FARMERS BRANCH

WEST SIDE PLAN

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infrastructure

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Infrastructure is a support system. In municipal terms, infrastructure consists of those public and private systems needed to meet a variety of needs of people and businesses including drinking, washing, irrigating, communicating, lighting, and fire suppression. Infrastructure includes water, sanitary sewer, drainage, roadways, energy, and communication systems.

The water distribution system, wastewater collection system, storm drainage system, street system (including the pedestrian elements), energy systems, and telecommunications systems are vital support systems today. The systems pose a significant challenge for the following reasons:

- They must be adequate to support existing populations and be able to accommodate growth;
- They represent a substantial investment;
- They have to be adaptable to meet changing technology, changing uses and growth; and
- They must be constructed so that they do not detract from the aesthetic qualities that make a place enjoyable to live, work, and recreate.

Municipal facilities, hospitals and educational facilities may also be considered as infrastructure. However, for purposes of planning utility facilities and addressing the needs of the city from a utility perspective, municipal facilities, hospitals, educational facilities and other similar facilities have not been addressed in this chapter and are addressed in the Public Facilities section.

History of Improvements

In order to understand and plan for the infrastructure needs of the city, it is important to understand the history of infrastructure improvements since the infrastructure improvements have helped shape the West Side as it exists today.

Providing the support systems for the West Side of the City has occurred in increments since the late 1970s. The creation of the Valwood Improvement Authority (VIA) provided the administrative and financing tools to reclaim land from the floodplain of the Elm Fork of the Trinity River. The land within VIA is between the Burlington Northern Railroad and the levees along the Elm Fork of the Trinity River, bounded by IH635 on the south and Belt Line Road in Carrollton on the north. VIA is a taxing authority that builds, maintains and operates the system of levees, sumps, and pumps to protect a significant portion of the West Side from flooding.

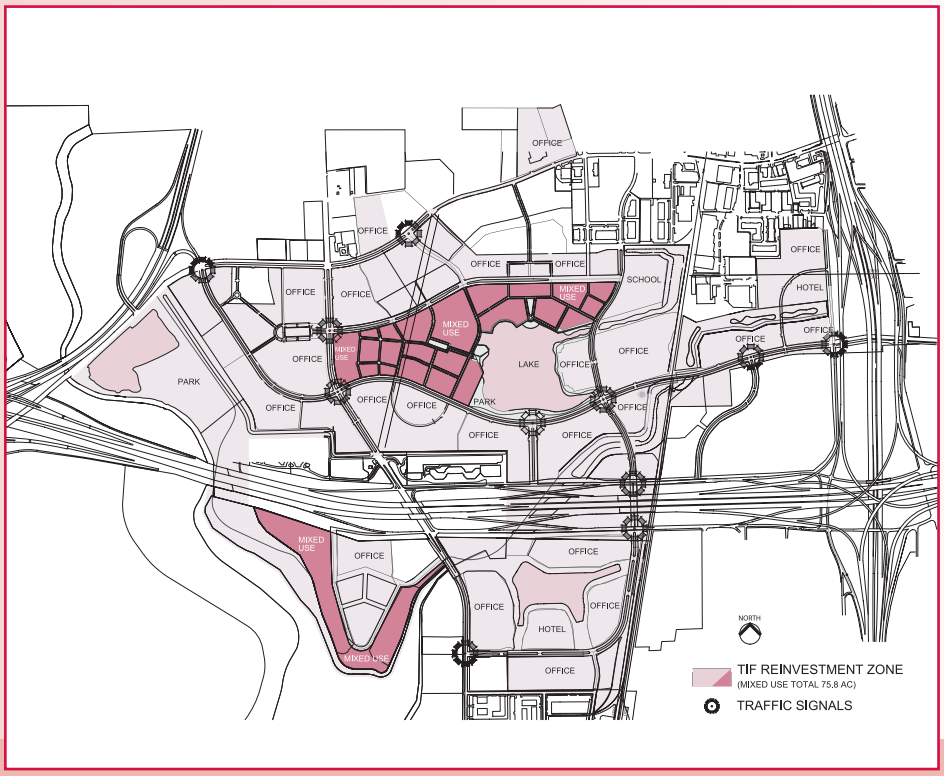
Valwood Improvement Authority created

During 1974, Dallas County Commissioners Court created the Conservation and Reclamations District in response to a petition executed by landowners west of IH35E within portions of the cities of Farmers Branch and Carrollton. In 1975 the State Legislature permitted the District to reorganize into the Farmers Branch-Carrollton Flood Control District. Subsequently in 1989, the 71st Legislature changed the name of the District to Valwood Improvement Authority of Dallas County, Texas.

Additional lands were reclaimed south of IH635 in 1984 by raising the elevation of the land above the floodplain of the river in compliance with federal and City requirements.

The support systems - the infrastructure - were then extended into the reclaimed land to support development. In the late 1970s and early 1980s, the development community constructed most of the public improvements, which the City accepted upon completion. Development generally occurred: north of Valley View Lane, between Stemmons Freeway (IH35E) and the Burlington Northern Railroad; at the northeast corner of Royal Lane and Luna Road; and near the intersection of LBJ Freeway (IH635) and Luna Road. The City constructed some improvements with the developers providing a significant portion of the funding. The public improvements included streets, sidewalks, water, sanitary sewer, drainage and public enhancements such as landscaping and lighting commonly owned, operated, and maintained by the City. Energy (electricity and natural gas) and telecommunications services are privately owned utilities that use public rights-of-way to provide service to users.

Although approximate 50% of the West Side area developed, the remaining undeveloped land within the West Side (approximate 800 acres) did not develop because the public improvements were too expensive for the developers to construct. The proposed development plan required bridges, large storm sewers, and sanitary sewers – the cost of which exceeded the usual cost of development. Without streets, drainage improvements, water lines, and sanitary sewer lines, additional growth on the West Side became limited to only those lands adjacent to existing streets and utilities.



The map above depicts the Tax Increment Financing (TIF) District. All or a portion of the taxes collected by participating taxing authorities from new development are used to fund the construction of improvements within the TIF boundaries.

Alternative methods for the City to finance public improvements were evaluated. The implementation of impact fees, street and utility assessments based on a cost per linear foot basis, and creation of a public improvement district were not practical methods to collect sufficient funds to make public improvements on the West Side. The use of tax increment financing was determined to be an acceptable financing tool.

During 1998, a Tax Increment Financing (TIF) District, was approved by the Farmers Branch City Council, Dallas County, Carrollton-Farmers Branch Independent School District, Valwood Improvement Authority, Dallas Independent School District, Dallas County Hospital District, and Dallas County Community College District to fund public street, sidewalk, drainage, water, sanitary sewer, and enhancement improvements on the West Side of the City.

The TIF was created to provide a financing tool for the public improvements to encourage and facilitate new development. All or a portion of the taxes collected by the aforementioned taxing authorities from new development are used to fund the construction of public improvements within the TIF boundaries.

Content Summary

The Infrastructure section includes the following systems:
1. Water (including conservation);
2. Sanitary Sewer;
3. Drainage;
4. Private Infrastructure;
5. Wireless Communication Systems; and
6. Conservation Through Building Design.

Roadway systems are not addressed in this section since roadway systems have been addressed specifically in the Circulation section.

1. Water

There are two essential components to a water system – water supply and water distribution. The water supply for Farmers Branch is the City of Dallas. Water is purchased by the City of Farmers Branch from the City of Dallas. The City of Farmers Branch then distributes the water to the users through a distribution system comprised of pump stations, elevated storage tanks, ground storage tanks, and pipes.

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A. Regional Perspective

While there is an adequate supply of water from Dallas available for Farmers Branch today and in the immediate future, long term planning must occur to ensure water availability for the future of the City, as well as the surrounding region and the state.

Water resource availability has become an important issue for the state of Texas. In 1997, the Texas legislature passed a bill requiring the state to develop a statewide water management plan. The law provides a framework for the management of water resources, including planning for droughts, water rights regulation, information collection, and financial and technical assistance.

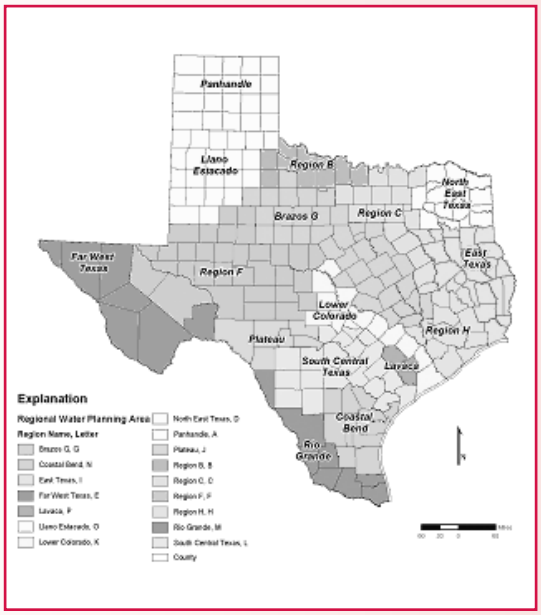
The Texas Water Development Board, the state authority for planning and managing the state's water system has divided the state into 16 regions in order to address water management and planning. Dallas/Fort Worth and its suburbs, including Farmers Branch, are located within Region C.

Each region was responsible for preparing a regional water management plan to specifically address the future water needs for their respective planning area. The regional water plans have been approved and are a component of the State Water Plan. The plans collectively address Texas' water needs till the year 2050.

The regional water plans were developed in response to a series of droughts that the state experienced during the mid-1990s. It was clear at that time that the state was vulnerable to drought and that existing water supplies would not be able to meet current demands during drought conditions, as well as the demands of a growing population.

The regional water plans are a resource available to elected officials as they consider important water issues in upcoming years; the plans are intended to guide state water policy and water resources development. The plans also serve as a guide for local municipalities in their long-range planning for future water needs; strategies outlined in the regional plan could potentially affect the expansion of local municipal utility systems, particularly if the municipal utility systems are part of a larger system, such is the case with Farmers Branch. The City of Farmers Branch's water is purchased from the City of Dallas Water Utilities, which is one of the five major water suppliers for Region C. The other major water suppliers are Tarrant Regional Water District, North Texas Municipal Water District, City of Fort Worth, and the Trinity River Authority.

Currently, water used by residential and commercial development (excluding manufacturing and industrial) is the predominant user of the region's water supply – approximately 85%. Manufacturing and industrial uses are the second largest users of the region's water supply. Residential and commercial users will continue to be the predominant user of water for Region C in the future.



The following counties are located within Region C: Collin, Cooke, Dallas, Denton, Ellis, Fannin, Freestone, Grayson, Henderson (partial), Jack, Kaufman, Navarro, Parker, Rockwall, Tarrant and Wise. Farmers Branch is located within Dallas County. Source: Water for Texas - 2002

Water consumption in Farmers Branch during 1999 was as follows:

- Residential: 37%
- Commercial: 50% (includes industrial and manufacturing uses)
- Apartments: 9%
- City: 4%

Although the land use categories identified above vary from the region's land use categories, water consumption rates for commercial (including industrial and manufacturing uses) and residential uses within Farmers Branch are indicative of Region C's largest water consumers.

The water demand projected for Region C for 2050 is 2,536,902 acre-feet per year – more than twice the amount used within the region during 1996 (1,100,000 acre-feet). The water demand projected for Dallas County alone during 2050 is 940,289 acre-feet (37%) of the total Region C water demand per year. Residential and commercial users are projected to be 2,125,330 acre-feet (84%) of the total of 2,536,902 acre-feet water use projected for Region C in 2050.

Who are the largest consumers of water in Farmers Branch?

Some of the City's largest water consumers include:

Dallas Semiconductor
Park West
Sonterra Apartments
Granite Properties
Cooks Creek Apartments
Omni Dallas Hotel
Intervest Property Company
RHD Hospital
Thermalloy Manufacturing

Source: City of Farmers Branch – Finance Department, 1999.

What is an "acre-foot" of water?

Acre-foot is a technical term used to describe volume of water. One acre-foot of water is equivalent to one acre of land covered in water one foot deep, or 325,851 gallons of water. In practical sense, an acre-foot of water is about enough water to cover a football field with one foot of water.

The regional plan identifies strategies that address the entire planning area. The strategies listed below are some of the strategies listed within the regional plan that are specific to ensuring the future water needs for the Dallas/Fort Worth area. Regional strategies include:

- Development of Marvin Nichols I Lake within Region D for usage by Region C (the Dallas/Fort Worth area is estimated to be a large consumer of this water supply);
- Connection of the Lake Fork Reservoir and Lake Palestine to the Dallas Water Utilities system;
- Develop a reuse project for the Dallas Water Utilities System and the Trinity River Authority System; and
- Develop additional water treatment capacity as needed for the Dallas Water Utilities System.

The aforementioned strategies are important to Farmers Branch for several reasons:

- The City's water system and sanitary sewer system are part of larger regional systems - Dallas Water Utilities and Trinity River Authority;
- The City's geographical location within the state and limited water resources within the region;
- The Dallas/Fort Worth area is a large consumer of water due to residential and commercial uses;
- The regional plan serves as a guide for the City for long-range planning of utility systems; and
- The regional strategies could affect expansion of the City's utility systems because the utility systems are part of regional systems.

Should strategies within the Region C water management plan require water suppliers to identify additional water resources and implement regional programs, such as a regional water reuse program, then the City should participate in the formulation of regional programs to insure the best interest of the City.

A key finding in the regional plans is that the statewide per capita demand projections are decreasing over the 50-year planning period. Based upon population projections, Texas is facing a significant increase in population within the next 50 years. However, according to the regional plans, population has less of an impact on water demand than one might expect.

The statewide per capita use from residential and commercial users has actually decreased over the last several decades due to conservation methods that have been implemented. It is anticipated that the statewide per capita use will continue to decrease into the future as a result of continued conservation efforts at the individual, local, regional and state levels.

When looking at the "big picture" and planning for our future, conserving water locally may not appear to be important given the City's size. However, Farmers Branch is only part of a network of cities and when all cities participate in conservation efforts, conservation efforts can be beneficial. Although the Region C water management plan does not mandate water conservation at this time, water conservation is a good practice. Water conservation encourages people to use water wisely and to be "water smart."

B. Local Perspective: Water Conservation

Most of the water used by the City is to irrigate major assets of the City – parks, athletic fields, and median landscaping. As new streets with landscaped medians, parks, and athletic facilities are constructed, the use of water by the City will likely increase.

Private developments are also a consumer of water due to operational and irrigation needs. As private development continues throughout the West Side, additional water will be consumed to meet the needs of new development, particularly for irrigation.

1.) Landscaping
An effective method for conserving water is to evaluate existing planting material requirements as development continues to happen within the West Side area.

Although existing ordinances encourage the installation of plant materials native to the City's climate, there are plant materials native to the area that still require significant irrigation in order for the plants to appear lush and thriving. Consideration should be given to using those native plant materials that require less irrigation. Introduction of drought tolerant materials should also be considered. Drought tolerant plant materials are able to survive during periods of stress because of the plants' internal protection mechanisms.

Plants that are thriving and lush help create a desirable sense of place and appeal to businesses searching for a new corporate home, as well as help retain existing businesses that call Farmers Branch home. This type of desirable sense of place that has already been established in Farmers Branch can continue to be achieved with the use of plant materials that require less irrigation.

Educating the public and development community of alternative forms of plant material, planting design and irrigation systems should occur so that they may better understand water conversation methods.

Consideration should be given to developing a plant palette consisting of desirable plant materials for the region to be used for private development and public improvements such as parks, municipal facilities and median improvements.

The City should also consider evaluating existing landscaping and irrigation system requirements for private developments to encourage usage of plant materials that require less irrigation and more efficient irrigation systems.

2.) Irrigation Systems
In addition to modifying planting requirements, consideration should be given to using irrigation systems that are more effective in watering plant materials while reducing the amount of water evaporation and water runoff. Specified watering times should be considered during summer months to ensure that irrigation is not occurring at the hottest time during the day when water usage is at its peak and when water evaporation rates are high. Irrigation systems should be designed and maintained to ensure that landscaping

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areas are receiving irrigation instead of paved areas such as streets and sidewalks.

Advances in technology continue to improve for irrigation systems. For example, tensiometers measure the moisture content in the soil and will trigger irrigation systems to water plant materials when the soils are in need of moisture and at the same time, monitor the irrigation moisture content received to trigger the irrigation system to terminate. Use of freeze sensors and rain sensors prevent irrigation systems from irrigating during freezing temperatures and during rain showers. Irrigation systems with multi-cycling (multiple start times) will help in watering areas which may need several short irrigation cycles to avoid water runoff.

A central irrigation system may be implemented to allow for initializing and terminating irrigation systems from one central location - such as computer in an office - instead of crews having to personally visit irrigation systems in the field to turn the systems on and off. Developers of large campus-style developments could explore implementing central irrigation systems to coordinate irrigation needs.

3.) Water Rate Structuring
The City has structured the price of water to better reflect the cost of providing water. The price of water increases as the use of water increases. The City should periodically study the relationship of the water rate structure and the cost of providing water.

While conservation practices assist with decreasing water usage so that existing water supply may be allocated for other users, conservation practices alone will not satisfy the need for more water. In addition to strategies and water sources outlined in the State Water Plan and the regional plan for the Dallas/Fort Worth area, additional water sources locally should be evaluated and studied, such as water reuse.

4.) Water Reuse: Gray Water Systems
During 1997, the City of Farmers Branch Public Works Department investigated the possibility of the constructing a gray water distribution system within the City. A gray water system was again reviewed during 2000 to determine if conditions had changed since the original investigation.

What is "gray water?"

Gray water is water that can be used more than once.

Gray water can be water that is discharged from wastewater treatment plants.

Gray water can also be water that is discharged from kitchen sinks, dishwashers, bathtubs, showers, lavatories, and household laundry – water that does not go to wastewater treatment plants. It is important to note that gray water is not water from garbage disposals, toilets and diaper water which must be sent to wastewater treatment facilities for treatment.

Since the City does not treat its wastewater, a gray water source needed to be identified. The TRA treatment plant is one potential source; however, the plant is 13 miles from Farmers Branch. Dallas County Utility and Reclamation District (DCURD) in Las Colinas is another source of the gray water. DCURD purchases gray water from TRA to fill Lake Carolyn in Las Colinas Urban Center in Irving. Lake Carolyn is an amenity and the reservoir from which DCURD uses the water for irrigation throughout the district. The infrastructure system needed to transport the water to Farmers Branch would have consisted of two pump stations, five miles of transmission mains and distribution network.

The project was not undertaken because the cost estimates for a city gray water system showed that the cost for the project would be $25-$30 million. It was determined that a city gray water system was not economically feasible and would probably not be feasible in the near future because the gray water would be more costly than potable water. While it was not cost effective to implement a gray water system during 1997 and 2000, the cost effectiveness of a gray water system should be reevaluated in the future. Over time, the cost of potable water may make a gray water system cost effective. Legislation aimed at reducing water use for landscaping may make a gray water system worthwhile to maintain landscaping.

Gray water systems, however, are not limited to serve cities or regional areas. Gray water systems can be implemented on a site-by-site situation through building plumbing design for residential and commercial developments. Using gray water can almost double home water-use efficiency and provide a water source for landscape irrigation. Similar commercial applications are available for manufacturing plants that use water in the manufacturing process. In residential and commercial application, gray water could be piped from selected drains into an aboveground, usually in-house, holding tank. This system uses gravity to move the gray water into the tank and a pump to remove it. Developer and builders may want to explore the financial feasibility of implementing gray water systems for individual developments.

Goals & Strategies

Goals
Implement conservation methods and encourage better water use efficiency locally.

Strategies
The following strategies encourage water conservation methods and improve water use efficiency locally:

1. Inform persons regarding landscaping materials that are native to the Farmers Branch area and irrigation requirements for the plant materials.
2. The City should explore developing a plant palette for private development and public improvements (medians, parks) including consideration of introducing the use of drought tolerant plant materials.
3. Inform persons regarding various irriga-tion systems and the most effective time of day to irrigate plant materials.
4. Public and private developments should use irrigation systems effective in water-ing plants while decreasing water runoff.
5. Public and private developments should explore using central irrigation systems, tensimometers, rain sensors and freeze sensors.
6. The City should periodically study the relationship of the water rate structure and the cost of providing water.
7. The City should reevaluate the cost effectiveness of a city gray water system. Also, the City should participate in the formulation of regional water reuse programs if water reuse programs become mandated by the Region C water management plan for the state of Texas.
8. Developer and builders may want to explore the financial feasibility of implementing gray water systems for individual developments.

C. Water Distribution

The City has one water distribution system that serves the entire City. The City's water distribution system, consisting of pump stations, ground storage tanks, elevated storage tanks, and pipelines, provides water for cooking, drinking, washing, irrigating, recreation, manufacturing, and fire suppression. Fire suppression is a major consideration because it means having the volume, pressure, and flow rate available to put out a large fire.

The distribution system has two pressures planes. A pressure plane in a water system is generally a service area where the operating water pressure is maintained within a relatively narrow range. There is the east pressure plane and the west pressure plane. The dividing line between the two planes is a meandering north-south line that is located between Webb Chapel Road and Marsh Lane.

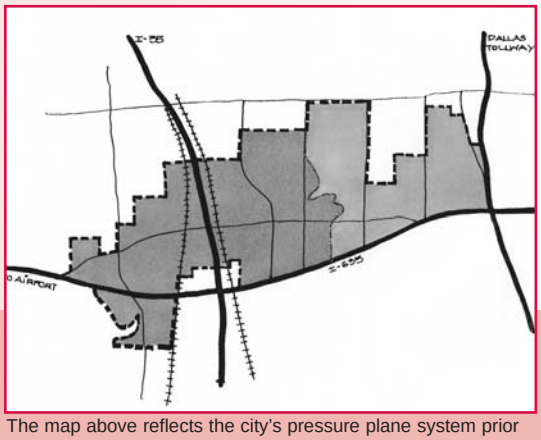
A pressure plane in a water system is generally a service area where the operating water pressure is maintained within a relatively narrow range.

The east pressure plane receives water from the City of Dallas near Belt Line Road and Marsh Lane. The maximum amount of water that is available is approximately 10 million gallons per day (MGD). The pressure plane has a pump station, 6 million gallons of ground storage, and two elevated storage tanks. The operating pressures are in the range of 45 to 80 pounds per square inch (psi). There are times when the operating pressure in a small area, will drop to 40 psi for short periods; there are times when the operating pressure in another area will increase to 90 psi. The minimum pressure required by the State is 21 psi.

The west pressure plane receives water from the City of Dallas in Denton Drive near Wicker Avenue. The maximum amount of water that is available is approximately 20 MGD; however, the pump station that serves the pressure plane is limited to pumping 10 MGD. The pressure plane has 6 million gallons of ground storage and one elevated storage tank. The operating pressures range from 50 to 110 psi. The wide variation in pressures is due to the significant variations in ground elevations within the area. During times of high water usage, water has to be transferred from the east pressure plane to the west pressure plane through pumps located near Valley View Lane and Templeton Trails.

The existing water system will need to be improved to meet continued growth in water usage throughout the entire City.

The present system meets current needs of the existing users.



The map above reflects the city's pressure plane system prior to creating the new third pressure plane.

The existing water system will need to be improved to meet continued growth in water usage throughout the entire City. Continued increases in water usage within the east pressure plane due to new growth, and changes in uses (some warehouses have been converted from storage to manufacturing), the ability to transfer water will diminish.

Dallas can supply water approximately 30 million gallons per day (MGD). During peak periods, Farmers Branch will use 17 to 19 MGD. The City's system is not able to distribute much more than 22 MGD because of limitations at the pump station at Wicker Avenue. The record peak day was 20.5 MGD. In order to meet that demand the City used water from ground storage tanks and used the Templeton Trails pump station to assist in the distribution of water.

A computer model of the system has been developed to evaluate the system's performance and its ability to meet new growth in water usage due to new development, increased use by existing development, and maintain fire protection. The evaluation identified improvements that the City has undertaken to increase the water system's ability to distribute water from the present 22 MDG to 27 MGD, which is an increase of over 22%. The improvements will focus on creating three self-sustaining pressure planes. Self-sustaining means that each pressure plane will be able to have the water supply and pumping capability to meet the water usage for that pressure plane. Water will not have to be transferred from one pressure plane to another.

The map above reflects the pressure plane system as it will exist after the third pressure plane is created. The eastern boundary of the third pressure plane is located generally along Stemmons Freeway (IH35E).

The improvements will include the construction of a new pump station near Wicker Avenue and a new elevated storage tank north of Valley View Lane near Keenan Bridge Road to serve the area west of IH35E.

Water usage can be expected to change over time due to growth and changes in uses. Consequently, the system will need to be monitored periodically to determine if and when additional facilities are needed. If the demand dictates, additional water system facilities could include additional ground storage tanks, additional elevated storage tanks, and new transmission (18-inch diameter or large) water mains.

Water usage can be expected to change over time due to growth and changes in uses. Consequently, the system will need to be monitored periodically to determine if and when additional facilities are needed.

Farmers Branch contracts to purchase water from the City of Dallas. Farmers Branch pays for the water on a two-tiered basis. First, Farmers Branch pays for the actual gallons of water used. Second, Farmers Branch pays a fixed fee to have a maximum amount of water available on the day or days of highest water. The fixed fee is substantial portion (more than 70%) of the total cost to Farmers Branch. Each time Farmers Branch requests an increase in the maximum amount of available water, there is a significant increase in the fixed-fee. An evaluation should be performed to determine the cost effectiveness of constructing the additional ground storage. Additional ground storage may be able to mitigate the need to increase the maximum amount of available water.

Goals & Strategies

Goals
Improve the water distribution system to meet continued growth in water usage throughout the City.

Strategies
The following strategies allow for improvements to the water distribution system to meet continued growth in water usage throughout the City:

1. Construct a new pump station near Wicker Avenue.

2. Construct a new elevated storage tank north of Valley View Lane near Keenan Bridge Road.

3. Periodically monitor the water system to determine if and when additional facilities are needed (such as ground storage tanks, elevated storage tanks and transmission water mains).

4. Perform an evaluation of the cost effectiveness of constructing additional ground storage as water usage increases in the third pressure plane.

5. Install fire hydrants at 300-foot intervals to insure adequate fire protection is provided.

2. Sanitary Sewer

The sanitary sewer system has two components – collection and treatment. The City of Farmers Branch collects sanitary sewer wastewater through a sanitary sewer system of pipes and lift stations. The wastewater is conveyed to sanitary sewer trunk mains owned and operated by the Trinity River Authority (TRA). TRA then treats the wastewater at its treatment plant located on Singleton Boulevard in Grand Prairie. The plant is west of Loop 12 and south of IH30. TRA was founded by area cities to provide regional wastewater treatment. The City of Farmers Branch was one of the founding members of TRA.

The sanitary sewer system has two components – collection and treatment.

A. Regional Perspective

In some areas of the United States, storm water runoff and sanitary sewer effluent are combined and treated. In Texas, storm water runoff and sanitary sewer effluent are not combined because it is cost prohibitive to construct facilities of sufficient size to collect and treat all of the storm water runoff that results from the high intensity rainfalls that frequently occur in the state. Sanitary sewer effluent is collected in pipes specifically dedicated for sanitary sewer effluent. Due to the location and condition of the sanitary sewers, some storm water and ground water is captured in the sanitary sewers. This capture is called inflow and infiltration.

TRA treats the sanitary sewer effluent and discharges most of the treated water into the Trinity River. Some of the treated water is sold to DCURD. TRA is required to treat all of the sanitary sewer effluent. There is a real cost to the treatment of non-sanitary sewer effluent – water that entered the sanitary

sewer system through inflow and infiltration – in terms of capital cost to build treatment facilities and operating cost for treatment. TRA apportions the cost to the member cities. It is in the interest of the City to monitor the sanitary sewer system and reduce inflow and infiltration where appropriate.

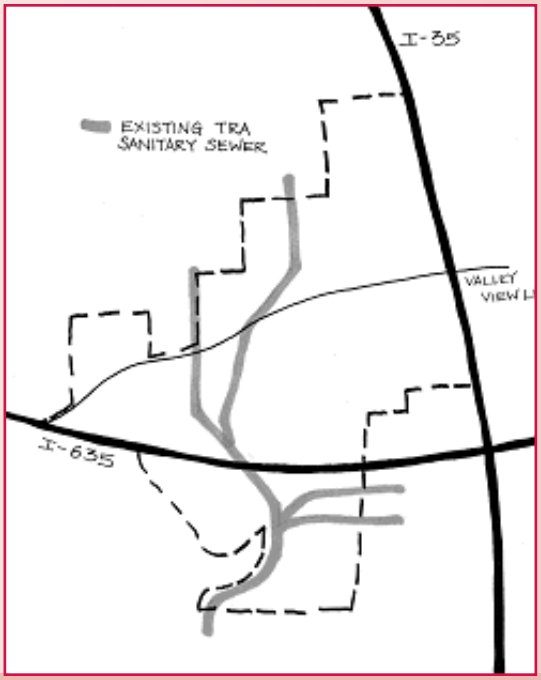
What is "inflow and infiltration"?

"Inflow and infiltration" is a general term to identify how water that is not sanitary sewer effluent gets into sanitary sewers. Inflow occurs when storm water gets into sanitary sewers through openings such as manholes, cleanouts and broken pipe. Infiltration occurs when storm water or ground water seeps into sanitary sewers through joints and cracks in the sanitary sewer pipes.

Treated wastewater is part of the water supply of the state. Use of treated wastewater was discussed in the Water section.

B. Local Perspective: Collection and Treatment

Existing buildings on the West Side are being served by the sanitary sewer collection system. The existing system conveys wastewater to the TRA sanitary sewer trunk mains that traverse the West Side. The wastewater flows into the TRA mains either by gravity flow or through lift stations. Lift stations are used in some areas because TRA trunk mains are not very deep in some areas and the land is relatively low. Under the City's contract with TRA, TRA must accept the City's wastewater flows. TRA has made improvements to its system to stay ahead of growth in Farmers Branch and the other member cities.



This graphic depicts the general location of existing TRA sanitary sewer trunk mains.

Issues

Issues
There are two issues related to providing sanitary sewer service to the West Side:

1. Sanitary sewer service must be extended to serve new development. How can sanitary sewer service be extended?

2. All of the undeveloped tracts on the West Side have TRA trunk mains in close proximity. Accessing the TRA sanitary sewer trunk mains is a challenge in some areas because the TRA mains are not sufficiently deep to gravity flow waste water directly into the TRA mains. Where the TRA mains are not sufficiently deep, waste-water will have to be pumped in the TRA mains by lift stations. The cost of lift stations of the size needed for growth on the West Side can range from $500,000 to $2,000,000 depending on the amount of wastewater flow that needs to be pumped. A wastewater collection plan needs to be developed that identifies the appropriate locations for the lift stations, the sizes of the lift stations, and minimizes the number of lift stations.

There are five wastewater collection service areas as identified on the map to the right. The City has existing sanitary sewer mains within Areas 1, 2, and 4 with sufficient capacity to serve existing uses and new growth. In some situations existing sanitary sewer mains and laterals within the three areas may have to be extended.

The City has existing sanitary sewer mains within Areas 3 and 5 with sufficient capacity to serve existing users. There are not any City sanitary sewer mains to serve the undeveloped land. There is a TRA sanitary sewer trunk main within the west right-of-way of Luna Road available to serve Area 3. When the TRA main was installed, each of the manholes along Luna Road was constructed with a “stub-out” to the west to provide locations on which City sanitary sewer mains could be connected to in the future. New sanitary sewers can be connected to the existing “stub-outs” to gravity flow wastewater into the TRA main in the future to serve new development west of Luna Road. A large storm sewer under Luna Road prevents sanitary sewer connection to the TRA main from Area 5, which is on the east side of Luna Road.

The ground elevations of Area 5 are too low for sanitary sewer mains to gravity flow into the available TRA trunk mains. Lift stations must be constructed to provide sanitary sewer service to this undeveloped area. One concept, which needs further development, is to construct two lift stations – one on each side of Area 5.

Goals & Strategies

Goals
To extend the sanitary sewer system to serve future development.

The five areas referenced in the Sanitary Sewer Strategies.

Strategies
The following strategies allow for the extension of the sanitary sewer system to accommodate new development:

1. Extend existing sanitary sewer mains and laterals within Areas 1, 2 and 4.

2. Connect new sanitary sewer lines to existing "stub-outs" to gravity flow wastewater in the TRA main to serve new development west of Luna Road within Area 3.

3. Construct the necessary lift stations within Area 5 to provide sanitary sewer service.

3. Drainage

A. National Perspective: Storm Water Quality Management

Polluted storm water runoff has become a concern at the federal and state government levels because polluted storm water runoff is often transported to municipal separate storm sewer systems (MS4) and eventually discharged into local rivers and streams without treatment. The Environmental Protection Agency (EPA) has adopted rules establishing Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) storm water program to address polluted storm water runoff.

The purpose of the Phase II rule is to establish a program that is intended to improve the quality of waterways by decreasing the level of pollutants that storm water runoff picks up and carries into storm sewer systems during storm events.

The purpose of the Phase II rule is to establish a program that is intended to improve the quality of waterways by decreasing the level of pollutants that storm water runoff picks up and carries into storm sewer systems during storm events. The pollutants negatively affect waterways by discouraging recreational use of the waterways, contaminating drinking water supplies, and disturbing habitats for aquatic plants and animals. Common pollutants include oil and grease from parking lots and roadways, lawn pesticides and fertilizers, pet waste, sediment from construction sites, and trash not disposed of properly (such as paper wrappers and plastic bottles).

The Phase I storm water management program has already been implemented and applies to medium and large municipal separate storm sewer systems (MS4s) serving incorporated places or cities with a population of 100,000 or greater. The Phase II rule applies to small MS4s – those MS4s that were not covered by Phase I – and requires storm water management programs to be fully implemented by 2008.

Phase II programs shall be designed addressing the following criteria:
- Reduce the discharge of pollutants to the maximum extent practicable;
- Protect water quality; and
- Satisfy the appropriate water quality requirements of the Clean Water Act.

In order to achieve the aforementioned criteria, a MS4 storm water management program must include six minimum control measures, when implemented collectively, that result in a significant decrease of pollutants entering the receiving waterways.

The six minimum control measures are as follows:
- Public education and outreach;
- Public participation/involvement;
- Illicit discharge detection and elimination;
- Construction site runoff control;
- Post-construction runoff control; and
- Pollution prevention/good housekeeping.

Best management practices, including measurable goals, must be developed to address the implementation of the Phase II program.

The City of Farmers Branch is responsible for complying with the Phase II rule with the initial submission of permit application to the regulating environmental agency. The permit application will outline the best management practices the City intends to implement, including measurable goals, for each of the six minimum control measures. The best management practices must be fully implemented within 5 years of the issuance of the permit.

Goals & Strategies

Goals
Comply with the Storm Water Phase II final rule by implementing a storm water management program.

Strategies
The following strategies allow for the implementation a storm water management program:

1. Submission of a permit application by the City to the regulating environmental agency that outlines the best management practices that the City intends to implement, including measurable goals, for each of the six minimum control measures stipulated with the Phase II rule.

2. Implement the best management practices, including measurable goals, as outlined in the permit application filed with the regulating environmental agency and the program be fully implemented by 2008, as required by the Phase II rule.

B. Local Perspective: Storm Sewer Collection System

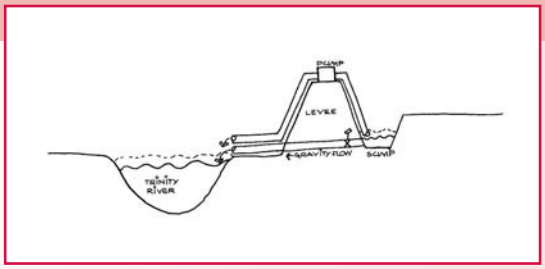
Buildings and other facilities can be protected from storm water in the following ways:

- Construct buildings and facilities at elevations that ensure that storm water drains away from the buildings and facilities;
- Construct storm sewers to carry storm water away from the building and facilities.

The storm sewers within street right-of-way or public easements are owned and operated by the City. The undeveloped lands within the West Side drain to Farmers Branch Creek, to the Elm Fork of the Trinity River, or to the sumps of the Valwood Improvement Authority District (VIA).

VIA is a taxing authority authorized by the Texas legislature to provide flood protection from the Elm Fork of the Trinity River. VIA is generally bounded by the Burlington Northern Railroad, IH635, the Elm Fork of the Trinity River, and Belt Line Road (in Carrollton). Some of the land lies within the 100-year floodplain of the creek, the river, or the sumps of the VIA.

The land within VIA is protected from flooding from the Elm Fork of the Trinity River by levees. Storm sewers and channels collect rain that falls within VIA and convey the storm water to large storage pools called sumps. When the river is not at flood stage, the sumps are drained into the river through gated pipes. When the river is at flood stage, the gated pipes are closed and large pumps lift the water into the river from the sumps.



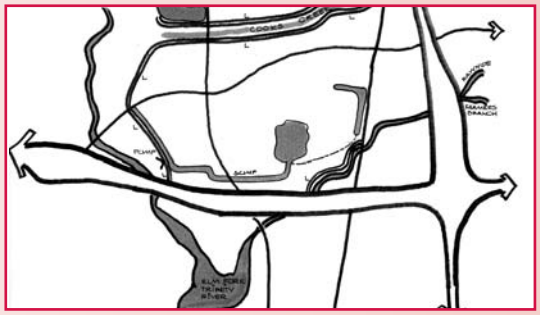
Section of the levee/sump system within the Valwood Improvement Authority District.

Issues

Issues

There are two issues associated with the drainage system for the West Side:

1. There is a significant amount of land that is designated floodplain and developable if appropriately reclaimed; and
2. There is a need to provide a drainage system to serve growth without causing adverse effects.



Levee/sump system as it exists today.

Issue 1: Developable land within the floodplain.

Area within VIA

A significant portion of the undeveloped land within VIA is low in relation to the sumps and can be subject to shallow flooding on occasions. The flooding is reflected on the National Flood Insurance Rate Maps (FIRM) administered by the Federal Emergency Management Agency (FEMA). The property can be removed from inundation by filling the land above the 100-year flood elevation shown on the FIRM.

The City's Floodplain Ordinance requires:

- The finish floor elevation of building must be three feet above the 100-year flood elevation;
- Parking lots must be one foot above the 100-year flood elevation; and
- The top of the curb of any street must be a minimum of 429.00 mean sea level.

In order to remove the floodplain designation from the FIRM, a letter of map revision (LOMR-F) can be submitted to FEMA when the land has been filled.

Issues

Area outside of VIA, south of IH635
A significant portion of the area south of IH635, east of Luna Road is shown on the FIRM to be within the 100-year floodplain. Shallow flooding inundates a significant portion of the land; consequently, some of the land may be feasible to be reclaimed from the floodplain.

Requirements for reclamation are set forth by the US Army Corps of Engineers (USACE), FEMA, and the City. The requirements prohibit the reclamation to cause increases in flood elevations, flood velocities, and valley storage upstream and downstream of the reclamation area.

Area A depicts the approximate area of reclamation by fill only. Area B depicts the approximate area of reclamation by following Federal, State, and City regulations.

Issue 2: Need for drainage system to serve growth.

Development of the West Side will not adversely affect drainage east of IH35E. The area within VIA drains into sumps that empty into the Elm Fork of the Trinity River either by gravity flow or by pumping. The undeveloped area outside VIA drains either into Farmers Branch Creek or into the Elm Fork of the Trinity River. Any additional flow into the creek or the river from development will not affect the drainage east of IH35E because there are a dam, culvert, and bridges between IH635 and IH35E that prevent any impact upstream of IH35E.

Within VIA
Part of the drainage system within VIA is the sump. Sump storage must be increased to accommodate the additional runoff from development. VIA's consultant has modeled drainage within VIA and has determined that additional sump storage is needed. Soil excavated to increase the sump storage can be used to fill the low areas. The enhancement and recreation opportunities provided by the sumps are discussed in the Open Space section. A master plan is needed to determine where the additional sump storage will be provided.

It is possible to have sump storage within mixed-use centers provided the sump storage is designed so as to not detract from the desired compactness of development and not impede pedestrian accessibility that is expected within the centers.

Storm sewers must be constructed to accommodate development as development occurs. Some of the storm sewers need to be constructed with the streets. Other storm sewers can be constructed to drain sites directly to the sumps.

Outside VIA
The storm sewers for the undeveloped land outside of VIA need to be constructed as development takes place. For the most part the storm sewers can outfall into Farmers Branch Creek or the Elm Fork of the Trinity River.

Goals & Strategies

Goals

1. Allow floodplain designated land within the West Side area to become developable, where appropriate.

2. Expand the drainage system to serve new development.

Strategies

The following strategies allow for floodplain designated land to become developable:

1. Properties within the VIA: Property owners can fill properties above the 100-year flood elevation as shown on Nation Flood Insurance Rate Maps (FIRM) and submit a letter of map revision (LOMR-F) to FEMA.

2. Properties south of IH635 and east of Luna Road: Property owners can reclaim properties in accordance with reclamation requirements as set forth by the US Army Corps of Engineers (USACE), FEMA and the City.

The following strategies allow the expansion of the drainage system to serve new development:

1. Coordinate with VIA to adopt a master plan for creation of additional sump storage within the VIA between IH635 and Cooks Creek.

2. Increase sump storage within VIA in conformance with master plan.

3. Sump storage provided for development within centers should be designed so as to not detract from the desired compactness of development and not impede pedestrian accessibility.

4. Construct storm sewers concurrently with development as development occurs.

4. Private Infrastructure

Electricity, gas, telephone communication, data communication and cable television are services provided by private companies in Farmers Branch. Electricity may be purchased from various sources; however, Oncor distributes the electric power to the end-users. Oncor also provides natural gas. Telephone service and data communication are provided by a variety of private companies thru fiber optic and coaxial cable. Comcast provides cable television in the City.

Overhead infrastructure is visual clutter that detracts from the aesthetics of a community. Poles that support overhead infrastructure limit the ability of motorist to see other vehicles and pedestrians. In many instances, the poles become obstructions to pedestrians utilizing sidewalks.

With the exception of gas, all of the private service providers can install the majority of their infrastructure either on poles or underground. Most of the fiber optic providers have a preference to place their fiber optic cables underground.

Overhead infrastructure is visual clutter that detracts from the aesthetics of a community, such as along Marsh Lane in Farmers Branch

Overhead infrastructure is visual clutter that detracts from the aesthetics of a community. Poles that support overhead infrastructure limit the ability of motorist to see other vehicles and pedestrians. In many instances, the poles become obstructions to pedestrians utilizing sidewalks.

Where overhead infrastructure exists within the West Side, the overhead infrastructure may be used. Additional infrastructure that may be added is wires, poles, and associated equipment to existing systems and to provide service to properties adjacent to existing overhead infrastructure systems. Where overhead infrastructure systems do not exist, then there shall be no new overhead infrastructure installed within the West Side.

The City has adopted an ordinance that has provisions regarding placement of the service structures, including addressing the types of service provider infrastructure that may be allowed within the city's rights-of-way.

Placement of box-like service structures, such as transformers and switchgear, for service providers are also visual clutter that detracts from the aesthetics of a community. Typically, service providers try to locate these service structures within public rights-of-way and other highly visible locations because of accessibility. The City has adopted an ordinance that has provisions regarding placement of the service structures, including addressing the types of service provider infrastructure that may be allowed within the city's rights-of-way.

The service structures must be sited in a manner such that the service structures comply with city ordinances, are placed so that the service structures appear as if they were planned as part of the development, and be screened to minimize visual impact.

For development within centers, service structures should be planned so that the service structures are incorporated into the development. For example, the service structures may be located within parking structures, between buildings, within courtyards, along mews streets and inside of buildings so that the service structures are not placed in highly visible locations. Should the service structures need to be located in highly visible locations to serve private development, then additional land should be provided within the development, including landscaping improvements, as useable open space. In locations where the service structures are visible, landscaping may be considered to soften the appearance of the service structures so that visibility is minimized.

By planning for the service structures and coordinating with service providers during initial stages of development design, service providers' needs can be met for providing service to developments while still preserving the visual appearance of the development.

Electrical boxes that serve individual residential units or commercial businesses, should also be located in non-prominent areas yet be located in areas that are accessible for service such as on the side of a building.

Utilities, fiber optics and other private infrastructure shall not be located within public parks.

By planning for the service structures and coordinating with service providers during initial stages of development design, the visual appearance of the development may be preserved.

Goals & Strategies

Goals
Preserve the overall streetscape through the placement of service provider infrastructure and other related facilities underground.

Strategies
The following strategies achieve preservation of the streetscape through placement of service provider infrastructure and associated facilities:

1. Locate all service provider infrastructure and other related facilities underground where possible. Construction of new overhead infrastructure shall be limited to installation of new wires, poles and associated equipment for existing systems and to provide service to properties adjacent to existing overhead infrastructure systems. Where overhead infrastructure systems do not exist, then there shall be no new overhead infrastructure installed within the West Side.

2. Encourage participation of service provider companies in the City's development review process.

3. Provide adequate easements to handle all the infrastructure, including all the fiber optic providers that are expected to serve development. Entice fiber optic providers to consolidate in duct banks where practical.

4. Place private service structures and other related facilities outside the public rights-of-way.

   Service structures and other related facilities should be located in accordance with zoning standards, be located so that the service structures appear as if they were planned as part of the development, and be screened.

   For development within centers, service structures and other related facilities should be located within parking structures, between buildings, within court yards, along muse streets and inside of buildings so that the service structures are not placed in highly visible locations. For service structures located in highly visible locations to serve private development, then additional land should be provided within the development, including landscaping improvements, as useable open space. Landscaping may be used to soften the appearance of the service structures where visible.

5. Design and/or screen service infrastructure and other related facilities so that the facilities are incorporated into surrounding architectural settings.

Transformer and switchgear structures are located on the first floor of the parking structure instead of being placed in highly visible locations within the development center.

The electrical bank is located on the side of the building, near the lower level entrance of the parking structure. Service access is preserved while the appearance of the electrical bank is minimized.

The transformer equipment pictured in this photo (in center of photo behind tall shrubbery) is located within an interior courtyard and screened with landscaping

These service structures are located inside a building "closet" so that the structures are incorporated into the development and not visible from adjacent properties. The "closet" is accessible from the exterior ground level.

5. Wireless Communication Systems

Wireless communication systems have an important role in the world today in that they provide another means for communication. As wireless technology continues to evolve and the communication industry expands, the infrastructure will need to be accommodated. Similar to other infrastructure discussed within this chapter of the Plan, wireless communication infrastructure creates visual clutter and detracts from the aesthetics of a community.

Wireless communication systems have an important role in the world today in that they provide another means for communication. As wireless technology continues to evolve and the communication industry expands, the infrastructure will need to be accommodated.

Goals & Strategies

Goals
Allow for the expansion of communication infrastructure while preserving the City's appearance.

Strategies
The following goals achieve preservation of the City's appearance through placement of communication infrastructure and associated facilities:

1. Allow and plan for wireless communication systems that continue to provide improved service to persons within the city.

2. Encourage co-location of infrastructure on existing buildings and other existing utility structures.

3. Building-mounted communication equipment should be designed so that it is architecturally compatible with its built environment to minimized visual impact.

4. Monopoles and similar utility structures should be located in areas that are com patible with surrounding development and be designed to accommodate additional communication systems.

5. Equipment buildings should be designed so that the buildings are architecturally compatible with the exterior façade of the primary building on the site.

6. Where feasible, locate the associated equipment inside the primary building in which the antennas or other infrastructure facilities are mounted.

6. Conservation Through Building Design

Environmental resources, including energy, water and open space, continue to become more valuable as cities grow and populations increase. Conservation methods should be encouraged through mixed land uses, and site and building design.

To encourage conservation through building design and construction, cities are adopting "green building" programs. A "green building" is a building that takes into consideration the health and well being of its occupants while minimizing the impacts on the environment and is achieved through building placement, design, construction, operation and maintenance. Green buildings are considered to be environmentally sound and resource-efficient. The buildings include design features and techniques that encourage energy and water conservation. The building construction materials may also include indigenous materials.

A "green building" is a building that takes into consideration the health and well being of its occupants while minimizing the impacts on the environment and is achieved through building placement, design, construction, operation and maintenance.

Throughout the country, cities are introducing codes that require certain green building components. For example, Austin, Texas and San Jose, California have each adopted a rating system based upon a national green building assessment system known as Leadership in Energy and Environmental Design (LEED) that was developed by the U.S. Green Building Council. The LEED system is a third party certification system designed for rating new and existing commercial, institutional, and high-rise residential buildings. The system rates buildings based upon several categories including: sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality.

A variety of incentives are needed to encourage private sector participation in green building programs particularly since many programs are on a volunteer basis. Incentives being offered by cities to encourage the developers to participate in green building programs include:

- Reduction in development fees or tax breaks;
- Money to offset design costs;
- Increase in project density; and
- Provide point bonuses for green buildings when evaluating tax abatement requests.

The following are benefits of implementing green building programs:

- Conservation of energy, water and other natural resources;
- Reduction of solid waste;
- Improved comfort, well-being and health for building occupants; and
- Reinforces policies to create mixed-use and transit-oriented development, allow for higher densities, and increase bicycle and pedestrian access; and

The state of Texas has begun taking steps towards encouraging more efficient building design and construction methods – both of which are components of a green building program. During 2001, the Texas legislature passed legislation that included the adoption of the 2000 International Energy Conservation Code. The legislation also requires that government facilities shall accomplish a 25% reduction in energy consumption within the subsequent five years. Government facilities that shall achieve compliance with the legislation include (but not limited to):

- Municipal buildings such as city hall, fire stations, libraries, police stations and service center;
- Pump stations and lift stations; and
- Traffic signal lights.

In 2002, the City of Farmers Branch began complying with the legislation by adopting the 2000 International Energy Conservation Code and using Light Emitting Diode (LED) traffic signal units.

Although green building programs may be environmentally conscientious, there are higher costs associated with building "green." Green building projects have higher design and construction costs because design consultants are having to be more involved with the initial planning stages of a project compared with a conventional building. Design teams are also having to involve green building design specialists and engineers. Building material prices have been higher for green buildings compared to material prices for conventional buildings.

Should the City explore adopting a green building program, consideration should be given to what other cities within the Dallas/Fort Worth region and other areas are doing so as to not deter economic development opportunities for Farmers Branch.

Should the City explore adopting a green building program, consideration should be given to what other cities within the Dallas/Fort Worth region and other areas are doing so as to not deter economic development opportunities for Farmers Branch. If development incentives are solely being offered for green building projects, then businesses may choose to locate in another city that is offering similar incentives but without requiring building green thus lower costs for the development. While Austin and San Jose may have programs that are successful for their cities, those same programs may not be the most cost effective for this region.