# TRANSPORTATION ELEMENT

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION</strong></td>
<td>3-1</td>
</tr>
<tr>
<td><strong>MAJOR PROPOSALS</strong></td>
<td></td>
</tr>
<tr>
<td>Transportation Planning</td>
<td>3-1</td>
</tr>
<tr>
<td>Transportation Improvements Programming</td>
<td>3-1</td>
</tr>
<tr>
<td>Transit Planning</td>
<td>3-1</td>
</tr>
<tr>
<td>Traffic Impact Analysis</td>
<td>3-1</td>
</tr>
<tr>
<td><strong>CONDITIONS/TRENDS/ISSUES</strong></td>
<td></td>
</tr>
<tr>
<td>Status of Regional Thoroughfares</td>
<td>3-3</td>
</tr>
<tr>
<td>Transportation Planning</td>
<td>3-4</td>
</tr>
<tr>
<td>Thoroughfare Implementation</td>
<td>3-5</td>
</tr>
<tr>
<td>Transit</td>
<td>3-6</td>
</tr>
<tr>
<td>Traffic Impact Analysis</td>
<td>3-8</td>
</tr>
<tr>
<td><strong>GOALS/OBJECTIVES/POLICIES</strong></td>
<td>3-10</td>
</tr>
<tr>
<td><strong>RECOMMENDATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>2020 Thoroughfare Plan</td>
<td>3-12</td>
</tr>
<tr>
<td>2000 Major Thoroughfare Plan</td>
<td>3-14</td>
</tr>
<tr>
<td>Transit</td>
<td>3-16</td>
</tr>
<tr>
<td>Traffic Impact Analysis</td>
<td>3-18</td>
</tr>
<tr>
<td>Standards</td>
<td>3-18</td>
</tr>
<tr>
<td><strong>TABLES</strong></td>
<td></td>
</tr>
<tr>
<td>Table 1: Place of Employment of Plano Residents, 1980</td>
<td>3-2</td>
</tr>
<tr>
<td>Table 2: Capital Improvement Funds Allocated to Transportation</td>
<td>3-5</td>
</tr>
<tr>
<td><strong>FIGURES</strong></td>
<td></td>
</tr>
<tr>
<td>Figure 1: Local Airports and Rail Lines</td>
<td>3-2</td>
</tr>
<tr>
<td>Figure 2: Regional Roadways Serving Plano</td>
<td>3-3</td>
</tr>
<tr>
<td>Figure 3: Proposed DART Rail Lines Serving Plano</td>
<td>3-7</td>
</tr>
<tr>
<td>Figure 4: DART Service Plan, North Central Station Locations</td>
<td>3-7</td>
</tr>
<tr>
<td>Figure 5: Spring Creek Parkway/U.S. 75 Overpass</td>
<td>3-13</td>
</tr>
<tr>
<td>Figure 6: Year 2000 Thoroughfare Phasing Plan</td>
<td>3-15</td>
</tr>
<tr>
<td>Figure 7: Typical 'Four-Way' Intersection</td>
<td>3-16</td>
</tr>
<tr>
<td>Figure 8: Typical 'Diamond' Intersection</td>
<td>3-16</td>
</tr>
<tr>
<td>Figure 9: Potential Station Sites, North Central DART Line</td>
<td>3-17</td>
</tr>
<tr>
<td><strong>PLATES</strong></td>
<td></td>
</tr>
<tr>
<td>Plate 1: Thoroughfare Plan</td>
<td></td>
</tr>
<tr>
<td>Plate 2: Thoroughfare Standards</td>
<td></td>
</tr>
</tbody>
</table>
PLANO COMPREHENSIVE PLAN
TRANSPORTATION ELEMENT

INTRODUCTION

The transportation element of the Comprehensive Plan describes a transportation system designed to accommodate local and regional demands through the year 2020. The transportation element is coordinated with the land use element; however, assumptions and projections of future traffic levels are based on projected population and employment for the 2020 design year, not the maximum allowable intensities of use shown on the Land Use Plan. The transportation element also contains policies, procedures and recommendations which create a continuous process of planning, implementation, monitoring and evaluation, the major proposals of which are summarized below.

MAJOR PROPOSALS

TRANSPORTATION PLANNING

Develop a continuous transportation planning process which projects long- and short-range thoroughfare and transit needs. Major updates to the Transportation Plan should be conducted every two years, with minor amendments allowed only through sub-area studies.

TRANSPORTATION IMPROVEMENTS PROGRAMMING

Develop an annual five-year Transportation Improvements Program (TIP) based on transportation plans and anticipated short-range development. Policies propose aggressive local funding strategies to encourage provision of matching funds, right-of-way dedication and private development of thoroughfares.

TRANSIT PLANNING

Cooperate with Dallas Area Rapid Transit (DART) to plan and implement transit services, giving priority to journey to work commuting (i.e., express bus and rail service) and the needs of transit dependent persons.

TRAFFIC IMPACT ANALYSIS

Implement procedures and methods to evaluate the traffic impacts of proposed projects, and promulgate policies and regulations required to balance land use development with thoroughfare capacity.

The transportation element is divided into three major sections: (1) A review of Conditions, Trends and Issues; (2) Goals, Objectives and Policies; and (3) Recommendations.

CONDITIONS/TRENDS/ISSUES

Plano's existing transportation system is principally designed to accommodate private vehicular travel; however, other transportation modes serve Plano. Several rail lines run through Plano (see Figure 1), providing limited service to industrial and warehousing areas, but no rail yards or heavy rail users exist. Air service is limited to two civil aviation fields located within Plano's planned municipal boundaries (see Figure 1). Future land use plans assume that these facilities eventually will be converted to other uses. Commercial air carriers are located at the Dallas/Ft. Worth Airport and Love Field, and local cross-town and express bus service were recently extended into Plano by the Dallas Area Rapid Transit System. A complete report of existing facilities is contained in the Transportation Element Technical Memorandum.
Plano's thoroughfare system is composed of a grid of six-lane thoroughfares coordinated with regional thoroughfares and freeways extending from Dallas (see Figure 1). Local thoroughfares under the City's control have been built as the City has grown; however, improvements to regional routes have not kept pace with growth. The majority of Plano's residents work outside Plano, particularly to the south in Dallas (see Table 1). This contributes heavily to the congestion along the north-south roadways, which is increasing with Plano's rapid growth. Most of these roads (Preston Road, Coit Road, Dallas North Tollway, Avenue K and Jupiter Road) have two-lane segments which seriously limit roadway capacity. The one existing major facility, U.S. 75, becomes seriously congested through Richardson, limiting its ability to provide the needed movement to the south. Problems such as these cannot be directly solved by the City of Plano. Improvements to these roads are needed in adjacent cities and responsibility for design and construction rests with those cities or with the State Department of Highways and Public Transportation.

**TABLE 1**

**PLACE OF EMPLOYMENT**

**PLANO RESIDENTS, 1980**

<table>
<thead>
<tr>
<th>City</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Dallas</td>
<td>41.5%</td>
</tr>
<tr>
<td>Plano</td>
<td>29.9%</td>
</tr>
<tr>
<td>Richardson</td>
<td>12.6%</td>
</tr>
<tr>
<td>Other</td>
<td>16.0%</td>
</tr>
</tbody>
</table>

Source: U.S. Census
STATUS OF REGIONAL THOROUGHFARES

Figure 2 shows the regional roadways serving Plano. The status of these facilities is as follows:

U.S. 75 (CENTRAL EXPRESSWAY)
This heavily congested four-lane freeway is the major link between Plano and Dallas. It is planned to be widened to eight lanes from Interstate 635 to FM 544 and to six lanes beyond that to Legacy Drive. Frontage roads are being widened from two to three lanes. Planning is underway to extend the widening project to McKinney.

STATE HIGHWAY 190
This proposed freeway along the south boundary of Plano will enhance regional mobility by connecting Plano more directly to Garland and State Highway 78 to the east and Carrollton and I-35 to the west. This facility is initially planned as a four-lane divided freeway with two-lane frontage roads. The ultimate design allows for eight main lanes and three-lane frontage roads.

STATE HIGHWAY 289 (PRESTON ROAD)
This two-lane roadway is striped for four lanes south of FM 544. It is seriously capacity deficient. The State Department of Highways and Public Transportation is planning to reconstruct it as a six-lane arterial roadway from Campbell Road in Dallas to State Highway 121 on the north side of Plano. The section in Plano to Legacy Drive should be under construction by early 1987, with the portion from Legacy Drive to State Highway 121 under construction later in the year.

STATE HIGHWAY 121
This facility is developed as a two-lane roadway. It has been upgraded in the Thoroughfare Plan from an arterial roadway to a proposed six-lane freeway to provide more direct access between Plano and the Dallas/Ft. Worth Airport and the mid-cities area.
DALLAS NORTH TOLLWAY
The Texas Turnpike Authority has issued contracts to construct the Tollway as a four-lane roadway to FM 544. It is planned to be extended north to State Highway 121 in the future when the expected revenues from the facility can justify its construction.

SPRING CREEK PARKWAY
This facility is shown on the Thoroughfare Plan as an "expressway" with grade separations at the major intersections. It previously was planned as a major east-west regional artery extending from State Highway 121 on the west to Wylie on the east. Due to the anticipated construction expense of crossing Rowlett Creek, the plan has been changed to curve Spring Creek Parkway southeasterly from Jupiter Road to connect to Shiloh Road.

PLANO PARKWAY
Originally planned as an industrial bypass, this roadway is becoming a regional arterial with adjacent land uses more devoted to offices, especially west of U.S. 75, rather than the originally envisioned industrial development. Plano Parkway is designed as a six-lane divided thoroughfare. Additional access control and upgrading of intersection design are planned to accommodate high daily volumes.

COIT ROAD
Although only a two-lane roadway in places, this facility links west Plano with employment centers in Richardson and Dallas. It provides a direct link to Interstate 635 and U.S. 75. It has recently been widened to six lanes from West 15th Street south to Campbell Road.

In addition to these regional facilities, Plano has a complement of planned six-lane arterial thoroughfares which result in a one-mile grid network.

TRANSPORTATION PLANNING
Plano has maintained a Major Thoroughfare Plan for over 20 years. The plan has changed over the years with changes in land use and updates to the Comprehensive Plan.

The City of Plano works closely with the North Central Texas Council of Governments (NCTCOG) to achieve regional continuity of facilities. The NCTCOG computer models have provided the City with future year traffic projections based on the City's input as to expected land use.

The transportation planning process has been complicated by zoning and development activity. The development potential allowed under the current zoning exceeds the projected land/space absorption for that development (see Development Policy Issue paper and the Land Use Chapter), making it difficult to project future population and employment by location. In turn, this makes it difficult to estimate the generated traffic in future years. The greater the variation between zoned and projected levels of development, the more difficult it is to project future roadway needs.

Many of the Thoroughfare Plan revisions have resulted from traffic studies discussed in conjunction with specific zoning and site plan cases. Sometimes this has resulted in modifications to the Plan that serve a particular development rather than complement the city-wide thoroughfare system.
THOROUGHFARE IMPLEMENTATION

Plano has relied on its Capital Improvements Program (CIP) to guide implementation of its thoroughfare plan. The CIP leads to a bond issue referendum going to the voters. Historically, the City has had strong citizen support for the financing of roadway improvement projects (see Table 2). Funds approved by the voters are usually held in reserve by the City until developers undertake construction of new thoroughfares. The City reimburses the developers for the oversize cost in accordance with the subdivision regulations.

Developer participation is an integral part of the funding of these improvements, and the timing of construction of the facilities is largely dependent on the developer's schedule. Where land owners and developers are unwilling to proceed, it can lead to critical sections of unimproved or underimproved roadways with fully improved sections on either side, thus significantly limiting the carrying capacity of the entire roadway. Additionally, developers are sometimes eager (or under contractual obligation) to construct roads in remote areas of the City which serve little of the population, but in which the City must invest capital and maintenance funds. Supplemental services such as police protection are also needed once the roads are in place.

The implementation of regional thoroughfare improvements is not under complete control of the City of Plano. For example, Preston Road, U.S. 75, State Highway 190, State Highway 121 and State Highway 5 (Avenue K) are projects that must be implemented by the State Department of Highways and Public Transportation.

The City has been successful in obtaining state funding by offering to provide City funding in proposed projects in the interest of accelerating them. The City's strong support of State Highway 190, State Highway 121, State Highway 289 and the Dallas North Tollway, for example, accelerated those projects. Plano officials have been praised for their vision and funding support by members of the State Highway and Public Transportation Commission.

TABLE 2
CAPITAL IMPROVEMENT FUNDS ALLOCATED TO TRANSPORTATION

<table>
<thead>
<tr>
<th>Date</th>
<th>Total Program (Millions)</th>
<th>Transportation (Millions)</th>
<th>Percent</th>
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<tr>
<td>1980-1985</td>
<td>77.7</td>
<td>42.6</td>
<td>54.8</td>
</tr>
<tr>
<td>1985-1990</td>
<td>172.8</td>
<td>82.5</td>
<td>47.7</td>
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Source: City of Plano

3-5
In recent years, the City of Plano has taken a proactive posture toward thoroughfare improvements and the effort should be continued. As a part of the transportation planning process previously described, the City should develop a five-year thoroughfare improvement schedule. The most critical needs should be identified based on development trends and on analysis of the most capacity-deficient roadways through a transportation modeling process. The City should then actively pursue the implementation of those projects, whether they are funded entirely by the City of Plano, or partially by the City and partially by developers, or even by the state or another city.

The City should encourage other jurisdictions to proceed with early implementation of projects that are critical to Plano. For example, roadway construction projects in north Richardson are important to Plano residents because of the heavy traffic movement to and from the south. A similar condition is likely to occur in the future in Carrollton to the west of Plano. The City is actively pursuing roadway construction with the State Department of Highways and Public Transportation and with the Texas Turnpike Authority to expedite construction of State Highway 190, U.S. 75, State Highway 121 and the Dallas North Tollway.

TRANSIT

In 1983, voters in Dallas and several suburban cities approved the creation of the Dallas Area Rapid Transit system (DART). DART has implemented express service to Dallas and cross town local service in Plano. The express service enjoys a good ridership.

In September, 1986, there were 42 buses (per average weekday) running from the park-and-ride location at Parker Road and U.S. 75 at intervals, or "headways", ranging from 5 to 15 minutes during the 6:00 to 9:00 a.m. peak. Headways during the 4:30 to 6:30 p.m. peak were 10 minutes, while the off-peak headway was one hour. The ridership on this express bus service was approximately 1,600 round trips per day. (DART is building a permanent park-and-ride facility at Coit Road and 15th Street.)

The local service within Plano had buses operating on seven routes on a headway of 20 minutes during the 6:00 to 9:00 a.m. and the 3:00 to 6:30 p.m. peaks. The off-peak headways were one hour. The ridership in September, 1986, was approximately 1,400 trips per day with individual route ridership ranging from a low of 90 trips per day to a high of 330 trips per day. In a review of the Plano crosstown routes, DART has proposed several schedule and route changes to be implemented in March, 1987. Peak headways have already been increased to 30 minutes on Plano routes. The service review indicated that passengers per vehicle mile ranged from 0.22 to 0.44 on Plano routes as contrasted to the desired DART system standard of 1.8.

The DART service plan calls for rail service (see Figure 3) to Plano along the Southern Pacific Railroad right-of-way, ending in the vicinity of downtown Plano. "Unfunded extensions" of the rail system are shown from the Interstate Highway 635 area along the Dallas North Tollway to State Highway 121, along the St. Louis and Southwestern Railroad from downtown Plano to Addison, and extending from the suggested terminal point in downtown Plano to the
draw ridership from a large region throughout Collin County. A large parking demand will have to be satisfied at this station. The southern station will initially serve as the terminal station, but may eventually serve the Addison line as well. Double line stations are especially attractive, luring private development because of rider transfers and their larger service area. Both sites should be secured by the City and DART at the earliest possible date in order to minimize cost and to plan for on- and off-site development. Planning for the sites should evaluate the impact of the stations on the local street network, and the surrounding land use pattern and intensities. Attention should also be paid to urban design features around station locations. (No station sites have been designated by DART for the other unfunded extension lines.)

Spring Creek Parkway area along the Southern Pacific Railroad. "Unfunded extensions" are potential additions to the rail system once the initial network is constructed. These unfunded lines are not included in any of the financial forecasts or construction schedules of DART. It will have to be determined whether the lines show the potential ridership to justify their construction, and whether DART has the financial resources to build them. A proposed schedule for construction of these lines will also be forecast. At this time, the funded portions of the DART system are scheduled to be constructed in three phases, with the Plano station included in the final phase and targeted for completion in 2010.

The DART service plan designates two general areas along the North Central line for rail stations in Plano (see Figure 4). Both stations have strategic importance to DART and the City. The northern-most station will eventually be the terminal station and thus, can be expected to
The success of express bus service on U.S. 75 would indicate the likelihood of a successful rail line operation between Plano and Dallas. The lack of success of the local bus service would indicate that it is unlikely that a similar rail operation in Plano will attract a large ridership even from a long-range standpoint.

These assumptions are largely supported by the ridership projections included in the recent Plano Transit Study as a part of the Comprehensive Plan update. A 1985 North Central Texas Council of Governments (NCTCOG) projection for the year 2000 predicts 12,500 transit trips per day made by Plano residents to areas outside Plano, and 2,700 transit trips per day made by non-residents to destinations within Plano. The great majority of the transit trips would be made on the DART light rail system.

The NCTCOG projections for year 2000 on the local bus service in Plano indicate that only 1,200 trips per day would be made on these local buses. Because of the high fixed cost of providing transit service (buses, drivers, etc.) it is difficult to justify bus operation with such small ridership.

There are two critical issues relating to transit service in Plano:

- Should local bus service be continued?
- Should the "unfunded extensions" of the rail lines be constructed?

The lack of ridership and the high cost of operation raises the issue of continuing (and especially expanding) the local bus service. One primary reason to continue the service is to provide a link to express bus service and eventually to the rail service. It also serves to provide transportation to those people who do not have automobiles or who cannot drive.

Elderly and handicapped service can and should be provided to those transit dependent persons. This service will be provided by DART on a regional basis, which is the appropriate means of providing mobility to those persons otherwise without it. Such a service can be more easily designed to accommodate the special needs of these persons without relying on a fixed-route crosstown system.

The critical aspect of the unfunded extensions, particularly the Dallas Tollway line, is that steps should be taken to reserve right-of-way immediately. With intense development occurring in north Dallas and Plano along the Tollway, the proposed rail line becomes more and more justified. Unfortunately, this same intense development, and accompanying high land costs, can preclude the rail line if right-of-way is not set aside early. Other unfunded extensions are proposed for rail rights-of-way which will, in all likelihood, remain available for transit use.

TRAFFIC IMPACT ANALYSIS

The intense office and retail development in north Dallas is extending into Plano. This development in Dallas has already caused serious traffic congestion around Interstate 635, Dallas North Tollway, U.S. 75 and other locations. These same traffic problems are beginning to occur in Plano, and will continue to be more of a problem unless a procedure is instituted to coordinate or phase the level of development with the capacity of the transportation network.
Zoning cannot be relied on to balance land use and transportation facility capacity. Zoning, by its nature, is broad, allowing for many alternative uses and intensities of development. This severely limits its value as a means of predicting or controlling traffic generation. Also, zoning is often granted well in advance of actual development and the construction of supporting community facilities. Therefore, zoning provides almost no control over the timing and coordination of development.

For major developments in Plano and elsewhere, traffic is becoming one of the most important considerations and traffic impact analyses are becoming more common. Many developers are recognizing that the success of their development is largely dependent on the traffic ingress, egress and circulation. One of the major concerns of increasingly active neighborhood groups is the impact of traffic on the existing and proposed network and on the quality of life of the community. Likewise, the Planning & Zoning Commission and the City Council continue to place a high priority on the evaluation of traffic impacts resulting from rezoning or site plan approval cases.

The City of Plano now has a formal requirement for traffic impact studies. The Traffic Impact Analysis (TIA) procedure has been adopted by the Planning & Zoning Commission and the City Council and incorporated into the Zoning Ordinance. This procedure is now in the process of being implemented (see Zoning Ordinance for full text).

Policies 4.101 - 4.109 detail some of the requirements of Traffic Impact Analysis. For zoning cases, a TIA must be prepared by the developer for requests generating more than 1000 trips per day. A TIA must also be prepared for multi-family and non-residential site plans generating over 5,000 trips per day. For zoning cases and site plans not meeting the threshold, City staff will conduct the Traffic Impact Analysis. The ordinance establishes a Level of Service "D" or above at peak hour as a desirable standard. (Level of Service [LOS] is a measure of congestion along roadways and at intersections. LOS is designated by the letters "A" - "F", with "A" being the least congested and "F" the most.)

A zoning case which meets the LOS standard of "D" or above meets the criterion for approval on the basis of traffic impact. If a site plan’s TIA indicates that, given existing facilities and those shown on the TIP, LOS may fall below "D", then the approval and construction of the site plan may be delayed until facilities are adequate, up to a maximum of two years. The applicant may employ mitigation measures such as voluntary construction of off-site improvements, financial participation in city street and traffic improvement projects, or phasing of the development to levels consistent with the capacity of the existing street system to avoid a delay in construction.

The Traffic Impact Analysis procedure will help the City accomplish two objectives. At the time of zoning, it will give decision makers an idea of the future ability of the thoroughfare system to handle the proposed zoning. At the time of site plan approval and construction, TIA will give a detailed picture of traffic patterns in the specific area of the site plan request and will allow the City and developer to attempt to bring development levels and roadway construction schedules into balance.
GOALS/OBJECTIVES/POLICIES

The following section of the transportation element provides a framework of objectives and policies developed in response to the conditions, trends and issues reviewed in the previous section. The policies provide a basis for the development of processes, regulations and recommendations to guide the development of Plano's transportation system.

GOALS

• Plano should develop an effective, coordinated local transportation system, and should encourage and participate in meeting regional transportation needs.

• Plano should develop a transportation system which will effectively, efficiently, and economically meet the existing and anticipated land use needs at a reasonable level of service, while protecting and enhancing the quality of life.

OBJECTIVES AND POLICIES

OBJECTIVE 1.100 DEVELOP A TRANSPORTATION PLANNING PROCESS WHICH ADDRESSES LONG-RANGE NEEDS BUT EMPHASIZES SHORT- AND MID-RANGE PROBLEM SOLVING.

POLICY 1.101 Maintain a long-range Major Thoroughfare Plan for the purposes of facility planning and right-of-way reservation and dedication. This Plan should also contain a 15-year phasing (or year 2000) plan.

POLICY 1.102 The year 2020 shall be used as the design year for long-range plans and projections of population and employment within the City. The projections should be distributed on the basis of existing zoning for the purpose of transportation modeling and planning.

POLICY 1.103 Participate in regional and interjurisdictional transportation programs. Coordinate local thoroughfare design standards and alignments with those of the region and adjacent municipalities, where feasible and in the best interest of Plano.

POLICY 1.104 Evaluate and update the Major Thoroughfare Plan on a citywide basis every two years.

POLICY 1.105 Allow for amendments to the Major Thoroughfare Plan between biennial updates only when essential to the development of land, and when supported by a study of the system and fiscal impacts of the proposed change.

POLICY 1.106 Conduct an annual review of existing transportation facilities and their performance and safety records to determine Transportation System Management techniques which would improve capacity and traffic safety.

OBJECTIVE 2.100 DEVELOP PROGRAMS AND FUNDING STRATEGIES TO IMPLEMENT TRANSPORTATION IMPROVEMENTS, ENSURING ADEQUATE CAPACITY AT THE LEAST COST TO PLANO WITHOUT COMPROMISING SERVICE, DELIVERY OR QUALITY.

POLICY 2.101 Develop and update annually a five year Transportation Improvements Program (TIP).

POLICY 2.102 Continue the use of local funding to supplement and leverage construction funding from non-local sources.

POLICY 2.103 Use incentive contracts to encourage the early completion of construction.
POLICY 2.104 Develop cost sharing policies which encourage private development of transportation projects consistent with the priorities of the Transportation Improvements Program (TIP) and thoroughfare phasing plan. Include the reimbursement of oversize costs only within the year scheduled in the TIP or on a pro rata basis based on developed frontage.

OBJECTIVE 3.100 ENCOURAGE DART TO PROVIDE A FISCALLY RESPONSIBLE TRANSIT SYSTEM WHICH GIVES PRIORITY TO JOURNEY TO WORK TRIPS AND THE NEEDS OF TRANSIT DEPENDENT PERSONS.

POLICY 3.101 Recognize DART as the primary provider of transit services in Plano.

POLICY 3.102 Encourage DART to give priority to rail and express bus service from Plano to major employment centers outside the City.

POLICY 3.103 Structure a transit route system such that a minimum of 40% of the route costs can be recovered by fares over an established time period.

POLICY 3.104 Encourage DART to examine paratransit (shared ride taxi, van-pool, dial-a-ride, etc.) as an alternative to fixed-route, cross-town transit service.

POLICY 3.105 Encourage DART to develop a locally targeted advertising and marketing program to increase ridership.

POLICY 3.106 Request DART to evaluate transit service needs and ridership annually in a report to City Council.

OBJECTIVE 4.100 ENSURE A BALANCED RELATIONSHIP BETWEEN LAND USE DEVELOPMENT AND THE TRANSPORTATION SYSTEM.

POLICY 4.101 Implement a traffic impact analysis procedure at both the zoning and site plan approval phases of the development process.

POLICY 4.102 Require a traffic impact study of all proposed rezonings generating more than 1,000 trips per day. For projects generating 1,000 trips per day or less, the analysis will be performed by City staff.

POLICY 4.103 Level of Service "D" in the peak hour is the minimum standard of service in the Plano thoroughfare system. Zoning changes should be evaluated on the basis of estimated future traffic volumes and the resulting level of service of streets and intersections.

POLICY 4.104 Amendments to the Major Thoroughfare Plan will not be accepted as a means of mitigating negative traffic impacts of a proposed zoning change (see Policy 1.104).

POLICY 4.105 Planned Development zoning should be used to place phasing requirements on development to ensure coordination with future transportation improvements.

POLICY 4.106 Require the applicant to perform a traffic impact analysis at the time of site plan approval for all multi-family and non-residential developments generating more than 5,000 trips per day. For projects generating 5,000 trips per day or less, the analysis will be performed by City staff.

POLICY 4.107 If the traffic impact analysis demonstrates that existing transportation facilities and those within the TIP are not adequate without increasing congestion beyond Level of Service "D", approval of site plans may be delayed up to a maximum of two years to allow for the construction of public improvements.
POLICY 4.108 Appropriate mitigation measures for unfavorable traffic impact analyses for site plans include the applicant's voluntary construction of off-site improvements, financial participation in City street and traffic improvement projects, or the phasing of development to levels consistent with the capacity of the existing street system.

POLICY 4.109 Results of traffic impact studies will be taken into account in the preparation of the TIP and biennial updates of the Major Thoroughfare Plan.

OBJECTIVE 5.100 DEVELOP ADMINISTRATIVE PROCEDURES AND RESPONSIBILITIES FOR THE PREPARATION, REVIEW AND APPROVAL OF TRANSPORTATION PLANS AND TRAFFIC IMPACT STUDIES.

POLICY 5.101 The Planning & Zoning Commission is responsible for reviewing and making recommendations on all transportation plans and related amendments.

POLICY 5.102 The Planning & Zoning Commission is responsible for reviewing and resolving all traffic impact studies. Appeals of the Planning & Zoning Commission's decision may be heard by City Council at its discretion.

RECOMMENDATIONS

The following section of the transportation element describes the Major Thoroughfare Plan and related recommendations for implementation of transportation improvements.

One of the most critical aspects of the quality of life in a high growth community such as Plano is transportation. If it is not provided for along with development, the mobility of the citizens will be seriously impaired. The following recommendations are intended to minimize that problem and to provide for the use of available financial resources in the most beneficial manner.

2020 THOROUGHFARE PLAN

The purpose of the Thoroughfare Plan is to provide a long-range plan for the purpose of facilities planning and dedication of needed rights-of-way. The recommended 2020 Plan is illustrated in Plate 1. The Plan is based upon the 1981 Thoroughfare Plan, under which the City has been operating.

Revisions to the 1981 Plan were derived from a computer model analysis of capacity deficiencies within the network based upon projected traffic volumes for the year 2020. This analysis assumed a future population of 360,000, and a local employment of 233,000. The future population and employment were distributed based on existing zoning patterns, which closely approximate the Future Land Use Plan. Zoning, rather than a plan based upon distribution, was selected to provide an appropriate basis for traffic impact analysis.

The major recommended changes in the 2020 Plan and 1981 Thoroughfare Plan are as follows:

- Curve Spring Creek Parkway north to State Highway 121 west of Midway Road, rather than extending it westerly parallel to State Highway 121. It appears that if Spring Creek Parkway were constructed according to the previous Thoroughfare Plan, early completion to State Highway 121 could not be assured. In the interest of providing continuity, it should be extended northerly to State Highway 121. This will necessitate the curving of Marsh Lane to intersect Spring Creek Parkway at a 90 degree angle.
• Replace the unnamed Type "C" facility north of Parker Road between Midway Road and Marsh Lane with two unnamed Type "C" facilities. These facilities are necessary to accommodate anticipated development.

• Provide for a depressed Tollway facility, where possible. Depressing the roadway will reduce its visual and noise impact, greatly improving the aesthetics of the corridor. A depressed roadway will also allow for alternate uses along the Tollway such as residential development similar to that found in Dallas (see Dallas North Tollway Corridor Design Study).

• Downgrade the unnamed Type "C" facility between Spring Creek Parkway and another unnamed Type "C" facility west of the Tollway to a Type "D" thoroughfare.

• Realign Ventura Drive between Park Boulevard and Spring Creek Parkway to encourage desirable land use along Preston Road.

• Add a north/south Type "C" facility between McDermott Road (FM 2170) and State Highway 121. This facility, located between Ohio Drive and Coit Road, should be aligned with a similar facility in Frisco to handle anticipated development along State Highway 121.

• Upgrade State Highway 121 to freeway status, and where possible depress the roadway. Campus office development should be encouraged. Depressing the roadway will reduce its visual and noise impact and will allow residential uses as well. Retail uses will be allowed at interchanges (see State Highway 121 Corridor Design Study).

• Add a Type "C" facility, Ridgeview Drive, paralleling State Highway 121 between Custer Road and Coit Road. Such a facility is needed to accommodate traffic from anticipated campus-type office development.

• Add an unnamed Type "D" facility parallel to State Highway 190 and Plano Parkway between Ohio Drive and Coit Road. This facility is needed to accommodate anticipated development in this area.

• Extend Legacy Drive easterly from U.S. 75 to tie into Los Rios Boulevard. Such a realignment of Legacy Drive will create a continuous loop from east Plano to northwest Plano.

• Implement plans for express lanes on Spring Creek Parkway under U.S. 75 and its frontage roads (see Figure 5). This will allow through trips (those that do not turn to or from the frontage roads) to travel below the signalized frontage road intersections. This will save time for those through vehicles as well as reduce congestion at the frontage road intersections.

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Spring Creek Parkway/U.S. 75 Overpass

FIGURE 5
• Add a grade separation, an extension of Chase Oaks Boulevard, across U.S. 75 connecting Legacy Drive to Jupiter Road. This Type "D" facility is intended to provide additional capacity to aid the overloaded crossings at Parker Road and Spring Creek Parkway, and to provide more direct access to a potential DART rail station.

• Change Parker Road east of Shiloh Road from a Type "A" to a Type "C" facility. Such a change provides route continuity along Parker Road and meets the anticipated traffic demands of future development.

• Extend 18th Street across U.S. 75 to Alma Road. This is intended to relieve current and projected congestion on 15th Street and Park Boulevard. This crossing should not interchange with the frontage roads, but should instead cross over them as well as the main lanes.

• Median widths have been increased on all divided thoroughfares. The change was made to allow cars to be sheltered in the median when crossing or turning across a major thoroughfare. The wider median will also allow for double left turn lanes to be installed at intersections if demand warrants, and for additional landscaping.

• Grade separated crossings of the Southern Pacific Railroad are planned where Spring Creek Parkway and Legacy Drive intersect with U.S. 75. This will allow emergency vehicle access from east Plano to the hospital, which the City currently lacks.

2000 MAJOR THOROUGHFARE PLAN

A phasing of the 2000 Plan was developed for the year 2000. The recommended 2000 Plan is presented in Figure 6. The Plan is based upon an estimated 2000 population of 259,000 and a work force of 120,300 employees. The City of Plano Planning staff estimated the distribution of projected population and employment based upon growth trend analyses and upon estimates of area growth potential relative to committed roadway improvements. This 2000 Plan should be used as the basis for the development of the five-year Transportation Improvement Program (TIP).

The 2000 Plan is based upon the following assumptions:

• North Central Expressway will be an eight-lane freeway with six frontage road lanes;

• State Highway 121 will be a four-lane expressway;

• State Highway 190 will be constructed as two three-lane frontage roads with no main lanes built; and

• The Dallas North Tollway will be constructed as two three-lane frontage roads with no main lanes built.

Recommended improvements are located throughout the City. Generally, the highest priority projects are located south of Hedgcoxe Road, east of the Dallas North Tollway, and west of Shiloh Road. Included among these high priority projects are three overpasses of North Central Expressway at Legacy Drive, Chase Oaks Extension, and 18th Street. Most of the 2000 Plan is composed of projects which upgrade existing facilities to the ultimate 2020 Plan level. Other improvements include the construction of new facilities or the upgrading of existing facilities, both to less than the 2020 Plan level of improvement. These projects can be considered the first phase of larger projects. More detailed discussions of the 2000 Plan are presented in the Technical Memorandum for the Year 2000 Thoroughfare Plan.
Year 2000 Thoroughfare Phasing Plan

FIGURE 6
The planned grade separations on the Thoroughfare Plan should be divided into two groups: those which need to be grade separated immediately, and those which may need to be grade separated in the future. Those which need to be grade separated immediately should be included in the five-year Capital Improvements Program, designed, and constructed. Those which cannot be justified within the five-year planning horizon should be built as a normal "four-way" intersection. The reason for this is that a normal intersection operates more efficiently than the "diamond" intersection that is currently constructed in anticipation of the grade separation (see Figures 7 & 8). The normal "four-way" intersection has greater capacity and reduces motorist delay when compared to the "diamond" intersection. If a "diamond" frontage road intersection is constructed (anticipating the grade separation of main lanes to be added later), the motorists must tolerate the additional delay until the overpass (or underpass) is built. In some cases, the additional capacity of the normal intersection might delay or eliminate the necessity of constructing the grade separation.

**TRANSIT**

Transit is and should continue to be an integral part of the transportation system in Plano. Based upon the transit studies conducted for Plano (see Plano Transit Element Working Paper on Evaluation of Transit Potential and Concept Plan Development), providing commuter service appears to be very desirable while internal service is questionable. The following transit recommendations are made:

- Temporarily discontinue internal bus service in Plano because of low ridership. Establish less expensive para-transit service as an alternative. Periodically investigate the demand for reestablishment of intracity bus service.

The internal DART bus service in Plano does not enjoy the ridership to justify continuing it. It should be emphasized that a new service such as this takes some time to gain ridership; however, the extremely low current ridership indicates that
passenger volumes are unlikely to reach a level which will justify continuing local bus service. In situations of very low ridership, a transit system could actually increase congestion and delay. It is estimated that only approximately 1,200 bus trips would be made within Plano in 2000. It is also estimated that the bus service would cost approximately $2 million per year and would only generate about $270,000 per year in the fare box. This would result in the recovery of only 14% of the operating costs and in an operating deficit of $1.7 million per year. Alternate forms of transportation service such as paratransit (shared ride taxis, vanpools, etc.) should be implemented in lieu of local bus service, and ridership potential should be periodically evaluated to determine the need of reestablishing internal bus service. Any reestablishment should be well-publicized to enhance ridership potential.

- Work with the Texas Turnpike Authority to set aside right-of-way for a future rail line.

Because of the way development in west Plano is occurring and land values in the vicinity of the Tollway are accelerating, it is necessary that right-of-way for the future unfunded rail line be reserved now. The logical place for this is in the center of the Tollway.

- Locate the DART rail stations along the St. Louis and Southwestern Railroad and the Southern Pacific Railroad.

The revised DART service plan shows a terminal station for the North Central Rail Line near Downtown Plano and the intersection of the St. Louis and Southwestern and Southern Pacific Railroads. Figure 9 shows locations that were considered for stations in the Transit Element Working Paper. The figure also shows alternative sites for other stations in the City. The DART service plan shows an unfunded extension of the North Central line to Spring Creek Parkway. A study prepared for the Spring Creek Parkway/State Highway 5 area recommended a location on both sides of Spring Creek Parkway for the station, including parts of A-1 and A-2. Sites labeled "B" were evaluated in the Park Boulevard/Parker Road area where an additional station might be located in the future. This general station area would have to be added to the DART service plan, however.

![Potential Station Sites North Central DART Line](image)

FIGURE 9
TRAFFIC IMPACT ANALYSIS

A continuous transportation planning process is needed. The City must be able to guide land uses and react to changes in land use. This will become more possible with the City's commitment to its own microcomputer-based transportation planning program. This program, MICROTRIPS, will permit the City to evaluate a major land use change in a relatively short time period. This is done by changing the trips based on the new Land Use Plan. The program then distributes the trips to other traffic zones and ultimately assigns the trips to the roadway network. This gives City staff a good idea of how much the traffic on a specific roadway will change with a land use change. Additionally, City staff will be able to consider alternative thoroughfare configurations. This is done by changing the network description in the computer model. Such characteristics as roadway length, speed and capacity enable the program to simulate the routes drivers will take between two traffic zones, thereby arriving at an estimate of the number of vehicles on each roadway. These tools will be valuable as the City implements requirements for traffic impact analysis.

The City will continue to work closely with the North Central Texas Council of Governments on regional considerations relating to transportation planning, but will have the ability to make quick turnaround analyses for specific land use and thoroughfare changes. This will enable the staff, Planning & Zoning Commission, and City Council to predict the effect on traffic volume of a land use or thoroughfare system change.

In order to facilitate a balanced relationship between land use development and the transportation system, the following recommendations are made:

• Implement a Traffic Impact Analysis procedure for large developments for both zoning requests and site plan submittals. This analysis should show the additional traffic generated by the development and how it will be accommodated both on-site and on the roadway network. For small requests, analyses will be conducted by City staff.

• Ensure staff capability to conduct the transportation planning function and review the traffic impact analyses submitted by developers.

• Approve developments only when the required roadway network is in place or will be in place when the project is ready to open. If this is not the case at site plan level, projects may be delayed up to a maximum of two years.

STANDARDS

The Thoroughfare Plan (see Plate 1) consists of numerous facilities with various cross-section characteristics. The cross-section is made up of such features as pavements, medians, parkways, frontage roads, transit ways, bikepaths, bike routes and rights-of-way. The recommended cross-section for each thoroughfare type is presented in detail in this section of the element. These cross-section recommendations are typical and should be used in conjunction with the Plano Thoroughfare Plan, the Plano Comprehensive Bikeway Plan, and the City’s Thoroughfare Standards Ordinance. Plate 2 shows the proposed cross-section standards.
The coding indicated for each thoroughfare is a combination of letters, numbers, and Roman numerals and is interpreted as follows:

The first letter is an E, M, S or R.

E - Expressway (includes thoroughfare types "T", "AA" and "A");

M - Major thoroughfare (includes thoroughfare types "B", "B+" and "C");

S - Secondary thoroughfare (includes thoroughfare types "D", "E" and "F"); or

R - Residential street (includes thoroughfare types "G" and "H").

The number following the first letter indicates the number of lanes specified; for example, the number six indicates a six-lane facility.

The second letter in the symbol designates whether the thoroughfare is divided by a median barrier or is undivided; the letter "D" indicates divided while the letter "U" means undivided.

The third letter indicates the access design characteristics. Where frontage roads are proposed, the letter "F" appears, while the letter "A" designates partial access control.

The Roman numeral indicates the type of bikeway design incorporated in the section. Class I and III are utilized as referenced in the 1985 Plano Comprehensive Bikeway Plan.

For example, the symbol (E6DFI) indicates an expressway with six lanes, divided by a median barrier, with frontage roads and a Class I bikepath.

Thoroughfares designed to the standards indicated are expected to be adequate to accommodate the local traffic volumes generated in the future in the Plano area. Facilities to handle the externally generated traffic volumes will depend heavily upon decisions relative to the regional highway system. The recommended face-to-face pavement widths and right-of-way widths for each type of street and thoroughfare shown on the Thoroughfare Plan are outlined as follows:

TYPE "T" (E6DF)
The Type "T" thoroughfare is the extension of Dallas North Tollway. The pavement section is depressed and consists of two 36-foot wide roadways with a 50-foot center median. The extra width in the median provides space for a future transit way or commuter rail line. The Type "T" roadway can be developed with 350 feet of right-of-way, which can accommodate future frontage roads utilizing retaining walls if necessary. If the roadway is developed using sloped sides, 380-450 feet of right-of-way may be necessary.

TYPE "AA" (E6DF or E8DA)
The Type "AA" thoroughfare is a freeway with two 48-foot wide roadways and a marginal parkway area 50 feet wide. The section may or may not have three-lane service roads on each side. The Type "AA" thoroughfare will have fully controlled access to the main roadway, with grade separations at cross streets. The right-of-way standard can vary upward from 452 feet depending on the width needed for grade separation. Less right-of-way will be required if frontage roads are not included. This section can be either depressed or at grade depending upon design and environmental considerations.
TYPE "A" (E6DA or E6DAI)
The Type "A" thoroughfare is a limited access arterial without frontage roads. The pavement section consists of two 36-foot wide roadways with a 28-foot center median and a marginal parkway area 30 feet wide. The Type "A" right-of-way standard will range from 160 to 170 feet in width depending upon the need for bikeways. A wider marginal area will accommodate deceleration lanes, and will provide additional space for planting trees to insulate adjacent development from the impact of high traffic volumes. The design of the thoroughfare is intended to limit points of intersection and to reduce the amount of marginal interference with traffic movements, thereby retaining a high capacity and a reasonable operating speed on the thoroughfare.

Intersections and left-turn lanes are limited to spacings of at least one-fourth mile intervals. Grade separations at points of heavy cross traffic are planned. Access to adjacent commercial properties is by privately constructed deceleration lanes.

TYPE "B+" (M8DA)
The Type "B+" thoroughfare is used where very heavy traffic volumes are expected, including through regional movements. The section consists of two 36-foot roadways with 12-foot wide access lanes and a 24-foot wide median. Access to adjacent land will be accomplished by utilizing the 12-foot access lanes (privately constructed), or by the use of deceleration lanes which the developer may build. The right-of-way width is a minimum of 140 feet, with additional right-of-way necessary for grade separations. Intersections and left-turn lanes are limited to spacings of at least one-fourth mile intervals. Grade separations at points of heavy cross traffic are planned.

TYPE "B" (M6DA or M6DAI)
Where fairly heavy traffic volumes are anticipated, including through regional movements, the Type "B" section is recommended. The pavement section provides two 36-foot paved roadways separated by a 24-foot median divider. The Type "B" thoroughfare standard has a minimum right-of-way of 130 feet in width. When the cross-section includes Class I bikepaths, the minimum right-of-way becomes 140 feet. The Class I bikepath should be a minimum of 10 feet as per the 1981 Guide for Development of New Bicycle Facilities by the American Association of State Highway and Transportation Officials.

TYPE "C" (M6D, M6DI or M6DIII)
For local major thoroughfares, a six-lane divided thoroughfare designated as Type "C" is recommended. The two 33-foot wide pavement sections would be separated by a 24-foot median divider. A 24-foot standard provides safer median storage of vehicles perpendicular to the roadway. The right-of-way requirement for a Type "C" standard thoroughfare is 110 feet. At intersections with type "A" through "C" thoroughfares, right-of-way is 130 feet for a distance of 200 feet from the intersection, followed by a transition back to 110 feet (see Thoroughfare Standards Ordinance No. 86-11-17). The Type "C" standard is appropriate for a majority of the local arteries which function primarily within Plano. With the inclusion of the Class I bikepath (M6DI), the minimum right-of-way width becomes 130 feet. The bikepath is a two-way facility and is generally required only on one
side. Similarly, when the Class III bike route (M6DIII) is included, the minimum right-of-way becomes 117 feet. The Class III bike route is a one-way facility and is required on both roadways. The curb lane is 14 feet to include the bike route as per the 1981 Guide for Development of New Bicycle Facilities by the American Association of State Highway and Transportation Officials.

That portion of Park Boulevard between Avenue N and Ridgewood Drive is designated as a Type "C" thoroughfare with a "C1" notation, whereas the use of two outside lanes is reserved for parking. Special circumstances surround this particular section of roadway. Homes have been constructed on both sides of the street facing the roadway. There is inadequate roadway and front yard setback to permit the addition of frontage roads to provide separate parking and access for residents and visitors. The City will make every effort possible to divert additional traffic from this section of East Park Boulevard by completing Parker Road, F.M. 544, Spring Creek Parkway, Jupiter Road, Shiloh Road and Los Rios Boulevard before changing the existing designation. When data produced by the City's traffic volume counts indicates that it may be necessary to remove parking from the street, the City will attempt to determine alternative parking in the affected area.

TYPE "D" (S4D, S4DI or S4DIII)
Where high volumes of predominately local traffic are anticipated on local arteries or where secondary thoroughfares may involve high volumes of turning movements, the Type "D" thoroughfare standard is appropriate. Two 24-foot wide pavement sections divided by a 24-foot wide median are the basis of the Type "D" thoroughfare standard. A 24-foot standard provides safer median storage of vehicles which are perpendicular to the roadway. The minimum right-of-way is 92 feet in width. Residential lots adjacent to a Type "D" thoroughfare will not have direct access to the street without utilizing circular drives, and they will be designed with a larger setback than is normally required.

When the Class I bikepath is included in the cross-section, the minimum right-of-way width becomes 104 feet. The bikepath is a two-way facility and is generally required on only one side of the roadway.

The Class III bike route requires that the roadway be constructed with two 26-foot wide pavement sections and a minimum right-of-way width of 92 feet. The bike route is a one-way facility on both sides of the roadway. The curb lane is 14 feet wide.

TYPE "E" (S4U, S4UI or S4UIII)
The Type "E" thoroughfare standard is intended to serve as both a moderate capacity thoroughfare and a secondary street. The Type "E" section is used where four moving lanes of traffic are required, but where right-of-way restrictions limit the use of divided roadway sections or it is not anticipated that a divided roadway will be needed. The right-of-way width standard for a Type "E" section is 65 feet. The application of the Type "E" section is also suggested for industrial areas where heavy truck movement can be anticipated, for business areas where the right-of-way is restricted, or where at some time it may be appropriate to operate the streets paired as one-way thoroughfares. On-street parking will be prohibited in these areas.
Where the Type "E" thoroughfare acts as a residential neighborhood collector, developers are encouraged to design subdivisions so that the sides of houses face toward the street. Lots which back to the Type "E" roadway will effectively split the neighborhood because of the screening required adjacent to the street and should be discouraged. Lots facing the street will not have direct access without utilizing circular drives, and they will have larger than normal setbacks.

When the Class I bikepath is included in the cross-section, the minimum right-of-way becomes 80 feet. The bikepath is a two-way facility and is required generally on one side of the roadway only.

The Class III bike route requires that the pavement section be widened to 52 feet to accommodate bicycles in each direction. The bike route is a one-way facility. The curb lane is 14 feet wide.

That Section of East 14th Street between Avenue K and Jupiter Road is designated as a Type "E" thoroughfare with an "E" notation. This allows for two lanes of traffic in each direction and a continuous center left-turn lane. Seventy-five feet of right-of-way is required with 55 feet of pavement. (This section is designated as "E" in the Thoroughfare Standards Ordinance.)

TYPE "F" (S2U or S2UI)
Collector streets are limited to approximately one mile in length and connect internal neighborhood residential streets to major thoroughfares. The Type "F" street, which uses a minimum 60-foot right-of-way and has a 36-foot wide pavement, is required. The thoroughfare provides two travel lanes and two parallel parking lanes. The Type "F" section is applicable to collector streets and to certain commercial and industrial streets where low to moderate traffic volumes are anticipated. The Type "F" standard is also appropriate for multi-family housing areas where periodic on-street parking facilities are needed. With the inclusion of a Class I bikepath in the cross-section, the minimum right-of-way becomes 74 feet. The bikepath is a two-way facility and is generally required on only one side of the roadway. The Class III bike route requires that the pavement section be widened to 40 feet to accommodate bicycles in each direction. The bike route is a one-way facility. The curb lane is 14 feet wide.

TYPE "G" (R2U)
Local or minor access streets in residential areas have rights-of-way 50 feet in width and minimum pavement widths of 26 feet. This standard local thoroughfare is the type of street which has been built for residential use in Plano for at least 20 years. The paved section allows for two travel lanes with one parking lane. In conditions of heavy on-street parking in residential areas, the capacity of the minor street would be reduced to one moving lane. Experience has shown that the Type "G" section is adequate where the street system is designed to prohibit through traffic movements and where the number of houses served by each street is limited. Some modification of the Type "G" pavement section may be appropriate in special cases, but the 50-foot right-of-way standard should be maintained as the minimum.

TYPE "H" (R2U)
In certain areas of Plano, country-type estates on fairly large lots have been developed. It is possible that additional development of this type may be created where a special type of thoroughfare would be appropriate. The Type "H" section requires a 60-foot right-of-way and provides a 24-foot pavement without a curb and with the surface drainage
provided in swales or ditches parallel to the roadway. In most cases, the drainage swales are constructed as sod gutters and maintained as part of the adjacent lawn or yards of the homes fronting upon them. The setback of residences and other structures must be sufficiently deep in the estate areas so that no on-street parking is needed, since the estate-type section prohibits parking on the roadway. The estate-type section should not be used where lots of less than two acres in size are created, or where driveway intersections occur more frequently on one side of the road than 250 feet apart. In this situation, the driveway intersections will require culverts in the drainage swale and closer spacing would unnecessarily complicate drainage and create a poorly designed road.

1 Type "G" and "H" thoroughfares are not specifically noted on the Thoroughfare Plan since the map is intended to identify roadways of secondary size or larger.