Section 8: Transportation

A community's land use pattern and transportation system interacts constantly with one another in that different types of land uses have different transportation needs; for example, single-family residential uses require local and collector streets to accommodate low speeds and low traffic, while commercial uses require arterial streets for handling major traffic volumes caused by shoppers. Conversely, the transportation system may have an impact upon the types of land uses that predominate in a particular land use module; for example, rail and interstate access can be important for industrial uses.

This section of the McKinney Comprehensive Plan serves to define a future thoroughfare system that is consistent with the City of McKinney's long range land use plans. Population and employment projections from the Land Use element were the basis for modeling future transportation demand. The thoroughfare plan defines a hierarchy of roadway functions providing a balance between mobility and access. The Thoroughfare Plan describes the general location, type and functional classification for thoroughfares within McKinney. This Plan serves as a general guide for long range growth of the City's future roadway network. The Thoroughfare Plan is implemented primarily through a series of capital improvement programs, land owner agreements, and developer-constructed roads over many years. Due to increasing traffic congestion within Collin County, continued high-quality growth of McKinney will be dependent upon the implementation of the Thoroughfare Plan and, with other multi-modal transportation systems. McKinney and other cities in Collin County will need to plan and construct additional multi-modal systems (light rail, commuter rail, bicycle lanes, pedestrian trails, buses, etc.) to support the growth as the area matures.

The thoroughfare plan describes the general location, type and functional classification for thoroughfares within McKinney.

8.1 Function and Benefits of Thoroughfare Planning

An important purpose of the Master Thoroughfare Plan is to provide a long-range vision to assist in thoroughfare facility implementation. The Thoroughfare Plan has been developed to support the Future Land Use Plan by identifying a system of roadway corridors to move both people and goods.

The major benefits provided by the Master Thoroughfare Plan include:

- Identifying right-of-way (ROW) needs in advance of new development or as it occurs;
- Identifying roadways that will accommodate traffic from adjacent land use patterns;
- Limiting the potential for high traffic volumes on neighborhood streets;
- Anticipating when funds must be programmed for needed roadway improvements; and
- Reducing the potential negative effects due to increased traffic congestion.

Thoroughfare Plan and Growth

The aim of the Thoroughfare Plan is to help guide the development of the community's roadway system in a manner consistent with managing traffic demands, accommodating growth estimates of the City, and supporting transportation policies. Proper transportation planning can assist in ensuring that limited transportation funds are utilized efficiently and effectively. As such, this Thoroughfare Plan will help identify capital street improvements needed as traffic demands increase. For the transpor-

tation system to keep pace with increasing traffic demands, a capital improvement strategy needs to be developed from the City's Master Thoroughfare Plan. The location of present and future residential, commercial, and industrial enterprises affects major street and highway locations and their carrying capacity. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern. The Comprehensive Plan has taken into account the relationship between land uses and thoroughfares as an important component in community form.

An effective thoroughfare plan includes five (5) framework elements:

1. A long-range plan that addresses increased travel demand and projected growth.
2. A process to perform traffic impact analyses of new developments.
3. Implementation of access management, transportation system management (TSM), and travel demand management (TDM) programs.
4. Coordination with county, regional (North Central Texas Council of Governments (NCTCOG)), and state (Texas Department of Transportation (TxDOT), North Texas Tollway Authority (NTTA)) planning programs.
5. A flexible plan with a process in place for updating/revising the plan as conditions warrant.

Access management is the combination of physical techniques and transportation policies that control the flow of traffic between roads and surrounding lands.

Traffic Impact Analysis Process

It is recommended that the City establish a process that helps the community understand the demands and impacts placed on the community's transportation network from development. This will allow the City to better estimate future traffic demands and related roadway improvements. This process is accomplished by the preparation of traffic impact analyses.

There are two types of traffic impact analyses conducted that support development processes. The first is a traffic impact analysis that assesses the effects a particular development's traffic will have on the transportation network resulting from a change in land use different from the Future Land Use Plan. The second type assesses the specific site and roadway improvements needed resulting from a proposed development. These studies are important in assisting public agencies in making land use decisions. These studies can be used to help evaluate whether the development is appropriate for a site; ensures adequate access is available for the proposed development; that sufficient roadway capacity exists to accommodate it; and what type of transportation improvements may be necessary.

Access Management

Access management is the combination of physical techniques and transportation policies that control the flow of traffic between roads and surrounding lands. Several common physical techniques for this are limiting the number of curb cuts into a private development, organizing the curb cuts into private development with others as a planned system, and using separate access lanes to access several smaller developments. The policies of access management include: regulating the number of driveways and median openings along a transportation corridor, encouraging shared access driveways between businesses, and incorporating street design standards that facilitate traffic flow.

This process protects the public investment in roadways and the need to move traffic through the City and not have congestion points. In addition, access management balances the desire for access to private property with the mobility needs of the

community.

Transportation System Management (TSM)

Transportation system management strategies help to alleviate traffic congestion by increasing the efficiency, safety, or flow of traffic on a community's existing transportation facilities. TSM can provide a viable alternative to costly reconstruction or road widening projects. These strategies can optimize the performance of the City's transportation network without adding new infrastructure that is often much more expensive and can be disruptive during construction.

Added capacity is gained through TSM measures such as high occupancy vehicle (HOV) lanes, intelligent transportation systems, facility design and modification, access management techniques, traffic signal timing changes and phasing, sidewalk widening, and other operation-oriented strategies. Other strategies, such as traffic calming and safety measures, support livability more than just TSM.

Travel Demand Management (TDM)

Travel demand management strategies are complementary to TSM strategies. TDM strategies help alleviate automobile traffic demand through ridesharing, peak-period spreading (flexible work schedules, staggered work hours, or compressed work weeks), enhanced transit and paratransit use, and parking management programs. TDM strategies are policy related components that assist in transportation management. An example of this for the future would be if the employees of Corporation A in McKinney were working off peak schedules, say 7:00 am to 4:00 pm. This would create a reduced demand in McKinney at the peak travel times nearest 8:00 am and 5:00 pm.

Project Planning Coordination

As the adjacent regional transportation facilities develop and grow around and within the City of McKinney, it is imperative that the City takes an active role in the planning and design of these TxDOT, NTTA, and other public and private roadway projects to ensure that these facilities are coordinated with planned City roadways. These roads include: US 75, US 380, SH 5, SH 121, FM 720, FM 1461, and others. The City also needs to coordinate roadway improvements with Collin County, NCTCOG, and surrounding municipalities. It is recommended that the City explore and consider incorporating multi-modal systems that provide alternative modes of travel to the private automobile. The process of adding capacity to existing roadways can be limited and a financial burden to the community. Alternative modes of travel will enhance the livability of the community by providing additional transportation choices and offer additional means of travel that can not be added to the existing roadway system.

Plan Update

The City of McKinney's Master Thoroughfare Plan should be flexible and should be reviewed on a yearly basis to incorporate changes in local conditions. The flexibility of the Plan is illustrated via the conceptual alignments of future roadways. The Plan indicates a generalized location for roads that will require additional site analysis and design. The plan is a guide that will indicate the appropriate combination of roadway capacity and property access needed to provide a balance between public mobility and neighborhood integrity in each sector of the City. In developed sections of the City, the Thoroughfare Plan provides guidance for upgrading and or protecting the integrity and character of existing thoroughfares and neighborhoods.

The MasterThoroughfare Plan is a guide that will indicate the appropriate combination of roadway capacity and property access needed to provide a balance between public mobility and neighborhood integrity in each sector of the City.

8.2 Thoroughfare Plan Development

The development and application of a functional street classification system and a travel demand forecasting model are two components in the development of the Thoroughfare Plan. Functional street classifications define the role of each major thoroughfare and reflect a set of characteristics that are common to all roadways within each classification. The travel forecasting model assists in evaluating future roadway capacity and functional requirements by providing future travel forecasts for the local and adjacent regional transportation network. The development of this model enables a plan to be developed that can move projected traffic demands.

Functional Classification System

McKinney's existing and future roadway system can be divided into a system called functional classifications. Functional classification is the grouping of highways, roads and streets by the character of service they provide and was developed for transportation planning purposes. Basic to this process is the understanding that individual routes do not serve travel singularly. Rather, most vehicular travel involves movement through a network of roads. This network of roads is driven by the residents of McKinney every day. Comprehensive transportation planning uses functional classification to determine how travel can be channelized within the network in a logical and efficient manner. Functional classification defines the part that any particular route should play in serving the flow of trips through a network.

The classic transportation chart (Figure 8.1) graphically depicts the relationship between the hierarchical functional classifications and the balance between access and mobility.

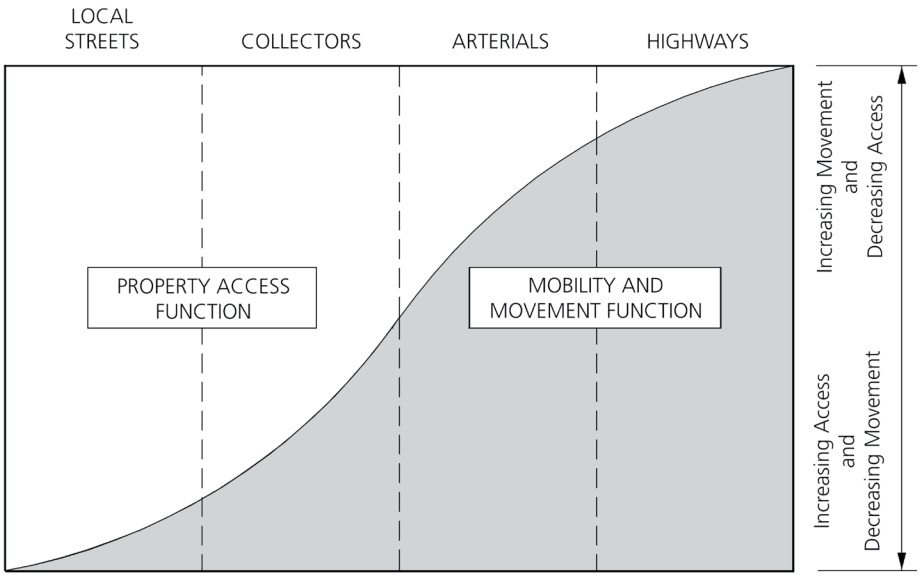


Figure 8.1: Functional Classification Model

The roadway system within McKinney can be divided into four (4) general classifications. They are as follows:

Local Streets

The local street is intended for low volume, low speed traffic movements. They provide access to residential lots and buildings sites. These streets should be arranged to discourage most through-traffic, except traffic that is directly related to the area. Because the streets are characterized by low volume, low speed traffic, they have narrower pavement widths consisting of two moving lanes.

For many years McKinney has been cognizant of the need to plan for local street systems within residential developments. Through past planning efforts, a network of residential streets is being developed to provide form and structure to neighborhood areas. Most streets in older sections of the City have varying right-of-way and pavement widths. The narrow paving widths found for many of these streets near the center of the City reflect the space needed at that time for vehicular travel when the subdivisions were platted.

Local streets that link and connect different subdivisions need to be direct and logical in alignment. Sometimes, a local street system will evolve which requires travel onto a major arterial to gain access to a subdivision within the same neighborhood. Consideration for continuity between subdivisions is particularly important when evaluating school-age children's needs for reaching school or park facilities within their neighborhood.

Local streets in McKinney

Collector Streets

A collector street's primary function is to collect and distribute traffic from local access streets to the arterial or major streets. These streets move moderate amounts of traffic volumes and provide limited access to adjacent properties. Collectors supplement the arterial system and should not be continuous for long distances. The collector street is usually located in a manner to discourage through-traffic movements. This is accomplished by the disruption of traffic flow by offsetting intersections and by incorporating curvilinear design.

Although not shown on the City of McKinney Thoroughfare Plan, collector streets are a critical component of the thoroughfare network. A well-designed system of collector streets can prevent potential problems on residential streets such as overly high traffic volumes and excessive speeds. Given the typical spacing of arterial streets (generally one (1) mile), a system of north/south and east/west collector streets could be provided midblock between arterials. These streets should not be continuous between arterials, as they would then be used for "cut-through" travel patterns.

Collector street in McKinney

The locations of collectors should be established as development plans, general development plans and preliminary plats are being prepared. The collectors should frame the edges of distinct neighborhoods. Houses should not front these collectors and instead should generally back to them. Additional collectors should be provided as necessary to distribute traffic throughout the neighborhood.

Arterial Streets

The greatest number of roads in the McKinney system is made of arterial streets. The main function of arterials is to provide for continuity and high traffic volume movement between major activity centers (employment and commercial centers, etc.) Property access is a medium level priority with an emphasis on limiting the location of driveways and groups of curb cuts that access this thoroughfare type. Arterials are usually divided to provide space for future left turn or through-lanes once traffic conditions are warranted. Hence, some arterials will contain four travel lanes, two

Arterial street in McKinney

in each direction, and others will contain six travel lanes, three in each direction.

Arterial street in McKinney

Strategic Regional Arterial

A Strategic Regional Arterial (SRA) is a facility with operational characteristics between those of freeways and other arterials. SRAs offer the characteristics associated with expressways, such as grade separations at arterial intersections and speed limits of 50 miles-per-hour, but usually require much less right-of-way. Since one of the primary goals of building an SRA is to increase vehicular movements in a corridor, traffic signals, and other control devices that contribute to delay should be minimized, but when necessary, should be spaced such that the impacts on through traffic movements are kept to a minimum. SRAs are typically spaced no closer than 3 to 5 miles apart and they should not penetrate residential neighborhoods. An SRA is generally recommended in corridors characterized by high through-traffic volumes or those which service land uses of regional significance such as large office complexes and shopping malls. SRAs provide the high-level of capacity roadway needed without the freeway's regional components such as frontage roads, access ramps, and state controls. This high capacity roadway can be a highly valued element for McKinney and its goals for increased economic development.

Tollways

SH 121 (Sam Rayburn Tollway) in Collin and Denton Counties is a 6-lane toll road which passes through the cities of McKinney, Allen, Plano, Frisco, The Colony, Carrollton, Lewisville, and Coppell. The SH 121 project in Collin County extends from US 75 to the Dallas North Tollway (DNT). The Sam Rayburn Tollway features all-electronic toll collection.

US 75 in McKinney

Freeways and Major Regional Highways

Freeways and regional highways are high capacity facilities intended to carry high volumes of longer distance trips and are a regional supplement to the arterial system. They usually consist of limited or highly controlled access. These highways are under the jurisdiction of regional, state, or federal agencies. However, the City does have input regarding how these agencies design future improvements to these facilities.

The state and federal highway system served as the initial structuring element for the City's Thoroughfare Plan. Among these highway facilities are SH 121, US 75, US 380 and SH 5. Each facility provides McKinney linkage to other cities in the region, and each handles significant volumes of traffic.

Base Information

The City of McKinney's existing roadway system consists of two distinct city-wide functional systems: the regional highway network and the local arterial roadway network. The regional highway network is served by four different highways located within the McKinney extraterritorial jurisdiction (ETJ). These highways are SH 121, US 75, US 380 and SH 5. US 75 is currently a four-lane rural freeway with parallel frontage roads that runs north-south through the center of McKinney's ETJ. SH 121 is a six-lane divided tollway running east/west along the southern edge of the City. SH 121 continues along US 75 and then splits to the northeast from US 75 just north of the City's northern ETJ border. After the split, SH 121 becomes a two-lane state highway. US 380 is a six and four lane, two-way thoroughfare that runs east-west through the center of City's ETJ. US 380 provides a critical highway link between McKinney and the Denton urban area. Multiple signalized intersections are located along this facility. SH 5 is a four lane, two-way thoroughfare that runs north-south

through McKinney's ETJ. SH 5 runs along the east side of downtown McKinney and contains multiple signalized intersections. This facility has varying characteristics such that it functions as a principle arterial in some segments and a minor arterial in others.

The local arterial roadway network provides for vehicular movement within the City. The roadway arterial's right-of-way widths vary according to location and is anywhere between 85 and 130 feet. Several of the north/south arterials are characterized by the 130 foot right-of-way cross section referred to as the greenway arterial. This greenway arterial provides an aesthetic 44-foot landscaped median. Heavy north/south movements are provided by Custer Road, Stonebridge Drive, Ridge Road, Lake Forest Drive, and Hardin Boulevard. Major east/west movements are accommodated by McKinney Ranch Parkway, Eldorado Parkway, Virginia Parkway, and Wilmeth Road.

Heavy congestion currently occurs on McKinney's highways, particularly US 380 and SH 121. The average daily traffic (ADT) demand on US 380 east of US 75 is roughly 37,000 ADT. US 380 west of US 75 sees an approximate demand of 51,000 ADT. Average daily traffic on SH 121 east of US 75 has a demand of approximately 47,000 ADT. US 380 congestion is due to high retail and employment land uses along its corridor, while SH 121 is congested due to an increase in regional traffic resulting from neighboring developments. The interchanges along US 75 are areas of high congestion because they are points of access to the arterial systems for the 124,000 ADT using US 75 south of Eldorado Parkway. Several arterials within McKinney are also experiencing congestion during peak hours. These include Eldorado Parkway and Virginia Parkway.

Year 2030 traffic forecasts were developed for the major thoroughfares in McKinney. These traffic forecasts were based on the projected changes in employment and population described in this Comprehensive Plan.

Travel Demand Forecasting Model

To support the City of McKinney's Thoroughfare Plan development, year 2030 traffic forecasts were developed for the major thoroughfares in McKinney. These traffic forecasts were based on the projected changes in employment and population described in this Comprehensive Plan. Because past records of traffic growth rates are not sensitive to shifting distributions of population and employment, the only valid method for considering changes in future travel patterns is a travel demand-forecasting model. This travel demand model requires subdividing the entire area into traffic analysis zones, and then population and employment projections are allocated to these zones. This allocation produces traffic volume forecasts on roadway segments. The McKinney traffic forecasting model was developed using the TransCAD (version 4.5) travel demand forecasting system.

Zone Structure

The amount and type of vehicle travel is dependent on the land use input into the transportation forecasting model. Traffic survey zones (TSZ) are the land use analysis units of the model. All the land use data is incorporated into zones that vary in size from a few city blocks in the urban area to several miles in the rural area. Zones are combinations of either Census blocks or block groups. Zonal boundaries consist of major roadway thoroughfares and other natural or manmade dividers, such as streams and railroads, which limit the amount of crossings available for vehicles to use. The land use is described in terms of type, intensity and location. This data is used to estimate the number of trips that a typical household or business employee will produce and attract from/to each TSZ. Land use data is developed for the base year (2000), a mid-year (2030), and build-out with no definition of time (year).

McKinney's TSZs were developed based on Census block group geography re-

ceived from the NCTCOG. For the McKinney model, the NCTCOG's TSZs were divided into smaller zones by arterial roadway locations and land use groupings. NCTCOG's TSZ data is developed for the regional area model and therefore, is generally too broad in scope for local city models. The demographic data contains such information as the number of households and basic, retail, and service employment levels that are currently contained within the TSZs. For the base year, each TSZ was coded with existing demographic data. The demographic data was determined through aerial photographs and City databases.

Building Existing Network

In developing a simulated transportation network for modeling, the roadway system is represented by a series of nodes and links. A node is the conceptual point along a roadway segment that traffic enters or exits the system. Links are the conceptual road alignment. Many links can make-up a local street. This representation is an attempt to quantify the street system for use in the traffic forecasting model. Inherent in the modeling effort is a simplification of the actual system of streets. For the McKinney model, highways, arterials, and major thoroughfares were identified through the City's Geographic Information System (GIS) database. This GIS data was loaded into the TransCAD software and coded for each roadway's existing characteristics. Data used in the model includes speed limits, number of lanes, and vehicle capacity available per lane.

Trip Generation

Trip generation is the procedure by which the amount of travel generated within each TSZ is estimated. Travel is estimated in the form of trip productions and trip attractions, and each is calculated by applying trip production and attraction rates to the land-use data variables in each TSZ. Typically, a trip production is associated with the home end of the trip (e.g., based upon the location of the household), while trip attractions are associated with the non-home end of the trip (based upon the location of employment).

Trip productions and attractions were estimated for four (4) different trip purposes: home-based work, home-based non-work, non-home-based, and other trips. These four types of trips are the majority of automobile trips produced in McKinney. The trip generation rates in the McKinney model are based on rates developed by the NCTCOG. Trip productions are stratified by household size and area type. Trip generation has been performed for the 2000 validation, 2030 mid-year, and the build-out time frame.

Trip Distribution

Trip distribution is the process by which the resulting trip productions and attractions are linked together to create travel flows between TSZs. Both the NCTCOG regional model and the McKinney subarea model are based on the mathematical relationship for the physical law of gravity. In fact, this type of distribution model is commonly called a gravity model. The gravity model distributes trips based upon the relative attractiveness of each zone and inversely to the distance between each zone. The trip distribution model has been calibrated based on the interzonal travel times from the 2000 simulation network and the use of nationally accepted gravity model friction factors. Trip distribution has been estimated for each of the four trip purposes in the model. The interzonal travel times from the 2030 network and the 2030 trip generation production and attractions have been used to develop 2030 vehicle trip tables by purpose.

Traffic Assignment

The vehicle trip tables were then assigned to the simulation network. The assignment process accumulates the vehicle trips on each network link based upon the travel path taken for each origin-destination zone pair. Volume-delay algorithms consider the effect that roadway congestion has on the network links selected to complete the trip. For the base year 2000 validation, the model-estimated volumes from the network simulation were compared to the observed traffic counts for selected screenline locations.

Calibration and Validation

Model calibration and validation are regarded as the final stage to investigate if each model component adequately reproduces observed travel characteristics. This determines if the overall performance of the model is reasonable and matches the existing real base data. Calibration is the process of identifying the appropriate parameters for each stage of model development. Validation is a required step that ensures that the traffic forecasting model contains acceptable error margins and that it provides traffic volume estimates that are reasonably close to actual vehicle counts at specific locations. Once the validation of the 2000 travel demand model to the observed conditions was producing acceptable results, the year 2030 land use and network data were used to prepare 2030 highway assignments. The 2030 assignment results were prepared and analyzed to test different thoroughfare plan concepts and provide information in the development of the final recommended plan. Build-out results were also developed for the complete roadway network.

Volume-to-Capacity Analysis

The projected daily traffic volumes were compared to the vehicular carrying capacities of each roadway. This volume-to-capacity (V/C) ratio is used to determine the level of congestion on a roadway over a twenty-four hour period.

The V/C ratio is translated into a level of service (LOS) indicator for purposes of interpretation. The LOS indicators are A, B, C, D, E and F; where "A" is free-flow conditions with no congestion, and "F" is heavily congested. This assessment allows communities to "grade" their traffic networks. Most communities plan for a LOS of no better than "D". In previous Thoroughfare Plan updates, McKinney used a policy of LOS "C" or better, but no worse than "D".

The transportation model for the McKinney Comprehensive Plan of 2004 is based on the LOS of "D" or better. This LOS is commonly used by Metroplex cities, particularly the high growth cities of Collin County. This was done to balance community desires regarding, movement, impact on neighborhoods, cost, etc.

The Master Thoroughfare Plan set forth herein is the updated plan; it is accurate for areas currently under development pressures and areas within the City of McKinney's ETJ.

8.3 Master Thoroughfare Plan

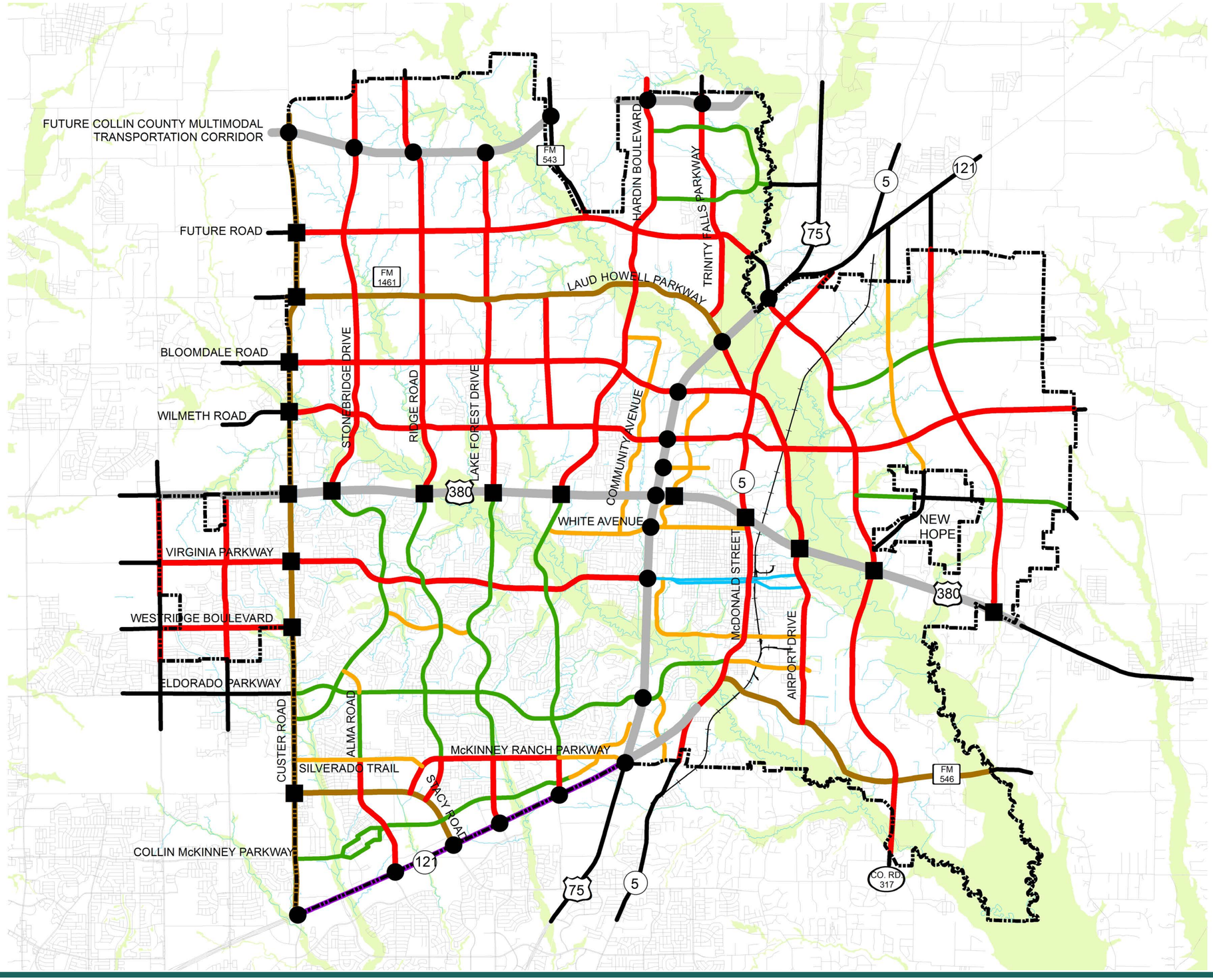
The Master Thoroughfare Plan (MTP) defines the network of future roads identified to handle the various levels of vehicular traffic. This document is a framework to plan and organize related land uses. The MTP set forth herein is the updated Plan; it is accurate for areas currently under development pressures and areas within the City of McKinney's ETJ.

The MTP map in Figure 8.2 illustrates the master thoroughfare system for McKinney. Completion of the system will occur over a period of time as the facilities are warranted, either as the adjacent lands develop or as may be required to accommodate special traffic movements through undeveloped sections.

The MTP provides generalized locations for thoroughfares. Alignments may shift as roads are engineered to accommodate flood plain areas and to meet sound engineering and urban planning principles. The system of thoroughfare alignments shown on the MTP have been coordinated with adjacent plans for the cities of Allen, Fairview, Prosper, Melissa, Frisco, and generally with the Collin County Thoroughfare Plan as well as with roadway plans from TxDOT and the NCTCOG.

Standards

Standards are needed to provide continuity throughout development of the thoroughfare system. Standards address a range of concerns from safety in operation to construction. The standards and criteria for all streets in McKinney are set forth in the City's Street Design Manual. The thoroughfare cross-section designs that are to be followed for future construction, as well as the roadway classifications, can be found in that manual. The following list is for informational purposes only. For a detailed description of thoroughfare design criteria, the McKinney Street Design Manual should be consulted.



CITY OF MCKINNEY

COMPREHENSIVE PLAN

MASTER THOROUGHFARE PLAN

- High Capacity at Grade Intersections
- Grade Separated Intersections
- Extraterritorial Jurisdiction (ETJ)
- Rail Line
- Floodplain

Roadway Classifications

- Major Regional Highway / Multi-Modal
- Tollway
- Principal Arterial: (P6D - 130'-150' ROW, 6 lanes)
- Major Arterial: (M6D - 120' ROW, 6 lanes)
- Minor Arterial: (M4D,M5U,M4U,M3U)
- Greenway Arterial: (G4D - 120' ROW, 4 lanes)
- Town Thoroughfare
- Road By Others

* Original Adoption (Ordinance No. 2004-03-035)
* Amendment #1 (Ordinance No. 2005-10-133) Revised to reflect changes to Ridge Road and Stonebridge Drive north of Bloomdale Road.
* Amendment #2 (Ordinance No. 2010-01-001) Revised to reflect actual alignments of recently built roads, the Future Collin County Multimodal Transportation Corridor alignment, the Trinity Falls Municipal Utility District, assorted roadway classification changes, and boundary changes between McKinney, Fairview and Princeton.
* Amendment #3 (Ordinance No. 2012-11-160) Revised to reflect new Custer Rd. /Wilmeth Rd. Alignment.
* Amendment #4 (Ordinance No. 2013-07-070) Revised to reflect actual alignments of recently built roads, the Future Collin County Multimodal Transportation Corridor alignment, the Trinity Falls Municipal Utility District, Custer Rd. north of U.S. 380, Stonebridge Dr. north of U.S. 380, Hardin Blvd. north of U.S. 380, FM 546, and assorted roadway classification changes.
* Amendment #5 (Ordinance No. 2015-06-048) Revised to reflect actual alignment of recently built roads, changes to the Ridge Rd., Lake Forest Dr. and Laud Howell Pkwy. alignments, assorted roadway classification changes, boundary changes between McKinney and Fairview, and floodplain changes.

Source: City of McKinney GIS Department Data

2 June 2015

FIGURE 8.3

0 1 2 Miles

100 Acres

1 Square Mile

Disclaimer: The Master Thoroughfare Plan provides generalized locations for future thoroughfares. Alignments may shift as roads are engineered and designed to accomodate floodplain areas and to meet sound engineering and urban planning principles. The roadway lines shown on the plan are not precise (site specific) locations of future thoroughfares.

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Principal Arterial, Divided ("P-6D") - Principal arterials have a minimum ROW width of 130 feet and an ultimate cross-section of six lanes. The pavement section consists of two 36-foot roadways with a 30-foot center median. The parkway area is intended to accommodate deceleration lanes into driveways and intersecting streets. There are traffic signals at all major intersections coordinated for progression during peak periods.

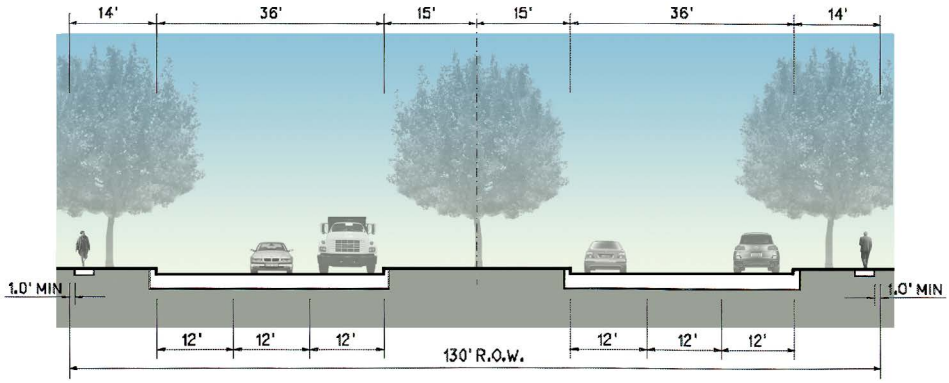

Figure 8.3: Principal Arterial Divided - Subregional

Major Arterial Divided ("M-6D") - The pavement section consists of two 36-foot wide roadways with a 20-foot center median. The standard ROW width is 120 feet, but may be increased at intersections. Median openings are spaced at significant intervals to reduce conflict between through-traffic and turning vehicles. The ultimate cross-section of a major arterial is six travel lanes.

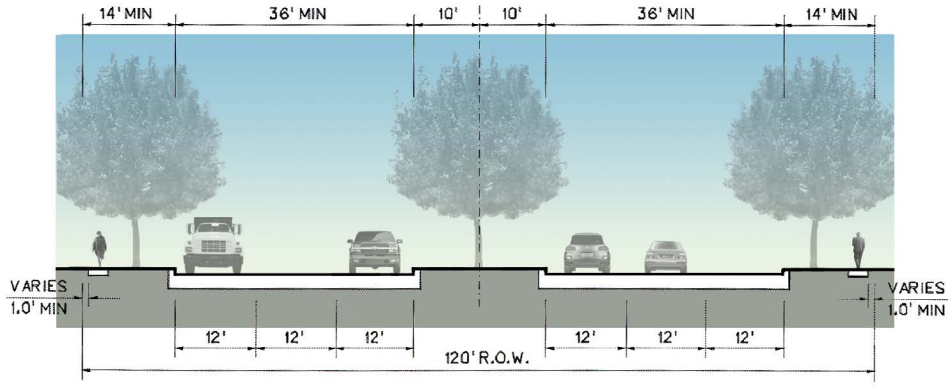

Figure 8.4: Major Arterial Divided - Local

Greenway Arterial Divided ("G-4D") - The Greenway arterials have a minimum ROW width of 120 feet with an extra wide 44-foot center median to accommodate landscaping and street trees. The pavement section provides two 24-foot roadways separated by the extra wide landscaped median. The greenway arterial has four lanes of traffic.

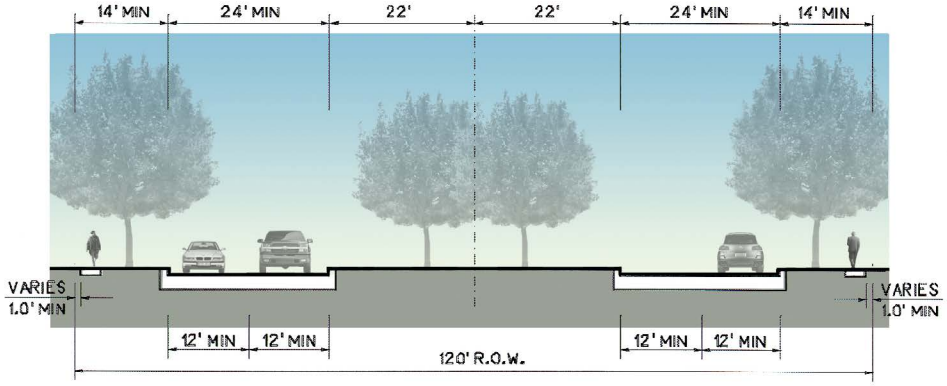

Figure 8.5: Greenway Arterial Divided

Minor Arterial Divided ("M-4D") - Minor arterials are a secondary thoroughfare used to move local traffic. They include two 24-foot wide pavement sections, divided by a 20-foot wide median. The minimum ROW is 100 feet. Minor arterials are intended to be a four-lane divided roadways.

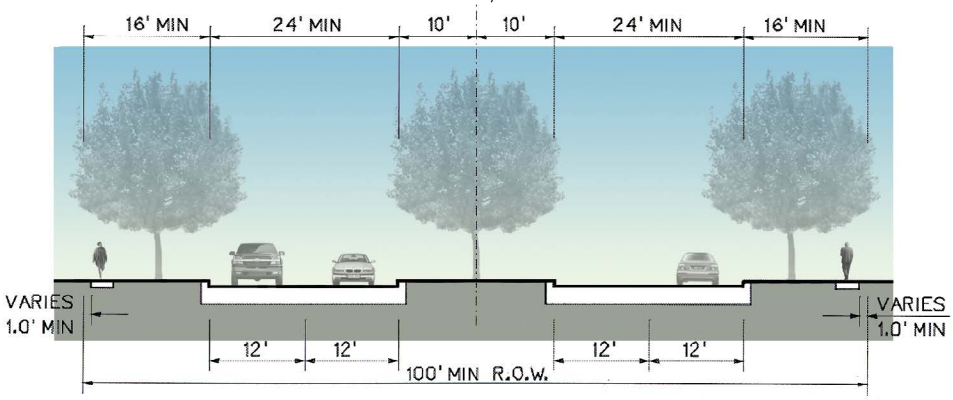

Figure 8.6: Minor Arterial Divided

Minor Arterial Undivided ("M-4D") - Minor arterials are a secondary thoroughfare used to move local traffic. Minor undivided arterials include two 22-foot wide pavement sections, with no median. The minimum ROW witdth is 80 feet.

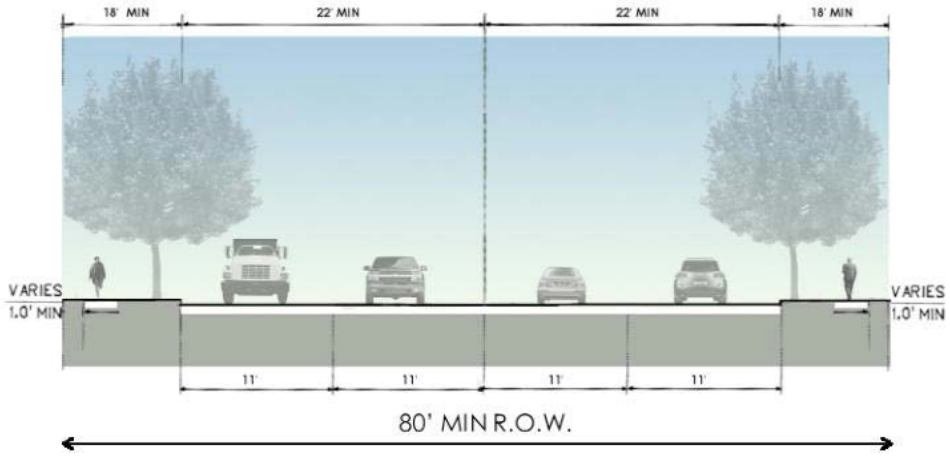

Figure 8.7: Minor Arterial Undivided

Thoroughfare Recommendations

Freeways

Three freeway facilities are planned or existing in the McKinney ETJ. These are US 75, SH 121, and the future Collin County Multi-modal Transportation Corridor. As a regional facility, the north-south location of US 75 links the City to the center of the Dallas metropolitan area. This facility has interchanges with major east/west regional highways as well as access to the interior sections of the region. TxDOT has proposed to widen US 75 to eight lanes through McKinney, including intersection and ramp improvements as well.

SH 121 (Sam Rayburn Tollway) between US 75 and DFW Airport is a tollway maintained by the North Texas Tollway Authority (NTTA). SH 121 includes full access-controlled tollway main lanes, continuous frontage roads, and grade separated interchanges at key crossings. The communities along SH 121 have worked closely with TxDOT in planning this tollway. The ultimate tollway section from US 75 westward to DFW Airport gives McKinney significant access to all transportation nodes and major land use areas along this route. SH 121 is an important thoroughfare because its intersection with US 75 forms a primary entrance into McKinney. Therefore, urban design and landscape design considerations must be carefully evaluated for all developments along the SH 121 corridor.

The future multi-modal transportation corridor is still in the early planning stages, but a general location has been chosen in the far north section of McKinney's ETJ. This corridor will be the next limited access freeway north of SH 121 and is planned to extend from IH 35 in Denton County to IH 30 east of Dallas County. This future freeway corridor provides McKinney with an area for long term tax base development as well as increased east-west regional access.

Regional Highways

US 380 provides east/west regional access and will continue to carry high traffic volumes to and through the City. US 380 has recently been widened to accommodate this higher traffic volume. As traffic volumes continue to increase along this corridor, access management, TSM strategies, and grade separated intersections should be considered for implementation.

SH 5 traverses the central business district of the City paralleling US 75. Generally, north-south traffic destined for the center City in McKinney will use SH 5. North-south through-traffic generally stays on US 75. This facility has varying characteristics such that it functions as a principal arterial in some segments and a minor arterial in others.

UPDATE: In late 2012, the City of McKinney (in partnership with the North Central Texas Council of Governments and Texas Department of Transportation) launched a corridor planning study for the portion of SH 5 within McKinney. The corridor planning study, known as the State Highway 5 Context Sensitive Transportation Study was completed in April 2014. The resulting Master Plan (adopted June 17, 2014) establishes the necessary framework to achieve a seamless transition of the roadway's feel and function as it traverses McKinney. See the State Highway 5 Corridor Context Sensitive Master Plan for additional information.

Arterials

The following describes many of the arterials in McKinney with future recommendations.

- Custer Road is a major north/south arterial carrying traffic continuously from western McKinney and eastern Frisco to Allen, Plano and Richardson to the south. Custer is designated as an ultimate six-lane principal arterial with 130 feet of ROW. Consideration should be given to preserve the mobility function of this facility in the future. Traffic projections show Custer carrying a significant amount of traffic attributable to the new growth planned for western McKinney.
- McKinney Ranch Parkway and Stacy Road carry east-west traffic to, from and through McKinney, connecting McKinney with Frisco to the west and Allen to the south. Stacy Road is designated as a six-lane principal arterial requiring 130 feet of ROW. McKinney Ranch Parkway is designated as a six-lane arterial with 120 feet of ROW.
- Collin McKinney Parkway is designated as a greenway arterial generally paralleling SH 121. This facility serves as the main arterial that generally bisects the Tollway Commercial module and the Urban Mix module.
- Virginia Parkway is designated as an east-west six-lane major arterial in the southwest part of the City. This facility will function to collect trafficdestined for US 75 or the McKinney central business district from the west-McKinney residential development and provide a high level of mobility.
- Stonebridge Drive is designated as a four-lane greenway arterial between US 380 and FM 720. North of US 380, it is anticipated that growth will produce the demand for this facility to be a six-lane major arterial.
- Ridge Road is a four-lane greenway arterial south of US 380, but is designated as a six-lane major arterial north of US 380.
- Lake Forest Drive is also a four-lane greenway arterial south of US 380 and a six-lane major arterial north of US 380.
- Hardin Boulevard is a four-lane greenway arterial south of US 380 and anticipated to be needed as a six-lane major arterial north of US 380.
- Eldorado Parkway is an east/west greenway arterial through the southwestern part of the City. This facility carries traffic from US 75 westward to residential areas in McKinney. However, it is also continuous with arterials in Frisco and to the west through the Colony and Little Elm. This roadway eventually connects to IH 35E via the Lewisville Lake Toll Bridge (opened in August 2009).
- Bloomdale Road is designated as a six-lane major arterial carrying east-west traffic across the northwest part of McKinney.
- Wilmeth Road is proposed to be a six-lane major arterial carrying east-west traffic parallel to and north of US 380.
- FM 546 is proposed to be a six-lane principal arterial carrying east-west traffic parallel to the southern ETJ boundary and to the south of the McKinney National Airport.
- FM 1461 and Laud Howell Parkway (formerly known as the FM 543 Connector) are designated as an east-west six-lane principal arterial in the northwest part of the City.

It is recommended that one of the east/west arterials (north of US 380 and west of US 75) be considered for special design treatments to facilitate higher vehicular capacities and speeds. This is in order to meet the anticipated travel demands attributable to the area's economic development and planned growth. One of the north/south arterials also in the northwest part of the City should be considered for these special design treatments to facilitate higher vehicular capacities and speeds.

8.4 Traffic Related Design Details

Traffic related design and thoroughfare planning is the continual analysis of factors affecting the flow of traffic. Intersection design and traffic signal timing are as important to a street's capacity abilities as the number of lanes available. Through traffic volume and impact analysis, intersections can be designed to accommodate smooth traffic flow by indicating a need for free right turn movements or dual left turn lanes. Access between the thoroughfare and adjacent private property is important, particularly at intersections. This concern often indicates a need for an access ordinance with appropriate design standards.

Often, through improved intersection design, signal timing, or signage, safety at accident prone locations can be significantly improved. Points of high volume movement of through or turning traffic should be recorded and periodic study made of conditions to ascertain that all the identifiable features are being handled correctly.

Coordination between trail systems within the parks and greenbelts with pavement space on the road for bicycle use is an important element in the design of future thoroughfares. Allocation of space for bicycle use in the arterial system requires greater pavement width for those facilities where this use will occur; therefore, the bike system must be planned as accurately as possible to ensure that space and safety measures are incorporated into the initial roadway design and construction.

Medians

Medians provide a separation of travel lanes and a location for beautification. Numerous factors are involved in the design of medians. An important factor is the distance between median openings that allow for turning movements. The Street Design Manual allows for openings to be created at intersections with dedicated streets as well as at limited mid-block locations. The purpose of limiting the number of mid-block openings is to ensure safe, efficient traffic movements and to maintain the appropriate level of service along major thoroughfares by reducing the conflict between through-traffic and turning vehicles. The optimum spacing of median openings is defined in the McKinney Street Design Manual.

Intersections

The capacity of a major street is significantly influenced by the design and operation of signalized intersections. Number of lanes, sequence of movements, and signal timing each affect the number of vehicles which can be handled by an intersection of two major thoroughfares. The Street Design Manual provides for a right turn lane exclusive of the through-lanes. When volumes can be projected by traffic studies or can be anticipated to be greater than the volume which can be managed for a standard intersection design, right-of-way provisions should be made to accommodate a greater number of lanes.

The illustrations in the Street Design Manual show intersection designs for various sizes of thoroughfares that recognize the need for mandatory right turn lanes as well as a high number of left turn lanes. An important feature of the Manual is that the right turn lanes are given deceleration space in advance of the intersection and acceleration space for traffic leaving the intersection after the right turn. Another important feature of the manual is the dual left turn. This feature has the advantage of moving vehicles through the intersection in pairs, thus significantly improving the efficiency of operation. Vehicular storage for waiting vehicles in dual left turn lanes is doubled as compared to a conventional left turn lane.

Grade Separations

Grade separations currently exist on US 75 and along SH 121. While the future Collin County Multi-modal Transportation Corridor is still in early planning stages, it is anticipated that it will eventually be constructed as a limited access freeway with grade separated intersections.

Other grade separations may be required as the City's urban area expands and the traffic demand at various thoroughfare intersections increases. Some cities choose to preserve the option of implementing arterial grade separations where it is anticipated that a significant amount of crossing traffic will occur. While not always immediately popular to consider, preserving the option for future generations provides additional solutions to solve future transportation problems. Where this type of intersection will not work, the crossing of two major thoroughfares should be given specific attention to reduce intersection delay and congestion, both of which contribute to poor air quality.

The City will use the Trans Plan transportation model to develop and test future development options. This will help in the understanding of need for high-capacity intersections and other elements. The City will use this model to coordinate better with NCTCOG over future projections and demand figures. Using this information, appropriate right-of-way can be acquired as development occurs.

In order to determine where such grade separations may possibly be needed, traffic demands can be analyzed using the Dallas-Fort Worth Regional Travel Model developed by NCTCOG or the new City of McKinney travel demand model. Travel models examine the relationship of land uses to the capacity of the thoroughfares. The data provided from a model provides a wealth of detailed information regarding future volume and capacity.

8.5 Other Transportation Modes

Means of transportation other than motor vehicles influence the City's development and will continue to impact future development. Some modes of transportation will relate either to personal needs or to needs for business services. As the city's urban area continues to gain population, new and expanded transportation services will be created or enhanced to meet the demands. Among these are the following:

Air Transportation

McKinney has operated a municipal airport for several years, but in recent years the importance of this facility has become increasingly greater to the City's service and economic base. The Collin County Regional Airport completed its Master Plan update in February 2006. The Master Plan focused on facility needs and evaluating alternatives for future development. In 2013, the City of McKinney purchased airport assets and renamed it as McKinney National Airport (TKI), viewing the acquisition as an economic development opportunity. In its first twelve months as McKinney National Airport, operations increased by 6%.

The airport is one of five general aviation facilities located in the north Dallas County and Collin County area and is second in annual operations to the Addison Municipal Airport. An Airport Master Plan update and Environmental Assessment were completed in 1988, which set forth projections for the McKinney facility. The 7,000-foot runway permits the municipal airport to accommodate aircraft larger than those handled by a utility airport. As airspace becomes more congested for airports

interior to the region, use of the airport can be expected to increase and be coupled with growth from personal and business operations conducted from the airport.

NCTCOG prepared a study in 1984 which examined airport facilities for the DFW region. Anticipated updating of data in this study will make available information on both conventional airport facilities, as well as heliport. The 1984 study recommended heliports for the Dallas and Fort Worth central city areas, a mid-cities location, and a north Dallas facility but none in the vicinity of McKinney or southern Collin County.

To maintain input from communities, NCTCOG has an Air Transportation Advisory Committee, which has existed since the mid-seventies. This Committee provides technical assistance to staff in maintenance of the 1984 Plan other aviation needs and serves as a technical advisor to the Regional Transportation Council.

On-Street Bicycling

The On-Street Bicycling section has been created to serve as a link between the On-Street Bicycle Transportation Master Plan and the Transportation Element of the Comprehensive Plan. The On-Street Bicycle Transportation Master Plan (Bicycle Master Plan) was adopted in 2012 and provides the City of McKinney with a policy framework which is needed for the implementation of networks, facilities, projects, and programs related to a safe and successful on-street bicycle network.

The Bicycle Master Plan sets forth the existing bicycling conditions within the City of McKinney, lays out the preferred network, facility types, wayfinding, routes and other related infrastructure, as well as program elements needed to support the Plan. The Bicycle Master Plan, including any future amendments, should be referenced when considering transportation decisions in the City. For additional information, see the On-Street Bicycle Transportation Master Plan (2012).

Public Transit

Presently, bus service is the only form of public transportation between McKinney and other sections of the region. Prior to April 2013, bus service was provided within the City by Collin County Area Rural Transit (CCART) in the form of on-call/on-demand service and fixed bus routes. However, in April 2013, City Council designated Texoma Area Paratransit Service (TAPS) as the provider of bus service within the City. TAPS provides public transportation in the form of on-call/demand response service and fixed bus routes.

A Transit Needs Assessment and Planning Study for Collin County was completed in September 2013 by the North Central Texas Council of Governments to determine current and future transit needs for Collin County. The City of McKinney participated as a stakeholder in this study process. It can be expected that, as population increases and as other factors that impact private vehicular travel occur, the need and service of mass transportation will be met.

After the 2000 Census, the City of McKinney was designated by the US Census Bureau as an Urbanized Area and began receiving urban transportation funds allocated by the Federal Transit Administration (FTA). Prior to April 2013, these funds were designated to CCART, as the designated-recipient, on an annual basis to help provide on-call/on-demand service and fixed bus route service. As of April 2013, TAPS is now the designated-recipient of these FTA funds.

Future public transportation service may be provided by Dallas Area Rapid Transit (DART). Currently, DART serves Dallas and 13 surrounding cities with more than 11,900 bus stops, 90 miles of light rail transit (LRT), 60 miles of HOV lanes, and paratransit service for the mobility impaired. DART and the Fort Worth Transportation Authority (the T) jointly operate 35 miles of commuter rail transit (the Trinity Railway Express or TRE), linking downtown Dallas and Fort Worth with stops throughout the mid-cities and DFW Airport.

DART light rail transit currently reaches as far north as Plano. DART has purchased the ROW for the railroad extending north from Plano, through McKinney. A city must designate a one-cent local sales tax to become a DART member city. Currently, the City of McKinney designates that one-cent sales tax towards the McKinney Economic Development Corporation (MEDC) and the McKinney Community Development Corporation (MCDC) and cannot increase the sales tax above the current level. Consideration with DART and/or other agencies is ongoing.

The North Central Texas Council of Governments initiated the McKinney Corridor Conceptual Engineering and Funding Study in late 2008 to support future passenger rail service implementation from Plano to McKinney. The study was facilitated by conducting outreach with key stakeholders and providing an open forum to identify key issues, identify potential station locations, and examine alignment options. In addition, the study documents existing environmental conditions and identifies potential impacts. The study and associated final report was completed in the summer of 2010 and provides a foundation for future environmental documentation anticipated to be completed by the implementing transit agency and identifies possible funding strategies intended to expedite project implementation.

Freight Systems

Freight rail service and future rail transit opportunities do not currently work together. This is due to the fact that the railroad line running through McKinney is only a single track network. A single track can not carry both modes of movement for people and freight. Further detailed review will need to be completed to better understand these two rail services. Any rail planning will need to include DART, the freight service provider, Collin County, and the City of McKinney.