4. TRANSPORTATION AND CIRCULATION ASSESSMENT

Introduction

The following assessment considers the present and future circulation trends in, and through, Westlake. Transportation will play an essential role in shaping the Town's future. Not only does it help determine how long it takes to get to and from our daily activities, such as work, school and errands, and how we'll get there, but it also plays a large role in shaping the layout and character of the community.

This section provides an assessment of transportation conditions in the Town of Westlake, including its street network, off-road facilities and transit. The information compiled here is based on on-site observations and readily available data from the Town, North Central Texas Council of Government (NCTCOG) and other sources. Additionally, this analysis is to identify the manner in which Westlake is structurally associated with its neighboring cities (namely Southlake and Keller) and the extent to which Westlake is currently functioning as a portal to SH114 and/ or commercial development along the SH 114 corridor. Once this is understood, a look at future trip volumes will reveal how those patterns are effected by new roadways and thoroughfares (proposed to accommodate future development), which may result in critical choke points that will ultimately impede the realization of such development. More specifically, this analysis considers the following:

Current Traffic Patterns

An assessment of transportation conditions in Westlake requires an understanding of context, in terms of the role of transportation within the Town, today. Key contextual factors to be considered include the Town's position relative to the region, its street network and other modes of transportation. More detail is provided below.

Regional Mobility

Westlake's northern boundaries are marked by SH 114 and SH 170, four-lane freeways that provide good accessibility to the rest of the region, including direct access to the Dallas Fort Worth International Airport (roughly 30 minute peak hour drive time), the Fort Worth central business district (CBD) via I-35W and SH 377 (30 minute drive time) and the Dallas CBD via I-35E/Stemmons Freeway (approximately 45 minute peak hour drive time).

SH 114 carries about 75,000 vehicles per day, while SH 170 carries about 40,000 vehicles per day. A majority of trips with an origin or destination within Westlake use these facilities to reach locations elsewhere throughout the region.

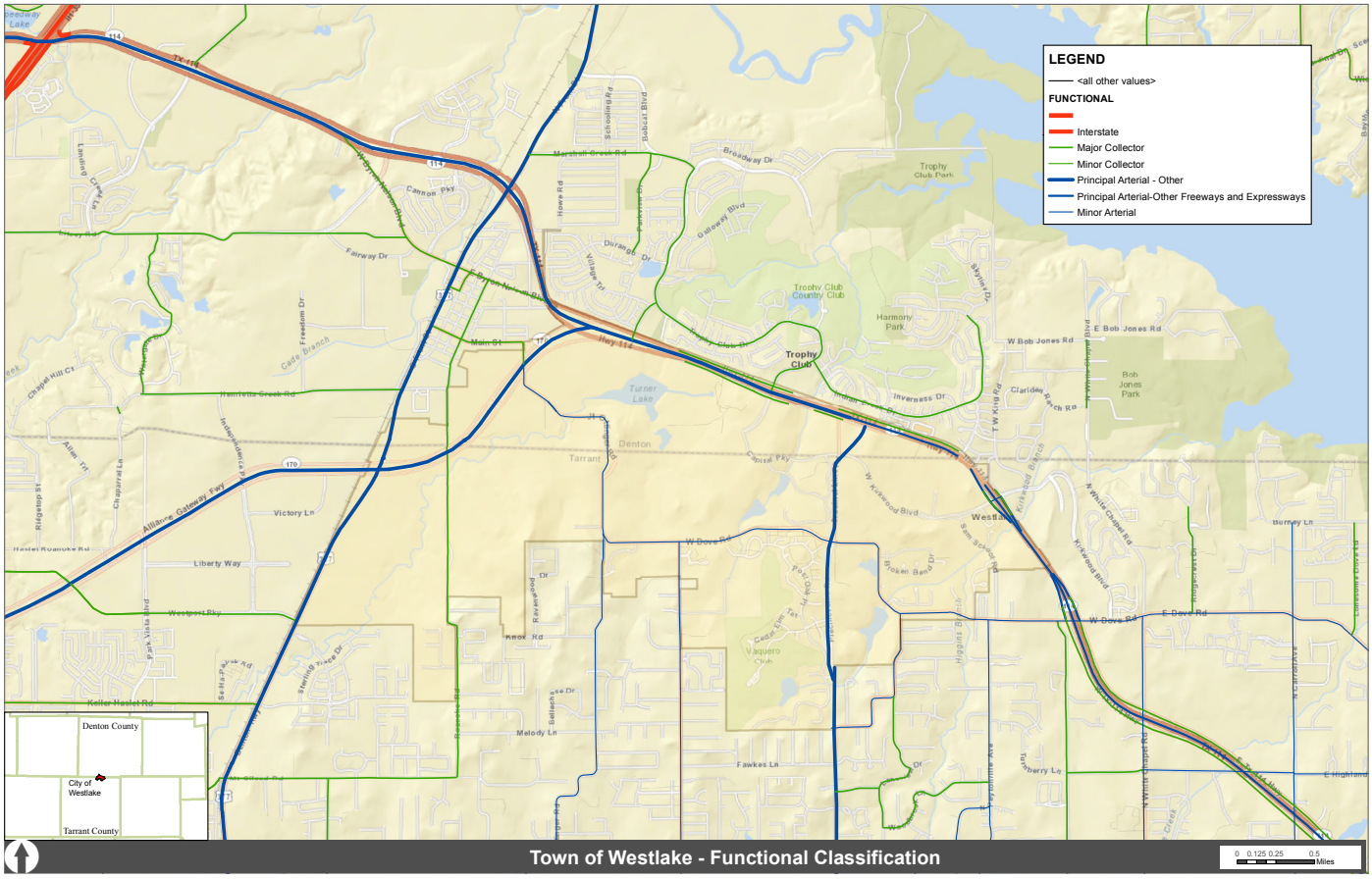


Figure 74: Transportation Classification Map

There are several regional transit services in operation, including commuter rail (Trinity Railway Express, Denton County Transit), light rail (Dallas Area Rapid Transit) and express bus service (Fort Worth Transportation Authority (The T), DART). However, none of these provide service to Westlake, but DART, The T and DCTA each operate vanpooling and carpooling programs. Additionally, Wheels provides on-demand, non-emergency medical transportation within Tarrant County for senior citizens and the transportation disadvantaged, but there is no fixed route transit service operating within Westlake.

Given that much of Westlake has yet to be developed, the existing street network (Figure 74) is relatively sparse. Two arterials span the Town from east to west and north to south. Dove Road, classified as a minor arterial, is a two-lane facility that extends from SH 114 and Southlake in the east to SH 170 and Roanoke in the west and is the primary east-west route for much of the Town. Existing traffic volumes range from 1,200 vehicles per day in the west to almost 6,000 vehicles per day in the east.

Davis Boulevard (FM 1938) is a principal arterial that connects Southlake and Keller to SH 114, where it terminates. Davis Boulevard is four lanes south of Dove Road and six lanes north of Dove Road. It carries about 6,000 vehicles per day.

A handful of local streets provide connectivity within the Town, including Solana Boulevard and Capital Parkway, which run from east to west, and Westlake Parkway and Sam School Road, which run from north to south. Solana Boulevard and Westlake Parkway each provide direct access to SH 114 frontage roads. Solana

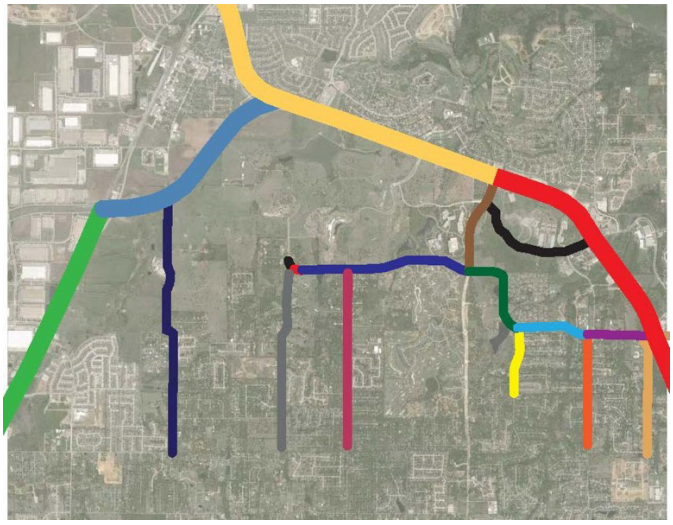


Figure 75a: Roadway Counts Map

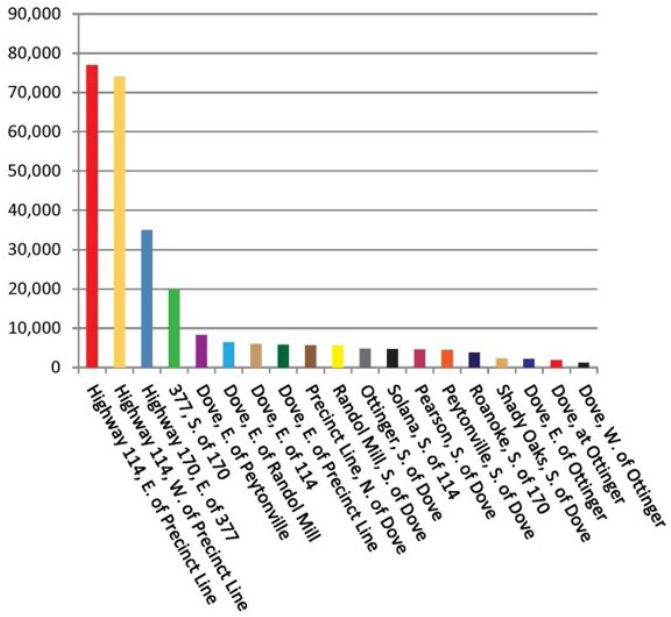


Figure 75b: Roadway Counts Graph

Boulevard carries about 5,000 vehicles per day, while Sam School Road carries less than 2,000 vehicles per day (traffic count data is not available for other local streets, but they are believed to carry less than 2,000 vehicles per day).

In addition to Precinct Line Road, several minor arterials connect Keller and Southlake to Westlake, including Pearson Lane, Randol Mill Avenue and Peytonville Avenue. Each of these streets terminates at Dove Road. Ottinger Road, also a minor arterial, enters Westlake from Keller to the south, where it merges with Dove Road and connects to SH 170 and the City of Roanoke. Roanoke Road is a major collector that connects Keller to SH 170 and Roanoke, passing through west Westlake. Each of these streets carries less than 5,000 vehicles per day. Currently, they are used predominant by residents of Keller and Southlake not only to access employment in Westlake but also as the path of least resistance to SH 114.

Figure 75a Roadway Counts Map and Figure 75b Roadway Counts Graph (compiled from State of Texas, City of Southlake, and NCTCOG sources) displays historic trip volumes along key roadways coming into Westlake. The key roadways are Dove Road (the primary east/west link to SH 170 and SH 114 and destination of most roadways entering Westlake from Southlake and Keller), Roanoke (key roadway serving residential development in Keller), Ottinger (key roadway serving both Keller and Southlake), Pearson (also known as CR 4041 is another roadway serving Southlake and Keller), Davis Boulevard (a key throughway serving Southlake and Keller and connecting to SH 114), Randol Mill/Peytonville/Shady Oaks (all serving residential and commercial development in Southlake).

When considering Figure 75a and Figure 75b, it is noticeable that traffic volumes on Dove Road increase as Dove approaches SH 114 from Ottinger. This sequential increase in traffic volume supports the notion that Dove is a primary local collector, receiving in-flow traffic from Ottinger, Pearson, Precinct Line, Randol Mill, Peytonville, and Shady Oaks. It is also

evident that most of this incoming traffic is flowing east toward SH 114 and Southlake, once it hits Dove Road. This is largely an indication that the generally undeveloped state of land west of Westlake does not offer significant traffic destination potential.

The roadways flowing from the south (Southlake and Keller) into Westlake are carrying significant traffic volumes for two-lane roadways. With the exception of Shady Oaks, each averages approximately 5,000 cars per day (about half the capacity of a two-lane, undivided roadway). The traffic volume patterns on Dove Road suggest that many of these trips are flowing to Dove, turning east toward SH 114, thereby avoiding the traffic congestion of roadways southward (such as 1709). Also, accessing commercial areas south would require a left turn maneuver, which will likely experience time delays during peak hours. The trip north and east is all right turn maneuvers, which can be made even on a red light, accessing 1709 retail from the SH 114 side (again a right turn maneuver instead of a left turn maneuver with short storage lanes along 1709). Any future improvement to Dove will only make it more attractive as an easier and quicker route to the commercial offerings of 1709 and SH 114.

The largely undeveloped Westlake makes it easy to see the patterns of movement that will come into and circulate through the Town. This pattern suggests that north and south bound traffic flowing to and from Dove Road is a regional pattern that Westlake will have to accommodate as populations, and subsequent trip volumes, within the region grow. The earlier analysis of population growth suggests that Southlake and Keller will contain approximately 54,000 households by 2040. Assuming that half of those households will generate traffic north of 1709 (Southlake Boulevard) and that 70% of those trips will flow north and southward to and from Dove road, that trip volume could be 187,000 trips flowing to Dove Road along six two-lane roadways. 187,000 trips would require the capacity of 26 lanes, meaning that each of these roadways would need to be a four-lane divided arterial. Further investigation of the south to north roadways reveals that only Pearson, Randol Mill/ Precinct Line, and Peytonville make through connections between Dove and 1709. Therefore, these streets will carry most of the future traffic that would flow north and south, to and from, Dove Road. If each of these streets became a four-lane divided arterial, the total trip volume they would bring in and out of Westlake is approximately 116,000 trips. Using 116,000 trips as a total volume flowing to and from Dove Road, it is clear that Dove Road can become the limiting factor. If Dove Road were widened to a six-lane divided arterial, the capacity of such a roadway would be right at 40,000 trips per day (provided dedicated turn lanes were also built at the key intersections). In addition, the 2004 Future Land Use Plan reveals that most of Westlake's present and future residential development will be built in places served by Dove Road. That contributes an additional 20,000 trips to the picture, a volume that could easily be served by a single four-lane divided thoroughfare. Therefore, the cost of additional lane capacity along north/south streets and Dove Road becomes a cost imposed on the citizens of Westlake by external growth that Westlake must bear.

Figure 76 shows 2012 trip volumes along SH 114 and SH 170. Note that the volumes decrease from east to west, indicating that trips are flowing to and from SH 114 from the intersections of Dove Road,

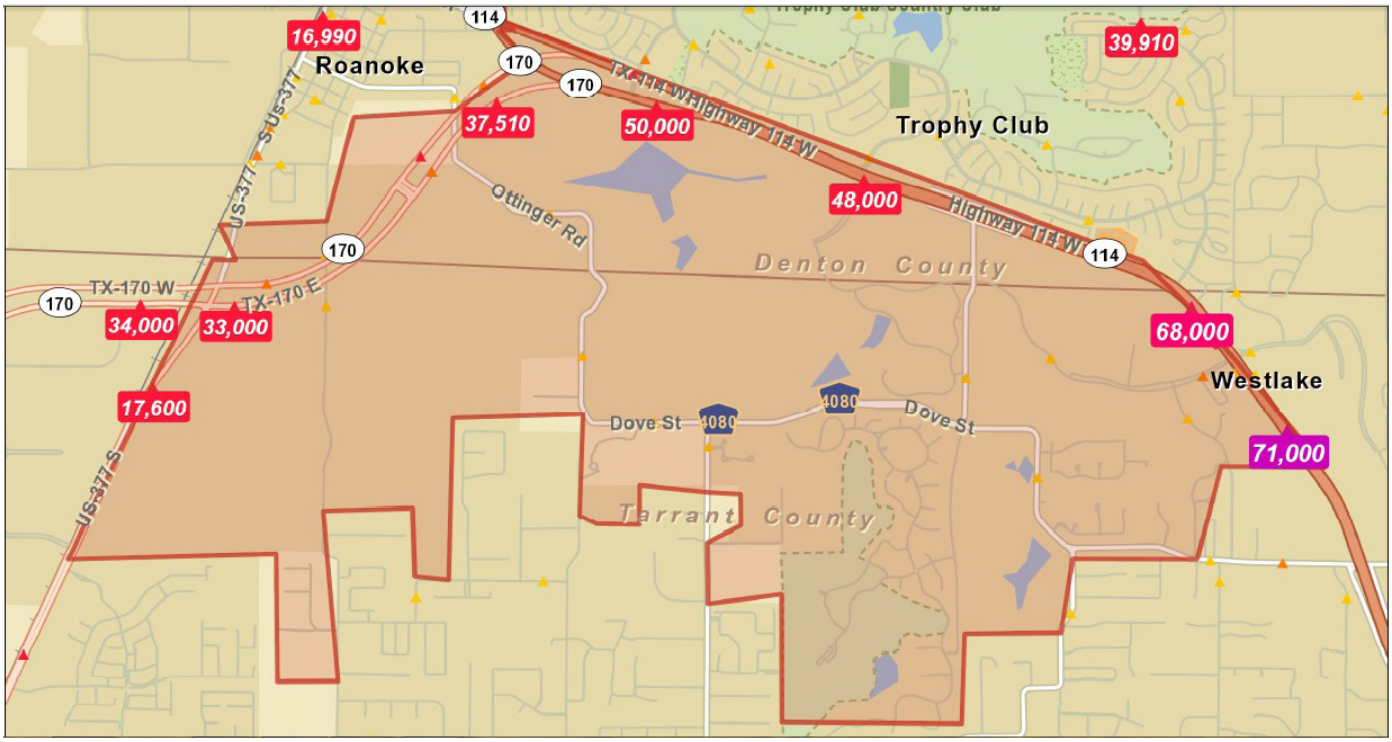


Figure 76: 2012 Trip Volumes

Solana, Precinct Line Road, and Trophy Club Boulevard. The drop in trip volumes from Dove to Precinct Line is 23,000 trips. Deducting the trip volume on Precinct Line (5,625 trips), Solana Boulevard (4,684 trips), Westlake/Trophy Club Boulevard (5,865), and a portion of the Dove Road traffic (3,200) accounts for this drop and reinforces the hypothesis that Westlake is the conduit through which externally generated trips are flowing to and from SH114.

State of Texas information shows that 2012 traffic volumes along SH 114 in the vicinity of the 1709 intersection are right at 100,000 trips. At such density of trip volumes, this portion of SH 114 is experiencing peak hour congestion. Therefore, 100,000 trips should be viewed as a threshold for traffic along SH 114. At present, trip volumes along SH 114 at the Solana Boulevard intersection are at 68,000, leaving a surplus capacity of 32,000 daily trips.

In summary, Westlake today is functioning as a portal for trip access to SH 114 via Dove Road. At current levels of development, current road capacities are sufficient to accommodate current trip volumes. This portal function of Westlake is revealed by the decreasing pattern of trip volumes along SH 114 (east to west). The future residential growth of Westlake will leave some road capacity on Dove Road if Dove Road were widened to a four-lane divided arterial, but the externally generated trips will quickly overcome that surplus capacity between now and 2040. In addition, present volumes along SH 114 leave an approximate 32,000 increment of growth in trip volumes before the Westlake portion of SH 114 becomes subject to peak hour congestion.

Bicycles and Pedestrians

The existing character and layout of Westlake doesn't lend itself to short bicycle and pedestrian work, school or shopping trips. Rather, walking and cycling in the

Estimate of Travel Demand from Existing Entitlements						
Residential - Productions			Non-Residential - Attractions			
Type	Units	Trips		Square feet	Employees	Trips
Single Family	2,410	23,000	Office	5,405,000	48,600	161,500
Multi-family	300	2,000	Retail	1,497,000	0	0
			Mall	1,630,000	3,400	57,900
			Hotel	424,000	3,400	63,000
Total	2,710	25,000				282,400

Figure 77: Estimate of Travel Demand from Entitlements

Town is done predominantly for health and recreational purposes, although some bicycle commuting may also take place. Most of the arterials, collectors and commercially-oriented local streets do not have sidewalks or parallel paths. Some have shoulders or wide outside lanes that could accommodate experienced cyclists.

Further, a majority of residential streets in Westlake do not have sidewalks. The Town's land development regulations do not require sidewalks for new development.

Future Traffic Patterns: Elements of Change

Westlake's development potential, coupled with existing entitlements spell out a significant amount of growth for the Town in terms of population and employment. With growth comes change. The challenge for the Comprehensive Plan lies in developing a transportation system that accommodates growth and change while maintaining a high quality of life for residents.

Travel Demand

An analysis was performed of Westlake's existing entitlements and their implications for growth in population, homes, employment, and square footage of development. In turn, that growth was translated into potential travel demand based on commonly accepted methodologies.

The Town's existing entitlements translate into roughly 2,400 new single family homes and 300 new multi-family units. Generally speaking, homes generate about nine trips per day. These trips are referred to as "productions" because they begin at the home, ultimately destined for somewhere else, be it work, school, shopping, etc. New growth will result in about 25,000 new trip productions on a daily basis.

Existing entitlements will also result in about 46,000 new office employees, 3.1 million square feet of retail (including a mall) and about 3,200 hotel rooms. Combined, these uses will generate about 280,000 trips per day. These trips are referred to as "attractions" because they originate from elsewhere (i.e. home).

All told, Westlake will experience an increase of over 300,000 trips per day.

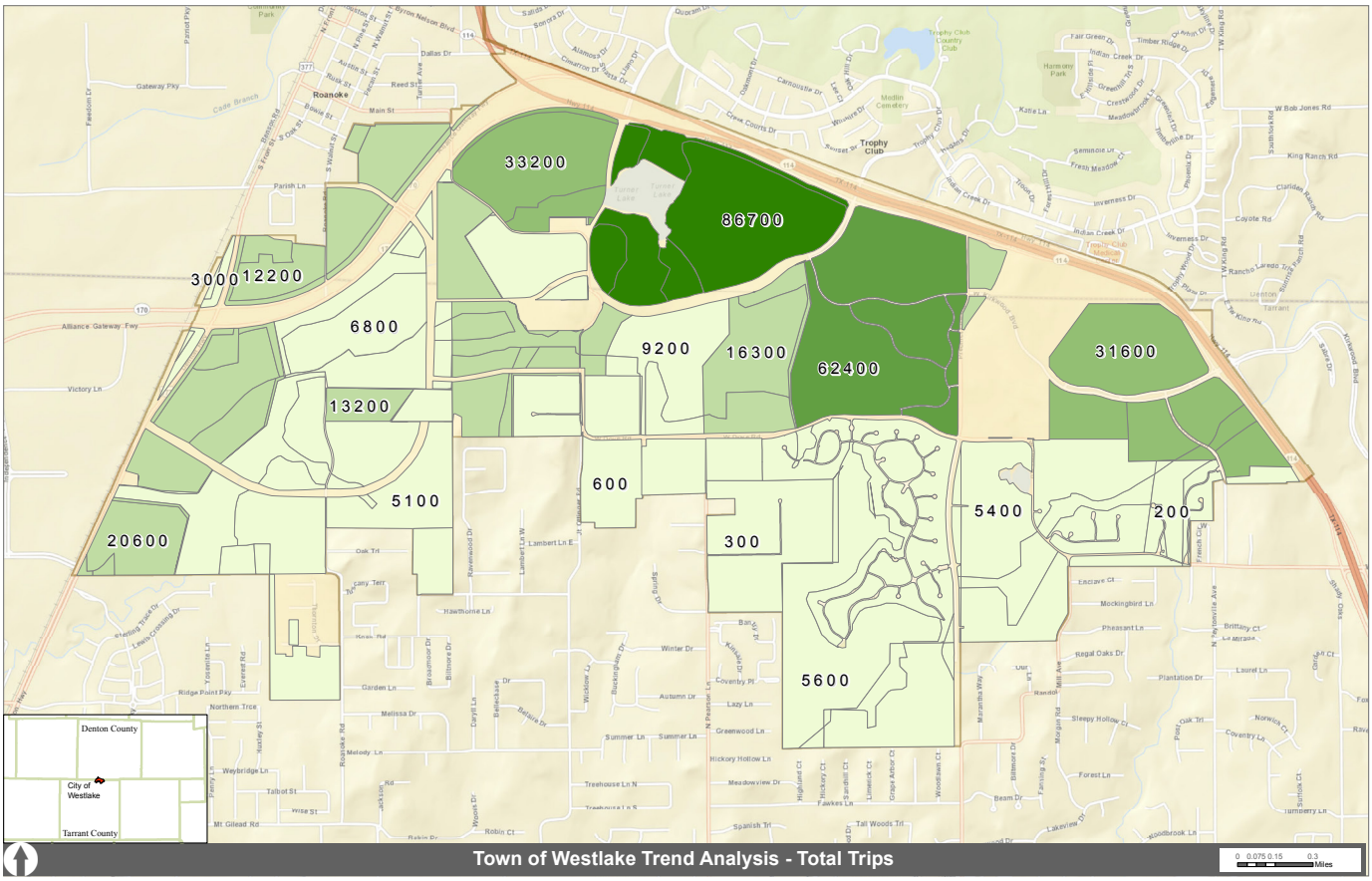


Figure 78: Travel Demand Map

Because of the overwhelming difference between trip productions and attractions, a vast majority of these trips will be drawn from places outside of the Town. Additionally, Southlake and Keller are anticipated to add another 187,000 trips at build-out, a significant share of which could be attracted to employment and shopping within Westlake and to gain access to SH 114 and SH 170. While the PD Plans (discussed in Existing Conditions) show connection between Westlake Parkway and Dove Road, the Town's current Land Use Plan does not show such connection, meaning that the total trip volume flows to Westlake Boulevard via four points of connection to the two lane service roads of SH 114. Therefore, the potential for significant congestion is very high.

Transportation Impacts

An analysis of travel demand clearly indicates that Westlake's existing street network is wholly insufficient to handle travel demand generated by new growth and development. The existing street network, which is predominated a handful of two-lane undivided roads, simply lacks the capacity.

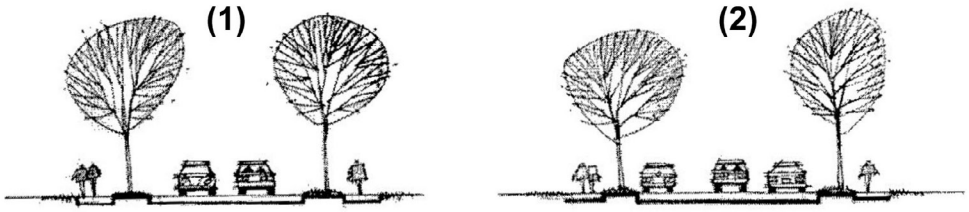
As many as three to five new four-lane divided roads could be needed to accommodate traffic in both north/south and east/west directions.

There are no other options to accommodate travel both within the Town and from elsewhere in the region. There are no plans to add local or regional transit service, and there are few facilities to accommodate bicycle and pedestrian trips.

To understand the lane capacity required to accommodate such trip volumes, the Institute of Transportation Engineers (ITE) has established planning standards for Average Daily Trips (ADT) street capacity. This information is presented in Figures 80a-d Capacity Diagrams and suggests that a capacity of 40 lanes (10 four-lane divided thoroughfares) is needed to move the 308,067 trips. These lanes must comprise a traffic system that moves vehicles in and out at multiple points in ingress/egress. However, the bifurcated residential network (flowing to Dove Road) and commercial network (serving the commercial area without direct connection to Dove Road) makes creation of a coherent overarching system very difficult.

		Trips Per Day			
Location	Lanes	Current Volume	Capacity	Estimated Demand	Deficit
East of Precinct Line Road					
Dove Road	2	6,000	10,000		
Solana Boulevard	4	4,200	36,000		
				150,000	-114,200
	6	10,200	46,000	to	to
				200,000	-164,200
West of Precinct Line Road					
Dove Road	2	2,200	10,000		
Capital Parkway	2	2,000	10,000		
				125,000	-109,200
	4	4,200	20,000	to	to
				175,000	-159,200
South of Dove Road					
Roanoke Road	2	3,800	10,000		
Ottinger Road	2	2,000	10,000		
Pearson Lane	2	4,600	10,000		
Precinct Line Road	4	6,200	36,000		
Randol Mill Ave	2	6,100	10,000		
Peytonville Avenue	2	4,500	10,000		
				150,000	-91,200
	14	27,200	86,000	to	to
				187,000	-128,200
North of Dove Road					
Roanoke Road	2	3,800	10,000		
Ottinger Road	2	1,900	10,000		
Westlake Parkway	4	2,000	32,000		
Precinct Line Road	6	5,600	48,000		
Sam School Road	2	1,800	10,000		
				200,000	-105,100
	16	15,100	110,000	to	to
				240,000	-145,100

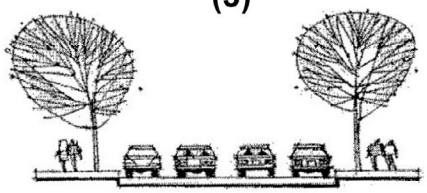
Figure 79: Street Capacity at Build-Out



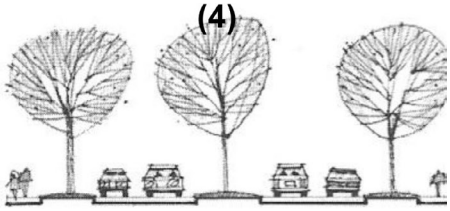
	TYPICAL ROADWAY CAPACITIES (ITE)	
	Cross-Section	General Maximum Two-Way ADT
(1)	Two-lane Urban	8,000 to 10,000
(2)	Three-lane Urban	14,000 to 18,000
	Four-lane Undivided Arterial	15,000 to 25,000
	Four-lane Divided Arterial	30,000 to 41,000
	Six-lane Divided Arterial	45,000 to 60,000
	Four-lane Expressway	35,000 to 60,000
	Four-lane Unmetered Freeway	65,000 to 90,000

Figures 80a-80d: Capacity Diagrams

(3)

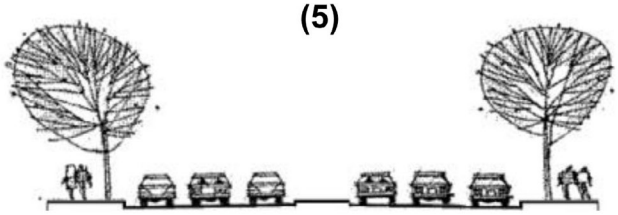


(4)



TYPICAL ROADWAY CAPACITIES (ITE)	
Cross-Section	General Maximum Two-Way ADT
Two-lane Urban	8,000 to 10,000
Three-lane Urban	14,000 to 18,000
(3) Four-lane Undivided Arterial	15,000 to 25,000
(4) Four-lane Divided Arterial	30,000 to 41,000
Six-lane Divided Arterial	45,000 to 60,000
Four-lane Expressway	35,000 to 60,000
Four-lane Unmetered Freeway	65,000 to 90,000

(5)



TYPICAL ROADWAY CAPACITIES (ITE)	
Cross-Section	General Maximum Two-Way ADT
Two-lane Urban	8,000 to 10,000
Three-lane Urban	14,000 to 18,000
Four-lane Undivided Arterial	15,000 to 25,000
Four-lane Divided Arterial	30,000 to 41,000
(5) Six-lane Divided Arterial	45,000 to 60,000
Four-lane Expressway	35,000 to 60,000
Four-lane Unmetered Freeway	65,000 to 90,000

(6)

(7)

TYPICAL ROADWAY CAPACITIES (ITE)	
Cross-Section	General Maximum Two-Way ADT
Two-lane Urban	8,000 to 10,000
Three-lane Urban	14,000 to 18,000
Four-lane Undivided Arterial	15,000 to 25,000
Four-lane Divided Arterial	30,000 to 41,000
Six-lane Divided Arterial	45,000 to 60,000
(6) Four-lane Expressway	35,000 to 60,000
(7) Four-lane Unmetered Freeway	65,000 to 90,000

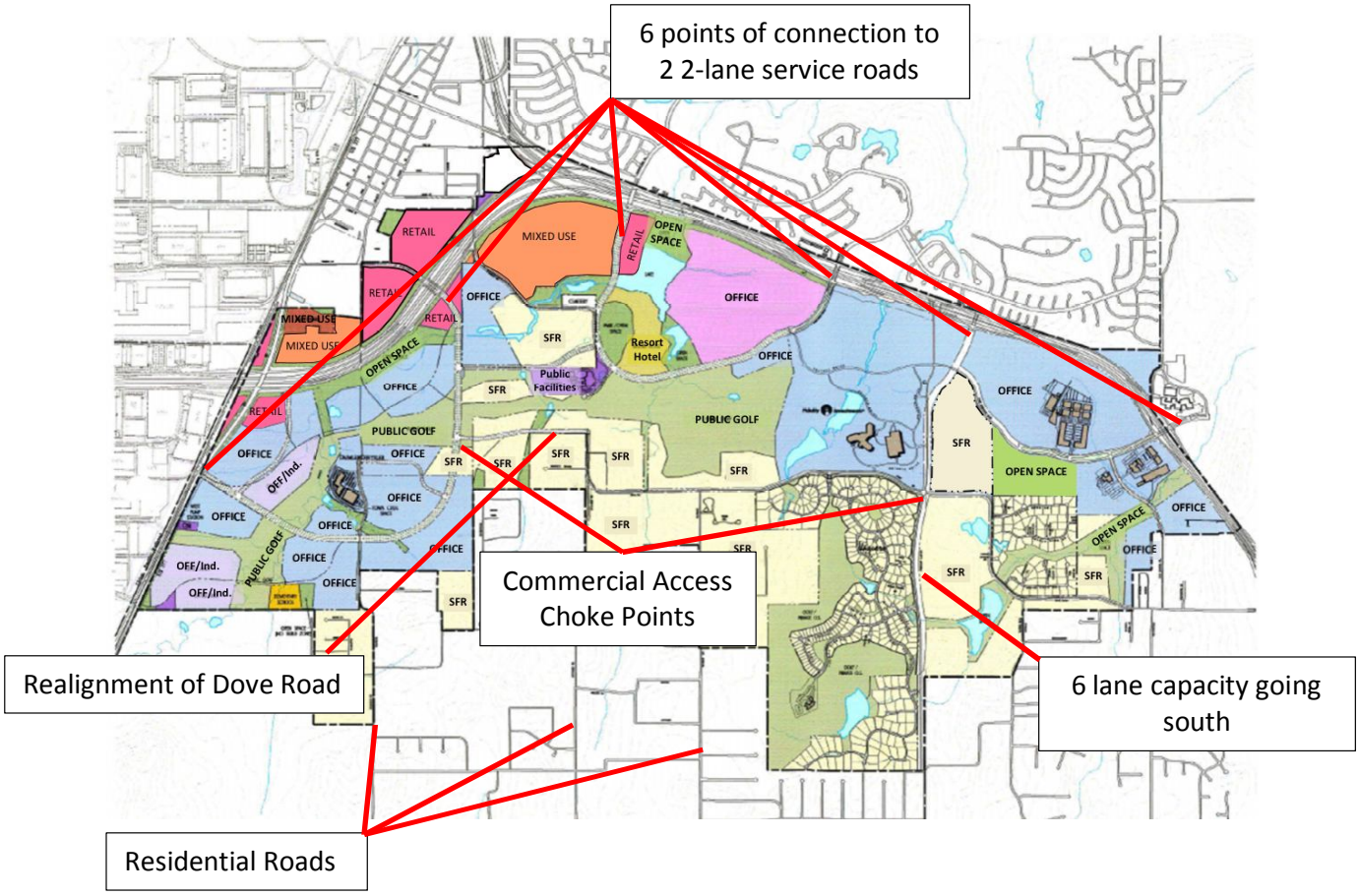


Figure 81: 2004 Future Land Use Plan

To understand how the projected trip volumes will affect circulation patterns in Westlake it is important to view the current Thoroughfare Plan as illustrated in Figure 81. The 2004 Future Land Use Plan presents several important characteristics including:

- **The realignment of Dove Road:** Note in Figure 81, that Dove Road, which currently extends north from Ottinger to a connection with SH 170, turns west from Ottinger and connects with a new commercial road. This disconnects Dove Road from commercial use. Therefore, growing populations, seeking to take advantage of Westlake's commercial offerings will flow to Dove Road, along Ottinger, Pearson, Randol Mill, Precinct Line, and Peytonville but will be unable to continue north without flowing to the east intersection with the new commercial street or flowing to Precinct Line Road. Therefore, convenient access to the commercial offerings of Westlake will be determined by the capacity of Dove (earlier determined to be limited) and the capacity of Precinct Line and/or the new commercial road. This could make Dove Road, a primary residential collector, have to function as a regional arterial. In addition, Westlake Academy, which is now served by the more residential/pastoral Dove Road will, in the future, be served by the commercial roadways. This significantly augments the associations of Westlake Academy with the residential fabric of Westlake.

- **Six points of connection to two two-lane service roads:** Note that trips flowing to and from the commercial district of Westlake, separated from the residential

areas of Westlake by the open space area, are served by six access points. Assuming that each access point is the beginning of a four-lane divided arterial, the combined lane capacity is 174,000 trips. The trip generation of that portion of commercial land uses served by these six points of connection is greater than the above stated capacity, meaning that intersection improvements will likely be required in order to expand capacity (such as dedicated turn lanes). Transportation Impact Analyses (TIA) should be done in the future to determine when such intersection improvements are necessary.

The six points of connection are served by two two-lane service roads linking to off/on ramps at Solana, Precinct Line Road and Westlake Boulevard. This could lead to congestion on the service roads as traffic from commercial areas to the west of Westlake Boulevard seek to flow eastward to the Westlake Boulevard on-ramp.

It seems that most of the traffic issues confronting the future are solvable through proper engineering and capacity enhancement. Although, the population of Westlake will have to become accustomed to lower levels of intersection service, which is typical of urban level development.

- **6 lanes of capacity going south:** Perhaps the greatest challenge is the focus of southward moving traffic to Precinct Line Road. A six-lane divided arterial can be expected to carry a planning maximum of 35,000 to 40,000 vehicles per day. As stated earlier, the potential number of vehicles moving from south to north to either access SH 114 or the commercial offerings of Westlake could exceed this planning capacity. Certainly convergence of all north bound movement from Keller, Southlake, Watauga, and northern North Richland Hills, at the intersection of Dove Road and Precinct Line Road, is a potential choke point in the local road system.

Issues and Opportunities

Transportation is an important element of the Town of Westlake's future. The Comprehensive Plan should give due consideration to the Town's transportation systems and characteristics as they evolve over time. To that end, this assessment yields several observations regarding transportation issues and challenges:

- **Street Network Capacity** – The existing street network clearly lacks sufficient capacity to accommodate the increase in travel demand associated with entitled development. In addition to improvements to existing streets, such as Dove Road, several new facilities will need to be added between now and build-out.

- **Freeway/Interchange Capacity** - A majority of trip attractions generated by new non-residential development will emanate from outside of the Town. Many of these trips will access Westlake via SH 114. Additionally, the Town will continue to experience pass-through from trips originating in communities to the south that are destined for SH 114. This has direct implications for SH 114 and associated interchanges and their ability to handle significant increases in traffic volume.

- **Connectivity** – Transportation networks in which all development connects directly to a few arterials is a very

inefficient system. As Westlake develops and expands its transportation network, the Town must establish a robust, well-connected street network that integrates arterials, collectors and local streets.

- **Opportunity to Shape Growth** – Given that a majority of the Town is yet to be built, there exists a golden opportunity to shape it in the desired pattern and form from the outset, rather than try to "fix" existing problems from a reactionary stand-point. This opportunity to shape future growth includes the design of the future transportation system.

In conclusion, it is clear that the traffic picture of the future will be dramatically different than it is today with Dove Road and Precinct Line Road functioning as regional arterials. These roads are also the major identity roads of Westlake. However, their function will move toward "pass through" rather than "arrival", making the assertion of Westlake's unique identity and form more difficult. In addition, the intersection of Dove Road and Precinct Line Road emerge as a significant choke point at the very center of the Town. Solutions to this potential problem, which seek to increase its capacity, can further regionalize the road identity and, thereby, overpower the pastoral self-image that Westlake nurtures. Solana Boulevard/ Westlake Boulevard will serve an immense amount of commercial square footage as well as the Westlake Academy (potentially separated from the residential fabric of the community). The visual character of this roadway is driven by its capacity needs; just like Dove/Precinct Line Roads, capacity increases a more regional town identity. Therefore, preserving a town identity when faced with regionalization pressures will be a significant planning challenge going forward.