R = 30' MIN.

R = 45' MIN.

PROPOSED 90 DEGREE ANGLE TURNING HEEL.
PROPOSED 110 DEGREE ANGLE (MAX.) TURNING HEEL.
SECTION 4
## SECTION 4

### FENCING

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHANLINK STANDARD DETAILS</td>
<td>4-1</td>
</tr>
<tr>
<td>CHANLINK FENCE POST</td>
<td>4-2</td>
</tr>
<tr>
<td>ROCKWALL DESIGN</td>
<td>4-3</td>
</tr>
<tr>
<td>WROUGHT IRON FENCE AND GATE DETAIL</td>
<td>4-4</td>
</tr>
</tbody>
</table>
EXTENSION ARM SLOPED TO BASIN SIDE

1 3/8" O.D. PIPE. 2.8 LB/FT

7'-0" WITH BARBED WIRE
6'-0" WITHOUT BARBED WIRE

3 ROWS OF BARBED WIRE 2 STRANDS, 12 1/2 GA. WITH 14 GA. 4 POINT ROUND BARBS, UNLESS OTHERWISE PROHIBITED

1 5/8" O.D. TOP RAIL

2" MESH 9 GA. ASTM A362

1 5/8" O.D. BOTTOM RAIL 2.7 LB/FT

3" O.D. PIPE 5.79 LB/FT

2500 PSI CONC. (MIN.)

LINE POST NTS

END POST & GATE POST NTS

LINE POST W/MESH NTS

NOTE: ALL PIPE TO BE SCHEDULE 40

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

CHAINLINK FENCE POSTS 4-2

Approved By: R. A. SHUBERT
Checked By: H. M. E.
Date: JUNE 03, 2008
Drawn By: OEC / J.R.
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.
SECTION 5
# SECTION 5

## EARTH RETENTION AND EROSION CONTROL

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCRETE RIP RAP</td>
<td>5-1</td>
</tr>
<tr>
<td>ROCK RIP RAP</td>
<td>5-2</td>
</tr>
<tr>
<td>WIRE WRAPPED RIP RAP</td>
<td>5-3</td>
</tr>
<tr>
<td>TEMPORARY EROSION CONTROL</td>
<td>5-4</td>
</tr>
</tbody>
</table>

**BACK TO SECTION INDEX PAGE**
NOTES:

1. CONCRETE RIP-RAP SHALL BE PLACED ON EMBANKMENTS OR SLOPES WHERE REQUIRED BY THE CITY ENGINEER FOR EROSION PROTECTION, EXCEPT FOR PONDING AREAS. (REFER TO SECTION 2)

2. CONCRETE RIP-RAP SHALL BE A MINIMUM OF 4" CONCRETE.

3. CONCRETE TO BE 3000 PSI WITH MIN. 6x6x10 WWF

4. FOR SLOPES GREATER THAN 1:1 OR VERTICAL HEIGHT OF MORE THAN SIX (6) FEET, THE RIP-RAP SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER.

5. PROVIDE ONE (1) INCH EXPANSION JOINT AT EVERY FIFTY (50) FEET WITH #6 DOWELS AT 18 INCHES O.C.

6. PROVIDE DUMMY JOINTS AT TEN (10) FEET O.C.
ROCK RIP-RAP DETAIL

NOTES:

1. ROCK RIP-RAP SHALL BE PLACED ON EMBANKMENTS OR SLOPES WHERE REQUIRED BY THE CITY ENGINEER FOR EROSION PROTECTION, EXCEPT FOR PONDING AREAS. (SEE SECTION 2)

2. ROCK RIP-RAP SHALL BE A MINIMUM OF 8" MORTARED ROCK.

3. STONE FOR ROCK RIP RAP SHALL BE AS NEARLY UNIFORM IN SECTION AS IS PRACTICAL. STONE SHALL BE QUARRIED; FRACTURED RIVERROCK SHALL NOT BE PERMITTED.


5. FOR SLOPES GREATER THAN 1:1 OR VERTICAL HEIGHT OF MORE THAN SIX (6) FEET, THE RIP RAP SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER.

6. PROVIDE ONE (1) INCH EXPANSION JOINT AT EVERY FIFTY (50) FEET.

7. PROVIDE DUMMY JOINTS AT TEN (10) FEET O.C.

8. NON-MORTARED ROCK RIP RAP SHALL BE ALLOWED WHERE APPROVED BY THE CITY ENGINEER.
WIRE FABRIC AND SPlice DETAIL
FOR NON-COHESIVE SOIL

TYPICAL SECTION

WIRE WRAPPED RIP-RAP DETAIL

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION
TYPICAL LOT LAYOUT FOR EROSION CONTROL

NOTE:
1. SILT FENCE SHALL BE PROVIDED PRIOR TO GRADING OF SITE AND IF THE SITE HAS SANDY SOIL CONDITIONS.
SECTION 6
# SECTION 6

## SIDEWALKS, DRIVEWAYS AND CURB RAMPS

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curb with Sidewalk Section</td>
<td>6-1</td>
</tr>
<tr>
<td>Sidewalk Adjacent to Curb Section</td>
<td>6-2</td>
</tr>
<tr>
<td>Curb with Sidewalk Section</td>
<td>6-3</td>
</tr>
<tr>
<td>Rolled Curb Sections</td>
<td>6-4</td>
</tr>
<tr>
<td>Rolled Curb Sections with Sidewalk Against Curb</td>
<td>6-5</td>
</tr>
<tr>
<td>Type &quot;A&quot; Curb and Gutter</td>
<td>6-6</td>
</tr>
<tr>
<td>Type &quot;B&quot; and &quot;C&quot; Curb and Gutter</td>
<td>6-7</td>
</tr>
<tr>
<td>Type &quot;D&quot; Curb and Gutter</td>
<td>6-8</td>
</tr>
<tr>
<td>Type &quot;E&quot; Curb</td>
<td>6-9</td>
</tr>
<tr>
<td>Temporary Curbs Type &quot;F&quot; and &quot;G&quot;</td>
<td>6-10</td>
</tr>
<tr>
<td>Type &quot;H&quot; Driveway Curb</td>
<td>6-11</td>
</tr>
<tr>
<td>Concrete Header with Sidewalk Section</td>
<td>6-12</td>
</tr>
<tr>
<td>Sidewalk for On-Site Ponding</td>
<td>6-13</td>
</tr>
<tr>
<td>Accessible Passing Space Design</td>
<td>6-14</td>
</tr>
<tr>
<td>Residential Driveways</td>
<td>6-15</td>
</tr>
<tr>
<td>Commercial/Industrial Driveways</td>
<td>6-15A</td>
</tr>
<tr>
<td>Driveway Approaches</td>
<td>6-16</td>
</tr>
<tr>
<td>Concrete Apron for Driveways/Alleyways</td>
<td>6-17</td>
</tr>
<tr>
<td>Driveway with On-Site Ponding</td>
<td>6-18</td>
</tr>
<tr>
<td>Asphaltic Walkway/Jogging Path</td>
<td>6-19</td>
</tr>
<tr>
<td>Straight Curb Ramp Design with Curb Returns</td>
<td>6-20</td>
</tr>
<tr>
<td>Diagonal Curb Ramp Design with Curb Returns</td>
<td>6-21</td>
</tr>
</tbody>
</table>

**TITLE 19 - SUBDIVISION ORDINANCE**

**ENGINEERING DEPARTMENT**

**DESIGN STANDARDS FOR CONSTRUCTION**

*Approved By: R. A. SHUBERT  Checked By: H. M. E.*

*Date: JUNE 03, 2008  Drawn By: OBC / J. R.*
# SECTION 6

**SIDEWALKS, DRIVEWAYS AND CURB RAMPS**

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIAGONAL CURB RAMP DESIGN WITH FLARED SIDES</td>
<td>6-22</td>
</tr>
<tr>
<td>STRAIGHT CURB RAMP DESIGN WITH FLARED SIDES</td>
<td>6-23</td>
</tr>
<tr>
<td>WHEEL CHAIR CURB RAMP WIDTH</td>
<td>6-24</td>
</tr>
<tr>
<td>RAMP SURFACE</td>
<td>6-25</td>
</tr>
<tr>
<td>TRANSITION RAMP WITH DETECTABLE WARNING</td>
<td>6-26</td>
</tr>
<tr>
<td>LOCATION OF DETECTABLE WARNINGS ON VARIOUS RAMPS</td>
<td>6-27</td>
</tr>
<tr>
<td>DOME SIZE AND SPACING</td>
<td>6-28</td>
</tr>
<tr>
<td>BUILT-UP CURB RAMP</td>
<td>6-29</td>
</tr>
<tr>
<td>DIAGONAL SHARED RAMP</td>
<td>6-30</td>
</tr>
<tr>
<td>CURB RAMPS AT MEDIAN ISLANDANS</td>
<td>6-31</td>
</tr>
<tr>
<td>MEDIAN CURB RAMP DESIGN (ARTERIAL)</td>
<td>6-32</td>
</tr>
<tr>
<td>MEDIAN CURB RAMP DESIGN (LOCAL)</td>
<td>6-33</td>
</tr>
</tbody>
</table>
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.

STANDARD 6" CURB WITH SIDEWALK SECTION
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.
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.
6" ROLLED CURB WITH SIDEWALK SECTION

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.

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

ROLLED CURB SECTIONS
6-4

Approved By: R. A. SHUBERT  Checked By: H. M. E.
Date: JUNE 03, 2008  Drawn By: QEC / J. R.
**6" ROLLED CURB WITH SIDEWALK SECTION**

**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.

---

**TITLE 19 - SUBDIVISION ORDINANCE**

**ENGINEERING DEPARTMENT**

**DESIGN STANDARDS FOR CONSTRUCTION**

**ROLLED CURB SECTIONS WITH SIDEWALK AGAINST CURB**

6-5

Approved By: R.A. SHUBERT
Checked By: H.M.
Date: JUNE 03, 2008
Drawn By: QEC / J.R.
THE FOLLOWING CURB STANDARDS (PLATES 6-6 THROUGH 6-11) CAN ONLY BE USED WITH APPROVAL BY THE CITY ENGINEER:

FOR USE ON ALL CITY STREETS WHERE THE ROADWAY IS SUPERELEVATED, I.E., THE PAVEMENT SLOPES AWAY FROM THE CURB AND DRAINAGE IS TO BE DIVERTED FROM THE GUTTER SECTION.

TYPE "A" MODIFIED CURB & GUTTER
N.T.S.
FOR USE ON ALL CITY STREET CLASSIFICATIONS AS A FUNCTION OF DRAINAGE AND TRAFFIC CONTROL. IT IS PERMISSIBLE TO MIX CURB HEIGHTS OF 6" & 8" WHEN APPROPRIATE FOR PROPER DRAINAGE CONVEYANCE, MINIMUM TRANSITION LENGTH OF 10' FROM 6" TO 8" CURB.

8" CURB NOT RECOMMENDED FOR STREETS WITH ON-STREET PARKING.

TYPE "B" 8" CURB & GUTTER

FOR USE ON CITY STREETS WHERE THE ROADWAY IS SUPERELEVATED, I.E. THE PAVEMENT SLOPES AWAY FROM THE CURB AND DRAINAGE IS TO BE DIVERTED.

TYPE "C" 8" MODIFIED CURB & GUTTER
TYPE "D" DRIVE OVER CURB & GUTTER
N.T.S.
TYPE "E" DRIVE OVER CURB & GUTTER
N.T.S.
FOR USE ON STREETS WHERE THE ESTIMATED EXPANSION OF THE ROAD IS TO OCCUR WITHIN THE NEXT FIVE (5) YEARS.

TYPE "F" TEMPORARY ASPHALT CURB

FOR USE ON STREETS WHEN EXPANSION TO THE CENTER IS PLANNED IN EXCESS OF FIVE (5) YEARS. NO DRAINAGE IS TO BE CONVEYED IN OR ON THE MEDIAN CURB IS TO BE REMOVED.

TYPE "G" TEMPORARY EXTRUDED CONCRETE MEDIAN CURB

ASPHALT SURFACING
CAN BE USED ON DRIVEWAYS WITH APPROVAL BY THE CITY ENGINEER; EXCEPT WHERE ROLLOVER OR MOUNTABLE CURBING IS INSTALLED.

TYPE "H" DRIVEWAY CURB
N.T.S.
2% SLOPE ON PARKWAY TOWARDS PROPERTY LINE FOR SUBDIVISIONS WITH ON-SITE PONDING

HEADER FOR EXPANSIVE SOIL

2% MAX. SLOPE

VARIES WITH PARKWAY WIDTH

SIDEWALK

6"

12"

HEADERS FOR ROCKY OR MOUNTAINOUS TERRAIN

VARIES WITH PARKWAY WIDTH

SIDEWALK

6"

18"

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.
SIDEWALK FOR ON-SITE PONDING

NOTES:

1. CONCRETE FOR HEADERS AND SIDEWALKS SHALL BE 3000 P.S.I. (MIN.).

2. DUMMY JOINT AT 5'-0" O.C., MINIMUM 1/2" PREMOLDED ASPHALT IMPREGNATED EXPANSION JOINT AT 20' O.C. (SIDEWALK ONLY)
ACCESSIBLE PASSING SPACE DESIGN
FOR 4 FT. SIDEWALKS
(SHALL BE SPACED AT EVERY 200' MAXIMUM)
FOR 3 CAR GARAGE

PROPERTY LINE

REFER TO PLATE 6-17

CONICSidewalk

STREET

CB & GTR

6-17

MIN

RESIDENTIAL DRIVEWAY

NOTE:
A minimum parking space length of twenty (20) feet shall be provided measured from the property line to a garage, carport or parking space.
COMMERCIAL/INDUSTRIAL DRIVEWAYS

THE CITY ENGINEER MAY GRANT VARIANCES TO THE DRIVEWAY REQUIREMENTS PURSUANT TO SECTION 13.12.210 OF THE EL PASO MUNICIPAL CODE.
Type I and Type II Two-Way Driveway Standards

<table>
<thead>
<tr>
<th>Driveway</th>
<th>Type of Development</th>
<th>Curb Width (ft.)</th>
<th>Curb Radius (ft.)</th>
<th>Minimum Edge to Edge Spacing Between Drives (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>Single-Family-60' lots</td>
<td>Min: 10 Max: 20</td>
<td>Min: 5 Max: 5</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Less than 60' lots, Duplex and Townhouse</td>
<td>Min: 15 Max: 25</td>
<td>Min: 10 Max: 10</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Multi-Resident Apartments</td>
<td>Min: 25 Max: 30*</td>
<td>Min: 10 Max: 10</td>
<td>20</td>
</tr>
<tr>
<td>Type II</td>
<td>Office, Commercial and Parking Lots</td>
<td>Min: 25 Max: 35</td>
<td>Min: 10 Max: 15</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Industrial</td>
<td>Min: 24 Max: 45</td>
<td>Min: 10 Max: 15</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Banks, Service Stations, and Convenience Stores with Gasoline Pumps</td>
<td>Min: 25 Max: 35**</td>
<td>Min: 10 Max: 15</td>
<td>1/3 x Frontage</td>
</tr>
</tbody>
</table>

* On 50 MPH streets

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

(TO BE MODIFIED BY THE CITY OF EL PASO TRAFFIC AND TRANSPORTATION DEPARTMENT)
DRIVEWAY PLAN

NTS

<table>
<thead>
<tr>
<th>DRIVEWAY WIDTH</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMERCIAL/INDUSTRIAL</td>
<td>24'</td>
<td>35'</td>
</tr>
<tr>
<td>RESIDENTIAL (SINGLE FAMILY 60' LOTS)</td>
<td>10'</td>
<td>20'</td>
</tr>
<tr>
<td>LESS THAN 60' LOTS, DUPLEX, AND TOWNHOMES</td>
<td>15'</td>
<td>25'</td>
</tr>
</tbody>
</table>

(FORER TO PLATE 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

R.O.W. OR PROPERTY LINE

PAVEMENT

6"

6"

SIDEWALK

GUTTER

95% COMPAClON FOR NON-COHESIVE AS PER ASTM D1557

1/2" APPROVED EXPANSION JOINT MATERIAL

95% COMPAClON FOR NON-COHESIVE
85% FOR COHESIVE AS PER ASTM D1557

1/2" APPROVED EXPANSION JOINT MATERIAL

FINISHED GRADE OR DRIVEWAY TREATMENT.

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

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

CONCRETE APRON FOR DRIVEWAYS/ALLEYWAYS 6-17
NOTES:
1. CONCRETE HEADER CURBS SHALL BE 3,000 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 PATH

SCALE: N.T.S.
ALL ACCESSIBLE ROUTES SHALL NOT EXCEED A RUNNING SLOPE GREATER THAN 1:20. NO WHERE SHALL THE CROSS SLOPE OF AN ACCESSIBLE ROUTE EXCEED 1:50. MAXIMUM SLOPES OF ADJOINING GUTTERS, ROAD SURFACE IMMEDIATELY ADJACENT TO THE CURB RAMP, OR ACCESSIBLE ROUTE SHALL NOT EXCEED 1:20. PARKING SPACES AND ACCESS AISLES SHALL BE LEVEL WITH SURFACE SLOPES NOT EXCEEDING 1:50 IN ALL DIRECTIONS. NEW WHEELCHAIR RAMPS SHALL NOT EXCEED A SLOPE OF 1:12.

STRAIGHT CURB RAMP DESIGN
WITH CURB RETURNS

SECTION A

NOTES:
(1) SLOPE = y/x, where x is level plane
(2) Cross-slope shall not exceed 1:50
ALL ACCESSIBLE ROUTES SHALL NOT EXCEED A RUNNING SLOPE GREATER THAN 1:20. NO WHERE SHALL THE CROSS SLOPE OF AN ACCESSIBLE ROUTE EXCEED 1:50. MAXIMUM SLOPES OF ADJOINING GUTTERS, ROAD SURFACE IMMEDIATELY ADJACENT TO THE CURB RAMP, OR ACCESSIBLE ROUTE SHALL NOT EXCEED 1:20. PARKING SPACES AND ACCESS AISLES SHALL BE LEVEL WITH SURFACE SLOPES NOT EXCEEDING 1:50 IN ALL DIRECTIONS. NEW WHEELCHAIR RAMPS SHALL NOT EXCEED A SLOPE OF 1:12.

DIAGONAL CURB RAMP DESIGN WITH CURB RETURNS

SECTION A

NOTES:
(1) SLOPE = \( y : x \), where \( x \) is level plane
(2) Cross-slope shall not exceed 1:50
ALL ACCESSIBLE ROUTES SHALL NOT EXCEED A RUNNING SLOPE GREATER THAN 1:20. NO WHERE SHALL THE CROSS SLOPE OF AN ACCESSIBLE ROUTE EXCEED 1:50.
MAXIMUM SLOPES OF ADJOINING GUTTERS, ROAD SURFACE IMMEDIATELY ADJACENT TO THE CURB RAMP, OR ACCESSIBLE ROUTE SHALL NOT EXCEED 1:20. PARKING SPACES AND ACCESS AISLES SHALL BE LEVEL WITH SURFACE SLOPES NOT EXCEEDING 1:50 IN ALL DIRECTIONS. NEW WHEELCHAIR Ramps SHALL NOT EXCEED A SLOPE OF 1:12.

NOTES:
IF "Z" IS LESS THAN 48 INCHES, THEN THE SLOPE OF THE FLARED SIDE SHALL NOT EXCEED 1:12

DIAGONAL CURB RAMP DESIGN WITH FLARED SIDES

SECTION A

NOTES:
(1) SLOPE = y/x, where x is level plane
(2) Cross-slope shall not exceed 1:50
ALL ACCESSIBLE ROUTES SHALL NOT EXCEED A RUNNING SLOPE GREATER THAN 1:20. NO WHERE SHALL THE CROSS SLOPE OF AN ACCESSIBLE ROUTE EXCEED 1:50. MAXIMUM SLOPES OF ADJOINING GUTTERS, ROAD SURFACE IMMEDIATELY ADJACENT TO THE CURB RAMP, OR ACCESSIBLE ROUTE SHALL NOT EXCEED 1:20. PARKING SPACES AND ACCESS AISLES SHALL BE LEVEL WITH SURFACE SLOPES NOT EXCEEDING 1:50 IN ALL DIRECTIONS. NEW WHEELCHAIR RAMPS SHALL NOT EXCEED A SLOPE OF 1:12.

STRAIGHT CURB RAMP DESIGN
WITH FLARED SIDES

SURFACE OF RAMP

1:12 MAX

4" CONC. RAMP

X HORIZONTAL PROJECTION
OR RUN

SECTION A

NOTES:
(1) SLOPE = y/x, where x is level plane
(2) Cross-slope shall not exceed 1:50
Width. The minimum width of curb ramps shall be 60 inches exclusive of flared sides. In areas where space does not permit a 60 inch width, the minimum width shall be no less than 36 inches as determined by the owner (Note; Landing can not exceed 2% slope on every direction). See Figure
(SHARED CURB RAMP)

(MATCH EXISTING SIDEWALK)

(TRANSITION RAMP: ISOMETRIC VIEW OF A TRANSITION RAMP AS CURRENTLY DEFINED. THE ILLUSTRATION IS BASED ON THE OLD "PARALLEL" STYLE RAMP)
DOME SIZE AND SPACING. TRUNCATED DOMES SHALL HAVE A DIAMETER OF NOMINAL 0.9 INCHES (23 mm) AT THE BOTTOM, A DIAMETER OF 0.4 INCH (10 mm) AT THE TOP, A HEIGHT OF NOMINAL 0.2 INCHES (5 mm), AND A CENTER-TO-CENTER SPACING OF NOMINAL 2.35 INCHES (60 mm) MEASURED ALONG ONE SIDE OF A SQUARE ARRANGEMENT.

DOME ALIGNMENT. DOMES SHALL BE ALIGNED ON A SQUARE GRID IN THE PREDOMINANT DIRECTION OF TRAVEL TO PERMIT WHEELS TO ROLL BETWEEN DOMES. DETECTABLE WARNING SURFACES SHALL EXTEND 24 INCHES (610 mm) MINIMUM IN THE DIRECTION OF TRAVEL AND THE FULL WIDTH OF THE CURB RAMP, LANDING, OR BLENDED TRANSITION.

CONTRAST. THERE SHALL BE A MINIMUM OF 70 PERCENT CONTRAST IN LIGHT REFLECTANCE BETWEEN THE DETECTABLE WARNING AND AN ADJOINING SURFACE, OR THE DETECTABLE WARNING SHALL BE "RED BRICK" COLOR, UNLESS OTHERWISE DIRECTED BY THE OWNER. THE MATERIAL USED TO PROVIDE VISUAL CONTRAST SHALL BE AN INTEGRAL PART OF THE DETECTABLE WARNING SURFACE. CONTRAST SHALL BE PROVIDED BY PLACING AND MIXING TINT IN THE PLASTIC CONCRETE USED FOR THE DETECTABLE WARNING SURFACE. NO PAINTING OF SURFACE SHALL BE PERMITTED.
Sides of Curb Ramps.
If a curb ramp is located where pedestrians must travel across the ramp, or where it is not protected by handrails or guardrails, it shall have flared sides; the maximum slope of the flare shall be 1:12. Curb ramps with returned curbs may be used where pedestrians would not normally walk across the ramp.
2' strip if cut through is greater than 4' in length. Otherwise place detectable warning on the entire surface of cut through.

Align curb parallel with crosswalk

Limits of pavement

5' min. for refuge

Curb ramps at median islands
# SECTION 7

## SIGNAGE AND SIGNALIZATION

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIFICATIONS FOR ALUMINUM SIGN BLANKS</td>
<td>7-1 thru 7-2</td>
</tr>
<tr>
<td>9&quot; STREET NAME SIGN EXTRUDED ALUMINUM SIGN BLANK</td>
<td>7-3</td>
</tr>
<tr>
<td>D.H.T. BLANK STANDARDS</td>
<td>7-4 thru 7-6</td>
</tr>
<tr>
<td>SPECIFICATIONS FOR REFLECTORIZED STREET NAME SIGNS</td>
<td>7-7 thru 7-8</td>
</tr>
<tr>
<td>9&quot; STREET NAME SIGN</td>
<td>7-9</td>
</tr>
<tr>
<td>9&quot; STREET NAME SIGN ASSEMBLY</td>
<td>7-10 thru 7-12</td>
</tr>
<tr>
<td>SIGN POST INSTALLATION</td>
<td>7-13</td>
</tr>
<tr>
<td>ALUMINUM SIGN CLAMP BRACKET FOR TRAFFIC CONTROL SIGNS</td>
<td>7-14</td>
</tr>
<tr>
<td>SIGN POST SPECIFICATIONS</td>
<td>7-15</td>
</tr>
<tr>
<td>BIKE LANE SIGNS AND MARKINGS</td>
<td>7-16</td>
</tr>
<tr>
<td>DEAD END SIGN</td>
<td>7-17A</td>
</tr>
<tr>
<td>GUARDRAIL SIGN ASSEMBLY AT DEAD END</td>
<td>7-17B</td>
</tr>
<tr>
<td>TYPICAL ELECTRIC RACEWAY TRENCH DETAIL</td>
<td>7-18</td>
</tr>
<tr>
<td>TRAFFIC SIGNAL CONDUIT LAYOUT (MAJOR-MAJOR)</td>
<td>7-19</td>
</tr>
<tr>
<td>TRAFFIC SIGNAL CONDUIT LAYOUT (MAJOR-MINOR)</td>
<td>7-20</td>
</tr>
<tr>
<td>TYPICAL TRAFFIC SIGNAL JUNCTION BOX</td>
<td>7-21</td>
</tr>
<tr>
<td>TYPICAL CUTS FOR CONDUIT PLACEMENT OF TRAFFIC SIGNALS</td>
<td>7-22</td>
</tr>
<tr>
<td>PROHIBITED PARKING SIGNAGE (FIRE LANE)</td>
<td>7-23</td>
</tr>
<tr>
<td>NO PARKING FIRE LANE SIGN</td>
<td>7-24</td>
</tr>
</tbody>
</table>

[BACK TO SECTION INDEX PAGE]
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 PREPARATION.

3. EDGES OF BLANKS SHALL BE CUT TRUE AND SQUARE. CORNER RADI, 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 TRICHLOROETHYLENE 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.
B. ETCHING

(1) **ACID ETCH** - ETCH WELL IN 6-8% PHOSPHORIC ACID SOLUTION AT 100 DEGREES FAHRENHEIT OR PROPRIETARY ACID ETCHING SOLUTION. RINSE THOROUGHLY WITH RUNNING WATER.

OR

(2) **ALKALINE ETCH** - ETCH WELL THE PRE-CLEANED ALUMINUM SURFACE IN AN ALKALINE ETCHING MATERIAL THAT IS CONTROLLED BY TITRATION. USE TIME, TEMPERATURE, AND CONCENTRATION SPECIFIED BY THE SOLUTION MANUFACTURER. RINSE THOROUGHLY. REMOVE SMUT WITH AN ACIDIC CHROMIUM COMPOUND-TYPE SOLUTION AS SPECIFIED BY THE SOLUTION MANUFACTURER AND THEN RINSE THOROUGHLY.

C. CHROMATE CONVERSION COATING

COAT THE ALUMINUM BLANKS ACCORDING TO THE CHROMATE CONVERSION COATING MANUFACTURER'S INSTRUCTIONS. THE COATING SHALL CONFORM TO ASTM B449, CLASS 2, AND SHALL RANGE IN COLOR FROM SILVER IRIDESCENT TO PALE YELLOW. THE COATING WEIGHT SHALL BE 10 TO 35 MG. PER SQ. FT WITH A MEDIAN OF 25 MG. PER SQ. FT. AS THE OPTIMUM COATING WEIGHT.
9" STREET NAME SIGN
EXTRUDED ALUMINUM SIGN BLANK

DIMENSIONS (INCHES)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>9</td>
<td>0.800</td>
<td>1/4R</td>
<td>0.091</td>
<td>0.25</td>
</tr>
<tr>
<td>36</td>
<td>9</td>
<td>0.800</td>
<td>1/4R</td>
<td>0.091</td>
<td>0.25</td>
</tr>
<tr>
<td>42</td>
<td>9</td>
<td>0.800</td>
<td>1/4R</td>
<td>0.091</td>
<td>0.25</td>
</tr>
<tr>
<td>48</td>
<td>9</td>
<td>0.800</td>
<td>1/4R</td>
<td>0.091</td>
<td>0.25</td>
</tr>
</tbody>
</table>
### Vertical Rectangle

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>12</td>
<td>3</td>
<td>6</td>
<td>1 1/2</td>
</tr>
<tr>
<td>10</td>
<td>18</td>
<td>2</td>
<td>14</td>
<td>1 1/2</td>
</tr>
<tr>
<td>10</td>
<td>27</td>
<td>2</td>
<td>23</td>
<td>1 1/2</td>
</tr>
<tr>
<td>10</td>
<td>36</td>
<td>2</td>
<td>32</td>
<td>1 1/2</td>
</tr>
<tr>
<td>12</td>
<td>18</td>
<td>1-1/2</td>
<td>15</td>
<td>1 1/2</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>2</td>
<td>20</td>
<td>1 1/2</td>
</tr>
<tr>
<td>12</td>
<td>30</td>
<td>1-1/8</td>
<td>27-3/4</td>
<td>1 1/2</td>
</tr>
<tr>
<td>12</td>
<td>36</td>
<td>2</td>
<td>32</td>
<td>1 1/2</td>
</tr>
<tr>
<td>12</td>
<td>48</td>
<td>2</td>
<td>44</td>
<td>1 1/2</td>
</tr>
<tr>
<td>18</td>
<td>24</td>
<td>3</td>
<td>18</td>
<td>1 1/2</td>
</tr>
<tr>
<td>18</td>
<td>30</td>
<td>1-1/2</td>
<td>27</td>
<td>1 1/2</td>
</tr>
<tr>
<td>24</td>
<td>30</td>
<td>3</td>
<td>24</td>
<td>1 1/2</td>
</tr>
<tr>
<td>24</td>
<td>36</td>
<td>3</td>
<td>30</td>
<td>1 1/2</td>
</tr>
<tr>
<td>24</td>
<td>48</td>
<td>3</td>
<td>42</td>
<td>1 1/2</td>
</tr>
<tr>
<td>30</td>
<td>36</td>
<td>3</td>
<td>30</td>
<td>1 7/8</td>
</tr>
<tr>
<td>30</td>
<td>42</td>
<td>3</td>
<td>36</td>
<td>1 7/8</td>
</tr>
</tbody>
</table>
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.


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 BETWEEN 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

1 TO 2 TIMES THE WIDTH OF THE LETTER "H"

1 3/8"
1 1/4"

2 1/2"
2 1/2"

1 1/2"

1" MIN.

1 3/8" 6"

6"

9"

1 1/2"

1 1/2"

1" MIN.

1 1/2"

9" STREET NAME SIGN

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

7-9

Approved By: R. A. SHUBERT
Checked By: H. M. E.
Date: JUNE 03, 2008
Drawn By: QBC / J. R.
THEFT PROOF CAP SCREW

BOLT OR RIVET

0.080" ALUMINUM FEMALE SEPARATOR

1/2" HIGH TENSILE ALUMINUM

0.080" ALUMINUM MALE SEPARATOR

ALUMINUM CAP WITH STAINLESS ALLEN HEADS TO FIT 2" I.D. STANDARD PIPE

0.080" ALUMINUM FEMALE SEPARATOR

WASHER

NUT

2" I.D. GALV. PIPE SCH.40

9" STREET NAME ASSEMBLY
POST CAP BRACKET
(FOR EXTRUDED BLADES)

5/16" x 5/16" SET SCREW
(INTERNAL ALLEN HEAD TAMPER-
PROOF CENTER PIN DESIGN)

5/16"-10-1" BUTTONHEAD BOLT
(INTERNAL ALLEN HEAD TAMPER-
PROOF CENTER PIN DESIGN)

3/16" - 18 THREAD
WITH LOCK WASHER

RECESSED TO ACCEPT
BUTTONHEAD BOLTS

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

DIE CAST FREE OF BURRS,
PITS, & HOLES
3/16 "-18 THREAD 1 1/2" BOLT WITH LOCK WASHER

90° SIGN TO SIGN BRACKET
FOR EXTRUDED BLADES

3/16 "-18 THREAD 1 1/2" BOLT
**SIGN POST INSTALLATION**

<table>
<thead>
<tr>
<th>LENGTH A</th>
<th>LENGTH B</th>
<th>LENGTH C</th>
<th>DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 FT</td>
<td>7 FT</td>
<td>LARGER THAN 24&quot;</td>
<td>2 FT</td>
</tr>
<tr>
<td>9 FT</td>
<td>7 FT</td>
<td>SMALLER THAN 24&quot;</td>
<td>1 1/2 FT</td>
</tr>
</tbody>
</table>

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

2" I.D. GALVANIZED PIPE—SCHEDULE 40

PIPE TO EXTEND TO FULL DEPTH OF CONC.

CONCRETE

LENGTH A
LENGTH B
LENGTH C
ALUMINUM SIGN CLAMP BRACKET FOR TRAFFIC CONTROL SIGNS

NOTES:

1. ALL HOLES 3/8" PUNCH

2. FILLETS & ROUNDS 1/16" = R

3. FURNISH THE FOLLOWING 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.

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

ALUMINUM SIGN CLAMP BRACKET FOR TRAFFIC CONTROL SIGNS
7-14

Approved By: R. A. SHUBEK
Checked By: H. M. E.
Date: JUNE 01, 2008
Drawn By: OEC/J.R.
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.
DEAD END SIGN

NOTE:
DEAD END SIGN TO BE PLACED BEHIND GUARD RAILS

2 1/4" O.D. GALVANIZED PIPE

RED REFLECTORIZED MAT.
WHITE REFLECTORIZED MAT.
STRIPS TO BE 6" WIDE

3000 P.S.I. CONCRETE

84"
GUARDRAIL/SIGN ASSEMBLY AT DEAD END STREET DETAIL
REMOVE & REPLACE EXISTING & ALONG ENTIRE LENGTH OF TRENCH

COMPACTED BACKFILL 95% IN 2 EQUAL LIFTS

ELECTRICAL RACEWAY

4" 4"

2'-6"

TYPICAL ELECTRICAL RACEWAY TRENCH DETAIL

SAW CUT EXISTING ASPHALT

4" 8" 4"

EXISTING ASPHALT AREA

HMAC AS SPECIFIED

BASE COURSE AS SPECIFIED

COMPACTED BACKFILL 95% IN 2 EQUAL LIFTS

ELECTRICAL RACEWAY

4" 4"

2'-6"

TYPICAL ELECTRICAL RACEWAY TRENCH DETAIL

KEYED NOTES:

1. TRENCHES IN AREAS WITH GRASS, DIRT, PAVERS, ETC. SHALL BE REPLACED ALONG ENTIRE LENGTH OF TRENCH.
TYPICAL INTERSECTION
MAJOR ARTERIAL - MAJOR ARTERIAL

NOTE:
CONDUIT SHALL BE HIGH IMPACT
P.V.C. - 3" SCHEDULE 40 AS
PER CITY SPECIFICATIONS.
TYPICAL INTERSECTION
MAJOR ARTERIAL – MINOR ARTERIAL

NOTE:
CONDUIT SHALL BE HIGH IMPACT
P.V.C. – 3" SCHEDULE 40 AS
PER CITY SPECIFICATIONS.
PLAN VIEW

SECTION A-A

TOP OF J-BOX TO BE LEVEL WITH TOP OF CURB OR SURROUNDING GROUND

SECTION B-B

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

PROPOSED 3" P.V.C. ELBOW W/ 90° BEND AT 18° RADIUS

TYPICAL JUNCTION BOX

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

TYPICAL TRAFFIC SIGNAL JUNCTION BOX

7-21

Approved By: R. A. SHUBERT
Checked By: H. M. E.
Date: JUNE 03, 2008
Drawn By: QEC/J.R.
PAVEMENT CUT FOR CONDUIT PLACEMENT

EXISTING PAVEMENT

PLACE SURFACE SAME AS OR EQUAL TO ORIGINAL SURFACE

ASPHALT SURFACE

CEMENT STABILIZED BACKFILL

PROPOSED 3" P.V.C. CONDUIT

2' MIN.

SIDEWALK CUT FOR CONDUIT PLACEMENT

EXISTING SIDEWALK

CONCRETE TO BE CLASS "A"
(3000 PSI)

SECTION VARIES FROM JOINT TO JOINT

EXISTING SIDEWALK

NEAREST JOINT IN CONCRETE WALK

CEMENT STABILIZED BACKFILL

PROPOSED 3" P.V.C. CONDUIT

2' MIN.

5"
WHEELCHAIR RAMP

PARKWAY

SIDWALK

12"
18"

150' MAX SPACING

NOTES:

1.) SIGNS TO BE PLACED AT EVERY LOT WITH A MAXIMUM SPACING OF 150'.

2.) REGULATORY SIGN SHALL BE WHITE WITH RED LEGEND.

3.) PROHIBITED PARKING MAY BE ON EITHER SIDE OF THE STREET AS ESTABLISHED BY SUBDIVISION PLAN.
NO PARKING
AT ANY TIME
FIRE LANE
TOW AWAY ZONE

COLORS

LEGEND ------------------ RED
BACKGROUND ------------- WHITE
SECTION 8
SECTION 8
STREET LIGHTING

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL STREET LIGHTING</td>
<td>8-1</td>
</tr>
<tr>
<td>RESIDENTIAL STREET LIGHT WOOD POLE</td>
<td>8-2</td>
</tr>
<tr>
<td>RESIDENTIAL STREET LIGHT WOOD POLE (connection to service enclosure)</td>
<td>8-3</td>
</tr>
<tr>
<td>RESIDENTIAL STREET LIGHTING MATERIAL LIST</td>
<td>8-4</td>
</tr>
<tr>
<td>RESIDENTIAL STREET LIGHT STEEL POLE</td>
<td>8-5 thru 8-6</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Street Type</th>
<th>Required Spacing</th>
<th>Pole Type</th>
<th>Lamp Type</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local streets</td>
<td>At intervals of not more than three hundred feet (300')</td>
<td>Wood or Metal</td>
<td>100 watt high pressure sodium</td>
<td>30 feet</td>
</tr>
<tr>
<td>Collector arterials</td>
<td>At intervals of not more than three hundred feet (300')</td>
<td>Wood or Metal</td>
<td>100 watt high pressure sodium</td>
<td>30 feet</td>
</tr>
</tbody>
</table>
EPEC SERVICE ENCLOSURE OR PULLBOX

AS REQUIRED TO TERMINATE IN SERVICE ENCLOSURE

2"

24"

KEY NOTES:

1. 1/2" GALVANIZED RIGID CONDUIT
2. REDUCER 1" TO 1/2" BUSHING
3. 1" PVC FEMALE ADAPTER
4. 1" PVC 90° ELBOW
5. 1" PVC CONDUIT
6. 1" PVC 45° ELBOW
7. 1" PVC COUPLING
8. TAPE 1/2" RIGID CONDUIT (6'')
<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>DESCRIPTION</th>
<th>STOCK No.</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>POLE, 35 FT.—CLASS IV</td>
<td>009-035</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>GALVANIZED RIGID 1/2&quot; CONDUIT</td>
<td>017-292</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>PIPE STRAP FOR 1/2&quot; CONDUIT, 2—HOLE</td>
<td>017-334</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>LAG BOLT, 1/4&quot; x 2&quot;</td>
<td>002-330</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>WEATHERHEAD, 1/2&quot; CONDUIT</td>
<td>017-293</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>PHOTOCELL, 240V—SEE NOTE 1</td>
<td>021-225</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>LAG BOLT, 1/2&quot; x 4&quot;</td>
<td>002-370</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>MACHINE BOLT, 5/8&quot; x 8&quot;</td>
<td>002-450</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>SQUARE GALV. WASHER, 2—1 1/4&quot; x 2” — 1/4&quot;</td>
<td>002-760</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>COIL—SPRING WASHER, 5/8&quot;</td>
<td>002-786</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>LOCKNUT, 5/8&quot;</td>
<td>002-705</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>LUMINAIRE, 100W H. P. S.</td>
<td>021-335</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>HPS LAMP, 100W</td>
<td>021-085</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>MAST ARM, 6&quot; x 1—1/4&quot;</td>
<td>021-200</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>COPPER CABLE, #12, 19 STRAND, 600 V</td>
<td>013-665</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>COPPER CABLE, #12, SOLID, 600 V, GREEN</td>
<td>013-701</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>CABLE, #10, 2 CONDUCTOR, 600 V, UF</td>
<td>013-600</td>
<td>8</td>
</tr>
<tr>
<td>18</td>
<td>SLEEVES, #12—10</td>
<td>005-140</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>GROUNDING CLAMP</td>
<td>021-215</td>
<td>1</td>
</tr>
</tbody>
</table>

**KEYNOTES**

1. MOUNT SO THAT CONTROL FACES NORTH.

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

**DESIGN NOTES**

1. INSTALLATION SHALL COMPLY WITH ALL LOCAL CODE REQUIREMENTS.

2. FOR ANY CLARIFICATION, EXCEPTIONS OR QUESTIONS REGARDING CODE INTERPRETATION, CALL EL PASO ELECTRIC CO. DISTRIBUTION DEVELOPMENT DEPARTMENT.
<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>DESCRIPTION</th>
<th>STOCK No.</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>POLE, 35 FT.—CLASS IV</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>PHOTOCELL, 240V—SEE NOTE 1</td>
<td>021-225</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>LUMINAIRE, 100W H. P. S.</td>
<td>021-335</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>HPS LAMP, 100W</td>
<td>021-085</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>MAST ARM, 6' x 1-1/4&quot;</td>
<td>21-200</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>#10 SOLID CABLE 600 V</td>
<td>013-600</td>
<td>AS REQ'D.</td>
</tr>
<tr>
<td>7</td>
<td>CABLE, #10, 3 CONDUCTOR, 600 V, UF</td>
<td>013-600</td>
<td>40’ PLUS</td>
</tr>
<tr>
<td>8</td>
<td>SLEEVES, #12</td>
<td>05-145</td>
<td>AS REQ'D.</td>
</tr>
<tr>
<td>9</td>
<td>ROADWAY LUMINAIRE HPS 150 WATTS</td>
<td>21-340</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>BREAK-A-WAY FUSES 30 AMP.</td>
<td>21-250</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>ALUMINUM TRANSFORMER BASE</td>
<td>21-608</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>5/8' GROUND ROD CLAMP</td>
<td>07-561</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>5/8” x 10’ CU BONDED GROUND ROD</td>
<td>08-626</td>
<td>1</td>
</tr>
</tbody>
</table>

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. FOR ANY CLARIFICATION, EXCEPTIONS RO QUESTIONS REGARDING CODE INTERPRETATION, CALL EL PASO ELECTRIC CO. DISTRIBUTION DEVELOPMENT DEPARTMENT.
3. A GROUND ROD MUST BE USED,
SECTION 9
TYPICAL LOT LAYOUT

SCALE: N.T.S.

DRIVEWAY NOTE:

NOTE: DRIVEWAY SLOPES MUST BE 10% MAX.
FROM GUTTER FOR FIRST 12 FT. AND
14% MAX. THEREAFTER (BLDG. CD. 18.08.060 C)
FOR SETBACK DIMENSIONS REFER TO ZONING ORDINANCE.
SECTION 10
# SECTION 10

## TRAFFIC CALMING STANDARDS

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BULBOUT (INTERSECTION TREATMENT)</td>
<td>10-1</td>
</tr>
<tr>
<td>BULBOUT (MIDBLOCK TREATMENT)</td>
<td>10-2</td>
</tr>
<tr>
<td>CENTER ISLAND NARROWING</td>
<td>10-3</td>
</tr>
<tr>
<td>CHOKER</td>
<td>10-4</td>
</tr>
<tr>
<td>DIAGONAL DIVERTER</td>
<td>10-5</td>
</tr>
<tr>
<td>FORCED TURN ISLAND</td>
<td>10-6</td>
</tr>
<tr>
<td>HALF CLOSURE</td>
<td>10-7</td>
</tr>
<tr>
<td>MEDIAN BARRIER</td>
<td>10-8</td>
</tr>
<tr>
<td>PEDESTRIAN REFUGE ISLAND</td>
<td>10-9</td>
</tr>
<tr>
<td>TRAFFIC CIRCLE</td>
<td>10-10</td>
</tr>
<tr>
<td>ROUNDABOUT</td>
<td>10-11</td>
</tr>
<tr>
<td>SPEED HUMP</td>
<td>10-12</td>
</tr>
<tr>
<td>SPEED TABLE</td>
<td>10-13</td>
</tr>
</tbody>
</table>
NOTES:
1. Distance X is referenced from the center of the roadway to the lip of gutter.

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>12</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>14</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>16</td>
<td>34</td>
<td></td>
</tr>
</tbody>
</table>
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

Parking Prohibited

R4-7  Keep Right

Edge line

Taper length per MUTCD
8:1 min. (typ.)

R=2'

R4-7

Pavement marker

Center line markings

Existing curbline

Chicane

Optional pavement markers
along centerline taper

8' min. extension (typ.)

Existing curbline

1'-2' drainage channel (typ.)

20' min

Center line markings

Parking Prohibited

Taper length per MUTCD
8:1 min. (typ.)

45° from
curbline (typ.)
CHOKER

Parking Prohibited

30° (typ.)

Existing curbline

45° (typ.)

Pavement marker

R=4'

Direction of traffic

Center line markings

Taper length per MUTCD 8.1 min. (typ.)

20' typ.

8' min. extension

1'-2' drainage channel

Edge line

Sign Description

om = Object Marker

TITe 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

Approved By R. A. SHUBERT  Checked By H. M. E
Date JUNE 03, 2008 Drawn By OEC / J.R.
Diagonal Diverter

Sign Descriptions
- W1-2L  Left Curve
- W1-2R  Right Curve
- R7-1   No Parking

Local Street

4'-5" pass-through for bicyclists

R7-1

4' min.

R7-1

Landscaping and/or bollards at 5' spacing (typ.)

R7-1

Original curbline

Bollards may be eliminated and mountable curb may be used to provide access to emergency vehicles.

TITLE 19 - SUBDIVISION ORDINANCE
ENGINEERING DEPARTMENT
DESIGN STANDARDS FOR CONSTRUCTION

DIAGONAL DIVERTER
10-5

Approved By: R. A. SHUBERT
Date: JUNE 09, 2008

Checked By: H. M. E.

Drawn By: QC/J. R.
HALF CLOSURE

Sign Descriptions
- om: Object Marker
- R3-8C: Left or Right Turn
- R5-1: Do Not Enter Except Bikes
- R6-1: One-Way
- R3-2: No Left Turn
- R3-1: No Right Turn

Optional crosswalk lines as per MUTCD

Bike Channel 4' to 5' (typ.)

Original curbline

1.5' offset

R=3'

R=5'

30' min.

R3-6LR

R=5'

10' min.
Median Barrier

Sign Descriptions:
R6-1 One-Way
R4-7 Keep Right
R7-4 No Stopping or Standing
R3-5R Lane Assignment (RT only)
R3-2 No Left Turn

Optional crosswalk lines as per MUTCD

Title 19 - Subdivision Ordinance
Engineering Department
Design Standards for Construction

Median Barrier

10-8

Approved By: R. A. Shubert
Checked By: H. M. E.
Date: June 03, 2008
Drawn By: QEC / J. R.
Pedestrian Refuge Island

Sign Descriptions
R4-7 Keep Right
R7-4 No Stopping or Standing

Optional crosswalk lines as per MUTCD

Pedestrian refuge islands should not impede vehicular movements through the intersect Mountable and non-mountable curb designed for the pedestrian refuge island should be considered based on the traffic mix and intersection geometry.
Traffic Circle

Counterclockwise circulation within circle

Optional crosswalk lines per MUTCD

Landscaping

Mountable curb delineates central island

Barrier Curb

W16-12p

Concrete apron

Local

R1

R2

R3

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.

<table>
<thead>
<tr>
<th>Diameter</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
</tr>
</thead>
<tbody>
<tr>
<td>34'</td>
<td>20'</td>
<td>20'</td>
<td>8'</td>
</tr>
<tr>
<td>25'</td>
<td>24'</td>
<td></td>
<td>8'</td>
</tr>
<tr>
<td>32'</td>
<td>15'</td>
<td>12'</td>
<td>7'</td>
</tr>
<tr>
<td>20'</td>
<td>18'</td>
<td></td>
<td>7'</td>
</tr>
<tr>
<td>25'</td>
<td>20'</td>
<td></td>
<td>7'</td>
</tr>
<tr>
<td>30'</td>
<td>15'</td>
<td>11'</td>
<td>6'</td>
</tr>
<tr>
<td>20'</td>
<td>15'</td>
<td></td>
<td>6'</td>
</tr>
<tr>
<td>25'</td>
<td>16'</td>
<td></td>
<td>8'</td>
</tr>
</tbody>
</table>

TRAFFIC CIRCLE 10-10

ENGINEERING DEPARTMENT

DESIGN STANDARDS FOR CONSTRUCTION

CITY OF NEW B香AS, TEXAS

Approved By R.A. SHUBERT

Checked By H.M. E.

Date JUNE 03, 2008

Drawn By OEC/J.R.
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.

Roundabout Geometries
(Typical for all legs)

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

METERS

0 5 10 15
Speed Hump

Driving Profile

Plan View

Typical Section

Note: Undisturbed clearance for drainage shall be 12" unless otherwise noted in construction documents.

Sign Descriptions
W17-1 Speed Hump

Type S-III Asphalt with tack coat over existing asphalt

"Street Print" Running bond Brick pattern and terra cotta

Optical Speed Bars

Existing Curb

Existing Asphalt

12" Transition

3" Hump

Slope to curb

14" 12"

W17-1

Existing Curb
Speed Table

Driving Profile

Typical Section

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

Plan View

Sign Descriptions
W17-1 Speed Hump