2013 Comprehensive Plan

City of Ferris

Adopted September 30, 2013 (TENTATIVE)

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Introduction to Comprehensive Planning

A city's comprehensive plan can generally be defined as a long-range planning tool intended to be used by municipal staff, decision-makers, and citizens to direct the growth and physical development of a community for 10 years, 20 years, or an even longer period of time.

This 2013 Comprehensive Plan consists of four basic parts:

1 | Vision

2| Recommendations

3| Implementation

4| Utilities

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1 *Vision*

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Community Snapshot

This part of the *Vision* element establishes a foundation of information for the community visioning process and the development of plan recommendations. It provides information on the City's existing conditions and recent trends, and the overall context in which this planning effort is occurring.

Population Characteristics

People are the most important component of any community. The following discussion is intended to provide insight into the historic and existing characteristics of the community. This demographic analysis will aid in planning for future growth of the City.

Growth Trends

Establishing the City's and region's growth trends is important to understanding what type of growth the City should expect in the future, both independently and in relation to its larger region. As shown in **Table 1. Population Trends**, the 2010 population of Ferris was approximately 2,436 residents, an increase of 261 residents or 12 percent from the previous decade.

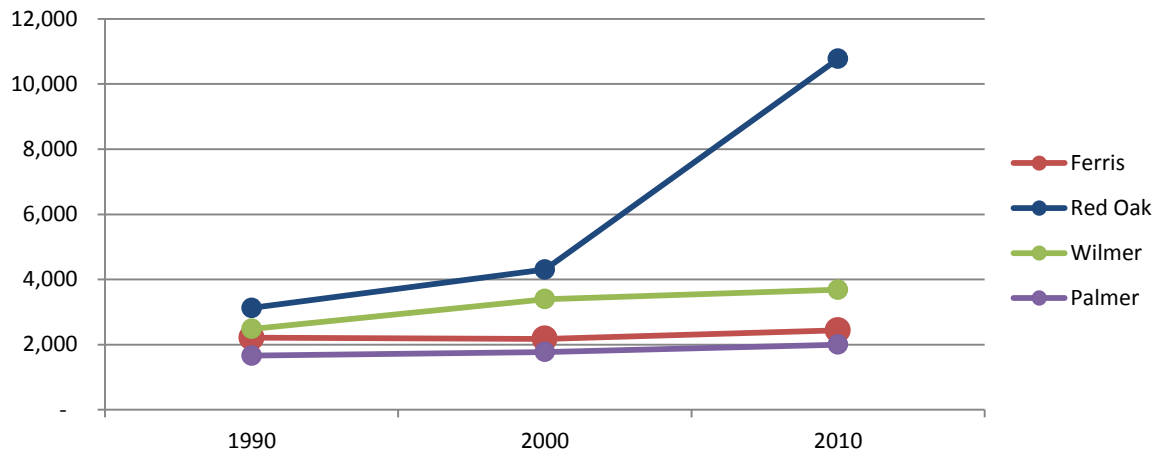
As shown in the table, according to the North Central Texas Council of Governments, the 2012 estimated population for Ferris was 2,440, nearly identical to the 2010 Census estimate. However, this growth rate is similar to the comparable cities (see **Figure 1. Population Comparison**).

Table 1. Population Trends

	Ferris		Red Oak		Wilmer		Palmer		Ellis County	
	#	%	#	%	#	%	#	%	#	%
1990	2,212	---	3,124	---	2,479	---	1,659	---	85,167	---
2000	2,175	-2%	4,301	38%	3,393	37%	1,774	7%	111,360	31%
2010	2,436	12%	10,769	150%	3,682	9%	2,000	13%	149,610	34%
2012*	2,440	0%	11,090	3%	3,830	4%	2,000	0%	152,580	2%

Source: U.S. Census and NCTCOG (2012)

Figure 1. Population Comparison



Following a small population decrease between 1990 and 2000, Ferris has maintained a relatively constant population. This is relatively similar to the population change in the neighboring areas, with the exception a large increase in Red Oak between 2000 and 2010.

Another method of evaluating the City's growth is to compare it to the larger area. The percentage that the City composes of the County allows for a comparison of Ferris's growth with that of its surrounding communities. As shown in **Table 2. Percent of County**, the City has consistently remained at about 2 percent of Ellis County's total population.

Table 2. Percent of County

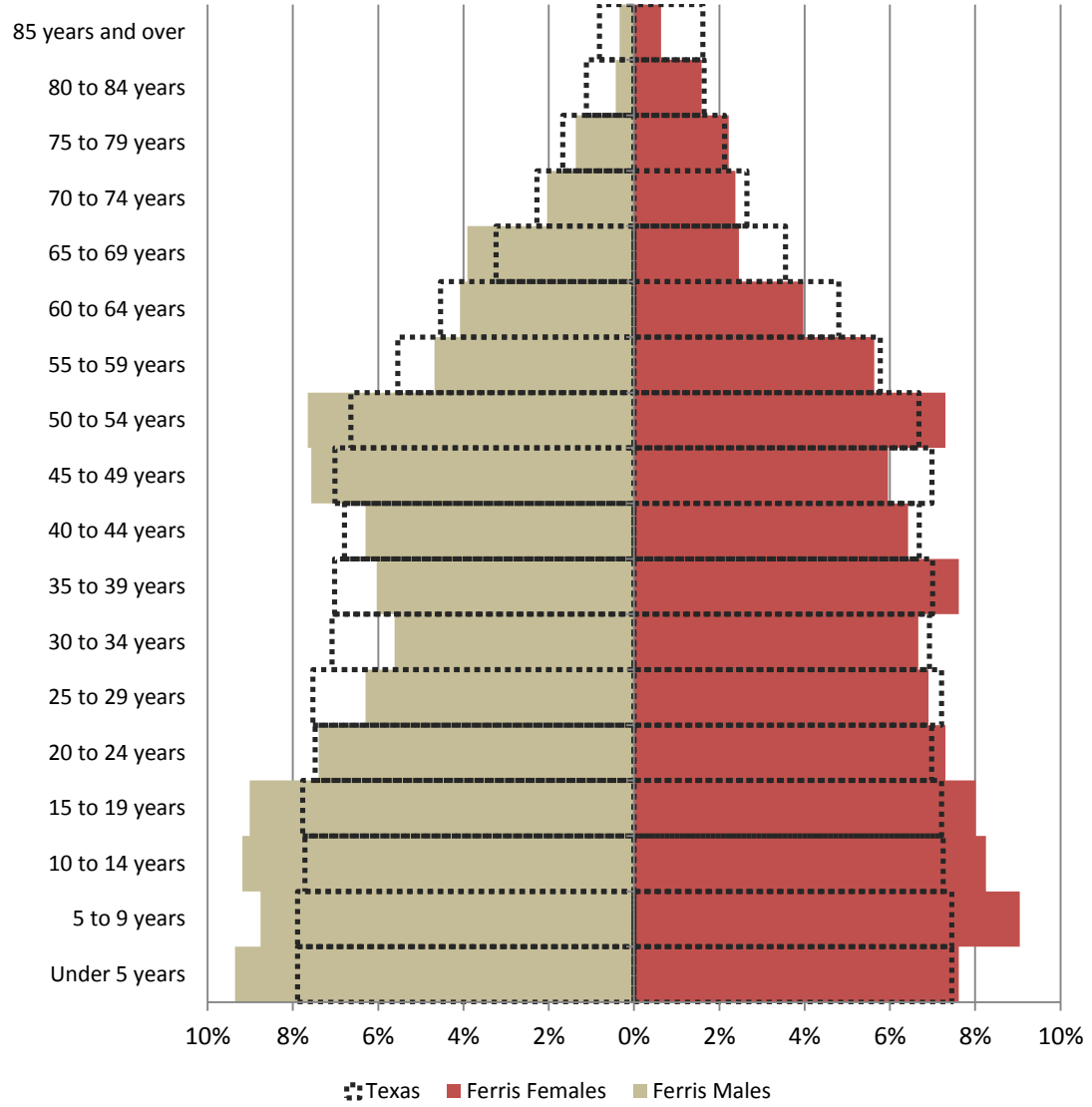
	Ferris	Ellis County	% of Ellis County
1990	2,212	85,167	3%
2000	2,175	111,360	2%
2010	2,436	149,610	2%
2012*	2,440	152,580	2%

Source: U.S. Census and NCTCOG (2012)

Age and Gender

The knowledge of Ferris's age composition can assist in planning for future possible needs, such as a senior citizens' center or a new elementary school. **Figure 2. Age and Gender Pyramid** shows the age distribution by gender for Ferris compared to the State average. The most noticeable differences include an increased population of children, aged 19 and under. This is an important planning consideration relating to housing options, neighborhood design, and land uses.

Figure 2. Age and Gender Pyramid



Source: U.S. Census

Households

Table 4. Household Type includes information regarding the composition of households in Ferris and the State of Texas. Consistent with **Figure 2. Age and Gender Pyramid**, this table indicates the population of Ferris is generally similar to the distribution for the State.

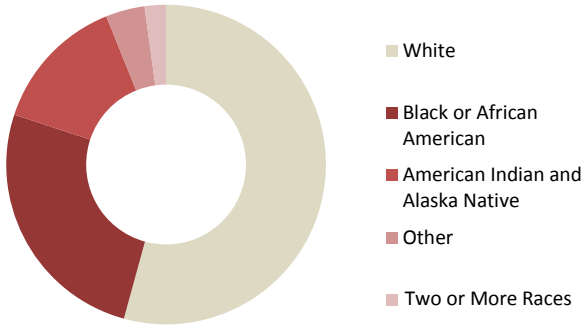
Race and Ethnicity

Information regarding race and ethnicity is important to local governments to ensure that all of its citizens are being represented in decision-making processes.

As shown in **Table 3. Racial Composition, t**he Black/African-American population is higher when compared to the State: 26 percent in Ferris versus 12 percent in the State. The American Indian and Alaska Native population is significantly higher than the State level.

The ethnic composition of Hispanic or Latino citizens in Ferris is equal to that of the State of Texas, both 38 percent (see **Figure 3. Racial and Ethnic Distribution**). It is important to note that 14 percent of Ferris's residents are Spanish-speaking who speak English less than "very well", which is approximately the same as the State.

Figure 3. Racial and Ethnic Distribution



14% of residents speak English less than "very well"

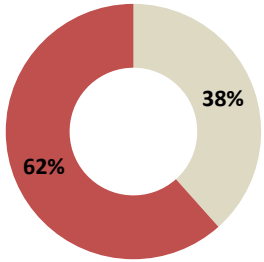


Table 4. Household Type

	Ferris		Texas
Total Households	755		8,667,807
Family Households	508	67%	70%
With own children under 18 years	204	27%	35%
Nonfamily households	247	33%	30%
Householder living alone	240	32%	25%
65 years and over	97	13%	7%
Households with one or more people under 18 years	287	38%	39%
Households with one or more people 65 years and over	211	28%	21%

Source: 2007-2011 ACS

Table 3. Racial Composition

	Ferris		Texas
Total Population	2,361		24,774,187
One race	2,310	98%	98%
White	1,281	54%	73%
Black or African American	609	26%	12%
American Indian and Alaska Native	327	14%	1%
Other	93	4%	12%
Two or more races	51	2%	2%

Source: 2007-2011 ACS

Educational Attainment

The educational attainment of a community can be an indicator of the types of jobs in the region and can provide general information on the skills and abilities of the local workforce. Knowledge of its workforce can also help a city to target and recruit certain types of businesses to the community.

Table 5. Educational Attainment provides detailed information regarding the population of Ferris compared to the population of Texas. **Figure 4. Educational Attainment** shows more clearly the overall tendency toward lower levels of education when compared to the State. This tendency toward lower education levels directly correlates to other factors within the City, such as lower home values and lower median incomes.

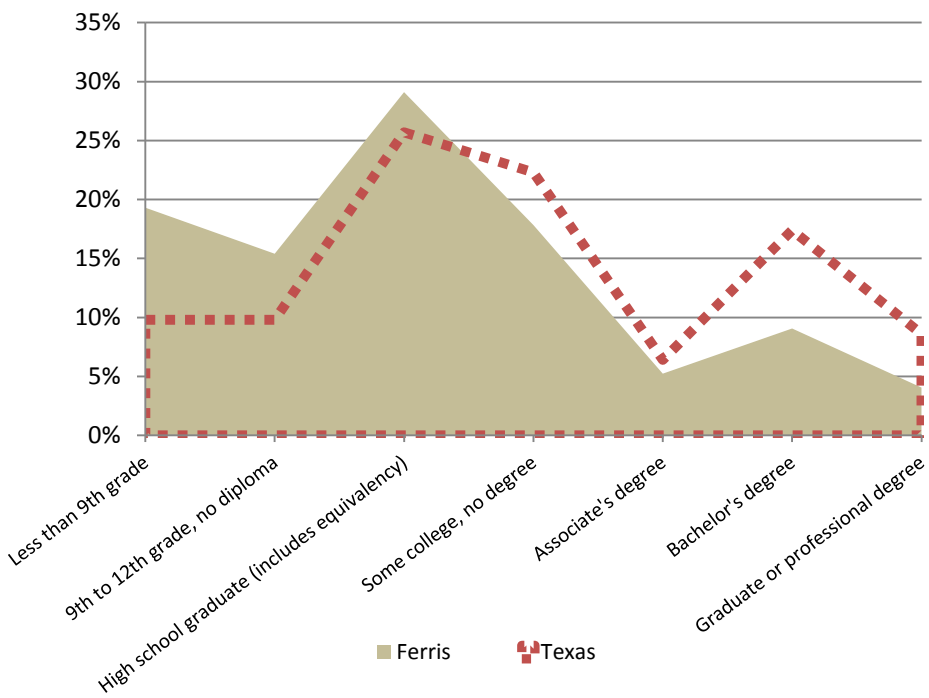
As shown, 13 percent of Ferris's population has received a bachelor's degree or higher, compared to 26 percent of the State population. This characteristic of Ferris can discourage new businesses and industries that require a college-educated workforce from locating within the City.

Table 5. Educational Attainment

	Ferris		Texas
Population 25 years and over	1,357		15,443,904
Less than 9th grade	262	19%	10%
9th to 12th grade, no diploma	209	15%	10%
High school graduate (includes equivalency)	395	29%	26%
Some college, no degree	242	18%	22%
Associate's degree	71	5%	6%
Bachelor's degree	123	9%	17%
Graduate or professional degree	55	4%	9%
Percent high school graduate or higher	65%		80%
Percent bachelor's degree or higher	13%		26%

Source: 2007-2011 ACS

Figure 4. Educational Attainment



Employment Characteristics

Employment opportunities can affect the growth rate of cities. These opportunities are important because they allow people to settle in a community, establish their home and begin a life. If citizens cannot find work in an area, then they are forced to move elsewhere, and to take their property and sales tax revenue with them. Cities are generally dependent on businesses to provide employment opportunities that in turn pay the citizens' salaries and provide them with the ability to buy and sell goods, pay taxes, and so on.

Table 6. Occupation compares the percent of each occupational category for the City of Ferris and State of Texas. The most noticeable difference is the management, professional, and related occupations category, which is a more "white collar" category, with 34 percent in Texas and 21 percent in Ferris. A larger percentage of jobs are held in *Service occupations* and *Sales and office occupations*. This data is consistent with the previous information regarding educational attainment (see **Figure 4. Educational Attainment)** – fewer residents with college education, and increased clerical, office, and commercial-type jobs.

Household income levels can be an important factor in planning Ferris's future. For example, income levels indicate to potential retailers whether or not the City is a prime site to locate their business. The amount of available disposable income is a major factor that influences the type and amount of retail development that a city can support. Also, income is a major determining factor for homeownership; a high level of homeownership is generally seen as a positive characteristic for a community. Income levels, therefore, can play a role in the size, type and quality of residential development a community attracts.

As shown in **Figure 5. Income Distribution**, Ferris's income levels generally have a tendency toward mid-range and lower incomes when compared to the State. The most common income levels occur in the $50,000 to $99,999 range; however, Ferris's median household income is $47,371, compared to Texas's median household income of $50,920.

Ferris
9.3% unemployment
$47,371 median household income

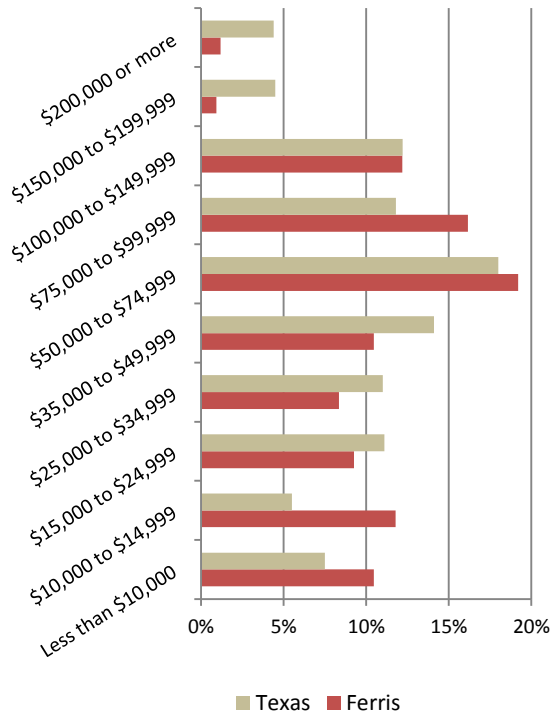
Texas
7.3% unemployment
$50,920 median household income

Table 6. Occupation

	Ferris		Texas
Civilian employed population 16 years and over	1,092		11,288,597
Management, business, science, and arts occupations	228	21%	34%
Service occupations	269	25%	17%
Sales and office occupations	333	30%	25%
Natural resources, construction, and maintenance occupations	124	11%	11%
Production, transportation, and material moving occupations	138	13%	12%

Source: 2007-2011 ACS

Figure 5. Income Distribution



Housing Data

The quality of housing and the affordability of housing options are important planning considerations. Among the factors influencing the desirability of Ferris as a place to live is the availability of housing and the quality of the existing neighborhoods. Housing also plays an important role in affecting the potential commercial development of various sections of the City and the immediate surrounding area. The community has an interest in the ability to attract new businesses in addition to ensuring adequate habitation for its residents. This section discusses various aspects of Ferris's housing.

Occupancy rate is an important indicator of the local housing market and housing saturation. A high occupancy rate may indicate a need for additional housing units and/or types to accommodate new population growth, whereas a low occupancy rate may indicate an oversaturation of housing units and/or type.

Table 7. Housing Occupancy displays a variety of information regarding occupancy characteristics. There are approximately 794 housing units in Ferris, 95 percent of which is occupied, which is above the State average of 88 percent. Ferris's homeowner and rental vacancy rates, 2.0 percent and 0.0 percent respectively. Both rates are lower than the State rates; however the rental rate is significantly lower. This may indicate a demand for rental housing within Ferris.

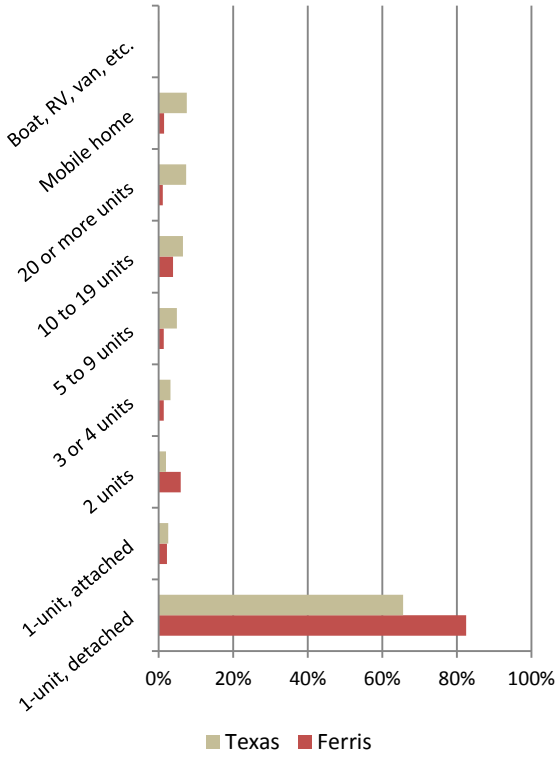
Table 7. Housing Occupancy

	Ferris		Texas
Total housing units	794		9,869,239
Occupied housing units	755	95%	88%
Vacant housing units	39	5%	12%
Homeowner vacancy rate	2.0%		2.3%
Rental vacancy rate	0.0%		10.0%

Source: 2007-2011 ACS

Figure 6. Housing Structure Type compares the type of residential structures in the City to the State. As shown in the chart, Ferris has about 16 percentage points more single family detached homes when compared to Texas. According to this comparison, Ferris is lacking primarily medium and high density dwellings of 3 or more units.

Figure 6. Housing Structure Type

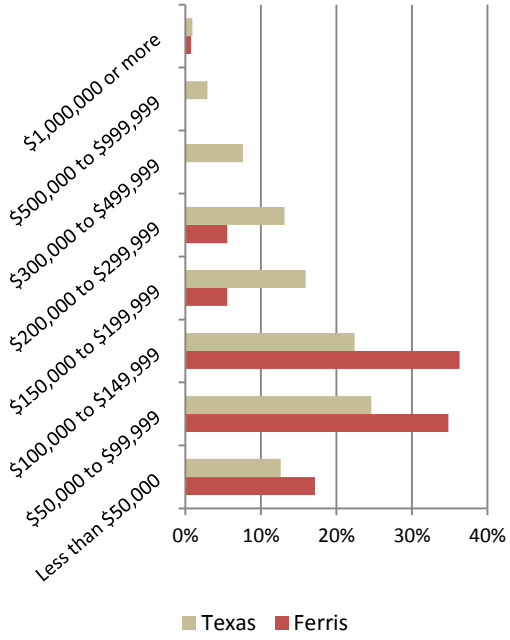


Source: 2007-2011 ACS

The value of local residential property is an important factor for cities to consider. Residential property valuation within Ferris influences property tax revenues, City services, and City staffing levels.

Figure 7. Home Value shows the distribution of home values for Ferris and the State of Texas. Eighty-eight percent of homes in Ferris are valued at less than $150,000, compared to 60 percent of the State. The median home value in Ferris is $96,100, compared to $126,400 Statewide (*2007-2011 ACS*).

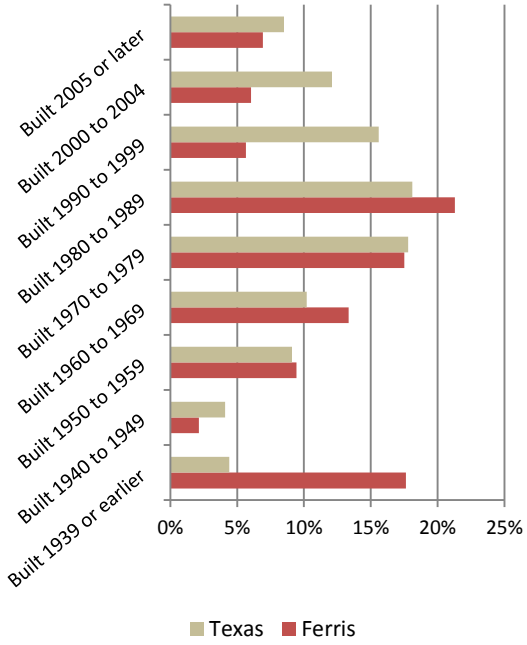
Figure 7. Home Value



Source: 2007-2011 ACS

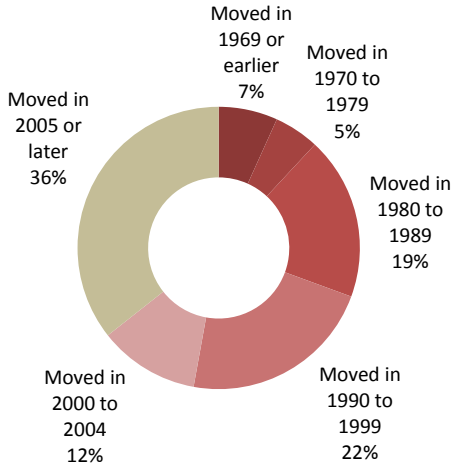
Structural age often influences the value, physical condition, and desirability of a home. Year of construction for the housing stock within Ferris compared to the State of Texas is shown in **Figure 8. Home Construction Year**. As shown, Ferris's housing stock is generally older when compared to the State, with a large percentage of homes (18 percent) constructed before 1939.

Figure 8. Home Construction Year



Source: 2007-2011 ACS

Figure 9. Resident Tenure



Source: 2007-2011 ACS

The examining the tenure of residents also provides insight into the community. As shown in **Figure 9. Resident Tenure**, 36 percent of Ferris's residents have moved into the City within the last eight years. Fifty-three percent have lived in the City since before 2000, compared to 33 percent of the State, indicating a significant long-term population.

Existing Land Use Analysis

Providing for the orderly and efficient use of land should be a major planning consideration in Ferris. The pattern of land use that exists today has evolved to accommodate the City's past needs. The activities of local residents create a need for various land uses, as well as for the supplemental systems that support the land uses (e.g., thoroughfare systems). The relationships of existing and future land uses will shape the character and quality of life of the community for many years to come. In order to accurately assess the City's future land use needs, an analysis of past land use trends and present land use patterns is of primary importance.

Additionally, Ferris's man-made and physical environment greatly influences its future land use pattern and rate of growth. It is important to document and analyze the physical factors that will ultimately contribute to the City's urban form and content. Each element of this plan must be fashioned with these physical factors in mind.

Existing Land Use Analysis and Map

Growth and development occurring within Ferris in the future will require the conversion of vacant and agricultural land to more intensified urban uses. The conversion process and how it occurs will be very important to the City in that it is one of the factors that will determine the community's future urban form, and in turn, its attractiveness and desirability. The relationships of existing and future land uses will not only have an impact upon Ferris economically, but will also shape the character and livability of the community in the years to come. Likewise, these relationships will be reflected in the provision of services and facilities throughout the community. An orderly and compact land use arrangement can be served more easily and efficiently than a random and scattered association of unrelated uses.

In order to analyze the land use trends within Ferris, aerial photography supported by field verification was used to identify existing land uses in the preparation of this chapter. This survey occurred in March 2013, and each parcel of land was color-coded according to various land use types. The information obtained from the survey is used herein to create **Figure 10. Existing Land Use Map (Core)** and **Figure 11. Existing Land Use Map**, and discuss Ferris's current land use pattern. The following section provides an overview of the different types of land uses included within the survey.

Figure 10. Existing Land Use Map (Core)

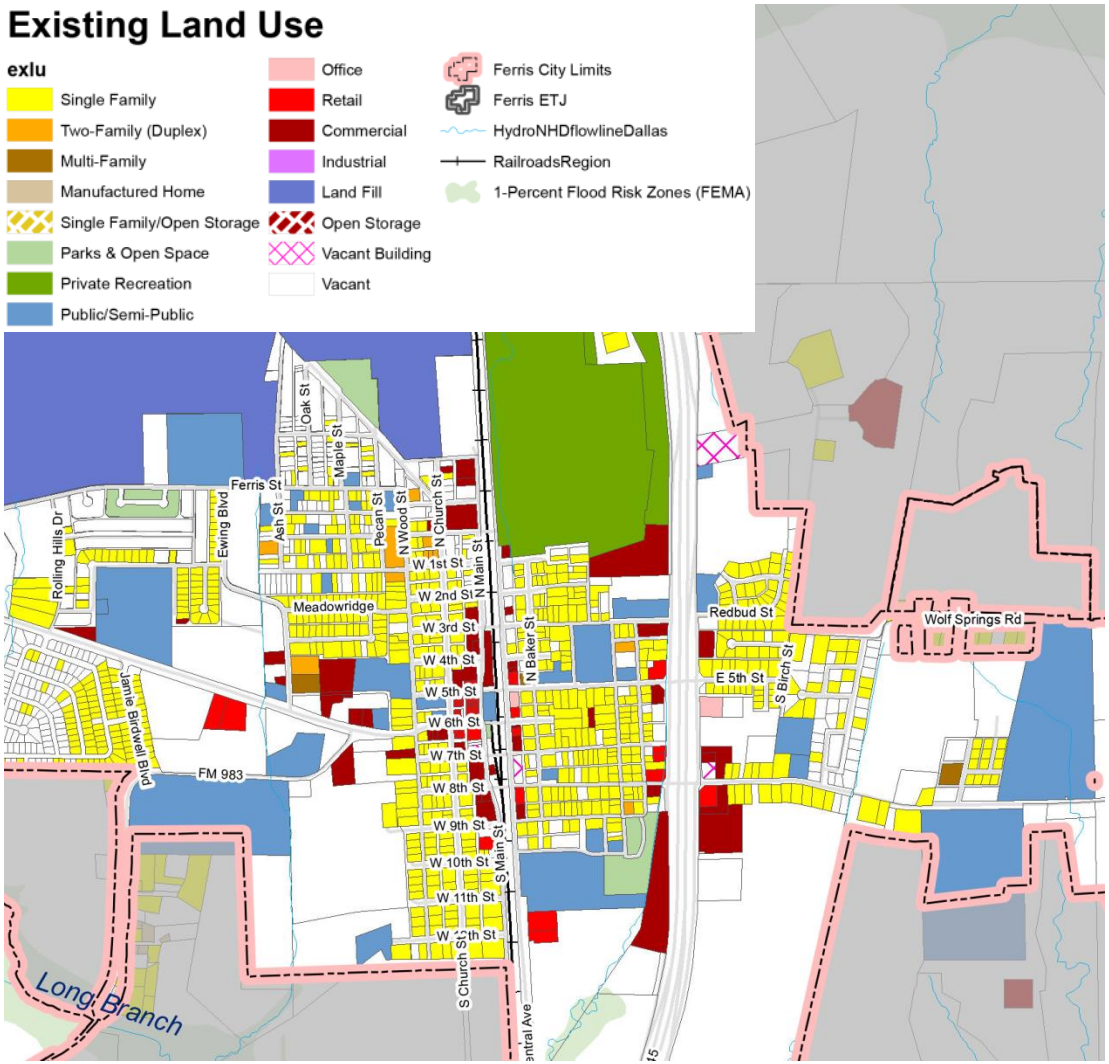


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Figure 11. Existing Land Use Map

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Residential Land Uses

The following is an overview of land uses that are primarily residential, including single family, two family, multiple family, and manufactured homes.

Single Family

A single dwelling unit that is detached from any other dwelling unit, is built on-site, and is designed to be occupied by only one family. Single family homes are the more prevalent housing type and developed land use type.

Two Family (Duplex)

A structure with two single family dwelling units attached with shared walls.

Multiple Family

A structure with numerous attached dwelling units that is designed to be occupied by several families (one in each unit). This term can be used to describe a single structure or series of structures in a complex. Multiple family homes are also commonly referred to as apartments.

Manufactured Home

A single family dwelling unit that is manufactured in a factory rather than on-site. These homes are usually transportable (i.e., are not on permanent foundations). The U.S. Department of Housing and Urban Development (HUD) established safety and construction standards for manufactured homes in 1976; therefore, the term “mobile home” is typically used for structures built prior to 1976.

Single Family with Outside Storage

A property used for both outside storage and for a single family dwelling.

Nonresidential Land Uses

Nonresidential land uses include areas in which people typically do not reside, although some residential units may occasionally be included as mixed use type developments.

Parks & Open Space

Public or private park land, open space, and/or recreation area that is outside. Includes recreational facilities, such as tennis courts, public swimming pools, picnic pavilions, and basketball courts.

Private Recreation

Private park land, open space, and/or recreation area or facility. Includes private recreational facilities, such as golf courses.

Public/Semi-Public

Uses that are generally accessible to the public, such as schools, churches, public buildings, cemeteries, and some medical facilities. Also includes some support services, such as a school bus storage lot.

Office

All types of professional and administrative offices, including those of doctors, lawyers, dentists, realtors, architects, and accountants.

Retail

Businesses that primarily sell commodities or goods to consumers. Examples include restaurants, grocery stores, beauty salons, and shopping centers.

Commercial

Establishments that primarily provide a service to consumers. Examples include hotels, automobile services stations, automobile sales lots, self-storage businesses, and welding shops.

Industrial

Allows for the processing, storage, assembly, and/or repairing of materials. Ranges from light industrial with all activity occurring indoors, to heavy industrial with activity occurring outside.

Land Fill

Land area used for the Skyline Landfill Waste Management Company in the northwestern portion of the City. This landfill occupies over 500 acres of the City limits and composes the single largest developed land use within Ferris.

Open Storage

Land used for open storage of equipment and other materials.

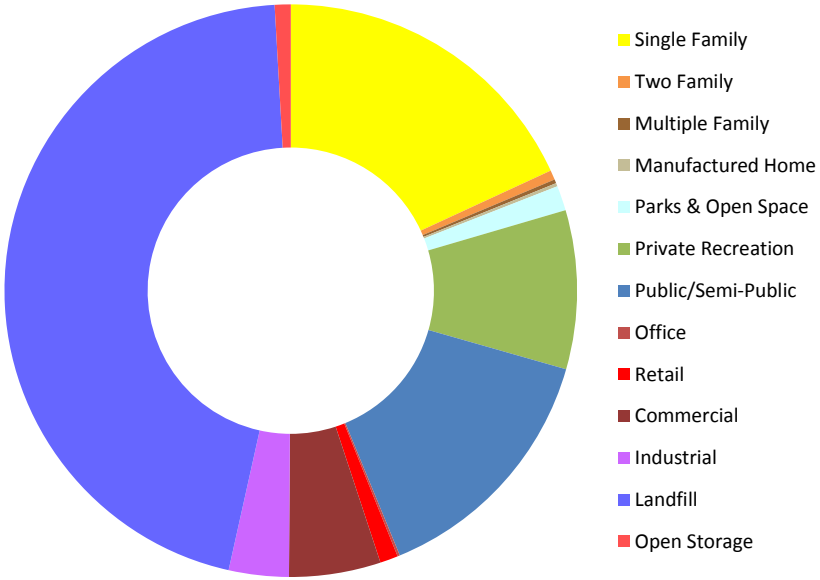
Table 8. Existing Land Use Acreage shows the existing land use characteristics of Ferris's City limits. As shown, approximately 36 percent of the City limits area has been developed, about 8 percent is used for right-of-way, and 56 percent vacant. **Figure 12. Existing Land Use Distribution** provides a visual depiction of the developed land use distribution.

The largest single developed land use is the Skyline Landfill at 46 percent (516 acres), followed by single family residential at 18 percent (205 acres) of all developed land within the City. The next most common uses of developed land are public/semi-public, private recreation, and commercial.

Table 8. Existing Land Use Acreage

Land Use Category	Acres	% of Total Land	% of Dev. Land
Single Family	205	7%	18%
Two Family	6	0%	1%
Multiple Family	3	0%	0%
Manufactured Home	2	0%	0%
Parks & Open Space	16	1%	1%
Private Recreation	101	3%	9%
Public/Semi-Public	162	5%	14%
Office	2	0%	0%
Retail	12	0%	1%
Commercial	59	2%	5%
Industrial	38	1%	3%
Landfill	516	16%	46%
Open Storage	10	0%	1%
Developed Land	1,131	36%	100%
Right-of-Way	251	8%	---
Vacant Building	6	0%	---
Vacant	1,764	56%	---
Total Land	3,152	100%	---

Figure 12. Existing Land Use Distribution



Extraterritorial Jurisdiction and Physical Constraints

Ferris contains 3,152 acres within its current City limits. The City has an extensive ETJ area, extending up to one-half mile from the City limits. This distance is established by the Texas Local Government Code for cities in population up to 5,000 residents.

The ETJ serves two purposes: First, cities can annex land only within their ETJ, and there is a statutory prohibition against another municipality annexing into the ETJ of another city; and second, cities can extend and enforce their subdivision regulations into their ETJ. Cities cannot, however, enforce zoning regulations into the ETJ.

Floodplain boundaries and topographic features are important to understanding where development should and should not occur. **Figure 14. Physical Features** shows the primarily physical constraints affecting Ferris. Land within the floodplain is typically appropriate for parks and open space, parking areas, and similar low-impact uses. This information is also important because topography influences the development and design of infrastructure systems such as water, wastewater, and storm water systems.

Land designated as floodplain is typically difficult to develop with increased development costs and environmental concerns regarding preservation and protection of wetlands. Approximately 1,862 acres of the City and 2,792 acres of the ETJ are within the floodplain. Land within the floodplain is often difficult to develop, which means much of this land will likely remain undeveloped and be used primarily for parks and open space.

Steep slopes can restrict development; however, Ferris's topography is generally flat and does not restrict development.

Additionally, manmade physical constraints must be considered. Interstate 45 provides access and an opportunity for economic development for the City. However, this thoroughfare also bisects the community, creating a disconnect in the urban fabric of Ferris and creating separate communities.

Figure 13. Aerial Image of I-45 Corridor

Source: Google Maps

Figure 14. Physical Features

<insert PDF of physical features map>

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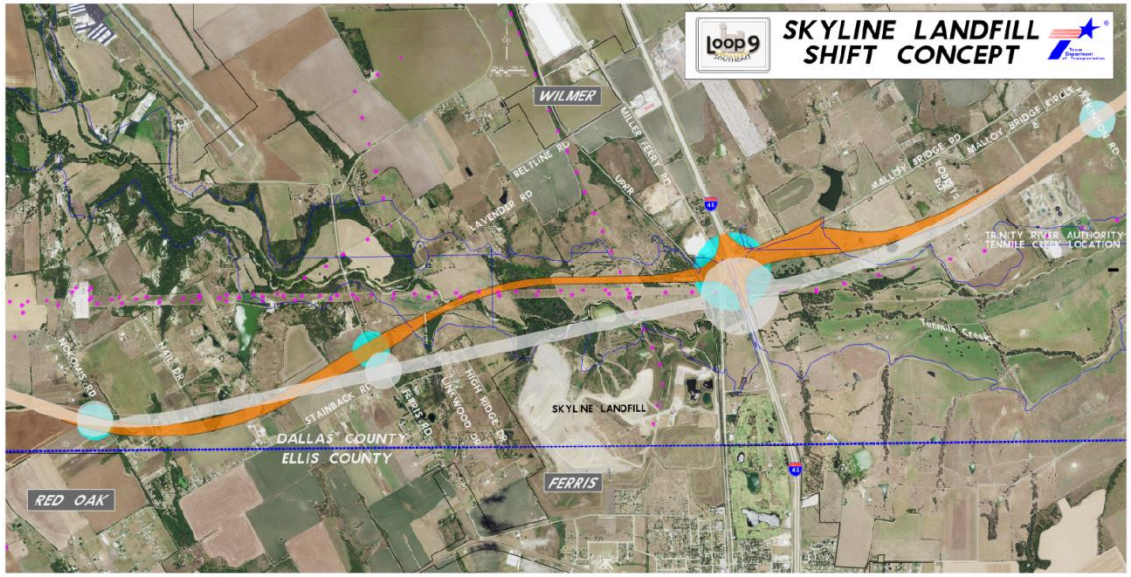
Planning Context

Relevant local and regional planning efforts should be considered when developing a comprehensive plan to ensure coordinated recommendations for the study area. This section provides a brief overview of these related efforts.

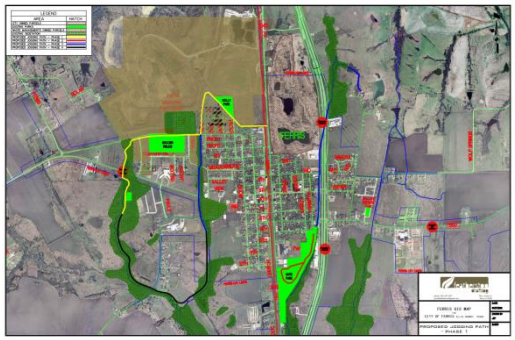
One major project that could possibly affect Ferris is the construction of Loop 9, a proposed outer loop freeway around the Dallas metropolitan area. Although this project has been discussed for nearly 60 years, a Corridor/Feasibility Study began in late 2012 to refine the proposed alignments. **Figure 15** shows the most recent proposed alignment for the roadway as it passes near Ferris. The roadway would be located just south of Malloy Bridge Road and run near Ferris's northern City limits, curving north of the Skyline landfill.

Figure 15. Proposed Loop 9 Alignment



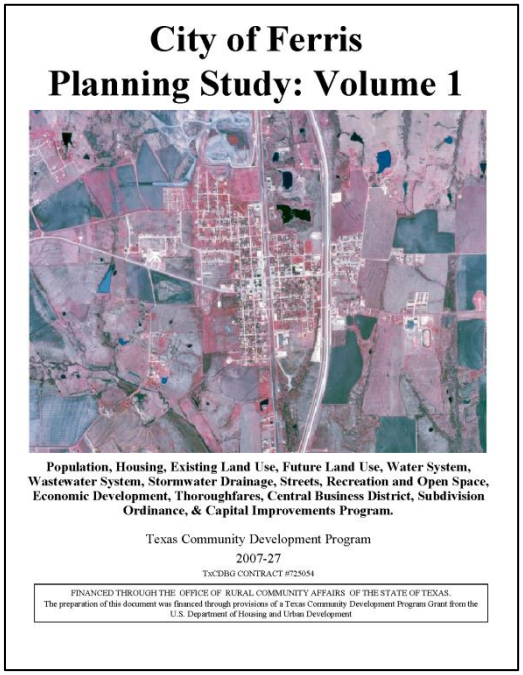
TXDOT, 2013

The City's recently adopted a zoning ordinance, which was carefully reviewed and integrated into this *2013 Comprehensive Plan*. The zoning ordinance regulates land use and development within the City, whereas the purpose of a comprehensive plan is to provide recommendations and establish policy guidance for the City's decision-makers. The *Recommendations* element of the plan provides specific revisions that the City may wish to consider during future updates of the zoning ordinance in order to ensure desirable future development.



City Walking Trail Master Plan (City of Ferris, 2013)

The City has recently adopted a Parks Master Plan (August 2013) to supplement the existing City Walking Trail Master Plan. The Parks Master Plan has been incorporated into this *2013 Comprehensive Plan*.



City of Ferris
Planning Study: Volume 1

Population, Housing, Existing Land Use, Future Land Use, Water System, Wastewater System, Stormwater Drainage, Streets, Recreation and Open Space, Economic Development, Thoroughfares, Central Business District, Subdivision Ordinance, & Capital Improvements Program.

Texas Community Development Program
2007-27
TxCDBG CONTRACT #725054

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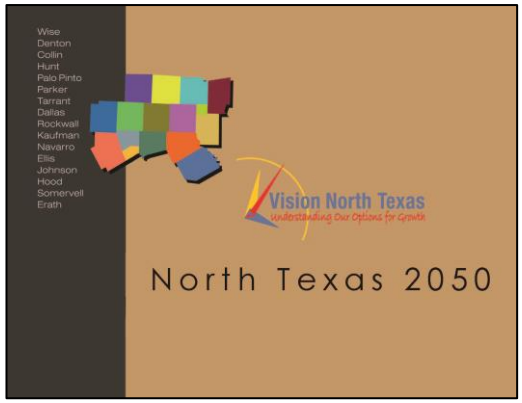
Planning Studies (City of Ferris and Texas Community Development Program, 2007)

In 2007, the City developed a very comprehensive series of Planning Studies. The purpose of this document is to establish a community profile, identify community goals, provide an analysis of population trends, housing, and existing land use. The plan projected future land use, water/ wastewater/storm drainage infrastructure needs, an evaluation of the City's park systems, economic development, thoroughfares, downtown, development regulations, and capital improvement plan.



Vision North Texas 2050 (NCTCOG and Strategic Community Solutions, 2010)

Developed as a private, public, and academic partnership, this plan identifies a unified vision for the future growth of the North Texas region. The plan categorizes Ferris as a "Separate Community", which is considered to be its own unique center with a distinctive character, likely due to its historic downtown.

Plan recommendations for these "Separate Community" areas focus on urban design, emphasizing local heritage, new opportunities to further the distinctive character, and preservation of natural beauty and resources.

Visioning

This second part of the Visioning phase involves collecting information from the community to identify Ferris's vision for its future. This will help shape and direct growth and development for the next twenty years and beyond. This plan is premised upon a shared vision of what Ferris should be as it continues to grow and become an increasingly mature city.

Meetings and Community Input

Ferris City Council appointed the Planning and Zoning Commission to act as an advisory or steering committee for the development of this plan's goals and recommendations. Over the course of the project, five meetings were held with the Planning and Zoning Commission to gather input on the City's vision for its future and receive feedback on the proposed recommendations. Members of the City Council and the community also attended some of these meetings. At the culmination of the project, City Council held a public hearing to solicit comments from the community, and adopted this Comprehensive Plan as the City's official policy.

Comprehensive Plan Goals

These goals define what Ferris seeks to accomplish with this Comprehensive Plan. The following goals were created to guide the Future Land Use and Livability elements.

Future Land Use

1. ***Encourage a desirable mix of land uses within the City.***

An appropriate mix of land uses is important to support the City's tax base, supporting Ferris's overall quality of life. This mix of land uses should include a variety of housing types, recreation and activities, retail, and commercial businesses to meet the community's needs.

Additionally, as the DFW metropolitan area continues to expand, Ferris should ensure adequate development regulations are in place. Land uses adjacent to residential areas should be less intensive in nature, such as retail, recreation, or public. Commercial and industrial uses, particularly those with outside storage, should not be permitted adjacent to residential neighborhoods unless significant screening and buffering is used.

2. ***Consider the development of an industrial business park in the City.***

Ferris has an opportunity for increased industrial businesses in the City due to its proximity to the Dallas Intermodal Terminal, Interstate 45, and proposed Loop 9. These assets should be leveraged to attract and support industrial development in the City, thereby creating employment and supporting the City's tax base.

3. ***Encourage complementary development and historic restoration within the Downtown.***

Downtown Ferris is one of the City's most unique and attractive features. The City should protect and enhance Downtown to ensure this distinct area continues to serve as the heart of Ferris.

As future redevelopment occurs in this area, the design should be complementary and compatible with the existing historic image. Additionally, rehabilitation of existing historic structures should be encouraged to support Downtown's character.

Livability

4. Establish a unique identity for the community.

Ferris should identify a consistent brand or image for the community to be incorporated throughout the community. Major gateways should be established at the entrances of the community along Interstate 45 to distinguish Ferris from the surrounding communities along the corridor.

5. Improve the physical appearance of Ferris's frontages and neighborhoods.

Development regulations should ensure quality development of its corridor frontages and neighborhoods. These regulations should address building materials, landscaping, and signage, among possible others. Additionally, a proactive code enforcement program should be in place to ensure the appearance and safety of the City meets the community's expectations.

6. Promote desirable neighborhoods.

Neighborhoods are the heart of the community. It is important that existing neighborhoods be preserved and protected through a combination of public and private investment. Ensuring a mix of land uses and quality development standards promotes a vibrate area in which residents want to live.

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2 *Recommendations*

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Future Land Use

The right of a municipality to coordinate growth is rooted in its need to protect the health, safety, and welfare of local citizens. An important part of establishing the guidelines for such responsibility is the Future Land Use Plan, which establishes an overall framework for the preferred pattern of development within Ferris. In general, the Future Land Use Plan is intended to be a comprehensive blueprint of Ferris's vision for its future land use pattern. Specifically, the Future Land Use Plan designates various areas within the City for particular land uses, based principally on the specific land use policies outlined herein.

Future Land Use Map

The Future Land Use map is a graphic for use during the development plan review process (**Figure 16**). This Future Land Use Plan should ultimately be the foundation upon which the City's policy and development decisions are based. The Future Land Use Plan map is not a zoning map, which deals with specific development requirements on individual parcels. The zoning map and changes in zoning should, however, be based on the Future Land Use map.

Ferris's land use pattern has evolved to become what it is today. The market, in conjunction with City policy, has dictated the existing land use pattern – a pattern that generally supports these concepts of residential and nonresidential locations. The challenge now is to maintain the current quality and history of the City while paving the way for new, quality, sustainable development that will contribute to the City in the years to come. This Future Land Use Plan has been written to achieve the following:

- Address the needs of the City as a whole;
- Address the concerns and issues raised throughout this planning process;
- Provide policy guidance in keeping with the City's established goals; and,
- Ensure that Ferris is a unique and sustainable community.

The various types of land uses have different needs in terms of location. For example, residential areas should be located away from major roadways so that automobile traffic is generally able to circumvent such areas, thereby preserving the integrity of local neighborhoods and ensuring the safety of local residents. In contrast, nonresidential uses should generally be located along major thoroughfares in order to allow them the highest visibility possible. More intense land uses, including heavy commercial and industrial, are typically located in areas less visible from public areas and residential developments, but that also have access to major thoroughfares to accommodate movement of goods and materials. If these uses are visible from the public view, screening requirements and design standards should be in place to protect the community's image.

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Figure 16. Future Land Use Map

<insert PDF of FLUP map here>

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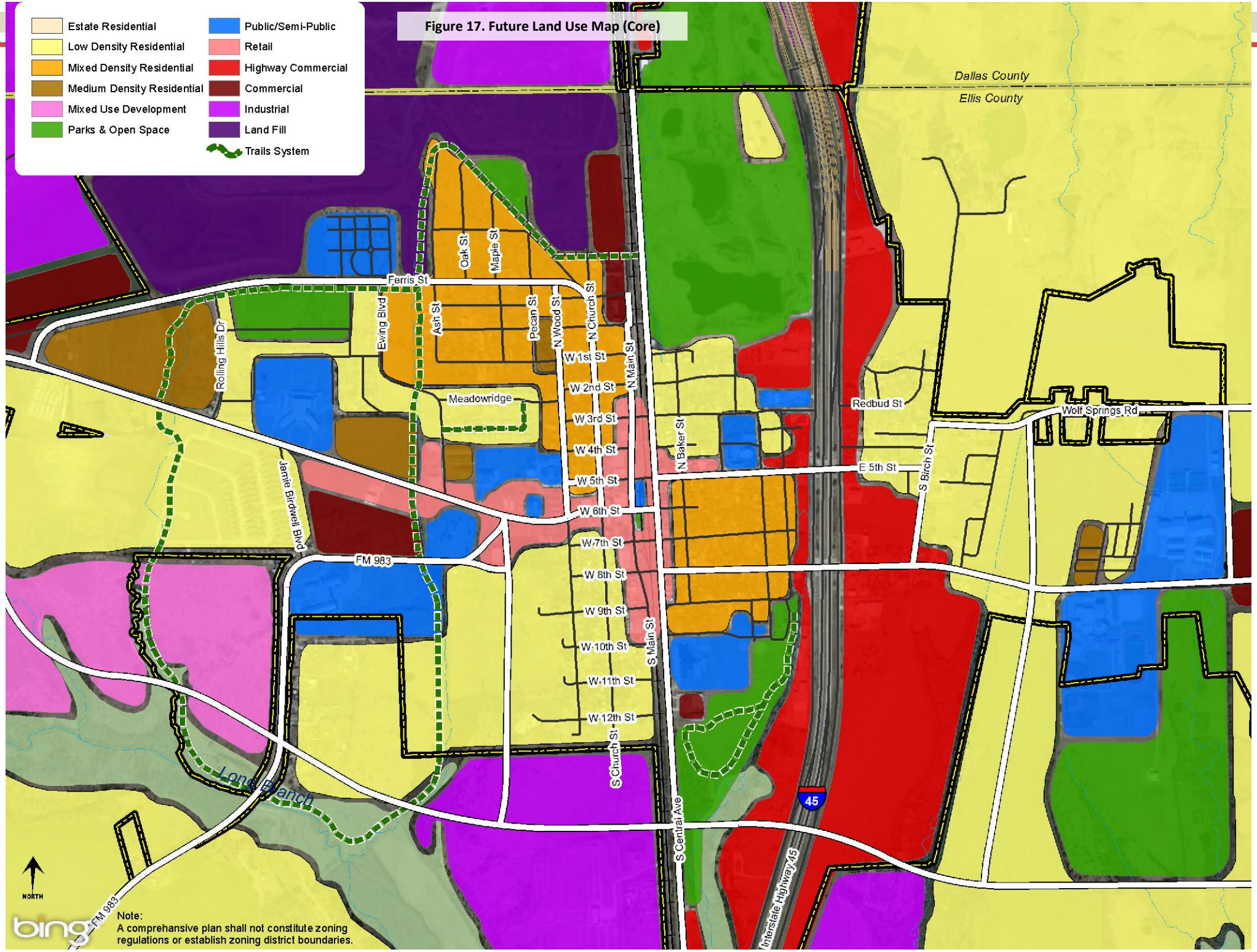


Figure 17. Future Land Use Map (Core)

Future Land Use Categories

The following land use categories are reflected in the Future Land Use map. Each category below has a corresponding color which can be used in order to establish physical visualization of the Future Land Use map and what types of development will be appropriate within each specific area.

Residential Land Uses

Estate Density Residential

This use is representative of traditional, single family detached dwelling units. Lot sizes for lower density, more rural type residential structures, typically include up to two dwelling units per acre. These larger lots must be able to support the accompanying infrastructure, such as on-site sewer facilities.

Low Density Residential

This category refers to smaller single-family homes and some duplex units. This density is similar to the majority of existing homes within Ferris. Approximately two to six dwelling units per acre are appropriate for this category.

Mixed Density Residential

Mixed residential is intended to be abstract in density requirements and character, therefore a variety of residential designs may be incorporated into one general area with the goal of creating an environment that accommodates different housing types and housing needs. Mixed residential uses include low density residential, medium density residential and the possibility of limited amounts of high density residential.

Medium Density Residential

This category refers to townhouses, condominiums, and apartments, which are intended to accommodate the City's need for diversity of housing choices. This category is intended to provide for about six to 12 dwelling units per acre on average.

Nonresidential Land Uses

Parks and Open Space

Areas with this land use designation are representative of parks and open spaces that are currently in existence or planned; however, parks and open spaces are permitted within any area. Note that this designation includes private recreation, such as the golf course.

Public/Semi-Public

This designation is representative of uses that are governmental, institutional, or religious in nature. These uses are generally permitted within any area; therefore, the areas shown on the Future Land Use Plan map include the uses that are currently in existence. It is, however, anticipated that there will be a need for additional public uses with future population growth. The City should remain aware of necessary increases in police and fire protection based on population growth and potential increases in space and personnel for City administration.

Retail

Retail uses typically include establishments that provide merchandise for retail sale such as shopping centers, restaurants, and grocery stores. Additionally, provisions for the incorporation of neighborhood retail, such as specialty shops, convenience stores, neighborhood pharmacies, or small restaurants, can improve the general character of neighborhoods. Retail land uses are typically dependent upon higher traffic volumes or pedestrian traffic and are located in areas with a high level of visibility.

Mixed Use

The majority of this development is anticipated to be nonresidential in nature; however these areas support a compact mix of office, retail, commercial, and some higher density housing options. This land use category should incorporate vertical (limited residential or office above retail) and horizontal mixed uses (uses adjacent to one another), and should be pedestrian-oriented, as appropriate.

Highway Commercial

This designation is intended for commercial and retail development along the corridors that is easily accessed by automobile traffic. Quality access and visibility are important components to encourage successful auto-oriented developments. Uses in this district may include hotels, possibly large retail developments (such as an outlet mall), or other traditional commercial uses.

Commercial

These areas provide for uses such as commercial amusements, building materials yards, automobile garages and sales lots, automobile body repair, warehouses, telecommunications towers and facilities, wholesale establishments, and the sale of used merchandise and welding shops. Often, retail and commercial land uses are thought to be similar, however, the intensity of these uses is often different. This fact should be taken into consideration when assessing the compatibility of these uses with surrounding areas.

Industrial

The industrial land use designation is applied to areas intended for a range of light and heavy commercial, assembly, warehousing, and manufacturing uses. These businesses can be beneficial for a municipality in terms of providing employment and an increased tax base. Large tracts of land with easy access to roadway transportation are becoming increasingly hard to find for the industrial business community, creating an advantage for Ferris.

Landfill

The existing Skyline Landfill is owned and operated by Waste Management of Texas, Inc. and is located entirely within the City of Ferris. The landfill was originally permitted in 1975 and has gradually increased in acreage over time. As a major contributor to Ferris' tax base, it is anticipated this use will continue operations within the City.

Future Land Use Distribution

Table 9 and **Figure 18** show the acreage of land uses based on the Future Land Use Plan for Ferris's combined planning area (combined City limits and extraterritorial jurisdiction), as well as the percentage each use comprises of the planning area.

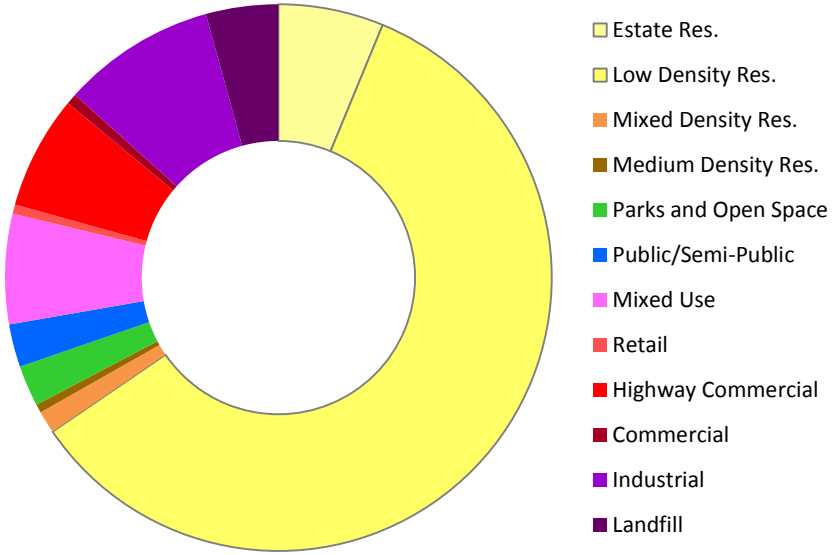
As shown, traditional single-family residential uses are recommended to continue as Ferris's largest land use – estate density residential at 6 percent and low density residential at 59 percent of all developed land.

The second-largest use types proposed are industrial development, mixed use, highway commercial businesses, and the landfill.

Table 9. Future Land Use Acreage for Total Planning Area

Future Land Use Category	Total Acres	% of Total Land	% of Dev. Land
Estate Res.	706	4%	6%
Low Density Res.	6,710	42%	59%
Mixed Density Res.	150	1%	1%
Medium Density Res.	57	0%	1%
Parks and Open Space	274	2%	2%
Public/Semi-Public	294	2%	3%
Mixed Use	785	5%	7%
Retail	62	0%	1%
Highway Commercial	768	5%	7%
Commercial	72	0%	1%
Industrial	1,028	6%	9%
Landfill	484	3%	4%
Developed	***11,390***	***71%***	***100%***
Floodplain	4,650	29%	---
Total	***16,040***	***100%***	***---***

Figure 18. Future Land Use Distribution of Developed Land



Population Projections

Increased demand for all types of land uses must be taken into account when establishing a Future Land Use Plan. This section contains projections for the future population of Ferris, including the City's total planning area (City limits and ETJ).

Table 10. CAGR Projections

Year	Compound Annual Growth Rate		
	1%	3%	8%
2012	2,440	2,440	2,440
2013	2,464	2,513	2,635
2014	2,489	2,589	2,846
2015	2,514	2,666	3,074
2016	2,539	2,746	3,320
2017	2,564	2,829	3,585
2018	2,590	2,913	3,872
2019	2,616	3,001	4,182
2020	2,642	3,091	4,516
2021	2,669	3,184	4,878
2022	2,695	3,279	5,268
2023	2,722	3,378	5,689
2024	2,749	3,479	6,144
2025	2,777	3,583	6,636
2026	2,805	3,691	7,167
2027	2,833	3,801	7,740
2028	2,861	3,915	8,359
2029	2,890	4,033	9,028
2030	2,919	4,154	9,750
2031	2,948	4,279	10,530
2032	2,977	4,407	11,373

Based on recent and anticipated development trends, a growth rate of approximately 3 percent is projected for the City of Ferris. Although this is more ambitious than recent growth has occurred, several factors contribute to the projected growth. These factors include a development anticipated in the southwestern portion of Ferris's ETJ (note that although this is outside of the City limits, a development agreement was established to include these residents in the City's population), continuing expansion of the DFW Metroplex, and the culmination of recent economic recession.

Ultimate Capacity

Ultimate capacity refers to the maximum number of residents that the City can support, given the current boundaries. In order to calculate the ultimate capacity, the Future Land Use Plan map and Existing Land Use Map are used to determine the number of vacant residential acres. This acreage is multiplied by the expected number of dwelling units per acre, the occupancy rate and number of persons per household. The number of current residents is then added to reach the total number of residents that can be supported within the existing planning area.

Based on these calculations, the current planning area can support about 60,000 residents. Considering the vast amount of vacant land and this extremely large population change from today's population of about 2,440 residents, Ferris's ultimate capacity will likely not be reached in the foreseeable future.

Table 11. Ultimate Capacity

Vacant Residential	Vacant Acres	DUA	Occ. Rate	PPH	Future Projected		
					Housing Units	House-holds	Pop-ulation
Estate Density	710	1	92.2%	3.1	710	654	2,028
Low Density	6,223	3	92.2%	3.1	18,669	17,213	53,359
Mixed Density	31	6	92.2%	3.1	185	171	530
Medium Density	45	10	92.2%	3.1	445	410	1,272
Ultimate Capacity within Vacant Areas					20,009	18,448	57,189
Current Population					794	755	2,440
Ultimate Population Capacity					20,803	19,203	59,629

Thoroughfare Network

The analysis of the future thoroughfare network began with an analysis of the existing roadway Level of Service. Figure 21. Level of Service located on page 45 indicates the existing roadway level of service provided at this time. Level of Service (LOS) refers to operational conditions of a road during daily, off-peak or peak periods and is categorized in a range from "A" to "F". The LOS rating system is similar to grades in the school system. An LOS of "A" is the best and vehicles have very little delay, while an LOS of "F" is for stop-and-go traffic.

As shown on this map, all roadways in Ferris have an LOS of C or better, which indicates acceptable operational conditions. Many cities in the surrounding areas consider an LOS of C or D to be acceptable and their design threshold. The roadway LOS is impacted by the delay at intersections along the roadway; therefore roadway LOS can be improved by improving an intersection LOS.

The Future Land Use Map located on page 31 also reflects the thoroughfare plan. A community's roadway network forms one of the most visible and permanent elements of a community. It establishes the framework for community growth and development and, along with the Future Land Use Plan, forms a long-range statement of public policy. The thoroughfare network is vital to the City's ability to grow and attract businesses, and as such it is directly linked to land use. The type of roadway dictates the use of adjacent land, and conversely, the type of land use dictates the size, capacity and flow of the roadway.

A functional classification of streets has been developed for the roadway network within Ferris. In short, this classification of streets provides for the circulation of traffic in a hierarchy of movement from one classification to the next. For Ferris, street classification includes a range of arterial and collector streets, interconnected with the FM and highway network. As identified on the map, the thoroughfare types include six lane divided roadway, four lane divided and undivided roadways, and two lane divided and undivided roadways (see **Figure 22. Thoroughfare Plan Cross-Sections**).

Two thoroughfare plans have been presented as shown in Figure 19 and Figure 20. The Future Land Use Map and Figure 19. Transportation Plan (Without Bypass Realignment) show the current configuration, requiring traffic to "jog" along Central Avenue to connect from FM 664 to 5th Street (subsequently to Interstate 45). One alternative would be to realign the FM 664 connection from 6th Street to 5th Street, west of Wood Street, which is shown in Figure 20.

Transportation Plan (With Bypass Realignment).

It is recommended to follow Figure 20 and add the FM 664 by-pass/5th Street extension. This roadway extension will keep the roadway widths within Ferris smaller, which creates a more pedestrian-friendly feel. It will also provide better east-west connectivity within the City and decrease the number of vehicles cutting through the downtown area.

Special Considerations

Several specific roadway issues should be identified, which may affect future development patterns in Ferris. The first of these is the construction of the future Loop 9 highway. The alignment shown on the map is the most recent; however, it has not been finalized as planning is currently on-going for this major mobility corridor. East-west demand within the core of Ferris may be impacted by this roadway. For example, the plan currently indicates a need for FM 664 to be a four lane roadway west of town. If Loop 9 is constructed as shown, FM 664 may only require the existing two lanes.

Another special consideration is the entry of FM 664 into the downtown area. The Future Land Use Map and **Figure 19. Transportation Plan (Without Bypass Realignment)** show the current configuration, requiring traffic to "jog" along Central Avenue to connect from FM 664 to 5th Street (subsequently to Interstate 45). One alternative would be to realign the FM 664 connection from 6th Street to 5th Street, west of Wood Street, which is shown in **Figure 20. Transportation Plan (With Bypass Realignment)**.

The final area of special note is the white dashed line in the southwestern portion of the map, a proposed bypass of Ferris's core area, which would provide a connection from FM 664 directly to Interstate 45. At this time, the bypass is recommended as a possible future consideration. A traffic impact analysis (TIA) study should be conducted following future development in this area to determine whether this bypass is appropriate.

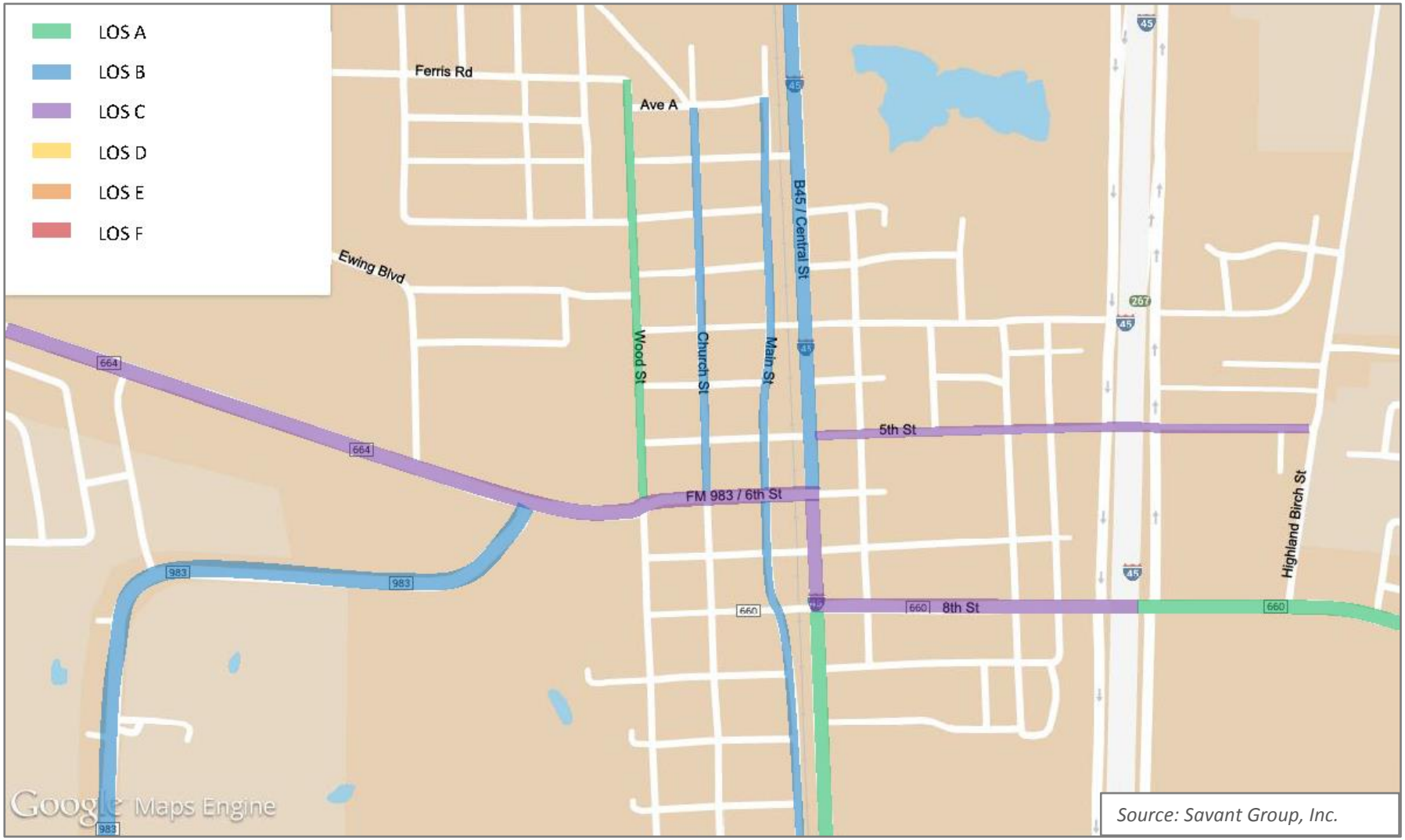
Figure 19. Transportation Plan (Without Bypass Realignment)

Source: Savant Group, Inc.

Figure 20. Transportation Plan (With Bypass Realignment)

Source: Savant Group, Inc.

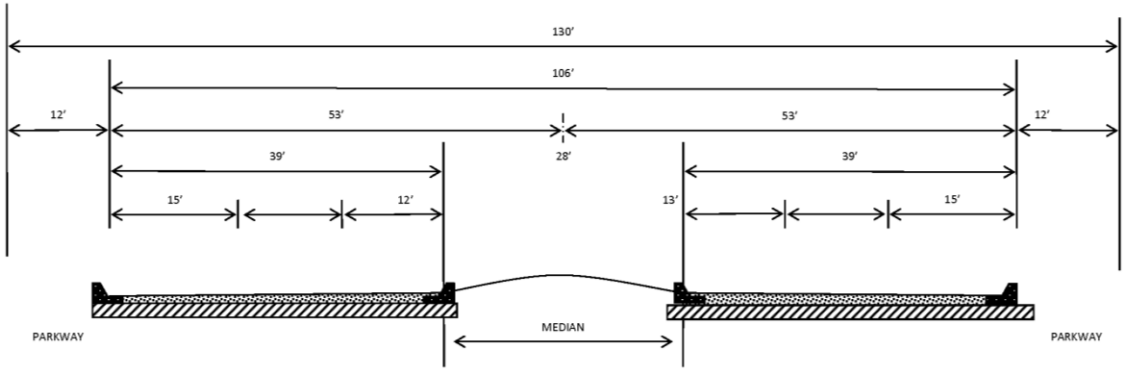
Figure 21. Level of Service



Source: Savant Group, Inc.

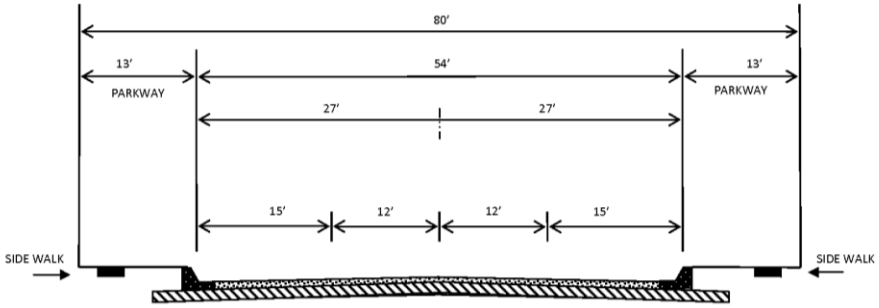
Figure 22. Thoroughfare Plan Cross-Sections

6 lane Principal Arterial (P6D)



All designs should be in accordance with *TxDOT Roadway Design Manual*

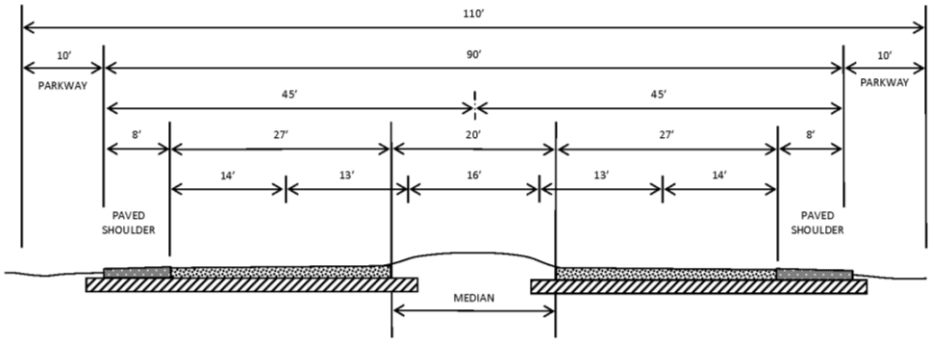
4 Lane Minor Arterial Undivided (M4U)



All designs should be in accordance with *TxDOT Roadway Design Manual*

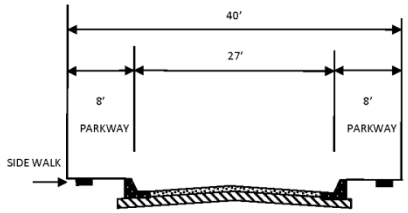
Source: Savant Group, Inc.

4 Lane Major Arterial Divided (MA4D)



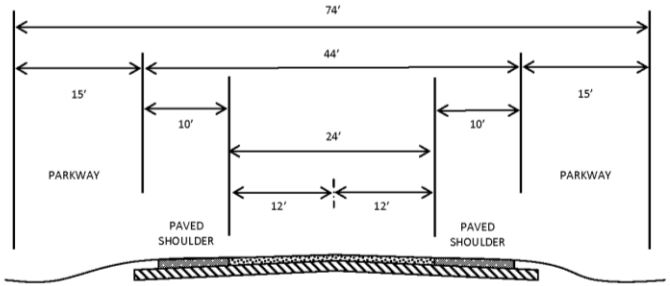
All designs should be in accordance with *TxDOT Roadway Design Manual*

Two Lane Limited Local (2LL)



All designs should be in accordance with *TxDOT Roadway Design Manual*

Two Lane (2U)



All designs should be in accordance with *TxDOT Roadway Design Manual*

Source: Savant Group, Inc.

Recommendations

The goals identified in the *Vision* element provide a basis for these future land use recommendations. For reference, the following are the goals related to future land use:

1. ***Encourage a desirable mix of land uses within the City.***
2. ***Consider the development of an industrial business park in the City.***
3. ***Encourage complementary development and historic restoration within the Downtown.***

#1 Adopt the Future Land Use map

The adoption of this 2013 Comprehensive Plan includes the adoption of the Future Land Use Map (see **Figure 16**). This map has been developed with existing land use, public input, and existing infrastructure in mind. As discussed below in **Administration of the Plan**, future rezonings should be made in accordance with the Future Land Use Map. If for some reason a rezoning that does not conform to the Future Land Use Map is desirable, the Future Land Use Map should be amended prior to the rezoning to ensure consistency.

Administration of the Plan

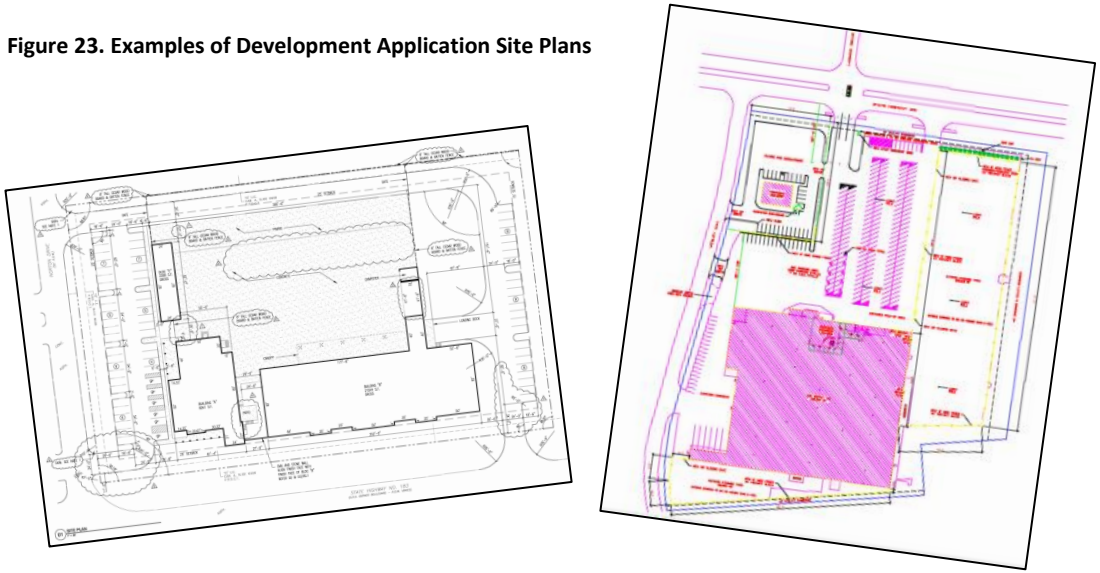
The following sections discuss the integration of the Future Land Use Plan into daily planning tasks – specifically development proposals and zonings. The purpose of this information is to help guide City Staff, City Council, and other decision-making bodies in upholding the intent of the Comprehensive Plan.

Development Proposals and the Future Land Use Plan

At times, the City will likely encounter development proposals that do not directly reflect the purpose and intent of the land use pattern shown on the Future Land Use Plan (**Figure 16**). Review of such development proposals should include the following considerations:

- Will the proposed change enhance the site and the surrounding area?
- Is the necessary infrastructure already in place?
- Is the proposed change a better use than that recommended by the Future Land Use Plan?
- Will the proposed use impact adjacent residential areas in a negative manner? Or, will the proposed use be compatible with adjacent residential areas?
- Are uses adjacent to the proposed use similar in nature in terms of appearance, hours of operation, and other general aspects of compatibility?
- Does the proposed use present a significant benefit to the public health, safety and welfare of the community?
- Would it contribute to the City's long-term economic well-being?

Figure 23. Examples of Development Application Site Plans



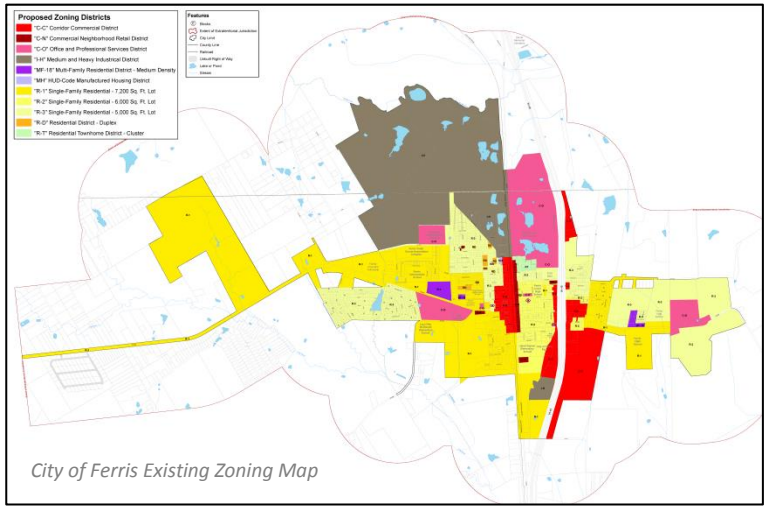
Development proposals that are inconsistent with the Future Land Use Plan (or that do not meet its general intent) should be reviewed based upon the above questions and should be evaluated on their own merit. It is the responsibility of the applicant to show that the proposal meets the aforementioned considerations and supports community goals and objectives as set forth within this Plan.

It is important to recognize that proposals contrary to this 2013 Comprehensive Plan could be an improvement over the uses shown on the map for a particular area. This may be due to changing markets, the quality of proposed developments and/or economic trends that occur at some point in the future after the plan is adopted. If such changes occur, and especially if there is a significant benefit to the City, then these proposals should be approved, and the Future Land Use Plan map should be amended accordingly.

Zoning and the Future Land Use Plan Map

The City's zoning map should reflect the Future Land Use Plan map to the fullest extent possible. It is important to note that the Future Land Use Plan map is not a zoning map, which legally regulates specific development requirements on individual parcels. Rather, the zoning map should be guided by the graphic depiction of the City's preferred long-range development pattern as shown on the Future Land Use Plan map.

Chapter 211 of the Texas Local Government Code states that "zoning regulations must be adopted in accordance with a comprehensive plan." Consequently, a zoning map and zoning decisions should reflect the Future Land Use Plan map; therefore, approval of development proposals that are inconsistent with the Future Land Use Plan should be avoided.



City of Ferris Existing Zoning Map

It is recommended that the City amend the Future Land Use Plan map prior to rezoning land that would result in such inconsistency. In order to expedite the process of amending the Future Land Use Plan to ensure zoning regulations correspond, the related amendment recommendation(s) may be forwarded simultaneously with the rezoning request(s). If a rezoning request is consistent with the plan, the City's routine review process would follow. It is recommended that the City engage in regular review of the Future Land Use Plan to further ensure that zoning is consistent and that the document and the map reflect all amendments made subsequent to the plan's initial adoption.

Reactive and Proactive Use of Zoning and the Plan

Approval of development proposals that are inconsistent with the Future Land Use Plan will often result in inconsistency between the Future Land Use Plan and zoning regulations. As previously mentioned, it is recommended that the City amend the Future Land Use Plan prior to rezoning land that would result in such inconsistency. In order to expedite the process of amending the Future Land Use Plan to ensure zoning regulations correspond, the related amendment recommendation(s) should be forwarded simultaneously with the rezoning request(s).

A proactive approach is the opposite of a reactive approach. In the reactive approach, the landowner or developer applies for a zoning change and the Future Land Use Plan map is updated accordingly. In a proactive approach, the City leads the effort to rezone land according to the Future Land Use Plan map.

#2 Establish incentives, target marketing efforts, and update zoning to promote an Industrial Business Park

An industrial business park should be established to take advantage of the City's assets – Interstate 45 and future proposed Loop 9 highway frontages, rail line, large vacant parcels, and the nearby Dallas Intermodal Terminal. The City should ensure that zoning allows industrial uses in this area that conduct light manufacturing, assembling and fabrication, warehousing, wholesaling, and service operations. Additionally, the City may wish to review the uses allowed in the Industrial districts. These districts are often used as a "catch-all" for generally less-desirable land uses. The City may wish to ensure that these large tracts may be reserved for true industrial development.

The City should coordinate with the Ferris Economic Development Corporation to target these businesses and identify incentives to attract desirable users.

The City should also take measures to ensure that these developments contribute positively to Ferris's image from the major corridors. To accomplish this, development regulations should be in place to require screening for outdoor storage and loading in areas that are visible from a roadway. The uses should be designed in a coordinated, campus-like setting with easy access to the major roadways to avoid disrupting local traffic.

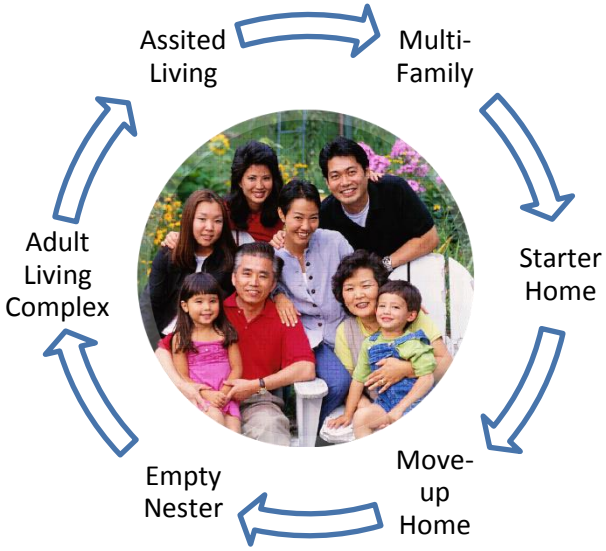
#3 Ensure a desirable mixture of housing types and lot sizes

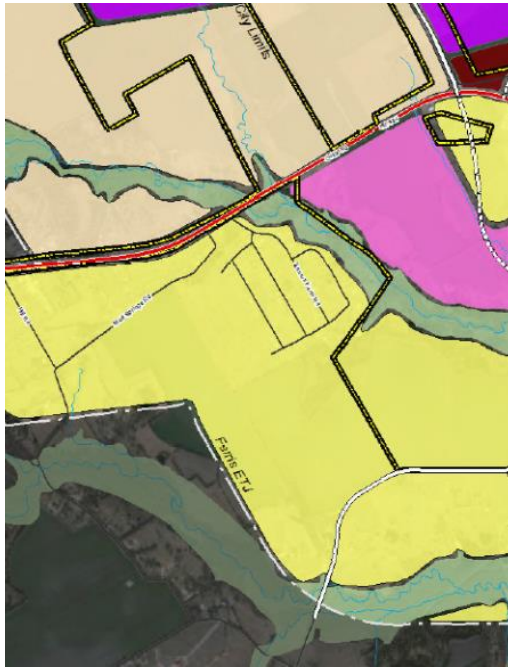
A mixture of residential housing types and lot sizes should exist throughout the community, promoting uniqueness and creating distinctive neighborhood areas. It is the intent of this recommendation to encourage housing diversity, both in housing type and lot size, so that neighborhoods can be developed that contain housing for residents at all stages of life. The ideal results would be full life-cycle neighborhoods that contribute to the desirability and uniqueness of Ferris.

It is important for cities to provide a variety of housing for the full life cycle of citizens and to meet the needs of different segments of the population – people of different ages, socio-economic levels, and employment levels. The "full-life cycle" is intended to describe all stages of life – young singles, professional couples, families with children, empty-nesters, retirees and seniors, including those requiring living assistance. In addition to providing housing types for all its residents, offering higher density housing will also help the City to eventually achieve home-rule status.

There are several existing multiple family housing developments within the City. These developments can be an asset to the community and are recommended to remain on the Future Land Use Plan map. Recommendations specific to multiple family design standards can be found in the Livability element.

At the other end of the density spectrum, the Future Land Use Plan map also shows low- and estate-density residential development. In order to ensure this development occurs as intended, it is recommended the City develop a residential zoning district for larger minimum lot sizes (i.e., a Rural Residential category for lots larger than one-half or one acre). The zoning ordinance currently has a minimum of 9,000 square feet for the largest residential zoning district lot size. Although lots may be developed larger than the minimum required size, large lot home owners often prefer to be located next to similar sized properties.





#4 Adopt programs or codes that encourage reuse of existing structures in Downtown

Special consideration needs to be given to the historic downtown area. This has long been the center for Ferris and its architecture and general form date to a previous time and period; therefore, preservation of the atmosphere, architecture, and historic relevance of the downtown area is something that the City desires to maintain. Additionally, the reuse of existing structures helps to maintain the area's unique character, reduces development costs, and reduces waste from demolition and reconstruction.

The City currently has voluntary guidelines in place in Downtown to encourage renovations to be consistent with the area's existing character. These guidelines are optional recommendations; however, the City may wish to consider adopting mandatory standards to ensure the character is preserved and even restored. This proposed regulation would be implemented as either a base zoning district or an overlay zoning district, with the purpose of setting standards on development within the Downtown area.

The City should also investigate the adoption of an Adaptive Reuse Ordinance to encourage the reuse of existing structures in the Downtown by permitting additional uses and avoiding additional costs and time spent by the developer. The City can also adopt the International Existing Building Code (IEBC) to address older existing buildings to achieve the same safety standards through different means.

A program is currently in place to provide matching grants up to a certain dollar amount for façade improvements in the downtown. This program should be continued and possibly expanded to increase the dollar amount, or to extend to other improvements such as signage.

A Business Improvement District (BID) may be appropriate to encourage improvements in the Downtown area as well.

Future Land Use Conclusion

The recommendations contained herein should guide Ferris's future land use planning and related policies. It is important to note that the Future Land Use Plan is not the community's official zoning map, but a guide to decision-making in the context of the City's future land use patterns. The Future Land Use Plan should be used consistently and updated as needed, as coordinated, quality development continues over time.

Livability

Urban design principles strive to improve the quality of life, or "livability", within a community by enhancing the man-made environment and by creating new opportunities for social interaction among residents. Quality urban design practices also help to create a legible development pattern that makes the community understandable to residents and visitors alike. They often deal with the sensory response of people to the community's physical environment: its visual appearance, its aesthetic quality, and its spatial character.

Urban design can be used to bolster people's sense of well-being, community identity, civic pride, and awareness of different places within the community. The creative application of specific urban design improvements, no matter how large or small they may be, should result in a more aesthetically and functionally stable community, which is a more desirable place to live.

Promoting livability also has long lasting financial benefits. Creating desirable places encourages reinvestment into the community. This reinvestment in turn helps to keep taxes low because property values tend to increase

In the simplest terms, creating "livability" means creating places where people want to be.

which lessens the need to raise tax rates. Quality, sustainable development attracts businesses and residents, expanding the tax base. Financial investments promote a sense of ownership of the community.

This Livability element of the Comprehensive Plan integrates urban design considerations into the City's growth and development processes to create an attractive and recognizable physical environment that complements the functional organization of Ferris, and to reinforce a sense of "community" among the people who live here. The intent of this Livability element is to provide recommendations for maintaining and strengthening both the City's image as a community of excellence and leisure, as well as its identity as a small town in spite of its proximity to the expanding City of Dallas and other neighboring communities.

The City has recently adopted a new zoning ordinance, which addresses many issues related to the community's livability. This section will focus on providing suggested revisions to consider during future updates of this ordinance.

Recommendations

The goals identified in the Vision element provide a basis for these livability recommendations. For reference, the following are the goals related to livability:

4. ***Establish a unique identity for the community.***
5. ***Improve the physical appearance of Ferris's frontages and neighborhoods.***
6. ***Promote desirable neighborhoods.***

#5 Create and enhance gateway entrances to the City

The visual monotony that is often inherent to communities within a geographic area makes it appear that each one is just like its neighbors. For example, the visual appearance of the City to a traveler along Interstate 45 may be very similar to the appearance of any other nearby community. This lack of design variety, especially along major corridors, makes it difficult for people to know when they have left one community and entered another. Gateways can provide a strong sense of arrival to a community. These features are the first thing visitors see when they arrive and the last impression visitors have when they leave.

The design of gateways into the City of Ferris should be guided by several factors. One factor is the number of people using a particular entry point. The most heavily traveled roadway entering the community is Interstate 45. Welcoming signage, similar to the illustration above, should be located at the north and south entrances into the City limits to greet visitors into Ferris. Additionally, the bridges and the frontage roads are alternate options that may be accomplished through coordination with TXDOT. Improved overpasses with decorative rails, landscaping, lighting, and signage are possibilities.

Another important factor in the design of gateways is to develop an entryway that provides a sense of identity for the community. Consideration should be given to establishing a uniform design concept for all gateway areas, and hierarchical distinction between major and minor gateways can be achieved through design modification and scaling for each type of entry feature.

Similarly, another important aspect to improving the livability of Ferris is to establish a consistent appearance and theme, particularly in the Downtown. For example, building on Ferris's history, the City could place banner signage on existing light posts with the words, "Welcome to the City that Bricked the World, est. 1874", reflecting the theme of the gateway entrances.

The City currently has an entryway sign along 5th Street; however this feature appears to be dated, does not reflect a consistent theme within Ferris, and has minimal landscaping and design attributes.

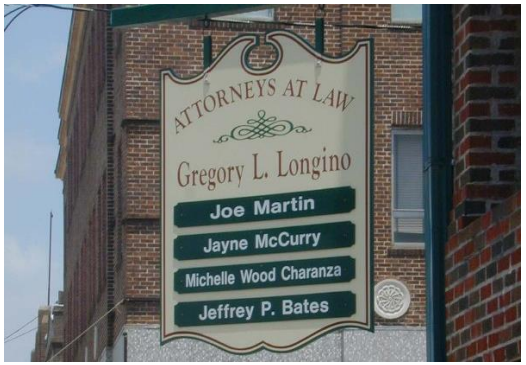
Priority for funding entry features, both in terms of total dollars spent per entry and in terms of the timing of expenditures, should be directly related to the number of people using a particular entry point. Donations can often be solicited from civic groups to assist in the funding of specific gateways and/or their maintenance (e.g., an "adopt a gateway" program).

#6 Evaluate and update signage requirements

Another method of enhancing the overall image of Ferris is through sign regulation that reduces the visual clutter that can result from a lack of regulation. Because of Ferris's location along Interstate 45, many of the businesses along the corridor use pole signs in order to make their advertisements visible to the passing traffic. This use of pole signs does not promote a positive, aesthetically-pleasing image of Ferris to those passing through.

Sign regulations, however, should be balanced between the public interest and the needs and rights of the business community. For instance, while sign regulations should enhance the roadway by improving the visual appearance and safety, the regulations should allow for businesses to advertise enough to entice customers or clients to stop at these businesses.

The zoning ordinance currently allows for "1 freestanding (either pole or monument) sign per street frontage, 2 maximum" in non-freeway areas. The City should consider reviewing the existing sign regulations and determine whether pole signs are appropriate in the non-freeway portions of Ferris. Additionally, the City may wish to consider removing the signage regulations from the zoning ordinance in order to enforce regulations beyond the City limits.



#7 Update design standards for nonresidential and multiple family residential development

In order to promote a positive image of Ferris, the City should continue its efforts to pursue quality urban design standards in all developments and provide flexibility for new market trends, design initiatives and features. Quality design standards are intended to improve the City's livability.

Ferris's zoning ordinance currently requires a certain percentage of nonresidential buildings to be constructed of masonry materials, and provides a definition for what materials this includes. The following are long-term suggested recommendations pertaining to nonresidential and multiple family residential developments within Ferris, and are intended to promote the quality and aesthetic appeal of the City. Specific methods and enhanced design standards may be considered during future updates of the City's zoning regulations.

One suggested revision is to reexamine the exclusion of fiber cement siding (i.e., HardiePlank) from the masonry materials classification. Another option to allow developers more flexibility in design while promoting quality materials is to assign materials within a "class" system. The City can require a certain percentage of each class be used in the design, with an emphasis on the building façade.

In addition to materials, building articulation is another important aspect of building design to consider. Building articulation refers to any prominent architectural feature that breaks up a wall plane, either horizontally or vertically. For example, the City can require that for every 50' of wall plane, the design must incorporate an element of articulation.

Additionally, for multiple family residential developments, the City may wish to consider requiring the following or similar conditions to ensure quality construction and design:

- Flat roofs prohibited
- Require a masonry fence (no wood) for buffer
- Four or more of the following architectural features:
    - Awnings/Canopies
    - Balconies
    - Dormers
    - Offsets within each building
    - Patio or porch
    - Varied roof height in building
    - Others as approved by the Director

Another option is to require an SUP for multiple family developments, to ensure appropriate, quality design.

#8 Ensure adequate screening and buffering to reduce land use conflicts

The Future Land Use Plan seeks to minimize conflict between residential and nonresidential areas, but screening and buffering efforts can help to mitigate any remaining incompatibility between land uses. The City should consider reviewing screening and buffering requirements between residential and multiple family or nonresidential developments.

If a screening wall is used, the wall should be constructed entirely of brick, masonry, or other like material consistent with the exterior finish of the primary structure. It should also be at least six feet in height, consistent with the zoning ordinance's requirements. The ordinance currently allows screening walls to be constructed of wood. Wood is an attractive material to use for screening walls initially, but it is a high maintenance material, and therefore is not recommended for screening walls. Construction of such a wall would typically be a responsibility of the nonresidential or multiple family land use developer.

It is important that the City maintain and enhance the view from public streets and neighboring properties. The City should ensure that any view of waste receptacles (e.g., dumpsters) from existing or proposed public roadways is screened by some type of screening device. Such regulations are not currently contained in the City's zoning ordinance. Containers should be screened on three sides with materials that are consistent with or similar to the construction of the main building, and should be equipped with a gate that remains closed when the refuse area is not in use. Additionally, waste receptacles should not be placed within required parking spaces, and should allow proper access and circulation by service trucks.

Outside storage and loading areas should also be screened as much as possible near public streets and neighboring properties, particularly within Downtown. Loading docks and service areas should be located at the rear of the building.

The City's zoning ordinance currently prohibits outside storage in certain districts, within a certain distance of residentially-zoned property, and for certain uses; however, the ordinance should also address outside storage in the districts and for the uses in which it is permitted. For example, outside storage may be permitted only when screened by the building itself or with screening/landscaping. In other instances, minimizing the view of the storage from public right-of-way may be a desirable option. Additionally, the City should consider developing regulations to screen loading areas, or to locate these areas in the rear of the building.

#9 Ensure Ferris's existing and future neighborhoods are desirable and well-maintained.

The design and character of residential neighborhoods is an important component of the community's overall urban design. As more vacant property is developed into residential subdivisions, such design factors including the provision of open space, adjacency issues, screening, landscaping, and the design layout of the subdivision itself, will be critical to the perception of the City's residential neighborhoods.

Preservation of Existing Neighborhoods

Many of Ferris's existing homes are historic structures, dating back to the early 20th century (see **Figure 8. Home Construction Year** on page 9). The City's existing historic preservation overlay district is in place to preserve these homes, and should be maintained. The City may also want to consider offering incentives for residential infill and redevelopment on vacant tracts. Density bonuses or help with infrastructure costs for the right type of development may also be considered.

Another opportunity for the City is to facilitate volunteer-based programs to upgrade housing and improve neighborhood areas. Funds for such programs could be garnered from grants or from charitable donations (e.g., from local businesses, churches, service organizations). Many cities across Texas host home improvement projects in which neighborhood residents volunteer to help with basic exterior household repairs. Many cities receive supply donations from local hardware stores.

The City may find it useful to document the conditions of neighborhoods as they age to identify deteriorating areas and to prioritize such areas for improvements. Facts that should be documented include but are not limited to, code violations, public safety reports (e.g., police and fire), and ownership/rental percentages. There are several methods that can be used to determine these facts, including conducting door-to-door housing condition surveys and reviewing code violation reports.

Code enforcement is one way the City can improve local housing. Many cities have code enforcement policies that are reactive – violations of general code regulations are not enforced unless and until a complaint is made. Other cities have code enforcement policies that are more proactive – staff is actively looking at areas of the community from a regulatory perspective, and enforcing codes as they see violations on a regular, consistent basis, without a complaint being made. Ferris should consider adopting a policy of proactive code enforcement. Code enforcement officers should be surveying the City, recognizing and taking care of violations. Public safety issues related to housing, such as sagging roofs and leaning exterior walls, should be of the utmost concern as violations are identified.

#10 Promote safety within the community

Code Red

Code Red is a free alert system in place to alert Ferris residents in case of a local emergency or other critical situations. Citizens must register in order to receive this alert (a link to registration is available on the City's homepage, or access the site directly at https://cne.coderedweb.com). Many citizens may not be aware of this alert system. The City may wish to consider advertising this service with notices in water bills, signage, or announcements at local community or neighborhood meetings.

Crime Prevention Through Environmental Design (CPTED)

Crime Prevention Through Environmental Design (CPTED) is a design approach that originated in the 1960s to deter criminal activity by relying on the design of the built environment to affect human behavior. CPTED can be an inexpensive method for cities to deter crime if incorporated into the initial design.

Although CPTED can be difficult to incorporate into development regulations, it can be beneficial for City Staff to be aware of the basic principles to assist in incorporation into future developments. The City may wish to provide materials to prospective developers to encourage these techniques. The following four CPTED principles should be incorporated into future development, as possible and appropriate, to increase perceived safety and discourage criminal activity.

Natural Surveillance

Increasing visibility can reduce the likelihood of criminal activity and increase the feeling of pedestrian safety. The feeling of "being seen" is created by ensuring clear lines of sight, the placement of windows facing onto streets, and shorter fences with open designs. Also, pedestrian scale lighting (i.e., lighting that increases the visibility of a person's face) helps to deter crime because a person can be more easily identified and is less likely to be disguised in shadows.

Natural Territorial Reinforcement

Public areas should be clearly distinguished from private areas. Common areas should be designated by the presence of signage, seating, and other public amenities, and should be used to host community gathering activities. Security signage should be used for private areas and public spaces accessible during evenings, such as parking lots. Creating a sense of ownership in private areas discourages unwanted persons from entering the area. Private land should be delineated by landscaping or short, open fencing.

Natural Access Control

Environmental design can be used to limit access by having designated points of entry, which increases the public awareness of a person entering the area. The placement of thorny bushes under low windows and around

fencing is an easy method to discourage intruders from "sneaking in". While open-style fencing is appropriate for front and side yards to increase visibility, taller masonry walls should be used along alleys.

Maintenance

Adequate maintenance of public and private areas helps to discourage criminal activity, and supports a sense of ownership for residents to protect their community. According to the "Broken Windows" theory, even small acts of crime can attract more severe acts of crime. Code enforcement and timely removal of graffiti and litter are relatively low-cost efforts to improve the City's appearance and deter criminal activity.

#11 Evaluate other suggested zoning regulation updates

The following is a summary of other aspects of the zoning ordinance that the City may wish to consider during any future ordinance updates (Note that items are not listed in order of priority):

1. Places of worship and schools should be permitted by-right in all districts. The zoning ordinance currently requires a Special Use Permit for these uses, which is in conflict with State law and contemporary planning practices.
2. The site plan requirements should be clarified. The use chart conditions indicate only certain uses require a site plan, whereas the Supplemental Requirements require a site plan for all new structures.
3. Consider inclusion of building material requirements and anti-monotony standards for residential developments to ensure quality home construction. As noted previously, the City currently has standards in place for nonresidential construction; however, no similar standards have been established for residential developments.
4. Develop standards to address sustainable features, such as wind energy conversion systems (i.e., windmills or wind turbines) and solar panels. For example, wind energy conversion systems should be required to have a "fall zone" setback from any neighboring properties and may include maximum decibel requirements.
5. Parking standards should be linked to the uses in the use chart, and should consider offering a shared parking agreement alternative. It is currently difficult to determine which parking requirements apply to which uses.
6. Consider removing the Recreational Vehicle zoning district. This should likely be deleted as a zoning district. The City may wish to maintain the standards as a separate portion of the City's Code of Ordinances (not within the zoning ordinance).
7. Ensure that all fees are removed from the ordinance and provide reference to the separate fee schedule.
8. The Special Use Chart should be synced with the Permitted Use Chart; these tables are currently in conflict and should be contained in one consolidated table.
9. The ordinance currently allows the City Manager to grant special exceptions for carports. All special exceptions must be granted by the Board of Adjustment. If it is desired for the City Manager to address carports, then the process should be removed from the special exceptions section and referred to as a permit.

10. The ordinance identifies variances as a power of the Board of Adjustment; however, it does not identify the necessary criteria or procedure for granting a variance. Although the City has a separate manual identifying these criteria, it should also be included in the zoning ordinance.

Livability Conclusion

The recommendations contained within this Livability element are intended to influence the aesthetics and functionality of the nonresidential and residential neighborhoods in Ferris. These recommendations should be considered in future community decisions, specifically during any future updates of the zoning ordinance.

3 *Implementation*

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Implementation Strategies

Implementation is one of the most important, yet most difficult, aspects of the comprehensive planning process. Without viable, realistic strategies for implementation, the recommendations contained within this 2013 Comprehensive Plan will be difficult to realize.

Implementation Matrix

The following matrix is a summary of the recommendations within this 2013 Comprehensive Plan. The columns *What*, *When*, *Who*, and *How* are intended to provide the City with specific tasks to work toward implementing the vision of this plan.

"What"

This table is a summary of the recommendations that are provided within each element of the plan. Each recommendation is a hyperlink to the original recommendation section with additional information.

"When"

Short-term items should be targeted for implementation within the first five years of plan adoption; long-term items should be targeted within five to ten years; on-going items cannot be completed with a single action and should be continually addressed.

"Who"

Although the responsibility for accomplishing a task may include additional parties, the purpose of this column is to identify the main player(s) in completing the action items.

"How"

This column identifies action items to accomplish each recommendation, such as a project that City Staff can lead, further study that is required, or necessary funding to be allocated.

What	When			Who	How
	Short-Term	Long-Term	On-Going		
Future Land Use Plan					
#1 Adopt the Future Land Use map	■			City Council and City Staff	• Adopt this 2013 Comprehensive Plan. • Ensure that the zoning map reflects the intent of the Future Land Use Plan map.
#2 Establish incentives, target marketing efforts, and update zoning to promote an Industrial Business Park		■		City Council, City Staff, and EDC	• Determine whether non-industrial uses are desirable in the Industrial district, and amend the zoning ordinance use chart if necessary. • Identify desirable businesses and possible incentives. • Revise development regulations to ensure quality appearance of industrial uses from roadway.
#3 Ensure a desirable mixture of housing types and lot sizes	■			City Council	• Amend the zoning ordinance to establish a larger lot residential district.
#4 Adopt programs or codes that encourage reuse of existing structures in Downtown		■		City Council and Main Street Board	• Consider mandatory development standards in Downtown. • Investigate benefits of adopting an adaptive reuse ordinance and/or the International Existing Building Code (IEBC). • Determine if any additional economic development tools are appropriate for Downtown (BID or expanding existing incentives).
Livability					
#5 Create and enhance gateway entrances to the City		■		City Council and City Staff	• Identify key sites for welcoming signage along Interstate 45. • Allocate funding for site acquisition, signage design, and construction/maintenance. • Identify volunteer groups that may be willing to perform regular maintenance at these gateway sites.

What	When			Who	How
	Short-Term	Long-Term	On-Going		
#6 Evaluate and update signage requirements		■		City Council	• Determine whether the existing sign regulations should be updated to restrict pole signage. • Move the sign regulations from the zoning ordinance to another location within the Code of Ordinances.
#7 Update design standards for nonresidential and multiple family residential development		■		City Council	• Consider updating the nonresidential development regulations (i.e., require building articulation and allow for more flexibility in nonresidential building materials). • Consider updating the multiple family development regulations (i.e., require certain amenities), and possibly requiring an SUP to ensure quality design.
#8 Ensure adequate screening and buffering to reduce land use conflicts		■		City Council	• Remove wood from acceptable materials for screening walls. • Require the screening of waste receptacles. • Require outside storage and loading areas to be located behind buildings or screened from public right-of-way.
#9 Ensure Ferris's existing and future neighborhoods are desirable and well-maintained.			■	City Council and City Staff	• Establish volunteer programs for neighborhood improvement projects. • Create and maintain an inventory of housing conditions. • Ensure code enforcement is proactive and prevents public safety issues.
#10 Promote safety within the community			■	City Staff	• Promote awareness of the City's existing Code Red alert system. • Ensure that City Staff is aware of CPTED principles, and informational materials are available.
#11 Evaluate other suggested zoning regulation updates		■		City Council	• Consider the 10 additional suggested amendments to the zoning ordinance outlined in this section.

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4 *Utilities*

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Storm Drainage System

Existing System

A storm drainage system is the method or methods which a city or entity utilizes to drain excess rain and ground water from paved streets, parking lots, sidewalks and roofs. The storm drainage system for the City of Ferris is made up predominately of surface drainage. Drainage is routed by overland flow to street gutters or small drainage ditches and culverts to various drainage channels or creeks. The city does have some small localized storm sewer systems. They collect runoff from small defined areas and conveys this runoff to one of the local creeks or drainage channels.

Drainage within the city is directed to six creeks or drainage channels and along Business I45 in some areas to the north. These different drainage areas or basins are illustrated in **Figure 24. Drainage Basins**. In determining the approximate drainage runoff from these areas, the basins were further divided into sub-basins. These sub-basins are also shown on **Figure 24.** Drainage Basins in addition to the area and runoff in cubic feet per second (cfs) for the area. The runoff volume is based on the Rational Formula of Q=CIA where:

Q	Runoff rate in cfs
C	Runoff coefficient based on land use
I	Intensity, inches/hour
A	Area in acres

The rainfall intensity was calculated using Ellis County drainage parameters which refer to the TxDOT Hydraulic Manual. For this study, the 100-year intensity of 8.83 inches per hour was utilized.

As can be seen from **Figure 24.** Drainage Basins, the Drainage Basins predominately flow to the south to Long Branch Creek except Drainage Basins #7 and #8, which flow to the north toward Ten Mile Creek. The Basins and sub-basins are defined in **Table 12. Drainage Basins and Sub-Basins**.

Sub-basin #15 is basically the golf course and includes two lakes which detain runoff. Drainage in the north area of this sub-basin flows to the north and Ten Mile Creek.

Existing Conditions

The existing drainage system for the City appears to be adequate and services the City well. There are some concerns of ponding water but these appear to be caused mainly by clogged or undersized culvert pipes and broken curb and gutters.

Broken Curb and Gutters

Broken curb and gutters is a common and ongoing problem for pavement built on clay soils. Over the years, the soils expand and contract due to changes in moisture content which result in the concrete failing. These failures usually cause the gutter to rise and fall at various locations inhibiting the drainage in the gutters and causing water ponding during significant rain events. We recommend Ferris budget a set amount of money each year for curb and gutter removal and replacement.

Table 12. Drainage Basins and Sub-Basins

Basin	Sub-Basins
#1	1, 2, and 3
#2	4, 5, and 6
#3	6, 7, 8, 9, 10, and 11
#4	14, 17, 18, 19, 20, 21, 22, 23, and 33
#5	24, 25, and 26
#6	27, 28, 29, 30, and 31
#7	12, 13, and 16
#8	15

Undersized and Clogged Culvert Pipes

Other problem areas noted in previous studies and in our site visits were the undersized and clogged culvert pipes. Many times undersized culverts are used under driveways due to cost

and also due to lack of vertical distance between the top of paving and the flowline of the drainage ditch. This lack of vertical distance encourages smaller or undersized culverts to be installed to keep the culvert at the flowline or bottom of the ditch and at the same time refrain from having a "hump" in the driveway over the culvert. The undersized culvert is either of insufficient diameter to carry the water flow or fills up with mud quickly and acts like a damn restricting the flow completely.

These types of problems can be addressed in several different ways. If the flowline of the drainage ditch centerline is fairly shallow, a concrete water crossing can be constructed to allow drainage across the driveway during rainfall events. The minimum size culvert recommended would be 18 inches in diameter. For ditches which are too shallow for a low water crossing but yet not really deep enough for an 18-inch culvert, an elliptical or "squash bottom" type pipe can be used.

Normally, the minimum size of this type of pipe is a 15-inch pipe which results in an 11-inch inside vertical dimension and an 18-inch inside horizontal dimension. This results in a "larger" pipe while minimizing the vertical impact on the driveway. In special cases, a combination of a squash bottom pipe covered with a structural slab would work to provide a minimum of cover over the culvert pipe.

Build-Up of Silt, Grass, and Weeds

A major problem which causes ponding and obstructs drainage is the build-up of silt, grass, weeds and other vegetation in the earthen drainage ditches. This is prevalent throughout the City. In order to keep these drainage ways working properly, the ditches need to be mowed, cleaned and cleared regularly. Even with scheduled maintenance activities, it is very hard to keep these areas clear.

For example when the drainage ditch is mowed at a scheduled time, and then rains prevent the next scheduled mowing, it is too wet to get in and mow again. Therefore the grass and vegetation grows up and restricts the flow. This excess vegetation keeps the bottom of the ditch wet making it difficult or impossible to mow which just compounds the problem.

In addition, the growth in the ditch causes the flow of the drainage to slow down depositing silt in the bottom. All of these actions over a period of time will cause the ditches to back up resulting in the spilling of water over the banks and on to the areas adjacent to the drainage ways.

This is a very common and expensive problem. Most cities do not have the proper equipment to keep the drainage ways open and it is not usually a very high priority for the limited man hours the city has at its disposal.

In addition, many of the drainage ways are maintained by the railroad, Ellis County or TxDOT. The City does not have these drainage ways under their control. It is recommended the City of Ferris work closely with these agencies to have them keep their drainage ways clear and maintained. The City may also decide to budget money each year to start constructing concrete bottoms in these drainage ditches. These concrete bottoms can be of varying widths and will keep grass and vegetation from growing in the bottom of the ditch. This will allow for improved flow and easier maintenance in the future.

Future Drainage

In reviewing Ferris' Future Land Use Plan, it appears the surface drainage method of conveying drainage to the various drainage channels or small creeks can continue to be used. As development does occur and drainage increases, careful consideration needs to be given to the maintenance of these drainage channels. Developers should provide the City with drainage plans for not only their development, but also the effects that the increased drainage has on downstream facilities. This can be accomplished with drainage models or by restricting the amount of runoff from a given drainage area to the same volume of drainage which occurs prior to development.

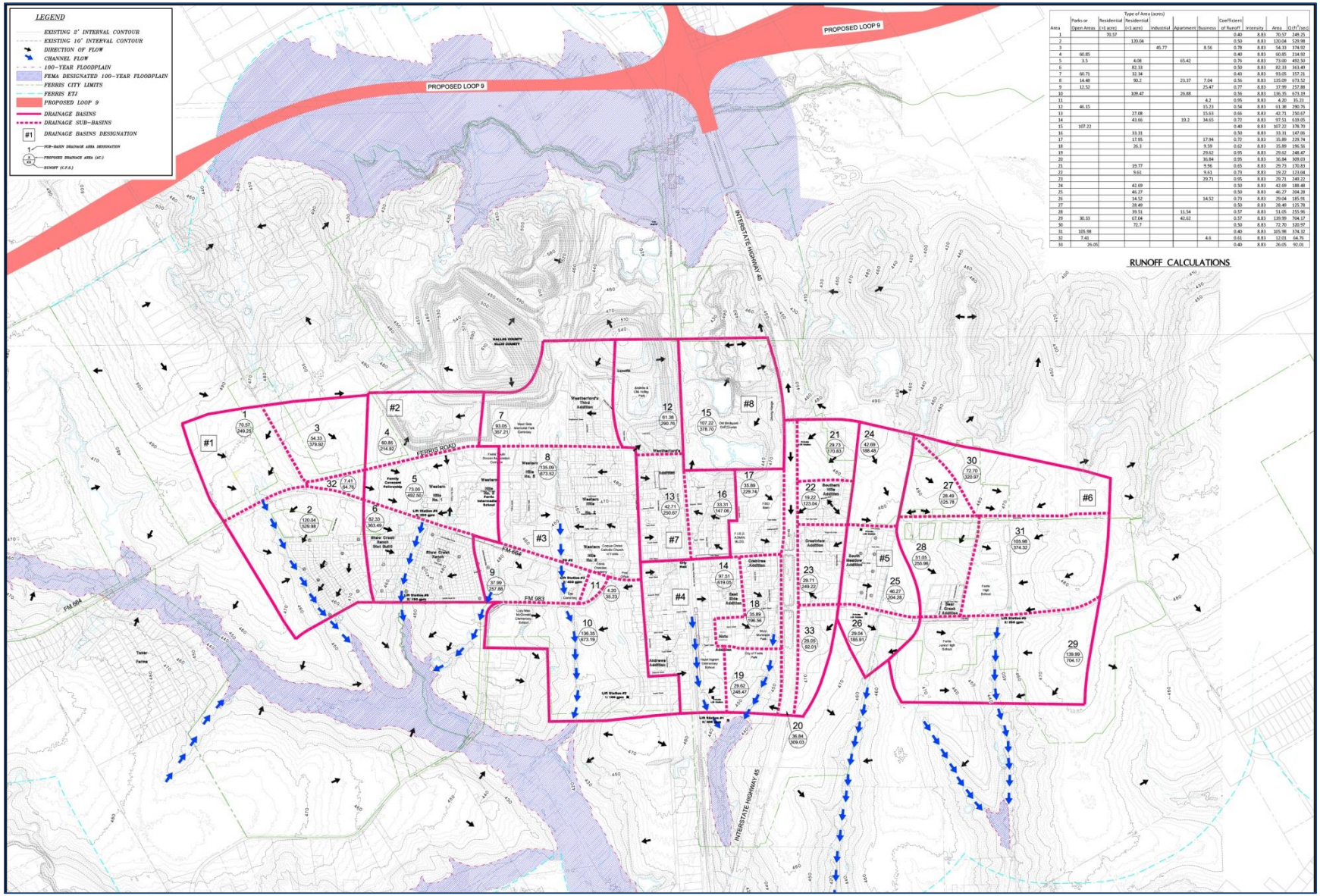
The North Central Texas Council of Governments (NCTCOG) has prepared a drainage design manual for site development titled "Integrated Storm Water Management" for Site Development. The "iSWM" manual would be a good reference or addition to the City of Ferris guidelines if the City desires to adopt a guideline for drainage planning in the future.

Table 13. Drainage System Recommended Improvements illustrates the annual costs associated with maintaining the existing drainage system.

Table 13. Drainage System Recommended Improvements

Description	Time Frame	Budget Cost
Curb and Gutter Replacement	Yearly	$ 15,000.00
Culvert Replacement	Yearly	$ 10,000.00
Clearing and mowing vegetation and constructing concrete bottoms. Coordinate with Ellis County, TxDOT and Railroad on maintaining their areas.	Yearly	$ 10,000.00

Figure 24. Drainage Basins



Area	Parks or Open Areas	Residential (>5 acre)	Type of Area (acres) Residential (<5 acre)	Industrial	Apartment	Business	Coefficient of Runoff	Intensity	Area	Q (ft³/sec)
1		70.57					0.40	8.83	70.57	249.25
2			120.04				0.50	8.83	120.04	529.98
3				45.77		8.56	0.78	8.83	54.33	374.92
4	60.85						0.40	8.83	60.85	214.92
5	3.5		4.08		65.42		0.76	8.83	73.00	492.50
6			82.33				0.50	8.83	82.33	363.49
7	60.71		32.34				0.43	8.83	93.05	357.21
8	14.48		90.2		23.37	7.04	0.56	8.83	135.09	673.52
9	12.52					25.47	0.77	8.83	37.99	257.88
10			109.47		26.88		0.56	8.83	136.35	673.19
11						4.2	0.95	8.83	4.20	35.23
12	46.15					15.23	0.54	8.83	61.38	290.76
13			27.08			15.63	0.66	8.83	42.71	250.67
14			43.66		19.2	34.65	0.72	8.83	97.51	619.05
15	107.22						0.40	8.83	107.22	378.70
16			33.31				0.50	8.83	33.31	147.06
17			17.95			17.94	0.72	8.83	35.89	229.74
18			26.1			9.59	0.62	8.83	35.89	196.56
19						29.62	0.95	8.83	29.62	248.47
20						36.84	0.95	8.83	36.84	309.03
21			19.77			9.96	0.65	8.83	29.73	170.83
22			9.61			9.61	0.73	8.83	19.22	123.04
23						29.71	0.95	8.83	29.71	249.22
24			42.69				0.50	8.83	42.69	188.48
25			46.27				0.50	8.83	46.27	204.28
26			14.52			14.52	0.73	8.83	29.04	185.91
27			28.49				0.50	8.83	28.49	125.78
28			39.51		11.54		0.57	8.83	51.05	255.96
29	30.33		67.04		42.62		0.57	8.83	139.99	704.17
30			72.7				0.50	8.83	72.70	320.97
31	105.98						0.40	8.83	105.98	374.32
32	7.41					4.6	0.63	8.83	12.01	64.76
33	26.05						0.40	8.83	26.05	92.01

Wastewater Collection System

Existing System

Wastewater collection systems are responsible for the collection and transporting of wastewater to a sewage treatment plant to protect public health and prevent disease. The City of Ferris owns and operates its wastewater collection system. The system is designed to collect wastewater from the different areas of the City and transport it through 4, 6 and 8-inch sewer lines to a 12-inch line located along Business I45. The 12-inch line runs from south (high end) to north and connects to a sewer main in Ten Mile Creek which is owned by the Trinity River Authority (TRA). The wastewater is then transported to TRA's Ten Mile Creek Regional Wastewater Treatment Plant and treated.

Table 14. Ferris Wastewater Collection System Size shows the approximate quantities of the current wastewater infrastructure.

The system also contains 6 lift stations owned and operated by the City. In addition there are several private lift stations which tie into the system. **Table 15. Lift Stations** itemizes the 6 stations owned and operated by the City of Ferris.

The system has 969 connections and has an average daily flow of 0.2424 million gallons per day (MGD).

Table 14. Ferris Wastewater Collection System Size

Collection System	Linear Feet
Force Mains	
2" Force Main	851
4" Force Main	1,432
6" Force Main	9,480
Subtotal Force Mains	**11,763**
Gravity Lines	
4"	4,390
6"	61,519
8"	31,116
10"	0
12"	8,484
Subtotal Gravity Lines	**105,509**
Total All Lines	**117,272**
Total Manholes	**255**
Total Cleanouts	**53**

Evaluation of Existing System

In order to evaluate the existing system (**Figure 25. Existing Sewer Map for the City of Ferris)** and its existing capacity, certain assumptions were made. In order to determine the capacity of a sewer line, the line size, type of material and the slope of the line are needed. For large areas of the Ferris wastewater system, the line size is generally known but the pipe material and the slope of the lines are not. In order to be conservative, the lines were assumed to be ductile iron unless specifically known from first-hand information from City staff or from record drawings.

The Texas Commission for Environmental Quality (TCEQ) requires a minimum slope to provide a velocity of 2 feet per second in a sewer line. **Table 16. Minimum and Maximum Pipe Slopes** were applied to the various sewer lines unless record drawings indicated otherwise. For residential areas, each platted lot was considered to be "built out" or each lot contained a residence.

The grades shown in **Table 16.** Minimum and Maximum Pipe Slopes are based on Manning's formula with an assumed "n factor" of 0.013 and are the minimum acceptable slopes.

Table 15. Lift Stations

Station Number	Location	Pumps
#1	South of Hazel Ingram School	2/300 gpm
#2	W. Twelfth	1/100 gpm
#3	Cemetery	2/450 gpm
#4	Rolling Hills Drive	2/250 gpm
#5	Ferris High School	2/250 gpm
#6	Shaw Creek Ranch	2/190 gpm

Table 16. Minimum and Maximum Pipe Slopes

Size of Pipe *(inches)*	Minimum Slope *(%)*	Maximum Slope *(%)*
6	0.50	12.35
8	0.33	8.40
10	0.25	6.23
12	0.20	4.88
15	0.15	3.62
18	0.11	2.83
21	0.09	2.30
24	0.08	1.93
27	0.06	1.65
30	0.055	1.43
33	0.05	1.26
36	0.045	1.12
39	0.04	1.01
>39	*	*

* For pipes larger than 39 inches in diameter, the slope is determined by Manning's formula to maintain a velocity greater than 2.0 feet per second and less than 10.0 feet per second when flowing full.

Table 17. Design Parameters were utilized for both the existing sewer flow calculations as well as for future flow projections.

The above design parameters were utilized to calculate an average daily flow for various lines in the City. This average was converted into gallons per minute (gpm) and was multiplied by 4 to calculate a peak hourly flow rate. This peak flow rate was then applied to the various sewer lines to determine the adequacy of the existing lines. In determining problem areas, the design value of 100 gpcd was utilized.

In addition to the calculated design flow, a historical flow rate was calculated by dividing the average daily flow metered by the TRA and dividing it by 969 connections with 3.2 persons per connection. This historical average daily flow calculated to be 78 gallons per capita per day (gpcd). Design flow amounts were then recalculated using the 78 gpcd instead of the 100 gpcd. These flows are shown in parenthesis ( ) next to the design calculated numbers.

Table 17. Design Parameters

Land Use	Design	Units per Acre
Single Family Residential	100 gallons per person per day 3.2 persons per unit	
Estate Residential		2 units per acre
Low Density Residential		4 units per acre
Mixed Density		6 units per acre
Industrial	20 gallons per person	1,388 parking spaces per 34.7 acres
	1 person per parking space	
Schools with Showers	20 gallons per person per day	
Schools without showers	15 gallons per person per day	
Mixed Use	35 gallons per person per day	3,100 spaces per acre
	1 person per space	
Retail, Highway Commercial, Commercial	35 gallons per person per day	3,100 spaces per acre
	1 person per space	

Two areas of concern were noted. Both areas pertain to force mains from lift stations.

6-Inch Force Main from Lift Station #3

The first concern is the 6 inch force main from Lift Station #3. Lift Station #3 contains two-450 gpm pumps. Wastewater is pumped by this lift station through a 6-inch force main to an 8-inch gravity main located near the intersection of First Street and Pecan Street. The wastewater then flows by gravity to the 12-inch line along Business I45. Based on design peak flow calculations, the incoming flow to Lift Station #3 during peak times is 663 gpm (559 gpm). TCEQ regulations require the lift station be able to pump the peak flow with the largest pump out of service. Lift Station #3 does not meet this regulation.

Currently, in order for the lift station to handle up to the peak flow, both pumps are needed to run. The recommended flow of a 6-inch force main at a velocity of 6 feet per second (fps) is 529 gpm or 705 gpm at 8 fps. As the flow is increased in the force main, the head loss due to pipe friction also increases. Therefore, the lift station probably does not pump 900 (2-450 gpm pumps) but an amount less than that. The 6-inch force main operates at a velocity between 6 and 8 fps. Besides not meeting TCEQ regulations, the lift station is probably very close to operating at its

maximum capacity. The flow of the lift station pumps could possibly be increased to meet TCEQ regulations and future growth but the force main would be a bottleneck and would also need to be upsized to handle this increase in flow. In addition, the 8-inch gravity main downstream of the lift station would need to be checked for its capacity if the lift station and force main were upgraded for additional flow.

Lift Station #1

The second area of concern is Lift Station #1. Lift Station #1 contains 2-300 gpm pumps. Wastewater flows to the lift station via an 8-inch gravity line and is then pumped through a 6-inch force main to the 12-inch line along Business I45. The concern here is very similar to that with Lift Station #3. The design flow into the lift station at peak flow is 436 gpm (396 gpm). This lift station does not meet TCEQ regulations with the largest pump out of service.

Both pumps at the lift station would be needed to handle the peak day flow. With both pumps running, the force main would be required to flow 600 gpm. This flow exceeds the 6 fps but is less than 8 fps. This lift station appears to be close to its maximum capacity without increasing the lift station pumps.

A third possible problem is the 12-inch gravity line which carries the wastewater to the TRA line. If additional capacity is considered for this line or upstream of this line, a closer review of the slopes for the line is needed to determine its full capacity. Based on map contours, the line appears to have an initial capacity of 709 gpm at the south end and then increases due to the grade to over 1351 gpm around Fifth Street. If additional flow is anticipated for this 12-inch line, it is recommend the flow line of this line be surveyed to more adequately determine its full capacity.

Future Sewer Map

The City of Ferris appears to be close to its capacity when build out of its existing service area occurs. This means that once the vacant lots inside the City's developed area are built and occupied and the existing facilities are occupied, the sewer system will be at capacity. As shown in the existing system analysis, two of the existing lift stations will need to be upgraded to handle this increase in flow. As new areas outside of the current service area are developed, these new areas will require extensive upgrading of the existing system or construction of new additional lines outside of the existing system. It is recommended that new lines with additional tie-ins to the TRA line be constructed. These lines are shown on **Figure 26. Proposed Sewer Map for the City of Ferris.**

The location of the lines shown is for illustrative purposes only and can be relocated. A general location was chosen to show how the new lines would be able to serve the newly developed areas. One line is shown on the east side of the city and one on the west. Both lines show large lift stations located at lower elevations on the south side of the city with the west line having an additional lift station. This enables collection lines to convey wastewater to a central location, and then be pumped to the north to a location where the gravity sewer mains can convey the wastewater to new taps on the TRA line near Ten Mile Creek. Collection lines are not shown as it is anticipated these lines would be installed by various developers. This results in an efficient collection system but unless development occurs at a very fast pace, may not be practical due to costs. The estimated cost for the east line is $2,411,796 and $4,846,537 for the west line.

An alternative to these two lines could be a phased-in approached which could more closely follow the actual development of the areas. Two additional tie-ins to the TRA are still recommended. The City could consider constructing only the gravity portions of the two lines and require developers to construct lines to convey their wastewater to these new gravity outfall or main lines. Depending on the location of the new developments, consideration could be given to upgrade these newly constructed lines for future development. A drawback to this would be there would be an increased number of lift stations constructed which would result in greater operation cost to the City as well as increased initial costs to the developers.

At this time, it is recommended the City consider upgrading Lift Stations #1 and #3. The pumping capacity of these stations needs to be increased to handle peak flows and to be in compliance with TCEQ guidelines. The existing force main from Lift Station #3 needs to be replaced with an 8-inch line. The 8-inch gravity line which Lift Station #3 ties into needs to be studied to determine its capacity based on the slope of the line. The 12-line paralleling Business I45 needs to be studied to determine its capacity also based on its slope. These items are shown on **Figure 25. Existing Sewer Map for the City of Ferris.** The proposed future new lines and lift stations are shown on **Figure 26. Proposed Sewer Map for the City of Ferris**. **Table 18. Wastewater Cost Estimates** provides costing for the proposed improvements. The lift station improvements are based on the premises the pumping capacity of the two lift stations can be increased by replacing the existing pumps.

Table 18. Wastewater Cost Estimates

Item	Description	Estimated Cost
1	Pumps for Lift Station #3, 2900 LF new 8-inch Force Main, and Determine Capacity of 8-inch Gravity Line.	$ 110,000.00
2	Pumps for Lift Station #1.	$ 30,000.00
3	Determine Capacity of 12-inch line	$ 2,000.00
4	Proposed East Main Sewer Line	$ 2,411,796.00
5	Proposed West Main Sewer Line	$ 4,846,537.00

Figure 25. Existing Sewer Map for the City of Ferris

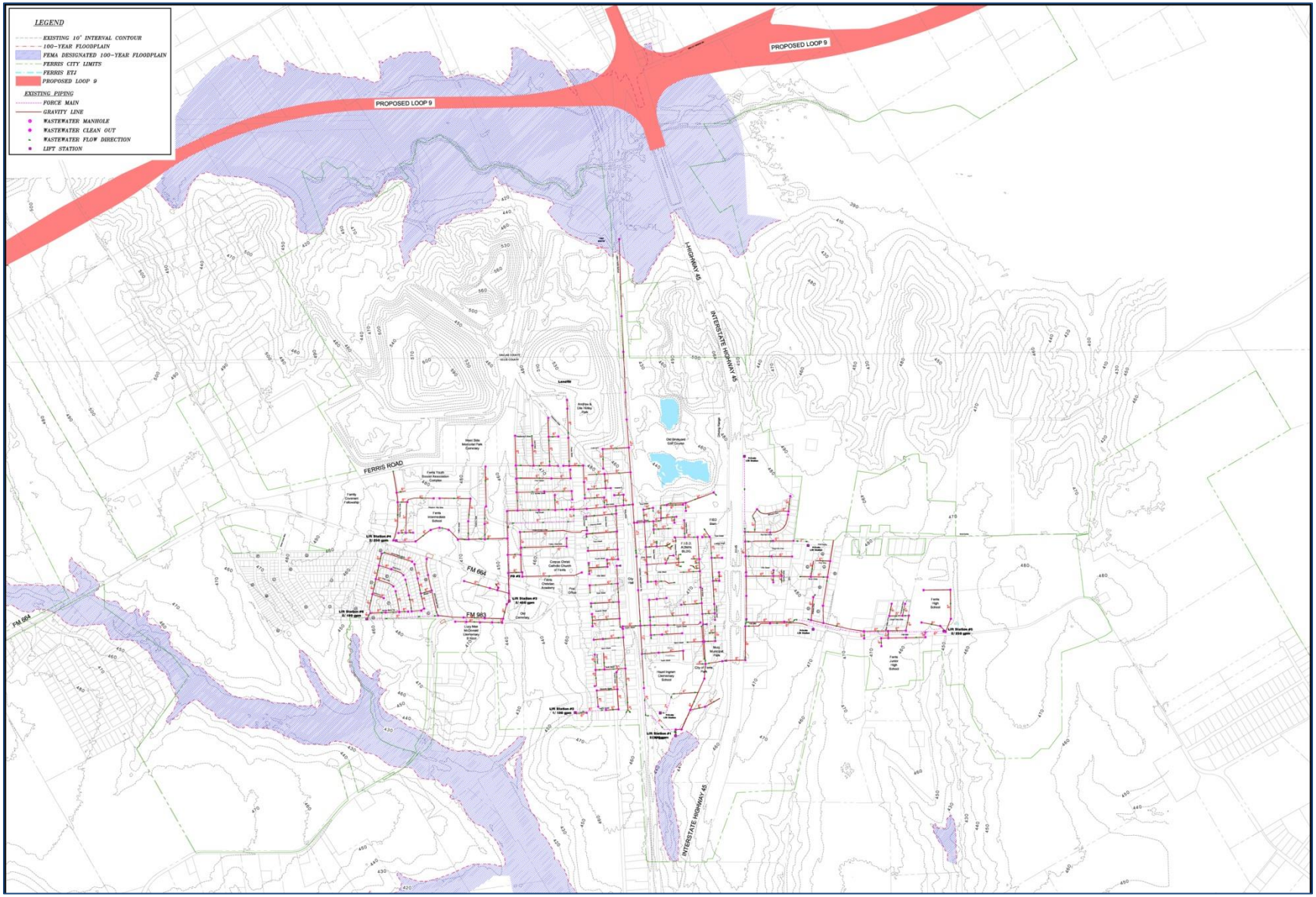
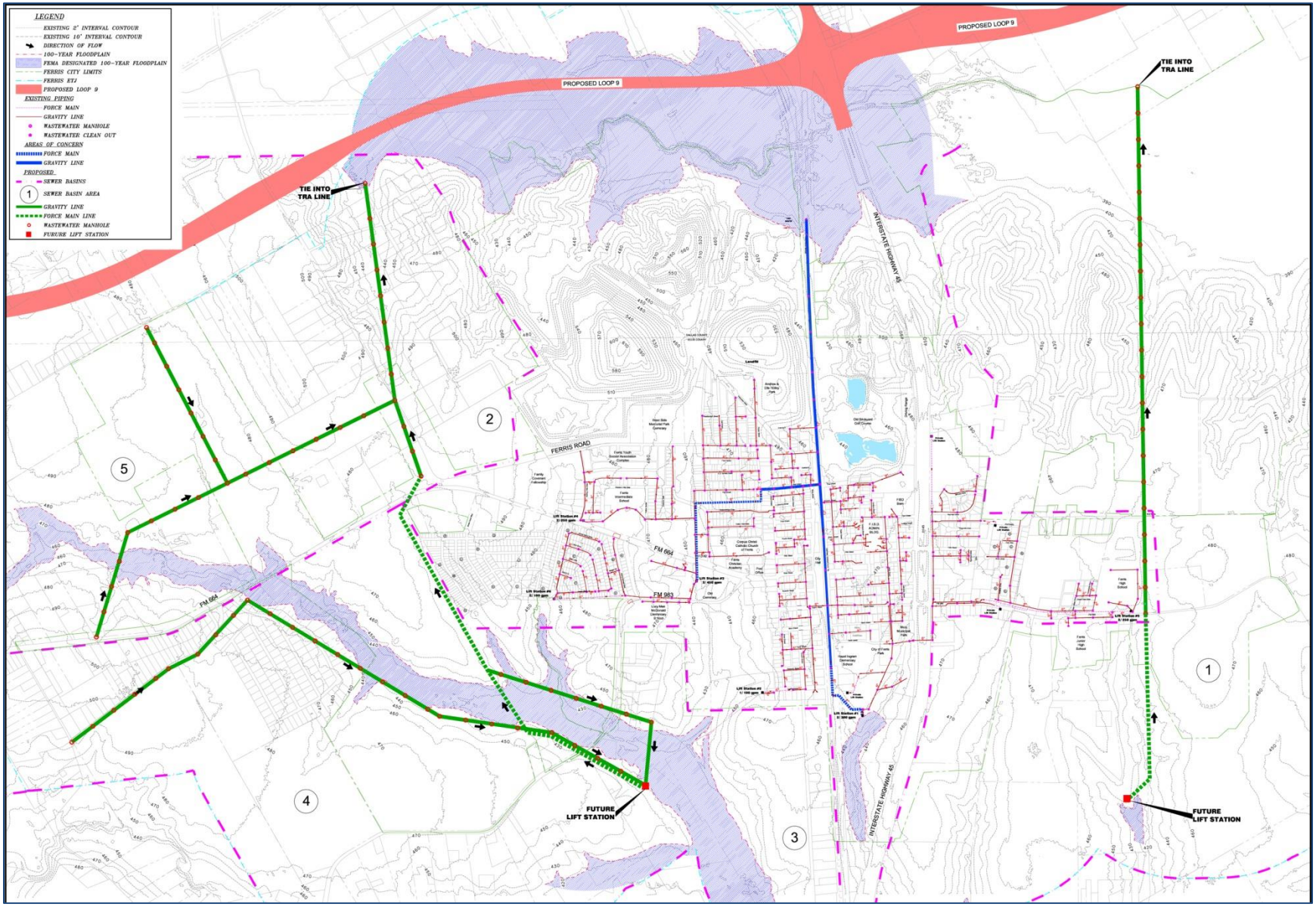


Figure 26. Proposed Sewer Map for the City of Ferris



Water System

Existing System

The City of Ferris owns and operates its own Public Water System (PWS) and holds a Certificate of Convenience and Necessity (CCN). A CCN is issued by the Texas Commission on Environmental Quality (TCEQ) and authorizes a utility to provide water and/or sewer service to a given service area. The water CCN obligates the water retail public utility to provide continuous and adequate service to all customers within the CCN boundaries. A CCN also prevents outside providers from serving customers within the CCN boundaries. The City of Ferris operates under the PWS #0700002 and the Water CCN# 10886.

The existing Ferris water system contains pipes with diameters of 1-inch to 12-inches. **Table 19. Water Pipes** provides an approximate summary of the various sizes of pipe in the City of Ferris.

The system also includes three pump stations with ground storage tanks (GST) and two elevated storage tanks (EST) as shown in **Table 20. Pump Stations and Storage Facilities**.

The system is supplied with water from two city wells and by an 8-inch line from the Rockett SUD. Well #1 located at PS#1 produces 310 gpm and Well #2 located at PS#2 produces 240 gpm. The City has a take-or-pay contract for 100,000 gpd with Rockett. In the winter or slower months, the city staff tries to cut back on the supply from Rockett to about 65,000 gpd in order to take more water in the high demand months.

Table 19. Water Pipes

Diameter (in)	Length (ft)
1	1,051
2	18,738
3	77
4	2,652
6	51,417
8	55,787
10	34
12	25,799
Total	**155,555**

The City's water system currently has 969 connections. In 2012, the system had an Average Daily Demand (ADD) of 307,000 gallons per day (gpd) and on August 6, 2012, had a Peak Daily Demand (PDD) of 739,000 gpd.

A schematic of the water system is shown in **Figure 27. Ferris Water System Schematic.**

Evaluation of System

Computer Modeling of System

A computer analysis was run on the system utilizing Bentley WaterGEMS water modeling software. The system was modeled using the ADD and PDD. In the ADD scenario, the pressure in the system varied from 51.2 psi to 48.9 psi. The pressure in the PDD varied from 41.5 psi to 34.3 psi. The TCEQ requires a minimum pressure throughout the system of 35 psi during normal operating and a minimum of 20 psi during firefighting, line flushing and other unusual conditions. The 34.3 psi is within acceptable tolerances for the normal operating conditions.

A scenario was also run to check the accuracy of the model by running the ADD and a fire flow from a fire hydrant. The hydrant located near the corner of 5th Street and Campus Street was assigned a fire flow of 1520 gpm. The 1520 gpm was taken from an actual flow test on the hydrant conducted by the Ferris Fire Department. The pressures indicated on the model were within acceptable limits of the actual pressures taken at the time of the test. The lowest pressure indicated by the model under this scenario was 25.8 psi.

Well Capacity

The TCEQ requires cities with more than 250 connections to have two or more wells with a total capacity of 0.6 gpm per connection. For 969 connections this calculates to be a required well capacity of 582 gpm or 830,808 gpd. With the combined capacity of both city wells and the 100,000 gpd from Rockett, the City's water supply is 892,000 gpd which meets the TCEQ requirement. But general design parameters require the City's water supply to be able to meet the Peak Daily Demand with its largest well out of service. Ferris' PDD is 739,000 gpd and with its largest well out of service, the City's water supply is 445,600 gpd. The water supply for Ferris is short 293,400 gpd.

Ferris' contract with Rockett Special Utility District allows for the City to take a maximum of 720,000 gpd. The City has access to this water if it adds one or more delivery points to their system. This additional supply would almost double the City's current supply.

Total Storage Requirements and Elevated Storage

In total storage, the TCEQ requires a minimum storage capacity of 200 gallons per connection. For Ferris, this calculates to be 193,800 gallons. Total storage for the City is 1,200,000 gallons. TCEQ requires a minimum elevated storage of 100 gallons per connection. Ferris has 400,000 gallons of elevated storage which exceeds the required 96,000 gallons.

Table 20. Pump Stations and Storage Facilities.

Location	Pump Station Number	Booster Pumps (gpm)	GST (gallons)	EST (gallons)
Church Street	PS#1	1-325/1-400	300,000	-
North Pasture	PS#2	2-300 *	100,000	-
Western Hills	PS#3	2-477	400,000	250,000
I45 N	-	-	-	150,000

*The nameplate on the pumps at the pump station state the pumps are rated for 300 gpm but the discharge lines on the two pumps are 2.5-inches and 3-inches. Normally a 3-inch pipe at a pump station would flow from 132 to 176 gpm. There is a question as to the accuracy of the 300 gpm output of the pumps.

Pump Station Capacity

The next area to be considered is the TCEQ requirement for pump station capacity. TCEQ requires two or more pumps that have a total capacity of 2 gpm per connection or that have a total capacity of 100 gpm and the ability to meet peak hourly demands with the largest pump out of service, whichever is less. If the two pumps at PS #2 are 300 gpm, the City has a pumping capacity of 2279 gpm which is more than the required 1938 gpm and also exceeds the peak hourly demand with the largest pump out of service.

Summary

Overall, the water system appears to meet TCEQ and general engineering standards except in the area of water supply. The area of water supply is a concern. The City's current two wells plus the water from Rockett meet the PDD but will probably not meet demand if one of the wells is not in operation. The City is fortunate to have more than adequate storage facilities which can help in emergency situations. It is recommended the City look into possibilities for additional water supply.

Ferris has a 720,000 GPD supply of water from the Tarrant Regional Water District which it assigns to Rockett SUD. It appears Rockett is allowed to use the 620,000 GPD above the take or pay amount Ferris currently uses to supply other customers. It is recommended the City further investigate the possibility of increasing its take from the Rockett SUD.

A second possible source is to obtain water from the Dallas Water Utility (DWU). In contacting the DWU, they were not interested in supplying water to Ferris at the current time. But they also stated they have not been requested to provide water to Ferris. The closest DWU line is a 30-inch line to Lancaster located near the intersection of W. Wintergreen Road and Bonnie View Road. A new line, possibly a 14-inch line, would need to be constructed from this line in Lancaster to Ferris. The line would be approximately 42,000 LF in length. A new ground storage tank of at least 3 MG would need to be constructed along with a new pump station. This 14-inch line would supply more than 4 MGD which would provide Ferris a long term water supply.

A third possible new source of water has been presented in the Southern Dallas County Infrastructure Study by CDM Smith. The study involves providing water supplies to southern Dallas County and to the cities of Ferris, Hutchins, Lancaster and Wilmer. The study proposes to construct a new pump station near the existing 72-inch water line at Simpson Stuart Road. The line would begin as a 42-inch line and follow the UPRR ROW south to Ferris. The study proposes to provide Ferris with 10 MGD to serve a population of 20,000 in the year 2060. A second possible route would be very similar to the proposed route for the 14-inch stated above and would pass through Wilmer and into Ferris. At this time, a timeline for the construction of either of these lines is

unknown. The study also proposes to increase storage capacity from 1.2 MG to 6.4 MG.

Future Proposed Improvements

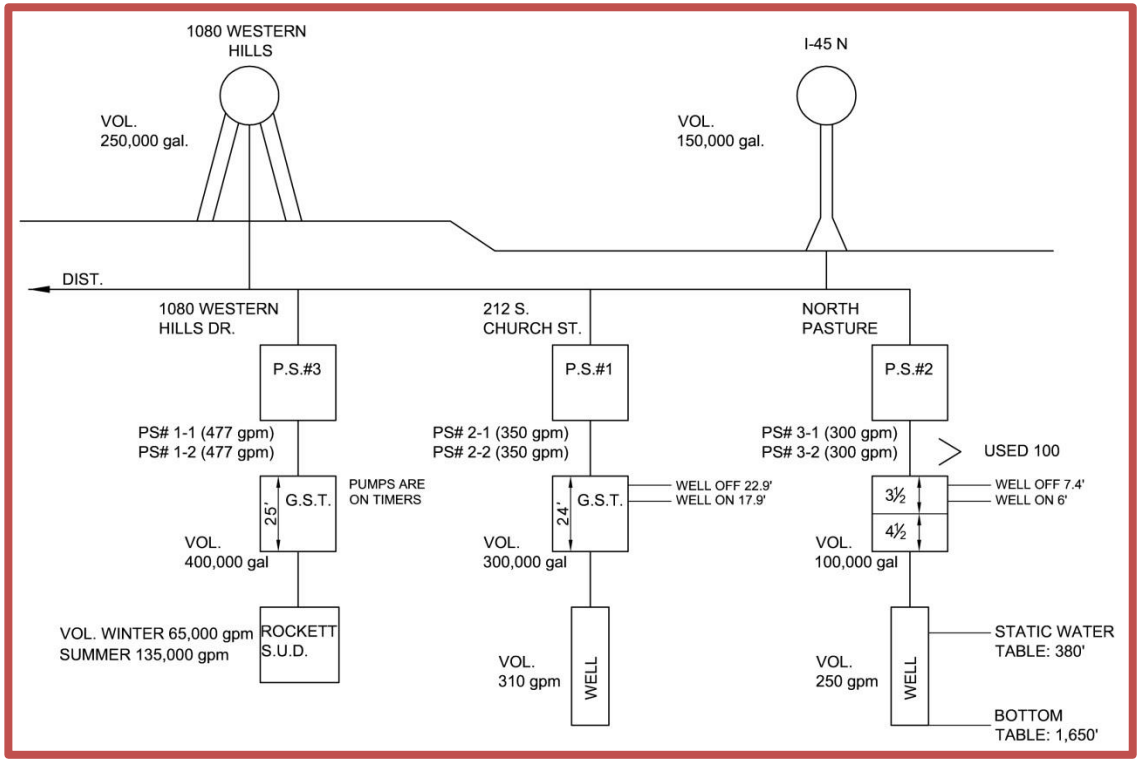
Population projections for Ferris in this study were calculated for 20-year growth using 1%, 3% and 8% growth. For this study, the 3% growth population was used for future water projections. Persons per service connection were calculated by using the current population of 2440 and dividing by 969 connections to achieve a 2.5 capita per connection. Taking the 2033 population of 4407 and dividing by 2.5 capita per connection, 1763 proposed connections are used to determine future required water requirements. **Table 21. Future Growth Requirements** itemized the various required facilities that would be required to meet the proposed growth.

In addition, additional pipelines will be required to serve the areas set forth in the Future Land Usage Plan. It is anticipated that a loop be constructed around the city to allow a tie-in for smaller distribution lines, thereby providing adequate pressure and fire

Table 21. Future Growth Requirements

Water Supply	Required increase 0.69 MGD
Total Storage	Required increase of 2.326 MG
Elevated Storage	No required increase. Increase could be based on pressure requirements
Booster Pump Capacity	Required increase of 1272 gpm

Figure 27. Ferris Water System Schematic



protection. A possible route is shown on **Figure 29. Ferris Proposed Water System** along with pipe sizes as well as possible pump station and ground storage locations.

On the west side of the city, Ferris is expected to encroach into the Rockett CCN. It is our understanding that Rockett will serve this area with water and Ferris will provide sewer collection. The cost of tying into the Rockett SUD for additional water supplies is expected to cost a minimum of $50,000 for the metering facilities plus the cost of running a new pipeline to the tie in point. Opinions of possible construction costs are provided in **Table 22. Estimated Construction Costs for Water Improvements.**

Table 22. Estimated Construction Costs for Water Improvements

Item	Description	Unit	Quantity	Price	Sub-Total
WATER SUPPLY					
1	14" Inch Pipe from Lancaster	LF	42,000	$ 65.00	$ 2,730,000.00
2	Booster Station	LS	1	$ 750,000.00	$ 750,000.00
3	1 MG GST	LS	1	$ 1,000,000.00	$ 1,000,000.00
	Sub-total				**$ 4,480,000.00**
	Contingencies (15%)				$ 672,000.00
	Total Estimated Cost				**$ 5,152,000.00**
FUTURE WATER					
1	18" Pipe	LF	60,320	$ 75.00	$ 4,524,000.00
2	12" Pipe	LF	13,230	$ 50.00	$ 661,500.00
3	2 MG GST	LS	1	$ 2,000,000.00	$ 2,000,000.00
4	Booster Station	LS	1	$ 750,000.00	$ 750,000.00
	Sub-total				**$ 7,935,500.00**
	Contingencies (15%)				$ 1,190,325.00
	Total Estimated Cost				**$ 9,125,825.00**

Figure 28. Ferris Existing Water System

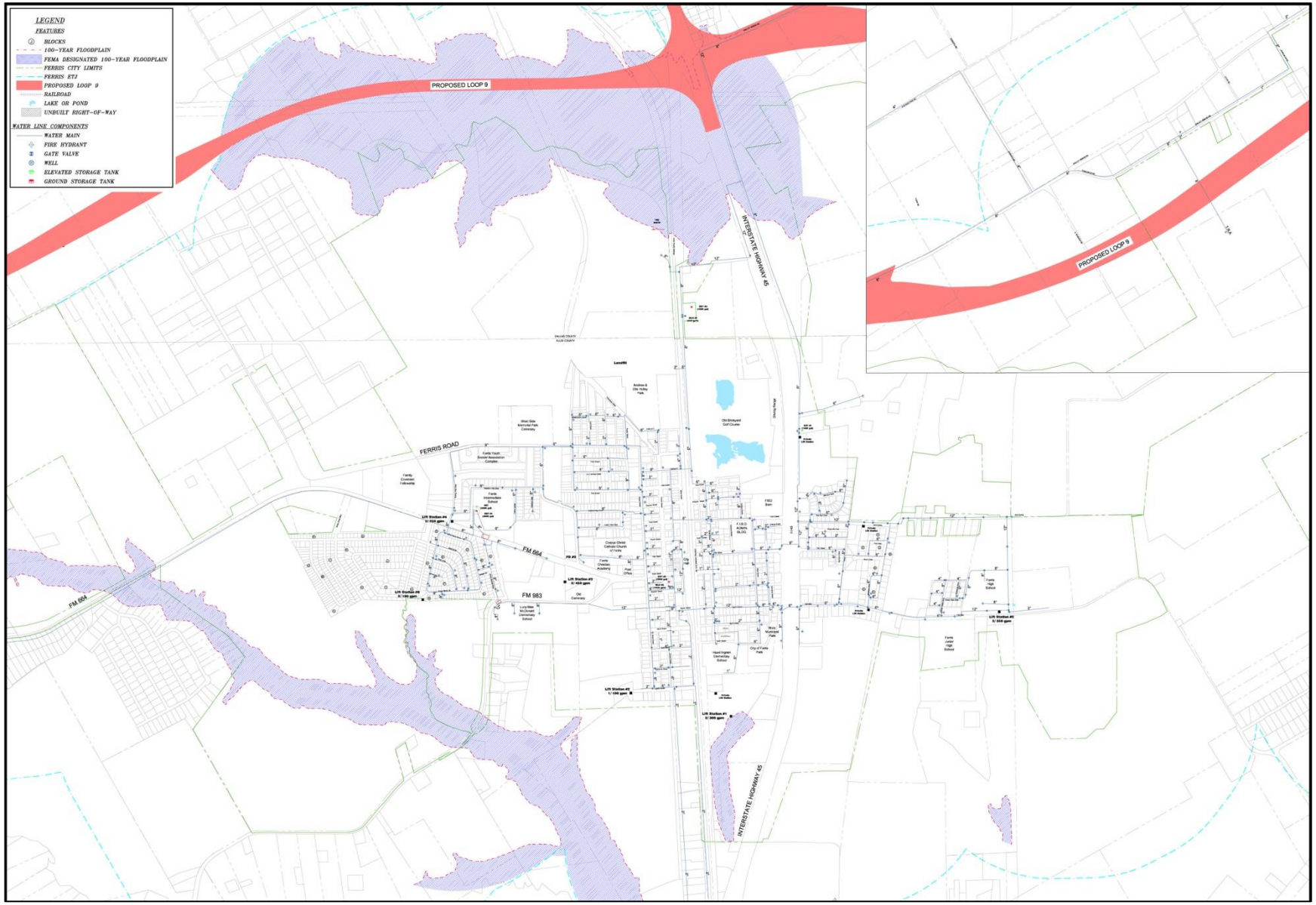
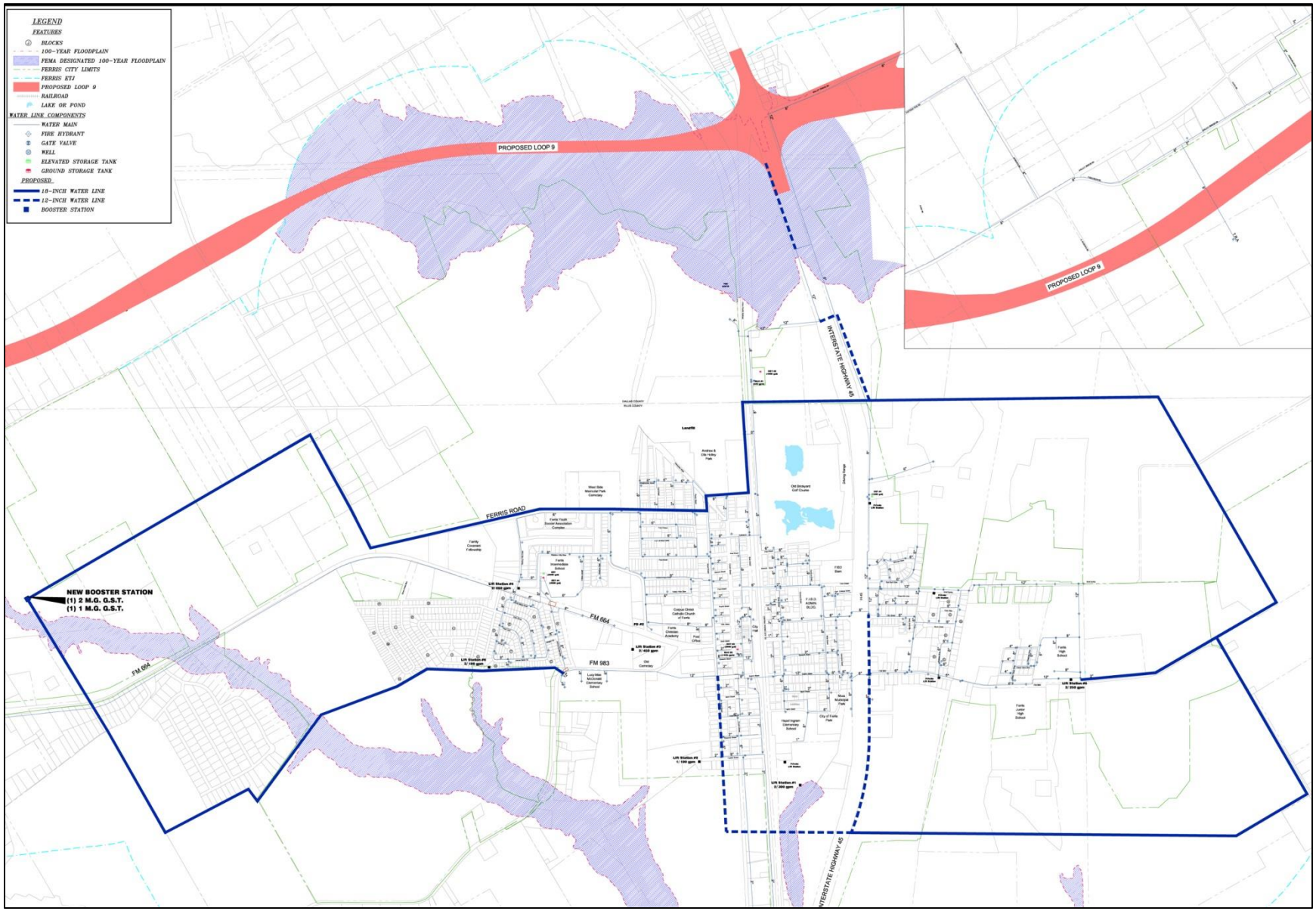



Figure 29. Ferris Proposed Water System