City of Sugar Land
Master Thoroughfare Plan

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A LEO A DALY COMPANY

June 2012

Master Thoroughfare Plan

Prepared for:

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EXECUTIVE SUMMARY

This report contains the methodology, recommendations and major components of the update to the Major Thoroughfare Plan (MTP) of the City of Sugar Land. As a separate but concurrent effort to the MTP update, analyses and recommendations of implementing Complete Streets policies are included. The report contents are a resource document that is part of the adopted plan. The following major deliverables are attached to the report.

Major Thoroughfare Plan Map

The MTP map depicts the existing and proposed roadway map within Sugar Land. Existing and proposed roadways are identified by the following functional classifications:

- Freeway
- State Highway
- Arterial
- Major Collector
- Minor Collector
- Other

Hike and Bike Remedies

Locations where bicycle and pedestrian mobility is obstructed, conflict points, were identified by City staff as part of the update process, based on the previous Hike & Bike Plan and other existing documents. Conflicts were classified as at intersections, midblock crossings, or anticipated in the future. For each conflict point, one of the following remedies was proposed, based on location, physical aspects of nearby infrastructure, and other planned projects:

- Grade separation
- New signal/signal upgrade
- Bike lanes/shared-use path
- Enhanced crosswalk

The analysis and recommendation for each conflict point is located in Appendix D. A map attached to the report shows the characteristic and solution for each conflict point.

Major Roadway Planning Guide

The Major Roadway Planning Guide (Appendix F) is an inventory of all roads that are classified as minor collectors or higher. The following roadway characteristics are identified by the Major Roadway Planning Guide:

- Functional classification on Major Thoroughfare Plan
- Posted speed
- Sidewalks
- Nearby Hike and Bike Master Plan Network
- 2035 Typical Section
- Recommended Sections, if different from 2035 Typical Section

Typical Sections

Typical sections within City of Sugar Land were reviewed. Each typical section is designated with two letters and one number. The first letter is a P, C, L or R which stand for Principal, Collector, Local, and Rural road respectively. The number states the total number of lanes, not counting medians or two-way left turn lanes (TWLTL). The second letter is a D or U which stands for divided and undivided respectively. Additional typical sections were developed to include parking and bicycle elements. The

table on the following page lists the standard typical sections (found in Appendix E) to be adopted with the MTP. The additional typical sections allow the City to select the most appropriate option for future roadways. The typical sections expanded on existing standards by including parking and consideration of non-vehicular travel based on facility type and surrounding land use. Typical sections within the "P" series propose a shared-use path in lieu of bicycle lanes because these roads are intended to carry high traffic volumes at a higher speed; traffic conditions where separate bike facilities are recommended. Conversely, typical sections within the "C" series allow bicycle lanes because those roads are intended to carry lower volumes at lower speeds and generally serve as the main road through a neighborhood, not a city.

Classifications	Typical Section	New?
None, Minor Collector	L2U	No
Minor & Major Collector / Arterial / State Hwy	R2U	Yes
Minor & Major Collector	C2U	No
Minor & Major Collector	C2U – Bike	Yes
Minor & Major Collector	C2U (40') - 10' Lanes	Yes
Major Collector	C2U (40') - Bike or Parking	Yes
Major Collector	C4U	No
Major Collector	C4U – Parking	Yes
Major Collector	C4U – Bike	Yes
Major Collector & Arterial	C4D	No
Major Collector	C4D – Parking	Yes
Major Collector	C4D – Bike	Yes
Arterial	P4D	No
Arterial	P4D – Bike	Yes
Arterial/State Hwy	P6D	No
Arterial/State Hwy	P8D	No

R=Rural, L=Local, C=Collector, P=Principal
# of lanes
U=Undivided, D=Divided

Complete Streets

This Thoroughfare Plan, by its adoption, includes most of the Complete Streets tenets. In addition, the City of Sugar Land should take the following actions to implement Complete Streets:

- Adopt a specific Complete Streets policy, acknowledging the existing procedures and directing staff in their application.
- Amend Design Standards (7.0 - Roadway Design Requirements) and City codes to include bicycles in the roadway network. The following language is suggested:

  Design of a bicycle lane shall be governed by appropriate sections of TxMUTCD or City of Sugar Land codes.

  Bicycle lanes shall be evaluated for all streets on the major thoroughfare plan. A bicycle lane shall be constructed during major roadway construction unless exempted by one of the following considerations:

  - **Bicycle use is prohibited,**
  - **Bicycle use would endanger the safety and welfare of the general public,**
  - **Cost of bicycle lanes is a disproportionate amount of overall project cost, or**
  - **A site-specific exemption is granted by the City Engineer.**

Exemptions shall require the approval of the City Manager.

- Revise project descriptions in the CIP to explicitly state all automobile, bicycle, transit, and pedestrian facilities.
- Program projects that address hike and bike conflict points.
- Adopt the following goals:
  - Coordinate and develop plan within one year with the University of Houston at Sugar Land to provide bike and pedestrian connections from the park and ride stop to University Boulevard,
  - Creation of bike network (on and off street) plan within two years,
  - Development and implementation of a sidewalk inventory and condition assessment program within three years.

A resolution supporting Complete Streets is not necessary. City Council adoption of the Major Thoroughfare Plan is adequate to direct staff to implement CS guidelines.

Updating the Major Thoroughfare Plan

The City of Sugar Land should consider updating the MTP if any of the following conditions are met:

- An interim update would be required if the future Owens Road/Prison complex is redeveloped,
- After development within the South Study Area that requires fulfillment of portions of the MTP,
- Any future action by City Council on a proposed Brazos River Bridge,
- Development in the vicinity and east of the River Pointe Golf Club on FM 2759. Development within this area is unlikely based on current floodplain boundaries.

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1.0 PURPOSE AND NEED STATEMENT

1.1 Introduction and Background

The City of Sugar Land last adopted a Major Roadway Plan in 2003, which was amended in 2004 and 2005. The Plan identified existing Arterials, Major and Minor Collectors plus future roadways. Future roadways were shown as either alignments or arrows indicating patterns of future growth. The plan defined the following classes:

- Freeway
- State Highway
- Arterial
- Major Collector
- Minor Collector
- Other

Since the plan was developed, Sugar Land has grown in population from 76,200 to 84,500. Additionally, large General Plan developments, such as the Imperial development near SH 6 and US 90A, have either expanded relative to previously approved plans or been newly proposed. These developments represent substantive changes in planned land uses, not only in terms of magnitude, but also diversity of development types. In the case of the Imperial development, the Constellation Field baseball stadium has been completed. Other considerations driving the need for this Master Thoroughfare Plan update include the closure of the State Prison Farm and the consequent sell-off of its land for development; the expansion of the urbanized area south and west of the Brazos River; and the City's development of the Cultural Arts District near US 59 and University Boulevard.

Other studies recently completed by the City include the Comprehensive Mobility Plan, which focused on large-scale policy directives and a high-level analysis of the City's transportation system. The Hike and Bike Master Plan was updated in 2007, and while the City has begun implementing this plan, there still exists limited connectivity to major destinations.

The Major Thoroughfare Plan Update also analyzes rail crossings along US 90A between SH 99 (Grand Parkway) and US 59 at the City of Stafford border. Union Pacific, the owner of the rail line, is proposing to construct a double track section within these limits in 2013. The double track section would impact the crossings of several major thoroughfares within Sugar Land, including Eldridge Parkway and Dairy Ashford Road, where grade-separations have been researched in the past, as well as potential future crossings such as University Boulevard.

The new plan is part of achieving the Superior Mobility goal within Vision 2025. The previous plan solely addressed mobility for automobiles, while mobility needs for bicycle, pedestrian and transit users remained unaddressed. Adoption of this new plan represents a step in achieving the Superior Mobility goal of Vision 2025. Additionally, this document provides analysis that can be consulted in the future during the next revision.

1.2 Objective

The City of Sugar Land has a stated goal of updating the current Major Roadway Plan and creating a Master Thoroughfare Plan (MTP) for the City Limits and Extra-Territorial Jurisdiction (ETJ). This Master Thoroughfare Plan defines further expansion of the City's roadway network, with more complete

descriptions of each roadway's functional classifications and resulting design elements. To accomplish this objective, the MTP Update process emphasized the following considerations:

- Coordination with adjoining municipalities and regional agencies,
- Coordination with the City's Mobility Study and Hike & Bike Master Plan,
- Development of a greater variety of typical thoroughfare cross-sections, and
- Context-sensitive solutions, with location specific provisions for pedestrians, bicyclists, and transit.
- Evaluation of needed freight rail corridor crossings by the thoroughfare network along US 90A.

1.3 Oversight

The MTP Update was developed with input from the Engineering, Public Works, Parks, Transportation and Planning staffs, as well as from the Planning and Zoning Commission. City staff and the Planning and Zoning Commission gave specific guidance with respect to the following areas:

- General population, employment, and traffic forecasts,
- Specific large-scale projects and initiatives (e.g., transportation accommodations for the minor league ballpark),
- Transportation concerns and needs for automobile, bicycle, pedestrian and transit modes,
- Guidance as to how the City should expand south of the Brazos River, and
- Classification and design of major thoroughfares.

Several meetings were held with the Planning and Zoning Commission and City staff. Notes from the following meetings were compiled and included in Appendix C - Summary of Stakeholder Comments:

- Project update with City staff - January 6, 2011
- Workshop with Planning and Zoning - February 3, 2011
- Workshop with Planning and Zoning - March 14, 2014
- Project update with City staff - April 19, 2011
- Guidance on roadway standards with City staff and others - April 26, 2011
- Review meeting with City staff - July 13, 2011
- Project progress meeting with City staff - August 5, 2011
- Project progress meeting with City staff - December 1, 2011
- Project update meeting with City Engineer - February 14, 2012

2.0 EXISTING CONDITIONS AND PLANNED DEVELOPMENTS

2.1 Existing Thoroughfare Plan

The current City of Sugar Land Major Roadway Plan was approved by City Council on December 17th, 2002 as part of Ordinance #1386, and amended on February 18th, 2003. Five functional classes, proposed roads, and new connections are defined in the existing Plan. The functional class defines the roadway's role within the transportation network. The five functional classes are described below and the proposed roads and connections are listed in Table 1.

Table 1 - Proposed Roads and Connections in 2002 MTP

Road	Status	Comment
Major Collector between Dairy Ashford Road and Jess Pirtle Boulevard	Built	Open to traffic.
Meadowcroft Boulevard	Built	Constructed as part of Telfair.
7th Street extension to Industrial Boulevard	Not Built	Not built or delayed. A connection would have to cross Schlumberger property
University Boulevard extension to Missouri City	In Progress	Planned to be finished as part of Riverstone General Plan accomplishment.
University Boulevard extension to US 90A	Not Built	This road is currently within the City's CIP.
Imperial Tract Roads	In Progress	Major roads constructed. Local roads yet to be defined. The General Plan amendment process will identify any additional major roads.
SH 99 south of US 59	Not Built	Defined as part of Segment D, this road is currently scheduled to be built by 2017 (www.grandpky.org).
Shadow Bend Drive	Not Built	Shown in Fort Bend County's MTP.
New Territory Boulevard	Not Built	This connection appears in Fort Bend County's MTP.
Easton Avenue	Built	Portions were built as part of Telfair. A connection is proposed to the existing Prison Drive and is coordinated with Fort Bend County's MTP (Owens Road).
Chatham Avenue	Built	Constructed by Telfair development.

Freeway

Freeways are major roads with full control of access with no grade crossings for motorized travel only. The only existing freeway within Sugar Land is US 59. SH 99 will be designated a freeway when the toll lanes are constructed.

State Highways

State Highways, such as SH 6, US 59, US 90A, SH 99, and FM 2759 are roads that are within the City's jurisdiction but maintained by TxDOT. State highways and interstates move people and goods at the regional, statewide and national level.

Arterials

Arterials, along with State Highways, are the main roadways within a city's street network. They are designed to carry large volumes of traffic longer distances throughout the city. Multiple, varying land uses are connected by Arterials. Cities around Sugar Land, such as Missouri City, Houston, and Stafford, are also connected to Sugar Land and each other by Arterials.

Major Collectors
Major Collectors are designed to carry large amounts of traffic over short distances within the city. Major Collectors may have typical sections similar to Arterials (one example being Telfair Avenue); however, a Major Collector provides access to development, and is not intended to carry traffic over the same distance as Arterials.

Minor Collectors
Minor Collectors are streets that connect local streets to major collectors or arterials. Generally, Minor Collectors share similar roadway elements with local streets, such as two lanes, no medians, more frequent driveways, and on-street parking. Single-family houses may or may not gain access from them.

2.2 Existing Typical Sections

The City of Sugar Land, in Appendix F of the City's Design Standards, has minimum standards for seven different typical sections: three for principal roads, three for collector roads, and one for local roads. These typical sections are not tied to any particular functional class. The following design elements are listed in the table:

- Number of Traffic Lanes
- Lane Width (ft)
- ROW Width (ft)
- Design Speed (ft)
- Maximum Grade (%)
- Stopping Sight distance
- Horizontal Curvature Min. Radius (ft)
- Vertical Clearance (ft)
- Lateral Clearance (ft)
- Minimum Median Width (ft)
- Acceptability of On Street Parking (Yes/No)
- Parkway Width (ft) - The parkway is defined as between the edge of pavement and the right of way line. Planting strips and sidewalks are defined as parkway features.

Table 2 - Minimum Design Standards

Design Element	P8D	P6D	P4D	C4D	C4U	C2U	L2U
Number of Traffic Lanes	8	6	4	4	4	2	2
Lane Width (Ft.)	12	12	12	11	11	36' F-F;40' F-F	27' F-F
ROW Width	150	130	105	80	70	60	50
Design Speed (MPH)	40-50	40-50	40-50	30-40	30-40	30-40	20-30
Max Grade (%)	6	6	6	8	8	8	10
Stopping Sight Distance (Ft.)	325-525	325-525	325-475	200-325	200-325	200-325	125-200
Horizontal Curvature Min. Radius (Ft.)	2,000	2,000	2,000	850	850	850	450 or 300
Vertical Clearance (Ft.)	15.5	15.5	15.5	15.5	15.5	15.5	15.5
Lateral Clearance (Ft.)	6	6	6	6	6	6	6
Min. Median Width (Ft.)	28	28	28	12	N/A	N/A	N/A
Parking Permitted	No	No	No	No	No	Some	Yes
Parkway Width (Ft.)	13	15	14.5	12	13	12';10'	11.5

(source: City of Sugar Land)

Each typical section is designated with two letters and one number. The first letter is a P, C or L which stand for principal, collector and local road respectively. The number states the total number of lanes, not counting medians or two-way left turn lanes (TWLTL). The second letter is a D or U which stands for divided and undivided respectively. All seven typical sections are described in further detail below.

The L2U cross section is the basic section for local streets. Two traffic lanes are provided and parking is allowed except where restricted by signing, striping or by fire hydrants. The purpose of this cross section is to provide individual lot access. This cross section is sometimes used for minor collectors.

The C2U cross section is wider than the L2U cross section, allowing for parking or bicycle lanes. While on-street parking is generally allowed on streets with an L2U section, the roadway width is insufficient for a vehicle to pass a parked car without traveling in the opposing traffic lane. The C2U section is preferred on more significant collectors, where on-street parking is present but traffic volumes are higher than on local roads. Table 2 lists two different roadway widths from curb to curb – 36-feet and 40-feet.

The C4U cross section has four lanes and is undivided. Turn bays are typically not provided except at major intersections. This typical section is for industrial or commercial areas.

The C4D cross section is the basic section for major collectors. Four traffic lanes are provided and on street parking is prohibited on major collectors but allowed on minor collectors.

The P4D cross section is the basic section for arterials. Four traffic lanes are provided and on street parking is prohibited. The P6D cross section and P8D cross section are similar to the P4D cross section except the have more lanes for arterials with higher traffic volumes.

2.3 Other Sugar Land Planning Studies

Comprehensive Mobility Plan

In 2009, a long-range "Vision 2025" plan was adopted by Sugar Land. The "Vision 2025" plan outlined basic principles and actions for the City to achieve its long-range goals. One of the goals - Superior Mobility – had eight supporting objectives identified by Vision 2025, which include enhancing the automobile infrastructure as well as improving service for transit, bicycle, and pedestrian movements. Objectives in Vision 2025 were expanded by the Comprehensive Mobility Plan with goals, strategies, and initiatives to achieve superior mobility.

Toll Bridge Feasibility Study

A Brazos River crossing south of US 59 and within the City of Sugar Land has been proposed by various entities over the last 20 years. The H-GAC travel demand model does not account for such a crossing in their 2035 travel demand forecasts, nor is a bridge within the agency's financially constrained long range plan. The 2008 Toll Bridge Feasibility Study by others for Fort Bend County identified three potential crossings from University Boulevard; it did not make recommendations on a preferred alignment.

Figure 1 - Toll Feasibility Study Alternatives

(Source: Toll Bridge Feasibility Study)

South Area Study

City Planning staff completed a South Area Study in 2011, which considered potential land uses and road networks in the undeveloped area between FM 2759, the Brazos River, the Greatwood Lakes subdivision, and Insurance Road. Three land uses and roadway networks were considered by the study: Business Park, Estate Residential, and Single family residential, with the Estate Residential use approved by City Council. The approved Estate Residential scenario is explained on the following page, and the Business Park and Single Family Residential are included in Appendix B.

Single-family residential, estate-residential and commercial are proposed land uses by the "estate residential" scenario. Compared to the business park scenario, the single family residential and light industrial are replaced with estate residential zoning. Commercial uses are planned along FM 2759 and at the intersection of the Macek Road and Shadow Bend Drive extensions. The acreage by zoning is in Table 3.

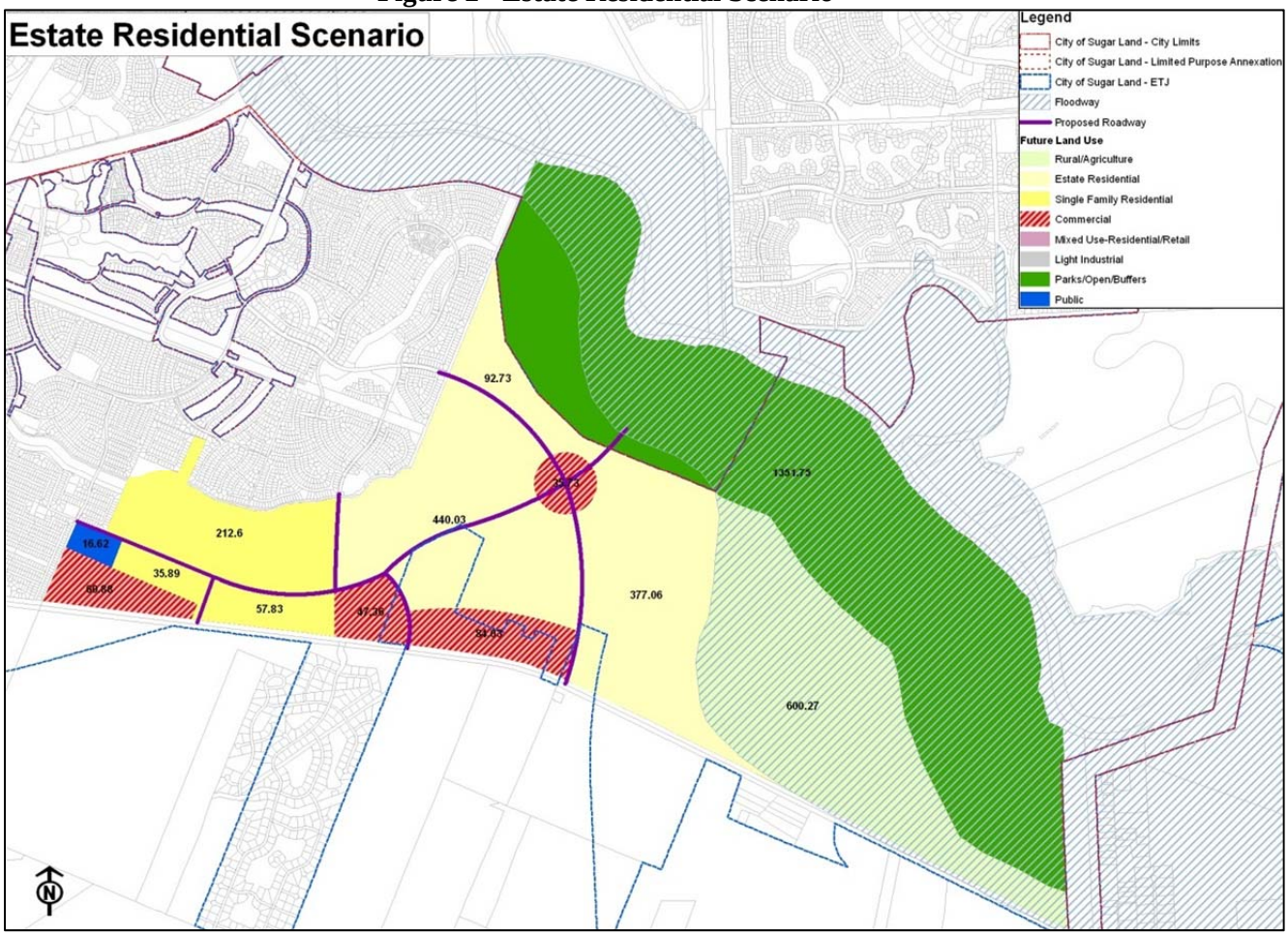
Table 3 – Estate Residential Land Use

Land Use	Acres
Single Family Residential	306.32
Estate Residential	909.82
Commercial	192.27
Public	16.62
Rural/Agricultural	600.27
Parks/Open Space	1,351.75
Total	**3,377.05**

A connection across the Brazos River is not proposed by the estate residential roadway network. Beyond this difference, the roadway network has the following features:

- Extension of Macek Road that curves northeast,
- Connection to Winding Brook Drive,
- An extension of Shadow Bend Drive that connects to FM 2759, and
- Three access points to FM 2759.

Figure 2 - Estate Residential Scenario

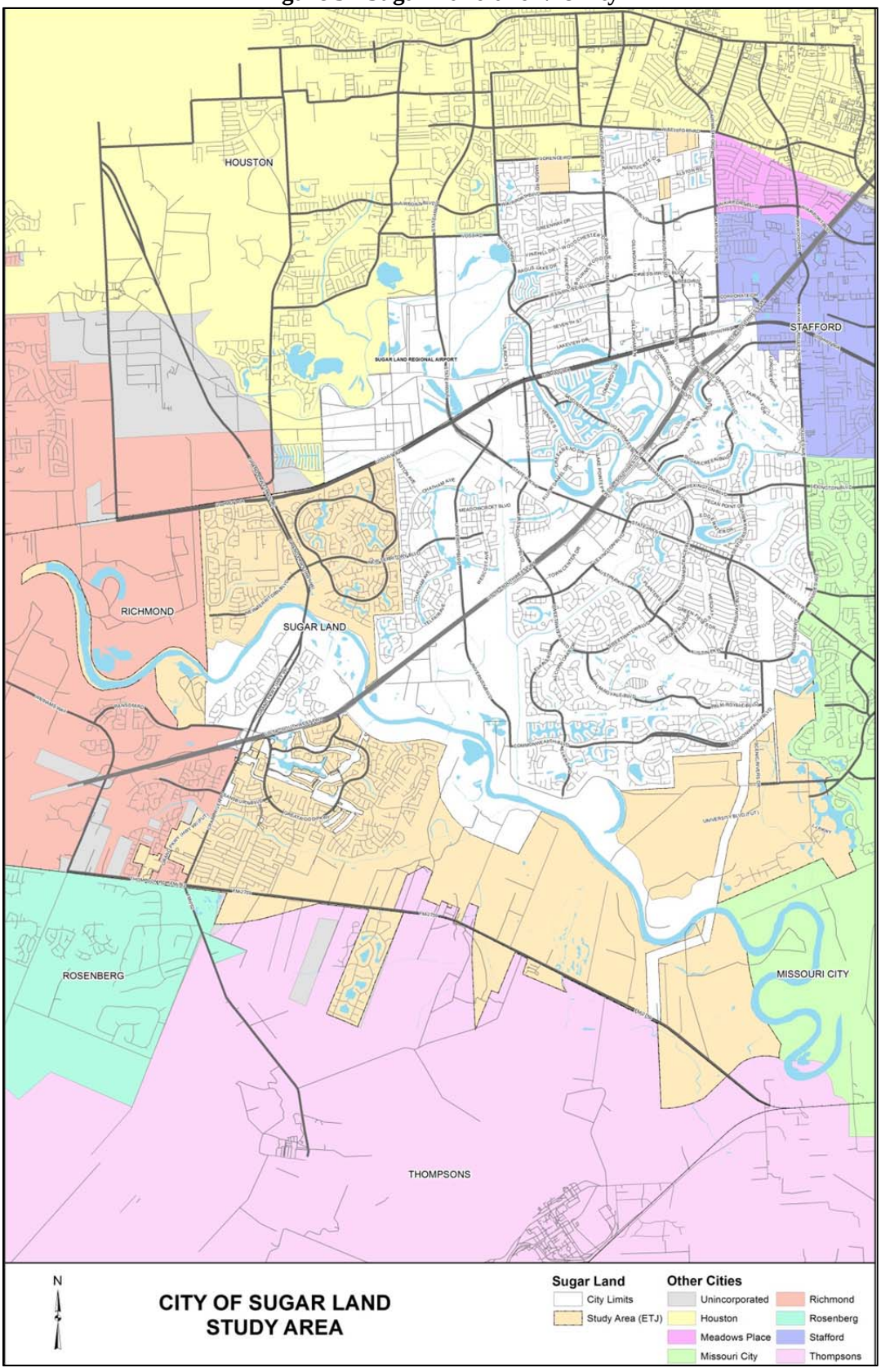


(Source: City of Sugar Land)

2.4 Coordination with Adjacent Entities

The MTP process provides the opportunity to coordinate transportation improvement projects with adjoining jurisdictions. City of Sugar Land lies entirely within Fort Bend County, which has its own transportation planning documents that are meant to reflect and augment the plans of the incorporated cities. Plans from these jurisdictions, where available, were obtained to review potential conflicting planned improvements, which were investigated in consultation with City of Sugar Land and applicable jurisdictional staffs. In addition, the Houston-Galveston Area Council's FY 2011-2014 Transportation Improvement Program was consulted to determine the status of ongoing projects in these municipalities. Sugar Land and its surrounding cities are shown in Figure 3.

Figure 3 - Sugar Land and Vicinity



Several plans from surrounding jurisdictions were reviewed. Existing and proposed roads were examined in the vicinity of Sugar Land's city limits, conflicts were identified. Proposed action by the City is in bold, and the recommendations are restated in at the end of the report. The following plans had specific features requiring coordination with the MTP:

- City of Houston Major Thoroughfare and Freeway Plan (MTFP), inclusive of applicable 2011 amendment requests
- City of Missouri City Traffic Management Plan (July 2006)
- City of Missouri City Major Thoroughfare Map (March 2010)
- City of Missouri City Zoning Districts Map (March 2010)
- City of Stafford Zoning District Map (February 2010)
- Fort Bend County 2007 Mobility Bond Program – March 2010 Progress

Stafford

The City of Stafford Major Thoroughfare Plan (dated May 14, 2007) identifies the following roadway classes. Intersection and overlap of Sugar Land roadways is listed with potential recommendations.

Major Thoroughfares

The following Major Thoroughfares intersect with the City of Sugar Land:

- Avenue E – 100' ROW
- Dairy Ashford Road – 100' ROW
- Dulles Avenue – 120' ROW

Dulles Avenue and Dairy Ashford Road are located on the border between Sugar Land and Stafford and are designated as Arterials by Sugar Land. Avenue E is a four-lane divided roadway east of Dulles Avenue in Stafford and a two-lane undivided road within Sugar Land. It provides access to the Riverbend Country Club and then dead ends. It is recommended that no changes be made, as Avenue E is surrounded by a built-up area.

Major Collectors

The following Major Collectors intersect with the City of Sugar Land:

- Corporate Drive – 80' ROW
- Fountain Lake Drive – 60' ROW
- Grove West Boulevard – 60' ROW

Corporate Drive and Fountain Lake Drive both extend west into Sugar Land. The Stafford MTP shows a proposed connection from Fountain Lake Drive to Julie Rivers Boulevard, which as of 2011 has been constructed and is open to traffic.

Fort Bend County

The Fort Bend County Major Thoroughfare Plan identifies the following roadway classes. Intersection and overlap of Sugar Land roadways is listed with potential recommendations.

Interstate

The Interstate class is used to identify IH 10. IH 10 does not pass through the City of Sugar Land.

Toll

The Toll / Proposed Toll classes, identify the Westpark, Fort Bend, and proposed Grand Parkway Tollways. Neither existing tollway is within the City of Sugar Land; however, the Fort Bend Tollway is expected to extend south and connect with FM 2759 approximately two miles east of City of Sugar

Land's extra-territorial jurisdiction boundary. In addition, as stated previously, the proposed Grand Parkway Tollway is planned to pass through the western edge of Sugar Land and its ETJ.

State
The State class identifies state and US highways within Fort Bend County. The following roadways are identified: SH 6, SH 99, US 59 and US 90A.

FM
Similar to the State class, the FM class identifies Farm-to-Market Roads within Fort Bend County. The following FM roads are either adjacent to or within City jurisdiction:

- FM 1464
- FM 1876 (Eldridge Road)
- FM 2759
- FM 762

Local Major Thoroughfare
The Local Major Thoroughfare classification identifies roads that are part of a municipality's roadway plan. There are several municipalities within Fort Bend County that choose not to adopt a roadway plan, most notably the City of Richmond, but coordinate with County staff to identify Local Major Thoroughfares. The following roads on the Fort Bend County MTP are Local Major Thoroughfares that connect to roads within City of Sugar Land's jurisdiction:

- Owens Road extension,
- Proposed connections to Royal Lakes Boulevard,
- Sansbury Boulevard, and
- New Territory Boulevard Extension.

Although the Fort Bend County plan defers to incorporated Cities where they have their own plan, it does reflect the contents of the Cities' plans. The following updates will be needed in the Fort Bend County MTP to ensure continuity with the City of Sugar Land MTP changes to date:

- The Imperial General Plan,
- The Riverstone General Plan, and
- Proposed roadway network from the Brazos River to FM 2759.

Missouri City Plan
The Missouri City Major Thoroughfare Plan identifies the following roadway classes. Intersection and overlap of Sugar Land roadways is listed with potential recommendations.

State
The State class is used to identify FM 1092 (Murphy Road) and SH 6.

Major Arterials
The following Major Arterials in Missouri City connect to roads in Sugar Land:

- Cartwright Road (Minor Collector in Sugar Land)
- Cross Lakes Boulevard (Major Collector in Sugar Land)
- Lexington Boulevard (Arterial in Sugar Land)
- LJ Parkway (Major Collector in Sugar Land)
- University Boulevard (Arterial in Sugar Land)

Cartwright Road is designated as a Minor Collector in Sugar Land because it extends about 460 feet west into the Magnolia Plantation subdivision before ending. The typical section for Cartwright Road is the

same in both cities, so no action is required. Similarly, Cross Lakes Boulevard extends less than one-quarter mile into Sugar Land and ends in the Lakeway subdivision. The typical section is the same in both cities, so no action is required. Lexington Boulevard, which is designated Independence Boulevard in Missouri City, is not anticipated to be expanded in the vicinity of Missouri City at this time. Independence Boulevard is also not anticipated to be widened in the vicinity of Sugar Land.

University Boulevard is currently under construction between Commonwealth Boulevard and Missouri City. The current typical section within Sugar Land includes provisions to widen University Boulevard to six lanes. This expansion, from Commonwealth Boulevard to SH 6 in Missouri City, is planned in the H-GAC RTP and sponsored by Sugar Land. Sugar Land will need to coordinate with Missouri City on any expansion project on University Boulevard.

The analysis and recommendations for LJ Parkway will be discussed in Chapter 6, due to its role in the Riverstone development network.

Minor Arterials
No roads designated as Minor Arterials in Missouri City connect to roads in Sugar Land.

Major Collectors
The following Major Collectors in Missouri City connect to roads in Sugar Land:

- Oilfield Road (Major Collector in Sugar Land)
- Plantation Colony Drive (Minor Collector in Sugar Land)
- Plantation Creek Drive (Minor Collector in Sugar Land)

The alignment of Oilfield Road displayed by Missouri City is not consistent with the land use plan proposed by Riverstone. A connection between Oilfield Road in Sugar Land and Oilfield Road in Missouri City, which was proposed by the Missouri City Thoroughfare Plan, is not depicted by the Riverstone development within Sugar Land. Missouri City will need to update their plan accordingly. **It is recommended to relay this conflict to Missouri City.**

Plantation Colony Drive and Plantation Creek Drive are spine roads within a subdivision developed in both cities and intersected by Dulles Avenue. This area is built out and neither road is planned to be expanded, so the roads are compatible.

City of Houston
The City of Houston's Major Thoroughfare and Freeway Plan (MTFP) identifies roadways by functional classification, and goes on to indicate if sufficient rights-of-way (Sufficient or To Be Widened) have been obtained for their ultimate, anticipated cross-sections. Intersection and overlap of Sugar Land roadways is listed with potential recommendations.

Freeway/Expressway
SH 99 / Grand Parkway and US 59 are designated Freeways/Expressways within the MTFP. These facilities' rights-of-way are not proposed to be widened. Unlike other plans, the MTFP does not have a "state highway" classification, and it does not make a distinction between tolled and non-tolled facilities.

Major Thoroughfare
The City of Houston designated the following roads as Major Thoroughfares that connect with roads within Sugar Land:

- Bellfort Avenue
- Dairy Ashford Road

- Eldridge Parkway/Belknap Road
- SH 6
- West Airport Boulevard

Bellfort Avenue, which follows the boundary between the existing corporate limits of Houston and Sugar Land, is designated as to be widened, which is consistent with the H-GAC RTP. Bellfort Avenue is proposed to be widened by Fort Bend County to six lanes between FM 1876 and the Harris County line.

The City of Houston also had some amendments to its MTFP which are adjacent to Sugar Land. Listed as a proposed, 100-foot wide, major thoroughfare, Owens Road was added to the MTFP and aligned differently than shown by Fort Bend County, which connected Owens Road to Ellis. Owens Road is proposed to connect to Easton Avenue at US 90A.

The City of Sugar Land's Major Roadway Plan designates Owens Road as a Major Collector. While this road is defined differently in each jurisdiction, neither associates a typical section with Owens Road. Within the City of Houston's ETJ, Owens Road is open to traffic west of FM 1464 and is constructed with a two-lane, shoulder and ditch section design. **It is recommended that Owens Road be classified as an arterial, to match Houston's 100-foot "thoroughfare" designation**. Coordination will be required with the City of Houston to ensure a smooth transition in pavement and cross-section at the mutual boundary.

Major Collectors

Burney Road and Voss Road form part of the Houston – Sugar Land border. They are both being added by Houston as "Sufficient Width" major collectors. Voss Road is shown on Sugar Land's current plan as a major collector, matching Houston's proposed designation. It recommended that no action be taken on Voss Road.

Burney Road between West Bellfort Street and the ETJ boundary with Sugar Land was added to the City of Houston MTFP as a sufficient width major collector with a 90-foot to 100-foot wide ROW. Burney Road is shown on Sugar Land's current plan as an arterial, and in the current plan is downgraded to a major collector. No further action is recommended because Houston's 90-foot to 100-foot wide ROW section is consistent with the City of Sugar Land's plan to upgrade Burney Road to a four-lane divided section with curb and gutter.

Synott Road, which is the continuation of Eldridge Road (FM 1876) from the Sugar Land City Limit to Westheimer Road, is designated within the City of Houston as a sufficient width major collector in the MTFP. Eldridge Road is shown in Sugar Land's current plan as a state highway. While the Houston and Sugar Land plans do not agree on classification, no action is recommended because the typical section, four-lanes divided, is the same in both cities.

Transit Corridor

This is a relatively new classification applied to streets where METRORail operates or is planned to operate. It affects various site development standards, as discussed in the Houston Planning Department's *Urban Corridors Initiative.* Typical sections depend on the design requirements of the light rail. No roads designated as Transit Corridor Streets connect with any roads in Sugar Land.

Meadows Place Plan

The City of Meadows Place does not have a Major Thoroughfare Plan. The City is planning to reconstruct West Airport Boulevard between Kirkwood Road and US 59 as part of the Fort Bend Mobility Bond Program. The project will involve adding turn bays to add capacity at intersections.

Richmond Plan

The City of Richmond does not have an adopted Thoroughfare Plan. The City, however, provides input and adheres to the County Thoroughfare Plan.

Thompsons Plan

The Town of Thompsons is a very small jurisdiction, despite having a large geographic area of mostly agricultural land. The population was 236 in the 2000 census. Thompsons does not have a major thoroughfare plan, but does coordinate with Fort Bend County.

3.0 PLANNED GROWTH

3.1 Planned Roadway Improvements

Several roadway improvements are planned within and around Sugar Land. Planned improvements were reviewed to analyze future traffic congestion and incorporate into the updated plan. For this effort, major elements include projects already underway, SH 99, other planned regional projects and regional unfunded projects. Unfunded projects are identified transportation projects that do not have a sponsor yet. Most of the project information is from the H-GAC Regional Transportation Plan *(1)*, which lists regionally-significant projects for the metropolitan area. Information from Burney Road is from the Fort Bend Mobility Bond. The following improvements were considered both when analyzing the adequacy of the thoroughfare plan network relative to Year 2035 demands, and when developing typical sections.

Table 4 - Funded Improvements

Sponsor*	Road	Source	From**	To	Improvement	Year
COSL	Burney	FB Mobility Bond	Voss	Florence	Widen to 4 lanes divided with curb and gutter	2011
FBC	Burney	FB Mobility Bond	Florence	Old Richmond	Widen to 4 lanes divided with curb and gutter	2011
COSL	Stadium	H-GAC TIP	N of Jess Pirtle	US 90A	Construct 4 lane roadway	2015
FBCTRA	SH 99 (Segment D)	H-GAC TIP	Westpark Tollway	US 59	Construct toll lanes on existing ROW	2012
FBCTRA	SH 99 (Segment C)	H-GAC TIP	US 59	SH 288	Construct toll lanes on new ROW	2017
FBC	Bellfort	H-GAC RTP	Eldridge	Harris C/L	Widen to 6 lanes divided	2018
COSL/ COH	Dairy Ashford	H-GAC TIP	Julie Rivers	US 90A	Widen to 6 lanes	2014
COSL	Dairy Ashford	H-GAC RTP			Grade Separation over RR	2025
FBC	Dairy Ashford	H-GAC RTP	Harris C/L	Airport	Widen to 6 lanes divided	2018
COSL	Eldridge	H-GAC RTP			Underpass at US 90A	2020
FBCTRA	FB Tollway	H-GAC RTP	SH 6	SH 99	4-lane toll road and Brazos Bridge	2025
COSL	Meadowcroft	H-GAC TIP	University	First Colony	4-lane extension	2013
COSL	New Territory	H-GAC RTP	LID 17	University	Widen to 6 lanes	2019
COSL	Scenic Rivers (formally Oilfield)	H-GAC RTP	Commonwealth	University	Widen to 4 lanes	2020
COSL	University	H-GAC RTP	US 59	SH 6	Widen to 6 lanes	2016
COSL	University	H-GAC RTP	Commonwealth	SH 6	Widen to 6 lanes	2015
COSL	Williams Trace	H-GAC RTP	US 59	Oyster Creek bridge	Widen to 6-lanes	2015

* COSL – City of Sugar Land; FBC – Fort Bend County; FBCTRA – Fort Bend County Toll Road Authority
** LID – Levee Improvement District

Several projects within Table 4 should be reconsidered. The potential grade separations at Eldridge Road and Dairy Ashford are being analyzed as part of an ongoing railroad crossing study, and the recommendations from the study may require changes to the H-GAC RTP. Additionally, the Scenic River Drive expansion (previously designated Oilfield Road) expansion should be reconsidered. The addition of LJ Parkway and its role within Riverstone should provide adequate access and mobility without expanding Scenic Rivers Drive.

Improvements in Table 5 have no ascribed funding within the H-GAC 2035 Regional Transportation Plan. As a result, they were not considered in the evaluation of the adequacy of the City's planned thoroughfare network. However, the potential of these projects needs to be considered during the thoroughfare plan update process.

Table 5 - Unfunded Improvements

Road	From	To	Improvement
FM 2759	FM 762	Smithers Lake Road	Widen from 2 to 6-lanes with bridges
FM 762	FM 1640	FM 2759	Widen from 2 to 6-lanes with bridges
Old Richmond	SH 6	Eldridge Pkwy	Wide to 4-lane undivided
SH 6	Beechnut	US 90A	Widen to 8-lanes
SH 6	US 90A	US 59	Widen from 6 to 8-lanes
US 90A	SH 99	0.3 MI west of SH 6	Widen to 8-lane divided

Sugar Land Projects under Construction

As the Major Thoroughfare Plan Update was in progress, there were several projects under construction. For purposes of the plan, these projects should be considered complete. These projects are listed in Table 6.

Table 6 - Sugar Land Projects under Construction

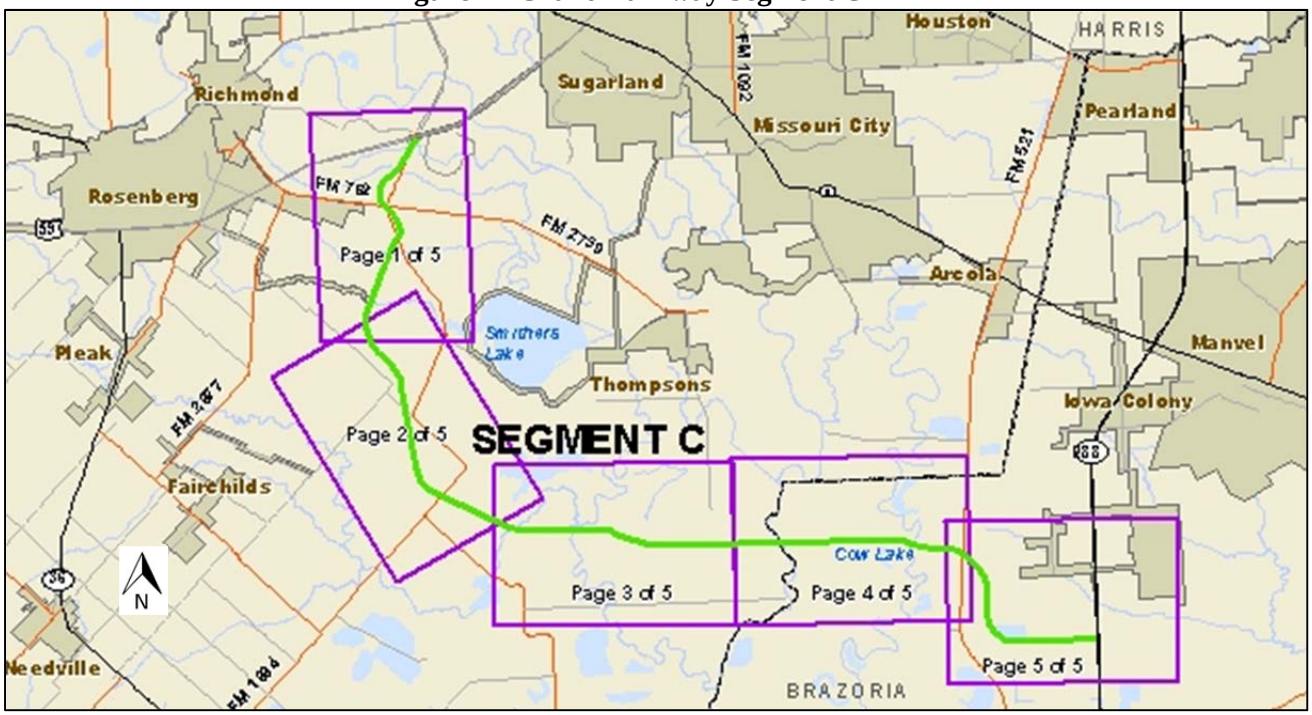
Sponsor	Road	Source	From	To	Improvement	Year
COSL	Stadium	H-GAC RTP	SH 6	Burney	New 4-lane boulevard	2012
COSL	Lexington	H-GAC RTP	University	Oxbow	4-lane undivided with parking	2011
COSL	Lexington	H-GAC TIP	University	Oxbow	Construct bridge over Ditch H	2011
COSL	University	H-GAC TIP	Ditch "H"	US 90A	Extend 4-lane section including bridge to US 90A	2011
COSL	University	H-GAC RTP	Commonwealth	Missouri City limit	Construct 4-lane roadway	2015

SH 99

SH 99, or Grand Parkway, is planned to be the third concentric expressway loop road centered on downtown Houston within the Houston-Sugar Land-Baytown metropolitan area. SH 99 is divided into 11 segments, with Segments C and D within Sugar Land city limits.

Segment C, shown in Figure 4 and Figure 5, is planned to roughly follow Crabb River Road and FM 762 within Sugar Land. Local access from SH 99, depicted in Figure 5, is proposed to be via frontage road extensions serving Sansbury Boulevard and Crabb River Road, as well as a new interchange at FM 2759. South of Crabb River Road, SH 99 is planned to a limited access tollway without frontage roads, the next interchange occurring at the planned extension of Reading Road to FM 762. The directional interchange at US 59 is also planned to be constructed during the first phases of Segment C.

Figure 4 - Grand Parkway Segment C



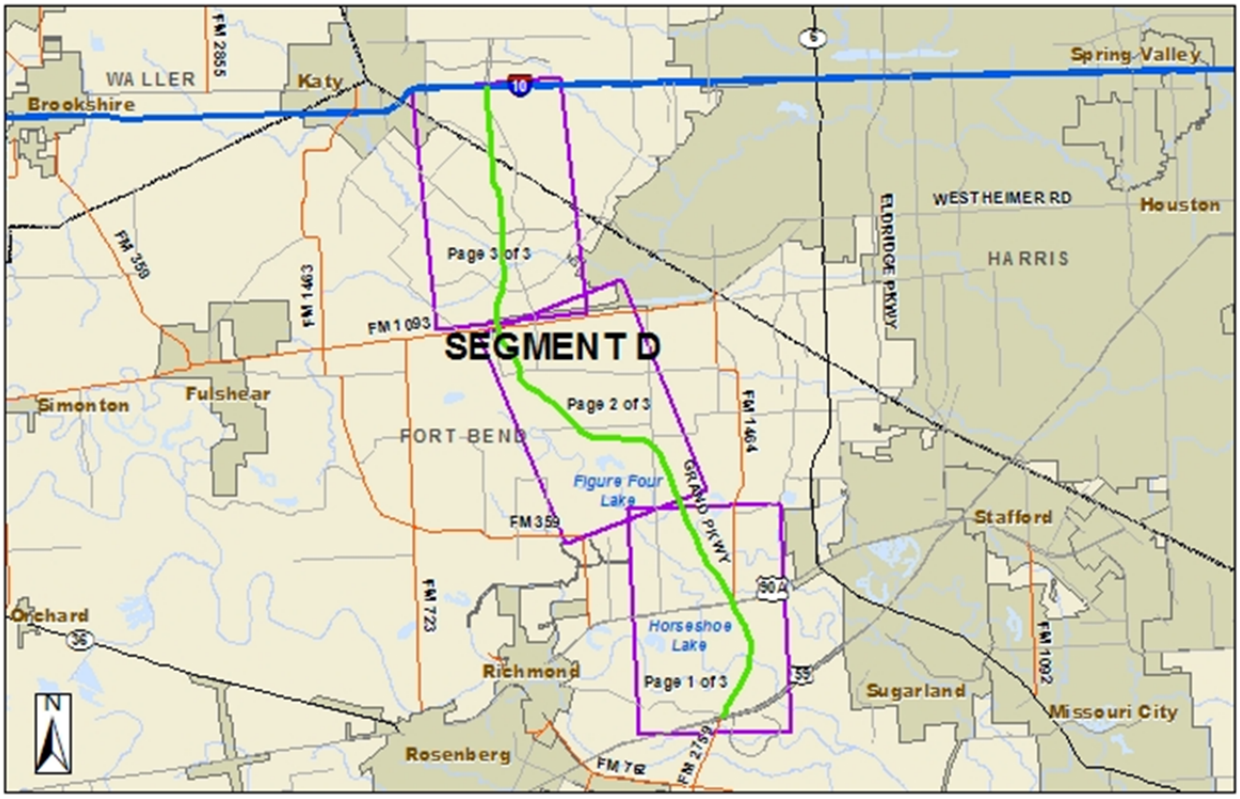
(Source: Grand Parkway Association)

Figure 5 - Segment C at US 59

(Source: Grand Parkway Association)

Segment D has been constructed; however, the tolled overpasses between Westpark Tollway and US 59 are not complete. Tolled overpasses within the City of Sugar Land are proposed at East Riverpark Drive, New Territory Boulevard, and Sandhill Drive. A three-level interchange with US 90A is also planned. Connections to local roads in this area will continue to be afforded from the SH 99 frontage roads.

Figure 6 - Grand Parkway Segment D



(Source: Grand Parkway Association)

3.2 Future Land Development Plans

Several large-scale planned developments are either proposed or underway within Sugar Land, including Imperial, Telfair, Greatwood Lakes, and Riverstone. Figure 7 shows the location of these within the study area; the details of each general development plan (GDP) discussed in greater detail following the figure. Some developments are not built, and any approved changes to a GDP may require revisions to the MTP.

Imperial Sugar/Tract 3

The Imperial Sugar/Tract 3 (referred to as "Imperial") development is a 716-acre site located northeast of SH 6 and US 90A (Figure 8). Access to the development is provided by SH 6 to the west, Burney Road to the east, and US 90A to the south. US 90A access will be constrained by the limitations of the existing Union Pacific freight rail main lines and potential passenger rail service. The extension of University Boulevard into the Imperial development remains a goal of the City, but is delayed due to coordination with Union Pacific Railroad. The Imperial GDP has been changed since the MTP was last adopted, and the prepared MTP revisions reflect all approved changes.

Figure 7 - General Plan Areas

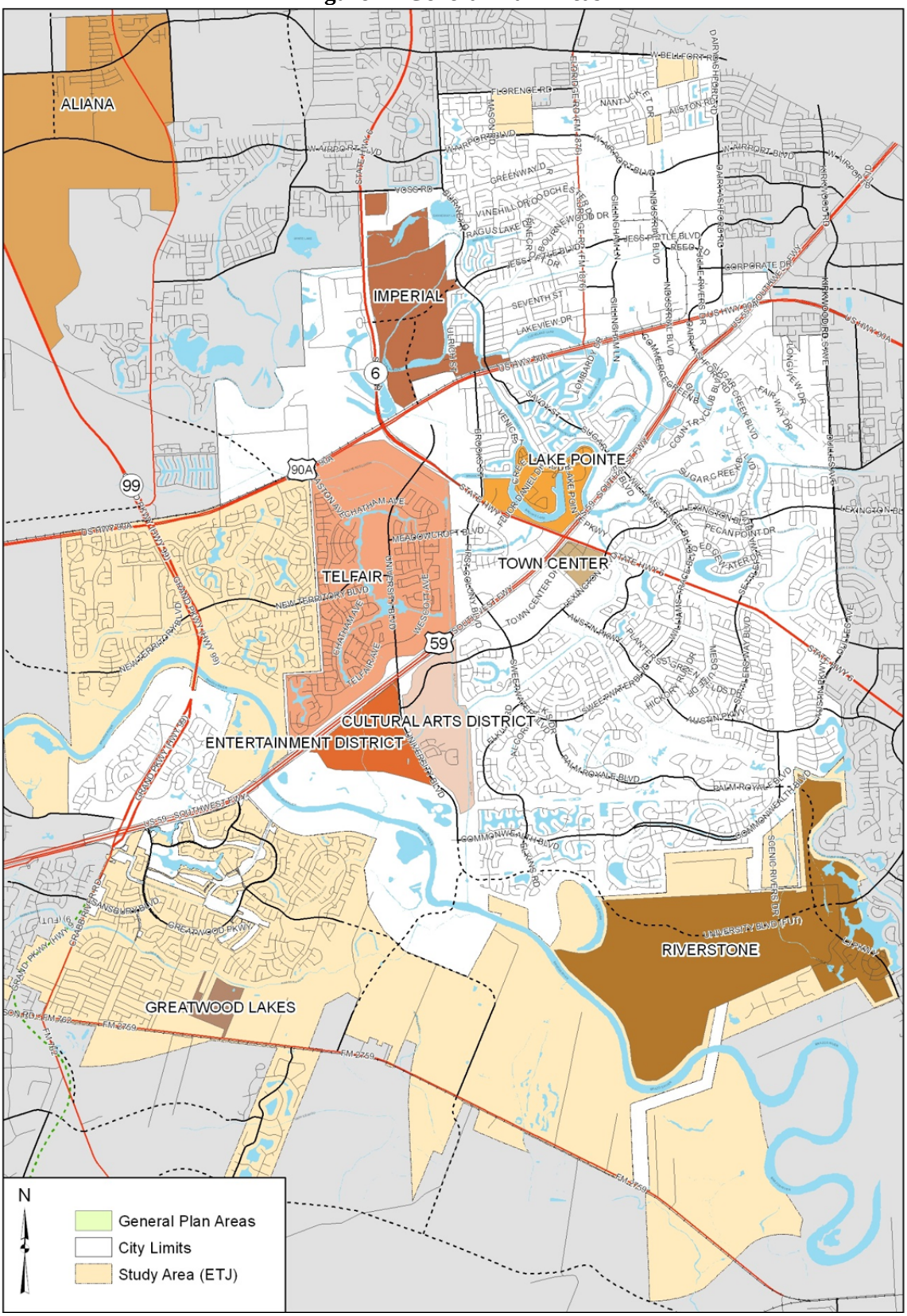
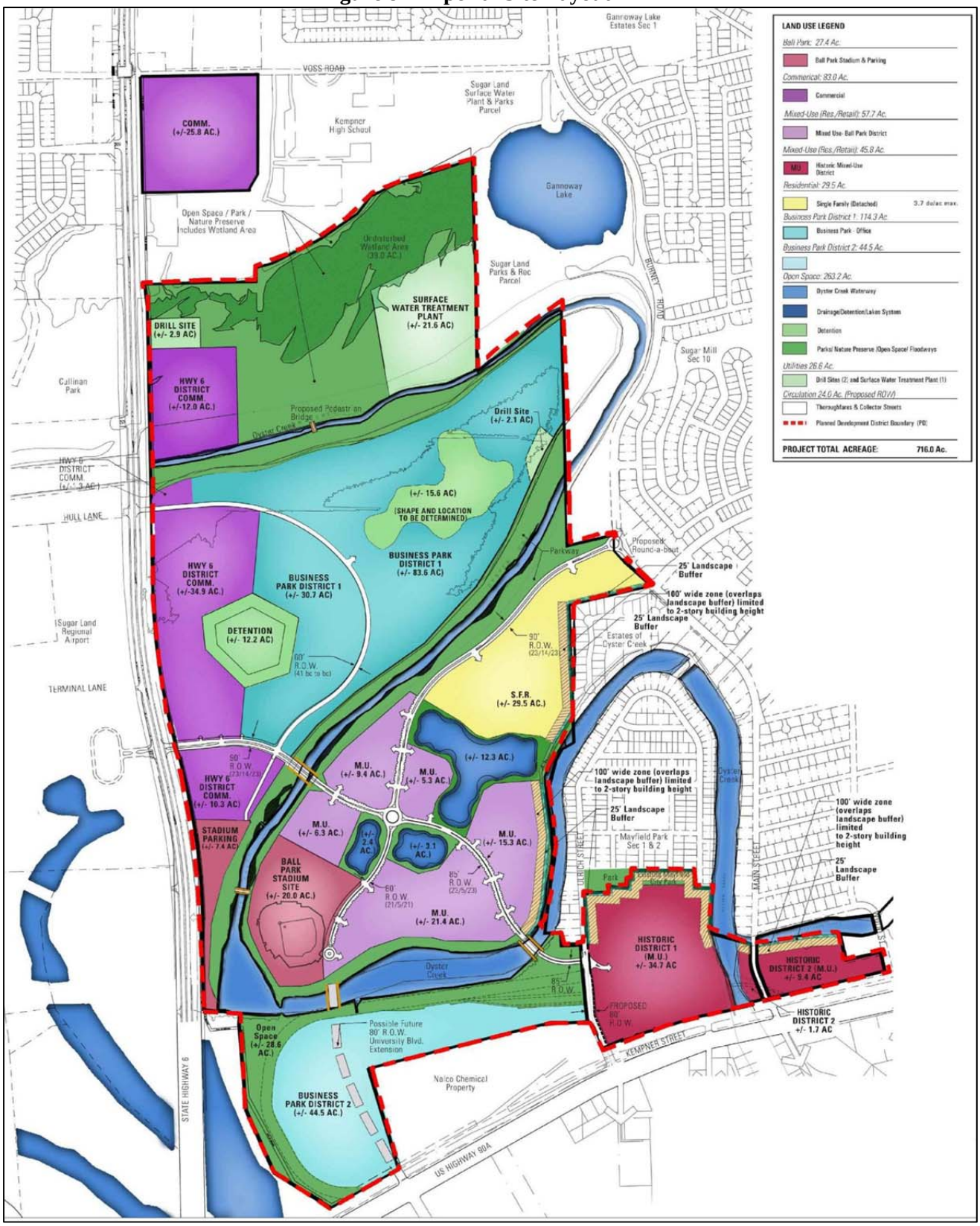


Figure 8 - Imperial Site Layout



(source: The Johnson Development Corporation, June 2011)

Telfair

The Telfair GDP is a 2,018.1 acre development located in western Sugar Land. Telfair has two separate parts, Tract 4, north of US 59 up to US 90A, and Tract 5, south of US 59 and east of University Boulevard. Telfair has access to three major regional roadways: SH 6, US 59, and US 90A. The following land uses are proposed within its GDP:

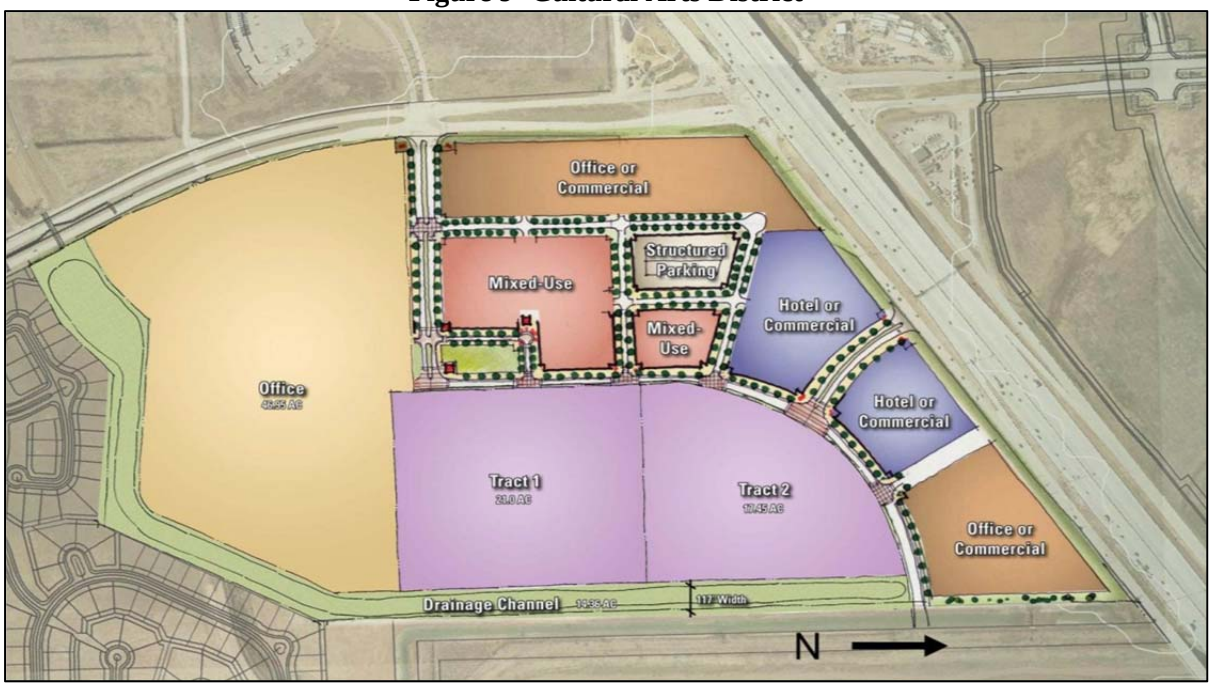
Table 7 - Telfair Land Use

Land Use	Acres
Residential	934.3
Mixed-Use	166.3
Commercial	248.1
Civic/Community	105.6
Open Space	433.6
Utilities	34.0
Circulation	96.2
Total	**2,018.1**

Within Tract 4, most of the traditional single family residential zones have been developed. Remaining zones to be developed include mixed-use, commercial, townhouse residential, and school sites. It should be noted that placement of any public schools are subject to the acceptance of Fort Bend County Independent School District. A civic center area within Tract 4 also includes a branch of the Houston Museum of Natural History and Science. The museum generally has 200 to 300 daily visitors and has a capacity of 700 to 800 daily visitors. Located in a historic building, the museum does not have opportunities to expand.

Tract 5 is located south of US 59 and across University Boulevard from the University of Houston (UH) – Sugar Land. The Telfair GDP originally depicted part of this area as 95.0 acres of Mixed-Use and 60.4 acres of Commercial, however, this area has been identified as the Cultural Arts District. The current plan, shown in Figure 9 includes the extension of Lexington Boulevard to University Boulevard.

Figure 9- Cultural Arts District



(source: TBG, April 2011)

Three unique street sections are proposed as part of the Cultural Arts District. These sections, listed in Table 8 are all four-lanes, but vary based on median, sidewalks, on-street parking, and ROW.

Table 8 - Cultural Arts District Typical Sections

Name	Median	Sidewalks	On-Street Parking	ROW
80' ROW with 10' Median	Yes – 10 feet	Yes – 5 feet	No	80 feet
Lexington Ave	No	Yes – 10 feet	Yes – Parallel	82 feet
87' ROW with Parallel Parking	Yes – 4 feet	Yes – 10 feet	Yes – Parallel	87 feet

(source: TBG, April 2011)

Greatwood Lakes

The Greatwood Lakes GDP was approved by City Council on December 21, 2010. The GDP is a 100.3 acre development located south of Greatwood subdivision in the City's Extraterritorial Jurisdiction (ETJ). The development will have 254 single-family residential lots and be accessed from FM 2759 on the south and Macek Road on the west.

Lake Pointe

The Lake Pointe GDP was approved by City Council on March 4, 2004. The GDP is a 184 acre mixed-use development located in the north corner of SH 6 and US 59 and west of Sugar Lakes Drive. As a result of the traffic impact analysis (TIA) for this project, Lake Pointe Parkway was extended through the development from Creekbend Drive to US 59; and the road next to the Fluor office complex was dedicated as a public street.

Riverstone

The Riverstone GDP (as of Amendment 3 released on September 21, 2010) is a 2,170.8 acre development located on the future southeastern extension of University Boulevard within in the City's ETJ. Access to the development is provided by University Boulevard and LJ Parkway. The following land uses in Table 9 are proposed by the General Plan.

Table 9 - Riverstone Land Use

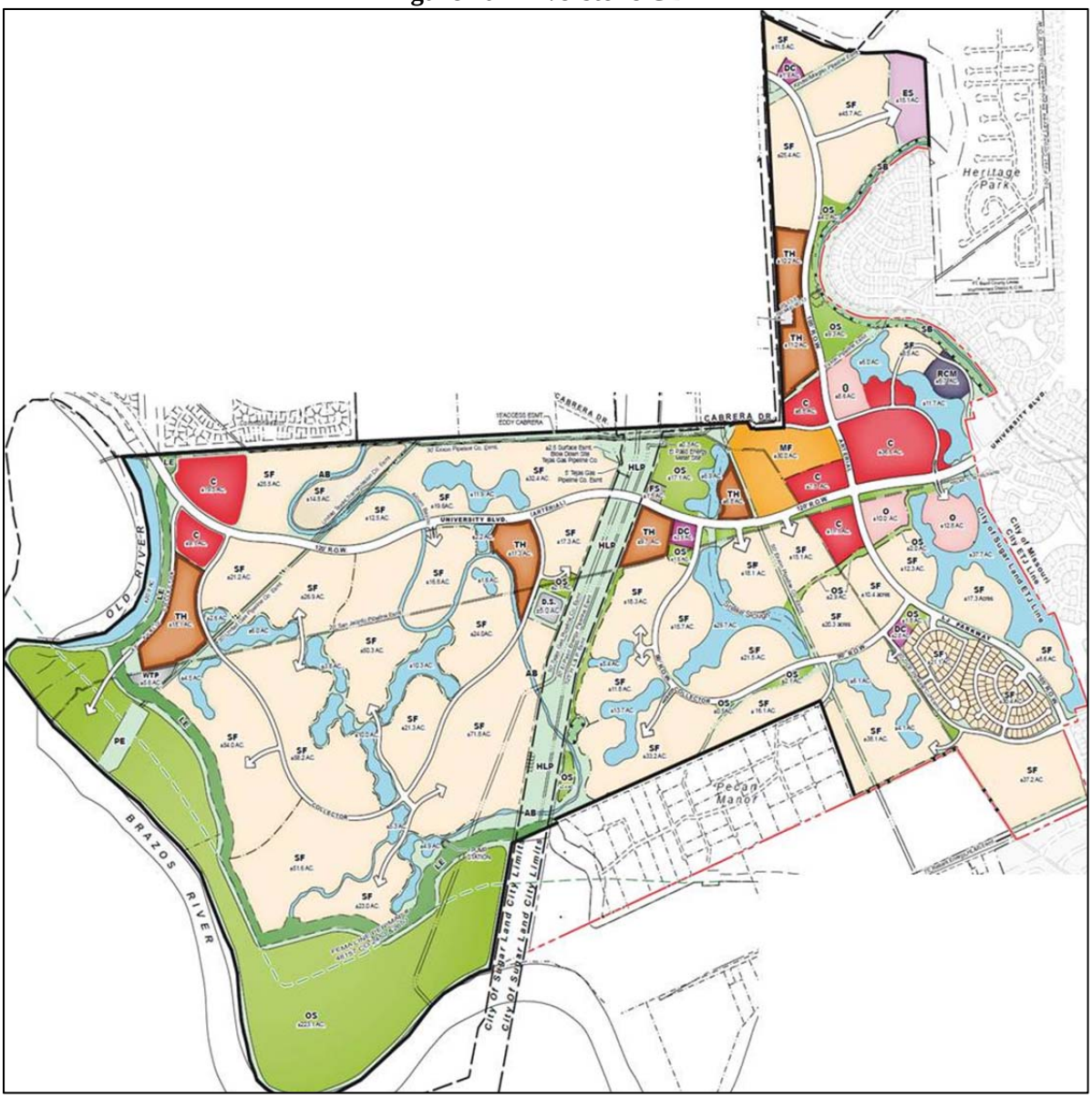
Land Use	Acres
Residential	1,081.3
Commercial	128.7
Civic / Community	16.6
Open Space	411.6
Utilities	131.6
Circulation	116.9
Drainage System	283.6
Total	**2,170.8**

(source: Riverstone Development Company, September 2010)

The completion of Riverstone would expand or add the following major thoroughfares to the Sugar Land roadway network.

- University Boulevard (120-foot wide arterial)
- LJ Parkway (105-foot wide arterial)
- Loop Road (60-foot wide collector)
- Winding Waters Lane (90-foot wide collector), and
- Levee Collector (60-foot wide collector).

Figure 10 - Riverstone GDP



(source: Riverstone Development Company, September 2010)

Potential Redevelopment Efforts

City staff also outlined potential areas of redevelopment, listed below with current zoning in parentheses:

- Eldridge Road at Greenway Drive (B-1 – Neighborhood Business),
- 1200 Block Eldridge Road (B-1 – Neighborhood Business),
- Eldridge Road at Jess Pirtle Boulevard (B-1 – Neighborhood Business),
- 14000 Block Southwest Freeway (B-2 General Business),
- 13300 Block Southwest Freeway (B-2 General Business),
- 16000 Block Southwest Freeway (B-2 General Business),
- 3500 Block SH 6 (B-2 General Business),
- SH 6 at Austin Parkway (B-2 General Business),
- The Sugar Land Prison site (ETJ, Industrial), and
- The Riverpark Shopping Center at SH 99 and US 59 (ETJ, no zoning).

The only major consideration for thoroughfare planning from the redevelopment areas listed above is the Sugar Land Prison site. Bounded to the east by the Sugar Land Regional Airport and to the north by Oyster Creek, the primary means of access to this site will be from the south and west via an extension of Owens Road. Owens Road is proposed to be extended to US 90A and connect to Easton Avenue from Telfair. The operation of the intersection at US 90A will be affected by the adjacent rail crossing.

3.3 Population and Employment Projections

The Houston-Galveston Area Council (H-GAC) produces population and employment forecasts to support travel demand modeling efforts. These models are based on Transportation Analysis Zones (TAZs), areas bounded by major roadways or geographic features. The travel demand modeling supports regional transportation planning. The future population and employment forecasts were reviewed to verify that planned developments (Imperial, Riverstone, Telfair, etc.) are included. An indication that planned development was not considered, for example, would be a TAZ with a planned 2,000-unit single-family subdivision, but a forecasted population of only 400. Regional and county population and employment forecasts are then developed with the following steps, as shown in the 2035 Regional Growth Forecast's technical documentation from the H-GAC website *(2)*:

STEP 1: Regional-level population forecasts are derived using data the US Census Bureau and national population projections.

STEP 2: County-level population forecasts are derived by county growth projections from the State Data Center and State Demographer,

STEP 3: County-level household forecasts are determined by ethnic and age compositions,

STEP 4: Regional-level employment forecasts are calculated using the projected working age labor force,

STEP 5: County-level employment forecasts are allocated with each county's "share" of regional employment,

STEP 6: The region is divided into 23 acre square cells by UrbanSim Land Use Forecasting and Simulation Model,

STEP 7: A base year condition is created in the square cells using appraisal data (county appraisal districts), demographic data (Census Bureau), and employment data (company-level data from Info-USA)

STEP 8: Housing units and job slots forecasts are created by the UrbanSim model based on various factors, such as land value, access to transportation network, and distance to population and employment centers.

STEP 9: Forecast results are converted into more common geographic units, such as counties and cities. For the Major Thoroughfare Plan Update, results were at the TAZ level.

H-GAC states the quality of the results at varying geographic levels with the following statement, "Due to statistical properties of error propagation, higher levels of aggregation will necessarily contain less error than the lower ones." As the region is divided into smaller areas, the accuracy within the individual areas decreases, e.g. county-level projections are more accurate than city-level projections, which are more accurate than TAZ-level projections.

Growth trends within Sugar Land were determined by regional population, employment, and traffic projections produced by H-GAC. Forecast years were 2009, 2015, 2025 and 2035. Over the next 25 years, percentage population growth is expected to be highest in the southern and western parts of the city, south and west of SH 6. East of SH 6, most areas are forecasted to have zero to modest growth, indicative of the fact that this portion of the city/ETJ is largely developed. Similar to the patterns of population growth, percentage employment growth is greatest in areas west of SH 6; however, most of the total employment within the city will remain east of SH 6.

Review maps were generated showing H-GAC Year 2035 population and employment projections and 2010-2035 growth rates at the TAZ level. City staff and Planning and Zoning (P & Z) Commission members reviewed and identified areas where population/employment growth rates or quantities were questionable based on local knowledge. These were further reviewed for reasonableness relative to development patterns visible in aerial imagery and tabulated General Plan area buildout conditions.

The population and employment adjustments were made by comparing General Plans to the H-GAC forecasts. Population forecasts were adjusted using updated numbers of households planned in corresponding developments. If a TAZ contains 1,000 new housing units from a proposed general plan, the 2035 population was revised using the same population per household in the original H-GAC forecasts. This procedure was repeated for the other TAZs regarding population.

Employment projections were revised based on correlating existing structures to jobs or using General Plans to estimate jobs. Correlating existing structures to jobs was estimated by assuming a set number of full time jobs per store or building. For example, each store in a strip mall was assumed to have ten full-time jobs. Larger retail businesses, such as H-E-B, Sam's Club, and Target, were assumed to generate a larger number of full-time jobs based on the relative physical size of the business. This correlation follows ITE engineering judgment. As a back-check, field conditions such as parking spaces were examined to verify reasonableness. For office employment, the number of parking spaces was counted from aerials to estimate the number of jobs. It should be noted that these estimates could have significant error, however, these estimates were used to verify if existing TAZ employment data was reasonable.

Employment projections for general plan areas were revised by estimating the number of jobs within the general plan area and adding that to the 2009 employment data from H-GAC. Land use for general plan areas was given in acres. Employment projections were calculated by assuming a floor-to-area ratio and per worker square footage estimate available from the US Bureau of Labor. A floor-to-area ratio of 0.3 was assumed based on similar properties throughout the City.

Discrepancies between H-GAC population and employment forecasts and computed values based upon planned development were identified in nine TAZs (shown in Figure 11 and tabulated in Table 10), with the forecasts in TAZ 2220 underreported in both population and employment. These TAZs are the location of the Imperial GDP and traffic network was adjusted to reflect the addition of this development, with guidance from City staff and the Imperial TIA *(3)*. With the exception of TAZs 2209 and 2259 only the employment projections have discrepancies. Several non-residential land uses, including retail do not have a correlation between employment and trip generation. Other TAZs with discrepancies between employment forecasts and planned development were not included in adjustments to the traffic network for these reasons:

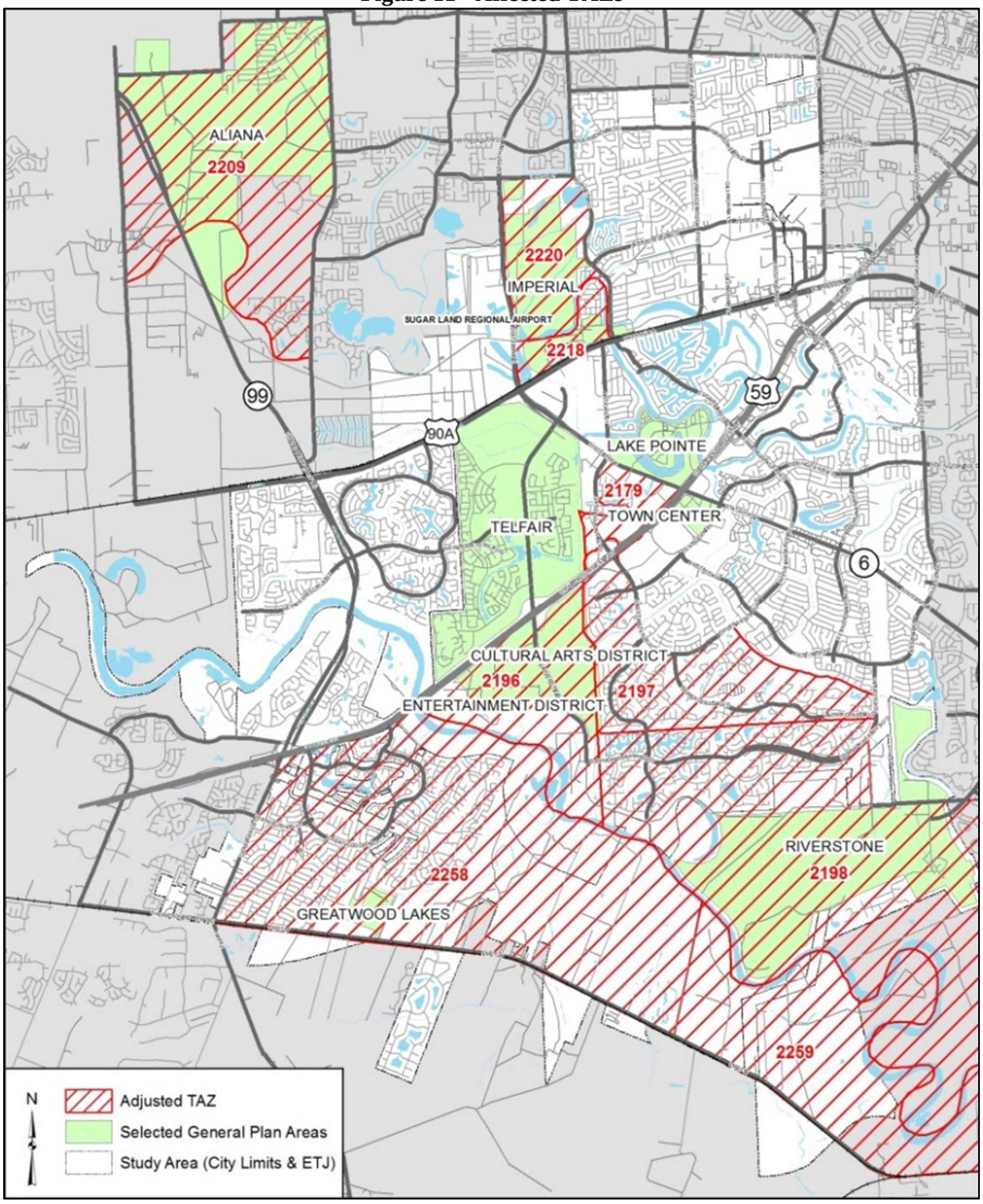
- TAZ 2209 (Aliana) is outside of the Sugar Land ETJ and no traffic analysis is available
- TAZ 2259 (South of River) is adjacent to Missouri City and represents a decrease in population along FM 2759. P & Z Commission members expressed concern about FM 2759 traffic projections being too low; adjusting the network would further decrease traffic on FM 2759.

- TAZ 2179 (Southwest Freeway/SH 6 west) is a built-out area that underestimated 2009 employment within the H-GAC model. The revised current estimate is close to the 2035 projection from H-GAC. However, growth from 2009 to 2035 is in the H-GAC model. Assuming that expansion is possible, the development would add 800 jobs (difference between 2009 and 2035 projections). Without an identified land use, the employment growth forecast is insufficient to identify added travel demand.
- TAZ 2196, 2197 and 2198 are adjacent to each other. As stated in H-GAC's methodology, the forecasting model is less accurate with decreasing area size. Additionally, the employment forecasts are insufficient to identify added travel demand.
- TAZ 2258 (Greatwood Lakes) is adjacent to Richmond and represents a decrease along major thoroughfares.

Table 10 - TAZ Adjustments

	Population Adjustments	***2009***		***2035***	
TAZ	**Location**	**H-GAC**	**Revised**	**H-GAC**	**Revised**
2209	Aliana	381	381	6,816	9,761
2220	Imperial Tract 3	206	206	789	2,408
2259	South of River	211	450	5,161	2,194
	Employment Adjustments	**2009**		**2035**	
2179	Southwest Freeway/SH 6 West	773	1,600	1,577	2,400
2196	UH-SL & South Telfair	40	40	418	6,197
2197	Clements HS/ Commonwealth	1,565	550	3,172	1,110
2198	Riverstone	684	684	1,225	2,984
2218	Nalco/Mayfield Park/Refinery	601	601	892	1,849
2220	Imperial Tract 3	731	300	1,458	4,059
2258	Greatwood Lakes	987	330	3,109	990

Figure 11 - Affected TAZs



4.0 TRAFFIC ANALYSIS

Major components of the traffic analysis included adjustments to H-GAC forecasts and performance of a roadway level-of-service analysis for the future 2035 collector and arterial network within Sugar Land. Traffic forecast adjustments were revised based on two TIAs provided by the City for the Riverstone and Imperial developments.

H-GAC Year 2035 projected traffic volumes and growth rates were reviewed for reasonableness by City staff and P & Z Commission members. The feedback received from this process was used to help distribute changes to forecasted traffic volumes associated with revisions to the demographic data mentioned above and accepted trip generation computation practices. Revised mapping was prepared and circulated for review and concurrence by City officials.

4.1 Traffic Forecast Adjustments

Riverstone

The Riverstone TIA *(4)* analyzed traffic conditions within the development, as well as University Boulevard, Commonwealth Boulevard, and Austin Parkway for an assumed buildout year of 2018. In addition to the employment discrepancy in Table 10, trips are distributed differently in the TIA than the H-GAC network. North-south trips were distributed in the TIA onto LJ Parkway, not Scenic Rivers Boulevard as assumed in the H-GAC model,

STEP 1: PM peak hour volumes from the buildout condition in the TIA were converted into daily volumes under the assumption that the PM peak is 10 percent of daily traffic.

STEP 2: Daily volumes were compared to 2035 daily volumes. It is assumed that once Riverstone is complete, volumes will not increase significantly on adjacent tributary roadways. Austin Parkway, Commonwealth Boulevard, and LJ Parkway are not regionally significant roadways that would receive trips from additional development in the region. Once development occurs around those types of roadways, traffic growth should not occur unless higher density redevelopment occurs, or any underlying assumptions change relating to per capita travel.

STEP 3: Buildout volumes replaced the 2035 H-GAC volumes and the difference was noted.

Imperial Sugar/Tract 3

H-GAC population and employment forecasts account for only 20% of the growth anticipated to occur due to the Imperial development. It is assumed that the traffic forecasts would have similar numbers. To adjust traffic forecasts, the following steps were performed:

STEP 1: Using ITE trip generation methods, the Imperial development was estimated to generate 50,000 daily trips. The Imperial TIA *(3)* estimated 43,134 trips in a three-phase buildout by 2019. The Business Park District adjacent to the Nalco refinery does not appear to be considered in this calculation. Therefore, the assumed 50,000 trips from the total development is reasonable.

STEP 2: Of the 50,000 trips generated, it is assumed that 20% of the trips are in the H-GAC forecasts, leaving 40,000 trips to be placed on the network around the Imperial development. A mode split was not assumed, and an internal capture determination was not prepared.

STEP 3: Trips were distributed on surrounding roads. Trips where allocated onto the Sugar Land roadway network as follows:

- 23% south on SH 6,
- 10% west on US 90A,
- 19% east on US 90A,
- 11% south on University Boulevard,
- 10% north on SH 6,
- 6% north on Burney Road,
- 4% south on Ulrich Road,
- 9% south on Brooks Street,
- 3% on Jess Pirtle Boulevard,
- 3% on Bay View Drive, and
- 2% on 7th Street.

STEP 4: Trips were added to 2035 daily volumes derived from H-GAC forecasts.

Roadway segments near the Imperial development reflected a more complete understanding of City of Sugar Land growth trends. It should be noted that this exercise is not a substitute for a comprehensive traffic impact analysis of the Imperial development. For example, actual traffic counts were not collected; and the Imperial development will likely have traffic impacts on smaller roads not considered in the H-GAC model.

4.2 Operational Analyses

Traffic congestion is generally analyzed for the peak travel hours; traditionally weekday AM and PM peak conditions apply. The single highest peak hour volume is generally 8 to 12 percent of daily volume, which is expressed as the K-factor. Per the Highway Capacity Manual, the K-factor typically decreases as daily traffic increases or development density increases. Lowest K-factors are in urban areas, followed by suburban, then rural facilities, in ascending order ***(5)***. It is assumed that a K-factor of 0.1 would be sufficient to account for the peak hour flows within Sugar Land. A directional distribution of 50/50 was assumed to be adequate for this analysis.

Future peak hour volumes were compared against roadway level of service (LOS) thresholds (see Table 11 below) obtained from the City of Houston's Major Thoroughfare and Freeway Plan to determine if future year typical sections will be adequate for these demands (or potentially overdesigned). These approximate thresholds are intended to describe the relative levels of congestion experienced on roadway segments. LOS thresholds are on alphabetic scale similar to grades in school, with "A" being the best and "F" being the worst. The LOS was determined by approximating the traffic volume per lane during a peak hour. These thresholds are used to analyze at-grade arterials and collectors; freeways and other limited access highways, including US 59, as well as portions of US 90A, and SH 6, would be analyzed with different criteria.

Table 11 - City of Houston Roadway LOS

LOS	Vehicle Trips Per Hour Per Lane
A	0-199
B	200-349
C	350-499
D	500-649
E	650-799
F	800 or more

For example the following calculation would apply to a four-lane roadway carrying 16,000 vehicles per day:

16,000 x 0.1 = 1,600 peak hour; 1,600 / 4 lanes = 400 vehicles per hour per lane = LOS "C"

Future demands were compared to roadway capacities using the adjusted H-GAC traffic forecasts and proposed roadway improvements listed in Table 4. Table 12 and Table 13 identify "over capacity" (LOS E or F) and "borderline" (LOS D) sections, respectively. This information is juxtaposed with the analogous findings of the Comprehensive Mobility Plan to aid in coordinated interpretation of these documents.

Table 12 - Overcapacity Segments

Road	From	To	Identified in CMP
Airport	Eldridge	East of C/L	X
Bellfort	Sugarbridge Trail	Eldridge	
Bellfort	Dairy Ashford	Kirkwood	
Brooks	US 90A	SH 6	X
Burney	Voss	Jess Pirtle	X
Dulles	SH 6	Cartwright	X
Dulles	Lexington	North of Avenue E	X
Dairy Ashford	US 90A	US 59	X
Eldridge	N of Airport	US 90A	X
Kirkwood	US 59	US 90A	X
SH 6	Most Segments		X
Sweetwater	Lexington	Palm Royale	X
Settlers Way	Windmill	SH 6	X
US 90A	Most Segments		X
William Trace	Oyster Creek	Lexington	X

Table 13 - Borderline Segments

Road	From	To	Identified in CMP
Airport	Burney	Mason	
Austin	Settlers park	SH 6	
Bellfort	Eldridge	Dairy Ashford	
Brooks	US 90A	SH 6	X
Commonwealth	Scenic Rivers	Austin Parkway	X
Dairy Ashford	Most segments		X
Dulles	Lexington	North of Cartwright	
Dulles	US 90A	Ludwig	
First Colony	SH 6	US 59	X
Jess Pirtle	Burney	Eldridge	
Kirkwood	US 59	US 90A	X
Oilfield	Commonwealth	University	X
Lexington	Williams Trace	Dulles	
Sweetwater	US 59	Lexington	X
University	US 59	SH 6	
William Trace	Lexington	SH 6	X
William Trace	SH 6	Ditch	X

This use of Roadway LOS greatly simplifies the capacity analysis of the roadway network. This method assumes that maximum flow in one direction is 10% of daily traffic volume and that the roadway lanes are utilized equally. This method neglects intersection analysis and spillback congestion on a corridor caused by one downstream intersection failing. Signal timing and turning movements at individual intersections are not considered. For example, if one intersection has a significant failing left turn movement, the failure of that movement could affect the through movement and consequently the corridor. *HCM 2010* reports a base saturation flow rate of 1,900 passenger cars per hour per lane on urban streets, more than double the threshold for LOS F. Other variables, such as lane utilization, on-street parking, and platooning decrease saturation flow rate. Roadway capacity is further reduced by delays at cross streets caused by signals. Despite the conservatism, it is recommended that any roadway expansion or reduction project follow a corridor study that reviews current and projected traffic operations.

4.3 Lane Reductions

Roadways with projected traffic demands that require at least one fewer lane by direction than available are considered candidates for bike lane conversions. Under such circumstances, the road would be restriped to provide a bike lane and wider remaining traffic lane(s). Roads in Table 14 met the following criteria and should be considered candidates for lane reduction:

- On or proximate to facilities in the Hike and Bike Master Plan, and
- Roadway LOS "C" or better after lane reduction.

Table 14 - Potential Lane Reductions

Road	From	To	Lanes	2035 Daily Volume
Austin Parkway	Lexington Boulevard	Sweetwater Boulevard	4	4,220
Commonwealth Boulevard	University Boulevard	Scenic Rivers Drive	4	7,610
Sugar Creek Boulevard	Crestwood Circle	Country Club Boulevard	4	1,300
Lexington Boulevard	Sweetwater Boulevard	SH 6	6	19,090
Sweetwater Boulevard	Palm Royale Boulevard	Austin Parkway	4	5,420
Williams Trace Boulevard	Austin Parkway	Sugar Mill Drive	4	9,330

Austin Parkway

Austin Parkway should be further analyzed for lane reduction. Austin Parkway has excess capacity and future development is not likely to increase traffic on it except for Riverstone. Riverstone traffic that could take Austin Parkway could also use alternate routes.

Williams Trace Boulevard and Sweetwater Boulevard

Williams Trace Boulevard and Sweetwater Boulevard should be considered for lane reduction in the vicinity of Austin Parkway. However, the impacts of lane reduction should be considered on the intersection of Austin Parkway itself. The trip generating characteristics of two schools and Fort Bend ISD offices could create a demand at the intersection that requires retention of all existing traffic lanes.

Lexington Boulevard

Lexington Boulevard should be considered in the future for reducing its six lane section to four lanes, from Sweetwater Boulevard to SH 6. Based on the thresholds in Table 11, the maximum daily volume of

a four-lane road that can operate at LOS C is 20,000 vpd (10 times the peak hour of 2,000 vehicles, 4 lanes x 500 veh/hr/lane), which is higher than the projected 2035 volume listed in Table 14. Although P & Z chose not to pursue this reduction at this time, it may be studied in the future.

Commonwealth Boulevard and Sugar Creek Boulevard

Commonwealth Boulevard and Sugar Creek Boulevard need not be considered for lane reduction. It is desirable to retain existing capacity since Riverstone is still developing, and there appears to be sufficient room in the median on Commonwealth Boulevard to widen in the center and accommodate all existing traffic lanes plus bike lanes. Sugar Creek Boulevard should not be considered either, as one lane is occupied by on-street parking.

5.0 MULTI-MODAL CONSIDERATIONS

During the course of preparing the Comprehensive Mobility Plan (CMP), feedback from the public indicated that improvements to alternate forms of transportation are needed, and that communities are relatively isolated from each other apart from vehicular traffic. City staff and P & Z Commission members echoed these observations and objectives within the context of both the CMP and MTP Update planning efforts.

5.1 Transit

Four transit/paratransit services operate within Sugar Land. The nature of each service is described in Table 15.

Table 15 - Transit Services in Sugar Land

Name	Service Type	Sponsoring Agency
Demand Response	Curb-to-curb scheduled services within Fort Bend County	Fort Bend County
Fort Bend Express	Commuter Bus to TX Medical Center and DeBakey VA Medical Center	Fort Bend County
STAR Vanpool	Vanpool service within the eight-county service area*	Houston METRO
TREK Express	Commuter Bus to Uptown/ Galleria, and Greenway Plaza	Fort Bend County; managed by a nonprofit organization

* Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller

The Trek Express is a commuter bus service operated by a non-profit transportation management organization (TMO). Trek Express serves two park and ride lots– University of Houston – Sugar Land and the AMC movie theater in Town Center. Greenway Plaza and Galleria area destinations, as well as METRO's downtown-oriented commuter service, are accessed by the Trek Express. The Fort Bend Express is a commuter service operated by Fort Bend County. It serves the county fairgrounds in Rosenberg and the same two park and ride locations within Sugar Land, offering single seat rides to the Texas Medical Center area.

5.2 Bike and Pedestrian

The City of Sugar Land adopted a Hike and Bike Trail Master Plan (HBTMP) in 2007. The HBTMP depicts an off-road network for non-motor vehicle use; however, its existing connectivity is limited. It does not designate bike routes, nor does it propose any typical sections. Part of the Mobility Plan includes adopting a "Complete Streets" approach for new roadway and reconstruction projects. These "Complete Streets" principles were reflected by some of the P & Z Commission comments on bicycle and pedestrian challenges and opportunities:

- Bicycle lanes needed in Venetian Estates
- Accessing the planned baseball stadium
- Bicycle lanes on Commonwealth Boulevard and Sweetwater Boulevard near Elkins Road
- Bicycle lane or trail needed on Sugar Lakes Boulevard
- Trail system needs bicycle and pedestrian access points for it to be useful

Seventy-one overall hike and bike conflict points were identified by City staff. A map of the points is attached to the Major Thoroughfare Plan. Conflict points are locations where pedestrian and/or bike mobility is restricted by major thoroughfares, and have been divided into three categories:

- Intersection – Conflict is at a signalized, or planned to be signalized intersection,

- Mid-block – Conflict is not at a major intersection, but is generally where the hike and bike system and road network intersect,
- Future – The conflict does not exist yet, but is recognized as a potential future problem.

Possible solutions were developed for each of these conflict points. One conflict point, located at Eldridge Road and Bellfort Road, requires coordination with City of Houston, as the signal is located at the city limits and not owned by Sugar Land. Recommendations and analysis for each crossing are located in Appendix D.

Grade Separation
A grade-separated crossing provides the most benefit to the hike and bike network, however, the construction costs may be cost-prohibitive. Of the 14 conflicts point identified for grade separation, 13 are located at the crossing of a road and off-street trail, such as US 59 and Ditch "H." The other one is located at the US 59 and US 90A interchange.

Bike Lanes/Shared-use paths
Bike lanes would be added to major collectors and shared-use paths would be constructed next to higher functionally classified roads. Some conflicts points can be addressed by adding a path or bike lane. Bike lanes are recommended to be six feet wide and are intended for streets classed as major collector or lower. Off road shared-use paths are used along streets classed as arterials and higher. The shared-use path would be a minimum eight feet wide to accommodate bikes and pedestrians. Most sidewalks are too narrow for a shared-use path; however, widening the sidewalk probably will not require roadway reconstruction. Seventeen conflict points are recommended to be resolved with bike lanes or shared-use paths.

New Signal/Signal Modification
Several of the conflict points are at intersections and can be resolved with a new path or bike lane. For situations where a grade separation, bike lane, or path is not feasible, the only action is signal modification so it can accommodate bicycles and pedestrians. The primary objective of a signal modification is for bicycles to be detected at signals and verifying functional pedestrian detectors and signal heads. This may require upgrading the signal technology from detector loops to video detection cameras. New signals should have the capability to be modified to incorporate bicycle detection capabilities. Thirty conflict points are located at existing signals that will need to be tested to verify adequate detection. Three conflict points are located at locations of planned signals.

Enhanced Crosswalk
Frequently used midblock crossings should be modified to improve their visibility to drivers and user comfort. Improving user comfort refers to promoting use of the crossing and may include better curb ramps, wider crosswalks, or median refuges. Treatments to improve driver visibility generally include signing, pavement striping, and elimination of obstructions. Other options to improve visibility may include different colored pavements or pedestrian actuated signals, if needed. Enhanced crosswalks are recommended at six conflict points.

Appendix D contains further analysis and individual recommendations for each conflict point.

5.3 Complete Streets Overview and Policy

A Complete Streets (CS) policy within Sugar Land is recommended in the Mobility Plan. Complete Streets infrastructure and policy are defined by the National Complete Streets Coalition (Coalition):

> "Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along

and across a complete street. Creating complete streets means transportation agencies must change their approach to community roads. By adopting a Complete Streets policy, communities direct their transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation."
(source: http://www.completestreets.org/complete-streets-fundamentals/)

CS policies are intended to impact all types of projects – maintenance, rehabilitation, new construction, major expansion, and new development. CS policies are also "context-sensitive," which reviews the role a road will serve within a community in relationship to the surrounding land uses and activity types, and that the road is designed to serve that role.

Recently, a community organization called the Houston Coalition for Complete Streets (Houston Coalition), a division of the national Coalition, has been founded, whose purpose is to lobby the City of Houston and other municipalities in the region to adopt CS policies. A number of local community organizations have signed on to the Houston Coalition in support of this effort:

- AARP
- American Institute of Architects - Houston
- APAC (Area Planning Advisory Council - Harris County Area Agency on Aging)
- Avenue CDC
- Better Houston
- Bike Houston
- Blueprint Houston
- Can Do Houston
- Care for Elders
- Catholic Charities
- Citizens Transportation Coalition
- Congress for the New Urbanism - Houston
- Evelyn Rubenstein Jewish Community Center Houston
- Go Neighborhoods
- Greater East End District
- HIVE Houston
- Houston Center for Independent Living
- Houston Parks Board
- Houston Tomorrow
- Local Initiatives Support Corporation (LISC)
- MD Anderson
- Neighborhood Centers
- Richmondrail.org
- Texas A&M University
- Texas Coastal Watershed Program
- WOW Roundabout

The CS policy development in Sugar Land is based on a review of peer cities. The Coalition lists jurisdictions (cities, counties, metropolitan planning organizations, and states) that have a CS policy. Table 16 lists the peer cities reviewed to develop CS policies for Sugar Land. The first three (Bloomington, Lee's Summit, Redmond) are cities that share several characteristics with Sugar Land:

- Located near major cities,
- Largely built in mid to late 20th century,
- Population of same magnitude, and
- Suburban settings more economically diverse than traditional bedroom communities.

San Antonio was reviewed because it recently adopted a CS policy, and no other Texas cities were listed on the Complete Streets website. Boulder, while of a similar size but significantly different in terms of ideology and development controls, was reviewed because its policies are much older than the other cities. All of the other cities on the list have policies that were adopted in the last few years; Boulder's policies were adopted in 1989 and significantly amended in 1996.

Table 16 - Complete Streets Peer Cities

City	State	2010 Pop.	Metropolitan Area	Section
Sugar Land	**Texas**	**79,000**	**Houston**	
Bloomington	Minnesota	83,000	Minneapolis - St. Paul	Alternative Transportation Plan Section 2
Lee's Summit	Missouri	91,000	Kansas City	Resolution 10-17
Redmond	Washington	54,000	Seattle	Ordinance 2369
San Antonio	Texas	1,327,000	San Antonio	Policy
Boulder	Colorado	97,000	Boulder (25 miles from Denver)	Transportation Master Plan originally started in 1996

Complete Streets within Sugar Land

The City of Sugar Land is already implementing several tenets of a Complete Streets policy, and a formal policy adoption would not result in a major shift in City policy, procedures, and funding priorities. The most significant outcomes (pending City funding) of a CS policy would be:

- An on-street bicycle route map and master plan,
- Sidewalk condition inventory and gap analysis,
- Sidewalk prioritization in new development,
- Adding criteria for justification and construction of a bicycle lane, and
- Involvement of the City Manager for a requested variance.

This Thoroughfare Plan, by its adoption, includes most of the elements of CS, including most significantly a greater variety of typical sections that respond to land use and expectations of pedestrian and bicyclist activity. If the City adopts a specific CS Policy, it should be one that contains enough detail to cause necessary change, but not overrule engineering judgment, financial prudence, and civic values for the occasional project. Some peer cities have CS policies that read like mission statements. A mission statement is meaningless without an implementation plan and defined relationships to specific policies the statement aims to influence. The implementation policies do not have to be long and detailed, but they have to be actionable. The City of Redmond's CS policy is very short, but contains an enforcement clause that lists two reasons to not build complete streets elements – health/safety of public and lack of long-term need – that can be evaluated by city staff. The third reason – a site-specific exception granted by the Public Works Director – is to give the City a way to solve any problem not anticipated to occur. Figure 14 depicts the likely implementation of complete streets by Sugar Land, with an explanation below:

STEP 1: The City Engineering Department reviews its existing policies, standards, and action items. The Engineering Department, being charged with the design of the city's infrastructure, reviews the ways it designs the transportation system. Relevant to this, and described in later sections, are the changes to the publicly approved documents that underpin design work:

- Master Plans (Major Thoroughfare Plan, Hike/Bike, e.g.),
- Typical Sections, as adopted as part of this Major Thoroughfare Plan
- Land Development Code (LDC),

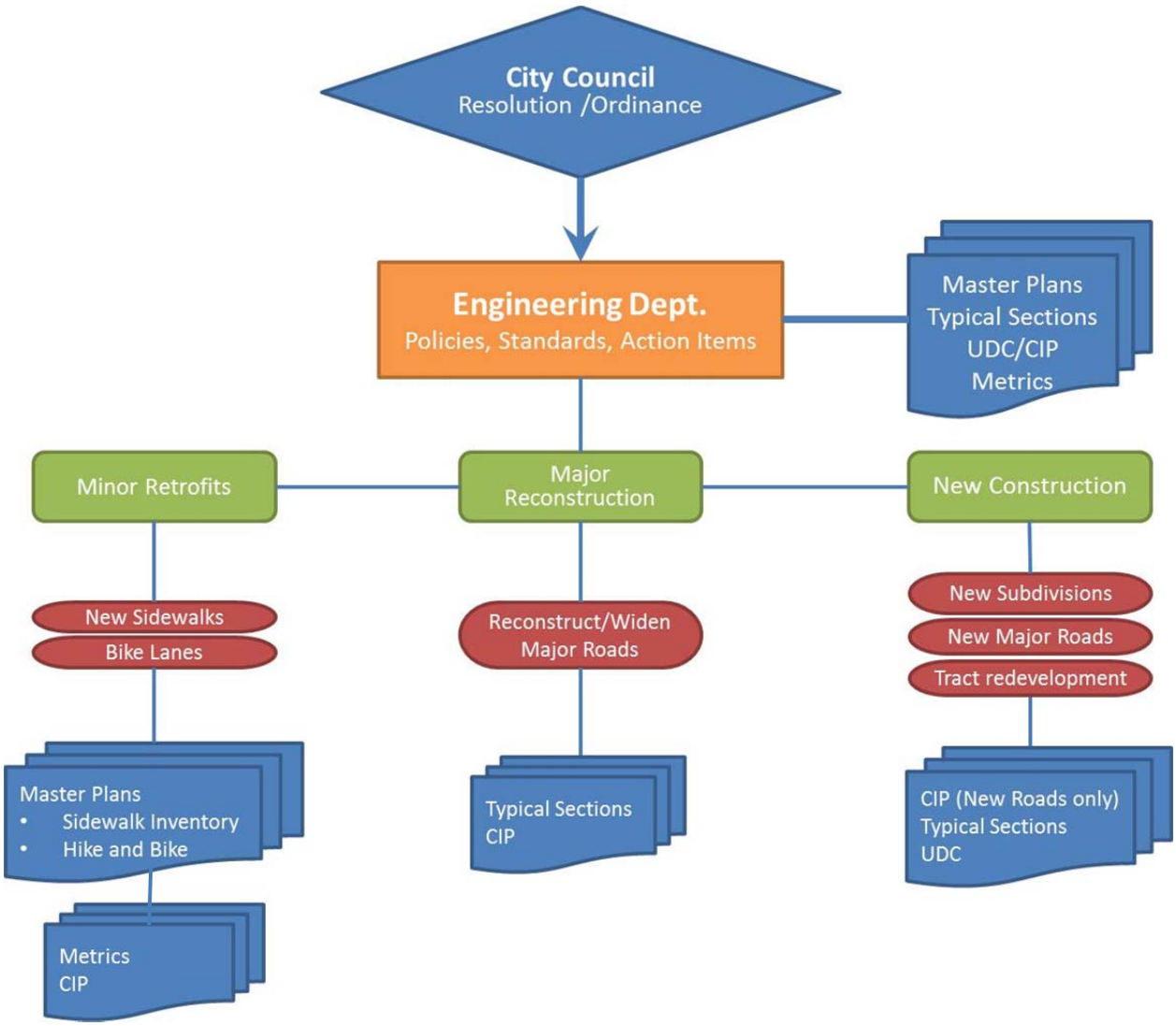
- Capital Improvements Program (CIP),
- Any metrics used to evaluate the effectiveness of the city's transportation system.

STEP 2: The City Engineering Department can implement CS through three types of construction, as shown in green and specific examples shown in red:

- New Construction
- Major Reconstruction
- Minor Retrofits

STEP 3: The Engineering Department will need to utilize publically approved documents to accomplish the CS implementation. The changes to applicable city codes are covered after the flowchart.

Figure 12 - Complete Streets Implementation Flowchart



Any CS policy adopted by the City should include the following:

- Purpose and Need
- Guiding Principles
  - Complete Streets Definitions
  - Design guidelines
  - Context-Sensitive Solutions (see also Section 1.2)
  - Fiscal Responsibility
- Directives
  - Use in Capital Improvement Program
  - Exceptions

Capital Improvement Plan

The Capital Improvement Plan is the first step to demonstrating CS implementation. Project descriptions should include relevant CS elements. For example, the Burney Road Widening and Dulles Avenue Upgrade project descriptions read as follows:

> For Burney Road – "Upgrade and widen the final section of existing 2 lane asphalt road with open ditches from Voss to Florence to a 4 lane divided concrete curb and gutter roadway. This project will be a Fort Bend County sponsored project with $1.9 Million budgeted in 2000 County Mobility Bonds and $2.25 Million budgeted in 2007 Mobility Bonds."
>
> For Dulles Avenue – "Design and construct Dulles Avenue between US90A and SH6. Dulles will be widened to a four-lane concrete pavement with raised median and turn lanes between US90A and Avenue E. Turn lanes will be added at various intersections south of Avenue E, where Dulles is already a four-lane concrete boulevard with a raised median. The preliminary engineering report was completed in spring 2008."

There is no mention pedestrian or bicycle facilities, even though the City intends to construct sidewalks for both projects. The description is focused on the impact to vehicular traffic, and focuses on items such as the roadway materials to be used. The description should identify planned treatments of all elements within the right-of-way (roadway, sidewalks, landscaping, etc.) even though the roadway is the majority of the work and cost.

Typical Sections

The typical sections developed for the MTP Update must address the needs of all users. Within Sugar Land, the needs of motorists and pedestrians need to be consistently addressed. Roads, by their definition, address the needs of motorists. The thoroughfare planning process, in part, is intended to ensure the adequacy of the road network to handle these needs. The typical sections and design criteria inventoried in the plan maintain and extend the critical elements of the City's road network using good design practices. Elements such as lane widths, median break spacing, and clear zone requirements are all considerations in this regard.

Pedestrian needs are accommodated by sidewalks and shared-use paths. Most roads within Sugar Land have sidewalks, and the typical sections in the plan do not deviate from this practice. Disabled pedestrians have been accommodated by curb ramps and other elements in design parameters in accordance with the Americans with Disabilities Act (ADA) and the related requirements of the Texas Accessibility Standards (TAS).

The needs of bicyclists are also met by the proposed typical sections. Bike lanes are proposed for various Major Collector roads. Arterials and higher-classification roadways should have a shared-use path at least 12 feet wide to provide an off-street alternative for cyclists. The MTP Update does not propose to

add bike lanes or paths throughout the City, but these treatments should be pursued at certain and hike/bike conflicts points identified on the map in the previous section. The hike and bike conflict points were determined by City staff and crossings from the Hike and Bike Master Plan.

The City is currently considering the types and locations for future transit services. Certain treatments for transit users such as bus-only lanes, queue jumps, and transit signal priority treatments cannot be considered at this time, because the nature of these services has not been defined. Certain elements in the typical sections can be adjusted that allow elements to be retrofitted for transit service, such reserving additional ROW to accommodate a bus stop and shelter. It is also possible on streets with on-street parking that this parking could transition to transit areas, such as curb extensions / bus bulb-outs, near stops and major intersections.

Design Standards

The Design Standards are the primary means for enforcing CS policies for new development construction. New development projects are regulated by the Land Development Code (LDC), while any public works project is regulated by Design Standards. The Land Development Code states that streets must comply with the City's Design Standards and Major Thoroughfare Plan. New subdivisions would have to comply with LDC and Design Standards.

The LDC and Design Standards generally meet CS standards for pedestrians. Design Standards (Section 7.8, emphasis added) states:

> "Sidewalks shall be a minimum of five feet (5') in width and located on each side of all public streets with the exception of US 59 and SH 99. **Construction of a sidewalk will be deferred until a lot is improved.**
>
> Sidewalk wheelchair ramps shall be required at all intersections and driveways. Sidewalks and ramps shall be located within the right-of-way at the crosswalk area. Sidewalk-ramps will be constructed monolithically with pavement. (Ordinance No. 1265, Section 1, 2001)
>
> Crosswalks constructed through an esplanade shall be a minimum of six feet (6') wide. All sidewalks and ramps are to be constructed in accordance with the City of Sugar Land Standard Details and in accordance with ADA requirements.
>
> Sidewalks shall be located two feet (2') within the street right-of-way or in an adjacent dedicated easement as approved by the City. (Ordinance No. 1265, Section 2, 2001)
>
> Where concrete curb and gutter streets are not present or where the potential for future roadway widening exists, a sidewalk easement shall be provided along the existing road right-of-way."

The bolded text can create gaps in the sidewalk infrastructure while a subdivision is being constructed. City standards, however, do not allow new direct residential lot access to collectors and higher on the major thoroughfare plan. Sidewalk gaps in new subdivisions would be restricted to local roads, and would be temporary as sidewalks are constructed when the lot is improved.

The Design Standards or Development Code does not make considerations for bicyclists. The Design Standards do not list the appropriate width of a bike lane nor stipulate the locations they should be considered. The following rewordings are recommended for the Roadway Design Requirements of the Design Standards:

> **Design features of a bicycle lane shall be governed by appropriate sections of TxMUTCD and applicable City of Sugar Land code sections.**

Until an on-street bicycle route map and master plan is developed, the City should not set standards for constructing a bicycle lane.

> **Bicycle lanes shall be evaluated for all streets on the major thoroughfare plan. A bicycle lane shall be constructed unless exempted by one of the following conditions:**
> - **Bicycle use is prohibited,**
> - **Bicycle use would endanger the safety and welfare of the general public,**
> - **Cost of bicycle lanes is a disproportionate amount of overall project cost, or**
> - **A site-specific exemption is granted by the City Engineer.**
> - **Any exemptions shall require the approval of the City Manager.**

Transit Users

Planning for the needs of transit users will involve the needs of other modes. Transit service within Sugar Land is currently limited to commuter buses at park and ride lots, vanpools, and on demand service. Park and ride facilities should have the following amenities:

- Kiss and ride areas to accommodate pickups/drop offs,
- Sufficient parking,
- Bike network connections and bike racks or lockers for transit riders, and
- Adequate pedestrian connections to and from the park and ride.

It is not known when or if fixed route transit service will be implemented in Sugar Land. The only feasible method to plan streets for transit users is to plan buffers within the right-of-way to preserve the opportunity for bus pads along the most heavily travelled pedestrian accessible corridors. The current arterial typical sections generally allow for a 12-foot buffer between the curb and right-of-way line, sufficient for a sidewalk and bus pad.

Metrics

Metrics and goals should be considered in areas needing improvement within the City. In general, the City addresses the needs of all users in infrastructure planning. The City should focus on the following metrics:

- Coordinate within one year with the University of Houston at Sugar Land to provide bike and pedestrian connections from the park and ride stop to University Boulevard,
- Creation of bike network (on and off street) plan within two years,
- Development and implementation of a sidewalk inventory and condition assessment program within three years.

6.0 MAJOR THOROUGHFARE PLAN ELEMENTS

The Major Thoroughfare Plan is three elements: the Major Thoroughfare Plan Map, the Major Roadway Planning Guide, and the typical sections.

Major Thoroughfare Plan Map

The Plan Map depicts existing and future roadways and their functional class. Attached to the report, the Plan Map was reviewed by the P & Z Commission and City Council. Most plan changes are roads within a GDP or changing the classification of an existing road.

It is recommended that the existing functional classification system for Sugar Land remain the same. The classification system is sufficient for Sugar Land and is similar to surrounding cities.

Major Roadway Planning Guide

The Major Roadway Planning Guide lists the major thoroughfares, their functional class, and typical section. The existing typical sections listed in the Major Roadway Planning Guide may not correspond exactly to the sections proposed by the Major Thoroughfare Plan due to changing design standards.

Typical Sections

The typical section is determined from its functional classification, surrounding land uses, and presence of shared facilities. Shared facilities could include a major bus route, bike lanes, or sidewalks (per the Hike and Bike Master Plan). These shared facilities are intended to be accomplished within the context of overall roadway construction/reconstruction, wherever possible, in order to save costs and reduce construction related disruptions to the community. It may be necessary, however, to pursue "missing link" connections as independent projects in order to gain the benefit of completing an important corridor. New cross sections standards were developed as part of updating the MTP. The additional cross sections include more provisions for non-vehicle traffic and context-sensitive solutions. Standard cross sections recommended are listed in Table 17.

Several new typical sections depict parking lanes. The width required for parallel parking is dependent on the functional class of the road. According to AASHTO, seven feet is the absolute minimum for parallel parking and is unacceptable on arterials. Eight feet is the desirable width for parallel parking on most roads and the minimum to be allowed on arterials. For arterials, ten feet is the desirable width for a parking lane because it can also function as a turning lane at intersections. Table 18 lists the proposed parallel parking standards for Sugar Land based upon these guidelines.

Table 17 - Typical Sections Summary

Classifications	Typical Section	New?	Note
None, Minor Collector	L2U	No	Basic 2-lane section for direct lot access
Minor & Major Collector / Arterial / State Hwy	R2U	Yes	Existing sections without sidewalks or curb/gutter. Not permitted for new construction within Sugar Land
Minor & Major Collector	C2U	No	Wider section for commercial areas; parking can be permitted
Minor & Major Collector	C2U – Bike	Yes	Wider section for residential areas; parking should not be permitted
Minor & Major Collector	C2U (40') 10' Lanes	Yes	New 4-lane section for collectors in commercial areas
Major Collector	C2U (40') Bike or Parking	Yes	Collectors in residential areas Two vehicle lanes, two striped outside lanes for bikes or parking
Major Collector	C4U	No	
Major Collector	C4U – Parking	Yes	On-street parking
Major Collector	C4U – Bike	Yes	Bike lanes
Major Collector & Arterial	C4D	No	Basic arterial section, Sharrows optional
Major Collector	C4D – Parking	Yes	On-street parking option
Major Collector	C4D – Bike	Yes	Bike Lanes
Arterial	P4D	No	Basic 4-lane arterial section for high speed roads (>40 mph)
Arterial	P4D – Bike	Yes	11' Lanes, Provide 8' Multi-Use trail for Hike and Bike Trail Segments
Arterial/State Hwy	P6D	No	Provide 8' Multi-Use trail for Hike and Bike Trail Segments
Arterial/State Hwy	P8D	No	Provide 8' Multi-Use trail for Hike and Bike Trail Segments

R=Rural, L=Local, C=Collector, P=Principal
# of lanes
U=Undivided, D=Divided

Table 18 - Parallel Parking Requirements

Width	Minor Collectors and Residential Streets	Major Collectors	Arterials
7 feet	Acceptable	Minimum acceptable	Unacceptable
8 feet		Acceptable	Minimum acceptable
10 feet			Acceptable

7.0 MAJOR PLAN CHANGES

The Major Thoroughfare Plan was changed through an iterative process with reviews by City staff and the Planning and Zoning Commission. In general, changes to the Major Thoroughfare Plan are from the incorporation of other plans (i.e. Riverstone General Plan or City of Houston), suggestions by the P & Z Commission or City staff, or as a result of this study, which are explained in further depth.

The following changes to roadway functional classifications were incorporated into the plan based on approved general plans:

Table 19 – General Development Plan-Driven Changes

Street	Limits	Change	Plan
Riverstone Collector	University Boulevard to Brazos River	Added as Minor Collector	Riverstone
Winding Waters Lane	University Boulevard extension to LJ Parkway	Added as Major Collector	Riverstone
Cabrera Road	Scenic Rivers Drive to University Boulevard	Added as Minor Collector	Riverstone
LJ Parkway	Commonwealth Boulevard to ETJ	Added as Arterial	Riverstone
Macek Road	East of Rabbs Crossing	Added as Minor Collector	Greatwood Lakes and South Study
South Study Connector (West)	Macek Road to FM 2759	Added as Minor Collector	South Study
South Study Connector (East)	Macek Road to FM 2759	Added as Minor Collector	South Study
Shadow Bend Drive	Winding Brook to FM 2759	Extension alignment changed	South Study
Winding Brook East Drive	Extended to Macek Road	Extended as Minor Collector	South Study
East/West Arterial	SH 6 to Ulrich Street	Added as Major Collector	Imperial
Burney Bypass	Burney Road to Imperial Road	Added as Major Collector	Imperial and H-GAC RTP
Owens Road	City of Houston ETJ to US 90A	Added as a proposed Arterial	Fort Bend and City of Houston
Lake Pointe Parkway	Creekbend Drive to US 59	Added as Major Collector	Lake Pointe

The following changes to roadway functional classifications were incorporated into the plan based on comments by City staff or the P & Z Commission:

Table 20 - P&Z/Staff-Driven Changes

Street	Limits	Change
7th Street	Main Street to Gillingham Lane	Minor Collector to Major Collector
Addison Avenue	Telfair Avenue to US 59	Extended Addison to US 59, designated as Minor Collector
Telfair Connector	Westcott Avenue to US 59	Added Minor Connector between Westcott Avenue and US 59
Cultural Arts Connector	Lexington Avenue to US 59	Added Minor Connector between Lexington Avenue and US 59
7th Street Extension	Gillingham Lane to Industrial Boulevard	Removed
Creekbend Drive	Fluor Daniels Drive to Sugar Lakes Drive	Changed to Minor Collector
Rabbs Crossing	Greatwood to Macek Road	Minor Collector to Major Collector
Macek Road	Rabbs Crossing to FM 2759	Minor Collector to Major Collector
Lakefield Boulevard	*Balboa Drive to LJ Parkway*	*Potential extension south to LJ Parkway*
Lakestone Boulevard	*Lakestone Boulevard in Missouri City to LJ Parkway*	*Potential extension west to LJ Parkway as Major Collector*
Italicized items were discussed by P&Z but not included in final plan. See discussion and Figure 13 below.		

Upgrading 7th Street was proposed by the P & Z Commission because houses are located only on one side of the street. Since 7th Street was a Minor Collector, it was upgraded to a Major Collector. The 7th Street extension was removed on advice from staff as it is not likely to be built.

Addison Avenue, Telfair Connector and Cultural Arts Connector were suggested by the P & Z Commission. Addison Avenue and Telfair Connectors were added to improve access to US 59 on both sides of University Boulevard. These connectors were placed to avoid conflicts with nearby ramps from the US 59 frontage road to its main lanes. It should be noted that theses connectors are not shown on any general plans. The addition of the Cultural Arts Connector was a separate comment and is included in the land use plan shown in a previous section.

Lake Pointe Parkway was not constructed when the previous plan was completed. It has been added as a major collector. Creekbend Drive was classified as a major collector between Lake Pointe Drive and Sugar Lakes Boulevard and is not recommended to be a part of the Major Thoroughfare Plan west of Lake Pointe Drive.

Riverstone Area

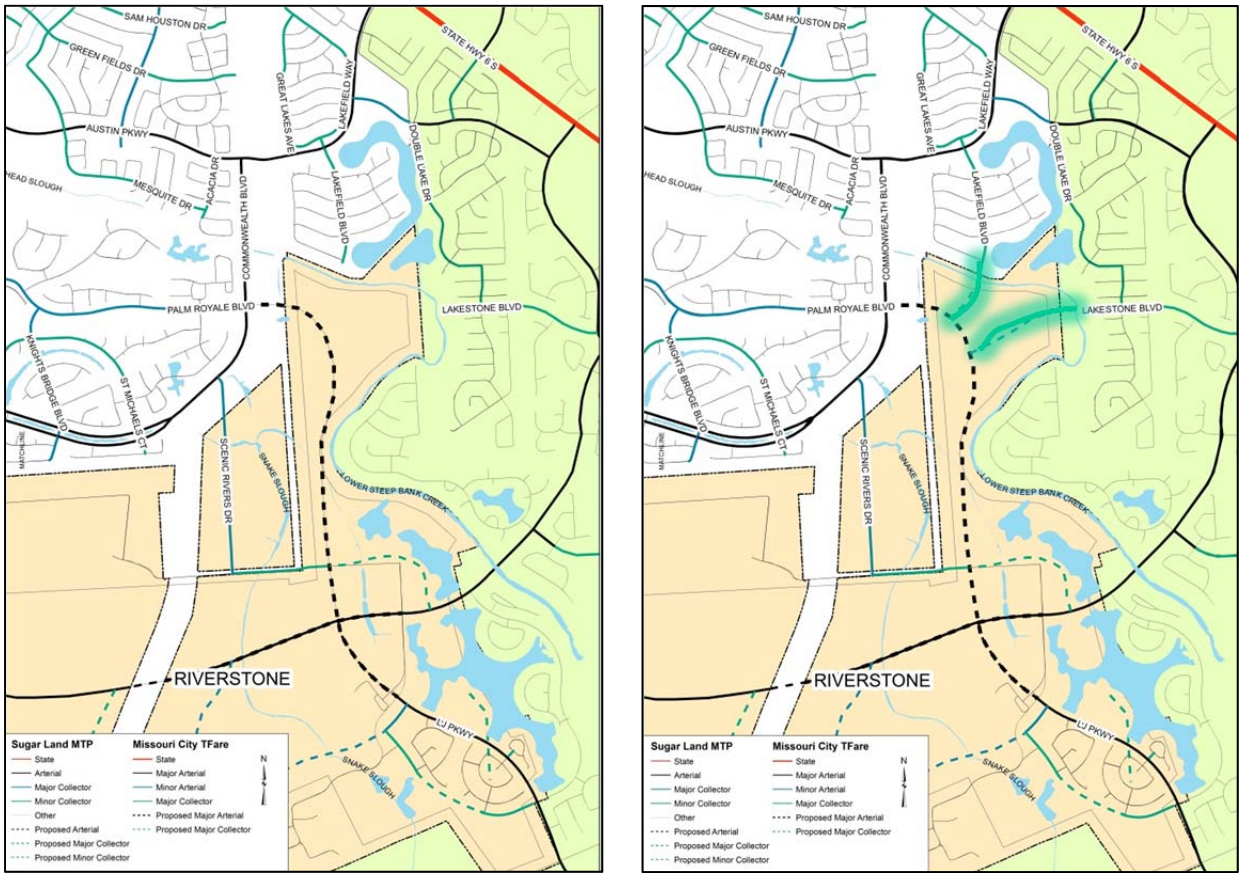
The P & Z Commission recommended two changes within the Riverstone Development: a connection to Lakestone Boulevard in Missouri City and an extension of Lakefield Boulevard across Bullhead Slough, both identified in Figure 13. These improvements would improve local connectivity within the Riverstone area and the following modifications are recommended:

- Maintain the proposed alignment of LJ Parkway
- Extend Lakefield Drive south of Bullhead Slough to LJ Parkway
- Extend Lakestone Boulevard west from Missouri City across Bullhead Slough to LJ Parkway.

These changes would improve connectivity and not create cut-through traffic. Lakefield Boulevard is currently fronted by single-family homes and designated as a minor collector; therefore it is important

that the extension does not attract significant cut-through trips. Mitigation improvements proposed by the Riverstone TIA will result in sufficient capacity within the arterial network, so cut-through trips within neighborhoods should not be encouraged. Currently, the contractual obligations with the Riverstone developer are binding with regards to street pattern, and do not allow this change. Consequently, it is not shown on the final plan map, but it remains a P&Z recommendation, and it should be reviewed in the future as the north section of Riverstone develops.

Figure 13 – Potential Changes to Riverstone Area



(Before) (Proposed Plan)

South Study Area

A major focus of this effort is creating a major roadway network between the Brazos River and FM 2759. As discussed in Section 2.3, the South Study proposed land use and roadway networks for this area. Additionally, Rabbs Crossing and Macek Road were added to the plan due to connectivity between FM 2759 and the Greatwood subdivision. The proposed roadway network is the City Council-approved estate residential roadway network without the Brazos River Bridge, which includes the following roads:

- Shadow Bend Drive is extended to FM 2759.
- Macek Road is extended further east to connect to Shadow Bend Drive
- Winding Brook Drive is extended south to Macek Road
- Two Minor Collectors connect Macek Road and FM 2759

8.0 CONCLUSIONS AND RECOMMENDATIONS

H-GAC Population, Employment, Travel Demand Forecasts

Several discrepancies were identified in the population and employment forecasts, which could impact travel demand forecasts. There is an inherent challenge of determining future population and employment, however, there were several TAZs with questionable employment numbers for 2009 conditions. City staff should work with H-GAC modelers during the development of base conditions and identifying planned developments.

Typical Sections

The additional typical sections allow the City to select the most appropriate option for future roadways. The typical sections expanded on existing standards by including parking and consideration of non-vehicular travel based on facility type and surrounding land use. Typical sections within the "P" series propose a shared-use path in lieu of bicycle lanes because these roads are intended to carry high traffic volumes at a higher speed; traffic conditions where separate bike facilities are recommended. Conversely, typical sections within the "C" series allow bicycle lanes because those roads are intended to carry lower volumes at lower speeds and generally serve as the main road through a neighborhood, not a city.

New and Changed Corridors

The majority of new corridors within the updated MTP are part of large developments that have recently been, or are planned to be, built. This includes corridors within Riverstone, Imperial Sugar/Tract 3, Telfair, Lake Pointe, Greatwood Lakes, and the South Study Area. The notable exceptions are Grand Parkway and Owens Road. Owens Road will need to be revisited when the Prison land is redeveloped, and the Grand Parkway toll facility is advancing through design and construction.

Prior to adoption of this plan, two coordination meetings are recommended to review MTP changes with other jurisdictions. One meeting with Missouri City is recommended to address the proposed Lakestone Boulevard connection. Additionally, Missouri City staff should be provided with the approved Riverstone roadway network so they update their plan. A second meeting with Fort Bend County is recommended to convey the following changes:

- Thoroughfares within Imperial Sugar/Tract 3,
- Thoroughfares within Riverstone,
- Thoroughfares within the South Study area and adjustment of Shadow Bend Drive extension,
- Owens Road,

Complete Streets

The City of Sugar Land should take the following actions to implement CS:

- Amend Roadway Design Requirements of the Design Standards and City codes to include bicycles in the roadway network:

  Design of a bicycle lane shall be governed by appropriate sections of TMUTCD or City of Sugar Land codes.
  Bicycle lanes shall be evaluated for all streets on the major thoroughfare plan. A bicycle lane shall be constructed unless exempted by one of the following conditions:
  - Bicycle use is prohibited,
  - Bicycle use would endanger the safety and welfare of the general public,
  - Cost of bicycle lanes is a disproportionate amount of overall cost, or
  - A site-specific exemption is granted by the City Engineer.

  Exemptions shall require the approval of the City Manager**.**

- Revise project descriptions in the CIP to explicitly define all automobile, bicycle, transit, and pedestrian facilities.
- Adopt the following goals:
  - Coordinate and develop plan within one year with the University of Houston at Sugar Land to provide bike and pedestrian connections from the park and ride stop to University Boulevard,
  - Creation of bike network (on and off street) plan within two years,
  - Development and implementation of a sidewalk inventory and condition assessment program within three years.
- Program projects that address hike and bike conflict points.

A resolution supporting Complete Streets is not necessary. City Council adoption of the Major Thoroughfare Plan is adequate to direct staff to implement CS guidelines.

Capital Improvement Plans

As the City develops the next Capital Improvement Plan (CIP), it should take into account the Thoroughfare Master Plan, and particularly the operational analysis described in Chapter 4, when selecting projects to be included. Projects in the existing CIP expected to be carried over include the development of Meadowcroft Boulevard in Telfair and the reconstruction of Lakefield Drive. Reconstruction of Austin Parkway and Williams Trace Boulevard have been programmed, but commitment of design and reconstruction dollars are awaiting final completion of the ongoing pavement condition assessment.

Based on the analysis in this plan, Williams Trace Boulevard should be considered for expansion between SH 6 and US 59. Any improvements to SH 6 would be beneficial, as most of its segments are expected to reach or exceed capacity. In addition to other roadway segments deemed in need of reconstruction, projects which should be considered for inclusion in the CIP are operational/efficiency improvements to Burney Road, Settlers Way Boulevard, University Boulevard, and Eldridge Parkway. Listed below are the recommendations for projects to be included in the five- and ten-year CIPs.

<u>Proposed New Projects (5 Year Timeframe)</u>

- Williams Trace PER – US59 to Lexington Blvd US 90A West
- (TxDOT) SH 6 most segments
- West Airport Analysis – Eldridge to East City Limits

<u>Out-Year Projects (10 Year Timeframe)</u>

- Williams Trace – Lexington to SH 6
- Williams Trace – SH 6 to Austin Parkway
- Burney Road – Voss south to Jess Pirtle (efficiency imp.)
- Settlers Way Boulevard – Windmill to SH 6
- University Blvd – US 59 to SH 6
- Eldridge Parkway – Airport Boulevard to US 90A

Updating the Major Thoroughfare Plan

The City of Sugar Land should consider updating the Major Thoroughfare Plan if any of the following conditions are met:

1. An interim update would be required if the future Owens Road/Prison complex is redeveloped,
2. After development within the South Study Area that requires fulfillment of portions of the MTP,
3. Action on the proposed Brazos River Bridge by City Council,
4. Development within the vicinity and east of the River Pointe Golf Club on FM 2759. Development within this area is unlikely based on current floodplain.
5. A separate Master Plan (such as Parks or Hike and Bike) is being updated, and coordination is required between the two plans.

REFERENCES

1. 2035 Regional Transportation Plan Update, Houston-Galveston Area Council, September 14, 2010.
2. 2035 Regional Growth Forecast, Houston-Galveston Area Council, Accessed April 2, 2012 http://www.h-gac.com/community/socioeconomic/forecasts/archive/2035.aspx
3. *Traffic Impact Analysis Addendum*, Traffic Engineers, Inc, July 2, 2008.
4. *Imperial Sugar/Tract 3 Traffic Analysis*, Wilbur Smith Associates, December 2, 2011.
5. *Highway Capacity Manual 2010*, Transportation Research Board, National Research Council, Washington D.C., 2010.

Appendix A

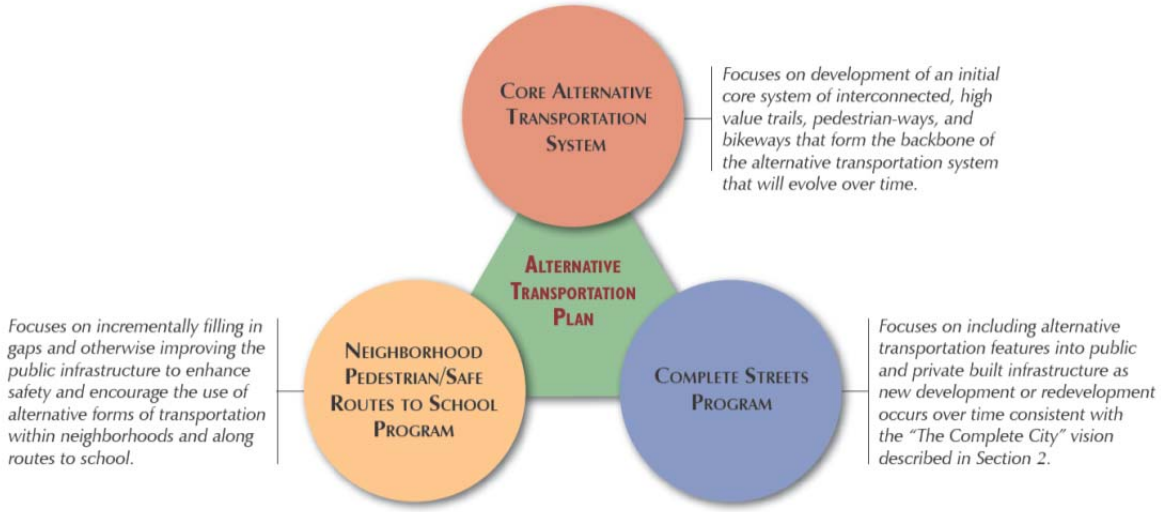
Complete Streets Peer Cities

City of Bloomington, Minnesota

The City of Bloomington City Council approved the Alternative Transportation Plan on July 7, 2008, which contains a Complete Streets vision. The groundwork is laid by this vision to amend municipal codes and plans to implement Complete Streets, however, specific policy and action items were not available. Recent projects and studies indicate the City is following a Complete Streets policy despite not having a formal code. An 86th Street Multi-Modal Study which resulted in new bike lanes was highlighted by the 2010 City Engineering report. This project was identified by the Alternative Transportation Plan.

The City of Bloomington also recognized that Complete Streets is not an umbrella policy for projects within the city. As depicted in the figure below, the Complete Streets Program is a component for creating non-motorized transportation options in the city. Other parts of the ATP – the Core Alternative Transportation System and Neighborhood Pedestrian/Safe Routes to School - are emphasized as planning efforts that result in projects that build significant parts of the non-motorized transportation network. Minor retrofits and setting standards for new development appear to be the focus of the Bloomington Complete Streets Program.

Bloomington's Alternative Transportation Plan



City of San Antonio, Texas

San Antonio City Council adopted a Complete Streets Policy on September 29, 2011. The Policy was preceded by the following reasons for adoption:

- SA 2020 Vision, the long range planning effort for the region, called for tripling the miles of Complete Streets and transit ridership, increasing pedestrian-oriented neighborhoods, and increasing physical activity in adults.
- Resolution for Mission Verde, a region-wide environmental and sustainability document, calls for complete streets and intersections
- SA-BC MPO adopted a policy supporting a Complete Streets Policy as a guiding principle.
- The Communities Putting Prevention to Work Initiative (a Center for Disease Control and Prevention grant allocated to the Health District) has Complete Streets as a component.

The need for the Policy created by these previous actions was outlined in the first half of the Resolution. The second half was the Policy itself. The Policy was made up of five components:

- A support statement with explanation of the Complete Streets concepts,
- Promotion of healthy living and fitness through Complete Streets
- Promotion of pedestrian-oriented neighborhoods through Complete Streets
- Commercial Corridors and Districts will be improved through Complete Streets
- Guiding implementation principles.

The Policy does not identify the need to amend or create any regulations or ordinances, with the exception of the Bicycle Master Plan. In short, the Policy states the City will balance the needs of all users, with considerations of land-use, right-of-way, and cost. A policy action plan to push forward Complete Streets implementation is not mentioned by the Policy, nor is there specific language to ensure the Policy is actually followed.

City of Redmond, Washington

City Council adopted Ordinance 2359 in 2007, which followed the recent promotion of mobility choices by the Comprehensive Plan and seamless integration of pedestrians, bicycle and transit facilities by the Transportation Master Plan. The City Council amended the Municipal Code to state that:

> The City of Redmond will plan for, design and construct all new transportation projects to provide appropriate accommodation for bicycles, pedestrians, transit users and persons of all abilities in comprehensive and connected networks.

Permissible exceptions to the Complete Streets ordinance were established, which were limited to health and safety, absence of long-term need, or site-specific waiver by the Public Works Director.

The City's Complete Streets policy influences other parts of municipal goals and codes, with diverse applications in mode split, new development, and construction. Table TR-2 in the Transportation Plan shown below mode split targets in specific districts, which would be used to justify funding CS improvements, as pedestrian accommodations, bike lanes and paths, and transit facilities are necessary for trips not using a SOV.

The CS policies were also reflected in the City's new construction codes. Streets are to be multimodal by default, however, a variance can be granted by a committee if impractical. Additionally, safe movement of vehicles, bikes and pedestrians is a requirement of for new street improvements. Construction phasing was also included influenced by CS policies. If road construction results in the closure of a public walkway, a pedestrian detour plan must be approved by the public works department.

Table TR-2: Arterial and Transit Service Standards with Mode Split Targets

Transportation Management District	Arterial Intersection Level-of-Service Standard (Area average of intersections)		Transit Level-of-Service Standard (% of land uses within 1/4 mi of 30-minute, peak hour transit service)		Mode Split Targets Level-of-Service Standard (% daily trips by modes other than Single-Occupant Vehicle)	
	Letter Value	Maximum V/C Ratio	Residential Land Uses	Employment Land Uses	1993	2012
1. Downtown	E+	0.95	100%	100%	18	30
2. NE Redmond	D+	0.85	30%	90%	18	23
3. Willows/ Sammamish Valley	D-	0.90	30%	90%	10	20
4. Grass Lawn	D+	0.85	50%	90%	15	18
5. Overlake	E+	0.95	50%	100%	18	30
6. Viewpoint	D+	0.85	30%	50%	15	18
7. SE Redmond	D-	0.90	70%	30%	10	20

City of Boulder, Colorado

The City of Boulder adopted policies in its Transportation Master Plan similar to Complete Streets in 1996 to support an overall goal of no long-term traffic growth over 1994 levels. Accomplishing this goal required mode shift away from single-occupancy vehicles to pedestrian, bicycle, or transit use. The plan selected 10 corridors to improve and recognized that all modes must share these corridors. Projects constructed would have to benefit all modes, and negative modal impacts would have to be mitigated. In combination with no traffic growth goal, the City expanded the pedestrian, bicycle, and transit capacity and money towards automobiles funded maintenance and safety, not roadway expansion. **Based on the needs and values of Sugar Land, adoption of a similar fiscal plan by Sugar Land is NOT recommended. Sugar Land should continue to expand vehicle capacity when financially prudent, justified by traffic demands, and supported by the citizens.**

A unique aspect of the 1996 Plan is that it was an update to the 1989 plan which was already starting to adopt Complete Streets principles. The 1989 plan had Complete Streets goals for each mode, but the City built upon those goals, added several specific new action items, listed specific improvements, and provided milestones. For bicycles, the following bicycle policy statements are from the 1989 TMP:

- The City will separate pedestrian and bicycle travel on multi-use paths facilities whenever possible through the use of path marking, signs or construction of separate facilities.
- The City will ensure that all streets are made safe and accessible to bicycles and will consider bicycle needs in all road projects.

Complete Streets policies are clearly demonstrated by stating "…will consider bicycle needs in all road projects, however, the 1996 plan outlined 11 policy statements to accomplish the bicycle portion of Complete Streets:

1. The City will develop a continuous bicycle system though the designation of a system of Primary and Secondary Corridors.
2. The City will actively work to complete the corridor network through a combination of CIP funding, federal funding, street projects and opportunities which arise though the development and redevelopment process.
3. The City will coordinate with Boulder County, the University of Colorado, the Boulder Urban Renewal Authority (BURA), neighborhood plans, City Parks and Recreation Department, the Open Space Department and other government entities and plans to ensure that all City and County projects connect with and/or help to complete the corridor network.
4. The City will use the preferred standard for bicycle lane width whenever possible for new construction.
5. The City will use road construction projects as opportunities to upgrade existing bicycle lanes to meet the new preferred standards.
6. The City will work with property owners, developers, the BURA, the Boulder Valley School District (BVSD), the Parks and Recreation Department and the University of Colorado to ensure that commercial, public, mixed use and multi-unit residential sites provide direct, safe and convenient internal bicycle circulation oriented along the line of sight from external connections to areas near building entrances and other on-site destinations.
7. The City will combine education and enforcement efforts to help instill safe and courteous use of the shared public roadway.
8. The City will collaborate with the Boulder Valley School District (BVSD), the University of Colorado, and private and public driving schools to better educate students on how to properly share the road with bicyclists, pedestrians and users of transits.
9. The City will develop a strong "Share the Road" public education campaign to foster increased courtesy and respect among all modes.
10. The City will work with Boulder County, the Denver Regional Council of Governments (DRCOG), and other city governments to ensure that bicycle facilities or adequate shoulders are included in all road construction projects.
11. The City will work with the Regional Transit District (RTD), Boulder County and other city governments to provide bicycle lockers or secure, covered bicycle parking at all transit centers and park 'n' Ride facilities within the region.
12. The City will work with RTD to ensure that all Boulder transit routes accommodate bikes on buses by 1996.

The street system was recognized, however, as the most significant part of the city infrastructure. The roadway infrastructure policies were shifted from a focus on the automobile to a general transportation focus, and provided guidance in the way monies were to be spent. A priority list was outlined by the 1996 TMP:

1. Highest priority - system preservation and travel safety,
2. Next priority - transit functional capacity; functional efficiency; pedestrian system connectivity and functional capacity; and, bicycle system connectivity and functional capacity,
3. Next lowest priority - quality of life, and
4. Lowest priority - functional capacity.

A commitment was made by the City to maintain its street infrastructure and make safety improvements, and considered transit expansion and bike and pedestrian connectivity and expansion a higher priority investment than quality of life (sound walls, vegetation). The lowest priority was the functional capacity of a street itself. In summation, the lowest priority within a street right-of-way was the expansion or addition of vehicle travel lanes.

The commitment to Complete Streets was affirmed in the recent 2008 Transportation Master Plan by stating major transportation improvements will be multimodal and inclusive of all modes. Additionally,

the City developed a Complete Streets Investment Package, which is a way to fund multi-modal projects within the City.

City of Lee's Summit, Missouri

The City Council adopted the Lee's Summit 360 long-term strategic plan in 2009. Six key performance areas were identified, including transportation, by the 360 plan. Complete Streets is a specific goal within the transportation key performance area. In support of the Complete Streets goal, City Council has:

- Amended Chapter 26 – Streets, Sidewalks, and other Public Places by adding Section 26-56 (January 2010) to Established a Livable Streets Advisory Board
- Passed a "Livable Streets Policy" as part of Resolution 10-17 (11/9/2010). The Resolution states "the terms 'Complete Streets' and 'Comprehensive Street Design' are also used to identify the same concepts as Livable Streets."

The Livable Streets Advisory Board (LSAB) has 11 citizen members appointed by the Mayor with approval of City Council. From the City's website, the LSAB has the following duties:

1. Advise the City Council on methods and procedures to accomplish the guiding principles of livable streets described by Resolution 10-17.
2. Review and evaluate the application and implementation of the livable streets policy.
3. Upon request of the City Council or City Manager, assist with long-range and on-going planning efforts that may be related to livable streets.
4. Promote the livable streets concept throughout the community and greater metropolitan area.
5. Educate the public regarding safe bicycling, walking and driving, applicable traffic laws, and the use of roads for multiple travel modes.
6. Encourage citizens to walk, bike and take public transportation.
7. Participate in programs that designate, reward or recognize the City's support, progress and accomplishments regarding livable streets.

The following policy elements are outlined in Resolution 10-17:

- Purpose and Definitions
- Applicability
- Guiding Principles
- Summary

In the applicability section, the Resolution states that this policy applies to "design, construction, and maintenance of Public Improvement Projects." In addition, the Resolution specifically calls for considering "public plans, standards, regulations and ordinances" that further the Livable Streets Policy, recognizing that strategies to achieve the goals of the Policy are subject to change as different methods come into practice.

The Guiding Principles states the objective of Livable Streets and specific intents within future projects and update specific documents, including

- Unified Development Ordinance
- Access Management Code
- Design and Construction Manual
- Planning Commission Plans:

The City ordinance also required that a summary or description of Livable Streets Elements of projects in the Capital Improvements Plan and private developments. If the Livable Streets Elements are not included then the omission shall be documented with the cause, which needs to be approved by the City

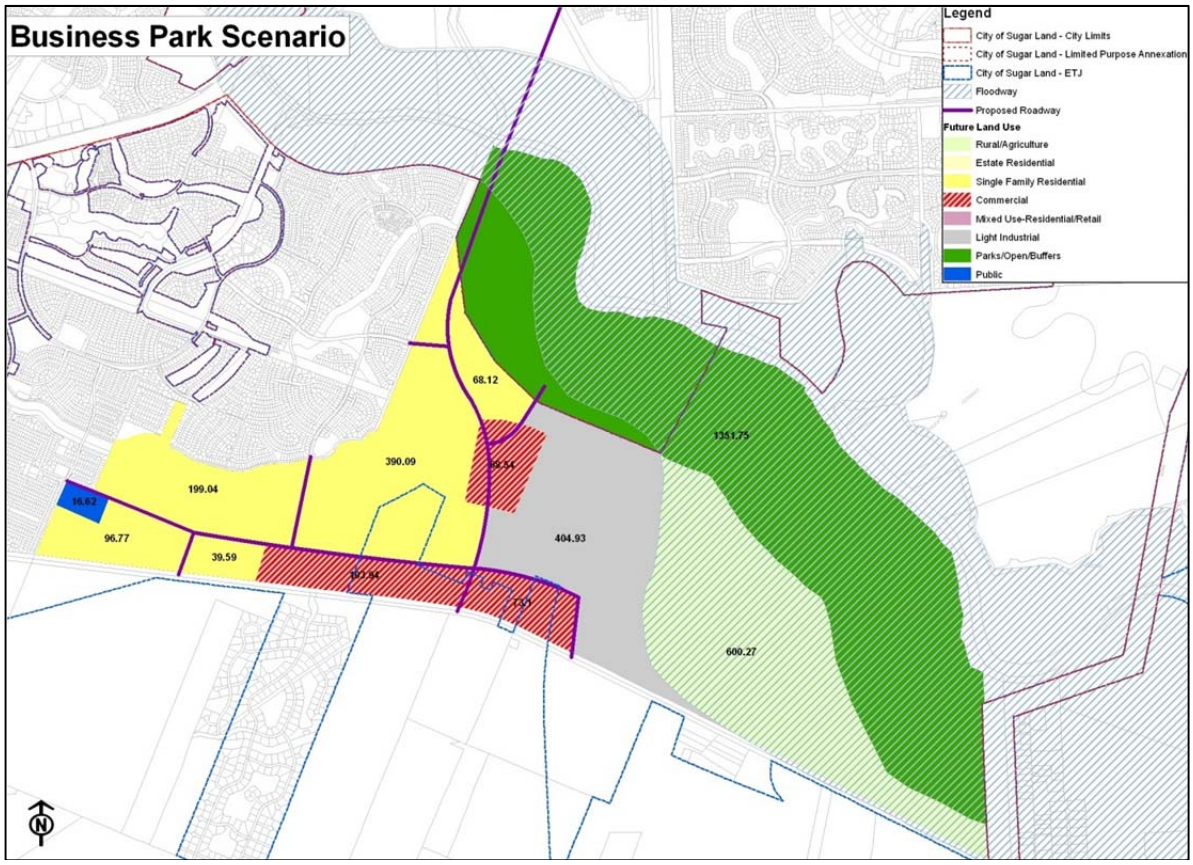
Manager or city Council. Similar to other cities, Lee's Summit allows for omission of Livable Streets for the following reasons:

- Not necessary because non-motorized use in prohibited by law (interstates),
- Disproportional cost of accommodation, and
- Absence of current or future need.

Appendix B

South Study Alternatives

Business Park Scenario



(Source: City of Sugar Land)

Business Park Land Use

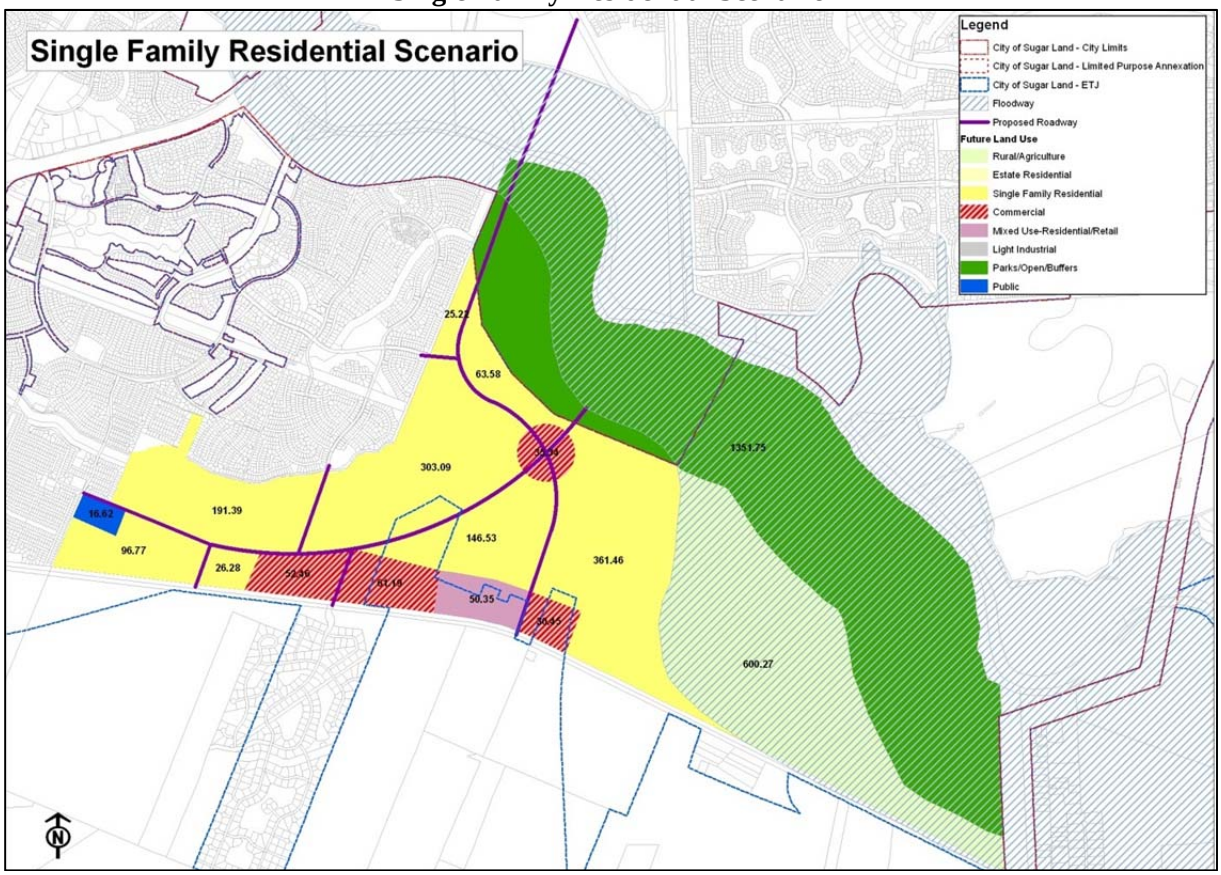
Land Use	Acres
Single Family Residential	793.61
Light Industrial	404.93
Commercial	245.58
Public	16.62
Rural/Agricultural	600.27
Parks/Open Space	1,351.75
Total	**3,412.66**

Single-family residential, commercial, and light industrial are proposed land uses in the "business park" scenario. Single-family residential zoning is located within the northern and western parts of the development. The light industrial zone is located east between the north/south spine road and rural/agricultural zone. Commercial uses are planned along FM 2759 and at the intersection of the residential and industrial zones.

The roadway network has the following features:

- Extension of Macek Road east parallel to FM 2759
- A connection across the Brazos River that serves as the north/south spine road for development,
- Connections to Winding Brook Drive and Shadow Bend Drive, and
- Three access points to FM 2759.

Single Family Residential Scenario



(Source: City of Sugar Land)

Single-family residential, mixed use residential/retail, and commercial are proposed land uses by the "single family residential" scenario. Single family residential is the dominant land use with planned commercial uses along FM 2759 and at the intersection of the Macek Road and north/south spine road. 50 acres of commercial land use is replaced with mixed use residential/retail uses.

Single Family Residential Land Use

Land Use	Acres
Single Family Residential	1,214.31
Mixed Use Residential/Retail	50.35
Commercial	144.10
Public	16.62
Rural/Agricultural	600.27
Parks/Open Space	1,351.75
Total	**3,377.40**

The roadway network has the following features:

- Extension of Macek Road that curves northeast,
- Connection to Winding Brook Drive,
- An extension of Shadow Bend Drive that connects to FM 2759, and
- Three access points to FM 2759.

Appendix C

Stakeholder Comments and Meeting Documentation

Lockwood, Andrews & Newnam, Inc.
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Meeting Memorandum

Project No.:	150-10219-000
Project:	Thoroughfare Master Plan
Client:	City of Sugar Land
Conference Date:	January 6, 2011
Conference Location:	Sugar Land City Hall—Oyster Creek Room 2700 Town Center Boulevard
Attendees:	Doug Schomburg – City of Sugar Land Chris Steubing – City of Sugar Land Robert Valenzuela – City of Sugar Land David Worley – City of Sugar Land Mike Feeney - LAN Chip Taylor - LAN

Conference Purpose:	**Monthly Progress Update**

Discussion:
The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us in writing within five days.

A project update meeting was held at 2:00 PM on January 6, 2011. The following memo documents the information exchanged and all resulting action items:

1. **Mobility Plan Coordination** – LAN staff will attend the public meeting on January 12th and the Final Advisory Committee meeting on January 31st. So far, the two planning projects appear to be fully compatible.

2. **Review of Needs Assessment Maps** - LAN staff presented the following map types for comment:
   - Aerial Imagery
   - Zoning Districts – this map will need to be revised to reflect the City's chosen color palette
   - Planning Subareas
   - H-GAC Forecasted Population – showing both % growth and Year 2035 magnitude. Two traffic analysis zones showed minor declines, which will be investigated
   - H-GAC Forecasted Employment – showing both % growth and Year 2035 magnitude
   - H-GAC Forecasted Traffic Volumes – showing both % growth and Year 2035 magnitude. Some segments showed declines that will need to be better understood.

3. **Selection of Potential Redevelopment Areas**
   - Prison property will grow in either population or employment beyond the H-GAC projections. COSL staff will provide the latest assumptions. It may go as either an industrial park or residential. The airport master plan expands into part of this area to create additional runway protection zone (RPZ) space, and to develop compatible land uses.
   - Tract 2 is adjacent to the prison property and is now under single, private ownership. Talks about possible uses are ongoing. It presents an opportunity for true mixed use development.
   - Sugar Land only has 2,000 multi-family units now, a large number of which were acquired through annexations. The City is coming up with multi-family guidelines that will encourage mixed use and

Project No.: 150-10219-000	Date: 4/30/2012

discourage block, garden apartment type developments.

- The Imperial General Plan will add more employment and apartment residential development than is accounted for in the H-GAC numbers. A traffic impact analysis was prepared that addresses these demands.
- Extending University Boulevard through Riverstone to SH 6 will add impetus to redevelop the commercial properties along SH 6 (old Target and Randall's stores). City staff will provide feedback as to the types of redevelopment to anticipate.
- The pocket of commercial frontage along Eldridge Road will redevelop, but will likely be similar in uses to their current form. Consequently, it is likely that these changes will not affect either the magnitude of forecast year traffic or the nature of the thoroughfare network in this vicinity.
- Another potential area of redevelopment is along the northbound US 59 frontage road. There are no specific plans yet to identify the form of this redevelopment.
- In general terms, redevelopment will likely take the form of walkable commercial infill through the creation of pad sites in existing parking areas. This was done at First Colony Mall already; however, the mall had roughly 1,000 surplus parking spaces to work with.
- Lastly, the Methodist Hospital is building out quicker than they foresaw (3-5 years, versus an expected 10 years). It would be beneficial to find out if they are contemplating additions or changes to their master plan in response.

4. Upcoming Events

- Planning & Zoning Workshop – January 27th in the Cane Room: LAN will provide advance copy of all presentation materials to Chris Steubing. A Power Point presentation of the work effort and its status is expected, along with the needs assessment mapping. P&Z will provide their own feedback in an informal charrette/visioning setting, particularly with respect to identifying focus areas and issues.
- Final Mobility Advisory Committee Meeting – January 31st
- Planning & Zoning Workshop – February TBD : Completed Needs Assessment and Consideration of Plan Elements

5. Conclusion

The following additional items were discussed:

- Entertainment District – The City has purchased 21 acres of a three-phase 70-acre ultimate acquisition. The property will create a destination location, including a large convention center. Context sensitive street design will be integrated with the planning process. The existing consultant, TBG, is defining the look of the Lexington Boulevard extension, but not the typical section(s). Chris Steubing is co-managing the visioning process and will invite LAN to participate in a charrette exercise to be held within the next two weeks. The intent is to raise the road in the vicinity of pedestrian plazas.
- The Lakepointe development is still building out. Some of the local roads in this area (such as Creekbend Drive) should be considered for inclusion in the plan, as they perform the function of collector roads in this area.
- South of the Brazos River there are 1300 to 1500 developable acres (there is a lot of flood plain in this area). Chris Steubing will provide the latest information about what to expect for development in this area.

Project No.: 150-10219-000	Date: 4/30/2012

At the conclusion of the presentation and discussion, the following action items were determined:

- COSL staff will present LAN with mark ups of the needs assessment mapping on or before 1/14.
- COSL staff will upload GIS data with respect to recent jurisdictional boundary changes.
- COSL staff will confirm the planned forecast year typical sections for Dulles Avenue (to address the concern that H-GAC forecast year modeling may not reflect anticipated improvements).
- COSL staff will upload the traffic impact analysis for the Imperial property.
- COSL staff will provide LAN with plans for the US 90A grade separations/restripings (this documentation was requested, but there were problems with the scanner).
- COSL staff will arrange with LAN to attend the entertainment district charrette.
- LAN staff will furnish Chris Steubing with P&Z presentation material for advance review.
- LAN staff will compare H-GAC data with General Plan area data, as available.
- LAN staff will update the Zoning District map to reflect the COSL adopted color palette.

Distribution	Prepared By
Michael Feeney – LAN David Manuel – LAN Marshall Cheek – LAN Thomas Gerrity – LAN Chris Steubing – COSL	Signature: Print Name: Chip Taylor, PE

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CONFERENCE MEMORANDUM

Date: 4/1/2011

Filing Data Code 1-03

Project No.:	150-10219-000
Project:	Sugar Land Major Thoroughfare Plan
Client:	City of Sugar Land
Conference Date:	March 14, 2011
Conference Location:	Sugar Land City Hall, Cane Room

Routing	

Attendees:	LAN: David Manuel, Michael Feeney, Chip Taylor City Staff: Chris Steubing, Robert Valenzuela, Doug Schomburg Planning & Zoning Commissioners: Marlena Berger, Himesh Gandhi, Kathy Huebner, Harish Jajoo, Gregory Schmidt, Jim Shaw, Carl Stevens, Bridget Yeung

Conference Purpose:	Solicit Commissioners' Input on Thoroughfare Plan

Discussion:
The following summarizes our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us in writing within five days.

On Monday, March 14, 2011, the project team and City staff conducted a workshop for the Planning & Zoning (P&Z) Commission, where their input was solicited on areas of concern throughout the city. Commissioners were reminded of the project's purpose and need and the next steps, as follows:

Project Purpose and Need
- Provide More Accurate Data
- Thoroughfare Planning (Changing Typical Cross-Sections)
- Coordinating w/Other local and regional agencies (County, Cities, TxDOT, etc.)
- Include Designs and Provisions for Pedestrians, Bicyclists and Transit

Next Steps
- P & Z Draft Plan Review (Workshop)
- P & Z Hearing
- City Council Workshop
- City Council Action

The P&Z Commissioners were divided into two tables of three commissioners each, and one table of two. Each group was offered six maps upon which to draw and write comments:
- Citywide map
- Commonwealth Boulevard area bordering Missouri City
- US 90A at US 59
- US 59 at SH 6 (Town Center area)
- SH 99 – Grand Parkway area
- Imperial development (NW area of city)

This memo is to be prepared by the conference chairperson.

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(continued)

Commissioners were directed to focus on connectivity/missing connections, undersized facilities, future growth areas, and other influences like pedestrian/bicycle activity. Congestion, safety issues, and potential changes were documented on the series of maps; those comments are compiled below. Some LAN notes are in italics. LAN will later transmit to the City a "punch list" of these comments sorted by theme and required action.

Group A: Commissioners Bridget Yeung, Marlena Berger, and Gregory Schmidt

- 7th Street will work as a thoroughfare (only houses on one end)
- Concern about traffic projections on Brooks Street
- Need to improve bicycle access along Sugar Lakes Boulevard
- Show University Boulevard extension to US 90A
- Need access management along Williams Trace Boulevard between US 59 and SH 6—*many comments from multiple groups about this roadway*
- Williams Trace north of Lexington – Traffic "barreling over the hill" needs a signal; road needs more capacity, as "people can't get out"
- Connection around NE quadrant of US 90A and SH 99 *(Fort Bend County has a thoroughfare shown here—this is Houston's ETJ, not Sugar Land's)*
- Imperial connections across US 90A pushed out to the distant future; what is the status of the General Plan?
- Show Brazos River on map
- Brazos River bridge "connection point" near SW corner of University Boulevard
- Extend Shadow Bend Drive east and south to intersect FM 2759
- Makes sense to cross the Brazos *by providing an additional bridge*
- Thompson Ferry Road was originally planned to cross the Brazos
- Fort Bend Toll Road is to cross the Brazos at some point
- Does the County have a Reading Road Corridor from Bridlewood to Brazos Town Center?
- Show Fort Bend County thoroughfare plan for continuity
- Palm Royale should connect through *to the east*; a TIA filed on this area said it should.
- Extend Palm Royale Boulevard from Commonwealth Boulevard to Riverstone Crossing *(would align with Lakestone Boulevard in Missouri City)*
- Is Lakefield Boulevard to be extended past Balboa Drive?
- Riverstone development will load up University & Commonwealth Boulevards
- Traffic signal at Dulles @ Broadmoor is congested—what more can be done there?
- Overlay Hike & Bike Master Plan
- Bicycle lanes needed on Commonwealth Boulevard and Sweetwater Boulevard near Elkins Road
- Bike lane exists on Elkins Road
- Bike trails/lanes are needed on Sugar Lakes Boulevard
- A lot of people bicycle through Venetian Isles
- Need a *bicycle* lane or trail on University Boulevard

Additional Non-Mapped Group A Comments:

- Discussions are ongoing with recurring plan updates—Wastewater in 2011, Water in 2010, Parks at a date TBD
- City of Houston has specific windows to change their thoroughfare plan
- No roads are oversized
- Need speed radar signs—*enforcement issue – convey to police*
- Need to look at trolleys to move folks around the City
- Need "lessons learned" from City and developers at Town Center
- Sugar Land is not a bike friendly city; can't ride a bike 2 miles to Ballpark
- Bike lanes are problematic (trash, drainage, etc.)
- Bike/ped access has to connect to be useful

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(continued)

- Need to see cross- sections from other cities that include bike/ped accommodations. *Wisconsin was suggested as a source.*

Group B: Commissioners Kathy Huebner and Himesh Gandhi

- Show University Boulevard extension to US 90A
- Show Imperial collectors extending to Burney Road and US 90A
- Much Imperial traffic is likely to exit to SH 6 and go south
- Collector behind HEB – W of SH 6 from US 90A to University Boulevard
- Need better access to commercial at New Territory and University Boulevards—*check Telfair GP for unbuilt collectors*
- Congestion on Williams Trace Boulevard and US 59
- PM Peak: southbound Sugar Lakes Boulevard traffic conflicts with right turns from eastbound Creekbend Drive
- Need to fill in missing sidewalk sections on SH 6
- Need better sidewalks on Lexington Boulevard
- Traffic growth along Lexington Boulevard seems low
- Quadrant connector in SE corner of University Boulevard and US 59
- Sight distance problems when turning left into southbound Eldridge Parkway—*mentioned at multiple locations north of US 90A*
- At US 59 and US 90A, southbound U-turn conflicts with eastbound left turn
- Consider streets near Commerce Green Drive for upgrades to collectors
- U-turns at intersections conflict with right-turn-on-red (general comment)
- Verify planned SH 99 design from US 59 to Sansbury Boulevard
- Will Ransom Road (NW quadrant of SH 99 / US 59) still have access to US 59?
- Show University Boulevard route all the way to Missouri City
- Need to create a network between the Brazos River and FM 2759, although that area probably will develop with estate lots and lower density than closer to SH 99—*check general plan for density; extensive floodplains here too*

Group C: Commissioners Harish Jajoo, Carl Stevens, and Jim Shaw

- Show Ditch “H” on map
- Show US 90A grade separations on map
- Williams Trace Boulevard south of US 59 is congested with people avoiding SH 6
- Show proposed roadways in Imperial tract
- Concern about intersection of US 90A and Eldridge Road—*grade separation planned*
- Show University Boulevard extension to US 90A
- Show Brazos River on map
- Brazos River bridge "connection point" near SW corner of University Boulevard
- Telfair should have connectors to US 59 feeder, east and west of University Boulevard
- Need bikeways around US 59 and University Boulevard
- Access to US 59 in and around SH 99 interchange—*multiple comments about SH 99 – verify plans with Grand Parkway Association / TxDOT*
- Verify planned SH 99 design near US 59
- FM 2759 is planned to be 6 lanes—reconcile with TxDOT
- FM 2759 traffic projections seem low
- Discuss entrances and exits to Greatwood subdivision
- Rabbs Crossing allows Greatwood traffic to access FM 2759—*show as collector*
- Area south of river will need greater mobility and connectivity
- Coordinate SE area of city with Missouri City
- Show extension of Palm Royale Boulevard—*presumed connection to Lakestone mentioned by Group A*

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(continued)

- Concern about traffic projections on West Airport Boulevard
- Concern about traffic projections on Dulles Avenue

Next Steps

LAN will next organize the Commissioners' comments by theme, in order to create a guide for Project Task 103, "Develop Updated Thoroughfare Plan," whose work will begin immediately and include the following:

- Coordinate with adjacent jurisdictions and determine if there are inconsistencies to resolve (such as with Fort Bend County's plan).
- Proceed with updating traffic projections to support the thoroughfare plan activity.
- Schedule a meeting with City staff to discuss expected changes to the plan, based on the comments and recommendations by P&Z.

Distribution	**Prepared By**
Attendees	Signature:
	Print Name: David Manuel, AICP

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Meeting Memorandum

Project No.:	150-10219-000
Project:	Thoroughfare Master Plan
Client:	City of Sugar Land
Conference Date:	April 26, 2011
Conference Location:	Sugar Land City Hall—Oyster Creek Room 2700 Town Center Boulevard
Attendees:	Richard Mancilla – City of Sugar Land Chris Steubing – City of Sugar Land Robert Valenzuela – City of Sugar Land Katie Fleming – TBG Christopher LeBlanc – LJA Chip Taylor – LAN

Conference Purpose:	**Obtain City Guidance Regarding Roadway Standards**

Discussion:
The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us in writing within five days.

Meeting Summary

On Tuesday, April 26, 2011, I attended a meeting to review the design standards for the extension of Lexington Boulevard from planned drainage channel bridge (west of Oxbow Drive) to University Boulevard. The City is in negotiations with Newland Communities to acquire a 38 acre portion of the undeveloped tract immediately west of the drainage channel for civic uses (see Attachment A). A convention center and performing arts theater were depicted in one version of the site exhibit, along with a shared use parking facility.

As depicted in the attachment, the Lexington extension will now extend directly eastward from University and introduce a 90 degree turn northward at a multi-way stop intersection. The western leg of this alignment will have a four-foot wide median to allow for street lights to be installed; whereas the northern leg will be a four-lane, undivided alignment (Attachments B & C, respectively). Both portions are anticipated to allow for on street parking through widening of their paved sections. An additional boulevard section is contemplated to provide a connection between Lexington Boulevard and the US 59 eastbound frontage road. It will be a four-lane section with a ten-foot wide median (Attachment D). The Lexington Boulevard intersection with this road will also be a multi-way stop location. All other public and/or private street intersections with Lexington will have stop signs controlling the minor street approaches only.

Traffic impact analysis of the planned conditions yielded 12,000 to 20,000 vpd trip generation. Lexington will maintain its arterial designation and be designed akin to an urban major collector. This arterial designation stipulated that alignment geometry satisfy a 45 mph design speed and that curb returns had radii of 30 feet or larger.

Surrounding land uses are intended to create a walkable, mixed use district, with wide sidewalks, small building setbacks, shared parking located behind the buildings along alleyways, and other treatments. All intersections will be called out with brick pavers and the corridor will have advance

Project No.: 150-10219-000	Date: 4/30/2012

pedestrian crossing warning signs. A pedestrian bridge between the contemplated theater (vicinity of Tract 2 label) and the hotel/commercial properties across Lexington was also briefly discussed.
The two multiway stop intersections are to have speed tables that will eliminate both the 6-inch curb faces and normal crowning of the approach roads over a distance of 100 feet. A photo of the marker board sketch of these intersections prepared by Mr. Steubing during the course of the discussion is included here as Attachment E.

Action Item

The Entertainment District will be a distinct area within the City of Sugar Land that will have alternative design standards in the updated thoroughfare plan. The standards can now be written to reflect the outcomes of this meeting.

Distribution	Prepared By
Michael Feeney – LAN Thomas Gerrity – LAN David Manuel – LAN	Signature: Print Name: Chip Taylor, PE

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CONFERENCE MEMORANDUM

Date: 4/22/2011

Filing Data Code 1-03

Project No.:	150-10219-000
Project:	Sugar Land Major Thoroughfare Plan
Client:	City of Sugar Land
Conference Date:	April 19, 2011
Conference Location:	Sugar Land City Hall, Lakeview Room
Attendees:	LAN: Michael Feeney, Chip Taylor City Staff: Chris Steubing, David Worley, Joe Chesser, Patrick Walsh

Routing	

Conference Purpose:	Update City on Thoroughfare Plan Process

Discussion:
The following summarizes our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us in writing within five days.

On Tuesday, April 19, 2011, the project team presented to City staff a draft in-process map of the Thoroughfare Plan, including changes discussed in the Planning & Zoning Commissioners' workshop in March. A draft of the Mobility Plan is to be provided to the project team by Pat Walsh—it is expected to have recommendations for additional grade separations, most notably Eldridge Road at US 90A, and additional hike/bike trails.

A scan of the map with comments is provided under separate cover. (\\hou\production\150-10219-000\1-0-Project Correspondence\1-03-Conf-Mtg Notes\COSL Staff 4 19 11\Map Comments.pdf in LAN files). Other comments on the draft map and action items are listed as follows:

Action Items as Draft Plan Progresses:

- Create a dated sequence of drafts.
- Show adjoining ETJs in different-color shading.
- Replace Fort Bend County (FBC) plan with the more recent version; get final disposition of Houston/FBC thoroughfare coordination from Amar Mohite at City of Houston.
- Create a data layer with the identified bike/ped conflict points—City to give further direction.
- Hagerson Road bridge is not happening and will be removed from FBC plan—remove from map and have north side of river match Riverstone GP.
- Bridge will not be located at 90-degree turn in University Boulevard-conflicts with existing parkland. Need to show alternatives to the east and west and make a recommendation. East is more problematic as it needs to avoid a water treatment plant and conservation easements.
- Show location of FBC Tollway-either as an inset or a separate map.

This memo is to be prepared by the conference chairperson.

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CONFERENCE MEMORANDUM

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(continued)

- University Boulevard between US 90A and Imperial GP should be dashed (connection through existing rail line is very long-term). Label as "potential future alignment."
- Imperial-area thoroughfares should match approved GP (updated FBC plan should reflect this).
- Show Lakepointe Parkway as major collector—cross section may be unique as houses front on it.
- Show Creekbend Drive as minor collector.
- Lexington Boulevard is planned as 4-lane undivided, 11' lanes, some on-street parking, and possible speed tables.
- Main Street, Burney Road, and Brooks Street may have alternative cross-sections relative to their designations.
- Elkins Road may potentially be downgraded or have a smaller cross-section.
- Identify (based on projected traffic volumes) which roads will have excess capacity in the future-may be good candidates for bike lanes if they complement the hike/bike plan.
- Need to get "South Area Study" from Doug Schomburg (COSL Planning) – land-use assumptions, floodways and levees, and any draft concepts.

Distribution	**Prepared By**
Attendees Doug Schomburg, COSL Tom Gerrity, LAN Abdul El-Hout, LAN	Signature: Print Name: David Manuel, AICP

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Sugar Land Major Thoroughfare Plan
Response to Comments - Needs Assessment Mapping
Edit Date: February 15, 2011

Route/Location	From	To	Staff Comment	Commission Comment
Traffic Growth Map				
Dulles Avenue	US 90	SH 6	Negative growth does not make sense. Verify that Year 2035 section reflects CIP project.	Group 2: Same comment
Main Street	Jess Pirtle Blvd	US 90	Negative growth does not make sense.	
Creekbend Drive	Fluor Daniel Drive	Sugar Lakes Drive	Add to network	
Fluor Daniel Drive	SH 6	Creekbend Drive	Add to network	
Lake Pointe Pkwy	US 59 SB Frontage Rd	Creekbend Drive	Add to network	
Meadowcroft Blvd	University Boulevard	First Colony Blvd	Add to network, portions future	
Wescott Avenue	Meadowcroft Blvd	Telfair Avenue	Add to network, portions future	
Chatham Avenue	University Blvd	Telfair Avenue	Add to network, portions future	
Telfair Avenue	Ralston Branch Way	Wescott Avenue	Add to network	
Easton Avenue	US 90	Chatham Avenue	Add to network	
Lexington Blvd	University Blvd	Oxbox Drive	Add to future network with alignment and associated connections per Newland Communities latest land plan	
Grand Parkway	US 90	New Territory Blvd		Group 1: Evaluate why this is growing faster than adjoining Grand Parkway segments.
Grand Parkway	Harlem Road	West Airport Blvd		Group 2: Why is this segment of the Grand Parkway growing so significantly?
Grand Parkway	US 59	FM 762		Group 1: Determine if this is Grand Parkway extension or Crabb River Road
Imperial General Plan Area (general comment)				Group 1: Show WM facility
Brazos River	vicinity of Commonwealth Blvd			Group 1: Does H-GAC model show an additional future river crossing?
Jess Pirtle Blvd	Bournewood Drive	Eldridge Road		Group 2: What is causing the high traffic growth in this developed area?
Williams Trace Blvd	SH 6	Lexington Blvd		Group 2: Negative growth does not make sense. Why is it occurring in the model?
Brooks Street	SH 6	US 90		Group 2: Negative growth does not make sense. Why is it occurring in the model?
Commonwealth Blvd	Oilfield Road	Knightsbridge Blvd		Group 2: Negative growth does not make sense. Why is it occurring in the model?
FY 2011-2015 CIP Projects Map				
US 59 / Grand Pkwy Interchange			Missing WB to EB U-Turn (existing)	
US 59 / University Blvd Interchange			Check frontage road alignments	
US 59 / SH 6 Interchange			Show "PM I, II, III"	
Grand Parkway	(various locations)		Show toll lane overpasses, new turn lanes, new alignment near Crabb River Road	
Imperial General Plan Area (various locations)			Fill in planned roads	
SH 6	(various locations)		Show access management improvements	
Zoning Map				
Brazos River Frontage	Richland Spring Lane	Canyon Crest Drive	Add BR designations	
Brazos River Frontage	US 59 EB Frontage Rd	Current BR zoning	Add BR designations	
Tract 2/Prison Farm/Airport Property			Need to check current classifications, presently shown as M-1 (restricted industrial)	
Oyster Creek Park	entirety		Shown as R-1	
Lost Creek Park	entirety		Shown as R-1	
Main Street / Lakeview Drive area			Shown as HR-1, only such area in the city	
Areas for potential redevelopment:			SH 6 South B-2 areas (east of Lexington),	
			Eldridge Road B-1 areas (likely to stay the same type), and	
			US 59 NB/Sugar Creek Blvd B-2	
Population Growth Map				
TAZ #2198			Should be growing faster due to Riverstone	
TAZ #2259			Too high (TAZ extends beyond border)	

Sugar Land Major Thoroughfare Plan
Response to Comments - Needs Assessment Mapping
Edit Date: February 15, 2011

Route/Location	From	To	Staff Comment	Commission Comment
TAZ #2258			Too low	
TAZ #2181			Too low (this is New Territory area)	
TAZ #2209			Should reflect Aliana demographics*	
TAZ #2220			Should reflect Tract 3 GP	Group 2: Too low
TAZ #2218			Should reflect Tract 3 GP	
TAZ #2180			Should reflect Telfair GP	Group 2: Too low
TAZ #2196			Should reflect Telfair GP	
TAZ #2175			Too low	
TAZ #2176			Too low	
TAZ #2178				Group 2: Too low
TAZ #2187				Group 2: Presently has 1600 homes
Employment Growth Map				
TAZ #2198			Consult Riverstone GP for commercial nodes, also Missouri City General Plan	
TAZ #2196			Too low	
TAZ #2180			Too low	
TAZ #2175			Too low	
TAZ #2220			Should reflect Tract 3 GP (higher)	
TAZ #2218			Should reflect Tract 3 GP (higher)	
TAZ #2211			Uncertain	
Brazos River	vicinity of Commonwealth Blvd			Group 1: Bridge?
TAZ #2179				Group 2: Too low
TAZ #2197				Group 2: Too high
TAZ: #2258				Group 2: Too high

Project No.:	150-10219-000
Project:	Thoroughfare Master Plan
Client:	City of Sugar Land
Conference Date:	July 13, 2011
Conference Location:	LAN Houston 2925 Briarpark Drive
Attendees:	Chris Steubing – City of Sugar Land Robert Valenzuela – City of Sugar Land David Manuel – LAN Chip Taylor – LAN

Conference Purpose:	**Review Progress; Obtain City Guidance Regarding Roadway Standards**

Discussion:
The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us in writing within five days.

Meeting Summary

On Wednesday, July 13, 2011, LAN conducted a project progress meeting with the City of Sugar Land, to receive comments on the proposed typical thoroughfare sections, plan next steps for the project, and discuss scope additions relative to the completed Mobility Plan. Following are our notes on the meeting:

Comments on Typical Sections

- Please include view of typical striping for each section.
- Clarify meaning of "Approximate Only" label.
- Are roadway widths measured from face of curb?
- Provide a 1' (minimum) or 2' (preferable) border at the outer edge of all rights-of-way.
- "Rural" sections are likely only in limited areas south of the Brazos River. None, however, are shown in the typical sections catalog.
- Bike lanes should be 6' instead of 5'.
- Lanes as narrow as 10' are acceptable.
- On the "SF" section, 20' is too wide for a travel lane. Reconfigure the street space to show a bike lane or parking lane; otherwise people will pass each other.
- Can parallel parking be accommodated in 7' instead of 8' ?
- Add note that parking shown is parallel only; angle parking is limited to "street design exception" areas like the Town Center and the Entertainment District.
- Major arterials should have parallel multi-use trail instead of on-street bike lanes.
- Median widths should be flexible, especially on P4D and P4D-B
- C2U could accommodate a bike lane; Main Street's "special section" could be this way.

Project No.: 150-10219-000	Date: 4/30/2012

- Following streets will likely be coded with unique sections:
  - Main
  - Lexington (west end)
  - Elkins
  - Sweetwater

Additions to Narrative, relative to Typical Sections

- Include a paragraph or two on general guidelines for where each section type is appropriate.
- Include a paragraph or two discussing minor variations (parking limits near intersections, bus pullouts, turn bays, etc.) and how they're to be handled.
- Make sure we explain the criteria used in upsizing or downsizing roads.
- Discuss AASHTO standards for roadway capacity.

Comments on Plan Map

- University Boulevard bridge over Brazos River is still contentious; best to show it with a unique symbology denoting "potential" or some such disclaimer.
- Need to explain County's distinction between "interchange" and "grade separation".
- City will provide direction for streets surrounding southern end of University Boulevard extension near FM 2759.
- Apply shading to Entertainment District and Town Center to denote that these are unique areas relative to roadway configurations and typical sections.

Comments on Bike/Ped Conflict Points

- Revise map to reflect trail changes in Imperial area
- Color-code conflict points to identify mid-block crossings vs. traffic signals
- Final plan will sort conflict points by category:
  - Those that can be addressed by changes to the thoroughfare plan (such as adding a bike lane to a nearby roadway).
  - Those at intersections where signal modifications may be warranted (these will be forwarded to traffic management).
  - Those where re-routing or re-grading (such as to connect under an existing bridge) is suggested (these will be forwarded to Engineering).

Additional Work on Compete Streets Policy

- Complete Streets coordination is an action item in the Mobility Plan
  - Document CS policy adoption and implementation in other jurisdictions.
  - Typical sections should address needs of all modes.
  - Our plan process largely addresses CS issues already, but we'll need to add some additional language making it more explicit. We'll also need to add a scope item to document other cities' policies.

Additional Work on Rail Crossing Plan

- Mobility Plan called for a study of US 90A, in the form of a "Comprehensive Rail Crossings Plan," examining which crossings should be eliminated or grade separated. Eldridge Road, University Boulevard, and the "prison drive" were called out specifically.
- Union Pacific has been converting the rail line to double tracks, proceeding from Houston westward. Work in Sugar Land is scheduled to begin in late 2012.

Project No.: 150-10219-000	Date: 4/30/2012

- Chip and I discussed LAN's rail capabilities and experience, and Chris would like to amend our contract to include the rail study. Potential scope items include traffic analysis with identification of potential crossing closures or relocations; comparing costs and footprints for at-grade, underpass, and overpass crossings at various locations; conceptual layouts; drainage concerns for underpasses; planning-level cost estimates; and potential rail elevation modifications. David Clary from LAN's Dallas office would be heavily involved.
- Rail study could be supplement to Thoroughfare Plan and coordinated with its recommendations, in order to prepare City Council for negotiations with Union Pacific.

Action Items

City of Sugar Land:

- Provide direction on the streets surrounding University / FM 2759.
- Propose meeting time for the week of July 25th.
- Robert to verify ETJ and City Limit polygons; there's a "donut hole" on the west side that we didn't show.
- Develop draft scope elements for additional services related to rail crossings study and Complete Streets peer cities documentation. LAN to comment.

LAN:

- Update the typical sections per today's comments.
- Revise the bike/ped conflict points map to further categorize the points.
- Continue drafting narrative report.

Distribution	Prepared By
Attendees Michael Feeney – LAN Thomas Gerrity – LAN David Clary – LAN	Signature: Print Name: David Manuel, AICP

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Meeting Memorandum

Project No.:	150-10219-000
Project:	Thoroughfare Master Plan
Client:	City of Sugar Land
Conference Date:	August 5, 2011
Conference Location:	Sugar Land City Hall Lakeview Room
Attendees:	Chris Steubing – City of Sugar Land Robert Valenzuela – City of Sugar Land Patrick Walsh – City of Sugar Land Doug Schomburg – City of Sugar Land David Manuel – LAN Michael Feeney – LAN

Conference Purpose:	**Project Progress Meeting and Discussion of Additional Services**

Discussion:
The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us in writing within five days.

Meeting Summary

On Friday, August 5, 2011, LAN conducted a project progress meeting with the City of Sugar Land to deliver revised versions of the proposed typical thoroughfare sections, the thoroughfare plan map, the bike/ped conflicts map, and the roadway planning guide (i.e., list of segments with assigned sections); and to discuss requested additional services relative to the rail crossings study addendum. Following are our notes on the meeting:

General Comments

- Bicyclist / Pedestrian Conflict Points map was coded to indicate whether new lanes, new signals, or potential trail underpasses would address the conflicts, or whether existing signalization should be modified. This map will be presented and discussed in the narrative report, though it does not have direct bearing on thoroughfare or typical-section assignments.
- "Donut Hole" previously viewed on west side of the city is part of Municipal Utility Districts only (pre-existing neighborhood not part of any MUD). It does not impact city limits or ETJ boundary.
- Now that Thoroughfare Plan is wrapping up, it would be a good idea to have an update to Planning & Zoning Commission (P&Z) and City Council in September or October.
- LAN needs to prepare a presentation that will:
    - Summarize products of Thoroughfare Master Plan, and
    - Describe the additional Rail Crossings Study activities.

Rail Crossings Study

- City staff intends to determine the City's preferences (i.e., ultimate conditions) for all existing and proposed railroad crossings along US 90A.
- Desired elements (by City):
    - Identify options as to what crossings can be closed and how to base that decision,
    - Identify options as to what crossings can be grade separated and perform cost/benefit analysis,
    - Include future technology for possible communication through dynamic message signs at strategic locations as they relate to road blockages due to parked trains (such as the Nalco spur), and
    - Develop and identify funding options for future projects.

Project No.: 150-10219-000	Date: 8/17/2011

- Traffic Department has an ITS contract with RS&H to do citywide traffic modeling. LAN would direct RS&H in needed modeling efforts for the rail study, including:
  - Delay analysis,
  - Identification of alternate traffic routings,
  - Determination of grade separated crossing impacts in certain locations, and
  - Determination of future intersection impacts.
- Particular locations of concern include:
  - University Boulevard north extension into Imperial GP,
  - Potential relocation of Nalco access and other less-traveled crossings,
  - Studied-but-unbuilt overpass at Eldridge Parkway (including potential impact on Venetian Estates (note: this is Councilmember Bridget Young's concern), and
  - Prison Drive / Easton Avenue.
- Study would begin around September and finish in March 2012. A presentation would be given to P&Z in January and to City Council in February.
- The City would *lead* the public process, and LAN will *assist* in providing meeting materials, attending and answering questions, etc.
- LAN's David Clary, while at Bridgefarmer & Associates, worked on a 2003 study on the potential Eldridge / US 90A overpass. His experience will be useful in this study.
- Tentative additional-services fee is approximately $100,000.

Action Items

City of Sugar Land:

- Provide final comments on thoroughfare plan map, including decision on route of southern University Boulevard extension, relative to its connections to Fort Bend County thoroughfares south of FM 2759.
- Provide final comments on typical sections.
- Provide comments on Roadway Planning Guide, where individual thoroughfare segments are assigned typical sections.

LAN:

- Develop rail study scope for City review, based on and expanding City's bullet points.
- Schedule a meeting where LAN's Tim Schmidt and David Clary will attend to discuss the rail study scope.
- Continue drafting the narrative report.

Distribution	Prepared By
Attendees Chip Taylor – LAN Thomas Gerrity – LAN Tim Schmidt – LAN David Clary – LAN	Signature: David Manuel Print Name: David Manuel, AICP

Project No.:	150-10219-000
Project:	Thoroughfare Master Plan
Client:	City of Sugar Land
Conference Date:	December 1, 2011
Conference Location:	Sugar Land City Hall Brazos Room
Attendees:	Chris Steubing – City of Sugar Land Robert Valenzuela – City of Sugar Land Patrick Walsh – City of Sugar Land Joe Chesser – City of Sugar Land David Worley – City of Sugar Land David Manuel – LAN

Conference Purpose:	**Project Progress Meeting – Finalization of Plan Exhibits and Tables**

Discussion:
The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us in writing within five days.

Meeting Summary

On Thursday, December 1, 2011, LAN conducted a project progress meeting with the City of Sugar Land to deliver revised versions of the proposed typical thoroughfare sections, the thoroughfare plan map, the bike/ped conflicts map, and the roadway planning guide (i.e., list of segments with assigned sections).

The following comments represent the changes to be made to finalize the plan elements. Some additional changes will be made as part of the Rail Study (Phase II of the TMP), but the current versions will be presented to Planning & Zoning and City Council in January 2012, to close out Phase I.

Typical Sections

- Change note to "Provide 8-foot minimum mixed-use trail"
- Section 6 (the various C2U)—label top two Typical Commercial and bottom two Typical Residential

Hike & Bike Map

- Remove grade separations that are not on MTFs (see markup *COSL trail grade seps 20111201.jpg*)
- Ditch H trail is planned only on west side, except for one small section near 59 (see same markup)
- Add point on Jess Pirtle Blvd. near Coventry Woods canal (trail extending south from Sugar Mill Park crosses JPB with existing crosswalk)
- Fix two typos of "Thoroughfare" in legend
- Add sentence to narrative report explaining that H&B conflicts map is to be a reference of locations where future attention will be required when roadway or adjacent property is under redevelopment

Roadway Planning Guide

- Burney south of Voss must stay 2 lanes, though bike lanes are to be included

Thoroughfare Map

- Make sure Oilfield Road is consistently renamed Scenic Rivers Drive
- The following roads are all but complete—show as solid lines, not dashed: Easton south of 90A, Chatham west of University, Lexington east of University, University from Commonwealth over to

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Missouri City, the east-west road in Imperial, and the north-south road in Imperial (except for across Nalco)
- Revisit color scheme—hard to distinguish major collectors on the print
- Add a table linking the typical section labels to classifications (e.g. Arterial = P8D, P6D, P4D, P4D-B)
- Brooks and Burney should be shown as collectors, not arterials
- Ensure narrative discussed how appropriate functional class of a road in chosen (length, connectivity, traffic volumes, adjacent land use, etc.)

Action Items

City of Sugar Land:
- Set up meeting with City Manager to discuss format of January 2012 presentations to P&Z and Council
- Provide comments on narrative report

LAN:
- Finalize plan elements with above changes

Distribution	Prepared By
Attendees Chip Taylor – LAN Michael Feeney – LAN Thomas Gerrity – LAN	Signature: Print Name: David Manuel, AICP

Sugar Land Thoroughfare Master Plan
Project Update Meeting Notes
February 14, 2012

Pre-Meeting Notes:
X. DVM question
CS initial response
Meeting Outcome

1. Sit-down to discuss the P&Z/public meeting to close out the Thoroughfare Plan Phase I-I'm pretty open all the rest of this month, though out on vacation 3/5-3/12.
I met with our communications department and we are working on notification and time lines for the public meeting which appears will happen in mid March.
Public Meeting scheduled for Thursday, 3/15, 6-8 pm. Chris to develop PPT—LAN to make exhibits: 1. Project Tasks (large print bullet points), 2. Overall Plan (large map), 2. Hike/Bike Conflicts (large map), 3. Typical Sections (existing 11x17s to be pinned to board COSL will provide)

2. (Related to that, do you have a copy of the TIAs for Riverstone and Imperial? I can't seem to lay my hand on those and as we finalize the MTP text, I want to reconfirm some of our projections against what the TIAs said.)
I can get you copies of both TIA's at our meeting next week.
TIAs provided—need to finalize Phase I report by 2/28.
Imperial in L:\150-10219-000\7-0-FTP-Extranet\From COSL
Riverstone on paper—DVM to interoffice to TJG

3. Makeup of the technical committee to vet which rail crossing modifications we need RS&H to simulate?
Technical committee recommendations have been sent upstairs to management and I am awaiting a response.
Still in process—City has internal meeting scheduled for 2/23

4. Progress from RS&H on the second and third citywide models? We'd like to look at how the congestion or LOSs change over the timeframe in the no-build cases.
I have not heard where RS&H is on their second iteration but will check prior to our meeting.
Still in process—Chris to ask David Worley for update

5. Update on the additional railroad crossing analyses? TranSystems had also asked about when they might start their part, in terms of scheduling staff time.
I have a meeting Monday with management to discuss the proposal and final direction and funding for this additional work. Will have an answer for you after that meeting.
City has internal meeting scheduled for 2/20.

City of Sugar Land
Major Thoroughfare Plan
Public Open House - Wednesday, May 30, 2012

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

SIGN-IN SHEET

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Susan Allen	14507 River Forest		susan@trafficengineers.com
Jan Peterson	602 Santa Maria	281-494-0727	janschendel@hotmail.com

Appendix D

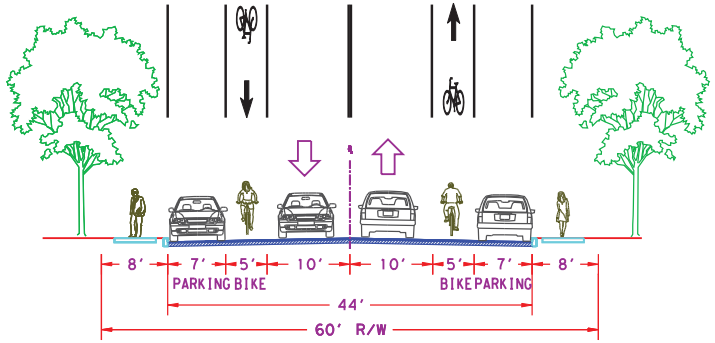
Conflict Point Analysis and Recommendations

Hike and Bike Conflict Points and Recommendations				
Street 1	**Street 2/Feature**	**Intersection or Midblock**	**Recommendation**	**Reason**
US 90A	Dairy Ashford	Intersection	Signal	Improve ability of signal to detect bikes and pedestrians
US 90A	Industrial Blvd	Intersection	Signal	Improve ability of signal to detect bikes and pedestrians
US 90A	Gillingham Lane	Intersection	Bike lanes or shared use path	Potential Bike Lanes on Gillingham Drive to connect with sidewalk on south side of US 90A
US 90A	Eldridge Rd	Intersection	Signal	Improve ability of signal to detect bikes and pedestrians
US 90A	Main St	Intersection	Signal	Improve ability of signal to recognize bikes and pedestrians, especially on the bike lanes on Main Street
US 90A	Brooks St	Intersection	Signal	Improve ability of signal detect bikes and pedestrians, especially on the bike lanes on Brooks Street
US 90A	Ulrich Rd	Intersection	Signal	Improve ability of signal to detect bikes and pedestrians
US 90A	Planned University Blvd Extension	Midblock	Signal	Future signal would need to recognize bikes and pedestrians
US 90A	Ditch	Midblock	Grade Separation	There appears to be construction right now under the RR line. There could be a potential crossing added to the design.
US 90A	SH 6	Intersection	Signal	Low potential for grade separation and neither road is under COSL's control.
US 90A	Future Owens Road	Intersection	Signal	Improve ability of signal to detect bikes and pedestrians
US 59	US 90A	Intersection	Grade Separation	Bike lanes not advised on either facility, routing bikes through here not advised due to traffic volumes and speeds. Potential of placing hike/bike bridge next to RR bridge
US 59	Dairy Ashford	Intersection	Signal	Bike lanes not advised on either facility, no potential sites for grade separation
US 59	Williams Trace Boulevard	Intersection	Signal	Bike lanes not advised on either facility, no potential sites for grade separation
US 59	SH 6	Intersection	Signal	Bike lanes not advised on either facility, no potential sites for grade separation
US 59	First Colony Boulevard	Intersection	Signal	Bike lanes not advised on either facility, no potential sites for grade separation
US 59	Ditch "H"	Midblock	Grade Separation	Potential offstreet trail along Ditch "H" underneath US 59
US 59	University Boulevard	Intersection	Signal	Verify that signal can recognize bikes in bike lanes
US 59	SH 99	Intersection	Signal	Bike lanes not advised on either facility, no potential sites for grade separation
SH 6	Voss Road	Intersection	Signal	Low potential for bike lanes or grade separation
SH 6	East-West Arterial	Midblock	Signal	Relay conflict to Imperial Development developer
SH 6	University Boulevard	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
SH 6	Ditch "H"	Midblock	Grade Separation	Potential offstreet trail along Ditch "H" underneath SH 6
SH 6	First Colony Boulevard	Intersection	Bike lanes or shared use path	Shared use path on First Colony Boulevard
SH 6	Fluor Daniel Drive	Intersection	Bike lanes or shared use path	Potential Bike lanes on Fluor Daniel Drive
SH 6	Kensington Drive	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
SH 6	Town Center Boulevard	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
SH 6	Lexington Boulevard	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
SH 6	Grants Lake Boulevard	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
SH 6	Williams Trace Boulevard	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
SH 6	The Market at First Colony	Midblock	New Signal	Evaluate feasibility of new signal
SH 6	Settlers Way Boulevard	Intersection	Bike lanes or shared use path	Potential for bike lanes on Settlers Way Boulevard
SH 6	Frost Pass	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
SH 6	Dulles Road	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
University Boulevard	Ditch "H"	Midblock	Grade Separation	Potential for grade separation at Ditch "H"
University Boulevard	Chatham Boulevard	Midblock	Bike lanes or shared use path	Potential for shared use path on University Boulevard
University Boulevard	Meadowcroft Boulevard	Midblock	Bike lanes or shared use path	Potential for shared use path on University Boulevard
University Boulevard	New Territory Boulevard	Intersection	Bike lanes or shared use path	Potential for shared use path on University Boulevard
University Boulevard	Lexington Boulevard Extension	Intersection	Bike lanes or shared use path	Potential for shared use path on University Boulevard
University Boulevard	Commonwealth Boulevard	Intersection	Bike lanes or shared use path	Potential for shared use path on University Boulevard
University Boulevard	Elkins Road	Intersection	Bike lanes or shared use path	Potential for shared use path on University Boulevard
University Boulevard	LJ Parkway	Future	Grade Separation	Neither road is constructed. Potential of grade separation on University Boulevard should be reviewed

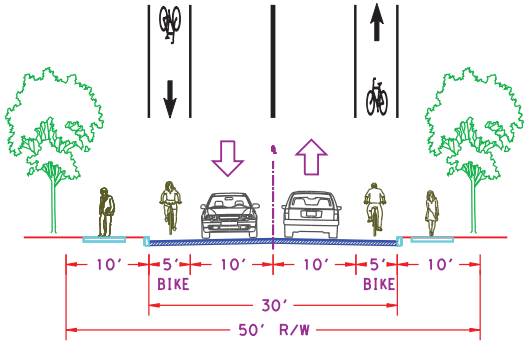
Hike and Bike Conflict Points and Recommendations				
Street 1	**Street 2/Feature**	**Intersection or Midblock**	**Recommendation**	**Reason**
Eldridge Road	Bellfort Road	Intersection	Coordinate with Houston	Intersection is at edge of city limit. Facilities outside of the Sugar Land City Limit are inadequate. Resolution of conflicts requires working with other entities. As signal is listed as "Other Agency," there is not a unilateral alternative the City can pursue.
Eldridge Road	Nantucket Drive	Intersection	Bike lanes or shared use path	Potential bike lanes on Nantucket Boulevard to provide access to sports fields
Eldridge Road	Airport Boulevard	Intersection	Bike lanes or shared use path	Potential shared use path on south side of Airport Boulevard
Eldridge Road	Jess Pirtle Boulevard	Intersection	Bike lanes or shared use path	Bike lanes on Jess Pirtle would improve connectivity between residential and Schumberger area.
Eldridge Road	Ditch	Midblock	Enhanced Crossing	Treatments to improve pedestran movement should be placed at this location
Eldridge Road	7th Street	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
Commonwealth Boulevard	Ditch "H"	Midblock	Grade Separation	Provide access to Ditch "H" offstreet trails
Commonwealth Boulevard	Elkins Road	Intersection	Signal	Existing bicycle facilities are adequate, however, need to improve movement between Commonwealth and Elkins
Commonwealth Boulevard	Scenic Rivers Boulevard	Midblock	Enhanced Crossing	Create a crosswalk across Commonwealth
Commonwealth Boulevard	Palm Royale Boulevard	Midblock	TBD	Treatment to be determined as part of further study of potential Riverstone changes
Commonwealth Boulevard	Austin Parkway	Midblock	New Signal	Create a crosswalk across Austin Parkway when signal is constructed as part of Riverstone
Airport Boulevard	Gillingham Lane	Intersection	Bike lanes or shared use path	Potential shared use path on south side of Airport Boulevard
Airport Boulevard	Industrial Boulevard	Intersection	Bike lanes or shared use path	Potential shared use path on south side of Airport Boulevard
Austin Parkway	Ditch 1360 feet south of Lexington Boulevard	Midblock	Grade Separation	Continue trail across Austin Parkway, cross Bullhead Slough and connect with existing trail. Low potential for separated crossing underneath Austin Parkway
Austin Parkway	near First Colony Middle School	Midblock	Grade Separation	Continue trail across Austin Parkway and connect with existing trail. Medium potential for separated crossing underneath Austin Parkway
Burney Road	Airport Boulevard	Intersection	Bike lanes or shared use path	Burney Road is proposed to be widened at this intersection. Bike lanes on Burney Road are proposed.
Burney Road	East-West Arterial	Midblock	Signal	Coordinate with Imperial developer to provide connection across Burney Road. Addresses comment with bike access to Ballpark
Crabb River Road	Rabbs Bayou	Midblock	Grade Separation	Potential grade separated crossing on south bank.
SH 99/Crabb River Road	Sansbury Boulevard	Intersection	Grade Separation	A future interchange with SH 99 is planned at Sansbury Boulevard. A grade separated crossing across SH 99 should be investigated.
Crabb River Road	FM 2759	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
Fluor Daniel Drive	Brooks Lake	Midblock	Enhanced Crossing	Visibility of the hike and bike path should be improved
Lexington Boulevard	Ditch "H"	Midblock	Grade Separation	Connect bike and pedestrian facilities on Lexington with offstreet Ditch "H" trail
Lexington Boulevard	near Bullhead Slough	Midblock	Enhanced Crossing	Creating a crosswalk north of Bullhead Slough would improve pedestrian access to Town Center. Trees should be trimmed so pedestrians are visible.
Lexington Boulevard	Dulles Ave	Intersection	Signal	Low potential for bike lanes or grade separation, verify that signal can detect pedestrians and bikes
Jess Pirtle Boulevard	East of Oak Knoll Drive	Midblock	Enhanced Crossing	Treatments to improve pedestran movement should be placed at this location
Sweetwater Boulevard	Bullhead Slough (near Lexington Boulevard)	Midblock	Grade Separation	Continue trail across Sweetwater Boulevard after constructing trail west of road. Potential for separated crossing underneath Sweetwater Boulevard
Sweetwater Boulevard	Bullhead Slough (near Stephens Grant Drive)	Midblock	Grade Separation	Potential for grade separated crossing underneath Sweetwater Boulevard
Town Center Boulevard	near City Hall	Midblock	Enhanced Crossing	Creating a crosswalk in front of City Hall would improve access to Town Square. Trees should be trimmed so pedestrians are visible.
Meadowcroft Boulevard	Ditch "H"	Future	Grade Separation	Provide access to Ditch "H" offstreet trails

Appendix E

Typical Sections



BROOKS STREET - C2U (BIKE + PARKING)



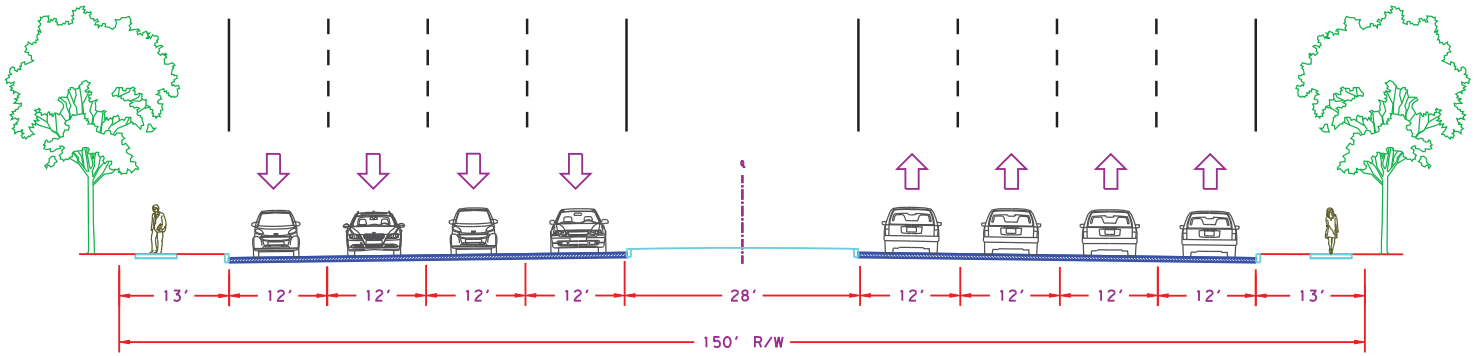
MAIN STREET

NOTES:

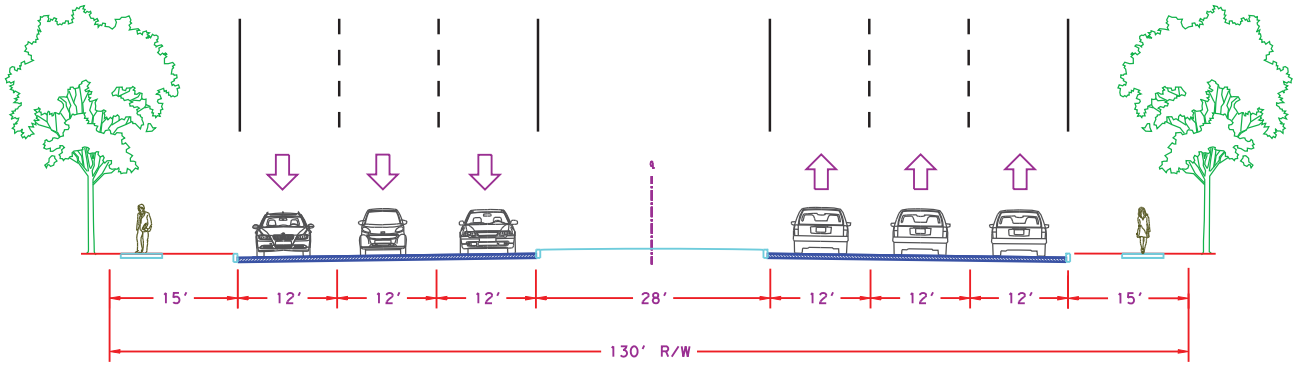
1. PROVIDE 2' BORDER AT OUTER EDGE OF ROW
   1' BORDER MINIMUM IF CONFLICTS EXIST
2. 10' LANES ACCEPTABLE
3. NO BUFFER REQUIRED BETWEEN SIDEWALKS AND CURB IF POSTED SPEED 35 MPH OR LESS

MAJOR THOROUGHFARE PLAN
TYPICAL SECTIONS
CONTEXT-SENSITIVE DESIGNS

NOT TO SCALE	03/01/2012	SHEET 1 OF 1



P8D



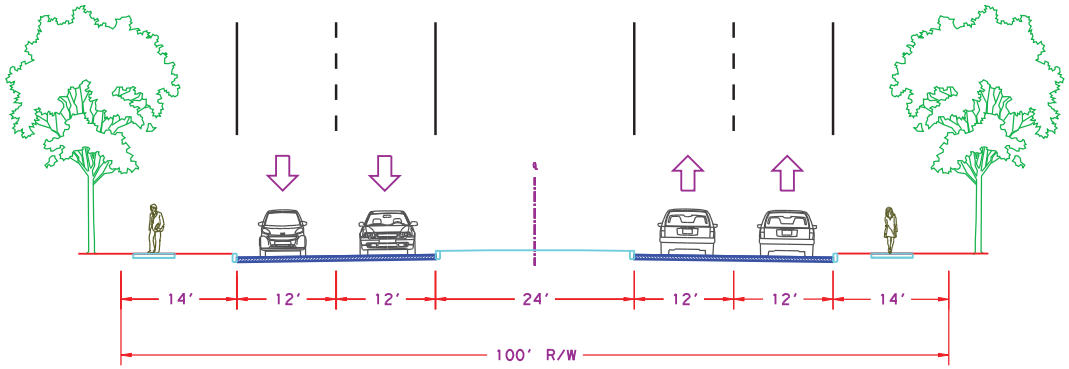
P6D

NOTE:

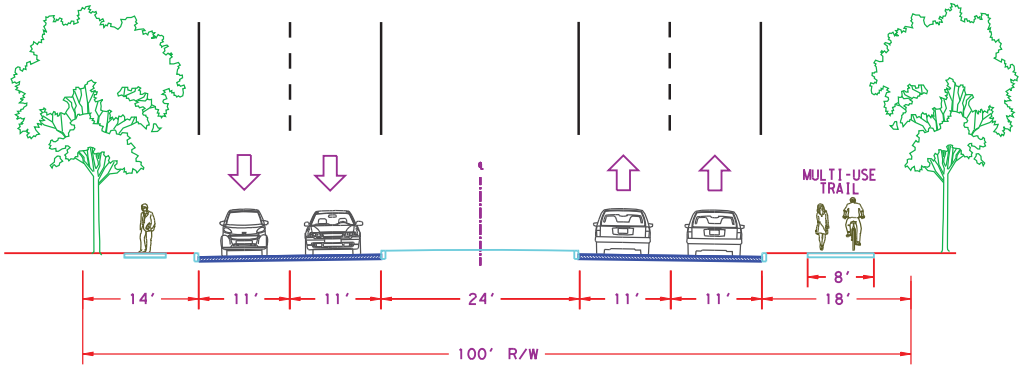
1. 18' MINIMUM MEDIAN WIDTH (28' PREFERRED)
2. PROVIDE 2' BORDER AT OUTER EDGE OF ROW
   1' BORDER MINIMUM IF CONFLICTS EXIST
3. PROVIDE 8-FOOT MINIMUM SHARED-USE TRAIL FOR HIKE AND BIKE TRAIL SEGMENTS

MAJOR THOROUGHFARE PLAN TYPICAL SECTIONS

NOT TO SCALE	03/01/2012	SHEET 1 OF 7



P4D



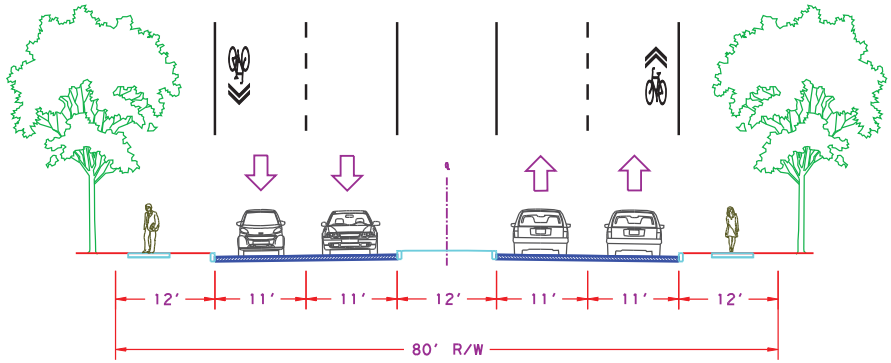
P4D-B

NOTES:

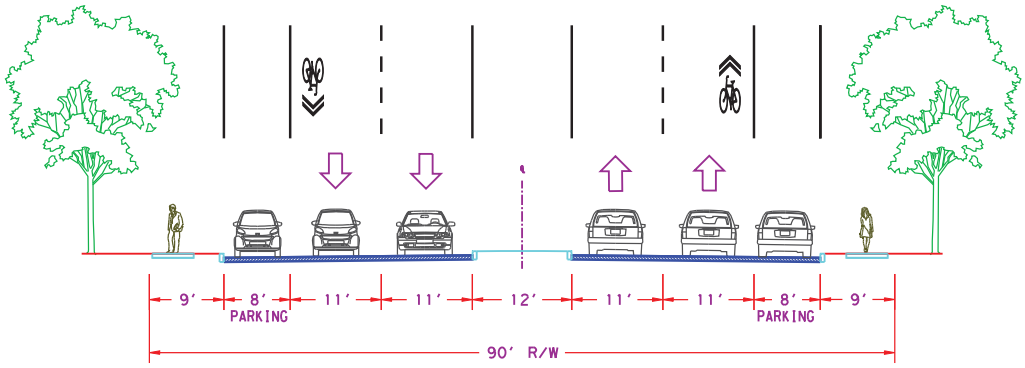
1. 18' MINIMUM MEDIAN WIDTH (24' PREFERRED)
2. PROVIDE 2' BORDER AT OUTER EDGE OF ROW
   1' BORDER MINIMUM IF CONFLICTS EXIST
3. PROVIDE 8' SHARED-USE TRAIL FOR HIKE AND BIKE TRAIL SEGMENTS

MAJOR THOROUGHFARE PLAN TYPICAL SECTIONS

NOT TO SCALE	03/01/2012	SHEET 2 OF 7



C4D



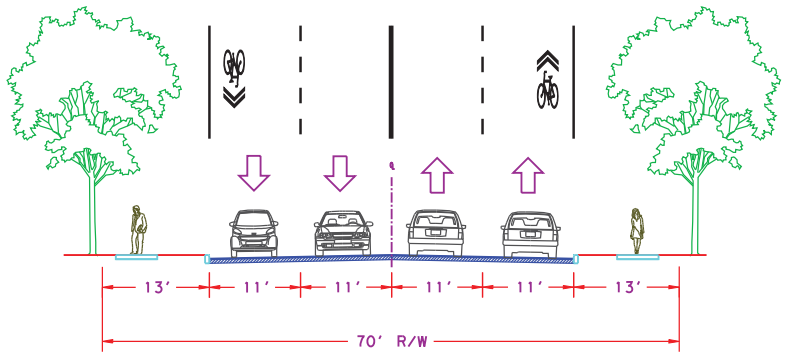
C4D-P

NOTES:

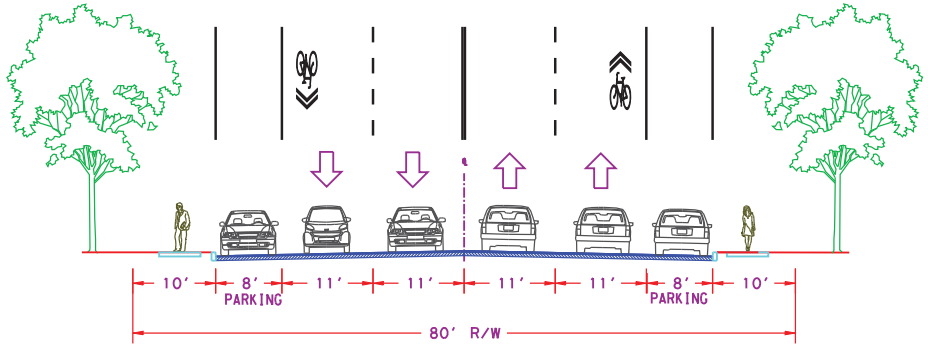
1. PROVIDE 2' BORDER AT OUTER EDGE OF ROW
   1' BORDER MINIMUM IF CONFLICTS EXIST
2. PROVIDE 8' SHARED-USE TRAIL FOR HIKE AND BIKE TRAIL SEGMENTS
3. SHARROWS OPTIONAL

MAJOR THOROUGHFARE PLAN TYPICAL SECTIONS

NOT TO SCALE	03/01/2012	SHEET 3 OF 7



C4U



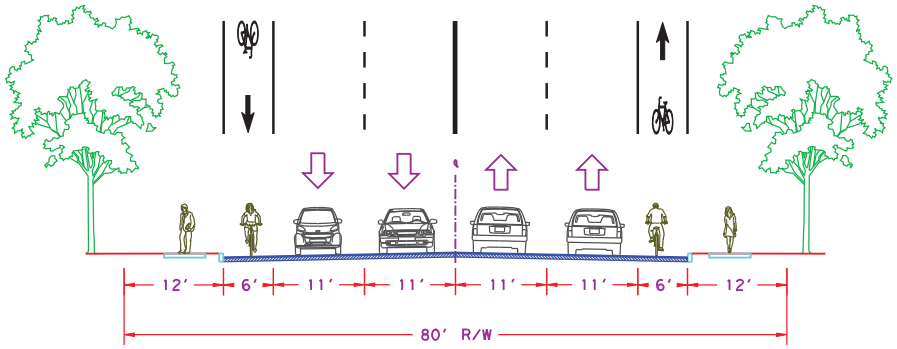
C4U-P

NOTES:

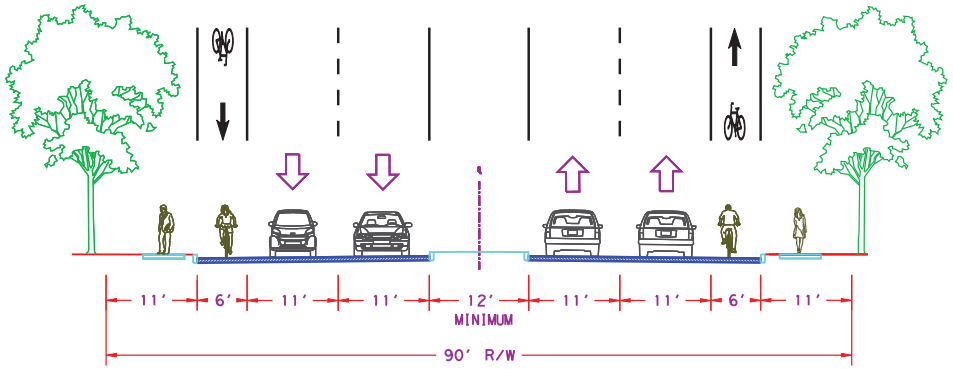
1. PROVIDE 2' BORDER AT OUTER EDGE OF ROW
   1' BORDER MINIMUM IF CONFLICTS EXIST
2. SHARROWS OPTIONAL
3. 10' LANES ACCEPTABLE
4. NO BUFFER REQUIRED BETWEEN SIDEWALKS
   AND CURB IF POSTED SPEED 35 MPH OR LESS

MAJOR THOROUGHFARE PLAN
TYPICAL SECTIONS

NOT TO SCALE	03/01/2012	SHEET OF 7



C4U-B



C4D-B

NOTES:

1. PROVIDE 2' BORDER AT OUTER EDGE OF ROW
   1' BORDER MINIMUM IF CONFLICTS EXIST
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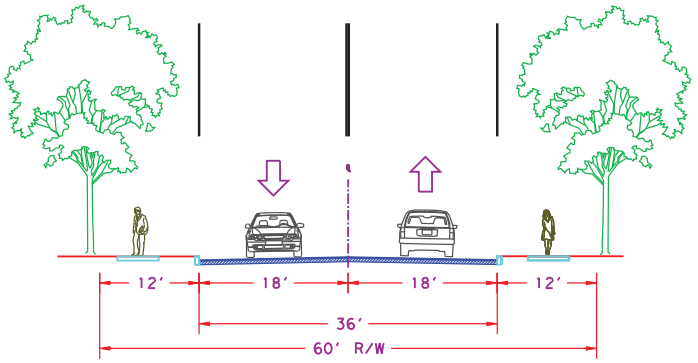
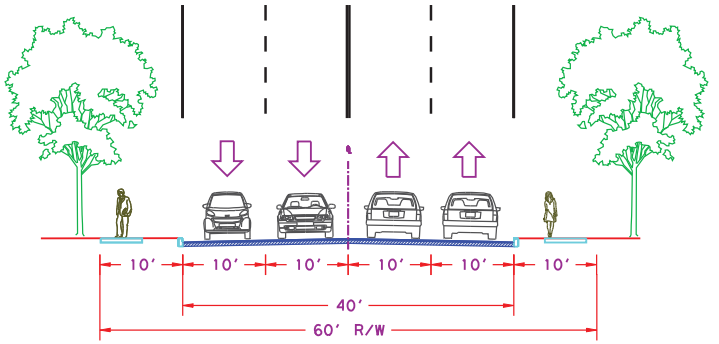
MAJOR THOROUGHFARE PLAN TYPICAL SECTIONS

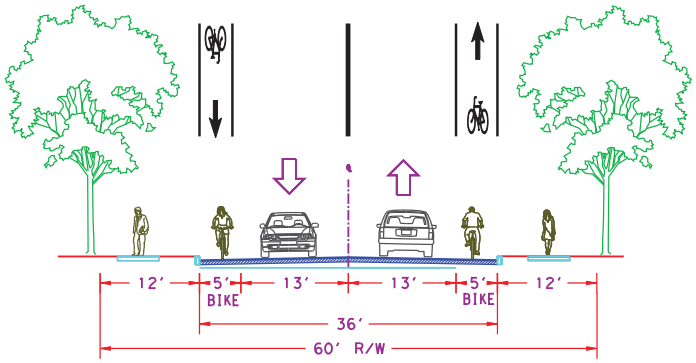
NOT TO SCALE	03/01/2012	SHEET OF 7



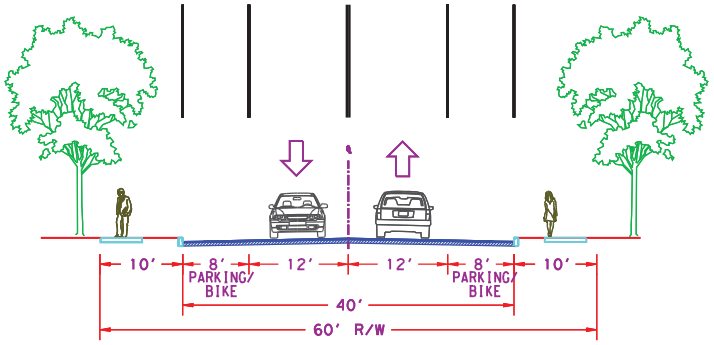
C2U
TYPICAL COMMERCIAL



C2U (40') - 10' LANES
TYPICAL COMMERCIAL



C2U - BIKE
TYPICAL RESIDENTIAL



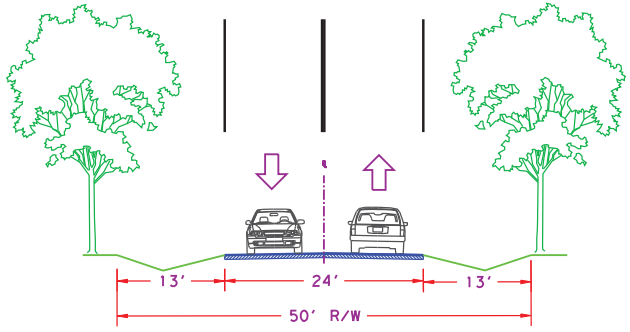
C2U (40') - BIKE OR PARKING
TYPICAL RESIDENTIAL

NOTES:

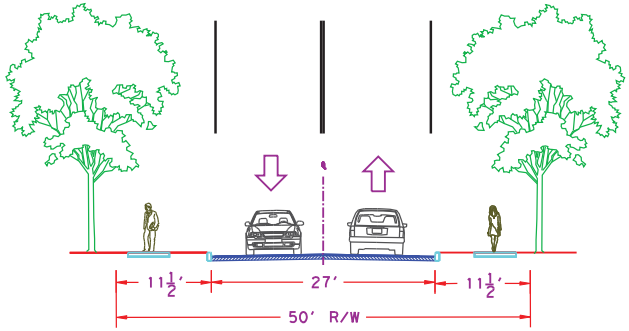
1. PROVIDE 2' BORDER AT OUTER EDGE OF ROW
   1' BORDER MINIMUM IF CONFLICTS EXIST
2. 10' LANES ACCEPTABLE
3. NO BUFFER REQUIRED BETWEEN SIDEWALKS
   AND CURB IF POSTED SPEED 35 MPH OR LESS

MAJOR THOROUGHFARE PLAN
TYPICAL SECTIONS

NOT TO SCALE	03/01/2012	SHEET 6 OF 7



R2U



L2U

NOTES:

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2. 10' LANES ACCEPTABLE
3. NO BUFFER REQUIRED BETWEEN SIDEWALKS
   AND CURB IF POSTED SPEED 35 MPH OR LESS

MAJOR THOROUGHFARE PLAN
TYPICAL SECTIONS

NOT TO SCALE	03/01/2012	SHEET 7 OF 7