1998 - Town Of Addison Transportation Plan - PERM

File

TOWN OF ADDISON

TRANSPORTATION PLAN

Prepared for:

The Town of Addison

Prepared by:

Parsons Transportation Group Inc.

June, 1998

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1. INTRODUCTION

In December 1992, the Addison Transportation Plan Committee was formed to develop a transportation system Plan that would accommodate travel demands within the Town through the year 2010. As a result of this effort, a transportation plan, incorporating thoroughfares, transit, and pedestrians, was developed which would provide for the safe, efficient, and orderly movement of people and goods in, out, and through the Town, while preserving the quality of life and environment for citizens and businesses.

In response to continued high economic growth in the Town since 1992, it has become necessary to update the Plan to reflect current conditions. Specific factors influencing this update include:

- Increased traffic volumes on major roadway facilities throughout Addison;
- Updated demographic projections for both 2010 and 2020;
- The need for additional north/south and east/west roadway capacity to accommodate growth; and
- Right-of-way limitations for roadway enhancements other than at intersections.

The updated Addison Transportation Plan consists of three fully integrated components: a thoroughfare plan, a pedestrian plan, and a transit plan. The thoroughfare plan is based on a system of functionally classified roadways. These functional classifications reflect the role or function of each roadway within the overall thoroughfare system. The pedestrian plan identifies strategies to accommodate future pedestrians and to encourage walking. The transit plan identifies needed transit improvements.

GOALS AND OBJECTIVES

Although this transportation plan provides for the safe and efficient movement of people and goods, it also dictates the planning of transportation facilities which are responsive to the goals and objectives of the Town. The following goals and objectives were developed to guide the development of the transportation plan:

OVERALL GOAL

Provide for the safe, efficient, and orderly movement of people and goods in, out, and through Addison while preserving the quality of life and environment for its citizens and businesses.

ROADWAY GOAL

Provide a roadway network that achieves desirable levels of service, promotes economic development opportunities, and preserves the quality of life and environment/aesthetics.

Objectives

1. Provide additional capacity in the east/west direction in order to prevent excessive congestion on Belt Line Road.

2. Provide additional access to the Quorum areas to allow fulfillment of economic potential.

3. Work with other jurisdictions to coordinate the provision of roadway capacity.

4. Provide a clear set of requirements for access to the public roadway system to:

    a. Facilitate the private development process;

    b. Ensure private development occurs in a beneficial manner; and

    c. Protect the public investment in roadway facilities.

5. Provide a clear set of classification and design criteria to:

    a. Clarify the present and future role of each street in the system;

    b. Protect the health and safety of the public;

    c. Establish a basis for right-of-way dedication; and

    d. Maintain the aesthetic quality of streets

6. Promote neighborhood integrity and safety by diminishing cut-through and truck traffic.

7. Protect and enhance the operational and economic viability of the airport.

PEDESTRIAN GOAL

Encourage walking within Addison.

Objectives

1. Enhance the pedestrian environment.

2. Explore opportunities for linking activity centers with pedestrian corridors.

3. Coordinate the provision of pedestrian facilities with transit services.

TRANSIT GOAL

Encourage the role of public and private transit in meeting the travel needs of Addison.

Objectives

1. Identify DART service plans for Addison and explore opportunities to enhance and accommodate them.

2. Explore the potential for a local circulator system to reduce vehicular demand and promote economic vitality.

3. Identify measures needed to integrate future retail service with desired development goals.

WHY FUNCTIONAL CLASSIFICATIONS?

Functional classifications for roadways are needed to provide an underlying basis for determining the following:

- Desired degree of continuity
- Capacity level
- Traffic control strategy
- Design speeds and other general criteria
- Access policy

In order to function properly, streets must not only be designed to provide adequately for the desired function, but must also appear to the driver to be appropriate for the role. Arterial streets typically have four or more lanes, medians, turn lanes at intersections, wider right-of-way, higher design speeds, high level of nighttime illumination, and traffic control which gives them priority at intersections with lower class streets. Local streets have one or two lanes with low design speeds and restricted right-of-way which tend to limit through movement. The functional classification system provides a basis for applying these characteristics to the roadway system.

The functional classifications describe each roadway's function and reflect a set of characteristics common to all roadways within each classification. Functions range from providing mobility for through traffic and major traffic flows to providing access to specific properties. Characteristics unique to each classification include degree of continuity, general capacity, and traffic control characteristics. Figure 2.1 illustrates the relative roles of each classification to achieve its intended function.

ROADWAY CLASSIFICATIONS

There are four basic functional classifications of roadways. These are:

- ***Freeways*** - high capacity facilities with controlled access intended to carry high volumes of longer distance trips; high capacity supplement to arterial system.

- ***Arterials*** - carry through traffic between areas. Relatively high speed, continuous, high-capacity roadways with mobility as their priority function.

- ***Collectors*** - link local streets with the arterial system; function as collector-distributors and provide access to commercial properties.

- ***Locals*** - provide access to individual properties. Accommodation of significant through traffic is not an appropriate function.

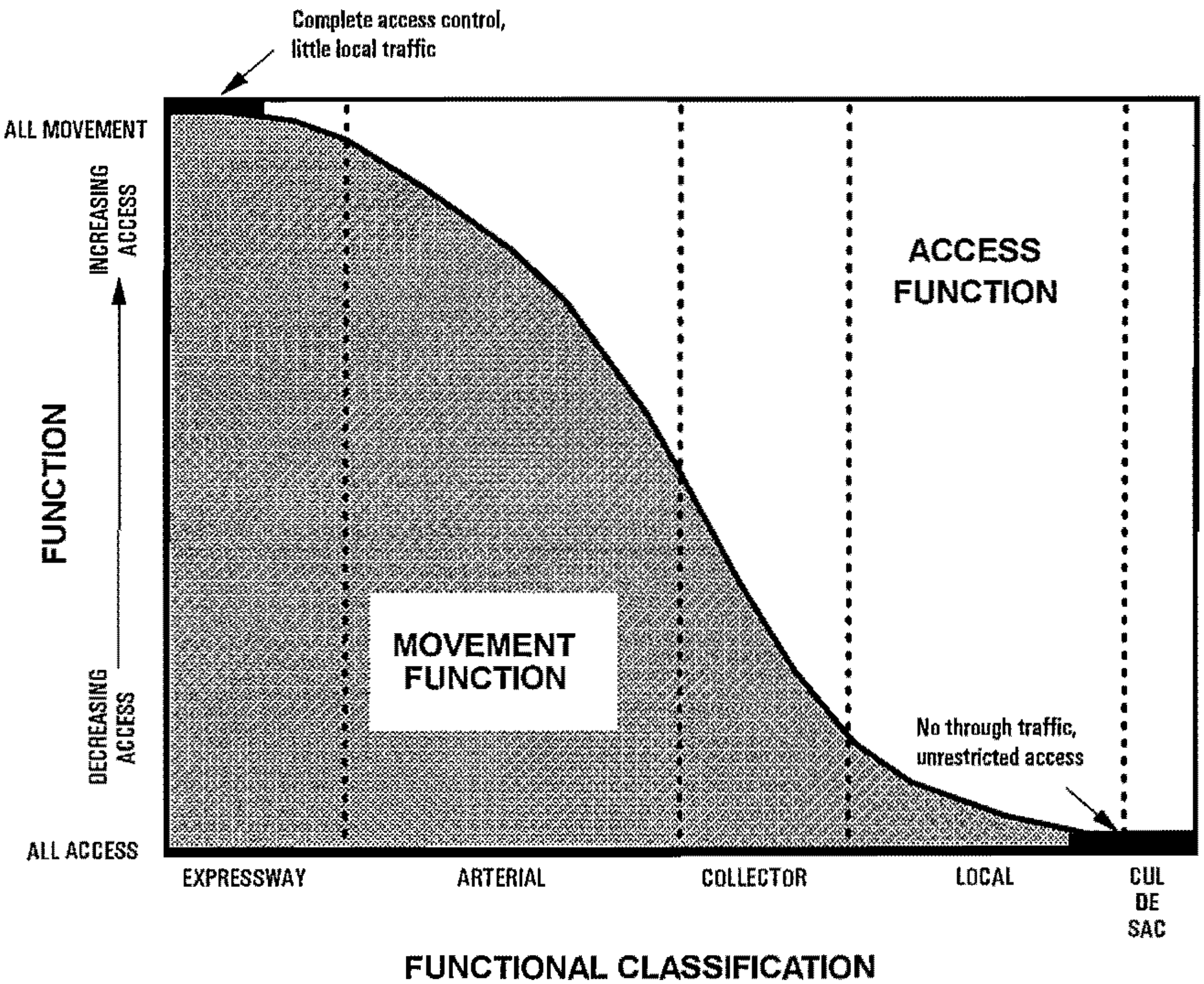

Figure 2.1
Roadway Function by Classification

Municipal street systems typically consist of arterials, collectors, and local streets. Freeways, and some arterials, are under the jurisdiction of TxDOT, while toll roads are the responsibility of the North Texas Tollway Authority.

The following section of this chapter addresses standards for arterials, collectors, and local streets which are the responsibility of the Town of Addison. Typical design standards for freeways are presented, but are not discussed in detail. Table 2.1 provides general planning guidelines for the basic functional classifications.

Based on the characteristics of the street system in the Town of Addison, the following five roadway classifications were established:

1. Principal arterial
2. Minor arterial
3. Commercial collector
4. Residential collector
5. Residential local

Figure 2.2 illustrates the existing classifications of each of the roadways which comprise the arterial and collector thoroughfare system within Addison.

TABLE 2.1

ROADWAY FUNCTIONAL CLASSIFICATIONS AND GENERAL PLANNING GUIDELINES

Classification	Function	Continuity	Approx. Spacing (Miles)1	Direct Land Access	Minimum Roadway Intersection Spacing	Speed Limit (mph)	Parking	Comments
Freeway and Expressway	Traffic Movement	Continuous	4	None	1 mile	45-55	Prohibited	Supplements capacity and arterial street system and provides high speed mobility.
Arterial	Moderate distance intercommunity, intrametro area, traffic movement. Minor functional and access.	Continuous	1/4 - 1[2]	Restricted- some movements may be prohibited; number and spacing of driveways controlled. May be limited to major generators on regional routes.	1/8 mile 1/4 mile on regional route	35-45	Prohibited	Backbone of street system.
Collector	Primary- collect/ distribute traffic between local streets and arterial system. Secondary- land access. Tertiary- traffic between neighborhoods	Not necessarily continuous; may not extend across arterials.	1/4 - 1/2[2]	Safety controls; limited regulation.	300 feet	30	Limited	Through traffic should be discouraged.
Local	Land Access	None	As needed	Safety control only.	300 feet	30	Permitted	Through traffic should be discouraged.

NA = Not applicable.

[1] Spacing determination should also include consideration of (travel projections in the area of corridor based on) ultimate anticipated development.

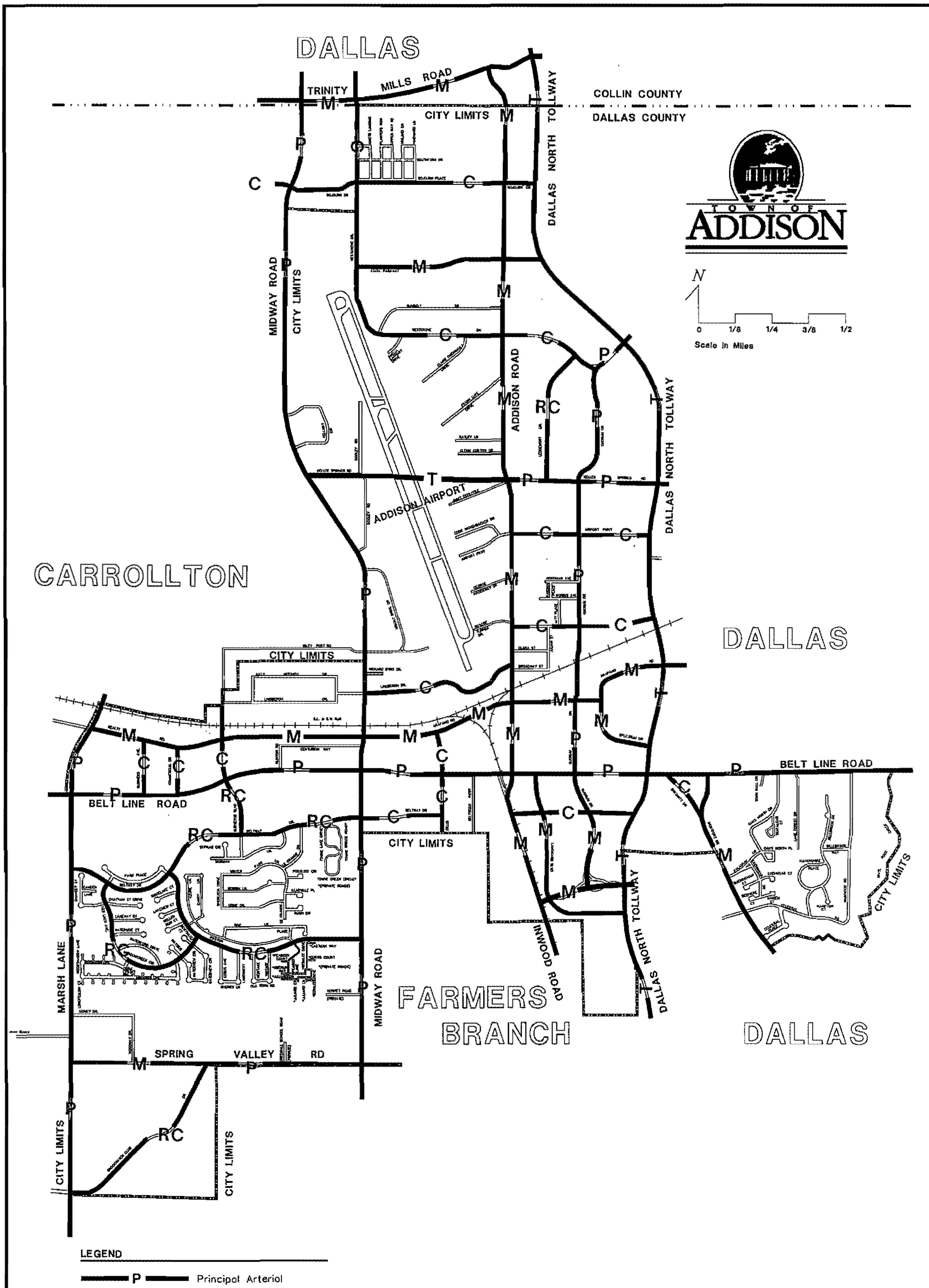

Figure 2.2
Roadway Functional Classification
Existing Thoroughfare Plan

3. DESIGN STANDARDS

Design standards, as discussed in this report, describe the generalized characteristics of each functional classification. These characteristics are necessary to ensure that roadways serve their intended functions, without resulting in diversion of traffic to or from these facilities. Maintaining these characteristics allows the roadways to operate as intended, with maximum efficiency and safety.

STANDARD CROSS SECTIONS

Roadway cross sections are composed of a total right-of-way width, pavement width, median width, and parkway width. Figure 3.1 shows the recommended standard roadway cross sections for the identified roadway classifications. Design elements are discussed below. The cross sections shown in Figure 3.1 represent mid-block conditions. In some instances (discussed under intersection treatments), the cross sections will vary in the vicinity of intersections.

LANES

The number of traffic lanes required for each roadway should be determined based on projected traffic volumes to be accommodated on each street. The number of lanes may vary from street to street although their functional classification may be the same. Table 3.1 shows the range in moving traffic lanes by functional classification.

TABLE 3.1
ROADWAY LANES BY FUNCTIONAL CLASSIFICATION

Functional Classification		Lanes[1]				
		2	4	5	4D	6D
Arterial -	Limited Continuity		X		X	X
	Continuous				X	X
	High Capacity/Principal					X
Collector -	Residential/Commercial		X	X	X	
Local -	Residential	X				

[1]D - divided roadway with median

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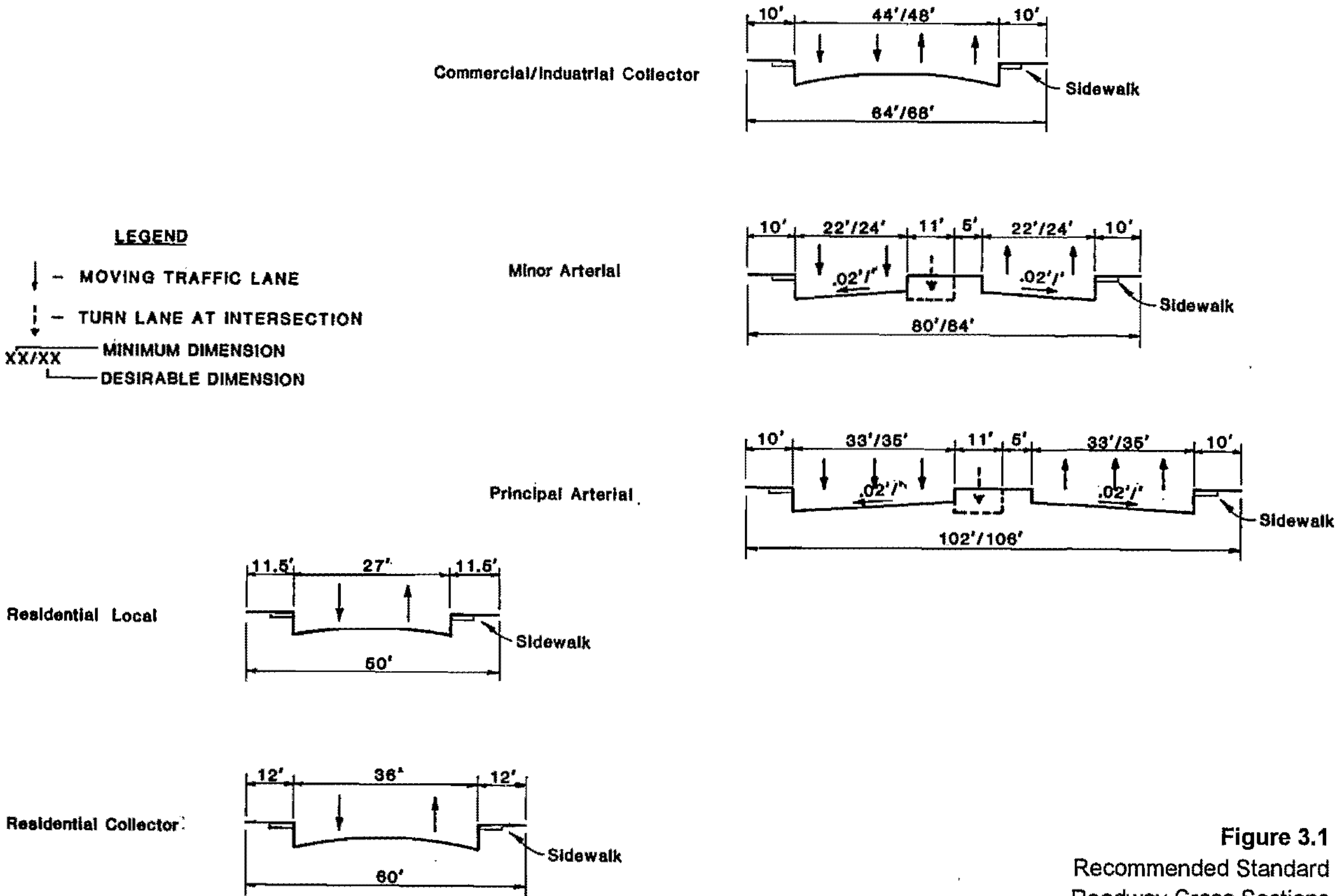


Figure 3.1
Recommended Standard
Roadway Cross Sections

LANE WIDTHS

These cross sections have been developed in accordance with the following lane widths:

- 12 foot curb lanes;
- 11 foot interior lanes; and
- 11 foot single left turn and right turn lanes, and 22 foot double left turn lanes.

SIDEWALKS

It is recommended that sidewalks be constructed to a minimum width of four feet. Sidewalks should be five feet or more in width in non-residential areas or where sidewalks are next to the curb. As an alternative, sidewalks may be considered for public easements adjacent to the right-of-way or on private property adjacent to the buildings which generate the pedestrian activity. Barrier-free ramps should be provided at all intersections.

MEDIAN WIDTHS

Median widths on divided roadways should maintain a minimum width of 16 feet. This width provides for a five foot median island adjacent to left turn lanes. A five foot median width is recommended on all new roadways, while a four foot minimum median width is recommended for reconstruction of existing roadways.

PARKWAYS

To accommodate sidewalks and driveway curb-returns within the roadway right-of-way, a minimum parkway width of ten feet is recommended.

PARKING

Parking should only be allowed on local residential streets, or on roadways adjacent to the Town Center. Currently, parking on residential streets is not allowed between the hours of 2:00 AM and 6:00 AM. A parking width of eight feet will allow for parallel parking. Sufficient on-site parking should be provided for each particular land use.

ROAD HUMPS

In order to discourage cut-through traffic on local streets in residential neighborhoods, the Town of Addison has adopted a road hump policy. This policy describes the requirements for implementing and constructing road humps.

INTERSECTION TREATMENTS

At intersections between arterial streets, or at locations with at least 200 turning movements per hour, special treatments should be considered for providing sufficient capacity to accommodate traffic volumes. These treatments may include left turn lanes, right turn lanes, double left turn lanes, bus turnouts, or a combination thereof. Each intersection treatment should be designed based on the specific needs of that location.

It is appropriate, advisable, and recommended that the Town reserve sufficient right-of-way to accommodate probable eventual intersection improvements. Figures 3.2 through 3.4 show the additional right-of-way necessary to accommodate several combinations of typical intersection treatments.

DESIGN SPEED

The design speed for a roadway is the maximum safe speed that can be maintained over a specified segment of roadway when conditions are so favorable that design features of the roadway govern. Design speeds determine the physical characteristics of the roadway (i.e. minimum horizontal centerline radius, stopping sight distance, etc.). The recommended design speed for each roadway classification is given below:

Roadway Classification	Design Speed
Principal arterial	45
Minor arterial	40
Commercial collector	40
Residential collector	35
Local	30

It should be noted that the physical characteristics of an arterial or collector are generally not the governing factor in restricting speeds. Traffic volumes during peak hours, cross traffic, and traffic controls are examples of factors that must be considered when determining speed limits.

HORIZONTAL CURVATURE

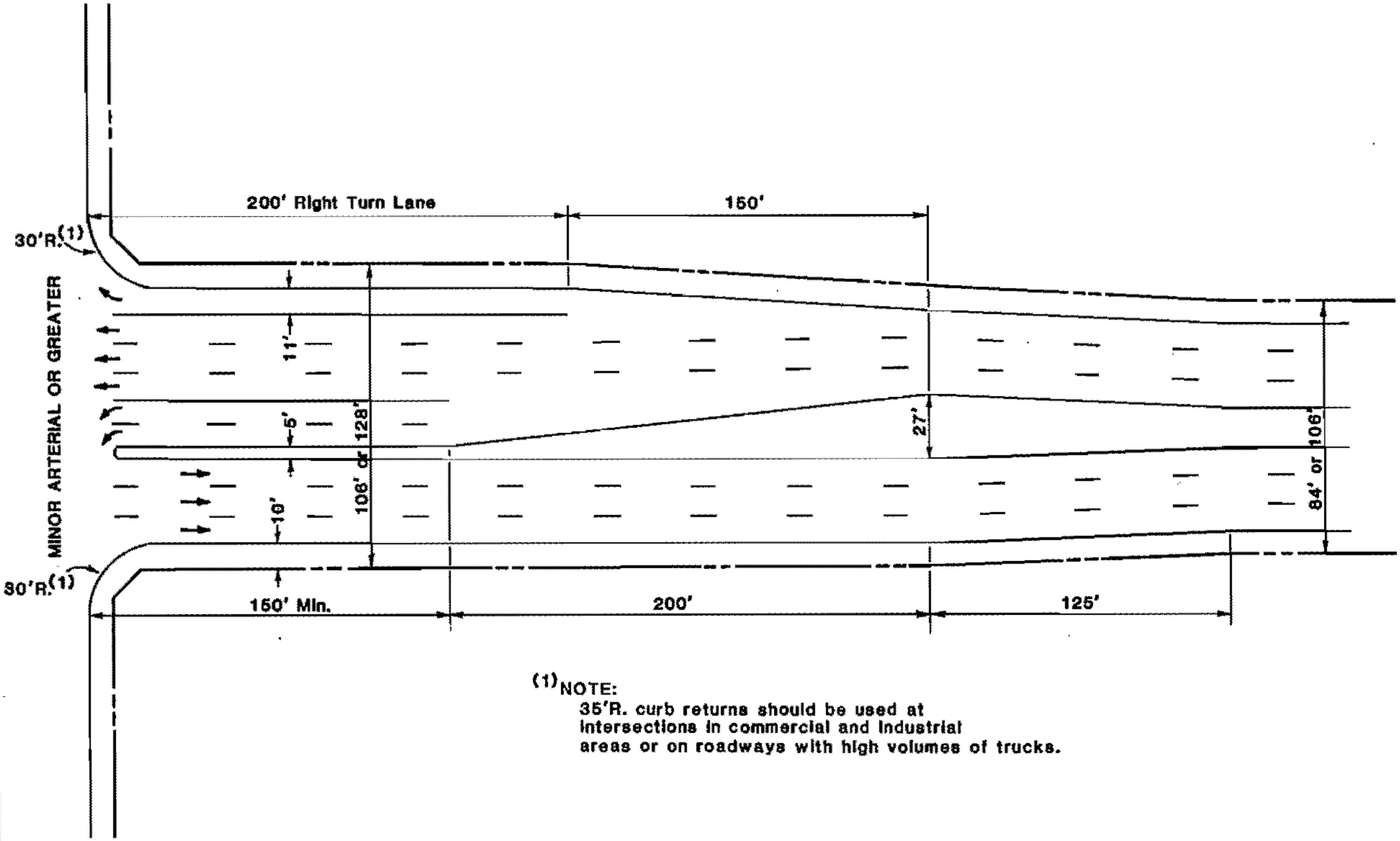
The minimum centerline radius for curving roadways is determined based on the design speed, friction factor, and rate of super elevation (cross slope) of the roadway. The minimum centerline radius is determined by the following equation:

$$R = \frac{V^2}{15\,(e + f)}$$

where:

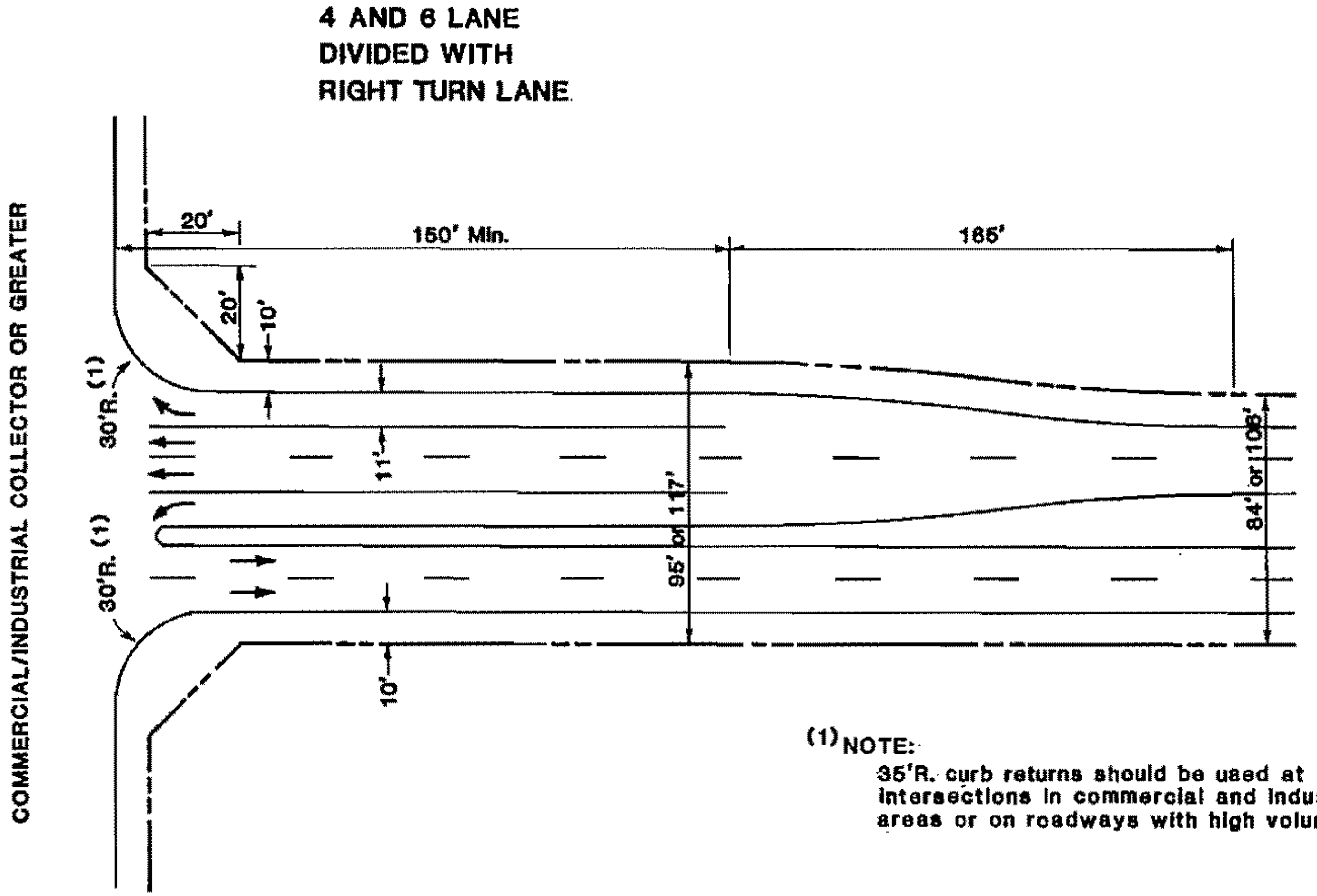
- R = radius of centerline curve (ft.)
- V = roadway design speed (mph)
- f = roadway side friction factor (for wet pavement)
- e = rate of super elevation (ft./ft.)

Table 3.2 presents the recommended minimum horizontal centerline radius for various design speeds.



(1) NOTE:
35'R. curb returns should be used at intersections in commercial and industrial areas or on roadways with high volumes of trucks.

Figure 3.2
Intersection/R.O.W. Requirements
Minor and Major Arterials Requiring Left-Turn Lanes



(1) NOTE:
35'R. curb returns should be used at intersections in commercial and industrial areas or on roadways with high volumes of trucks.

Figure 3.3
Intersection R.O.W. Requirements
Minor Arterial

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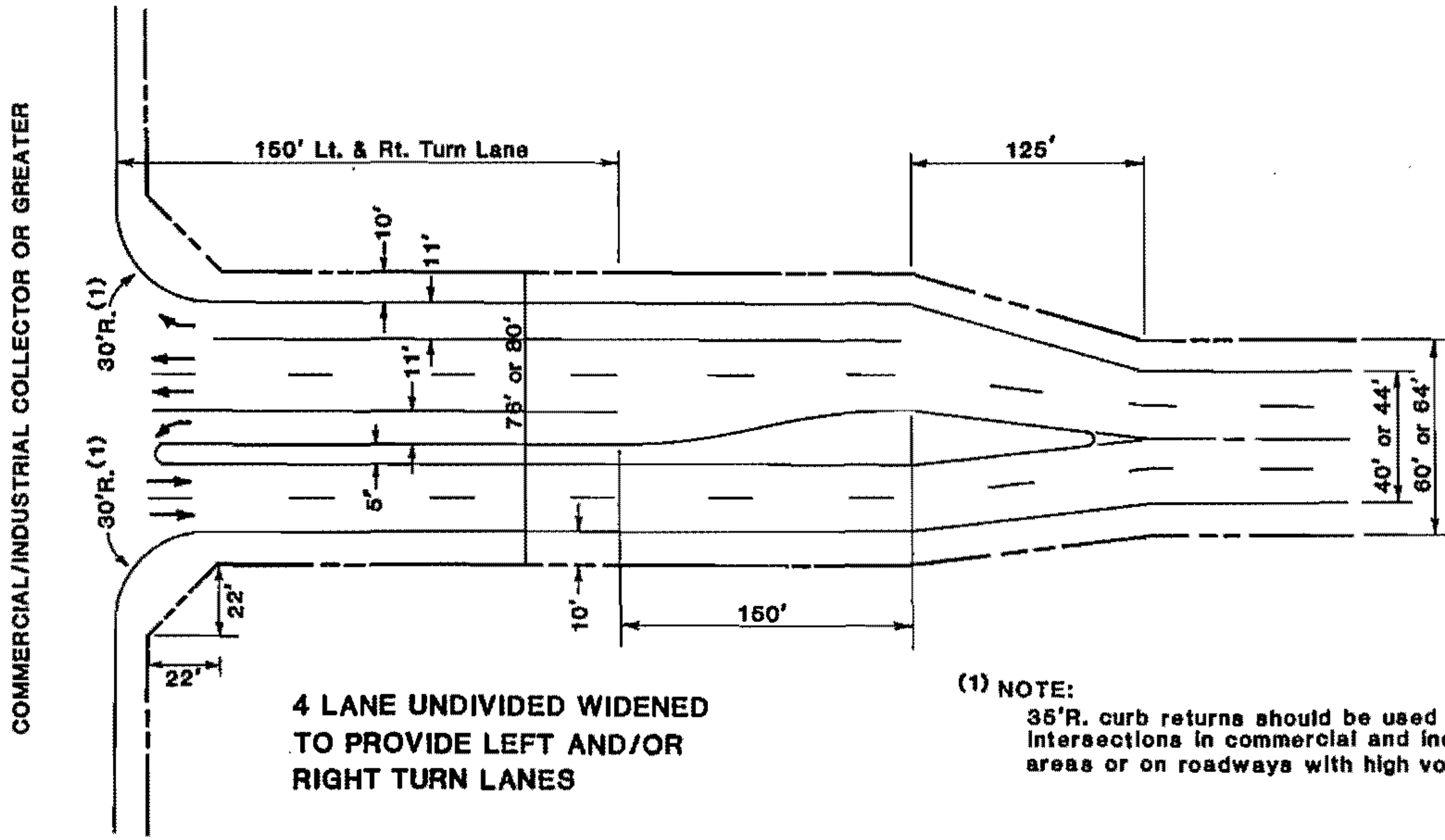

(1) NOTE:
35'R. curb returns should be used at intersections in commercial and industrial areas or on roadways with high volumes of trucks.

Figure 3.4
Intersection R.O.W. Requirements
Residential / Industrial Collectors

TABLE 3.2
MINIMUM HORIZONTAL CENTERLINE RADIUS (R)

Design Speed	f[1]	e	R Calculated	R Rounded
30	.22	-.02	300	300
35	.19	-.02	480.39	500
40	.15	-.02	820.51	850
45	.15	-.02	1038.46	1050

[1] Side friction factor

VERTICAL CURVATURE

Crest and sag vertical curves should be designed based on recommended standards contained in the 1990 edition of A Policy on Geometric Design for Highways and Streets published by the American Association of State Highway and Transportation Officials (AASHTO).

INTERSECTION SIGHT TRIANGLE

Adequate sight distance at the intersections of roadways with other roadways and with driveways must be ensured. The operator of a vehicle attempting to cross a thoroughfare should have an unobstructed view of the entire intersection and a sufficient length of the thoroughfare to be crossed. Sufficient sight distance should be provided for the driver on a minor roadway to cross or turn onto a major roadway without requiring approaching traffic to reduce speed.

Adequate sight distance must be ensured for four different cases:

- Vehicles crossing a major roadway;
- Vehicles turning left onto a major roadway;
- Vehicles turning right onto a major roadway; and
- Vehicles turning left from a major roadway onto a minor roadway.

Each case is illustrated in figure 3.5.

Visibility triangles should be maintained at all intersections to ensure proper sight distance for all cases. Obstructions greater than two feet in height should be prohibited within these visibility triangles, except for traffic control signs and signals, street signs, fire hydrants, utility poles, or other devices authorized by the Town Council.

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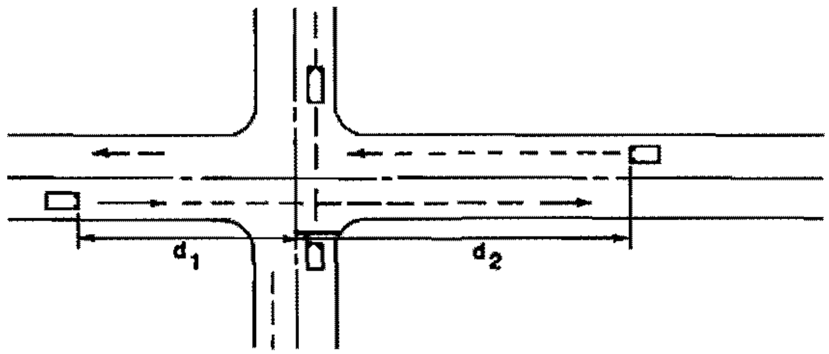
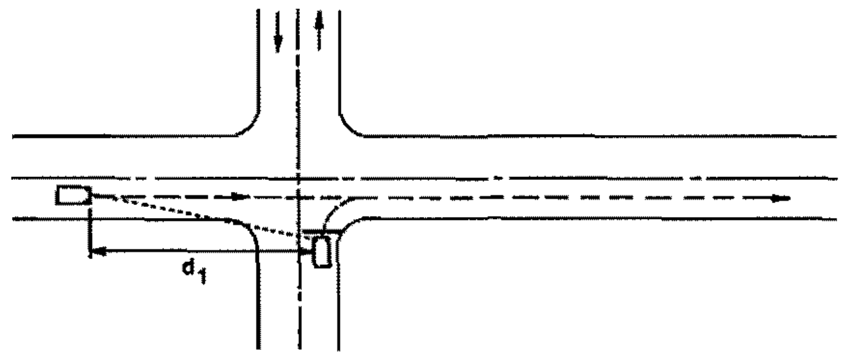
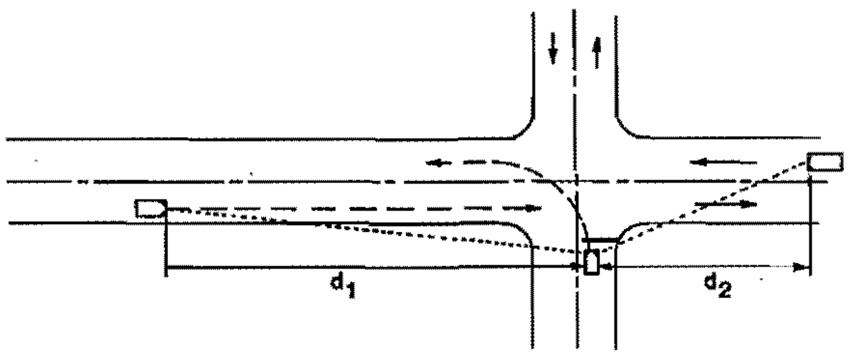


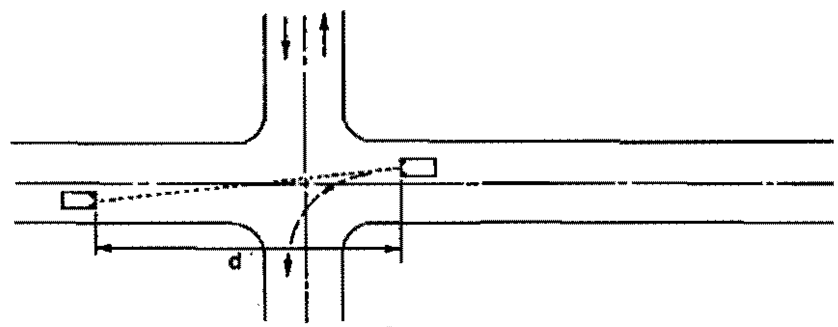
CASE A
STOPPED VEHICLE CROSSING AN ARTERIAL



CASE C
STOPPED VEHICLE TURNING RIGHT ONTO ARTERIAL



CASE B
STOPPED VEHICLE TURNING LEFT ONTO ARTERIAL



CASE D
LEFT TURNING VEHICLE ENTERING DRIVEWAY

d= sight distance

Figure 3.5
Sight Distances

The recommended corner visibility triangles are illustrated in Figure 3.6. The corresponding minimum corner intersection sight distances are displayed in Table 3.3 (see Figure 3.6).

These recommended intersection sight distances apply for street grades of zero to three percent. Town staff should have the ability to vary the dimensions of the visibility triangle to account for steeper grades or other geometric conditions at the intersection.

DALLAS NORTH TOLLWAY (DNT) INTERCHANGES

Access to the Town from the Dallas North Tollway is provided through interchanges at Quorum Drive, Belt Line Road, Arapaho Road, Keller Springs Road, and Westgrove Road. The traffic conditions at the interchanges are critical to the overall traffic conditions within the Town. However, these interchanges are located within the City of Dallas. In many cases, the interchanges were constructed to provide less capacity than demand. For example, a three-level interchange was originally recommended for the interchange of Belt Line Road and the Tollway, but, due to the impact to surrounding areas, the City of Dallas, the North Texas Tollway Authority, and the Town of Addison decided not to construct a three-level interchange.

Existing congestion at Belt Line Road and the Tollway can be reduced by extending the free right-turn lanes eastbound and southbound. The eastbound free right turn lane should be extended to the first drive west of the approach (approximately midway between the Tollway and Quorum Drive). The southbound free right-turn lane should be extended to allow 250 feet of storage and 100 feet of transition.

The interchanges of the Tollway with Keller Springs, Quorum, and Arapaho, will remain bottlenecks to east/west travel unless expanded. It is recommended that the Town of Addison continue to monitor and address all Tollway interchanges. Cooperative efforts among the Town, the City of Dallas, and the Tollway Authority will be necessary to improve these interchanges.

SPECIAL DISTRICTS

ADDISON CIRCLE AREA

Special street types with unique street and sidewalk design standards could be used in the Addison Circle area to support special development. These streets should be designed to promote non-automobile traffic, yet still move local traffic. This district should encourage a mixed land use development compatible with a more pedestrian-friendly environment. Through vehicles should be restricted to the thoroughfares surrounding the area.

AIRPORT AREA

In order to protect and enhance the operational and economic viability of the airport, roadways should service the drivers within the Airport. Construction and maintenance standards have been established by the Addison Airport Board. All airport roadways should be maintained to these standards.

TABLE 3.3

RECOMMENDED INTERSECTION SIGHT DISTANCE

Travel Speed	X (ft.)
20	200
30	300
40	400
50	500
60	600

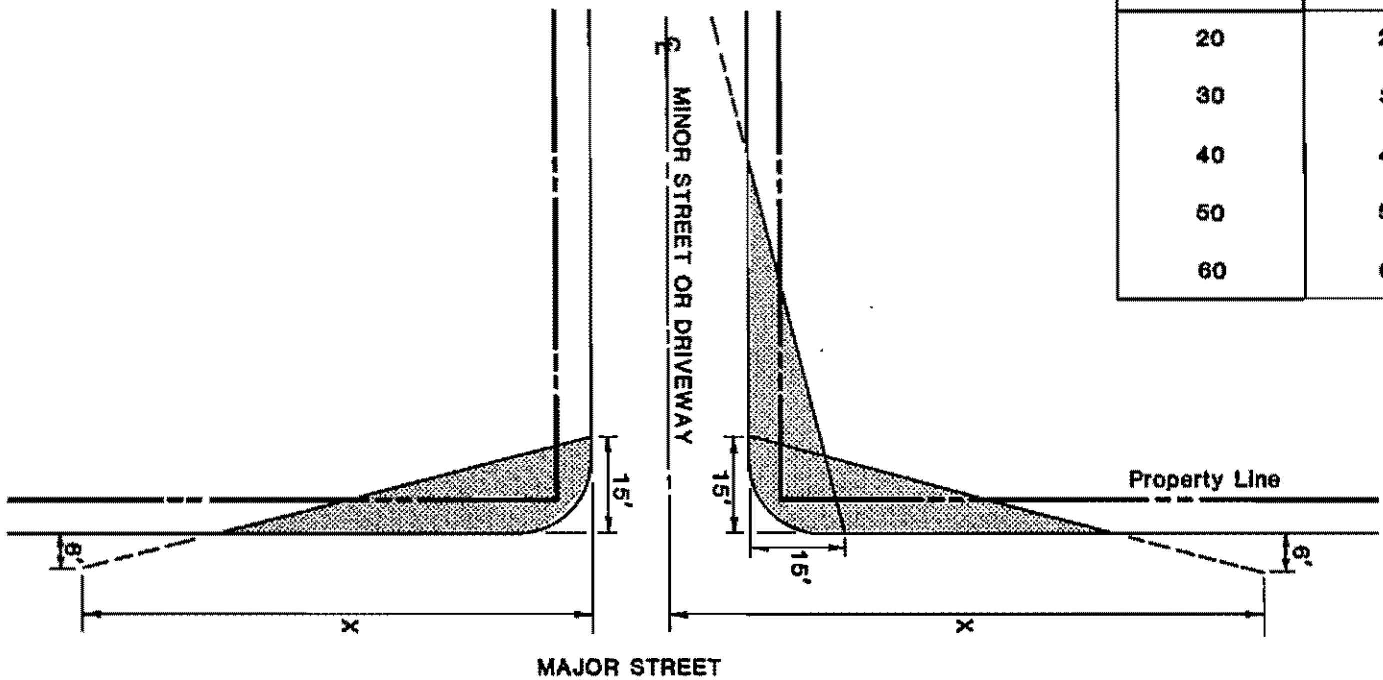


Figure 3.6
Intersection Visibility Triangles

ACCESS CONTROL POLICY

Driveway access is a critical issue which requires a well-defined policy with proper enforcement of the guidelines to enhance traffic safety and preserve maximum available capacity on arterial roadways. Since a large percentage of the thoroughfares in the Town of Addison carry high volumes of traffic, and there is limited opportunity for additional roadway capacity increases, this requirement is of particular importance.

The purpose of an access control policy is to provide guidelines which apply to driveway location, driveway geometric design, the spacing of driveways for various types of roadway facilities, median opening spacing, and median opening geometric design. Most driveway design guidelines are the same regardless of roadway functional classification. Those elements that do warrant differing criteria by functional classification are properly defined.

This access policy proposes to preserve the integrity of existing and future arterial roadways. Proper driveway design with enforced access control will help maintain the safe and steady flow of traffic that is so critical to achieve maximum effectiveness of the existing arterial roadway system.

BACKGROUND

These guidelines have been based on existing and proposed area policies enhanced by national research findings, and recommended standards and practices of national transportation organizations as applied to conditions which do or are likely to exist in the Town of Addison.

Each driveway intersection with any street introduces conflict points to the street's traffic stream (see Figure 3.7). Research has shown conclusively that accident frequency is closely correlated with the number of conflicts in a roadway section. For this reason, driveways should be properly located in accordance with actual need and ability to provide safe roadway operation and, if necessary, proper traffic control.

Each driveway also generates "side friction" along a roadway. It has been estimated that for each two percent increase in driveway frequency, a reduction of one percent of roadway capacity results. Hence, roadway capacity can be maximized by carefully determining where and how many driveways should be provided.

This recommended roadway access policy is directed toward providing both adequate property access and efficient, safe roadway operation.

DRIVEWAY CLASSIFICATION

Access to properties is completed through a driveway. Driveways are classified by the land use of the property and the intensity of that land use. For purposes of this access policy, there are three categories of drives: residential, commercial, and industrial.

Residential drives should serve all single-family land uses, including duplexes, townhouses, and small multi-family complexes of up to eight units.

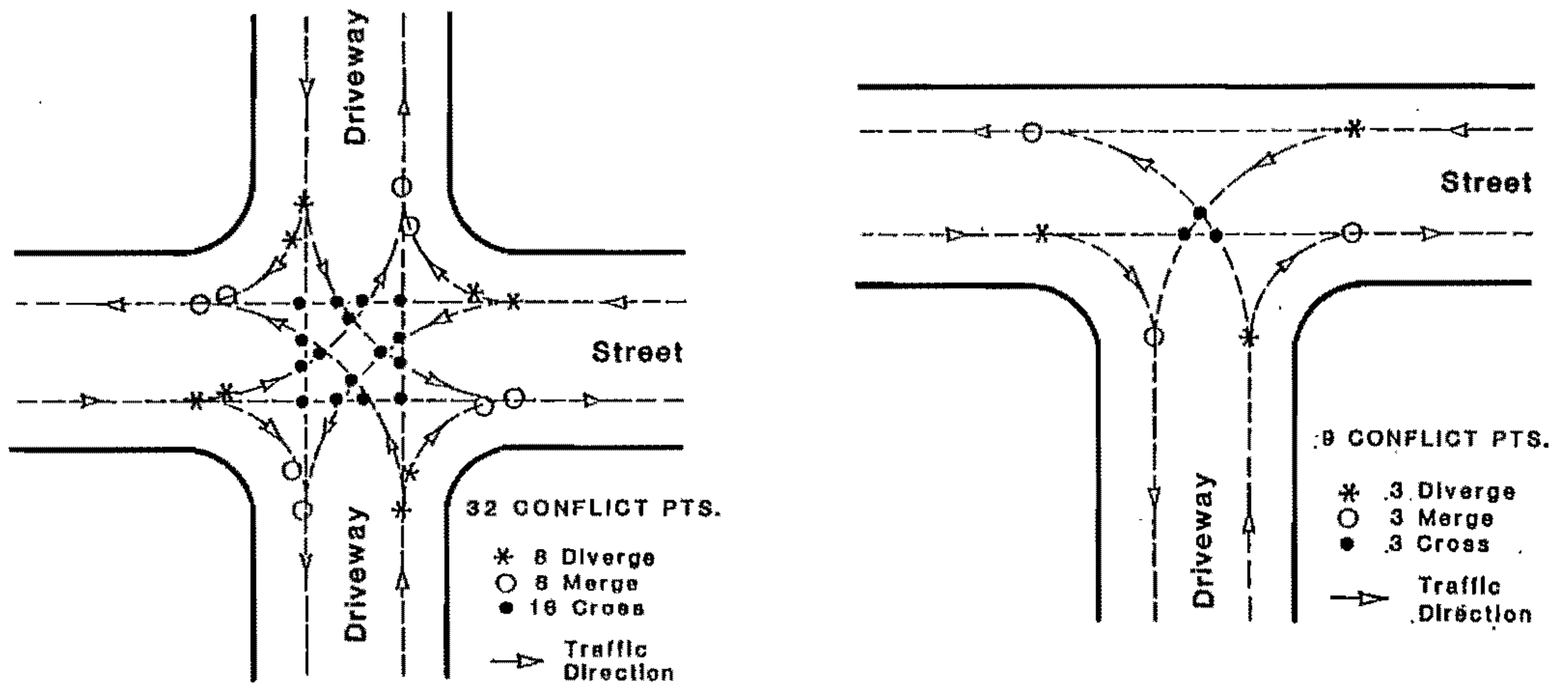


Figure 3.7
Intersection Conflict Points
Driveway / Street

Commercial drives should serve all retail, office, and other land uses commonly referred to as commercial. Driveways serving multi-family complexes of more than eight units should conform to commercial rather than residential driveway standards.

Industrial driveways should serve truck traffic, and be used at manufacturing and truck access points of high volume commercial land uses (i.e., shopping malls).

GENERAL DRIVEWAY ACCESS PRINCIPLES

This section covers five specific areas of access control policy. These are:

a. Property access
b. Number of access points
c. Number of ingress lanes
d. Number of egress lanes
e. One-way access

The critical access and design issues relative to these areas are addressed in the following sections of this report.

Property Access

The number of access points to any property should be limited to one, unless it can be shown that the development will generate sufficient volumes to require two points of access for safe internal operations. Should an additional access point be needed, joint access should be sought with adjacent property owners.

Number of Access Points

Each parcel should be permitted one access point either contained wholly within the property frontage or as part of a joint access with an adjacent property. Additional points of access may be considered if adequate driveway spacing can be maintained (see section on driveway locations) and the following conditions apply:

1. The average daily driveway volume is expected to exceed 5000 vehicles per day (vpd) (reference 8), or

2. The expected peak hour driveway volume would exceed the capacity of a stop sign controlled intersection in accordance with the 1994 Highway Capacity Manual, or

3. A professionally competent traffic analysis shows that more than one access point is needed to properly and safely serve the property.

Number of Ingress Lanes

At medium volume driveways exceeding 1000 vpd and 40 right turn ingress movements during the peak hour, it may be desirable to provide an additional ingress lane, thereby widening the effective width of the throat to facilitate simultaneous left and right turn ingress movements.

Should a high volume driveway have two left turn ingress lanes, the receiving length at the drive entrance must be a minimum of thirty feet.

Number of Egress Lanes

The number of lanes required to serve the exiting movements at a driveway location is a function of the number of vehicles expected to exit from the land use served by the driveway. Driveways should be designed with more than one egress lane if either of the following conditions are present or expected:

1. The average daily egress traffic volume exceeds 1000 vehicles (Reference 8).

2. If more than 100 vph are expected to turn left from the driveway during any hour (Reference 4), and there are more than 500 vehicles on the street being entered (Reference 8).

One-Way Access

Access design of a one-way pair of driveways should be considered if either of the following conditions are present or expected:

1. Roadway average daily traffic (ADT) is greater than 10,000 (Reference 8).

2. The left turn volume into the driveway exceeds 40 vph, and the property frontage exceeds 200 feet in length (Reference 7).

DRIVEWAYS

Driveways provide the link from a thoroughfare to a land use. Specific design elements for driveways and median openings along thoroughfares are displayed on Figure 3.8, while the applicable standards are discussed below.

Driveway Location

Driveway location is one of the most critical access management issues. Driveways which are spaced too closely together or too close to adjacent intersections will result in reduced capacity and increased accidents regardless of their individual design standards.

Driveway Spacing

Driveways should be spaced at sufficient distances to ensure that conflicting movements at adjacent driveways do not overlap. Adjacent driveways should be spaced as far apart as access and on-site circulation needs will permit. Table 3.4 shows the minimum safe driveway spacing standards for various roadway functional classifications. This spacing should be maintained to ensure safe stopping distances. The recommended local residential street driveway spacing is based on a ten foot minimum curb return at back-to-back driveways.

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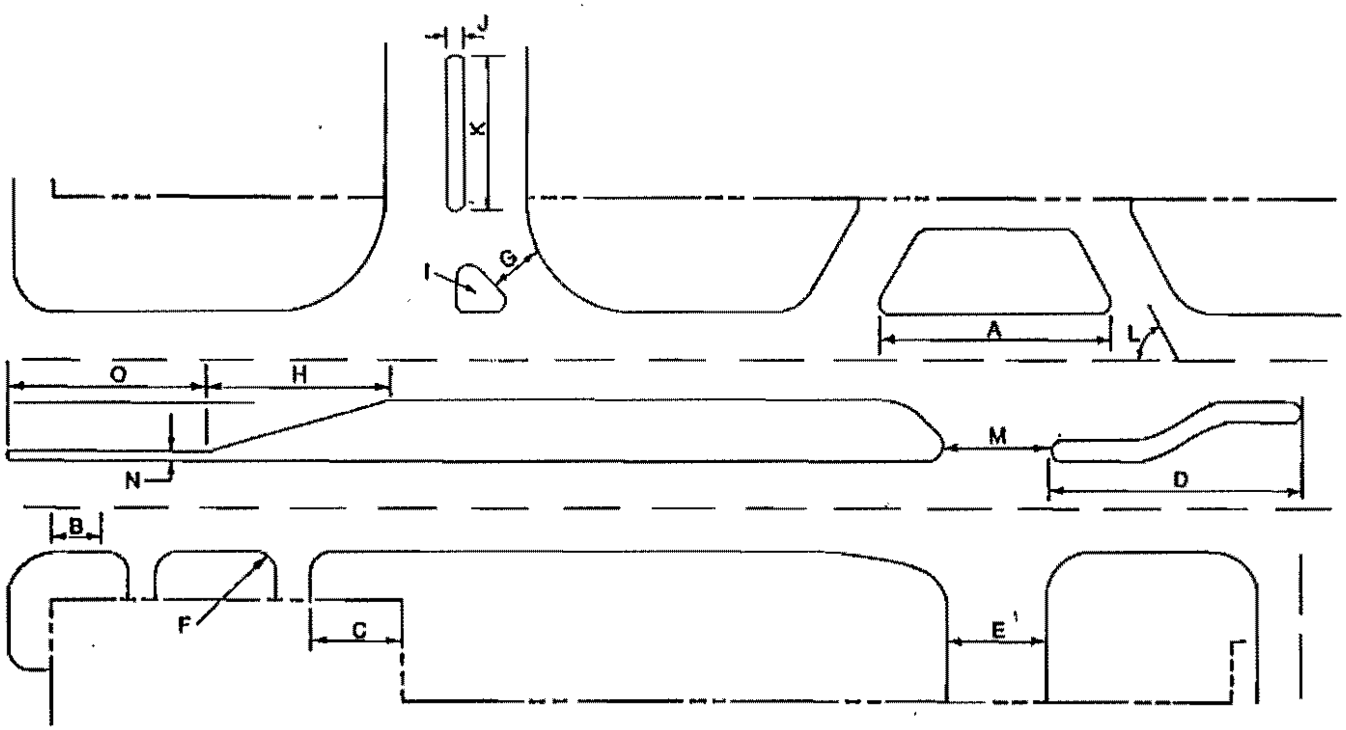

A - DRIVEWAY SPACING
B - CORNER CLEARANCE
C - PROPERTY CLEARANCE
D - MEDIAN OPENING SPACING
E - DRIVEWAY WIDTH
F - CURB RETURN RADIUS
G - TURNING ROADWAY WIDTH
H - TAPER LENGTH
I - ISLAND SIZE
J - ELONGATED ISLAND WIDTH
K - ELONGATED ISLAND LENGTH
L - DRIVEWAY ANGLE
M - MEDIAN OPENING LENGTH
N - NARROWED MEDIAN END WIDTH
O - LEFT TURN STORAGE AREA

Figure 3.8
Driveway Design Elements

TABLE 3.4
MINIMUM DRIVEWAY SPACING - TWO-WAY DRIVEWAYS[1]

Functional Classification	Minimum Spacing[1]
Arterial (Principal)	200
Arterial (Minor)	200
Collector (Non-Residential)	150
Collector (Residential)	20
Local (Residential)	20

[1] The two-way driveway distance may be reduced to one-half this distance for an adjacent one-way driveway where the inbound drive is upstream from the downstream drive (except for local residential streets). (Reference 7).

<u>Corner Clearances</u>

Spacing between the cross street and an access driveway should be adequate to avoid any driveway conflict areas within the intersection. The corner clearance required is a function of the type of roadways which intersect. The minimum corner clearances for arterials, collectors, and local streets are displayed in Table 3.5.

TABLE 3.5
CORNER CLEARANCE

Functional Classification	Intersecting With	Clearance,[1,2] (ft.)
Arterial (principal and minor)	Arterial, Collector, Local	200, 125, 50
Collector (residential and commercial)	all	50
Local	all	50

[1] Corner clearance is measured from the ultimate near cross street curb to the near driveway curb (see Distance "B" on Figure 3.8)
[2] If the property line is less than the minimum distance from the corner to meet these requirements, the driveway must be located within ten feet of the property line away from the corner.

<u>Driveways Adjacent to Right Turn Lanes</u>

Driveways should not be permitted to exit into auxiliary turn lanes due to the difficulty in performing the weaving movement to cross the right-turning vehicles. If permitted, they should be located as far from the intersection as possible.

Property Clearance

Property clearance is the distance between the property line of a parcel and the edge of the nearest driveway. In order to ensure proper spacing, the minimum property clearance distance should ideally be one-half of the driveway spacing requirement. Should a property not have sufficient frontage to provide this distance, joint access with an adjacent property should be considered.

The minimum property clearances for specific roadway functional classifications are displayed in Table 3.6.

TABLE 3.6
PROPERTY CLEARANCE REQUIREMENTS[1]

Functional Classification	Property Clearance (feet)
Arterial (principal and minor)	100
Commercial/Industrial Collector	75
Residential Collector	10
Local Residential	10

[1] For single-family, duplex, and townhouse residential land uses, lots should be platted so that direct access to arterial streets is not provided.

DRIVEWAY DESIGN

Driveway Grades

The normal driveway grade within the street right-of-way is set at a one-quarter inch per foot rise from the top of the curb at the property line. The minimum elevation of a driveway at the right-of-way line is two inches above the top of curb. Barrier-free sidewalk construction requires a maximum driveway grade, as measured from the gutter, of eight percent. Driveways should be profiled for a distance of at least 20 feet outside the right-of-way to ensure adequate replacement design. Due to state laws requiring the barrier-free construction of sidewalks or steps, grades are prohibited at driveways.

Figure 3.9 displays the acceptable range of grades outside the right-of-way which should be maintained for a minimum distance of 20 feet.

Width and Curb Return Radius

Driveway width and curb return interact to affect vehicle speed and path. The selection of an appropriate width must be coordinated with that for curb return radii to achieve safe and efficient driveway operation.

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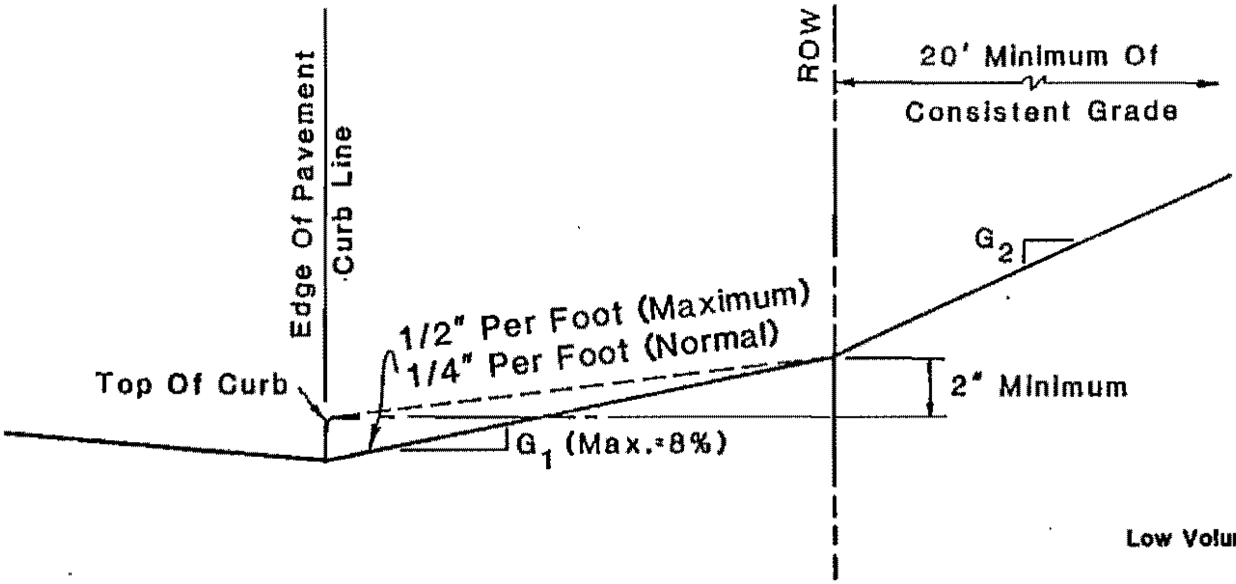

Low Volume Driveway–less than 100 veh. during peak hour in peak direction

High Volume Driveway–more than 100 veh. during peak hour in peak direction

	G_2 Maximum Range
1. Low Volume Driveway On Local Street	−10% To +14%
2. Low Volume Driveway On Collector Streets	−4% To +8%
3. High Volume Driveway Or Low Volume Driveway On Arterial Streets	−1% To +5%

Figure 3.9
Driveway Vertical Grades

The use of a narrow driveway width in combination with a short curb return radius should be avoided. If the width must be reduced, the curb return radius should be increased, and vice versa.

Table 3.7 identifies the appropriate curb return radius and driveway width combinations that should be used for different types of driveways.

TABLE 3.7
CURB RETURN RADIUS AND DRIVEWAY ENTRY WIDTH COMBINATIONS[1]

Land Use	Design Vehicle[3]	Short Radius		Narrow Width	
		Radius	Associated Entry Width[2]	Entry Width[2]	Associated Radius
Industrial	WB-50	15'	42	20	45'
Commercial and Large MF Residential	SU	15'	26	15	35'
SF and Small MF Residential	P	10'	15	12	15'

[1] For a driveway angle of 90 degrees.
[2] Entry width should be one-half the total width for two-way access points.
[3] Design vehicles
WB-50 - large semi-trailer truck
SU - single unit truck
P - passenger car

Some additional considerations regarding driveway width and curb return radii are presented below:

1. The width of the street right-of-way should not be a limiting factor in selecting the appropriate curb return radii. Curb returns should extend into private property if necessary.

2. If a commercial development is serviced by moderate truck traffic (i.e., delivery trucks), it may be desirable to provide one well-designed "industrial" driveway for these vehicles and prohibit their use of the other "commercial" driveways within the development.

3. At high volume industrial driveways, the use of compound curves in the curb returns is recommended by AASHTO (Reference 1).

Driveway Angle

A driveway should intersect the street at a 90 degree angle. If the site conditions (e.g., terrain, lot size, and shape, etc.) will not permit a 90 degree approach, the angle may be reduced to the following minimums.

Two-way:

1. 70 degrees for large multi-family complex, commercial, and industrial driveways.
2. 60 degrees for single-family, duplex, townhouse, and small multi-family complex residential driveways.

One-way:

45 degrees for all driveways.

CHANNELIZATION ISLANDS AND MEDIAN DIVIDERS

Turning Roadway Width

To facilitate the ingress and egress movements on high speed arterials, islands separating right turn movements may be used if the pavement width is sufficient to allow the vehicle to negotiate the turns at the proper design speed (see Table 3.8). The pavement should be widened to permit the outer and inner wheel tracks of the selected design vehicle to clear the pavement gores by two feet on each side.

TABLE 3.8
PAVEMENT WIDTHS FOR TURNING ROADWAYS[1]

Radius on Inner Edge of Pavement	Pavement Width (feet) for Design Vehicle		
R (feet)	Passenger Car	Single-Unit	WB-50
50	13	18	26
75	13	17	22

[1] Developed from Reference 1.

Driveways that have right turn ingress movements separated by an island, and that have more than ten percent truck traffic, should be designed for single-unit trucks, while industrial or commercial delivery driveways should be designed for WB-50 vehicles.

Island Size

Islands should be constructed to clearly define the proper course of travel. They should exceed 75 square feet in area, with a preferred minimum of 100 square feet.

Elongated Driveway Island Width Plus Length

When an elongated island is used as a driveway divider, that island should have the following minimum dimensions:

1. Minimum island width = 5 feet

2. Minimum island length = 20 feet

This will ensure adequate island visibility and width for the installation of traffic signs, while providing adequate lateral clearance. Any island landscaping heights and densities shall be as specified in the visual obstruction regulations.

Throat Length

The required length of throat for storage will depend on two factors:

1. Parking facility egress control, if any, and

2. The gap availability on the street being entered.

Egress control should be considered as a site design prerogative of the developer and normally does not impact street operations. Gap availability, if not considered in establishing driveway throat length, can result in the request for police traffic control or unwarranted signalization. Police control should not be permitted as a solution to inadequate throat length.

Egress driveway lanes should be designed to accommodate outbound traffic during the most demanding peak hour condition. Differing land uses will have differing peak parking movement distributions. These distributions affect the rate at which vehicles exit the parking locations and therefore directly affect the length of storage required to hold the vehicles until they receive an acceptable gap to enter the roadway. Table 3.9 presents the required storage for exiting driveway lanes as a function of land use and parking spaces.

TABLE 3.9
ON-SITE DRIVEWAY VEHICLE STORAGE LENGTHS[1]

Parking Spaces/Outbound Driveway Lane	Storage Required (feet)[2]			
	MF Residential	Retail[3]	Office	Industrial
0 - 200	25	25	25	50
200 - 400	25	50	100	150
400 - 600	50	150	200	more lanes
> 600	100	200	more lanes	more lanes

[1] Developed from Reference 7.
[2] Measured from property line.
[3] More than 700 spaces/lane will require additional outbound driveway lanes.

DECELERATION LANES

Right Turn Deceleration Lanes

A deceleration lane for right turns into a driveway eases the negative impact that a drive has on the flow of traffic on an adjacent arterial. Such a provision enables right-turning traffic to slow down to turn, without impeding the flow of through traffic. It also reduces the risk of rear-end accidents.

A deceleration lane should be considered on arterials with average operating speeds of 35 mph or more, if the following conditions apply:

1. The average peak hour inbound right turn volume is at least 75 vehicles.

2. Where several successive driveways meet condition 1, and driveway spacing is not adequate to avoid encroachment of the right turn lane on another driveway, a continuous right turn lane should be used.

3. A continuous right turn lane should be considered at a location where 20 percent of the directional volume on the arterial makes a right turn.

For signalized driveway intersections, lane requirements should be based on a capacity analysis.

Right Turn Lane Length

Deceleration lanes should be of adequate length to permit safe deceleration from the design speed to a stop within the deceleration lane. Traffic may be assumed to leave the through lane at 15 mph below the design speed. The total deceleration lane length includes the length of taper. It also depends on the speed of the vehicles on the roadway. Table 3.10 (Reference 1) shows the desired length for various design speeds.

TABLE 3.10
RIGHT TURN LANE LENGTH

Functional Classification	Initial Speeds	Deceleration Length Excluding Taper (feet)
Arterial	35-45	150 - 250
Collector	25-35	50 - 150

The recommended taper lengths for left or right turns are displayed in Table 3.11. The transition should be accomplished using reverse curve geometry.

TABLE 3.11
TRANSITION DISTANCE FOR DECELERATION

Functional Classification	Transition Length (feet)
Arterial	100 - 150
Collector	100 - 150

The total right turn lane length is the summation of the deceleration length (Table 3.10) and the transition length (Table 3.11).

MEDIAN OPENING

MEDIAN OPENING SPACING

The location of openings in a median to allow left turn ingress and egress movements at a driveway or local street is a function of the type and operating speed of the roadway; the volume of traffic expected to make the left turn movements; and the location relative to other intersecting streets, driveways, and median openings.

Median openings may be permitted on divided thoroughfares at intersections with public streets and/or driveways. The order of priority for determining where median openings should be located is as follows:

1. First Priority - Designated Thoroughfares

2. Second Priority - Minor Streets

3. Third Priority - Driveways

Median openings will be provided at all intersections with designated arterials and collectors. They will normally be permitted at all intersections with minor streets, with priority given to minor streets that serve collector functions. No median opening will be permitted at minor streets or driveways if specific conditions create an unsafe intersection. Vertical and horizontal sight distance must meet minimum standards, as previously specified in this report.

No median opening will be allowed to serve either alleys or emergency access easements, and the minimum distance of an opening to an intersecting public street will be governed by the combined left turn lane design requirements for that intersection and the median opening, as well as the functional classification of the two intersecting streets.

Median openings should not be granted unless all of the following conditions exist:

1. The property to be served has a driveway at the median opening and is a significant traffic generator with demonstrated or projected trip generation of not less than 100 left turn ingress or egress vehicles during the peak hour. (Reference 7)

2. The median width is sufficient to permit construction of a left turn storage lane.

3. The median is sufficiently long so that adequate distance will be available to properly design deceleration taper and storage lanes, as shown in Table 3.12, if exclusive left turn lanes are needed at both ends of a median.

TABLE 3.12
LENGTH OF MEDIAN

Functional Classification	Cross-Street Functional Classification	Minimum Median[1] Length (feet)
Arterial	Freeway	600
	Arterial	600
	Collector	450
	Local	400
	Driveway - less than 40 ft. in width[2]	400
	- 40 ft. or more in width[3]	400
Collector	Freeway	600
	Arterial	450
	Collector	400
	Local	300
	Driveway - less than 40 ft. in width[2]	300
	- 40 ft. or more in width[3]	350

[1] Measured from end to end.
[2] 2-way driveway; 1-way driveway less than 20 feet in width.
[3] 2-way driveway; 1-way driveway 20 feet or more in width.

MEDIAN OPENING DESIGN

Median Opening Length

The nose-to-nose length of median openings is a function of turning angles and left-turning radius (based on the expected traffic volume vehicle mixture, i.e., passenger cars, single unit trucks, semi-trailers, etc.). Median openings that will be expected to handle a large number of trucks should be designed to accommodate design vehicles appropriate for the driveway. The minimum median opening length should be 60 feet.

Median End Treatment

Median noses should be of the type illustrated in Figure 3.10, with a nose end radius of 2'6" and transition radii from the full width median to the nose end radius ranging from a minimum of 50 feet to a maximum of 75 feet, depending on the design vehicle turning radius to be accommodated. The median nose should have a minimum of a 15 foot setback from the cross street curb line for single left turn lanes and 18 feet for dual left turn lanes.

MEDIAN BULLET NOSE DETAIL

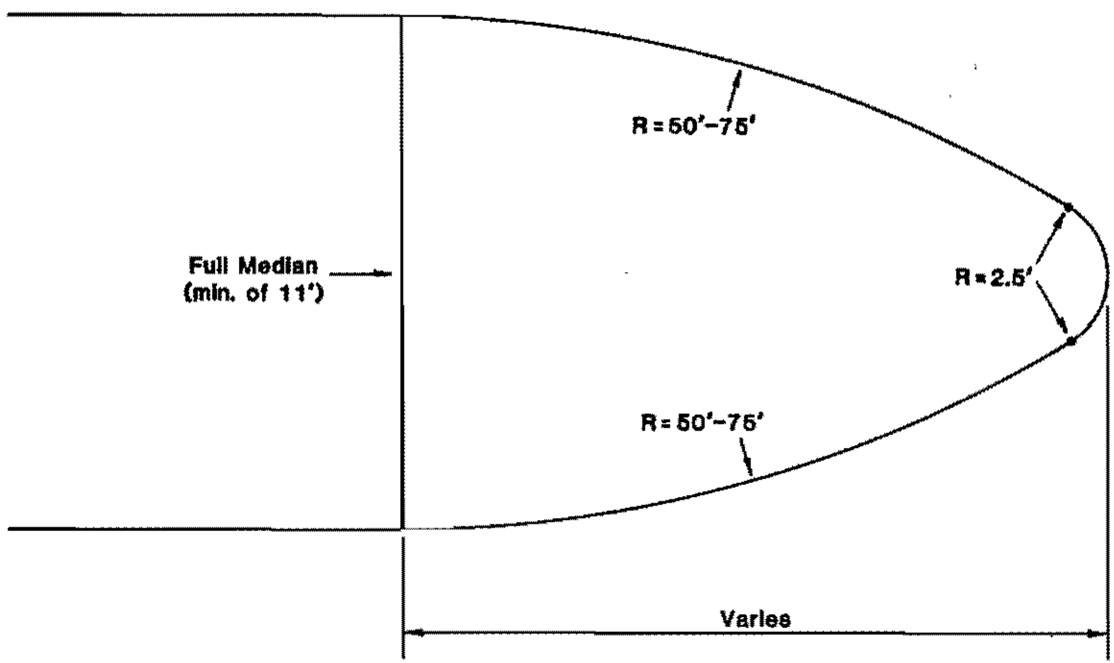

Figure 3.10
Median End Treatment

Median Left Turn Lane Width

Each median opening where a left turn or U-turn movement will be permitted should be designed with a left turn lane of sufficient storage and taper distance. Left turn lanes constructed in the median should be a minimum width of 11 feet.

Left Turn Storage Requirements

The length required for left turn storage in the median left turn lane is a function of the number of left turn movements, opposing through movements, and, if the intersection is signalized, the cycle length and green time. Figure 3.11 shows the required storage length for various left turn and through movement conflicts at unsignalized intersections.

TRAFFIC SIGNAL SPACING

The primary function of an arterial street is to move a large volume of through traffic as quickly, efficiently, and safely as possible. For major roadways with at-grade intersections, this can best be done by providing progressive signal operation. Signal spacing and timing are two of the limiting factors in providing such operation.

Standard procedure in signal timing is to attempt to establish offsets, cycle lengths, and phasings for given conditions, as determined by existing intersection spacings. More efficient operation, however, can be obtained if the intersections are uniformly spaced within a certain optimum range. By providing for proper intersection spacing during the development of an area or, in some cases, modifying existing intersection or signal spacings, a high degree of efficiency in operation of the major roadway and flexibility of adaptation to daily volume fluctuations can be realized.

Subject to the constraints of providing reasonable access to the arterial, and avoiding excessive circuity of travel for crossing traffic, a procedure has been developed (Reference 14) to define the "optimum" range of intersection spacings. Table 3.13 gives desirable intersection spacings for different combinations of cycle lengths and speeds of progression. The numbers in parentheses are for a simultaneous system.

BUS TURNOUT LANE

Bus turnout lanes are recommended on all major through routes in the Town which carry bus service. This would include Belt Line Road, Midway Road, Quorum Drive, Addison Road, and Arapaho Road. Bus turnout lanes provide a refuge for the bus and its passengers on major streets. Other traffic may pass the bus while it is boarding and discharging passengers, thereby reducing accident potential and increasing arterial capacity. The recommended bus turnout lane dimensions are shown in Figure 3.12.

All bus stop locations should be located to adequately serve the surrounding area. In some areas, bus stops may need to be consolidated. Only major bus stops should have bus turnout lanes.

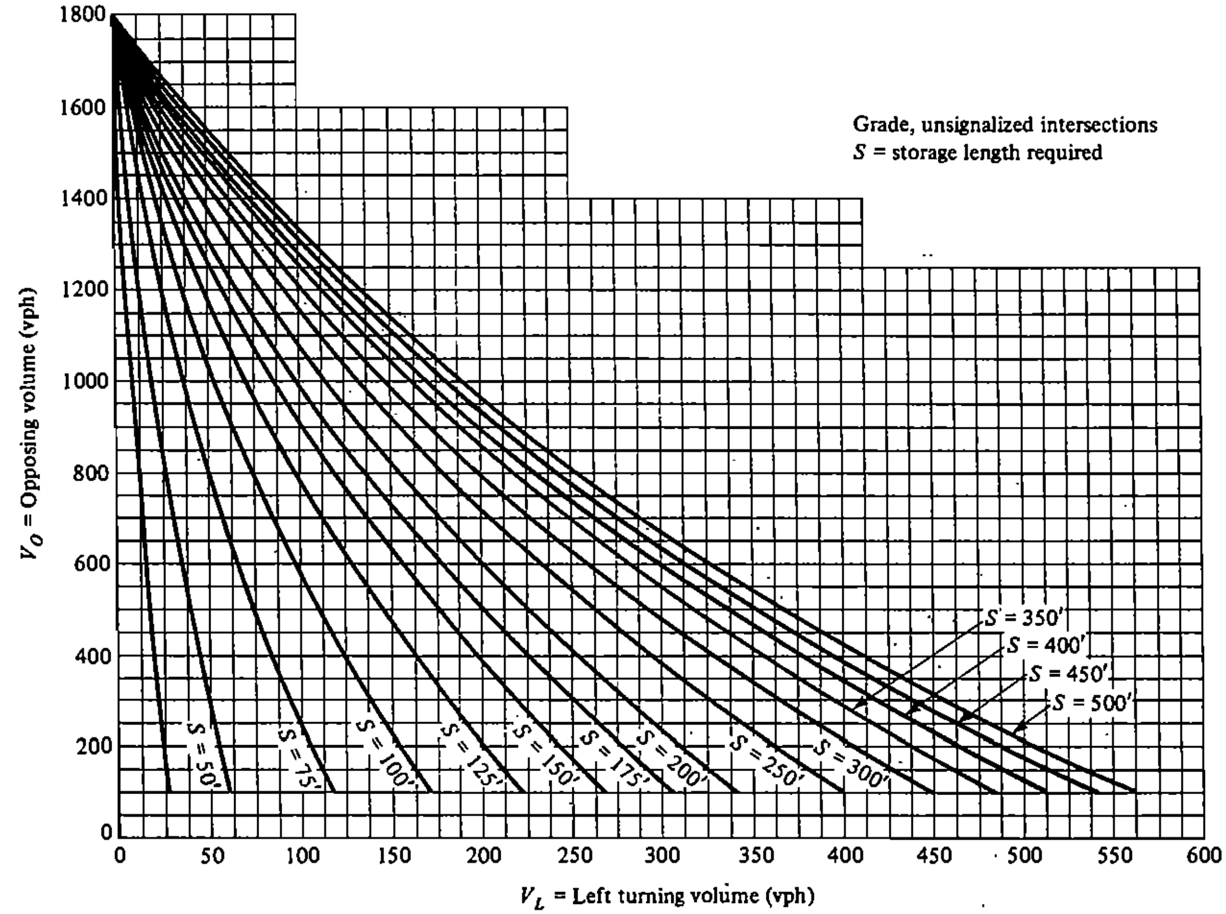

Figure 3.11
Storage Length Requirements For Unsignalized Left-Turn Lanes

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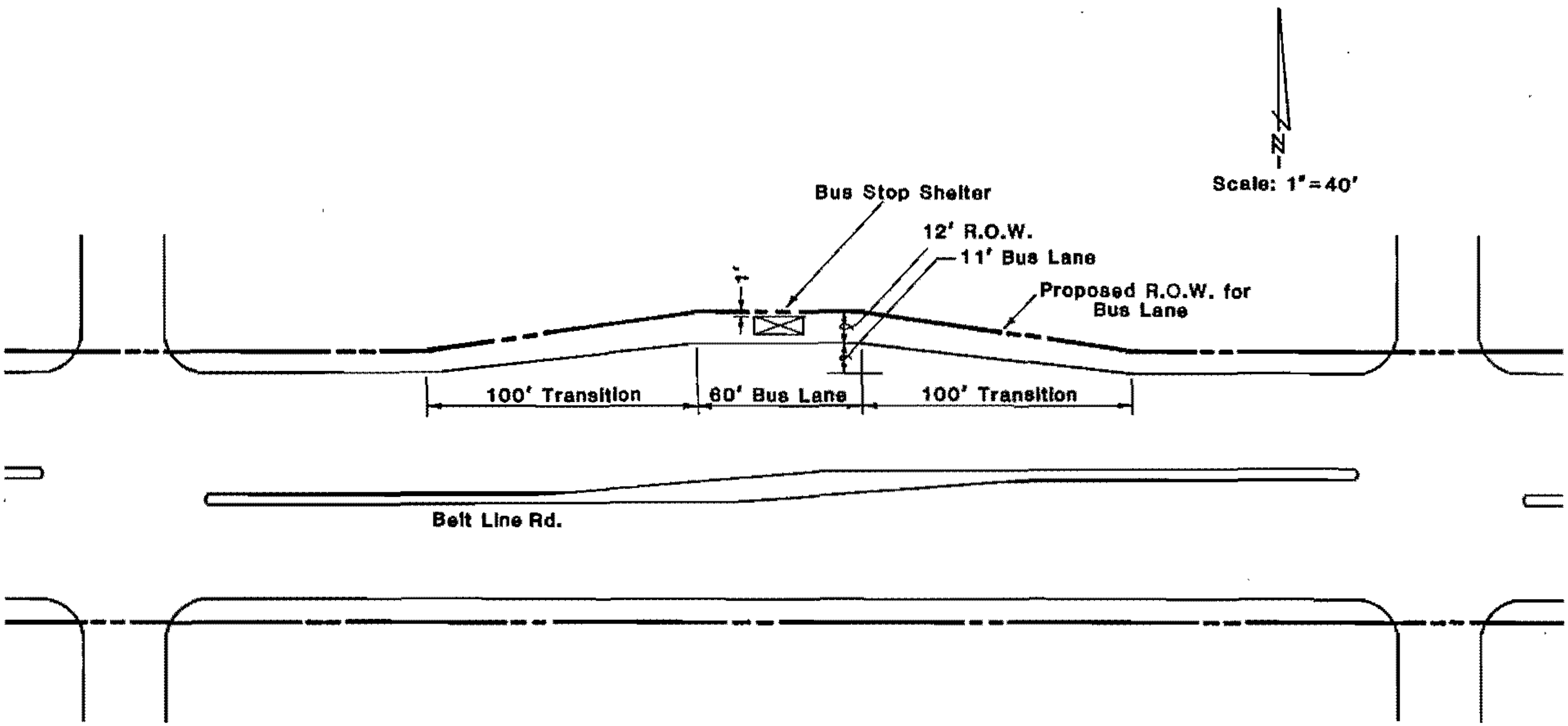


Figure 3.12
Recommended Bus Turnout Lane

TABLE 3.13

INTERSECTION SPACING FOR VARIOUS SPEEDS AND CYCLE LENGTHS*

Speed (mph)	INTERSECTION SPACING (FT) FOR CYCLE LENGTH								
	40 sec	**50 sec**	**60 sec**	**70 sec**	**80 sec**	**90 sec**	**100 sec**	**110 sec**	**120 sec**
25	735 (1470)	919 (1838)	1103 (2205)	1286 (2573)	1470 (2940)	1654 (3308)	1838 (3675)	2021 (4043)	2180 (4360)
30	882 (1764)	1103 (2205)	1323 (2646)	1544 (3087)	1764 (1528)	1985 (3969)	2205 (4410)	2426 (4851)	2616 (5232)
35	1029 (2058)	1286 (2573)	1544 (3087)	1801 (3602)	2058 (4116)	2315 (4631)	2573 (5145)	2830 (5660)	3052 (5232)
40	1176 (2352)	1470 (2940)	1764 (3528)	2058 (4116)	2352 (4704)	2646 (5292)	2940 (5880)	3234 (6468)	3488 (6976)
45	1323 (2646)	1654 (3308)	1985 (3969)	2315 (4631)	2646 (5292)	2977 (5954)	3308 (6615)	3638 (7277)	3924 (7848)
50	1470 (2940)	1838 (3675)	2205 (4410)	2573 (5145)	2940 (5880)	3308 (6615)	3775 (7550)	4153 (8305)	4360 (8720)
55	1617 (3234)	2021 (4043)	2426 (4851)	2830 (5660)	3234 (6468)	3638 (7277)	4153 (8305)	4447 (8894)	4796 (9592)

*Numbers in parentheses are for a simultaneous system.

DEVIATION FROM STANDARDS

It is intended that the functional classifications and design standards presented in this report be used throughout the Town of Addison. However, some exceptions may be necessary. For example, special intersection treatments to provide left or right turn lanes on collector streets may be desirable. Also, design exceptions to accommodate the special needs of certain areas may be necessary. Each potential exception should be carefully reviewed to determine if other alternatives exist. This is particularly important for any proposal which would reduce the potential capacity offered by standard criteria.

4. THE TRANSPORTATION PLAN

This section of the report presents the Transportation Plan for the Town of Addison. This Plan includes three components: a Thoroughfare Plan, a Pedestrian Plan, and a Transit Plan.

NEED FOR A PLAN UPDATE

The Thoroughfare Plan identifies specific improvements to the roadway system that will enhance traffic circulation within Addison; provide a framework for future development; and increase operational efficiency. During the initial development of the Plan in 1992, the North Central Texas Council of Governments (NCTCOG) travel demand forecasting model was utilized to project future traffic demand. After calibrating the model to 1986 conditions, 2010 demographics were used to project future demand for the existing or "no-build" roadway system. Based on these projections, several alternative 2010 highway networks were developed and evaluated to determine needed roadway improvements.

Over the past five years, growth in Addison, from both a demographic and vehicular standpoint, has warranted the need to update the Thoroughfare Plan. For example, traffic volumes within the Town have approached or exceeded acceptable levels-of-service on several roadways, most notably Belt Line Road and Addison Road. These two roadways are experiencing average daily volumes in excess of 50,000 and 23,000, respectively, throughout the Town. However, the corresponding daily roadway capacities are 40-45,000 for Belt Line Road and 20-24,000 for Addison Road.

Revised demographic projections from the NCTCOG for 2010, as well as new projections for 2020, indicate that there will be significantly higher growth in population and employment in Addison than the levels projected during the original thoroughfare planning process. As displayed in Table 4.1, the five Traffic Survey Zones (TSZ) in Addison with the highest economic activity are projected to include 965 people by 2010, and 1,115 people by 2020. However, the initial 2010 population projections for this same area were for only 307 people.

Total employment within this same area is projected to increase by 3,252 by 2010, and 4,902 by 2020. This compares with the initial projected increase of only 1,102 employees.

Based on this demographic assessment, there will be a need for additional north/south and east/west roadway capacity within the Town. However, limited available right-of-way along both Belt Line Road and Addison Road limit the opportunity for capacity enhancements other than intersection improvements.

TABLE 4.1

ADDISON DEMOGRAPHIC PROJECTIONS

TSZ	DATA FROM 1986 NCTCOG FORECAST				1990-2010 Difference		DATA FROM 1994 NCTCOG FORECAST						1990-2010 Difference		2010-2020 Difference		TOTAL GROWTH 1990-2020	
	1990		2010				1990		2010		2020							
	Pop	Emp	Pop	Emp	Pop	Emp	Pop	Emp	Pop	Emp	Pop	Emp	Pop	Emp	Pop	Emp	Pop	Emp
213	0	1792	0	1790	0	(2)	0	1626	0	1722	0	1751	0	96	0	29	0	125
214	6	633	111	763	105	130	2	509	2	509	2	512	0	0	0	3	0	3
571	35	1490	196	2536	161	1046	0	1321	854	2754	1012	4110	854	1433	158	1356	1012	2789
573	0	2257	0	2192	0	(65)	0	2728	64	3656	59	3849	64	928	(5)	193	59	1121
13238	NA	NA	NA	NA	NA	NA	6	10036	45	10831	42	10900	39	795	(3)	69	36	864
TOTAL	41	6172	307	7281	266	1109	8	16220	965	19472	1115	21122	957	3252	150	1650	1107	4902

MODIFICATIONS TO 1992 THOROUGHFARE PLAN

Several potential modifications to the 1992 Thoroughfare Plan were evaluated as a part of this Plan Update. These were as follows:

- Extension of Spectrum Drive from Arapaho Road to Airport Parkway;
- Modifications to Quorum Drive between the Dallas North Tollway and Belt Line Road;
- Upgrade of Arapaho Road from four to six lanes between Quorum Drive and the Tollway;
- Realignment of Arapaho Road along Realty/Centurion Way;
- Removal of Beltway Drive between Inwood Road and Quorum Drive; and
- Addition of an east/west connection in the Quorum area.

The results of these evaluations are described in the following sections of this chapter.

Extension of Spectrum Drive from Arapaho Road to Airport Parkway

The extension of Spectrum Drive would provide additional north/south circulation to the Dallas North Tollway southbound frontage roads and to Quorum Drive for development within the immediate corridor. It would also provide backside access to future developments along the Tollway. Without such a facility, access would be restricted to right-in/right-out movements along the frontage roads.

It is recommended that this roadway be classified as a four lane Commercial Collector due to its spacing relative to the Tollway and Quorum Drive, as well as the access that will be provided to future development within the Addison Circle area.

Modifications to Quorum Drive between the Dallas North Tollway and Belt Line Road

Two modifications are recommended to Quorum Drive. These are as follows:

1. The addition of a "round-about" circle at Addison Circle Road; and
2. The reduction in functional classification from Principle Arterial to Minor Arterial status.

There are several reasons for downgrading Quorum Drive, including:

- The standard spacing for principle arterials is on one mile intervals. However, Quorum is 1/4 mile from the Dallas North Tollway and 3/4 mile from Midway Road.
- The Quorum cross section in the Addison Circle area is being constructed as a four lane facility with parallel parking.

- The addition of the round-about and on-street parking lowers the traffic carrying capacity of the facility.

- Quorum Drive does not provide the continuity that principle arterial facilities should provide in terms of crosstown movement.

- The addition of Spectrum Drive to the Plan will provide additional north/south capacity, and potentially reduce the role that Quorum would functionally provide.

Although it is recommended that this facility be downgraded in functional status, flared right-of-way should be maintained at the intersections with other major roadways in order to provide for additional turning movements as necessary/warranted.

Upgrade of Arapaho Road from four to six lanes between Quorum Drive and the Tollway

The projected growth of the Addison Circle area, coupled with the availability of undeveloped land around the Quorum/Spectrum area, warrants the provision of as much east/west roadway capacity as possible. In addition, upgrading Arapaho Road will maximize the efficiency of the Tollway intersection.

Realignment of Arapaho Road along Realty/Centurion Way

Since the adoption of the original Addison Thoroughfare Plan, a final alignment for Arapaho Road has been approved and engineered. This Update reflects the final location of this roadway from the Dallas North Tollway to Marsh Road in Carrollton. Upon its implementation, this facility will provide relief to the Belt Line Road, and also provide back side access to commercial and industrial development in the area.

Removal of Beltway Drive between Inwood Road and Quorum Drive, and the addition of an east/west connection in the Quorum area

The original intent of Beltway Drive was to provide development in the south Quorum Drive/Landmark Boulevard area with additional access to north/south facilities, rather than accessing them solely via Belt Line Road. However, over time, new development in the area of the proposed roadway has prevented this facility from being implemented, and thereby closed the opportunity for access to Inwood Road at the initially proposed location.

On the other hand, additional east/west capacity in the south Quorum area would be very beneficial to traffic circulation. The optimal location for a new facility would be near the motor bank on Landmark Boulevard. This location is centrally located between Belt Line Road and the south Town Limits, and would minimize the impact to the railroad yard, sidings, and switches located further south. In addition, a roadway in this location would provide back side access to existing development in south Addison, as well as provide relief to traffic congestion on Belt Line Road. Without such a facility, access would be restricted to right-in/right-out movements along the southbound Tollway frontage roads. It is recommended that this new roadway be classified and constructed as a Commercial Collector.

THOROUGHFARE RECOMMENDATIONS

The Addison Thoroughfare Plan, as amended from this Update, is depicted on Figure 4.1. The specific facilities which are recommended for implementation and/or improvement are summarized in Table 4.2.

In order to minimize the need for additional new roadways within Addison, the efficiency and capacity of the existing roadway system must be maximized. The Addison Bottleneck Report (Reference 15) identifies specific intersection improvements which will increase system efficiency and capacity at various intersections through the provision of additional lane capacity at the intersection approaches to facilitate turning movements.

Efficient signal timing plans should be maintained at all Addison signalized intersections. Timing plans for the Town were revised in 1990 as part of the Dallas County Signalization Project and the TxDOT Traffic Light Synchronization Program. These timing plans provide increased efficiency on the roadway system by reducing vehicle stops and delays. As travel patterns and volumes change, these timing plans will require updating in order to maintain optimum signal timing plans.

Currently, through truck traffic in the Town is restricted to Belt Line Road, Midway Road, and the southbound frontage roads of the Dallas North Tollway. Truck traffic should be monitored and other truck routes established, as necessary.

It is recommended that the Town of Addison implement a transportation system management program which monitors conditions at intersections within the Town. This program will allow the Town to identify additional roadway improvements necessary to meet changing traffic characteristics.

In addition to the recommended Thoroughfare Plan, the design and access control guidelines in this report should be followed to aid the Town in preserving thoroughfare capacity. As vacant parcels adjacent to existing thoroughfares develop, new driveways will generate new conflict pints along the roadways, reducing the capacity of the roadway. As stated in Chapter 3, a two percent increase in driveway volumes can result in a one percent decrease in the adjacent roadway capacity. By adhering to the access control guidelines, adequate access to adjacent properties can be provided while minimizing the impact on roadway system capacity.

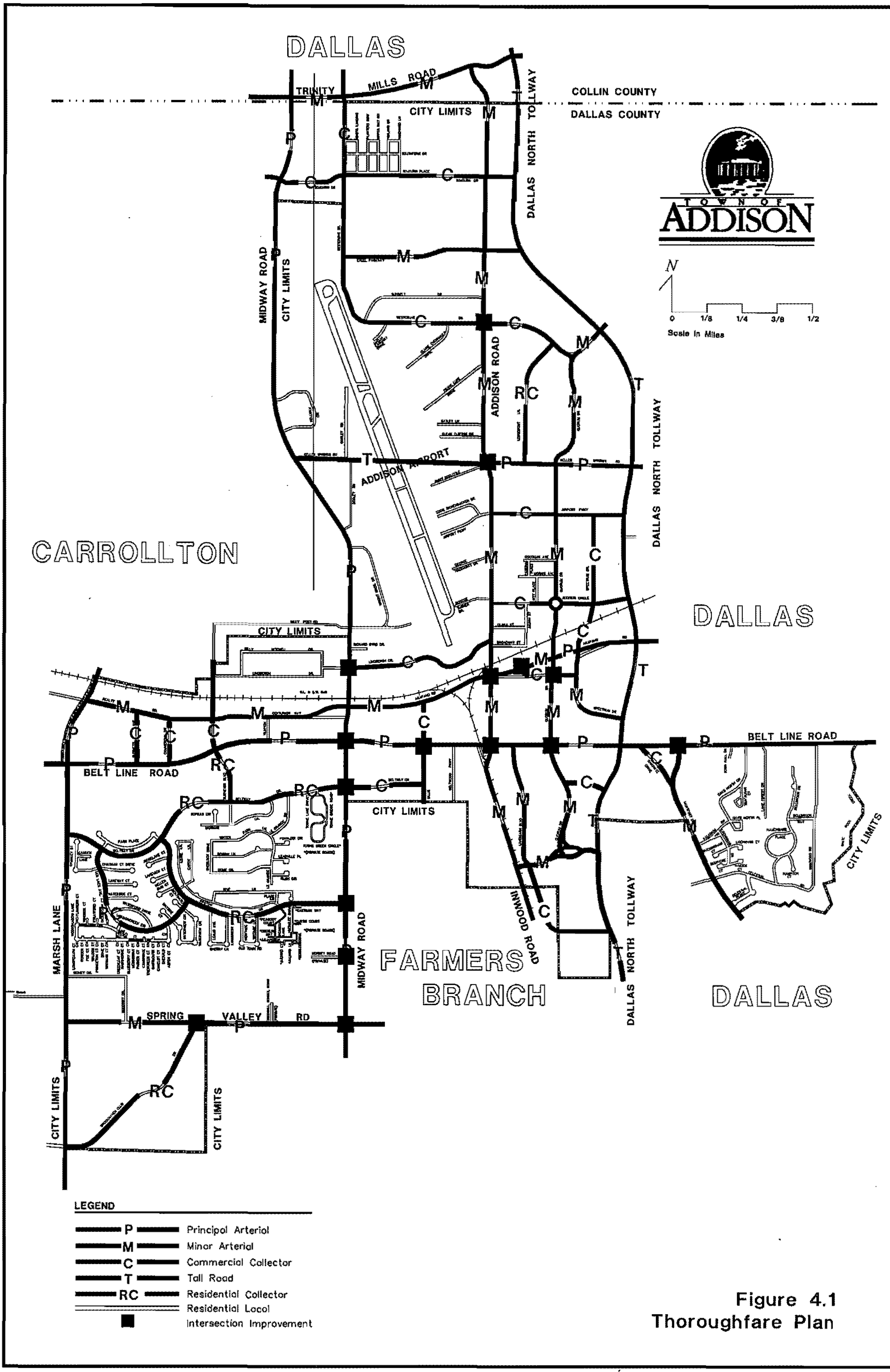


Figure 4.1
Thoroughfare Plan

TABLE 4.2

RECOMMENDED THOROUGHFARE IMPROVEMENTS

Roadway	Limits	Existing Class	Improvement
Addison/Inwood Road	N. Town Limit to S. Town Limit	4U	Widen to 4D
Arapaho Road	Marsh to Quorum	2U/None	Construct/Widen to 4D
Arapaho Road	Quorum to DNT	4D	Widen to 6D
Beltway Drive	Quorum to DNT	None	Construct as 4U
Gillis Road	Arapaho to S. Town Limit	2U/None	Construct/Widen to 4U
Keller Springs Road	DNT to Addison	4U	Arapaho Road
Keller Springs Road	Addison to Midway	2U/None	Construct as a 4U Toll Tunnel
Landmark Boulevard	Quorum to DNT	None	Extend south as 4D
Quorum Drive	Inwood to Landmark	None	Construct as 4D
Quorum Drive	Westgrove to DNT	4D	Reconstruct the intersection so that Quorum will be the main road, and Westgrove will "T" into Quorum.
Sojourn Drive	Westgrove to DNT	2U	Widen to 4U
Spectrum Drive	Airport Pkwy. to Arapaho	None	Construct as 4U
Westgrove Drive	Quorum to Trinity Mills	2U	Widen to 4U
Intersection Improvements	Various locations		-Construct dual left turn lanes and free right turn lanes as recommended in the Addison bottleneck study (Reference 15). -Construct a traffic circle at the intersection of Quorum Drive and Addison Circle.

PEDESTRIAN RECOMMENDATIONS

At the present time there is little pedestrian activity within Addison. Sidewalks are discontinuous and in some areas located close to the adjacent roadway. In addition, all signalized intersections in Addison provide pedestrian indications, but some do not provide crosswalks for the pedestrians.

There is a great potential to capture the employee who drives to lunch from the workplace. Many of these employees could travel less than three blocks to eat, and would be candidates for walking. Other walk trips to retail locations would be facilitated if pedestrian links were available. Overall, an effective pedestrian system would have the potential to attract many pedestrians, especially during the mid-day peak-hour.

Figure 4.2 displays the recommended pedestrian system for the Town of Addison. This Plan consists of both primary and secondary pedestrian corridors. The primary corridors include major roadways such as Belt Line Road, Arapaho Road, Quorum Drive, and the southbound Tollway frontage roads. Special pedestrian enhancements should be provided in these corridors, including barrier-free sidewalks and abundant landscaping. Secondary pedestrian corridors are designed to provide access to the primary pedestrian system and to, or through, adjacent development areas.

As Addison continues to grow, the following pedestrian goals should be sought:

1. Provide sidewalks along all arterials and collectors.
2. Make residential areas more pedestrian-friendly.
3. Provide pedestrian links within major activity areas.
4. Provide pedestrian connections between residential areas and neighboring activity centers.
5. Consider pedestrian needs when developing capital improvement programs.
6. Consider pedestrian links with transit routes.

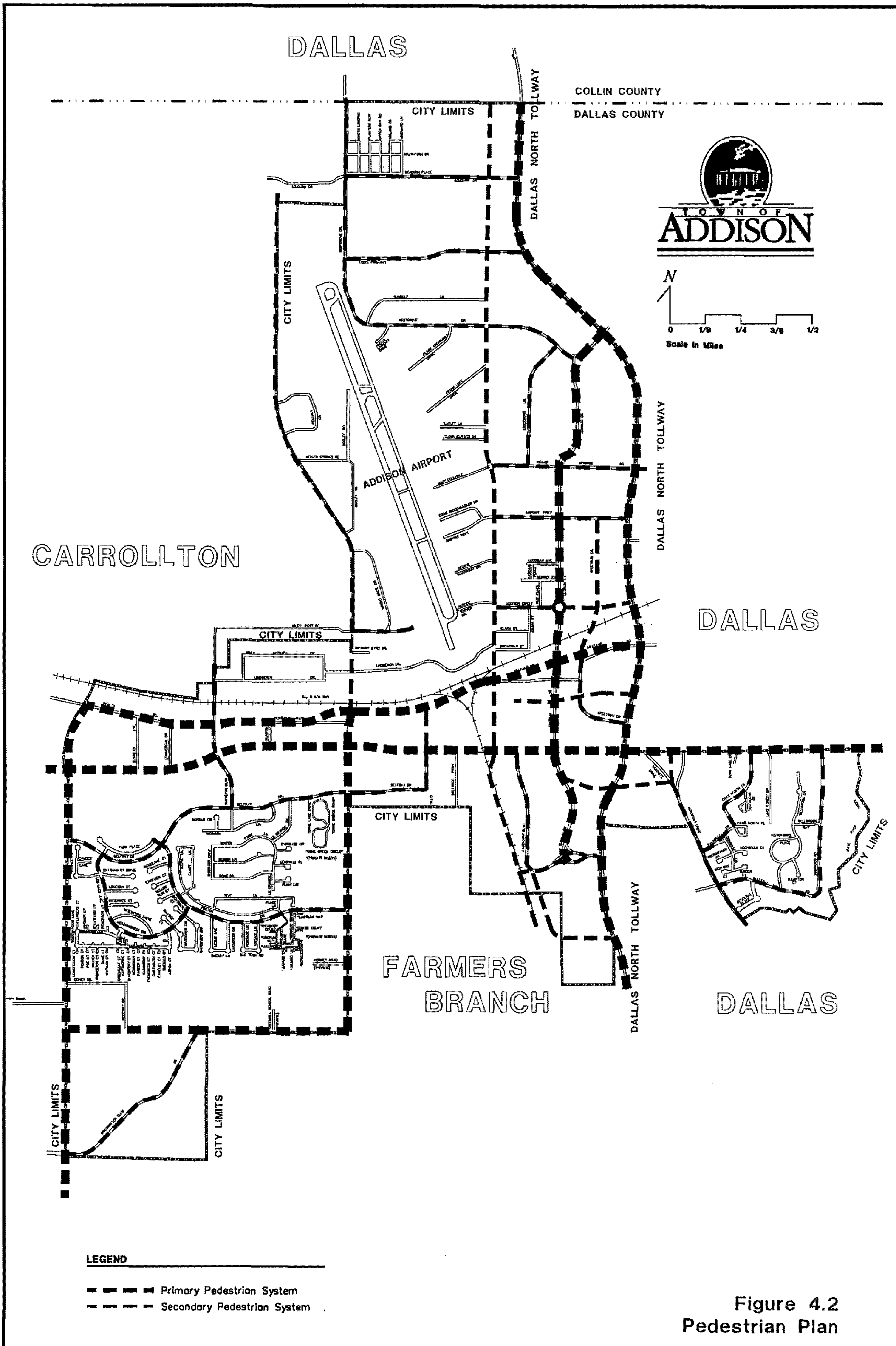


Figure 4.2
Pedestrian Plan

Potential actions to achieve these six pedestrian goals are presented in Table 4.3.

TABLE 4.3
POTENTIAL PEDESTRIAN GOALS AND ACTIONS

Goal	Actions
1	Provide Sidewalks Along All Arterials and Collectors * Require sidewalks in the development process. * Program prioritized sidewalk capital improvements: school routes, bus stops, activity centers, and barrier-free placement.
2	Make Residential Areas More "Pedestrian-Friendly" * Encourage subdivisions to develop comprehensive plans which support the Town's overall plan. * Delineate crosswalks.
3	Provide Pedestrian Links Within Activity Areas * Require "pedestrian-sensitive" site design. * Require a comprehensive walkway system.
4	Provide Connections Between Residential Areas and Activity Centers * Identify opportunities for separate pathways. * Develop an implementation plan. * Require new development to provide pedestrian links.
5	Consider Pedestrian Needs In Capital Improvements Programming * Street widening or new construction * Landscaping * Develop sidewalk/pathway standards.
6	Consider Pedestrian Links with Transit Routes * Bus pads * Relationship to transit routes

Mixed land use developments should be encouraged so that short trips, especially for non-work purposes such as convenience shopping or lunch, may substitute for longer vehicular trips made for the same purposes. This action will help reduce auto dependency and decrease mid-day traffic.

Convenient, direct, attractive, and safe pedestrian connections are crucial in order to attract riders to transit. Consequently, the pedestrian system is a necessary ingredient for transit success.

Little bicycle travel occurs in the Town of Addison. However, as the Pedestrian Plan is implemented, bicycle travel may increase within residential areas, or between residential areas and major activity centers. As bicycle travel increases, the Pedestrian Plan should be reevaluated to ensure that it is meeting the needs of bicyclists. This may include the provision of wider sidewalks to meet the needs of both pedestrians and bicyclists.

TRANSIT SYSTEM RECOMMENDATIONS

EXISTING TRANSIT SERVICE

Current transit service in Addison is provided by Dallas Area Rapid Transit (DART). This service includes local, feeder/distributor, express, and crosstown routes. As shown in Table 4.4 and on Figure 4.3, ten routes presently serve the Town. Most of these routes originate/terminate at Prestonwood Town Center on Prestonwood Drive east of the mall. Of the various routes serving Addison, one is a local route; six are feeder/distributer routes; one other route provides crosstown service; and the remaining two routes provide express service to downtown Dallas.

Route 83 provides peak period service on 15 minute headways and non-peak service on 30 minute headways. On Saturday, it operates on 30 minute headways. Service is provided every 40 minutes on Sunday.

Route 31B provides service on 40 minute headways continously from the A.M. peak period through the P.M. peak period on weekdays. On Saturday, service is provided throughout the day on average headways of 35 minutes.

During peak periods, routes 172 and 205 operate on 27 minute headways, whereas routes 321, 322, 333, 341, 363, and 400 operate on 30 minute headways. During off-peak periods, routes 205 and 341 operate on 50 minute headways, whereas the other routes operate on 60 minute headways.

Routes 172 and 322 have no midday service. Routes 341, 363, and 400 also provide service on Saturday on 60 minute headways.

TABLE 4.4
TYPES OF TRANSIT SERVICE

Type	Description
Local	83 - Prestonwood
Feeder/Distributer	363 - Spring Valley
	341 - Rosemeade
	333 - Kelly - Carrollton
	322 - Valwood - Belt Line
	321 - Valley View
	31B - Midway
Express	172 - Welch/Inwood
	205 - Addison Farmers Branch Express
Crosstown	400 - Belt Line Crosstown

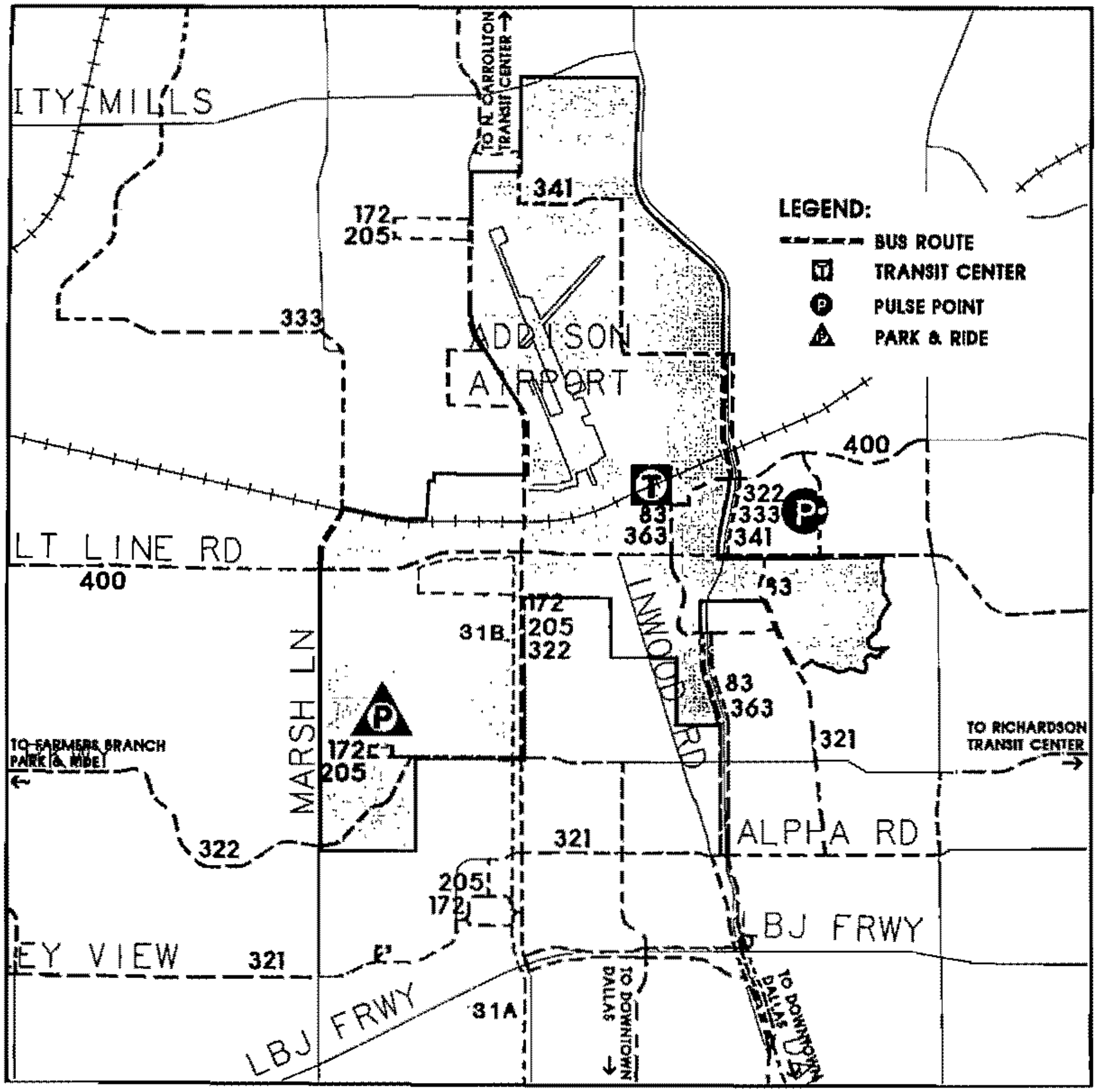


Figure 4.3
Existing Transit Service

FUTURE TRANSIT SERVICE

The Mobility 2020 Plan, prepared by the NCTCOG, identifies existing and potential rail alignments within the Dallas Fort Worth area. Two of the future alignments would impact Addison. For example, the Cottonbelt line passes through Addison near the planned realignment of Arapaho Road. Leading to the south is a spur line along Inwood Road toward the Galleria Shopping Mall area of Dallas. In conjunction with the DART light rail expansion plans, some of the existing bus routes in the area will likely be rerouted to serve as feeders to the rail lines.

As part of the expansion of the DART system, a transit center is proposed along the Cottonbelt Railroad at the northwest corner of the realigned Arapaho Road and Quorum Road. This new transit center is planned to be in operation by the end of 1998, and will replace the current facility at Prestonwood Town Center.

With this planned relocation, Addison will be served by an additional four bus routes that presently originate from Prestonwood Town Center, but do not pass through the Town. It is envisaged that this transit center will be able to accommodate a future rail station. According to current plans, 152 park and ride and 60 kiss and ride parking spaces will be provided. Figure 4.4 displays the location of the planned transit center.

Based on projected 2020 employment and population densities, the Town is unlikely to generate sufficient demand to support a grid-type transit system. However, as development increases, the DART bus system should be restructured to provide more effective transit service to and within Addison.

Public transit usage can be encouraged through land use planning. For example, higher commercial and residential densities along transit corridors, as well as activity centers within mixed uses, will lead to increased opportunities for the success of the transit system. Provisions for transit can also be incorporated into public/private projects by adding bus pull-out lanes or bus stop shelters. It is therefore recommended that the Town adopt land use policies surrounding future rail stations and transfer centers which will support the transit system.

As transit demand increases, there will likely be a reduction in single occupancy automobile travel. This will lead to reductions in the increase of traffic congestion, and lesser demand for additional roadway facilities.

PARSONS TRANSPORTATION GROUP INC.

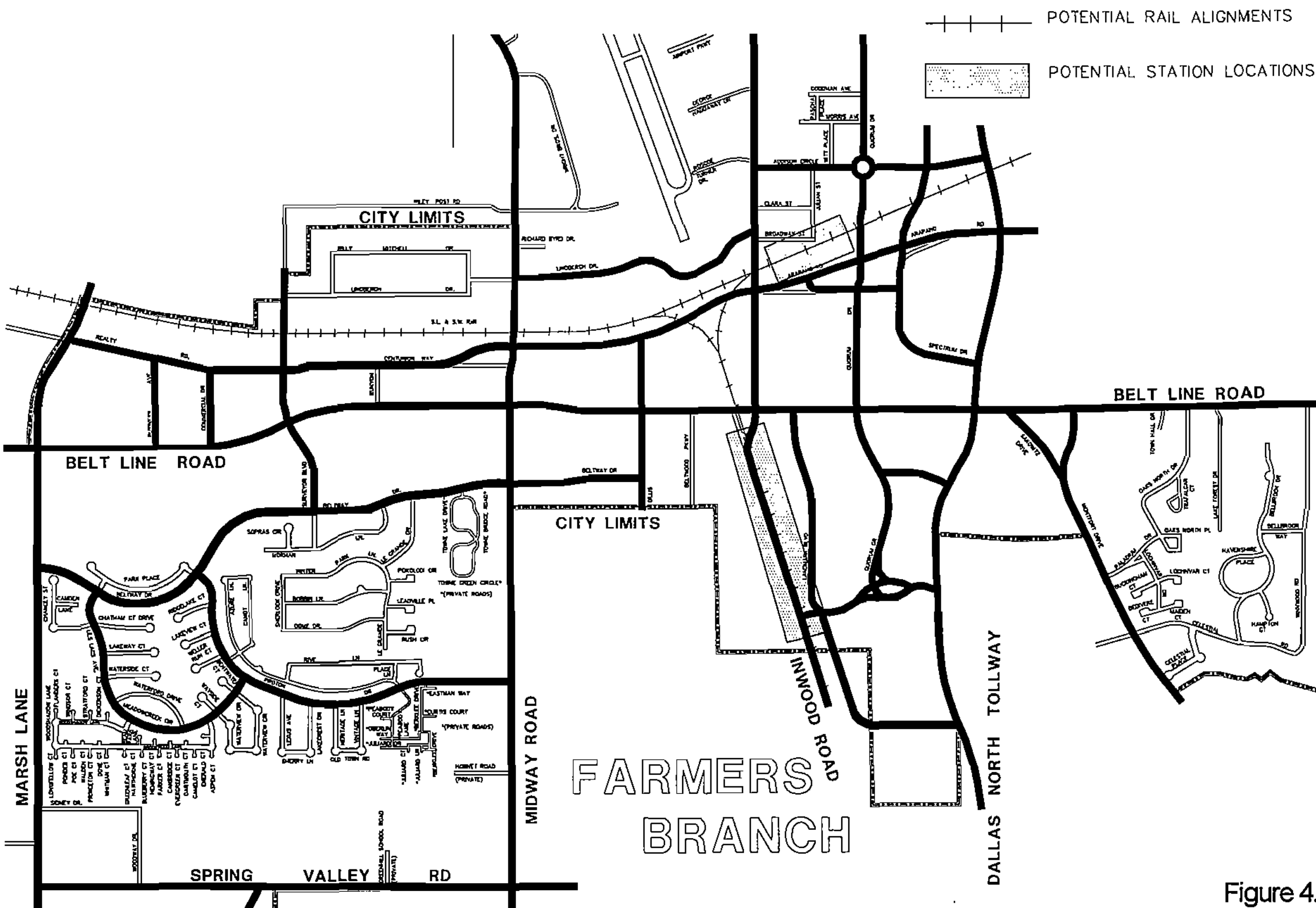
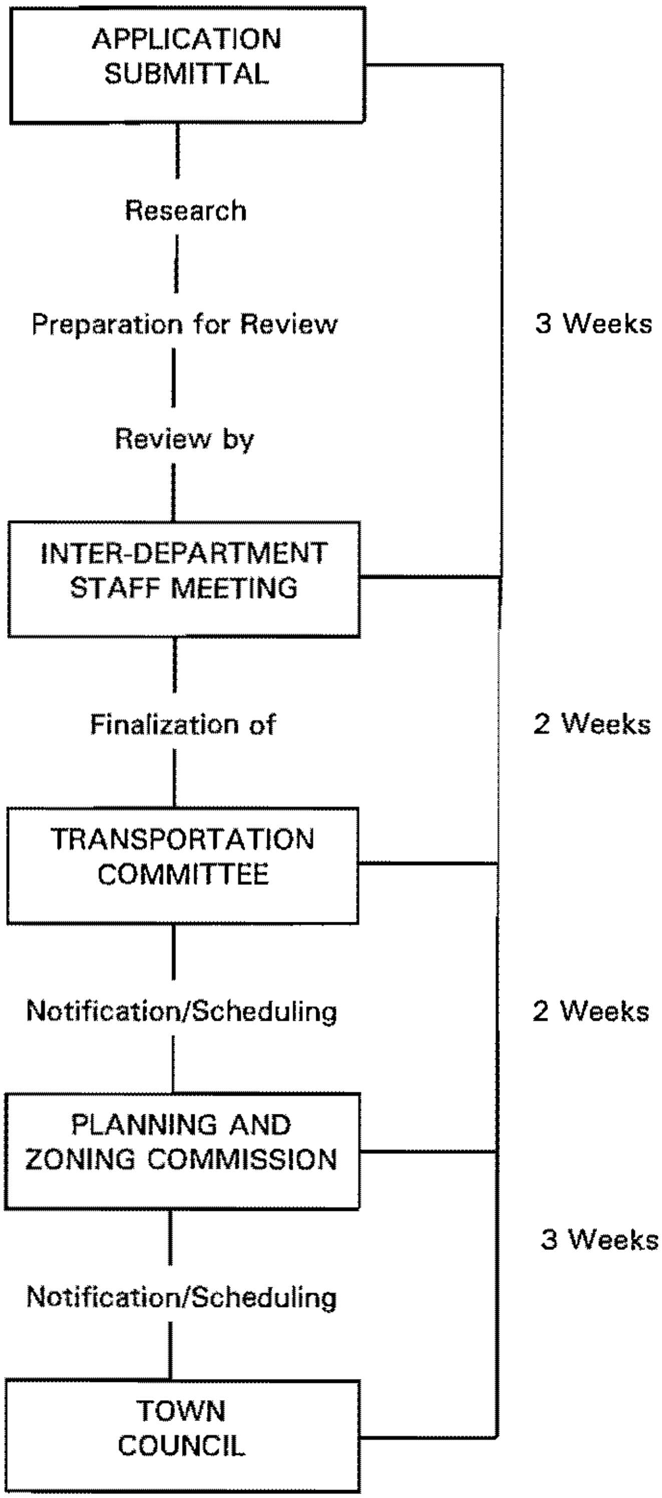


Figure 4.4
Potential Rail Alternatives


APPLICATION SUBMITTAL
Research
Preparation for Review
Review by
INTER-DEPARTMENT STAFF MEETING
Finalization of
TRANSPORTATION COMMITTEE
Notification/Scheduling
PLANNING AND ZONING COMMISSION
Notification/Scheduling
TOWN COUNCIL
3 Weeks
2 Weeks
2 Weeks
3 Weeks

6. CONCLUSIONS

All components of this Transportation Plan are essential to achieve the overall goal of the study: i.e. to provide for the safe, efficient, and orderly movement of people and goods within, to, and through Addison, while preserving the quality of life and environment for local residents and businesses. In order to monitor progress toward the implementation of this Plan; to ensure its continued viability in efficiently meeting the needs of the Town; and to reflect changing conditions; this Plan should be reviewed and updated periodically (at least once every five years).

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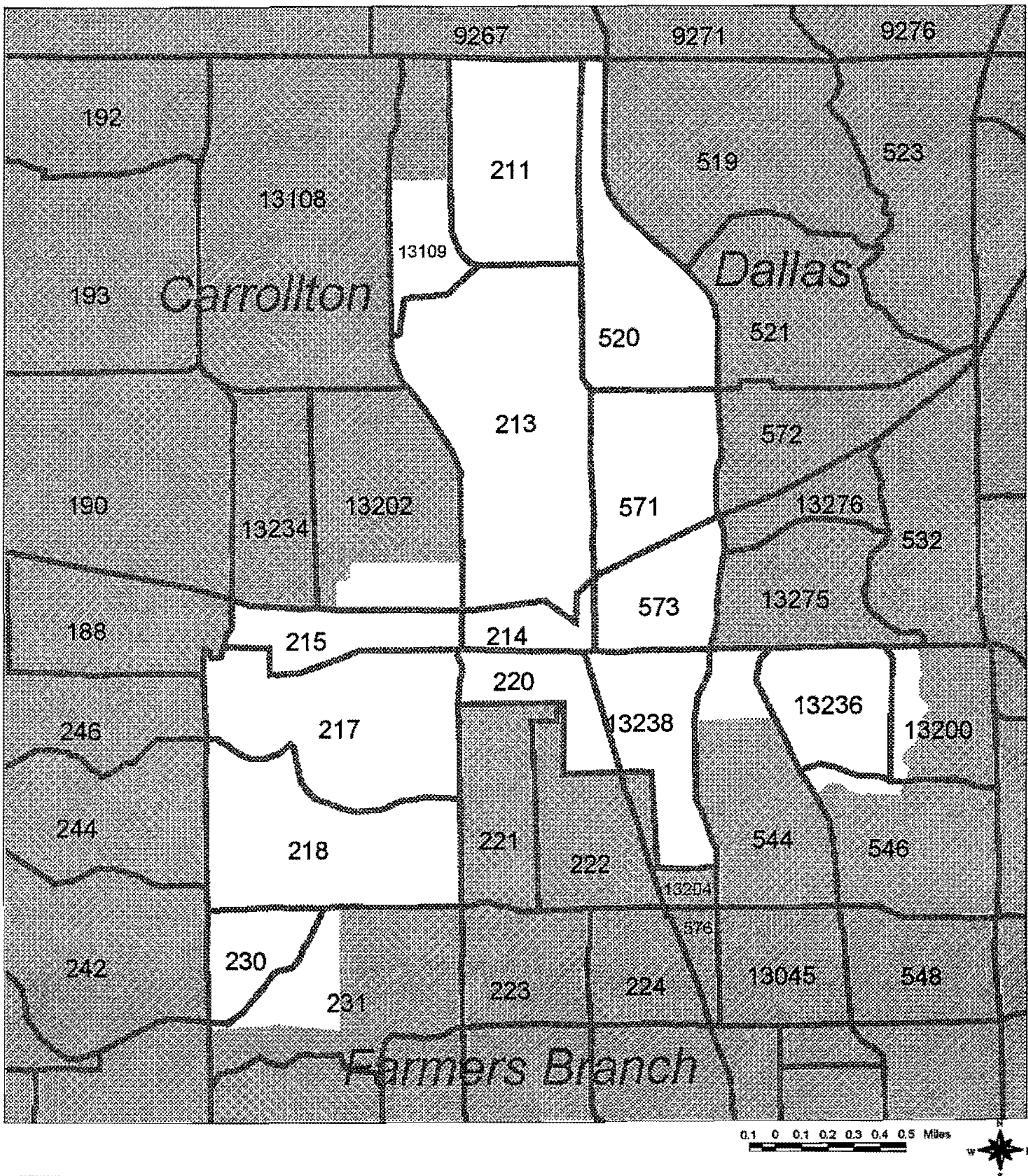
APPENDIX A

TRAFFIC SURVEY ZONE MAP

PARSONS TRANSPORTATION GROUP, INC.



Traffic Survey Zone

Figure A.1
Addison Traffic Survey Zone Structure

APPENDIX B

1995 AND 2020 DEMOGRAPHIC DATA

ADDISON TRANSPORTATION PLAN

POPULATION AND EMPLOYMENT BY TSZ

TSZ	F/P	1995 POP	2020 POP	Proj. Growth (Total)	Proj. Growth (Percent)	1995 EMP	2020 EMP	Proj. Growth (Total)	Proj. Growth (Percent)
211	F	1246	1357	111	9	403	2131	1728	429
213	F	0	0	0	0	772	1751	979	127
214	F	2	2	0	0	89	512	423	475
215	F	2	4	2	100	164	2504	2340	1427
217	F	986	1835	849	86	473	4315	3842	812
218	F	895	912	17	2	488	3409	2921	599
220	F	0	2	2	200	145	1009	864	596
230	F	2230	1952	(278)	(12)	136	201	65	48
231	P	2267	2542	275	12	408	3043	2635	646
520	F	1761	3301	1540	87	338	3917	3579	1059
544	P	3712	5043	1331	36	373	2584	2211	593
546	P	4520	5240	720	16	338	85	(253)	(75)
571	F	211	1012	801	380	291	4110	3819	1312
573	F	16	59	43	269	191	3849	3658	1915
13109	P	0	0	0	0	241	289	48	20
13200	P	883	1787	904	102	209	3489	3280	1569
13202	P	0	0	0	0	428	4615	4187	978
13236	F	588	1801	1213	206	216	1512	1296	600
13238	F	16	42	26	163	245	10900	10655	4349
Total		19335	26891	7556	1655	5948	54225	48277	812

TSZ = Traffic Survey Zone

F = TSZ is completely within Town Limits

P = TSZ is partially within the Town Limits

TOWN OF ADDISON

TRANSPORTATION PLAN

Prepared for:

The Town of Addison

Prepared by:

Barton-Aschman Associates, Inc.

TOWN OF ADDISON

TRANSPORTATION PLAN

Prepared for:

The Town of Addison

Prepared by:

Barton-Aschman Associates, Inc.

December, 1992

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1. INTRODUCTION

The Addison Transportation Plan Committee was formed to develop a transportation system necessary to accommodate future travel demands within the Town. As part of the Transportation Plan Committee, the Town of Addison retained Barton-Aschman Associates, Inc. to recommend a transportation plan which incorporates thoroughfares, transit, and pedestrians. The transportation plan provides a transportation system within the Town to support the mobility of the projected population and employment through the year 2010.

The transportation plan is divided into three (3) separate plans: a thoroughfare plan, a pedestrian plan, and a transit plan. The thoroughfare plan is based on a system of functionally classified roadways. These functional classifications are intended to reflect the role or function of each roadway within the overall thoroughfare system. The pedestrian plan provides a policy for the Town to accommodate future pedestrians and encourage walking. The transit plan focuses on needed changes to the existing routes, as well as, incorporating a possible future rail system into the Town.

GOALS AND OBJECTIVES OF PLAN

Although this transportation plan provides for the safe and efficient movement of people and goods, it also dictates the planning of transportation facilities which are responsive to the goals and objectives of the Town. The following goals and objectives were developed to guide the development of the transportation plan:

OVERALL GOAL

Provide for the safe, efficient, and orderly movement of people and goods in, out, and through Addison while preserving the quality of life and environment for its citizens and businesses.

ROADWAY GOAL

Provide a roadway network that achieves desirable levels of service, promotes economic development opportunities, and preserves the quality of life and environment/ aesthetics.

Objectives

1. Provide additional capacity in the east/west direction in order to prevent intolerable congestion on Belt Line Road.

2. Provide additional access to the Quorum areas to allow fulfillment of economic potential.

3. Work with other jurisdictions to coordinate the provision of roadway capacity.

4. Provide a clear set of requirements for access to the public roadway system to:

   a. Facilitate the private development process
   b. Ensure private development occurs in a beneficial manner
   c. Protect the public investment in roadway facilities

5. Provide a clear set of classification and design criteria to:

   a. Clarify the present and future role of each street in the system
   b. Protect the health and safety of the public
   c. Establish a basis for right-of-way dedication
   d. Maintain the aesthetic quality of streets

6. Promote neighborhood integrity and safety by diminishing cut-through and truck traffic.

7. Protect and enhance the operational and economic viability of the airport.

PEDESTRIAN GOAL

Encourage walking within Addison.

<u>Objectives</u>

1. Enhance the pedestrian environment.

2. Explore opportunities for linking activity centers with pedestrian corridors.

3. Coordinate the provision of pedestrian facilities with transit service.

TRANSIT GOAL

Encourage the role of public and private transit in meeting the travel needs of Addison.

<u>Objectives</u>

1. Identify DART service plans for Addison and explore opportunities to enhance and accommodate them.

2. Explore the potential for a local circulator system to reduce vehicular demand and promote economic vitality.

3. Identify measures needed to integrate future rail service with desired development goals.

2. FUNCTIONAL CLASSIFICATIONS

WHY FUNCTIONAL CLASSIFICATIONS?

Functional classifications for thoroughfare roadways are needed to provide an underlying basis for determining the following:

- Desired degree of continuity
- Capacity level
- Traffic control strategy
- Design speeds and other general criteria
- Access policy

In order to function properly, streets must not only be designed to provide adequately for the desired function, but must also appear to the driver to be appropriate for the role. Arterial streets typically have four or more lanes, medians, turn lanes at intersections, wider right-of-way, higher design speeds, high level of nighttime illumination, and traffic control which gives them priority at intersections with lower class streets. Local streets have one or two lanes with low design speeds and restricted right-of-way which tend to limit through movement. The functional classification system provides a basis for applying these characteristics to the roadway system.

The functional classifications describe each roadway's function and reflect a set of characteristics common to all roadways within each classification. Functions range from providing mobility for through traffic and major traffic flows to providing access to specific properties. Characteristics unique to each classification include degree of continuity, general capacity, and traffic control characteristics. Figure 2.1 illustrates the relative roles of each classification to achieve its intended function.

ROADWAY CLASSIFICATIONS

There are four basic functional classifications of roadways. These are:

- *Freeways* - high capacity facilities with controlled access intended to carry high volumes of longer distance trips; high capacity supplement to arterial system.

- ***Arterials*** - carry though traffic between areas. Relatively high speed, continuous, high capacity roadways with mobility as their priority function. Property access is low priority function.

- ***Collectors*** - primary function is to link local streets with the arterial system; function as collector-distributors and provide property access to commercial properties.

- ***Locals*** - provide access to individual properties. Accommodation of significant through traffic is not an appropriate function.

City street systems consist of arterials, collectors, and local streets. Freeways are normally under the jurisdiction of TxDOT or the Texas Turnpike Authority, and are therefore not the responsibility of the municipalities. The remainder of this discussion, which relates to the town municipal thoroughfare systems, address only arterials, collectors, and locals. Typical design standards for freeways are given, but are not discussed in detail. Table 2.1 describes the most important characteristics of functional classifications.

Based on the characteristics of the street system in the Town of Addison, the following five roadway classifications were established:

1. Principal arterial
2. Minor arterial
3. Commercial collector
4. Residential collector
5. Residential local

Figure 2.2 illustrates the existing classifications of each of the roadways which comprise the arterial and collector thoroughfare system within Addison.

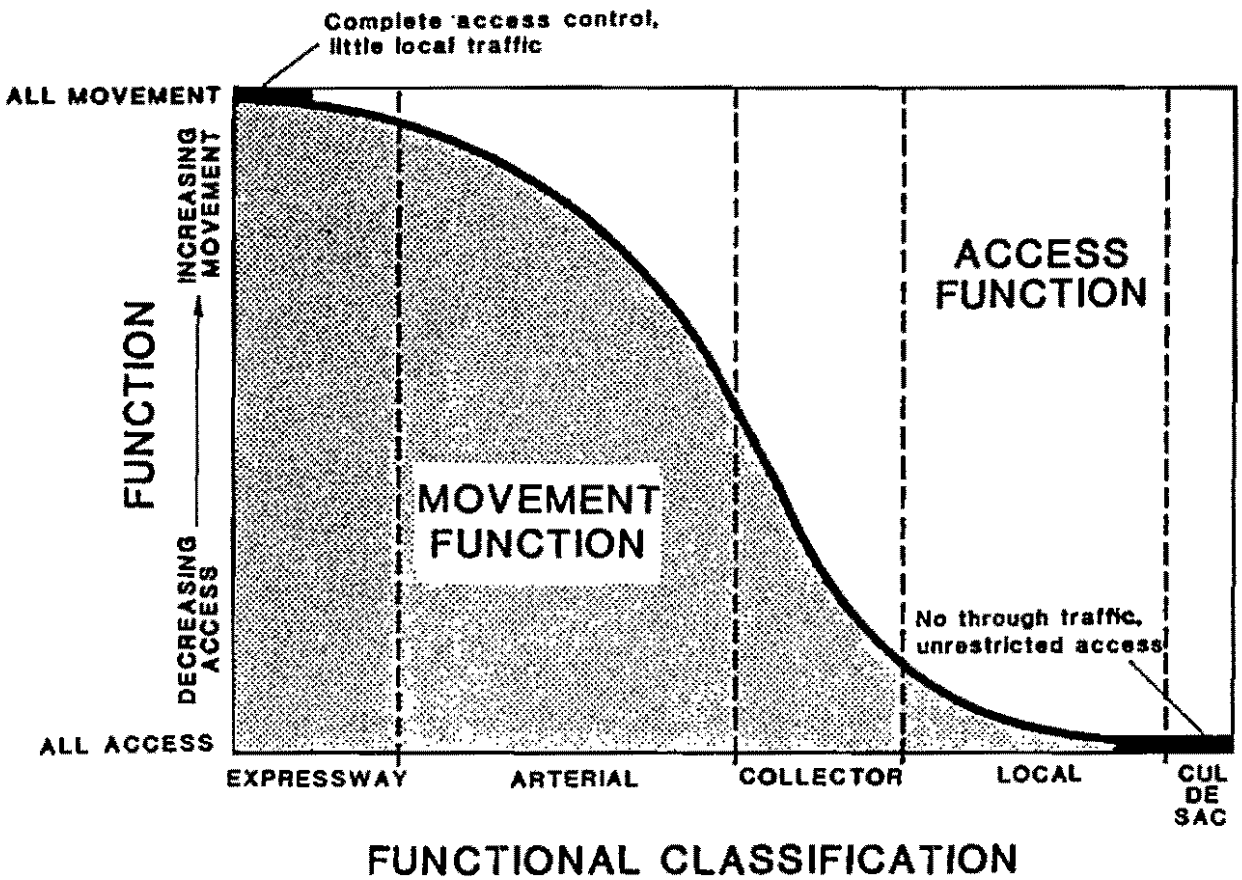


FIGURE 2.1

ROADWAY FUNCTION BY CLASSIFICATION

Table 2.1
ROADWAY FUNCTIONAL CLASSIFICATIONS AND GENERAL PLANNING GUIDELINES

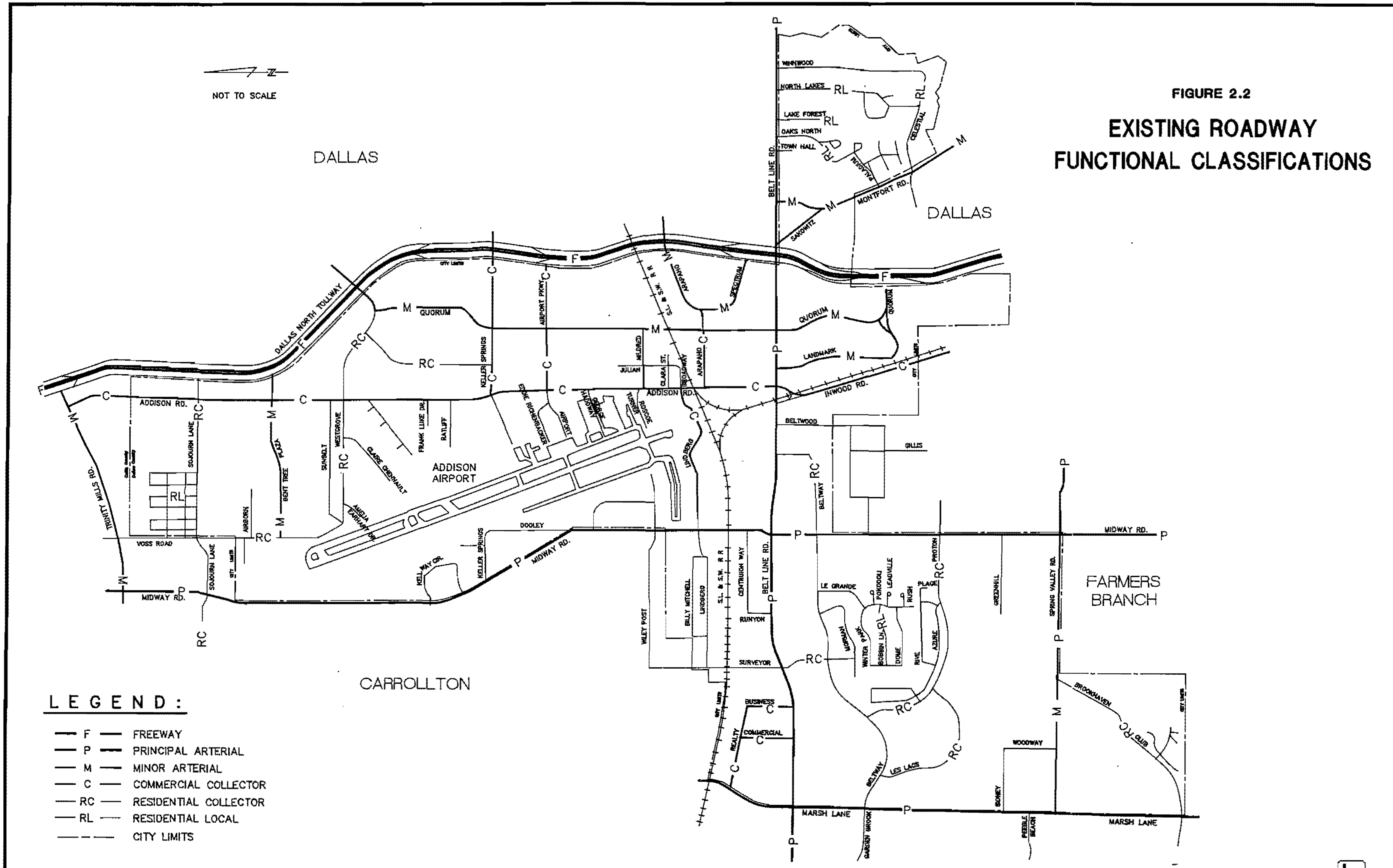
Classification	Function	Continuity	Approx. Spacing (Miles)[1]	Direct Land Access	Minimum Roadway Intersection Spacing	Speed Limit (mph)	Parking	Comments
Freeway and Expressway	Traffic Movement	Continuous	4	None	1 mile	45-55	Prohibited	Supplements capacity and arterial street system and provides high speed mobility.
Arterial	Moderate distance intercommunity, intrametro area, traffic movement. Minor functional and access.	Continuous	1/4 - 1[2]	Restricted-some movements may be prohibited; number and spacing of driveways controlled. May be limited to major generators on regional routes.	1/8 mile 1/4 mile on regional route	35-45	Prohibited	Backbone of street system.
Collector	Primary - collect/distribute traffic between local streets and arterial system. Secondary-land access. Tertiary-interneighborhood traffic movement.	Not necessarily continuous ; may not extend across arterials	1/4 - 1/2[2]	Safety controls; limited regulation.	300 feet	30	Limited	Through traffic should be discouraged.
Local	Land Access	None	As needed	Safety control only.	300 feet	30	Permitted	Through traffic should be discouraged.

NA = Not applicable.

[1] Spacing determination should also include consideration of (travel projections in the area of corridor based on) ultimate anticipated development.
[2] Denser spacing needed for commercial and high density residential districts.

FIGURE 2.2

EXISTING ROADWAY FUNCTIONAL CLASSIFICATIONS



3. DESIGN STANDARDS

Design standards, as discussed in this report, describe the generalized characteristics of each functional classification. These characteristics are necessary to ensure roadways serve their intended functions without resulting in diversion of traffic to or from these facilities. Maintaining these characteristics allows the roadways to operate as intended, with maximum efficiency and safety.

STANDARD CROSS SECTIONS

Roadway cross sections are composed of a total right-of-way width, pavement widths, median widths, and parkway widths. Figure 3.1 shows the recommended standard roadway cross sections for the identified roadway classifications. Design elements are discussed below. The cross sections shown in Figure 3.1 represent mid-block conditions. In some instances (discussed under intersection treatments), the cross sections will vary in the vicinity of intersections.

LANES

The number of traffic lanes required for each roadway should be determined based on projected traffic volumes to be accommodated on each street. The number of lanes may vary from street to street although their functional classification may be the same. Table 3.1 shows the range in moving traffic lanes by functional classification.

TABLE 3.1
ROADWAY LANES BY FUNCTIONAL CLASSIFICATION

	Lanes[1]				
Functional Classification	2	4	5	4D	6D
Arterial - Limited Continuity		X		X	X
Continuous				X	X
High Capacity/Principal					X
Collector - Residential/Commercial		X	X	X	
Local - Residential	X				

[1]D - divided roadway with median

LANE WIDTHS

These cross sections have been developed in accordance with the following lane widths: (1) 12-foot curb lanes; (2) 11-foot interior lanes; (3) 11-foot single left-turn and right-turn lanes and 22-foot double left-turn lanes.

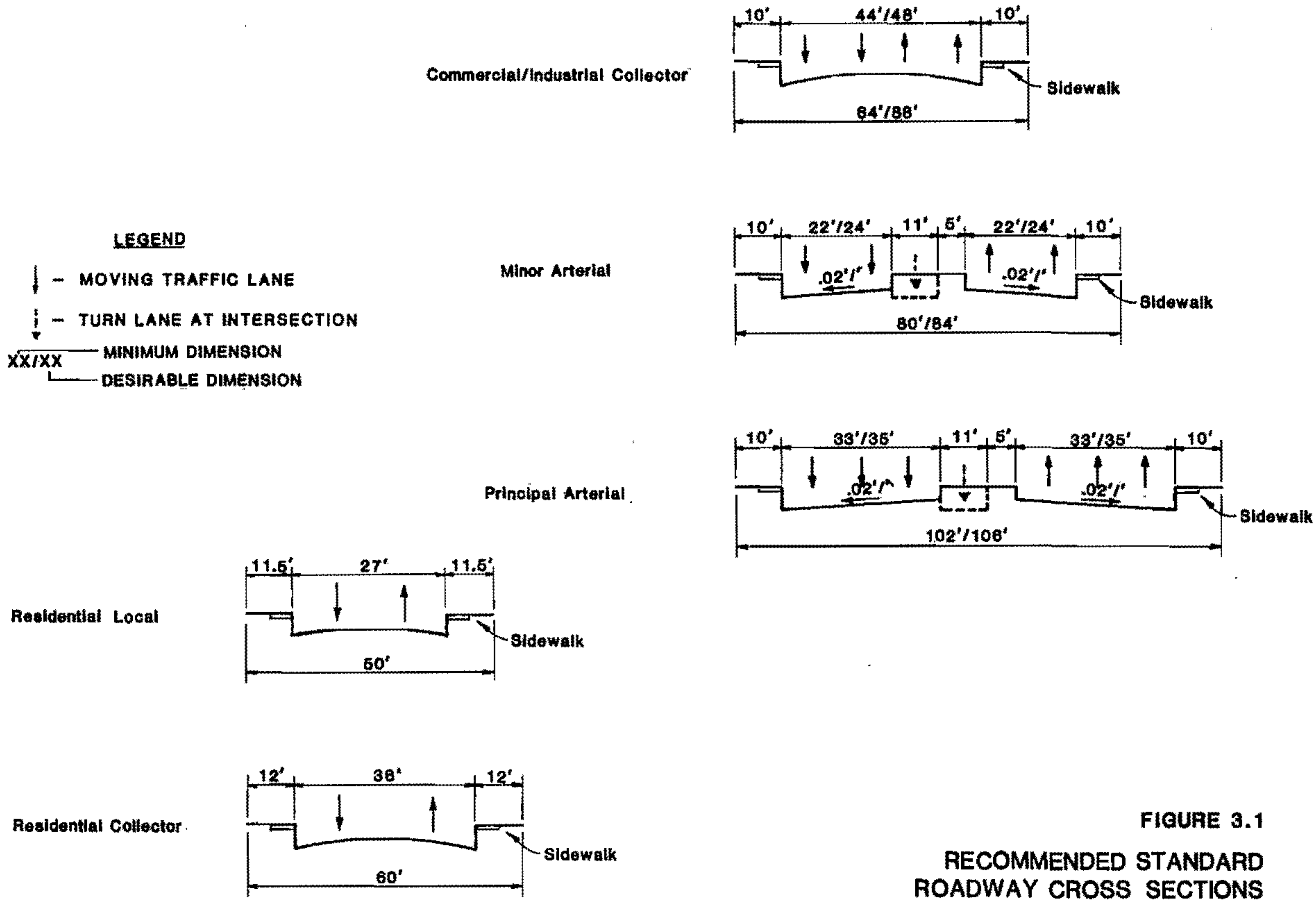


FIGURE 3.1

RECOMMENDED STANDARD ROADWAY CROSS SECTIONS

SIDEWALKS

It is recommended that sidewalks be constructed to a minimum width of four (4) feet. Sidewalks should be five (5) feet or more in width in non-residential areas or where sidewalks are next to the curb. As an alternative, sidewalks may be considered for public easements adjacent to the right-of-way or on private property adjacent to the buildings which generate the pedestrian activity. Barrier-free ramps should be provided at all intersections.

MEDIAN WIDTHS

Median widths on divided roadways should maintain a minimum width of sixteen (16) feet. This width provides for a five (5) foot median island width adjacent to left-turn lanes. A five (5) foot median width is recommended on all new roadways; a four (4) foot minimum median width is recommended on reconstruction of existing roadways.

PARKWAYS

The recommended minimum parkway width is ten (10) feet to accommodate sidewalks and driveway curb-returns within the roadway right-of-way.

PARKING

Parking should only be allowed on local residential streets. Currently, parking on residential streets is not allowed between the hours of 2:00 AM and 6:00 AM. Parking widths should be eight (8) feet to allow for parallel parking only. No parking should be allowed on residential collectors, commercial/industrial collectors, and arterials. Ample on-site parking should be required for each particular land-use.

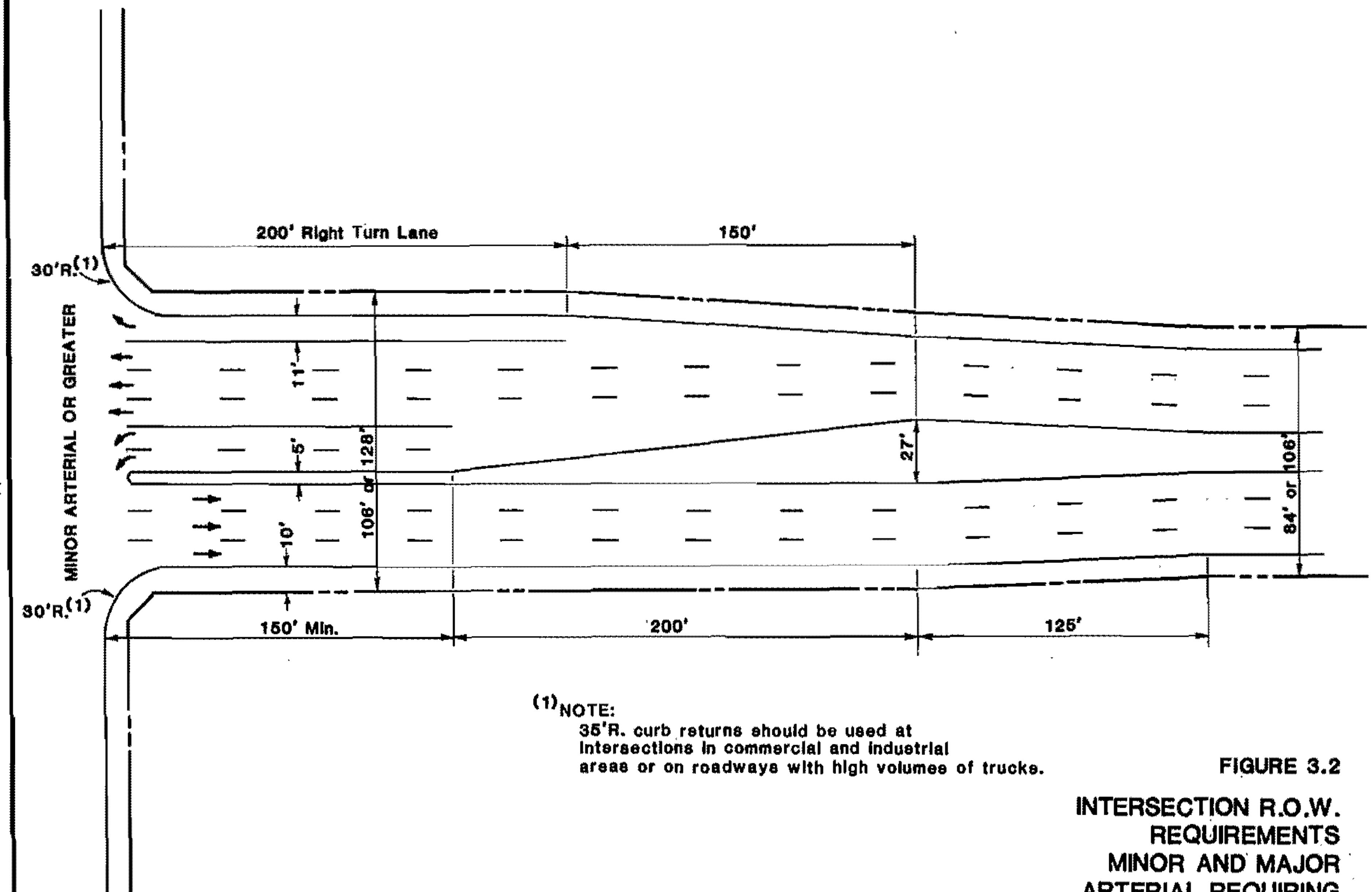
ROAD HUMPS

In order to discourage cut-through traffic in residential neighborhoods on local residential streets, the Town of Addison has adopted a road hump policy. All requirements for implementing and constructing road humps are presented in this policy which is available from the Town of Addison.

INTERSECTION TREATMENTS

At intersections between arterial streets or at locations with at least 200 turning movements per hour, special treatments should be considered to provide sufficient capacity to accommodate existing or projected volumes. These treatments may include left-turn lanes, right-turn lanes, double left-turn lanes, bus turn-outs, or a combination thereof. Each intersection treatment should be designed based on the specific needs of that location.

It is appropriate, advisable, and recommended that the Town reserve sufficient right-of-way to accommodate probable eventual intersection improvements. Figures 3.2 through 3.4 show the additional right-of-way necessary to accommodate several combinations of typical intersection treatments.

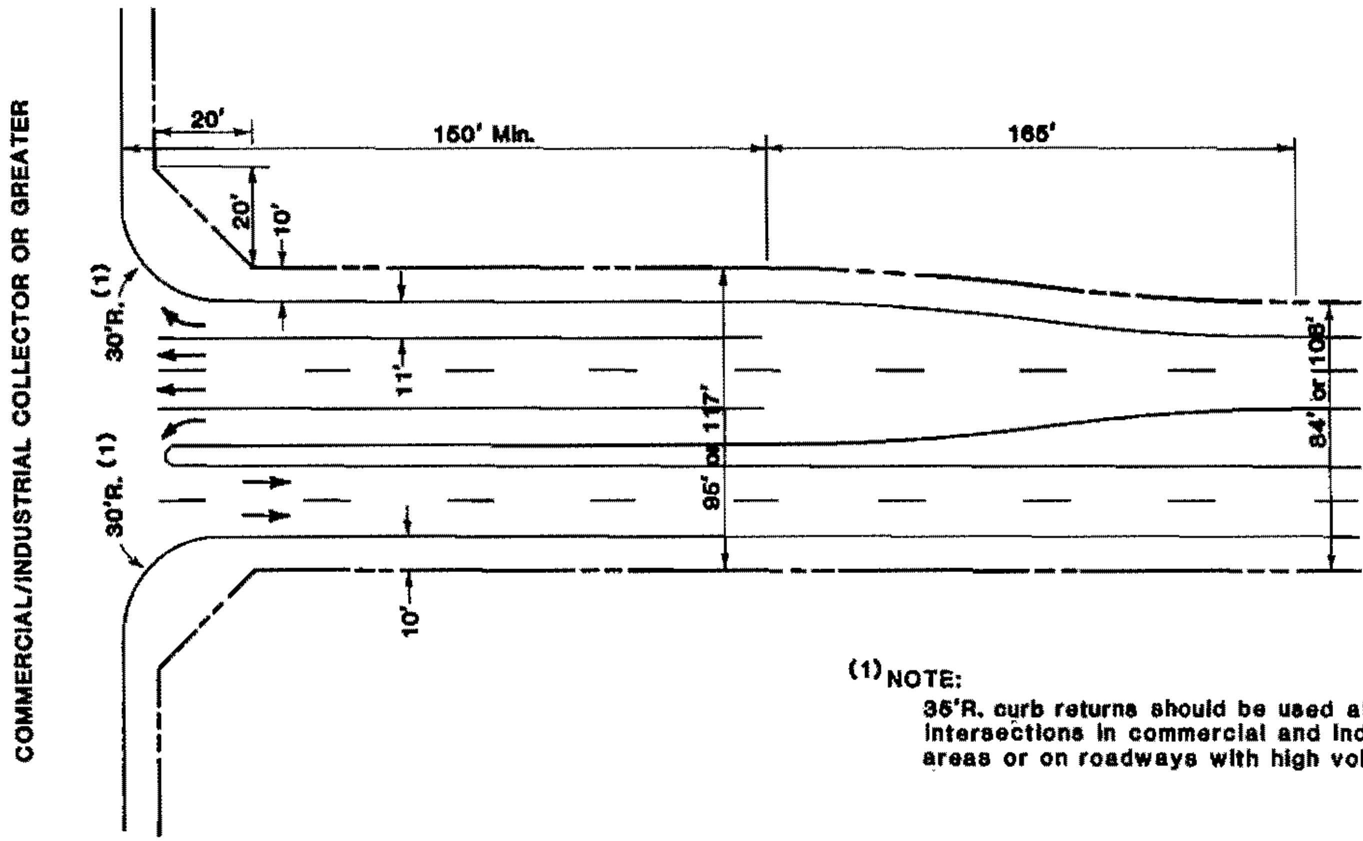


(1) NOTE:
35'R. curb returns should be used at intersections in commercial and industrial areas or on roadways with high volumes of trucks.

FIGURE 3.2

INTERSECTION R.O.W. REQUIREMENTS MINOR AND MAJOR ARTERIAL REQUIRING LEFT-TURN LANES

**4 AND 6 LANE
DIVIDED WITH
RIGHT TURN LANE**



(1) NOTE:
35'R. curb returns should be used at intersections in commercial and industrial areas or on roadways with high volumes of trucks.

FIGURE 3.3

**INTERSECTION R.O.W. REQUIREMENTS
MINOR ARTERIAL**

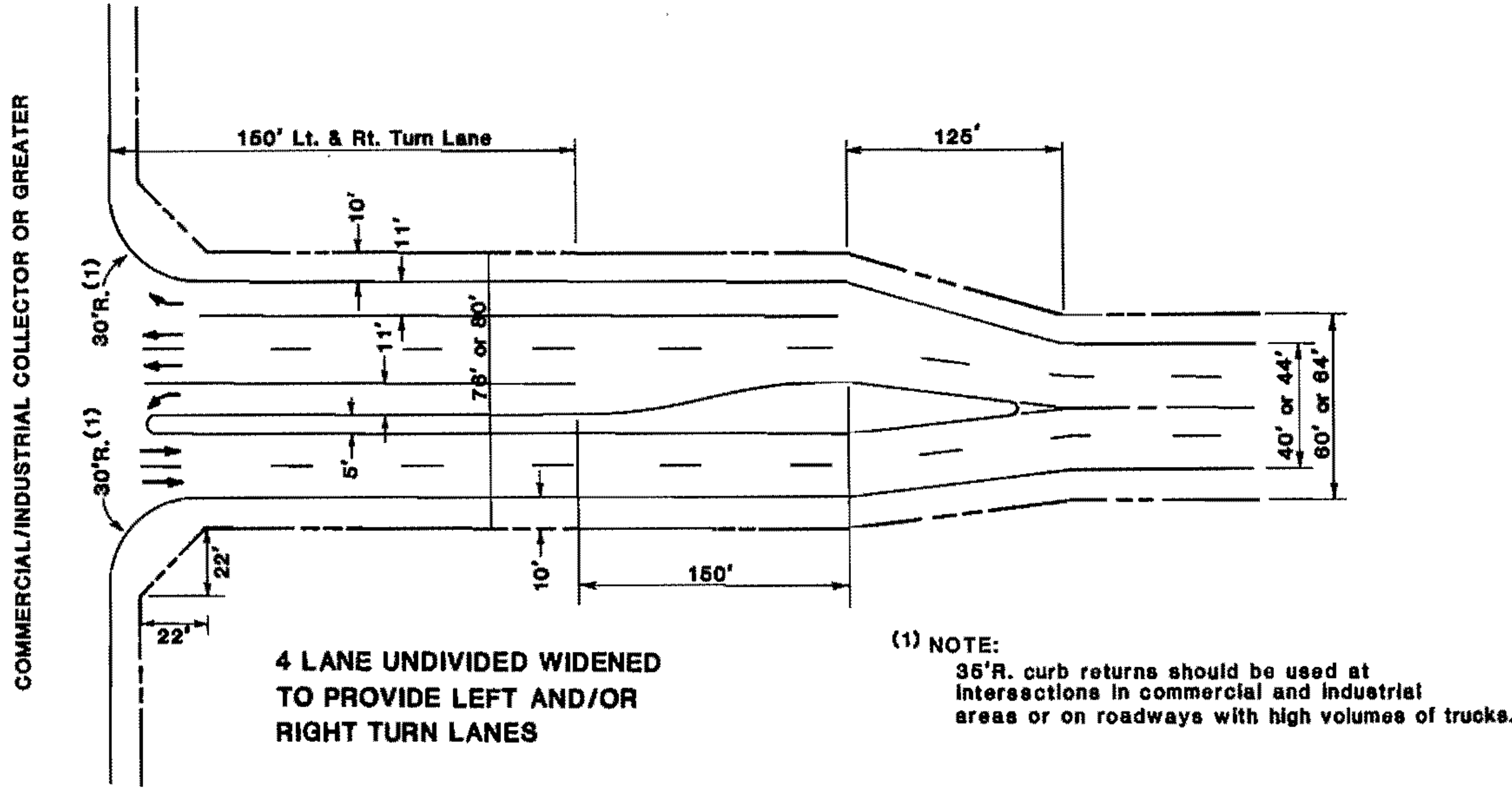


FIGURE 3.4

INTERSECTION R.O.W. REQUIREMENTS
RESIDENTIAL/INDUSTRIAL COLLECTORS

DESIGN SPEED

The design speed for a roadway is the maximum safe speed that can be maintained over a specified segment of roadway when conditions are so favorable that design features of the roadway govern. Design speeds determine the physical characteristics of the roadway (i.e. minimum horizontal centerline radius, stopping sight distance, etc.). The recommended design speed for each roadway classification is given below:

Roadway Classification	Design Speed
Principal arterial	45
Minor arterial	40
Commercial collector	40
Residential collector	35
Local	30

It should be noted that the physical characteristics of an arterial or collector are generally not the governing factor in restricting speeds. Traffic volumes during peak hours, cross traffic, and traffic controls are examples of factors that must be considered when determining speed limits.

HORIZONTAL CURVATURE

The minimum centerline radius for curving roadways is determined based on the design speed, friction factor, and rate of super elevation (cross slope) of the roadway. The minimum centerline radius is determined by the following equation:

$$R = \frac{V^2}{15\,(e+f)}$$

where:

- R = radius of centerline curve (ft.)
- V = roadway design speed (mph)
- f = roadway side friction factor (for wet pavement)
- e = rate of super elevation (ft./ft.)

Table 3.2 presents the recommended minimum horizontal centerline radius for the Town of Addison Roadway Classification.

Table 3.2
MINIMUM HORIZONTAL CENTERLINE RADIUS (R)

Design Speed	f[1]	e	R Calculated	R Rounded
30	.22	-.02	300	300
35	.19	-.02	480.39	500
40	.15	-.02	820.51	850
45	.15	-.02	1038.46	1050

[1] Side friction factor

VERTICAL CURVATURE

Crest and sag vertical curves should be designed based on recommended standards contained in the 1990 edition of A Policy on Geometric Design for Highways and Streets published by the American Association of State Highway and Transportation Officials (AASHTO).

INTERSECTION SIGHT TRIANGLE

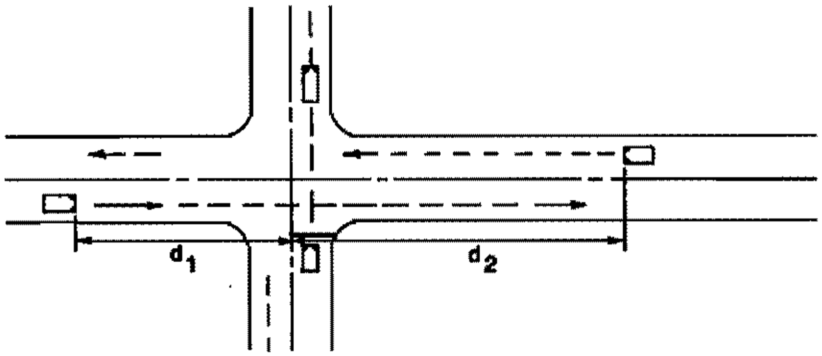
Adequate sight distance at the intersections of roadways with other roadways and roadways with driveways must be ensured. The operator of the vehicle attempting to cross a thoroughfare should have an unobstructed view of the entire intersection and a sufficient length of the thoroughfare to be crossed. Sufficient sight distance should be provided for the driver on a minor roadway to cross or turn onto a major roadway without requireing approaching traffic to reduce speed.

Adequate sight distance must be ensured for four (4) different cases: vehicles crossing a major roadway; vehicles turning left onto a major roadway; vehicles turning right onto a major roadway; and vehicles turning left from a major roadway onto a minor roadway. Each case is illustrated in Figure 3.5.

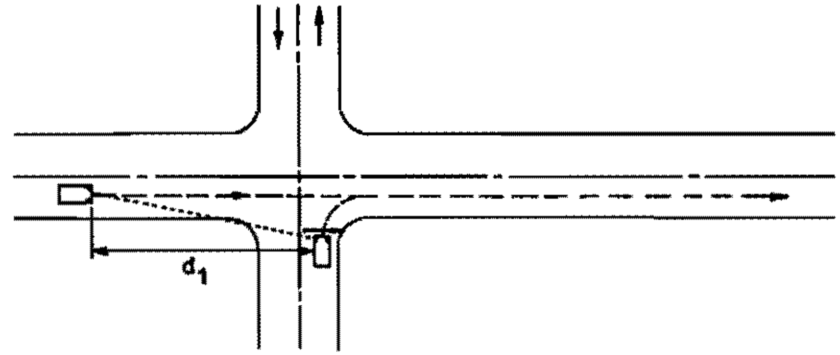
Visibility triangles should be maintained at all intersections to ensure proper sight distance for all cases. Obstruction greater than two (2) feet in height should be prohibited within these visibility triangles except for traffic control signs and signals, street signs, fire hydrants, utility poles, or other devices authorized by the City Council.

The recommended corner visibility triangles are illustrated in Figure 3.5a. The corresponding minimum corner intersection sight distances are given in Table 3.3 (see Figure 3.5a).

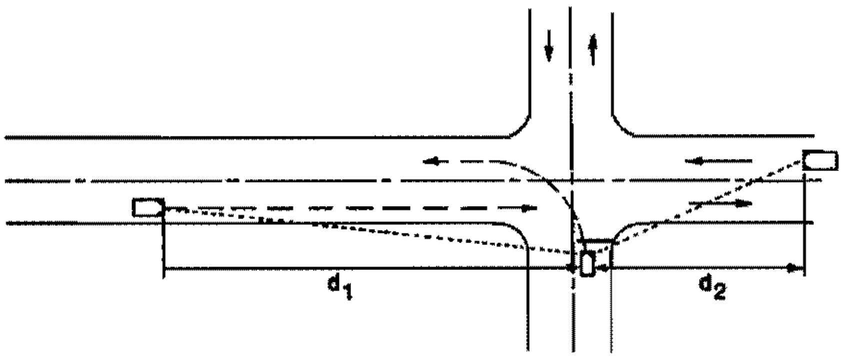
The recommended intersection sight distances apply when street grades are zero (0) to three (3) percent. Town staff should have the power to vary the dimensions of the visibility triangle to account for grades or other geometric conditions at the intersection.



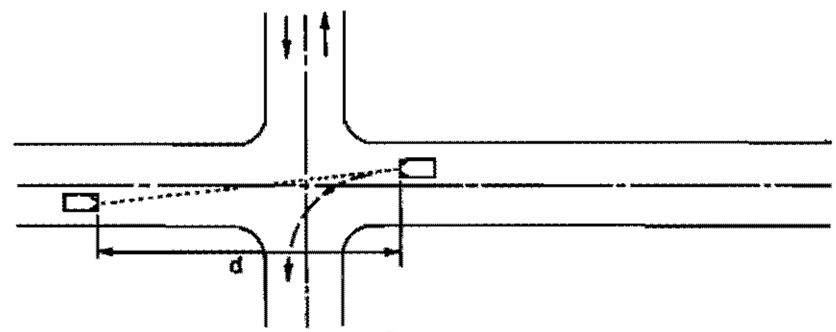
CASE A
STOPPED VEHICLE CROSSING AN ARTERIAL



CASE C
STOPPED VEHICLE TURNING RIGHT ONTO ARTERIAL



CASE B
STOPPED VEHICLE TURNING LEFT ONTO ARTERIAL



CASE D
LEFT TURNING VEHICLE ENTERING DRIVEWAY

d= sight distance

FIGURE 3.5

SIGHT DISTANCES

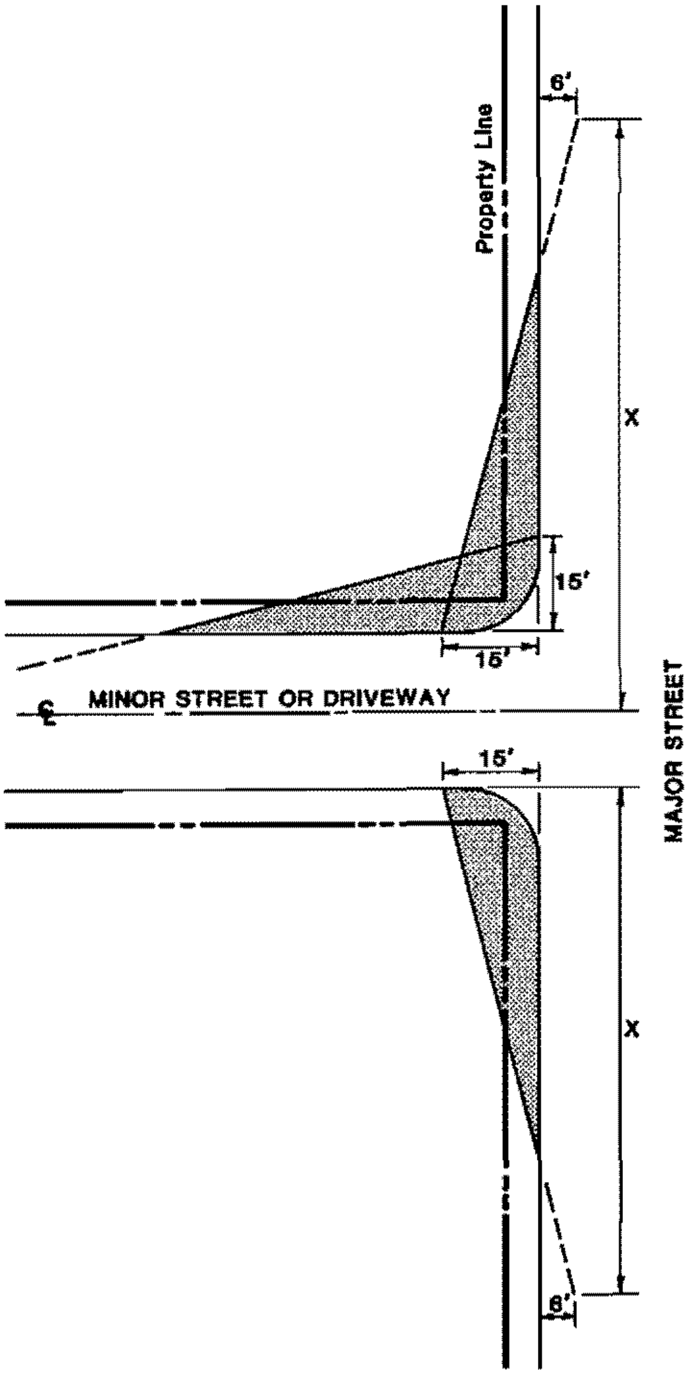


TABLE 3.3

RECOMMENDED INTERSECTION SIGHT DISTANCE

Travel Speed	X (ft.)
20	200
30	300
40	400
50	500
60	600

FIGURE 3.5a

INTERSECTION VISIBILITY TRIANGLES

DALLAS NORTH TOLLROAD (DNT) INTERCHANGES

Access to the Town from the Dallas North Tollway is provided through interchanges at Quorum Drive, Belt Line Road, Arapaho Road, Keller Springs Road, and Westgrove Road. The traffic conditions at the interchanges are critical to the overall traffic conditions within the Town. However, these interchanges are located within the City of Dallas. In many cases, the interchanges were constructed to provide less capacity than demand. For example, a three-level interchange was originally recommended for the interchange of Belt Line Road and the Tollroad, but because of the impact to surrounding areas the City of Dallas, the Texas Turnpike Authority, and the Town of Addison decided not to construct a three-level interchange.

The congestion problem at Belt Line Road and the Tollroad could be reduced by extending the free right-turn lanes eastbound and southbound. The eastbound free right-turn lane should be extended to the first drive west of the approach (approximately midway between the Tollroad and Quorum Drive). The southbound free right-turn lane should be extended to allow 250 feet of storage and 100 feet of transition.

The interchanges of the Tollroad with Keller Springs, Quorum, and Arapaho, will remain bottlenecks to east/west travel unless expanded. It is recommended that the Town of Addison continue to monitor and address all Tollroad interchanges. Cooperation from the City of Dallas and the Turnpike Authority will be necessary to improve the DNT interchanges.

SPECIAL DISTRICTS

OLD ADDISON AREA

Special street types with unique street and sidewalk design standards could be used in the old Addison area to support special development. These streets should be designed to promote non-automobile traffic yet still move local traffic. This district should encourage a mixed land-use development compatible with a more pedestrian-friendly environment. Through vehicles should be restricted to the thoroughfares surrounding the area.

AIRPORT AREA

In order to protect and enhance the operational and economic viability of the airport, roadways should service the drivers within the Airport. Construction and maintenance standards have been established by the Addison Airport Board. All airport roadways should be maintained to these standards.

ACCESS CONTROL POLICY

Driveway access is a critical issue which requires a well-defined policy with proper enforcement of the guidelines to enhance traffic safety and preserve maximum available capacity on arterial roadways. Because the Town of Addison has a large percentage of its thoroughfares which carry large volumes of traffic and limited opportunity for additional roadway capacity increases, this requirement is of particular importance.

The purpose of an access control policy is to provide guidelines which apply to driveway location, driveway geometric design, the spacing of driveways for various types of roadway facilities, median opening spacing, and median opening geometric design in the Town of Addison. The majority of driveway design guidelines are the same regardless of functional classification. Elements that do warrant differing criteria by functional roadway classification are properly defined.

This access policy proposes to preserve the integrity of existing and future arterial roadways. Proper driveway design with enforced access control will help maintain the safe and steady flow of traffic that is so critical to achieve maximum effectiveness of the existing arterial roadway system.

BACKGROUND

These guidelines have been based on existing and proposed area policies enhanced by national research findings, and recommended standards and practices of national transportation organizations as applied to conditions which do or are likely to exist in the Town of Addison.

Each driveway intersection with any street introduces conflict points to the street's traffic stream (see Figure 3.6). Research has shown conclusively that accident frequency is closely correlated with the number of conflicts in a roadway section. For this reason, driveways should be properly located in accordance with actual need and ability to provide safe roadway operation and, if necessary, proper traffic control.

Each driveway also generates "side friction" along a roadway. It has been estimated that for each two percent increase in driveway frequency, a reduction of one percent of roadway capacity results. Hence, roadway capacity can be maximized by carefully determining where and how many driveways should be provided.

This recommended roadway access policy is directed toward providing both adequate property access and efficient, safe roadway operation.

DRIVEWAY CLASSIFICATION

Access to properties is completed through a driveway. Driveways are classified by the land-use of the property and the intensity of that land-use. For purposes of this access policy three categories of drives may be used; residential, commercial, and industrial.

Residential drives will serve all single-family land-uses including duplexes, townhouses, and small multi-family complexes of up to eight (8) units.

Commercial drives will serve all retail, office, and other land-uses commonly referred to as a commercial. Driveways serving multi-family complexes of more than eight (8) units should conform to commercial rather than residential driveway standards.

Industrial driveways will serve truck traffic, and shall be used at manufacturing and truck access points at high volume commercial land-uses (i.e., shopping malls).

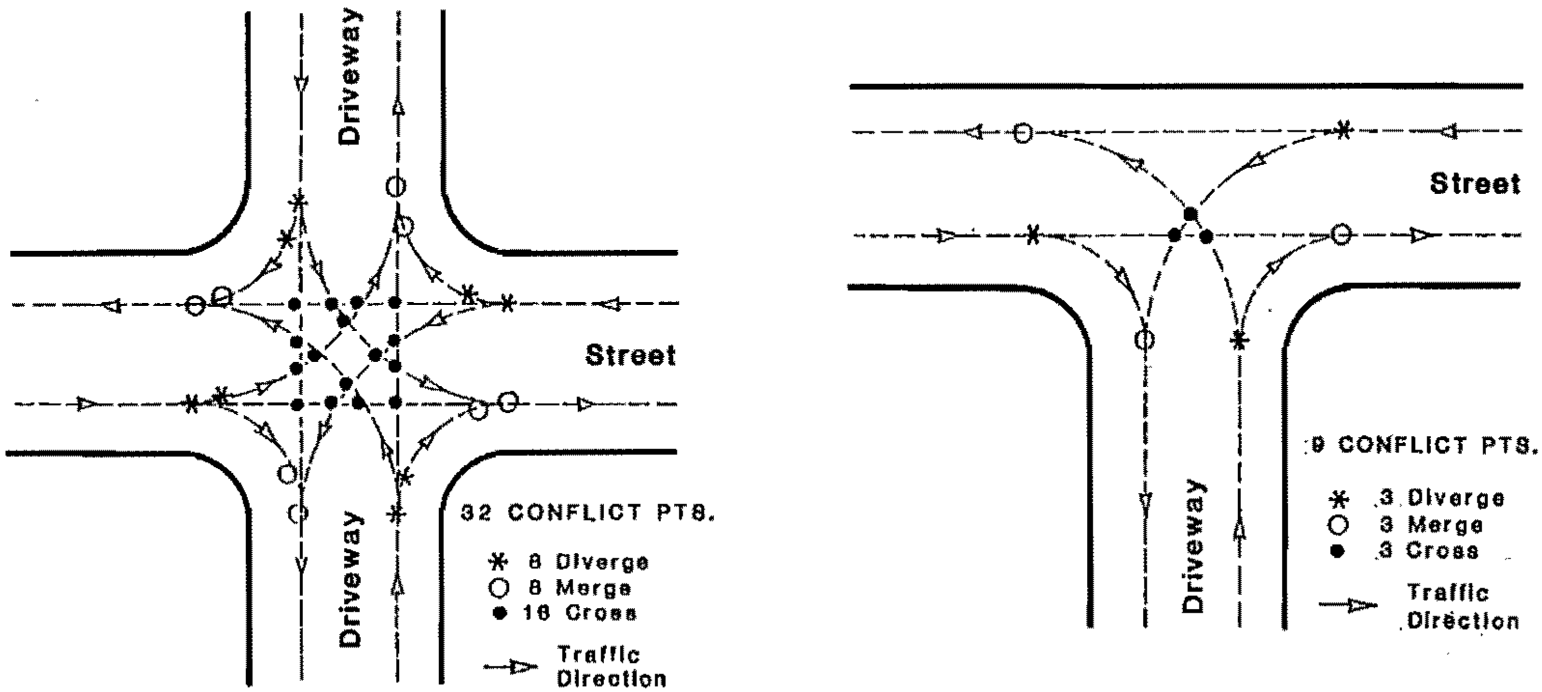


FIGURE 3.6

INTERSECTION CONFLICT POINTS DRIVEWAY/STREET

GENERAL DRIVEWAY ACCESS PRINCIPLES

This section covers five specific areas of access policy. These are:

a. Property Access
b. Number of Access Points
c. Number of Ingress Lanes
d. Number of Egress Lanes
e. One-way Access

Within these areas the critical access and design issues are addressed.

Property Access

The number of access points to any property should be limited to one, unless it can be shown that the property will generate sufficient volumes to require two points of access that are necessary for safe internal operation on the property. Should an additional access point be needed, joint access should be sought with adjacent property owners.

Number of Access Points

Each parcel should be permitted one access point either contained wholly within the property frontage or as part of a joint access with an adjacent property. Additional points of access may be considered if adequate driveway spacing can be maintained (see section on driveway locations) and the following conditions apply:

1. The average daily driveway volume is expected to exceed 5000 vpd (reference 8), or

2. The expected peak hour driveway volume would exceed the capacity of a stop sign controlled intersection in accordance with the 1985 Highway Capacity Manual, or

3. A professionally competent traffic analysis shows that more than one access point is needed to properly and safely serve the property.

4. Corner lots may have access points on more than on one street if warranted by a traffic analysis, subject to the defined corner clearance criteria.

Number of Ingress Lanes

At medium to high volume driveways exceeding 1000 vpd and 40 right-turn ingress movements during the peak hour, it may be desirable to provide an additional ingress lane thereby widening the effective width of the throat to facilitate simultaneous left-turn and right-turn ingress movements.

Should a high volume driveway have two (2) left-turn ingress lanes the receiving length at the drive entrance must be a minimum of thirty (30) feet.

Number of Egress Lanes

The number of lanes required to serve the exiting movements at a driveway location is a function of the number of vehicles expected to exit from the land-use served by the driveway. Driveways should be designed with more than one egress lane if any of the following conditions are expected to be present.

1. The average daily egress traffic volume exceeds 1000 vehicles (Reference 8).

2. If more than 100 vph are expected to turn left from the driveway during any hour (Reference 4), and there are more than 500 vehicles on the street being entered (Reference 8).

One-Way Access

Access design of a one-way pair of driveways should be considered and is desirable if any of the following conditions are present or expected:

1. Roadway average daily traffic (ADT) should be greater than 10,000 vpd (Reference 8).

2. The left-turn volume into the driveway is expected to exceed 40 vph, and the property frontage exceeds 200 feet in length (Reference 7).

DRIVEWAYS

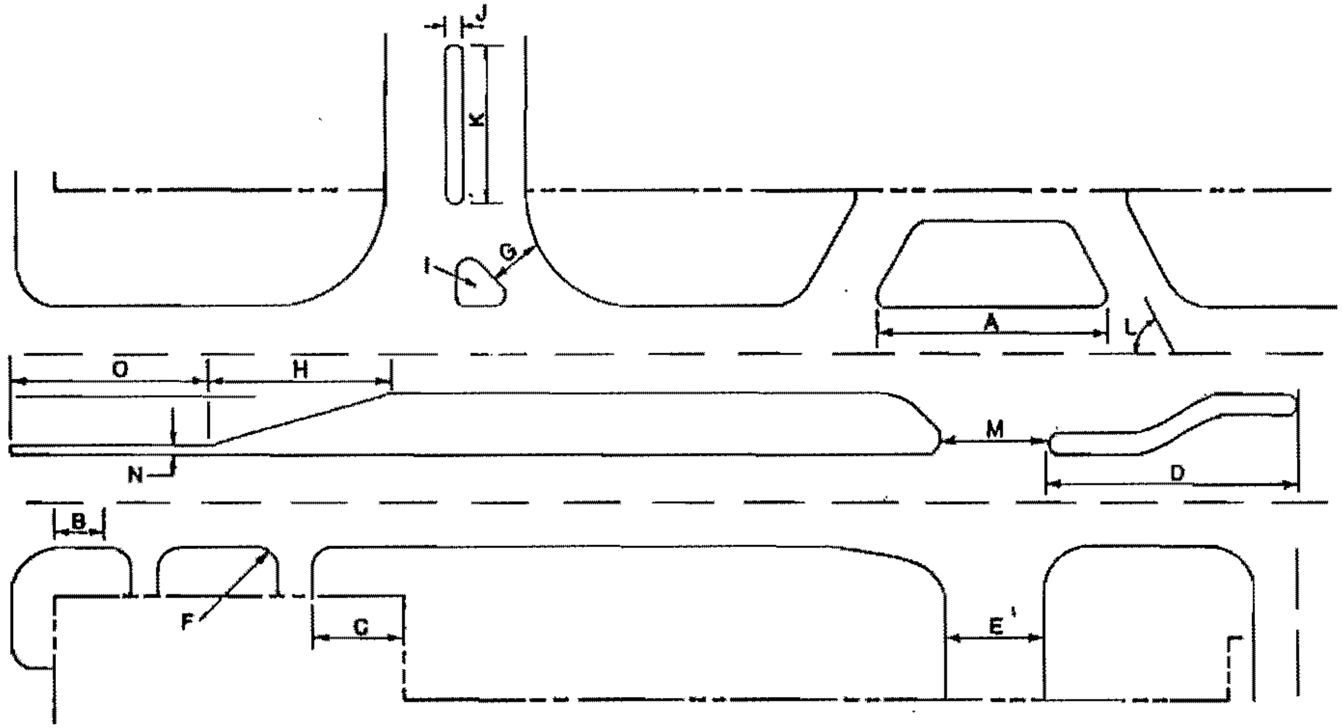
Driveways provide the link from the thoroughfare to a land-use. Several design specific elements of driveways and median openings along thoroughfares are shown in Figure 3.7 and detail the applicable standards shown.

Driveway Location

Driveway location is perhaps the most critical issue pertaining to access management. Driveways spaced too closely together or too close to adjacent intersections will result in reduced capacity and increased accidents regardless of their individual design standards. A discussion of the critical drive location elements follow.

Driveway Spacing

Driveways should be spaced at distances sufficient to ensure that conflicting movements at adjacent driveways do not overlap. Adequate driveway spacing should not be difficult to maintain if property frontage is several hundred feet in length. Adjacent driveways should be spaced as far apart as access and on-site circulation needs will permit. Table 3.4 shows the minimum safe driveway spacing as a function of roadway functional classification. This spacing should be maintained to ensure safe stopping distances. Local residential street driveway spacing is based on a ten (10) foot minimum curb return at back-to-back driveways.



A - DRIVEWAY SPACING
B - CORNER CLEARANCE
C - PROPERTY CLEARANCE
D - MEDIAN OPENING SPACING
E - DRIVEWAY WIDTH
F - CURB RETURN RADIUS
G - TURNING ROADWAY WIDTH
H - TAPER LENGTH
I - ISLAND SIZE
J - ELONGATED ISLAND WIDTH
K - ELONGATED ISLAND LENGTH
L - DRIVEWAY ANGLE
M - MEDIAN OPENING LENGTH
N - NARROWED MEDIAN END WIDTH
O - LEFT TURN STORAGE AREA

FIGURE 3.7

DRIVEWAY DESIGN ELEMENTS

Table 3.4
MINIMUM DRIVEWAY SPACING - TWO-WAY DRIVEWAYS[1]

Functional Classification	Minimum Spacing[1]
Arterial (Principal)	200
Arterial (Minor)	200
Collector (Non-Residential)	150
Collector (Residential)	20
Local (Residential)	20

[1] The two-way driveway distance given in Table 1 may be reduced to one-half the distance for adjacent one-way driveway with the inbound drive upstream from the downstream drive, excepting local residential streets. (Reference 7).

Corner Clearances

Spacing between the cross-street and an access driveway should be adequate to avoid having driveway conflict areas within the intersection of the two (2) streets.

The corner clearance required is a function of the type of streets which intersect. Table 3.5 shows minimum corner clearances for arterials and collectors.

Table 3.5
CORNER CLEARANCE

Functional Classification	Intersecting With	Clearance,[1,2] (ft.)
Arterial (principal and minor)	Arterial, Collector, Local	200, 125, 50
Collector (residential and commercial)	all	50
Local	all	50

[1] Corner clearance is measured from the ultimate near cross-street curb to the near driveway curb (see Distance "B" Figure 3.5)
[2] If the property line is less than the necessary distance from the corner to meet minimum requirements, the driveway must be located within ten (10) feet of the property line away from the corner.

Driveways Adjacent to Right-turn Lanes

Driveways should not be permitted to exit into auxiliary turn lanes because of the difficulty in performing the weaving movement to cross the right-turning vehicles. If permitted, they should be located as far from the intersection as possible.

Property Clearance

Property clearance is the distance between the property line of a parcel and the nearest edge of the nearest driveway. The minimum property clearance distance should ideally be one-half of the driveway spacing requirement to ensure proper spacing. Should a property not be of sufficient frontage to provide this distance, joint access with an adjacent property should be considered.

The minimum property clearance should be shown in Table 3.6.

Table 3.6
PROPERTY CLEARANCE REQUIREMENTS[1]

Functional Classification	Property Clearance (feet)
Arterial (principal and minor)	100
Commercial/Industrial Collector	75
Residential Collector	10
Local Residential	10

[1] For single-family, duplex, and townhouse residential land-uses, lots should be platted so as not to provide direct access to arterial streets.

DRIVEWAY DESIGN

Driveway Grades

The normal driveway grade within the street right-of-way is set at one-quarter inch per foot rise above the top of curb at the property line. The minimum elevation of a driveway at the right-of-way line is two inches above the top of curb. Barrier-free sidewalk construction requires a maximum driveway grade as measured from the gutter of eight (8) percent. Driveways should be profiled for a distance of at least twenty (20) feet outside the right-of-way to ensure adequate replacement design.

Due to state laws requiring barrier-free construction of sidewalks, steps, or other abrupt changes in sidewalk, grades are prohibited at driveways.

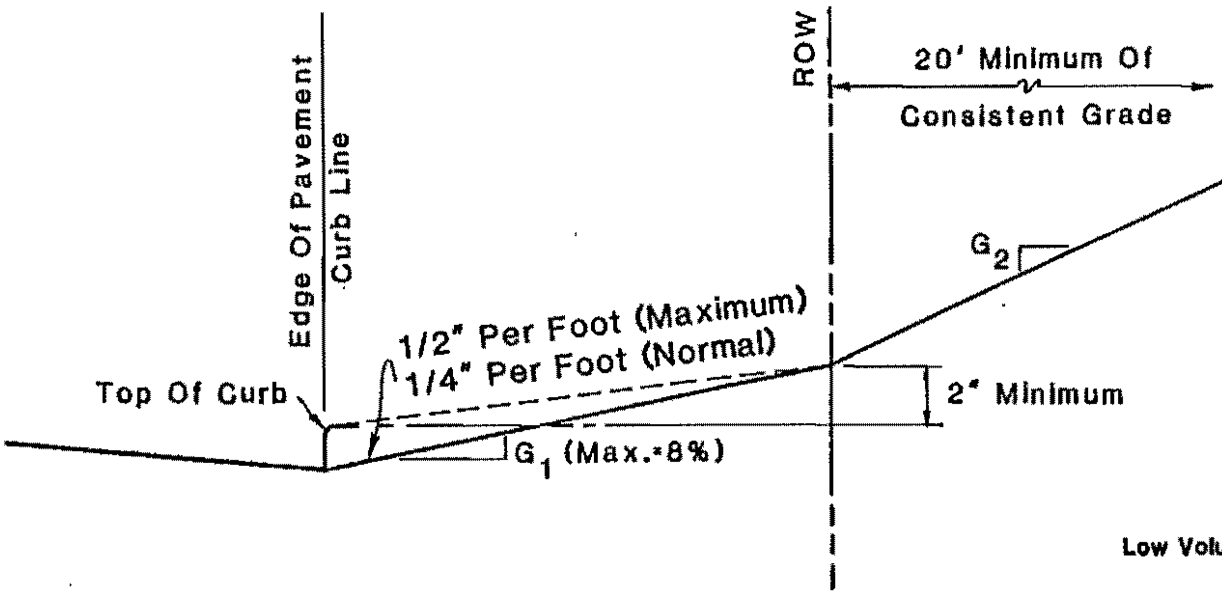
Figure 3.8 shows the acceptable range of grades outside the right-of-way which should be maintained for a minimum of twenty (20) feet.

Width and Curb Return Radius

Driveway width and curb return interact to affect vehicle speed and path. The selection of an appropriate width must be coordinated with curb return radii selection to achieve safe and efficient driveway operation.

Use of narrow width in combination with a short curb return radius should be avoided. Generally, if the width must be reduced, the curb return radius should be increased and vice versa.

Table 3.7 should be used to determine the curb return radius and driveway width combination that should be used for differing driveways based upon driveway classification and functional classification of the arterial roadway.



Low Volume Driveway–less than 100 veh. during peak hour in peak direction

High Volume Driveway–more than 100 veh. during peak hour in peak direction

	G_2 Maximum Range
1. Low Volume Driveway On Local Street	−10% To +14%
2. Low Volume Driveway On Collector Streets	−4% To +8%
3. High Volume Driveway Or Low Volume Driveway On Arterial Streets	−1% To +5%

FIGURE 3.8

DRIVEWAY VERTICAL GRADES

Table 3.7
CURB RETURN RADIUS AND DRIVEWAY ENTRY WIDTH COMBINATIONS[1]

Land Use	Design Vehicle[3]	Short Radius		Narrow Width	
		Radius	Associated Entry Width[2]	Entry Width[2]	Associated Radius
Industrial	WB-50	15'	42	20	45'
Commercial and Large MF Residential	SU	15'	26	15	35'
SF and Small MF Residential	P	10'	15	12	15'

[1] For a driveway angle of 90 degrees.
[2] Entry width should be one-half total width for two-way access points.
[3] Design vehicles
WB-50 - large semi-trailer truck
SU - single unit truck
P - passenger car

Some additional considerations regarding driveway width and curb return radii are presented below:

1. The width of the street right-of-way should not be a limiting factor in selecting the appropriate curb return radii. Curb returns should extend into private property if necessary.

2. If a commercial development is serviced by moderate truck traffic (i.e., delivery trucks), it may be desirable to provide one well-designed "industrial" driveway for these vehicles and prohibit their use of the other "commercial" driveways within the development.

3. At high volume industrial driveways, the use of compound curves in the curb returns is recommended by AASHTO (Reference 1).

<u>Driveway Angle</u>

The angle at which a driveway intersects the street should be ninety (90) degrees. If the site conditions (e.g., terrain, lot size, and shape, etc.) will not permit a ninety (90) degree approach, the angle may be reduced to the following minimums.

Two-way:

1. Seventy (70) degrees for large multi-family complex, commercial, and industrial driveways.

2. Sixty (60) degrees for single family, duplex, townhouse, and small multi-family complex residential driveways.

One-way:

Forty-five (45) degrees for all driveways.

CHANNELIZATION ISLANDS AND MEDIAN DIVIDERS

Turning Roadway Width

To facilitate the ingress and egress movements on high speed arterials, islands separating right-turn movements may be used provided the pavement width is sufficient to allow the vehicle to negotiate the turns at the proper design speed (see Table 3.8). The pavement should be widened to permit the outer and inner wheel tracks of the selected design vehicle to clear the pavement gores by about two (2) feet on each side.

Table 3.8
PAVEMENT WIDTHS FOR TURNING ROADWAYS[1]

Radius on Inner Edge of Pavement	Pavement Width (feet) for Design Vehicle		
R (feet)	Passenger Car	Single-Unit	WB-50
50	13	18	26
75	13	17	22

[1] Developed from Reference 1.

Driveways with island separated right-turn ingress movements that will have more than ten (10) percent trucks traffic should be designed for single-unit trucks while industrial or commercial delivery driveways should be designed for WB-50 vehicles.

Island Size

Islands should be constructed to be easily seen and make obvious the proper course of travel. Islands should only be constructed if they will exceed seventy-five (75) square feet in area. Islands of a minimum one hundred (100) square feet are preferred.

Elongated Driveway Island Width Plus Length

When an elongated island is used as a driveway divider way, that island should have the following minimum dimensions.

1. Minimum island width = Five (5) feet
2. Minimum island length = Twenty (20) feet

This will ensure adequate island visibility and width on which traffic signs can be installed while providing adequate lateral clearance. Any island landscaping heights and densities shall be as specified in the visual obstruction regulations.

Throat Length

The required length of throat for storage will depend on two factors. These are the parking facility egress control, if any, and the gap availability on the street being entered. Egress control should be considered as a site design prerogative of the developer and normally does not impact street operations. Gap availability, if not considered in establishing driveway throat length, can result in request for police traffic control or unwarranted signalization. Police control should not be permitted as a solution to inadequate throat length.

Egress driveway lanes should be designed to accommodate outbound traffic during the most demanding peak hour condition (site outbound or street peak). Differing land-uses will have differing peak parking movement distributions. These distributions affect the rate at which vehicles exit the parking locations and therefore directly affect the length of storage required to hold the vehicles until they receive an acceptable gap to enter the roadway. Table 3.9 presents the required storage for exiting driveway lanes as a function of land-use and the number of total site parking spaces divided by the number of exit lanes.

TABLE 3.9
ON-SITE DRIVEWAY VEHICLE STORAGE LENGTHS[1]

Parking Spaces/Outbound Driveway Lane	Storage Required (feet)[2]			
	MF Residential	Retail[3]	Office	Industrial
0 - 200	25	25	25	50
200 - 400	25	50	100	150
400 - 600	50	150	200	more lanes
> 600	100	200	more lanes	more lanes

[1] Developed from Reference 7.
[2] Measured from property line.
[3] More than 700 spaces/lane will require additional outbound driveway lanes.

DECELERATION LANES

Right-Turn Deceleration Lanes

Deceleration lanes for right-turns into driveways may greatly ease the negative impact a drive will have on the flow of traffic on an arterial. Such a provision will enable right-turning traffic to slow to turn without risk of rear-end accidents or causing following traffic to slow down.

A deceleration lane should be considered on arterials with average operating speeds of at least 35 mph or more if the following conditions apply:

1. The average peak hour inbound right-turn volume is at least seventy-five (75) vehicles.

2. Where several successive driveways meet condition 1, and driveway spacing is not adequate to avoid encroachment of the right-turn lane on another driveway, a continuous right-turn lane should be used.

3. A continuous right-turn lane should be considered in a section where twenty (20) percent of the directional volume on the arterial makes right-turns.

For signalized driveway intersections, lane requirements should be based on a capacity analysis.

Right-Turn Lane Length

Deceleration lanes should be of adequate length to permit safe deceleration from the design speed to a stop within the deceleration lane. Traffic may be assumed to leave the through lane at fifteen (15) mph below the design speed. Total deceleration lane length includes length of taper. The length of the deceleration lane depends on the speed of the vehicles on the roadway. Table 3.10 (Reference 1) shows the desired length for various design speeds.

Table 3.10
RIGHT-TURN LANE LENGTH

Functional Classification	Initial Speeds	Deceleration Length Excluding Taper (feet)
Arterial	35-45	150 - 250
Collector	25-35	50 - 150

The recommended taper lengths for left- or right-turns is given in Table 3.11. The transition should be accomplished using reverse curve geometry.

Table 3.11
TRANSITION DISTANCE FOR DECELERATION

Functional Classification	Transition Length (feet)
Arterial	100 - 150
Collector	100 - 150

The total right-turn lane length is the summation of the deceleration length (Table 3.10) and the transition length (Table 3.11).

MEDIAN OPENING

MEDIAN OPENING SPACING

The location of openings in a median to allow left-turn ingress and egress movements at a driveway or local street is a function of the type and operating speed of the roadway, volume of traffic expected to make the left-turn movements, and the location relative to other intersecting streets, driveways, and median openings.

Median openings may be permitted on divided thoroughfares at intersections with public streets and/or driveways.

The order of priority to be utilized to determine where median openings should be located is at intersections with:

1. First Priority - Designated Thoroughfares
2. Second Priority - Minor Streets
3. Third Priority - Driveways

Median openings will be provided at all intersections with designated arterials and collectors. Median openings will normally be permitted at all intersections with minor streets. Priority will be given to minor streets that serve collector functions. No median opening will be permitted at minor streets or driveways if specific conditions create an unsafe intersection. Vertical and horizontal sight distance must meet minimum standards, as previously specified in this report.

No median opening will be allowed to serve either alleys or emergency access easements, and the minimum distance of an opening to an intersecting public street will be governed by the combined left-turn lane design requirements for that intersection and the median opening, as well as the functional classification of the two (2) intersecting streets.

Median openings should not be granted unless all of the following conditions exist:

1. The property to be served has a driveway at the median opening and is a significant traffic generator with demonstrated or projected trip generation of not less than one hundred (100) left-turn ingress or one hundred (100) egress vehicles during the peak-hour. (Reference 7)

2. The median width is sufficient to permit construction of a left-turn storage lane.

3. The median is sufficiently long so that, should exclusive left-turn lanes be needed at both ends of a median, sufficient distance will be available to properly design deceleration taper and sufficient storage lanes as shown in Table 3.12.

Table 3.12
LENGTH OF MEDIAN

Functional Classification	Cross-Street Functional Classification	Minimum Median [1] Length (feet)
Arterial	Freeway Arterial Collector Local Driveway - less than 40 ft. in width[2] - 40 ft. or more in width[3]	600 600 450 400 400 400
Collector	Freeway Arterial Collector Local Driveway - less than 40 ft. in width[2] - 40 ft. or more in width[3]	600 450 400 300 300 350

[1] Measured from end to end.
[2] 2-way driveway; 1-way driveway less than twenty (20) feet in width.
[3] 2-way driveway; 1-way driveway twenty (20) feet or more in width.

MEDIAN OPENING DESIGN

Median Opening Length

The nose-to-nose length of median openings is a function of turning angles and left-turning radius (based on the expected traffic volume vehicle mixture, i.e., passenger cars, single unit trucks, semi-trailers, etc.). Median openings that will be expected to handle a large number of trucks should be designed to accommodate design vehicles appropriate for the driveway. The minimum median opening length should be sixty (60) feet.

Median End Treatment

Median noses should be of the type illustrated in Figure 3.9, with a nose end radius of 2'6" and transition radii from the full width median to the nose end radius ranging from a minimum of fifty (50) feet to a maximum of seventy-five (75) feet, depending on the design vehicle turning radius to be accommodated. The median nose should have a minimum of a fifteen (15) foot setback from the cross-street curb line for single left-turn lanes and eighteen (18) feet for dual left-turn lanes.

MEDIAN BULLET NOSE DETAIL

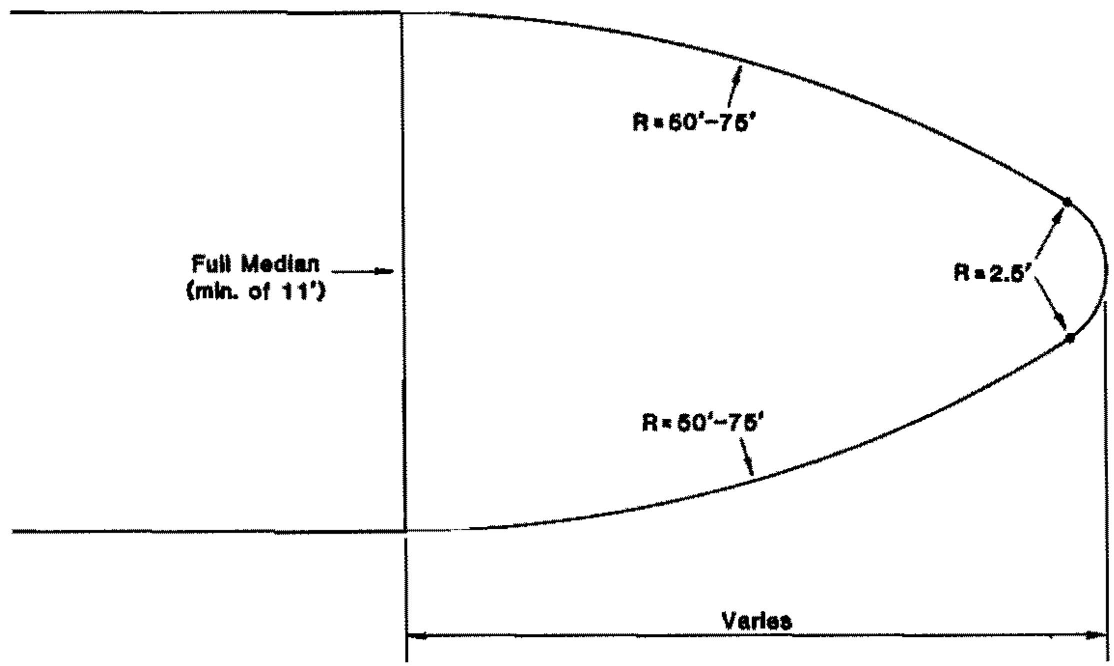


FIGURE 3.9

MEDIAN END TREATMENT

Median Left-Turn Lane Width

Each median opening where a left-turn or U-turn movement will be permitted should be designed with a left-turn lane of sufficient storage and taper distance. Left-turn lanes constructed in the median should be a minimum width of eleven (11) feet wide.

Left-Turn Storage Requirements

The length required for left-turn storage in the median left-turn lane is a function of the number of left-turn movements, opposing through movements and, if the intersection is signalized, the cycle length and green time. Figure 3.10 shows the required storage length for various left-turn and through-movement conflicts at unsignalized intersections.

TRAFFIC SIGNAL SPACING

The primary function of an arterial street is to move a large volume of through traffic as quickly, efficiently, and safely as possible. For major roadways with at-grade intersections, this can best be done by providing progressive signal operation. Signal spacing and timing are two of the limiting factors in providing such operation.

Standard procedure in signal timing is to attempt to establish offsets, cycle lengths, and phasings for given conditions, as determined by existing intersection spacings. More efficient operation, however, can be obtained if the intersections are uniformly spaced within a certain optimum range. By providing for proper intersection spacing during the development of an area or, in some cases, modifying existing intersection or signal spacings, a high degree of efficiency in operation of the major roadway and flexibility of adaptation to daily volume fluctuations can be realized.

Subject to the constraints of providing reasonable access to the arterial, and avoiding excessive circuity of travel for crossing traffic, a procedure has been developed (Reference 14) to define the "optimum" range of intersection spacings.

Table 3.13 gives desirable intersection spacings for different combinations of cycle lengths and speeds of progression; the numbers in parentheses are for a simultaneous system.

BUS TURNOUT LANE

Bus turnout lanes are recommended on all major through routes which carry bus service in the Town. This wouuld include Belt Line Road, Midway Road, Quorum Drive, Addison Road, and Arapaho Road: Bus turnout lanes provide a refuge for the bus and its passengers on major streets. Other traffic may pass the bus while it is boarding and discharging passengers, thereby reducing the accident potential and increasing the arterial capacity.

The recommended bus turnout lane dimensions are shown in Figure 3.11. All bus stop locations should be located to adequately serve the surrounding area. In some areas, bus stops may need to be consolidated and only major bus stops would need constructed bus turnout lanes.

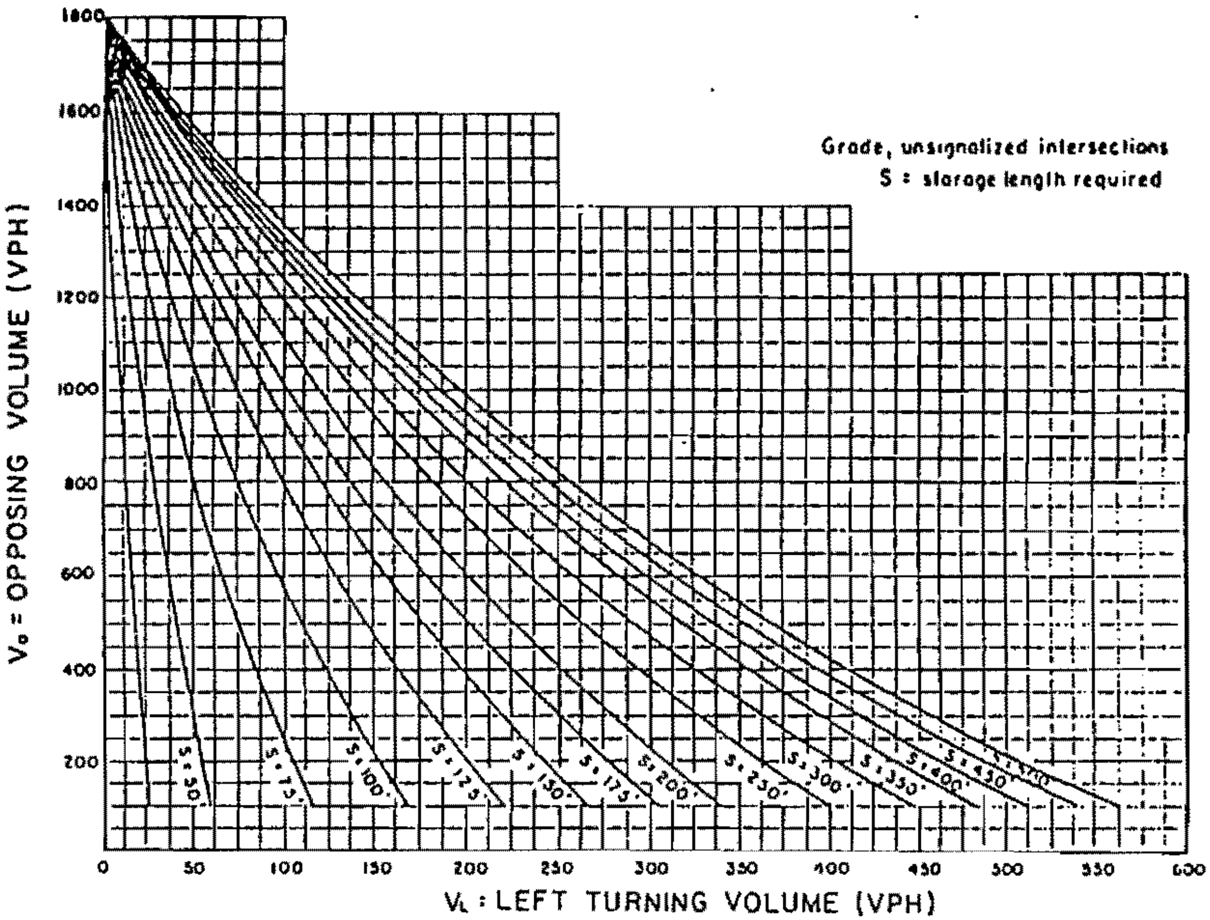


FIGURE 3.10

STORAGE LENGTH REQUIRED FOR UNSIGNALIZED LEFT-TURN LANES

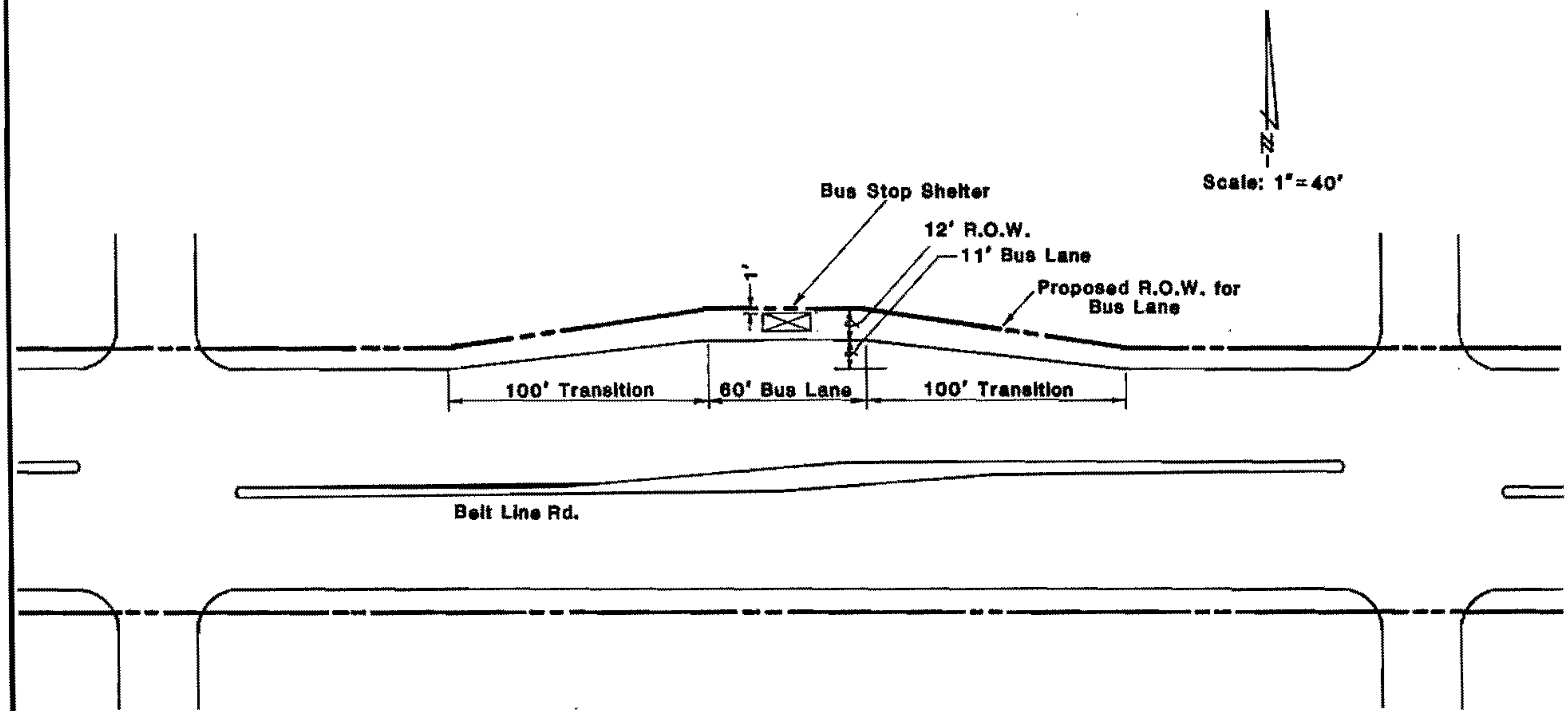


FIGURE 3.11

RECOMMENDED BUS TURNOUT LANE

Table 3.13
INTERSECTION SPACING CORRESPONDENCE TO GIVEN SPEEDS AND CYCLE LENGTHS FOR THE SIGNAL ALTERNATE SIGNAL SYSTEM*

Speed (mph)	INTERSECTION SPACING (FT) FOR CYCLE LENGTH								
	40 sec	50 sec	60 sec	70 sec	80 sec	90 sec	100 sec	110 sec	120 sec
25	735 (1470)	919 (1838)	1103 (2205)	1286 (2573)	1470 (2940)	1654 (3308)	1838 (3675)	2021 (4043)	2180 (4360)
30	882 (1764)	1103 (2205	1323 (2646)	1544 (3087)	1764 (1528)	1985 (3969)	2205 (4410)	2426 (4851)	2616 (5232)
35	1029 (2058)	1286 (2573)	1544 (3087)	1801 (3602)	2058 (4116)	2315 (4631)	2573 (5145)	2830 (5660)	3052 (5232)
40	1176 (2352)	1470 (2940)	1764 (3528)	2058 (4116)	2352 (4704)	2646 (5292)	2940 (5880)	3234 (6468)	3488 (6976)
45	1323 (2646)	1654 (3308)	1985 (3969)	2315 (4631)	2646 (5292)	2977 (5954)	3308 (6615)	3638 (7277)	3924 (7848)
50	1470 (2940)	1838 (3675)	2205 (4410)	2573 (5145)	2940 (5880)	3308 (6615)	3775 (7550)	4153 (8305)	4360 (8720)
55	1617 (3234)	2021 (4043)	2426 (4851)	2830 (5660)	3234 (6468)	3638 (7277)	4153 (8305)	4447 (8894)	4796 (9592)

* Numbers in parentheses are for a simultaneous system.

DEVIATION FROM STANDARDS

It is intended that the functional classifications and design standards presented here be used throughout the Town of Addison. It is recognized that some exceptions may be necessary. For example, special intersection treatments to provide left- or right-turn lanes on collector streets may be desirable. Also, design exceptions to accommodate the special needs of certain areas may be necessary. Each potential exception should be carefully reviewed to determine if other alternatives exist. This is particularly important for any proposal which would reduce potential capacity offered by standard criteria.

4. THE TRANSPORTATION PLAN

This section of the report presents the Transportation Plan. The Transportation Plan is broken down into three plans: a thoroughfare plan, a pedestrian plan, and a transit plan.

THOROUGHFARE RECOMMENDATIONS

The thoroughfare plan identifies roadway improvements which will maximize the efficiency of the thoroughfare systems and accommodate the future (year 2010) traffic volumes in an acceptable manner.

The recommended thoroughfare improvements were identified through the use of the North Central Texas Council of Governments model. A base model (year 1986) was calibrated and a future no-build network was created as a base future (year 2010) network. Alternative networks were created and evaluated to test the specific recommendations. The recommended thoroughfare plan is shown in Figure 4.1 and the improvements are summarized in Table 4.1.

As traffic increases on the major thoroughfares within the Town, grade separations may be warranted at individual intersections along Belt Line Road. Grade separation on arterial roadways has a significant impact on community aesthetics and the environment and is, therefore, not recommended as part of this plan. However, as traffic demand increases, the appropriateness of grade separated facilities should be analyzed.

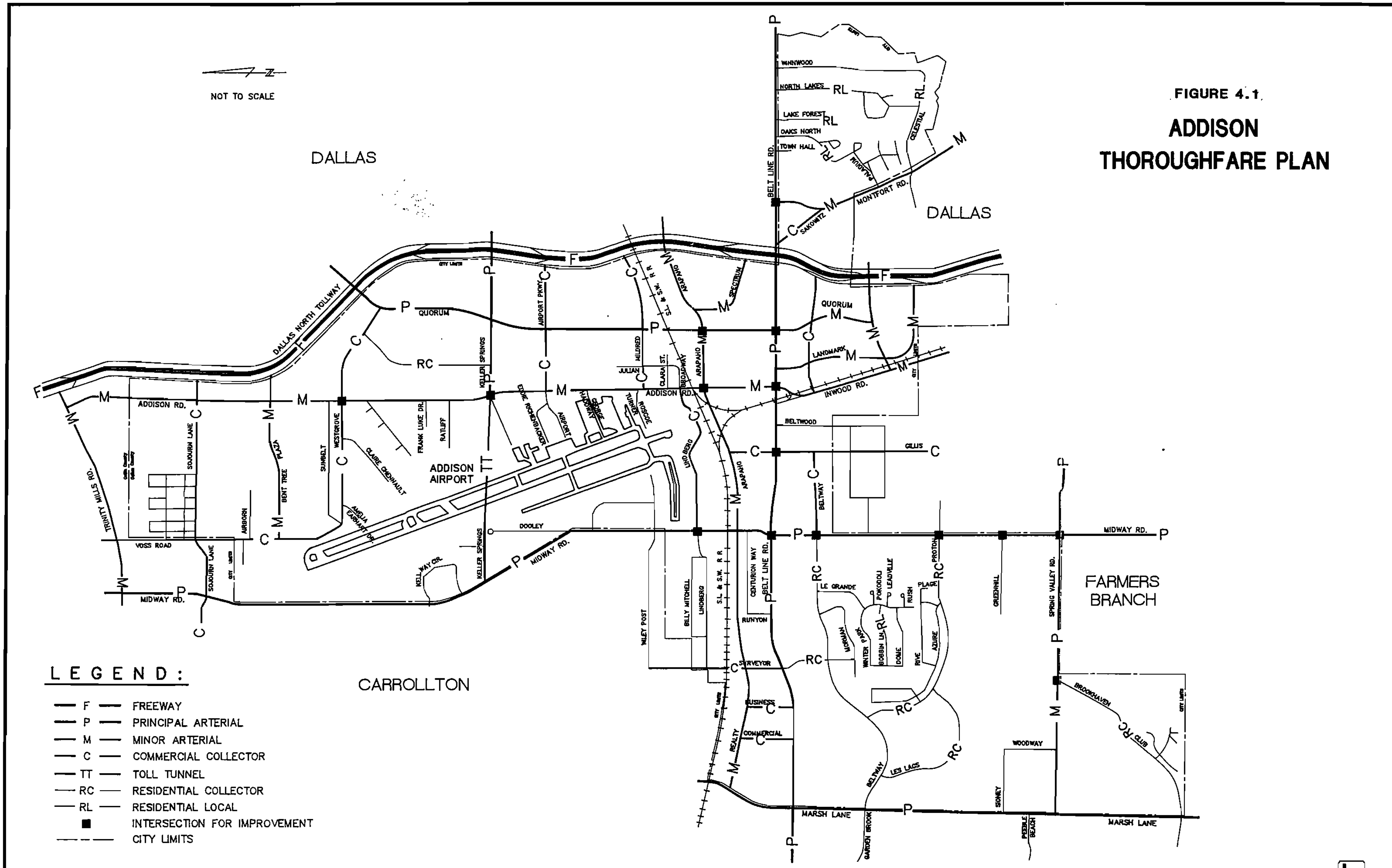


FIGURE 4.1
ADDISON THOROUGHFARE PLAN

Table 4.1
RECOMMENDED THOROUGHFARE IMPROVEMENTS

Roadway	Limits	Improvement
Keller Springs Road	DNT to Addison	Expand to 6LD
Keller Springs Road	Addison to Midway	Tollroad Tunnel
Addison/Inwood Road	Town Limits to Trinity Mills	Expand to 4LD
Quorum Drive (North)	Belt Line to DNT	Expansion from 4LD to 6LD
Quorum Drive (North)	Keller Springs	Straighten "S" Curve
Quorum Drive (North)	Westgrove to DNT	Reconstruct Quorum Drive as main street with Westgrove as minor street creating a "T"
Quorum Drive (South)	Landmark to Inwood	Extend Quorum to Inwood
Arapaho Road	DNT to Marsh	Construct Arapaho 4LD/5LU
Gillis Road	Town limits to Arapaho	Expand to 4LU
Landmark Road	Quorum to DNT	Extend Landmark to DNT
New Road in S. Quorum Area	DNT to Inwood	Construct 4LU
Mildred	Quorum to DNT	Extend Mildred to DNT
Westgrove Drive	Quorum to Trinity Mills	Expand to 4LU
Sojourn Drive	DNT to Westgrove	Expand to 4LU
Bent Tree Plaza Parkway	DNT to Westgrove	Delineate to 4LD
Intersection Improvements	Various intersections	Construct dual left-turn lanes and free right-turn lanes as recommended in the Addison Bottleneck Study (Reference 15).

MAXIMIZE SYSTEM EFFICIENCY

In order to minimize the need for costly new roadways within Addison, the efficiency and capacity of the existing roadway system must be maximized. The intersection improvements of the Addison Bottleneck Report (Reference 15) identified specific intersection improvements to meet the demand placed on the roadway system by the existing traffic volumes and travel characteristics. These intersection improvements generally provide additional lane capacity at the intersection approaches for turning vehicles. Implementation of these improvements will increase the capacity and efficiency of the intersection operation, thereby improving the capacity and efficiency of the roadway system itself.

In addition to the intersection improvements recommended in the Addition Bottleneck Report (Reference 15), free right-hand turn lanes should be extended at the southbound and eastbound approaches of Belt Line Road and the Dallas North Tollway. Additional improvements may be warranted at this and other Tollway interchanges which lie within the City of Dallas. Cooperation from the City of Dallas and the Texas Turnpike Authority is necessary for improvements to the tollroad interchanges; the tollroad interchanges should be evaluated continuously.

Efficient signal timing plans should be maintained at all Addison signalized intersections. Timing plans for the Town were revised in 1990 as part of the Dallas County Signalization Project and the TxDOT Traffic Light Synchronization Program. These timing plans provide increased efficiency on the roadway system by reducing vehicle stops and delays. As travel patterns and volumes change, these timing plans will require updating in order to maintain optimum signal timing plans.

Currently, through truck traffic in the Town is limited to Belt Line Road, Midway Road, and the southbound frontage road of the Dallas North Tollway. Truck traffic should be monitored and truck routes established or restricted as necessary.

It is recommended that the Town of Addison implement a transportation system management program which monitors conditions at intersections within the Town. This program will allow the Town to identify additional roadway improvements necessary to meet changing traffic characteristics.

In addition to the recommended thoroughfare plan, the design and access control guidelines in this report should be followed to aid the Town in preserving thoroughfare capacity. As vacant parcels adjacent to existing thoroughfares develop, new driveways will generate new conflict points along the roadways, reducing the capacity of the roadway. As stated in Chapter 3, a two (2) percent increase in driveway volumes can result in a one (1) percent decrease in the adjacent roadway capacity. By adhering to the access control guidelines recommended, adequate access to adjacent properties can be provided while minimizing the impact on the roadway system capacity.

PEDESTRIAN RECOMMENDATIONS

At the present time there is little pedestrian activity within Addison. Sidewalks are discontinuous and in some areas located close to the adjacent roadway. In addition, all signalized intersections in Addison provide pedestrian indications, but some do not provide crosswalks for the pedestrians.

There is a great potential to capture the employee who currently leaves the development in which they work to travel to lunch by vehicle. Many of these employee's could travel less than three (3) blocks to eat; and these would be candidates for walking. Some retail walk trips could be made by residents if pedestrian links were available. Overall, an effective pedestrian system would have the potential to attract many pedestrians, especially during the mid-day peak-hour.

Figure 4.2 shows the major element of the recommended pedestrian system. All arterials and collectors should be accompanied by sidewalks. The Town currently constructs their sidewalks to the back of a curb. The pedestrian plan is broken into primary pedestrian corridors and secondary pedestrian corridors. Primary pedestrian corridors should provide special pedestrian enhancements including barrier-free sidewalks, and abundant landscaping. Secondary pedestrians corridors are those which provide access to the primary pedestrian system and to or through adjacent development areas.

The pedestrian plan improvements are consistent with the City of Dallas' Parkway Center Project - Development Program (Reference 16). As in the Parkway Center Project report, pedestrian linkages over the Dallas North Tollroad are recommended to enhance the east-west pedestrian access. These overhead bridges are recommended in two locations: (1) connecting the south Quorum area to the old Sakowitz Village area, and (2) connecting the Colonnade area to the Prestonwood Mall area.

As Addison grows, the following pedestrian goals should be sought:

1. Provide sidewalks along all arterials and collectors.

2. Make residential areas more pedestrian friendly.

3. Provide pedestrian links within activity areas.

4. Provide pedestrian connection between residential areas and neighboring activity centers.

5. Consider pedestrians in all capital improvement design.

6. Consider pedestrian links with transit usage.

The pedestrian system goals and the respective actions to achieve those goals are presented in Table 4.2.

FIGURE 4.2

RECOMMENDED PEDESTRIAN PLAN

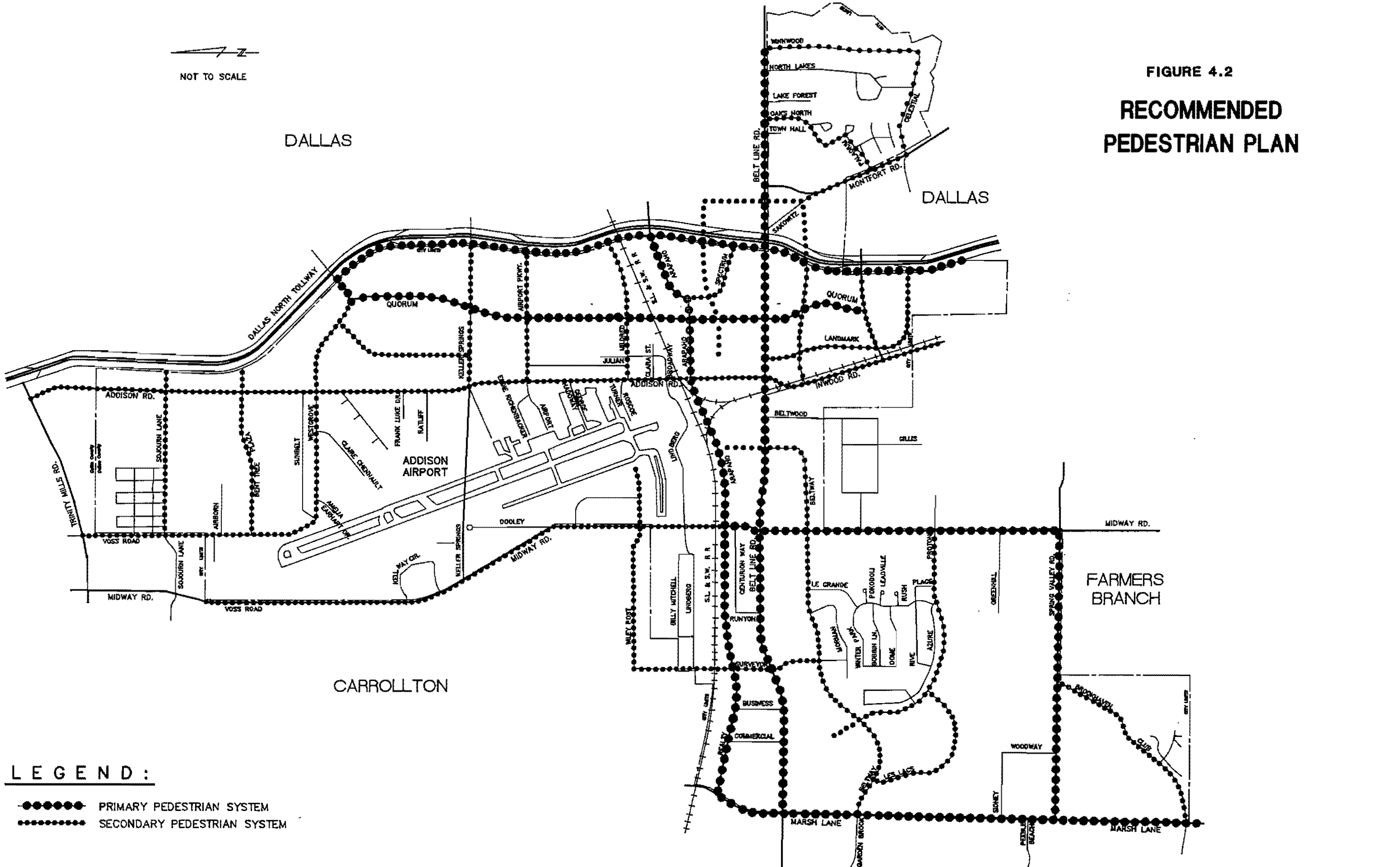


Table 4.2
POTENTIAL PEDESTRIAN GOALS AND ACTIONS

Goal	Actions
1	Provide Sidewalks Along All Arterials and Collectors • Require sidewalks in development process • Program Prioritized sidewalk capital improvements program: School routes, bus stops, activity centers, widths, and barrier-free placement sensitivity.
2	Make Residential Areas More "Pedestrian-Friendly" • Encourage subdivisions to develop comprehensive plans which ties into the Town's overall plan. • Crosswalk delineation
3	Provide Pedestrian Links Within Activity Areas • Require "pedestrian-sensitive" site design • Require comprehensive walkway system
4	Provide Connections Between Residential Areas and Activity Centers • Identify opportunities for separate pathways • Develop implementation plan • Require new development to provide links
5	Consider Pedestrians In All Capital Improvement Design • Street widening considerations • Landscaping considerations • Develop sidewalk/pathway standards
6	Consider Pedestrian Links with Transit Usage • Bus pads • Relation to transit routes

Mixed land-use developments should be encouraged so short trips -- especially for non-work purposes such as convenience shopping or lunch -- substitute for longer vehicular trips now made for the same purposes. This will reduce auto-dependency and decrease mid-day traffic in the areas.

Convenient, direct, attractive, and safe pedestrian connections are crucial to attracting riders to transit. The pedestrian system is a necessary ingredient for transit success.

Little bicycle travel is currently occurring in the Town of Addison. As the pedestrian plan is implemented, the bicycle usage may increase especially in residential areas and residential areas tied to major activity centers. The recommended pedestrian and thoroughfare plan should accommodate the expected bicycle usage. As bicycle usage increases in the area, the pedestrian plan should be reevaluated to ensure the plan is meeting the needs of the bicyclist. This may include recommending wider sidewalks to meet the needs of both pedestrians and bicyclists.

TRANSIT SYSTEM RECOMMENDATIONS

EXISTING TRANSIT SERVICE

The existing transit service in Addison includes local and express bus service and a transit center at Prestonwood Town Center. Almost all routes are directed through the Prestonwood Pulse Point. The south Quorum area is served by two routes: Route 83 (which is tollway-based to downtown) and Route 363 (which goes to Richardson Transit Center via Spring Valley). Stops for all routes are specified along the routes and transfers occur at the pulse point and where routes cross. The different routes serving Addison are separated into four different types. Table 4.3 presents the description of the different types of routes. Most of Addison is ineligible for DART-About Service, since the origin or destination of the trip cannot be within 1/2 mile of regular service.

Table 4.3
TYPES OF TRANSIT SERVICE

Type	Description
Radial Local	Service to downtown (36,83)
Transit Center Circulator/Locals	Connect pulse points with transit centers, 30 minutes in peak, one hour in off-peak. • Word of Faith (Carrollton), (321, 322) • North Carrollton, (333, 341) • West Plano, (350) • Richardson, (361, 362, 363)
Corsstown	Connects Irving, Prestonwood, Richardson, and Garland along Belt Line (400)
Express	Downtown from Loos Stadium and Skylane (205)

FUTURE TRANSIT SERVICE

DART currently plans to increase bus service in the suburbs as demand arises. For now, DART will continue to operate the great majority of its additional suburban service through its suburban transit centers. The existing Prestonwood Town Center facility is to be relocated from Prestonwood Boulevard to a site adjacent to the golf course, which is across Prestonwood Boulevard. This service structure will continue to make commuter travel to the Quorum area indirect and time-consuming from most suburban locations. There is a potential for a transfer center to be located in the Quorum area. This would provide direct access to the Quorum area.

In addition to proposed modifications in the conventional bus service, Phase III of the DART rail plan contains a proposed light rail line between Plano and Carrollton and passes through Addison on the Cotton Belt Railroad right-of-way. A section of the rail is proposed to run south alongside Inwood Road. There are two potential rail stations (shown in Figure 4.3) within Addison: (1) near the intersection of Arapaho Road and Quorum Drive, and (2) in the south Quorum area. Addison should continue to monitor the progress of the proposed light rail.

The year 2010 employment and population densities are unlikely to support a grid-type system. As development increases, the regional bus system should be restructured to provide more effective transit service to and within Addison. Future routes should be shorter routes which focus on the pulse point and cover more of the local area. Future routes should also provide additional service to the Quorum area. As demand warrants, new transit routes should be added or existing routes altered.

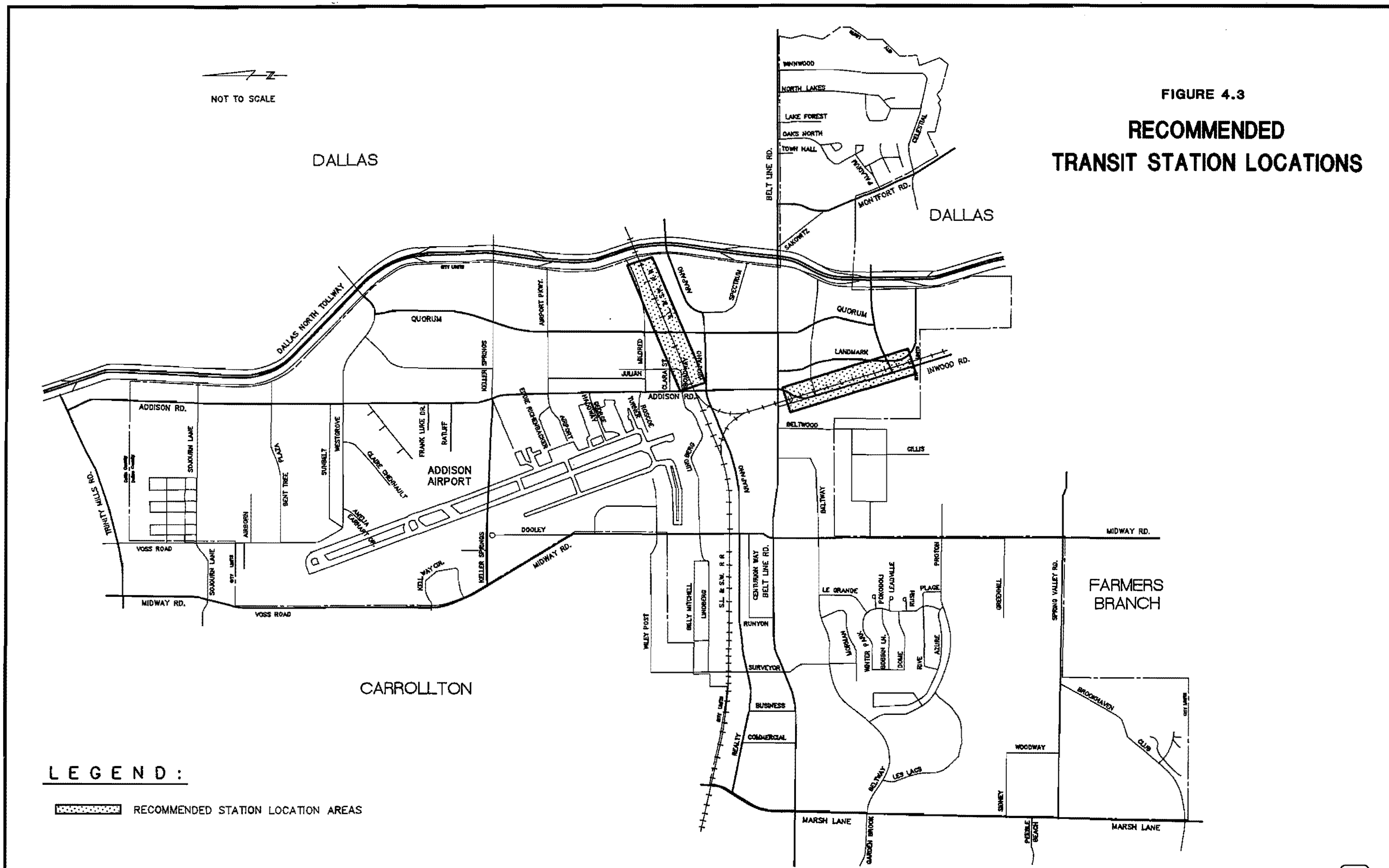
As previously stated, the pedestrian system is an important ingredient for transit success. Addison should support land-use patterns which encourage public transit. This would include high density on public transit corridor, activity centers within mixed uses, and high residential densities along public transit corridors. Another method to support transit would be to incorporate transit into public/private projects, such as adding bus pull-out lanes or bus stop shelters. As demand increases, the reduction of single occupancy vehicles will become important. Alternatives to promote high occupancy vehicles or the use of transit include traffic demand management alternatives, travel management associations, subsidized passes, and commuter information systems. These measures can promote development activity even when additional roadway capacity is not available.

The advantages of transit include a reduction in vehicles and congestion (and therefore a cleaner environment), and in infrastructure necessary to provide an efficient roadway system. Transit usage is an important component to the success of the transportation plan. The railroad line located adjacent to Inwood Road constrains the transportation system in the south Quorum area and the widening of Inwood Road. The Town should explore opportunities to purchase this spur.

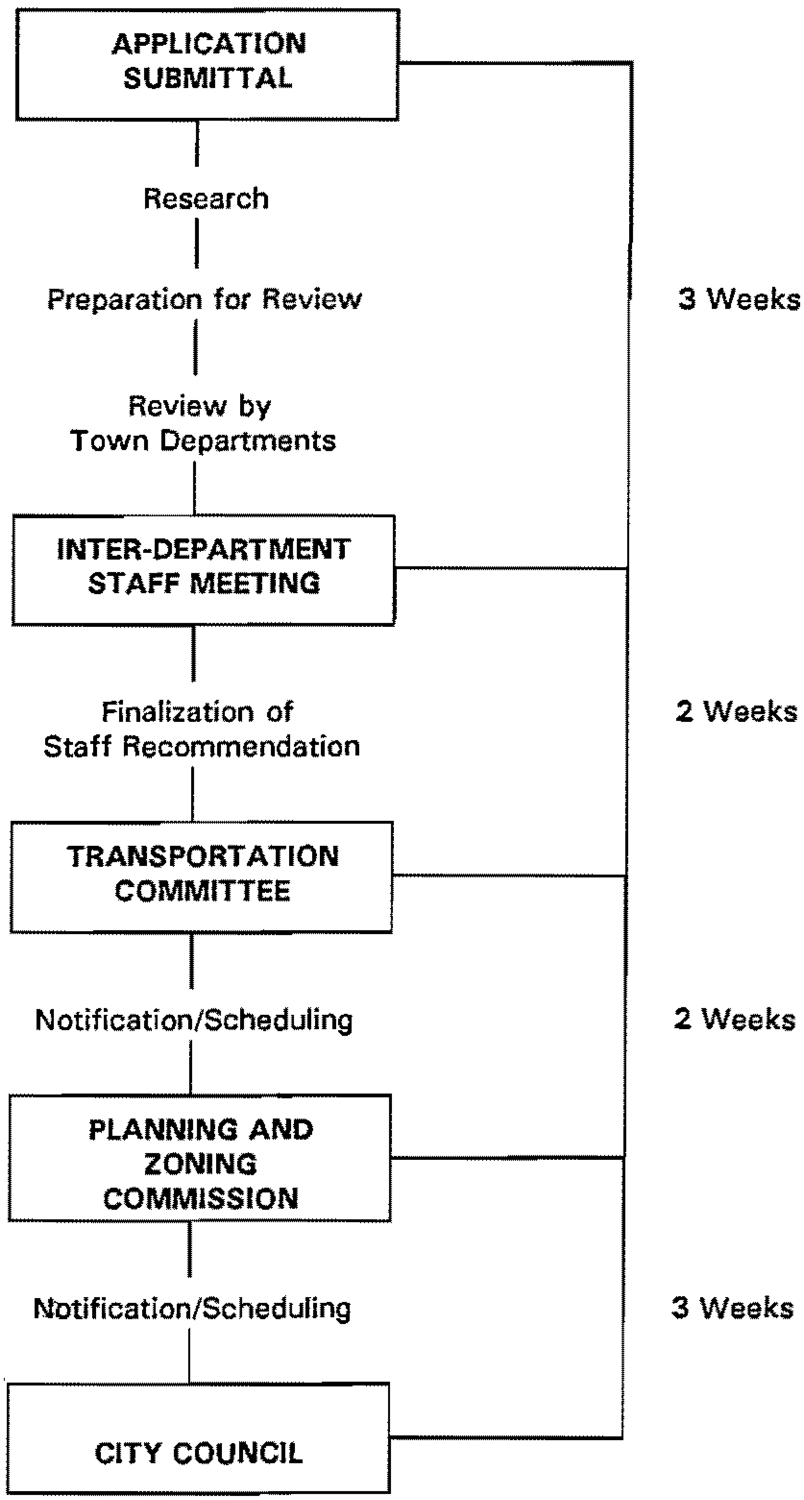
It is recommended that Addison work closely with DART to identify locations and reserve right-of-way for the future rail stations and transfer centers. Addison should adopt land-use policies surrounding the rail stations and transfer centers which support the transit uses. The rail line provides a potential for a link between Addison and the high growth areas of Collin County and DFW Airport. Proper planning of the rail station locations within Addison and surrounding land-uses is highly recommended to maximize the benefits of this future transit mode.

FIGURE 4.3

RECOMMENDED TRANSIT STATION LOCATIONS



5. TRANSPORTATION PLAN AMENDMENT PROCESS



6. CONCLUSIONS

All aspects of this transportation plan work together to achieve the overall goal of the study: to provide for the safe, efficient, and orderly movement of people and goods in, out, and through Addison while preserving the equality of life and environment for its citizens and businesses. This Thoroughfare Plan should be reviewed periodically (at least once every five years) to ensure its continued ability to efficiently meet the needs of the Town of Addison.

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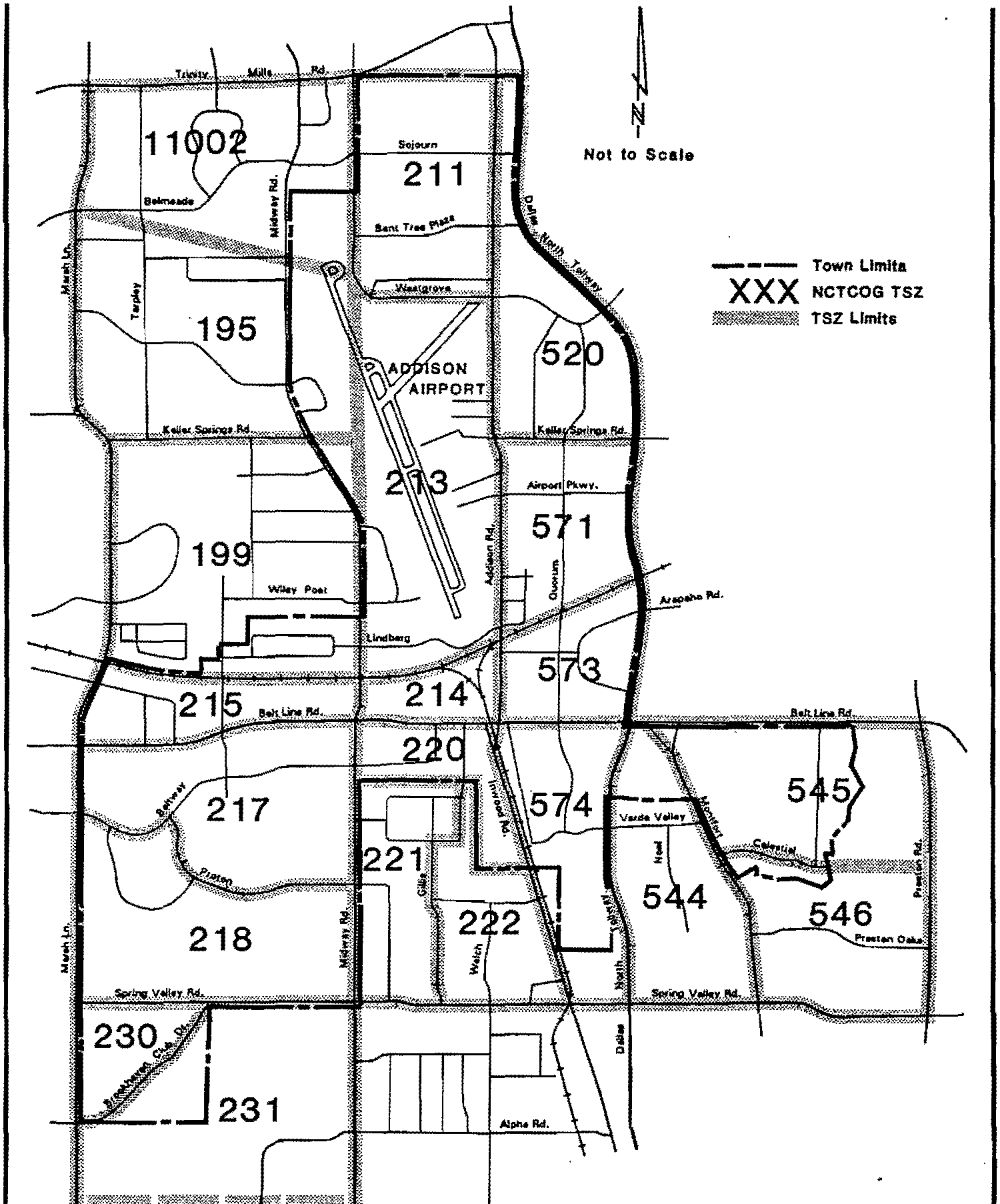
APPENDIX A

TAP ZONE MAP



ADDISON TRAFFIC
SURVEY ZONES

APPENDIX B

1986 AND 2010 DEMOGRAPHIC DATA

ADDISON TRANSPORTATION PLAN
Land Use Information

TSZ	F/P	1986 POP	2010 POP	DIFF	DIFF %	1986 EMP	2010 EMP	DIFF	DIFF %
195	P	403	1899	1496	371	1502	3563	2061	137
199	P	2917	3497	580	20	5992	6757	765	13
211	F	676	3607	2931	433	1925	3703	1778	92
213	F	0	0	0	0	1659	1789	130	8
214	F	0	0	0	0	584	890	184	52
215	F	0	0	0	0	1542	2588	1046	68
217	F	1180	1453	273	23	2278	5363	3085	135
218	F	67	2019	1952	2813	1237	3611	2374	192
220	F	0	0	0	0	1110	1254	144	13
230	F	3931	3931	0	0	212	212	0	0
231	P	1798	2236	438	24	1383	2848	1465	106
520	F	1376	2686	1310	95	4010	7079	3069	76
544	P	0	3914	3914	N/A	2565	2731	166	6
545	P	507	1907	1400	276	2336	6205	3869	166
546	P	5535	6412	877	16	23	166	143	622
573	F	0	0	0	0	2046	5832	3786	185
574	P	0	0	0	0	13395	15956	2561	19
571	F	34	0	(34)	N/A	1250	10272	9022	721
11002	P	403	807	404	100	1502	5563	4061	270
TOTAL		18827	34368	15541	82	46551	86260	39709	85

TSZ = Traffic Survey Zone
F = TSZ is completely within Town limits
P = Town is partially within the TSZ
N/A = Not Applicable

Keren\Addithor.Tab

Decrease from 1986 Model

Increase from 1986 Model

Addison Traffic Survey Zones: Area and FAR

TSZ	Total Area (sq ft)	Comm Area (sq ft)	Resid Area (sq ft)	Other Area (sq ft)	NCTCOG Emply (sq ft)	Comm FAR	Resid Hholds	Resid Density (units/acre)
195	18,574,400	8,614,400	8,464,000	1,496,000	2,356,255	0.27	932	4.8
199	20,353,600	13,076,800	7,276,800	0	6,988,066	0.53	1879	11.2
211	10,483,200	3,649,600	6,052,800	780,800	2,294,763	0.63	1839	13.2
213	18,275,200	11,211,200	0	7,064,000	1,411,646	0.13	0	0.0
214	2,280,000	1,011,200	0	1,268,800	576,624	0.57	0	0.0
215	5,190,400	5,190,400	0	0	1,926,450	0.37	0	0.0
217	12,427,200	7,271,140	4,807,580	348,480	2,519,132	0.35	749	6.8
218	12,440,000	1,440,000	6,580,800	4,419,200	1,746,517	1.21	1075	7.1
220	4,387,200	4,387,200	0	0	1,050,427	0.24	0	0.0
230	3,430,400	1,032,000	2,398,400	0	153,069	0.15	2034	36.9
231	–	0	233600*					
520	9,460,800	5,644,800	3,656,000	160,000	3,917,590	0.69	1782	21.2
544	10,457,600	3,264,000	7,193,600	0	1,664,966	0.51	2418	14.6
545	11,734,400	5,614,400	6,120,000	0	3,104,189	0.55	1145	8.1
546	9,246,400	0	9,124,800	121,600	101,716	0.00	4248	20.3
571	7,867,200	7,867,200	0	0	4,535,123	0.58	0	0.0
573	5,787,200	5,787,200	0	0	3,522,802	0.61	0	0.0
574	8,048,000	8,048,000	0	0	8,927,173	1.11	0	0.0
11002	14,505,600	10,859,200	1,742,400	1,904,000	3,678,845	0.34	418	10.5
Total	184,948,800	103,968,740	63,417,180	17,562,880	50,475,353	0.49	18,519	

*This area is the residential area in Addison only.

Decrease from 1986 Model

Increase from 1986 Model