

Prepared for:
Houston-Galveston Area Council
Texas Department of Transportation
City of Stafford

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FM 1092

ACCESS MANAGEMENT STUDY

December 2013

FM 1092 ACCESS MANAGEMENT STUDY

FM 1092 is the main north-south corridor through the City of Stafford connecting US 59 (recently designated I-69) and the City of Houston on the north to the City of Missouri City to the south. The study area corridor, also known to many people in the region as Murphy Road, can be seen in Figure ES.1. The study area includes the right-of-way for FM 1092, major intersections, and also considers access to major facilities and destinations along the corridor

The FM 1092 corridor plays two primary roles in the City of Stafford and the region. First, it is the primary connection for many north-south trips through Stafford connecting SH 6 and Missouri City on the south with major regional roadways such as US 90A and US 59. Its role is particularly important as there are limited alternative north-south corridors in eastern Fort Bend County. Safety along the corridor is a concern as, currently, the corridors experiences a high rate of crashes versus similar corridors across the State of Texas. To the north of the corridor is the West Bellfort Park & Ride which provides strong commuter and local bus connections as well as access to the HOV/HOT lane system on US 59.

Secondly, the FM 1092 corridor also represents the economic core of the City of Stafford. Travelling the full length of the city, the corridor is home to many businesses and potential development sites and a significant share of the city’s tax base. Key destinations along the corridor include the Stafford Centre, the nearby Houston Community College campus, the Island District along US 90A, and the Texas Instruments campus site.

The FM 1092 Access Management Study has been developed to help define a vision for the corridor to support and balance these two objectives as traffic volumes grow and the corridor continues to redevelop.

STAKEHOLDERS AND STUDY GOALS

The FM 1092 Access Management Study was sponsored by the City of Stafford and the Houston-Galveston Area Council (H-GAC). The study team developed the recommendations outlined in the study through extensive input from the public and business owners along the corridor. Input was gathered through a series of outreach events and public meetings (Chapter 2 of this report). A steering committee guided the study development and was made up of constituents who have an interest in the long term success of the corridor. The steering committee included representatives from:

- Houston - Galveston Area Council
- City of Stafford Public Works
- City of Stafford Fire Department
- City of Stafford Police Department
- Stafford Municipal School District
- Stafford Economic Development Council
- Texas Department of Transportation
- City of Houston
- City of Missouri City
- METRO
- Fort Bend Chamber of Commerce
- Houston Community College System

The Steering Committee developed three major goals for the study as a framework for the recommendations for the corridor.

- Improve FM 1092 Corridor Mobility
- Address Safety Issues
- Enhance Economic Development Opportunities

These goals were developed to balance the objectives for the corridor to move people traveling in all modes efficiently and safely while enhancing FM 1092 as the economic “Main Street” for the City of Stafford.

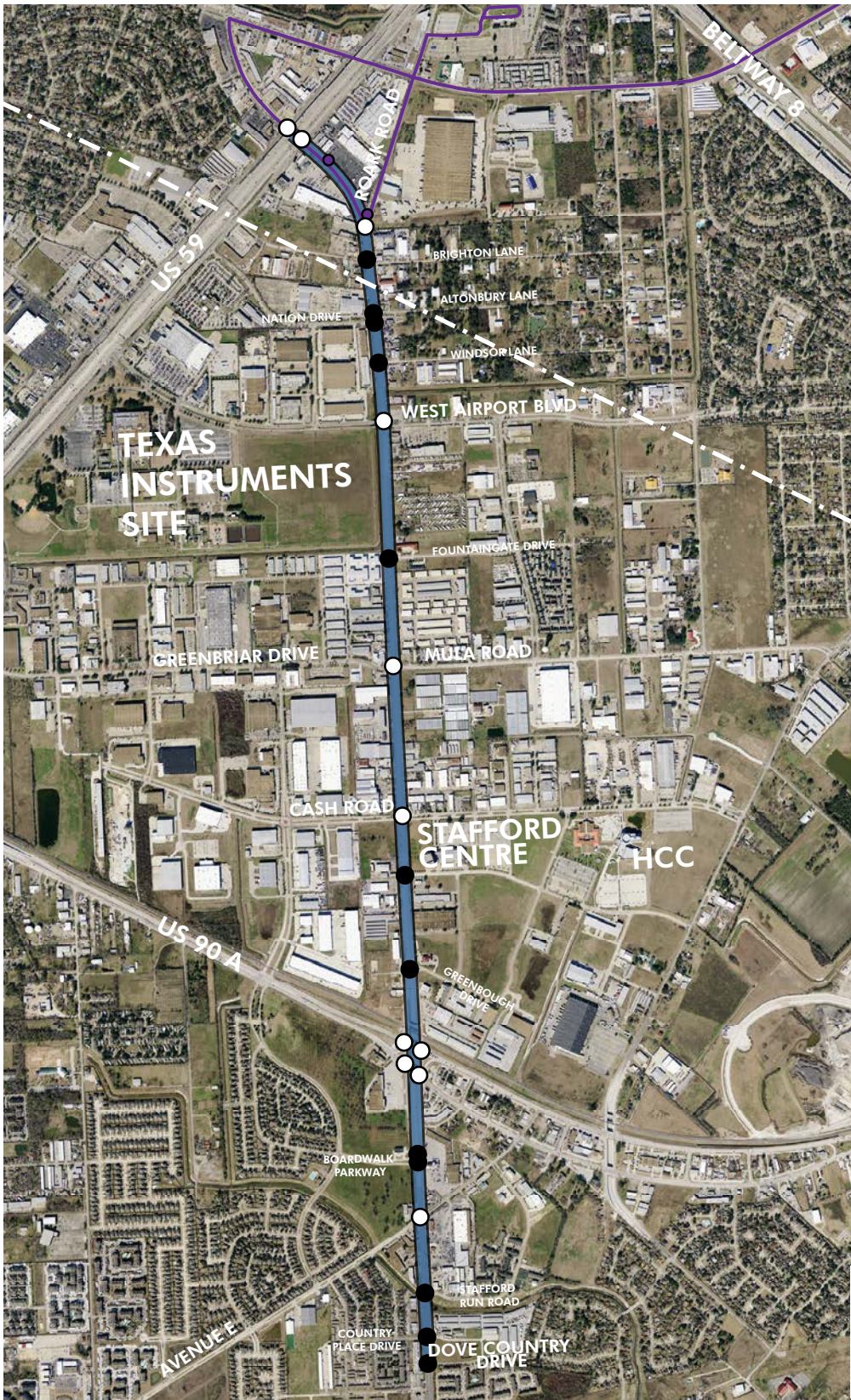


Figure ES.1 - FM 1092 Study Corridor

STUDY RECOMMENDATIONS

Based on an analysis of existing conditions along the corridor and comparing with the goals established by the Steering Committee, a set of recommendations were developed. The existing conditions assessment looked at critical issues including traffic operations and delay, pedestrian and cyclist mobility, safety metrics including crash rates and causes, and overall economic performance data such as land values and sales tax rates.

Based on this detailed assessment, which is detailed in Chapter 3 of this report, recommendations were developed that address the overall corridor, key intersections, streetscape elements and economic development opportunities focused around key opportunity nodes.

The current cross-section for most of the FM 1092 corridor is shown in Figure ES.2. The roadway is seven lanes with three travel lanes in each direction and a center turn lane. No sidewalks exist along the majority of the corridor. The proposed cross-section for the corridor, shown in Figure ES.3, was developed to utilize the existing right-of-way and pavement section as efficiently possible to achieve the desired benefits and minimize implementation costs. The proposed cross-section maintains three travel lanes in each direction but also provides a center median with turn lanes at major roadways and driveways to provide access to adjacent developments. 11' travel lanes allow the inclusion of a bike lane in each direction of travel. Sidewalks were proposed for the length of the project, a top concern of area residents.

A more detailed set of recommendations with associated planning level cost estimates are shown in Table ES.1 on the following page. Each of these recommendations is detailed in Chapter 5 of this report.

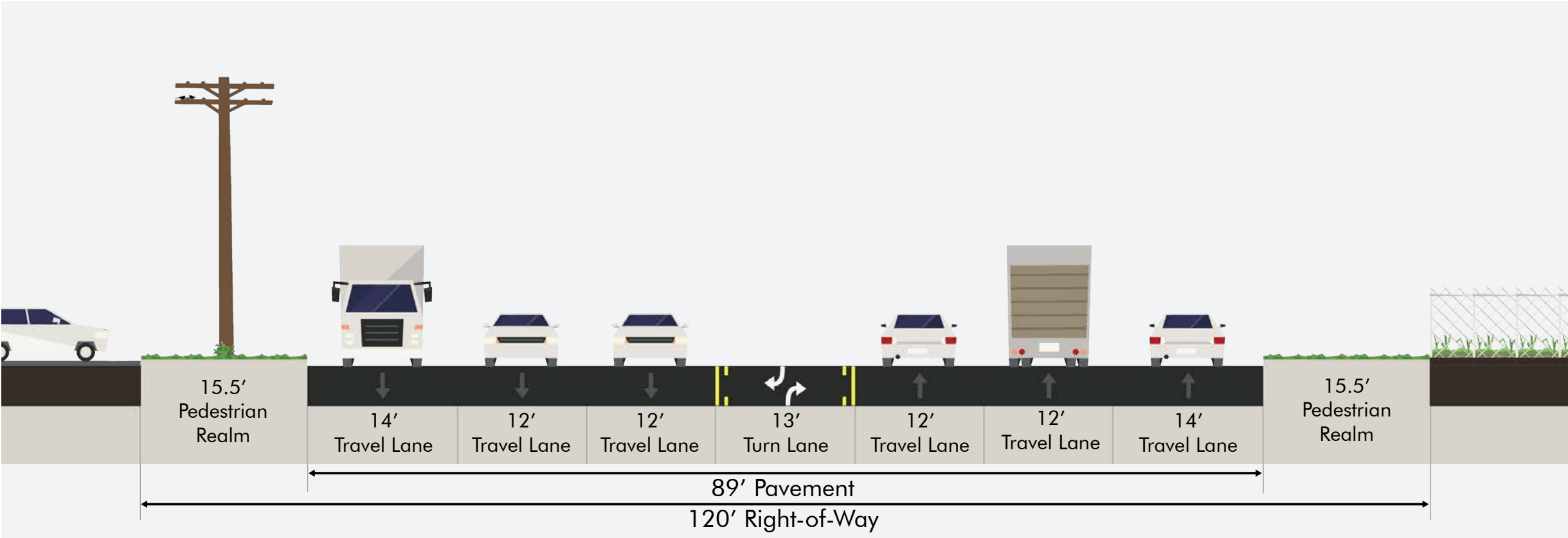


Figure ES.2 FM 1092 Study Corridor Typical Cross Section

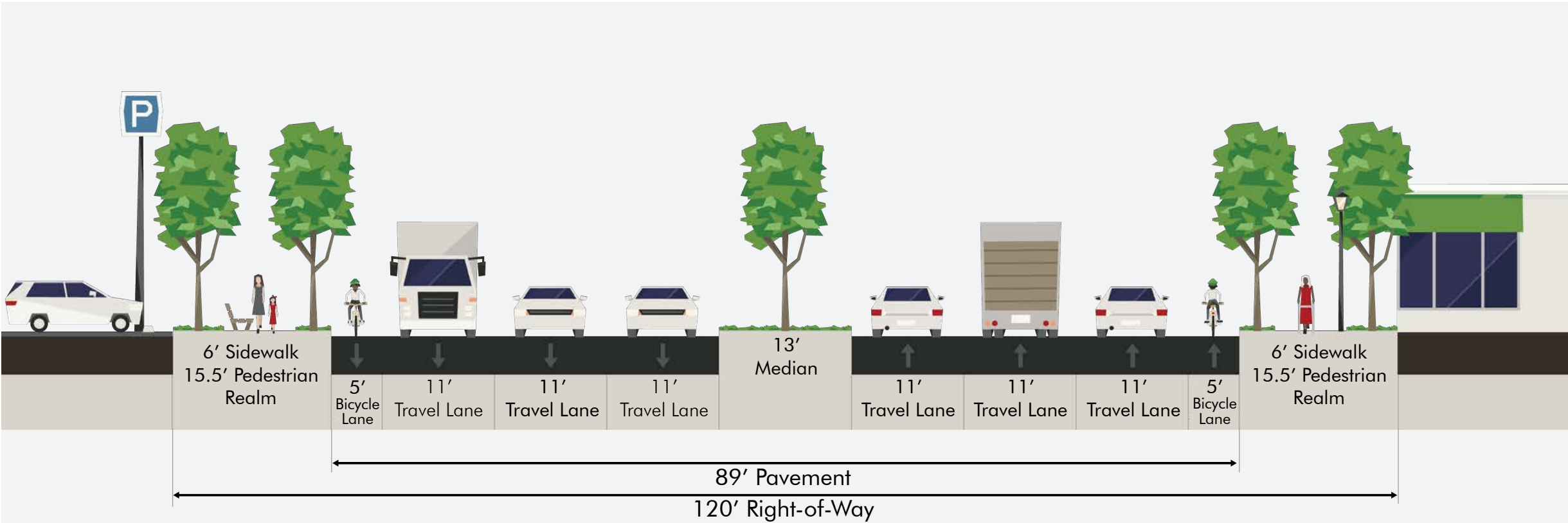


Figure ES.3 Proposed Typical Cross-section - Roark Road to Dove Country Drive

Table ES.1 Summary of Roadway Corridor, Intersection and Streetscape Recommendations

PROJECT NUMBER	PROJECT TITLE	TYPE	TxDOT COST	CITY OF STAFFORD COST ¹	OTHER ENTITIES ²	COST
SHORT						
1	Install Signal Interconnect	Corridor	\$ 510,400	\$0	\$0	\$ 510,400
2A	FM 1092 at US 59 West Frontage Rd - Short	Intersection	\$ 46,200	\$0	\$0	\$ 46,200
5A	FM 1092 at West Airport Blvd - Short	Intersection	\$ 33,400	\$0	\$0	\$ 33,400
7	FM 1092 at Greenbriar Dr/Mula Rd	Intersection	\$ 22,920	\$ 34,380	\$0	\$ 57,300
8	FM 1092 at Cash Rd	Intersection	\$ 48,800	\$ 12,200	\$0	\$ 61,000
9	FM 1092 at US 90A Underpass	Intersection	\$ 30,500	\$0	\$0	\$ 30,500
11A	FM 1092 at Dove Country Dr - Short	Intersection	\$ 28,800	\$0	\$0	\$ 28,800
12	US 90A at Promenade Blvd	Intersection	\$ 33,800	\$0	\$0	\$ 33,800
13	Restripe Corridor	Corridor	\$ 471,100	\$0	\$0	\$ 471,100
14	Construct 13' Median	Corridor	\$ 485,400	\$0	\$0	\$ 485,400
MEDIUM						
4	Mid-block Crossing	Intersection	\$ 147,500	\$0	\$0	\$ 147,500
11B	FM 1092 at Dove Country Dr - Medium	Intersection	\$ 186,000	\$0	\$0	\$ 186,000
16	Landscape Medians	Landscape	\$0	\$ 425,000 - \$ 595,000 ³	\$ 75,000 - \$ 105,000 ³	\$ 500,000 - \$700,000 ³
17	Driveway Consolidation	Corridor	\$ 120,800	\$0	\$0	\$ 120,800
18A	Construct Sidewalks	Corridor	\$ 1,444,700	\$0	\$0	\$ 1,444,700
18B	Construct Side Paths	Corridor	\$ 321,900	\$0	\$0	\$ 321,900
19	Plants Street Trees	Landscape	\$0	\$127,500 - \$ 255,000 ⁴	\$ 22,500 - \$ 45,000 ⁴	\$ 150,000 - \$ 300,000 ⁴
20	Pedestrian Lighting	Streetscape	\$0	\$ 850,000 - \$ 2,550,000 ⁵	\$ 150,000 - \$ 450,000 ⁵	\$ 1,000,000 - \$ 3,000,000 ⁵
21	Roadway Lighting	Corridor	\$ 400,000 - \$ 500,000 ⁴	\$0	\$0	\$ 400,000 - \$ 500,000 ⁶
22	City of Stafford Monuments	Streetscape	\$0	Cost similar to existing monuments	\$0	Cost similar to existing monuments
LONG						
2B	FM 1092 at US 59 West Frontage Rd - Long	Intersection	\$ 297,600	\$0	\$0	\$ 297,600
3	FM 1092 at Roark Rd	Intersection	Future Cost ⁷			
5B	FM 1092 at West Airport Blvd - Long	Intersection	\$ 1,225,500	\$0	\$0	\$ 1,225,500
6	FM 1092 at Fountaingate Dr	Intersection	\$1,006,160	\$ 251,540	\$0	\$ 1,257,700
10	FM 1092 at Avenue E	Intersection	\$ 1,774,000	\$0	\$0	\$ 1,774,000
15	RTP Project 13641	Corridor	City of Missouri City listed as lead agency in the 2035 RTP Update			\$ 10,100,000
23	Stafford Centre Park	Streetscape	\$0	\$ 145,000 ⁸	\$0	\$ 145,000 ⁸
24	Pedestrian and Bicycle Trail	Streetscape	\$0	\$ 135,000 ⁹	\$0	\$ 135,000 ⁹
TOTAL COST						
LOW			\$ 8,635,480	\$ 1,980,620	\$ 357,500	\$ 10,863,600 ¹⁰
HIGH			\$ 8,735,480	\$ 3,978,120	\$ 600,000	\$ 13,313,600 ¹⁰

¹ Includes other entities within the City of Stafford not yet determined, e.g.: improvement districts, local businesses, other management entities

² Other entities outside the City of Stafford, e.g.: Brays Oaks Management District, International Management District

³ For trees, depending on size, at a 25 to 100 foot spacing. Special pavers are an alternative to vegetation landscaping that can reduce maintenance costs.

⁴ For trees, depending on size, at a spacing of 25 to 100 feet

⁵ Dependent on phasing of implementation prioritized by activity centers and fixture type and spacing

⁶ Dependent on fixture type and a spacing of 120 to 150 feet

⁷ Cost to be based on final design of future long term project

⁸ Cost is estimated based on a 9,000 square foot plaza on the southeast corner of FM 1092 at Cash Rd

⁶ Cost estimate considers the addition of a trail, irrigation and street trees along the drainage corridor at the Texas Instruments Site

¹⁰ Does not include Project 15 - 2035 RTP Updated Project 13641

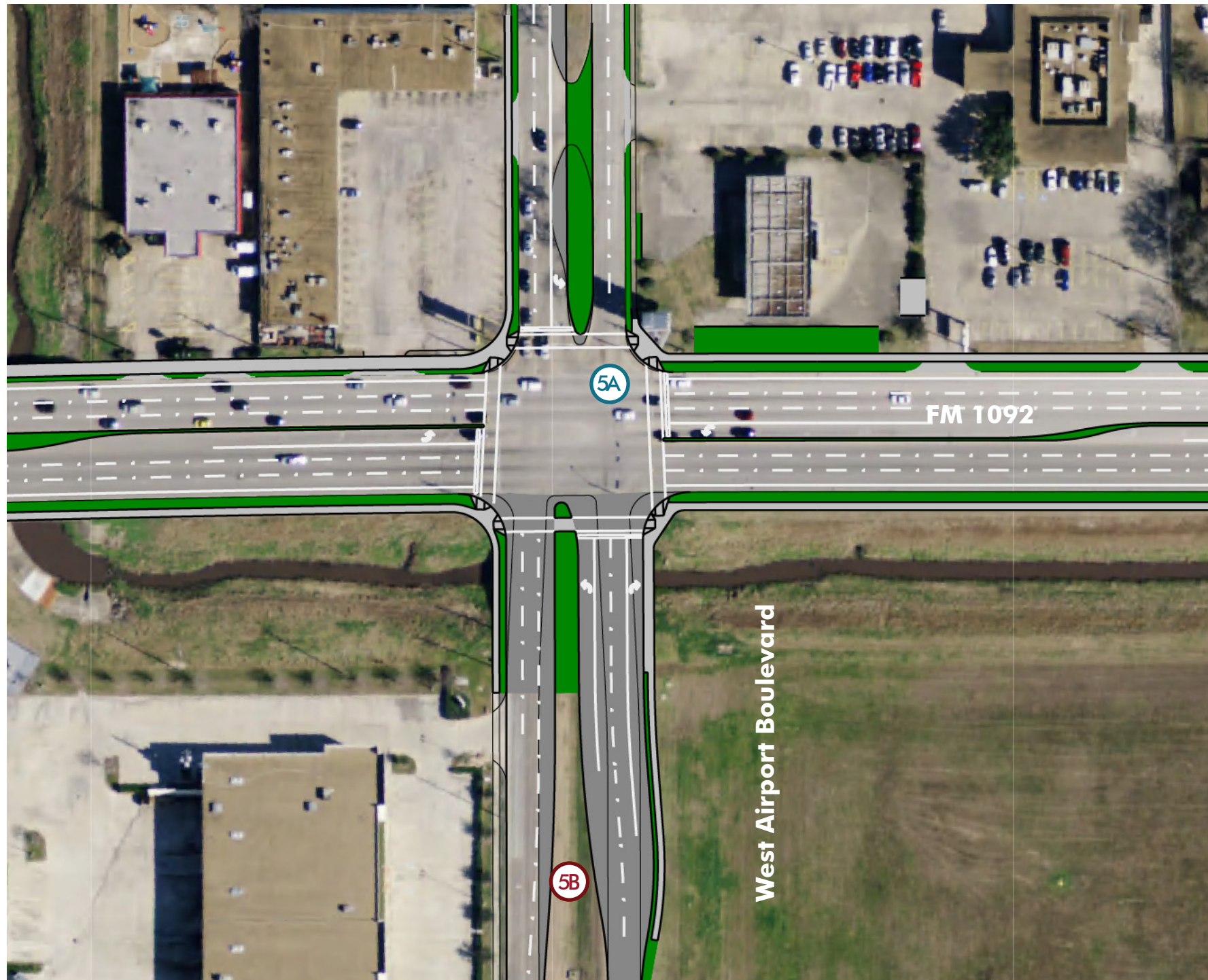


Figure ES.4: Recommendations for FM 1092 at West Airport Boulevard

Recommendations were developed to a schematic design level, to assess the feasibility and identify any potential challenges or opportunities that would arise from the proposed recommendations. An example of this is shown in Figure ES.4 which shows the proposed conditions for the intersection of FM 1092 at West Airport Boulevard. The addition of left turns at the intersection were recommended to improve the signal operations and improve the overall level of service for vehicles. Improved pedestrian and bicycle facilities are also recommended.

The recommendations outlined in Table ES.1 summarize an implementation approach that defines a clear path forward in terms of project phasing based on a prioritized timeline. The timeline was established based on 1) project cost, 2) likely ease of implementation and 3) ability to satisfy project goals. The timeline is an estimate and individual projects may be accelerated by increased focus and availability of funding.

In addition to the recommendations outlined for the corridor, the report also identifies regional improvements, such as improvements in regional roadway connectivity, potential bicycle opportunities, and stronger transit connections that round out the toolbox of transportation choices to improve mobility for travellers along the corridor and in the study area.

The implementation of the recommendations outlined in this report will require strong partnership among the various stakeholders, both public and private, with interests along the corridor. While the infrastructure improvements outlined here may be accomplished through partnerships of public agencies such as the City of Stafford, the City of Houston, TxDOT and H-GAC, to fully achieve the vision for the corridor outlined by the goals set forth by the project steering committee, a more holistic approach will be required. The redevelopment adjacent to the corridor should be coordinated with the investments in infrastructure that these recommendations outline to maximize the potential benefits to the community and the region.

Chapter 6 of this report outlines implementation strategies including economic development tools, potential partnerships, and approaches to redefine key development nodes along the corridor. By coordinating the recommendation with planning efforts such as the development of an updated Comprehensive Plan for the City of Stafford, supporting a regulatory environment aligned with the communities goals, and working with property owners and developers along the corridor, FM 1092 can continue to be the true “Main Street” for the City of Stafford while providing safer, more efficient connectivity and mobility for the region.

FM 1092 AT WEST AIRPORT BOULEVARD

Case for Action

Operations
The intersection of FM 1092 at West Airport Boulevard operates at a LOS of C during the AM Peak and LOS D during the PM peak period. While the LOS values are classified as acceptable, the intersection could operate more efficiently if the existing split phase operations on West Airport Boulevard were removed. Currently, the West Airport Boulevard approaches operate as a split phase as the approach lane geometry is limited by the bridge over the drainage canal.

The existing bridges on the eastbound approach also limit the turning radius for large trucks with a long wheel base wishing to turn from southbound FM 1092 to westbound West Airport Boulevard. Widening the intersection will help reduce issues with large trucks turning at the intersection.

Safety
The intersection of FM 1092 at West Airport Boulevard has the highest crash rate along the study corridor with 63 crashes occurring at or near the intersection between 2009 and 2011. The addition of turn lanes can reduce the read-end crashes at the intersection.

The intersection has no pedestrian infrastructure, making the intersection difficult to traverse for pedestrians.

- Top Manner of Crash classifications:

 - Rear-End - 54%
 - Other - 18%
- Top contributing factors for collisions:

 - Failed to Control Speed - 57%
 - Driver Inattention - 11%
 - Disregard stop sign or light - 11%

Recommended Improvements

Short Term

PROJECT #5A - Install crosswalks on all four approaches as well as wheelchair ramps and pedestrian signals.

Estimated Cost: \$33,400

Long Term

PROJECT #5B - Intersection upgrades including the installation of eastbound left-turn lane and right-turn lane, additional downstream lane from the westbound approach, extension of westbound left-turn lane, and signal timings to remove split phasing for West Airport Boulevard approaches. Includes the widening of West Airport Boulevard bridge with bridge culverts.

Estimated Cost: \$1,225,500

	A.M. Peak Hour			P.M. Peak Hour		
	LOS	Delay (seconds/vehicle)	v/c	LOS	Delay (seconds/vehicle)	v/c
Before	C	31.6	0.82	D	51.5	0.95
After	C	25.3	0.67	C	31.4	0.77

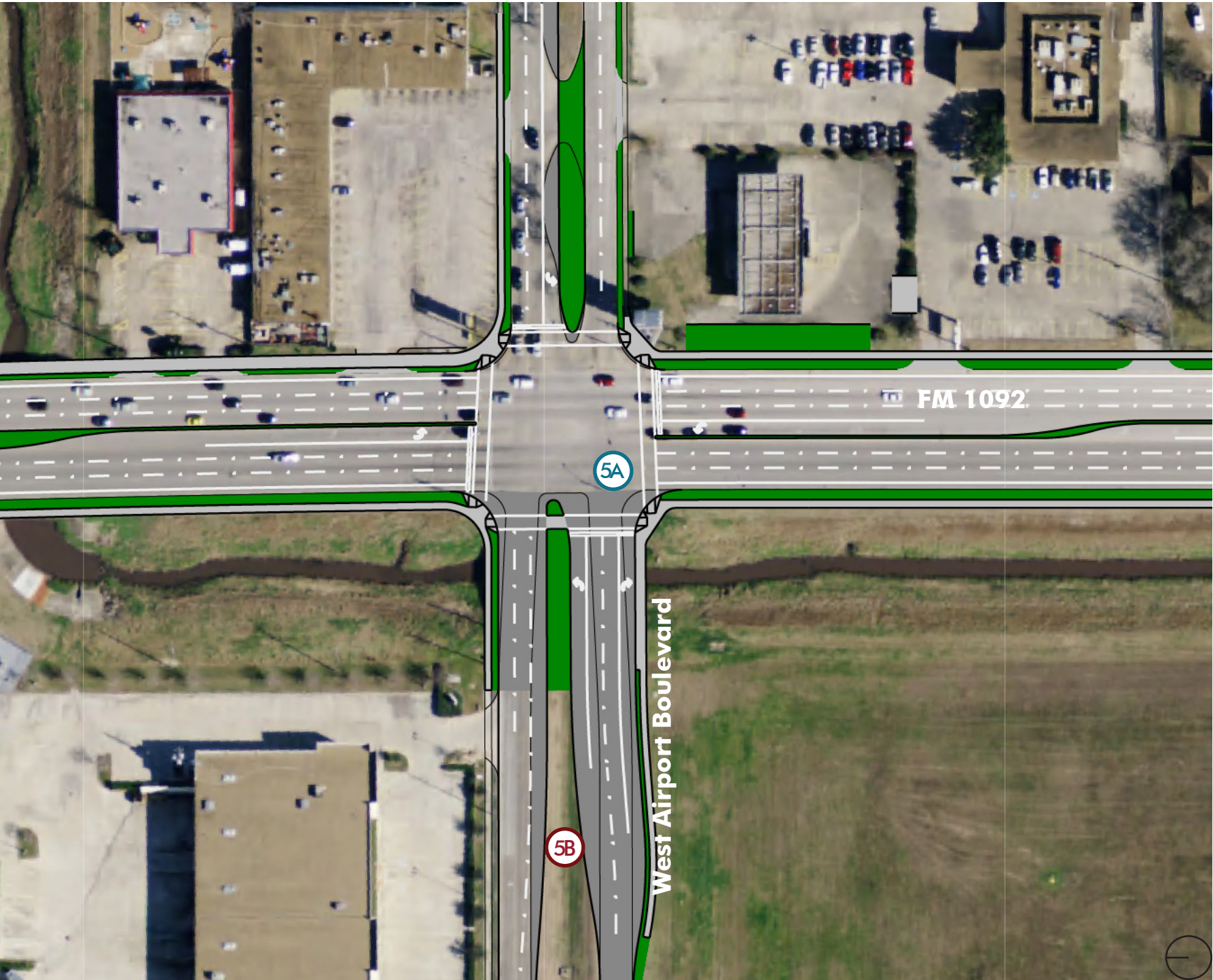
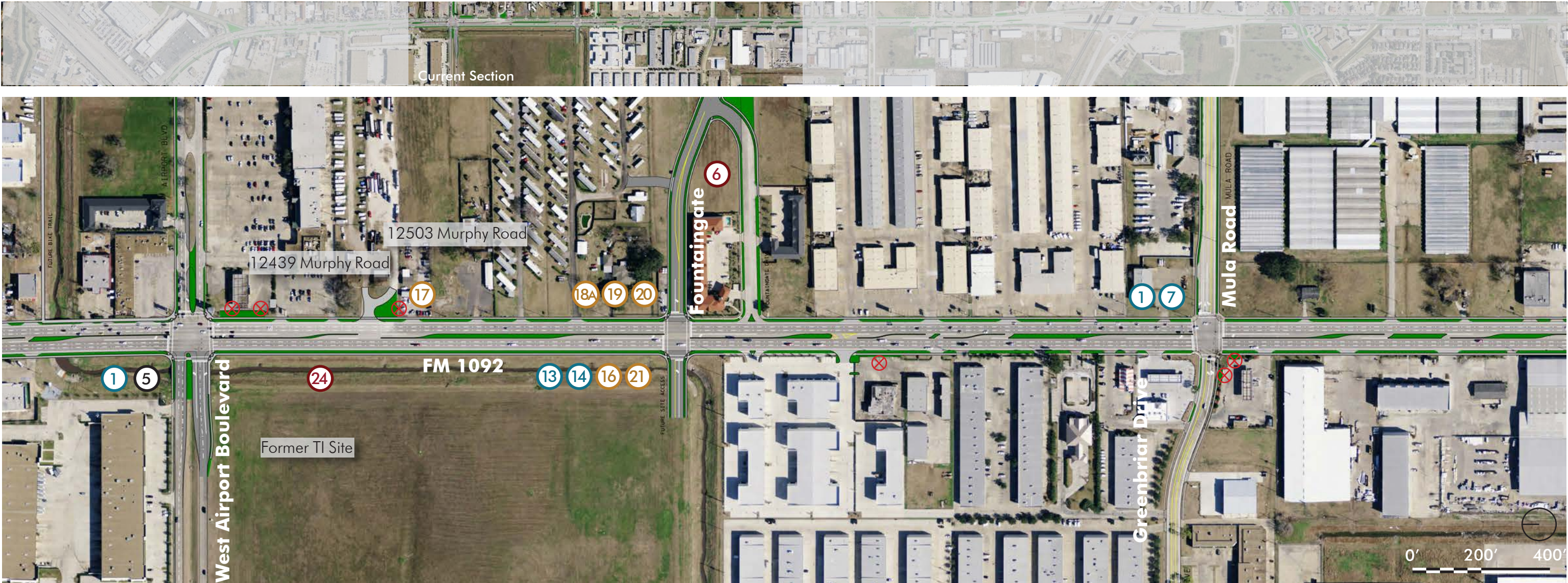


Figure 5.6: Recommendations for FM 1092 at West Airport Boulevard



Recommendation	Term	Cost
1 Install Signal Interconnect	Short	\$ 510,400
5 FM 1092 at West Airport Boulevard intersection improvements presented in Figure 5.6	Short & Long	\$1,258,900
6 Realign Fountaingate Drive with potential signalized access point to future development on former TI Site	Long	\$1,257,700
7 FM 1092 at Greenbriar Drive/Mula Road intersection improvements presented in Figure 5.7	Short	\$ 57,300
13 Restripe with proposed cross-section	Short	\$ 471,100
14 Construct 13' median along the corridor with channelized left-turns lanes	Short	\$ 485,400
16 Landscape roadway medians	Medium	\$ 500,000 - \$ 700,000 ¹
17 Driveway consolidation and cross access between 12439 Murphy Road and 12503 Murphy Road	Medium	\$ 120,800
18A Construct 6' sidewalks	Medium	\$ 1,444,700
19 Landscape pedestrian realm to provide shade and buffer	Medium	\$ 150,000 - \$ 300,000 ¹
20 Install pedestrian lighting and install City of Stafford banners on lighting poles within Stafford city limits	Medium	\$ 1,000,000 - \$ 3,000,000 ¹
21 Install double-headed roadway lighting	Medium	\$ 400,000 - \$ 500,000
24 Develop landscape/beautification plan for drainage corridor, create pedestrian and bicyclist trails	Long	\$ 135,000

¹ Dependent on type and spacing

LEGEND

- # Short Term Project (0-5 years)
- # Medium Term Project (5-15 years)
- # Long Term Project (15+ years)
- # Multi Phased Intersection Improvements
- New Curb
- Median/Pedestrian Realm (Potential Streetscapes Improvements)
- Sidewalk/Side Path
- ⊗ Driveway Removal

Figure 5.18: FM 1092 Corridor Recommendations - Windsor Lane to Scarpinato Road

TI TRACT TRAFFIC IMPACT ANALYSIS

LJA Project No. 2172-1000

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Executive Summary

This report presents the summary of findings for a Traffic Impact Analysis (TIA) prepared by LJA Engineering, Inc. (LJA) for the proposed TI Tract development in Stafford, Texas. The proposed development site is bounded by US Highway 59 (US Hwy 59) and South Kirkwood Road to the West, Murphy Road to the east, West Airport Boulevard to the North, and several developments along Bluebonnet Drive to the south. This proposed development will consist of an outlet mall, restaurants, retail stores, apartments, hotels, an industrial park, office buildings, and a gas station. Construction of this development is expected to be completed in six phases. Phase 1 is expected to begin in 2015, while Phase 6 is expected to be completed in 2020. The objective of this study is to analyze the traffic impacts of each year of development on the performance of the surrounding street network and to determine mitigation measures to address any resulting deficiencies.

Access to this development will be provided via five driveways along West Airport Boulevard (Driveways 1,2,3,4 and 5), two Driveways along Murphy Road (Driveways 6 and 7), one driveway along South Kirkwood Road (Driveway 8), and two driveways along US Hwy 59 Northbound Frontage Road (Driveways 9 and 10). The study area for this TIA includes the street network determined during this project's kick off meeting with the City of Stafford. Major intersections that were analyzed in this TIA are presented in the Existing Area Conditions section of the report. Existing land uses within the study area include retail, lodging, restaurant, office, and industrial land uses. The development site currently consists of an industrial park that will be demolished in phases in correspondence to the proposed development.

Due to the nature of this development and the traffic conditions within the study area, only the weekday AM and the weekday PM peak hour periods were analyzed in this TIA. The overall proposed development is expected to add 46,246 daily vehicle trips with 3,281 vehicle trips during the AM peak hour period and 4,188 vehicle trips during the PM peak hour period. In order to evaluate the impacts of the proposed development on the surrounding street network, each year of development was analyzed without (No Build Conditions) and with (Build Conditions) the development's generated traffic.

This study includes the analysis of several intersections that are operated and maintained by the City of Stafford, and others that are operated and maintained by the Texas Department of Transportation (TxDOT). Mitigation measures for this TIA require:

1. When the LOS without development is LOS A, B, C or D, the minimum acceptable projected LOS shall be LOS D.
2. When the LOS without development is LOS E or F, the minimum acceptable projected LOS shall be equal to the LOS without development.

Left and Right Turn Lane Warrant Analyses were completed for all driveways to the proposed development. The lengths of turn bays along the street network maintained by the City of Stafford were determined to accommodate the corresponding anticipated traffic queue lengths. The lengths of turn bays along the street network maintained by TxDOT were determined in

accordance with the requirements in the Texas Department of Transportation (TxDOT) Access Management Manual. The following is a list of access management requirements at the driveways to the proposed development:

1. Construct right and left turn bays along West Airport Boulevard at Driveway 1. These right and left turn bays should each have full width of 100 feet and a 100 foot taper.
2. Construct a right turn bay along eastbound West Airport Boulevard at Driveway 2. This right turn bay should have a full width of 100 feet and a 100 foot taper.
3. Extend the existing left turn bay along westbound West Airport Boulevard at Driveway 2 to consist of a full width of 175 feet and a 100 foot taper.
4. Construct right and left turn bays along West Airport Boulevard at Driveway 3. The right turn bay should have a full width of 100 feet and a 100 foot taper, while the left turn bay should have a full width of 175 feet and a 100 foot taper.
5. Construct a left turn bay along westbound West Airport Boulevard at Driveway 4. This left turn bay should have a full width of 150 feet and a 100 foot taper.
6. Construct a left turn bay along westbound West Airport Boulevard at Driveway 5. This left turn bay should have a full width of 150 feet and a 100 foot taper.
7. Construct a right turn bay along southbound Murphy Road at Driveway 6. This right turn bay should have a full width of 375 feet and a 100 foot taper.
8. Construct right and left turn bays along South Kirkwood Road at Driveway 8. These right and left turn bays should each have a full width of 100 feet and a 100 foot taper.
9. Construct a right turn bay along US Hwy 59 Northbound Frontage Road at Driveway 9. This right turn bay should have a full width of 375 feet and a 100 foot taper.

In order to maintain acceptable operational conditions within the study street network, several roadway improvements will be required concurrently with the proposed development. The following is the list of recommendations corresponding to each year of development:

Year 2015:

1. Construct Driveways 1 through 8 each to consist of two exit lanes (One shared left/through and one right lanes) in order to prevent right turning vehicles from getting trapped behind left turning vehicles that will require more time to exit the development site.

Year 2016:

1. Construct dual left turn bays along northbound Murphy Road at its intersection with West Airport Boulevard. These left turn bays should have a full width of 645 feet and a 150 foot taper.
2. Construct eastbound left turn lane at the intersection of West Airport Boulevard and Murphy Road. This left turn lane should have a full width of 250 feet and a 100 foot taper. This improvement will be constructed by City of Stafford as part of the improvements recommended in the FM 1092 Access Management Study.
3. Reconstruct the eastbound approach of West Airport Boulevard at its intersection with Murphy Road to consist of one left turn bay (See recommendation #2 in Year 2016), two

through lanes, and one channelized right turn bay. The channelized right turn bay should have a full width of 100 feet and a 100 foot taper.

4. Change the operation of the traffic signal at West Airport Boulevard and Murphy Road from split phase operation along the eastbound and westbound approaches to protected left turns operation. This improvement will require modification of the traffic signal at this intersection and will be constructed by City of Stafford as part of the improvements recommended in the FM 1092 Access Management Study.
5. Construct a right turn bay along westbound Cash Road at its intersection with Murphy Road. This right turn bay should have a full width of 100 feet and a 100 foot taper.
6. Reconstruct the existing right turn bay along the northbound approach of US 59 Northbound Frontage Road at its intersection with West Airport Boulevard to a channelized right turn bay.
7. Reconstruct the existing right turn bay along the westbound approach of West Airport Boulevard at its intersection with US 59 Northbound Frontage Road to a channelized right turn bay. This improvement may require right-of-way acquisition.

Year 2017:

1. Reconstruct the eastbound and westbound approaches of Greenbriar Drive at Murphy Road to consist of one left turn bay, one through lane, and one shared through/right turn lane along the eastbound direction, and one left turn lane, one through lane, and one right turn bay along the westbound direction. The eastbound left turn bay should have a full width of 300 feet and a 100 foot taper. The westbound right turn bay should have a full width of 100 feet and a 100 foot taper.
2. Change the operation of the traffic signal at Greenbriar Drive and Murphy Road from split phase operation along the eastbound and westbound approaches to protected left turns operation. This improvement will require modification of the traffic signal at this intersection and will be constructed by City of Stafford as part of the improvements recommended in the FM 1092 Access Management Study.
3. Construct dual left turn bays along southbound Murphy Road at its intersection with Cash Road. These left turn bays should have a full width of 545 feet and a 150 foot taper.
4. Reconstruct the existing right turn bay along US Highway 59 Southbound Frontage Road at its intersection with West Airport Boulevard to a channelized right turn bay, and change the lane configuration along US Highway 59 Southbound Frontage Road to one channelized right turn bay, two through lanes, one shared left/through lane, one left turn bay and one U-turn bay. This improvement may require right-of-way acquisition.

Year 2018: (Mitigation Not Required)

Year 2019: (Mitigation Not Required)

Year 2020: (Mitigation Not Required)

This study assumed that traffic signal timings at all signalized intersections within the study area will be updated as needed. Several roadway recommendations listed above may require right-of-

way acquisitions along adjacent properties. These roadway improvements will require coordination between the developer, City of Stafford, TxDOT, and impacted business owners.

Several roadway improvements along Murphy Road within the study area were recommended as part of the FM 1092 Access Management Study dated December 2013. Refer to the Proposed Area Conditions Section of this report for a list of these roadway improvements. These recommendations include geometric and traffic signal improvements along the eastbound and westbound approaches of West Airport Boulevard, Greenbriar Drive, and Cash Road at Murphy Road. These proposed recommendations do not take into account the traffic generated by this proposed development, and therefore, should be updated as described in the list of recommendations above.

Several intersection movements will operate at unacceptable levels with and without the proposed development. Mitigation measures to address these deficiencies were not established in this study. This study provides mitigation measures to improve the operation of movements that will be reduced to unacceptable levels upon the construction of this proposed development.

West Airport Boulevard and Murphy Road

The intersection of West Airport Boulevard and Murphy Road is located northeast of the proposed development site. This intersection is currently signalized with protected left turns along the northbound and southbound approaches of Murphy Road and split phase along the eastbound and westbound approaches of West Airport Boulevard. The northbound and southbound approaches to this intersection each consists of three through lanes and one 150 foot left turn bay. The eastbound approach consists of one shared left/through and one shared through/right lanes. The westbound approach consists of two through lanes and one 50 foot left turn bay. **Table 5** and **Table 6** provide a summary of the MOEs at this intersection for the AM and PM peak hours, respectively.

Table 5: West Airport Boulevard @ Murphy Road Summary of MOEs - (AM Peak)

Scenario / Lane Group	EBL/T	EBT/R	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Int.
2014 Existing AM	168.0/F	259.0/F	-	29.5/C	96.3/F	109.7/F	44.4/D	18.4/B	21.3/C	42.5/D	28.8/C	33.8/C	63.2/E
2015 No Build AM	190.2/F	284.5/F	-	29.8/C	107.5/F	121.5/F	48.2/D	19.1/B	22.3/C	44.3/D	30.2/C	35.8/D	69.1/E
2015 Build AM	218.7/F	437.0/F	-	29.9/C	110.9/F	125.1/F	93.3/F	19.2/B	22.4/C	44.3/D	30.8/C	36.6/D	95.5/F
2015 Build AM*	164.8/F	360.0/F	-	33.2/C	188.5/F	209.3/F	56.5/E	19.2/B	22.4/C	44.3/D	42.6/D	53.2/D	88.4/F
2016 No Build AM	209.0/F	307.5/F	-	29.9/C	118.4/F	133.2/F	55.6/E	20.2/C	23.9/C	46.5/D	31.6/C	37.9/D	75.1/E
2016 Build AM	370.3/F	968.3/F	-	30.8/C	145.2/F	160.1/F	361.7/F	20.8/C	24.8/C	46.5/D	38.4/D	48.2/D	238.8/F
2016 Build AM**	47.7/D	-	48.9/D	31.1/C	62.9/E	71.1/E	31.8/C	17.3/B	20.6/C	38.3/D	29.0/C	35.7/D	30.9/C
2017 No Build AM	228.1/F	330.7/F	-	30.1/C	130.2/F	145.7/F	64.6/E	21.5/C	25.9/C	49.0/D	33.2/C	40.3/D	81.4/F
2017 Build AM	464.1/F	1145.1/F	-	31.2/C	176.5/F	191.4/F	523.1/F	22.3/C	27.1/C	49.0/D	48.5/D	60.6/E	312.2/F
2017 Build AM*	76.4/E	-	37.3/D	53.7/D	79.0/E	87.6/F	38.8/D	17.3/B	19.8/B	52.0/D	39.0/D	48.1/D	36.6/D
2018 No Build AM	248.9/F	355.7/F	-	30.2/C	144.0/F	160.4/F	73.7/E	23.4/C	28.8/C	50.3/D	35.4/D	43.4/D	88.7/F
2018 Build AM	508.5/F	1231.7/F	-	31.6/C	194.7/F	209.9/F	552.0/F	24.4/C	30.3/C	50.3/D	55.5/E	68.0/E	338.8/F
2018 Build AM*	84.1/F	-	43.2/D	53.8/D	90.1/F	99.0/F	45.6/D	18.6/B	20.9/C	52.8/D	39.1/D	46.2/D	39.7/D
2019 No Build AM	270.0/F	380.9/F	-	30.6/C	158.4/F	175.0/F	84.7/F	26.1/C	32.7/C	51.0/D	38.3/D	47.3/D	96.6/F
2019 Build AM	557.7/F	1320.2/F	-	32.3/C	211.9/F	227.1/F	582.8/F	27.6/C	34.7/C	51.0/D	64.3/E	76.7/E	367.3/F
2019 Build AM*	61.2/E	-	42.7/D	54.8/D	132.4/F	143.2/F	58.6/E	20.3/C	23.2/C	52.4/D	42.1/D	49.3/D	46.0/D
2020 No Build AM	294.2/F	408.0/F	-	31.2/C	173.3/F	190.2/F	97.0/F	30.2/C	38.1/D	51.6/D	42.2/D	52.2/D	106.0/F
2020 Build AM	603.8/F	1408.7/F	-	33.3/C	229.6/F	244.5/F	612.7/F	32.4/C	41.0/D	51.6/D	75.2/E	87.1/F	396.1/F
2020 Build AM*	59.8/E	-	42.1/D	51.9/D	142.6/F	153.5/F	94.3/F	22.5/C	26.2/C	52.5/D	39.5/D	47.0/D	53.5/D

* Update signal timing

** Reconfigure intersection geometry and update signal operation

Bold text indicates LOS E or LOS F

Red highlight indicates movements that will require mitigation

Green highlight indicates mitigated movements

Table 6: West Airport Boulevard @ Murphy Road Summary of MOEs - (PM Peak)

Scenario / Lane Group	EBL/T	EBT/R	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Int.
2014 Existing PM	171.5/F	255.2/F	-	36.3/D	137.4/F	145.0/F	89.8/E	29.2/C	33.5/C	58.5/E	52.6/D	63.1/E	87.1/F
2015 No Build PM	189.2/F	276.9/F	-	37.1/D	153.0/F	160.5/F	99.5/F	30.3/C	35.2/D	63.6/E	61.4/E	72.0/E	96.2/F
2015 Build PM	218.9/F	412.5/F	-	37.2/D	157.6/F	164.9/F	225.0/F	30.8/C	35.9/D	63.6/E	64.6/E	75.3/E	126.2/F
2016 No Build PM	208.3/F	298.7/F	-	37.8/D	168.2/F	175.4/F	111.3/F	31.8/D	37.4/D	70.4/E	72.4/E	82.8/F	106.3/F
2016 Build PM	431.8/F	1056.9/F	-	40.5/D	207.3/F	213.0/F	697.5/F	33.8/C	40.4/D	70.4/E	110.6/F	121.1/F	329.4/F
2016 Build PM**	51.8/D	-	46.3/D	51.5/D	106.0/F	109.9/F	86.2/F	27.0/C	30.3/C	55.4/E	72.0/E	83.6/E	63.5/E
2017 No Build PM	227.8/F	322.2/F	-	38.9/D	185.7/F	192.7/F	124.1/F	33.7/C	40.1/D	78.3/E	85.4/F	95.3/F	117.7/F
2017 Build PM	559.1/F	1394.3/F	-	42.1/D	236.8/F	241.7/F	824.7/F	36.3/D	43.7/D	78.3/E	134.9/F	146.4/F	442.8/F
2017 Build PM*	58.9/E	-	45.4/D	54.0/D	129.5/F	133.1/F	84.5/F	32.8/C	36.6/C	65.6/E	137.3/F	148.9/F	89.0/F
2018 No Build PM	250.0/F	348.7/F	-	40.3/D	202.8/F	209.3/F	139.0/F	36.2/D	43.6/D	86.2/F	100.3/F	109.8/F	130.5/F
2018 Build PM	594.1/F	1454.9/F	-	44.0/D	258.9/F	263.2/F	893.2/F	39.6/D	48.1/D	86.2/F	154.3/F	166.9/F	472.5/F
2019 No Build PM	271.0/F	373.9/F	-	41.8/D	224.7/F	230.7/F	153.4/F	39.6/D	48.0/D	96.5/F	115.8/F	125.0/F	144.1/F
2019 Build PM	625.5/F	1516.9/F	-	46.1/D	283.3/F	287.2/F	955.5/F	44.3/D	53.8/D	96.5/D	173.2/F	187.3/F	501.8/F
2020 No Build PM	293.5/F	399.2/F	-	43.3/D	243.3/F	248.8/F	171.0/F	44.6/D	54.0/D	106.9/F	133.1/F	142.3/F	158.6/F
2020 Build PM	660.3/F	1576.0/F	-	48.1/D	306.8/F	310.0/F	1023.9/F	50.9/F	61.1/E	106.9/F	193.5/F	209.8/F	532.0/F

* Update signal timing

** Reconfigure intersection geometry and update signal operation

Bold text indicates LOS E or LOS F

Red highlight indicates movements that will require mitigation

Green highlight indicates mitigated movements

* The intersection of West Airport Boulevard and Murphy Road will operate at unacceptable levels during the Existing, No Build and Build Conditions. Several intersection movements will also operate at unacceptable levels with and without the proposed development in place.

The construction of the proposed development will reduce the level of operation of this intersection from a LOS E to a LOS F during the 2017 Build AM Condition. The level of operation of several movements will also be reduced from acceptable levels to unacceptable levels during several AM and PM Build Conditions. In order to mitigate these failing conditions, the reconstruction of eastbound West Airport Boulevard to consist of a left turn bay, two through lanes, and a right turn bay, as well as changing the operation of the traffic signal along the eastbound and westbound approaches from a split phase to a protected left turns will be required. The analysis for this intersection assumed that signal timings at this intersection will be updated as needed.

Improvements at the intersection of West Airport Boulevard and Murphy Road have been established as part of the FM 1092 Access Management Study dated December 2013. These improvements do not take this proposed development into account, and therefore should be updated as recommended in this TIA.

Murphy Road and Fountaingate Drive

The intersection of Murphy Road and Fountaingate Drive is located east of the proposed development site. This intersection is currently a one way stop controlled T-intersection with stop sign along the westbound approach of Fountaingate Drive. The northbound and southbound approaches of Murphy Road each consists of three through lanes and a two way left turn lane. The westbound approach of Fountaingate Drive consists of one shared left/through/right lane.

Table 40: Right and Left Turn Bay Requirements

Driveway/ Turn Bay	Right Turn Bays			Left Turn Bays	
	Storage length	Deceleration Length	Taper Length	Storage length	Taper Length
Driveway 1	100	N/A	100	100	100
Driveway 2	100	N/A	100	175	100
Driveway 3	100	N/A	100	175	100
Driveway 4	N/A	N/A	N/A	175	100
Driveway 5	N/A	N/A	N/A	175	100
Driveway 6*	30	345	100	N/A	N/A
Driveway 7	N/A	N/A	N/A	N/A	N/A
Driveway 8	100	N/A	100	100	100
Driveway 9*	30	345	100	N/A	N/A

*Requirements per TxDOT turn lanes criteria

Conclusion

This study examined the flow of traffic around the proposed TI Tract development in Stafford, Texas. This proposed development will consist of an outlet mall, restaurants, retail stores, apartments, hotels, an industrial park, office buildings, and a gas station. Construction of this development is expected to be completed in six phases. Phase 1 is expected to begin in 2015, while Phase 6 is expected to be completed in 2020. The objective of this study is to analyze the traffic impacts of each year of development on the performance of the surrounding street network and to determine mitigation measures to address any resulting deficiencies.

Planned roadway improvements within the study area include several access management improvements along Murphy Road. These improvements are presented in the FM 1092 Access Management Study dated December 2013. These improvements consist of:

1. Constructing a raised median along parts of Murphy Road with turn bays at major intersections and driveways to provide access to adjacent properties.
2. Installing crosswalks, pedestrian ramps, and pedestrian signal heads along all approaches at the intersection of Murphy Road and West Airport Boulevard.
3. Installing eastbound left and right lanes along eastbound West Airport Boulevard, and extending the westbound left turn bay along westbound West Airport Boulevard.
4. Removing the split phase traffic signal operation at the intersection of Murphy Road and West Airport Boulevard.
5. Restriping Cash Road and Greenbriar Drive as three lane roads with one lane in each direction, a two way left turn lane, and two 5 feet bicycle lanes. Improvements to the intersections of Murphy Road with Greenbriar Road and Cash Road also include updating the signal operations at these intersections to support the proposed lane geometry. These improvements also call for installing pedestrian crosswalks and signal heads along all approaches to these intersections.
6. Extending Cash Road in the west direction to intersect South Kirkwood Road.

As of the date of this study, these planned roadway improvements are unfunded and were not included as part of this study. However, these improvements were taken into consideration during the process of establishing mitigation measures to address deficiencies in the study area street network as a result of this proposed development.

In order to determine any impacts caused by the proposed development on the existing and proposed transportation network, this study examined the performance of key intersections within the study area. A 3.5 percent annualized growth rate was calculated and applied to the existing traffic volumes to determine the future No-Build Conditions. Traffic that will be generated by the proposed development was then added to the No Build Conditions to determine the Build Condition.

The intersection of West Airport Boulevard and Murphy Road will operate at unacceptable levels during the Existing, No Build and Build Conditions. Several intersection movements will also operate at unacceptable levels with and without the proposed development in place. The construction of the proposed development will reduce the level of operation of this intersection from a LOS E to a LOS F during the 2017 Build AM Condition. The level of operation of several movements will also be reduced from acceptable levels to unacceptable levels during several AM and PM Build Conditions. In order to mitigate these failing conditions, the reconstruction of eastbound West Airport Boulevard to consist of a left turn bay, two through lanes, and a right turn bay, as well as changing the operation of the traffic signal along the eastbound and westbound approaches from a split phase to a protected left turns will be required. The analysis for this intersection assumed that signal timings at this intersection will be updated as needed. Improvements at the intersection of West Airport Boulevard and Murphy Road have been established as part of the FM 1092 Access Management Study dated December 2013. These improvements do not take this proposed development into account, and therefore should be updated as recommended in this TIA.

The level of operation of the southbound left and westbound right movements at the intersection of Murphy Road and Fountaingate Drive will be reduced from acceptable levels to unacceptable levels during several Build Conditions; this is primarily due to the high volume of traffic along Murphy Road and the lack of sufficient gaps for conflicting traffic to complete their corresponding turning maneuver. This study investigated the installation of a traffic signal at this intersection, however, due to the close proximity of this intersection to other signalized intersections to the north and south, the installation of a traffic signal at this location was determined not feasible, and there are no other improvements which could be made to improve the LOS of these movements to the required mitigated levels.

The level of operation of the intersection of Murphy Road and Greenbriar Drive will be reduced from acceptable levels to unacceptable levels during several AM and PM Build Conditions. The level of operation of several movements will also be reduced from acceptable levels to unacceptable levels during several AM and PM Build Conditions. In order to mitigate these failing conditions, the reconstruction of the eastbound and westbound approaches of Greenbriar Drive at Murphy Road to consist of one left turn bay, one through lane, and one shared through/right turn lane along the eastbound direction, and one left turn lane, one through lane, and one right turn bay along the westbound direction will be required. This improvement will

also require the modification of the traffic signal operation along these approaches from split phase operation to protected left turns operation.

The construction of the proposed development will reduce the level of operation of the intersection of Murphy Road and Cash Road from acceptable levels to unacceptable levels during several AM and PM Build Conditions. The level of operation of several movements will also be reduced from acceptable levels to unacceptable levels during several AM and PM Build Conditions. In order to mitigate these failing conditions, the construction of a right turn bay along westbound Cash Road will be required in year 2016, and the construction of dual left turn bays along southbound Murphy Road will be required in 2017.

The construction of the proposed development will reduce the level of operation of the intersection of South Kirkwood Road and Greenbriar Drive to levels that will require mitigation during several AM Build Conditions. The westbound left and the southbound through movements will also be reduced to unacceptable levels during several PM Build Conditions. These failing conditions are primarily due to the high volume of traffic at this intersection. This study investigated the installation of a traffic signal at this intersection, however, due to the close proximity of this intersection to other signalized intersections to the north and south, the installation of a traffic signal at this location was determined not feasible, and there are no other improvements which could be made to improve the LOS of these movements to the required mitigated levels.

The construction of the proposed development will reduce the level of operation of the east and west intersections at US 59 Frontage Roads and West Airport Boulevard to levels that require mitigation during several AM and PM Build Conditions. The level of operation of several movements at both intersections will also require mitigation during several AM and PM Build Conditions. In order to feasibly mitigate these failing conditions, the construction of a westbound and a northbound channelized right turn bays will be required at the east intersection during the 2016 Build Conditions, the construction of a southbound channelized right turn bay will be required at the west intersection during the 2017 Build Conditions, and updating the signal timings during the 2016 through 2020 Build Conditions will be required at both intersections.

The operation of other signalized intersections within the study area will be reduced during several Build Conditions to levels that will require mitigation. In order to feasibly mitigate the operation of these signals, updating the signal timings will be required as discussed in the intersection Capacity Analysis section of this report.

Left and Right Turn Lane Warrant Analyses were performed to analyze the need for left and right turn bays at all driveways to the proposed development in accordance with the City of Stafford and the Texas Department of Transportation (TxDOT) Access Management Manual requirements. The results of the Left Turn Lane Warrant Analysis indicated that left turn bays will be required at Driveway 1, Driveway 3, Driveway 4, Driveway 5, and Driveway 8. Northbound left turns along Murphy Road into Driveway 6 and Driveway 7 will utilize the existing two way left turn lane. Driveway 9 and Driveway 10 will be located along US 59 Northbound Frontage Road and therefore, left turning movement is not possible at these

driveways. The results of the Right Turn Lane Warrant Analysis indicated that right turn bays will be required at all driveways to the proposed development except for Driveway, 4 Driveway 5, and Driveway 7.

Recommendations

In order to maintain acceptable operational conditions within the study street network, several roadway improvements will be required concurrently with the proposed development. The following is the list of recommendations corresponding to each year of development:

Year 2015:

1. Construct Driveways 1 through 8 each to consist of two exit lanes (One shared left/through and one right lanes) in order to prevent right turning vehicles from getting trapped behind left turning vehicles that will require more time to exit the development site.

Year 2016:

1. Construct dual left turn bays along northbound Murphy Road at its intersection with West Airport Boulevard. These left turn bays should have a full width of 645 feet and a 150 foot taper.
2. Construct eastbound left turn lane at the intersection of West Airport Boulevard and Murphy Road. This left turn lane should have a full width of 250 feet and a 100 foot taper. This improvement will be constructed by City of Stafford as part of the improvements recommended in the FM 1092 Access Management Study.
3. Reconstruct the eastbound approach of West Airport Boulevard at its intersection with Murphy Road to consist of one left turn bay (See recommendation #2 in Year 2016), two through lanes, and one channelized right turn bay. The channelized right turn bay should have a full width of 100 feet and a 100 foot taper.
4. Change the operation of the traffic signal at West Airport Boulevard and Murphy Road from split phase operation along the eastbound and westbound approaches to protected left turns operation. This improvement will require modification of the traffic signal at this intersection and will be constructed by City of Stafford as part of the improvements recommended in the FM 1092 Access Management Study.
5. Construct a right turn bay along westbound Cash Road at its intersection with Murphy Road. This right turn bay should have a full width of 100 feet and a 100 foot taper.
6. Reconstruct the existing right turn bay along the northbound approach of US 59 Northbound Frontage Road at its intersection with West Airport Boulevard to a channelized right turn bay.
7. Reconstruct the existing right turn bay along the westbound approach of West Airport Boulevard at its intersection with US 59 Northbound Frontage Road to a channelized right turn bay. This improvement may require right-of-way acquisition.

Year 2017:

1. Reconstruct the eastbound and westbound approaches of Greenbriar Drive at Murphy Road to consist of one left turn bay, one through lane, and one shared through/right turn lane along the eastbound direction, and one left turn lane, one through lane, and one right turn bay along the westbound direction. The eastbound left turn bay should have a full width of 300 feet and a 100 foot taper. The westbound right turn bay should have a full width of 100 feet and a 100 foot taper.
2. Change the operation of the traffic signal at Greenbriar Drive and Murphy Road from split phase operation along the eastbound and westbound approaches to protected left turns operation. This improvement will require modification of the traffic signal at this intersection and will be constructed by City of Stafford as part of the improvements recommended in the FM 1092 Access Management Study.
3. Construct dual left turn bays along southbound Murphy Road at its intersection with Cash Road. These left turn bays should have a full width of 545 feet and a 150 foot taper.
4. Reconstruct the existing right turn bay along US Highway 59 Southbound Frontage Road at its intersection with West Airport Boulevard to a channelized right turn bay, and change the lane configuration along US Highway 59 Southbound Frontage Road to one channelized right turn bay, two through lanes, one shared left/through lane, one left turn bay and one U-turn bay. This improvement may require right-of-way acquisition.

Year 2018: (Mitigation Not Required)

Year 2019: (Mitigation Not Required)

Year 2020: (Mitigation Not Required)

This study assumed that traffic signal timings at all signalized intersections within the study area will be updated as needed. Several roadway recommendations listed above may require right-of-way acquisitions along adjacent properties. These roadway improvements will require coordination between the developer, City of Stafford, TxDOT, and impacted business owners.

Several roadway improvements along Murphy Road within the study area were recommended as part of the FM 1092 Access Management Study dated December 2013. Refer to the Proposed Area Conditions Section of this report for a list of these roadway improvements. These recommendations include geometric and traffic signal improvements along the eastbound and westbound approaches of West Airport Boulevard, Greenbriar Drive, and Cash Road at Murphy Road. These proposed recommendations do not take into account the traffic generated by this proposed development, and therefore, should be updated as described in the list of recommendations above.

Several intersection movements will operate at unacceptable levels with and without the proposed development. Mitigation measures to address these deficiencies were not established in this study. This study provides mitigation measures to improve the operation of movements that will be reduced to unacceptable levels upon the construction of this proposed development.

Appendix A

Preliminary Site Plan

Appendix C

Trip Generation Calculations

		2015					
		AM Peak		PM Peak		Weekday	
		In	Out	In	Out	In	Out
1	Mid-Rise Apartments	34	76	77	56	971	971
2	Retail						
3	Restaurant						
4	Restaurant						
5	Restaurant						
6	Hotel						
7	Restaurant						
8	Restaurant						
9	Restaurant						
10	Retail						
11	Retail						
12	Retail						
13	Retail						
14	Retail						
15	Office						
16	Hotel						
17	Restaurant						
18	Restaurant						
19	Office						
20	Retail						
21	Restaurant						
22	Restaurant						
23	Outlet Mall						
24	Restaurant						
25	Mid-Rise Apartments						
26	Office						
27	Office						
28	Office						
29	Industrial Park	204	45	62	234	1,190	1,190
30	Gas Station						
31	Restaurant						
	Totals	238	121	139	290	2,161	2,161

		2016					
		AM Peak		PM Peak		Weekday	
		In	Out	In	Out	In	Out
1	Mid-Rise Apartments	72	161	161	116	1,880	1,880
2	Retail	0	0	15	19	126	126
3	Restaurant	36	29	35	24	381	381
4	Restaurant	36	29	35	24	381	381
5	Restaurant	30	24	30	20	318	318
6	Hotel	51	37	51	54	669	669
7	Restaurant	18	15	18	12	191	191
8	Restaurant	18	15	18	12	191	191
9	Restaurant	24	19	24	16	254	254
10	Retail	0	0	14	18	115	115
11	Retail	0	0	15	19	126	126
12	Retail	0	0	14	18	115	115
13	Retail	0	0	16	20	147	147
14	Retail	0	0	21	26	243	243
15	Office	61	8	19	91	249	249
16	Hotel	51	37	51	54	669	669
17	Restaurant	24	19	24	16	254	254
18	Restaurant	24	19	24	16	254	254
19	Office	134	18	28	135	527	527
20	Retail	0	0	24	30	308	308
21	Restaurant	21	17	21	14	223	223
22	Restaurant	21	17	21	14	223	223
23	Outlet Mall	152	56	220	248	4,121	4,121
24	Restaurant	30	24	30	20	318	318
25	Mid-Rise Apartments						
26	Office						
27	Office						
28	Office						
29	Industrial Park	353	77	118	444	2,041	2,041
30	Gas Station	145	139	170	163	1,834	1,834
31	Restaurant	18	15	18	12	191	191
	Totals	1,319	775	1,235	1,655	16,349	16,349

		2017					
		AM Peak		PM Peak		Weekday	
		In	Out	In	Out	In	Out
1	Mid-Rise Apartments	110	246	244	177	2,789	2,789
2	Retail	0	0	15	19	126	126
3	Restaurant	36	29	35	24	381	381
4	Restaurant	36	29	35	24	381	381
5	Restaurant	30	24	30	20	318	318
6	Hotel	51	37	51	54	669	669
7	Restaurant	18	15	18	12	191	191
8	Restaurant	18	15	18	12	191	191
9	Restaurant	24	19	24	16	254	254
10	Retail	0	0	14	18	115	115
11	Retail	0	0	15	19	126	126
12	Retail	0	0	14	18	115	115
13	Retail	0	0	16	20	147	147
14	Retail	0	0	21	26	243	243
15	Office	61	8	19	91	249	249
16	Hotel	51	37	51	54	669	669
17	Restaurant	24	19	24	16	254	254
18	Restaurant	24	19	24	16	254	254
19	Office	134	18	28	135	527	527
20	Retail	0	0	24	30	308	308
21	Restaurant	21	17	21	14	223	223
22	Restaurant	21	17	21	14	223	223
23	Outlet Mall	201	74	248	279	5,451	5,451
24	Restaurant	30	24	30	20	318	318
25	Mid-Rise Apartments	32	70	72	52	910	910
26	Office	195	27	36	177	754	754
27	Office	134	18	28	135	527	527
28	Office	134	18	28	135	527	527
29	Industrial Park	353	77	118	444	2,041	2,041
30	Gas Station	145	139	170	163	1,834	1,834
31	Restaurant	18	15	18	12	191	191
	Totals	1,901	1,011	1,510	2,246	21,306	21,306

		2018					
		AM Peak		PM Peak		Weekday	
		In	Out	In	Out	In	Out
1	Mid-Rise Apartments	148	330	328	237	3,698	3,698
2	Retail	0	0	15	19	126	126
3	Restaurant	36	29	35	24	381	381
4	Restaurant	36	29	35	24	381	381
5	Restaurant	30	24	30	20	318	318
6	Hotel	51	37	51	54	669	669
7	Restaurant	18	15	18	12	191	191
8	Restaurant	18	15	18	12	191	191
9	Restaurant	24	19	24	16	254	254
10	Retail	0	0	14	18	115	115
11	Retail	0	0	15	19	126	126
12	Retail	0	0	14	18	115	115
13	Retail	0	0	16	20	147	147
14	Retail	0	0	21	26	243	243
15	Office	61	8	19	91	249	249
16	Hotel	51	37	51	54	669	669
17	Restaurant	24	19	24	16	254	254
18	Restaurant	24	19	24	16	254	254
19	Office	134	18	28	135	527	527
20	Retail	0	0	24	30	308	308
21	Restaurant	21	17	21	14	223	223
22	Restaurant	21	17	21	14	223	223
23	Outlet Mall	201	74	248	279	5,451	5,451
24	Restaurant	30	24	30	20	318	318
25	Mid-Rise Apartments	32	70	72	52	910	910
26	Office	195	27	36	177	754	754
27	Office	134	18	28	135	527	527
28	Office	134	18	28	135	527	527
29	Industrial Park	353	77	118	444	2,041	2,041
30	Gas Station	145	139	170	163	1,834	1,834
31	Restaurant	18	15	18	12	191	191
	Totals	1,939	1,095	1,594	2,306	22,215	22,215

		2019					
		AM Peak		PM Peak		Weekday	
		In	Out	In	Out	In	Out
1	Mid-Rise Apartments	187	415	411	298	4,604	4,604
2	Retail	0	0	15	19	126	126
3	Restaurant	36	29	35	24	381	381
4	Restaurant	36	29	35	24	381	381
5	Restaurant	30	24	30	20	318	318
6	Hotel	51	37	51	54	669	669
7	Restaurant	18	15	18	12	191	191
8	Restaurant	18	15	18	12	191	191
9	Restaurant	24	19	24	16	254	254
10	Retail	0	0	14	18	115	115
11	Retail	0	0	15	19	126	126
12	Retail	0	0	14	18	115	115
13	Retail	0	0	16	20	147	147
14	Retail	0	0	21	26	243	243
15	Office	61	8	19	91	249	249
16	Hotel	51	37	51	54	669	669
17	Restaurant	24	19	24	16	254	254
18	Restaurant	24	19	24	16	254	254
19	Office	134	18	28	135	527	527
20	Retail	0	0	24	30	308	308
21	Restaurant	21	17	21	14	223	223
22	Restaurant	21	17	21	14	223	223
23	Outlet Mall	201	74	248	279	5,451	5,451
24	Restaurant	30	24	30	20	318	318
25	Mid-Rise Apartments	32	70	72	52	910	910
26	Office	195	27	36	177	754	754
27	Office	134	18	28	135	527	527
28	Office	134	18	28	135	527	527
29	Industrial Park	353	77	118	444	2,041	2,041
30	Gas Station	145	139	170	163	1,834	1,834
31	Restaurant	18	15	18	12	191	191
	Totals	1,978	1,180	1,677	2,367	23,121	23,121

Table 3: Proposed Development Generated Traffic Volumes

Development ID#	Development Type	Year 2020								
		AM Peak			PM Peak			Weekday		
		In	Out	Total	In	Out	Total	In	Out	Total
1	Mid-Rise Apartments	225	500	725	495	358	853	5,516	5,516	11,032
2	Retail	0	0	0	15	19	34	126	126	252
3	Restaurant	36	29	65	35	24	59	381	381	762
4	Restaurant	36	29	65	35	24	59	381	381	762
5	Restaurant	30	24	54	30	20	50	318	318	636
6	Hotel	51	37	88	51	54	105	669	669	1,338
7	Restaurant	18	15	33	18	12	30	191	191	382
8	Restaurant	18	15	33	18	12	30	191	191	382
9	Restaurant	24	19	43	24	16	40	254	254	508
10	Retail	0	0	0	14	18	32	115	115	230
11	Retail	0	0	0	15	19	34	126	126	252
12	Retail	0	0	0	14	18	32	115	115	230
13	Retail	0	0	0	16	20	36	147	147	294
14	Retail	0	0	0	21	26	47	243	243	486
15	Office	61	8	69	19	91	110	249	249	498
16	Hotel	51	37	88	51	54	105	669	669	1,338
17	Restaurant	24	19	43	24	16	40	254	254	508
18	Restaurant	24	19	43	24	16	40	254	254	508
19	Office	134	18	152	28	135	163	527	527	1,054
20	Retail	0	0	0	24	30	54	308	308	616
21	Restaurant	21	17	38	21	14	35	223	223	446
22	Restaurant	21	17	38	21	14	35	223	223	446
23	Outlet Mall	201	74	275	248	279	527	5,451	5,451	10,902
24	Restaurant	30	24	54	30	20	50	318	318	636
25	Mid-Rise Apartments	32	70	102	72	52	124	910*	910*	0
26	Office	195	27	222	36	177	213	754	754	1,508
27	Office	134	18	152	28	135	163	527	527	1,054
28	Office	134	18	152	28	135	163	527	527	1,054
29	Industrial Park	353	77	430	118	444	562	2,041	2,041	4,082
30	Gas Station	145	139	284	170	163	333	1,834	1,834	3,668
31	Restaurant	18	15	33	18	12	30	191	191	382
Totals		2,016	1,265	3,281	1,761	2,427	4,188	23,123	23,123	46,246

Appendix D

Intersection Capacity Analysis Reports

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Existing 2014
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	28	304	330	64	213	85	383	1570	58	68	864
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		24	263	245	164	232	89	459	2260	83	101	1244
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		155	1700	1583	1774	2500	963	1774	5034	186	1774	5033
Grp Volume(v), veh/h		360	0	359	70	162	162	416	1149	621	74	632
Grp Sat Flow(s),veh/h/ln		1855	0	1583	1774	1770	1693	1774	1695	1830	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	2.4	5.9	6.0	14.7	18.3	18.3	2.7	11.2
Cycle Q Clear(g_c), s		10.0	0.0	10.0	2.4	5.9	6.0	14.7	18.3	18.3	2.7	11.2
Prop In Lane		0.08		1.00	1.00		0.57	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		287	0	245	164	164	157	459	1522	822	101	838
V/C Ratio(X)		1.26	0.00	1.47	0.43	0.99	1.03	0.91	0.76	0.76	0.73	0.75
Avail Cap(c_a), veh/h		287	0	245	164	164	157	466	1522	822	137	838
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.4	0.0	27.4	27.7	29.3	29.4	23.2	14.9	14.9	30.1	22.6
Incr Delay (d2), s/veh		140.7	0.0	231.6	1.7	66.9	80.3	21.1	3.5	6.4	12.5	6.3
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		15.5	0.0	19.4	1.1	5.5	5.9	8.5	7.1	8.4	1.5	5.0
Lane Grp Delay (d), s/veh		168.0	0.0	259.0	29.5	96.3	109.7	44.4	18.4	21.3	42.5	28.8
Lane Grp LOS		F		F	C	F	F	D	B	C	D	C
Approach Vol, veh/h			719			394			2186			1048
Approach Delay, s/veh			213.4			89.9			24.2			31.4
Approach LOS			F			F			C			C
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		20.7	33.1		7.7	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		16.7	20.3		4.7	13.2
Green Ext Time (p_c), s			0.0			0.0		0.0	6.9		0.0	2.6
Intersection Summary												
HCM 2010 Ctrl Delay			63.2									
HCM 2010 LOS			E									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Existing 2014
AM Peak Period

Movement	SBR
Approach Configurations	
Volume (veh/h)	32
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	46
Arrive On Green	0.25
Sat Flow, veh/h	187
Grp Volume(v), veh/h	342
Grp Sat Flow(s),veh/h/ln	1830
Q Serve(g_s), s	11.2
Cycle Q Clear(g_c), s	11.2
Prop In Lane	0.10
Lane Grp Cap(c), veh/h	452
V/C Ratio(X)	0.76
Avail Cap(c_a), veh/h	452
HCM Platoon Ratio	0.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	22.6
Incr Delay (d2), s/veh	11.2
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	6.1
Lane Grp Delay (d), s/veh	33.8
Lane Grp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Existing 2014
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	372	397	133	376	132	269	1180	80	192	1355	119
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	28	320	297	244	355	123	288	1642	111	244	1488	130
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	148	1707	1583	1774	2582	893	1774	4865	330	1774	4762	417
Grp Volume(v), veh/h	439	0	432	145	279	273	292	894	476	209	1048	554
Grp Sat Flow(s),veh/h/ln	1855	0	1583	1774	1770	1705	1774	1695	1805	1774	1695	1789
Q Serve(g_s), s	15.0	0.0	15.0	6.1	11.0	11.0	13.0	19.0	19.0	9.2	24.6	24.6
Cycle Q Clear(g_c), s	15.0	0.0	15.0	6.1	11.0	11.0	13.0	19.0	19.0	9.2	24.6	24.6
Prop In Lane	0.08		1.00	1.00		0.52	1.00		0.18	1.00		0.23
Lane Grp Cap(c), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559
V/C Ratio(X)	1.26	0.00	1.46	0.59	1.15	1.16	1.01	0.78	0.78	0.86	0.99	0.99
Avail Cap(c_a), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	32.4	34.5	34.5	33.5	23.8	23.8	33.7	27.4	27.4
Incr Delay (d2), s/veh	139.0	0.0	222.7	3.9	102.9	110.5	56.3	5.3	9.6	24.7	25.3	35.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	20.0	0.0	24.0	2.9	11.6	11.7	10.0	8.2	9.4	5.6	13.3	15.7
Lane Grp Delay (d), s/veh	171.5	0.0	255.2	36.3	137.4	145.0	89.8	29.2	33.5	58.5	52.6	63.1
Lane Grp LOS	F		F	D	F	F	F	C	C	E	D	E
Approach Vol, veh/h		871			697			1662			1811	
Approach Delay, s/veh		213.0			119.4			41.1			56.5	
Approach LOS		F			F			D			E	
Timer												
Assigned Phs		4			8		5	2		1	6	
Phs Duration (G+Y+Rc), s		19.0			15.0		17.0	31.0		15.0	29.0	
Change Period (Y+Rc), s		4.0			4.0		4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s		15.0			11.0		13.0	27.0		11.0	25.0	
Max Q Clear Time (g_c+l1), s		17.0			13.0		15.0	21.0		11.2	26.6	
Green Ext Time (p_c), s		0.0			0.0		0.0	5.6		0.0	0.0	
Intersection Summary												
HCM 2010 Ctrl Delay				87.1								
HCM 2010 LOS				F								
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2015
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	29	315	342	66	220	88	396	1625	60	70	894
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		24	261	244	164	230	90	464	2267	83	102	1239
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		159	1696	1583	1774	2489	972	1774	5035	185	1774	5034
Grp Volume(v), veh/h		374	0	372	72	168	167	430	1189	642	76	654
Grp Sat Flow(s),veh/h/ln		1855	0	1583	1774	1770	1691	1774	1695	1830	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	2.5	6.0	6.0	15.4	19.3	19.3	2.7	11.7
Cycle Q Clear(g_c), s		10.0	0.0	10.0	2.5	6.0	6.0	15.4	19.3	19.3	2.7	11.7
Prop In Lane		0.09		1.00	1.00		0.57	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		285	0	244	164	163	156	464	1527	824	102	835
V/C Ratio(X)		1.31	0.00	1.53	0.44	1.03	1.07	0.93	0.78	0.78	0.75	0.78
Avail Cap(c_a), veh/h		285	0	244	164	163	156	464	1527	824	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	27.9	29.5	29.5	23.4	15.1	15.1	30.2	22.9
Incr Delay (d2), s/veh		162.7	0.0	257.0	1.8	78.0	92.0	24.8	4.0	7.2	14.1	7.3
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		17.2	0.0	21.0	1.1	6.0	6.4	9.3	7.6	9.0	1.6	5.3
Lane Grp Delay (d), s/veh		190.2	0.0	284.5	29.8	107.5	121.5	48.2	19.1	22.3	44.3	30.2
Lane Grp LOS		F		F	C	F	F	D	B	C	D	C
Approach Vol, veh/h			746			407			2261			1084
Approach Delay, s/veh			237.2			99.5			25.6			33.0
Approach LOS			F			F			C			C
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	33.3		7.7	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		17.4	21.3		4.7	13.7
Green Ext Time (p_c), s			0.0			0.0		0.0	6.1		0.0	2.1
Intersection Summary												
HCM 2010 Ctrl Delay			69.1									
HCM 2010 LOS			E									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2015
AM Peak Period

Movement	SBR
Left	
Volume (veh/h)	33
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	46
Arrive On Green	0.25
Sat Flow, veh/h	186
Grp Volume(v), veh/h	354
Grp Sat Flow(s),veh/h/ln	1830
Q Serve(g_s), s	11.7
Cycle Q Clear(g_c), s	11.7
Prop In Lane	0.10
Lane Grp Cap(c), veh/h	450
V/C Ratio(X)	0.79
Avail Cap(c_a), veh/h	450
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	22.9
Incr Delay (d2), s/veh	12.9
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	6.4
Lane Grp Delay (d), s/veh	35.8
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2015
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	33	385	411	138	389	137	278	1221	83	199	1402	123
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	28	320	297	244	354	124	288	1642	111	244	1488	131
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	147	1708	1583	1774	2576	898	1774	4865	330	1774	4761	418
Grp Volume(v), veh/h	454	0	447	150	289	283	302	925	492	216	1085	573
Grp Sat Flow(s),veh/h/ln	1855	0	1583	1774	1770	1704	1774	1695	1805	1774	1695	1789
Q Serve(g_s), s	15.0	0.0	15.0	6.4	11.0	11.0	13.0	19.9	19.9	9.6	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	6.4	11.0	11.0	13.0	19.9	19.9	9.6	25.0	25.0
Prop In Lane	0.08		1.00	1.00		0.53	1.00		0.18	1.00		0.23
Lane Grp Cap(c), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559
V/C Ratio(X)	1.31	0.00	1.51	0.61	1.19	1.21	1.05	0.81	0.81	0.89	1.02	1.02
Avail Cap(c_a), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	32.5	34.5	34.5	33.5	24.1	24.1	33.9	27.5	27.5
Incr Delay (d2), s/veh	156.7	0.0	244.4	4.5	118.5	126.0	66.0	6.2	11.0	29.7	33.9	44.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	21.7	0.0	25.8	3.0	12.7	12.7	10.8	8.7	10.1	6.1	14.7	17.2
Lane Grp Delay (d), s/veh	189.2	0.0	276.9	37.1	153.0	160.5	99.5	30.3	35.2	63.6	61.4	72.0
Lane Grp LOS	F		F	D	F	F	F	C	D	E	F	F
Approach Vol, veh/h		901			722			1719			1874	
Approach Delay, s/veh		232.7			131.8			43.9			64.9	
Approach LOS		F			F			D			E	
Timer												
Assigned Phs		4			8		5	2		1	6	
Phs Duration (G+Y+Rc), s		19.0			15.0		17.0	31.0		15.0	29.0	
Change Period (Y+Rc), s		4.0			4.0		4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s		15.0			11.0		13.0	27.0		11.0	25.0	
Max Q Clear Time (g_c+l1), s		17.0			13.0		15.0	21.9		11.6	27.0	
Green Ext Time (p_c), s		0.0			0.0		0.0	4.9		0.0	0.0	
Intersection Summary												
HCM 2010 Ctrl Delay			96.2									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2016
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	30	326	354	69	228	91	410	1682	62	73	926
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		24	261	244	164	230	89	464	2262	83	104	1240
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		158	1697	1583	1774	2493	968	1774	5036	184	1774	5035
Grp Volume(v), veh/h		387	0	385	75	174	173	446	1230	665	79	678
Grp Sat Flow(s),veh/h/ln		1855	0	1583	1774	1770	1692	1774	1695	1830	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	2.6	6.0	6.0	16.1	20.4	20.4	2.9	12.2
Cycle Q Clear(g_c), s		10.0	0.0	10.0	2.6	6.0	6.0	16.1	20.4	20.4	2.9	12.2
Prop In Lane		0.09		1.00	1.00		0.57	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		285	0	244	164	163	156	464	1523	822	104	835
V/C Ratio(X)		1.36	0.00	1.58	0.46	1.07	1.11	0.96	0.81	0.81	0.76	0.81
Avail Cap(c_a), veh/h		285	0	244	164	163	156	464	1523	822	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.0	29.5	29.5	23.7	15.5	15.5	30.2	23.1
Incr Delay (d2), s/veh		181.5	0.0	280.0	2.0	88.9	103.7	31.9	4.7	8.4	16.4	8.5
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		18.7	0.0	22.6	1.2	6.5	6.9	10.6	8.2	9.7	1.7	5.6
Lane Grp Delay (d), s/veh		209.0	0.0	307.5	29.9	118.4	133.2	55.6	20.2	23.9	46.5	31.6
Lane Grp LOS		F		F	C	F	F	E	C	C	D	C
Approach Vol, veh/h			772			422			2341			1123
Approach Delay, s/veh			258.1			108.8			28.0			34.7
Approach LOS			F			F			C			C
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	33.2		7.8	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		18.1	22.4		4.9	14.3
Green Ext Time (p_c), s			0.0			0.0		0.0	5.2		0.0	1.7
Intersection Summary												
HCM 2010 Ctrl Delay			75.1									
HCM 2010 LOS			E									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2016
AM Peak Period

Movement	SBR
Left Lane Configurations	
Volume (veh/h)	34
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	45
Arrive On Green	0.25
Sat Flow, veh/h	185
Grp Volume(v), veh/h	366
Grp Sat Flow(s),veh/h/ln	1830
Q Serve(g_s), s	12.3
Cycle Q Clear(g_c), s	12.3
Prop In Lane	0.10
Lane Grp Cap(c), veh/h	450
V/C Ratio(X)	0.81
Avail Cap(c_a), veh/h	450
HCM Platoon Ratio	0.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	23.1
Incr Delay (d2), s/veh	14.8
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	6.9
Lane Grp Delay (d), s/veh	37.9
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2016
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	34	398	425	142	403	141	288	1264	86	206	1452	127
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	27	321	297	244	355	123	288	1642	111	244	1489	130
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	146	1709	1583	1774	2581	894	1774	4866	329	1774	4763	416
Grp Volume(v), veh/h	470	0	462	154	299	292	313	957	510	224	1123	593
Grp Sat Flow(s),veh/h/ln	1855	0	1583	1774	1770	1705	1774	1695	1805	1774	1695	1789
Q Serve(g_s), s	15.0	0.0	15.0	6.6	11.0	11.0	13.0	20.9	20.9	10.0	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	6.6	11.0	11.0	13.0	20.9	20.9	10.0	25.0	25.0
Prop In Lane	0.08		1.00	1.00		0.52	1.00		0.18	1.00		0.23
Lane Grp Cap(c), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559
V/C Ratio(X)	1.35	0.00	1.56	0.63	1.23	1.25	1.09	0.84	0.84	0.92	1.06	1.06
Avail Cap(c_a), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	32.6	34.5	34.5	33.5	24.5	24.5	34.1	27.5	27.5
Incr Delay (d2), s/veh	175.8	0.0	266.2	5.2	133.7	140.9	77.8	7.3	12.9	36.4	44.9	55.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	23.6	0.0	27.6	3.1	13.7	13.7	11.8	9.3	10.8	6.7	16.3	18.8
Lane Grp Delay (d), s/veh	208.3	0.0	298.7	37.8	168.2	175.4	111.3	31.8	37.4	70.4	72.4	82.8
Lane Grp LOS	F		F	D	F	F	F	C	D	E	F	F
Approach Vol, veh/h		932			745			1780			1940	
Approach Delay, s/veh		253.1			144.0			47.4			75.4	
Approach LOS		F			F			D			E	
Timer												
Assigned Phs		4			8		5	2		1	6	
Phs Duration (G+Y+Rc), s		19.0			15.0		17.0	31.0		15.0	29.0	
Change Period (Y+Rc), s		4.0			4.0		4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s		15.0			11.0		13.0	27.0		11.0	25.0	
Max Q Clear Time (g_c+I1), s		17.0			13.0		15.0	22.9		12.0	27.0	
Green Ext Time (p_c), s		0.0			0.0		0.0	4.0		0.0	0.0	
Intersection Summary												
HCM 2010 Ctrl Delay			106.3									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2017
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	31	337	366	71	236	94	425	1741	64	75	958
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		24	261	244	164	230	89	464	2257	83	105	1240
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		158	1697	1583	1774	2497	965	1774	5034	186	1774	5037
Grp Volume(v), veh/h		400	0	398	77	180	179	462	1273	689	82	700
Grp Sat Flow(s),veh/h/ln		1855	0	1583	1774	1770	1692	1774	1695	1830	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	2.7	6.0	6.0	16.9	21.6	21.6	3.0	12.8
Cycle Q Clear(g_c), s		10.0	0.0	10.0	2.7	6.0	6.0	16.9	21.6	21.6	3.0	12.8
Prop In Lane		0.09		1.00	1.00		0.57	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		285	0	244	164	163	156	464	1520	820	105	835
V/C Ratio(X)		1.40	0.00	1.63	0.47	1.10	1.14	1.00	0.84	0.84	0.78	0.84
Avail Cap(c_a), veh/h		285	0	244	164	163	156	464	1520	820	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.0	29.5	29.5	24.0	15.8	15.9	30.1	23.3
Incr Delay (d2), s/veh		200.6	0.0	303.2	2.1	100.7	116.2	40.6	5.7	10.1	18.8	9.9
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		20.2	0.0	24.2	1.2	7.1	7.4	11.9	8.8	10.5	1.8	6.0
Lane Grp Delay (d), s/veh		228.1	0.0	330.7	30.1	130.2	145.7	64.6	21.5	25.9	49.0	33.2
Lane Grp LOS		F		F	C	F	F	E	C	C	D	C
Approach Vol, veh/h			798			436			2424			1161
Approach Delay, s/veh			279.3			118.9			31.0			36.6
Approach LOS			F			F			C			D
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	33.1		7.9	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		18.9	23.6		5.0	14.8
Green Ext Time (p_c), s			0.0			0.0		0.0	4.1		0.0	1.2
Intersection Summary												
HCM 2010 Ctrl Delay			81.4									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2017
AM Peak Period

Movement	SBR
Approach Configurations	
Volume (veh/h)	35
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	45
Arrive On Green	0.25
Sat Flow, veh/h	184
Grp Volume(v), veh/h	379
Grp Sat Flow(s),veh/h/ln	1830
Q Serve(g_s), s	12.8
Cycle Q Clear(g_c), s	12.8
Prop In Lane	0.10
Lane Grp Cap(c), veh/h	451
V/C Ratio(X)	0.84
Avail Cap(c_a), veh/h	451
HCM Platoon Ratio	0.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	23.3
Incr Delay (d2), s/veh	17.0
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	7.4
Lane Grp Delay (d), s/veh	40.3
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2017
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	412	440	147	417	146	298	1308	89	213	1502	132
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	27	321	297	244	354	123	288	1641	112	244	1488	130
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	145	1710	1583	1774	2577	897	1774	4863	332	1774	4763	417
Grp Volume(v), veh/h	486	0	478	160	310	302	324	991	528	232	1162	614
Grp Sat Flow(s),veh/h/ln	1855	0	1583	1774	1770	1704	1774	1695	1804	1774	1695	1789
Q Serve(g_s), s	15.0	0.0	15.0	6.8	11.0	11.0	13.0	21.9	21.9	10.4	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	6.8	11.0	11.0	13.0	21.9	21.9	10.4	25.0	25.0
Prop In Lane	0.08		1.00	1.00		0.53	1.00		0.18	1.00		0.23
Lane Grp Cap(c), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559
V/C Ratio(X)	1.40	0.00	1.61	0.66	1.27	1.29	1.12	0.87	0.87	0.95	1.10	1.10
Avail Cap(c_a), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	32.7	34.5	34.5	33.5	24.8	24.8	34.2	27.5	27.5
Incr Delay (d2), s/veh	195.3	0.0	289.7	6.2	151.2	158.2	90.6	8.9	15.3	44.1	57.9	67.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	25.4	0.0	29.5	3.3	14.9	14.8	12.8	9.9	11.7	7.4	18.2	20.8
Lane Grp Delay (d), s/veh	227.8	0.0	322.2	38.9	185.7	192.7	124.1	33.7	40.1	78.3	85.4	95.3
Lane Grp LOS	F		F	D	F	F	F	C	D	E	F	F
Approach Vol, veh/h		964			772			1843			2008	
Approach Delay, s/veh		274.6			158.0			51.4			87.6	
Approach LOS		F			F			D			F	
Timer												
Assigned Phs		4			8		5	2		1	6	
Phs Duration (G+Y+Rc), s		19.0			15.0		17.0	31.0		15.0	29.0	
Change Period (Y+Rc), s		4.0			4.0		4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s		15.0			11.0		13.0	27.0		11.0	25.0	
Max Q Clear Time (g_c+I1), s		17.0			13.0		15.0	23.9		12.4	27.0	
Green Ext Time (p_c), s		0.0			0.0		0.0	3.0		0.0	0.0	
Intersection Summary												
HCM 2010 Ctrl Delay			117.7									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2018
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	32	349	379	73	244	98	440	1802	67	78	991
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		24	261	244	164	229	90	464	2247	84	109	1239
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		157	1698	1583	1774	2483	977	1774	5033	187	1774	5033
Grp Volume(v), veh/h		414	0	412	79	187	185	478	1318	714	85	725
Grp Sat Flow(s),veh/h/ln		1855	0	1583	1774	1770	1690	1774	1695	1830	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	2.7	6.0	6.0	17.0	22.9	23.0	3.1	13.3
Cycle Q Clear(g_c), s		10.0	0.0	10.0	2.7	6.0	6.0	17.0	22.9	23.0	3.1	13.3
Prop In Lane		0.08		1.00	1.00		0.58	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		285	0	244	164	163	156	464	1514	817	109	835
V/C Ratio(X)		1.45	0.00	1.69	0.48	1.14	1.19	1.03	0.87	0.87	0.78	0.87
Avail Cap(c_a), veh/h		285	0	244	164	163	156	464	1514	817	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.0	29.5	29.5	24.0	16.3	16.3	30.1	23.5
Incr Delay (d2), s/veh		221.4	0.0	328.2	2.2	114.5	130.9	49.7	7.2	12.5	20.2	11.9
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		21.8	0.0	25.9	1.2	7.7	8.1	13.1	9.6	11.6	1.9	6.4
Lane Grp Delay (d), s/veh		248.9	0.0	355.7	30.2	144.0	160.4	73.7	23.4	28.8	50.3	35.4
Lane Grp LOS		F		F	C	F	F	F	C	C	D	D
Approach Vol, veh/h			826			451			2510			1202
Approach Delay, s/veh			302.2			130.8			34.5			39.1
Approach LOS			F			F			C			D
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	33.0		8.0	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	25.0		5.1	15.4
Green Ext Time (p_c), s			0.0			0.0		0.0	2.9		0.0	0.6
Intersection Summary												
HCM 2010 Ctrl Delay			88.7									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2018
AM Peak Period

Movement	SBR
Left	
Volume (veh/h)	37
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	46
Arrive On Green	0.25
Sat Flow, veh/h	187
Grp Volume(v), veh/h	392
Grp Sat Flow(s),veh/h/ln	1830
Q Serve(g_s), s	13.4
Cycle Q Clear(g_c), s	13.4
Prop In Lane	0.10
Lane Grp Cap(c), veh/h	450
V/C Ratio(X)	0.87
Avail Cap(c_a), veh/h	450
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	23.5
Incr Delay (d2), s/veh	19.9
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	7.9
Lane Grp Delay (d), s/veh	43.4
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2018
PM Peak Period

															
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Volume (veh/h)	37	427	456	153	431	151	309	1354	92	220	1555	137			
Number	7	4	14	3	8	18	5	2	12	1	6	16			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3			
Lanes	0	2	0	1	2	0	1	3	0	1	3	0			
Cap, veh/h	28	320	297	244	354	123	288	1642	112	244	1488	131			
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31			
Sat Flow, veh/h	147	1708	1583	1774	2577	897	1774	4864	330	1774	4760	419			
Grp Volume(v), veh/h	504	0	496	166	320	312	336	1026	546	239	1203	636			
Grp Sat Flow(s),veh/h/ln	1855	0	1583	1774	1770	1705	1774	1695	1804	1774	1695	1789			
Q Serve(g_s), s	15.0	0.0	15.0	7.1	11.0	11.0	13.0	23.0	23.0	10.7	25.0	25.0			
Cycle Q Clear(g_c), s	15.0	0.0	15.0	7.1	11.0	11.0	13.0	23.0	23.0	10.7	25.0	25.0			
Prop In Lane	0.08		1.00	1.00		0.53	1.00		0.18	1.00		0.23			
Lane Grp Cap(c), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559			
V/C Ratio(X)	1.45	0.00	1.67	0.68	1.32	1.33	1.17	0.90	0.90	0.98	1.14	1.14			
Avail Cap(c_a), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559			
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Uniform Delay (d), s/veh	32.5	0.0	32.5	32.8	34.5	34.5	33.5	25.2	25.2	34.4	27.5	27.5			
Incr Delay (d2), s/veh	217.5	0.0	316.2	7.5	168.3	174.8	105.5	11.0	18.4	51.8	72.8	82.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile Back of Q (50%), veh/ln	27.6	0.0	31.7	3.5	16.0	15.9	14.0	10.7	12.7	8.1	20.4	23.0			
Lane Grp Delay (d), s/veh	250.0	0.0	348.7	40.3	202.8	209.3	139.0	36.2	43.6	86.2	100.3	109.8			
Lane Grp LOS	F		F	D	F	F	F	D	D	F	F	F			
Approach Vol, veh/h	1000			798				1908			2078				
Approach Delay, s/veh	299.0			171.6				56.4			101.6				
Approach LOS	F			F				E			F				
Timer															
Assigned Phs	4			8				5		2		1		6	
Phs Duration (G+Y+Rc), s	19.0			15.0				17.0		31.0		15.0		29.0	
Change Period (Y+Rc), s	4.0			4.0				4.0		4.0		4.0		4.0	
Max Green Setting (Gmax), s	15.0			11.0				13.0		27.0		11.0		25.0	
Max Q Clear Time (g_c+I1), s	17.0			13.0				15.0		25.0		12.7		27.0	
Green Ext Time (p_c), s	0.0			0.0				0.0		2.0		0.0		0.0	
Intersection Summary															
HCM 2010 Ctrl Delay			130.5												
HCM 2010 LOS			F												
Notes															

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2019
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	33	361	392	76	253	101	455	1865	69	81	1026
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		24	261	244	164	230	90	464	2237	83	112	1239
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.44	0.44	0.06	0.25
Sat Flow, veh/h		156	1699	1583	1774	2489	972	1774	5034	186	1774	5035
Grp Volume(v), veh/h		428	0	426	83	194	191	495	1363	739	88	751
Grp Sat Flow(s),veh/h/ln		1855	0	1583	1774	1770	1691	1774	1695	1830	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	2.9	6.0	6.0	17.0	24.3	24.4	3.2	13.9
Cycle Q Clear(g_c), s		10.0	0.0	10.0	2.9	6.0	6.0	17.0	24.3	24.4	3.2	13.9
Prop In Lane		0.08		1.00	1.00		0.57	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		285	0	244	164	163	156	464	1506	813	112	835
V/C Ratio(X)		1.50	0.00	1.75	0.51	1.18	1.23	1.07	0.91	0.91	0.78	0.90
Avail Cap(c_a), veh/h		285	0	244	164	163	156	464	1506	813	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.1	29.5	29.5	24.0	16.8	16.8	30.0	23.7
Incr Delay (d2), s/veh		242.5	0.0	353.4	2.5	128.9	145.5	60.7	9.4	15.8	21.0	14.6
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		23.5	0.0	27.6	1.3	8.3	8.7	14.5	10.7	13.0	2.0	7.0
Lane Grp Delay (d), s/veh		270.0	0.0	380.9	30.6	158.4	175.0	84.7	26.1	32.7	51.0	38.3
Lane Grp LOS		F		F	C	F	F	F	C	C	D	D
Approach Vol, veh/h			854			468			2597			1244
Approach Delay, s/veh			325.3			142.5			39.2			42.1
Approach LOS			F			F			D			D
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	32.9		8.1	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	26.4		5.2	15.9
Green Ext Time (p_c), s			0.0			0.0		0.0	1.5		0.0	0.1
Intersection Summary												
HCM 2010 Ctrl Delay			96.6									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2019
AM Peak Period

Movement	SBR
Left Lane Configurations	
Volume (veh/h)	38
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	46
Arrive On Green	0.25
Sat Flow, veh/h	185
Grp Volume(v), veh/h	405
Grp Sat Flow(s),veh/h/ln	1830
Q Serve(g_s), s	13.9
Cycle Q Clear(g_c), s	13.9
Prop In Lane	0.10
Lane Grp Cap(c), veh/h	450
V/C Ratio(X)	0.90
Avail Cap(c_a), veh/h	450
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	23.7
Incr Delay (d2), s/veh	23.6
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	8.7
Lane Grp Delay (d), s/veh	47.3
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2019
PM Peak Period

															
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Volume (veh/h)	38	442	472	158	447	157	319	1401	95	228	1609	141			
Number	7	4	14	3	8	18	5	2	12	1	6	16			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3			
Lanes	0	2	0	1	2	0	1	3	0	1	3	0			
Cap, veh/h	27	321	297	244	354	124	288	1642	111	244	1489	130			
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31			
Sat Flow, veh/h	146	1709	1583	1774	2574	900	1774	4866	329	1774	4764	416			
Grp Volume(v), veh/h	521	0	513	172	333	324	347	1061	565	248	1243	659			
Grp Sat Flow(s),veh/h/ln	1855	0	1583	1774	1770	1704	1774	1695	1805	1774	1695	1789			
Q Serve(g_s), s	15.0	0.0	15.0	7.4	11.0	11.0	13.0	24.1	24.2	11.0	25.0	25.0			
Cycle Q Clear(g_c), s	15.0	0.0	15.0	7.4	11.0	11.0	13.0	24.1	24.2	11.0	25.0	25.0			
Prop In Lane	0.08		1.00	1.00		0.53	1.00		0.18	1.00		0.23			
Lane Grp Cap(c), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559			
V/C Ratio(X)	1.50	0.00	1.73	0.71	1.37	1.38	1.20	0.93	0.93	1.02	1.17	1.18			
Avail Cap(c_a), veh/h	348	0	297	244	243	234	288	1144	609	244	1059	559			
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Uniform Delay (d), s/veh	32.5	0.0	32.5	33.0	34.5	34.5	33.5	25.6	25.6	34.5	27.5	27.5			
Incr Delay (d2), s/veh	238.5	0.0	341.4	8.9	190.2	196.2	119.9	14.0	22.4	62.0	88.3	97.5			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile Back of Q (50%), veh/ln	29.6	0.0	33.8	3.8	17.5	17.3	15.1	11.7	13.8	8.9	22.7	25.4			
Lane Grp Delay (d), s/veh	271.0	0.0	373.9	41.8	224.7	230.7	153.4	39.6	48.0	96.5	115.8	125.0			
Lane Grp LOS	F		F	D	F	F	F	D	D	F	F	F			
Approach Vol, veh/h	1034			829				1973			2150				
Approach Delay, s/veh	322.1			189.1				62.0			116.4				
Approach LOS	F			F				E			F				
Timer															
Assigned Phs	4			8				5		2		1		6	
Phs Duration (G+Y+Rc), s	19.0			15.0				17.0		31.0		15.0		29.0	
Change Period (Y+Rc), s	4.0			4.0				4.0		4.0		4.0		4.0	
Max Green Setting (Gmax), s	15.0			11.0				13.0		27.0		11.0		25.0	
Max Q Clear Time (g_c+l1), s	17.0			13.0				15.0		26.2		13.0		27.0	
Green Ext Time (p_c), s	0.0			0.0				0.0		0.8		0.0		0.0	
Intersection Summary															
HCM 2010 Ctrl Delay			144.1												
HCM 2010 LOS			F												
Notes															

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2020
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	34	374	406	79	262	104	471	1930	71	84	1062
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		24	262	244	164	230	89	464	2227	81	116	1240
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.44	0.44	0.07	0.25
Sat Flow, veh/h		155	1700	1583	1774	2495	967	1774	5036	184	1774	5037
Grp Volume(v), veh/h		444	0	441	86	200	198	512	1410	765	91	777
Grp Sat Flow(s),veh/h/ln		1855	0	1583	1774	1770	1692	1774	1695	1830	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	3.0	6.0	6.0	17.0	25.8	26.0	3.3	14.6
Cycle Q Clear(g_c), s		10.0	0.0	10.0	3.0	6.0	6.0	17.0	25.8	26.0	3.3	14.6
Prop In Lane		0.08		1.00	1.00		0.57	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		285	0	244	164	163	156	464	1499	809	116	835
V/C Ratio(X)		1.56	0.00	1.81	0.53	1.23	1.27	1.10	0.94	0.94	0.78	0.93
Avail Cap(c_a), veh/h		285	0	244	164	163	156	464	1499	809	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.1	29.5	29.5	24.0	17.3	17.4	29.9	24.0
Incr Delay (d2), s/veh		266.7	0.0	380.5	3.1	143.8	160.7	73.0	12.9	20.8	21.7	18.2
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		25.4	0.0	29.4	1.4	9.0	9.4	16.1	11.9	14.9	2.1	7.6
Lane Grp Delay (d), s/veh		294.2	0.0	408.0	31.2	173.3	190.2	97.0	30.2	38.1	51.6	42.2
Lane Grp LOS		F		F	C	F	F	F	C	D	D	D
Approach Vol, veh/h			885			484			2687			1287
Approach Delay, s/veh			350.9			155.0			45.2			46.1
Approach LOS			F			F			D			D
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	32.7		8.3	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	28.0		5.3	16.6
Green Ext Time (p_c), s			0.0			0.0		0.0	0.0		0.0	0.0
Intersection Summary												
HCM 2010 Ctrl Delay			106.0									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

No Build 2020
AM Peak Period

Movement	SBR
Left	
Volume (veh/h)	39
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	45
Arrive On Green	0.25
Sat Flow, veh/h	183
Grp Volume(v), veh/h	419
Grp Sat Flow(s),veh/h/ln	1830
Q Serve(g_s), s	14.6
Cycle Q Clear(g_c), s	14.6
Prop In Lane	0.10
Lane Grp Cap(c), veh/h	451
V/C Ratio(X)	0.93
Avail Cap(c_a), veh/h	451
HCM Platoon Ratio	0.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	24.0
Incr Delay (d2), s/veh	28.2
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	9.5
Lane Grp Delay (d), s/veh	52.2
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2015
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	42	319	420	68	224	88	466	1628	61	70	901
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		33	252	244	164	231	89	464	2266	84	102	1225
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		217	1635	1583	1774	2502	961	1774	5032	187	1774	4978
Grp Volume(v), veh/h		393	0	457	74	170	169	507	1192	644	76	666
Grp Sat Flow(s),veh/h/ln		1852	0	1583	1774	1770	1693	1774	1695	1830	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	2.6	6.0	6.0	17.0	19.4	19.4	2.7	12.0
Cycle Q Clear(g_c), s		10.0	0.0	10.0	2.6	6.0	6.0	17.0	19.4	19.4	2.7	12.0
Prop In Lane		0.12		1.00	1.00		0.57	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		285	0	244	164	163	156	464	1527	824	102	835
V/C Ratio(X)		1.38	0.00	1.88	0.45	1.04	1.08	1.09	0.78	0.78	0.75	0.80
Avail Cap(c_a), veh/h		285	0	244	164	163	156	464	1527	824	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	27.9	29.5	29.5	24.0	15.1	15.2	30.2	23.0
Incr Delay (d2), s/veh		191.2	0.0	409.5	1.9	81.4	95.6	69.3	4.0	7.3	14.1	7.9
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		19.4	0.0	31.4	1.2	6.2	6.5	15.6	7.6	9.0	1.6	5.4
Lane Grp Delay (d), s/veh		218.7	0.0	437.0	29.9	110.9	125.1	93.3	19.2	22.4	44.3	30.8
Lane Grp LOS		F		F	C	F	F	F	B	C	D	C
Approach Vol, veh/h			850			413			2343			1101
Approach Delay, s/veh			336.1			102.2			36.1			33.7
Approach LOS			F			F			D			C
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	33.3		7.7	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	21.4		4.7	14.0
Green Ext Time (p_c), s			0.0			0.0		0.0	6.1		0.0	1.9
Intersection Summary												
HCM 2010 Ctrl Delay			95.5									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2015
AM Peak Period

Movement	SBR
Approach Configurations	
Volume (veh/h)	42
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	57
Arrive On Green	0.25
Sat Flow, veh/h	234
Grp Volume(v), veh/h	359
Grp Sat Flow(s),veh/h/ln	1822
Q Serve(g_s), s	12.0
Cycle Q Clear(g_c), s	12.0
Prop In Lane	0.13
Lane Grp Cap(c), veh/h	448
V/C Ratio(X)	0.80
Avail Cap(c_a), veh/h	448
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	23.0
Incr Delay (d2), s/veh	13.9
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	6.6
Lane Grp Delay (d), s/veh	36.9
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2015
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	48	392	496	139	395	137	366	1231	87	199	1406	134
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	38	310	297	244	356	122	288	1636	116	244	1476	141
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	202	1651	1583	1774	2586	890	1774	4848	344	1774	4722	451
Grp Volume(v), veh/h	478	0	539	151	292	286	398	936	497	216	1097	577
Grp Sat Flow(s),veh/h/ln	1853	0	1583	1774	1770	1706	1774	1695	1802	1774	1695	1783
Q Serve(g_s), s	15.0	0.0	15.0	6.4	11.0	11.0	13.0	20.2	20.2	9.6	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	6.4	11.0	11.0	13.0	20.2	20.2	9.6	25.0	25.0
Prop In Lane	0.11		1.00	1.00		0.52	1.00		0.19	1.00		0.25
Lane Grp Cap(c), veh/h	347	0	297	244	243	235	288	1144	608	244	1059	557
V/C Ratio(X)	1.38	0.00	1.82	0.62	1.20	1.22	1.38	0.82	0.82	0.89	1.04	1.04
Avail Cap(c_a), veh/h	347	0	297	244	243	235	288	1144	608	244	1059	557
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	32.5	34.5	34.5	33.5	24.2	24.2	33.9	27.5	27.5
Incr Delay (d2), s/veh	186.4	0.0	380.0	4.7	123.1	130.4	191.5	6.5	11.6	29.7	37.1	47.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	24.6	0.0	36.9	3.0	13.0	13.0	20.9	8.8	10.3	6.1	15.2	17.6
Lane Grp Delay (d), s/veh	218.9	0.0	412.5	37.2	157.6	164.9	225.0	30.8	35.9	63.6	64.6	75.3
Lane Grp LOS	F		F	D	F	F	F	C	D	E	F	F
Approach Vol, veh/h		1017			729			1831			1890	
Approach Delay, s/veh		321.5			135.5			74.4			67.8	
Approach LOS		F			F			E			E	
Timer												
Assigned Phs		4			8		5	2		1	6	
Phs Duration (G+Y+Rc), s		19.0			15.0		17.0	31.0		15.0	29.0	
Change Period (Y+Rc), s		4.0			4.0		4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s		15.0			11.0		13.0	27.0		11.0	25.0	
Max Q Clear Time (g_c+I1), s		17.0			13.0		15.0	22.2		11.6	27.0	
Green Ext Time (p_c), s		0.0			0.0		0.0	4.6		0.0	0.0	
Intersection Summary												
HCM 2010 Ctrl Delay			126.2									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2016
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	105	346	687	77	253	91	739	1707	68	73	949
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		66	217	244	164	237	83	464	2254	90	104	1146
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		428	1413	1583	1774	2569	904	1774	5018	200	1774	4654
Grp Volume(v), veh/h		490	0	747	84	187	187	803	1253	676	79	751
Grp Sat Flow(s),veh/h/ln		1841	0	1583	1774	1770	1703	1774	1695	1827	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	2.9	6.0	6.0	17.0	21.0	21.0	2.9	13.9
Cycle Q Clear(g_c), s		10.0	0.0	10.0	2.9	6.0	6.0	17.0	21.0	21.0	2.9	13.9
Prop In Lane		0.23		1.00	1.00		0.53	1.00		0.11	1.00	
Lane Grp Cap(c), veh/h		283	0	244	164	163	157	464	1523	821	104	835
V/C Ratio(X)		1.73	0.00	3.07	0.51	1.15	1.19	1.73	0.82	0.82	0.76	0.90
Avail Cap(c_a), veh/h		283	0	244	164	163	157	464	1523	821	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.1	29.5	29.5	24.0	15.6	15.7	30.2	23.7
Incr Delay (d2), s/veh		342.8	0.0	940.8	2.7	115.7	130.6	337.7	5.1	9.2	16.4	14.7
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		31.2	0.0	67.3	1.3	7.7	8.1	50.2	8.4	10.0	1.7	7.0
Lane Grp Delay (d), s/veh		370.3	0.0	968.3	30.8	145.2	160.1	361.7	20.8	24.8	46.5	38.4
Lane Grp LOS		F		F	C	F	F	F	C	C	D	D
Approach Vol, veh/h			1237			458			2732			1224
Approach Delay, s/veh			731.4			130.3			122.0			42.1
Approach LOS			F			F			F			D
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	33.2		7.8	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	23.0		4.9	16.0
Green Ext Time (p_c), s			0.0			0.0		0.0	4.7		0.0	0.0
Intersection Summary												
HCM 2010 Ctrl Delay			238.8									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2016
AM Peak Period

Movement	SBR
Approach Configurations	
Volume (veh/h)	104
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	125
Arrive On Green	0.25
Sat Flow, veh/h	509
Grp Volume(v), veh/h	394
Grp Sat Flow(s),veh/h/ln	1773
Q Serve(g_s), s	14.0
Cycle Q Clear(g_c), s	14.0
Prop In Lane	0.29
Lane Grp Cap(c), veh/h	436
V/C Ratio(X)	0.90
Avail Cap(c_a), veh/h	436
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	23.7
Incr Delay (d2), s/veh	24.5
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	8.5
Lane Grp Delay (d), s/veh	48.2
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

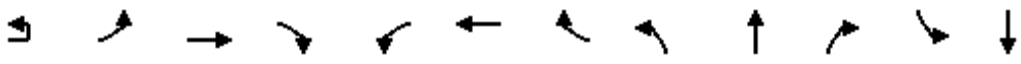
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2016
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	142	450	890	154	447	141	650	1297	101	206	1480	235
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	83	262	297	244	365	114	288	1624	127	244	1384	219
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	441	1400	1583	1774	2655	831	1774	4811	375	1774	4430	699
Grp Volume(v), veh/h	643	0	967	167	323	316	707	993	527	224	1230	634
Grp Sat Flow(s),veh/h/ln	1841	0	1583	1774	1770	1716	1774	1695	1797	1774	1695	1739
Q Serve(g_s), s	15.0	0.0	15.0	7.2	11.0	11.0	13.0	22.0	22.0	10.0	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	7.2	11.0	11.0	13.0	22.0	22.0	10.0	25.0	25.0
Prop In Lane	0.24		1.00	1.00		0.48	1.00		0.21	1.00		0.40
Lane Grp Cap(c), veh/h	345	0	297	244	243	236	288	1144	606	244	1059	544
V/C Ratio(X)	1.86	0.00	3.26	0.68	1.33	1.34	2.45	0.87	0.87	0.92	1.16	1.17
Avail Cap(c_a), veh/h	345	0	297	244	243	236	288	1144	606	244	1059	544
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	32.8	34.5	34.5	33.5	24.8	24.8	34.1	27.5	27.5
Incr Delay (d2), s/veh	399.3	0.0	1024.4	7.7	172.8	178.5	664.0	9.0	15.5	36.4	83.1	93.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	44.8	0.0	90.1	3.6	16.3	16.2	58.7	10.0	11.7	6.7	21.9	24.1
Lane Grp Delay (d), s/veh	431.8	0.0	1056.9	40.5	207.3	213.0	697.5	33.8	40.4	70.4	110.6	121.1
Lane Grp LOS	F		F	D	F	F	F	C	D	E	F	F
Approach Vol, veh/h	1610			806			2227			2088		
Approach Delay, s/veh	807.3			175.0			246.1			109.5		
Approach LOS	F			F			F			F		
Timer												
Assigned Phs	4			8			5			2		
Phs Duration (G+Y+Rc), s	19.0			15.0			17.0			31.0		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	15.0			11.0			13.0			27.0		
Max Q Clear Time (g_c+I1), s	17.0			13.0			15.0			24.0		
Green Ext Time (p_c), s	0.0			0.0			0.0			2.9		
Intersection Summary												
HCM 2010 Ctrl Delay	329.4											
HCM 2010 LOS	F											
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2017
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations			↔↔		↔	↔↔		↔	↔↔↔		↔	↔↔↔
Volume (veh/h)	1	138	367	776	79	276	94	893	1766	70	75	981
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		77	205	244	164	241	80	464	2250	89	105	1101
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		502	1336	1583	1774	2609	870	1774	5020	198	1774	4474
Grp Volume(v), veh/h		549	0	843	86	202	200	971	1296	700	82	807
Grp Sat Flow(s),veh/h/ln		1838	0	1583	1774	1770	1709	1774	1695	1828	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	3.0	6.0	6.0	17.0	22.2	22.3	3.0	15.3
Cycle Q Clear(g_c), s		10.0	0.0	10.0	3.0	6.0	6.0	17.0	22.2	22.3	3.0	15.3
Prop In Lane		0.27		1.00	1.00		0.51	1.00		0.11	1.00	
Lane Grp Cap(c), veh/h		283	0	244	164	163	158	464	1520	819	105	835
V/C Ratio(X)		1.94	0.00	3.46	0.53	1.23	1.27	2.09	0.85	0.85	0.78	0.97
Avail Cap(c_a), veh/h		283	0	244	164	163	158	464	1520	819	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.1	29.5	29.5	24.0	16.0	16.0	30.1	24.2
Incr Delay (d2), s/veh		436.6	0.0	1117.6	3.1	147.0	161.9	499.1	6.3	11.1	18.8	24.2
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		38.5	0.0	79.3	1.4	9.2	9.5	71.0	9.1	10.9	1.8	8.6
Lane Grp Delay (d), s/veh		464.1	0.0	1145.1	31.2	176.5	191.4	523.1	22.3	27.1	49.0	48.5
Lane Grp LOS		F		F	C	F	F	F	C	C	D	D
Approach Vol, veh/h			1392			488			2967			1306
Approach Delay, s/veh			876.5			157.0			187.3			52.4
Approach LOS			F			F			F			D
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	33.1		7.9	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	24.3		5.0	17.4
Green Ext Time (p_c), s			0.0			0.0		0.0	3.6		0.0	0.0
Intersection Summary												
HCM 2010 Ctrl Delay			312.2									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2017
AM Peak Period

Movement	SBR
Approach Configurations	
Volume (veh/h)	145
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	163
Arrive On Green	0.25
Sat Flow, veh/h	662
Grp Volume(v), veh/h	417
Grp Sat Flow(s),veh/h/ln	1746
Q Serve(g_s), s	15.4
Cycle Q Clear(g_c), s	15.4
Prop In Lane	0.38
Lane Grp Cap(c), veh/h	430
V/C Ratio(X)	0.97
Avail Cap(c_a), veh/h	430
HCM Platoon Ratio	0.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	24.3
Incr Delay (d2), s/veh	36.4
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	10.4
Lane Grp Delay (d), s/veh	60.6
Lane Grp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2017
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	194	487	1095	159	473	146	726	1341	104	213	1530	270
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	98	246	297	244	367	113	288	1625	126	244	1361	238
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	524	1313	1583	1774	2667	821	1774	4814	373	1774	4356	762
Grp Volume(v), veh/h	740	0	1190	173	340	333	789	1027	544	232	1292	664
Grp Sat Flow(s),veh/h/ln	1837	0	1583	1774	1770	1718	1774	1695	1797	1774	1695	1728
Q Serve(g_s), s	15.0	0.0	15.0	7.5	11.0	11.0	13.0	23.0	23.0	10.4	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	7.5	11.0	11.0	13.0	23.0	23.0	10.4	25.0	25.0
Prop In Lane	0.29		1.00	1.00		0.48	1.00		0.21	1.00		0.44
Lane Grp Cap(c), veh/h	344	0	297	244	243	236	288	1144	606	244	1059	540
V/C Ratio(X)	2.15	0.00	4.01	0.71	1.40	1.41	2.74	0.90	0.90	0.95	1.22	1.23
Avail Cap(c_a), veh/h	344	0	297	244	243	236	288	1144	606	244	1059	540
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	33.0	34.5	34.5	33.5	25.2	25.2	34.2	27.5	27.5
Incr Delay (d2), s/veh	526.6	0.0	1361.8	9.2	202.3	207.2	791.3	11.1	18.5	44.1	107.4	118.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	56.9	0.0	117.9	3.8	18.3	18.1	68.9	10.7	12.6	7.4	25.5	27.7
Lane Grp Delay (d), s/veh	559.1	0.0	1394.3	42.1	236.8	241.7	824.8	36.3	43.7	78.3	134.9	146.4
Lane Grp LOS	F		F	D	F	F	F	D	D	E	F	F
Approach Vol, veh/h	1930			846			2360			2188		
Approach Delay, s/veh	1074.1			198.9			301.6			132.4		
Approach LOS	F			F			F			F		
Timer												
Assigned Phs	4			8			5			2		
Phs Duration (G+Y+Rc), s	19.0			15.0			17.0			31.0		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	15.0			11.0			13.0			27.0		
Max Q Clear Time (g_c+l1), s	17.0			13.0			15.0			25.0		
Green Ext Time (p_c), s	0.0			0.0			0.0			1.9		
Intersection Summary												
HCM 2010 Ctrl Delay	442.8											
HCM 2010 LOS	F											
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2018
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	150	381	819	81	285	98	921	1827	73	78	1014
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		80	203	244	164	240	81	464	2241	89	109	1103
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.45	0.45	0.06	0.25
Sat Flow, veh/h		519	1318	1583	1774	2597	880	1774	5019	199	1774	4479
Grp Volume(v), veh/h		577	0	890	88	209	208	1001	1340	725	85	834
Grp Sat Flow(s),veh/h/ln		1837	0	1583	1774	1770	1707	1774	1695	1828	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	3.1	6.0	6.0	17.0	23.5	23.6	3.1	16.0
Cycle Q Clear(g_c), s		10.0	0.0	10.0	3.1	6.0	6.0	17.0	23.5	23.6	3.1	16.0
Prop In Lane		0.28		1.00	1.00		0.52	1.00		0.11	1.00	
Lane Grp Cap(c), veh/h		283	0	244	164	163	158	464	1514	816	109	835
V/C Ratio(X)		2.04	0.00	3.65	0.54	1.28	1.32	2.16	0.89	0.89	0.78	1.00
Avail Cap(c_a), veh/h		283	0	244	164	163	158	464	1514	816	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.2	29.5	29.5	24.0	16.5	16.5	30.1	24.5
Incr Delay (d2), s/veh		481.0	0.0	1204.2	3.4	165.2	180.4	528.0	8.0	13.8	20.2	31.0
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		42.0	0.0	85.1	1.4	10.0	10.3	74.7	9.9	12.0	1.9	9.7
Lane Grp Delay (d), s/veh		508.5	0.0	1231.7	31.6	194.7	209.9	552.0	24.4	30.3	50.3	55.5
Lane Grp LOS		F		F	C	F	F	F	C	C	D	E
Approach Vol, veh/h			1467			505			3066			1349
Approach Delay, s/veh			947.3			172.5			198.0			59.1
Approach LOS			F			F			F			E
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	33.0		8.0	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	25.6		5.1	18.0
Green Ext Time (p_c), s			0.0			0.0		0.0	2.3		0.0	0.0
Intersection Summary												
HCM 2010 Ctrl Delay			338.8									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2018
AM Peak Period

Movement	SBR
Approach Configurations	
Volume (veh/h)	149
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	162
Arrive On Green	0.25
Sat Flow, veh/h	658
Grp Volume(v), veh/h	430
Grp Sat Flow(s),veh/h/ln	1747
Q Serve(g_s), s	16.0
Cycle Q Clear(g_c), s	16.0
Prop In Lane	0.38
Lane Grp Cap(c), veh/h	430
V/C Ratio(X)	1.00
Avail Cap(c_a), veh/h	430
HCM Platoon Ratio	0.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	24.5
Incr Delay (d2), s/veh	43.5
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	11.5
Lane Grp Delay (d), s/veh	68.0
Lane Grp LOS	F
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2018
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	201	505	1132	165	491	151	766	1387	107	220	1583	284
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	98	246	297	244	367	112	288	1626	125	244	1357	242
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	522	1315	1583	1774	2671	817	1774	4817	370	1774	4343	773
Grp Volume(v), veh/h	767	0	1230	179	353	345	833	1061	563	239	1340	690
Grp Sat Flow(s),veh/h/ln	1837	0	1583	1774	1770	1719	1774	1695	1797	1774	1695	1726
Q Serve(g_s), s	15.0	0.0	15.0	7.7	11.0	11.0	13.0	24.1	24.2	10.7	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	7.7	11.0	11.0	13.0	24.1	24.2	10.7	25.0	25.0
Prop In Lane	0.28		1.00	1.00		0.48	1.00		0.21	1.00		0.45
Lane Grp Cap(c), veh/h	344	0	297	244	243	236	288	1144	607	244	1059	539
V/C Ratio(X)	2.23	0.00	4.14	0.73	1.45	1.46	2.89	0.93	0.93	0.98	1.26	1.28
Avail Cap(c_a), veh/h	344	0	297	244	243	236	288	1144	607	244	1059	539
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	33.1	34.5	34.5	33.5	25.6	25.6	34.4	27.5	27.5
Incr Delay (d2), s/veh	561.6	0.0	1422.4	10.9	224.4	228.8	859.7	14.1	22.5	51.8	126.8	139.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	60.2	0.0	122.9	4.0	19.8	19.5	74.4	11.7	13.8	8.1	28.4	30.8
Lane Grp Delay (d), s/veh	594.1	0.0	1454.9	44.0	258.9	263.3	893.2	39.6	48.1	86.2	154.3	166.9
Lane Grp LOS	F		F	D	F	F	F	D	D	F	F	F
Approach Vol, veh/h	1997			877			2457			2269		
Approach Delay, s/veh	1124.3			216.8			331.0			150.9		
Approach LOS	F			F			F			F		
Timer												
Assigned Phs	4			8			5			1		
Phs Duration (G+Y+Rc), s	19.0			15.0			17.0			15.0		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	15.0			11.0			13.0			11.0		
Max Q Clear Time (g_c+l1), s	17.0			13.0			15.0			12.7		
Green Ext Time (p_c), s	0.0			0.0			0.0			0.0		
Intersection Summary												
HCM 2010 Ctrl Delay	472.5											
HCM 2010 LOS	F											
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2019
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	162	397	863	84	295	101	950	1890	75	81	1049
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		82	201	244	164	240	81	464	2229	89	112	1104
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.44	0.44	0.06	0.25
Sat Flow, veh/h		532	1305	1583	1774	2602	876	1774	5018	200	1774	4485
Grp Volume(v), veh/h		608	0	938	91	216	215	1033	1386	750	88	862
Grp Sat Flow(s),veh/h/ln		1836	0	1583	1774	1770	1708	1774	1695	1827	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	3.2	6.0	6.0	17.0	25.0	25.1	3.2	16.0
Cycle Q Clear(g_c), s		10.0	0.0	10.0	3.2	6.0	6.0	17.0	25.0	25.1	3.2	16.0
Prop In Lane		0.29		1.00	1.00		0.51	1.00		0.11	1.00	
Lane Grp Cap(c), veh/h		282	0	244	164	163	158	464	1506	812	112	835
V/C Ratio(X)		2.15	0.00	3.85	0.56	1.33	1.36	2.23	0.92	0.92	0.78	1.03
Avail Cap(c_a), veh/h		282	0	244	164	163	158	464	1506	812	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.2	29.5	29.5	24.0	17.0	17.0	30.0	24.5
Incr Delay (d2), s/veh		530.2	0.0	1292.7	4.1	182.4	197.6	558.8	10.6	17.7	21.0	39.8
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		45.8	0.0	91.1	1.5	10.8	11.1	78.7	11.3	13.8	2.0	10.8
Lane Grp Delay (d), s/veh		557.7	0.0	1320.2	32.3	211.9	227.1	582.8	27.6	34.7	51.0	64.3
Lane Grp LOS		F		F	C	F	F	F	C	C	D	F
Approach Vol, veh/h			1546			522			3169			1394
Approach Delay, s/veh			1020.3			186.8			210.3			67.4
Approach LOS			F			F			F			E
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	32.9		8.1	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	27.1		5.2	18.0
Green Ext Time (p_c), s			0.0			0.0		0.0	0.8		0.0	0.0
Intersection Summary												
HCM 2010 Ctrl Delay			367.3									
HCM 2010 LOS			F									
Notes												

Build 2019
AM Peak Period

Movement	SBR
Approach Configurations	
Volume (veh/h)	153
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	161
Arrive On Green	0.25
Sat Flow, veh/h	653
Grp Volume(v), veh/h	444
Grp Sat Flow(s),veh/h/ln	1748
Q Serve(g_s), s	16.0
Cycle Q Clear(g_c), s	16.0
Prop In Lane	0.37
Lane Grp Cap(c), veh/h	430
V/C Ratio(X)	1.03
Avail Cap(c_a), veh/h	430
HCM Platoon Ratio	0.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	24.5
Incr Delay (d2), s/veh	52.2
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	12.6
Lane Grp Delay (d), s/veh	76.7
Lane Grp LOS	F
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+I1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2019
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	207	522	1169	170	510	157	803	1434	110	228	1637	297
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	98	247	297	244	367	113	288	1626	125	244	1355	243
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	522	1315	1583	1774	2667	820	1774	4817	371	1774	4337	779
Grp Volume(v), veh/h	792	0	1271	185	367	358	873	1097	582	248	1386	716
Grp Sat Flow(s),veh/h/ln	1837	0	1583	1774	1770	1718	1774	1695	1797	1774	1695	1725
Q Serve(g_s), s	15.0	0.0	15.0	8.0	11.0	11.0	13.0	25.4	25.4	11.0	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	8.0	11.0	11.0	13.0	25.4	25.4	11.0	25.0	25.0
Prop In Lane	0.28		1.00	1.00		0.48	1.00		0.21	1.00		0.45
Lane Grp Cap(c), veh/h	344	0	297	244	243	236	288	1144	607	244	1059	539
V/C Ratio(X)	2.30	0.00	4.28	0.76	1.51	1.52	3.03	0.96	0.96	1.02	1.31	1.33
Avail Cap(c_a), veh/h	344	0	297	244	243	236	288	1144	607	244	1059	539
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	33.2	34.5	34.5	33.5	26.0	26.0	34.5	27.5	27.5
Incr Delay (d2), s/veh	594.0	0.0	1484.4	12.9	248.8	252.7	922.0	18.4	27.8	62.0	145.7	159.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	63.3	0.0	128.0	4.3	21.5	21.1	79.4	12.8	15.2	8.9	31.1	33.8
Lane Grp Delay (d), s/veh	626.5	0.0	1516.9	46.1	283.3	287.2	955.5	44.3	53.8	96.5	173.2	187.3
Lane Grp LOS	F		F	D	F	F	F	D	D	F	F	F
Approach Vol, veh/h	2063			910			2552			2350		
Approach Delay, s/veh	1175.1			236.6			358.2			169.4		
Approach LOS	F			F			F			F		
Timer												
Assigned Phs	4			8			5			2		
Phs Duration (G+Y+Rc), s	19.0			15.0			17.0			31.0		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	15.0			11.0			13.0			11.0		
Max Q Clear Time (g_c+l1), s	17.0			13.0			15.0			13.0		
Green Ext Time (p_c), s	0.0			0.0			0.0			0.0		
Intersection Summary												
HCM 2010 Ctrl Delay	501.8											
HCM 2010 LOS	F											
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2020
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	174	412	907	87	305	104	979	1955	77	84	1085
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		84	199	244	164	241	81	464	2220	87	116	1105
Arrive On Green		0.15	0.15	0.15	0.09	0.09	0.09	0.26	0.44	0.44	0.07	0.25
Sat Flow, veh/h		545	1291	1583	1774	2606	872	1774	5020	198	1774	4487
Grp Volume(v), veh/h		637	0	986	95	224	221	1064	1433	776	91	891
Grp Sat Flow(s),veh/h/ln		1836	0	1583	1774	1770	1709	1774	1695	1828	1774	1695
Q Serve(g_s), s		10.0	0.0	10.0	3.3	6.0	6.0	17.0	26.5	26.8	3.3	16.0
Cycle Q Clear(g_c), s		10.0	0.0	10.0	3.3	6.0	6.0	17.0	26.5	26.8	3.3	16.0
Prop In Lane		0.30		1.00	1.00		0.51	1.00		0.11	1.00	
Lane Grp Cap(c), veh/h		282	0	244	164	163	158	464	1499	808	116	835
V/C Ratio(X)		2.26	0.00	4.05	0.58	1.37	1.40	2.29	0.96	0.96	0.78	1.07
Avail Cap(c_a), veh/h		282	0	244	164	163	158	464	1499	808	136	835
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.5	0.0	27.5	28.3	29.5	29.5	24.0	17.5	17.6	29.9	24.5
Incr Delay (d2), s/veh		576.3	0.0	1381.2	5.1	200.1	215.0	588.7	14.9	23.4	21.7	50.7
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		49.4	0.0	97.1	1.6	11.6	11.8	82.6	12.6	15.6	2.1	12.0
Lane Grp Delay (d), s/veh		603.8	0.0	1408.7	33.3	229.6	244.5	612.7	32.4	41.0	51.6	75.2
Lane Grp LOS		F		F	C	F	F	F	C	D	D	F
Approach Vol, veh/h			1623			540			3273			1441
Approach Delay, s/veh			1092.8			201.2			223.1			77.5
Approach LOS			F			F			F			E
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			14.0			10.0		21.0	32.7		8.3	20.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			10.0			6.0		17.0	28.0		5.0	16.0
Max Q Clear Time (g_c+l1), s			12.0			8.0		19.0	28.8		5.3	18.0
Green Ext Time (p_c), s			0.0			0.0		0.0	0.0		0.0	0.0
Intersection Summary												
HCM 2010 Ctrl Delay			396.1									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2020
AM Peak Period

Movement	SBR
Approach Configurations	
Volume (veh/h)	157
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	160
Arrive On Green	0.25
Sat Flow, veh/h	651
Grp Volume(v), veh/h	459
Grp Sat Flow(s),veh/h/ln	1748
Q Serve(g_s), s	16.0
Cycle Q Clear(g_c), s	16.0
Prop In Lane	0.37
Lane Grp Cap(c), veh/h	430
V/C Ratio(X)	1.07
Avail Cap(c_a), veh/h	430
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	24.5
Incr Delay (d2), s/veh	62.6
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	13.8
Lane Grp Delay (d), s/veh	87.1
Lane Grp LOS	F
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2020
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	213	539	1205	175	529	162	844	1484	113	236	1694	311
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	98	247	297	244	367	112	288	1627	124	244	1353	245
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	521	1316	1583	1774	2673	816	1774	4821	367	1774	4331	784
Grp Volume(v), veh/h	818	0	1310	190	380	371	917	1134	602	257	1435	744
Grp Sat Flow(s),veh/h/ln	1837	0	1583	1774	1770	1719	1774	1695	1798	1774	1695	1724
Q Serve(g_s), s	15.0	0.0	15.0	8.3	11.0	11.0	13.0	26.6	26.7	11.0	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	8.3	11.0	11.0	13.0	26.6	26.7	11.0	25.0	25.0
Prop In Lane	0.28		1.00	1.00		0.47	1.00		0.20	1.00		0.45
Lane Grp Cap(c), veh/h	344	0	297	244	243	236	288	1144	607	244	1059	539
V/C Ratio(X)	2.38	0.00	4.41	0.78	1.56	1.57	3.18	0.99	0.99	1.05	1.35	1.38
Avail Cap(c_a), veh/h	344	0	297	244	243	236	288	1144	607	244	1059	539
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	33.3	34.5	34.5	33.5	26.4	26.4	34.5	27.5	27.5
Incr Delay (d2), s/veh	627.8	0.0	1543.5	14.8	272.3	275.5	990.4	24.5	34.7	72.4	166.0	182.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	66.6	0.0	132.9	4.5	23.1	22.6	84.8	14.3	16.9	9.6	34.1	37.2
Lane Grp Delay (d), s/veh	660.3	0.0	1576.0	48.1	306.8	310.0	1023.9	50.9	61.1	106.9	193.5	209.8
Lane Grp LOS	F		F	D	F	F	F	D	E	F	F	F
Approach Vol, veh/h	2128			941			2653			2436		
Approach Delay, s/veh	1224.0			255.8			389.5			189.3		
Approach LOS	F			F			F			F		
Timer												
Assigned Phs	4			8			5			2		
Phs Duration (G+Y+Rc), s	19.0			15.0			17.0			31.0		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	15.0			11.0			13.0			27.0		
Max Q Clear Time (g_c+I1), s	17.0			13.0			15.0			28.7		
Green Ext Time (p_c), s	0.0			0.0			0.0			0.0		
Intersection Summary												
HCM 2010 Ctrl Delay	532.0											
HCM 2010 LOS	F											
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2015 Mitigated
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	42	319	420	68	224	88	466	1628	61	70	901
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		0	2	0	1	2	0	1	3	0	1	3
Cap, veh/h		37	277	268	136	192	74	519	2266	84	102	1072
Arrive On Green		0.17	0.17	0.17	0.08	0.08	0.08	0.29	0.45	0.45	0.06	0.22
Sat Flow, veh/h		217	1635	1583	1774	2502	961	1774	5032	187	1774	4978
Grp Volume(v), veh/h		393	0	457	74	170	169	507	1192	644	76	666
Grp Sat Flow(s),veh/h/ln		1852	0	1583	1774	1770	1693	1774	1695	1830	1774	1695
Q Serve(g_s), s		11.0	0.0	11.0	2.6	5.0	5.0	18.4	19.4	19.4	2.7	12.5
Cycle Q Clear(g_c), s		11.0	0.0	11.0	2.6	5.0	5.0	18.4	19.4	19.4	2.7	12.5
Prop In Lane		0.12		1.00	1.00		0.57	1.00		0.10	1.00	
Lane Grp Cap(c), veh/h		313	0	268	136	136	130	519	1527	824	102	730
V/C Ratio(X)		1.25	0.00	1.71	0.54	1.25	1.30	0.98	0.78	0.78	0.75	0.91
Avail Cap(c_a), veh/h		313	0	268	136	136	130	519	1527	824	136	730
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		27.0	0.0	27.0	28.9	30.0	30.0	22.8	15.1	15.2	30.2	24.9
Incr Delay (d2), s/veh		137.8	0.0	333.0	4.3	158.5	179.3	33.7	4.0	7.3	14.1	17.7
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		16.7	0.0	28.8	1.3	8.1	8.5	12.0	7.6	9.0	1.6	6.6
Lane Grp Delay (d), s/veh		164.8	0.0	360.0	33.2	188.5	209.3	56.5	19.2	22.4	44.3	42.6
Lane Grp LOS		F		F	C	F	F	E	B	C	D	D
Approach Vol, veh/h			850			413			2343			1101
Approach Delay, s/veh			269.7			169.2			28.2			46.2
Approach LOS			F			F			C			D
Timer												
Assigned Phs			4			8		5	2		1	6
Phs Duration (G+Y+Rc), s			15.0			9.0		23.0	33.3		7.7	18.0
Change Period (Y+Rc), s			4.0			4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s			11.0			5.0		19.0	28.0		5.0	14.0
Max Q Clear Time (g_c+I1), s			13.0			7.0		20.4	21.4		4.7	14.5
Green Ext Time (p_c), s			0.0			0.0		0.0	6.1		0.0	0.0
Intersection Summary												
HCM 2010 Ctrl Delay			88.4									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2015 Mitigated
AM Peak Period

Movement	SBR
Left	
Volume (veh/h)	42
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	50
Arrive On Green	0.22
Sat Flow, veh/h	234
Grp Volume(v), veh/h	359
Grp Sat Flow(s),veh/h/ln	1822
Q Serve(g_s), s	12.5
Cycle Q Clear(g_c), s	12.5
Prop In Lane	0.13
Lane Grp Cap(c), veh/h	392
V/C Ratio(X)	0.91
Avail Cap(c_a), veh/h	392
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	24.9
Incr Delay (d2), s/veh	28.2
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	8.3
Lane Grp Delay (d), s/veh	53.2
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2015 Mitigated
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	48	392	496	139	395	137	366	1231	87	199	1406	134
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	0	2	0	1	2	0	1	3	0	1	3	0
Cap, veh/h	38	310	297	244	356	122	288	1636	116	244	1476	141
Arrive On Green	0.19	0.19	0.19	0.14	0.14	0.14	0.16	0.34	0.34	0.14	0.31	0.31
Sat Flow, veh/h	202	1651	1583	1774	2586	890	1774	4848	344	1774	4722	451
Grp Volume(v), veh/h	478	0	539	151	292	286	398	936	497	216	1097	577
Grp Sat Flow(s),veh/h/ln	1853	0	1583	1774	1770	1706	1774	1695	1802	1774	1695	1783
Q Serve(g_s), s	15.0	0.0	15.0	6.4	11.0	11.0	13.0	20.2	20.2	9.6	25.0	25.0
Cycle Q Clear(g_c), s	15.0	0.0	15.0	6.4	11.0	11.0	13.0	20.2	20.2	9.6	25.0	25.0
Prop In Lane	0.11		1.00	1.00		0.52	1.00		0.19	1.00		0.25
Lane Grp Cap(c), veh/h	347	0	297	244	243	235	288	1144	608	244	1059	557
V/C Ratio(X)	1.38	0.00	1.82	0.62	1.20	1.22	1.38	0.82	0.82	0.89	1.04	1.04
Avail Cap(c_a), veh/h	347	0	297	244	243	235	288	1144	608	244	1059	557
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	32.5	32.5	34.5	34.5	33.5	24.2	24.2	33.9	27.5	27.5
Incr Delay (d2), s/veh	186.4	0.0	380.0	4.7	123.1	130.4	191.5	6.5	11.6	29.7	37.1	47.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	24.6	0.0	36.9	3.0	13.0	13.0	20.9	8.8	10.3	6.1	15.2	17.6
Lane Grp Delay (d), s/veh	218.9	0.0	412.5	37.2	157.6	164.9	225.0	30.8	35.9	63.6	64.6	75.3
Lane Grp LOS	F		F	D	F	F	F	C	D	E	F	F
Approach Vol, veh/h	1017			729			1831			1890		
Approach Delay, s/veh	321.5			135.5			74.4			67.8		
Approach LOS	F			F			E			E		
Timer												
Assigned Phs	4			8			5			2		
Phs Duration (G+Y+Rc), s	19.0			15.0			17.0			31.0		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	15.0			11.0			13.0			27.0		
Max Q Clear Time (g_c+I1), s	17.0			13.0			15.0			22.2		
Green Ext Time (p_c), s	0.0			0.0			0.0			4.6		
Intersection Summary												
HCM 2010 Ctrl Delay	126.2											
HCM 2010 LOS	F											
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2016 Mitigated
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	105	346	687	77	253	91	739	1707	68	73	949
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		1	2	1	1	2	0	2	3	0	1	3
Cap, veh/h		149	415	186	149	302	106	902	2355	94	109	1249
Arrive On Green		0.08	0.12	0.00	0.08	0.12	0.12	0.26	0.47	0.47	0.06	0.27
Sat Flow, veh/h		1774	3539	1583	1774	2569	904	3442	5018	200	1774	4654
Grp Volume(v), veh/h		114	376	0	84	187	187	803	1253	676	79	751
Grp Sat Flow(s),veh/h/ln		1774	1770	1583	1774	1770	1703	1721	1695	1827	1774	1695
Q Serve(g_s), s		3.8	6.3	0.0	2.7	6.2	6.5	13.4	18.5	18.6	2.6	12.4
Cycle Q Clear(g_c), s		3.8	6.3	0.0	2.7	6.2	6.5	13.4	18.5	18.6	2.6	12.4
Prop In Lane		1.00		1.00	1.00		0.53	1.00		0.11	1.00	
Lane Grp Cap(c), veh/h		149	415	186	149	208	200	902	1591	858	109	910
V/C Ratio(X)		0.77	0.90	0.00	0.56	0.90	0.93	0.89	0.79	0.79	0.73	0.83
Avail Cap(c_a), veh/h		149	415	186	149	208	200	923	1591	858	149	910
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		26.7	26.0	0.0	26.3	26.0	26.1	21.2	13.3	13.3	27.5	20.5
Incr Delay (d2), s/veh		21.0	22.9	0.0	4.9	36.9	45.0	10.6	4.0	7.3	10.8	8.5
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (95%), veh/ln		4.4	7.0	0.0	2.4	8.2	8.7	10.5	11.5	13.3	2.5	9.6
Lane Grp Delay (d), s/veh		47.7	48.9	0.0	31.1	62.9	71.1	31.8	17.3	20.6	38.3	29.0
Lane Grp LOS		D	D		C	E	E	C	B	C	D	C
Approach Vol, veh/h			490			458			2732			1224
Approach Delay, s/veh			48.6			60.4			22.4			31.7
Approach LOS			D			E			C			C
Timer												
Assigned Phs		7	4		3	8		5	2		1	6
Phs Duration (G+Y+Rc), s		9.0	11.0		9.0	11.0		19.6	32.0		7.6	20.0
Change Period (Y+Rc), s		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s		5.0	7.0		5.0	7.0		16.0	27.0		5.0	16.0
Max Q Clear Time (g_c+l1), s		5.8	8.3		4.7	8.5		15.4	20.6		4.6	14.5
Green Ext Time (p_c), s		0.0	0.0		0.0	0.0		0.2	6.0		0.0	1.5
Intersection Summary												
HCM 2010 Ctrl Delay			30.9									
HCM 2010 LOS			C									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2016 Mitigated
AM Peak Period

Movement	SBR
Left Lane Configurations	
Volume (veh/h)	104
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	137
Arrive On Green	0.27
Sat Flow, veh/h	509
Grp Volume(v), veh/h	394
Grp Sat Flow(s),veh/h/ln	1773
Q Serve(g_s), s	12.5
Cycle Q Clear(g_c), s	12.5
Prop In Lane	0.29
Lane Grp Cap(c), veh/h	476
V/C Ratio(X)	0.83
Avail Cap(c_a), veh/h	476
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	20.5
Incr Delay (d2), s/veh	15.2
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (95%), veh/ln	11.1
Lane Grp Delay (d), s/veh	35.7
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2016 Mitigated
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	142	450	890	154	447	141	650	1297	101	206	1480	235
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	1	2	1	1	2	0	2	3	0	1	3	0
Cap, veh/h	193	580	260	206	455	142	669	1877	146	261	1519	240
Arrive On Green	0.11	0.16	0.00	0.12	0.17	0.17	0.19	0.39	0.39	0.15	0.34	0.34
Sat Flow, veh/h	1774	3539	1583	1774	2655	831	3442	4811	375	1774	4430	699
Grp Volume(v), veh/h	154	489	0	167	323	316	707	993	527	224	1230	634
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1716	1721	1695	1797	1774	1695	1739
Q Serve(g_s), s	7.4	11.7	0.0	8.0	15.0	15.0	17.0	22.1	22.1	10.8	30.0	30.0
Cycle Q Clear(g_c), s	7.4	11.7	0.0	8.0	15.0	15.0	17.0	22.1	22.1	10.8	30.0	30.0
Prop In Lane	1.00		1.00	1.00		0.48	1.00		0.21	1.00		0.40
Lane Grp Cap(c), veh/h	193	580	260	206	303	294	669	1323	701	261	1162	596
V/C Ratio(X)	0.80	0.84	0.00	0.81	1.06	1.07	1.06	0.75	0.75	0.86	1.06	1.06
Avail Cap(c_a), veh/h	243	580	260	264	303	294	669	1323	701	304	1162	596
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.1	35.5	0.0	37.7	36.3	36.3	35.3	23.0	23.0	36.4	28.8	28.8
Incr Delay (d2), s/veh	13.7	10.8	0.0	13.8	69.8	73.7	51.0	4.0	7.3	19.0	43.2	54.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	3.9	6.0	0.0	4.3	12.4	12.3	11.8	9.4	10.6	6.0	18.9	21.4
Lane Grp Delay (d), s/veh	51.8	46.3	0.0	51.5	106.0	109.9	86.2	27.0	30.3	55.4	72.0	83.6
Lane Grp LOS	D	D		D	F	F	F	C	C	E	F	F
Approach Vol, veh/h		643			806			2227			2088	
Approach Delay, s/veh		47.6			96.3			46.6			73.7	
Approach LOS		D			F			D			E	
Timer												
Assigned Phs	7	4		3	8		5	2		1	6	
Phs Duration (G+Y+Rc), s	13.5	18.4		14.2	19.0		21.0	38.1		16.9	34.0	
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s	12.0	14.0		13.0	15.0		17.0	32.0		15.0	30.0	
Max Q Clear Time (g_c+l1), s	9.4	13.7		10.0	17.0		19.0	24.1		12.8	32.0	
Green Ext Time (p_c), s	0.1	0.2		0.1	0.0		0.0	7.5		0.1	0.0	
Intersection Summary												
HCM 2010 Ctrl Delay				63.5								
HCM 2010 LOS				E								
Notes												

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2017 Mitigated
AM Peak Period

												
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	1	138	367	776	79	276	94	893	1766	70	75	981
Number		7	4	14	3	8	18	5	2	12	1	6
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Parking Bus Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln		186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes		1	2	1	1	2	0	2	3	0	1	3
Cap, veh/h		166	521	233	119	314	105	1046	2572	102	105	1198
Arrive On Green		0.09	0.15	0.00	0.07	0.12	0.12	0.30	0.51	0.51	0.06	0.27
Sat Flow, veh/h		1774	3539	1583	1774	2609	870	3442	5020	198	1774	4474
Grp Volume(v), veh/h		150	399	0	86	202	200	971	1296	700	82	807
Grp Sat Flow(s),veh/h/ln		1774	1770	1583	1774	1770	1709	1721	1695	1828	1774	1695
Q Serve(g_s), s		6.3	8.1	0.0	3.6	8.4	8.7	20.4	22.5	22.6	3.4	17.1
Cycle Q Clear(g_c), s		6.3	8.1	0.0	3.6	8.4	8.7	20.4	22.5	22.6	3.4	17.1
Prop In Lane		1.00		1.00	1.00		0.51	1.00		0.11	1.00	
Lane Grp Cap(c), veh/h		166	521	233	119	213	206	1046	1737	937	105	908
V/C Ratio(X)		0.90	0.77	0.00	0.72	0.95	0.97	0.93	0.75	0.75	0.78	0.89
Avail Cap(c_a), veh/h		166	521	233	119	213	206	1060	1737	937	142	908
HCM Platoon Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh		33.5	30.6	0.0	34.2	32.6	32.7	25.2	14.4	14.4	34.7	26.3
Incr Delay (d2), s/veh		42.9	6.7	0.0	19.5	46.4	54.8	13.6	3.0	5.4	17.3	12.7
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln		4.6	3.9	0.0	2.2	6.3	6.7	9.9	8.8	10.2	2.0	8.3
Lane Grp Delay (d), s/veh		76.4	37.3	0.0	53.7	79.0	87.6	38.8	17.3	19.8	52.0	39.0
Lane Grp LOS		E	D		D	E	F	D	B	B	D	D
Approach Vol, veh/h			549			488			2967			1306
Approach Delay, s/veh			48.0			78.1			25.0			42.7
Approach LOS			D			E			C			D
Timer												
Assigned Phs		7	4		3	8		5	2		1	6
Phs Duration (G+Y+Rc), s		11.0	15.0		9.0	13.0		26.7	42.3		8.4	24.0
Change Period (Y+Rc), s		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Max Green Setting (Gmax), s		7.0	11.0		5.0	9.0		23.0	37.0		6.0	20.0
Max Q Clear Time (g_c+l1), s		8.3	10.1		5.6	10.7		22.4	24.6		5.4	19.1
Green Ext Time (p_c), s		0.0	0.5		0.0	0.0		0.3	11.4		0.0	0.8
Intersection Summary												
HCM 2010 Ctrl Delay			36.6									
HCM 2010 LOS			D									
Notes												

HCM 2010 Signalized Intersection Summary
1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2017 Mitigated
AM Peak Period

Movement	SBR
Left	
Volume (veh/h)	145
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow veh/h/ln	186.3
Lanes	0
Cap, veh/h	177
Arrive On Green	0.27
Sat Flow, veh/h	662
Grp Volume(v), veh/h	417
Grp Sat Flow(s),veh/h/ln	1746
Q Serve(g_s), s	17.1
Cycle Q Clear(g_c), s	17.1
Prop In Lane	0.38
Lane Grp Cap(c), veh/h	467
V/C Ratio(X)	0.89
Avail Cap(c_a), veh/h	467
HCM Platoon Ratio	0.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	26.3
Incr Delay (d2), s/veh	21.8
Initial Q Delay(d3),s/veh	0.0
%ile Back of Q (50%), veh/ln	9.8
Lane Grp Delay (d), s/veh	48.1
Lane Grp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	
Assigned Phs	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green Setting (Gmax), s	
Max Q Clear Time (g_c+l1), s	
Green Ext Time (p_c), s	
Intersection Summary	

HCM 2010 Signalized Intersection Summary

1: Murphy Road/Murphy Rd & W Airport Blvd

Build 2017 Mitigated
PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	194	487	1095	159	473	146	726	1341	104	213	1530	270
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	1	2	1	1	2	0	2	3	0	1	3	0
Cap, veh/h	245	685	306	208	460	141	758	1866	145	264	1377	241
Arrive On Green	0.14	0.19	0.00	0.12	0.17	0.17	0.22	0.39	0.39	0.15	0.32	0.32
Sat Flow, veh/h	1774	3539	1583	1774	2667	821	3442	4814	373	1774	4356	762
Grp Volume(v), veh/h	211	529	0	173	340	333	789	1027	544	232	1292	664
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1718	1721	1695	1797	1774	1695	1728
Q Serve(g_s), s	12.1	14.8	0.0	10.0	18.0	18.0	23.0	27.8	27.8	13.4	33.0	33.0
Cycle Q Clear(g_c), s	12.1	14.8	0.0	10.0	18.0	18.0	23.0	27.8	27.8	13.4	33.0	33.0
Prop In Lane	1.00		1.00	1.00		0.48	1.00		0.21	1.00		0.44
Lane Grp Cap(c), veh/h	245	685	306	208	305	296	758	1314	697	264	1071	546
V/C Ratio(X)	0.86	0.77	0.00	0.83	1.12	1.12	1.04	0.78	0.78	0.88	1.21	1.22
Avail Cap(c_a), veh/h	340	685	306	340	305	296	758	1314	697	306	1071	546
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.0	39.9	0.0	45.1	43.2	43.2	40.7	28.1	28.1	43.5	35.7	35.7
Incr Delay (d2), s/veh	14.9	5.5	0.0	8.9	86.3	89.9	43.8	4.7	8.5	22.1	101.6	113.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	6.3	7.1	0.0	5.0	15.3	15.1	14.4	12.0	13.4	7.5	28.8	31.1
Lane Grp Delay (d), s/veh	58.9	45.4	0.0	54.0	129.5	133.1	84.5	32.8	36.6	65.6	137.3	148.9
Lane Grp LOS	E	D		D	F	F	F	C	D	E	F	F
Approach Vol, veh/h		740			846			2360			2188	
Approach Delay, s/veh		49.2			115.5			50.9			133.2	
Approach LOS		D			F			D			F	
Timer												
Assigned Phs	7	4		3	8		5	2		1	6	
Phs Duration (G+Y+Rc), s	18.4	24.2		16.2	22.0		27.0	44.5		19.5	37.0	
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s	20.0	18.0		20.0	18.0		23.0	38.0		18.0	33.0	
Max Q Clear Time (g_c+I1), s	14.1	16.8		12.0	20.0		25.0	29.8		15.4	35.0	
Green Ext Time (p_c), s	0.3	0.8		0.3	0.0		0.0	7.9		0.2	0.0	
Intersection Summary												
HCM 2010 Ctrl Delay			89.0									
HCM 2010 LOS			F									
Notes												

LJA Engineering, Inc.

2929 Briarpark Drive
Suite 600
Houston, Texas 77042-3703

Phone 713 953 5200
Fax 713 953 5026
www.ljaengineering.com

October 15, 2014

FEE PROPOSAL

Charles Russell, PE
City Engineer/Assistant Director of Municipal Services
City of Stafford
2610 South Main
Stafford, Texas 77477

Re: Engineering Services for the
West Airport @ FM 1092 Intersection Improvements
LJA Fee Proposal No. 14-08244

Dear Mr. Russell:

LJA Engineering, Inc. (LJA) is pleased to present this fee proposal to provide comprehensive engineering services on the referenced project. Our work for this project will be completed under our current on-call agreement with the City dated November 13, 2008 and comply with the updated rate schedule approved by council on November 20, 2013.

We understand the City will be pursuing funding through the current HGAC 2015 TIP Call for Projects application process due December 15, 2014. The project generally consists of improving the intersection by:

- adding an eastbound left-turn lane, extending the west bound left-turn lane and improving signal timing
- adding an east bound right-turn only lane
- improving the south bound turning radius
- installing crosswalks and wheelchair ramps

Our conceptual construction cost estimate is approximately \$1,230,000.00 including 15% contingencies. This project will require an expansion of the existing bridge to accommodate the number of traffic lanes and sidewalks proposed.

Scope of Services and Associated Fee

Route and Design Study (Preliminary Layout)	\$ 4,100.00
Roadway Design Controls	\$ 18,000.00
Drainage Design	\$ 6,600.00
Signing, Pavement Markings and Signalization	\$ 28,600.00
Miscellaneous Roadway Items	\$ 17,300.00
Design Project Management	\$ 6,500.00
Bridge Design	\$ 84,000.00
Hydraulic Modeling	\$ 6,100.00
Construction Engineering (RFI's)	\$ 13,200.00
Sub-total	\$184,400.00

Geotechnical Investigation (2-80' bores, TxDOT stds)	\$ 14,500.00
Project Surveying	\$ 13,500.00
Environmental Study	\$ 21,200.00
Non-Salary Expenses	\$ 600.00
Sub-total	\$ 49,800.00

TOTAL FEE **\$234,200.00**

The geotechnical investigation will be provided by Terracon Consultants, Inc. as approved by the City. They will be a sub-consultant to LJA and the fee presented above includes a 10% mark-up pursuant to LJA policy for invoicing sub-consulting fees through LJA.

COMPENSATION

Based upon the Scope of Work listed above, LJA proposes to provide the items described above for a LUMP SUM price of \$234,200.00 including reimbursable cost. The City will be invoiced on a monthly basis on the percentage of each task completed. Any directive by the City not included in the work items above will be billed on a time and material basis per the approved rate schedule.

PROJECT SCHEDULE

LJA proposes to provide the items necessary to meet the HGAC 2015 TIP "Call for Projects" application process due December 15, 2014 being prepared by the City. LJA proposes to provide the PS&E documents; from the date authorization is received as follows:

• Concept design through 30% submittal plans	9 months
• 60% plan submittal	3 months
• 90% plan submittal	3 months
• 100% plan submittal to letting	4 months
 Total Concept Design to PS&E for letting	 19 months

ASSUMPTIONS

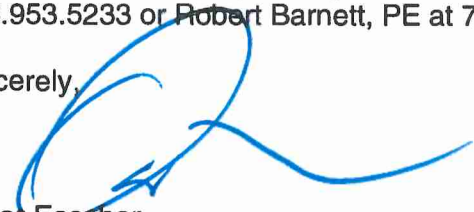
LJA made the following assumptions in the preparation of this proposal and fee estimate. Should any of these assumptions not be correct, LJA will negotiate an additional fee with the City of Stafford as necessary.

- LJA is not responsible for completing the TIP application to HGAC but will assist as design items are available.
- LJA has assumed existing plans for the roadways and utilities are available and Sub-surface Utility Engineering will not be required.
- Minor utility adjustment plans will be provided by LJA; any major utility adjustments will be provided by others or considered "extra work" if provided by LJA.

If this proposal meets with your approval, your signature below will be sufficient authorization to commence the stated work.

We appreciate the opportunity to submit this proposal, and look forward to working with you on completion of this project. If you have any questions please feel free to call me at any time at 713.953.5233 or Robert Barnett, PE at 713.953.5248.

Sincerely,



Omar Escobar
Director of Project Development



Robert Barnett, PE
Senior Project Manager

Accepted By City of Stafford

By: 

Title: City Engineer

Date: 10-20-14

OE/RB/pa

Attachment



Houston District
Project Development

Roadway:
Limits:
Project Length:
Estimate date:

West Airport at FM 1092
Fr 700' West to 700' East of FM 1092
1500 ft

Preliminary
Construction Cost
Estimate

Pavement	Item Description	Units	Avg Bid Price	Quantity	Cost
	Concrete Pavement	SF \$	7.00	18650.00	\$ 130,550.00
	Remove concrete pavement	SY \$	7.00	500.00	\$ 3,500.00
	Remove asphalt and stabilized base	SY \$	4.50		\$ -
	Subtotal Pavement				\$ 134,050.00

Structures	Item Description	Units	Avg Bid Price	Quantity	Cost
	Remove Bridge (0'-99')	each \$	20,000.00		\$ -
	Remove Bridge (100'-499')	each \$	20,500.00		\$ -
	Remove Bridge (500'-999')	each \$	50,000.00		\$ -
	Bridge (Concrete I-Beam)	SF \$	90.00	3900.00	\$ 351,000.00
	Bridge (Steel plate girder)	SF \$	155.00		\$ -
	Retaining wall	SF \$	30.00		\$ -
	Sound wall	LF \$	300.00		\$ -
	Rail (Type SSTR)	LF \$	30.00		\$ -
	Concrete traffic barrier	LF \$	30.00		\$ -
	Subtotal Structures				\$ 351,000.00

Earthwork	Item Description	Units	Avg Bid Price	Quantity	Cost
	Excavation (Roadway)	CY \$	6.00	1200.00	\$ 7,200.00
	Embankment	CY \$	8.00	1500.00	\$ 12,000.00
	Subtotal Earthwork				\$ 19,200.00

Traffic Systems	Item Description	Units	Avg Bid Price	Quantity	Cost
	Conventional both side lights	per mile \$	455,000.00		\$ -
	Conventional one side lights	per mile \$	228,000.00		\$ -
	Safety-underpass lighting	each \$	36,000.00		\$ -
	Signal(Single intersection)	Per Int \$	150,000.00	1.00	\$ 150,000.00
	Signal(Diamond Interchange)	Per Int \$	200,000.00		\$ -
	Signing Freeway - mainlanes	per mile \$	25,000.00		\$ -
	Signing Frontage roads- both sides	per mile \$	30,000.00		\$ -
	Signing other roadways	per mile \$	30,000.00		\$ -
	Striping Freeway 8 lanes	per mile \$	150,000.00		\$ -
	Striping Freeway 6 lanes	per mile \$	100,000.00		\$ -
	Striping Freeway 4 lanes	per mile \$	75,000.00		\$ -
	Striping rural frontage road-both sides-3 lanes	per mile \$	45,000.00	0.50	\$ 22,500.00
	Striping rural frontage road-both sides-2 lanes	per mile \$	30,000.00		\$ -
	Subtotal Traffic Systems				\$ 172,500.00

Hydraulics	Item Description	Units	Avg Bid Price	Quantity	Cost
	Storm Drains (4-lane curb and gutter)	per mile \$	800,000.00	0.20	\$ 160,000.00
	Storm Drains (6-lane curb and gutter)	per mile \$	2,700,000.00		\$ -
	Concrete Box culvert	LF \$	300.00		\$ -
	Regrade new ditch rural (2-lane with shoulders)	per mile \$	500,000.00		\$ -
	Regrade new ditch rural (4-lane with shoulders)	per mile \$	800,000.00		\$ -
	Subtotal Hydraulics				\$ 160,000.00

Other Items	Item Description	Units	Avg Bid Price	Quantity	Cost
	Prepare Right of Way (small project)	STA \$	5,000.00	0.25	\$ 1,250.00
	Prepare Right of Way (medium project)	STA \$	10,000.00		\$ -
	Prepare Right of Way (large project)	STA \$	26,500.00		\$ -
	Concrete Curb and Gutter Type II	LF \$	30.00		\$ -
	Concrete Rip Rap (4")	CY \$	300.00	50.00	\$ 15,000.00
	Metal Beam Guardfence	LF \$	30.00	200.00	\$ 6,000.00
	Sidewalk	LF \$	25.00	1200.00	\$ 30,000.00
	Crash cushion attenuator	each \$	1,800.00	2.00	\$ 3,600.00
	American with disabilities act (ADA) features	per mile \$	200,000.00		\$ -
	Landscaping	SF \$	3.00		\$ -
	Storm water pollution prevention plan (SW3P)	per mile \$	62,000.00		\$ -
	Traffic control (freeway reconstruction) complex	Month \$	50,000.00		\$ -
	Traffic control (freeway construction) major	Month \$	25,000.00		\$ -
	Traffic control (intermediate projects) (4 and 6 lane)	Month \$	15,000.00	6.00	\$ 90,000.00
	Traffic control (simple roadway reconstruction)	Month \$	2.00		\$ -
	Subtotal Other Items				\$ 145,850.00

ROW	Utility Relocation Cost	
	Additional Right-Of-Way (SF)	
	urban	\$ 75.00
	Additional Right-of-Way Cost	0.00

Subtotal Construction	\$	982,600.00
Mobilization(10%)	\$	98,260.00
Contingencies(15%)	\$	147,390.00
Const. ENG/PM (20%)	\$	196,520.00
Subtotal ROW	\$	-

Estimated Total Project Cost \$ 1,424,770.00

From: [Robert Barnett](#)
To: [Cristin Emshoff](#)
Cc: [Omar Escobar](#)
Subject: RE: Stafford Intersection Estimates
Date: Monday, June 02, 2014 6:31:21 PM
Attachments: [FM 1092 at AVE E Design & Const Schedule.xlsx](#)
[FM 1092 at West Airport Design Schedule.xlsx](#)
[SCOPE-FM 1092 at Ave E .docx](#)
[SCOPE-FM 1092 at West Airport.docx](#)
[Stafford Intersection Design PS&E Cost Estimate.xls](#)

Cristin,

Attached are the following

1. Schedules revised as we discussed on Friday (to add a Preliminary Design meeting and move the DCC into the fall).
2. The estimates with the amounts copied over into the summary sheets in exact TxDOT Function Codes (previously broken down by more common task names).
3. Scope of Services for each intersection listed in the same order as shown on the cost estimates.

We are still working on the construction cost estimates.

Regards

From: Robert Barnett
Sent: Friday, May 30, 2014 12:15 PM
To: 'Cristin Emshoff'
Cc: Omar Escobar
Subject: RE: Stafford Intersection Estimates

Cristin,

Attached are the project schedules for FM 1092 at West Airport and FM 1092 at Avenue E. These were revised to show PS&E preparation starting after the approval of the CE and right of way acquisition complete before the project is bid.

I have also attached the engineering cost estimates with hydraulic modeling added to the West Airport project.

That added about \$6000. I reduced another task by \$2,000 for a net difference of approximately \$4,000.

We will work on preliminary construction cost estimates.

Regards,

From: Cristin Emshoff [<mailto:cemshoff@cityofstafford.com>]
Sent: Thursday, May 29, 2014 10:51 AM
To: Robert Barnett
Subject: RE: Stafford Intersection Estimates

Thank you.

Cristin Emshoff
281-261-3921
cemshoff@cityofstafford.com

From: Robert Barnett [<mailto:rbarnett@ljaengineering.com>]
Sent: Thursday, May 29, 2014 9:25 AM
To: Cristin Emshoff
Cc: Omar Escobar; 'Charles Russell'
Subject: RE: Stafford Intersection Estimates

Cristin,

I discussed the timing of the CE with other project tasks this morning with Jeff Anderson, the environmental group manager at Klotz.

His interpretation of the interaction is as follows:

- TxDOT prefers the environmental document be approved before they spend time reviewing any PS&E work. There are exceptions and the local district will sometimes start reviewing projects that appear to be a sure thing to move forward.
- We will place a time slot of 6 months for preparation and approval of the CE. He thinks we can beat this time but it is a safe estimate.
- It is dangerous to acquire (or even negotiate on) right of way parcels before approval of the environmental document. So we will show right of way acquisition after approval of the CE.
- I think the "cleared ROW" term ties to the bid process. TxDOT does not want to bid a project before all right of way has been acquired or has gone far enough in the condemnation process that the state has the right of entry to construct on the property.

I will proceed with revising the schedules based on this information.

Robert W. Barnett, P.E.

Senior Project Manager

LJA Engineering, Inc.

2929 Briarpark Drive Suite 600

Houston, Texas 77042-3703

Phone 713-953-5200

Direct: 713-953-5248

Mobile: 281-615-9683

From: Cristin Emshoff [<mailto:cemshoff@cityofstafford.com>]
Sent: Wednesday, May 28, 2014 4:26 PM
To: Robert Barnett
Cc: Omar Escobar; 'Charles Russell'
Subject: RE: Stafford Intersection Estimates

Bob,

As discussed, please update the schedules for both the Avenue E project and West Airport for the TxDOT requirement that environmental documents are submitted before TxDOT will begin reviewing the projects (30%, 60%, 95%). Also, please verify if the ROW must be cleared before the CE can be submitted.

Charles will be discussing the design estimates with the Mayor. Even though the estimate won't change much, send me the updated design estimate for W Airport for the hydraulic study when that is complete. What is your rough cost estimate for construction?

In addition, we have another project we would like to consider for the budget next year. We need a design cost estimate and construction cost estimate to install sidewalks along Stafford/Staffordshire Rd from Cravens to Fifth St on the east side of the roadway. The preference is for 5' sidewalks throughout but 6' sidewalks from Fifth St to Scanlin because of the location to the school. There will be some tight areas just north of First St to US 90A because of the fences installed there that may require 4' sidewalks but only if necessary. There may also be tight ROW areas from Frank Ln to Cravens Rd. Since we don't want to install sidewalks on both sides of the roadway but do want to be continuous, the east side of the roadway is preferred because it looks as though we have the most ROW. Sidewalks can also be placed on the west side of the road if needed but it would be best if the switch happens at an intersection with a crosswalk. If you want a closer look at the city limits, access our GIS site here: <http://staffordpw.com/interactive-maps.html>

Please call if you need clarification. Thank you!

Cristin Emshoff
281-261-3921
cemshoff@cityofstafford.com

From: Omar Escobar [<mailto:oescobar@jaengineering.com>]
Sent: Friday, May 23, 2014 10:25 AM
To: Charles Russell
Cc: Cristin Emshoff (cemshoff@cityofstafford.com); Robert Barnett
Subject: Stafford Intersection Estimates

Charles

Here is where we are on our estimates

Bob thought that the bridge widening at West Airport will match existing and minimal H&H will be required and could be included in the design fee. Thus, we have not included any "impact" study.

Construction Phase Services are limited any shop drawings and assist with RFIs, it does not include project inspection and administration

I am out next week on vacation so we wanted to get you something to look at.

Please call Bob directly at the numbers below if you have any questions.

Enjoy Memorial Day

Thanks Omar

From: Robert Barnett
Sent: Thursday, May 22, 2014 5:59 PM
To: Omar Escobar
Subject: Stafford Intersection Estimates

Attached are the schedules and cost proposal.

The ROW surveying cost is based on \$3500 per parcel, a typical cost number provided by Keith Monroe.

The surveying cost is an estimate by me.

I am waiting on a final cost proposal from LJA Surveyors, but if we have to turn something in asap, this is a good estimate.

Robert W. Barnett, P.E.

Senior Project Manager

LJA Engineering, Inc.

2929 Briarpark Drive Suite 600

Houston, Texas 77042-3703

Phone 713-953-5200

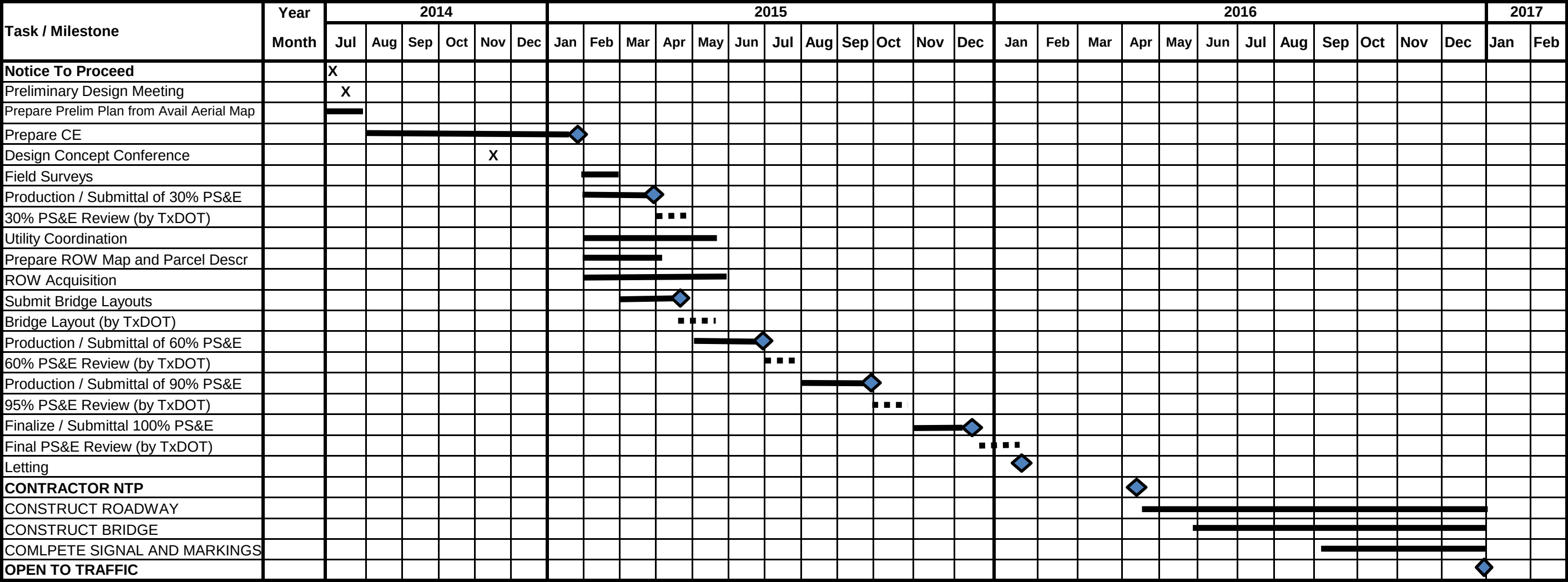
Direct: 713-953-5248

Mobile: 281-615-9683

**FM 1092 at West Airport
Intersection Design
Scope of Services**

1. Prepare preliminary intersection layout from available aerial photography to define the roadway footprint for the environmental study, design surveys and right of way surveys.
2. Prepare environmental document, assumed to be a CE from currently available information, in accordance with the attached environmental scope of services.
3. Perform design field surveys in accordance with TxDOT standards of practice.
4. Perform right of way surveys and prepare right of way plans and parcel descriptions in accordance with TxDOT standard practices.
5. Prepare roadway plans for widening West Airport in accordance with the preliminary plan in the FM 1092 Access Management Study and the preliminary intersection layout prepared in Item 1 above.
6. Prepare storm sewer adjustment plans to accommodate widened pavement.
7. Prepare Traffic signal plans and specifications.
8. Prepare signing and pavement marking plans for the intersection.
9. Prepare Traffic Control Plan for widening existing pavement at locations shown on the plans.
10. Prepare miscellaneous drawings including title sheet, index of sheets, storm water pollution prevention plan, summary of quantities, general notes, list of specifications,, construction cost estimate and construction contract time determination.
11. Prepare plans for widening of the West airport bridges to include filling in the existing open median and an outside widening to the south side of the eastbound lanes.
12. Perform Hydraulics calculations to evaluate the of impact of bridge widening on the existing drainage ditch
13. Provide limited construction phase engineering services to include attendance at Monthly progress meetings, checking of required shop drawings and submittals, assistance with requests for information and assistance with change orders if required.

FM 1092 AT WEST AIRPORT
Work Schedule





⊛ = connect sidewalk to signal

EXHIBIT D Development Plan

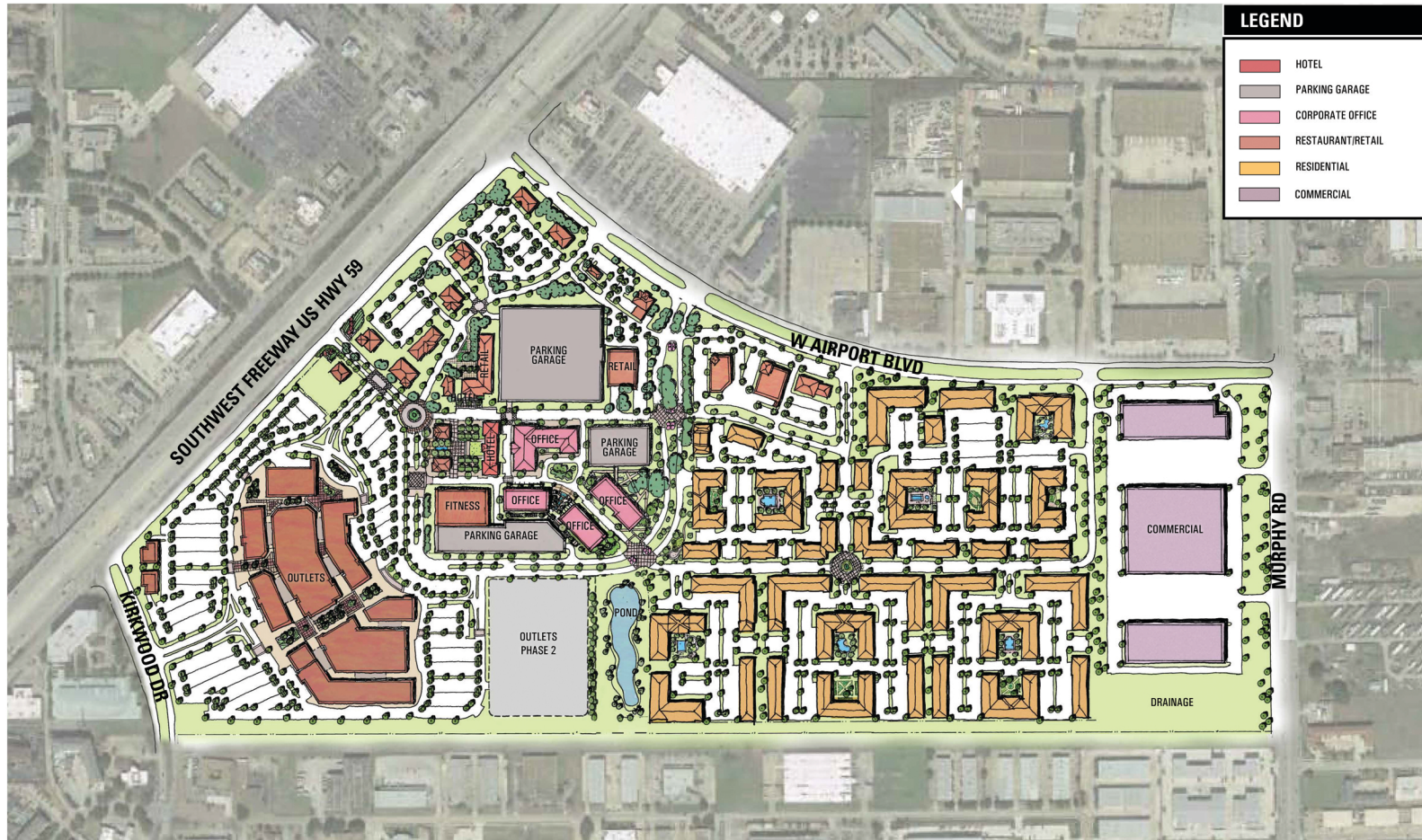
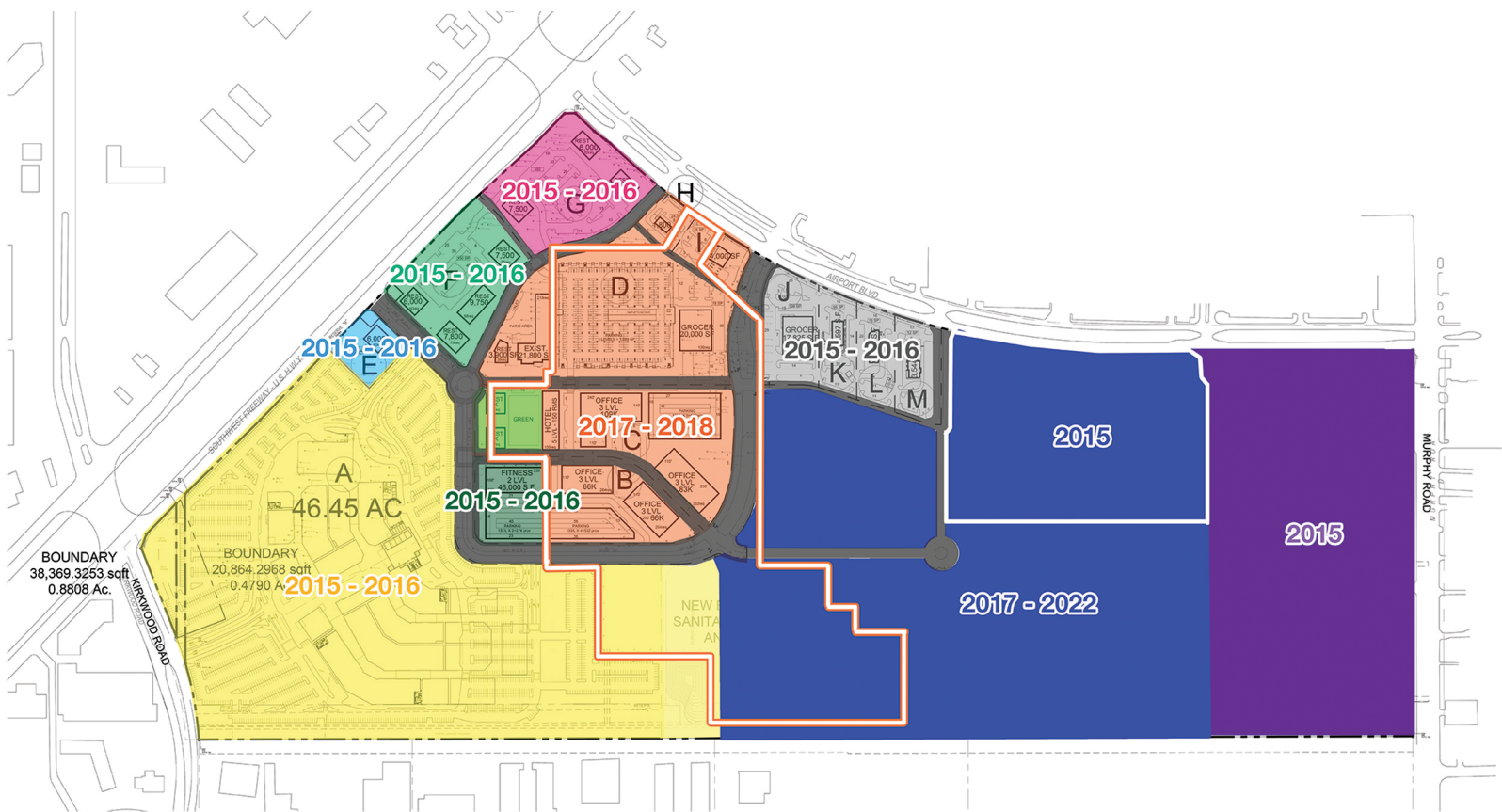


EXHIBIT D-2 Construction Schedule



FM 1092 (Murphy Rd) at West Airport Blvd Intersection Upgrades



Turn Lane



Sidewalk



Traffic Signal

1: Add Eastbound Left and Right Turn Lanes

2: 6 Foot Sidewalk, Connect to Future Development;
ROW Dedication with Development Agreement

3: Upgrade Signals From Span Wire to
Traffic Pole and Arm Configuration,
Improve Signal Timing

4: Add Westbound Through-Lane

5: Extend Existing Sidewalk from 4 Foot to 6 Foot

6: Extend Westbound Left Turn Lane

7: Connect Existing Sidewalks to Intersection,
Install Wheelchair Ramps, Crosswalks with Pavers
and Audible Pedestrian Countdowns

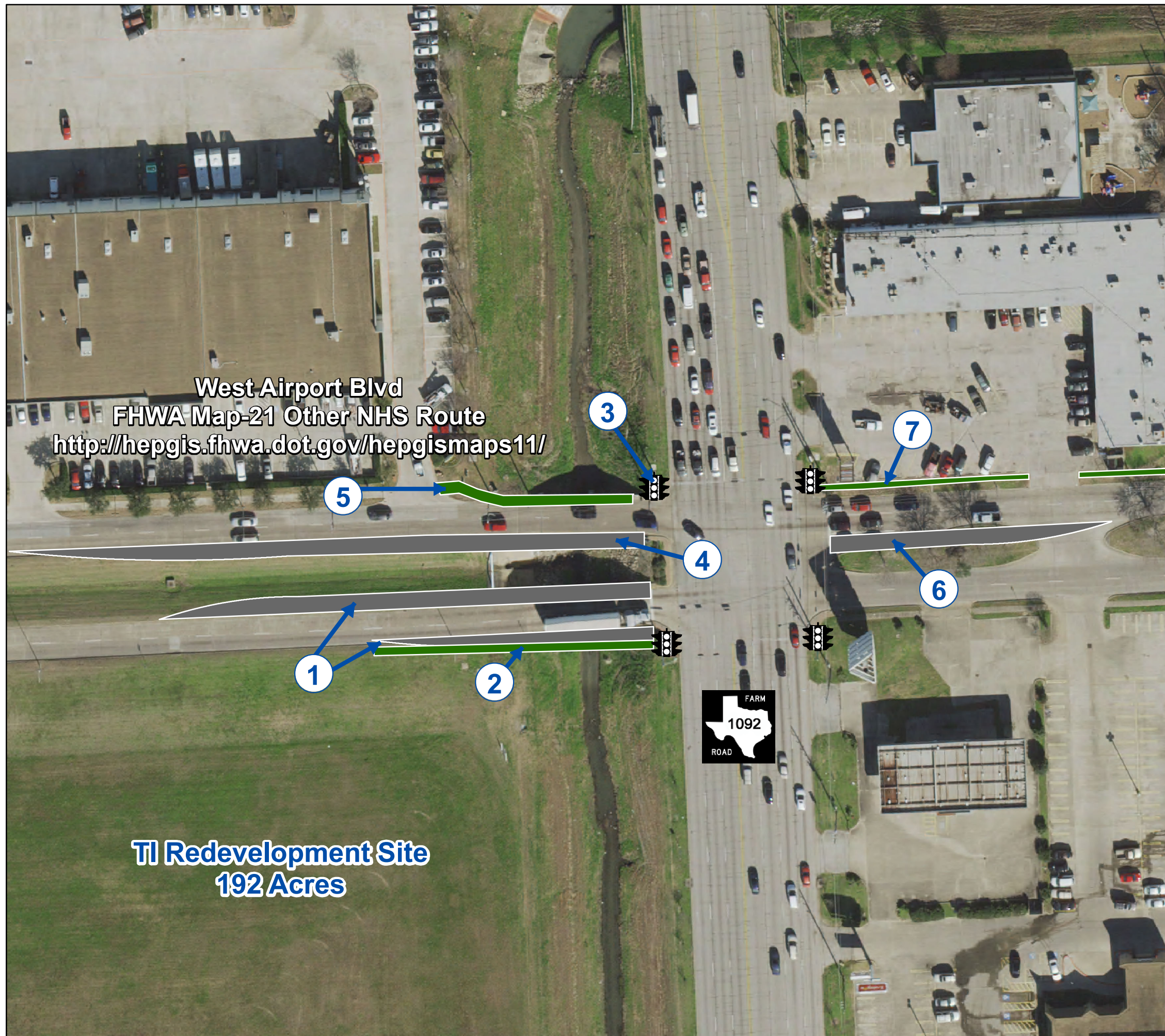
For Planning Purposes Only
Reference ROW Schematic for Additional Information

0 35 70 140
Feet

1 inch = 70 feet



Stafford Public Works
Maps and GIS

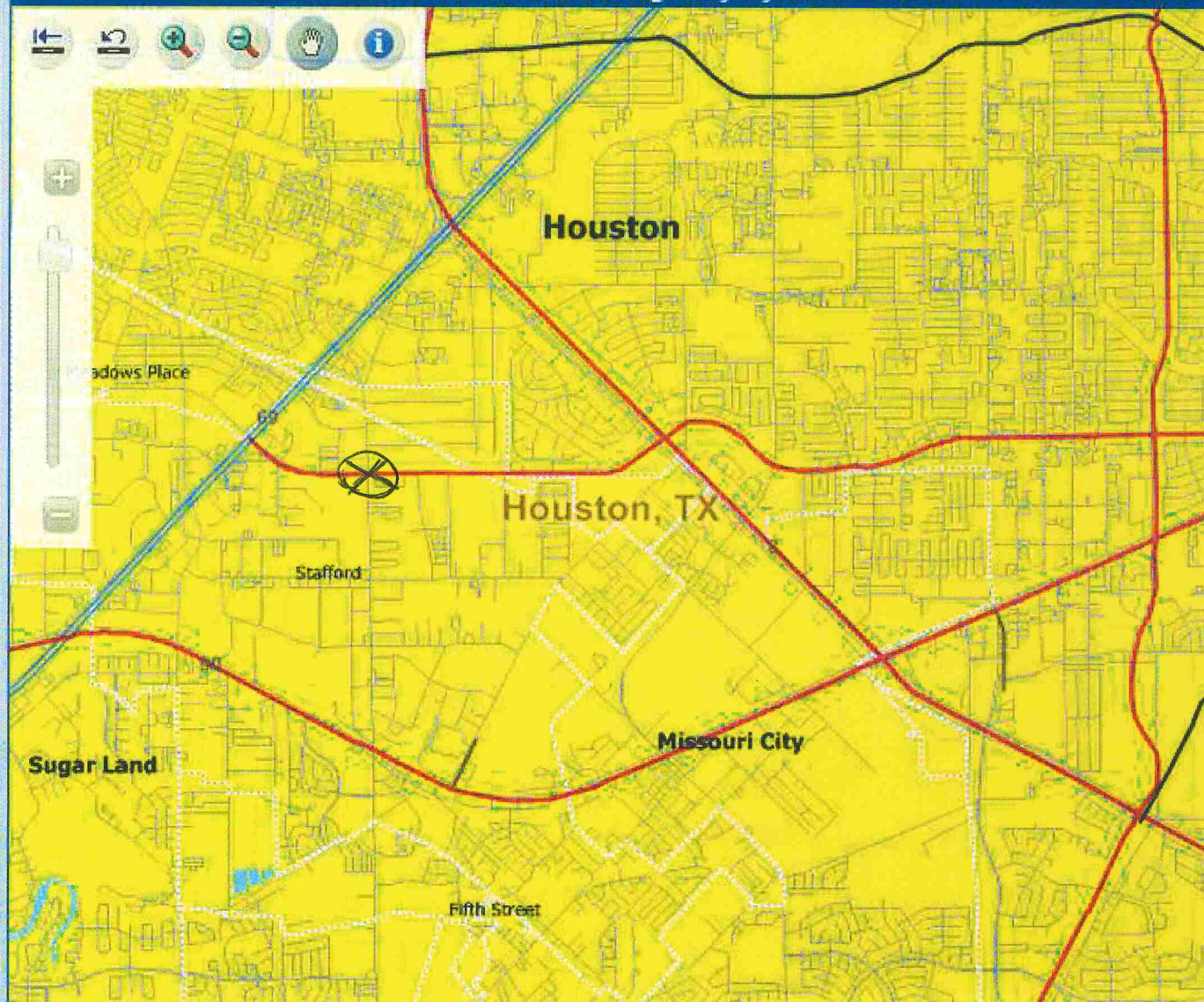




U.S. Department of Transportation Federal Highway Administration

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MAP-21 National Highway System

[Legend](#)[Layers](#)[Data](#)

Legend

2010 Urbanized Area

State Boundary

Streets

Census Place 2010

National Highway System (NHS)

Eisenhower Interstate System

Other NHS Routes

Non-Interstate STRAHNET Route

Major STRAHNET Connector

Intermodal Connector

Intermodal/STRAHNET Connector

Unbuilt NHS Routes

MAP-21 Principal Arterials

0 0.5 1 1.5

Miles

Updated: 08/25/14

Date: Effective October 1, 2012

Data Source:

FHWA Office of Planning, Environment and & Realty, please contact [Mike Neathery](#) for any questions related to MAP-21 NHS. You can also read FAQ at <http://www.fhwa.dot.gov/map21/qandas/qanhhs.cfm>

To download Map-21 NHS shapefile go to:
National Highway System

Please contact [Supin Yoder](#) if you have any questions.