# APPENDIX C

## SANITARY SEWER – PEAK DESIGN FACTOR

All gravity sewers will be designed to accommodate the peak flow from the contributing drainage area. The peak flow will be computed using the appropriate peaking factor, F, multiplied by the average day flow for the contributing area. For non-residential areas, the peak flow should include consideration of flow characteristics from the anticipated development. In all cases, the design peaking factor, F, shall meet or exceed the values as follows:

An equivalent population less than 5,000 persons,

$$F = 4$$

An equivalent population greater than or equal to 5,000 persons,

$$F = (14 / (3.316 + P^{0.5}\ ))\ ) + 1.5$$

For, P = equivalent population in thousands

Additional consideration of peak flow shall be given for design of pumping stations. The impact of pumping stations on the upstream and downstream sanitary sewer system shall be evaluated. The peak flow for design of a pumping station shall be based on the flow into the station. A reduced peak flow, based on the peaking factor presented above, may be used for design of larger pumping stations provided a detailed hydraulic analysis is performed on the sanitary sewer system. Specific approval by the Community Development Department shall be required prior to use of a reduced peak flow for the design of a pumping station and related sanitary sewer system.

# APPENDIX - D

# MANDREL REQUIREMENTS

All gravity sanitary sewers, constructed using P.V.C pipe, shall be tested using a Mandrel that will measure five percent (5%) deflection in the pipe. ASTM 3034, current, provides diameters for seven and one-half percent (7-1/2%) deflection. Five (5%) deflection requirements are listed below.

P.V.C. PIPE – SDR – 35

| Nominal Pipe Size (IN.) | Average Inside Diameter (IN.) | Base Inside Diameter (IN.) | 5% Deflection Mandrel (IN.) |
|---|---|---|---|
| 6 | 5.893 | 5.742 | 5.45 |
| 8 | 7.891 | 7.665 | 7.28 |
| 10 | 9.864 | 9.563 | 9.08 |
| 12 | 11.737 | 11.361 | 10.79 |
| 15 | 14.374 | 13.898 | 13.20 |

P.V.C. PIPE – SDR – 26

| Nominal Pipe Size (IN.) | Average Inside Diameter (IN.) | Base Inside Diameter (IN.) | 5% Deflection Mandrel (IN.) |
|---|---|---|---|
| 6 | 5.764 | 5.612 | 5.33 |
| 8 | 7.715 | 7.488 | 7.11 |
| 10 | 9.644 | 9.342 | 8.87 |
| 12 | 11.480 | 11.102 | 10.55 |
| 15 | 14.053 | 13.575 | 12.90 |

For P.V.C. pipe sizes larger than fifteen inch (15”) diameter, specific requirements for the Mandrel will be established by the Community Development Department.

# APPENDIX E

## STREET LIGHTING REQUIREMENTS

| Street Type | Pavement Width | Right-of-Way Width | Minimum-Maximum Distance | Lumens |
|---|---|---|---|---|
| Minor / Local | 28’ | ≤ 60’ (50’ w/ utility easements) | Note 1 | Note 2 |
| Collector / Commercial | 36’ – 48’ | 60’ – 80’ | Note 1 | Note 2 |
| Divided Roads | 25’ – 37’ (2 each) | ≥ 80’ | Note 1<br>Note 4 | Note 2<br>Note 5 |

**NOTES:**

1. Distances shall be measured along the centerline of road. Minimum – Maximum Distance shall be as per approved layout from the lighting company (CenterPoint).
2. All lighting shall be High Pressure Sodium Vapor with elliptical lighting pattern.
3. Where practical, lights shall be located on alternating sides of roadway.
4. Distance applies to each side of a divided roadway, i.e. double the number of lights.
5. For boulevard streets, double-arm steel standards in the median may be utilized. Light standards and electrical conduits shall not conflict with other City/County/State facilities in the right-of-way.
6. All street light fixtures shall be full cut-off fixtures to minimize light pollution.

# PUBLIC WORKS DEPARTMENT

THE GUIDELINES PRESENTED IN THIS DOCUMENT INCLUDE THE MOST OFTEN REQUESTED INFORMATION REGARDING GEOMETRIC DESIGN OF SUBDIVISION STREETS. DESIGNATED MAJOR THOROUGHFARES (I), AND COLLECTOR STREETS (1) WITHIN SUBDIVISIONS, SHALL BE CONSIDERED FOR SPECIAL DESIGN FEATURES AND MAY REQUIRE HIGHER DESIGN CRITERIA THAN SHOWN HEREIN. ALSO, DESIGN FEATURES NOT SHOWN IN THESE GUIDELINES SHOULD BE CONSIDERED SPECIAL DESIGN FEATURES.

IT IS ADVISABLE TO CONSULT WITH THE APPROPRIATE AGENCIES AND REVIEW THE MOST RECENT EDITION OF THE FOLLOWING PUBLICATIONS TO DETERMINE ADEQUATE THOROUGHFARE REQUIREMENTS AND SPECIAL DESIGN FEATURES.

- RECOMMENDED GUIDELINES FOR SUBDIVISION STREETS, INSTITUTE OF TRANSPORTATION ENGINEERS.
- GUIDELINES FOR URBAN MAJOR STREETS DESIGN, INSTITUTE OF TRANSPORTATION ENGINEERS.
- A POLICY OF GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS.
- TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD), TEXAS DEPARTMENT OF TRANSPORTATION.

(1) DESIGNATED ROADWAY APPEARING ON THE MAJOR THOROUGHFARE AND FREEWAY PLAN, HOUSTON CITY PLANNING COMMISSION.

NOTE: ALL REFERENCES TO HARRIS COUNTY AND CITY OF HOUSTON SHALL BE REFERRED TO CITY OF WEBSTER, COMMUNITY DEVELOPMENT DEPARTMENT.

Drawing produced 08/12/2004
C.I.P Engineering & GIS, City of Webster, TX
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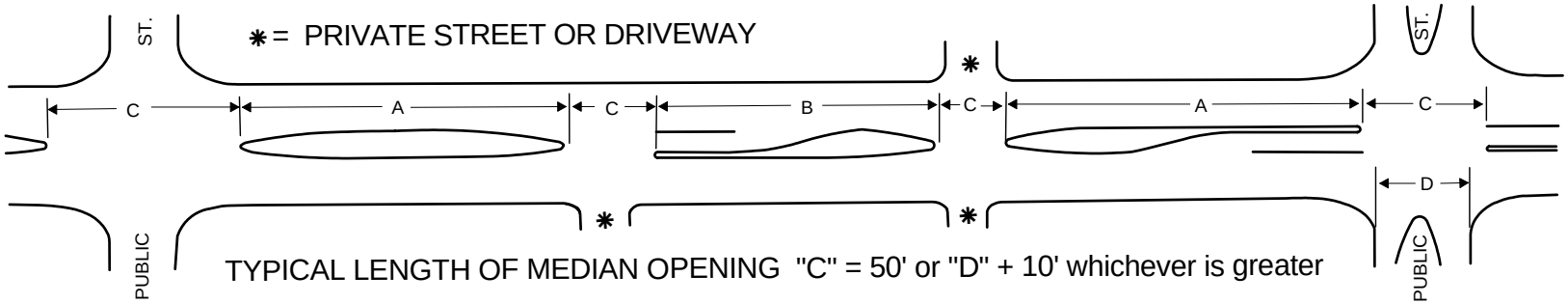
STREET_standards\F2\F2.mxd

# TYPICAL LENGTH OF MEDIAN AND MEDIAN OPENING




## MINIMUM ACCEPTABLE MEDIAN LENGTH FOR TYPE OF STREET

| | PURPOSE OF MEDIAN INTERRUPTION | | | |
|---|---|---|---|---|
| ***IF PLANNED DIVIDED STREET IS:*** | ***MAJOR STREET/ THOROUGHFARE (A)*** | ***COLLECTOR STREET (A)*** | ***LOCAL STREET (A)*** | ***PRIVATE STREET OR DRIVEWAY (B)*** |
| ***MAJOR STREET/THOROUGHFARE*** | 350' | 300' | 300' | 300' |
| ***COLLECTOR STREET*** | 300' | 250' | 250' | 250' |
| ***LOCAL STREET*** | 250' | 250' | 250' | 250' |

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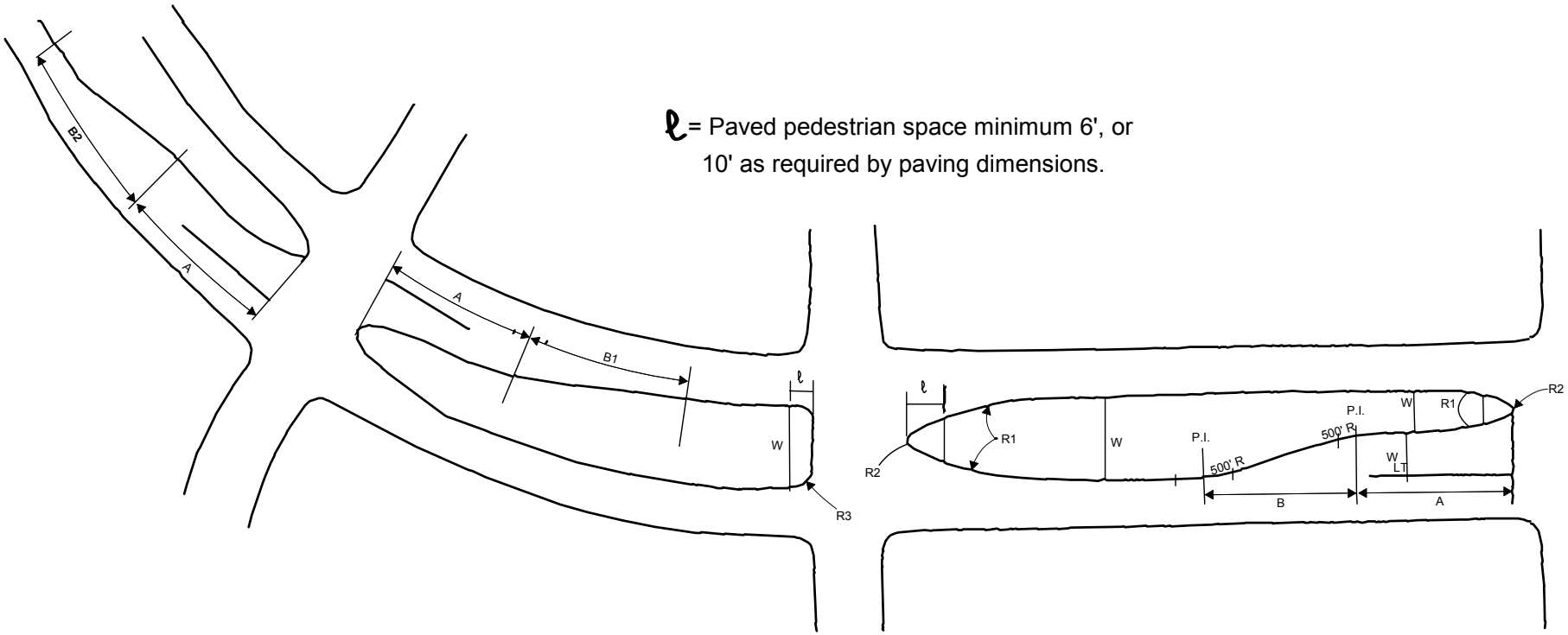
STREET_standards\F3\F3.mxd

# MEDIAN NOSE AND LEFT TURN BAY DESIGN




ℓ = Paved pedestrian space minimum 6', or
10' as required by paving dimensions.

| MEDIAN DIMENSIONS | | | |
|---|---|---|---|
| W | R1 | R2 | R3 |
| ≤ 10' | NONE | W/2 | NONE |
| > 10' | 90' | W/5 | NONE |
| < 40' | NONE | NONE | 15' |

**LEFT TURN BAY DIMENSIONS**

A = 150' minimum at intersections of two major streets.
= 100' minimum at all other intersections.
B = 100' minimum on straight roadway.
B1 = Taper length may be shorter if it is on a horizontal curve to the left.
B2 = Taper length may be longer if curve is to the right.
W (LT) = 10' minimum

Note: Dimensions may be adjusted as determined by Community Development Department
The above lengths required are minimum distance and may require adjusting to comply with acceptable engineering practices or an approved traffic Impact Analysis.

Map produced 08/12/2004
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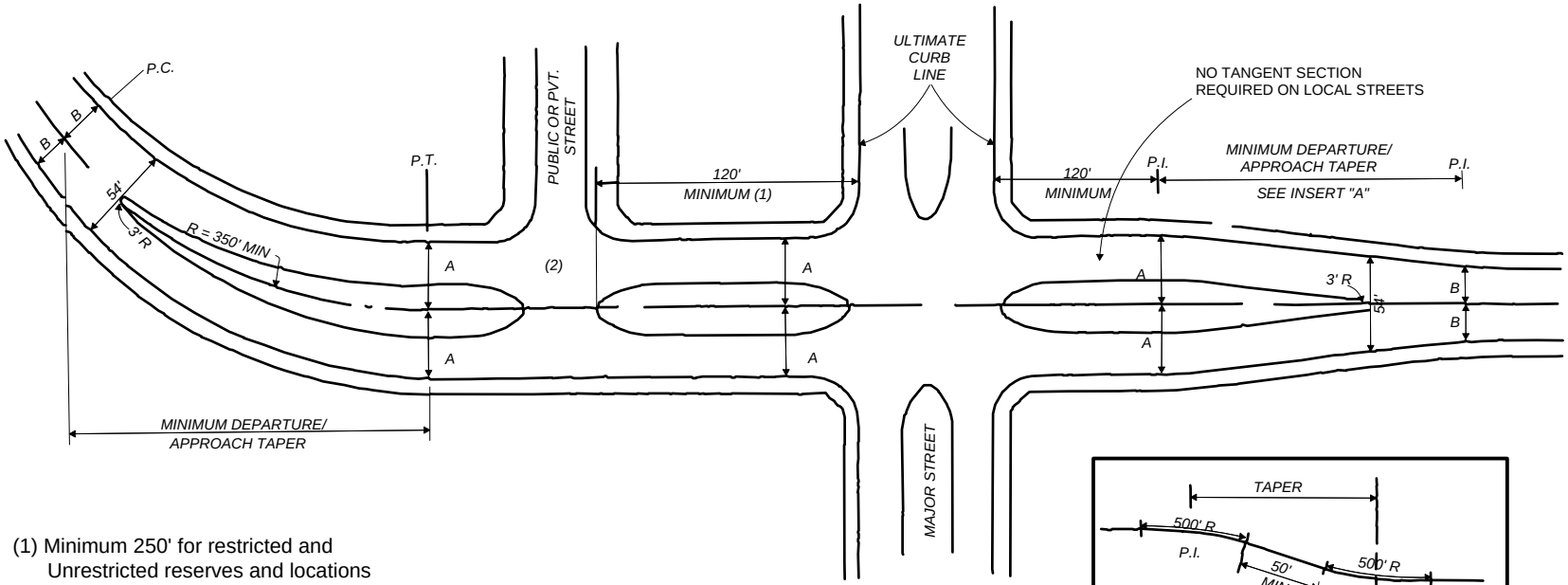
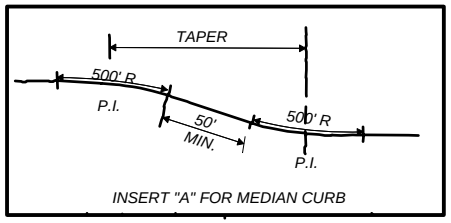
# ROADWAY TAPERS FOR SUBDIVISION STREETS




Notes: (1) Minimum 250' for restricted and Unrestricted reserves and locations Where a left turn lane may be required.

(2) Median opening may not be allowed if median becomes less than 250' in length on major street.

(3) Approach and Departure Taper Requirement:

$L = ws^2/60$ Where L = length in feet
S = speed in m.p.h.
W = lateral offset in feet

For S < 40 &
S = 30 m.p.h. Minimum design speed for subdivision streets.

W = A-B

(4) 350' minimum centerline radius for horizontal curve with approach or departure tapers.

(5) Approach and departure taper requirements:

S > 45
L = SW

## QUICK REFERENCE GUIDE

| ROADWAY CROSS SECTION (FEET) | | TAPER $L=WS^2/60$ (FEET) |
|---|---|---|
| A + A | B + B | |
| 80 | 60 | 150 |
| 80 | 40 | 300 |
| 80 | 27 | 400 |
| 70 | 40 | 225 |
| 70 | 27 | 325 |
| 60 | 40 | 150 |
| 60 | 27 | 250 |
| 40 | 27 | 100 |

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City of Webster, TX
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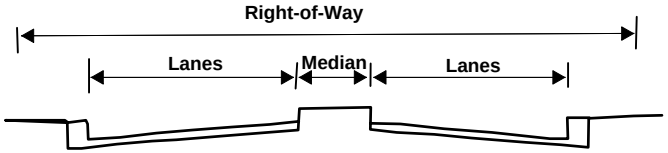
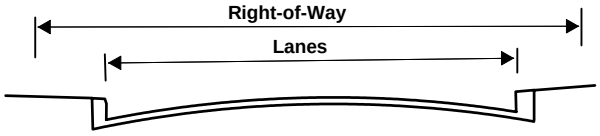
# GEOMETRIC STREET DESIGN STANDARDS
## Minimum Standards




**DIVIDED ROADWAYS**

Arterials

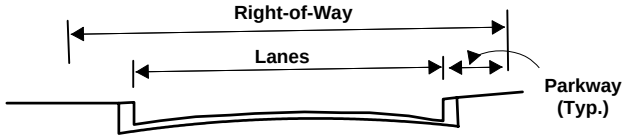
PA6D -- Major Arterial, 6 Lanes, Divided
PA4D -- Major Arterial, 4 Lanes, Divided
MA4D -- Minor Arterial, 4 Lanes, Divided
PC4D -- Major Collector, 4 Lanes, Divided




**UNDIVIDED ROADWAYS**

Arterials -- Collectors

MA4U -- Minor Arterial, 4 Lanes, Undivided
PC4U -- Major Collector, 4 Lanes, Undivided
PC2U -- Minor Collector, 2 Lanes, Undivided

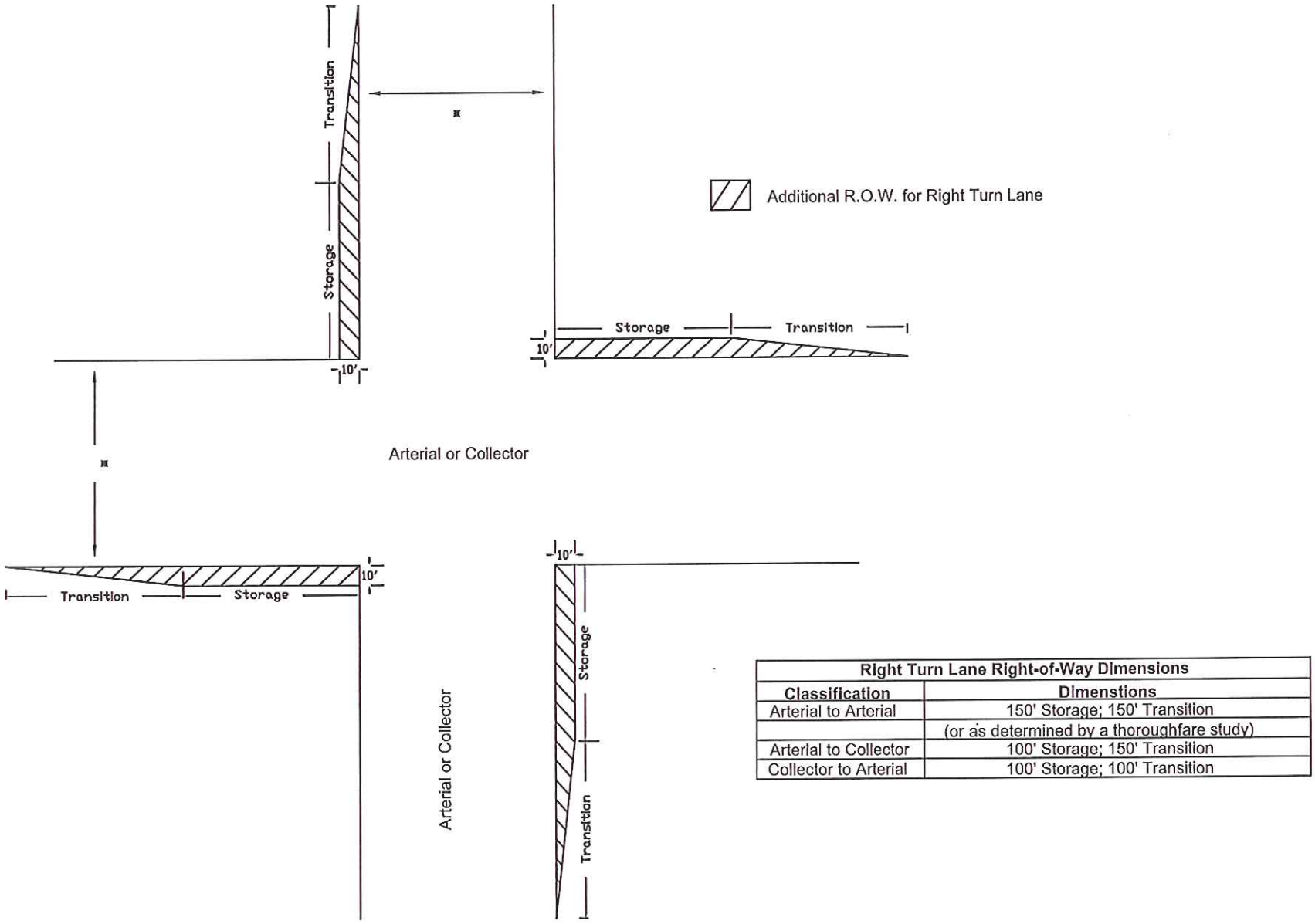



**LOCAL STREETS**

LR2U -- Residential, 2 Lanes, Undivided

| Design Element | Roadway Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PA6D | PA4D | MA4D | MA4U | PC4D | PC4U | PC2U | LR2U |
| Number Traffic Lanes | 6 | 4 | 4 | 4 | 4 | 4 | 2 | 2 |
| Lane Width (Ft.) | 12 | 12 | 12 | 11 | 12 | 11 | 36'-40' F-F | 36' F-F |
| R.O.W. Width (Ft.) | 120 | 100 | 80 | 60 | 80 | 60 | 60 | 60 |
| Design Speed (MPH) | 40-50 | 40-50 | 35-45 | 35-45 | 30-40 | 30-40 | 30-40 | 20-30 |
| Max. Grade (%) | 6 | 6 | 6 | 6 | 8 | 8 | 8 | 10 |
| Stopping Sight Distance (Ft.) | 325-525 | 325-475 | 250-400 | 250-400 | 200-325 | 200-325 | 200-325 | 125-200 |
| Horizontal Curvature Min. Radius (Ft.) | 2000 | 2000 | 1050 | 1050 | 850 | 850 | 600 | 500 or 300* |
| Vertical Clearance (Ft.) | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 |
| Lateral Clearance (Ft.) | 6 | 6 | 6 | 6 | 6 | 6 | 6 | - |
| Min. Median Width (Ft.) | 28 | 28 | - | - | - | - | - | - |
| Parking Permitted | No | No | No | No | No | No | Some | Yes |
| Parkway Width (Ft.) | 10 | 12 | 12 | 11 | 12 | 10.5 | 10 | 11.5 |
| * | For local streets less than 2000' long. | | | | | | | |

# RIGHT TURN LANE RIGHT-OF-WAY REQUIREMENTS




| Right Turn Lane Right-of-Way Dimensions | |
|---|---|
| **Classification** | **Dimenstions** |
| Arterial to Arterial | 150' Storage; 150' Transition |
| | (or as determined by a thoroughfare study) |
| Arterial to Collector | 100' Storage; 150' Transition |
| Collector to Arterial | 100' Storage; 100' Transition |

Map prepared on 05/12/2004
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City of Webster, Texas
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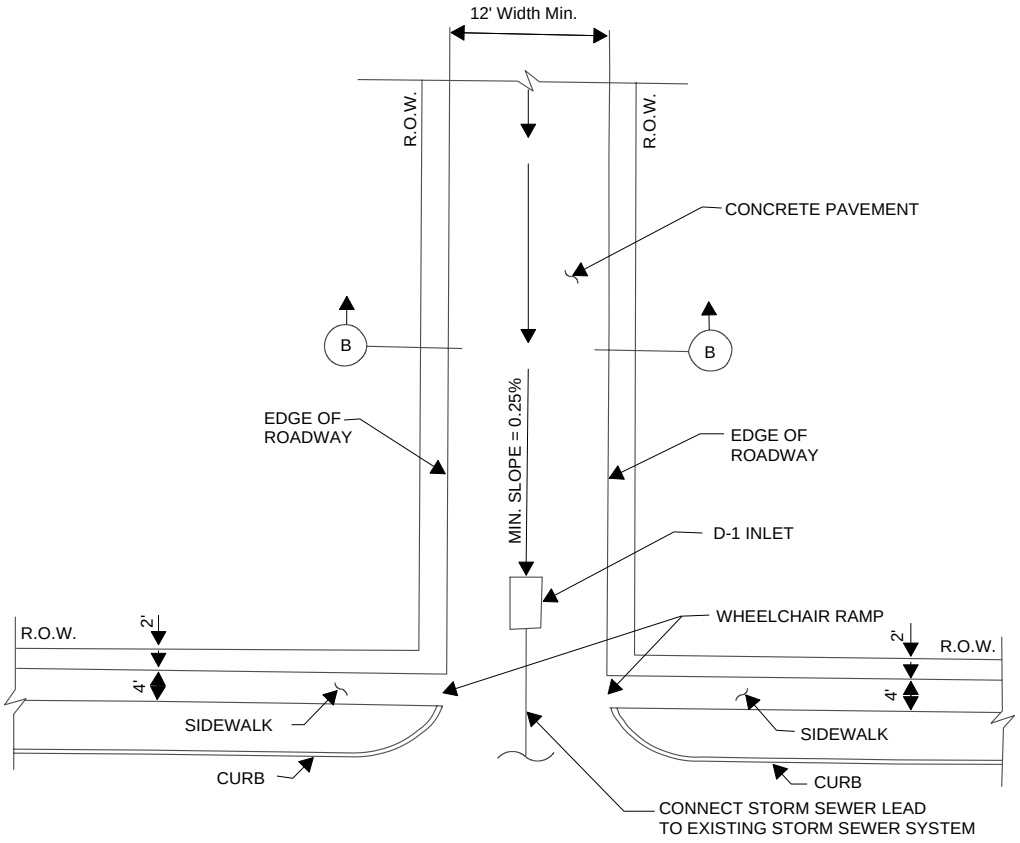
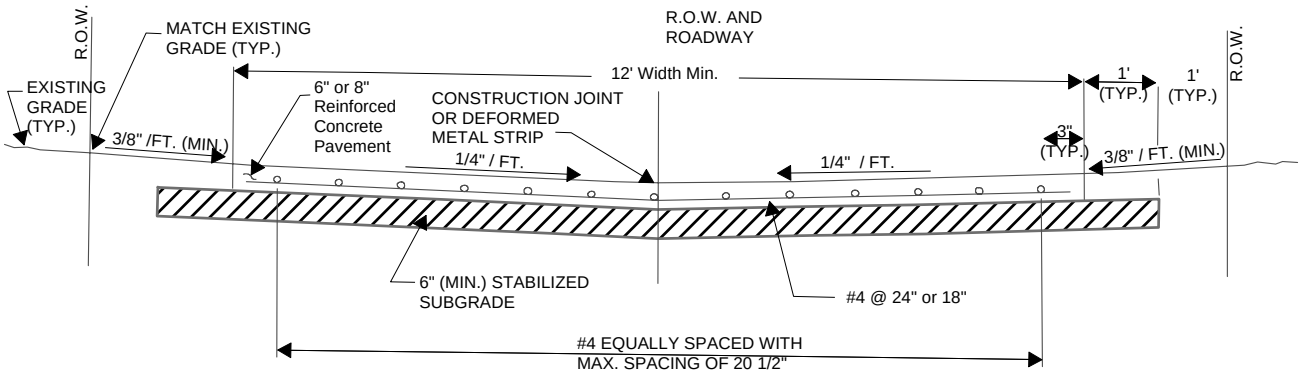
# ALLEY PAVING
# CURB AND GUTTER STREET




PLAN VIEW




SECTION B-B