Innovative approaches
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Outstanding service

LAND USE ASSUMPTIONS AND CAPITAL IMPROVEMENT PLAN REPORT FOR WATER, WASTEWATER, AND ROADWAY IMPACT FEES

June 2025

Prepared for:

Town of Westlake

Prepared by:

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FNI Project Number: WSK24597

FREESE AND NICHOLS

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6/12/25

FREESE AND NICHOLS, INC.
TEXAS REGISTERED
ENGINEERING FIRM
F-2144

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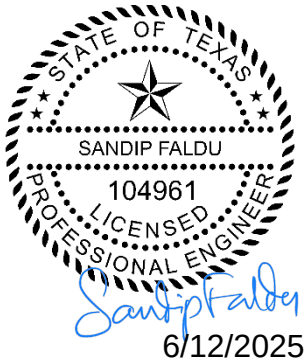

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List of Abbreviations

Abbreviation	Full Nomenclature
CIP	Capital Improvement Plan
CAGR	Compound Annual Growth rate
FNI	Freese and Nichols, Inc.
ITE	Institute for Transportation Engineers
MGD	Million Gallons per Day
NAICS	North American Industry Classification System
NCTCOG	North Central Texas Council of Governments
PP	Pressure Plane
Town	Town of Westlake
TLGC	Texas Local Government Code
TRA	Trinity River Authority
TSZ	Traffic Survey Zone
Veh-Mi	Vehicle-Miles, the service unit for roadway fees

EXECUTIVE SUMMARY

The Town of Westlake, Texas, (Town) authorized Freese and Nichols, Inc. (FNI) to perform an impact fee analysis of the Town's water, wastewater, and roadway systems. The purpose of this report is to summarize the methodology used in the development of land use assumptions and impact fee capital improvement plans for the Town of Westlake.

LAND USE ASSUMPTIONS

Land use assumptions, including population and employment projections, are important elements in the analysis of water, wastewater, and roadway systems. A reasonable estimation of future growth is required to determine the need and timing of capital improvements to serve future development. Growth and future development projections were formulated based on assumptions pertaining to the type, location, quantity, and timing of various future land uses within the community. These land use assumptions are the basis for the preparation of impact fee capital improvement plans (CIP) for water, wastewater, and roadway facilities.

ELIGIBLE CAPITAL IMPROVEMENT PLAN

The water, wastewater, and roadway impact fee CIP was developed for the Town of Westlake based on the land use assumptions, input from Town staff, known development information, and projects anticipated within the near future. The recommended improvements were designed to provide the required capacity to meet projected water demands, wastewater flows, and roadway demand through the year 2045, but will provide capacity for anticipated growth through the year 2035. The projects identified are consistent with the Texas Local Government Code Chapter 395 definition of impact fee eligible projects. The water, wastewater, and roadway CIP projects are summarized in **Tables ES-1**, **ES-2**, and **ES-3**, respectively.

ES- 1: Water System Eligible CIP

Project ID	Project Name
1	2.0 MGD Water Supply and Connection Improvements from Fort Worth via Southlake
2	4.0 MGD Firm Capacity at the Davis Boulevard Pump Station (East PP) and 1.5 MG Ground Storage Tank
3	20-inch Dove Road Water Line Extension
4	16/20-inch US 377 Water Line Loop
5	4.0 MGD Water Supply Increase from Fort Worth via Southlake
6	2.0 MG Firm Capacity at the Davis Boulevard Pump Station (West PP)
7	12-inch SH 114 Water Line Loop
8	1.0 MG Circle T Ranch Elevated Storage Tank
9	16-inch J.T. Ottinger Road Water Line
10	12-inch J.T. Ottinger Road Water Line
11	0.5 MG J.T. Ottinger Road Elevated Storage Tank
12	12-inch US 377 Water Line Loop
13	12-inch Parish Lane Water Line Loop
14	12-inch Main Street Water Line Loop

ES- 2: Wastewater System Eligible CIP

Project ID	Project Name
1	12-inch Parish Lane Gravity Main
2	8-inch Marshall Branch Gravity Main Extension 1
3	8-inch Marshall Branch Gravity Main Extension 2
4	8-inch Marshall Branch Gravity Main Extension 3
5	10-inch Schwab Way Gravity Main Extension
6	8-inch Ottinger Road Gravity Main
7	12-inch Turner Lake Replacement and Gravity Main Extension
8	TRA Denton Creek WRF Expansion Cost Participation

ES- 3: Roadway System Eligible CIP

Roadway CIP Projects – Service Area 1					
ID	**Roadway**	**From**	**To**	**Improvement**	**Total Proposed Lanes**
1	New Road A	SH 170	Roanoke Rd	+ 4 lanes	4D Arterial
2	New Road A	Roanoke Rd	Liberty Ext	+ 4 lanes	4D Arterial
3	New Road A	Liberty Ext	Ottinger Rd	+ 4 lanes	4D Arterial
4	Liberty Ext	US 377	Roanoke Rd	+ 4 lanes	4D Arterial
5	Liberty Ext	Roanoke Rd	New Road A	+ 4 lanes	4D Arterial
6	Liberty Ext	New Road A	New Road B	+ 4 lanes	4D Arterial
7	New Road B	SH 170	Liberty Ext	+ 4 lanes	4D Arterial
8	New Road B	Liberty Ext	Ottinger Rd	+ 4 lanes	4D Arterial
9	Ottinger Rd	New Road B	New Road A	+ 2 lanes	4D Arterial
10	Ottinger Rd	New Road A	N Pearson Ln	+ 2 lanes	4D Arterial
11	New Road C	Liberty Ext	New Road A	+ 4 lanes	4D Arterial
12	Ottinger Rd	Dove Rd	Town Limits	+ 2 lanes	4D Arterial
13	Roanoke Rd	Liberty Ext	Town Limits	+ 2 lanes	4D Arterial
14	Westlake Pkwy	New Road E	Ottinger Rd	+ 4 lanes	4D Arterial
15	Dove Rd	N Pearson Ln	Blue Sky Dr	+ 2 lanes	4D Arterial
16	Roanoke Rd	New Road A	Liberty Ext	+ 2 lanes	4D Arterial
17	Westlake Pkwy	Capital Way	New Road E	+ 2 lanes	4D Arterial
18	New Road E	SH 114	Westlake Pkwy	+ 4 lanes	4D Arterial
19	Capital Pkwy	Westlake Pkwy	Davis Blvd	+ 2 lanes	4D Arterial
20	Schwab Way	Ottinger Rd	New Road B	+ 4 lanes	4D Arterial
21	N Pearson	Dove Rd	50' S of Spring Dr	+ 2 lanes	4D Arterial
22	Dove Rd	Blue Sky Dr	Davis Blvd	+ 4 lanes (recoup)	4D Arterial
23	Davis Blvd	SH 114	Solana Blvd	+ 6 lanes (recoup)	6D Arterial
24	Davis Blvd	Solana Blvd	Dove Rd	+ 6 lanes (recoup)	6D Arterial
25	Davis Blvd	Dove Rd	Town Limits	+ 4 lanes (recoup)	4D Arterial

1.0 PURPOSE

Chapter 395 of the Texas Local Government Code (TLGC) prescribes the process by which cities in Texas must formulate an Impact Fee Program. An initial step in the process is the establishment of land use assumptions and a capital improvement plan (CIP) to address growth and development for a 10-year planning period (TLGC Section 395.001(5)) for the years 2025-2035. The land use assumptions, which include population, non-residential acreage and employment projections, will become the basis for the preparation of impact fee capital improvements plans for water, wastewater, and roadway facilities. This report details the development of the land use assumptions and the impact fee CIPs. This report contains the following components:

- **Methodology** - Explanation of the general methodology used to prepare the land use assumptions and CIPs.
- **Land Use Assumptions**
    - **Service Area Structure** – Description of benefit area to be served by capacity enhancement infrastructure projects from the impact fee program. Explanation of data collection zones (traffic analysis zones), and the division of the Town of Westlake (Town) into impact fee service areas for roadway, water, and wastewater facilities.
    - **Base Year Data** – Historical population trends for Westlake and information on population, non-residential acreage, employment, and existing land use for each service area.
    - **Existing Conditions Analysis** – Analysis of the existing roadway system including its carrying capacity, current utilization, and deficiencies.
    - **Growth Projections** – Population and non-residential acreage, and employment growth assumptions for 10 years by service areas.
- **Eligible Capital Improvements Plans** - Description of identified capital improvement to address growth for roads, water, and wastewater.

2.0 METHODOLOGY

Based upon the growth assumptions and the capital improvements needed to support growth, it is possible to develop an impact fee structure which fairly allocates improvement costs to growth areas in relationship to their impact upon the entire infrastructure system. The data in this report has been formulated using reasonable and generally accepted planning principles for the preparation of impact fee systems in Texas and meets the requirements of the TLGC Section 395 for the establishment of impact fees. For the formulation of the land use assumptions and the capital improvements plans, a series of work tasks were undertaken and are described below.

- A kick-off meeting was held to describe the general methodological approach in the study.
- Service areas were defined for roadway, water, and wastewater impact fee systems.
- Current and historical population, non-residential acreage, and employment data were gathered from the U.S. Census Bureau American Community Survey (2025), the North Central Texas Council of Governments (NCTCOG), the Town future land use plan, and input from Town staff. These served as a basis for future growth.
- A compound annual growth rate (CAGR) of 5.28% was recommended for 10-year population growth in the roadway service area (Town Limits) and the water/wastewater service area (Town Limits).
- A CAGR of 6.79% was recommended for 10-year non-residential acreage in the water/wastewater service area (Town Limits).
- A CAGR of 6.72% was recommended for 10-year employment growth in the roadway service area (Town Limits).
- Vehicle-miles of travel in the PM peak hour was identified as the service unit of measure for analyses and roadway impact fee calculations.
- A roadway inventory was conducted to document lane geometrics, roadway functional classification, and system capacity. Traffic volume count data were collected in winter 2025 to determine roadway utilization and if any capacity deficiencies exist within each impact fee service area.

- Base and 10-year demographics were prepared for the respective service areas for water, wastewater, and roadway.

- Water demands and wastewater flow projections were developed based on the population projections for evaluating the water and wastewater CIP.

- Projected 10-year growth was calculated for the roadway service areas based on land use assumptions (projections of population and employment growth) and translated into residential, office, commercial and industrial travel using service unit equivalencies. Trip rate data was obtained from *Trip Generation, Eleventh Edition* by the Institute of Transportation Engineers, and trip length statistics for Westlake were obtained from the National Household Workplace Survey.

- Projected 10-year growth was calculated for the water and wastewater service areas based on land use assumptions (projections of population and employment growth).

- Water, wastewater, and roadway eligible capital improvements plans were developed.

3.0 LAND USE ASSUMPTIONS

3.1 Data Collection Zones and Service Area Maps

3.1.1 Study Areas

TLGC Chapter 395 requires that service areas be defined for impact fees to ensure that facility improvements are located in close proximity to areas generating needs. The water and wastewater service areas are defined as the town limits. **Figure 3-1** illustrates the water and wastewater service area for the Westlake Impact Fee study.

Legislative requirements stipulate that roadway service areas be limited to a 6-mile maximum and must be located within the current Town Limits. Transportation service areas are different from water and wastewater systems, which can include the Town Limits and its ETJ or other defined service area. This is primarily because roadway systems are "open" to both local and regional (non-town) use as opposed to a defined level of utilization from residents within a water and wastewater system. The roadway service area established for the Town is illustrated in **Figure 3-2**.

FIGURE 3-1

TOWN OF WESTLAKE

WATER/WASTEWATER SERVICE AREA

LEGEND

- Water/Wastewater Service Area
- Road
- Railroad
- Stream
- Lake
- Parcel
- Town Limit
- Other City Limit
- County Boundary

THE TOWN OF WESTLAKE

FREESE AND NICHOLS

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FIGURE 3-2

TOWN OF WESTLAKE

ROADWAY SERVICE AREA

LEGEND

- Roadway Service Area
- Road
- Railroad
- Stream
- Lake
- Parcel
- Town Limit
- Other City Limit
- County Boundary

THE TOWN OF WESTLAKE

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3.1.2 Land Use Methodology

The land use assumptions and future growth projections take into consideration several factors influencing development patterns, including the following:

- The character, type, density, and quantity of existing development
- Availability of land for future expansion,
- Current and historical growth trends of population and development within the Town,
- Location and configuration of vacant land
- Known or anticipated development projects as defined by Town staff

3.2 HISTORICAL GROWTH

FNI reviewed the Town's historical population data collected from the North Central Texas Council of Governments (NCTCOG) and the US Census Bureau. Based on the NCTCOG and US Census Bureau data, the Town experienced an average population growth rate of approximately 6.77% and 5.98% over the last 10 years, respectively. Generally, the Town has maintained a high growth rate since 2010. The historical population is shown in **Table 3-1.**

Table 3-1: Historical Population Growth

Year	NCTCOG Population[1]	NCTCOG Growth Rate	U.S. Census Population[2]	U.S. Census Growth Rate
2010	992	--	992	--
2011	990	-0.20%	999	0.71%
2012	1,010	2.02%	1,029	3.00%
2013	1,040	2.97%	1,076	4.57%
2014	1,050	0.96%	1,112	3.35%
2015	1,120	6.67%	1,207	8.54%
2016	1,230	9.82%	1,276	5.72%
2017	1,310	6.50%	1,390	8.93%
2018	1,380	5.34%	1,483	6.69%
2019	1,610	16.67%	1,555	4.86%
2020	1,623	0.81%	1,623	4.37%
2021	1,780	9.67%	1,681	3.57%
2022	1,842	3.48%	1,778	5.77%
2023	1,922	4.34%	1,920	7.99%
2024	2,006	4.37%	--	--
10-Year Average Growth Rate		**6.77%**	**--**	**5.98%**
5-Year Average Growth Rate		**4.53%**	**--**	**5.31%**
3-Year Average Growth Rate		**4.06%**	**--**	**5.78%**

[1]Source: North Central Texas Council of Governments
[2]Source: U.S Census Bureau

3.3 POPULATION AND EMPLOYMENT PROJECTIONS

For the land use assumptions process, the existing population and non-residential acreage data was calculated using U.S. Census, NCTCOG, and Town data. FNI prepared a projections database to determine a population and non-residential acreage for each parcel within the Town's service area. The Town's future land use plan and input from Town staff were used to develop 10-year projections. Adjustments were also made based on discussions with Town staff. A series of assumptions were made to arrive at reasonable growth rates for population and employment.

3.3.1 Population and Non-Residential Acreage

Generally, the following assumption was made as a basis from which 10-year and 20-year projections could be initiated.

- Future land uses will occur based on similar trends of the past and will conform with the anticipated future development and redevelopment opportunities as forecasted in the 2015 Comprehensive Plan and other special area plans.

The water and roadway population and service connection projections are presented in **Table 3-2**. The existing population for wastewater is smaller to account for septic users that will not be served by the Town. The wastewater population projections are provided in **Table 3-3**. The 10-year future land use plan is presented in **Figure 3-3**.

Table 3-2: Water/ Roadway Service Area Population Projections

Planning Period	Served Population	Connections	Non-Residential Acreage
Existing	2,073	1,002	581
10-year	3,469	1,676	1,150
10-year CAGR	**5.28%**	**5.28%**	**7.07%**

Table 3-3: Wastewater Service Area Population Projections

Planning Period	Served Population	Non-Residential Acreage
Existing	1,856	581
10-year	3,252	1,150
10-year CAGR	**5.28%**	**7.07%**

FIGURE 3-3
TOWN OF WESTLAKE
2035 LAND USE

LEGEND

- Road
- Railroad
- Stream
- Lake
- 100-Year Floodplain
- Floodway
- Parcel
- Town Limit
- Other City Limit
- County Boundary

THE TOWN OF WESTLAKE

FREESE AND NICHOLS

2035 LAND USE

- Single Family Residential
- Commercial
- Institution
- Mixed Use
- Open Space
- Municipal
- Future Land Use

0 800 1,600

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3.3.2 Employment

Employment for each service area was broken down into basic, retail, and service uses as defined by the North American Industry Classification System (NAICS) code. Each of these employment types generate unique types of demand for roadway usage, hence the breakdown. **Basic Employment** includes land use activities that produce goods and services exported outside the local economy, such as manufacturing, construction, transportation, wholesale trade, warehousing, and other industrial uses. **Retail Employment** includes land use activities that provide for the retail sale of goods that primarily serve households and whose location choice is oriented to the household sector, such as grocery stores, restaurants, and shopping centers. **Service Employment** includes land use activities that provide personal and professional services such as financial, insurance, government, and other professional administrative offices.

Traffic Survey Zone (TSZ) data was used to attribute projected employment within the roadway service area. Based on known development trends, incoming employment centers, Census data, and TSZ data, a CAGR of approximately 6.7% aligns with employment expectations for non-residential acreage within the Town. This will result in approximately a 90% total increase in employment over 10 years. **Table 3-4** shows this projected employment data.

Table 3-4: Roadway Employment Projections

Planning Period	Employment Type			Total
	Basic	Retail	Service	
Existing	5,188	2,739	10,151	**18,078**
10-year	5,292	5,248	24,098	**34,638**
			10-Year CAGR	**6.72%**

4.0 ELIGIBLE CAPITAL IMPROVEMENT PLANS

The water, wastewater, and roadway impact fee analysis involves determining the eligible portion of total projected costs to serve new development and the projected number of service units attributed to new development over the next 10 years. The total projected costs include the 10-year capital costs, financing costs for the capital improvements, and consultant costs for preparing and updating the study.

The water, wastewater, and roadway impact fee CIP was developed for the Town to provide high quality infrastructure based on the growth patterns detailed in the land use assumptions. The eligible existing and future improvements were designed to provide the required capacity to meet projected water, wastewater, and roadway demands through the next 10 years and are sized to 20-year conditions. The water, wastewater, and roadway projects required to meet growth in the 10-year period were used in the impact fee analysis and calculation.

4.1 Existing Water and Wastewater Systems

The Town of Westlake's water distribution system includes one existing pressure plane, one elevated storage tank, two ground storage tanks, and more than 367,000 linear feet of water line ranging in size from 6 inches to 20 inches in diameter. The existing water system is shown on **Figure 4-1**. The Town's drinking water is supplied on the west side of the Town Limits by the City of Fort Worth.

The Town of Westlake's wastewater collection system includes approximately 167,000 linear feet of gravity and force main lines ranging in size from 4 inches to 18 inches. The Town's wastewater is lifted southwest and northeast into the Trinity River Authority (TRA) collection system to be treated. The existing collection system is shown on **Figure 4-2**.

FIGURE 4-1

TOWN OF WESTLAKE

EXISTING WATER SYSTEM

LEGEND

- Pressure Reducing Valve
- Hydrant
- Meter Station
- Elevated Storage Tank
- Pump Station
- Under Design/Construction Water Line
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Trophy Club MUD Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Town Limit
- Other City Limit
- County Boundary

Pump Station
Firm Capacity = 9,000 gpm
0.665 MG Ground Storage Tank
1.0 MG Ground Storage Tank

1.0 MG Knox
Elevated Storage Tank
Overflow Elev. = 901.5'

THE TOWN OF WESTLAKE

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FIGURE 4-2

TOWN OF WESTLAKE

EXISTING WASTEWATER SYSTEM

LEGEND

Under Design/Construction
- Lift Station
- Wastewater Line
- Force Main

Existing Wastewater System
- Manhole
- Meter Station
- Lift Station
- 8" and Smaller Wastewater Line
- 10" and Larger Wastewater Line
- Force Main

Owned by Other Wastewater System
- Manhole
- Meter Station
- Lift Station
- Southlake Wastewater Line
- Trophy Club MUD Wastewater Line
- Private Wastewater Line
- TRA Wastewater Line
- TRA Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- Town Limit
- Other City Limit
- County Boundary

THE TOWN OF WESTLAKE

FREESE AND NICHOLS

Cade Branch Lift Station

Circle T Ranch Lift Station

Westlake Ranch Lift Station

Vaquero Lift Station

Roanoke

Trophy Club

Fort Worth

Keller

Southlake

Turner Lake

DENTON CO

TARRANT CO

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4.2 Water Demand and Wastewater Load Projections

4.2.1 Water Demands

A water utility must be able to supply water at rates that fluctuate over time. Yearly, monthly, daily, and hourly variations in water use occur, with higher use during dry years and in hot months. Also, water use typically follows a diurnal pattern, being low at night and peaking in the early morning and late afternoon. Flow rates most important to the hydraulic design and operation of a water treatment plant and distribution system are average day and maximum day demands. Average day use is the total annual water use divided by the number of days in the year and is typically used in water supply planning. The average day demand is also typically used as a basis for estimating maximum day demands. Maximum day demand is the maximum quantity of water used on any one day of the year. Water supply facilities, such as treatment plants and pump stations, are typically designed based on the maximum day demand. Therefore, estimating future water demands directly impacts the projects needed to serve future growth.

Future water demands were developed by utilizing per-capita usage rates applied to the projected service connection count. Known Town commercial flows were also added to projected future demand. A maximum day to average day peaking factor was then used to estimate future maximum day demands. **Table 4-1** presents the water demand design criteria and **Table 4-2** displays the projected water demands. A lower residential per capita usage is assumed in the 10-year period due to projected water conservation.

Table 4-1: Water Demand Design Criteria

Criteria	Factor
Residential Average Day Per Capita Usage (gpcd)	700
Non-Residential Average Day Per Acre Usage (gpad)	700
10-year Residential Average Day Per Capita Usage (gpcd)	675
Maximum Day to Average Day Peaking Factor	2.8
Peak Hour to Maximum Day Peaking Factor	1.85

Table 4-2: Projected Water Demands

Year	Pressure Plane	Population	Connections	Non-Residential Acreage	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
2025	East	731	353	124	0.6	1.68	3.11
	West	1,342	648	457	1.28	3.58	6.63
	Sum	**2,073**	**1,001**	**581**	**1.88**	**5.26**	**9.74**
2035	East	1,148	555	271	0.96	2.69	4.97
	West	2,321	1,121	879	3.38	7.31	12.74
	Sum	**3,469**	**1,676**	**1,150**	**4.34**	**10.00**	**17.72**

4.2.2 Wastewater Flows

Wastewater flows in a municipal collection system vary by time of day, wastewater discharge source, and weather conditions. Average daily flow is defined as the total wastewater flow over a one-year period divided by the number of days in that year. Wastewater treatment plants are typically sized in terms of average daily flow. Peak wastewater flow consists of the peak dry weather flow plus infiltration and inflow (I/I). Infiltration is the seepage of groundwater into the sewer pipe and appurtenances. Inflow is the measurement of storm water runoff that enters the wastewater collection system during wet weather rain events. I/I is typically expressed in terms of a wet weather peaking factor for the purposes of estimating future wastewater flows. The collection system is sized to convey peak wastewater flows. Therefore, developing future wastewater flows directly impacts the projects needed to serve future growth. **Table 4-3** presents the wastewater flow design criteria and **Table 4-4** displays the projected wastewater flows for the Town of Westlake.

Table 4-3: Wastewater Flow Design Criteria

Criteria	Factor
Residential Average Day Per Capita Flow (gpcd)	95
Non-Residential Average Day Per Acre Flow (gpad)	150
Peak Wet Weather to Average Day Peaking Factor	5.5

Table 4-4: Projected Wastewater Flows

Year	Population	Non-Residential Acreage	Average Day Flow (MGD)	Peak Wet Weather Flow (MGD)
2025	1,856	581	0.26	1.45
2035	3,252	1,150	0.48	2.65

4.3 Water and Wastewater System Improvements

Proposed wastewater projects were developed using planning-level desktop analyses. No hydraulic modeling was performed to prepare the wastewater CIP. Proposed water system improvement projects were developed based on hydraulic modeling to determine projects required to support growth for the 5-year and 10-year periods. Projects were sized for 20-year growth, but only projects serving growth in the 10-year period were included. FNI also received input from Town staff to right-size the proposed improvements. The proposed 10-year eligible water system projects are shown on **Figure 4-3** and summarized in **Table 4-5**. Proposed 10-year eligible wastewater projects are shown on **Figure 4-4** and summarized in **Table 4-6**.

Table 4-5: Water System Eligible CIP

Project ID	Project Name
1	2.0 MGD Water Supply and Connection Improvements from Fort Worth via Southlake
2	4.0 MGD Firm Capacity at the Davis Boulevard Pump Station (East PP) and 1.5 MG Ground Storage Tank
3	20-inch Dove Road Water Line Extension
4	16/20-inch US 377 Water Line Loop
5	4.0 MGD Water Supply Increase from Fort Worth via Southlake
6	2.0 MG Firm Capacity at the Davis Boulevard Pump Station (West PP)
7	12-inch SH 114 Water Line Loop
8	1.0 MG Circle T Ranch Elevated Storage Tank
9	16-inch J.T. Ottinger Road Water Line
10	12-inch J.T. Ottinger Road Water Line
11	0.5 MG J.T. Ottinger Road Elevated Storage Tank
12	12-inch US 377 Water Line Loop
13	12-inch Parish Lane Water Line Loop
14	12-inch Main Street Water Line Loop

Table 4-6: Wastewater System Eligible CIP

Project ID	Project Name
1	12-inch Parish Lane Gravity Main
2	8-inch Marshall Branch Gravity Main Extension 1
3	8-inch Marshall Branch Gravity Main Extension 2
4	8-inch Marshall Branch Gravity Main Extension 3
5	10-inch Schwab Way Gravity Main Extension
6	8-inch Ottinger Road Gravity Main
7	12-inch Turner Lake Replacement and Gravity Main Extension
8	TRA Denton Creek WRF Expansion Cost Participation

FIGURE 4-3
TOWN OF WESTLAKE
WATER SYSTEM
IMPACT FEE ELIGIBLE
CAPITAL IMPROVEMENTS PLAN

10.0 MGD Water Supply from Fort Worth

Pump Station
Firm Capacity = 9.000 gpm
0.665 MG Ground Storage Tank
1.0 MG Ground Storage Tank

0.5 MG J.T. Ottinger
Elevated Storage Tank
Overflow Elev. = 901.5'

1.0 MG Circle T Ranch
Elevated Storage Tank
Overflow Elev. = 820'

1.0 MG Knox
Elevated Storage Tank
Overflow Elev. = 901.5'

Pump Station
East PP Firm Capacity = 2.778 gpm
1.5 MG Ground Storage Tank
West PP Firm Capacity = 1,389 gpm

2.0 MGD Water Supply and Connection Improvements from Fort Worth via Southlake
Increase Water Supply to 4.0 MGD from Fort Worth via Southlake

WW_Modeled_LS

DENTON CO
TARRANT CO

Roanoke
Trophy Club
Fort Worth
Southlake
Turner Lake
Marshall Branch
Kirkwood Branch

LEGEND

- Hydrant
- Pressure Reducing Valve
- Meter Station
- Elevated Storage Tank
- Pump Station
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Under Design/Construction Water Line
- Fort Worth Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- Town Limit
- Other City Limit
- County Boundary

PROPOSED IMPROVEMENTS

Proposed IF Eligible Improvements

- Pump Station
- Ground Storage Tank
- Elevated Storage Tank
- Water Line
- East Pressure Plane
- West Pressure Plane

The utility alignments shown in this figure are for illustration purposes only and do not set the alignments. The alignment of each utility will be determined at the time of the engineering design.

THE TOWN OF WESTLAKE

FREESE AND NICHOLS

0 800 1,600
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User Name: GBT

The utility alignments shown in this figure are for illustration purposes only and do not set the alignments. The alignment of each utility will be determined at the time of the engineering design.

PROPOSED IMPROVEMENTS

Proposed IF Eligible Wastewater Line

8 TRA Denton Creek WRF Expansion Cost Participation

FIGURE 4-4
TOWN OF WESTLAKE
WASTEWATER SYSTEM IMPACT FEE ELIGIBLE CAPITAL IMPROVEMENTS PLAN

LEGEND

Under Design/Construction
- Lift Station
- Wastewater Line
- Force Main

Existing Wastewater System
- Manhole
- Meter Station
- Lift Station
- 8" and Smaller Wastewater Line
- 10" and Larger Wastewater Line
- Force Main

Owned by Other Wastewater System
- Manhole
- Meter Station
- Lift Station
- Southlake Wastewater Line
- TRA Wastewater Line
- TRA Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- Town Limit
- Other City Limit
- County Boundary

THE TOWN OF WESTLAKE

FREESE AND NICHOLS

Cade Branch Lift Station

Circle T Ranch Lift Station

Westlake Ranch Lift Station

Vaquero Lift Station

Turner Lake

Roanoke

Trophy Club

Fort Worth

Keller

Southlake

DENTON CO

TARRANT CO

SCALE IN FEET

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4.4 Roadway System Analysis

An inventory of the collector and arterial roadway facilities within the Town Limits was conducted to determine existing conditions throughout the Town. This analysis determined the capacity provided by the existing roadway system, the demand currently placed on the system, and the potential existence of deficiencies on the roadway system. Updated data for the inventory was obtained from traffic volume counts and field reconnaissance of current roadway sections.

The roadways were divided into segments based on volume changes, major intersections, service area boundaries, and capacity changes. The length, number of lanes, cross-section, and peak hour volume data were obtained for each roadway segment. Lane capacities were assigned to each segment based on functional street classification, associated roadway lane capacities, and the present number of lanes. Lane capacities used in the analysis are shown in **Table 4-7**.

Table 4-7: Roadway Facility Vehicle-Mile Lane Capacities

Roadway Type	Capacity (vehicle per hour per lane)
Undivided Minor Collector (UC)	450
Divided Major Collector (DC)	500
Undivided Minor Arterial (UA)	550
Divided Major Arterial (DA)	600

4.4.1 Existing Roadway Volumes

Existing directional peak hour volumes were obtained from automated traffic counts on major roadways (as identified in the Thoroughfare Plan as arterial or collector status) throughout the Town. To minimize the total number of counts, data was collected at locations where traffic volumes would typify link volumes on the major segments within the immediate area. For segments not counted, existing volumes were used or estimates were developed based on data from adjoining roadway counts. Data was compiled for roadway segments throughout the Town and entered into the database for use in calculations. The unit for many of these calculations is vehicle-miles (veh-mi), and the existing roadway capacity analysis is shown in **Table 4-8.**

Table 4-8: Existing Roadway Capacity Analysis

Roadway	From	To	Type	Lanes	Miles	Peak Hour Volumes (Veh. per Hour)			Supply (veh-mi)	Demand (veh-mi)	Excess Capacity (veh-mi)	Existing Deficiency (veh-mi)
						A	B	Total				
Solana Blvd	SH 114	Sam School Rd	DA	6	0.22	836	282	1,118	794	247	548	0
Solana Blvd	Sam School Rd	Campus Court	DA	6	0.41	755	360	1,115	1,485	460	1,025	0
Solana Blvd	Campus Court	David Blvd.	DA	6	0.46	236	404	640	1,672	297	1,375	0
Sam School Rd	Solana Blvd	Kirkwood Branch Br.	UC	4	0.31	116	138	254	559	79	480	0
Sam School Rd	Kirkwood Branch Br.	City Limits	UC	2	0.10	116	138	254	87	24	62	0
Davis Blvd	SH 114	Solana Blvd	DA	6	0.20	1,114	1,465	2,579	707	507	201	0
Davis Blvd	Solana Blvd	W Dove Rd	DA	6	0.60	714	1,292	2,006	2,163	1,205	958	0
Davis Blvd	W Dove Rd	Town Limits	DA	4	1.23	616	650	1,266	2,952	1,557	1,395	0
Capital Pkwy	Davis Blvd	Westlake Pkwy	UA	2	0.83	395	23	418	915	348	567	0
Westlake Pkwy	Capital Pkwy	SH 114	DA	6	0.32	619	56	675	1,156	217	940	0
W Dove Rd	Ottinger Rd	N Pearson Ln	UA	2	0.12	157	245	402	135	49	86	0
W Dove Rd	N Pearson Ln	Blue Sky Dr	UA	2	0.59	217	272	489	649	288	360	0
W Dove Rd	Blue Sky Dr	Davis Blvd	DA	4	0.55	257	322	579	1,330	321	1,009	0
N Pearson Ln	Town Limits	W Dove Rd	UA	2	0.24	75	137	212	267	51	216	0
Schwab Way	SH 114	Ottinger Rd	DA	4	0.76	388	58	446	1,818	338	1,480	0
Ottinger Rd	SH 170	Schwab Way	UA	2	0.13	204	175	379	140	48	92	0
Ottinger Rd	Schwab Way	Deloitte Way	UA	2	1.14	154	178	332	1,254	378	876	0
Ottinger Rd	Deloitte Way	W Dove Rd	UA	2	0.25	42	52	93	272	23	249	0
Parish Ln	Roanoke Rd	SH 170	DA	4	0.30	121	202	323	713	96	617	0
Roanoke Rd	Town Limits	SH 170	UA	2	0.92	127	157	284	1,012	261	751	0
Service Area Total									**20,080**	**6,795**	**13,285**	**0**

4.4.2 Vehicle-Miles of Existing Capacity

An analysis of the total capacity for each service area was performed. For each roadway segment, the existing vehicle-miles of capacity supplied was calculated using the following equation:

Vehicle-Miles of Capacity = Link capacity per peak hour per lane x Number lanes x Segment length

A summary of the current capacity available on the roadway system is shown in **Table 4-9**. It is important to note that the roadway capacity depicted in **Table 4-9** is system-wide for most major roadways and not restricted to those roadways proposed in the impact fee CIP. Directional calculations of capacity were performed separately.

4.4.3 Vehicle-Miles of Existing Demand

The level of current usage in terms of vehicle-miles was calculated for each roadway segment. The vehicle-miles of existing demand were calculated by the following equation:

Vehicle-Miles of Demand = Peak hour volume x Segment length

Table 4-8 also lists total vehicle-miles of demand. For each roadway segment, the existing vehicle-miles of excess capacity and/or deficiencies were calculated. Each direction was evaluated to determine if vehicle demands exceeded the available capacity. If demand exceeded capacity in one or both directions, the deficiency was deducted from the supply associated with the impact fee CIP. A summary of existing capacity, demand, and deficiencies by roadway service area is shown in **Table 4-9.**

Table 4-9: Roadway Existing Vehicle-Miles of Capacity, Demand, and Deficiencies

Capacity (veh-mi)	Demand (veh-mi)	Excess Capacity (veh-mi)	Deficiencies (veh-mi)
20,080	6,795	13,285	0

4.4.4 Roadway Demand Projections

The projected growth for the transportation service area is represented by the increase in the number of new vehicle-miles generated over the 10-year planning period. The basis for calculating new demand was the population and employment projections outlined in previous sections. Employment data was provided in terms of the number of jobs.

Projected vehicle-miles of demand were calculated based on the growth expected to occur during the 10-year planning period, and on the associated service unit generation for each of the population and

employment data components (basic, service and retail). Separate calculations were performed for each data component and were then aggregated for the service area. Vehicle-miles of demand for population growth were based on dwelling units, and vehicle-miles of demand for employment were based on the number of employees and estimates of square footage per employee.

Information extracted from the regional travel demand model provides information on average trip lengths for four general types of land uses. These trip lengths were converted into service unit equivalencies based on trip rates in the Institute for Transportation Engineers' (ITE) *Trip Generation, 11th Edition* and trip lengths from the NCTCOG travel demand model, tailored to the Town of Westlake. These equivalencies are:

- 3.93 vehicle-miles per dwelling unit for residential.
- 2.43 vehicle-miles per thousand square feet for basic employment.
- 2.10 vehicle-miles per thousand square feet of retail employment.
- 6.52 vehicle-miles per thousand square feet for service employment.

Table 4-10 lists the projected vehicle-miles of demand over the 10-year planning period for the Town.

Table 4-10: 10-Year Projected Vehicle-Miles of New Demand

A		B	C	D	E
Additional Population		**Persons per Dwelling Unit**	**Added Dwelling Units (A / B)**	**Vehicle-Miles per Dwelling Unit**	**Total Vehicle-Miles (C x D)**
1,396		3.19	438	3.93	1,721
Additional Employees		**Square Feet per Employee**	**Added Square Feet (A x B)**	**Vehicle-Miles per 1,000 Square Feet**	**Total Vehicle-Miles (C/1000 x D)**
Basic	104	1,500	155,652	2.43	378
Retail	2,509	1,000	2,508,840	2.10	5,269
Service	13,947	500	6,973,696	6.52	45,468
				Total Growth (Vehicle-Miles)	**52,836**

4.5 ROADWAY SYSTEM IMPROVEMENTS

4.5.1 Eligible Improvements

The roadway portion of the impact fee CIP aims to address the long-term growth expected for the Town, provide the ability to credit development-driven road improvements against assessed impact fees, and reduce program amendment needs to incorporate eligible facilities not in the impact fee program. To this end, most arterial and collector roads on the Thoroughfare Plan were initially incorporated into the impact fee program, with adjustments made to remove developer-implemented improvements (information per Town staff). The approach of all remaining roadways satisfies recently adopted legislation regarding "funded" roads through the impact fee program.

Legislative mandate stipulates that the impact fee CIP contain only those roadways classified as *arterial* or *collector* status facilities that are included in the Town's adopted Thoroughfare Plan. Impact fee legislation also allows for the recoupment of costs for previously constructed facilities as well as projects currently under construction. Four recently constructed improvement projects were identified as recoupment-eligible in this program.

4.5.2 Impact Fee CIP

The impact fee CIP includes 25 project segments that advance the implementation of the Thoroughfare Plan network. Projects identified include only new lanes added to achieve Thoroughfare Plan standards, and, thus, only new capacity is provided by the CIP. For example, if two lanes of a future six-lane arterial exist, the four new lanes of added capacity are incorporated into the program. The capacity provided and the net capacity provided by the proposed CIP are summarized in **Table 4-11**. Net capacity provided by the proposed CIP takes into consideration current traffic on those roadways and any deficiencies in the network from the existing conditions analysis described in Section 4.4. A detailed listing by project of the capacity supplied can be found in **Table 4-13**.

Table 4-11: Capacity and Net Capacity Provided by the Proposed CIP

Service Area	A	B	C = A – B	D	E = C – D
	Capacity Supplied by CIP (veh-mi)	Existing Utilization on Eligible Network (veh-mi)	Excess Capacity (veh-mi)	Existing Deficiencies (veh-mi)	Net Capacity Supplied by CIP (veh-mi)
1	23,909	2,187	21,722	0	21,722

A comparison of net capacity provided by the proposed CIP relative to 10-year needs is listed in **Table 4-12**. The percent attributable to new growth is a direct result of the land use assumptions described earlier in the report. Based on the land use assumptions, 100% of the capacity provided by the CIP is expected to be consumed by 10-year growth in the Roadway Service Area.

Table 4-12: Capacity and Net Capacity Provided by the Proposed CIP

A	B	B / A (Max 100%)
Net Capacity Supplied by CIP (veh-mi)	Projected 10-Year Growth (veh-mi)	Percent Of CIP Attributable to New Dev. (10-Yr.)
21,722	52,836	100%

Figure 4-5 illustrates the eligible roadway CIP, and **Table 4-13** lists the corresponding proposed CIP projects.

Table 4-13: Roadway System Eligible CIP Projects

				A		B	C	D = A x B x C	E	F = D - E
ID	Roadway	From	To	Length (mi)	Ultimate Thoroughfare Class	Eligible Improvement	Lane Capacity	New Capacity Provided	Existing Utilization	Net Capacity Provided (veh-mi)
1	New Road A	SH 170	Roanoke Rd	0.45	4D Arterial	+ 4 lanes	600	1,080	0	1,080
2	New Road A	Roanoke Rd	Liberty Ext	0.41	4D Arterial	+ 4 lanes	600	984	0	984
3	New Road A	Liberty Ext	Ottinger Rd	0.61	4D Arterial	+ 4 lanes	600	1,464	0	1,464
4	Liberty Ext	US 377	Roanoke Rd	0.82	4D Arterial	+ 4 lanes	600	1,968	0	1,968
5	Liberty Ext	Roanoke Rd	New Road A	0.74	4D Arterial	+ 4 lanes	600	1,776	0	1,776
6	Liberty Ext	New Road A	New Road B	0.57	4D Arterial	+ 4 lanes	600	1,368	0	1,368
7	New Road B	SH 170	Liberty Ext	0.11	4D Arterial	+ 4 lanes	600	264	0	264
8	New Road B	Liberty Ext	Ottinger Rd	0.37	4D Arterial	+ 4 lanes	600	888	0	888
9	Ottinger Rd	New Road B	New Road A	0.85	4D Arterial	+ 2 lanes	600	1,020	0	1,020
10	Ottinger/Dove Rd	New Road A	N Pearson Ln	0.73	4D Arterial	+ 2 lanes	600	876	0	876
11	New Road C	Liberty Ext	New Road A	0.54	4D Arterial	+ 4 lanes	600	1,296	0	1,296
12	Ottinger Rd	Dove Rd	Town Limits	0.27	4D Arterial	+ 2 lanes	600	328	0	328
13	Roanoke Rd	Liberty Ext	Town Limits	0.10	4D Arterial	+ 2 lanes	600	120	0	120
14	Westlake Pkwy	New Road E	Ottinger Rd	0.40	4D Arterial	+ 4 lanes	600	960	0	960
15	Dove Rd	N Pearson Ln	Blue Sky Dr	0.59	4D Arterial	+ 2 lanes	600	708	0	708
16	Roanoke Rd	New Road A	Liberty Ext	0.52	4D Arterial	+ 2 lanes	600	624	0	624
17	Westlake Pkwy	Capital Way	New Road E	0.61	4D Arterial	+ 2 lanes	600	732	0	732
18	New Road E	SH 114	Westlake Pkwy	0.49	4D Arterial	+ 4 lanes	600	1,176	0	1,176
19	Capital Pkwy	Westlake Pkwy	Davis Blvd	0.85	4D Arterial	+ 2 lanes	600	1,020	0	1,020
20	Schwab Way	Ottinger Rd	New Road B	0.20	4D Arterial	+ 4 lanes	600	480	0	480
21	N Pearson	Dove Rd	50' S of Spring Dr	0.70	4D Arterial	+ 2 lanes	600	841	0	841
22	Dove Rd	Blue Sky Dr	Davis Blvd	0.44	4D Arterial	+ 2 lanes (recoup)	600	528	255	273
23	Davis Blvd	SH 114	Solana Blvd	0.20	6D Arterial	+ 4 lanes (recoup)	600	480	344	136
24	Davis Blvd	Solana Blvd	Dove Rd	0.60	6D Arterial	+ 4 lanes (recoup)	600	1,440	803	637
25	Davis Blvd	Dove Rd	Town Limits	1.24	4D Arterial	+ 2 lanes (recoup)	600	1,488	785	703
								Total Net Capacity Provided by CIP		**21,722**

FIGURE 4-5
TOWN OF WESTLAKE
ROADWAY
IMPACT FEE ELIGIBLE
CAPITAL IMPROVEMENTS PLAN

LEGEND

Proposed Improvements

- New Project
- Recoup Project (Completed)
- Road
- Railroad
- Stream
- Lake
- Parcel
- Town Limit
- Other City Limit
- County Boundary

THE TOWN OF WESTLAKE

FREESE AND NICHOLS

0 800 1,600

SCALE IN FEET

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