

# **STREET DESIGN CRITERIA**

## **General**

Location and alignment of streets shall conform to the Comprehensive Plan and shall be subject to approval by the City. Streets shall be designated and designed according to their expected function and traffic capacity. Construction of streets and their appurtenances shall be in accordance with current City standards and specifications. The term "City" as used herein shall mean the City Engineer of the City of Nacogdoches or his/her designated representative.

## **Street Classification**

The roadways within the City are classified according to the type of service, or function, and the expected traffic capacity to be provided. Each street classification has its own general design criteria and primary function. These functional classifications are used in the Comprehensive Plan and in these standards and are further described in Table 1.

**Table 1**

### **STREET CLASSIFICATION AND CAPACITY**

<b>STREET CLASSIFICATION</b>	<b>OPERATING VOLUME (VEHICLES/DAY)</b>
Expressway/Freeway	30,000 +
Arterial	10,000 - 30,000
Collector	5,000 - 10,000
Local - High Volume	1,000 - 2,000
Local - Low Volume	Less than 2,000

## **Street Right-Of-Way**

Right-of-way for public streets shall be provided as described in Table 2. Minimum right-of-way shall be determined by the functional classification of the street as shown in the Comprehensive Plan or otherwise determined by the City.

Required street right-of-way shall be dedicated either by subdivision plat or deed to the City.

**Table 2**

**STREET WIDTHS AND RIGHTS-OF-WAY**

<b>STREET CLASSIFICATION</b>	<b>NO. OF TRAVEL LANES</b>	<b>NO. OF PARKING LANES</b>	<b>MINIMUM R-O-W WIDTH (IN FEET)</b>	<b>REQUIRED PAVEMENT WIDTH (B-B CURB, IN FEET)</b>
Major Arterial	5	0	100	61
Minor Arterial	4	0	80	49
Collector	2	2	60	37
Local - High Volume	2	1	50	32
Local - Low Volume *	1	2	50	28

\* Low Volume Local Street provides access to 20 or less dwelling units or short connecting streets.

**Street Access**

All public street access shall comply with City Code Section 86-156

All public streets shall have direct access to another public street.

Primary access to large developments and subdivisions shall be provided from arterial or collector streets. Developments containing more than fifty (50) lots or dwelling units shall provide at least two (2) points of access to adjacent public streets unless otherwise approved by the City. Such access shall meet the spacing requirements herein.

The following Table 3 shall be used for access design:

**Table 3**

<b>STREET CLASSIFICATION</b>	<b>ACCESS TO ACCESS SPACING *</b>
Major Arterial	120
Minor Arterial	100
Collector	80
Local - High Volume	50 (Comm'l) N/A (Resid.)
Local - Low Volume	N/A

\* Edge to edge of travel lanes (driveway to driveway/street or street to street)

Access to State highway ramps shall be in accordance with the Texas Department of Transportation's current "Roadway Design Manual."

Each tract of land or development site shall be limited to one access to each adjacent public street unless the public street frontage exceeds 400 feet. If public street frontage exceeds 400 feet, one additional access may be considered if the two accesses are separated by at least 400 feet.

Each access, including radii, shall be wholly contained within the projected property lines of the tract or site. Access shared with the adjacent property shall be encouraged.

The design of an access shall take into consideration the sight distances required for oncoming traffic and the required clear view of the sight triangle to the accessed public street.

Each access shall comply with the Americans with Disabilities Act and the Texas Accessibility Standards.

Stormwater control and drainage in accordance with City Standards shall be incorporated into the design of all access.

If a proposed development may generate more than 500 vehicle trips per day and prior to consideration of an access request, the developer shall submit to the City Engineer a traffic study prepared by a Traffic Engineer licensed in the State of Texas.

Traffic signalization, restricted turning movements into and out of the site or other special conditions may be required for approval of any access. Approval by the Texas Department of Transportation is required for any proposed signalization on the State Highway System.

Where existing development on a tract of land is to be removed and a new development constructed, all access shall be in compliance with this ordinance.

Where a proposed development involves unique site, traffic or land use characteristics, the developer may request deviation from these standards by submittal to the City Engineer of a written report justifying such deviation prepared by an Engineer licensed in the State of Texas.

### **Street Location**

Certain streets should be planned to carry large volumes of through traffic (arterials and collectors) while other streets (locals) should be laid out to provide access within a development. Arterial and collector streets should follow the continuity of city streets leading to or from the development and should provide for extension into adjacent property. Depending on the size of the development and the projected traffic volumes, local streets may need to provide for extension into adjacent property. The City shall determine the final location of all streets.

## **Street Intersections**

The number of intersections shall be kept to a minimum consistent with traffic needs. The number of streets permitted to converge at a single intersection shall be minimized. Intersecting streets shall be designed so that they intersect at right angles. Variations up to 15 degrees may be allowed for local streets, only. Such local street shall be curved as it approaches the intersection in order to effect a nearly right-angle alignment to the extent possible. Intersections may be staggered or offset only if the distance between street centerlines is at least 125 feet.

Local streets intersecting a collector or arterial street shall have a straight section of centerline at least fifty (50) feet in length measured from the right-of-way line of the higher traffic volume street. However, no such straight alignment is required if the local street curve has a centerline radius greater than four hundred (400) feet with the center located in the major street's right-of-way line.

The minimum distance between streets shall be 800 feet for streets intersecting an arterial street, 600 feet for a collector street and 200 feet for a local street.

## **Street Visibility (Site) Triangle**

In order to provide a clear view of intersecting streets to motorists, there shall be a triangular area of clear vision formed by two intersecting streets. The size of the triangular area is based on functional classification.

On any portion of property that lies within the triangular area shown in Figure 1, nothing shall be erected, placed, planted or allowed to remain or grow in such a manner as to materially impede vision between a height of thirty (30) inches and eight feet above the average grade at the two street centerlines. The triangular area shall be formed by a point on each street centerline located 50, 75 or 100 feet from the intersection of the street curbs and a third line connecting the two points, as shown in Figure 1.

## **Half-Streets**

Half-streets are prohibited. Full street right-of-way and improvements shall be provided for any development.

## **Alleys**

Public alleys are prohibited. If alleys are proposed for a development, they shall be private and in addition to the required public streets.

## **Cul-de-sac and Dead-end Public Streets**

Cul-de-sac streets shall be designed to prohibit future extension by arranging lots around the turnaround. The cul-de-sac turnaround shall have a minimum back-of-curb radius of 40 feet and right-of-way radius of 50 feet.

A dead-end street shall not be designed or constructed unless it is intended to connect with a future street on adjacent land. A temporary turnaround shall be constructed at the end of any dead-end street. Such turnaround shall have a pavement radius of 40 feet and shall require the dedication of easements to remain in effect until the street is extended and the turnaround is removed. In a commercial or industrial development, however, construction of a temporary turnaround may be waived if adequate alternatives are available for vehicles to turn around. Such alternatives must be approved by the City.

### **Private Streets and Alleys**

Private streets and alleys shall be designed and constructed in accordance with public street standards. Private streets and alleys shall:

1. Provide adequate vehicular access to all buildings and facilities within the boundaries of the development;
2. Provide adequate interior traffic circulation and access to all buildings by fire fighting and other emergency personnel and equipment;
3. Allow for the smooth flow of vehicular traffic, avoiding such traffic hazards as closely spaced intersections;
4. Provide direct access to the existing public street system adjacent to the property boundaries.
5. Alleys shall be a minimum of 24 feet in width and do not require curb and gutter.

### **Geometric Criteria**

Streets shall be designed according to the minimum geometric criteria established in Table 3 and Figures 2 through 6.

VISIBILITY SITE TRIANGLE

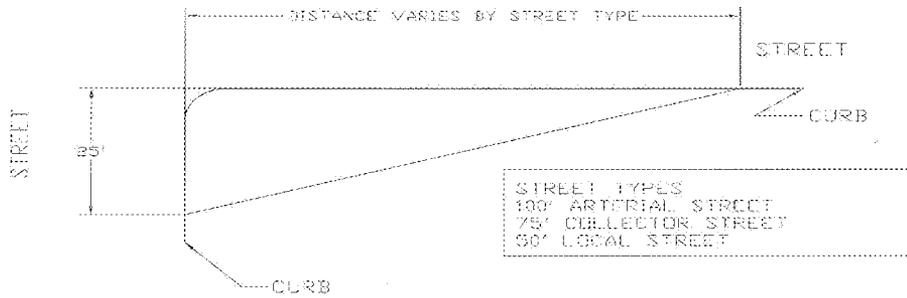


FIGURE 1

**Table 3**

**GEOMETRIC STREET DESIGN CRITERIA**

<b>STREET CLASSIFICATION</b>	<b>MAXIMUM GRADE (%)</b>	<b>MINIMUM GRADE (%)</b>	<b>MINIMUM C.L. CURVE RADIUS (FEET)</b>	<b>MINIMUM LENGTH VERTICAL CURVE<sup>(2)</sup> (FEET)</b>	<b>MINIMUM SIGHT DISTANCE (FEET)</b>	<b>MINIMUM TANGENT LENGTH BETW. CURVES (FEET)</b>	<b>CURB RETURN RADII (FEET)</b>
Arterial	6	0.5	800	300	400	300	30
Collector	8 <sup>(1)</sup>	0.5	500	100	250	200	25
Local	10 <sup>(1)</sup>	0.5	200	100	250	100	20 <sup>(3)</sup>

<sup>(1)</sup> Where existing topography makes conformance to these grades impractical, consideration may be given to allowing an additional two (2) percent increase in grade for a distance of 500 feet or less.

<sup>(2)</sup> Arterial Streets: or 50 times the algebraic difference in grades.  
Collector and Local Streets: or 20 times the algebraic difference in grades.

<sup>(3)</sup> Acute angle intersections shall have 25-foot radii.

**Street Structural Thickness Design**

Engineered Design: Except as provided below, all street structural sections (structural thickness) shall be designed by a registered professional engineer in accordance with:

1. American Association of State Highway and Transportation Officials (AASHTO), Flexible Pavement Design Method;
2. Asphalt Institute Design Method;
3. Portland Cement Association, Rigid Pavement Design Method; or
4. Any other methods not specifically mentioned herein, with prior approval of the City.

The street structural section design shall be based on the concept of “Equivalent Axle Loadings” (EAL’s) to express the total number and mixture of loadings that will occur during the street section’s design life of twenty (20) years. Each street will be designed as an arterial, collector or local street and its structural section design shall use the loadings shown in Table 4.

**Table 4**

**EQUIVALENT AXLE LOADINGS  
(20 YEAR DESIGN LIFE)**

<b>STREET CLASSIFICATION</b>	<b>AXLE LOADS EQUIVALENT TO 18,000 LBS</b>
Arterial	5,000,000
Collector	3,000,000
Local	9,000

Standard Design: In lieu of a designed street structural section, the developer may design and construct local residential street pavement sections as follows:

1. 1.5 " Hot Mix Asphaltic Concrete (HMAC), 6" flexible base, 6" stabilized subgrade if required;
2. 5" HMAC, 6" stabilized subgrade if required;
3. 6" reinforced Portland Cement Concrete (PCC) (with 2" sand cushion permitted), 6" stabilized subgrade if required.

All HMAC, flexible base and subgrade dimensions are for compacted thickness.

Soils Testing and Subgrade Stabilization: A soils test report shall be submitted to the City for each 1,000 square yards of paved surface proposed or for each type of soil encountered in the subgrade.

The following data shall be included in the soil test report:

1. Soil Classification;
2. Optimum Moisture/Density relationships;
3. Atterberg Liquid Limits and Plasticity Index (L.L. & P.I.);
4. Stabilization requirements for subgrade soil (% lime for clay or % cement for non-cohesive soils), if required;
5. All tests shall be performed by a certified testing laboratory.

All subgrade soils with a P.I. of 20 or more shall be stabilized:

1. If the standard structural section design for local street is used, 5% lime may be used; otherwise,
2. A certified testing laboratory shall conduct lime (or other approved material) series tests to determine the percent of stabilizing agent required.

Native soils with a P.I. of less than 20 may be used as subgrade material as long as they can meet the City's compaction requirements. A stabilizing agent such as lime, cement, etc. may be added as recommended by soil analysis to aid in compaction.

Subgrade soils evaluation shall generally apply to the top 6 inches of soil measured down from the proposed subgrade surface.

Subgrade, base and asphalt density testing is required during construction. Such tests shall be provided for each lift of material placed and shall use the Standard Proctor

ASTM D-698 for subgrade, Modified Proctor ASTM-D-1557 for flexible base and 5 to 9 percent air voids based on the maximum theoretical specific gravity for HMAC pavement.

### **Stormwater Management and Surface Restoration**

The design and construction of all new street and drainage facilities shall provide for stormwater management and restoration of the construction sites. Drainage and erosion control measures shall be approved by the City and shall meet all requirements of the state and federal government.

All areas disturbed by the construction work shall be restored to a condition equal to or better than that which existed prior to the start of the project. At a minimum, all disturbed areas shall be graded smooth (mowable), seeded, fertilized and maintained until a healthy stand of vegetation is achieved, as determined by the City.

### **Other Basic Criteria**

The design thickness of each layer of the street structural section shall be rounded up to the nearest one-half inch.

The total thickness of an asphalt concrete pavement may be divided into different types of material. Unless otherwise approved by the City, Type "D" HMAC per Item 340 of the Texas Department of Transportation (TxDOT) Standard Specifications, latest edition, shall be used for a surface course of less than two (2) inches thickness, with Type "C" HMAC used for all courses two (2) inches or greater in thickness.

HMAC shall be laid in lifts no greater than three (3) inches nor less than one and one-half (1.5) inches in thickness.

Whenever an existing curb cut or drive approach is abandoned for access purposes, the affected portion of the existing curb line shall be replaced with curb and gutter meeting current City Standards or matching the existing curb and gutter.

The complete right-of-way shall be cleared and grubbed prior to construction of any street improvements.

If shallow groundwater or springs are encountered during the design or construction process, french drains shall be constructed to intercept and take the water to an approved outfall. French drain design must be approved by the City.

The design requirements set forth herein are minimum design standards. The City reserves the right to require additional precautions or treatments consistent with sound engineering practice to provide for conditions not specifically covered herein.

Any other design methods not specifically described in this document may be used with prior approval of the City.

### **End Of Section**