

STREET DEVELOPMENT STANDARDS

ROADWAY STANDARDS
AND
MASTER THOROUGHFARE PLAN



Adopted by City Council March 10, 2009

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I. INTRODUCTION

The City of Fort Worth's street development standards are significant City policies. The *Master Thoroughfare Plan* (MTP) and "Roadway Standards" guide roadway network decisions in planning and development of the City's infrastructure. This document contains information on roadway functional classification, street characteristics, recommended street design criteria, Traffic Impact Study (TIS) guidelines, Context Sensitive Solutions (CSS) street designs, and the current *Master Thoroughfare Plan*. The purpose of these street standards is to provide for the safety, health, and well being of the general public by providing mobility and access to adequate streets and facilities in new development and redevelopment within the City of Fort Worth and its extraterritorial jurisdiction (ETJ). Existing infrastructure is utilized to the extent possible.

These standards are based on several fundamental principles. The first is that residential neighborhood streets should be designed for low speeds and low vehicular traffic volumes. Second, arterial streets should be designed and located to provide a higher level of mobility at higher speeds, while at the same time being sensitive to the land uses that surround them. The third principle is that the street network should be designed to maximize connectivity. This will improve access for emergency vehicles, make walking and bicycling more attractive forms of transportation, and reduce the burden on the arterial network because more short trips would be remain on local and collector streets. Fourth, collector streets, particularly those located within residential subdivisions, are encouraged to be designed with built-in traffic calming features. Lastly, the siting of new elementary and middle schools is strongly discouraged adjacent to streets classified as arterials, as documented in the Subdivision Ordinance. These principles are applied to different levels of development based on mobility needs, traffic capacity and land uses.

Closely associated with the *Master Thoroughfare Plan* and "Roadway Standards" are the Traffic Impact Study (TIS) guidelines. The use of traffic impact studies will allow the establishment of a street system that provides adequate traffic circulation, safety and access, concurrent with development. Where more intensive development occurs, additional roadway widths, turn lanes, signalization, multi-modal features, or other mitigation measures may be required. Traffic impact studies address localized developments that influence mobility in the immediate area but not the entire system. Traffic Impact Study Guidelines are found in Appendix A of this document.

The City of Fort Worth views the use of "Context Sensitive Solutions" (CSS) as an innovative approach to planning, designing, constructing, maintaining and operating its transportation system. CSS is a philosophy wherein safe transportation solutions are designed in harmony with adjacent land uses. Proposed CSS alternative design standards provide additional flexibility in the design of city roadways, and will be considered as the preferred approach for street design within higher-density, mixed-use areas designated as Urban Villages and Mixed Use Growth Centers in the City of Fort Worth Comprehensive Plan. The CSS Policy is found in Appendix B of this document.

II. STREET FUNCTIONAL CLASSIFICATION

The traditional street functional classification system consists of a hierarchy where each category of road places a different emphasis on traffic mobility and property access. There are many advantages in providing specialized facilities for similar types of traffic in similar contexts. Each traditional classification of roadway serves a specific function. Taken together, they provide a balance of mobility and land access (see Figure 1 below).

Failure to provide all components of the street system will result in misuse of local streets by cut-through traffic or construction of streets that are not fully utilized. These standards provide street designs that enhance multi-modal transportation and provide alternative street designs in new developments. A brief discussion of each type of facility follows.



Figure 1 – Mobility / Access Relationship

Where land use, environmental, or other contexts vary greatly – such as in mixed use growth centers and urban villages – a Context Sensitive Solutions approach to street design may be favored over the traditional street functional classification system. See Appendix B for more discussion regarding CSS.

Freeways/Tollways/Managed Facilities

A freeway is a controlled access roadway designed to carry high volumes of through traffic. Tollways and managed facilities are designed similarly to freeways except for the addition of toll collection facilities. Access to and from these facilities is allowed at ramps and interchanges. These facilities are designed to permit high-speed merging and diverging maneuvers with minimum disruption to the mainline traffic. Traffic capacities are generally from 60,000 to 200,000 vehicles per day (vpd). Freeways, tollways and managed facilities are designed to serve long-distance, inter-regional trips. They are ordinarily designed and constructed by the Texas Department of Transportation (TxDOT) and/or the North Texas Tollway Authority (NTTA).

Principal Arterial Streets

The main function of principal arterial streets is to provide mobility for people and for freight between communities and between major activity centers of the region. Principal arterials are used for longer urban trips and carry a higher proportion of the total area traffic on less mileage than other arterial streets.

The principal arterial street system carries most of the traffic entering and leaving the urban area, as well as most of the through movement bypassing the central city. Principal arterials may carry 30,000 to 45,000 vehicles per day and may serve high-density residential, retail, service, industrial, and mixed uses.

Major Arterial Streets

The major arterial street system connects with the principal arterial system to accommodate trips of moderate length with a lower level of travel mobility and a higher level of land access. The major arterial street system distributes trips to geographic areas and serves major commercial and industrial districts. Such facilities may carry local bus routes and provide inter-community continuity, but should not provide direct access to residential lots. Major arterials are generally designed to carry 15,000 to 35,000 vehicles per day.

Minor Arterial Streets

Minor arterials are commonly located along neighborhood borders and collect traffic from residential areas and channel vehicles to the major and principal arterial system. These streets are designed to carry 4,000 to 24,000 vehicles per day.

Industrial Streets

Industrial streets are identified in industrial areas to recognize different types of vehicles with large turning radii and heavy industrial type traffic. These roadways are basically minor arterials that route industrial vehicles from the arterial system to and within industrial districts.

Collector Streets

Collector streets distribute traffic from arterials to local streets, and collect traffic from local streets and channel it to the arterial system. These streets provide land access and local traffic movements in residential, commercial, mixed use and industrial areas. They are designed to carry 1,000 to 8,000 vehicles per day.

Local Streets

Local streets serve traffic within neighborhoods and should carry low traffic volumes (less than 1,000 vehicles per day) at slower speeds. There are two types of local streets: local and limited local. The streets are used in subdivisions based on varying sizes and numbers of residential lots.

The street functional classification for the roadway system is provided in Table I.

Table I
STREET FUNCTIONAL CLASSIFICATION

Criteria	Freeways	Principal Arterials	Major Arterials	Minor Arterials	Industrial Streets	Collector Streets	Local Streets
Trip Length	Long	Long	Long to Moderate	Moderate	Less than 1 Mile	Less than ½ Mile	Less than ¼ Mile
Traffic Volume	High	High	High to Moderate	Moderate	Light	Moderate to Light	Light
Service to Activity Center	Major Generator s	Major Generator s	Major Generator s	Local Areas	Individual Sites	Local Areas	Individual Sites
System Continuity	Interconnects with same system	Interconnects with higher system	Interconnects with higher system	Interconnect s with higher system	Interconnect s with higher system & individual sites	Interconnects with higher system & individual sites	Connects individual sites
Facility Spacing	5 - 6 Miles	1 - 3 Miles	1 - 2 Miles	½ - 1 Mile	NA	½ Mile	NA
Access Control	Full	High	Medium	Medium-Low	Low	Low	None
Transit Service	Yes/Possible HOV Lanes	Normal	Normal	Normal	Door to Door Service	Normal	Door to Door Service
Right-of-Way	400'	130'	110'	80'	100'	60'-66'	40' - 60'
Number of Lanes	4 – 8	6	4-5	3-4	4-5	2-3	Undesignated

III. STREET CHARACTERISTICS AND MULTI-MODAL CONSIDERATIONS

Several street characteristics are addressed in this section.

Right-of-Way Dedication

Right-of-way (ROW) refers to the extent of land necessary to construct roadways, medians, parking lanes, sidewalks, and utilities. The expanding use of public rights of way by utilities – with special emphasis recently on gas pipelines – and telecommunication networks places greater demands on public spaces. Most ROW is dedicated during final subdivision platting. If the roadway is a border street, each adjacent owner is expected to dedicate the amount determined by City staff to be roughly proportional to the impact of the development on the transportation system. Additional ROW may be required for grade separations and at major intersections and interchanges for turning lanes. The amount and location of right of way required are reflective of the specific roadway and its environment.

Arterial Street Intersections

The main objective of intersection design is to increase traffic flow and reduce the severity of potential conflicts between vehicles and/or pedestrians while increasing the safety of pedestrians crossing the intersection. Principal arterials should have dual left turn lanes at all intersections with arterial streets where needed to accommodate the volume of turning movements (Figure 2) and single left turn lanes at other intersections. Major arterials may have dual left turn lanes at intersections with other arterials where demanded, or single left turn lanes (Figure 3). Intersections along any arterial street may require additional right turn lanes and/or dual left turn lanes. These standards provide for necessary traffic capacity while minimizing the streets' basic right-of-way requirements.

Railroad Crossings

Due to the difficulty involved in adding new crossings of existing rail lines and for traffic safety reasons, new at-grade arterial crossings of existing rail lines should be discouraged. New principal arterial crossings of railroads and major state highways should be grade separated, barring topographic, environmental, economic or development constraints. New major arterial crossings of rail lines should be considered for grade-separation on a case-by-case basis. Additional ROW width may be required for these grade separations.

Pedestrian and Bicycle Facilities

Sidewalks

Sidewalks are required by City ordinance to be constructed on both sides of new streets. In order to provide a buffer between pedestrians and moving vehicles,

sidewalks are normally constructed along the property line. The standard width of sidewalks is 4 feet except when it is adjacent to the curb where it should be a minimum of 5 feet wide. Sidewalks may meander in the parkway, but should come no closer to the curb than 4 feet. Additional sidewalk widths may be required at regular intervals and at mail boxes, street light poles, etc., in order to conform to ADA requirements. Where people are dropped off and/or picked up (such as schools, bus stops, etc.), additional sidewalk width (8' to 12') may be required adjacent to the curb. Curb ramps must be provided where sidewalks access streets and intersections, and must be designed in accordance with ADA. In areas of the City covered under the Context Sensitive Solutions for Street Design policy, the minimum sidewalk width shall be 5', with even wider sidewalks preferred in areas with heavy pedestrian traffic.

On-street Bicycle Facilities

In order to safely accommodate bicycling activity, all urban arterial streets should – at a minimum – have a wide (15') outside curb lane for shared use by vehicles and bicycles. Arterials and certain collector streets identified as bike routes in *Bike Fort Worth*, the City's bicycle plan that should be finished in early 2009, should be designed and constructed with dedicated bike lanes in lieu of the wide curb lane. Sample illustrations of arterial cross sections with dedicated bike lanes are shown in Figure 4. AASHTO standards and the bicycle facility design guidelines in *Bike Fort Worth* should be referenced to determine the proper facility for a given roadway. Local streets and most collector streets identified as bike routes should be provided with bike route signage and, in some cases, pavement markings, as determined in *Bike Fort Worth*.

Off-street Bicycle Facilities

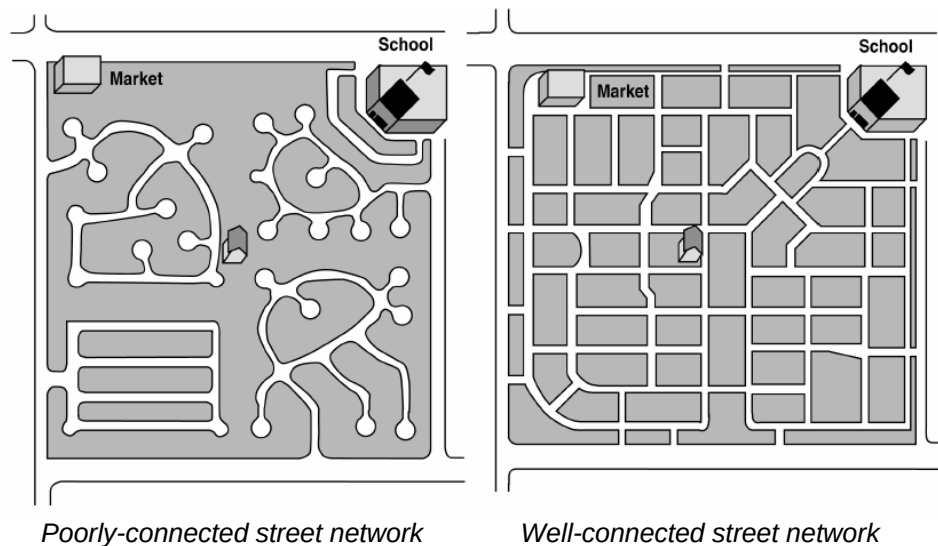
In order to provide the land needed to develop an interconnected off-street bicycle/pedestrian transportation network, rights of way for the off-street trails identified in *Bike Fort Worth* and other City-adopted trail plans should be preserved in the development process through parkland dedications, easements, or other available instruments. From a regional transportation perspective, the highest priority off-street bicycle facilities are contained in the *Regional Veloweb*, an existing and planned system identified by the North Central Texas Council of Governments in the *2030 Mobility Plan*. Significant sections of the veloweb are located in the City of Fort Worth and its extra-territorial jurisdiction.

Street Connectivity

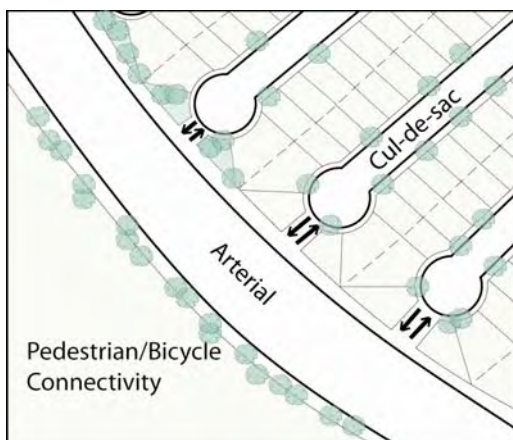
A well-planned street system can help prevent congestion while encouraging walking, transit and bicycling. The street network also plays a very important role in determining the character and form of a community. Local residential streets are instrumental in shaping the identity of a neighborhood, determining how people travel and how they feel about their neighborhood. Local streets and - to a lesser extent - collector streets provide access to individual properties and neighborhood facilities such as parks and schools. Although local streets are not designed for significant amounts of traffic, the connectivity of these streets with each other and with collectors is crucial to ensure that residents can easily reach close-by destinations without burdening the arterial street network. Developers are strongly encouraged to provide street and pedestrian

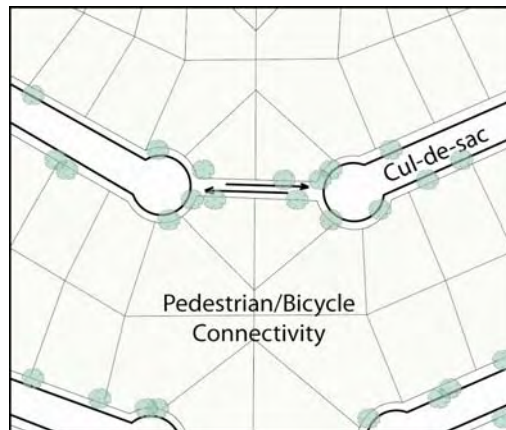
connectivity in development proposals (concept plans, plats, site plans, etc.) submitted to the City for review.

Local streets should form a well-connected network that provides for safe, direct, and convenient access by automobile, bicycling, and walking. A poorly-connected street network encourages use of the automobile over other travel modes; creates the need for excessive out-of-direction travel on the overburdened arterial street network; divides neighborhoods; and limits accessibility to nearby properties and neighborhood facilities. A well-connected street network provides more travel choices, helps to disperse traffic, and encourages walking and bicycling.



In developments where cul-de-sacs, looped streets, or long blocks are included, through connections for bicyclists and pedestrians should be provided whenever feasible to adjacent streets or other cul-de-sacs.





Multimodal Arterial Corridors

The main objective of multimodal accommodations on arterials is to provide for a mix of future on-street rapid transit along with automobile, bicycle, and pedestrian accessibility. By providing transportation options to a wide variety of users, incidents of congestion can be reduced while also providing air quality benefits.

Multimodal arterial cross section designs will be based on the proposed arterial classification and conditions specific to the location. Actual widths may vary due to interchanges, intersections or other factors that affect geometric design. The specific technology for rapid transit (i.e. bus, light rail, streetcar) will not be determined by the *Master Thoroughfare Plan*, but by other corridor studies or transit plans. Multimodal arterials will be designed in accordance with the CSS policy in Appendix B. See Appendix C for sample illustrations of a multimodal cross section. Multimodal arterials identified via the Mobility and Air Quality (MAQ) Plan are identified in the 2008 *Master Thoroughfare Plan* map. Additional corridors may be identified as multimodal arterials through future planning efforts.

Turning Lanes

Standard curb radii at intersections have been established to accommodate right turning vehicles. Generally, the larger the width of the intersecting streets, the larger the curb radii. Adding designated left and/or right turn lanes with storage and deceleration areas can also increase the capacity of streets. The length of these storage areas is a function of the number of vehicles expected during peak traffic flows. Adequate length is needed to prevent turning vehicles from blocking through lanes. The deceleration lane design depends upon the vehicular speeds on the street.

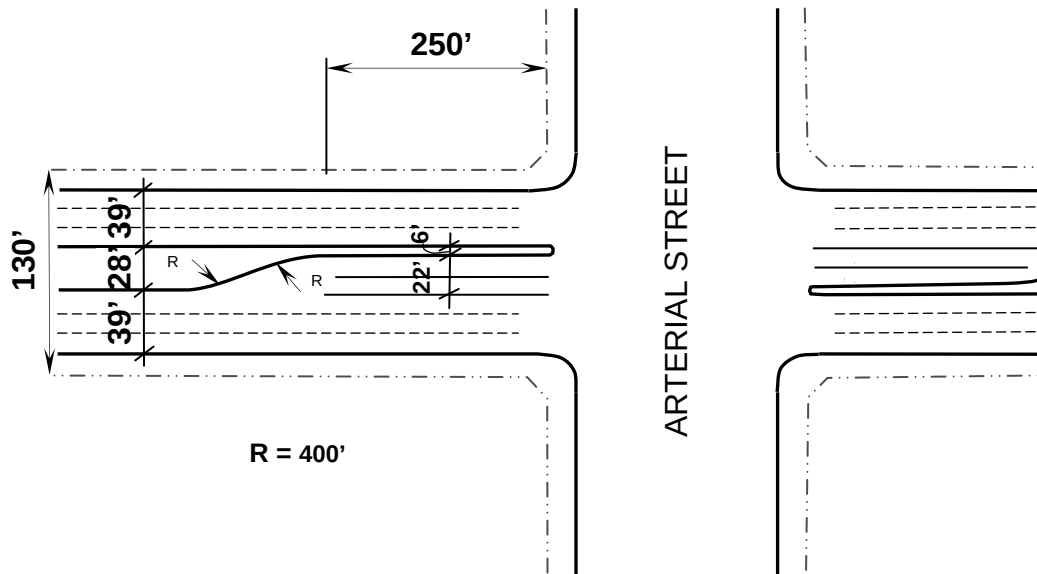
Driveways

Driveways provide access to adjacent private property. The number and location of driveways can affect the safety and operation of the adjacent roadway. Commercial driveways along streets with low pedestrian traffic should have larger (36' to 48') widths

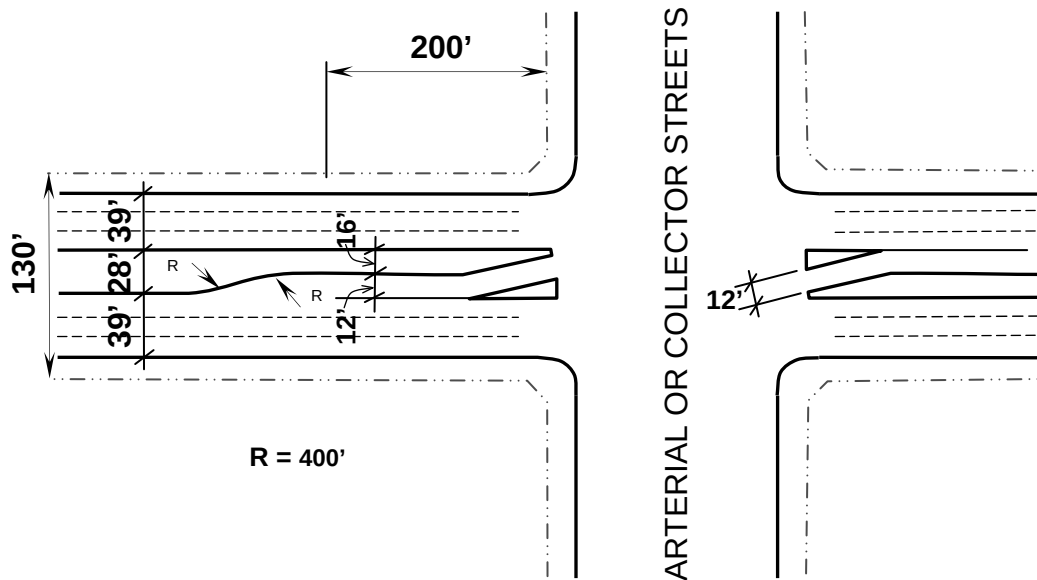
with 15' to 30' turning radii. Industrial street driveways should also have large widths and curb radii to reflect the type of vehicles using them. Construction easements may be used to construct driveways with larger curb radii. Depending on the volume and type of vehicles utilizing it, the driveway may be built and operated as a "street" intersection. All commercial access driveways that are signalized must be designed as a "street" cross section.

Median Openings

Median openings may be permitted between intersecting streets if there is adequate distance for necessary transition and storage lanes based on existing and/or anticipated traffic volumes. Generally, distances between median openings vary from 500 to 600 feet for major arterials and 600 to 800 feet for principal arterials. Proposed median openings along arterial streets may be shown on preliminary plats only where collector and arterial streets intersect. Median openings shall not be allowed where urban local residential streets intersect with an arterial street except when determined by TPW as necessary for street connectivity. The final spacing and location of all median openings shall be determined by TPW, based on projected traffic flow and circulation characteristics of the development and the standards contained in the Subdivision Ordinance, prior to the developer's submission of subdivision development construction drawings. When proposing retrofitted median openings on existing divided arterials, developers should give due consideration to the location of access points to land uses on the opposite side of the arterial, as well as these spacing guidelines. Special designs that only allow one-way access may be permitted.



PRINCIPAL ARTERIAL DUAL LEFT TURN LANES



PRINCIPAL ARTERIAL SINGLE LEFT TURN LANES

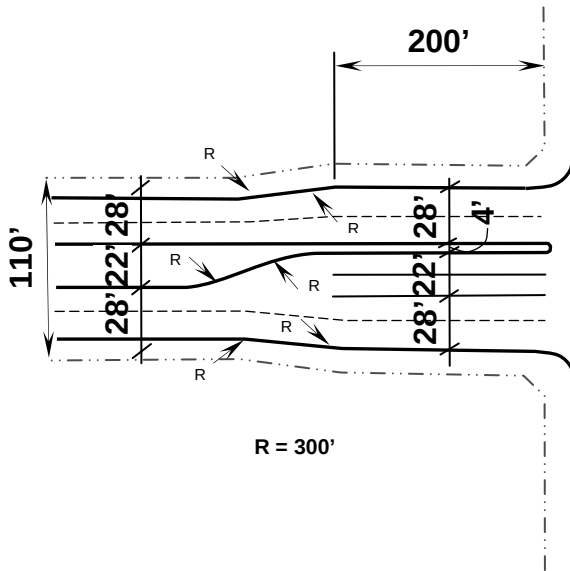
CITY OF FORT WORTH STREET STANDARDS

PRINCIPAL ARTERIAL
TURN LANES

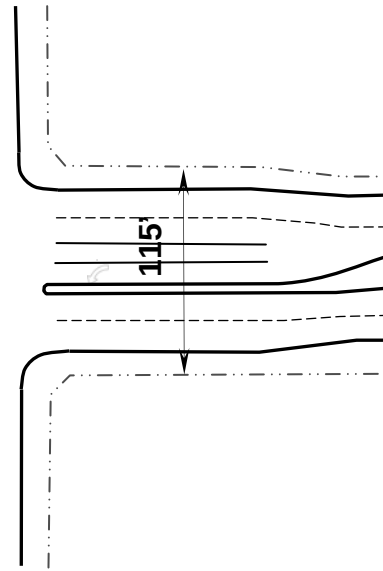
DUAL LEFT TURN LANES
SINGLE LEFT TURN LANES

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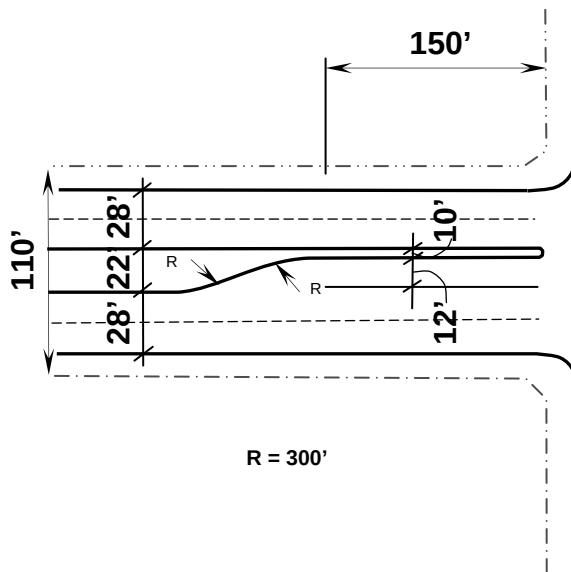
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FIGURE 2



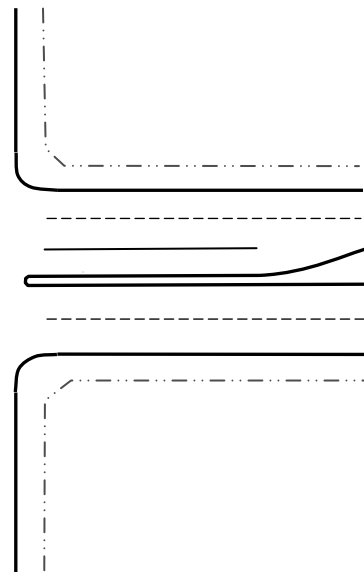
ARTERIAL STREET



**MAJOR ARTERIAL DUAL LEFT TURN LANES
(WIDEN AT INTERSECTIONS)**



ARTERIAL, COLLECTOR,
OR LOCAL STREET



MAJOR ARTERIAL SINGLE LEFT TURN LANES

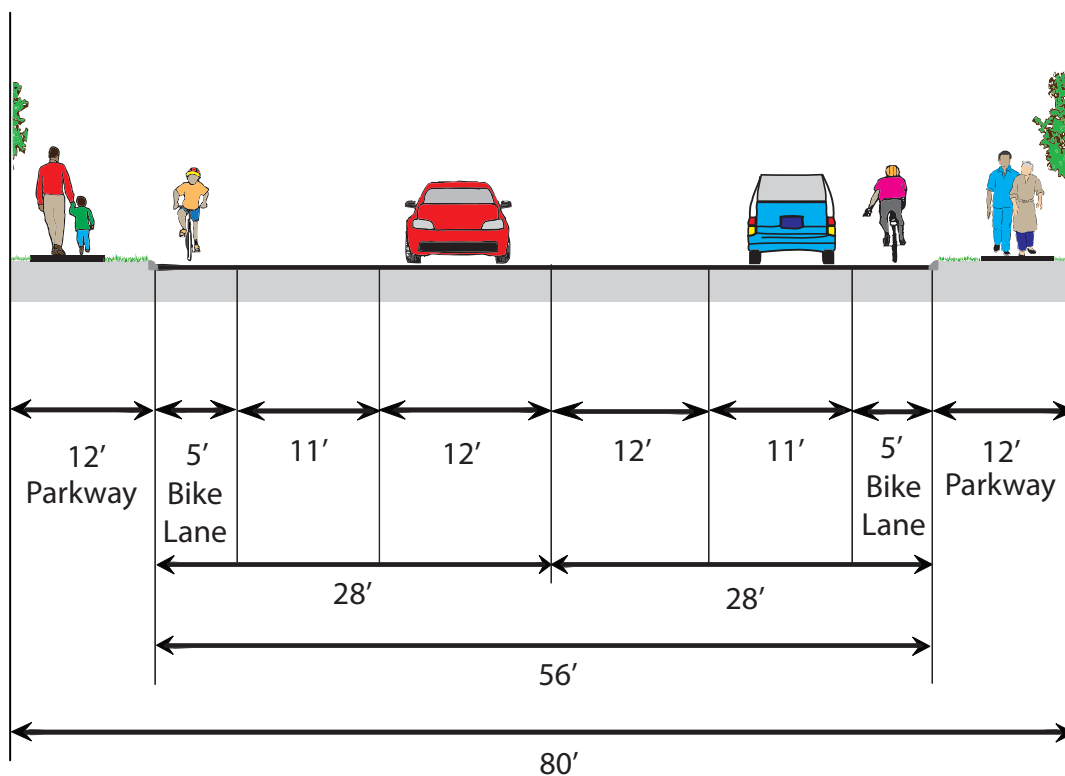
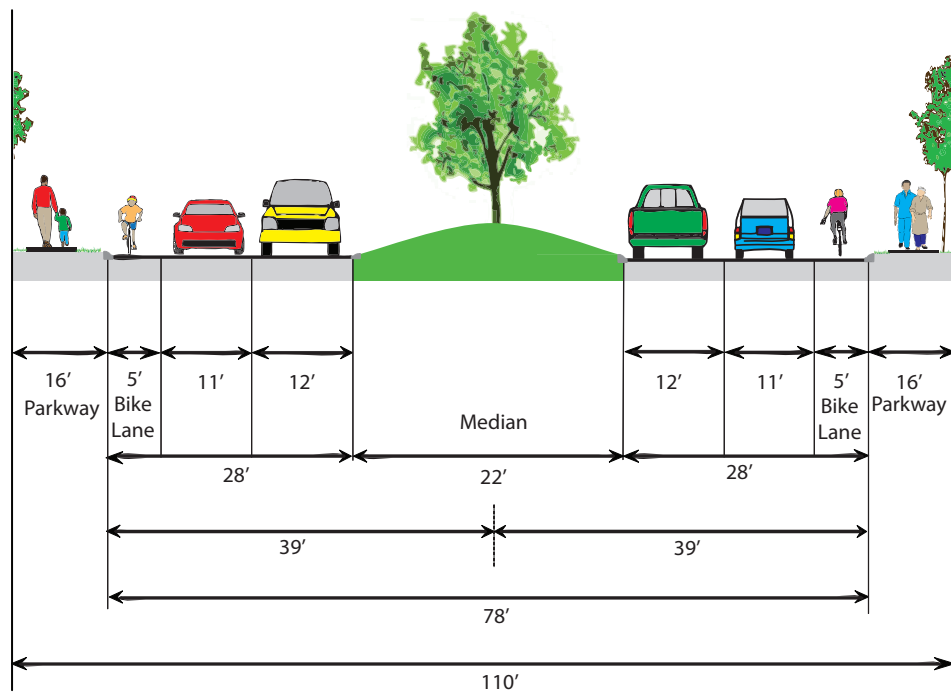
CITY OF FORT WORTH STREET STANDARDS

**MAJOR ARTERIAL
TURN LANES**

**DUAL LEFT TURN LANES
SINGLE LEFT TURN LANES**

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Sheet No.
FIGURE 3



SAMPLE CROSS SECTION - MINOR ARTERIAL w/ BIKE LANE

* BIKE LANE CROSS SECTIONS ARE ALSO BEING DEVELOPED FOR PRINCIPAL ARTERIALS AND COLLECTORS

CITY OF FORT WORTH STREET STANDARDS

PROPOSED URBAN DESIGN STANDARDS

MINOR ARTERIAL w/BIKE LANE
MAJOR ARTERIAL w/BIKE LANE

Date 3/4/2008

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FIGURE 4

IV. STREET DESIGN STANDARDS

Roadway designs have been developed for Urban and Rural (Extra-Territorial Jurisdiction (ETJ)) Street Standards. The designs are based on street classifications, types of development, and lot sizes. The street design standards include street and pavement cross sections for streets within the City and/or in the ETJ. Since the street cross sections are primarily designed for new streets, they will not be applied to existing streets for marginal adjustments. The street cross section standards may be modified to reflect planning and urban design objectives and existing street cross sections, while maintaining public safety. Commercial corridors, designated urban villages and mixed-use growth centers, and redevelopment projects in the central city may require unique street designs that more appropriately support the land-use, urban design and circulation objectives of these districts. The objective of street design is to provide mobility while recognizing and reflecting the context in which the street exists.

Street Cross Sections

Street cross section designs influence traffic speeds and volumes on the various types of roadways. They also have significant impacts on adjacent properties. Cross section right-of-way and roadway widths are based on anticipated traffic flows.

A primary goal of the set of cross sections and locations of arterial streets in the *Master Thoroughfare Plan* is to provide for an effective street network that maximizes the ease of construction and that moves traffic safely and efficiently. The standards also recognize the needs of various types of traffic using the streets (bicycles, trucks, buses, etc.)

Limited rights-of-way and roadway widths for local streets (as well as limits on the number of residential units and the length of these streets) can improve the livability of residential subdivisions. New subdivisions should be designed to provide slower speeds (traffic calming) on local and collector residential streets. These elements help make neighborhoods safer and provide a better environment in which to live. As appropriate, these cross sections may be modified to reflect appropriate vehicular, pedestrian, bicyclist, and transit needs based on specific development design principles and engineering judgment.

Street standards apply to new developments within the City of Fort Worth as well as within its ETJ. The following criteria are used to identify the appropriate street standard:

Urban Standards apply to all streets that are:

- Within the City;
- Within subdivisions in the ETJ with individual lots less than one acre (net); and
- May apply to any subdivision in the ETJ.

Rural (ETJ) Standards apply to streets that are:

- Within the ETJ; and
- Within subdivisions in the City with individual lots that are equal to or greater than one acre (net) and fronted by lots with a minimum of 200' frontage.

Cross sections are presented in Figures 6 through 13 for Urban and Rural (ETJ) Street Standards. They are summarized in Tables II and III.

Since drainage for rural (ETJ) streets will be “surface drainage”, additional drainage easements may be necessary based on engineering and hydraulic studies required in existing City standards. Typical shoulder and parkway cross sections for arterial and industrial streets and for residential streets are presented in Figure 14.

Pavement Cross Sections

In order to provide consistency in the construction of pavement cross sections, standards have been adopted for new streets in the City and in the ETJ. All street pavements shall be designed and constructed to the same standards regardless of whether the street is public or private. The consistent design, construction, and inspection of rural streets will not only better serve the public in the ETJ, but also citizens of the City of Fort Worth when these areas are annexed.

Pavement cross sections for each classification of street are summarized in Table IV.

Policy on Context Sensitive Solutions for Street Design (CSS)

See Appendix B for the CSS Policy and its Alternative Design Guidelines.

Three-lane Design Alternative for Major Collector and Minor Arterial Streets

The feasibility of constructing urban major collector and minor arterial streets with a three-lane cross section should be considered on a case-by-case basis. A number of factors should be considered before this type of cross-section is used. Some of the factors include roadway function and access control; total traffic volume; turning volumes and 85 percent speed; accident type and patterns; pedestrian and bike activity; and right-of-way availability and costs.

Advantages that have been noted when using a three lane cross section with two way left turn lane (TWLTL) in place of an undivided four-lane are improved vehicular safety, improved pedestrian safety, traffic calming, more efficient use of signalization, and the relatively inexpensive cost of the conversion. Disadvantages include increased travel delay, problems caused by frequent-stop and/or slow moving vehicles, increased delays

for entering vehicles at driveways, decreased average speed, and eliminated opportunities for passing other vehicles.

Three lane cross sections work best in situations where traffic volumes are moderate and where the proportion of vehicles turning left is high (25% turning volumes). The use of TWLTLs is discouraged in rural areas, where their use in high speed, low volume roadways can lead to an increase in head-on crashes. They should be avoided in urban areas where the design year traffic is expected to exceed 17,000 AADT. TWLTLs are best used in situations where driveway density is low to moderate, which equates to a spacing of about 300 feet between driveways. They may be considered in multifamily residential areas or mixed land use areas, especially on urban minor arterials and collectors. The three-lane cross section is shown in Figure 5.

The wide outside lanes in the proposed design are meant to safely accommodate mixed vehicular (including buses, where applicable) and bicycle traffic. Dedicated bike lanes (in lieu of the wide outside lanes) are also an alternative if the street is designated as a bike route.

The Transportation/Public Works Department will consider the three-lane design alternative on a case-by-case basis for major collector and minor arterial streets. TPW considers the three-lane alternative most appropriate in cases of back-loading subdivision border streets and in areas where there driveway spacing is moderate, as defined in the previous paragraph. The other factors listed below will also be taken into consideration.

In summary, transportation professionals should consider the three lane cross section as a possible alternative design, keeping in mind the following factors:

- Roadway function and environment
- Overall traffic volume and Level of Service
- Turning volumes and patterns
- Frequent-stop and/or slow-moving vehicles (busses, other transit modes)
- Weaving, speed and queues
- Crash types and patterns
- Pedestrian and bicycle activity
- Right-of-way availability, cost, and acquisition impacts
- Effects on parallel roadways
- Driveway density
- Tandem Parallel Parking*

*Tandem parking is a feature that allows for greater ease of parallel parking on narrow, busy streets, while reducing the impact to through moving traffic. Standard parking spaces are 8' X 22'. However with the tandem parking, the parking spaces will be separated by a 6' long, stamped patterned asphalt/concrete pad. This padded area will be taken partially from the two- (2) adjoining parking spaces, in effect reducing the parking spaces to 20'. The padded areas will act as "rideable" buffers for vehicles to park in-between, and at the same time allow for easier maneuvering into and out of a parking space. For example, because of the added room created by the 6' buffer, cars wanting to park in-between two parked cars need only to pull forward into the parking space, without having to move forward off the space and reverse into the parking space. The buffers to the front and rear of the parking spaces allow for maneuvering while out of the travel lane. It also allows for easy exiting of the space, having room to back-up and pull out without hitting a parked vehicle. In areas where walkability is more important the use of bulbouts between (min. of two) spaces is encouraged.

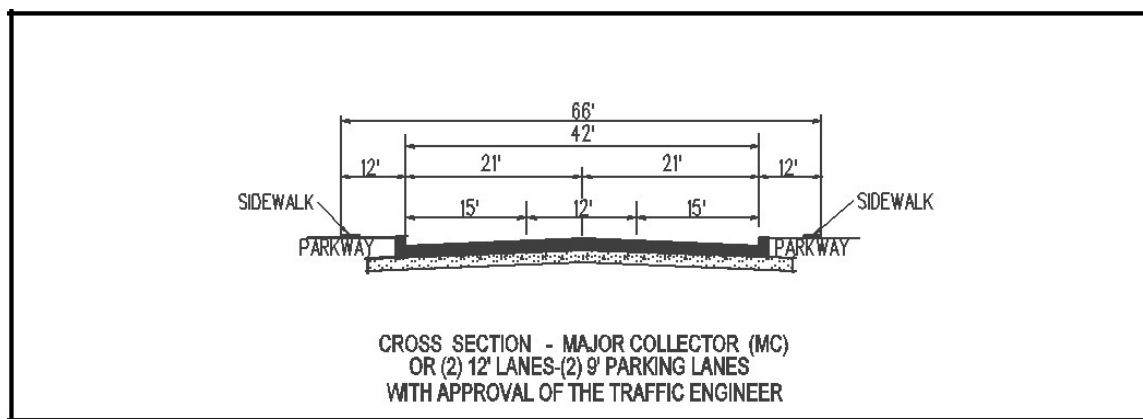
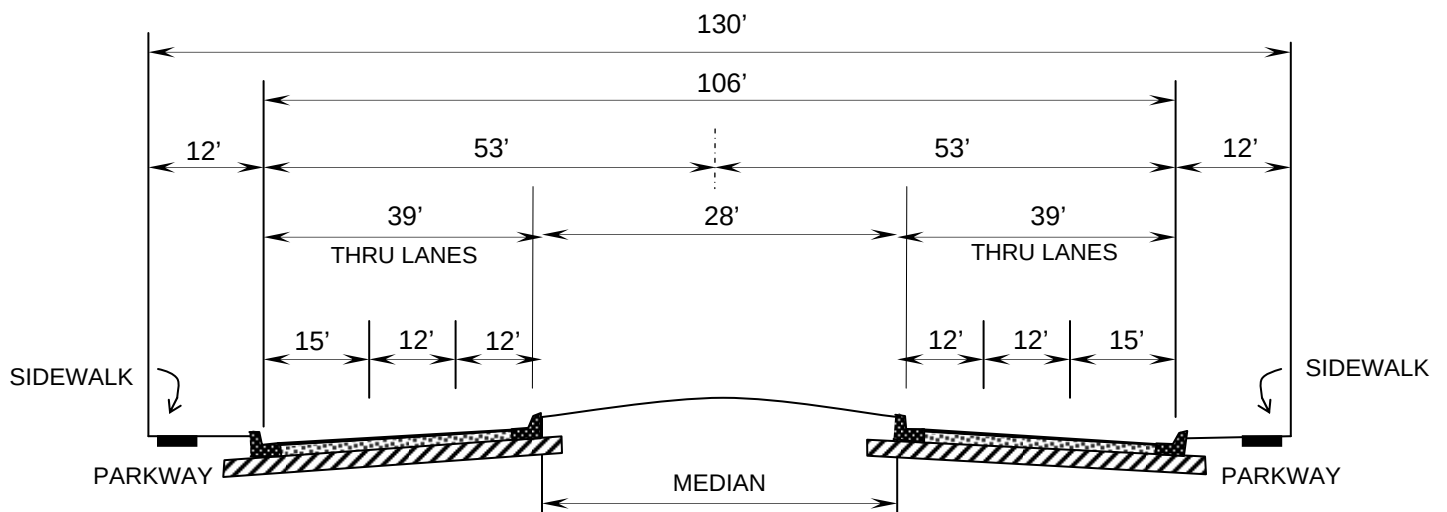


Figure 5 - Three Lane Major Collector/Minor Arterial Cross Section



CROSS SECTION – PRINCIPAL ARTERIAL (P6D)

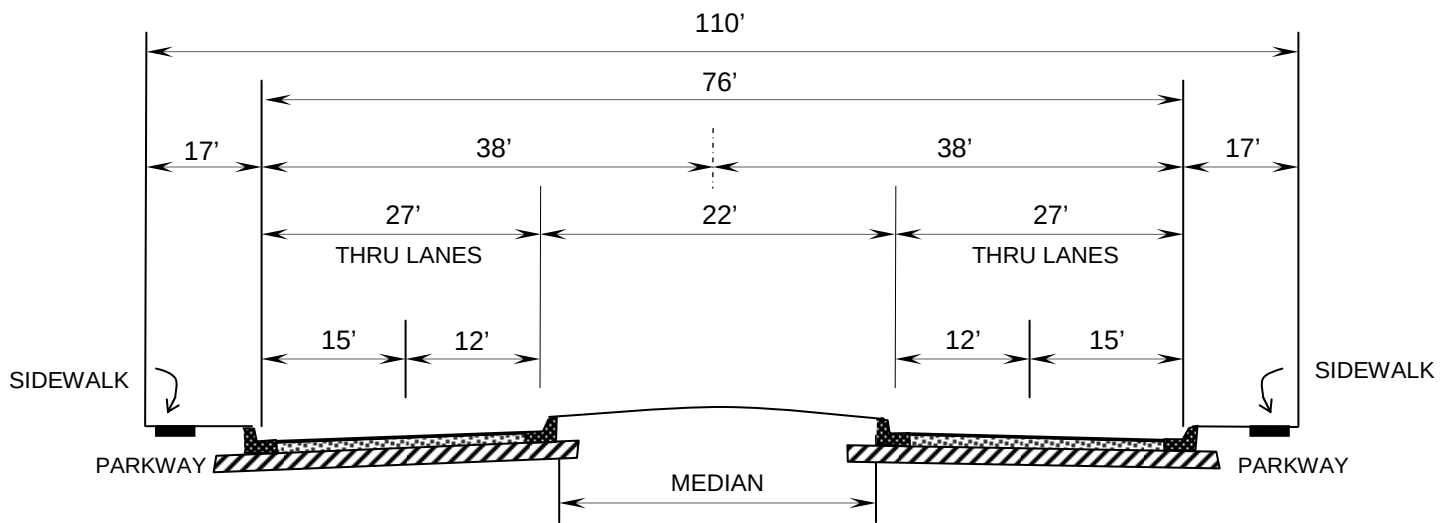
CITY OF FORT WORTH STREET STANDARDS

**URBAN DESIGN
STANDARDS**

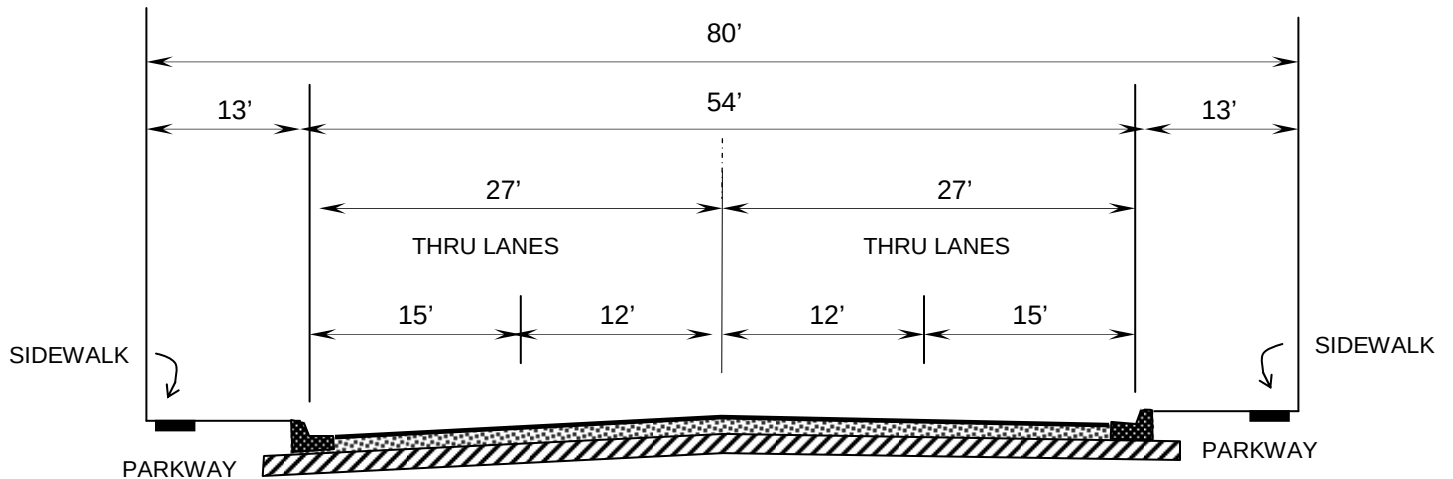
PRINCIPAL ARTERIALS

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Sheet No.
FIGURE 6



CROSS SECTION - MAJOR ARTERIAL (MA4D)



CROSS SECTION - MINOR ARTERIAL (M4U)

Alternative 3-lane Minor Arterial cross section is shown in Figure 5 on page 16.

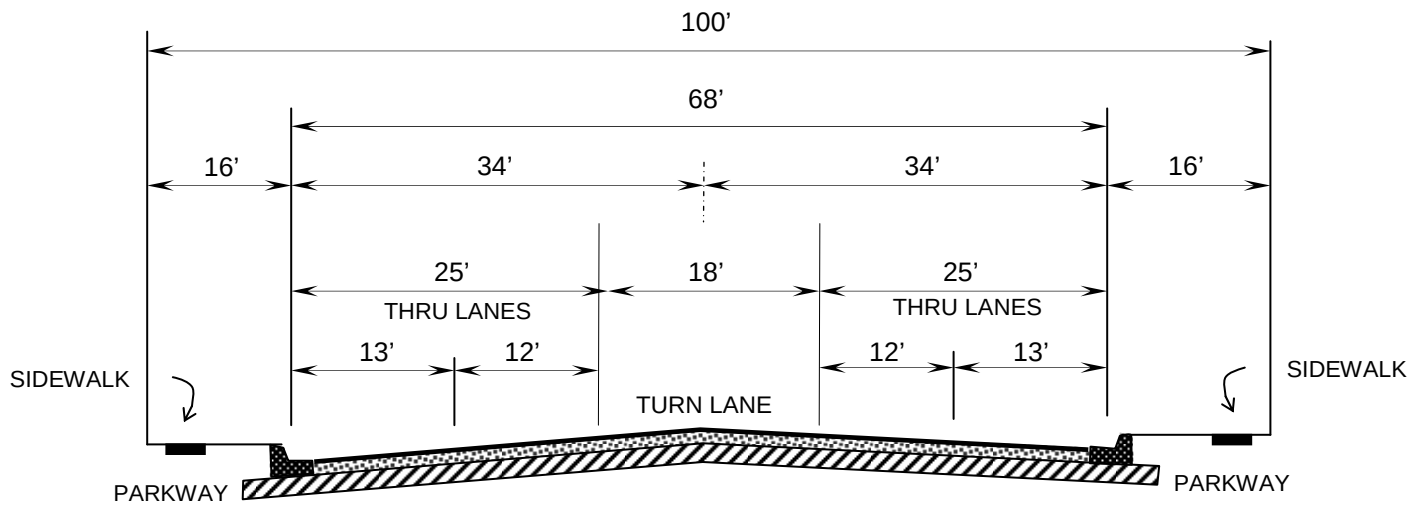
CITY OF FORT WORTH STREET STANDARDS

**URBAN DESIGN
STANDARDS**

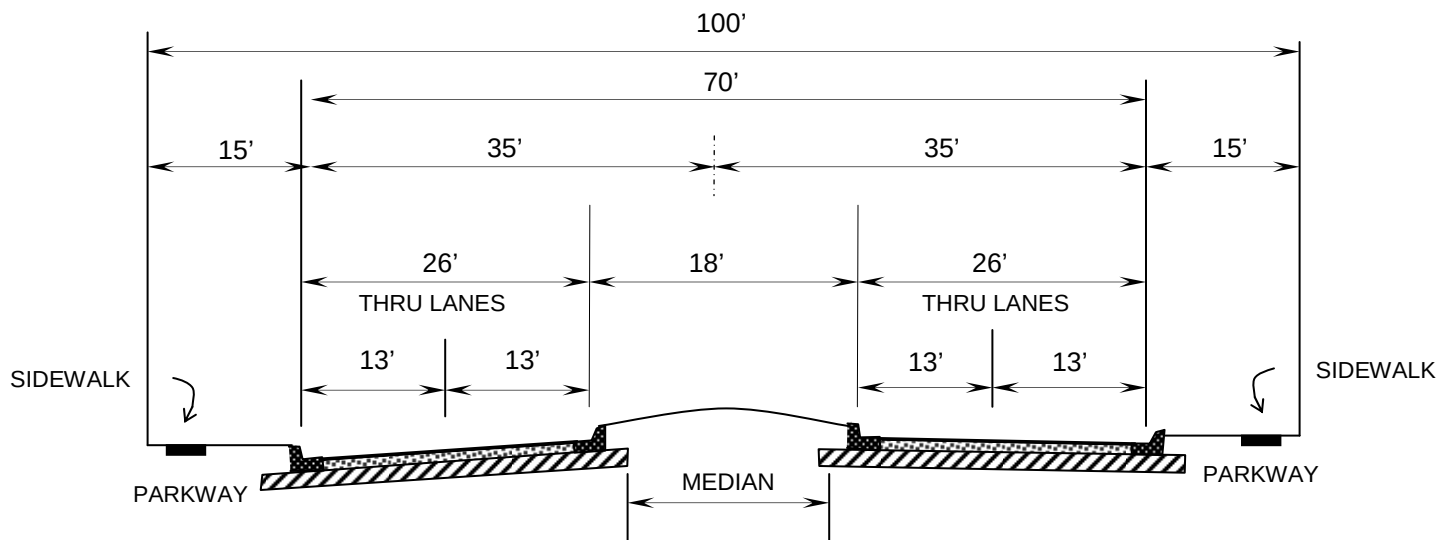
**MAJOR ARTERIALS
MINOR ARTERIALS**

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7/16/2008

Sheet No.
FIGURE 7



CROSS SECTION – INDUSTRIAL STREET (I5U)



CROSS SECTION – INDUSTRIAL STREET (I4D)

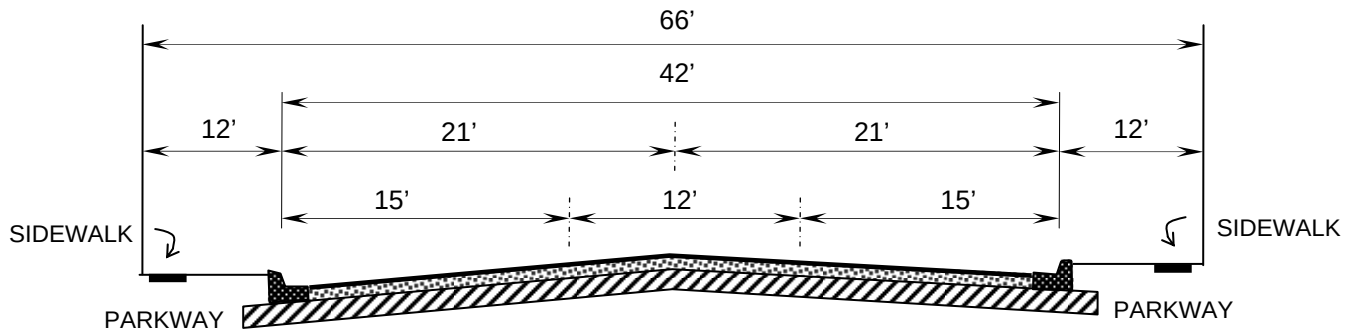
CITY OF FORT WORTH STREET STANDARDS

**URBAN DESIGN
STANDARDS**

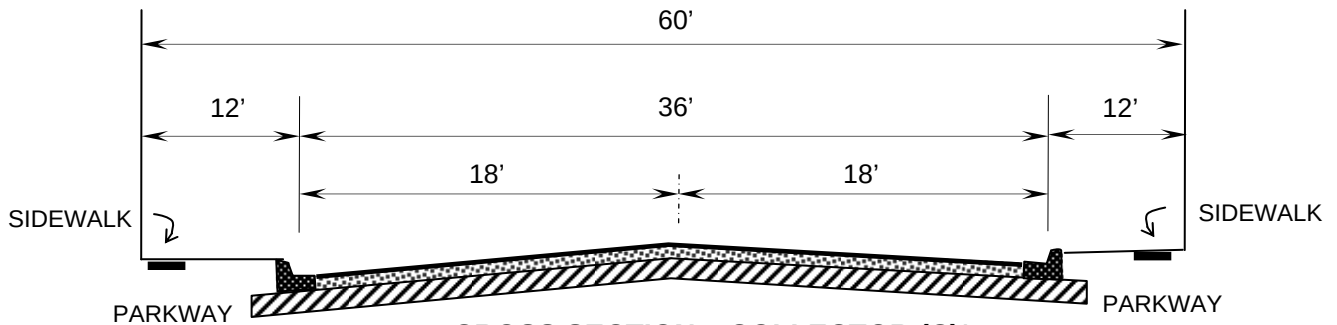
INDUSTRIAL STREETS

Date
6/3/2008

Sheet No.
FIGURE 8

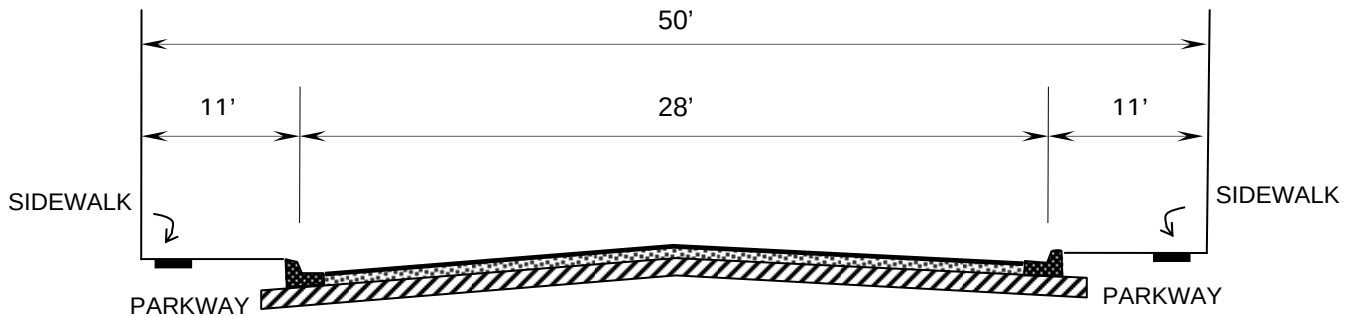


CROSS SECTION – MAJOR COLLECTOR (MC) – 3-LANE

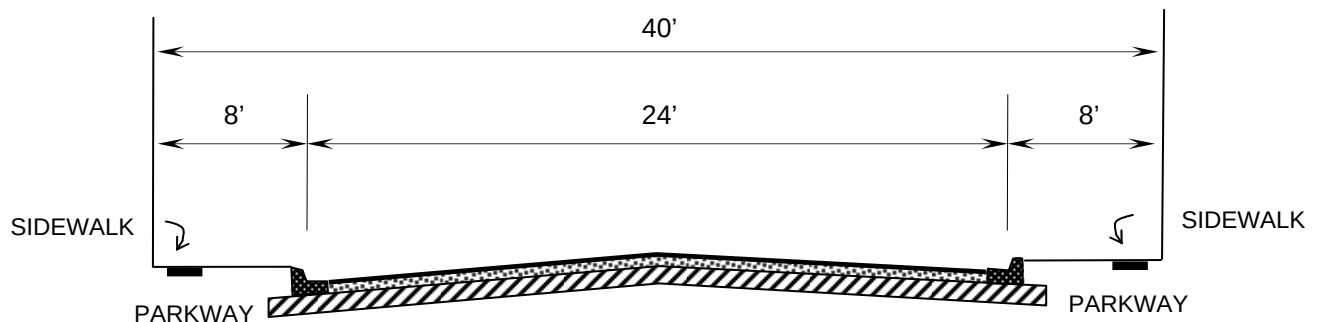


CROSS SECTION – COLLECTOR (C)*

* In H, MU-1 and MU-2 zoning districts, a 32-foot roadway width is allowed for collector streets when adequate off-street parking is provided.



CROSS SECTION – LOCAL STREET (L)



CROSS SECTION – LIMITED LOCAL (LL)

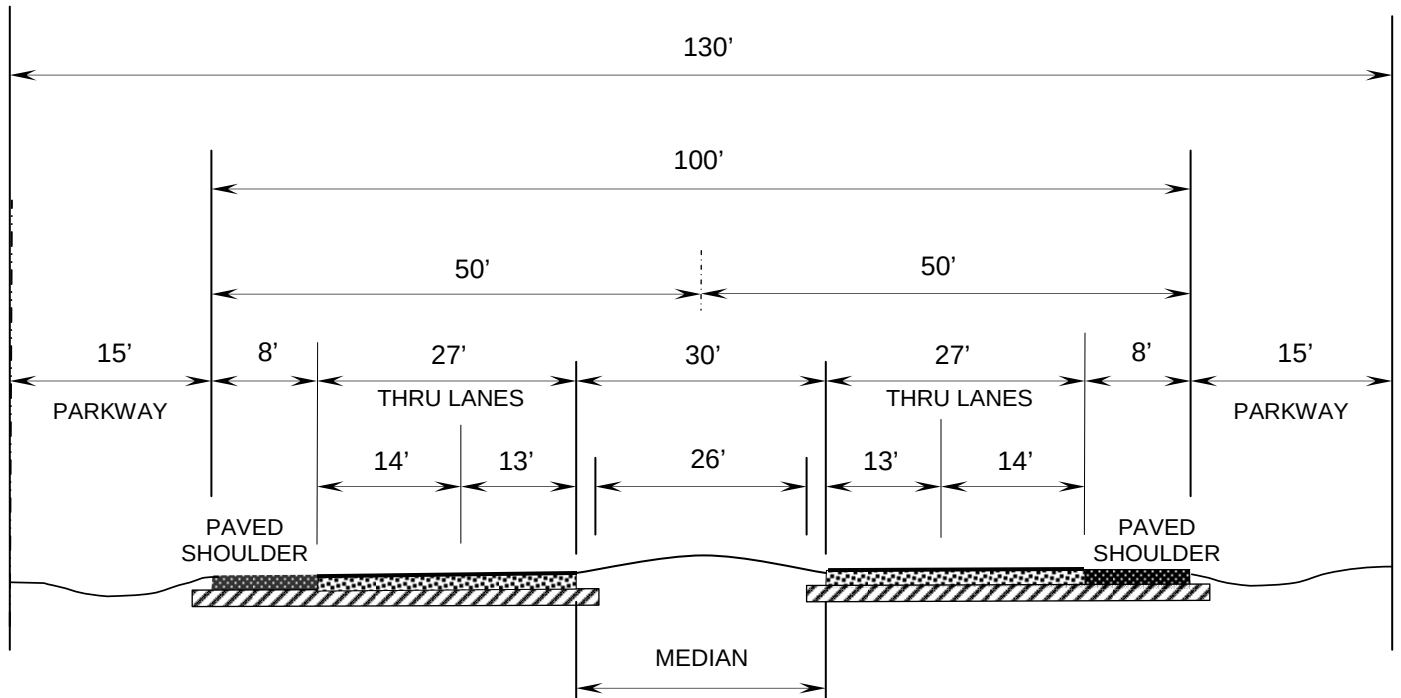
CITY OF FORT WORTH STREET STANDARDS

**URBAN DESIGN
STANDARDS**

COLLECTOR AND LOCAL STREETS

Date
6/3/2008

Sheet No.
FIGURE 9



CROSS SECTION – PRINCIPAL ARTERIAL (P4DA)

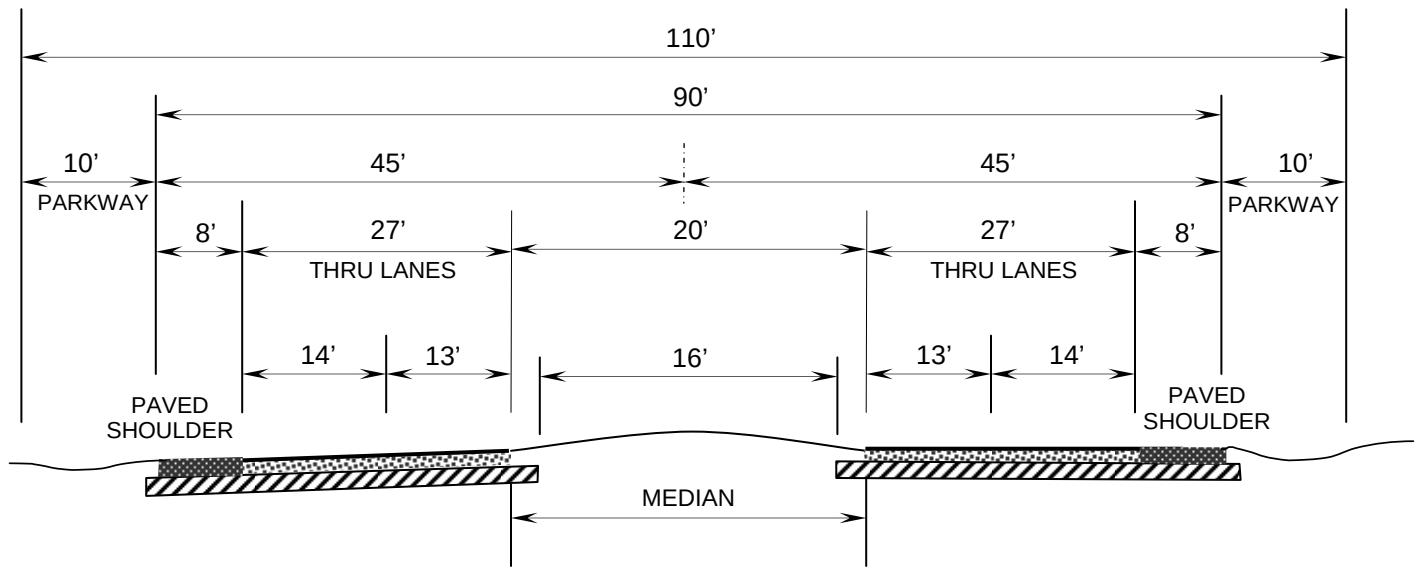
CITY OF FORT WORTH STREET STANDARDS

**RURAL (ETJ)
DESIGN STANDARDS**

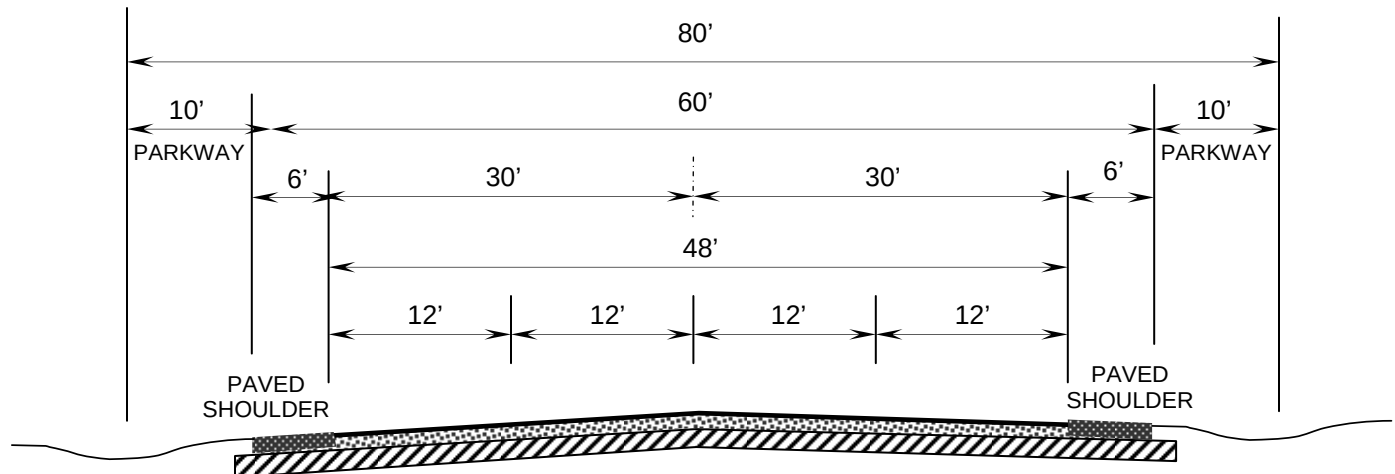
PRINCIPAL ARTERIALS

Date
6/3/2008

Sheet No.
FIGURE 10



CROSS SECTION – MAJOR ARTERIAL (MA4DA)



CROSS SECTION – MINOR ARTERIAL (M4A)

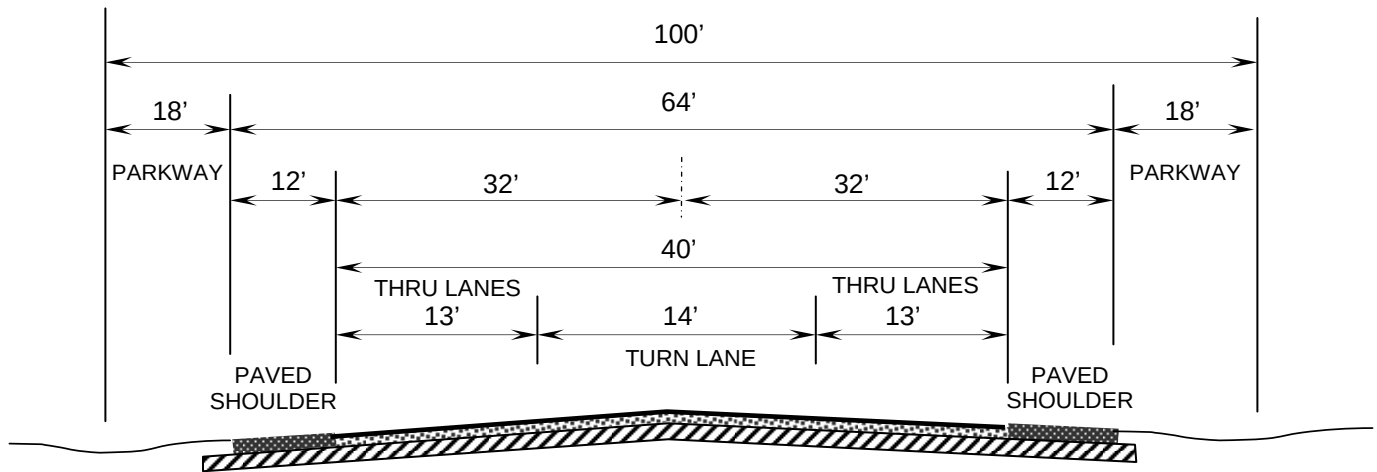
CITY OF FORT WORTH STREET STANDARDS

**RURAL (ETJ)
DESIGN STANDARDS**

MAJOR AND MINOR ARTERIALS

Date
6/3/2008

Sheet No.
FIGURE 11



CROSS SECTION – INDUSTRIAL STREET (I3A)

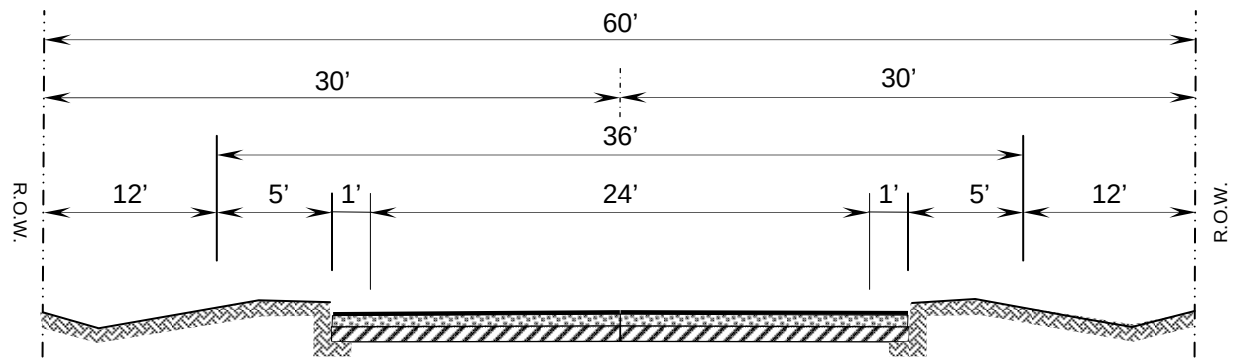
CITY OF FORT WORTH STREET STANDARDS

**RURAL (ETJ)
DESIGN STANDARDS**

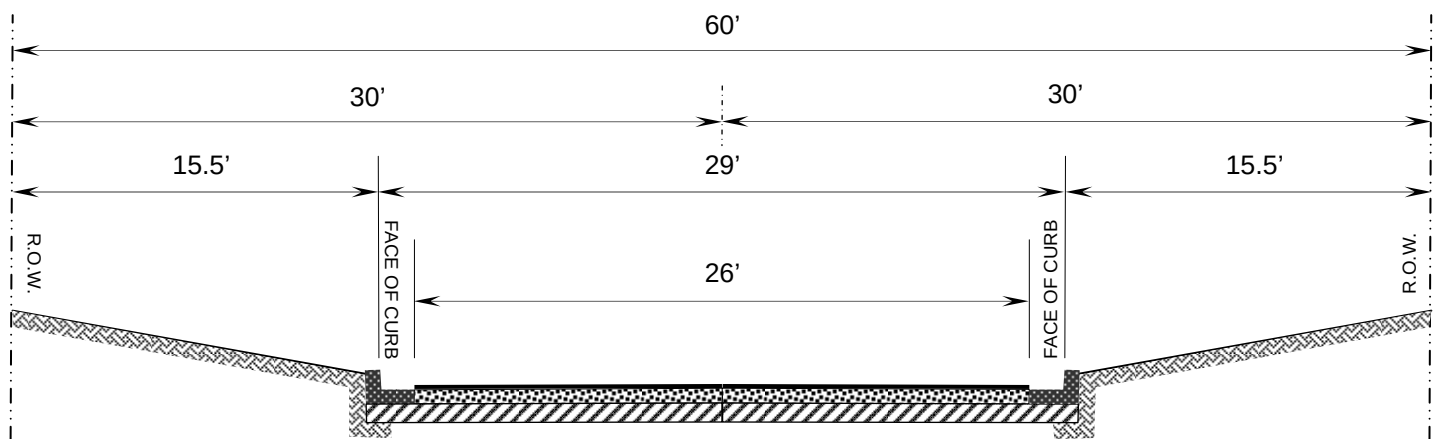
INDUSTRIAL STREETS

Date
6/3/2008

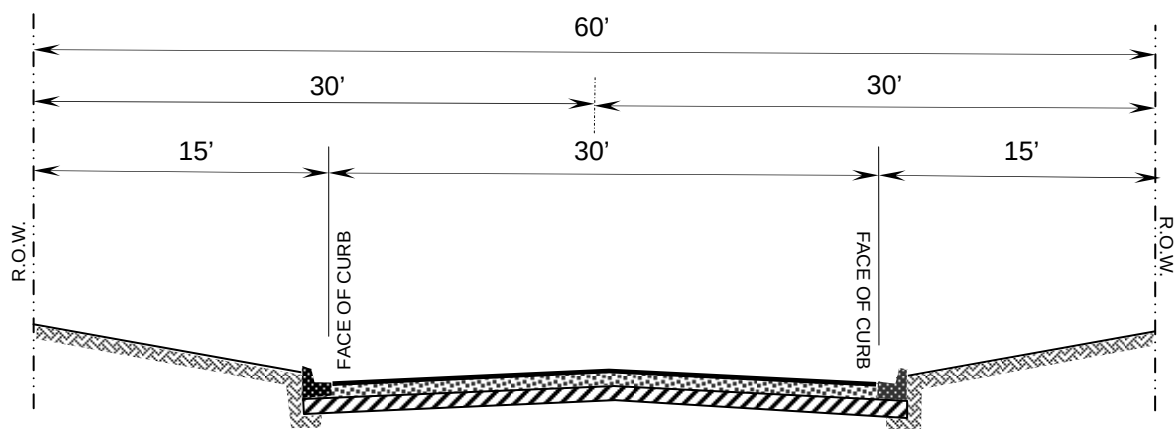
Sheet No.
FIGURE 12



CROSS SECTION - LOCAL - OPTION "A"



CROSS SECTION - LOCAL - OPTION "B"



CROSS SECTION - LOCAL - OPTION "C"

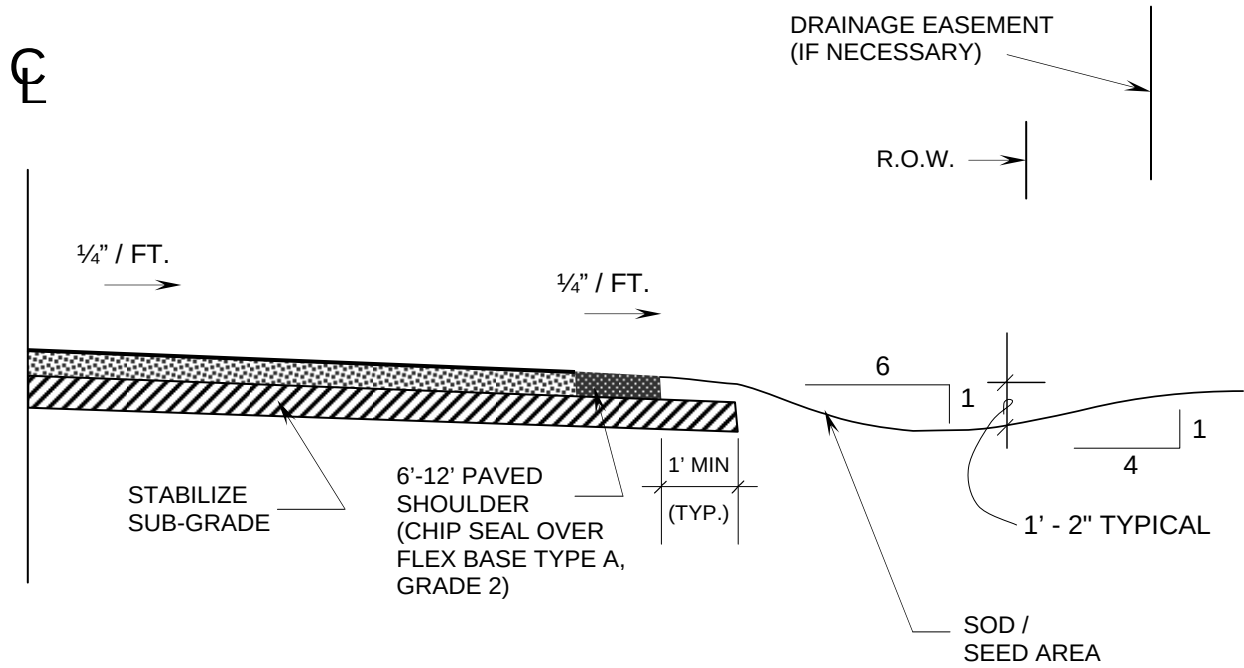
CITY OF FORT WORTH STREET STANDARDS

**RURAL (ETJ)
DESIGN STANDARDS**

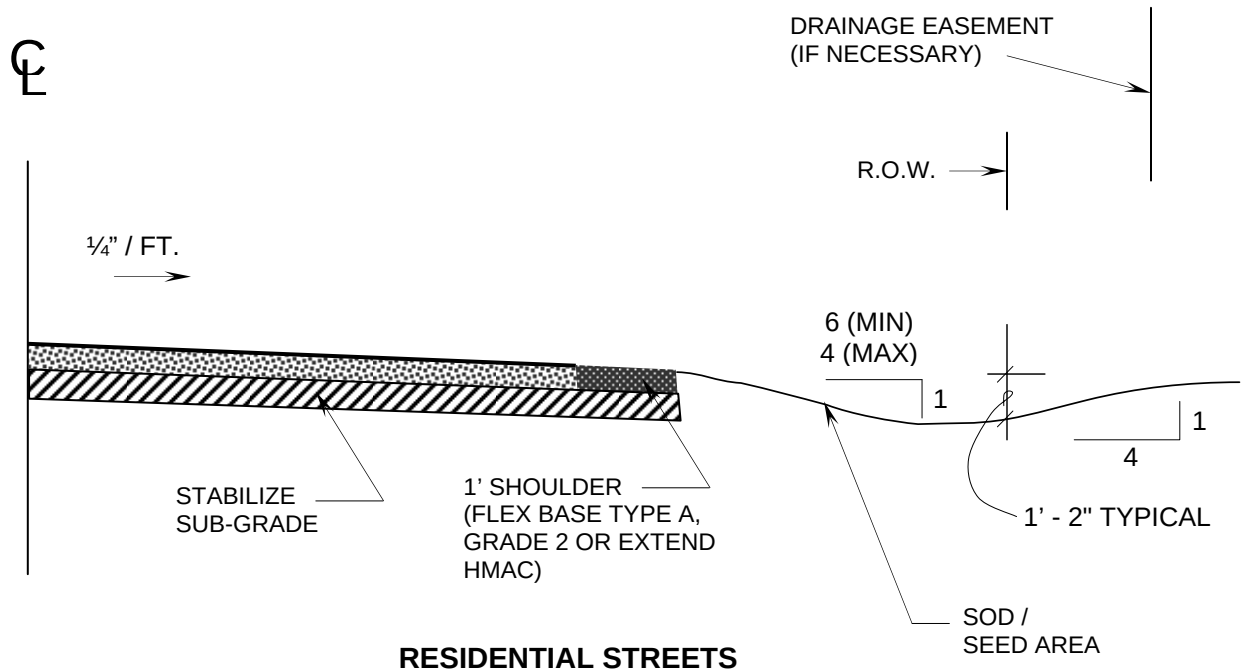
LOCAL STREETS

Date
6/3/2008

Sheet No.
FIGURE 13



ARTERIAL AND INDUSTRIAL STREETS



RESIDENTIAL STREETS

CITY OF FORT WORTH STREET STANDARDS

**RURAL (ETJ)
STREETS**

SLIDE SLOPES

Date

6/3/2008

Sheet No.

FIGURE 14

Table II
URBAN DESIGN STANDARDS

Street Classification	Designation	Minimum Right-of-Way Widths	Minimum Roadway Widths	No. of Travel Lanes and Widths	Left Turn Lanes at Arterial	Median Widths (Center Lane)	Parkway Widths
Principal Arterials	P6D	130'	2-39'	6 Lanes – 4 @ 12', 2 @ 15'	2	28'	2@12'
Major Arterials	MA4D	110'	2-27'	4 Lanes – 2-12' & 2-15'	2	22'	2@17'
Minor Arterials	M4U *	80'	2-27'	4 Lanes- 2-12' & 2-15'	1	None	2@13'
Industrial Streets	I 5U	100'	2-25'	4 Lanes – 2-12' & 2-13'	1	None	2@16'
	I 4D	100'	2-26'	4 Lanes – 4-13'	1	18'	2@15'
Collector Streets	MC * (1)	66'	42'	3 Lanes – 2-15' & 1-12'	-	None	2@12'
	C * (2)	60'	36'	-	-	None	2@12'
Local Streets	L	50'	28'	-	-	None	2@11'
	LL	40'	24'	-	-	None	2@8'

Notes:

1. Sidewalks required on both sides of all streets.
2. On-street parking is discouraged on arterial and industrial streets, except as allowed under the Context Sensitive Solutions policy.
3. * (1): MC design may be considered for primary collector or minor arterial streets, as described in the three-lane design alternative section of this document (p. 10).
4. * (2): In "H", MU-1 and MU-2 zoning districts, a 32 foot roadway width is allowed for collector streets when adequate off-street parking is provided.

Table III

RURAL (ETJ) DESIGN STANDARDS

Street Classification	Designation	Minimum Right-of-Way	Minimum Roadway Widths	No. of Lanes and Widths	Shoulder Widths	Median Widths	Parkway Widths
Principal Arterials	P4DA	130'	2-27'	4 Lanes 2-13' & 2-14'	2@8'	30'	2@15'
Major Arterials	MA4DA	110'	2-27'	4 Lanes 2-13' & 2-14'	2@8'	20'	2@10'
Minor Arterial	M4A	80'	48'	4 Lanes 4-12'	2@6'	None	2@10'
Industrial Streets	I 3A	100'	40'	2 Lanes 2-13'	2@12'	14'	2@18'
Local Streets (Options)	LA-A	60'	24'	-	2@6'	None	2@12'
	LA-B	60'	30' (FC-FC)	-	None	None	2@15'
	LA-C	60'	30' (FC-FC)	-	None	None	2@15'

Notes:

1. Additional drainage easements may be required based on drainage studies, to meet 5 and 100 year storms.
2. On-street parking is discouraged on all streets.

Table IV
MINIMUM PAVEMENT CROSS SECTIONS

	Street Classification	Construction Standard
URBAN STANDARDS	Principal Arterial and Industrial Streets	8" Reinforced concrete 6" Stabilized Subgrade
	Major and Minor Arterial Streets	7" Reinforced Concrete 6" Stabilized Subgrade
	Collector, Local, and Private Streets	6" Reinforced Concrete 6" Stabilized Subgrade
		6" H.M.A.C. 8" Stabilized Subgrade
RURAL (ETJ) STANDARDS	Principal Arterial and Industrial Street	2" H.M.A.C 6" Compacted Flex Base (Type A, Grade 2) 6" Stabilized Subgrade
		6" Reinforced Concrete 8" Stabilized Subgrade
	Major and Minor Arterial Street	2" H.M.A.C. 6" Compacted Flex Base (Type A, Grade 2) 6" Stabilized Subgrade
	Collector, Local, and Private Street	
		6" Reinforced Concrete 6" Stabilized Subgrade

V. MASTER THOROUGHFARE PLAN

The *Master Thoroughfare Plan* was developed based on the following criteria:

- “City of Fort Worth Comprehensive Plan”;
- Street functional classifications (discussed in Chapter II)
- Future traffic capacity needs;
- Adequate parkways for utilities, sidewalks, landscaping, etc.;
- Environmental issues (floodplain, drainage, topographic features, etc.);
- Safe utilization by pedestrians, bicyclists, buses, motorists, and truck traffic;
- Existing and planned neighborhoods;
- Existing roadways and railroads;
- Construction feasibility;
- Anticipated land uses within the City and the ETJ; and
- Coordination with NCTCOG’s “Regional Transportation Plan” and with the plans of adjacent cities and counties.

The *Master Thoroughfare Plan* map identifies existing and future roadways for the City and its ETJ consistent with the above criteria. It is recognized that classifications and/or locations of arterials may change based on future conditions. A formal process is used for these changes. In areas, particularly in the ETJ, where the streets are not in place, the proposed street alignments reflect corridors and not exact locations. Wherever possible, existing county roads are used as one side of divided roadways. The MTP map is available for viewing on the City of Fort Worth’s Web site under the Transportation and Public Works Department.

The exact alignment and geometric design of future freeways and tollways will be determined through a comprehensive corridor study that will be conducted by the Texas Department of Transportation (TxDOT) and/or the North Texas Tollway Authority (NTTA). Those studies, conducted at a time closer to when funding might be available, must evaluate various alternative alignments, while considering future social, economic, environmental, and engineering aspects of the project. Modifications to the proposed alignments of these facilities in the MTP may be required to reflect the specific alignments identified through these studies.

VI. PROCEDURES FOR CHANGES TO MASTER THOROUGHFARE PLAN

It is important that the transition between the existing and the proposed street standards with the *Master Thoroughfare Plan* be accomplished in an orderly fashion. The following procedures are planned:

- Final plats in the review process at time of adoption would normally comply with the standards existing at the time of preliminary plat approval;
- Preliminary and final plats on file, or filed prior to the implementation date, may comply with existing or new standards. City staff shall approve all technical and engineering transitions between existing streets and new streets;
- Preliminary and final plats filed after the implementation date shall conform to the new standards;
- The implementation date shall be sixty (60) days following approval of the “Street Standards” and the *Master Thoroughfare Plan* by the City Council; and

PROCEDURES FOR CHANGES TO MASTER THOROUGHFARE PLAN:

The following procedures will be used for changes to the *Master Thoroughfare Plan* (MTP):

(a) Property owners or land developers submit a land development plan through the Planning and Development Department:

- (1) The Transportation and Public Works Department makes a determination as to whether the thoroughfare plan alignment as shown on the land development plan is within 1000 feet in either direction of the alignment as shown on the *Master Thoroughfare Plan* (MTP).
- (2) A *Master Thoroughfare Plan* (MTP) Amendment is not required if the thoroughfare plan alignment as shown on the land development plan is within 1000 feet in either direction of the alignment shown on the City’s approved *Master Thoroughfare Plan* (MTP) and/or the thoroughfare plan alignment does not impact an adjacent property owner or parkland.
 - If the thoroughfare plan alignment impacts an adjacent property and the owner gives consent in writing to the City of Fort Worth to a change in the thoroughfare plan alignment within 1000 feet in either direction of the alignment as shown on the *Master Thoroughfare Plan* (MTP) that would directly impact his property, a *Master Thoroughfare Plan* (MTP) Amendment is not required.

- (3) A *Master Thoroughfare Plan* (MTP) Amendment is required if the thoroughfare plan alignment as shown on the land development plan lies beyond 1000 feet of the alignment as shown on the Master Thoroughfare Plan (MTP), or if parkland is affected.

(b) A *Master Thoroughfare Plan* (MTP) Amendment may be initiated by the City Council, City Plan Commission, or City staff by submitting the proposed amendment to the Planning and Development Department.

(c) Procedure for notification of a *Master Thoroughfare Plan* (MTP) Amendment:

- (1) The Planning and Development Department compiles staff reports from various City departments into a committee report that identifies that a *Master Thoroughfare Plan* (MTP) Amendment is required,
- (2) Notices of public hearing are mailed out to all property owners within 300 feet of the existing and/or proposed alignment to the thoroughfare plan and to the neighborhood associations,
- (3) The Planning and Development Department prepares a final report to the City Plan Commission,
- (4) If parkland is affected, then the proposed *Master Thoroughfare Plan* (MTP) Amendment must be considered by the Parks and Community Services Board prior to being heard by the City Plan Commission
- (5) The City Plan Commission holds a public hearing and makes a recommendation to the City Council for its final decision on the *Master Thoroughfare Plan* (MTP) Amendment,
- (6) Notices of public hearing are mailed out to all property owners within 300 feet of the existing and/or proposed alignment to the thoroughfare plan and to the neighborhood associations,
- (7) The City Council holds a public hearing on the City Plan Commission recommendation and makes a final decision on the *Master Thoroughfare Plan* (MTP) Amendment. If the City Council approves the request, the MTP is amended.

VARIANCES:

Variances may be requested where literal interpretations of these street sections would result in undue economic hardships. Traffic studies are often used to provide justification for traffic flow issues. If any questions arise as to the interpretation of design criteria, the Director of Transportation and Public Works will resolve all engineering issues and may approve engineering related variances. As identified in the City's Subdivision Ordinance, the Plan Commission would approve other variance requests.

LIST OF APPENDICES

- A. Traffic Impact Study (TIS) Guidelines**
- B. Context Sensitive Solutions Policy for Street Design**
- C. Multimodal Arterial Sample Cross Section Designs**

APPENDIX A

TRAFFIC IMPACT STUDY (TIS) GUIDELINES

Traffic Impact Study Guidelines

1. Purpose and Responsibilities for Traffic Studies

Traffic studies may be required by the City in order to adequately assess the impacts of a development proposal on the existing and/or planned street system. The primary responsibility for assessing the traffic impacts associated with a proposed development will rest with the developer, with the City serving in a review capacity.

Traffic Studies shall be prepared under the direction and supervision of a licensed professional engineer (P.E.) in the State of Texas, with experience in professional traffic and transportation engineering.

A Traffic Impact Study (TIS) is intended to adequately assess the traffic-related impacts of a zoning and/or development proposal on the existing and planned street and thoroughfare system. The purpose of this policy is to:

- Provide the safest and most efficient transportation system in conjunction with the development review process;
- Inform the applicant of the City's requirements and expectations;
- Provide standard guidelines for the preparation and review of a TIS; and
- Establish equitable mitigation measures for the accommodation of identified impacts.

2. Types of Traffic Studies

The Transportation and Public Works Department reserves the right to require a traffic study at anytime. In general, one of two types of traffic studies may be required as follows:

- A. Traffic Assessment Study (TAS). A TAS is required when more than 1,000 (or >100 in peak hour) but less than 5,000 daily vehicle trips are anticipated to be generated by the development or when certain intersections may have a capacity or safety problem.
- B. Traffic Impact Study (TIS). A TIS is required when 5,000 or more daily vehicle trips are anticipated to be generated by the development or if the development is anticipated to cause severe impacts on either the roadway system, nearby neighborhoods, collector streets, or internal neighborhood circulation and connectivity.
 - i. For certain projects the City may require an enlarged study area. Land uses in the Study Area should include recently approved or pending development adjacent to site.
 - ii. Depending upon specific site development characteristics, the following analyses may also be required as part of the TIS; accident analysis, sight distance survey, traffic simulation, queuing analysis, turn lane analysis, and/or traffic signal warrant study.

CRITERIA FOR STUDY REQUIREMENTS			
Category	Characteristic	Analysis Periods	Minimum Study Area
TAS	≥ 500 vpd, but < 5000 vpd	Existing Year	All Site Access Driveways & Streets
		Opening Year	All Signalized Intersections and/or Major Unsignalized Intersections within ½ Mile of Boundary
		Each Phase (if applicable)	“ “
		Build-out	“ “
TIS	≥ 5000 vpd	Same as Above	Same as Above, but within 1 Mile of Site Boundary

Based upon the project size, development intensity, land use mix, and estimated traffic generation, TPW shall advise the applicant/developer as to the type and detail level of traffic study required at the time a Pre-development Conference is held. In general, traffic studies shall be prepared using trip generation calculations from the most recent version of the Institute of Transportation Engineer's (ITE) *'Trip Generation Manual'*.

Transportation consultants are required to discuss the study's approach with the City prior to starting the study. At a minimum, studies will include trip generation, directional distribution of traffic, trip assignment, definition of the study area, intersections requiring critical lane analysis, and methods for projecting build-out volumes. This will provide a firm base of cooperation and communication between the City, the owner or developer and the project's consultants in forecasting future traffic characteristics that realistically define traffic movement associated with the proposed development. Specific requirements will vary depending on the site location.

3. Traffic Study Definitions

- Accident Analysis – a summary of the accident history on adjacent roadways during a specified time period. Such analyses typically include measures to mitigate the impact of site traffic on safety based on accident history and associated information.
- Capacity – the maximum number of vehicles which can pass a given point during one hour under prevailing roadway and traffic conditions.
- Level of Service (LOS) – a qualitative measure of traffic operating conditions based on such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Level of Service analyses conducted as part of a TIS shall be determined using procedures of the latest edition of the Highway Capacity Manual.
- Modal Split – the percentage of people using a certain means of transport: auto, transit, and walk.
- Queuing Analysis – an analysis of vehicle stacking and required lane storage necessary to mitigate excessive vehicle queues. Typically performed for drive-through facilities, drop-off zones to schools and daycare facilities, entrance gates, turn lanes and median breaks.

- Sight Distance Survey – a survey of the available horizontal and vertical sight distance at access points to a site, intersection or roadway section. Such study must include measures to eliminate any resulting safety hazard.
- Signal Cycle – the time period required for one complete sequence of traffic signal indications.
- Signal Phase – a part of the signal cycle allocated to a traffic movement or any combination of traffic movements.
- TIS Analysis Period – time periods for traffic assessment as part of a TIS submittal.
- Traffic Control Device – any sign, signal, marking, or device placed or erected for the purpose of regulating, warning, or guiding vehicular traffic and/or pedestrians.
- Traffic Impact Study – a study that provides information to: 1) Determine whether or not the existing and planned thoroughfare system can accommodate the traffic to be generated by a proposed development; and 2) Evaluate the appropriate traffic mitigation measures if the thoroughfare system cannot accommodate the impact.
- Traffic Simulation – the use of a computer model to provide detailed analysis of the interaction between traffic, roadway geometry, and traffic control devices.
- Trip Generation – the number of one-way traffic movements associated with such variables as building size, type of dwelling unit, employees, land area, etc.
- Turn Lane Analysis – an analysis of storage requirements for driveways or nearby intersections based on existing and future roadway volumes.
- Vehicle Trip – a one-way movement of a vehicle between two points.
- Volume/Capacity Ratio (V/C) – the ratio of an actual volume to the capacity of a roadway.

4. Traffic Study Standards

It is the objective of the City to determine whether the existing and planned thoroughfare system can accommodate the impact of the proposed development. To achieve uniformity in the evaluation process, the following standards shall apply:

A. Design Level of Service (LOS)

The target LOS within the City shall be LOS “D” in the peak hour in build out year for all critical movements and links. All development impacts on both thoroughfare and intersection operations must be measured against this standard.

B. Trip Generation Resources

The City’s standard for trip generation rates for various land use categories shall be those found in the latest edition of Trip Generation published by the Institute of Transportation Engineers (ITE) or other published or recognized sources applicable to the region. Alternate trip generation rates may be accepted on a case-by-case basis if the applicant can provide current supporting data substantiating that their development

significantly differs from the ITE rates. The Transportation and Public Works Department (TPW), in advance of the traffic study submission, must approve alternative trip generation rates in writing.

Trip reductions for pass-by trips and internal capture rate for mixed-use developments will be permitted, subject to analytical support provided by the applicant and approval by the Transportation and Public Works Department.

5. Traffic Study Methodology

The TAS/TIS for zoning and development applications shall comply with the following methodology:

- A. Site Location / Study Area – a brief description of the size, general features, and location of the site, including a map of the site in relation to the study area and surrounding vicinity;
- B. Existing Zoning – a description of the existing zoning for the site and adjacent property, including land area by zoning classification and density by FAR, square footage, number of hotel rooms, and dwelling units (as appropriate);
- C. Existing Development – a description of any existing development on the site and adjacent to the site and how it would be affected by the development proposal;
- D. Proposed Zoning / Site Development – a description of the proposed zoning/development for the site, including land area by zoning classification and density by FAR, square footage, number of hotel rooms, and dwelling units (as appropriate); identify other adjacent land uses that have similar peaking characteristics as the proposed land use; identify recently approved or pending land uses within the area;
- E. Thoroughfare System – a description and map of existing, planned or proposed thoroughfares and traffic signals for horizon year(s) within the study area;
- F. Existing Traffic Volumes – recent traffic counts for existing thoroughfares and major intersections within the study area;
- G. Projected Traffic Volumes – horizon year(s) background traffic projections for the planned thoroughfare system within the study area;
- H. Existing Site Trip Generation – a table displaying trip generation rates and total trips generated by land use category for the AM and PM peak hours and on a daily basis, assuming full development and occupancy based on existing zoning (if applicable), and including all appropriate trip reductions (as approved by Staff);
- I. Proposed Site Trip Generation – a table displaying trip generation rates and total generated by land use category for the AM and PM (or PM/Saturday for retail) peak hours and on a daily basis, assuming full development and occupancy for the proposed development, and including all appropriate trip reductions (as approved by Staff);
- J. Trip Distribution and Traffic Assignment – tables and figures of trips generated by the proposed development (or net change in trips, if applicable) added to the existing and projected volumes, as appropriate, with distribution and assignment assumptions (unless computer modeling has been performed);

- K. Level of Service Evaluations – capacity analyses for weekday AM and PM peak hours of the roadway (and peak hour of the site, if different from the roadway) for both existing conditions and horizon (build out plus five years) year projections for intersections, thoroughfare links, median openings and turn lanes associated with the site, as applicable;
- L. Traffic Signal Evaluations – the need for new signals based on warrants and the impact on transportation system performance;
- M. Evaluations of Proposed / Necessary Mitigation – capacity analyses for weekday AM and PM peak hours of the roadway (and peak hour of the site if different from the roadway) for intersections, thoroughfare links, median openings and turn lanes associated with the site under proposed/necessary traffic mitigation measures;
- N. Conclusions – identification of all thoroughfares, driveways, intersections, and individual movements that exceed LOS D or degrade by one or more LOS, the percentage of roadway volume produced by the proposed development, and any operational problems likely to occur;
- O. Recommendations – proposed impact mitigation measures consistent with Section 6.0 – Mitigation;
- P. Residential subdivisions – discussion of how street layout and block lengths promote safe speeds and operations within the development. If a waiver is required for long block length, a description of mitigating improvements (e.g., traffic calming, street connectivity, etc.) to be built by the developer must be included;
- Q. School sites – If an elementary, middle, or high school(s) is within or adjacent to the development, a description of vehicular and pedestrian traffic control measures and anticipated pedestrian connection needs;
- R. Pedestrian and bicycle connectivity – discussion of expected pedestrian and bicycle routes within the development and connecting to surrounding streets, including mitigation to ensure pedestrian and bicyclist safety;
- S. Other Transportation Modes – discussion of the availability of other modes of transportation within and adjacent to the development which the public may use as an alternative to automobiles; and
- T. All raw traffic count data (including average daily volumes and peak hour turning movements) and analysis worksheets must be provided in the appendices of the report. Computer programs and the associated printouts may be used as part of the report.

6. Mitigation

Mitigation of impacts shall be required if the proposed development would cause a facility or traffic movement to fall below LOS D. If mitigation is required, the applicant must only mitigate the impact of the proposed development based on rough proportionality, and would not be responsible for alleviating any deficiencies in the street and thoroughfare system that may occur without the proposed development. Acceptable mitigation measures shall include:

- A. Phasing of development in order to relate site development to the construction of the required thoroughfare system;
- B. On-site improvements, including access controls and site circulation adjustments; and

- C. Off-site improvements, including the provision of right-of-way and/or the participation in funding for needed thoroughfare and intersection improvement projects.

7. Traffic Study Report Format

The various sections of the report should be categorized according to the subject areas below:

Executive Summary

- I. Introduction
 - A. Purpose
 - B. Methodology
- II. Existing and Proposed Land Use
 - A. Site Location / Study Area
 - B. Existing Zoning
 - C. Existing Development
 - D. Proposed Zoning (if applicable)
 - E. Proposed Development
- III. Existing and Proposed Transportation System
 - A. Thoroughfare System
 - B. Other Transportation Facilities (bike routes, pedestrian connections, transit routes, etc.)
 - C. Existing Traffic Volumes
 - D. Projected Traffic Volumes
- IV. Site Traffic Characteristics
 - A. Existing Site Trip Generation (if applicable)
 - B. Proposed Site Trip Generation
 - C. Net Change in Trip Generation (if applicable)
 - D. Trip Distribution and Traffic Assignment
- V. Traffic Analysis
 - A. Level of Service Evaluations
 - B. Traffic Signal Evaluations
- VI. Traffic Mitigation
- VII. Conclusions
- VIII. Recommendations

APPENDICES

8. Submission of Traffic Studies

The final Traffic Study shall be submitted by the developer/applicant to the Planning and Development Department at the time the plan or plat is submitted for review and approval. Four (4) copies of the full report and fifteen (15) copies of the 'Executive Summary Report' shall be transmitted. The Planning and Development Department shall promptly transmit three (3) copies of the full report to TPW for review, report, and recommendations to the Plan Commission and place one full copy in the permanent case file. One copy of TPW's

review copy shall be returned to the developer/applicant with any remarks or issues duly noted no later than at the time of Development Review Committee (DRC) with the developer/applicant. The Planning and Development Department shall transmit copies of the 'Executive Summary Report' to the Plan Commission along with a written copy prior to the Plan Commission's scheduled public hearing.

9. Master Thoroughfare Plan (MTP) Amendments

Developers interested in submitting an amendment or change to the *Master Thoroughfare Plan* should meet with TPW staff to determine if the amendment requires a Traffic Impact Study. If it does, TPW will determine the scope and area of the study, and the applicant should cite the reasons the roadway classification is being modified, with supporting traffic volume forecasts and documentation.

If the request is to remove a thoroughfare from the MTP or to change a thoroughfare to a lesser classification, the TIS must prove that the remaining thoroughfare and street system will have adequate capacity to provide the minimum LOS D at peak hours for a twenty year horizon. The growth rate, trip distribution and area of influence to be analyzed must be approved by the Transportation and Public Works Department prior to submittal.

If the request is to relocate a thoroughfare, the TIS must prove the alignment change does not decrease the capacity or LOS of the thoroughfare and street system in the area. Trip distribution and the area of influence must be approved by TPW prior to submittal.

APPENDIX B

CONTEXT SENSITIVE SOLUTIONS POLICY FOR STREET DESIGN

City of Fort Worth

Context Sensitive Solutions Policy

For Street Design

Introduction

The City of Fort Worth views the use of “Context Sensitive Solutions” (CSS) as an innovative approach in planning, designing, constructing, maintaining and operating its transportation system. Context Sensitive Solutions (CSS) is a philosophy wherein safe transportation solutions are designed in harmony with adjacent land uses. These solutions, through a collaborative and interdisciplinary approach that involves a full-range of stakeholders, use an innovative and inclusive perspective that balances community, aesthetic, historic and environmental values with goals related to transportation safety, maintenance and performance. The City of Fort Worth, through creation of this CSS program, will consider the application of CSS design principles by examining the development context of the applicable project area as well as issues related to maintenance feasibility, traffic demand, impact on alternate routes and safety, funding options, and adherence to relevant laws, rules and regulations.

The City of Fort Worth’s Goals for the CSS program include:

- Achieve the City’s Vision of becoming the “most livable city”
- Build a stronger working relationship among public agencies, communities and citizens
- Promote flexible design standards for local communities
- Revitalize central city neighborhoods, urban villages and commercial districts
- Address all modes of travel, including public transit, pedestrian and bicycle
- Establish a policy framework to better integrate transportation and land use planning

In developing this policy, the City of Fort Worth inventoried CSS policies from around the country and also collaborated with interested community stakeholders. Once the CSS program is finalized, the City will amend the existing City of Fort Worth Street Standards to provide additional flexibility in the design of city roadways. These alternative standards will be considered as the preferred approach for application in higher-density, mixed-use, pedestrian-friendly areas within Urban Villages and Mixed Use Growth Centers, as designated in the City of Fort Worth Comprehensive Plan.

City of Fort Worth Goals, Priorities and Standards for CSS

The City of Fort Worth’s main objective in implementing CSS is to balance the goals of walkability, business accessibility, economic development, aesthetic design, safety for all travel modes, maintenance, vehicular mobility (level of service), and existing and future transit service. To that end, the City has developed a table of priority CSS

elements based on roadway classification (Table 1); a table of priority CSS design elements by travel mode (Table 2); and a set of CSS design standards that aim to ensure that the City's primary transportation goals (e.g., safety, maintenance, and mobility) are maintained (Table 3).

In Table 1, street classification is based on a combination of street type (i.e. major/minor arterial, collector, local, etc.) and neighborhood context (i.e. commercial district, residential, mixed-use, etc.). CSS calls for an approach to roadway design that considers the priority of each design element such as sidewalks, travel lanes, parking lanes, medians, etc. In cases of limited right-of-way (ROW), it may be necessary to choose among design elements. This decision may also depend on whether additional ROW may be obtained or certain design elements narrowed to fit the available ROW.

The CSS approach to transportation project development stresses the use of an interdisciplinary team tailored to identify and address project needs. The following table has been developed to help guide planners, developers, designers and engineers in determining which elements may take priority within the street ROW of their project. These priority elements are organized by street classification, including major arterials (4-lane divided), minor arterials (4-lane undivided), collectors and local streets. The design must also reflect the results of the project's Traffic Impact Study (TIS), should the City Traffic Engineer of the Transportation and Public Works Department determine that a TIS is required. The City of Fort Worth will not allow the application of CSS design elements that negatively impact traffic along 6-lane divided principal arterials since these roadways are meant to move regional traffic at higher speeds.

Table 1. CSS Design Element Priorities by Street Classification in Urban Villages and Mixed Use Growth Centers

Elements	Street Classification			
	Major Arterial	Minor Arterial/Collector Commercial Oriented	Minor Arterial/Collector Mixed-Use Oriented	Local Streets
Traffic Lanes (No. and Width)				
Vehicle Capacity (ADT)				
Medians				
Access Management				
Level Of Service				
Transit Routes				
Bicycle Lanes				
Public Realm (Parkway)				
On Street Parking*				
			High Priority	
			Medium Priority	
			Low Priority	

*On local streets, it is assumed that on-street parking will be accommodated via the standard local street design. Its high priority designation in this table does not commit the City of Fort Worth to provide striping or other on-street parking enhancements on local streets.

Table 2. Top CSS Conceptual Design Element Priorities by Travel Mode

Priority Order* of Design Elements	Travel Mode			
	Walking	Bicycling	Transit	Vehicle
1	Wider Sidewalks	Bike Lanes, Wide Outside Lanes, or Edge-lined Shoulder (Determination should be made according to criteria developed in 2008 Bicycle Transportation Study)	Transit Stops/ Stations	Roadway Traffic Capacity (No. of Lanes)
2	Buffer from Traffic	Signed Bike Routes	Wide Outside Curb Lanes (Shared Use)	Turn Lanes
3	Landscaping, Shade Trees & Lighting	Share the Road Signage	Enhanced Pedestrian Access	Lane Width
4	Crosswalks & Pedestrian Signals	Street Furniture/ Bike Parking	Traffic Signal Timing & Priority	Traffic Signal Timing
5	Traffic Calming Measures (Bulbouts, etc.)	Bicycle-Sensing Traffic Signals	Street Furniture/ Bike Parking	Medians
6	On-street Parking	Pavement Markings (e.g., "Sharrows")	Far-side Bus Stops	On-street Parking
7	Street Furniture	Access Management	Curb Extensions	Access Management
8	Access Management (Limited Curb Cuts)	Traffic Calming Measures (Bulbouts, etc.)	Crosswalks at Bus Stop Locations	Channelization
9	Landscaped Medians	Exclusive Travel Lanes Shared with Transit Vehicles	Exclusive Travel Lanes	Curb Return Radius
10	Mid-block Crossings	Landscaped Medians	Transit Vehicle "Queue Jumpers"	Lighting

*The priority order of elements shown above is generalized and is not exhaustive. Actual priorities for a given project or development will depend on the importance of each travel mode for the particular roadway, the goals of the community, the roadway's functional classification, existing infrastructure, traffic impacts and adjacent land uses.

With respect to standards for CSS design parameters, the City of Fort Worth has developed the following table based on AASHTO, ITE, and FHWA Standards and Best Practices.

Table 3. CSS Design Standards

Item No.	Design Standard	Local (UL)	Collector (C)	Minor Arterial (M4U)	Major Arterial (MA4D)
1	Clear zone (from face of barrier curb) see notes a, b, c, and d.	1.5 ft min 3 ft desired	1.5 ft min 3 ft desired	1.5 ft min 3 ft desired	1.5 ft min 3 ft desired
2	Sidewalk Width/ Pedestrian Travel Way (each side of street) (Must meet ADA req.)	5'-7'+	5'-7'+	5'-7'+	5'-7'+
3	Traffic Lanes see note e. The minimum traffic lane widths cited are preferred (No. and Width)	Not Striped	2 lanes @ 11'-12' plus two 5'-6' bike lanes. If no bike lane, 2 lanes @ 13'-15'	4 lanes @ 11'-12' plus two 5'-6' bike lanes. If no bike lane, 2 lanes @ 11'-12' (inside) & 2 @ 13'-15' (outside)	4 lanes @ 11'-12' plus two 5'-6' bike lanes. If no bike lane, 2 lanes @ 11'-12' (inside) & 2 @ 13'-15' (outside)
4	Median Width (B -B of curb)	n/a	n/a	n/a	12 ft to 16 ft min. depending on local conditions
5	Left Turn Lane Width	n/a	10'-12'	10'-12'	11'-12'
6	Parking Lanes				*Tandem Parallel Park min No parking desired
	Parallel (No. and Width)	8'-9'	2 @ 8'-9'	2 @ 8'-9'	
	Angled (degree of) see note f.	45 deg min (only allowed if adequate lane width provided)	45 deg min (only allowed if adequate lane width provided)	45 deg min (only allowed if adequate lane width provided)	45 deg min (only allowed if adequate lane width provided)
7	Transit Stops (width of lane) see note g.	n/a	13'-15'	13'-15'	13'-15'
8	Design Speed	Civil Design Function- Use AASHTO Design Criteria			
9	Intersection Safe Site Distance see note h.	10 ft X Posted Speed Limit measured 10 ft from edge of travel lane			
10	Median Openings (Spacing) see note i.	n/a	n/a	n/a	500 ft. to 600 ft.
11	Max. Intersection Deviation Angle Allowed -from 90°	5°	5°	5°	5°
12	LOS	C desired D min	C desired D min	C desired D min	C desired D min
13	Left Turn Storage	100 ft min	125 ft min	150 ft min	200 ft min

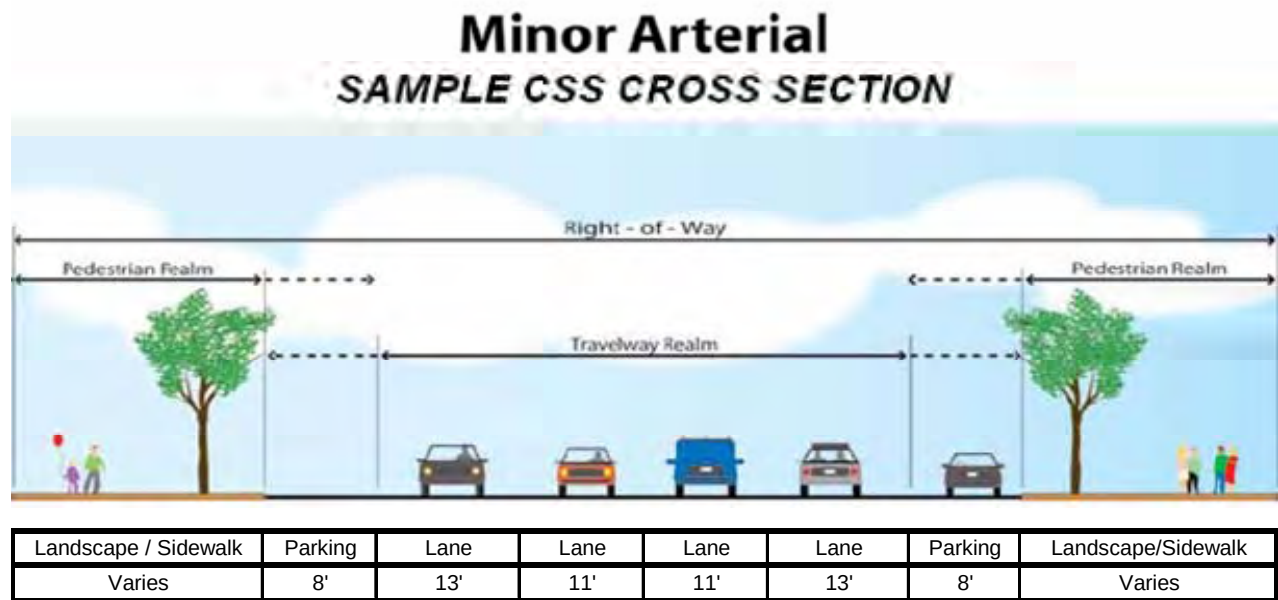
Notes

- a. Applies to barrier curbs, with no curb clear zone is 10 ft from the edge of travel way.
For trees the measurement is from the face of the curb to the projected outside diameter of a mature tree. For tree spacing, refer to City of Fort Worth Tree Ordinance
- b.
- c. The use of street furniture, art and other amenities is encouraged, within a designated space (min of 5 ft) between the face of the curb and the start of the pedestrian travel way.
- d. Breakaway-type bollards are allowed so long as they are at least 1.5 ft from the face of the barrier curb to the outer diameter, or, with no curb, they should be at least three feet from the outside edge of the adjacent travel lane.
- e. Implementation of the bicycle treatments mentioned here and other possible bicycle treatments will be addressed via the completion of the City of Fort Worth's Bicycle Transportation Study in mid- to late- 2008.
- f. No Bike Lanes allowed with angled, head-in parking. If head-in parking, the minimum sidewalk width will be 6 ft.
- g. Transit stops will be located approximately 80 ft (or double the average bus length) from the far side of an intersection.
- h. Applies only for stop controlled intersections.
- i. For streets with block lengths of 400 ft. or more a mid block crossing will be considered.

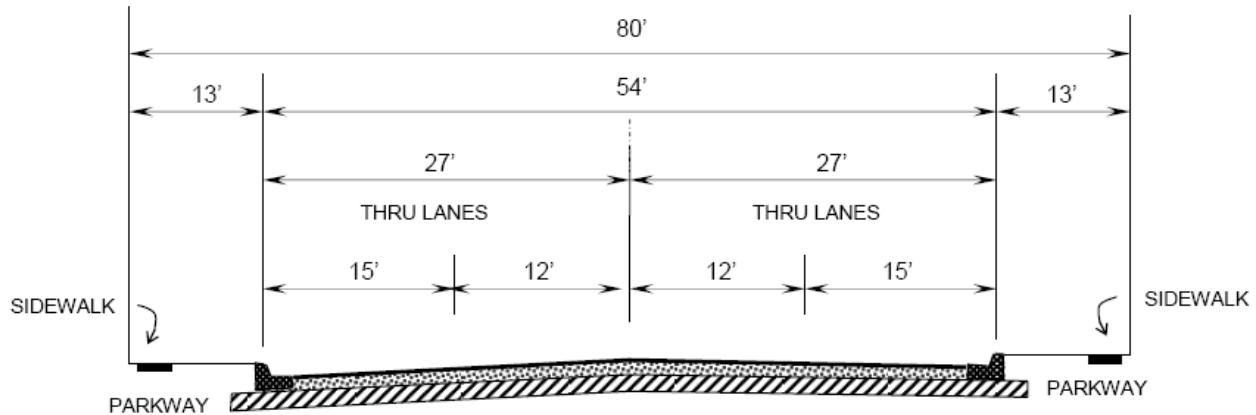
*Tandem parking is a feature that allows for greater ease of parallel parking on narrow, busy streets, while reducing the impact to through moving traffic. Standard parking spaces are 8' X 22'. However with the tandem parking, the parking spaces will be separated by a 6' long, stamped patterned asphalt pad. This padded area will be taken from the two- (2) adjoining parking spaces, in effect reducing the parking spaces to 20'. The padded areas will act as "rideable" buffers for vehicles to park in-between, and at the same time allow for easier maneuvering into and out of a parking space. For example, because of the added room created by the 6' buffer, cars wanting to park in-between two parked cars need only to pull forward into the parking space, without having to move forward off the space and reverse into the parking space. The buffers to the front and rear of the parking spaces allow for maneuvering while out of the travel lane. It also allows for easy exiting of the space, having room to back-up and pull out without hitting a parked vehicle. In areas where walkability is more important the use of bulbouts between (min of two spaces) is encouraged.

Sample CSS Roadway Cross Section Design

The image below represents a sample cross section for a CSS design. This particular sample is a design for a minor arterial roadway. The image should be considered a general representation. Individual design features may vary based on the priorities and standards previously discussed. For comparison purposes, the sample CSS design is followed by the cross-section design of a standard minor arterial using the City of Fort Worth's current street development standards.



Minor Arterial CURRENT STREET DESIGN STANDARD

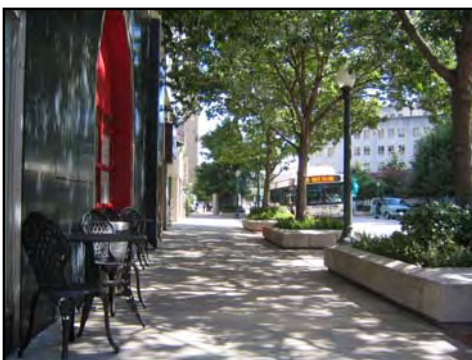


CSS Urban Streetscape/Parkway Design

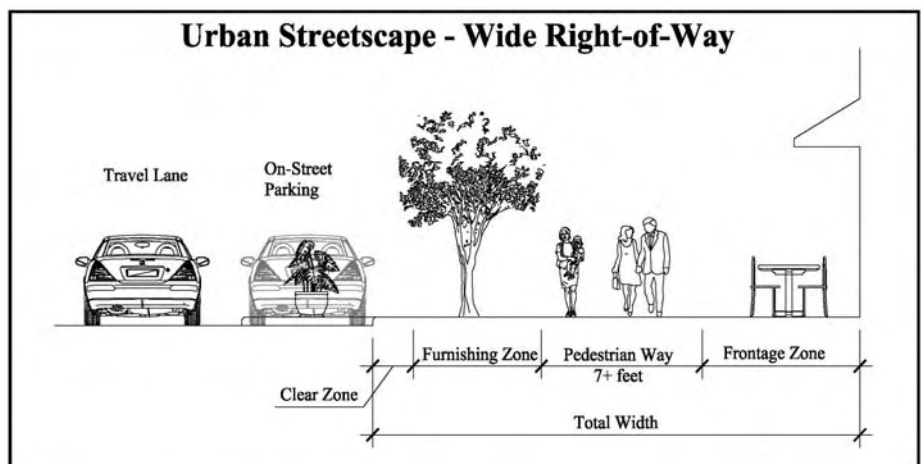
In CSS, the parkway or Urban Streetscape portion of the road's right of way is critical to its attractiveness as a valued, walkable public space. Four primary elements create the design of the Urban Streetscape: Frontage Zone, Pedestrian Way, Furnishing Zone, and Clear Zone.

Frontage Zone

The Frontage Zone is located immediately adjacent to buildings, walls, fences, or property lines fronting the street. It can include landscaping (permanent or temporary) as well as awnings, news racks, benches, outdoor café seating, and other furnishings typically found in the Furnishing Zone. In residential neighborhoods, landscaping typically occupies the Frontage Zone. Where outdoor café seating is desired on urban streets, the Frontage Zone should extend at least 8 feet from the adjacent building façade. In accordance with the City's Sidewalk Café Ordinance, sidewalk cafés are permitted when they are abutting and contiguous to a restaurant or café and at least 8 feet of unobstructed walkway is preserved for pedestrians. The Frontage Zone may be located on private property.

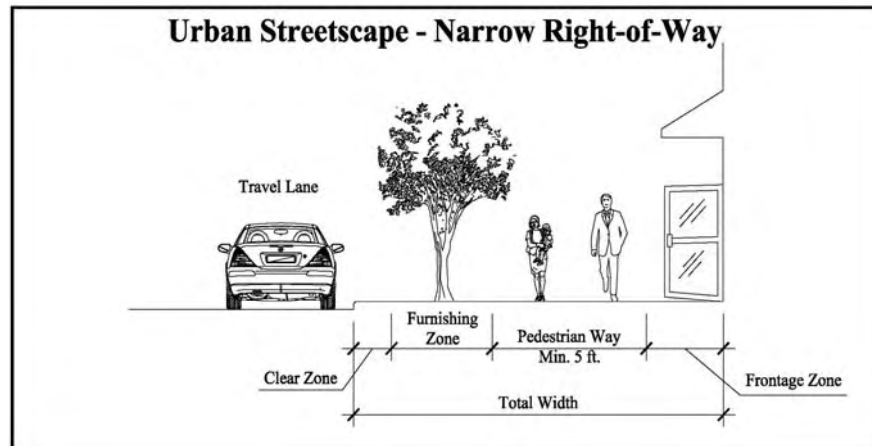


Outdoor seating can be located in the Frontage Zone. Street trees and planters occupy the



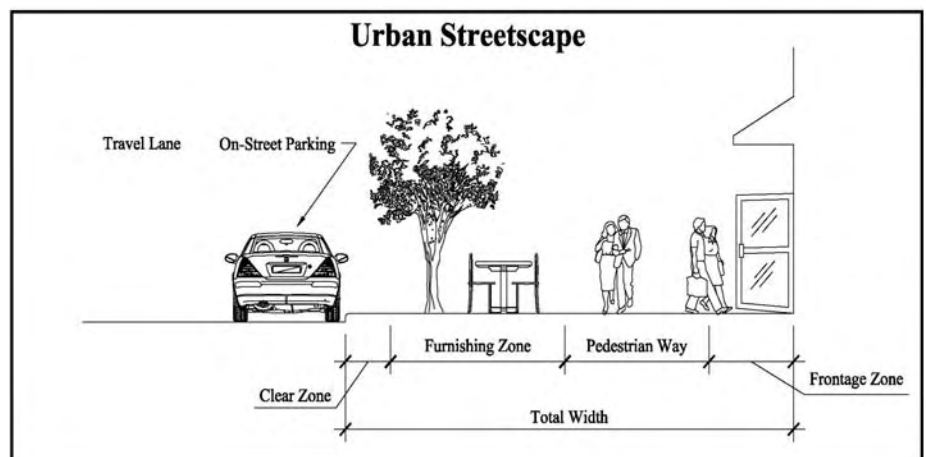
Pedestrian Way

The Pedestrian Way serves as the area dedicated to walking and should be kept clear of all fixtures and obstructions. The clearance provided in the Pedestrian Way should generally be straight, for the convenience of all pedestrians, but especially for the sight-impaired and those using a wheelchair. This zone is located between the Frontage Zone and the Furnishing Zone. The standard widths for the Pedestrian Way range from 5ft. - 7ft. At sidewalk café locations, at least 8 feet of unobstructed walkway must be preserved for pedestrians. Where sufficient right-of-way and/or public access easement exists, the Pedestrian Way may be greater than 8 feet wide.



Furnishing Zone

The Furnishing Zone lies between the Pedestrian Way and the Clear Zone. Fixtures such as street trees, utility poles and boxes, lamp posts, parking and transit signage, bike racks, news racks, benches, waste receptacles, drinking fountains, and other street furniture should be contained in the Furnishing Zone to keep the Pedestrian Way free for walking. Fixtures must leave pedestrians in clear sight of – and in alignment with – motorists' views at all times. This will provide a safe sight distance as decided by the design engineer. In residential neighborhoods, a planting strip often occupies the Furnishing Zone. The minimum width for the Furnishing Zone should be 4 feet. The width should be increased to at least 8 feet where transit stops, pedestrian amenities, or more generous landscaping are to be provided. This increase allows for sufficient access and also ADA compliance. Pedestrian-scale lighting is encouraged and lights generally should be spaced at a maximum of 60' apart and have a height not greater than 16'.



Outdoor furnishings must not impede the Pedestrian Way.

Clear Zone

The Clear Zone separates the pedestrian area from the street. The Clear Zone includes the width of the curb and may contain extra space for the unloading of passengers or freight. The minimum width of the Clear Zone is 18 inches. The preferred width should increase to at least 3 feet where pedestrian or freight loading is expected and may conflict with obstacles in the Furnishing Zone.

CSS Implementation

While not all projects in the City will incorporate the CSS design standards described in Table 3, the City of Fort Worth will integrate CSS principles as a standard component of the agency's transportation and project development procedures, programs, and investment decisions. These principles include:

- The project satisfies the purpose and needs as agreed to by a full range of stakeholders. This agreement is forged in the earliest phase of the project and amended as warranted as the project develops.
- The project is a safe facility for both the user and the community.
- The project is in harmony with the community, and it preserves the environmental, scenic, aesthetic, historic and natural resource values of the area.
- The project exceeds the expectations of both designers and stakeholders and achieves a level of excellence in people's minds.
- The project involves efficient and effective use of the resources (time, budget and community) of all involved parties.
- The project is designed and built with minimal disruption to the community.
- The project is seen as having lasting value to the community.

The City of Fort Worth encourages developers, designers and engineers working on projects within the areas covered by the CSS design policy – urban villages and mixed-use growth centers - to meet with the City early in the process. This will help forge consensus on the project purpose and scope before the project gets off the ground, and could help control costs by addressing up-front the combinations of CSS design elements associated with the project.

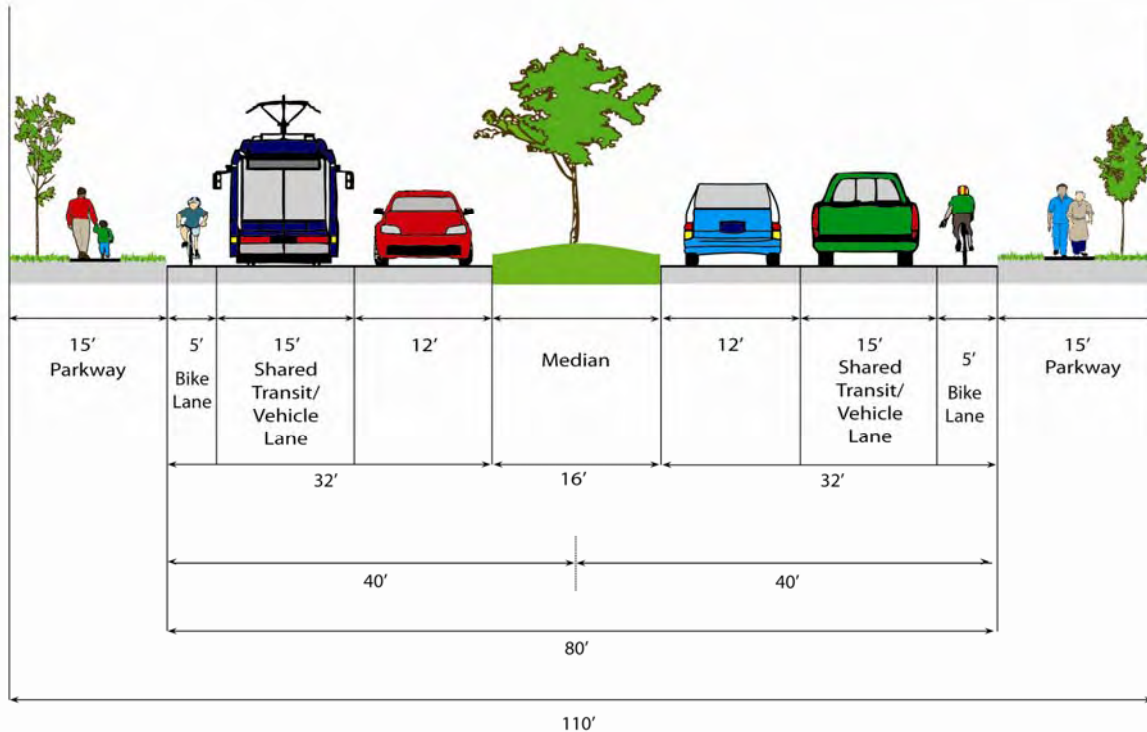
The City is proud of its role as a partner with the citizens of Fort Worth in creating transportation facilities that accommodate multiple modes of transportation and protect and enhance the natural beauty and livability of the city. The City of Fort Worth believes that CSS will help strengthen the city's neighborhoods and transportation system, bringing lasting value to the community through a more efficient and effective use of resources and stakeholder input that will help bring lasting value to the community.

APPENDIX C

SAMPLE MULTI-MODAL ARTERIAL CROSS SECTION DESIGNS

Sample Multi-Modal Arterial Cross Section Designs

MULTI-MODAL MAJOR ARTERIAL CROSS-SECTION



MULTI-MODAL PRINCIPAL ARTERIAL CROSS SECTION

