INTRODUCTION

Each mode of transportation, be it automobile, pedestrian, rail or heavy truck traffic, has its own advantages and limitations. The city is confronted with the problem of adopting a thoroughfare system which both serves and reduces conflicts among these various forms of movement. The meandering path is interesting and ideal for pedestrian and/or light residential traffic but is impossible for heavy automobile volumes and/or truck traffic which requires sweeping curves and broad ribbons of roadway with no intersections to create potential conflict points. It become apparent that, to the maximum extent feasible, that the various conflicting forms of transportation must be segregated to properly function with speed and safety.

The thoroughfare plan will assist public officials in the development of a specialized system for efficient and safe movement of vehicular traffic while minimizing potential conflicts with other forms of transportation. Acting as a framework, the thoroughfare system ties the various neighborhoods and parts of the city together and directs where present and future development will occur.

THOROUGHFARE SYSTEM CLASSIFICATIONS

Thoroughfare classifications usually carry with them a set of suggested minimum design standards which are in keeping with the importance of the system and are governed by the specific transportation services the system is to perform. The principal consideration for designating roads into systems are the travel desires of the public, land-access requirements based upon existing and future land use, and continuity of the system.

Major and Minor Arterials

Major and minor arterial streets primarily function is to move large volumes of automobile and truck traffic. Access to abutting property is directly in conflict with the primary function of a major arterial street which is to move traffic as efficiently and safely as possible. The same characteristics define the minor arterial except that traffic volumes and speeds are

generally lower and through traffic is discouraged. Parking should generally be prohibited along major arterials except in cases of low traffic volumes.

Collector Streets

Collector streets are intended to collect and move traffic safely and efficiently. Land access and parking are of secondary importance in collector street function. The function of the collector street in residential areas is to collect traffic from local streets in the interior of the neighborhood and distribute it to the arterial street system. This allows local streets to remain quiet and congestion free which in turn enhances the living environment of the neighborhood. Collector streets in business and industrial areas serve as collector and distributor routes for traffic around heavy traffic generators such as the downtown area, schools or industrial areas which have higher truck traffic volumes. Traffic safety is an important design consideration for the collector street. Whenever possible and practical, buildings should not front on the collector street and driveways should be prohibited. In the interior of the neighborhood, local streets should connect in “T” intersections. This kind of intersection is superior from the standpoint of traffic safety since there are fewer turning conflicts. The spacing of collector streets is often influenced by land use, density of development, and land use traffic generating characteristics. A spacing of one-fourth to one-half mile intervals is a reasonable standard where conditions are such that it can be achieved.

Local Streets

The primary purpose of the local street system is to provide access to property abutting the right-of-way. Curbs and gutters should be provided on all local streets as well as sidewalks on both sides of the street to provide for pedestrian access. A secondary purpose of local streets is to move traffic because traffic generated by abutting land use is generally light. Through traffic, trucks and other non-automobile traffic is discouraged from using the local street, except where such a street is located in an industrial or commercial area. Local street right-of-way also serve to provide easements as access for public utilities such as water and sewer lines. The local street is a major element in the design composition of the

city, providing space for plantings and arranging properties in various sizes and shapes of blocks with an irregular or rectangular street pattern.

Summarized are the four basic purposes of the urban street systems:

1. *Major arterial system - providing for the through traffic movement between areas and across the city, and direct access to abutting property; subject to necessary control of entrances, exits and curb use.*
2. *Minor arterial system - providing for through and limited local traffic volumes and functioning as a feeder type system carrying traffic from areas of the city to the major arterial system.*
3. *Collector street system - providing for traffic movement between the major and minor arterials and local traffic movement.*
4. *Local street system - providing for direct access to abutting land and for local traffic movements.*

Specific thoroughfare classification criteria are further detailed as follows:

ELEMENT	MAJOR ARTERIAL	MINOR ARTERIAL	COLLECTOR	LOCAL
Service Function: - Movement - Access - Principal Trip Length	 Primary Limited Over 1 Mile	 Primary Allowed Under 1 Mile	 Primary/Secondary Allowed Under ½ Mile	 Secondary Allowed Under ½ Mile
Land Use Linkage	Major Generators	Secondary Generators	Local Areas	Individual Sites
Spacing	Approx. 3/4 to 1 Mile	Approx. ½ Mile	Approx. 1/4 to ½ Mile	Variable

Source: Tim F. Glendening & Associates, Inc.

THOROUGHFARE DESIGN AND OPERATIONAL STANDARDS

The principles and elements of geometric design for various thoroughfare types are generally the same. However, to meet varied traffic demands, design details are often varied because speeds, traffic composition, lengths and purposes of trips are not always the same.

Designing an effective thoroughfare system must take into account both the characteristics of the vehicular trip and the city's desire to control and direct traffic throughout the community. Each type of thoroughfare has specific design and operation standard which should be considered when developing an effective plan. Table 6.1 illustrates the specific characteristics of each type of thoroughfare.

TABLE 6.1

TYPICAL THOROUGHFARE DESIGN STANDARDS

TYPE OF FACILITY	FUNCTION AND DESIGN FEATURES	TYPICAL RIGHT OF WAY	PAVEMENT WIDTH	DESIGN SPEED
Major Arterial	Provides unity throughout contiguous urban area. Usually forms neighborhood boundary; minor access control and parking generally prohibited	80 to 90 feet	60 to 64 feet with 2-4 lanes	35 - 55 mph
Minor Arterial	Main feeder streets; signals where needed; occasionally form neighborhood boundaries	60 to 70 feet	40 to 44 feet	35 - 40 mph
Collector	Main interior streets. Stop signs on side streets.	60 feet	36 - 40 feet	30 mph
Local	Local service streets.	50 feet	24 - 30 feet	25 mph

Source: Tim F. Glendening & Associates, Inc.

TRIP GENERATION AND TRAFFIC CAPACITY

Every land use in the city generates a certain amount of traffic each day. The amount of traffic depends upon the type of land use. By looking at adjacent land uses, planners can determine potential traffic volumes. Capacity is a term used to express the ability of a

roadway to accommodate traffic. On arterial streets this is usually expressed as vehicles per lane per hour. There are numerous factors which will influence roadway traffic capacity, including turning movements at intersections, stop lights and adjacent land use. Typical design capacities for thoroughfare types are shown in Table 6.2.

TABLE 6.2

TYPICAL THOROUGHFARE DESIGN CAPACITIES

STREET TYPE	DESIGN CAPACITY (VEHICLES PER DAY)	NUMBER OF LANES
Major Arterial	20,000 VPD	2 - 4
Minor Arterial	15,000 VPD	2
Collector	8,000 VPD	2
Local	1,000 VPD	2

SOURCE: Tim F. Glendening & Assoc., Inc.

As traffic volumes approach the design capacity, the service level of the street declines. Ideally, actual traffic volumes need to be approximately one-half the design capacity to ensure smooth traffic flows.

INVENTORY OF THOROUGHFARES

The thoroughfare system in Center is essentially based upon a grid type system. This is especially evident in the central, older portions of the city. As one moves further to the west, however, newer residential development has followed as less formal grid type pattern in favor of a more free-form design. The full hierarchy of thoroughfare types exists in Center, with some streets clearly functioning as arterial's and collectors. Table 6.3 identifies arterial streets in Center.

TABLE 6.3

CITY OF CENTER

ARTERIAL STREET SYSTEM

ARTERIAL	TYPE	FUNCTION	AVERAGE DAILY TRAFFIC	PEAK HOUR TRAFFIC
State Highway 7	Major	Northeast/southwest through traffic carrier	5,305 (2002)	795
Louisiana Street/State Highway 7	Major	Northeast/southwest through traffic carrier	6,890 (2002)	1,030
Loop 500	Major	Partial outer loop running southwest to southeast	2,040 to 1,950 (2002)	550
US Highway 96 North	Major	North/south through traffic carrier	9,800 (2002)	1,470
Hurst Street/US Highway 96	Major	North/south through traffic carrier	12,810 (2002)	1,920
State Highway 87	Major	East/west through traffic area	8,864 (2002)	1,330

Source: Traffic volumes provided by Texas Department of Transportation

At the present time, Center's arterial system provides an effective means of moving traffic through the city. The heaviest local traffic flows are along State Highway 7, State Highway 87, and US Highway 96. These are convenient and often used routes for automobiles and truck traffic that lead to different cities and the network of regional interstate highways. Total traffic volumes are within the design capacity of all streets. The other arterial's function effectively and without problem.

The collector street system in Center is not as clearly defined as the arterial system. However, based upon locally perceived travel patterns and traffic volumes, the collector street system for Center has been identified in Table 6.4.

TABLE 6.4

CITY OF CENTER

COLLECTOR STREET SYSTEM

COLLECTOR	FUNCTION	AVERAGE DAILY TRAFFIC	PEAK HOUR TRAFFIC
Loop 500	Half loop around the eastern portion of the city.	3,115	465
Martin Luther King	Collects traffic from southeastern residential areas to State Highway 87 and Loop 500	NA	NA
Rail Road Avenue	Collects traffic from Northeastern residential areas to areas to State Highway 87 and State Highway 7	2,090	315
Logansport	Collects traffic from central residential areas and the CBD to State Highway 7, State Highway 87, and US Highway 96	2,420	365
Cotton Ford Rd./FM 699	Collects traffic from northeastern areas to Logansport	2,080	315
San Augustine St.	Collects traffic from central residential areas and the CBD to State Highway 7 and US Highway 96	NA	NA

Arcadia/FM 138	Collects traffic from western residential areas to US Highway 96	2,670	400
Upper Arcadia Rd/FM 2974	Collects traffic from western areas of the city to US Highway 96	600	90
Lower Arcadia/FM 138	Collects traffic from western areas of the city to US Highway 96	1,160	175
Roughrider Drive/FM 3534	Collects traffic from western areas of the city to US Highway 96	NA	NA
Timpson Highway/State Highway 87	Collects traffic from western areas of the city to US Highway 96 and State Highway 87	6,810	1,025

Source: Traffic volumes provided by Texas Department of Transportation

OTHER TRANSPORTATION ELEMENTS

Other factors which influence the thoroughfare system include truck traffic, curbs and gutters and parking. There are six truck routes through Center. These include Loop 500, US Highway 96, State Highway 87, State Highway 7, State Highway 7, and Hurst Street. These serve to accommodate primarily through truck traffic that is traveling throughout cities in eastern Texas, and on to Interstate Highways 10, 20 and 49. Curbs and gutters are located along the majority of streets in the downtown area and in several of the newer residential areas of Center. With respect to parking restrictions, there are no metered or time limited parking facilities in Center. On-street parking in the downtown area is angled and marked. There are also some off-street parking areas in the downtown area for use by employees and customers of businesses and government facilities located there.

THOROUGHFARE ANALYSIS

The effectiveness of a thoroughfare system is judged most simply by how well the system serves adjacent land uses. Each type of land use generates a particular amount and type of trip, be it vehicular or pedestrian. The ability of the adjacent street and the network of interconnected streets to accommodate these trip movements is most critical. When trips generated by an adjacent land use have adequate ingress and egress and can move throughout the immediate area and the city overall, at a safe and optimal speed and without restrictions or impediments to flow caused by physical constrictions, then the thoroughfare system is meeting its intended function.

In the analysis of Center existing thoroughfare system, three factors are to be examined to determine their impact on the system and its ability to meet the needs of the community. These factors include (1) major traffic generators, (2) traffic speed or level of service and (3) alignments, intersections and system connectivity.

Trip Generation

Each type of land use creates or generates a certain amount of traffic. The Institute of Transportation Engineers (ITE) has compiled a comprehensive tabulation and analysis of various land use types and the number of vehicle trips generated. Following is a sampling of various land use types which can be found in Center and the corresponding trip generation rate as compiled by ITE:

TABLE 6.5

TRIP GENERATION RATES FOR SELECTED LAND USES

LAND USE TYPE	UNIT	AVERAGE DAILY TRIP RATE
Single- Family Dwelling	dwelling unit	10.0
Apartment	dwelling unit	6.1
Mobile Home	dwelling unit	4.8
Motel	occupied room	10.14
Elementary School	per student	1.02
High School	per student	1.39
Hospital	per bed	11.4
Nursing Home	per bed	2.6
General Office	per 1,000 square feet	17.7
Super Market	per 1,000 square feet	125.5
Convenience Store	per 1,000 square feet	322.6
Service Station	per pump	133
Restaurant	per 1,000 square feet	164.4
Bank (walk-in)	per 1,000 square feet	169
Bank (drive-in)	per window	297
Specialty Retail	per 1,000 square feet	40.7

Source: Trip Generation, Third Edition, Institute of Transportation Engineers

As shown in Figure 6.6, there are some significant traffic generators in Center which impact the overall circulation system. Although all land uses generate some amount of traffic, it is these major generators which must be considered when analyzing the Center thoroughfare system.

TABLE 6.6

MAJOR TRAFFIC GENERATORS

LAND USE	STREETS AFFECTED	AVERAGE DAILY TRAFFIC GENERATED (vehicles)	PEAK HOUR TRAFFIC GENERATED (vehicles)
Tyson Foods, Inc.	Shelbyville Street	3,525	670
General Shelters of Texas/ Cooling Division	FM 2648 and Cotton Ford Road (FM 699)	825	194
Shelby Regional Medical Center	Hurst Street	833	97
Pilgrims Pride	Logansport Street and Railroad Avenue	465	88
Wal-Mart	Tenaha Street and Hurst Street	9,603	955
Shelby County (Courthouse)	Nacogdoches Street	1,248	199
Armstrong/Bruce Hardwood Floors	Cotton Ford Road (FM 699) and FM 2648	1,155	219
Hallmark Center Fixture	Logansport Street, Railroad Avenue and Cotton Ford Road	450	86
F.L.Moffett Primary	Timpson Highway/State Highway 87	590	130
Center Elementary	Nacogdoches Highway/State Highway 7/San Augustine Street	395	90
Center Middle School	Malone Street/Kennedy Street	740	195
Center Intermediate School	Malone/Kennedy Streets	370	80

Center High School	Roughrider Drive/Hurst Street	860	225

Source: Based upon ITE trip generation rates using facility sizes

Speed and Level of Service

Once traffic volumes based upon trip generation rates have been determined, the speed of vehicular travel on streets and the corresponding level of service must be determined. As previously mentioned, each type of thoroughfare has a specific design capacity. The design capacity is the theoretical volume of traffic which a street could accommodate in free flow conditions at the posted speed limit. However, other than on rural interstate highways, free flow conditions are seldom encountered. As such, a means to measure how effective a street is accommodating vehicular volumes has been developed and is referred to as level of service (LOS). The LOS for thoroughfares ranges from "A" for uninterrupted, free flow at posted speed limits to "D" which denotes extremely heavy congestion with very low operational speeds. For Center all streets operate at LOS "C" or better which denotes that, except for occasional congestion around the schools during peak morning and afternoon travel times, all thoroughfares in Center effectively accommodate traffic demand. Because the system operates at such a desirable level, there can be a corresponding problem associated with higher than desirable vehicle speeds. Speeding vehicles and truck traffic are a frequent problems on several streets in Center. Continued police enforcement appears to be the only option to reduce speeding since other traffic control devices such as speed bumps cannot be placed on public thoroughfares without incurring liability. The majority of truck traffic is due to the forest industry in the region and will continue due to the multiple highway interchanges within the city.

Alignments, Intersections and System Connectivity

One potential intersection problem is at US Highway 96 and State Highway 87. This intersection has approach angles of less than the minimum acceptable 90 degrees which can cause sight distance problems for oncoming traffic. Where traffic volumes are high and/or high peak period traffic flows occur such as around school facilities, this can present a high potential for vehicles accidents. As opportunities permit for right-of-way acquisition

and/or reconstruction, this substandard intersection should be realigned to 90 degrees from all approaches.

THOROUGHFARE PLAN

The Thoroughfare Plan for Center has been developed to guide the city's implementation of needed improvements. Based upon locally determined goals and objectives, the plan will enable Center to address system deficiencies in a comprehensive, phased manner until all proposed improvements have been implemented. As the city grows, the Thoroughfare Plan will need regular review and updating to ensure that as circumstances change, so will the goals, objectives and recommendations for thoroughfare improvements.

Goals and Objectives

The following goals and objectives have been developed for the Thoroughfare Plan:

***Goal**: Ensure adequate right-of-way to enable future street improvements.*

Objective: Adopt the Subdivision Ordinance which specifies minimum rights-of-way during the platting process.

Objective: As opportunities arise during replatting or from outright purchase, acquire needed right-of-way near intersections where realignments are needed to eliminate substandard approach angles.

***Goal**: Improve the overall circulation efficiency of the thoroughfare system.*

Objective: Ensure that no arterial or collector streets are deadended

Objective: Eliminate intersections with substandard alignments

Objective: For future developments, require a 90 degree approach at all intersections

***Goal**: Improve the operational safety of the thoroughfare system*

Objective: Continue speed limit enforcement

Objective: Install traffic control devices where needed

***Goal**: Obtain funding for needed thoroughfare improvements*

Objective: Request financial assistance from the Texas Department of Transportation to address problem intersections at state highways

***Goal**:* *Effectively integrate all modes of transportation include vehicle, bicycle and pedestrian.*

Objective: Request financial assistance from the Texas Department of Transportation and the Texas Parks and Wildlife Department for installing pedestrian and bicycle trails along any abandoned railroad rights-of-way.

Objective: Where possible, route through traffic around schools and park areas to minimize automobile/pedestrian conflicts.

***Goal**:* *Ensure the compatibility of thoroughfares with adjacent land uses.*

Objective: Discourage through traffic on local streets by using four-way stop signs at every intersection.

Objective: Minimize local street intersections with major and minor thoroughfares to one every one-half mile.

***Goal**:* *Minimize the creation of barriers and maximize accessibility to the thoroughfare system to all residents.*

Objective: Ensure that all street improvements comply with Americans with Disabilities Act requirements.

Thoroughfare Improvement Priorities and Estimated Costs

It is not feasible for the city of Center to simultaneously implement all thoroughfare improvements. The sheer cost of all identified improvements exceeds local financial capacities. Instead, Center must prioritize improvements then begin implementing the most essential as funds become available. The prioritization of improvements is based upon the following criteria:

* ***Essential*** *- those which have a direct and clear impact on the safety of pedestrians*
* ***Important*** *- those that protect motorists and improve traffic flow*

* ***Desirable*** *- those that improve traffic flow*

* ***Needed*** *- those that address convenience*

The ranking of thoroughfare improvements in Center is based upon this prioritization.

TABLE 6.7

CITY OF CENTER

THOROUGHFARE IMPROVEMENTS PLAN

2004 TO 2009

PROJECT	PRIORITY	ESTIMATED COST
Loop 500	Essential	$13,500,000
US 96 Bypass	Important	$17,000,000
North/south collector from US Highway 87 to FM 138	Desirable	$2,000,000
East/west collector between US Highway 96 and FM 2648	Desirable	$2,000,000
TOTAL		$34,500,000

Funding for thoroughfare improvements can be provided from the Texas Department of Transportation, the City's General Fund, use of economic development sales tax funds and, where there are issues regarding school safety, the Center Independent School District. An alternative to the above sources would be to consider a local bond issue to finance the improvements. Any and all thoroughfare improvements, however, should be closely coordinated with other public improvement project to minimize conflict and take advantage of the possibility of combining projects such as water, sewer and drainage improvements.