TRAFFIC ANALYSIS

for

FM 2818 Schematic:
FM 2154 (Wellborn Road) Ramps to FM 60 (University Drive) Ramps

City of College Station, Texas

Prepared

for

City of College Station

and

Texas Department of Transportation

November 8, 2017

By

Binkley & Barfield, Inc.
consulting engineers
Texas Registration Number F-257

STATE OF TEXAS
BRADFORD K. BRIMLEY
125348
LICENSED
PROFESSIONAL ENGINEER

11/8/17

Bradford K. Brimley, Ph.D., P.E.

Table of Contents

Introduction **4**

Study Area **5**

Streets and Intersections 5

Traffic Volumes 8

Recent and Anticipated Development 10

Crash Analysis **10**

Projected Traffic Volumes **11**

Trip Generation 11

Distribution of New Trips From Known Developments 12

Alternatives Evaluated **22**

Alternative A: Raised Median 22

Alternative B: Raised Median and Additional U-turn Lanes 22

Alternative C: Raised Median and Hooded Left-Turns from FM 2818 22

Alternative D: Eliminate Holleman Drive Through Movement and Provide a Mid-block U-Turn 22

Alternative E: Eliminate Holleman Drive Through Movement with no U-Turn Provided 23

Alternative F: Continuous Flow Intersection (CFI) with Displaced Left Turns 24

Alternative G: Displaced Left Turns from FM 2818 and No Through on Holleman Drive 24

Alternative H: No Through or Left Turns From Side Streets 24

Intersection Capacity Analysis **25**

Analyses of Alternatives A through G 25

Summary of Alternatives A through G 29

Analysis of Alternative H 36

Summary of Alternative H 37

Alternative H - 2039 Queueing Analysis **41**

Recommendations **44**

Recommended Locations and Geometry of Right-Turn Deceleration Lanes 44

Geometry of Left-Turn and U-Turn Lanes 45

Remove the Ramp From Jones Butler Road to the FM 2818 Main Lanes 45

Conclusions **46**

Appendix **47**

List of Figures

Figure 1. Site Location 7
Figure 2. Peak Hour Volumes – Existing (2016) 9
Figure 3. Peak Hour Volumes – Background (2029) 13
Figure 4. Peak Hour Volumes – Background (2039) 14
Figure 5. Trip Distribution from Holleman Drive Study 15
Figure 6. Trip Distribution from Holleman Crossing Development 16
Figure 7. Trip Distribution from Park West Development 17
Figure 8. Trip Distribution from Wyndham Garden Hotel.....18
Figure 9. Volumes Added from Nearby Developments 19
Figure 10. Peak Hour Volumes – Design Year (2029) 20
Figure 11. Peak Hour Volumes – Design Year (2039) 21
Figure 12. U-turn for southbound through movements on Holleman Drive. 23
Figure 13. Southbound through movement accommodated with a left turn and access from Dowling Road. 23
Figure 14. Sample CFI traffic movement diagram. 24
Figure 15. Left-turn movements from FM 2818 in a CFI. 24
Figure 16. Mid-block U-turns provided to accommodate left-turn and through movements from side streets. 25
Figure 17. Peak Hour Volumes (2029) Redistributed for Super Street 38
Figure 18. Peak Hour Volumes (2039) Redistributed for Super Street 39
Figure 19. Simulated 2039 Average Maximum Queues 43

List of Tables

Table 1. Signalized Intersection Crashes: 2013 – 2015 10
Table 2. Unsignalized Intersection Crashes: 2013 - 2015 11
Table 3. Summary of Peak Hour Trips Added to FM 2818 Network 12
Table 4. AM Peak Hour Level of Service Analysis: Signalized Intersections.....30
Table 5. AM Peak Hour Level of Service Analysis: Unsignalized Intersections.....32
Table 6. PM Peak Hour Level of Service Analysis: Signalized Intersections.....33
Table 7. PM Peak Hour Level of Service Analysis: Unsignalized Intersections.....35
Table 8. AM Peak Hour Level of Service by Movement (Alternative H) 40
Table 9. PM Peak Hour Level of Service by Movement (Alternative H) 40
Table 10. Average Vehicular Delay Along Corridor in Alternative H 41
Table 11. Average Maximum Simulated Queue and Calculated Queue (feet).....42
Table 12. Minimum U-Turn Lane Dimensions 45
Table 13. Minimum Left-Turn Lane Dimensions.....45

TRAFFIC ANALYSIS
for
FM 2818 Schematic:
FM 2154 (Wellborn Road) Ramps to FM 60 (University Drive) Ramps
City of College Station, Texas

INTRODUCTION

The City of College Station and the Texas Department of Transportation plan to widen FM 2818 (Harvey Mitchel Parkway South) from the ramps at FM 2154 (Wellborn Road) to FM 60 (University Drive). Reconstruction of the corridor will modify the existing five-lane cross section comprised of two through lanes for each direction and a two-way left-turn lane median. In the process of determining a preferred alternative for how the corridor should be configured, Binkley and Barfield, Inc. (BBI) analyzed the traffic operations of the roadway under the current and possible future conditions. This report documents roadway operations under the following conditions with the identified design year:

- Existing – 2016
- Existing with planned improvements – 2016
- No Build – 2029
- Alternative A – 2029
- Alternative B – 2029
- Alternative C – 2029
- Alternative D – 2029
- Alternative E – 2029
- Alternative F – 2029
- Alternative G – 2029
- Alternative H – 2029
- Alternative H – 2039

Each alternative differs from another by how lanes are configured along the corridor, access is provided at key driveways, and/or the signal phasing used at signalized intersections. As part of the evaluation process, each configuration has been modeled in a traffic simulation to obtain measures of effectiveness used in the decision-making process. The preferred alternative results in the least amount of delay along the corridor while addressing safety concerns that have been identified in a crash analysis. Each alternative is briefly described below.

- Alternative A: A raised median throughout corridor with median openings only at signalized intersections. U-turns are allowed from traditional turn lanes at these locations.
- Alternative B: A raised median throughout the corridor with median openings only at signalized intersections. U-turn lanes are provided at Luther Street and at Holleman Drive adjacent to the left-turn lanes.
- Alternative C: A raised median throughout the corridor with median openings at signalized intersections and also hooded left-turn lanes at Canyon Creek Circle and the Parkway Place Apartments.
- Alternative D: A raised median throughout the corridor. At Holleman Drive, the through movement that crosses FM 2818 is eliminated. A mid-block U-turn is provided on FM 2818.

- Alternative E: A raised median throughout the corridor. At Holleman Drive, the through movement that crosses FM 2818 is eliminated. There is no mid-block U-turn provided.
- Alternative F: A raised median throughout the corridor. At Holleman Drive, the left-turn movements are displaced to create a continuous flow intersection (CFI).
- Alternative G: A raised median throughout the corridor. At Holleman Drive, the left-turn movements are displaced to create a continuous flow intersection, and the through movement crossing FM 2818 is eliminated.
- Alternative H: A super street with a wide median separating the two directions on FM 2818. The through and left-turn movements are eliminated from the signalized side streets. Mid-block U-turns are provided.

STUDY AREA

The study corridor extends along FM 2818 (Harvey Mitchel Parkway South) from the ramps at Wellborn Road (FM 2154) to Raymond Stotzer Parkway / University Drive (FM 60). In this study, the FM 2818 corridor is considered to be oriented in the east-west direction and the side streets extend north-south. The sections below describe the existing conditions along the corridor, the current traffic volumes, relevant development that is expected in the area, and an analysis of crashes along the corridor.

STREETS AND INTERSECTIONS

FM 2818 is classified as an expressway in the City Master Thoroughfare Plan (MTP) and contains five lanes along most of the study corridor; however, there is no median left-turn lane near the Wellborn Road (FM 2154) ramps. At this location FM 2818 operates as a freeway with grade separation over Wellborn Road with two main lanes for each direction. The posted speed limit is 55 mph.

Raymond Stotzer Parkway / University Drive (FM 60) is a four lane road with a posted speed limit of 55 mph. The road is identified as a proposed 6-lane major arterial on one side and a freeway/expressway on the other side in the City's MTP. Currently, the interchange of FM 2818 at Raymond Stotzer Parkway / University Drive is being reconstructed to have ramps configured as a "diverging diamond" to improve operations of the interchange.

George Bush Drive (FM 2347) is a four-lane divided roadway with a posted speed limit of 45 mph. George Bush Drive is classified as a four-lane major arterial on the City's MTP and is built to its full intended cross section. There are planned improvements at the intersection of FM 2818 at George Bush Drive that will increase the number of through lanes for each direction at the intersection to three and provide an additional eastbound left-turn lane on FM 2818 turning north onto George Bush Drive. The City's MTP identifies the intersection as a candidate for grade separation in the future.

Luther Street is a two-lane road defined in the City's MTP as a two-lane major collector. Though it currently terminates on the south side of the intersection at the Poultry Science Center, the MTP indicates the two-lane collector is to be extended south and east to Dowling Road.

The **Knightsgate Apartments** are located east of Luther Street on the south side of FM 2818.

Canyon Creek Circle provides access to FM 2818 for a townhome community. Canyon Creek Circle is located on the north side of FM 2818 and is the only access for the townhome community. On the south side of FM 2818 across from Canyon Creek Circle is the **Parkway Place** apartments complex.

The **Walden Pond Apartments** are located on the north side of FM 2818 to the west of Holleman Drive. On the opposite side of FM 2818 is the **2818 Place** apartment complex.

Holleman Drive is a two-lane undivided road north of FM 2818 and four-lane divided road south of FM 2818. The City MTP identifies the north portion as a proposed four-lane minor arterial. The south portion is built out to its identified classification as a four-lane minor arterial. There are planned improvements at the intersection of FM 2818 at Holleman Drive that will add a left-turn lane for the northbound to westbound movement.

Frontage roads are used on the east portion of the study corridor where FM 2818 contains a freeway segment with grade separated ramps at Wellborn Road. **Dowling Road** intersects the eastbound frontage road (**FM 2818 Eastbound Frontage Road**) and **Jones-Butler Road** intersects the westbound frontage road (**FM 2818 Westbound Frontage Road**). The Eastbound Frontage Road connects to the Westbound Frontage Road with a U-turn that passes under the FM 2818 main lanes.

See **Figure 1** for an aerial photograph of the area identifying the key roads and study locations along the FM 2818 corridor.

FM 2818 TRAFFIC STUDY FIGURE 1: AERIAL MAP	
SCALE: N/A	DATE: SEPTEMBER 2017
JOB NO.:	DWG. FILE:

Binkley & Barfield, Inc.
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West
College Station, Texas 77845
979.703.1809
www.binkleybarfield.com

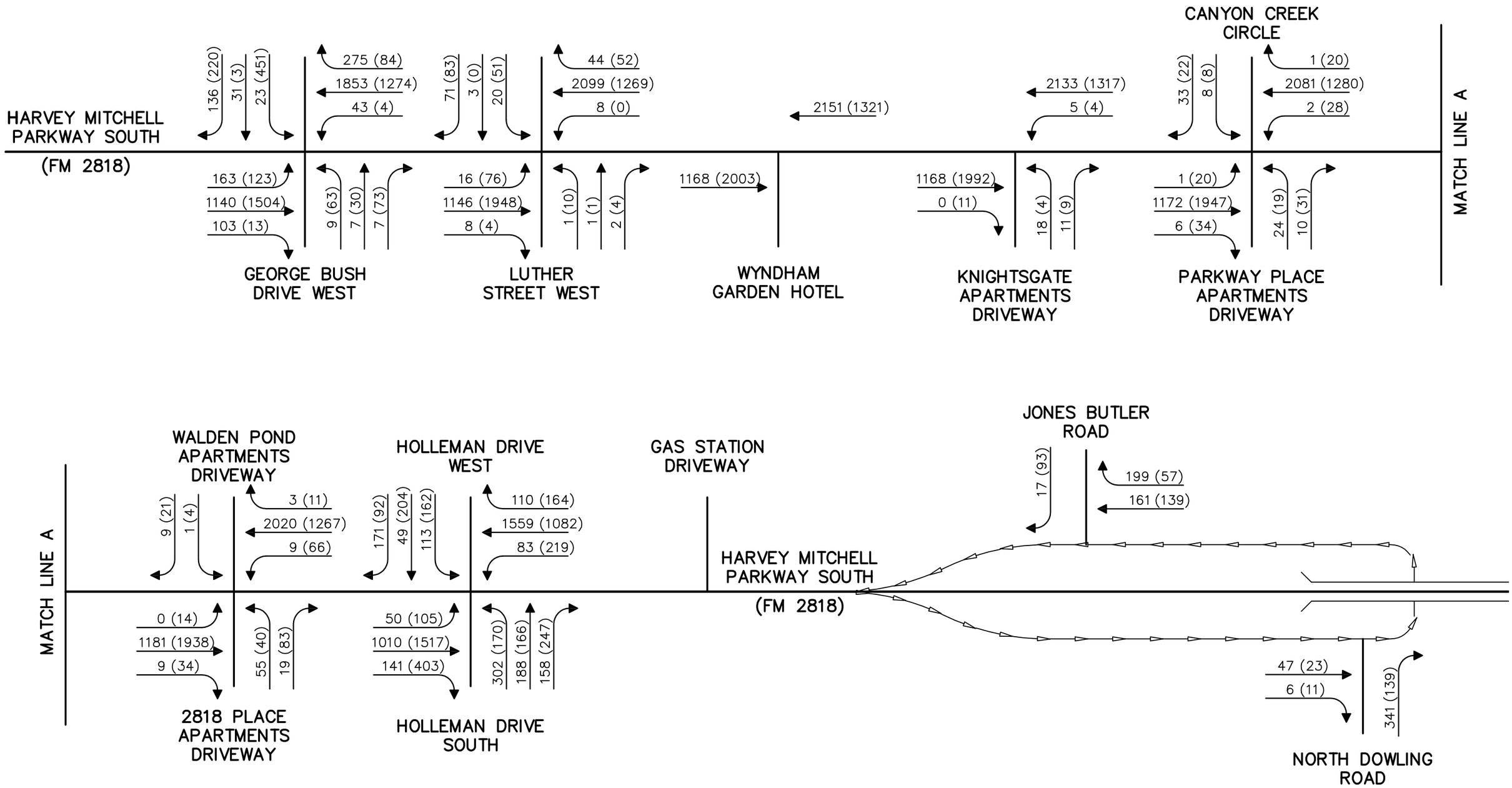
T:\155117_FM_2818_Schematic\2.03_Ent&Quant\Traffic\Aerial Map.dwg-Model Plotted Nov 04, 2016 at 5:23pm by bbrimley | Last Saved by: bbrimley

TRAFFIC VOLUMES

Traffic data were collected on March 29, 2016 and included 24-hour counts and AM and PM Peak Hour turning movement counts. The Peak Hours were identified within the 7 AM to 9 AM and 4 PM to 6 PM morning and afternoon periods. Traffic counts were collected during the AM and PM Peak Hours at the following intersections on FM 2818:

- George Bush Drive
- Luther Street
- Knightsgate Apartments
- Canyon Creek Circle / Parkway Place apartments
- Walden Pond Apartments / 2818 Place apartments
- Holleman Drive
- Dowling Road at FM 2818 Eastbound Frontage Road
- Jones-Butler Road at FM 2818 Westbound Frontage Road

Figure 2 identifies the AM and PM Peak Hour movements as observed in 2016.



LEGEND
XXX A.M. PEAK HOUR
(XXX) P.M. PEAK HOUR

FM 2818 TRAFFIC STUDY

PEAK HOUR VOLUMES - EXISTING (2016)

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #2

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #2 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley

RECENT AND ANTICIPATED DEVELOPMENT

Although most of the land along the FM 2818 corridor has been fully developed to its intended land use, there remains several areas that are experiencing growth. Texas A&M University (TAMU) recently announced it has surpassed enrollment of 60,000 students on the College Station campus and intends to continue growing. Part of that growth is reflected in the TAMU Park West student housing project located between Luther Street and George Bush Drive and adjacent to Penberthy Road and Jones Butler Road. The development will house approximately 3,400 students. Other anticipated or recently-completed projects in the area include The Retreat, located at the intersection of Jones-Butler Road and FM 2818 Frontage Road; the Wyndham Garden Hotel; Holleman Crossing; The Junction Cottages & Townhomes; and the Aspen Heights apartments. The latter three developments are all located on Holleman Drive South.

A recent study completed by BBI evaluated future traffic operations along Holleman Drive South that accounted for some of these and other anticipated developments. This study incorporates assumptions from that study, as identified later in this report.

CRASH ANALYSIS

An analysis of crashes along the FM 2818 corridor was completed to identify crashes that may be mitigated by the addition of a raised median. Crashes occurring between Wellborn Road and George Bush Drive reported over a three-year period (2013-2015) were analyzed. Of the 256 crash records that were reviewed, 114 crashes were found to be directly attributed to the study intersections. These 114 crashes were investigated to reveal critical patterns between the sites relevant to the left-turn movements. With the inability to make a left-turn movement at unsignalized locations, it is reasonable to assume that the crashes involving left-turns at these locations would be eliminated by the median barrier.

Results of the crash analysis are summarized in **Table 1** and **Table 2** for the signalized and unsignalized intersections, respectively. The left-turn crashes identified in **Table 1** and **Table 2** are specifically those that involve conflicting movements, and not side-swipe or rear-end collisions that are in the same direction of travel (even if in the left-turn lane). Crash diagrams with information from each reported collision at the study intersections are provided in the Appendix.

Table 1. Signalized Intersection Crashes: 2013 – 2015

Intersection	All Directions	Left-Turn Crashes With Conflicting Movements	
	Total Crashes	From FM 2818	Onto FM 2818
George Bush Drive	21	12 (57%)	1 (5%)
Luther Street	15	1 (7%)	1 (5%)
Holleman Drive	56	18 (32%)	5 (9%)
Total	**92**	**31 (34%)**	**7 (8%)**

Table 2. Unsignalized Intersection Crashes: 2013 - 2015

Intersection	All Directions	Left-Turn Crashes With Conflicting Movements	
	Total Crashes	From FM 2818	Onto FM 2818
TAMU Sewer Plant	1	0 (0%)	1 (100%)
Knightsgate Apts	2	0 (0%)	1 (50%)
Parkway Place Apts / Canyon Creek Circle	6	0 (0%)	4 (67%)
2818 Place Apts / Walden Pond Apts	12	2 (17%)	5 (42%)
Jones-Butler Road	1	0 (0%)	0 (0%)
Total	**22**	**2 (9%)**	**11 (50%)**

As shown in **Table 1**, 34% of the 92 crashes at signalized intersections are associated with left-turns from FM 2818 to the minor street. The patterns in crash frequencies are not likely to be reduced with a raised median because the proposed improvements include openings in the median at these locations. However, the proposed cross section includes three through lanes in each direction. With three lanes to cross and high opposing traffic volumes, it is unlikely that left-turns would operate in a permissive phase, and it is not recommended that they do so. By having protected-only phasing for the left-turns, the crash frequency for left-turns is likely to decrease as several crashes are due to motorists not yielding to oncoming traffic when completing left-turn maneuvers.

As shown in **Table 2**, 50% of the 22 reported crashes at unsignalized intersections are associated with left-turn movements onto FM 2818 from the minor road. In several instances, the crash reports indicate that traffic was stopped in only the outside lane when the responsible driver attempted to turn left through a gap in the stopped traffic. The collision occurred with a moving vehicle in the inside lane. For these cases, the drivers did not misjudge a gap in traffic, but visibility was restricted such that drivers were misled to think a left-turn was safe. Based on the tabulation in **Table 2**, at least 13 crashes over a three-year period (approximately 4 per year) will be reduced by the installation of a raised median.

Crash severity was not a key part of the crash analysis. However, there was one crash, out of the thirteen involving left-turns, that resulted in two fatalities, three incapacitating injuries, and two non-incapacitating injuries. The crash occurred at the Parkway Place Apartments on March 23, 2013. Nationally, 6.8% of all crashes involving left turns result in a fatality (as reported by the National Highway Traffic Safety Administration's *Traffic Safety Facts 2014*). One fatal crash out of thirteen left-turn crashes, as was observed on this corridor, is consistent with national trends.

PROJECTED TRAFFIC VOLUMES

Background traffic along the FM 2818 corridor was assumed to grow at an annual rate of 1%. A rate of 1% may be considered smaller than is typical, but was selected based on growth observed at similar locations in the area and because additional trips generated by surrounding developments are included as discussed below. The background traffic was grown over a period of 13 years and 23 years from 2016, to determine 2029 and 2039 traffic volumes that represent 10 or 20 years from project completion. **Figure 3** shows the resulting 2029 background traffic, and **Figure 4** shows the traffic grown through 2039. A design life of 10 years was assumed for the first Alternatives evaluated (A through G). Alternative H was evaluated at 10 and 20 years from opening.

TRIP GENERATION

The Holleman Drive South study completed by BBI assumed a very aggressive growth along the Holleman Drive corridor for the next 22 years. The growth in background traffic combined

with assumed development of land with urban land use led to equivalent annual growth rates of more than 5% at each intersection. Such aggressive growth produced a conservative analysis to ensure the corridor is designed to meet the future traffic demands.

It was determined that the forecasted traffic identified in the Holleman Drive South Report should be added to the traffic at and along FM 2818. Preliminary analysis indicated that there was not enough capacity for FM 2818 to manage all forecasted Holleman Drive traffic, even after implementing one of the proposed alternatives. To conduct an analysis that addresses some growth of the area, half of the trips generated from the Holleman Drive study were added to the network. The included volumes are summarized in **Table 3**.

In addition to the volumes from the Holleman Drive Study, new traffic generated from the TAMU Park West development, the Holleman Crossing apartments, and a forthcoming Wyndham Garden Hotel with adjacent restaurant were assumed to use the FM 2818 corridor. The assumed trips generated from the Holleman Crossing apartments were derived from a traffic impact analysis completed for Crystal Real Estate Development in August 2014 and are reprinted in **Table 3**. Trips generated from the Park West development were based on the number of apartment bedrooms with a 30% reduction for use of transit and walking proximity to the TAMU campus. Trips generated for the hotel and adjacent restaurant were calculated from assuming ITE Trip Generation rates for a hotel (130 beds) and a high-turnover sit-down restaurant (4,200 square feet). **Table 3** indicates the number of assumed trips generated.

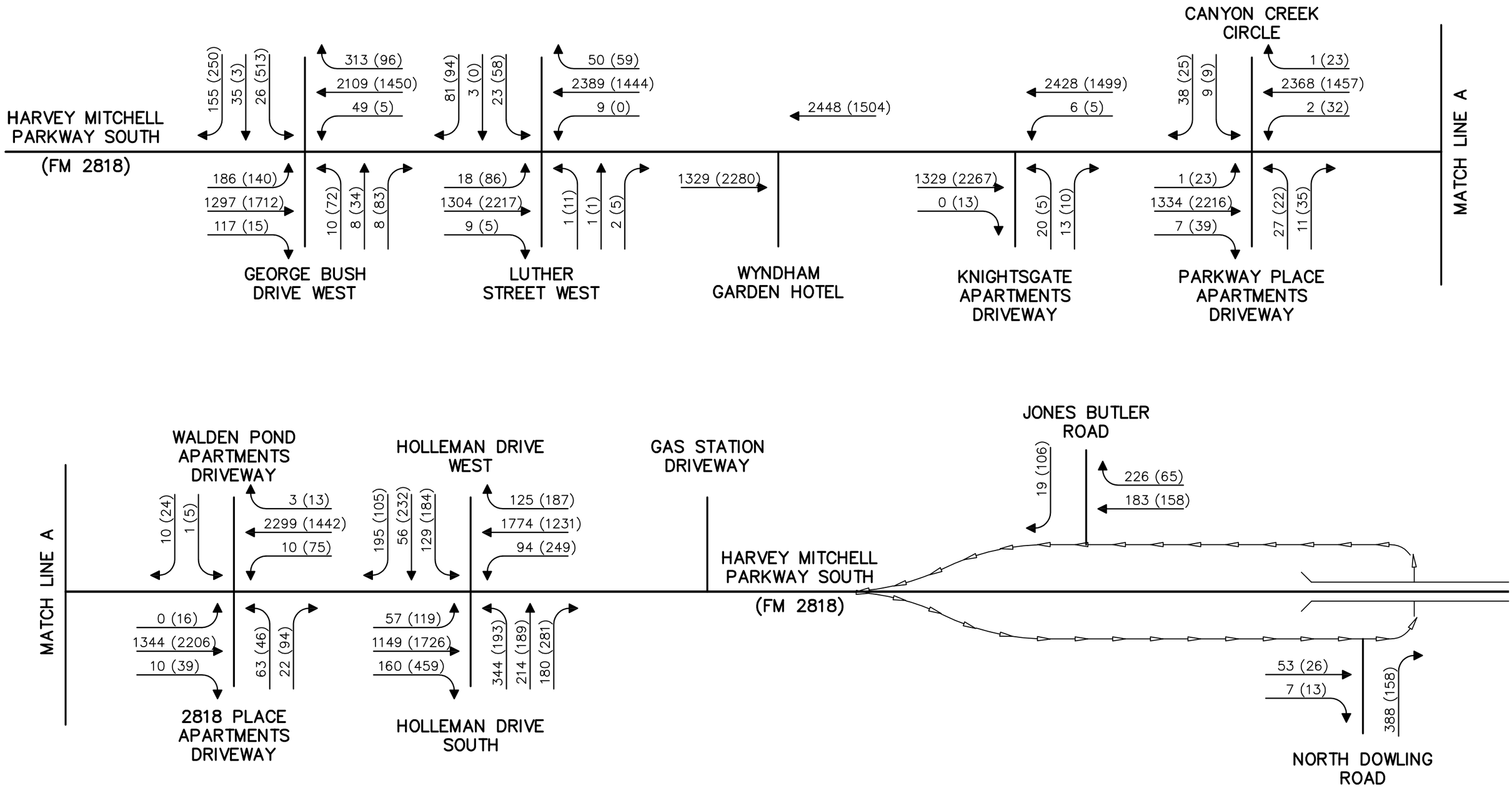
Table 3. Summary of Peak Hour Trips Added to FM 2818 Network

Generator	ITE Code	Size	AM Peak Hour Trips			PM Peak Hour Trips		
			Enter	Exit	Total	Enter	Exit	Total
Holleman Drive Study[1]	Mixed	-	424	592	1,016	655	605	1,260
Holleman Crossing[2]	Mixed	-	122	181	303	189	147	336
TAMU Park West	222	3,400 beds	84	440	524	347	129	476
Wyndham Garden Hotel	Mixed	-	66	48	114	65	54	119

Notes: [1] Represents 50% of 2038 forecasted traffic added to the Holleman Drive corridor determined in BBI study.
[2] Trip generation from TIA for Crystal Real Estate Development.

DISTRIBUTION OF NEW TRIPS FROM KNOWN DEVELOPMENTS

The trips generated from the Holleman Drive corridor, the Holleman Crossing development, the Park West housing project, and the Wyndham Garden Hotel were distributed throughout the road network based on the likely routes drivers will take to reach local attractions. Current traffic patterns helped identify appropriate distributions. **Figures 5** through **9** identify the distributions used and the resulting traffic added to the network background traffic. **Figure 10** shows the combined Peak Hour traffic for 2029 resulting from the growth of background traffic and the inclusion of trips generated from other developments. **Figure 11** shows the combined Peak Hour traffic for 2039.



LEGEND
XXX A.M. PEAK HOUR
(XXX) P.M. PEAK HOUR

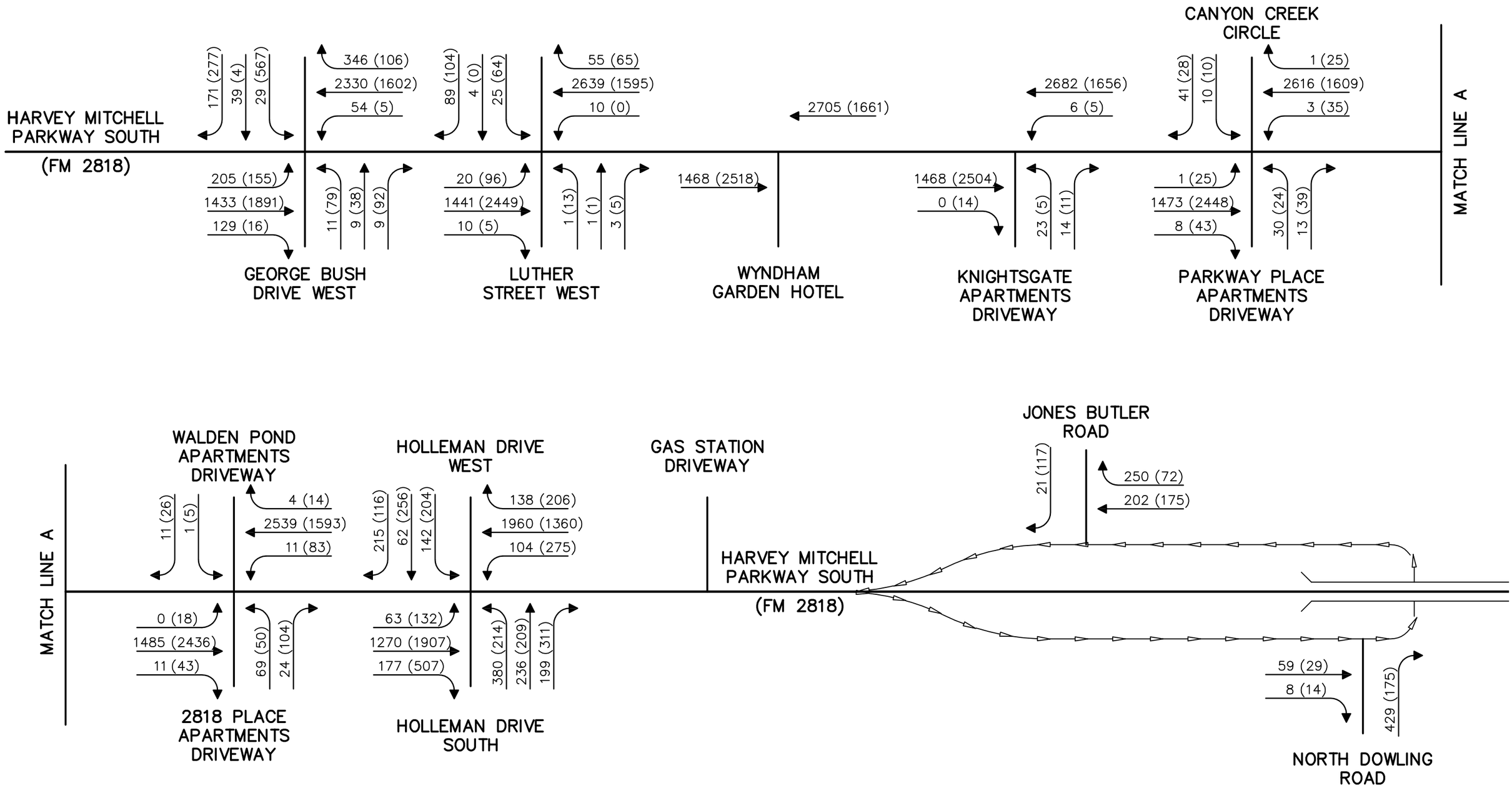
FM 2818 TRAFFIC STUDY

PEAK HOUR VOLUMES - BACKGROUND (2029)

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #3

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #3 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley



LEGEND
XXX A.M. PEAK HOUR
(XXX) P.M. PEAK HOUR

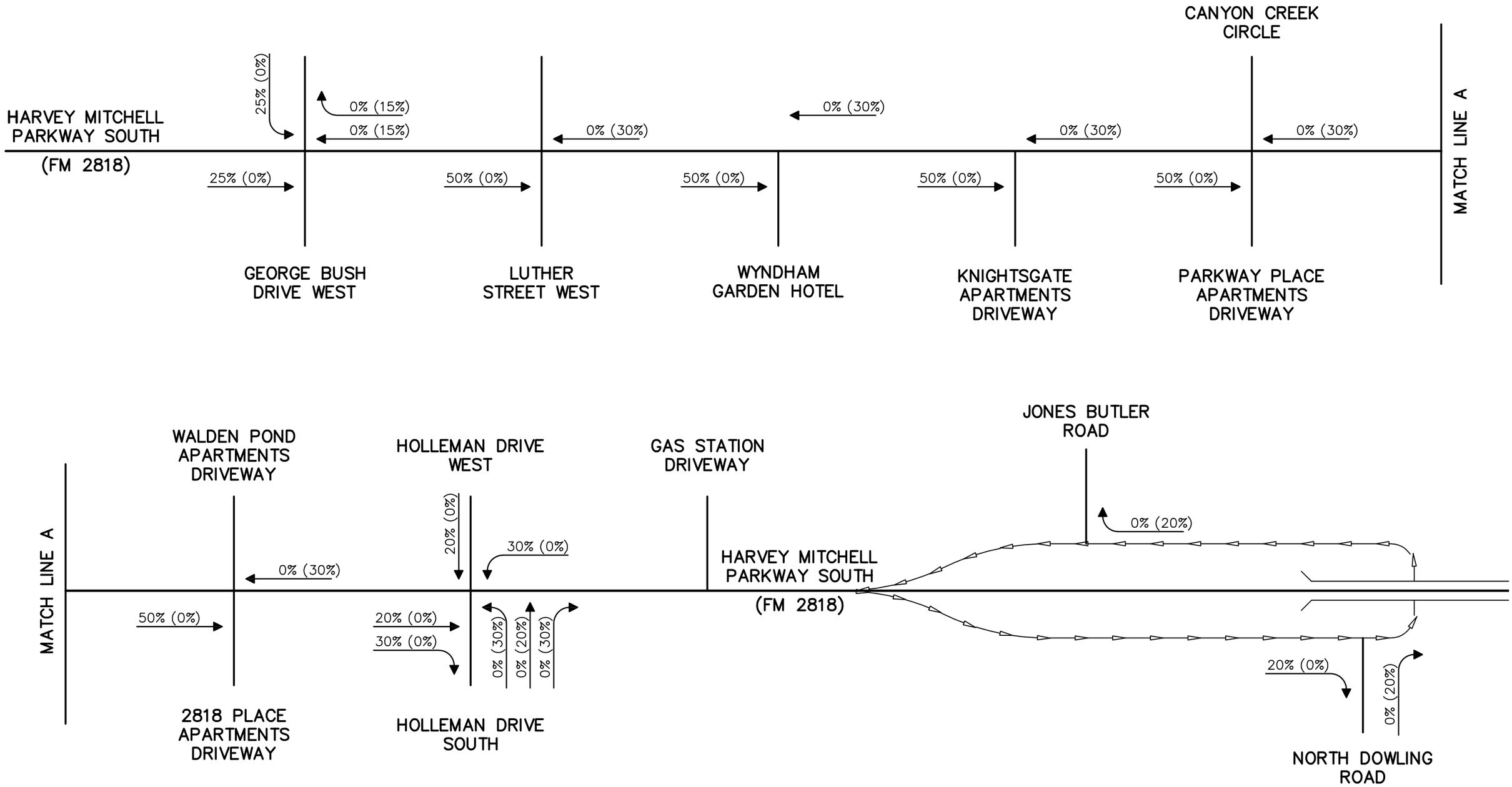
FM 2818 TRAFFIC STUDY

PEAK HOUR VOLUMES - BACKGROUND (2039)

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #4

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #4 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley



LEGEND
XX% INBOUND
(XX%) OUTBOUND

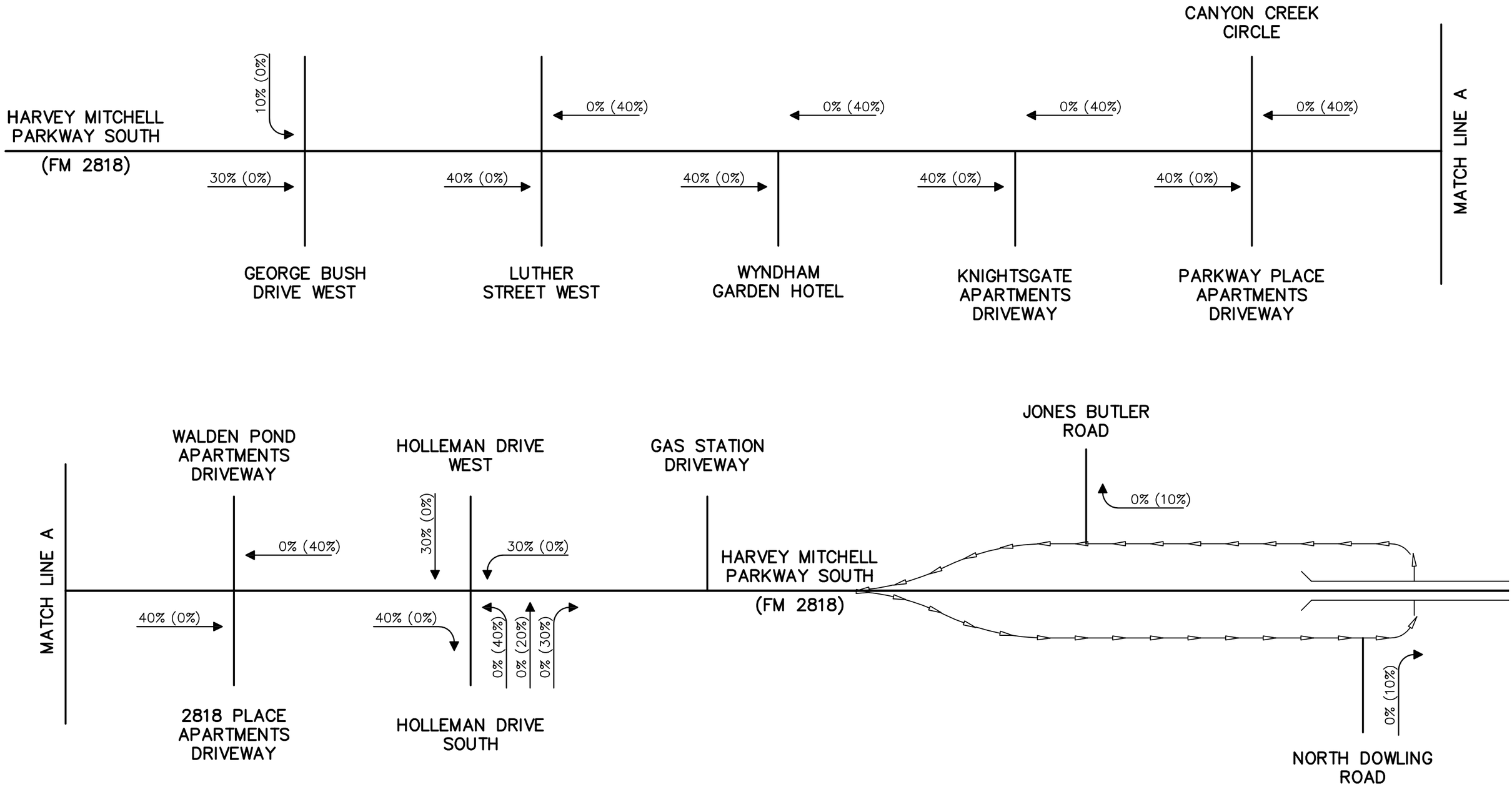
FM 2818 TRAFFIC STUDY

TRIP DISTRIBUTION FROM HOLLEMAN DRIVE STUDY

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #5

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #5 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley



LEGEND
XX% INBOUND
(XX%) OUTBOUND

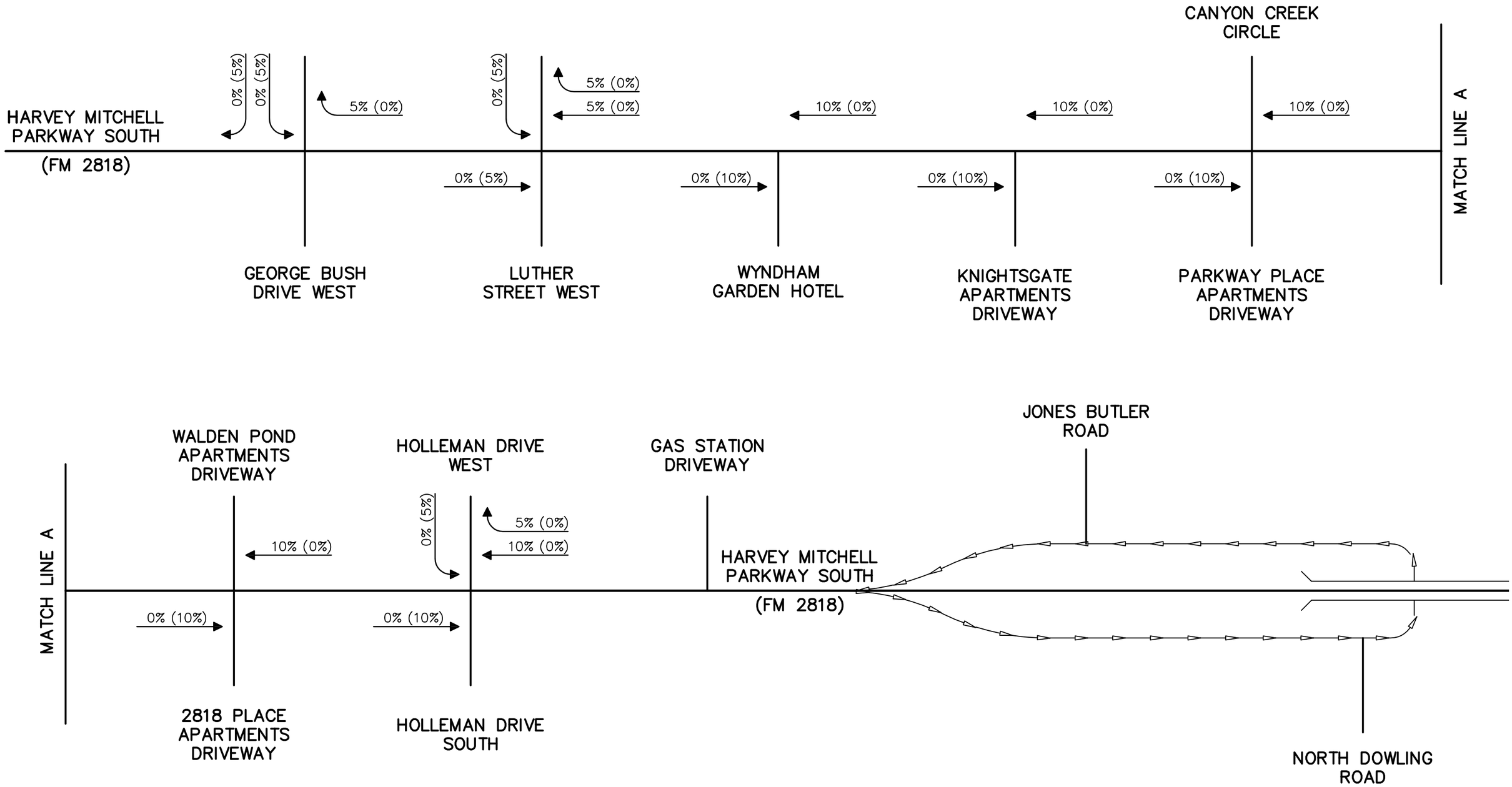
FM 2818 TRAFFIC STUDY

TRIP DISTRIBUTION FROM HOLLEMAN CROSSING DEVELOPMENT

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #6

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #6 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley



LEGEND
XX% INBOUND
(XX%) OUTBOUND

north

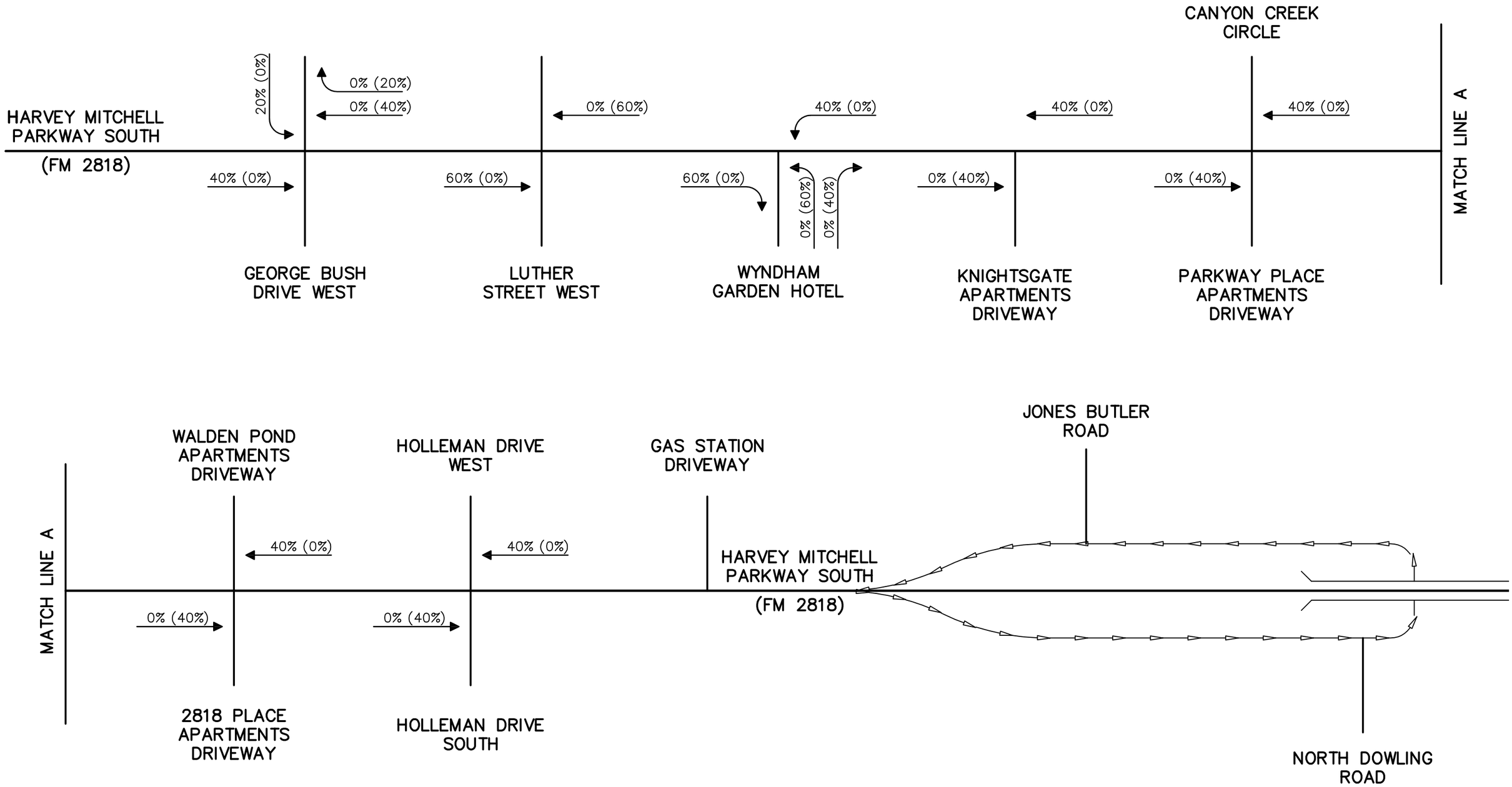
FM 2818 TRAFFIC STUDY

TRIP DISTRIBUTION FROM PARK WEST DEVELOPMENT

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #7

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #7 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley



LEGEND
XX% INBOUND
(XX%) OUTBOUND

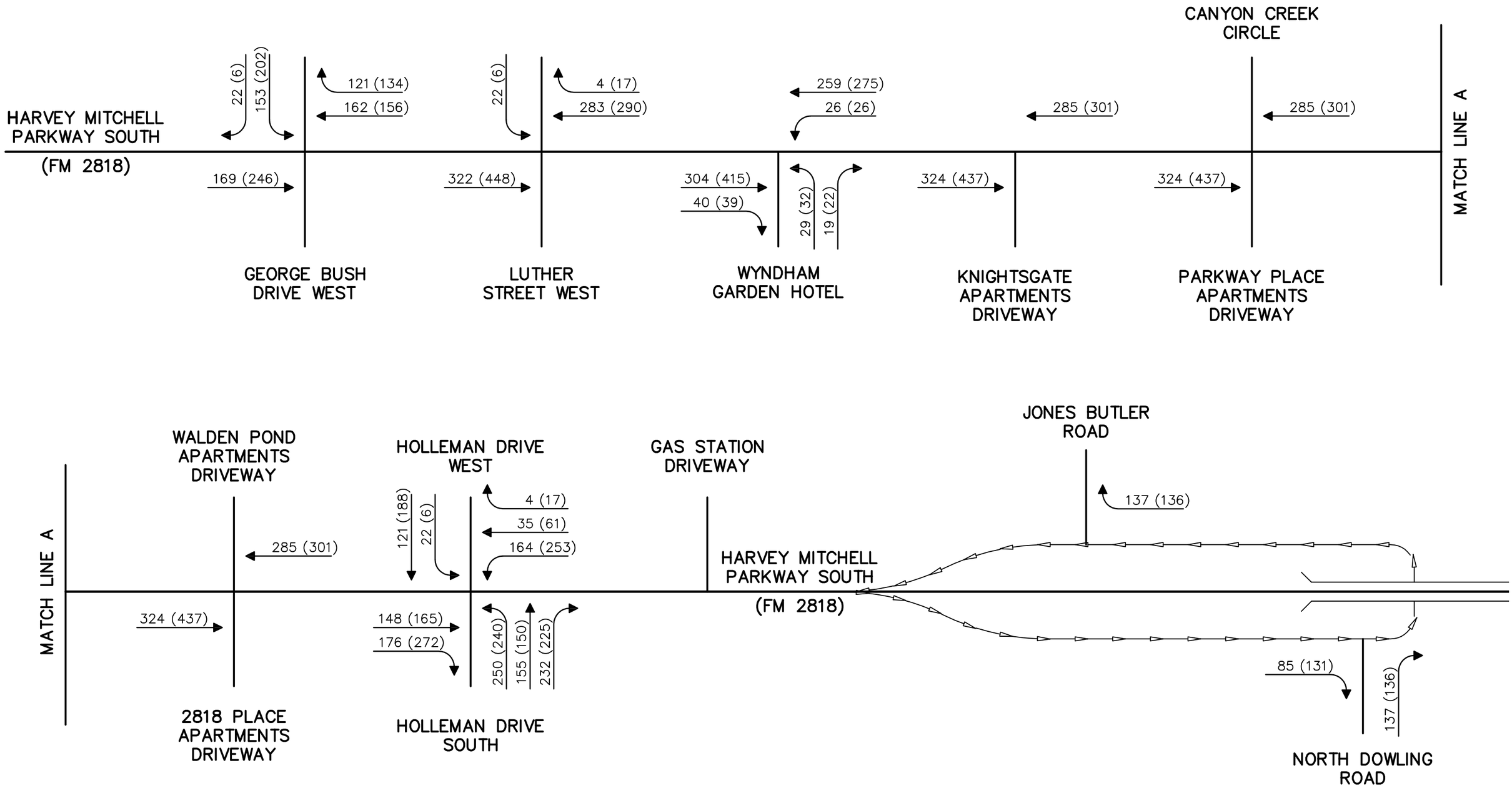
FM 2818 TRAFFIC STUDY

TRIP DISTRIBUTION FROM WYNDHAM GARDEN HOTEL

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #8

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jnoswell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #8 Plotted Sep 12, 2017 at 1:59pm by jnoswell | Last Saved by: bbrimley



north

LEGEND
XXX A.M. PEAK HOUR
(XXX) P.M. PEAK HOUR

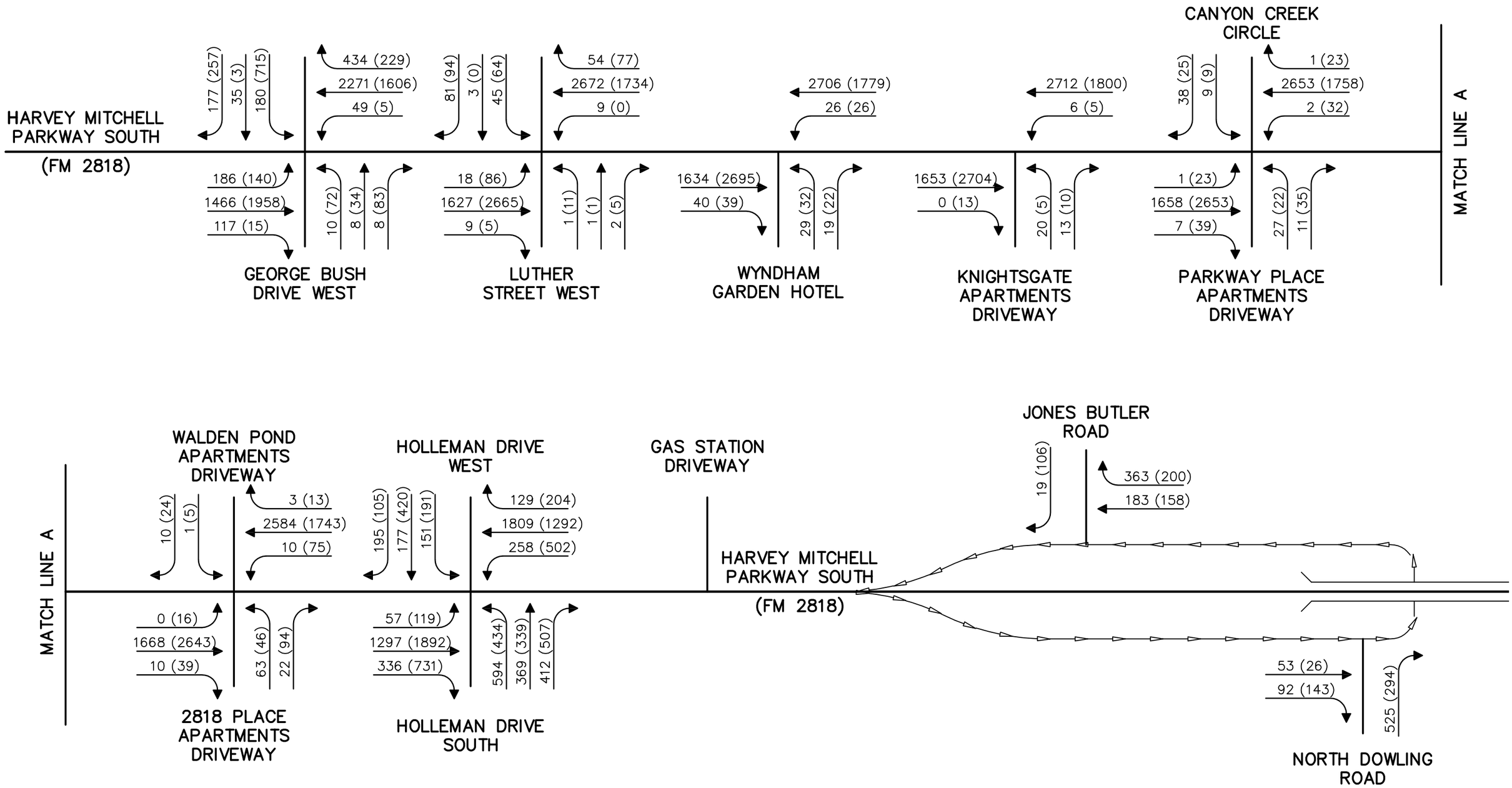
FM 2818 TRAFFIC STUDY

VOLUMES ADDED FROM KNOWN DEVELOPMENTS

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #9

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #9 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley



LEGEND
XXX A.M. PEAK HOUR
(XXX) P.M. PEAK HOUR

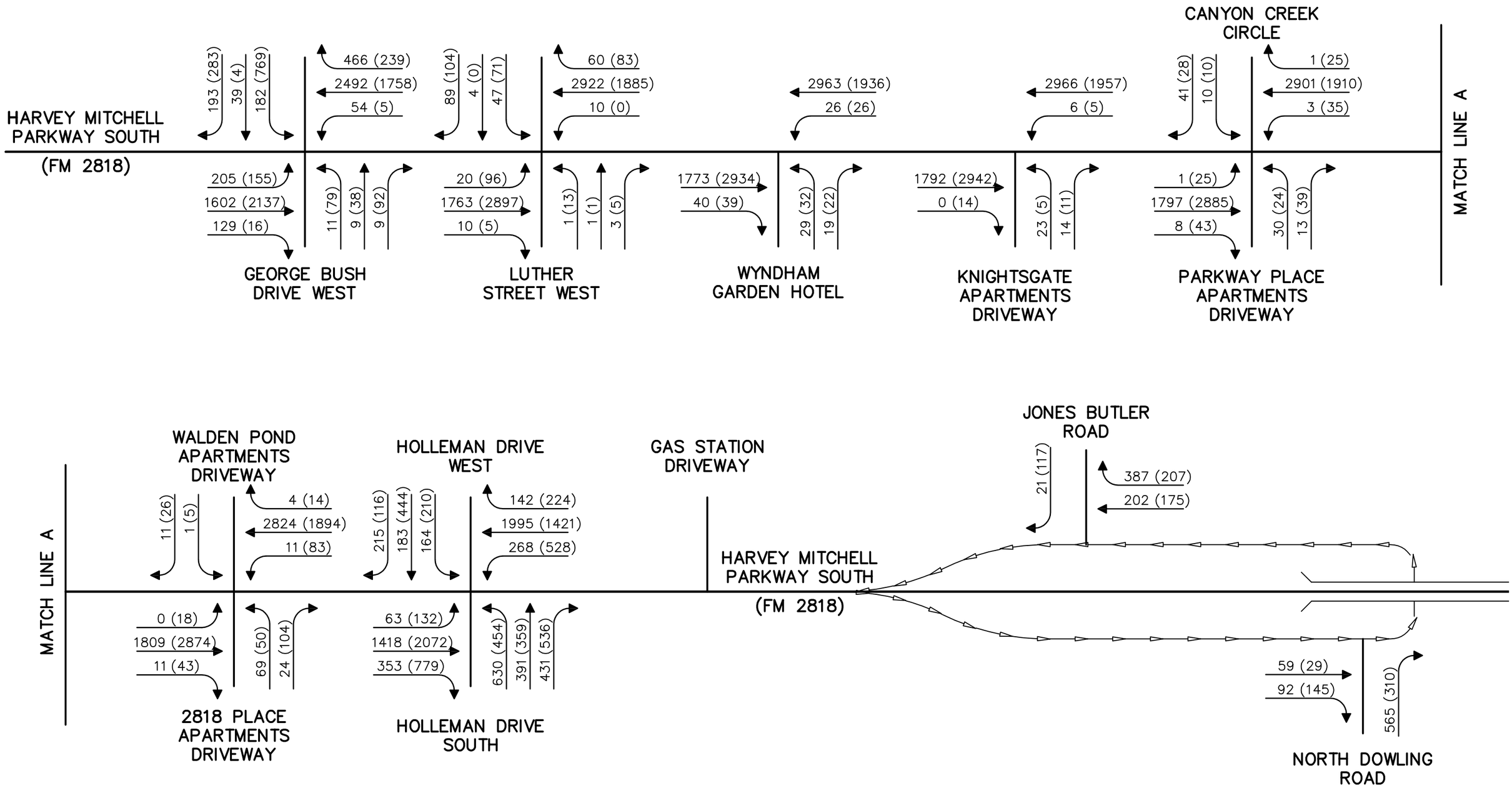
FM 2818 TRAFFIC STUDY

PEAK HOUR VOLUMES - DESIGN YEAR 2029

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #10

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #10 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley



LEGEND
XXX A.M. PEAK HOUR
(XXX) P.M. PEAK HOUR

FM 2818 TRAFFIC STUDY

PEAK HOUR VOLUMES - DESIGN YEAR 2039

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #11

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\jmaxwell\appdata\local\temp\AcPublish_1027\155117-FIGURES---REVISED.dwg-FIGURE #11 Plotted Sep 12, 2017 at 1:59pm by jmaxwell | Last Saved by: bbrimley

ALTERNATIVES EVALUATED

Each of the proposed alternatives in this study includes a six-lane cross section with a median along the corridor that restricts left-turn movements of unsignalized intersections. The alternatives differ in how left-turn and U-turn movements are accommodated and how the signalized intersections are phased. The alternatives are evaluated in terms of the resulting delay and level of service (LOS) at each intersection and the ability to reduce crashes at the unsignalized intersections.

ALTERNATIVE A: RAISED MEDIAN

Alternative A includes a raised median along the corridor with median openings at all signalized intersections. Left-turns and U-turns will be allowed from traditional turn lanes at these locations. The median will be closed at all unsignalized locations to prohibit all egress and ingress left-turns.

ALTERNATIVE B: RAISED MEDIAN AND ADDITIONAL U-TURN LANES

Alternative B includes a raised median along the corridor with median openings at all signalized intersections and an additional U-turn lane provided at Luther Street and at Holleman Drive. These U-turn lanes will allow motorists to reverse direction due to being diverted by the raised median.

ALTERNATIVE C: RAISED MEDIAN AND HOODED LEFT-TURNS FROM FM 2818

Alternative C provides median openings with left-turn lanes at all signalized intersections. Additional openings with hooded left-turns will be provided at Canyon Creek Circle and the Parkway Place apartments. The configuration of the hooded left-turn lanes will allow for left-turns from FM 2818 to these driveways, but not for left-turn movements onto FM 2818.

ALTERNATIVE D: ELIMINATE HOLLEMAN DRIVE THROUGH MOVEMENT AND PROVIDE A MID-BLOCK U-TURN

Alternative D eliminates the northbound and southbound through movement that crosses FM 2818. A signalized U-turn west of the intersection is provided for motorists intending to make a through movement in the southbound direction. Motorists would turn right at FM 2818, complete a U-turn at the proposed signal, then turn right at Holleman Drive as shown in **Figure 12**. It is expected that some diverted through traffic would turn left and use the frontage road exit at Dowling Road to connect to Holleman Drive. Northbound motorists intending to make a through movement would similarly turn right, but instead of a signalized U-turn, would use the frontage-road turn-around under the bridge at Jones Butler Road. It is likely that a large proportion of motorists intending to make a northbound through movement would eventually adjust their travel to avoid the intersection and exclusively use Dowling Road to connect at Jones Butler Road.

Figure 12. U-turn for southbound through movements on Holleman Drive.

ALTERNATIVE E: ELIMINATE HOLLEMAN DRIVE THROUGH MOVEMENT WITH NO U-TURN PROVIDED

It is expected that some motorists will use the frontage road turnaround at Jones Butler Road if the through movement is eliminated and only left-turns and right-turns are allowed. Southbound motorists can turn left, use the frontage road exit, and then turn right onto Dowling Road to continue to Holleman Drive as shown in **Figure 13**. Forcing all through movements to use this route only creates a longer travel distance for motorists along Holleman Drive. This proposed route is more direct than the U-turn provided in Alternative D for motorists connecting to areas along Holleman Drive to the south of the Dowling Road intersection.

Figure 13. Southbound through movement accommodated with a left turn and access from Dowling Road.

ALTERNATIVE F: CONTINUOUS FLOW INTERSECTION (CFI) WITH DISPLACED LEFT TURNS

Alternative D and Alternative E remove the northbound and southbound through movemetns that cross FM 2818 at Holleman Drive, thereby reducing one phase needed to be served during the signal's cycle. A continuous flow intersection (CFI) with displaced left turns removes left-turn movements from the main intersection to upstream signalized locations. This results in fewer conflict points at the main intersection and the elimination of the left-turn phase as the left-turn movments would then run concurrent with the through movements. Additional coordinated signals are used so that the displaced left turns cross the conflicting eastbound or westbound traffic with little interference. A simple configuration is shown in **Figure 14**. The left-turn movements applied to the intersection of FM 2818 at Holleman Drive are shown in **Figure 15**.

Figure 14. Sample CFI traffic movement diagram.

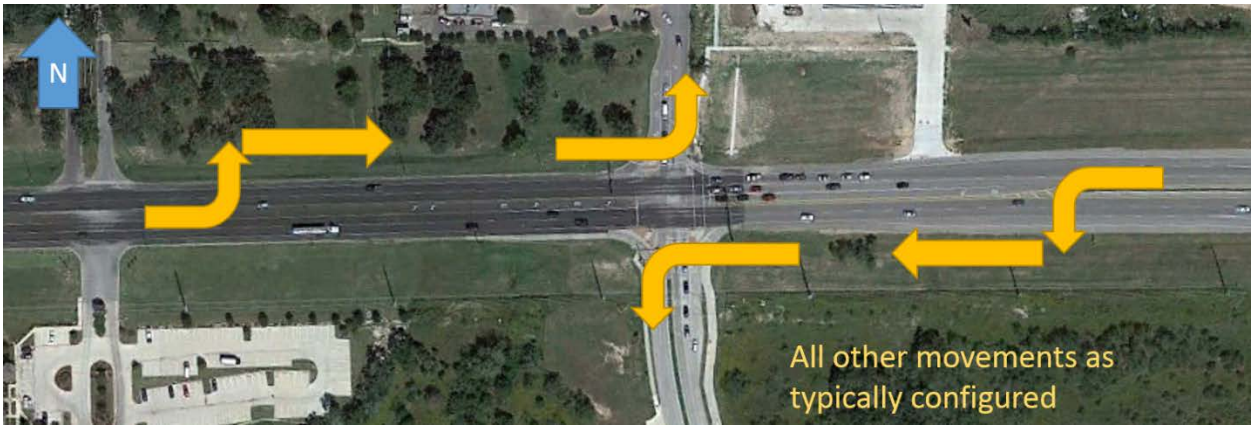


Figure 15. Left-turn movements from FM 2818 in a CFI.

ALTERNATIVE G: DISPLACED LEFT TURNS FROM FM 2818 AND NO THROUGH ON HOLLEMAN DRIVE

Alternative G is patterned after the CFI suggested in Alternative F, with the proposed change of eliminating through movements on Holleman Drive, as suggested by Alternative E. As shown in Alternative E, motorists intending to make a northbound or southbound through movement on Holleman Drive can use the connection at Dowling Road and the turnaround to Jones Butler Drive.

ALTERNATIVE H: NO THROUGH OR LEFT TURNS FROM SIDE STREETS

Alternative H is a super street concept that allows all movements from FM 2818 (left-turn, through, and right-turn movements) and only permits right-turn movements from the side streets. To accommodate the motorists intending to go through or turn left from the side street, mid-block U-turns are permitted at signalized locations. The result is a dramatic increase in efficiency for the main arterial by reducing the number of phases at the intersection to two

phases: one serving the main through movement and one serving both the left-turn movement from the arterial and the right-turn movement from the minor approach.

Figure 16. Mid-block U-turns provided to accommodate left-turn and through movements from side streets.

INTERSECTION CAPACITY ANALYSIS

Analyses of delay and resultant Levels of Service (LOS) of the study intersections were performed with Synchro and VISSIM software. The model inputs were the volumes identified in **Figures 10** and **11** and timing and phasing plans for the signalized intersections as currently used by the City, or phasing and timing that may be used if the phasing would change for an Alternative. The volumes at the study intersections were adjusted as necessary for any diverted movements.

Copies of the computer printouts and a description of the various levels of service have been included in the Appendix. Typically, the desirable levels of service are "A" through "D." Levels of service "E" and "F" are undesirable.

The findings and discussion of the analyses are divided into two groups. The first group contains Alternatives A through G, which were analyzed using Synchro. Upon reviewing the findings of the analyses, it was determined that Alternatives A through G did not provide adequate capacity for the traffic demands in 2029. Alternative H (a super street eliminating left-turns and through movements from the side streets) was subsequently evaluated as a more dramatic solution. Alternative H, recommended as the appropriate configuration for the corridor, was evaluated with VISSIM software. VISSIM provides a more-rigorous analysis and is appropriate for complex situations such as alternative intersections. The findings of the analysis of Alternative H, the super street, are discussed after those of Alternatives A through G.

ANALYSES OF ALTERNATIVES A THROUGH G

Alternatives A through G were evaluated with Synchro software. For Alternatives D through G, only the Holleman Drive intersection was analyzed and in the PM Peak Hour because it was determined that addressing the inadequate capacity at the Holleman Drive intersection was the key to addressing congestion throughout the corridor. The results of the capacity analyses for the study intersections of Alternatives A through G are summarized by approach in the following tables:

- **Table 4.** AM Peak Hour Level of Service Analysis: Signalized Intersections
- **Table 5.** AM Peak Hour Level of Service Analysis: Unsignalized Intersections
- **Table 6.** PM Peak Hour Level of Service Analysis: Signalized Intersections

- **Table 7.** PM Peak Hour Level of Service Analysis: Unsignalized Intersections

The summary tables contain results from analyses for the following conditions which are discussed below:

- Existing (2016)
    - Operations as currently observed using existing traffic volumes.
- Existing (2016) with Planned Improvements
    - Operations as forecasted following improvements planned at the Holleman Drive and George Bush Drive intersections.
- Future (2029) No Build
    - Operations using 2029 volumes and no changes made following the current planned improvements.
- Future (2029) Alternative A
    - Operations using 2029 volumes, planned improvements, 6-lane divided cross section with median openings, and turn lanes only at signalized intersections.
- Future (2029) Alternative B
    - Operations using 2029 volumes, planned improvements, 6-lane divided cross section with median openings, and turn lanes only at signalized intersections. Additional U-turn lanes are provided at the Holleman Drive and Luther Street intersections.
- Future (2029) Alternative C
    - Operations using 2029 volumes, planned improvements, 6-lane divided cross section with median openings, turn lanes only at signalized intersections, and hooded left-turn lanes provided at Canyon Creek Circle.
- Future (2029) Alternative D
    - Operations using 2029 volumes, planned improvements, 6-lane divided cross section with no through movement at Holleman Drive. The southbound through movement on Holleman Drive is accommodated by a mid-block U-turn west of the intersection.
- Future (2029) Alternative E
    - Operations using 2029 volumes, planned improvements, 6-lane divided cross section with no through movement at Holleman Drive. A mid-block U-turn is not provided.
- Future (2029) Alternative F
    - Operations using 2029 volumes, planned improvements, 6-lane divided cross section with a continuous flow intersection using displaced left-turns at Holleman Drive.
- Future (2029) Alternative G
    - Operations using 2029 volumes, planned improvements, 6-lane divided cross section with a continuous flow intersection using displaced left-turns at Holleman Drive. Through movements are not provided at Holleman Drive.

Existing (2016)

The analysis identified that the signalized intersections at George Bush Drive and at Luther Street operate at LOS D or better in the AM and PM Peak Hours. The intersection at Holleman Drive, however, currently operates at LOS E in the AM and PM Peak Hours. Of the unsignalized intersections, the northbound approaches at the Parkway Place Apartments and the 2818 Place Apartments experience failing levels of service in the AM and PM Peak Hours. The delay calculated for these movements is greater than 300 seconds, but it is likely that, in reality, motorists executing left-turns from the side streets use the two-way left-turn lane to split the turn into two maneuvers, or they accept smaller gaps than are applied by model assumptions. This

second reason is possible given the motorist demographics. Such behavior can lead to higher crash rates.

Existing (2016) with Planned Improvements
The Existing with Planned Improvements scenario focused on corridor operations with the intersections at Holleman Drive and at George Bush drive configured to how they will be constructed in the near future. The modifications at George Bush Drive will increase the number of through lanes at the intersection to three for each direction and provide an additional left-turn lane eastbound on FM 2818 turning north onto George Bush Drive. The modifications at Holleman Drive will add another left-turn lane for the northbound to westbound movement. This improvement creates dual northbound left-turn lanes.

There is a notable improvement in operations at George Bush Drive and at Holleman Drive with the planned improvements. The intersection at George Bush Drive operates at LOS B in the AM Peak Hour (instead of LOS D), reducing delay by an average of 28 seconds per vehicle. In the PM Peak Hour, the intersection operates at LOS C (instead of LOS D), with a reduction in 21 seconds of delay per vehicle. At Holleman Drive, the intersection is expected to operate at LOS D (improved from LOS E) in the AM Peak Hour, with 18 seconds of delay per vehicle less than under the existing conditions. In the PM Peak Hour, Holleman Drive operates at LOS D, with 20 seconds of delay per vehicle less than currently experienced.

Future (2029) No Build
While there are several locations with failing operations along the corridor in the Future No Build scenario, operations are notably poor at the Holleman Drive intersection. The intersection operates at LOS F during both AM and PM Peak Hours. Luther Street is expected to operate at LOS E during the AM Peak Hour, but LOS C in the PM Peak Hour. The intersection at George Bush Drive operates at LOS D or better during the AM and PM Peak Hours. The unsignalized intersections at the Parkway Place Apartments and at the 2818 Place Apartments have failing levels of service for the northbound approaches during both the AM and PM Peak Hours. The southbound approaches operate at LOS F during the PM Peak Hour. The long delays indicate that there are not enough gaps in the traffic to service the vehicles attempting to turn onto FM 2818.

Future (2029) Alternative A
With Alternative A, FM 2818 is widened to a 6-lane cross section and a raised median is installed along the corridor. Where drivers once made left-turns onto or from FM 2818, they now make an equivalent movement with a U-turn at either Holleman Drive or Luther Street. By prohibiting left-turns from the side streets at the unsignalized intersections, operations improve for those northbound or southbound movements as motorists are forced to execute right-turns. Only the Holleman Drive intersection operates at a LOS E or F.

Future (2029) Alternative B
With Alternative B, FM 2818 is widened to a 6-lane cross section and a raised median is installed along the corridor. Additional U-turn lanes are provided at Luther Street and at Holleman Drive to accommodate the increased demand in those lanes under Alternative A and Alternative C. It was found that the number of left-turns from the westbound approach at Luther Street was sufficiently small enough that, operationally, the U-turns can be managed sufficiently well without an additional U-turn lane as prescribed by Alternative B. Therefore, the lane configuration at Luther Street was altered to have the U-turns use the left-turn lane at that location as done with Alternative A or Alternative C. (Otherwise, the traditional left-turn lane is underutilized and unnecessary). With the addition of the U-turn lane at Holleman Drive, operations at the intersection remain at LOS E during the AM Peak Hour and LOS F during the

PM Peak Hour. The average delay experienced by drivers is shortened by about 5 seconds per vehicle in the AM Peak and 1 second per vehicle in the PM Peak.

Future (2029) Alternative C
With Alternative C, FM 2818 is widened to a 6-lane cross section and a raised median is installed along the corridor. A median opening is provided at Canyon Creek Circle / Parkway Place Apartments to allow for vehicles to turn left from FM 2818, but it is configured to prohibit left-turns from the side streets. The signalized and unsignalized intersections under Alternative C operate at comparable levels of service as when they are configured the same as Alternative A or Alternative B. The opening for hooded left-turns from FM 2818 operates at LOS B or LOS C, depending on the direction and the peak hour.

Mitigation 1 For Alternatives A through C
No proposed alternative results in a desirable level of service at Holleman Drive during either Peak Hour. While the additional through lanes reduce delay, the intersection still operates at LOS E or LOS F during the AM and PM Peak Hours. It was observed that the westbound left-turn movement experiences significant delay and queueing, and that mitigation on that approach may be the best option to increase capacity at the intersection and manage the demand. A dual-left-turn for the westbound approach is recommended as Mitigation 1. Alternatives A through C were re-analyzed to identify the effects on operations if a second left-turn lane is added.

The greatest benefits of the Holleman Drive mitigation are observed during the PM Peak Hour where, despite still operating at LOS F, the average delay per vehicle is reduced from approximately 133 seconds to less than 100. During the AM Peak Hour, the intersection still operates at LOS E for Alternative A and Alternative C, but improves to LOS D for Alternative B.

Future (2029) Alternative D
Alternative D was only evaluated at Holleman Drive for the PM Peak Hour. Alternative D reduces a phase at the intersection and diverts all through movements crossing Holleman Drive as right-turns that either use a midblock U-turn or the turnaround at Dowling Road and Jones Butler Road. The intersection in the PM Peak Hour operates at LOS D with nearly 45 seconds of delay per vehicle.

Future (2029) Alternative E
Alternative E does not provide a midblock U-turn like Alternative D provides. All vehicles intending to make a through movement on Holleman Drive crossing FM 2818 must use Dowling Road. The intersection still operates with one less phase and there is no noticeable improvement in level of service or delay compared to Alternative D.

Future (2029) Alternative F
The CFI intersection with displaced left-turns at Holleman Drive was forecasted to operate at LOS E in the PM Peak Hour with 64 seconds of delay per vehicle. The added efficiency of this intersection compared to the traditional configurations of Alternatives A through C comes from displacing the left-turns upstream of the intersection so they can be executed during the through phase on FM 2818.

Future (2029) Alternative G
Alternative G is a combination of Alternative E and Alternative F, producing a CFI at Holleman Drive that has no through movements crossing FM 2818. The result is another phase removed from the cycle. The forecasted delay for the 2029 PM Peak Hour is 56 seconds per vehicle, corresponding to LOS E.

SUMMARY OF ALTERNATIVES A THROUGH G

Operations along the corridor improve dramatically under the proposed configurations due to the increase in capacity for the through movements and the restricted left-turn movements. Most notable is the reduced delay experienced by drivers leaving the apartment complexes at unsignalized intersections. This reduced delay leads to improved safety because drivers are less likely to accept unsafe gaps. Comparing Alternative A, Alternative B, and Alternative C at the signalized intersections, there are primarily minor differences in level of service. From the level of service and calculated delay alone, Alternative B appears preferable. Additionally, Alternative C has vehicles making unprotected left-turns against three lanes of traffic with heavy volumes at the hooded left-turns. The result is long delays, especially when opposing the peak directional flow.

It should be noted that the intersection operations as analyzed in this study have been optimized to minimize the average delay experienced at the intersection. The optimization may force vehicles on one approach to experience very long delays compared to other approaches simply because it improves overall efficiency. The failing levels of service or long queues for specific approaches may be mitigated by adjusting the timing settings. This comes at the expense of overall efficiency, but is one method to address very localized issues. The results of the Queueing Analysis discussed in the next section supplement the findings of the capacity analysis by providing estimates of the lengths of the queues that form at the intersections. Long queues, especially for left-turns, should be a priority for mitigation as they can block other vehicles from making their intended turns.

Table 4. AM Peak Hour Level of Service Analysis: Signalized Intersections

Scenario	Eastbound			Westbound			Northbound			Southbound			INT
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
FM 2818 at FM 2347 (George Bush Drive)													
Existing (2016)	F	B	A	A	E	A	D			E	E	B	D
	82	18	1	6	56	3	50			65	74	19	38
Existing (2016) Planned Improvements	C	B	A	A	A	A	E	E	A	D	E	A	B
	22	17	1	2	7	0	60	59	0	53	55	4	11
Future (2029) No Build	C	C	A	A	B	A	F	E	A	E	E	A	C
	31	27	0	6	16	0	80	60	2	62	62	10	27
Future (2029) Alternative A	C	B	A	A	B	A	E	E	A	F	F	A	B
	31	19	1	6	12	0	61	59	0	93	92	10	17
Future (2029) Alternative B	C	B	A	A	B	A	E	E	A	F	F	A	B
	31	19	1	6	12	0	61	59	0	93	92	10	17
Future (2029) Alternative C	C	B	A	A	B	A	E	E	A	F	F	A	B
	31	19	1	6	12	0	61	59	0	93	92	10	17
FM 2818 at Luther Street													
Existing (2016)	A	A		A	C		D			E	B		B
	8	10		4	21		42			61	14		17
Existing (2016) Planned Improvements	A	B		A	B		D			E	B		B
	8	11		3	17		43			61	14		15
Future (2029) No Build	A	B		A	F		D			E	B		E
	5	15		1	117		46			73	14		74
Future (2029) Alternative A	A	A		A	A		D			E	B		A
	5	6		1	5		45			66	16		6
Future (2029) Alternative B	A	A		A	A		D			E	B		A
	5	6		1	5		45			66	16		6
Future (2029) Alternative C	A	A		A	A		D			E	B		A
	5	5		1	5		45			66	16		6

Note: Letters are level of service; numbers are average seconds of delay per vehicle

Table 4. AM Peak Hour Level of Service Analysis: Signalized Intersections (Continued)

Scenario	Eastbound				Westbound			Northbound			Southbound			INT
	UT	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
FM 2818 at Holleman Drive														
Existing (2016)	-	B	B	A	B	D	A	F	F	B	F	E	C	E
	-	16	19	4	16	54	1	248	80	13	149	67	22	57
Existing (2016) Planned Improvements	-	B	B	A	C	D	A	E	F	A	F	E	A	D
	-	15	12	0	22	42	1	80	125	5	149	65	8	38
Future (2029) No Build	-	B	E	A	F	F	A	F	F	E	F	F	A	F
	-	16	55	0	180	142	0	195	219	69	84	196	4	113
Future (2029) Alternative A	-	F	D	A	F	E	A	F	F	C	F	F	A	E
	-	130	37	0	96	69	1	96	96	35	95	134	4	62
Future (2029) Alternative B	F	E	D	A	F	E	A	F	F	C	F	F	A	E
	146	70	37	0	110	56	1	96	85	33	95	112	4	57
Future (2029) Alternative C	-	F	D	A	F	E	A	F	F	C	F	F	A	E
	-	126	37	0	96	64	1	96	96	35	95	134	4	62
Future (2029) Alternative A – Mit 1	-	F	C	A	E	E	A	F	F	C	F	F	B	E
	-	140	22	4	67	69	1	96	96	22	95	134	4	57
Future (2029) Alternative B – Mit 1	F	E	C	A	E	E	A	F	F	C	F	F	A	D
	143	65	23	4	67	56	2	96	85	28	95	112	10	52
Future (2029) Alternative C – Mit 1	-	F	C	A	E	E	A	F	F	C	F	F	A	E
	-	140	23	4	67	69	1	96	96	22	95	134	4	57

Note: Letters are level of service; numbers are average seconds of delay per vehicle

Table 5. AM Peak Hour Level of Service Analysis: Unsignalized Intersections

Scenario	Northbound		Eastbound		Westbound		Southbound	
	LT	RT	LT	TH/RT	LT	TH/RT	LT	RT
FM 2818 at Knightsgate Apartments								
Existing (2016)	D		-	A	A	A	-	
	30		-	0	10	0	-	
Existing (2016) Planned Improvements	D		-	A	A	A	-	
	31		-	0	10	0	-	
Future (2029) No Build	D		-	A	A	A	-	
	31		-	0	10	0	-	
Future (2029) Alternative A	-	B	-	A	-	A	-	
	-	12	-	0	-	0	-	
Future (2029) Alternative B	-	B	-	A	-	A	-	
	-	12	-	0	-	0	-	
Future (2029) Alternative C	-	B	-	A	-	A	-	
	-	12	-	0	-	0	-	
FM 2818 at Canyon Creek Circle / Parkway Place Apartments								
Existing (2016)	**F**		C	A	A	A	D	
	>300		16	0	10	0	30	
Existing (2016) Planned Improvements	**F**		C	A	A	A	D	
	>300		16	0	10	0	30	
Future (2029) No Build	**F**		C	A	A	A	D	
	>300		16	0	10	0	30	
Future (2029) Alternative A	-	B	-	A	-	A	-	C
	-	12	-	0	-	0	-	20
Future (2029) Alternative B	-	B	-	A	-	A	-	C
	-	12	-	0	-	0	-	20
Future (2029) Alternative C	-	B	B	A	B	A	-	C
	-	12	15	0	11	0	-	20
FM 2818 at 2818 Place Apartments / Walden Pond Apartments								
Existing (2016)	**F**		A	A	B	A	C	
	>300		0	0	10	0	21	
Existing (2016) Planned Improvements	**F**		A	A	B	A	C	
	250		0	0	10	0	21	
Future (2029) No Build	**F**		A	A	B	A	C	
	250		0	0	10	0	21	
Future (2029) Alternative A	-	B	-	A	-	A	-	C
	-	13	-	0	-	0	-	18
Future (2029) Alternative B	-	B	-	A	-	A	-	C
	-	13	-	0	-	0	-	18
Future (2029) Alternative C	-	B	-	A	-	A	-	C
	-	13	-	0	-	0	-	18

Note: Letters are level of service; numbers are average seconds of delay per vehicle

Table 6. PM Peak Hour Level of Service Analysis: Signalized Intersections

Scenario	Eastbound			Westbound			Northbound			Southbound			INT
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
FM 2818 at FM 2347 (George Bush Drive)													
Existing (2016)	F	D	A	B	C	A	F			F	F	C	D
	81	36	0	18	29	2	150			101	103	24	47
Existing (2016) Planned Improvements	C	C	A	B	B	A	F	E	A	E	E	B	C
	20	28	0	12	19	0	93	66	2	63	63	12	28
Future (2029) No Build	C	D	A	B	C	A	F	F	A	F	F	B	D
	25	36	0	17	26	0	250	92	3	129	130	16	47
Future (2029) Alternative A	C	D	A	A	B	A	F	F	A	F	F	B	D
	25	36	0	6	13	0	250	92	3	129	130	16	43
Future (2029) Alternative B	C	D	A	A	B	A	F	F	A	F	F	B	D
	25	36	0	7	15	0	250	92	3	129	130	16	43
Future (2029) Alternative C	C	D	A	A	B	A	F	F	A	F	F	B	D
	25	36	0	6	13	0	250	92	3	129	130	16	43
FM 2818 at Luther Street													
Existing (2016)	A	A		-	C		E			F	A		B
	5	9		-	31		62			92	8		19
Existing (2016) Planned Improvements	A	A		-	A		E			F	A		A
	3	7		-	5		62			92	7		8
Future (2029) No Build	B	D			A		E			F	A		C
	18	47			10		65			115	9		33
Future (2029) Alternative A	A	A		E	A		E			F	A		A
	8	7		55	2		55			91	6		8
Future (2029) Alternative B	A	A		E	A		E			F	A		A
	8	6		58	2		55			91	6		7
Future (2029) Alternative C	A	A		D	A		E			F	A		A
	8	6		42	2		55			91	6		7

Note: Letters are level of service; numbers are average seconds of delay per vehicle

Table 7. PM Peak Hour Level of Service Analysis: Signalized Intersections (Continued)

Scenario	Eastbound				Westbound			Northbound			Southbound			INT
	UT	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
FM 2818 at Holleman Drive														
Existing (2016)	-	B	D	B	F	C	A	F	F	D	F	F	A	E
	-	12	37	12	95	24	3	147	128	44	222	>300	4	59
Existing (2016) Planned Improvements	-	A	C	A	F	C	A	F	F	C	F	F	A	D
	-	9	31	0	120	24	3	104	84	22	88	109	2	39
Future (2029) No Build	-	C	F	A	F	D	A	F	F	F	F	F	A	F
	-	34	278	0	362	38	7	253	134	132	186	353	2	173
Future (2029) Alternative A	-	E	F	A	F	D	A	F	F	D	F	F	A	F
	-	75	195	1	>300	44	6	240	101	48	168	270	3	133
Future (2029) Alternative B	E	E	F	A	F	D	A	F	F	E	F	F	A	F
	70	70	195	1	>300	38	5	240	101	62	168	270	1	132
Future (2029) Alternative C	-	E	F	A	F	D	A	F	F	E	F	F	A	F
	-	70	70	195	1	>300	38	5	240	101	62	168	270	1
Future (2029) Alternative A – Mit 1	-	F	F	B	F	D	A	F	F	D	F	F	A	F
	-	115	125	19	204	44	4	165	83	53	100	196	3	98
Future (2029) Alternative B – Mit 1	E	E	F	B	F	D	A	F	F	D	F	F	A	F
	76	75	125	20	204	39	4	165	83	53	100	196	3	95
Future (2029) Alternative C – Mit 1	-	F	F	C	F	D	A	F	F	D	F	F	A	F
	-	94	125	20	204	44	4	165	83	53	100	196	3	97
Future (2029) Alternative D	E	E	D	B	E	D	A	E	-	E	E	-	B	D
	68	73	42	16	61	38	2	72	-	73	55	-	14	45
Future (2029) Alternative E	E	E	C	A	E	C	A	F	-	E	F	-	B	D
	66	70	33	7	61	65	2	80	-	73	83	-	11	45
Future (2029) Alternative F	-	-	E	D	-	C	A	F	D	F	F	F	B	E
	-	-	77	47	-	33	5	93	50	98	128	82	11	64
Future (2029) Alternative G	-	-	E	A	-	D	A	C	-	F	F	-	A	E
	-	-	77	2	-	35	2	33	-	98	120	-	5	56

Note: Letters are level of service; numbers are average seconds of delay per vehicle

Table 7. PM Peak Hour Level of Service Analysis: Unsignalized Intersections

Scenario	Northbound		Eastbound		Westbound		Southbound	
	LT	RT	LT	TH/RT	LT	TH/RT	LT	RT
FM 2818 at Knightsgate Apartments								
Existing (2016)	C		-	A	B	A	-	
	25		-	0	14	0	-	
Existing (2016) Planned Improvements	C		-	A	B	A	-	
	25		-	0	14	0	-	
Future (2029) No Build	F		-	A	F	A	-	
	>300		-	0	>300	0	-	
Future (2029) Alternative A	-	C	-	A	-	A	-	
	-	19	-	0	-	0	-	
Future (2029) Alternative B	-	C	-	A	-	A	-	
	-	19	-	0	-	0	-	
Future (2029) Alternative C	-	C	-	A	-	A	-	
	-	19	-	0	-	0	-	
FM 2818 at Canyon Creek Circle / Parkway Place Apartments								
Existing (2016)	F		A	A	C	A	D	
	>300		9	0	15	0	26	
Existing (2016) Planned Improvements	F		A	A	B	A	D	
	>300		9	0	14	0	32	
Future (2029) No Build	F		B	A	F	A	F	
	>300		12	0	>300	0	>300	
Future (2029) Alternative A	-	C	-	A	-	A	-	B
	-	21	-	0	-	0	-	13
Future (2029) Alternative B	-	C	-	A	-	A	-	B
	-	21	-	0	-	0	-	13
Future (2029) Alternative C	-	C	B	A	C	A	-	B
	-	20	11	0	17	0	-	13
FM 2818 at 2818 Place Apartments / Walden Pond Apartments								
Existing (2016)	F		A	A	C	A	D	
	>300		9	0	15	0	26	
Existing (2016) Planned Improvements	F		A	A	C	A	F	
	>300		9	0	15	0	218	
Future (2029) No Build	F		B	A	F	A	F	
	>300		12	0	>300	0	>300	
Future (2029) Alternative A	-	D	-	A	-	A	-	B
	-	29	-	0	-	0	-	13
Future (2029) Alternative B	-	D	-	A	-	A	-	B
	-	29	-	0	-	0	-	13
Future (2029) Alternative C	-	D	-	A	-	A	-	B
	-	29	-	0	-	0	-	13

Note: Letters are level of service; numbers are average seconds of delay per vehicle

ANALYSIS OF ALTERNATIVE H

Alternative H, a super street, was proposed as a viable solution to the inadequate capacity of the tested future scenarios. A simulation model using VISSIM software was used to test whether the super street provides adequate capacity and to make recommendations for design elements that impact traffic operations, such as the presence and lengths of turn lanes. The following scenarios were evaluated:

- Future (2029) Alternative H
    - Operations using 2029 volumes and a 6-lane divided cross section that prohibits through and left-turn movements from side streets. Only right-turns occur at the side streets. U-turns are provided downstream of the three signalized intersections.
- Future (2039) Alternative H
    - Operations using 2039 volumes and a 6-lane divided cross section that prohibits through and left-turn movements from side streets. Only right-turns occur at the side streets. U-turns are provided downstream of the three signalized intersections.

As noted above, Alternative H was evaluated with 2029 and 2039 conditions. This was to ensure the facility will operate adequately for 20 years from completion. During the process of developing the model, it was determined that the connection between Jones Butler Road and the westbound/northbound FM 2818 mainlanes would not be long enough to provide a safe distance for merging or weaving, especially with the signalized U-turn located between Jones Butler and Holleman Drive. It is recommended that the connection be removed. The traffic volumes that previously entered the corridor from Jones Butler Drive or Dowling Road were redirected to enter the network at Holleman Drive. As was done with the analyses of Alternatives A through G, left-turn and through movements at side streets were redirected to using U-turns. The resultant Peak Hour traffic volumes for 2029 and 2039 are shown in **Figures 17** and **18**.

There are significant differences between the methods used by the Synchro and VISSIM software programs. Synchro primarily applies calculations developed for the *Highway Capacity Manual* (*HCM*). VISSIM is a microsimulation tool that provides the user much more control over input parameters and uses stochastic methods to provide a different result each time the simulation is run. Several iterations were conducted to set signal timings and offsets so vehicular delay is minimized as much as possible. Upon finalizing the signal parameters in the model, five simulations were run for each scenario to produce the averages reported in the tables below.

The primary measure of effectiveness for the VISSIM analysis is the vehicular delay of each intended movement at the signalized intersections. The level of service is determined from the same *HCM* scale used in the Synchro analyses. Each signalized intersection, however, is more complicated with this super street concept than the previous iterations since every movement except a right-turn from the side street crosses at least two signalized locations. For example, a motorist intending to turn left from a side street must first turn right onto FM 2818, then make a U-turn, then go through the intersection (passing through three signalized locations). A through movement on FM 2818 requires the motorist to first pass the first signalized U-turn, then go straight at the main signalized intersection (passing through three signalized locations). Ideally, the signal timings are offset to reduce the number of stops at each location and the signals are coordinated along the corridor to maximize progression. **Table 8** and **Table 9** record the delay measured for each intended movement at the signalized intersections. These values account for

all the steps involved in executing the movement. **Table 10** shows the delay experienced driving from one location in the corridor to another.

Future (2029) Alternative H

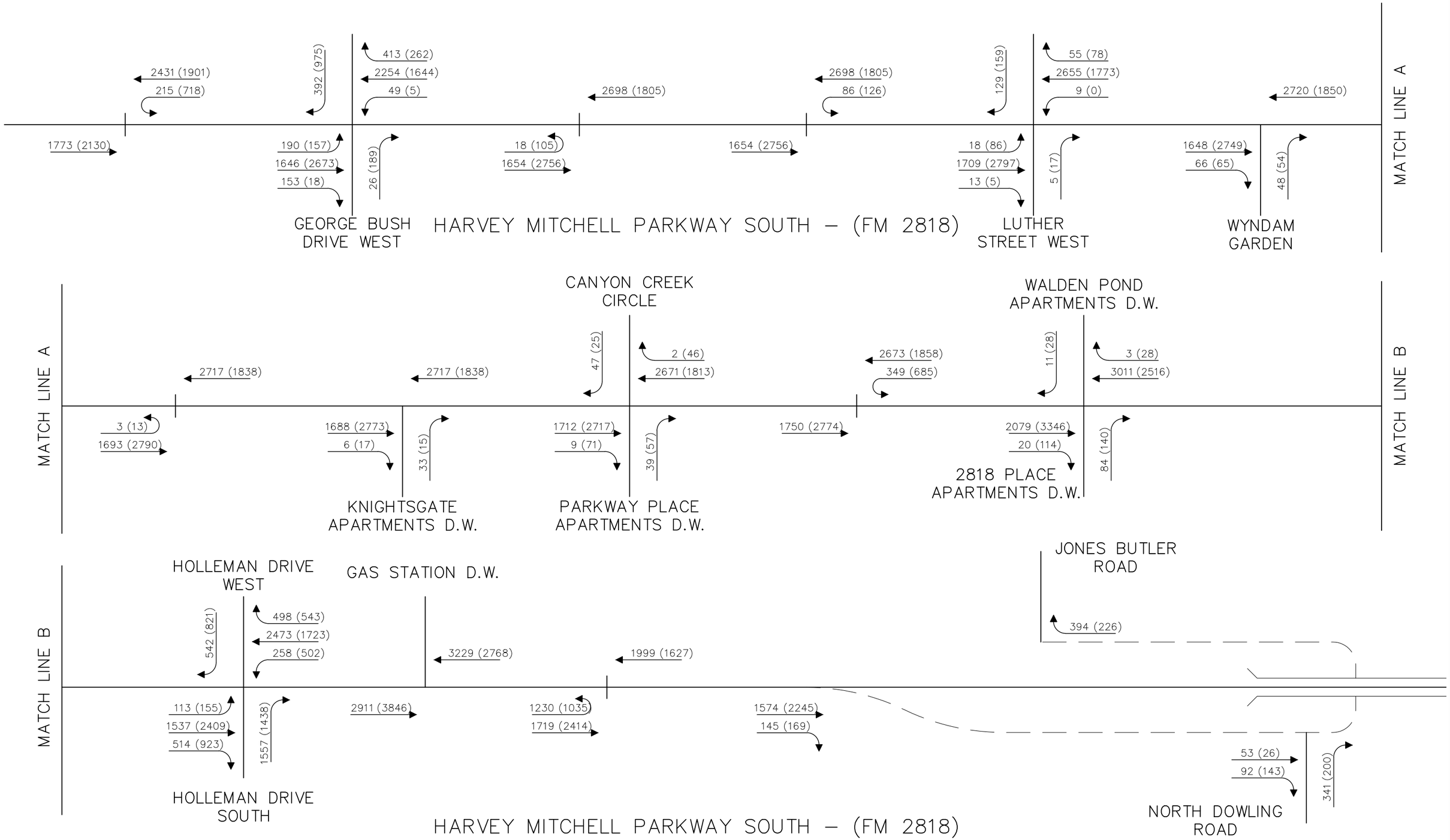
With the super street concept for Alternative H, the network is forecasted to operate much more efficiently than Alternatives A through G in 2029. In the AM Peak Hour, the delays at George Bush Drive and at Luther Street are both less than 15 seconds per vehicle, comparable to the findings for the other Alternatives. At Holleman Drive, the AM Peak Hour delay improves to 34 seconds per vehicle, approximately 20 seconds per vehicle less than with the other alternatives during that period. In the PM Peak Hour, the delay at George Bush Drive is 28 seconds per vehicle (LOS C), at Luther Street it is 9 seconds per vehicle (LOS A), and at Holleman Drive it is 44 seconds per vehicle (LOS D). These values represent significant reductions in delay at George Bush Drive and at Holleman Drive compared to the other Alternatives.

Future (2039) Alternative H

Alternative H is the only concept that was evaluated with traffic volumes forecasted to 2039. During the AM Peak Hour, both George Bush Drive and Luther Street operate with 15 seconds of delay per vehicle or less. At Holleman Drive, the average delay is 44 seconds per vehicle, resulting in LOS D. For the PM Peak Hour, the average delay at George Bush Drive is 43 seconds per vehicle (LOS D), at Luther Street it is 15 seconds per vehicle (LOS B), and at Holleman Drive it is 57 seconds per vehicle (LOS E).

SUMMARY OF ALTERNATIVE H

The average vehicular delay for Alternative H is dramatically lower at the signalized intersections than the delay experienced in Alternatives A through G. In fact, the delays forecasted for Alternative H in 2039 are comparable or lower than those identified for Alternatives A through G in 2029. By having only two phases at the intersections, there is a smaller proportion of time lost during yellow and all-red intervals. Additionally, progression throughout the corridor is increased through improved coordination that favors the movement along FM 2818. These result is more than 10 extra years of functional use of the corridor compared to the other Alternatives.



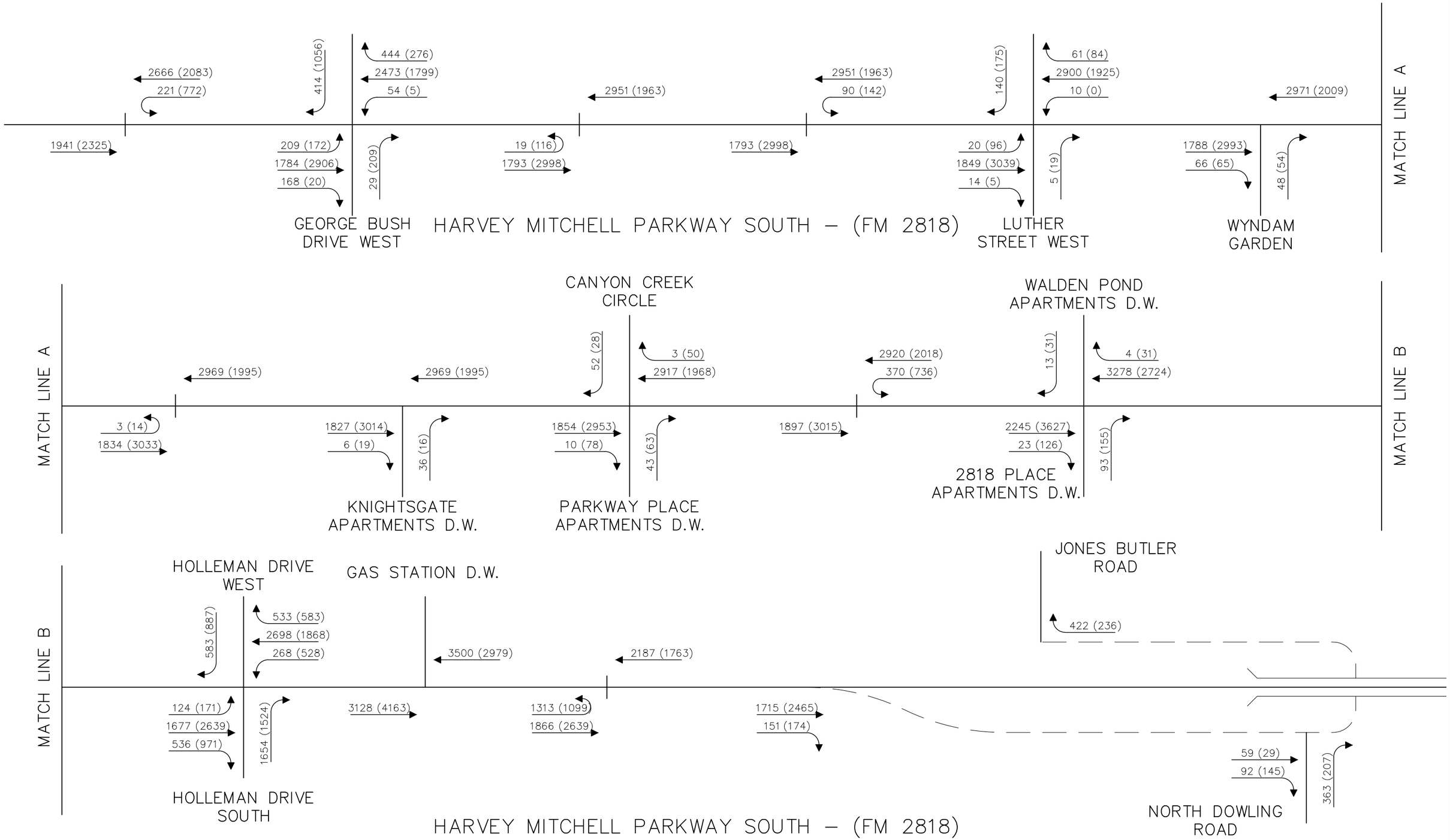
LEGEND
XXX A.M. PEAK HOUR
(XXX) P.M. PEAK HOUR

FM 2818 TRAFFIC STUDY
PEAK HOUR VOLUMES (2029)
REDISTRIBUTED FOR SUPER STREET

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #17

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\bbrimley\appdata\local\temp\AcPublish_24928\155117-FIGURES-SUPER STREET.dwg-FIGURE #17 Plotted Sep 12, 2017 at 8:23am by bbrimley | Last Saved by: bbrimley



LEGEND
XXX A.M. PEAK HOUR
(XXX) P.M. PEAK HOUR

FM 2818 TRAFFIC STUDY
PEAK HOUR VOLUMES (2039)
REDISTRIBUTED FOR SUPER STREET

SCALE:	N/A	DATE:	SEPTEMBER 2017
JOB NO.:	155117	DWG. FILE:	FIGURE #18

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257
3452 Rock Prairie Road West.
College Station, Texas 77845
979.703.1809
www.bbcpi.com

G:\Users\bbrimley\appdata\local\temp\AcPublish_24928\155117-FIGURES-SUPER STREET.dwg-FIGURE #18 Plotted Sep 12, 2017 at 8:23am by bbrimley | Last Saved by: bbrimley

Table 8. AM Peak Hour Level of Service by Movement (Alternative H)

Scenario	Eastbound			Westbound			Northbound			Southbound			INT
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
FM 2818 at FM 2347 (George Bush Drive)													
Future (2029)	E	B	B	B	A	A	E	D	C	E	D	C	B
Alternative H	55	14	18	11	5	9	57	46	26	76	52	32	14
Future (2039)	E	B	C	B	A	B	E	D	C	E	E	C	B
Alternative H	55	15	20	14	6	11	56	54	21	75	55	33	15
FM 2818 at Luther Street													
Future (2029)	C	B	B	D	A	A	E	E	C	E	A	C	A
Alternative H	25	11	10	35	3	4	72	60	25	62	0	35	8
Future (2039)	C	B	B	C	A	A	E	E	C	E	A	D	A
Alternative H	21	12	10	32	3	4	73	60	25	62	0	39	8
FM 2818 at Holleman Drive													
Future (2029)	B	A	A	D	D	D	E	D	C	E	D	C	C
Alternative H	19	5	10	49	35	38	64	49	22	67	52	28	34
Future (2039)	C	A	B	E	D	D	F	E	C	E	D	C	D
Alternative H	23	6	12	68	52	54	88	73	25	69	53	27	44

Note: Letters are level of service; numbers are average seconds of delay per vehicle

Table 9. PM Peak Hour Level of Service by Movement (Alternative H)

Scenario	Eastbound			Westbound			Northbound			Southbound			INT
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
FM 2818 at FM 2347 (George Bush Drive)													
Future (2029)	E	C	C	B	A	A	D	C	B	E	D	C	C
Alternative H	65	31	35	14	6	6	50	28	19	77	46	31	28
Future (2039)	E	E	E	D	A	A	F	E	C	F	E	D	D
Alternative H	58	57	57	44	5	5	103	70	28	112	64	44	43
FM 2818 at Luther Street													
Future (2029)	A	A	B	D	A	A	E	C	C	D	A	B	A
Alternative H	9	8	11	40	7	8	71	29	23	50	0	19	9
Future (2039)	D	B	B	C	A	A	E	A	B	F	A	C	B
Alternative H	53	17	15	29	7	8	56	7	18	92	0	25	15
FM 2818 at Holleman Drive													
Future (2029)	C	B	D	D	C	D	F	F	C	E	F	C	D
Alternative H	34	14	37	50	26	52	102	109	35	71	81	35	44
Future (2039)	D	B	C	D	D	E	F	F	E	F	F	D	E
Alternative H	41	12	26	42	37	69	146	152	64	99	116	37	57

Note: Letters are level of service; numbers are average seconds of delay per vehicle

Table 10. Average Vehicular Delay Along Corridor in Alternative H

Starting Location	Ending Location	Average Vehicular Delay (s)			
		2029		2039	
		AM	PM	AM	PM
Holleman Drive Northbound	Holleman Drive Northbound	48	86	72	135
Holleman Drive Southbound	Holleman Drive Southbound	51	67	52	111
Holleman Drive Northbound	Wellborn Road Overpass	22	29	25	57
Holleman Drive Northbound	George Bush Drive	68	94	91	136
Holleman Drive Southbound	George Bush Drive	54	62	54	70
Holleman Drive Southbound	Wellborn Road Overpass	66	66	68	94
George Bush Drive Southbound	Wellborn Road Overpass	84	86	85	134
FM 2818 at Wellborn Drive Overpass	George Bush Drive	43	36	62	44
FM 2818 at George Bush Drive	Wellborn Road Overpass	32	52	34	87

ALTERNATIVE H - 2039 QUEUEING ANALYSIS

A queueing analysis was performed for the 2039 design year using the VISSIM simulations and calculations for required storage length provided in the TxDOT *Roadway Design Manual* (*RDM*). For calculating queues using the *RDM* equation the inputs are hourly volumes, number of lanes, and number of cycles per hour. A vehicle length of 25 feet and a factor of 2 are used. The factor accounts for variations throughout the hour, such as different arrival rates and the possibility that not all queued vehicles are served in a given cycle. The equation is:

$$Q = [V/(N \times L)] \times S \times 2$$

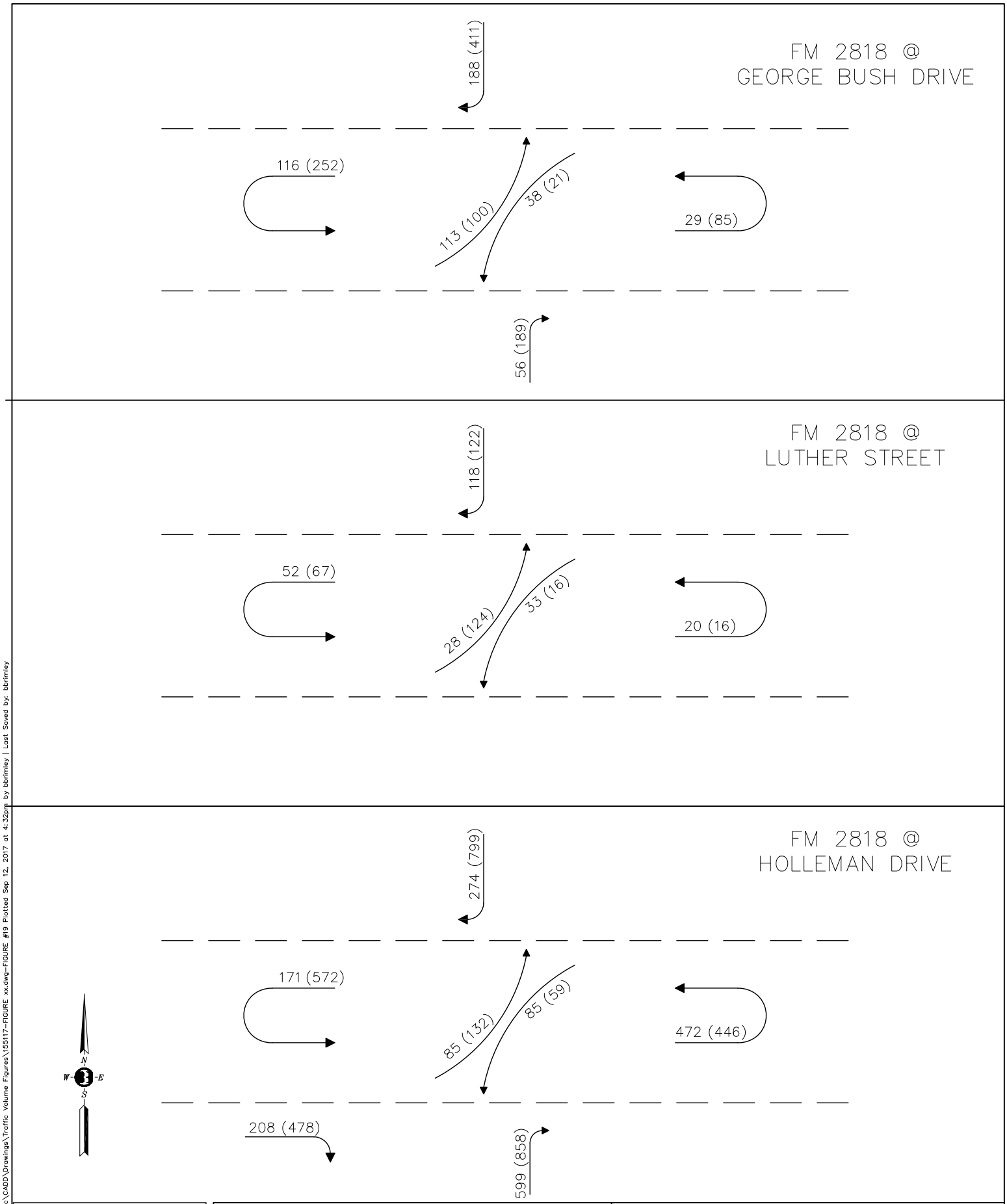
Where:
Q = Queue length
V = Hourly volume
N = Number of cycles (per hour)
L = Number of lanes
S = Queue length per vehicle (25 feet)

Without the factor 2, the above equation would assume that the queue clears each cycle and that the arrival rate were constant throughout the hour. In calculating the expected queue, a cycle length of 90 seconds was used. Shorter cycle lengths are commonly used with two-phase intersections (the existing timing patterns use 120 seconds and greater), and 90 seconds seems reasonable for that type of location. Combined, the simulation findings and the calculations are used to recommend lengths of turn lanes to ensure adequate storage is provided. The queue lengths are provided in **Table 11**. Queue lengths obtained from the VISSIM analysis are illustrated in **Figure 19**.

Table 11. Average Maximum Simulated Queue and Calculated Queue (feet)

Location	2039 Simulation		2039 Calculation[1]	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Westbound to Eastbound U-turn at Luther Street	52	67	56	89
Eastbound to Westbound U-turn at Luther Street	20	16	2	9
Left Turn to go Northbound on Luther Street	28	124	25	119
Left Turn to go Southbound on Luther Street	33	16	13	0
Westbound to Eastbound U-turn at Holleman Drive	171	572	232	460
Eastbound to Westbound U-turn at Holleman Drive	472	446	694	578
Left Turn to go Southbound on Holleman Drive	85	59	168	330
Left Turn to go Northbound on Holleman Drive	85	132	155	213
Right Turn to go Southbound on Holleman Drive	208	478	670	1528
Southbound at Holleman Drive	274	799	234	370
Northbound at Holleman Drive	599	858	689	635
Southbound at Luther Street	118	122	88	109
Westbound to Eastbound U-turn at George Bush Drive	116	252	138	483
Eastbound to Westbound U-turn at George Bush Drive	29	85	12	73
Left Turn to go Southbound on George Bush Drive	38	21	68	6
Left Turn to go Northbound on George Bush Drive	113	100	131	107
Northbound at George Bush Drive	56	189	35	260
Southbound at George Bush Drive	188	411	173	440

Note: [1] Queue length calculated using a cycle length of 90 seconds.



2039 QUEUE LENGTHS – FEET	FM 2818 TRAFFIC STUDY QUEUE LENGTHS (ft) FROM ALTERNATIVE H VISSIM ANALYSIS		Binkley & Barfield, Inc consulting engineers Texas Registration Number F-257
XXX A.M. (XXX) P.M.	SCALE: N/A	DATE: SEPTEMBER 2017	
	JOB NO.: 155117	DWG. FILE: FIGURE #19	3452 Rock Prairie Road West College Station, Texas 77845 979.703.1809 www.binkleybarfield.com

T:\155117_FM_2818_Schematic\CADD\Drawings\Traffic Volume Figures\155117-FIGURE xx.dwg-FIGURE #19 Plotted Sep 12, 2017 at 4:32pm by bbrimley | Last Saved by: bbrimley

RECOMMENDATIONS

Based on the findings of the capacity analyses, the super street concept of Alternative H provides the most capacity with the least amount of delay. Significant safety improvements should be achieved throughout the corridor due to the removal of multiple movements from side streets, the reduction of phases at signalized intersections, and control of access provided by the wide median. Of the Alternatives investigated in this study, the super street is the preferred configuration.

These recommendations are included in the following discussion:

- Locations where right-turn deceleration lanes should be provided
- Design specifications for turn lanes throughout the corridor with storage lengths adequate for anticipated queues
- Removal of the connecting ramp from Jones Butler Road to the FM 2818 mainlanes
- Extension of the U-turn west of Holleman Drive to connect to the eastbound direction upstream of the 2818 Place Apartments driveway

RECOMMENDED LOCATIONS AND GEOMETRY OF RIGHT-TURN DECELERATION LANES

Right-turn deceleration lanes may be provided at driveways and intersections along the FM 2818 corridor. The recommendation to provide right-turn deceleration lanes is based on turn volumes. The TxDOT threshold for recommending a right-turn deceleration lane at a driveway is 50 vehicles per hour for a facility with a speed limit greater than 45 mph. The following driveways should therefore have a right-turn deceleration lane:

- Parkway Place Apartments
- 2818 Place Apartments
- Canyon Creek Apartments
- Exxon Gas Station before Holleman Drive
- Wyndham Garden Hotel

The signalized intersections which are recommended to have dedicated right-turn lanes on FM 2818 are as follows:

- George Bush Drive (both approaches)
- Holleman Drive (both approaches)

As a signalized intersection, the right-turn volumes at any approach to Luther Street are not forecasted to be high enough to justify a right-turn deceleration lane for operational or safety reasons.

The right-turn deceleration lanes should be long enough to supply adequate queue storage and provide deceleration length outside of the mainlane. For a facility with a 55 mph speed limit, the *RDM* specifies a deceleration length of 345 feet, which assumes a deceleration of 20 mph occurs in the main lane. Each location should also provide at least 30 feet of queue storage, and more if there is any queueing observed in the simulation or model. The target length of right-turn deceleration lanes is therefore at least 375 feet for each location. Locations with observed queues should have longer turn lanes.

At the right-turn from FM 2818 to go south on Holleman Drive, the simulations observed an average maximum queue of 478 feet. Combined with the deceleration distance, the total length of the turn lane should be approximately 825 feet. The driveway for the 2818 Apartments is approximately 700 feet upstream of the Holleman Drive intersection. It is recommended that the

right-turn deceleration lane extend no farther than the driveway, as it will still be long enough to hold the queue.

The right-turn deceleration lane at the Exxon Gas Station before Holleman Drive is likely to conflict with the U-turn lane if it is constructed to the desired 375 feet. A shorter deceleration lane is appropriate to prevent this conflict.

GEOMETRY OF LEFT-TURN AND U-TURN LANES

Similar to the right-turn deceleration lanes, left-turn and U-turn lanes should have adequate deceleration length and storage. A deceleration length of 345 feet from the mainlanes should be provided. The queue lengths listed in **Table 11** contribute to the recommended storage length for these lanes. At least 100 feet should be provided for storage, regardless of queues, as specified in the *RDM*.

Each U-turn should have two lanes that extend at least as long as the recommended storage length. However, the deceleration length can be one lane, as long as it is separate from the main lanes. It is recommended that low-volume locations (such as the U-turns at Luther Street) have only one lane for deceleration that later transitions into two lanes with adequate storage. At Holleman Drive, it is recommended that both U-turn lanes extend through the deceleration distance in the event where extra storage is needed. **Table 12** lists the minimum recommended dimensions of the U-turn lanes.

Table 12. Minimum U-Turn Lane Dimensions

Location	Direction	Storage Lanes	Storage Length	Deceleration Length	Total Length
George Bush Drive	Westbound to Eastbound	2	450	345	795
	Eastbound to Westbound	1	100	345	445
Luther Street	Westbound to Eastbound	1	100	345	445
	Eastbound to Westbound	1	100	345	445
Holleman Drive	Westbound to Eastbound	2	575	345	920
	Eastbound to Westbound	2	500	345	845

There are two locations where dual left-turn lanes should be provided. They are eastbound to northbound at George Bush Drive and westbound to southbound at Holleman Drive. Similar to the U-turns, the deceleration length can be in a single lane; however, it is recommended that the second lane be extend farther to provide a more conservative design. **Table 13** lists the minimum recommended dimensions of the left-turn lanes.

Table 13. Minimum Left-Turn Lane Dimensions

Location	Direction	Storage Lanes	Storage Length	Deceleration Length	Total Length
George Bush Drive	Eastbound to Northbound	2	150	345	495
	Westbound to Southbound	1	100	345	445
Luther Street	Eastbound to Northbound	1	150	345	495
	Westbound to Southbound	1	100	345	445
Holleman Drive	Eastbound to Northbound	1	200	345	545
	Westbound to Southbound	2	300	345	645

REMOVE THE RAMP FROM JONES BUTLER ROAD TO THE FM 2818 MAIN LANES

A single lane crossing under FM 2818 currently connects Dowling Road to Jones Butler Road and continues onto the westbound lanes of FM 2818, ending as an auxiliary right-turn lane at

Holleman Drive. The connecting ramp serves as an additional entry point for motorists who otherwise must use the side street of Holleman Drive. However, the acceleration distance from Jones Butler to the main lanes is inadequate for a 55-mph facility and the presence of the signalized U-turn creates a situation where motorists will have difficulty merging regardless of the ability to reach the operating speed. Simulations of the corridor with the ramp connecting near the U-turn showed significant queueing as motorists were unable to merge at the desired location. For safety and operational efficiency considerations, it is recommended that the connection from Jones Butler to the mainlanes be removed. The simulation of the super street in this study was modeled without this connection. Traffic volumes that would have been added to FM 2818 through the connection were added at the two Holleman Drive approaches.

CONCLUSIONS

This study evaluated the FM 2818 corridor from Wellborn Road (FM 2154) to Raymond Stotzer Parkway / University Drive (FM 60) in several configurations. Traffic volumes were forecasted to 2029 and 2039 using an annual, regional growth factor and the addition of traffic from specific known developments. Of the concepts evaluated, Alternative H provides the configuration best suited to meet the future demands of the system. The super street in Alternative H limits the ability to make left-turn and through movements from the side streets at signalized intersections. The resulting two phase operation for each cycle significantly reduces the amount of delay experienced at each intersection, despite the redirection of multiple movements.

In addition to the improved efficiency of Alternative H, there are likely to be significant reductions in crashes along the corridor. The only conflicts at unsignalized locations are due to a right-turn diverge from FM 2818 onto a driveway or a right-turn merge from a driveway onto FM 2818. There are also fewer conflicts at the signalized intersections as the left-turns and U-turns cross over or merge onto the main lanes and the right-turn movement merges onto the main lanes. These movements can, and should, all be protected. (The right-turn movements can be permissive, though it is preferred that they be protected.) The result are fewer conflict points and the minimization of conflicts that tend to be severe.

Despite efforts to forecast traffic demands as accurately as possible and develop a robust model that accurately portrays future conditions, these are only forecasts of how the corridor will operate in the future. The actual development of the city and the fluctuations in regional traffic patterns will change due to unforeseen reasons, some of which are even linked to the reconstruction of the corridor and the resultant increase in capacity. The recommendations for the geometric design of left-turn, right-turn, and U-turn lanes have been conservatively made to help the corridor operate more efficiently in the future.

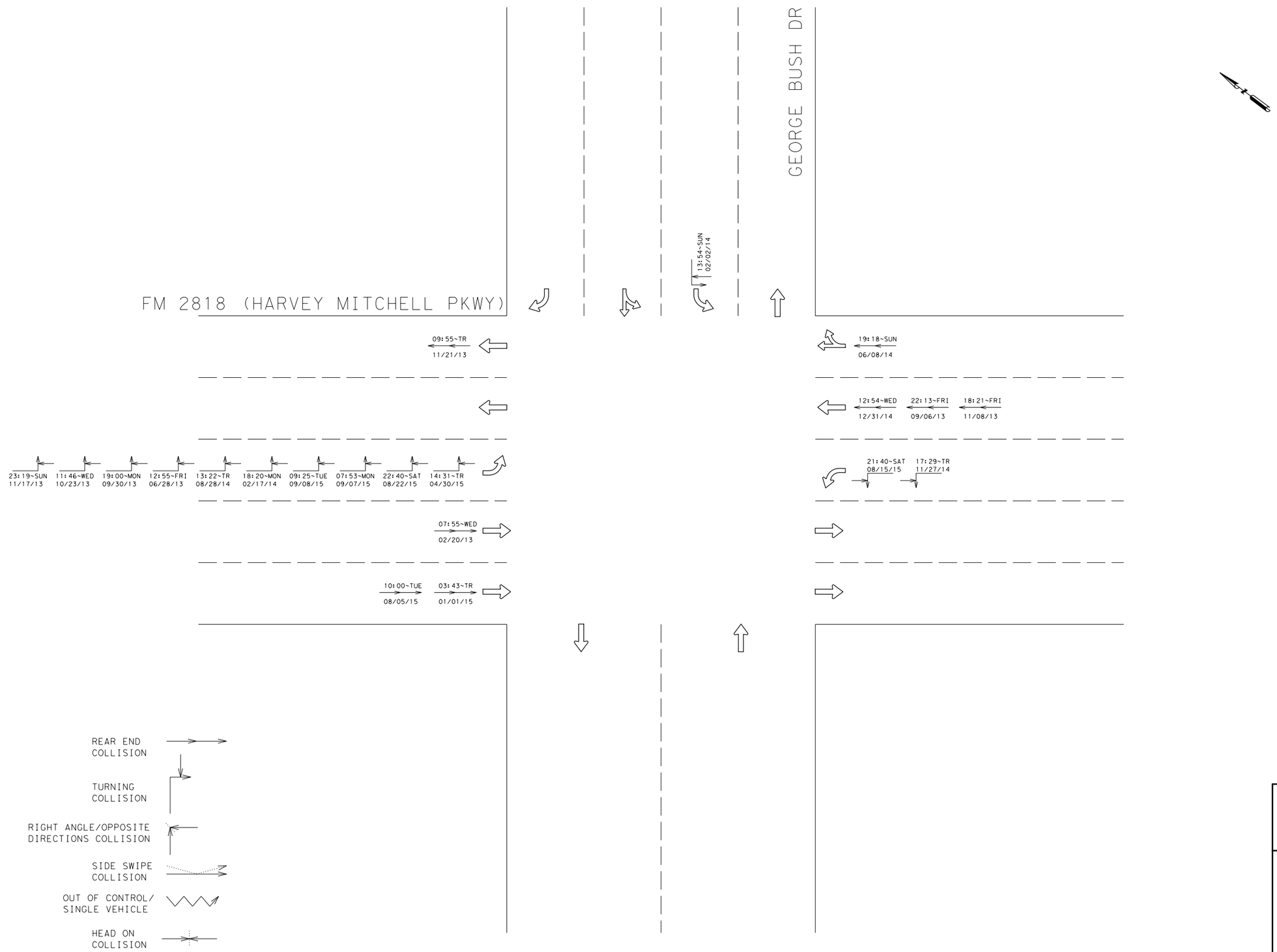
APPENDIX

CRASH DIAGRAMS ..... 8 PAGES

CAPACITY ANALYSIS SHEETS

Existing (2016) ..... 9 PAGES
Existing (2016) with Planned Improvements ..... 9 PAGES
Future (2029) No Build ..... 9 PAGES
Future (2029) Option A ..... 9 PAGES
Future (2029) Option B ..... 9 PAGES
Future (2029) Option C ..... 9 PAGES
Future (2029) Option A – Mitigation 1 ..... 2 PAGES
Future (2029) Option B – Mitigation 1 ..... 2 PAGES
Future (2029) Option C – Mitigation 1 ..... 2 PAGES
Future (2029) Alternative D PM Peak Hour ..... 2 PAGES
Future (2029) Alternative E PM Peak Hour ..... 1 PAGES
Future (2029) Alternative F PM Peak Hour ..... 2 PAGES
Future (2029) Alternative G PM Peak Hour ..... 2 PAGES

DESCRIPTION OF LEVELS OF SERVICE ..... 1 PAGE



Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257

FM 2818
SCHEMATIC

CRASH DIAGRAMS
FM 2818 AT GEORGE BUSH DR

SHEET 1 OF 8

COUNTY	CONT	SECT	JOB	HWY NO	SHEET NO
BRAZOS	0917	XX	XXX	FM 2818	

$STATUS$
PLOTDRIVER: $PLTDRVS$
PENTABLE: $PENTBLS$
USER: $USER$
$TIME$
FILE: $FILE$
DATE: $DATE$

REAR END COLLISION

TURNING COLLISION

RIGHT ANGLE/OPPOSITE DIRECTION COLLISION

SIDE SWIPE COLLISION

OUT OF CONTROL/ SINGLE VEHICLE

HEAD ON COLLISION

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257

FM 2818

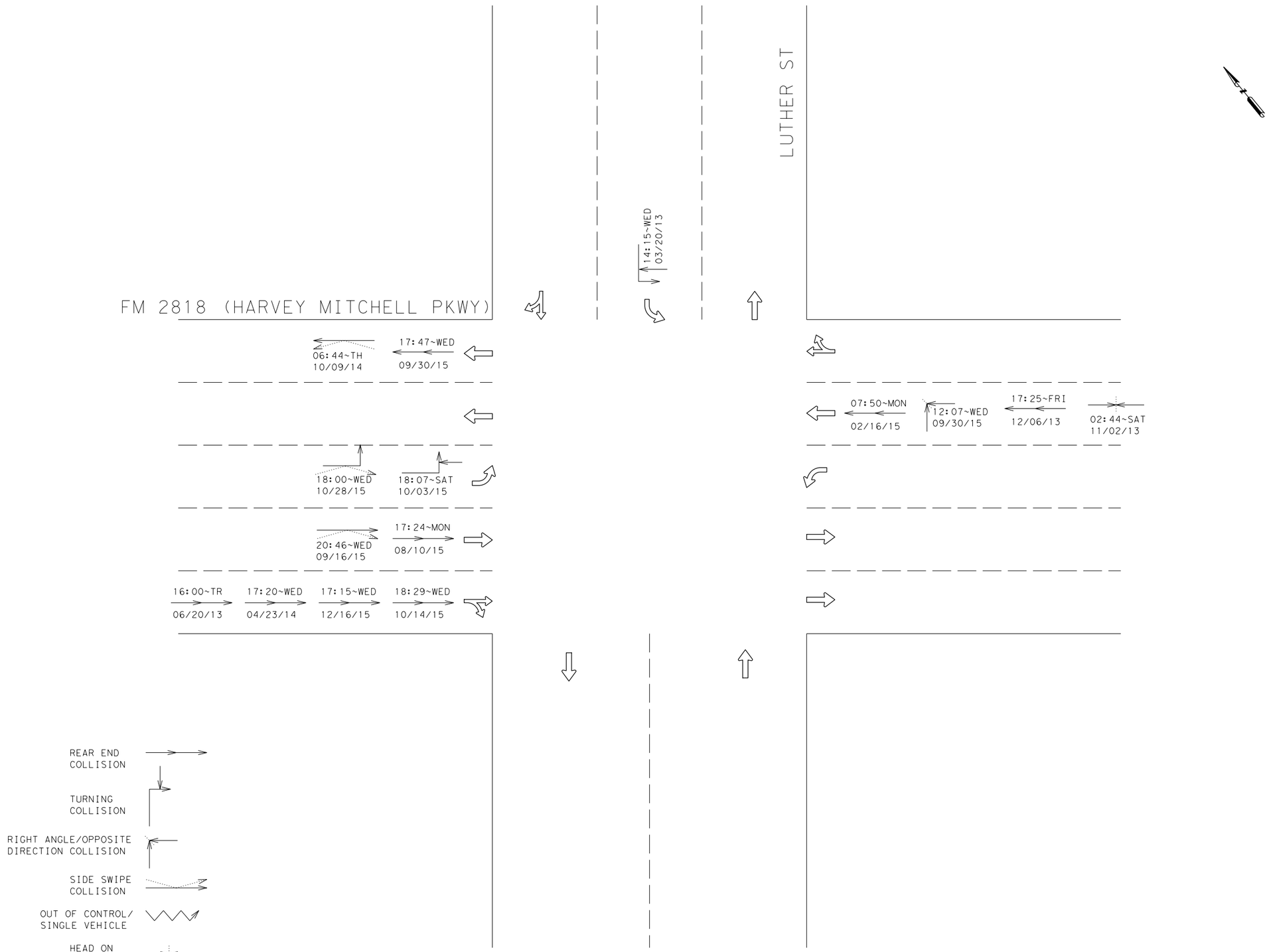
SCHEMATIC

CRASH DIAGRAMS
FM 2818 AT
TAMU SEWER PLANT RD

SHEET 2 OF 8

COUNTY	CONT	SECT	JOB	HWY NO	SHEET NO
BRAZOS	0917	XX	XXX	FM 2818	

$STATUS$
PLOTDRIVER: $PLTDRVS$
PENTABLE: $PENTBLS$
USER: $USER$
$TIME$
FILE:$FILE$
DATE:$DATE$



Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257

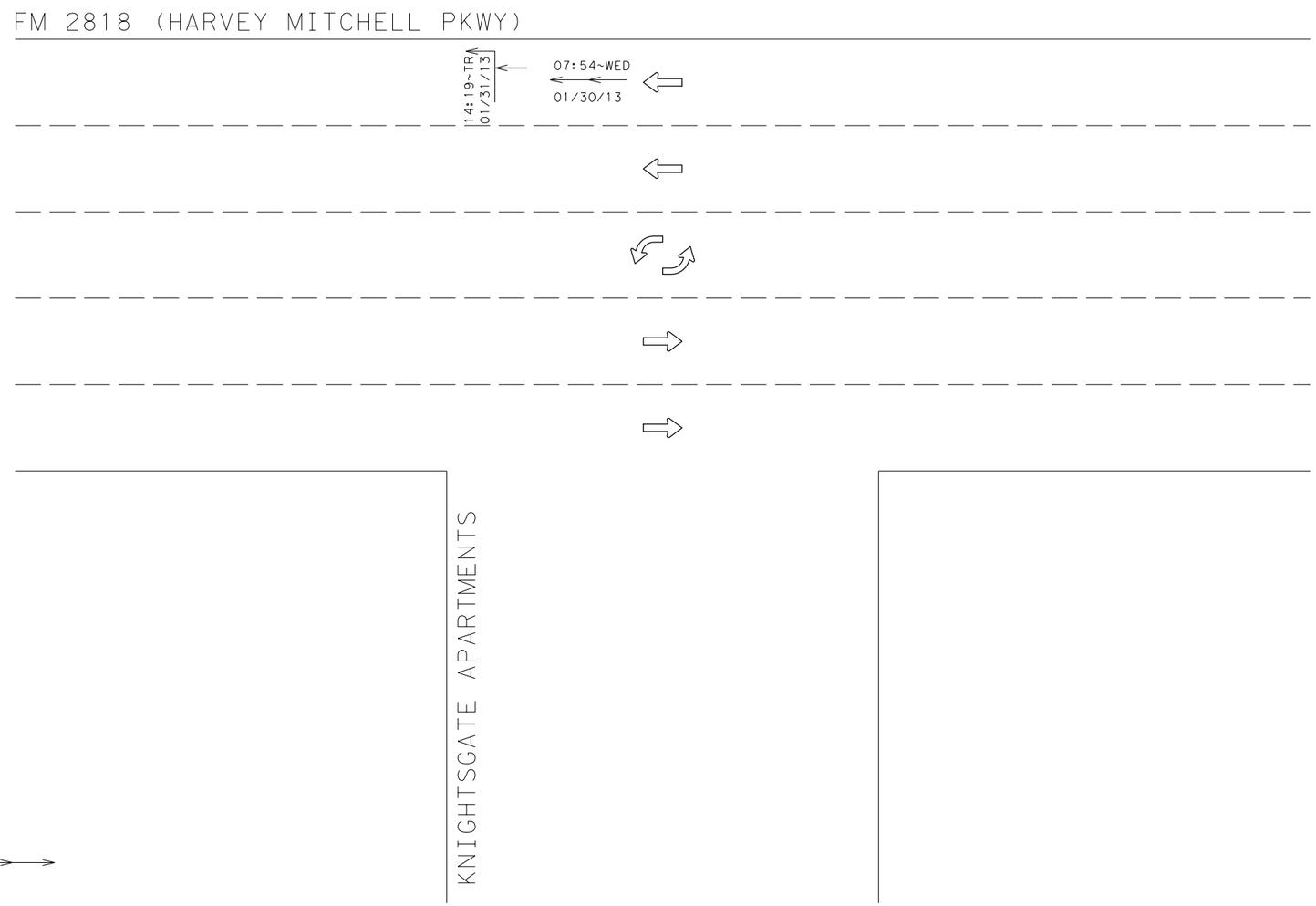
FM 2818
SCHEMATIC

CRASH DIAGRAMS
FM 2818 AT LUTHER ST

SHEET 3 OF 8

COUNTY	CONT	SECT	JOB	HWY NO	SHEET NO
BRAZOS	0917	XX	XXX	FM 2818	

$STATUS$
PLOTDRIVER: $PLTDRVS$
PENTABLE: $PENTBLS$
USER: $USER$
$TIME$
FILE:$FILE$
DATE:$DATE$



REAR END COLLISION

TURNING COLLISION

RIGHT ANGLE/OPPOSITE DIRECTION COLLISION

SIDE SWIPE COLLISION

OUT OF CONTROL/ SINGLE VEHICLE

HEAD ON COLLISION

Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257

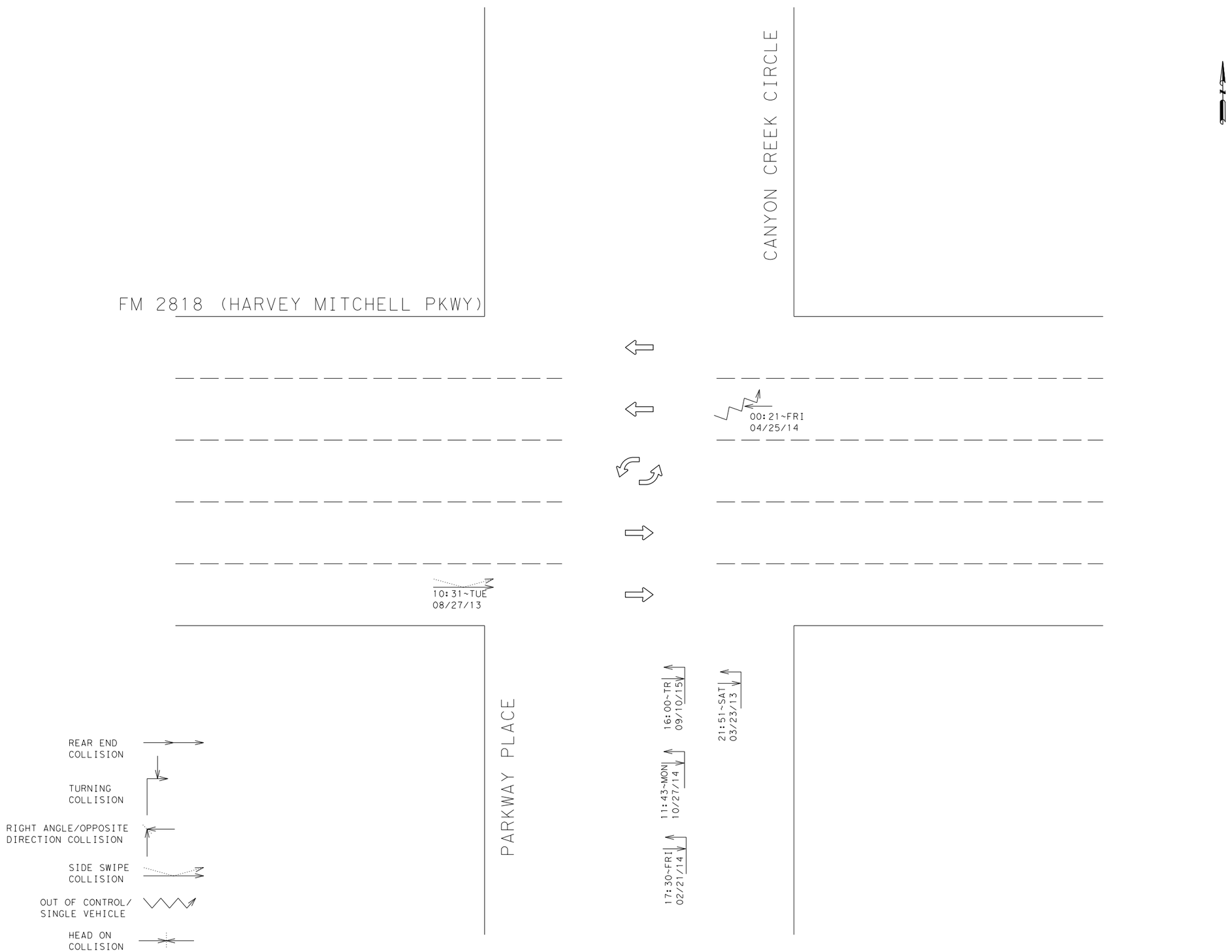
FM 2818
SCHEMATIC

CRASH DIAGRAMS
FM 2818 AT KNIGHTSGATE APTS.

SHEET 4 OF 8

COUNTY	CONT	SECT	JOB	HWY NO	SHEET NO
BRAZOS	0917	XX	XXX	FM 2818	

$STATUS$
PLOTDRIVER: $PLTDRVS$
PENTABLE: $PENTBLS$
USER: $USER$
$TIME$
FILE: $FILE$
DATE: $DATE$



Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257

FM 2818

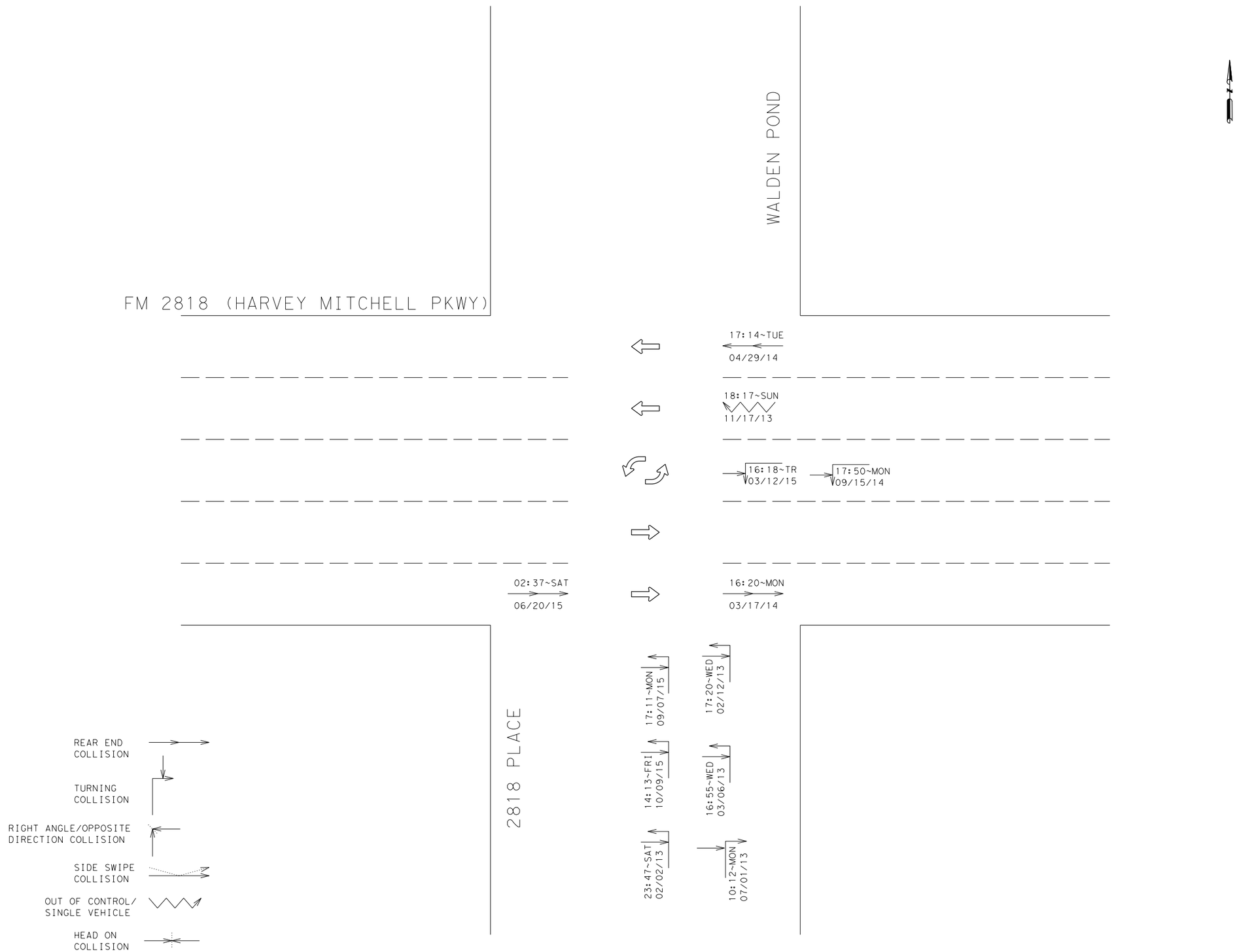
SCHEMATIC

CRASH DIAGRAMS
FM 2818 AT
PARKWAY PLACE APTS./
CANYON CREEK CIRCLE

SHEET 5 OF 8

COUNTY	CONT	SECT	JOB	HWY NO	SHEET NO
BRAZOS	0917	XX	XXX	FM 2818	

$STATUS$
PLOTDRIVER: $PLTDRVS$
PENTABLE: $PENTBLS$
USER: $USER$
$TIME$
FILE:$FILE$
DATE:$DATE$



Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257

FM 2818

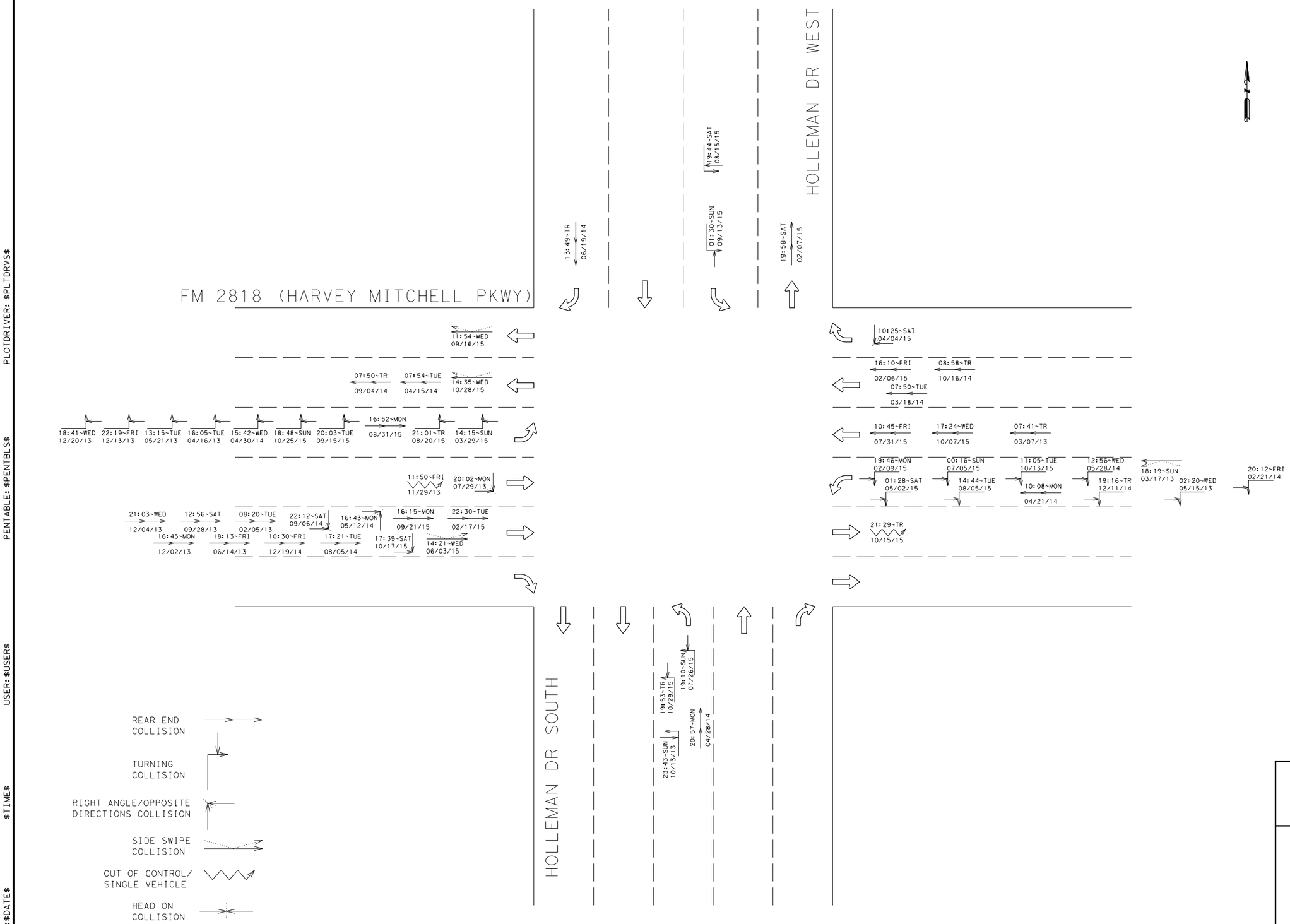
SCHEMATIC

CRASH DIAGRAMS
FM 2818 AT
2818 PLACE APTS./
WALDEN POND APTS.

SHEET 6 OF 8

COUNTY	CONT	SECT	JOB	HWY NO	SHEET NO
BRAZOS	0917	XX	XXX	FM 2818	

$STATUS$
PLOTDRIVER: $PLTDRVS$
PENTABLE: $PENTBLS$
USER: $USER$
$TIME$
FILE:$FILE$
DATE:$DATE$



Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257

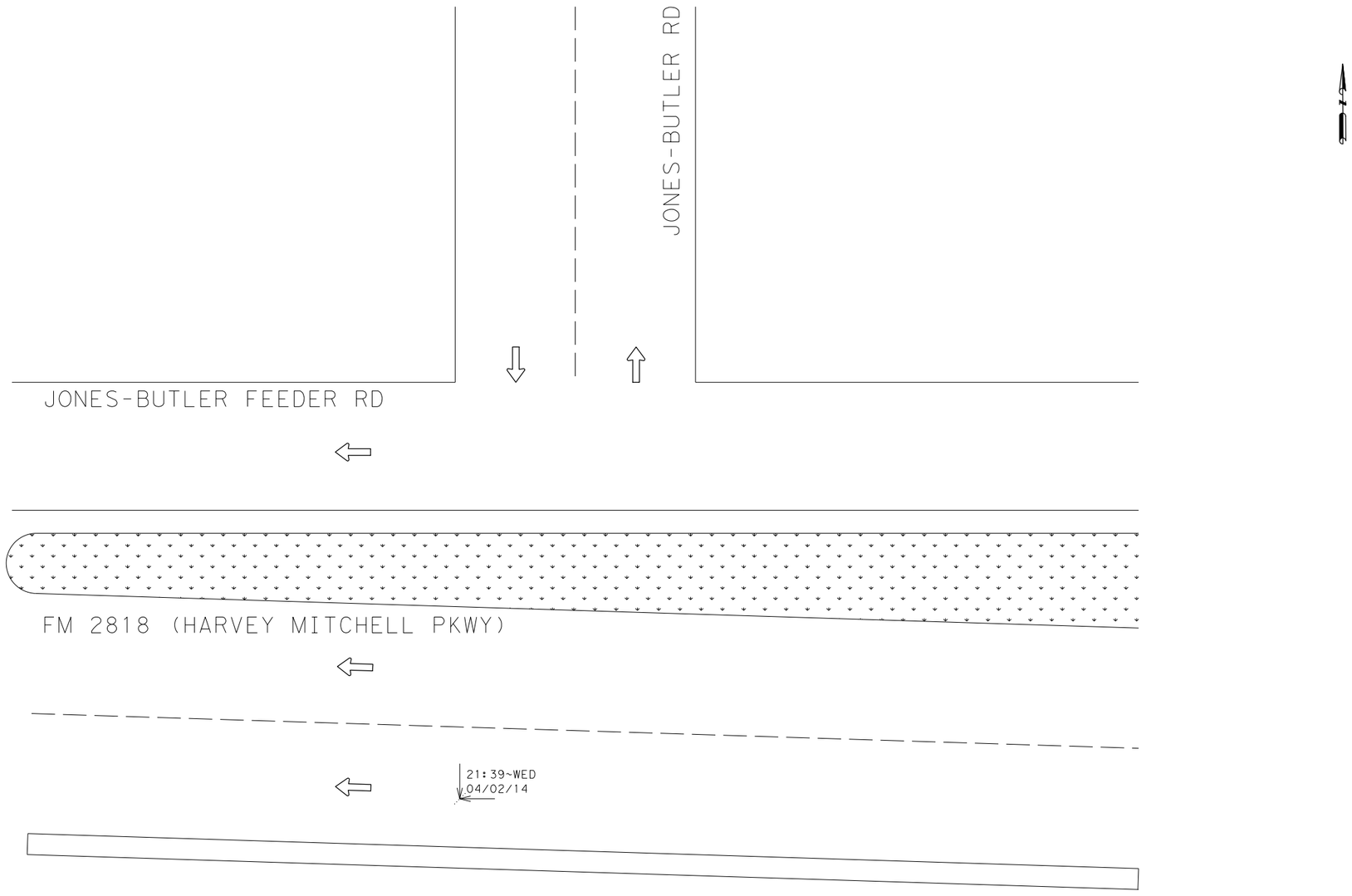
FM 2818
SCHEMATIC

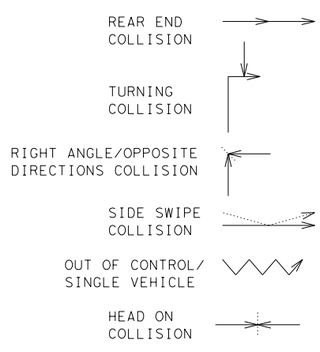
CRASH DIAGRAMS
FM 2818 AT HOLLEMAN DR

SHEET 7 OF 8

COUNTY	CONT	SECT	JOB	HWY NO	SHEET NO
BRAZOS	0917	XX	XXX	FM 2818	

$STATUS$
PLOTDRIVER: $PLTDRVS$
PENTABLE: $PENTBLS$
USER: $USER$
$TIME$
FILE: $FILE$
DATE: $DATE$





Binkley & Barfield, Inc
consulting engineers
Texas Registration Number F-257

FM 2818
SCHEMATIC

CRASH DIAGRAMS
FM 2818 AT JONES-BUTLER RD

SHEET 8 OF 8

COUNTY	CONT	SECT	JOB	HWY NO	SHEET NO
BRAZOS	0917	XX	XXX	FM 2818	

$STATUS$
PLOTDRIVER: $PLTDRVS$
PENTABLE: $PENTBLS$
USER: $USER$
$TIME$
FILE: $FILE$
DATE: $DATE$

1: FM 2347 (George Bush Drive) & FM 2818

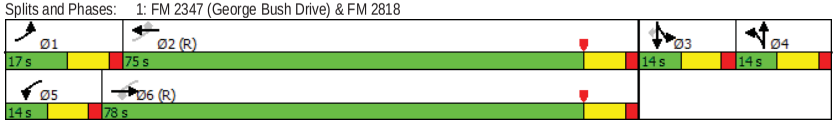
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	1140	103	43	1853	275	9	7	7	23	31	136
Future Volume (vph)	163	1140	103	43	1853	275	9	7	7	23	31	136
Satd. Flow (prot)	1947	3539	1583	1947	3539	1583	0	1751	0	1681	1764	1583
Flt Permitted	0.060			0.118				0.981		0.950	0.997	
Satd. Flow (perm)	123	3539	1583	242	3539	1583	0	1751	0	1681	1764	1583
Satd. Flow (RTOR)			191			191		9				191
Lane Group Flow (vph)	204	1425	129	49	2130	316	0	29	0	26	43	174
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		2						3
Total Split (s)	17.0	78.0	78.0	14.0	75.0	75.0	14.0	14.0		14.0	14.0	14.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	8.0		8.0		8.0	8.0	8.0
Act Effct Green (s)	76.0	73.2	73.2	77.6	67.0	67.0		6.0		6.0	6.0	6.0
Actuated g/C Ratio	0.63	0.61	0.61	0.65	0.56	0.56		0.05		0.05	0.05	0.05
v/c Ratio	0.95	0.66	0.12	0.21	1.08	0.33		0.30		0.31	0.49	0.67
Control Delay	81.5	17.9	0.5	5.8	56.3	3.3		50.4		65.0	74.3	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	81.5	17.9	0.5	5.8	56.3	3.3		50.4		65.0	74.3	19.2
LOS	F	B	A	A	E	A		D		E	E	B
Approach Delay		24.0			48.6			50.4			33.9	
Approach LOS		C			D			D			C	
Queue Length 50th (ft)	102	378	0	2	~967	20		15		21	34	0
Queue Length 95th (ft)	#200	377	0	m11	#1027	m33		43		45	66	29
Internal Link Dist (ft)		1307			2211			1167			1439	
Turn Bay Length (ft)	200		50	175		100				325		
Base Capacity (vph)	214	2157	1039	242	1975	968		96		84	88	260
Starvation Cap Reductn	0	0	0	0	0	0		0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0		0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0		0		0	0	0
Reduced v/c Ratio	0.95	0.66	0.12	0.20	1.08	0.33		0.30		0.31	0.49	0.67

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 38.3 — Intersection LOS: D
Intersection Capacity Utilization 88.2% — ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



2: Luther Street & FM 2818

AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	1146	8	8	2099	44	1	1	2	20	3	71
Future Volume (vph)	16	1146	8	8	2099	44	1	1	2	20	3	71
Satd. Flow (prot)	1947	3536	0	1947	3529	0	0	1715	0	1770	1596	0
Flt Permitted	0.049			0.133				0.879		0.950		
Satd. Flow (perm)	100	3536	0	273	3529	0	0	1526	0	1770	1596	0
Satd. Flow (RTOR)		1			3			6			109	
Lane Group Flow (vph)	21	1479	0	9	2464	0	0	12	0	30	114	0
Turn Type	D.P+P	NA		D.P+P	NA		Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	6			2			8					
Total Split (s)	14.0	78.0		14.0	78.0		14.0	14.0		14.0	28.0	
Total Lost Time (s)	6.0	7.0		6.0	7.0			6.0		6.0	6.0	
Act Effct Green (s)	93.2	92.0		94.4	89.4			7.0		7.2	12.4	
Actuated g/C Ratio	0.78	0.77		0.79	0.74			0.06		0.06	0.10	
v/c Ratio	0.11	0.55		0.03	0.94			0.13		0.28	0.44	
Control Delay	7.9	9.9		3.9	20.6			41.8		60.9	14.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	7.9	9.9		3.9	20.6			41.8		60.9	14.4	
LOS	A	A		A	C			D		E	B	
Approach Delay		9.9			20.5			41.8			24.1	
Approach LOS		A			C			D			C	
Queue Length 50th (ft)	2	166		1	187			5		23	4	
Queue Length 95th (ft)	m10	308		m2	m#1121			6		39	18	
Internal Link Dist (ft)		2211			916			487			1137	
Turn Bay Length (ft)	175			100								
Base Capacity (vph)	201	2710		326	2629			107		118	381	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.10	0.55		0.03	0.94			0.11		0.25	0.30	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 108 (90%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 16.8 — Intersection LOS: B
Intersection Capacity Utilization 76.1% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1168	0	5	2133	18	11
Future Vol, veh/h	1168	0	5	2133	18	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1407	0	5	2318	27	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1407	0	2577	704
Stage 1	-	-	-	-	1407	-
Stage 2	-	-	-	-	1170	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	766	-	*33	*624
Stage 1	-	-	-	-	*450	-
Stage 2	-	-	-	-	*183	-
Platoon blocked, %	-	-	1	-	1	1
Mov Cap-1 Maneuver	-	-	766	-	*33	*624
Mov Cap-2 Maneuver	-	-	-	-	*130	-
Stage 1	-	-	-	-	*450	-
Stage 2	-	-	-	-	*182	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	30.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	186	-	-	766	-
HCM Lane V/C Ratio	0.236	-	-	0.007	-
HCM Control Delay (s)	30.2	-	-	9.7	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	1172	6	2	2081	1	24	0	10	8	0	33
Future Vol, veh/h	1	1172	6	2	2081	1	24	0	10	8	0	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	90	90	90	61	61	61	54	54	54
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1429	7	2	2312	1	39	0	16	15	0	61

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2313	0	0	1437	0	0	2596	3753	718	3034	3756	1157
Stage 1	-	-	-	-	-	-	1435	1435	-	2317	2317	-
Stage 2	-	-	-	-	-	-	1161	2318	-	717	1439	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*328	-	-	775	-	-	-	-	*599	-	-	*219
Stage 1	-	-	-	-	-	-	*452	*419	-	*207	*181	-
Stage 2	-	-	-	-	-	-	*207	*181	-	*564	*416	-
Platoon blocked, %	1	-	-	1	-	-	2	2	1	2	2	1
Mov Cap-1 Maneuver	*328	-	-	775	-	-	-	-	*599	-	-	*219
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	*450	*418	-	*206	*181	-
Stage 2	-	-	-	-	-	-	*149	*181	-	*547	*415	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	* 328	-	-	775	-	-	-
HCM Lane V/C Ratio	-	0.004	-	-	0.003	-	-	-
HCM Control Delay (s)	-	16	-	-	9.7	-	-	-
HCM Lane LOS	-	C	-	-	A	-	-	-
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	10.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1181	9	9	2020	3	55	0	19	1	0	9
Future Vol, veh/h	0	1181	9	9	2020	3	55	0	19	1	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	88	88	88	64	64	64	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1495	11	10	2295	3	86	0	30	2	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2299	0	0	1506	0	0	2669	3820	753	3065	3824	1149
Stage 1	-	-	-	-	-	-	1501	1501	-	2318	2318	-
Stage 2	-	-	-	-	-	-	1168	2319	-	747	1506	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*366	-	-	697	-	-	*~ 67	*0	*599	*~ 0	*0	*245
Stage 1	-	-	-	-	-	-	*385	*371	-	*231	*202	-
Stage 2	-	-	-	-	-	-	*231	*202	-	*564	*368	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*366	-	-	697	-	-	*~ 61	*0	*599	*0	*0	*245
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 61	*0	-	*0	*0	-
Stage 1	-	-	-	-	-	-	*385	*371	-	*231	*199	-
Stage 2	-	-	-	-	-	-	*211	*199	-	*536	*368	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	$ 357.1	21
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	79	* 366	-	-	697	-	-	245
HCM Lane V/C Ratio	1.464	-	-	-	0.015	-	-	0.082
HCM Control Delay (s)	$ 357.1	0	-	-	10.2	-	-	21
HCM Lane LOS	F	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	9.3	0	-	-	0	-	-	0.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1010	141	83	1559	110	302	188	158	113	49	171
Future Volume (vph)	50	1010	141	83	1559	110	302	188	158	113	49	171
Satd. Flow (prot)	1947	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.067			0.134			0.000			0.000		
Satd. Flow (perm)	137	3539	1583	250	3539	1583	0	1863	1583	0	1863	1583
Satd. Flow (RTOR)			173			173			182			182
Lane Group Flow (vph)	59	1188	166	97	1813	128	364	227	190	123	53	186
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	6		2	2		6	8		8	4		4
Total Split (s)	16.0	65.0	65.0	16.0	65.0	65.0	24.0	24.0	24.0	15.0	15.0	15.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)	66.6	57.6	57.6	65.0	60.9	60.9	17.4	17.0	17.0	8.0	7.6	7.6
Actuated g/C Ratio	0.56	0.48	0.48	0.54	0.51	0.51	0.14	0.14	0.14	0.07	0.06	0.06
v/c Ratio	0.32	0.70	0.20	0.42	1.01	0.14	1.42	0.86	0.50	1.04	0.45	0.69
Control Delay	15.9	19.1	4.1	16.1	54.0	1.2	247.7	80.2	12.6	148.9	66.8	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	19.1	4.1	16.1	54.0	1.2	247.7	80.2	12.6	148.9	66.8	22.3
LOS	B	B	A	B	D	A	F	F	B	F	E	C
Approach Delay		17.2			48.9			141.8			71.8	
Approach LOS		B			D			F			E	
Queue Length 50th (ft)	19	217	17	29	~812	0	~382	174	5	~103	40	3
Queue Length 95th (ft)	m18	291	42	50	#880	10	#515	#272	56	#229	84	#79
Internal Link Dist (ft)		674			850			1375			1029	
Turn Bay Length (ft)	350		100	380					100			100
Base Capacity (vph)	197	1697	849	237	1797	888	257	263	380	118	124	275
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.70	0.20	0.41	1.01	0.14	1.42	0.86	0.50	1.04	0.43	0.68

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 40 (33%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.42
Intersection Signal Delay: 56.8 Intersection LOS: E
Intersection Capacity Utilization 96.5% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	161	199	0	17
Future Vol, veh/h	0	0	161	199	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	175	216	0	18

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	283
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	756
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	756
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	9.9
HCM LOS		A

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	756
HCM Lane V/C Ratio	-	-	0.024
HCM Control Delay (s)	-	-	9.9
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	9.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	47	6	0	0	0	341
Future Vol, veh/h	47	6	0	0	0	341
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	7	0	0	0	371

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	54
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	1013
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	1013
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	10.6
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	1013	-	-
HCM Lane V/C Ratio	0.366	-	-
HCM Control Delay (s)	10.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.7	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	345	43	0	15
Future Vol, veh/h	0	0	345	43	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	375	47	0	16

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	398
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	652
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	652
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.7
HCM LOS		B

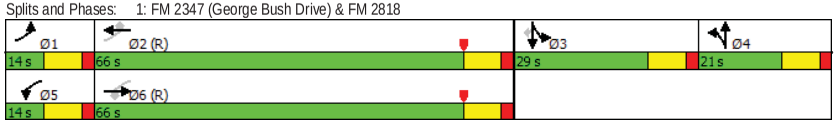
Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	652
HCM Lane V/C Ratio	-	-	0.025
HCM Control Delay (s)	-	-	10.7
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	1504	13	4	1274	84	63	30	73	451	3	220
Future Volume (vph)	123	1504	13	4	1274	84	63	30	73	451	3	220
Satd. Flow (prot)	1947	3539	1583	1947	3539	1583	0	1720	0	1681	1686	1583
Flt Permitted	0.069			0.063				0.981		0.950	0.953	
Satd. Flow (perm)	141	3539	1583	129	3539	1583	0	1720	0	1681	1686	1583
Satd. Flow (RTOR)			176			176		24				176
Lane Group Flow (vph)	140	1709	15	4	1400	92	0	218	0	262	265	256
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		2						3
Total Split (s)	14.0	66.0	66.0	14.0	66.0	66.0	21.0	21.0		29.0	29.0	29.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	8.0		8.0		8.0	8.0	8.0
Act Effct Green (s)	64.0	69.4	69.4	70.4	58.0	58.0		13.0		21.0	21.0	21.0
Actuated g/C Ratio	0.49	0.53	0.53	0.54	0.45	0.45		0.10		0.16	0.16	0.16
v/c Ratio	0.92	0.90	0.02	0.03	0.89	0.11		1.13		0.97	0.97	0.64
Control Delay	80.6	35.7	0.0	18.0	28.7	1.7		150.0		100.9	102.6	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	80.6	35.7	0.0	18.0	28.7	1.7		150.0		100.9	102.6	24.4
LOS	F	D	A	B	C	A		F		F	F	C
Approach Delay		38.8			27.0			150.0			76.5	
Approach LOS		D			C			F			E	
Queue Length 50th (ft)	62	628	0	1	220	0		~193		233	236	60
Queue Length 95th (ft)	#184	#936	0	m2	333	m15		#273		#387	#392	140
Internal Link Dist (ft)		1307			2211			1167			1439	
Turn Bay Length (ft)	200		50	175		100				325		
Base Capacity (vph)	152	1889	927	154	1578	803		193		271	272	403
Starvation Cap Reductn	0	0	0	0	0	0		0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0		0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0		0		0	0	0
Reduced v/c Ratio	0.92	0.90	0.02	0.03	0.89	0.11		1.13		0.97	0.97	0.64

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 47.1 — Intersection LOS: D
Intersection Capacity Utilization 85.0% — ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	1948	4	0	1269	52	10	1	4	51	0	83
Future Volume (vph)	76	1948	4	0	1269	52	10	1	4	51	0	83
Satd. Flow (prot)	1947	3539	0	2049	3518	0	0	1735	0	1770	1583	0
Flt Permitted	0.121							0.741		0.950		
Satd. Flow (perm)	248	3539	0	2049	3518	0	0	1328	0	1770	1583	0
Satd. Flow (RTOR)					5			10			141	
Lane Group Flow (vph)	83	2121	0	0	1484	0	0	36	0	72	117	0
Turn Type	D.P+P	NA		D.P+P	NA		Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	6			2			8					
Total Split (s)	18.0	88.0		14.0	84.0		14.0	14.0		14.0	28.0	
Total Lost Time (s)	6.0	7.0		6.0	7.0			6.0		6.0	6.0	
Act Effct Green (s)	96.2	101.2			88.2			7.3		7.7	15.8	
Actuated g/C Ratio	0.74	0.78			0.68			0.06		0.06	0.12	
v/c Ratio	0.30	0.77			0.62			0.43		0.69	0.37	
Control Delay	4.7	8.7			31.1			62.0		92.1	7.7	
Queue Delay	0.0	0.0			0.0			0.0		0.0	0.0	
Total Delay	4.7	8.7			31.1			62.0		92.1	7.7	
LOS	A	A			C			E		F	A	
Approach Delay		8.5			31.1			62.0			39.8	
Approach LOS		A			C			E			D	
Queue Length 50th (ft)	12	306			563			22		60	0	
Queue Length 95th (ft)	m20	m458			m630			22		88	6	
Internal Link Dist (ft)		2211			916			487			1137	
Turn Bay Length (ft)	175											
Base Capacity (vph)	349	2754			2387			91		108	385	
Starvation Cap Reductn	0	0			0			0		0	0	
Spillback Cap Reductn	0	0			0			0		0	0	
Storage Cap Reductn	0	0			0			0		0	0	
Reduced v/c Ratio	0.24	0.77			0.62			0.40		0.67	0.30	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 16 (12%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 19.1 — Intersection LOS: B
Intersection Capacity Utilization 81.5% — ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection

Int Delay, s/veh 0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1992	11	4	1317	4	9
Future Vol, veh/h	1992	11	4	1317	4	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	91	91	41	41
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2165	12	4	1447	10	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	2177	0	2903	1089
Stage 1	-	-	-	-	2171	-
Stage 2	-	-	-	-	732	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	*393	-	*~ 6	*262
Stage 1	-	-	-	-	*248	-
Stage 2	-	-	-	-	*512	-
Platoon blocked, %	-	-	1	-	1	1
Mov Cap-1 Maneuver	-	-	*393	-	*~ 6	*262
Mov Cap-2 Maneuver	-	-	-	-	*154	-
Stage 1	-	-	-	-	*248	-
Stage 2	-	-	-	-	*507	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	24.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	215	-	-	* 393	-
HCM Lane V/C Ratio	0.147	-	-	0.011	-
HCM Control Delay (s)	24.6	-	-	14.3	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	98.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	1947	34	28	1280	20	19	0	31	8	0	22
Future Vol, veh/h	20	1947	34	28	1280	20	19	0	31	8	0	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	66	66	66	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	2116	37	30	1391	22	29	0	47	11	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1413	0	0	2153	0	0	2935	3652	1077	2565	3660	707
Stage 1	-	-	-	-	-	-	2178	2178	-	1463	1463	-
Stage 2	-	-	-	-	-	-	757	1474	-	1102	2197	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*846	-	-	*427	-	-	*~ 3	*0	*286	*18	*0	*566
Stage 1	-	-	-	-	-	-	*269	*236	-	*495	*442	-
Stage 2	-	-	-	-	-	-	*533	*433	-	*269	*236	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*846	-	-	*427	-	-	*~ 3	*0	*286	*14	*0	*566
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 3	*0	-	*14	*0	-
Stage 1	-	-	-	-	-	-	*262	*230	-	*482	*411	-
Stage 2	-	-	-	-	-	-	*470	*402	-	*219	*230	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	$ 4716.4	206.5
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	8	* 846	-	-	* 427	-	-	49
HCM Lane V/C Ratio	9.47	0.026	-	-	0.071	-	-	0.816
HCM Control Delay (s)	$ 4716.4	9.4	-	-	14.1	-	-	206.5
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	11	0.1	-	-	0.2	-	-	3.4

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	982.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	1938	34	66	1267	11	40	0	83	4	0	21
Future Vol, veh/h	14	1938	34	66	1267	11	40	0	83	4	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	91	91	91	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	2107	37	73	1392	12	49	0	102	5	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1404	0	0	2143	0	0	2996	3704	1072	2627	3717	702
Stage 1	-	-	-	-	-	-	2155	2155	-	1543	1543	-
Stage 2	-	-	-	-	-	-	841	1549	-	1084	2174	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*846	-	-	*427	-	-	*~ 1	*0	*286	*86	*0	*566
Stage 1	-	-	-	-	-	-	*269	*236	-	*403	*379	-
Stage 2	-	-	-	-	-	-	*533	*375	-	*269	*236	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*846	-	-	*427	-	-	*~ 1	*0	*286	*47	*0	*566
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 1	*0	-	*47	*0	-
Stage 1	-	-	-	-	-	-	*265	*232	-	*396	*314	-
Stage 2	-	-	-	-	-	-	*422	*311	-	*170	*232	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.7	$ 24696.3	25.6
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	3	* 846	-	-	* 427	-	-	205
HCM Lane V/C Ratio	50.617	0.018	-	-	0.17	-	-	0.151
HCM Control Delay (s)	$ 24696.3	9.3	-	-	15.1	-	-	25.6
HCM Lane LOS	F	A	-	-	C	-	-	D
HCM 95th %tile Q(veh)	21.3	0.1	-	-	0.6	-	-	0.5

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	1517	403	219	1082	164	170	166	247	162	204	92
Future Volume (vph)	105	1517	403	219	1082	164	170	166	247	162	204	92
Satd. Flow (prot)	1947	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.146			0.063			0.000			0.000		
Satd. Flow (perm)	299	3539	1583	117	3539	1583	0	1863	1583	0	1863	1583
Satd. Flow (RTOR)			159			170			189			168
Lane Group Flow (vph)	114	1649	438	246	1216	184	193	189	281	176	222	100
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	6		2	2		6	8		8	4		4
Total Split (s)	22.0	71.0	71.0	22.0	71.0	71.0	20.0	20.0	20.0	17.0	17.0	17.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)	77.0	63.0	63.0	77.0	69.3	69.3	13.0	13.0	13.0	10.0	10.0	10.0
Actuated g/C Ratio	0.59	0.48	0.48	0.59	0.53	0.53	0.10	0.10	0.10	0.08	0.08	0.08
v/c Ratio	0.42	0.96	0.52	1.00	0.64	0.20	1.09	1.02	0.86	1.29	1.55	0.36
Control Delay	12.1	36.7	11.6	94.8	23.7	3.4	147.4	127.5	43.7	222.3	318.6	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	36.7	11.6	94.8	23.7	3.4	147.4	127.5	43.7	222.3	318.6	3.7
LOS	B	D	B	F	C	A	F	F	D	F	F	A
Approach Delay		30.4			32.1			97.8			221.3	
Approach LOS		C			C			F			F	
Queue Length 50th (ft)	24	565	98	159	367	5	~183	~165	77	~189	~263	0
Queue Length 95th (ft)	m35	#862	177	#330	448	41	#327	#311	#217	#340	#428	0
Internal Link Dist (ft)		674			850			1375			1029	
Turn Bay Length (ft)	350		100	380					100			100
Base Capacity (vph)	369	1715	849	247	1887	923	177	186	328	136	143	276
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.96	0.52	1.00	0.64	0.20	1.09	1.02	0.86	1.29	1.55	0.36

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 40 (31%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.55
Intersection Signal Delay: 58.8 — Intersection LOS: E
Intersection Capacity Utilization 99.2% — ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818

Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	139	57	0	93
Future Vol, veh/h	0	0	139	57	0	93
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	151	62	0	101

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	182
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	861
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	861
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	9.7
HCM LOS		A

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	861
HCM Lane V/C Ratio	-	-	0.117
HCM Control Delay (s)	-	-	9.7
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.4

8: North Dowling Road & FM 2818 EB FR

PM PEAK

Intersection	
Int Delay, s/veh	7.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	23	11	0	0	0	139
Future Vol, veh/h	23	11	0	0	0	139
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	12	0	0	0	151

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	31
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	1043
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	1043
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	9
HCM LOS		A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	1043	-	-
HCM Lane V/C Ratio	0.145	-	-
HCM Control Delay (s)	9	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-

13: FM 2818 WB FR & The Retreat Apartments

PM PEAK

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	145	17	0	51
Future Vol, veh/h	0	0	145	17	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	158	18	0	55

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	167
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	877
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	877
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	9.4
HCM LOS		A

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	877
HCM Lane V/C Ratio	-	-	0.063
HCM Control Delay (s)	-	-	9.4
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.2

2818 Analysis — 1: FM 2347 (George Bush Drive) & FM 2818

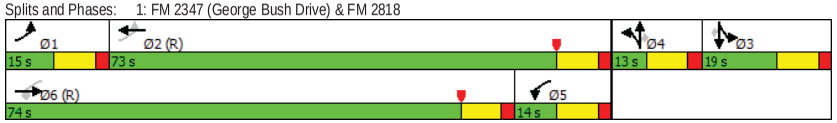
Existing 2016 -- Planned Improvements — AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	1140	103	43	1853	275	9	7	7	23	31	136
Future Volume (vph)	163	1140	103	43	1853	275	9	7	7	23	31	136
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1764	1583
Flt Permitted	0.061			0.140			0.950			0.950	0.997	
Satd. Flow (perm)	242	5085	1583	287	5085	1583	1770	1863	1583	1681	1764	1583
Satd. Flow (RTOR)			191			336			264			264
Lane Group Flow (vph)	204	1425	129	49	2130	316	11	9	9	26	43	174
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	15.0	74.0	74.0	14.0	73.0		13.0	13.0	13.0	19.0	19.0	19.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	72.0	68.8	68.8	73.6	65.5	120.0	5.0	5.0	5.0	11.0	11.0	11.0
Actuated g/C Ratio	0.60	0.57	0.57	0.61	0.55	1.00	0.04	0.04	0.04	0.09	0.09	0.09
v/c Ratio	0.61	0.49	0.13	0.19	0.77	0.20	0.15	0.12	0.03	0.17	0.27	0.45
Control Delay	22.2	16.5	0.6	2.1	6.6	0.1	60.2	58.9	0.1	53.2	55.4	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	16.5	0.6	2.1	6.6	0.1	60.2	58.9	0.1	53.2	55.4	4.0
LOS	C	B	A	A	A	A	E	E	A	D	E	A
Approach Delay		16.0			5.7			41.2			18.4	
Approach LOS		B			A			D			B	
Queue Length 50th (ft)	26	242	0	2	257	0	8	7	0	20	33	0
Queue Length 95th (ft)	48	238	0	m1	98	m0	26	23	0	43	63	0
Internal Link Dist (ft)		1307			758			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	352	2915	989	259	2774	1583	73	77	318	154	161	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.49	0.13	0.19	0.77	0.20	0.15	0.12	0.03	0.17	0.27	0.45

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 10.6 — Intersection LOS: B
Intersection Capacity Utilization 68.6% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



2818 Analysis — 2: Luther Street & FM 2818

Existing 2016 -- Planned Improvements — AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	1146	8	8	2099	44	1	1	2	20	3	71
Future Volume (vph)	16	1146	8	8	2099	44	1	1	2	20	3	71
Satd. Flow (prot)	1947	3536	0	1947	3529	0	0	1715	0	1770	1596	0
Flt Permitted	0.050			0.133				0.717		0.950		
Satd. Flow (perm)	102	3536	0	273	3529	0	0	1245	0	1770	1596	0
Satd. Flow (RTOR)		1			3			6			109	
Lane Group Flow (vph)	21	1479	0	9	2464	0	0	12	0	30	114	0
Turn Type	D.P+P	NA		D.P+P	NA		Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	6			2			8					
Total Split (s)	14.0	78.0		14.0	78.0		14.0	14.0		14.0	28.0	
Total Lost Time (s)	6.0	7.0		6.0	7.0			6.0		6.0	6.0	
Act Effct Green (s)	93.2	92.0		94.4	89.0			7.0		7.2	12.4	
Actuated g/C Ratio	0.78	0.77		0.79	0.74			0.06		0.06	0.10	
v/c Ratio	0.11	0.55		0.03	0.94			0.15		0.28	0.44	
Control Delay	7.9	10.8		3.4	16.9			43.2		60.9	14.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	7.9	10.8		3.4	16.9			43.2		60.9	14.4	
LOS	A	B		A	B			D		E	B	
Approach Delay		10.7			16.8			43.3			24.1	
Approach LOS		B			B			D			C	
Queue Length 50th (ft)	2	145		1	198			5		23	4	
Queue Length 95th (ft)	m8	149		m2	#1262			6		39	18	
Internal Link Dist (ft)		1373			916			487			1137	
Turn Bay Length (ft)	175			100								
Base Capacity (vph)	201	2710		326	2618			88		118	381	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.10	0.55		0.03	0.94			0.14		0.25	0.30	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 106 (88%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 14.9 — Intersection LOS: B
Intersection Capacity Utilization 76.1% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1168	0	5	2133	18	11
Future Vol, veh/h	1168	0	5	2133	18	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1407	0	5	2318	27	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1407	0	2577	704
Stage 1	-	-	-	-	1407	-
Stage 2	-	-	-	-	1170	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	766	-	*27	*624
Stage 1	-	-	-	-	*450	-
Stage 2	-	-	-	-	*183	-
Platoon blocked, %	-	-	1	-	1	1
Mov Cap-1 Maneuver	-	-	766	-	*~ 27	*624
Mov Cap-2 Maneuver	-	-	-	-	*128	-
Stage 1	-	-	-	-	*450	-
Stage 2	-	-	-	-	*182	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	183	-	-	766	-
HCM Lane V/C Ratio	0.24	-	-	0.007	-
HCM Control Delay (s)	30.8	-	-	9.7	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	147.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	1172	6	2	2081	1	24	0	10	8	0	33
Future Vol, veh/h	1	1172	6	2	2081	1	24	0	10	8	0	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	90	90	90	61	61	61	54	54	54
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1429	7	2	2312	1	39	0	16	15	0	61

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2313	0	0	1437	0	0	2596	3753	718	3034	3756	1157
Stage 1	-	-	-	-	-	-	1435	1435	-	2317	2317	-
Stage 2	-	-	-	-	-	-	1161	2318	-	717	1439	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*328	-	-	775	-	-	*~ 3	*0	*599	*0	*0	*219
Stage 1	-	-	-	-	-	-	*452	*419	-	*207	*181	-
Stage 2	-	-	-	-	-	-	*207	*181	-	*564	*416	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*328	-	-	775	-	-	*~ 2	*0	*599	*0	*0	*219
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 2	*0	-	*0	*0	-
Stage 1	-	-	-	-	-	-	*450	*418	-	*206	*181	-
Stage 2	-	-	-	-	-	-	*149	*181	-	*547	*415	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	$ 10227.6	29.9
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	3	* 328	-	-	775	-	-	219
HCM Lane V/C Ratio	18.579	0.004	-	-	0.003	-	-	0.347
HCM Control Delay (s)	$ 10227.6	16	-	-	9.7	-	-	29.9
HCM Lane LOS	F	C	-	-	A	-	-	D
HCM 95th %tile Q(veh)	8.9	0	-	-	0	-	-	1.5

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1181	9	9	2020	3	55	0	19	1	0	9
Future Vol, veh/h	0	1181	9	9	2020	3	55	0	19	1	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	88	88	88	64	64	64	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1495	11	10	2295	3	86	0	30	2	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2299	0	0	1506	0	0	2669	3820	753	3065	3824	1149
Stage 1	-	-	-	-	-	-	1501	1501	-	2318	2318	-
Stage 2	-	-	-	-	-	-	1168	2319	-	747	1506	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*366	-	-	697	-	-	*~ 80	*0	*599	*~ 0	*0	*245
Stage 1	-	-	-	-	-	-	*385	*371	-	*231	*202	-
Stage 2	-	-	-	-	-	-	*231	*202	-	*564	*368	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*366	-	-	697	-	-	*~ 73	*0	*599	*0	*0	*245
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 73	*0	-	*0	*0	-
Stage 1	-	-	-	-	-	-	*385	*371	-	*231	*199	-
Stage 2	-	-	-	-	-	-	*211	*199	-	*536	*368	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	249.6	21
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	94	* 366	-	-	697	-	-	245
HCM Lane V/C Ratio	1.23	-	-	-	0.015	-	-	0.082
HCM Control Delay (s)	249.6	0	-	-	10.2	-	-	21
HCM Lane LOS	F	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	8.1	0	-	-	0	-	-	0.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1010	141	83	1559	110	302	188	158	113	49	171
Future Volume (vph)	50	1010	141	83	1559	110	302	188	158	113	49	171
Satd. Flow (prot)	1947	3539	1689	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.064			0.137			0.950			0.000		
Satd. Flow (perm)	131	3539	1689	255	3539	1583	3433	1863	1583	0	1863	1583
Satd. Flow (RTOR)			318			173			255			255
Lane Group Flow (vph)	59	1188	166	97	1813	128	364	227	190	123	53	186
Turn Type	D.P+P	NA	Free	D.P+P	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	6		Free	2		6			8	4		4
Total Split (s)	16.0	68.0		16.0	68.0	68.0	20.0	21.0	21.0	15.0	16.0	16.0
Total Lost Time (s)	8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)	69.6	60.0	120.0	68.0	64.0	64.0	14.0	14.0	14.0	8.0	8.0	8.0
Actuated g/C Ratio	0.58	0.50	1.00	0.57	0.53	0.53	0.12	0.12	0.12	0.07	0.07	0.07
v/c Ratio	0.32	0.67	0.10	0.40	0.96	0.14	0.91	1.05	0.46	1.04	0.43	0.54
Control Delay	15.2	12.1	0.1	21.7	41.6	1.1	79.5	124.9	5.4	148.9	64.6	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.2	12.1	0.1	21.7	41.6	1.1	79.5	124.9	5.4	148.9	64.6	7.6
LOS	B	B	A	C	D	A	E	F	A	F	E	A
Approach Delay		10.8			38.1			74.7			63.9	
Approach LOS		B			D			E			E	
Queue Length 50th (ft)	12	156	0	27	~732	0	145	~191	0	~103	40	0
Queue Length 95th (ft)	m21	222	0	46	#842	9	#215	#310	4	#229	83	17
Internal Link Dist (ft)		674			850			1375			1029	
Turn Bay Length (ft)	350		100	380					150			250
Base Capacity (vph)	198	1769	1689	245	1886	924	401	217	409	118	139	354
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.67	0.10	0.40	0.96	0.14	0.91	1.05	0.46	1.04	0.38	0.53

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 44 (37%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 38.0 Intersection LOS: D
Intersection Capacity Utilization 90.1% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	161	199	0	17
Future Vol, veh/h	0	0	161	199	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	175	216	0	18

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	283
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	756
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	756
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	9.9
HCM LOS		A

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	756
HCM Lane V/C Ratio	-	-	0.024
HCM Control Delay (s)	-	-	9.9
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	9.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	47	6	0	0	0	341
Future Vol, veh/h	47	6	0	0	0	341
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	7	0	0	0	371

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	54
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	1013
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	1013
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	10.6
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	1013	-	-
HCM Lane V/C Ratio	0.366	-	-
HCM Control Delay (s)	10.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.7	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	345	43	0	15
Future Vol, veh/h	0	0	345	43	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	375	47	0	16

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	398
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	652
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	652
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.7
HCM LOS		B

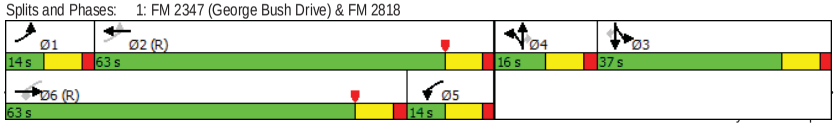
Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	652
HCM Lane V/C Ratio	-	-	0.025
HCM Control Delay (s)	-	-	10.7
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	1504	13	4	1274	84	63	30	73	451	3	220
Future Volume (vph)	123	1504	13	4	1274	84	63	30	73	451	3	220
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1686	1583
Flt Permitted	0.096			0.067			0.950			0.950	0.953	
Satd. Flow (perm)	382	5085	1583	137	5085	1583	1770	1863	1583	1681	1686	1583
Satd. Flow (RTOR)			176			310			243			243
Lane Group Flow (vph)	154	1880	16	5	1464	97	77	37	89	289	293	282
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	14.0	63.0	63.0	14.0	63.0		16.0	16.0	16.0	37.0	37.0	37.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	61.0	66.2	66.2	67.4	55.1	130.0	8.0	8.0	8.0	29.0	29.0	29.0
Actuated g/C Ratio	0.47	0.51	0.51	0.52	0.42	1.00	0.06	0.06	0.06	0.22	0.22	0.22
v/c Ratio	0.46	0.73	0.02	0.03	0.68	0.06	0.71	0.32	0.27	0.77	0.78	0.52
Control Delay	20.0	27.7	0.0	12.2	19.0	0.1	93.1	66.4	2.1	62.5	62.9	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	27.7	0.0	12.2	19.0	0.1	93.1	66.4	2.1	62.5	62.9	12.0
LOS	C	C	A	B	B	A	F	E	A	E	E	B
Approach Delay		26.9			17.8			48.4			46.1	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	31	417	0	1	141	0	65	30	0	242	246	26
Queue Length 95th (ft)	43	490	0	m2	158	m0	#124	62	0	295	300	63
Internal Link Dist (ft)		1307			767			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	335	2589	892	154	2154	1583	108	114	325	374	376	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.73	0.02	0.03	0.68	0.06	0.71	0.32	0.27	0.77	0.78	0.52

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 28.3 — Intersection LOS: C
Intersection Capacity Utilization 72.5% — ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	1948	4	0	1269	52	10	1	4	51	0	83
Future Volume (vph)	76	1948	4	0	1269	52	10	1	4	51	0	83
Satd. Flow (prot)	1947	3539	0	2049	3518	0	0	1735	0	1770	1583	0
Flt Permitted	0.119							0.741		0.950		
Satd. Flow (perm)	244	3539	0	2049	3518	0	0	1328	0	1770	1583	0
Satd. Flow (RTOR)					6			10			143	
Lane Group Flow (vph)	83	2121	0	0	1484	0	0	36	0	72	117	0
Turn Type	D.P+P	NA		D.P+P	NA		Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	6			2			8					
Total Split (s)	14.0	88.0		14.0	88.0		14.0	14.0		14.0	28.0	
Total Lost Time (s)	6.0	7.0		6.0	7.0			6.0		6.0	6.0	
Act Effct Green (s)	96.2	101.2			87.2			7.3		7.7	15.8	
Actuated g/C Ratio	0.74	0.78			0.67			0.06		0.06	0.12	
v/c Ratio	0.29	0.77			0.63			0.43		0.69	0.37	
Control Delay	3.3	6.9			4.6			62.0		92.1	7.3	
Queue Delay	0.0	0.0			0.0			0.0		0.0	0.0	
Total Delay	3.3	6.9			4.6			62.0		92.1	7.3	
LOS	A	A			A			E		F	A	
Approach Delay		6.8			4.6			62.0			39.6	
Approach LOS		A			A			E			D	
Queue Length 50th (ft)	4	122			41			22		60	0	
Queue Length 95th (ft)	m1	101			97			22		88	5	
Internal Link Dist (ft)		1364			916			487			1137	
Turn Bay Length (ft)	175											
Base Capacity (vph)	285	2754			2361			91		108	386	
Starvation Cap Reductn	0	0			0			0		0	0	
Spillback Cap Reductn	0	0			0			0		0	0	
Storage Cap Reductn	0	0			0			0		0	0	
Reduced v/c Ratio	0.29	0.77			0.63			0.40		0.67	0.30	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 19 (15%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 8.0 — Intersection LOS: A
Intersection Capacity Utilization 81.5% — ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1992	11	4	1317	4	9
Future Vol, veh/h	1992	11	4	1317	4	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	91	91	41	41
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2165	12	4	1447	10	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	2177	0	2903	1089
Stage 1	-	-	-	-	2171	-
Stage 2	-	-	-	-	732	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	*393	-	-	*262
Stage 1	-	-	-	-	*248	-
Stage 2	-	-	-	-	*512	-
Platoon blocked, %	-	-	1	-	2	1
Mov Cap-1 Maneuver	-	-	*393	-	-	*262
Mov Cap-2 Maneuver	-	-	-	-	*152	-
Stage 1	-	-	-	-	*248	-
Stage 2	-	-	-	-	*507	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	
HCM LOS			-

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	* 393	-
HCM Lane V/C Ratio	-	-	-	0.011	-
HCM Control Delay (s)	-	-	-	14.3	-
HCM Lane LOS	-	-	-	B	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

4: Canyon Creek / Parkway Place Apts & FM 2818

PM PEAK

Intersection	
Int Delay, s/veh	158.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	1947	34	28	1280	20	19	0	31	8	0	22
Future Vol, veh/h	20	1947	34	28	1280	20	19	0	31	8	0	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	66	66	66	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	2116	37	30	1391	22	29	0	47	11	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1413	0	0	2153	0	0	2935	3652	1077	2565	3660	707
Stage 1	-	-	-	-	-	-	2178	2178	-	1463	1463	-
Stage 2	-	-	-	-	-	-	757	1474	-	1102	2197	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*846	-	-	*427	-	-	*~ 2	*0	*286	*76	*0	*566
Stage 1	-	-	-	-	-	-	*269	*236	-	*495	*442	-
Stage 2	-	-	-	-	-	-	*533	*433	-	*269	*236	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*846	-	-	*427	-	-	*~ 2	*0	*286	*59	*0	*566
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 2	*0	-	*59	*0	-
Stage 1	-	-	-	-	-	-	*262	*230	-	*482	*411	-
Stage 2	-	-	-	-	-	-	*470	*402	-	*219	*230	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	$ 7788.2	32.2
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	5	* 846	-	-	* 427	-	-	172
HCM Lane V/C Ratio	15.152	0.026	-	-	0.071	-	-	0.233
HCM Control Delay (s)	$ 7788.2	9.4	-	-	14.1	-	-	32.2
HCM Lane LOS	F	A	-	-	B	-	-	D
HCM 95th %tile Q(veh)	11.3	0.1	-	-	0.2	-	-	0.9

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

5: 2818 Place Apts / Walden Pond Apts & FM 2818

PM PEAK

Intersection	
Int Delay, s/veh	484.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	1938	34	66	1267	11	40	0	83	4	0	21
Future Vol, veh/h	14	1938	34	66	1267	11	40	0	83	4	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	91	91	91	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	2107	37	73	1392	12	49	0	102	5	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1404	0	0	2143	0	0	2996	3704	1072	2627	3717	702
Stage 1	-	-	-	-	-	-	2155	2155	-	1543	1543	-
Stage 2	-	-	-	-	-	-	841	1549	-	1084	2174	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*846	-	-	*427	-	-	*~ 3	*0	*286	*12	*0	*566
Stage 1	-	-	-	-	-	-	*269	*236	-	*403	*379	-
Stage 2	-	-	-	-	-	-	*533	*375	-	*269	*236	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*846	-	-	*427	-	-	*~ 2	*0	*286	*7	*0	*566
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 2	*0	-	*7	*0	-
Stage 1	-	-	-	-	-	-	*265	*232	-	*396	*314	-
Stage 2	-	-	-	-	-	-	*422	*311	-	*170	*232	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.7	$ 12136.5	218.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	6	* 846	-	-	* 427	-	-	41
HCM Lane V/C Ratio	25.309	0.018	-	-	0.17	-	-	0.753
HCM Control Delay (s)	$ 12136.5	9.3	-	-	15.1	-	-	218.4
HCM Lane LOS	F	A	-	-	C	-	-	F
HCM 95th %tile Q(veh)	20.9	0.1	-	-	0.6	-	-	2.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

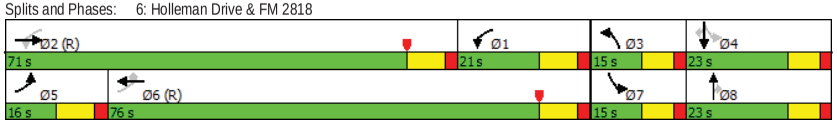
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	1517	403	219	1082	164	170	166	247	162	204	92
Future Volume (vph)	105	1517	403	219	1082	164	170	166	247	162	204	92
Satd. Flow (prot)	1947	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.144			0.063			0.950			0.384		
Satd. Flow (perm)	295	3539	1583	117	3539	1583	3433	1863	1583	715	1863	1583
Satd. Flow (RTOR)			294			184			235			235
Lane Group Flow (vph)	114	1649	438	246	1216	184	193	189	281	176	222	100
Turn Type	D.P+P	NA	Free	D.P+P	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	6		Free	2		6			8	4		4
Total Split (s)	16.0	71.0		21.0	76.0	76.0	15.0	23.0	23.0	15.0	23.0	23.0
Total Lost Time (s)	8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)	76.0	63.0	130.0	76.0	68.5	68.5	8.0	16.0	16.0	24.0	16.0	16.0
Actuated g/C Ratio	0.58	0.48	1.00	0.58	0.53	0.53	0.06	0.12	0.12	0.18	0.12	0.12
v/c Ratio	0.43	0.96	0.28	1.06	0.65	0.20	0.91	0.83	0.70	0.90	0.97	0.25
Control Delay	8.5	31.3	0.3	119.7	24.3	2.7	103.5	83.5	21.5	88.1	108.7	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	31.3	0.3	119.7	24.3	2.7	103.5	83.5	21.5	88.1	108.7	1.5
LOS	A	C	A	F	C	A	F	F	C	F	F	A
Approach Delay		23.9			36.1			63.1			79.9	
Approach LOS		C			D			E			E	
Queue Length 50th (ft)	26	499	0	~175	374	0	85	158	36	126	189	0
Queue Length 95th (ft)	m32	#861	0	#342	447	35	#153	#274	125	#208	#353	0
Internal Link Dist (ft)		674			850			1375			1029	
Turn Bay Length (ft)	350		100	380					150			250
Base Capacity (vph)	275	1715	1583	233	1866	921	211	229	400	196	229	400
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.96	0.28	1.06	0.65	0.20	0.91	0.83	0.70	0.90	0.97	0.25

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 68 (52%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 38.7 — Intersection LOS: D
Intersection Capacity Utilization 96.8% — ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	139	57	0	93
Future Vol, veh/h	0	0	139	57	0	93
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	151	62	0	101

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	182
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	861
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	861
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	9.7
HCM LOS		A

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	861
HCM Lane V/C Ratio	-	-	0.117
HCM Control Delay (s)	-	-	9.7
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.4

8: North Dowling Road & FM 2818 EB FR

PM PEAK

Intersection	
Int Delay, s/veh	7.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	23	11	0	0	0	139
Future Vol, veh/h	23	11	0	0	0	139
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	12	0	0	0	151

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	31
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	1043
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	1043
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	9
HCM LOS		A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	1043	-	-
HCM Lane V/C Ratio	0.145	-	-
HCM Control Delay (s)	9	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-

13: FM 2818 WB FR & The Retreat Apartments

PM PEAK

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	145	17	0	51
Future Vol, veh/h	0	0	145	17	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	158	18	0	55

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	167
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	877
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	877
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	9.4
HCM LOS		A

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	877
HCM Lane V/C Ratio	-	-	0.063
HCM Control Delay (s)	-	-	9.4
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.2

1: FM 2347 (George Bush Drive) & FM 2818

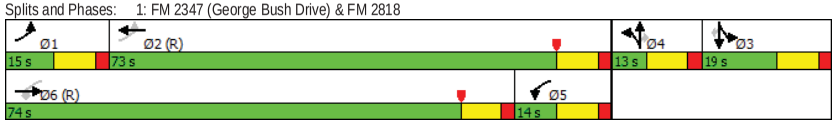
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	1140	103	43	1853	275	9	7	7	23	31	136
Future Volume (vph)	163	1140	103	43	1853	275	9	7	7	23	31	136
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1764	1583
Flt Permitted	0.061			0.140			0.950			0.950	0.997	
Satd. Flow (perm)	242	5085	1583	287	5085	1583	1770	1863	1583	1681	1764	1583
Satd. Flow (RTOR)			191			336			264			264
Lane Group Flow (vph)	204	1425	129	49	2130	316	11	9	9	26	43	174
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	15.0	74.0	74.0	14.0	73.0		13.0	13.0	13.0	19.0	19.0	19.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	72.0	68.8	68.8	73.6	65.5	120.0	5.0	5.0	5.0	11.0	11.0	11.0
Actuated g/C Ratio	0.60	0.57	0.57	0.61	0.55	1.00	0.04	0.04	0.04	0.09	0.09	0.09
v/c Ratio	0.61	0.49	0.13	0.19	0.77	0.20	0.15	0.12	0.03	0.17	0.27	0.45
Control Delay	22.2	16.5	0.6	2.1	6.6	0.1	60.2	58.9	0.1	53.2	55.4	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	16.5	0.6	2.1	6.6	0.1	60.2	58.9	0.1	53.2	55.4	4.0
LOS	C	B	A	A	A	A	E	E	A	D	E	A
Approach Delay		16.0			5.7			41.2			18.4	
Approach LOS		B			A			D			B	
Queue Length 50th (ft)	26	242	0	2	257	0	8	7	0	20	33	0
Queue Length 95th (ft)	48	238	0	m1	98	m0	26	23	0	43	63	0
Internal Link Dist (ft)		1307			771			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	352	2915	989	259	2774	1583	73	77	318	154	161	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.49	0.13	0.19	0.77	0.20	0.15	0.12	0.03	0.17	0.27	0.45

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 10.6 — Intersection LOS: B
Intersection Capacity Utilization 68.6% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



2: Luther Street & FM 2818

AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	1146	8	8	2099	44	1	1	2	20	3	71
Future Volume (vph)	16	1146	8	8	2099	44	1	1	2	20	3	71
Satd. Flow (prot)	1947	3536	0	1947	3529	0	0	1715	0	1770	1596	0
Flt Permitted	0.050			0.133				0.717		0.950		
Satd. Flow (perm)	102	3536	0	273	3529	0	0	1245	0	1770	1596	0
Satd. Flow (RTOR)		1			3			6			109	
Lane Group Flow (vph)	21	1479	0	9	2464	0	0	12	0	30	114	0
Turn Type	D.P+P	NA		D.P+P	NA		Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	6			2			8					
Total Split (s)	14.0	78.0		14.0	78.0		14.0	14.0		14.0	28.0	
Total Lost Time (s)	6.0	7.0		6.0	7.0			6.0		6.0	6.0	
Act Effct Green (s)	93.2	92.0		94.4	89.0			7.0		7.2	12.4	
Actuated g/C Ratio	0.78	0.77		0.79	0.74			0.06		0.06	0.10	
v/c Ratio	0.11	0.55		0.03	0.94			0.15		0.28	0.44	
Control Delay	7.9	10.8		3.4	16.9			43.2		60.9	14.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	7.9	10.8		3.4	16.9			43.2		60.9	14.4	
LOS	A	B		A	B			D		E	B	
Approach Delay		10.7			16.8			43.3			24.1	
Approach LOS		B			B			D			C	
Queue Length 50th (ft)	2	145		1	198			5		23	4	
Queue Length 95th (ft)	m8	149		m2	#1262			6		39	18	
Internal Link Dist (ft)		1360			916			487			1137	
Turn Bay Length (ft)	175			100								
Base Capacity (vph)	201	2710		326	2618			88		118	381	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.10	0.55		0.03	0.94			0.14		0.25	0.30	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 106 (88%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 14.9 — Intersection LOS: B
Intersection Capacity Utilization 76.1% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1168	0	5	2133	18	11
Future Vol, veh/h	1168	0	5	2133	18	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1407	0	5	2318	27	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1407	0	2577	704
Stage 1	-	-	-	-	1407	-
Stage 2	-	-	-	-	1170	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	766	-	*27	*624
Stage 1	-	-	-	-	*450	-
Stage 2	-	-	-	-	*183	-
Platoon blocked, %	-	-	1	-	1	1
Mov Cap-1 Maneuver	-	-	766	-	*~ 27	*624
Mov Cap-2 Maneuver	-	-	-	-	*128	-
Stage 1	-	-	-	-	*450	-
Stage 2	-	-	-	-	*182	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	183	-	-	766	-
HCM Lane V/C Ratio	0.24	-	-	0.007	-
HCM Control Delay (s)	30.8	-	-	9.7	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	147.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	1172	6	2	2081	1	24	0	10	8	0	33
Future Vol, veh/h	1	1172	6	2	2081	1	24	0	10	8	0	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	90	90	90	61	61	61	54	54	54
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1429	7	2	2312	1	39	0	16	15	0	61

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2313	0	0	1437	0	0	2596	3753	718	3034	3756	1157
Stage 1	-	-	-	-	-	-	1435	1435	-	2317	2317	-
Stage 2	-	-	-	-	-	-	1161	2318	-	717	1439	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*328	-	-	775	-	-	*~ 3	*0	*599	*0	*0	*219
Stage 1	-	-	-	-	-	-	*452	*419	-	*207	*181	-
Stage 2	-	-	-	-	-	-	*207	*181	-	*564	*416	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*328	-	-	775	-	-	*~ 2	*0	*599	*0	*0	*219
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 2	*0	-	*0	*0	-
Stage 1	-	-	-	-	-	-	*450	*418	-	*206	*181	-
Stage 2	-	-	-	-	-	-	*149	*181	-	*547	*415	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	$ 10227.6	29.9
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	3	* 328	-	-	775	-	-	219
HCM Lane V/C Ratio	18.579	0.004	-	-	0.003	-	-	0.347
HCM Control Delay (s)	$ 10227.6	16	-	-	9.7	-	-	29.9
HCM Lane LOS	F	C	-	-	A	-	-	D
HCM 95th %tile Q(veh)	8.9	0	-	-	0	-	-	1.5

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1181	9	9	2020	3	55	0	19	1	0	9
Future Vol, veh/h	0	1181	9	9	2020	3	55	0	19	1	0	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	88	88	88	64	64	64	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1495	11	10	2295	3	86	0	30	2	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2299	0	0	1506	0	0	2669	3820	753	3065	3824	1149
Stage 1	-	-	-	-	-	-	1501	1501	-	2318	2318	-
Stage 2	-	-	-	-	-	-	1168	2319	-	747	1506	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*366	-	-	697	-	-	*~ 80	*0	*599	*~ 0	*0	*245
Stage 1	-	-	-	-	-	-	*385	*371	-	*231	*202	-
Stage 2	-	-	-	-	-	-	*231	*202	-	*564	*368	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*366	-	-	697	-	-	*~ 73	*0	*599	*0	*0	*245
Mov Cap-2 Maneuver	-	-	-	-	-	-	*~ 73	*0	-	*0	*0	-
Stage 1	-	-	-	-	-	-	*385	*371	-	*231	*199	-
Stage 2	-	-	-	-	-	-	*211	*199	-	*536	*368	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	249.6	21
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	94	* 366	-	-	697	-	-	245
HCM Lane V/C Ratio	1.23	-	-	-	0.015	-	-	0.082
HCM Control Delay (s)	249.6	0	-	-	10.2	-	-	21
HCM Lane LOS	F	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	8.1	0	-	-	0	-	-	0.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1010	141	83	1559	110	302	188	158	113	49	171
Future Volume (vph)	50	1010	141	83	1559	110	302	188	158	113	49	171
Satd. Flow (prot)	1947	3539	1689	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.064			0.137			0.950			0.000		
Satd. Flow (perm)	131	3539	1689	255	3539	1583	3433	1863	1583	0	1863	1583
Satd. Flow (RTOR)			318			173			255			255
Lane Group Flow (vph)	59	1188	166	97	1813	128	364	227	190	123	53	186
Turn Type	D.P+P	NA	Free	D.P+P	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	6		Free	2		6			8	4		4
Total Split (s)	16.0	68.0		16.0	68.0	68.0	20.0	21.0	21.0	15.0	16.0	16.0
Total Lost Time (s)	8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)	69.6	60.0	120.0	68.0	64.0	64.0	14.0	14.0	14.0	8.0	8.0	8.0
Actuated g/C Ratio	0.58	0.50	1.00	0.57	0.53	0.53	0.12	0.12	0.12	0.07	0.07	0.07
v/c Ratio	0.32	0.67	0.10	0.40	0.96	0.14	0.91	1.05	0.46	1.04	0.43	0.54
Control Delay	15.2	12.1	0.1	21.7	41.6	1.1	79.5	124.9	5.4	148.9	64.6	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.2	12.1	0.1	21.7	41.6	1.1	79.5	124.9	5.4	148.9	64.6	7.6
LOS	B	B	A	C	D	A	E	F	A	F	E	A
Approach Delay		10.8			38.1			74.7			63.9	
Approach LOS		B			D			E			E	
Queue Length 50th (ft)	12	156	0	27	~732	0	145	~191	0	~103	40	0
Queue Length 95th (ft)	m21	222	0	46	#842	9	#215	#310	4	#229	83	17
Internal Link Dist (ft)		674			850			1375			1029	
Turn Bay Length (ft)	350		100	380					150			250
Base Capacity (vph)	198	1769	1689	245	1886	924	401	217	409	118	139	354
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.67	0.10	0.40	0.96	0.14	0.91	1.05	0.46	1.04	0.38	0.53

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 44 (37%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 38.0 Intersection LOS: D
Intersection Capacity Utilization 90.1% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	161	199	0	17
Future Vol, veh/h	0	0	161	199	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	175	216	0	18

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	283
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	756
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	756
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	9.9
HCM LOS		A

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	756
HCM Lane V/C Ratio	-	-	0.024
HCM Control Delay (s)	-	-	9.9
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	9.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	47	6	0	0	0	341
Future Vol, veh/h	47	6	0	0	0	341
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	7	0	0	0	371

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	54
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	1013
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	1013
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	10.6
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	1013	-	-
HCM Lane V/C Ratio	0.366	-	-
HCM Control Delay (s)	10.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.7	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	345	43	0	15
Future Vol, veh/h	0	0	345	43	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	375	47	0	16

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	398
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	652
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	652
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.7
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	652
HCM Lane V/C Ratio	-	-	0.025
HCM Control Delay (s)	-	-	10.7
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1931	14	4	1584	218	71	34	83	702	3	256
Future Volume (vph)	139	1931	14	4	1584	218	71	34	83	702	3	256
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1686	1583
Flt Permitted	0.071			0.066			0.950			0.950	0.953	
Satd. Flow (perm)	282	5085	1583	135	5085	1583	1770	1863	1583	1681	1686	1583
Satd. Flow (RTOR)			176			310			243			243
Lane Group Flow (vph)	174	2414	18	5	1821	251	87	41	101	450	454	328
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	14.0	64.0	64.0	14.0	64.0		13.0	13.0	13.0	39.0	39.0	39.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	62.0	67.2	67.2	68.4	56.0	130.0	5.0	5.0	5.0	31.0	31.0	31.0
Actuated g/C Ratio	0.48	0.52	0.52	0.53	0.43	1.00	0.04	0.04	0.04	0.24	0.24	0.24
v/c Ratio	0.59	0.92	0.02	0.03	0.83	0.16	1.28	0.58	0.34	1.12	1.13	0.58
Control Delay	25.0	35.9	0.1	16.5	25.6	0.1	249.5	91.7	3.2	128.5	129.8	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	35.9	0.1	16.5	25.6	0.1	249.5	91.7	3.2	128.5	129.8	16.4
LOS	C	D	A	B	C	A	F	F	A	F	F	B
Approach Delay		34.9			22.5			112.6			99.1	
Approach LOS		C			C			F			F	
Queue Length 50th (ft)	35	632	0	1	296	0	~93	35	0	~460	~466	58
Queue Length 95th (ft)	47	#753	0	m2	401	m0	#182	#76	0	#543	#547	101
Internal Link Dist (ft)		1307			756			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	295	2628	903	154	2192	1583	68	71	294	400	402	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.92	0.02	0.03	0.83	0.16	1.28	0.58	0.34	1.13	1.13	0.58

Intersection Summary

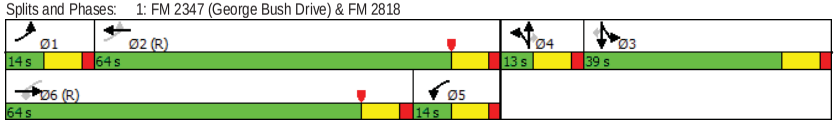
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.28
Intersection Signal Delay: 46.5 — Intersection LOS: D
Intersection Capacity Utilization 87.7% — ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	2626	4	0	1701	76	11	1	4	64	0	94
Future Volume (vph)	86	2626	4	0	1701	76	11	1	4	64	0	94
Satd. Flow (prot)	1947	3539	0	2049	3518	0	0	1736	0	1770	1583	0
Flt Permitted	0.048							0.715		0.950		
Satd. Flow (perm)	98	3539	0	2049	3518	0	0	1284	0	1770	1583	0
Satd. Flow (RTOR)					6			10			143	
Lane Group Flow (vph)	93	2858	0	0	1996	0	0	38	0	90	132	0
Turn Type	D.P+P	NA		D.P+P	NA		Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	6			2			8					
Total Split (s)	14.0	88.0		14.0	88.0		14.0	14.0		14.0	28.0	
Total Lost Time (s)	6.0	7.0		6.0	7.0			6.0		6.0	6.0	
Act Effct Green (s)	93.4	98.4			84.4			7.4		7.8	18.6	
Actuated g/C Ratio	0.72	0.76			0.65			0.06		0.06	0.14	
v/c Ratio	0.51	1.07			0.87			0.46		0.86	0.38	
Control Delay	17.9	47.2			9.9			65.2		114.9	9.3	
Queue Delay	0.0	0.0			0.0			0.0		0.0	0.0	
Total Delay	17.9	47.2			9.9			65.2		114.9	9.3	
LOS	B	D			A			E		F	A	
Approach Delay		46.2			9.9			65.2			52.1	
Approach LOS		D			A			E			D	
Queue Length 50th (ft)	16	~1416			660			23		76	0	
Queue Length 95th (ft)	m22	m#1429			m353			23		#118	15	
Internal Link Dist (ft)		1376			916			487			1137	
Turn Bay Length (ft)	175											
Base Capacity (vph)	184	2678			2286			88		108	386	
Starvation Cap Reductn	0	0			0			0		0	0	
Spillback Cap Reductn	0	0			0			0		0	0	
Storage Cap Reductn	0	0			0			0		0	0	
Reduced v/c Ratio	0.51	1.07			0.87			0.43		0.83	0.34	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 13 (10%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 32.7 — Intersection LOS: C
Intersection Capacity Utilization 91.1% — ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	2682	12	4	1773	4	10
Future Vol, veh/h	2682	12	4	1773	4	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	91	91	41	41
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2915	13	4	1948	10	24

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	2928	0	3905	1464
Stage 1	-	-	-	-	2922	-
Stage 2	-	-	-	-	983	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	*336	-
Platoon blocked, %	-	-	2	-	2	2
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	*336	-

Approach	EB	WB	NB
HCM Control Delay, s	0		
HCM LOS			-

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

4: Canyon Creek / Parkway Place Apts & FM 2818

PM PEAK

Intersection	
Int Delay, s/veh	13.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	2632	38	31	1731	22	21	0	35	9	0	25
Future Vol, veh/h	22	2632	38	31	1731	22	21	0	35	9	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	66	66	66	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	2861	41	34	1882	24	32	0	53	12	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1905	0	0	2902	0	0	3937	4902	1451	3439	4911	953
Stage 1	-	-	-	-	-	-	2929	2929	-	1961	1961	-
Stage 2	-	-	-	-	-	-	1008	1973	-	1478	2950	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*567	-	-	*~ 9	-	-	-	-	*~ 6	-	-	*379
Stage 1	-	-	-	-	-	-	*~ 5	*5	-	*343	*304	-
Stage 2	-	-	-	-	-	-	*357	*294	-	*~ 5	*5	-
Platoon blocked, %	1	-	-	1	-	-	2	2	1	2	2	1
Mov Cap-1 Maneuver	*567	-	-	*~ 9	-	-	-	-	*~ 6	-	-	*379
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	*~ 5	*5	-	*329	*0	-
Stage 2	-	-	-	-	-	-	-	*0	-	-	*5	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	35.6		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	* 567	-	-	~ * 9	-	-	-
HCM Lane V/C Ratio	-	0.042	-	-	3.744	-	-	-
HCM Control Delay (s)	-	11.6	-	$	2049.6	-	-	-
HCM Lane LOS	-	B	-	-	F	-	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-	5.4	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

5: 2818 Place Apts / Walden Pond Apts & FM 2818

PM PEAK

Intersection	
Int Delay, s/veh	72.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	2623	38	75	1716	12	45	0	94	4	0	23
Future Vol, veh/h	15	2623	38	75	1716	12	45	0	94	4	0	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	91	91	91	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	2851	41	82	1886	13	56	0	116	5	0	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1899	0	0	2892	0	0	4012	4968	1446	3515	4982	949
Stage 1	-	-	-	-	-	-	2904	2904	-	2057	2057	-
Stage 2	-	-	-	-	-	-	1108	2064	-	1458	2925	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	*567	-	-	*~ 9	-	-	*0	*0	*~ 6	*0	*0	*379
Stage 1	-	-	-	-	-	-	*~ 5	*5	-	*237	*231	-
Stage 2	-	-	-	-	-	-	*357	*226	-	*5	*5	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*567	-	-	*~ 9	-	-	-	*0	*~ 6	-	*0	*379
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	*0	-	-	*0	-
Stage 1	-	-	-	-	-	-	*~ 5	*5	-	*231	*0	-
Stage 2	-	-	-	-	-	-	-	*0	-	-	*5	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	186.4		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	* 567	-	-	~ * 9	-	-	-
HCM Lane V/C Ratio	-	0.029	-	-	9.158	-	-	-
HCM Control Delay (s)	-	11.5	-	$	4480.3	-	-	-
HCM Lane LOS	-	B	-	-	F	-	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-	11.8	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	119	1872	730	502	1266	204	433	339	506	190	419	104
Future Volume (vph)	119	1872	730	502	1266	204	433	339	506	190	419	104
Satd. Flow (prot)	1947	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.066			0.083			0.950			0.211		
Satd. Flow (perm)	135	3539	1583	155	3539	1583	3433	1863	1583	393	1863	1583
Satd. Flow (RTOR)			294			173			235			235
Lane Group Flow (vph)	129	2035	793	564	1422	229	492	385	575	207	455	113
Turn Type	D.P+P	NA	Free	D.P+P	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	6		Free	2		6			8	4		4
Total Split (s)	16.0	56.0		28.0	68.0	68.0	20.0	31.0	31.0	15.0	26.0	26.0
Total Lost Time (s)	8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)	68.0	48.0	130.0	68.0	60.3	60.3	13.0	24.0	24.0	27.0	19.0	19.0
Actuated g/C Ratio	0.52	0.37	1.00	0.52	0.46	0.46	0.10	0.18	0.18	0.21	0.15	0.15
v/c Ratio	0.72	1.56	0.50	1.71	0.87	0.28	1.43	1.12	1.19	1.25	1.67	0.26
Control Delay	34.4	277.4	0.3	362.1	38.3	6.7	252.6	133.7	132.0	186.4	352.6	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.4	277.4	0.3	362.1	38.3	6.7	252.6	133.7	132.0	186.4	352.6	1.5
LOS	C	F	A	F	D	A	F	F	F	F	F	A
Approach Delay		192.5			117.5			173.3			257.0	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	48	~1275	0	~654	556	26	~289	~373	~413	~165	~558	0
Queue Length 95th (ft)	m47	m#1182	m0	#869	650	73	#388	#553	#615	#324	#770	0
Internal Link Dist (ft)		674			850			1375			1029	
Turn Bay Length (ft)	350		100	380					150			250
Base Capacity (vph)	182	1306	1583	329	1640	826	343	343	483	166	272	432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	1.56	0.50	1.71	0.87	0.28	1.43	1.12	1.19	1.25	1.67	0.26

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 71 (55%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.71
Intersection Signal Delay: 173.0 — Intersection LOS: F
Intersection Capacity Utilization 139.0% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	158	200	0	105
Future Vol, veh/h	0	0	158	200	0	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	172	217	0	114

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	280
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	759
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	759
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.6
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	759
HCM Lane V/C Ratio	-	-	0.15
HCM Control Delay (s)	-	-	10.6
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.5

8: North Dowling Road & FM 2818 EB FR

PM PEAK

Intersection	
Int Delay, s/veh	6.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	26	143	0	0	0	293
Future Vol, veh/h	26	143	0	0	0	293
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	155	0	0	0	318

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	106
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	948
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	948
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	10.7
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	948	-	-
HCM Lane V/C Ratio	0.336	-	-
HCM Control Delay (s)	10.7	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.5	-	-

13: FM 2818 WB FR & The Retreat Apartments

PM PEAK

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	289	30	0	69
Future Vol, veh/h	0	0	289	30	0	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	314	33	0	75

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	330
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	712
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	712
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.7
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	712
HCM Lane V/C Ratio	-	-	0.105
HCM Control Delay (s)	-	-	10.7
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.4

1: FM 2347 (George Bush Drive) & FM 2818

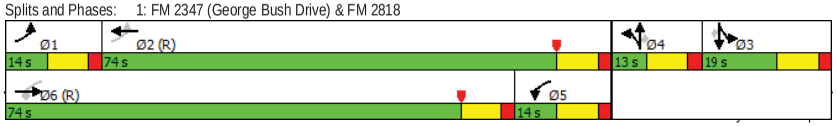
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	1441	117	48	2251	424	10	7	7	166	35	176
Future Volume (vph)	185	1441	117	48	2251	424	10	7	7	166	35	176
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1713	1583
Flt Permitted	0.061			0.078			0.950			0.950	0.968	
Satd. Flow (perm)	242	5085	1583	160	5085	1583	1770	1863	1583	1681	1713	1583
Satd. Flow (RTOR)			191			336			264			264
Lane Group Flow (vph)	231	1801	146	55	2587	487	12	9	9	128	130	226
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	14.0	74.0	74.0	14.0	74.0		13.0	13.0	13.0	19.0	19.0	19.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	72.0	68.8	68.8	73.6	66.0	120.0	5.0	5.0	5.0	11.0	11.0	11.0
Actuated g/C Ratio	0.60	0.57	0.57	0.61	0.55	1.00	0.04	0.04	0.04	0.09	0.09	0.09
v/c Ratio	0.72	0.62	0.15	0.30	0.92	0.31	0.16	0.12	0.03	0.83	0.83	0.59
Control Delay	30.5	18.7	1.0	6.0	12.3	0.3	60.7	58.9	0.1	92.5	91.5	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.5	18.7	1.0	6.0	12.3	0.3	60.7	58.9	0.1	92.5	91.5	9.8
LOS	C	B	A	A	B	A	E	E	A	F	F	A
Approach Delay		18.8			10.3			42.0			53.6	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	33	340	0	3	256	0	9	7	0	104	106	0
Queue Length 95th (ft)	61	324	4	m3	112	0	27	23	0	#172	#175	13
Internal Link Dist (ft)		1307			2211			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	321	2915	989	187	2797	1583	73	77	318	154	157	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.62	0.15	0.29	0.92	0.31	0.16	0.12	0.03	0.83	0.83	0.59

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 17.2 — Intersection LOS: B
Intersection Capacity Utilization 81.0% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



2: Luther Street & FM 2818

AM PEAK

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	18	1587	9	27	9	2642	54	1	1	2	44	3
Future Volume (vph)	18	1587	9	27	9	2642	54	1	1	2	44	3
Satd. Flow (prot)	1947	5080	0	0	1947	5070	0	0	1715	0	1770	1593
Flt Permitted	0.048				0.098				0.893		0.950	
Satd. Flow (perm)	98	5080	0	0	201	5070	0	0	1550	0	1770	1593
Satd. Flow (RTOR)		1				4			2			89
Lane Group Flow (vph)	20	1773	0	0	40	2996	0	0	4	0	49	92
Turn Type	D.P+P	NA		custom	D.P+P	NA		Perm	NA		Prot	NA
Protected Phases	5	2			1	6			8		7	4
Permitted Phases	6			1	2			8				
Total Split (s)	14.0	78.0		14.0	14.0	78.0		14.0	14.0		14.0	28.0
Total Lost Time (s)	6.0	7.0			6.0	7.0			6.0		6.0	6.0
Act Effct Green (s)	95.4	86.4			93.0	91.2			7.0		7.6	10.2
Actuated g/C Ratio	0.80	0.72			0.78	0.76			0.06		0.06	0.08
v/c Ratio	0.10	0.48			0.16	0.78			0.04		0.44	0.43
Control Delay	5.1	5.5			1.1	5.1			44.5		66.3	16.3
Queue Delay	0.0	0.0			0.0	0.0			0.0		0.0	0.0
Total Delay	5.1	5.5			1.1	5.1			44.5		66.3	16.3
LOS	A	A			A	A			D		E	B
Approach Delay		5.5				5.0			44.5			33.7
Approach LOS		A				A			D			C
Queue Length 50th (ft)	2	110			1	44			2		37	2
Queue Length 95th (ft)	m5	121			m2	m270			14		78	47
Internal Link Dist (ft)		2211				916			487			1137
Turn Bay Length (ft)	175				100							
Base Capacity (vph)	200	3657			273	3853			105		121	364
Starvation Cap Reductn	0	0			0	0			0		0	0
Spillback Cap Reductn	0	0			0	0			0		0	0
Storage Cap Reductn	0	0			0	0			0		0	0
Reduced v/c Ratio	0.10	0.48			0.15	0.78			0.04		0.40	0.25

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 107 (89%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 6.0 — Intersection LOS: A
Intersection Capacity Utilization 70.8% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1655	5	0	2732	0	32
Future Vol, veh/h	1655	5	0	2732	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1839	6	0	3036	0	36

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	922
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	0	*550
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*550
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	550	-	-	-
HCM Lane V/C Ratio	0.065	-	-	-
HCM Control Delay (s)	12	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1679	8	0	2686	2	0	0	38	0	0	46
Future Vol, veh/h	0	1679	8	0	2686	2	0	0	38	0	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1866	9	0	2984	2	0	0	42	0	0	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	937	-	-	1493
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*528	0	0	*293
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*528	-	-	*293
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.4	19.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	528	-	-	-	-	293
HCM Lane V/C Ratio	0.08	-	-	-	-	0.174
HCM Control Delay (s)	12.4	-	-	-	-	19.9
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.6

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1697	20	0	2677	3	0	0	83	0	0	11
Future Vol, veh/h	0	1697	20	0	2677	3	0	0	83	0	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1886	22	0	2974	3	0	0	92	0	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	954	-	-	1489
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*528	0	0	*293
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*528	-	-	*293
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.3	17.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	528	-	-	-	-	293
HCM Lane V/C Ratio	0.175	-	-	-	-	0.042
HCM Control Delay (s)	13.3	-	-	-	-	17.8
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.1

Notes

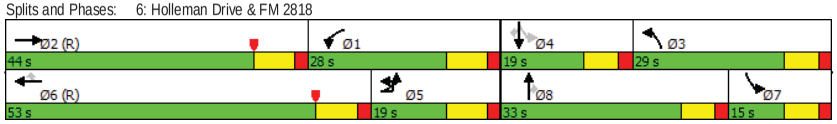
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	110	56	1278	336	258	1783	129	593	368	411	150	177
Future Volume (vph)	110	56	1278	336	258	1783	129	593	368	411	150	177
Satd. Flow (prot)	0	1947	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863
Flt Permitted		0.950			0.950			0.950			0.333	
Satd. Flow (perm)	0	1947	5085	1583	1770	5085	1583	3433	1863	1583	620	1863
Satd. Flow (RTOR)				382			236			255		
Lane Group Flow (vph)	0	184	1420	373	287	1981	143	659	409	457	167	197
Turn Type	Prot	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases				Free			6			8	4	
Total Split (s)	19.0	19.0	44.0		28.0	53.0	53.0	29.0	33.0	33.0	15.0	19.0
Total Lost Time (s)		8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)		11.0	36.0	120.0	20.0	45.0	45.0	22.0	26.0	26.0	20.0	12.0
Actuated g/C Ratio		0.09	0.30	1.00	0.17	0.38	0.38	0.18	0.22	0.22	0.17	0.10
v/c Ratio		1.03	0.93	0.24	0.97	1.04	0.19	1.05	1.01	0.84	0.93	1.06
Control Delay		130.3	36.8	0.3	96.2	68.6	0.6	96.4	95.5	34.9	95.2	134.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		130.3	36.8	0.3	96.2	68.6	0.6	96.4	95.5	34.9	95.2	134.1
LOS		F	D	A	F	E	A	F	F	C	F	F
Approach Delay			38.6			67.9			77.7			74.4
Approach LOS			D			E			E			E
Queue Length 50th (ft)		~158	409	0	224	~606	0	~286	~326	159	94	~167
Queue Length 95th (ft)		#309	#495	0	#401	#702	0	#404	#532	#340	#219	#319
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)		350		100	380					150	200	
Base Capacity (vph)		178	1525	1583	295	1906	741	629	403	542	180	186
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.03	0.93	0.24	0.97	1.04	0.19	1.05	1.01	0.84	0.93	1.06

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 61.9 Intersection LOS: E
Intersection Capacity Utilization 97.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Holleman Drive & FM 2818



Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	183	362	0	19
Future Vol, veh/h	0	0	183	362	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	203	402	0	21

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	404
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	647
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	647
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.8
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	647
HCM Lane V/C Ratio	-	-	0.033
HCM Control Delay (s)	-	-	10.8
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	11.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	53	91	0	0	0	524
Future Vol, veh/h	53	91	0	0	0	524
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	101	0	0	0	582

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	109
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	945
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	945
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	14.7
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	945	-	-
HCM Lane V/C Ratio	0.616	-	-
HCM Control Delay (s)	14.7	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	4.4	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	527	50	0	18
Future Vol, veh/h	0	0	527	50	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	586	56	0	20

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	613
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	492
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	492
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	12.6
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	492
HCM Lane V/C Ratio	-	-	0.041
HCM Control Delay (s)	-	-	12.6
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1931	14	4	1584	218	71	34	83	702	3	256
Future Volume (vph)	139	1931	14	4	1584	218	71	34	83	702	3	256
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1686	1583
Flt Permitted	0.071			0.066			0.950			0.950	0.953	
Satd. Flow (perm)	282	5085	1583	135	5085	1583	1770	1863	1583	1681	1686	1583
Satd. Flow (RTOR)			176			310			243			243
Lane Group Flow (vph)	174	2414	18	5	1821	251	87	41	101	450	454	328
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	14.0	64.0	64.0	14.0	64.0		13.0	13.0	13.0	39.0	39.0	39.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	62.0	67.2	67.2	68.4	56.0	130.0	5.0	5.0	5.0	31.0	31.0	31.0
Actuated g/C Ratio	0.48	0.52	0.52	0.53	0.43	1.00	0.04	0.04	0.04	0.24	0.24	0.24
v/c Ratio	0.59	0.92	0.02	0.03	0.83	0.16	1.28	0.58	0.34	1.12	1.13	0.58
Control Delay	25.0	35.9	0.1	6.0	12.9	0.2	249.5	91.7	3.2	128.5	129.8	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	35.9	0.1	6.0	12.9	0.2	249.5	91.7	3.2	128.5	129.8	16.4
LOS	C	D	A	A	B	A	F	F	A	F	F	B
Approach Delay		34.9			11.3			112.6			99.1	
Approach LOS		C			B			F			F	
Queue Length 50th (ft)	35	632	0	0	228	0	~93	35	0	~460	~466	58
Queue Length 95th (ft)	47	#753	0	m1	87	0	#182	#76	0	#543	#547	101
Internal Link Dist (ft)		1307			2211			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	295	2628	903	154	2192	1583	68	71	294	400	402	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.92	0.02	0.03	0.83	0.16	1.28	0.58	0.34	1.13	1.13	0.58

Intersection Summary

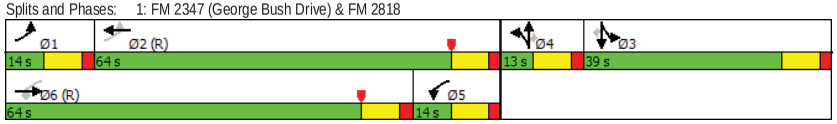
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.28
Intersection Signal Delay: 42.7 — Intersection LOS: D
Intersection Capacity Utilization 87.7% — ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	86	2626	4	123	0	1701	76	11	1	4	64	0
Future Volume (vph)	86	2626	4	123	0	1701	76	11	1	4	64	0
Satd. Flow (prot)	1947	5085	0	0	1947	5055	0	0	1742	0	1770	1583
Flt Permitted	0.072				0.046				0.793		0.950	
Satd. Flow (perm)	148	5085	0	0	94	5055	0	0	1430	0	1770	1583
Satd. Flow (RTOR)						10			4			143
Lane Group Flow (vph)	96	2922	0	0	137	1974	0	0	17	0	71	104
Turn Type	D.P+P	NA		custom	D.P+P	NA		Perm	NA		Prot	NA
Protected Phases	5	2			1	6			8		7	4
Permitted Phases	6			1	2			8				
Total Split (s)	14.0	88.0		14.0	14.0	88.0		14.0	14.0		14.0	28.0
Total Lost Time (s)	6.0	7.0			6.0	7.0			6.0		6.0	6.0
Act Effct Green (s)	99.0	90.0			99.0	90.0			7.1		7.7	13.0
Actuated g/C Ratio	0.76	0.69			0.76	0.69			0.05		0.06	0.10
v/c Ratio	0.43	0.83			0.74	0.56			0.21		0.68	0.36
Control Delay	7.6	6.5			56.0	2.7			55.1		91.2	6.2
Queue Delay	0.0	0.0			0.0	0.0			0.0		0.0	0.0
Total Delay	7.6	6.5			56.0	2.7			55.1		91.2	6.2
LOS	A	A			E	A			E		F	A
Approach Delay		6.5				6.2			55.1			40.7
Approach LOS		A				A			E			D
Queue Length 50th (ft)	7	107			67	13			11		60	0
Queue Length 95th (ft)	m7	m221			m79	m175			37		#132	22
Internal Link Dist (ft)		2211				916			487			1137
Turn Bay Length (ft)	175				100							
Base Capacity (vph)	223	3518			192	3504			91		108	386
Starvation Cap Reductn	0	0			0	0			0		0	0
Spillback Cap Reductn	0	0			0	0			0		0	0
Storage Cap Reductn	0	0			0	0			0		0	0
Reduced v/c Ratio	0.43	0.83			0.71	0.56			0.19		0.66	0.27

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 14 (11%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 7.7 — Intersection LOS: A
Intersection Capacity Utilization 81.0% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	2801	16	0	1900	0	14
Future Vol, veh/h	2801	16	0	1900	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3112	18	0	2111	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	1565
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	0	*281
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*281
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	281	-	-	-
HCM Lane V/C Ratio	0.055	-	-	-
HCM Control Delay (s)	18.6	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

4: Canyon Creek / Parkway Place Apts & FM 2818

PM PEAK

Intersection												
Int Delay, s/veh	0.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2746	69	0	1866	44	0	0	56	0	0	34
Future Vol, veh/h	0	2746	69	0	1866	44	0	0	56	0	0	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	3051	77	0	2073	49	0	0	62	0	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1564	-	-	1061
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*281	0	0	*499
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*281	-	-	*499
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	21.4	12.8
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	281	-	-	-	-	499
HCM Lane V/C Ratio	0.221	-	-	-	-	0.076
HCM Control Delay (s)	21.4	-	-	-	-	12.8
HCM Lane LOS	C	-	-	-	-	B
HCM 95th %tile Q(veh)	0.8	-	-	-	-	0.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

5: 2818 Place Apts / Walden Pond Apts & FM 2818

PM PEAK

Intersection												
Int Delay, s/veh	0.9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2689	113	0	1883	27	0	0	139	0	0	27
Future Vol, veh/h	0	2689	113	0	1883	27	0	0	139	0	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2988	126	0	2092	30	0	0	154	0	0	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1557	-	-	1061
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*301	0	0	*499
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*301	-	-	*499
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	28.9	12.7
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	301	-	-	-	-	499
HCM Lane V/C Ratio	0.513	-	-	-	-	0.06
HCM Control Delay (s)	28.9	-	-	-	-	12.7
HCM Lane LOS	D	-	-	-	-	B
HCM 95th %tile Q(veh)	2.7	-	-	-	-	0.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

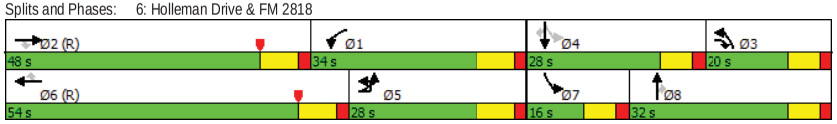
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	107	119	1872	730	502	1266	204	433	339	506	190	419
Future Volume (vph)	107	119	1872	730	502	1266	204	433	339	506	190	419
Satd. Flow (prot)	0	1947	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863
Flt Permitted		0.950			0.950			0.950			0.333	
Satd. Flow (perm)	0	1947	5085	1583	1770	5085	1583	3433	1863	1583	620	1863
Satd. Flow (RTOR)				159			218			325		
Lane Group Flow (vph)	0	251	2080	811	558	1407	227	481	377	562	211	466
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA
Protected Phases	5	5	2	3	1	6		3	8		7	4
Permitted Phases				2			6			8	4	
Total Split (s)	28.0	28.0	48.0	20.0	34.0	54.0	54.0	20.0	32.0	32.0	16.0	28.0
Total Lost Time (s)		8.0	8.0	7.0	8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)		20.0	40.0	61.0	26.0	46.0	46.0	13.0	25.0	25.0	21.0	21.0
Actuated g/C Ratio		0.15	0.31	0.47	0.20	0.35	0.35	0.10	0.19	0.19	0.16	0.16
v/c Ratio		0.84	1.33	0.98	1.58	0.78	0.32	1.40	1.05	0.99	1.18	1.55
Control Delay		79.3	179.3	34.0	307.4	41.3	5.6	239.8	112.3	58.4	168.7	301.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		79.3	179.3	34.0	307.4	41.3	5.6	239.8	112.3	58.4	168.7	301.2
LOS		E	F	C	F	D	A	F	F	E	F	F
Approach Delay			133.8			105.3			134.2			222.4
Approach LOS			F			F			F			F
Queue Length 50th (ft)		223	~828	418	~667	386	5	~279	~346	232	~202	~552
Queue Length 95th (ft)		m#285	#922	#244	#891	446	60	#390	#546	#478	#322	#766
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)		350		100	380					150	200	
Base Capacity (vph)		299	1564	827	354	1799	701	343	358	566	179	300
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.84	1.33	0.98	1.58	0.78	0.32	1.40	1.05	0.99	1.18	1.55

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 70 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.58
Intersection Signal Delay: 134.9 — Intersection LOS: F
Intersection Capacity Utilization 123.4% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	158	200	0	105
Future Vol, veh/h	0	0	158	200	0	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	176	222	0	117

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	287
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	752
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	752
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.7
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	752
HCM Lane V/C Ratio	-	-	0.155
HCM Control Delay (s)	-	-	10.7
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.5

8: North Dowling Road & FM 2818 EB FR

PM PEAK

Intersection	
Int Delay, s/veh	6.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	26	143	0	0	0	293
Future Vol, veh/h	26	143	0	0	0	293
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	159	0	0	0	326

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	108
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	946
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	946
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	10.8
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	946	-	-
HCM Lane V/C Ratio	0.344	-	-
HCM Control Delay (s)	10.8	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.5	-	-

13: FM 2818 WB FR & The Retreat Apartments

PM PEAK

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	284	35	0	74
Future Vol, veh/h	0	0	284	35	0	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	316	39	0	82

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	335
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	707
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	707
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.8
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	707
HCM Lane V/C Ratio	-	-	0.116
HCM Control Delay (s)	-	-	10.8
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.4

1: FM 2347 (George Bush Drive) & FM 2818

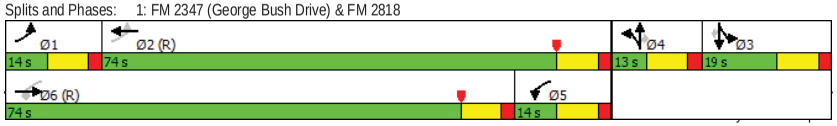
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	1441	117	48	2251	424	10	7	7	166	35	176
Future Volume (vph)	185	1441	117	48	2251	424	10	7	7	166	35	176
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1713	1583
Flt Permitted	0.061			0.078			0.950			0.950	0.968	
Satd. Flow (perm)	242	5085	1583	160	5085	1583	1770	1863	1583	1681	1713	1583
Satd. Flow (RTOR)			191			336			264			264
Lane Group Flow (vph)	231	1801	146	55	2587	487	12	9	9	128	130	226
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	14.0	74.0	74.0	14.0	74.0		13.0	13.0	13.0	19.0	19.0	19.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	72.0	68.8	68.8	73.6	66.0	120.0	5.0	5.0	5.0	11.0	11.0	11.0
Actuated g/C Ratio	0.60	0.57	0.57	0.61	0.55	1.00	0.04	0.04	0.04	0.09	0.09	0.09
v/c Ratio	0.72	0.62	0.15	0.30	0.92	0.31	0.16	0.12	0.03	0.83	0.83	0.59
Control Delay	30.5	18.7	1.0	6.0	12.3	0.3	60.7	58.9	0.1	92.5	91.5	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.5	18.7	1.0	6.0	12.3	0.3	60.7	58.9	0.1	92.5	91.5	9.8
LOS	C	B	A	A	B	A	E	E	A	F	F	A
Approach Delay		18.8			10.3			42.0			53.6	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	33	340	0	3	256	0	9	7	0	104	106	0
Queue Length 95th (ft)	61	324	4	m2	104	0	27	23	0	#172	#175	13
Internal Link Dist (ft)		1307			2211			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	321	2915	989	187	2797	1583	73	77	318	154	157	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.62	0.15	0.29	0.92	0.31	0.16	0.12	0.03	0.83	0.83	0.59

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 17.2 — Intersection LOS: B
Intersection Capacity Utilization 81.0% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



2: Luther Street & FM 2818

AM PEAK

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	18	1587	9	27	9	2642	54	1	1	2	44	3
Future Volume (vph)	18	1587	9	27	9	2642	54	1	1	2	44	3
Satd. Flow (prot)	1947	5080	0	0	1947	5070	0	0	1715	0	1770	1593
Flt Permitted	0.048				0.098				0.893		0.950	
Satd. Flow (perm)	98	5080	0	0	201	5070	0	0	1550	0	1770	1593
Satd. Flow (RTOR)		1				4			2			89
Lane Group Flow (vph)	20	1773	0	0	40	2996	0	0	4	0	49	92
Turn Type	D.P+P	NA		custom	D.P+P	NA		Perm	NA		Prot	NA
Protected Phases	5	2			1	6			8		7	4
Permitted Phases	6			1	2			8				
Total Split (s)	14.0	78.0		14.0	14.0	78.0		14.0	14.0		14.0	28.0
Total Lost Time (s)	6.0	7.0			6.0	7.0			6.0		6.0	6.0
Act Effct Green (s)	95.4	86.4			93.0	91.2			7.0		7.6	10.2
Actuated g/C Ratio	0.80	0.72			0.78	0.76			0.06		0.06	0.08
v/c Ratio	0.10	0.48			0.16	0.78			0.04		0.44	0.43
Control Delay	5.1	5.5			1.2	4.8			44.5		66.3	16.3
Queue Delay	0.0	0.0			0.0	0.0			0.0		0.0	0.0
Total Delay	5.1	5.5			1.2	4.8			44.5		66.3	16.3
LOS	A	A			A	A			D		E	B
Approach Delay		5.5				4.7			44.5			33.7
Approach LOS		A				A			D			C
Queue Length 50th (ft)	2	110			1	23			2		37	2
Queue Length 95th (ft)	m5	121			m2	m278			14		78	47
Internal Link Dist (ft)		2211				916			487			1137
Turn Bay Length (ft)	175				100							
Base Capacity (vph)	200	3657			273	3853			105		121	364
Starvation Cap Reductn	0	0			0	0			0		0	0
Spillback Cap Reductn	0	0			0	0			0		0	0
Storage Cap Reductn	0	0			0	0			0		0	0
Reduced v/c Ratio	0.10	0.48			0.15	0.78			0.04		0.40	0.25

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 107 (89%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 5.9 — Intersection LOS: A
Intersection Capacity Utilization 70.8% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1655	5	0	2732	0	32
Future Vol, veh/h	1655	5	0	2732	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1839	6	0	3036	0	36

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	922
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	0	*550
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*550
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	550	-	-	-
HCM Lane V/C Ratio	0.065	-	-	-
HCM Control Delay (s)	12	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1679	8	0	2686	2	0	0	38	0	0	46
Future Vol, veh/h	0	1679	8	0	2686	2	0	0	38	0	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1866	9	0	2984	2	0	0	42	0	0	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	937	-	-	1493
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*528	0	0	*293
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*528	-	-	*293
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.4	19.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	528	-	-	-	-	293
HCM Lane V/C Ratio	0.08	-	-	-	-	0.174
HCM Control Delay (s)	12.4	-	-	-	-	19.9
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.6

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1697	20	0	2677	3	0	0	83	0	0	11
Future Vol, veh/h	0	1697	20	0	2677	3	0	0	83	0	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1886	22	0	2974	3	0	0	92	0	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	954	-	-	1489
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*528	0	0	*293
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*528	-	-	*293
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.3	17.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	528	-	-	-	-	293
HCM Lane V/C Ratio	0.175	-	-	-	-	0.042
HCM Control Delay (s)	13.3	-	-	-	-	17.8
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.1

Notes

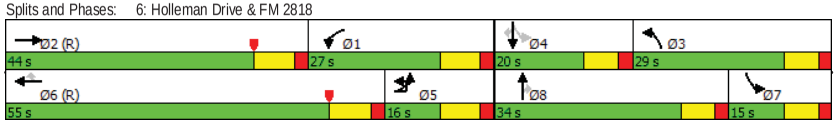
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	110	56	1278	336	258	1783	129	593	368	411	150	177
Future Volume (vph)	110	56	1278	336	258	1783	129	593	368	411	150	177
Satd. Flow (prot)	1770	1947	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863
Flt Permitted	0.950	0.950			0.950			0.950			0.308	
Satd. Flow (perm)	1770	1947	5085	1583	1770	5085	1583	3433	1863	1583	574	1863
Satd. Flow (RTOR)				382			236			255		
Lane Group Flow (vph)	122	62	1420	373	287	1981	143	659	409	457	167	197
Turn Type	Prot	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases				Free			6			8	4	
Total Split (s)	16.0	16.0	44.0		27.0	55.0	55.0	29.0	34.0	34.0	15.0	20.0
Total Lost Time (s)	8.0	8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)	8.0	8.0	36.0	120.0	19.0	47.0	47.0	22.0	27.0	27.0	21.0	13.0
Actuated g/C Ratio	0.07	0.07	0.30	1.00	0.16	0.39	0.39	0.18	0.22	0.22	0.18	0.11
v/c Ratio	1.03	0.48	0.93	0.24	1.02	0.99	0.19	1.05	0.98	0.83	0.93	0.98
Control Delay	146.2	70.1	36.8	0.3	110.2	55.6	0.5	96.4	85.1	33.0	95.0	112.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	146.2	70.1	36.8	0.3	110.2	55.6	0.5	96.4	85.1	33.0	95.0	112.3
LOS	F	E	D	A	F	E	A	F	F	C	F	F
Approach Delay			37.7			58.8			74.3			66.8
Approach LOS			D			E			E			E
Queue Length 50th (ft)	~105	51	409	0	~237	553	0	~286	317	157	92	155
Queue Length 95th (ft)	#233	98	#495	0	#412	#678	0	#404	#520	#333	#216	#306
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)	350	350		100	380					150		
Base Capacity (vph)	118	129	1525	1583	280	1991	763	629	419	553	180	201
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.48	0.93	0.24	1.02	0.99	0.19	1.05	0.98	0.83	0.93	0.98

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 56.8 Intersection LOS: E
Intersection Capacity Utilization 94.5% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Holleman Drive & FM 2818



Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	183	362	0	19
Future Vol, veh/h	0	0	183	362	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	203	402	0	21

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	404
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	647
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	647
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.8
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	647
HCM Lane V/C Ratio	-	-	0.033
HCM Control Delay (s)	-	-	10.8
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	11.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	53	91	0	0	0	524
Future Vol, veh/h	53	91	0	0	0	524
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	101	0	0	0	582

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	109
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	945
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	945
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	14.7
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	945	-	-
HCM Lane V/C Ratio	0.616	-	-
HCM Control Delay (s)	14.7	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	4.4	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	527	50	0	18
Future Vol, veh/h	0	0	527	50	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	586	56	0	20

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	613
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	492
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	492
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	12.6
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	492
HCM Lane V/C Ratio	-	-	0.041
HCM Control Delay (s)	-	-	12.6
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1931	14	4	1584	218	71	34	83	702	3	256
Future Volume (vph)	139	1931	14	4	1584	218	71	34	83	702	3	256
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1686	1583
Flt Permitted	0.071			0.066			0.950			0.950	0.953	
Satd. Flow (perm)	282	5085	1583	135	5085	1583	1770	1863	1583	1681	1686	1583
Satd. Flow (RTOR)			176			310			243			243
Lane Group Flow (vph)	174	2414	18	5	1821	251	87	41	101	450	454	328
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	14.0	64.0	64.0	14.0	64.0		13.0	13.0	13.0	39.0	39.0	39.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	62.0	67.2	67.2	68.4	56.0	130.0	5.0	5.0	5.0	31.0	31.0	31.0
Actuated g/C Ratio	0.48	0.52	0.52	0.53	0.43	1.00	0.04	0.04	0.04	0.24	0.24	0.24
v/c Ratio	0.59	0.92	0.02	0.03	0.83	0.16	1.28	0.58	0.34	1.12	1.13	0.58
Control Delay	25.0	35.9	0.1	7.2	14.5	0.2	249.5	91.7	3.2	128.5	129.8	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	35.9	0.1	7.2	14.5	0.2	249.5	91.7	3.2	128.5	129.8	16.4
LOS	C	D	A	A	B	A	F	F	A	F	F	B
Approach Delay		34.9			12.7			112.6			99.1	
Approach LOS		C			B			F			F	
Queue Length 50th (ft)	35	632	0	0	242	0	~93	35	0	~460	~466	58
Queue Length 95th (ft)	47	#753	0	m1	100	0	#182	#76	0	#543	#547	101
Internal Link Dist (ft)		1307			2211			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	295	2628	903	154	2192	1583	68	71	294	400	402	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.92	0.02	0.03	0.83	0.16	1.28	0.58	0.34	1.13	1.13	0.58

Intersection Summary

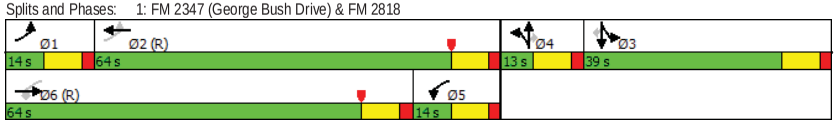
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.28
Intersection Signal Delay: 43.2 — Intersection LOS: D
Intersection Capacity Utilization 87.7% — ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	86	2626	4	123	0	1701	76	11	1	4	64	0
Future Volume (vph)	86	2626	4	123	0	1701	76	11	1	4	64	0
Satd. Flow (prot)	1947	5085	0	0	1947	5055	0	0	1742	0	1770	1583
Flt Permitted	0.072				0.046				0.793		0.950	
Satd. Flow (perm)	148	5085	0	0	94	5055	0	0	1430	0	1770	1583
Satd. Flow (RTOR)						10			4			143
Lane Group Flow (vph)	96	2922	0	0	137	1974	0	0	17	0	71	104
Turn Type	D.P+P	NA		custom	D.P+P	NA		Perm	NA		Prot	NA
Protected Phases	5	2			1	6			8		7	4
Permitted Phases	6			1	2			8				
Total Split (s)	14.0	88.0		14.0	14.0	88.0		14.0	14.0		14.0	28.0
Total Lost Time (s)	6.0	7.0			6.0	7.0			6.0		6.0	6.0
Act Effct Green (s)	99.0	90.0			99.0	90.0			7.1		7.7	13.0
Actuated g/C Ratio	0.76	0.69			0.76	0.69			0.05		0.06	0.10
v/c Ratio	0.43	0.83			0.74	0.56			0.21		0.68	0.36
Control Delay	7.8	6.2			57.6	2.1			55.1		91.2	6.2
Queue Delay	0.0	0.0			0.0	0.0			0.0		0.0	0.0
Total Delay	7.8	6.2			57.6	2.1			55.1		91.2	6.2
LOS	A	A			E	A			E		F	A
Approach Delay		6.3				5.7			55.1			40.7
Approach LOS		A				A			E			D
Queue Length 50th (ft)	6	116			66	12			11		60	0
Queue Length 95th (ft)	m7	m233			m86	m171			37		#132	22
Internal Link Dist (ft)		2211				916			487			1137
Turn Bay Length (ft)	175				100							
Base Capacity (vph)	223	3518			192	3504			91		108	386
Starvation Cap Reductn	0	0			0	0			0		0	0
Spillback Cap Reductn	0	0			0	0			0		0	0
Storage Cap Reductn	0	0			0	0			0		0	0
Reduced v/c Ratio	0.43	0.83			0.71	0.56			0.19		0.66	0.27

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 15 (12%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 7.4 — Intersection LOS: A
Intersection Capacity Utilization 81.0% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	2801	16	0	1900	0	14
Future Vol, veh/h	2801	16	0	1900	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3112	18	0	2111	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	1565
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	0	*281
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*281
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	281	-	-	-
HCM Lane V/C Ratio	0.055	-	-	-
HCM Control Delay (s)	18.6	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

4: Canyon Creek / Parkway Place Apts & FM 2818

PM PEAK

Intersection												
Int Delay, s/veh	0.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2746	69	0	1866	44	0	0	56	0	0	34
Future Vol, veh/h	0	2746	69	0	1866	44	0	0	56	0	0	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	3051	77	0	2073	49	0	0	62	0	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1564	-	-	1061
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*281	0	0	*499
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*281	-	-	*499
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	21.4	12.8
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	281	-	-	-	-	499
HCM Lane V/C Ratio	0.221	-	-	-	-	0.076
HCM Control Delay (s)	21.4	-	-	-	-	12.8
HCM Lane LOS	C	-	-	-	-	B
HCM 95th %tile Q(veh)	0.8	-	-	-	-	0.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

5: 2818 Place Apts / Walden Pond Apts & FM 2818

PM PEAK

Intersection												
Int Delay, s/veh	0.9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2689	113	0	1883	27	0	0	139	0	0	27
Future Vol, veh/h	0	2689	113	0	1883	27	0	0	139	0	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2988	126	0	2092	30	0	0	154	0	0	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1557	-	-	1061
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*301	0	0	*499
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*301	-	-	*499
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	28.9	12.7
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	301	-	-	-	-	499
HCM Lane V/C Ratio	0.513	-	-	-	-	0.06
HCM Control Delay (s)	28.9	-	-	-	-	12.7
HCM Lane LOS	D	-	-	-	-	B
HCM 95th %tile Q(veh)	2.7	-	-	-	-	0.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

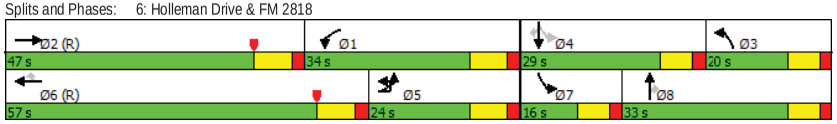
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	107	119	1872	730	502	1266	204	433	339	506	190	419
Future Volume (vph)	107	119	1872	730	502	1266	204	433	339	506	190	419
Satd. Flow (prot)	1770	1947	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863
Flt Permitted	0.950	0.950			0.950			0.950			0.308	
Satd. Flow (perm)	1770	1947	5085	1583	1770	5085	1583	3433	1863	1583	574	1863
Satd. Flow (RTOR)				352			218			307		
Lane Group Flow (vph)	119	132	2080	811	558	1407	227	481	377	562	211	466
Turn Type	Prot	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases				Free			6			8	4	
Total Split (s)	24.0	24.0	47.0		34.0	57.0	57.0	20.0	33.0	33.0	16.0	29.0
Total Lost Time (s)	8.0	8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)	16.0	16.0	39.0	130.0	26.0	49.0	49.0	13.0	26.0	26.0	22.0	22.0
Actuated g/C Ratio	0.12	0.12	0.30	1.00	0.20	0.38	0.38	0.10	0.20	0.20	0.17	0.17
v/c Ratio	0.55	0.55	1.36	0.51	1.58	0.73	0.31	1.40	1.01	1.00	1.18	1.48
Control Delay	70.0	69.5	194.5	0.7	307.4	37.7	5.2	239.8	101.4	61.7	168.2	269.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.0	69.5	194.5	0.7	307.4	37.7	5.2	239.8	101.4	61.7	168.2	269.9
LOS	E	E	F	A	F	D	A	F	F	E	F	F
Approach Delay			134.5			103.0			132.6			203.5
Approach LOS			F			F			F			F
Queue Length 50th (ft)	104	116	~843	0	~667	371	5	~279	~326	250	~200	~540
Queue Length 95th (ft)	m134	m147	#935	0	#891	429	57	#390	#533	#498	#322	#754
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)	350	350		100	380					150		
Base Capacity (vph)	217	239	1525	1583	354	1916	732	343	372	562	179	315
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.55	1.36	0.51	1.58	0.73	0.31	1.40	1.01	1.00	1.18	1.48

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 71 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.58
Intersection Signal Delay: 132.3 — Intersection LOS: F
Intersection Capacity Utilization 123.4% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	158	200	0	105
Future Vol, veh/h	0	0	158	200	0	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	176	222	0	117

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	287
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	752
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	752
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.7
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	752
HCM Lane V/C Ratio	-	-	0.155
HCM Control Delay (s)	-	-	10.7
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.5

Intersection	
Int Delay, s/veh	6.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	26	143	0	0	0	293
Future Vol, veh/h	26	143	0	0	0	293
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	159	0	0	0	326

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	108
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	946
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	946
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	10.8
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	946	-	-
HCM Lane V/C Ratio	0.344	-	-
HCM Control Delay (s)	10.8	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.5	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	284	35	0	74
Future Vol, veh/h	0	0	284	35	0	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	316	39	0	82

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	335
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	707
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	707
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.8
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	707
HCM Lane V/C Ratio	-	-	0.116
HCM Control Delay (s)	-	-	10.8
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.4

1: FM 2347 (George Bush Drive) & FM 2818

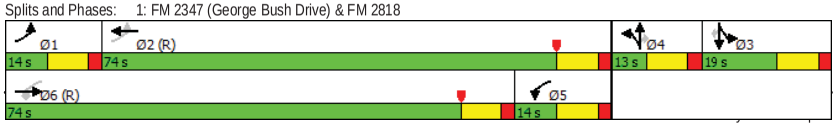
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	1441	117	48	2251	424	10	7	7	166	35	176
Future Volume (vph)	185	1441	117	48	2251	424	10	7	7	166	35	176
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1713	1583
Flt Permitted	0.061			0.078			0.950			0.950	0.968	
Satd. Flow (perm)	242	5085	1583	160	5085	1583	1770	1863	1583	1681	1713	1583
Satd. Flow (RTOR)			191			336			264			264
Lane Group Flow (vph)	231	1801	146	55	2587	487	12	9	9	128	130	226
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	14.0	74.0	74.0	14.0	74.0		13.0	13.0	13.0	19.0	19.0	19.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	72.0	68.8	68.8	73.6	66.0	120.0	5.0	5.0	5.0	11.0	11.0	11.0
Actuated g/C Ratio	0.60	0.57	0.57	0.61	0.55	1.00	0.04	0.04	0.04	0.09	0.09	0.09
v/c Ratio	0.72	0.62	0.15	0.30	0.92	0.31	0.16	0.12	0.03	0.83	0.83	0.59
Control Delay	30.5	18.7	1.0	6.0	12.3	0.3	60.7	58.9	0.1	92.5	91.5	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.5	18.7	1.0	6.0	12.3	0.3	60.7	58.9	0.1	92.5	91.5	9.8
LOS	C	B	A	A	B	A	E	E	A	F	F	A
Approach Delay		18.8			10.3			42.0			53.6	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	33	340	0	3	256	0	9	7	0	104	106	0
Queue Length 95th (ft)	61	324	4	m3	112	0	27	23	0	#172	#175	13
Internal Link Dist (ft)		1307			2211			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	321	2915	989	187	2797	1583	73	77	318	154	157	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.62	0.15	0.29	0.92	0.31	0.16	0.12	0.03	0.83	0.83	0.59

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 17.2 — Intersection LOS: B
Intersection Capacity Utilization 81.0% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



2: Luther Street & FM 2818

AM PEAK

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	18	1587	9	15	9	2642	54	1	1	2	44	3
Future Volume (vph)	18	1587	9	15	9	2642	54	1	1	2	44	3
Satd. Flow (prot)	1947	5080	0	0	1947	5070	0	0	1715	0	1770	1593
Flt Permitted	0.048				0.100				0.893		0.950	
Satd. Flow (perm)	98	5080	0	0	205	5070	0	0	1550	0	1770	1593
Satd. Flow (RTOR)		1				4			2			89
Lane Group Flow (vph)	20	1773	0	0	27	2996	0	0	4	0	49	92
Turn Type	D.P+P	NA		custom	D.P+P	NA		Perm	NA		Prot	NA
Protected Phases	5	2			1	6			8		7	4
Permitted Phases	6			1	2			8				
Total Split (s)	14.0	78.0		14.0	14.0	78.0		14.0	14.0		14.0	28.0
Total Lost Time (s)	6.0	7.0			6.0	7.0			6.0		6.0	6.0
Act Effct Green (s)	95.4	89.0			94.2	91.2			7.0		7.6	10.2
Actuated g/C Ratio	0.80	0.74			0.78	0.76			0.06		0.06	0.08
v/c Ratio	0.10	0.47			0.10	0.78			0.04		0.44	0.43
Control Delay	5.1	5.0			0.9	5.1			44.5		66.3	16.3
Queue Delay	0.0	0.0			0.0	0.0			0.0		0.0	0.0
Total Delay	5.1	5.0			0.9	5.1			44.5		66.3	16.3
LOS	A	A			A	A			D		E	B
Approach Delay		5.0				5.0			44.5			33.7
Approach LOS		A				A			D			C
Queue Length 50th (ft)	2	110			0	44			2		37	2
Queue Length 95th (ft)	m5	121			m1	m270			14		78	47
Internal Link Dist (ft)		2211				916			487			1137
Turn Bay Length (ft)	175				100							
Base Capacity (vph)	200	3767			278	3853			105		121	364
Starvation Cap Reductn	0	0			0	0			0		0	0
Spillback Cap Reductn	0	0			0	0			0		0	0
Storage Cap Reductn	0	0			0	0			0		0	0
Reduced v/c Ratio	0.10	0.47			0.10	0.78			0.04		0.40	0.25

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 107 (89%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 5.9 — Intersection LOS: A
Intersection Capacity Utilization 70.8% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1643	5	0	2720	0	32
Future Vol, veh/h	1643	5	0	2720	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1826	6	0	3022	0	36

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	916
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	0	*550
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*550
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	550	-	-	-
HCM Lane V/C Ratio	0.065	-	-	-
HCM Control Delay (s)	12	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	1668	6	12	2674	1	0	0	38	0	0	46
Future Vol, veh/h	1	1668	6	12	2674	1	0	0	38	0	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1853	7	13	2971	1	0	0	42	0	0	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2972	0	0	1860	0	0	-	-	930	-	-	1486
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	5.34	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	3.12	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	*368	-	-	*664	-	-	0	0	*528	0	0	*293
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	1	-	-	1	-	-			1			1
Mov Cap-1 Maneuver	*368	-	-	*664	-	-	-	-	*528	-	-	*293
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	12.4	19.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	528	* 368	-	-	* 664	-	-	293
HCM Lane V/C Ratio	0.08	0.003	-	-	0.02	-	-	0.174
HCM Control Delay (s)	12.4	14.8	-	-	10.5	-	-	19.9
HCM Lane LOS	B	B	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.6

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1696	10	0	2676	3	0	0	83	0	0	11
Future Vol, veh/h	0	1696	10	0	2676	3	0	0	83	0	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1884	11	0	2973	3	0	0	92	0	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	948	-	-	1488
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*528	0	0	*293
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*528	-	-	*293
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	13.3	17.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	528	-	-	-	-	293
HCM Lane V/C Ratio	0.175	-	-	-	-	0.042
HCM Control Delay (s)	13.3	-	-	-	-	17.8
HCM Lane LOS	B	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.1

Notes

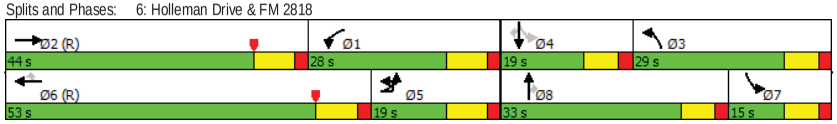
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	109	56	1278	336	258	1783	129	593	368	411	150	177
Future Volume (vph)	109	56	1278	336	258	1783	129	593	368	411	150	177
Satd. Flow (prot)	0	1947	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863
Flt Permitted		0.950			0.950			0.950			0.333	
Satd. Flow (perm)	0	1947	5085	1583	1770	5085	1583	3433	1863	1583	620	1863
Satd. Flow (RTOR)				382			236			255		
Lane Group Flow (vph)	0	183	1420	373	287	1981	143	659	409	457	167	197
Turn Type	Prot	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases				Free			6			8	4	
Total Split (s)	19.0	19.0	44.0		28.0	53.0	53.0	29.0	33.0	33.0	15.0	19.0
Total Lost Time (s)		8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)		11.0	36.0	120.0	20.0	45.0	45.0	22.0	26.0	26.0	20.0	12.0
Actuated g/C Ratio		0.09	0.30	1.00	0.17	0.38	0.38	0.18	0.22	0.22	0.17	0.10
v/c Ratio		1.03	0.93	0.24	0.97	1.04	0.19	1.05	1.01	0.84	0.93	1.06
Control Delay		126.2	37.3	0.3	96.2	68.6	0.6	96.4	95.5	34.9	95.2	134.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		126.2	37.3	0.3	96.2	68.6	0.6	96.4	95.5	34.9	95.2	134.1
LOS		F	D	A	F	E	A	F	F	C	F	F
Approach Delay			38.6			67.9			77.7			74.4
Approach LOS			D			E			E			E
Queue Length 50th (ft)		~157	409	0	224	~606	0	~286	~326	159	94	~167
Queue Length 95th (ft)		#309	#496	0	#401	#702	0	#404	#532	#340	#219	#319
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)		350		100	380					150		
Base Capacity (vph)		178	1525	1583	295	1906	741	629	403	542	180	186
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.03	0.93	0.24	0.97	1.04	0.19	1.05	1.01	0.84	0.93	1.06

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 61.8 Intersection LOS: E
Intersection Capacity Utilization 97.5% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Holleman Drive & FM 2818



Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	183	362	0	19
Future Vol, veh/h	0	0	183	362	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	203	402	0	21

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	404
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	647
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	647
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.8
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	647
HCM Lane V/C Ratio	-	-	0.033
HCM Control Delay (s)	-	-	10.8
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	11.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	53	91	0	0	0	524
Future Vol, veh/h	53	91	0	0	0	524
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	101	0	0	0	582

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	109
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	945
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	945
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	14.7
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	945	-	-
HCM Lane V/C Ratio	0.616	-	-
HCM Control Delay (s)	14.7	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	4.4	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	527	50	0	18
Future Vol, veh/h	0	0	527	50	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	586	56	0	20

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	613
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	492
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	492
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	12.6
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	492
HCM Lane V/C Ratio	-	-	0.041
HCM Control Delay (s)	-	-	12.6
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1931	14	4	1584	218	71	34	83	702	3	256
Future Volume (vph)	139	1931	14	4	1584	218	71	34	83	702	3	256
Satd. Flow (prot)	3776	5085	1583	1947	5085	1583	1770	1863	1583	1681	1686	1583
Flt Permitted	0.071			0.066			0.950			0.950	0.953	
Satd. Flow (perm)	282	5085	1583	135	5085	1583	1770	1863	1583	1681	1686	1583
Satd. Flow (RTOR)			176			310			243			243
Lane Group Flow (vph)	174	2414	18	5	1821	251	87	41	101	450	454	328
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Free	Split	NA	Perm	Split	NA	Perm
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases	2		6	6		Free			4			3
Total Split (s)	14.0	64.0	64.0	14.0	64.0		13.0	13.0	13.0	39.0	39.0	39.0
Total Lost Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Act Effct Green (s)	62.0	67.2	67.2	68.4	56.0	130.0	5.0	5.0	5.0	31.0	31.0	31.0
Actuated g/C Ratio	0.48	0.52	0.52	0.53	0.43	1.00	0.04	0.04	0.04	0.24	0.24	0.24
v/c Ratio	0.59	0.92	0.02	0.03	0.83	0.16	1.28	0.58	0.34	1.12	1.13	0.58
Control Delay	25.0	35.9	0.1	6.0	12.7	0.2	249.5	91.7	3.2	128.5	129.8	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	35.9	0.1	6.0	12.7	0.2	249.5	91.7	3.2	128.5	129.8	16.4
LOS	C	D	A	A	B	A	F	F	A	F	F	B
Approach Delay		34.9			11.2			112.6			99.1	
Approach LOS		C			B			F			F	
Queue Length 50th (ft)	35	632	0	0	230	0	~93	35	0	~460	~466	58
Queue Length 95th (ft)	47	#753	0	m1	90	0	#182	#76	0	#543	#547	101
Internal Link Dist (ft)		1307			2211			1167			1439	
Turn Bay Length (ft)	200		100	175		100	100		250			500
Base Capacity (vph)	295	2628	903	154	2192	1583	68	71	294	400	402	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.92	0.02	0.03	0.83	0.16	1.28	0.58	0.34	1.13	1.13	0.58

Intersection Summary

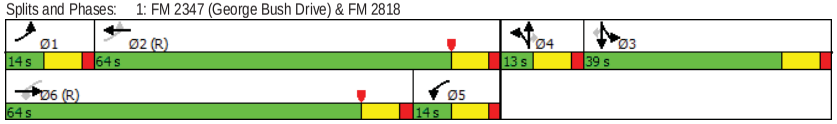
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.28
Intersection Signal Delay: 42.7 — Intersection LOS: D
Intersection Capacity Utilization 87.7% — ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: FM 2347 (George Bush Drive) & FM 2818



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	86	2626	4	92	0	1701	76	11	1	4	64	0
Future Volume (vph)	86	2626	4	92	0	1701	76	11	1	4	64	0
Satd. Flow (prot)	1947	5085	0	0	1947	5055	0	0	1742	0	1770	1583
Flt Permitted	0.072				0.046				0.793		0.950	
Satd. Flow (perm)	148	5085	0	0	94	5055	0	0	1430	0	1770	1583
Satd. Flow (RTOR)						10			4			143
Lane Group Flow (vph)	96	2922	0	0	102	1974	0	0	17	0	71	104
Turn Type	D.P+P	NA		custom	D.P+P	NA		Perm	NA		Prot	NA
Protected Phases	5	2			1	6			8		7	4
Permitted Phases	6			1	2			8				
Total Split (s)	14.0	88.0		14.0	14.0	88.0		14.0	14.0		14.0	28.0
Total Lost Time (s)	6.0	7.0			6.0	7.0			6.0		6.0	6.0
Act Effct Green (s)	99.0	90.6			99.0	90.0			7.1		7.7	13.0
Actuated g/C Ratio	0.76	0.70			0.76	0.69			0.05		0.06	0.10
v/c Ratio	0.43	0.82			0.57	0.56			0.21		0.68	0.36
Control Delay	7.6	6.2			42.2	2.2			55.1		91.2	6.2
Queue Delay	0.0	0.0			0.0	0.0			0.0		0.0	0.0
Total Delay	7.6	6.2			42.2	2.2			55.1		91.2	6.2
LOS	A	A			D	A			E		F	A
Approach Delay		6.2				4.1			55.1			40.7
Approach LOS		A				A			E			D
Queue Length 50th (ft)	7	83			0	14			11		60	0
Queue Length 95th (ft)	m7	m221			m42	m177			37		#132	22
Internal Link Dist (ft)		2211				916			487			1137
Turn Bay Length (ft)	175				100							
Base Capacity (vph)	223	3542			187	3504			91		108	386
Starvation Cap Reductn	0	0			0	0			0		0	0
Spillback Cap Reductn	0	0			0	0			0		0	0
Storage Cap Reductn	0	0			0	0			0		0	0
Reduced v/c Ratio	0.43	0.82			0.55	0.56			0.19		0.66	0.27

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 14 (11%), Referenced to phase 2:EBWB and 6:EBWB, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 6.7 — Intersection LOS: A
Intersection Capacity Utilization 80.1% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Luther Street & FM 2818

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	2770	16	0	1869	0	14
Future Vol, veh/h	2770	16	0	1869	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3078	18	0	2077	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	1548
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	-	0	*281
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*281
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	281	-	-	-
HCM Lane V/C Ratio	0.055	-	-	-
HCM Control Delay (s)	18.6	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

4: Canyon Creek / Parkway Place Apts & FM 2818

PM PEAK

Intersection												
Int Delay, s/veh	0.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	2724	38	31	1835	22	0	0	56	0	0	34
Future Vol, veh/h	22	2724	38	31	1835	22	0	0	56	0	0	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	3027	42	34	2039	24	0	0	62	0	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2063	0	0	3069	0	0	-	-	1534	-	-	1032
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	5.34	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	3.12	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	615	-	-	326	-	-	0	0	*301	0	0	*499
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	1	-	-	1	-	-			1			1
Mov Cap-1 Maneuver	615	-	-	326	-	-	-	-	*301	-	-	*499
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	20.1	12.8
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	301	615	-	-	326	-	-	499
HCM Lane V/C Ratio	0.207	0.04	-	-	0.106	-	-	0.076
HCM Control Delay (s)	20.1	11.1	-	-	17.3	-	-	12.8
HCM Lane LOS	C	B	-	-	C	-	-	B
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0.4	-	-	0.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

5: 2818 Place Apts / Walden Pond Apts & FM 2818

PM PEAK

Intersection												
Int Delay, s/veh	0.9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2667	113	0	1861	27	0	0	139	0	0	27
Future Vol, veh/h	0	2667	113	0	1861	27	0	0	139	0	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2963	126	0	2068	30	0	0	154	0	0	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1544	-	-	1049
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	*301	0	0	*499
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-			1			1
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	*301	-	-	*499
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	28.9	12.7
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	301	-	-	-	-	499
HCM Lane V/C Ratio	0.513	-	-	-	-	0.06
HCM Control Delay (s)	28.9	-	-	-	-	12.7
HCM Lane LOS	D	-	-	-	-	B
HCM 95th %tile Q(veh)	2.7	-	-	-	-	0.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

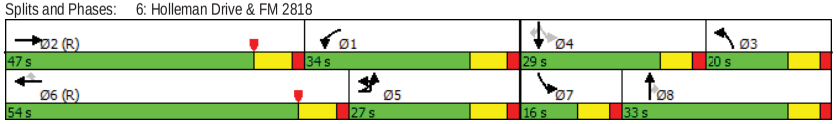
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	85	119	1872	730	502	1266	204	433	339	506	190	419
Future Volume (vph)	85	119	1872	730	502	1266	204	433	339	506	190	419
Satd. Flow (prot)	0	1947	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863
Flt Permitted		0.950			0.950			0.950			0.308	
Satd. Flow (perm)	0	1947	5085	1583	1770	5085	1583	3433	1863	1583	574	1863
Satd. Flow (RTOR)				285			218			318		
Lane Group Flow (vph)	0	226	2080	811	558	1407	227	481	377	562	211	466
Turn Type	Prot	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases				Free			6			8	4	
Total Split (s)	27.0	27.0	47.0		34.0	54.0	54.0	20.0	33.0	33.0	16.0	29.0
Total Lost Time (s)		8.0	8.0		8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)		19.0	39.0	130.0	26.0	46.0	46.0	13.0	26.0	26.0	22.0	22.0
Actuated g/C Ratio		0.15	0.30	1.00	0.20	0.35	0.35	0.10	0.20	0.20	0.17	0.17
v/c Ratio		0.80	1.36	0.51	1.58	0.78	0.32	1.40	1.01	0.98	1.18	1.48
Control Delay		78.5	194.4	0.8	307.4	41.3	5.6	239.8	101.4	56.7	168.2	269.9
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		78.5	194.4	0.8	307.4	41.3	5.6	239.8	101.4	56.7	168.2	269.9
LOS		E	F	A	F	D	A	F	F	E	F	F
Approach Delay			135.6			105.3			130.6			203.8
Approach LOS			F			F			F			F
Queue Length 50th (ft)		203	~843	0	~667	386	5	~279	~326	237	~200	~540
Queue Length 95th (ft)		m252	#936	0	#891	446	60	#390	#533	#482	#322	#754
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)		350		100	380					150		
Base Capacity (vph)		284	1525	1583	354	1799	701	343	372	571	179	315
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.80	1.36	0.51	1.58	0.78	0.32	1.40	1.01	0.98	1.18	1.48

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 71 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.58
Intersection Signal Delay: 133.0 — Intersection LOS: F
Intersection Capacity Utilization 123.4% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	158	200	0	105
Future Vol, veh/h	0	0	158	200	0	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	176	222	0	117

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	287
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	752
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	752
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.7
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	752
HCM Lane V/C Ratio	-	-	0.155
HCM Control Delay (s)	-	-	10.7
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.5

Intersection	
Int Delay, s/veh	6.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	26	143	0	0	0	293
Future Vol, veh/h	26	143	0	0	0	293
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	159	0	0	0	326

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	108
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	946
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	946
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	10.8
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	946	-	-
HCM Lane V/C Ratio	0.344	-	-
HCM Control Delay (s)	10.8	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.5	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	284	35	0	74
Future Vol, veh/h	0	0	284	35	0	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	-	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	316	39	0	82

Major/Minor	Major2		Minor2	
Conflicting Flow All	-	0	-	335
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	707
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	-	707
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.8
HCM LOS		B

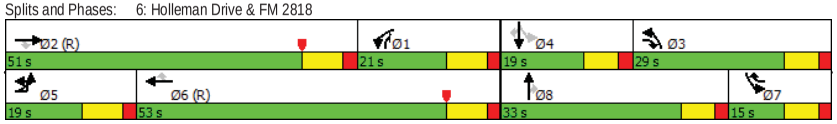
Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	707
HCM Lane V/C Ratio	-	-	0.116
HCM Control Delay (s)	-	-	10.8
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.4

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	110	56	1278	336	258	1783	129	593	368	411	150	177
Future Volume (vph)	110	56	1278	336	258	1783	129	593	368	411	150	177
Satd. Flow (prot)	0	1947	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863
Flt Permitted		0.950			0.950			0.950			0.333	
Satd. Flow (perm)	0	1947	5085	1583	3433	5085	1583	3433	1863	1583	620	1863
Satd. Flow (RTOR)				109			173			182		
Lane Group Flow (vph)	0	184	1420	373	287	1981	143	659	409	457	167	197
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	5	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6			8	4	
Total Split (s)	19.0	19.0	51.0	29.0	21.0	53.0	15.0	29.0	33.0	21.0	15.0	19.0
Total Lost Time (s)		8.0	8.0	7.0	8.0	8.0	7.0	7.0	7.0	8.0	7.0	7.0
Act Effct Green (s)		11.0	43.0	73.0	13.0	45.0	54.0	22.0	26.0	46.0	20.0	12.0
Actuated g/C Ratio		0.09	0.36	0.61	0.11	0.38	0.45	0.18	0.22	0.38	0.17	0.10
v/c Ratio		1.03	0.78	0.37	0.77	1.04	0.18	1.05	1.01	0.64	0.93	1.06
Control Delay		140.4	22.0	3.7	66.9	68.6	1.3	96.4	95.5	22.1	95.2	134.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		140.4	22.0	3.7	66.9	68.6	1.3	96.4	95.5	22.1	95.2	134.1
LOS		F	C	A	E	E	A	F	F	C	F	F
Approach Delay			29.6			64.4			73.9			74.4
Approach LOS			C			E			E			E
Queue Length 50th (ft)		~158	182	26	113	~606	0	~286	~326	172	94	~167
Queue Length 95th (ft)		#309	238	6	#174	#702	13	#404	#532	290	#219	#319
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)		350		100	380					150	200	
Base Capacity (vph)		178	1822	1005	371	1906	807	629	403	719	180	186
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.03	0.78	0.37	0.77	1.04	0.18	1.05	1.01	0.64	0.93	1.06

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 37 (31%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 56.9 — Intersection LOS: E
Intersection Capacity Utilization 97.6% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Holleman Drive & FM 2818



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	194
Future Volume (vph)	194
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	318
Lane Group Flow (vph)	216
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	19.0
Total Lost Time (s)	7.0
Act Effct Green (s)	12.0
Actuated g/C Ratio	0.10
v/c Ratio	0.49
Control Delay	3.8
Queue Delay	0.0
Total Delay	3.8
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	
Turn Bay Length (ft)	250
Base Capacity (vph)	444
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.49

Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	107	119	1872	730	502	1266	204	433	339	506	190	419
Future Volume (vph)	107	119	1872	730	502	1266	204	433	339	506	190	419
Satd. Flow (prot)	0	1947	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863
Flt Permitted		0.950			0.950			0.950			0.308	
Satd. Flow (perm)	0	1947	5085	1583	3433	5085	1583	3433	1863	1583	574	1863
Satd. Flow (RTOR)				159			177			101		
Lane Group Flow (vph)	0	251	2080	811	558	1407	227	481	377	562	211	466
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	5	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6			8	4	
Total Split (s)	24.0	24.0	52.0	22.0	24.0	52.0	19.0	22.0	35.0	24.0	19.0	32.0
Total Lost Time (s)		8.0	8.0	7.0	8.0	8.0	7.0	7.0	7.0	8.0	7.0	7.0
Act Effct Green (s)		16.0	44.0	67.0	16.0	44.0	57.0	15.0	28.0	43.0	25.0	25.0
Actuated g/C Ratio		0.12	0.34	0.52	0.12	0.34	0.44	0.12	0.22	0.33	0.19	0.19
v/c Ratio		1.05	1.21	0.91	1.32	0.82	0.29	1.21	0.94	0.95	0.96	1.30
Control Delay		115.4	125.2	19.3	204.4	44.1	3.9	165.3	82.5	53.2	100.4	196.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		115.4	125.2	19.3	204.4	44.1	3.9	165.3	82.5	53.2	100.4	196.4
LOS		F	F	B	F	D	A	F	F	D	F	F
Approach Delay			97.1			80.7			99.0			142.6
Approach LOS			F			F			F			F
Queue Length 50th (ft)		~236	~778	319	~312	395	13	~255	315	262	165	~502
Queue Length 95th (ft)		m#339	#871	#810	#428	457	40	#366	#508	#542	#286	#716
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)		350		100	380					150	200	
Base Capacity (vph)		239	1721	892	422	1721	793	396	401	591	220	358
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.05	1.21	0.91	1.32	0.82	0.29	1.21	0.94	0.95	0.96	1.30

Intersection Summary

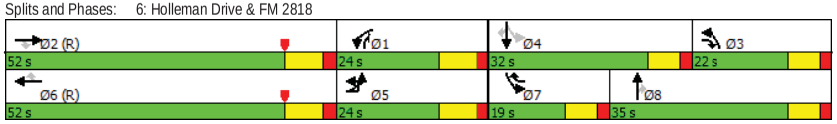
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 71 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 97.5 Intersection LOS: F
Intersection Capacity Utilization 109.9% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	104
Future Volume (vph)	104
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	168
Lane Group Flow (vph)	116
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	32.0
Total Lost Time (s)	7.0
Act Effct Green (s)	25.0
Actuated g/C Ratio	0.19
v/c Ratio	0.26
Control Delay	3.0
Queue Delay	0.0
Total Delay	3.0
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	14
Internal Link Dist (ft)	
Turn Bay Length (ft)	250
Base Capacity (vph)	440
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.26

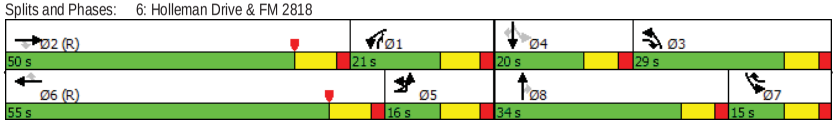
Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	110	56	1278	336	258	1783	129	593	368	411	150	177
Future Volume (vph)	110	56	1278	336	258	1783	129	593	368	411	150	177
Satd. Flow (prot)	1770	1947	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863
Flt Permitted	0.950	0.950			0.950			0.950			0.308	
Satd. Flow (perm)	1770	1947	5085	1583	3433	5085	1583	3433	1863	1583	574	1863
Satd. Flow (RTOR)				109			173			109		
Lane Group Flow (vph)	122	62	1420	373	287	1981	143	659	409	457	167	197
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	5	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6			8	4	
Total Split (s)	16.0	16.0	50.0	29.0	21.0	55.0	15.0	29.0	34.0	21.0	15.0	20.0
Total Lost Time (s)	8.0	8.0	8.0	7.0	8.0	8.0	7.0	7.0	7.0	8.0	7.0	7.0
Act Effct Green (s)	8.0	8.0	42.0	72.0	13.0	47.0	63.0	22.0	27.0	47.0	21.0	13.0
Actuated g/C Ratio	0.07	0.07	0.35	0.60	0.11	0.39	0.52	0.18	0.22	0.39	0.18	0.11
v/c Ratio	1.03	0.48	0.80	0.38	0.77	0.99	0.16	1.05	0.98	0.67	0.93	0.98
Control Delay	143.0	65.3	23.3	3.5	66.9	55.6	1.5	96.4	85.1	28.0	95.0	112.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	143.0	65.3	23.3	3.5	66.9	55.6	1.5	96.4	85.1	28.0	95.0	112.3
LOS	F	E	C	A	E	E	A	F	F	C	F	F
Approach Delay			28.3			53.7			72.8			69.1
Approach LOS			C			D			E			E
Queue Length 50th (ft)	~105	51	293	34	113	553	0	~286	317	221	92	155
Queue Length 95th (ft)	#231	98	329	1	#174	#678	19	#404	#520	344	#216	#306
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)	350	350		100	380					150	200	
Base Capacity (vph)	118	129	1779	993	371	1991	913	629	419	686	180	201
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.48	0.80	0.38	0.77	0.99	0.16	1.05	0.98	0.67	0.93	0.98

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 51.9 — Intersection LOS: D
Intersection Capacity Utilization 94.5% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Holleman Drive & FM 2818



FM 2818 Traffic Analysis
Future (2029) Option B - Mitigation 1
6: Holleman Drive & FM 2818
AM PEAK

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	194
Future Volume (vph)	194
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	245
Lane Group Flow (vph)	216
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	20.0
Total Lost Time (s)	7.0
Act Effct Green (s)	13.0
Actuated g/C Ratio	0.11
v/c Ratio	0.56
Control Delay	9.7
Queue Delay	0.0
Total Delay	9.7
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	50
Internal Link Dist (ft)	
Turn Bay Length (ft)	250
Base Capacity (vph)	389
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.56

Intersection Summary

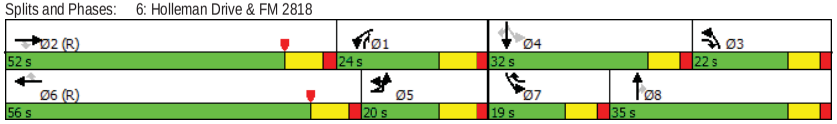
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	107	119	1872	730	502	1266	204	433	339	506	190	419
Future Volume (vph)	107	119	1872	730	502	1266	204	433	339	506	190	419
Satd. Flow (prot)	1770	1947	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863
Flt Permitted	0.950	0.950			0.950			0.950			0.308	
Satd. Flow (perm)	1770	1947	5085	1583	3433	5085	1583	3433	1863	1583	574	1863
Satd. Flow (RTOR)				159			159			101		
Lane Group Flow (vph)	119	132	2080	811	558	1407	227	481	377	562	211	466
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	5	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6			8	4	
Total Split (s)	20.0	20.0	52.0	22.0	24.0	56.0	19.0	22.0	35.0	24.0	19.0	32.0
Total Lost Time (s)	8.0	8.0	8.0	7.0	8.0	8.0	7.0	7.0	7.0	8.0	7.0	7.0
Act Effct Green (s)	12.0	12.0	44.0	67.0	16.0	48.0	61.0	15.0	28.0	43.0	25.0	25.0
Actuated g/C Ratio	0.09	0.09	0.34	0.52	0.12	0.37	0.47	0.12	0.22	0.33	0.19	0.19
v/c Ratio	0.73	0.74	1.21	0.91	1.32	0.75	0.27	1.21	0.94	0.95	0.96	1.30
Control Delay	76.1	75.1	125.1	19.6	204.4	38.8	4.3	165.3	82.5	53.2	100.4	196.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.1	75.1	125.1	19.6	204.4	38.8	4.3	165.3	82.5	53.2	100.4	196.4
LOS	E	E	F	B	F	D	A	F	F	D	F	F
Approach Delay			93.9			77.4			99.0			142.6
Approach LOS			F			E			F			F
Queue Length 50th (ft)	106	118	~778	330	~312	375	18	~255	315	262	165	~502
Queue Length 95th (ft)	m134	m147	#871	#808	#428	434	45	#366	#508	#542	#286	#716
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)	350	350		100	380					150	200	
Base Capacity (vph)	163	179	1721	892	422	1877	827	396	401	591	220	358
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.74	1.21	0.91	1.32	0.75	0.27	1.21	0.94	0.95	0.96	1.30

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 71 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 95.2 — Intersection LOS: F
Intersection Capacity Utilization 109.9% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	104
Future Volume (vph)	104
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	168
Lane Group Flow (vph)	116
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	32.0
Total Lost Time (s)	7.0
Act Effct Green (s)	25.0
Actuated g/C Ratio	0.19
v/c Ratio	0.26
Control Delay	3.0
Queue Delay	0.0
Total Delay	3.0
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	14
Internal Link Dist (ft)	
Turn Bay Length (ft)	250
Base Capacity (vph)	440
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.26

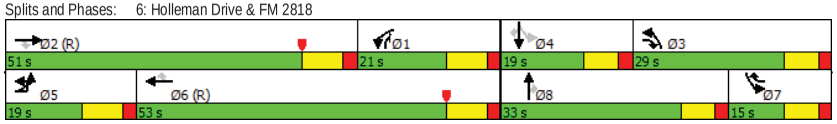
Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	109	56	1278	336	258	1783	129	593	368	411	150	177
Future Volume (vph)	109	56	1278	336	258	1783	129	593	368	411	150	177
Satd. Flow (prot)	0	1947	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863
Flt Permitted		0.950			0.950			0.950			0.333	
Satd. Flow (perm)	0	1947	5085	1583	3433	5085	1583	3433	1863	1583	620	1863
Satd. Flow (RTOR)				109			173			182		
Lane Group Flow (vph)	0	183	1420	373	287	1981	143	659	409	457	167	197
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	5	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6			8	4	
Total Split (s)	19.0	19.0	51.0	29.0	21.0	53.0	15.0	29.0	33.0	21.0	15.0	19.0
Total Lost Time (s)		8.0	8.0	7.0	8.0	8.0	7.0	7.0	7.0	8.0	7.0	7.0
Act Effct Green (s)		11.0	43.0	73.0	13.0	45.0	54.0	22.0	26.0	46.0	20.0	12.0
Actuated g/C Ratio		0.09	0.36	0.61	0.11	0.38	0.45	0.18	0.22	0.38	0.17	0.10
v/c Ratio		1.03	0.78	0.37	0.77	1.04	0.18	1.05	1.01	0.64	0.93	1.06
Control Delay		139.8	22.6	4.1	66.9	68.6	1.3	96.4	95.5	22.1	95.2	134.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		139.8	22.6	4.1	66.9	68.6	1.3	96.4	95.5	22.1	95.2	134.1
LOS		F	C	A	E	E	A	F	F	C	F	F
Approach Delay			30.0			64.4			73.9			74.4
Approach LOS			C			E			E			E
Queue Length 50th (ft)		~157	181	27	113	~606	0	~286	~326	172	94	~167
Queue Length 95th (ft)		#309	238	6	#174	#702	13	#404	#532	290	#219	#319
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)		350		100	380					150	200	
Base Capacity (vph)		178	1822	1005	371	1906	807	629	403	719	180	186
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.03	0.78	0.37	0.77	1.04	0.18	1.05	1.01	0.64	0.93	1.06

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 37 (31%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 57.0 — Intersection LOS: E
Intersection Capacity Utilization 97.5% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Holleman Drive & FM 2818



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	194
Future Volume (vph)	194
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	318
Lane Group Flow (vph)	216
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	19.0
Total Lost Time (s)	7.0
Act Effct Green (s)	12.0
Actuated g/C Ratio	0.10
v/c Ratio	0.49
Control Delay	3.8
Queue Delay	0.0
Total Delay	3.8
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	
Turn Bay Length (ft)	250
Base Capacity (vph)	444
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.49

Intersection Summary

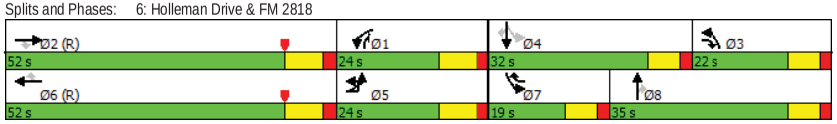
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	85	119	1872	730	502	1266	204	433	339	506	190	419
Future Volume (vph)	85	119	1872	730	502	1266	204	433	339	506	190	419
Satd. Flow (prot)	0	1947	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863
Flt Permitted		0.950			0.950			0.950			0.308	
Satd. Flow (perm)	0	1947	5085	1583	3433	5085	1583	3433	1863	1583	574	1863
Satd. Flow (RTOR)				159			177			101		
Lane Group Flow (vph)	0	226	2080	811	558	1407	227	481	377	562	211	466
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	5	5	2	3	1	6	7	3	8	1	7	4
Permitted Phases				2			6			8	4	
Total Split (s)	24.0	24.0	52.0	22.0	24.0	52.0	19.0	22.0	35.0	24.0	19.0	32.0
Total Lost Time (s)		8.0	8.0	7.0	8.0	8.0	7.0	7.0	7.0	8.0	7.0	7.0
Act Effct Green (s)		16.0	44.0	67.0	16.0	44.0	57.0	15.0	28.0	43.0	25.0	25.0
Actuated g/C Ratio		0.12	0.34	0.52	0.12	0.34	0.44	0.12	0.22	0.33	0.19	0.19
v/c Ratio		0.95	1.21	0.91	1.32	0.82	0.29	1.21	0.94	0.95	0.96	1.30
Control Delay		93.9	124.9	20.2	204.4	44.1	3.9	165.3	82.5	53.2	100.4	196.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		93.9	124.9	20.2	204.4	44.1	3.9	165.3	82.5	53.2	100.4	196.4
LOS		F	F	C	F	D	A	F	F	D	F	F
Approach Delay			95.4			80.7			99.0			142.6
Approach LOS			F			F			F			F
Queue Length 50th (ft)		202	~778	330	~312	395	13	~255	315	262	165	~502
Queue Length 95th (ft)		m#290	#871	#811	#428	457	40	#366	#508	#542	#286	#716
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)		350		100	380					150	200	
Base Capacity (vph)		239	1721	892	422	1721	793	396	401	591	220	358
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.95	1.21	0.91	1.32	0.82	0.29	1.21	0.94	0.95	0.96	1.30

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 71 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 96.8 — Intersection LOS: F
Intersection Capacity Utilization 109.9% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	104
Future Volume (vph)	104
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	168
Lane Group Flow (vph)	116
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	32.0
Total Lost Time (s)	7.0
Act Effct Green (s)	25.0
Actuated g/C Ratio	0.19
v/c Ratio	0.26
Control Delay	3.0
Queue Delay	0.0
Total Delay	3.0
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	14
Internal Link Dist (ft)	
Turn Bay Length (ft)	250
Base Capacity (vph)	440
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.26

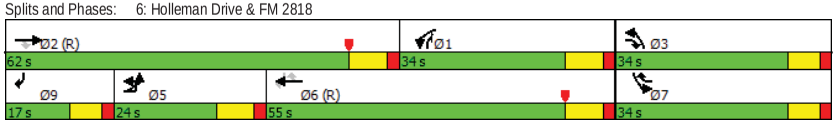
Intersection Summary

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	107	119	1872	868	502	1266	224	602	0	676	471	0
Future Volume (vph)	107	119	1872	868	502	1266	224	602	0	676	471	0
Satd. Flow (prot)	1770	1770	5085	1583	3433	5085	1583	3433	0	2787	3433	0
Flt Permitted	0.950	0.950			0.950			0.950			0.950	
Satd. Flow (perm)	1770	1770	5085	1583	3433	5085	1583	3433	0	2787	3433	0
Satd. Flow (RTOR)				42			249			227		
Lane Group Flow (vph)	119	132	2080	964	558	1407	249	669	0	751	523	0
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot		Over	Prot	
Protected Phases	5	5	2	3	1	6	7	3		1	7	
Permitted Phases				2			6					
Total Split (s)	24.0	24.0	62.0	34.0	34.0	55.0	34.0	34.0		34.0	34.0	
Total Lost Time (s)	8.0	8.0	8.0	7.0	8.0	8.0	7.0	7.0		8.0	7.0	
Act Effct Green (s)	13.2	13.2	54.0	89.0	26.0	50.0	85.0	27.0		26.0	27.0	
Actuated g/C Ratio	0.10	0.10	0.42	0.68	0.20	0.38	0.65	0.21		0.20	0.21	
v/c Ratio	0.66	0.74	0.98	0.88	0.81	0.72	0.22	0.94		1.02	0.73	
Control Delay	68.2	73.1	41.7	16.2	61.0	37.8	1.7	72.4		73.0	55.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	68.2	73.1	41.7	16.2	61.0	37.8	1.7	72.4		73.0	55.1	
LOS	E	E	D	B	E	D	A	E		E	E	
Approach Delay			36.5			39.6			72.7			41.2
Approach LOS			D			D			E			D
Queue Length 50th (ft)	94	105	584	199	234	373	1	288		~286	214	
Queue Length 95th (ft)	m127	m142	#745	#268	m300	m440	m30	#403		#426	277	
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)	300	300		500	380			150		150		
Base Capacity (vph)	217	217	2112	1096	686	1954	1120	713		739	713	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.55	0.61	0.98	0.88	0.81	0.72	0.22	0.94		1.02	0.73	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 44.5 Intersection LOS: D
Intersection Capacity Utilization 89.9% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	242
Future Volume (vph)	242
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	
Lane Group Flow (vph)	269
Turn Type	custom
Protected Phases	9
Permitted Phases	6
Total Split (s)	17.0
Total Lost Time (s)	7.0
Act Effct Green (s)	60.8
Actuated g/C Ratio	0.47
v/c Ratio	0.36
Control Delay	14.2
Queue Delay	0.0
Total Delay	14.2
LOS	B
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	79
Queue Length 95th (ft)	118
Internal Link Dist (ft)	
Turn Bay Length (ft)	250
Base Capacity (vph)	742
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.36

Intersection Summary

Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	2802	0	138	0	2079	0	0
Future Volume (vph)	2802	0	138	0	2079	0	0
Satd. Flow (prot)	5085	0	1770	0	5085	0	0
Flt Permitted			0.950				
Satd. Flow (perm)	5085	0	1770	0	5085	0	0
Satd. Flow (RTOR)							
Lane Group Flow (vph)	3113	0	153	0	2310	0	0
Turn Type	NA		Prot		NA		
Protected Phases	2		1		6		
Permitted Phases							
Total Split (s)	104.0		26.0		130.0		
Total Lost Time (s)	4.5		4.5		4.5		
Act Effct Green (s)	104.7		16.3		130.0		
Actuated g/C Ratio	0.81		0.13		1.00		
v/c Ratio	0.76		0.69		0.45		
Control Delay	1.8		52.4		0.8		
Queue Delay	0.0		0.0		0.0		
Total Delay	1.8		52.4		0.8		
LOS	A		D		A		
Approach Delay	1.8				4.0		
Approach LOS	A				A		
Queue Length 50th (ft)	49		114		0		
Queue Length 95th (ft)	65		m141		4		
Internal Link Dist (ft)	312				446	138	
Turn Bay Length (ft)			400				
Base Capacity (vph)	4096		292		5085		
Starvation Cap Reductn	0		0		0		
Spillback Cap Reductn	0		0		0		
Storage Cap Reductn	0		0		0		
Reduced v/c Ratio	0.76		0.52		0.45		

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 45 (35%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 2.8 Intersection LOS: A
Intersection Capacity Utilization 69.3% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

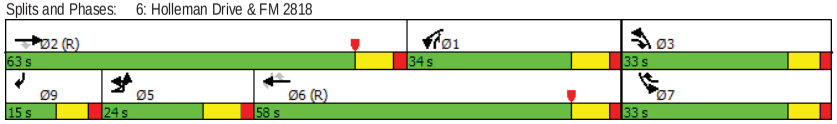
Splits and Phases: 14: Eastbound U-Turn & FM 2818

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	107	119	1872	730	502	1266	224	602	0	676	609	0
Future Volume (vph)	107	119	1872	730	502	1266	224	602	0	676	609	0
Satd. Flow (prot)	1770	1770	5085	1583	3433	5085	1583	3433	0	2787	3433	0
Flt Permitted	0.950	0.950			0.950			0.950			0.950	
Satd. Flow (perm)	1770	1770	5085	1583	3433	5085	1583	3433	0	2787	3433	0
Satd. Flow (RTOR)				42			249			227		
Lane Group Flow (vph)	119	132	2080	811	558	1407	249	669	0	751	677	0
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot		Over	Prot	
Protected Phases	5	5	2	3	1	6	7	3		1	7	
Permitted Phases				2			6					
Total Split (s)	24.0	24.0	63.0	33.0	34.0	58.0	33.0	33.0		34.0	33.0	
Total Lost Time (s)	8.0	8.0	8.0	7.0	8.0	8.0	7.0	7.0		8.0	7.0	
Act Effct Green (s)	13.2	13.2	55.0	89.0	26.0	53.3	87.3	26.0		26.0	26.0	
Actuated g/C Ratio	0.10	0.10	0.42	0.68	0.20	0.41	0.67	0.20		0.20	0.20	
v/c Ratio	0.66	0.74	0.97	0.74	0.81	0.68	0.22	0.98		1.02	0.99	
Control Delay	65.5	69.7	32.8	7.4	60.9	34.5	1.6	80.4		73.0	83.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	65.5	69.7	32.8	7.4	60.9	34.5	1.6	80.4		73.0	83.0	
LOS	E	E	C	A	E	C	A	F		E	F	
Approach Delay			29.0			37.4			76.5			72.5
Approach LOS			C			D			E			E
Queue Length 50th (ft)	93	105	556	126	234	357	1	291		~286	295	
Queue Length 95th (ft)	m110	m123	#728	m127	m300	m424	m29	#415		#426	#423	
Internal Link Dist (ft)			674			850			1375			1029
Turn Bay Length (ft)	300	300		500	380			150		150		
Base Capacity (vph)	217	217	2151	1096	686	2083	1144	686		739	686	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.55	0.61	0.97	0.74	0.81	0.68	0.22	0.98		1.02	0.99	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 44.9 Intersection LOS: D
Intersection Capacity Utilization 93.9% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Holleman Drive & FM 2818



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	104
Future Volume (vph)	104
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	
Lane Group Flow (vph)	116
Turn Type	custom
Protected Phases	9
Permitted Phases	6
Total Split (s)	15.0
Total Lost Time (s)	7.0
Act Effct Green (s)	61.8
Actuated g/C Ratio	0.48
v/c Ratio	0.15
Control Delay	10.8
Queue Delay	0.0
Total Delay	10.8
LOS	B
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	30
Queue Length 95th (ft)	50
Internal Link Dist (ft)	
Turn Bay Length (ft)	250
Base Capacity (vph)	758
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.15

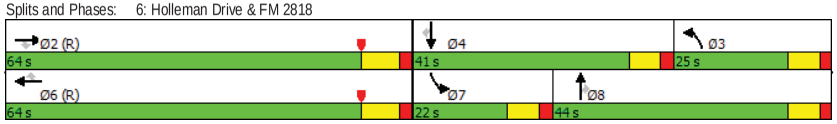
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1979	730	0	1373	204	433	339	506	190	419	104
Future Volume (vph)	0	1979	730	0	1373	204	433	339	506	190	419	104
Satd. Flow (prot)	0	5085	1583	0	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	5085	1583	0	5085	1583	3433	1863	1583	1770	1863	1583
Satd. Flow (RTOR)			245			217			101			101
Lane Group Flow (vph)	0	2199	811	0	1526	227	481	377	562	211	466	116
Turn Type		NA	Perm		NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases			2			6			8			4
Total Split (s)		64.0	64.0		64.0	64.0	25.0	44.0	44.0	22.0	41.0	41.0
Total Lost Time (s)		8.0	8.0		8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0
Act Effct Green (s)		56.0	56.0		56.0	56.0	18.5	37.0	37.0	15.0	33.5	33.5
Actuated g/C Ratio		0.43	0.43		0.43	0.43	0.14	0.28	0.28	0.12	0.26	0.26
v/c Ratio		1.00	0.99		0.70	0.28	0.99	0.71	1.08	1.03	0.97	0.24
Control Delay		40.4	40.3		32.5	4.5	92.7	50.3	97.9	127.7	82.3	10.7
Queue Delay		36.3	6.7		0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		76.7	47.0		32.8	4.5	92.7	50.3	97.9	127.7	82.3	10.7
LOS		E	D		C	A	F	D	F	F	F	B
Approach Delay		68.7			29.1			83.5			83.9	
Approach LOS		E			C			F			F	
Queue Length 50th (ft)		~620	321		383	6	~215	286	~462	~191	389	9
Queue Length 95th (ft)		#792	#123		439	54	#330	403	#690	#352	#603	58
Internal Link Dist (ft)		441			539			1375			1029	
Turn Bay Length (ft)			100						150	200		250
Base Capacity (vph)		2190	821		2190	805	488	530	522	204	487	488
Starvation Cap Reductn		206	22		177	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0	0	0	0	0
Reduced v/c Ratio		1.11	1.02		0.76	0.28	0.99	0.71	1.08	1.03	0.96	0.24

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 71 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 63.5 — Intersection LOS: E
Intersection Capacity Utilization 98.4% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Holleman Drive & FM 2818



14: FM 2818 & Eastbound Left at Holleman

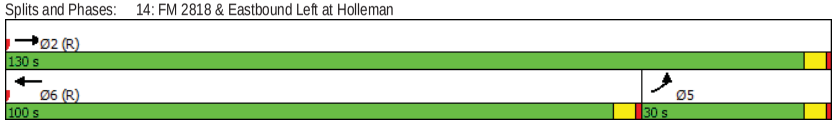
PM PEAK

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	119	2709	1910	0	0	0
Future Volume (vph)	119	2709	1910	0	0	0
Satd. Flow (prot)	1770	5085	5085	0	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	5085	5085	0	0	0
Satd. Flow (RTOR)						
Lane Group Flow (vph)	132	3010	2122	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	5	2	6			
Permitted Phases						
Total Split (s)	30.0	130.0	100.0			
Total Lost Time (s)	4.5	4.5	4.5			
Act Effct Green (s)	25.5	130.0	95.5			
Actuated g/C Ratio	0.20	1.00	0.73			
v/c Ratio	0.38	0.59	0.57			
Control Delay	55.7	0.3	2.6			
Queue Delay	0.0	0.1	0.3			
Total Delay	55.7	0.4	2.9			
LOS	E	A	A			
Approach Delay		2.7	2.9			
Approach LOS		A	A			
Queue Length 50th (ft)	89	0	105			
Queue Length 95th (ft)	m119	0	m120			
Internal Link Dist (ft)		152	441		194	
Turn Bay Length (ft)	450					
Base Capacity (vph)	347	5085	3735			
Starvation Cap Reductn	0	0	826			
Spillback Cap Reductn	0	583	0			
Storage Cap Reductn	0	0	0			
Reduced v/c Ratio	0.38	0.67	0.73			

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 5 (4%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 2.8 — Intersection LOS: A
Intersection Capacity Utilization 56.1% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 14: FM 2818 & Eastbound Left at Holleman



15: Westbound Left at Holleman & FM 2818

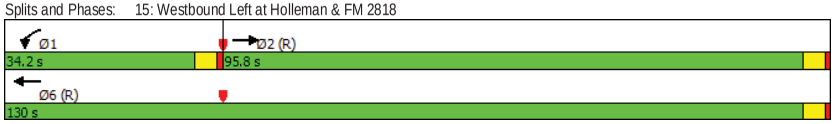
PM PEAK

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	2675	0	502	1577	0	0
Future Volume (vph)	2675	0	502	1577	0	0
Satd. Flow (prot)	5085	0	3433	6408	0	0
Flt Permitted			0.950			
Satd. Flow (perm)	5085	0	3433	6408	0	0
Satd. Flow (RTOR)						
Lane Group Flow (vph)	2972	0	558	1752	0	0
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Total Split (s)	95.8		34.2	130.0		
Total Lost Time (s)	4.5		4.5	4.5		
Act Effct Green (s)	95.2		25.8	130.0		
Actuated g/C Ratio	0.73		0.20	1.00		
v/c Ratio	0.80		0.82	0.27		
Control Delay	5.5		60.6	0.1		
Queue Delay	0.1		0.0	0.0		
Total Delay	5.6		60.6	0.1		
LOS	A		E	A		
Approach Delay	5.6			14.7		
Approach LOS	A			B		
Queue Length 50th (ft)	128		232	0		
Queue Length 95th (ft)	m146		288	0		
Internal Link Dist (ft)	539			231	339	
Turn Bay Length (ft)			450			
Base Capacity (vph)	3725		784	6408		
Starvation Cap Reductn	100		0	0		
Spillback Cap Reductn	0		0	0		
Storage Cap Reductn	0		0	0		
Reduced v/c Ratio	0.82		0.71	0.27		

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 120 (92%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 9.6 — Intersection LOS: A
Intersection Capacity Utilization 73.5% — ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Westbound Left at Holleman & FM 2818



6: Holleman Drive & FM 2818

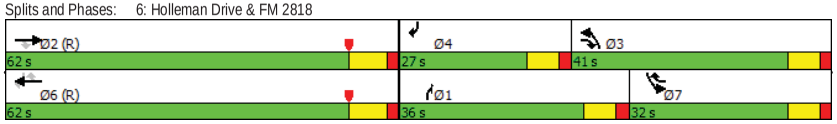
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1979	730	0	1373	374	602	0	676	609	0	104
Future Volume (vph)	0	1979	730	0	1373	374	602	0	676	609	0	104
Satd. Flow (prot)	0	5085	1583	0	5085	1583	3433	0	2787	3433	0	1583
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	5085	1583	0	5085	1583	3433	0	2787	3433	0	1583
Satd. Flow (RTOR)			533			416			101			92
Lane Group Flow (vph)	0	2199	811	0	1526	416	669	0	751	677	0	116
Turn Type		NA	pm+ov		NA	pm+ov	Prot		Prot	Prot		custom
Protected Phases		2	3		6	7	3		1	7		4
Permitted Phases			2			6						6
Total Split (s)		62.0	41.0		62.0	32.0	41.0		36.0	32.0		27.0
Total Lost Time (s)		8.0	7.0		8.0	7.0	7.0		7.0	7.0		7.0
Act Effct Green (s)		54.0	111.4		54.0	87.0	49.4		29.0	25.0		66.6
Actuated g/C Ratio		0.42	0.86		0.42	0.67	0.38		0.22	0.19		0.51
v/c Ratio		1.04	0.57		0.72	0.35	0.51		1.07	1.03		0.14
Control Delay		53.0	1.3		35.2	1.7	32.8		96.5	93.0		5.2
Queue Delay		24.3	0.1		0.3	0.2	0.0		1.8	27.3		0.0
Total Delay		77.2	1.5		35.4	1.8	32.8		98.3	120.3		5.2
LOS		E	A		D	A	C		F	F		A
Approach Delay		56.8			28.2			67.4			103.4	
Approach LOS		E			C			E			F	
Queue Length 50th (ft)		~726	0		397	2	222		~359	~312		10
Queue Length 95th (ft)		#817	0		453	37	281		#498	#435		41
Internal Link Dist (ft)		441			539			1375			1029	
Turn Bay Length (ft)			100						150	200		250
Base Capacity (vph)		2112	1432		2112	1196	1303		700	660		1032
Starvation Cap Reductn		185	93		145	213	0		0	0		0
Spillback Cap Reductn		0	0		10	0	0		3	62		3
Storage Cap Reductn		0	0		0	0	0		0	0		0
Reduced v/c Ratio		1.14	0.61		0.78	0.42	0.51		1.08	1.13		0.11

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 71 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 56.3 — Intersection LOS: E
Intersection Capacity Utilization 95.1% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Holleman Drive & FM 2818



14: FM 2818 & Eastbound Left at Holleman

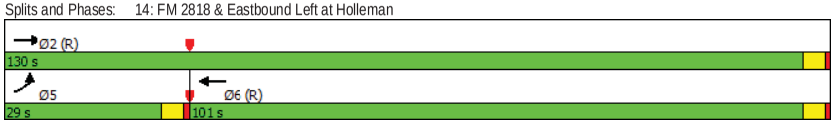
PM PEAK

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	119	2709	2079	0	0	0
Future Volume (vph)	119	2709	2079	0	0	0
Satd. Flow (prot)	1770	5085	5085	0	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	5085	5085	0	0	0
Satd. Flow (RTOR)						
Lane Group Flow (vph)	132	3010	2310	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	5	2	6			
Permitted Phases						
Total Split (s)	29.0	130.0	101.0			
Total Lost Time (s)	4.5	4.5	4.5			
Act Effct Green (s)	15.0	130.0	106.0			
Actuated g/C Ratio	0.12	1.00	0.82			
v/c Ratio	0.65	0.59	0.56			
Control Delay	69.9	0.3	2.9			
Queue Delay	0.0	0.1	0.3			
Total Delay	69.9	0.4	3.2			
LOS	E	A	A			
Approach Delay		3.3	3.2			
Approach LOS		A	A			
Queue Length 50th (ft)	107	0	75			
Queue Length 95th (ft)	m119	0	128			
Internal Link Dist (ft)		152	441		194	
Turn Bay Length (ft)	450					
Base Capacity (vph)	333	5085	4147			
Starvation Cap Reductn	0	0	936			
Spillback Cap Reductn	0	661	0			
Storage Cap Reductn	0	0	0			
Reduced v/c Ratio	0.40	0.68	0.72			

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 16 (12%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 3.3 — Intersection LOS: A
Intersection Capacity Utilization 56.1% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 14: FM 2818 & Eastbound Left at Holleman



15: Westbound Left at Holleman & FM 2818

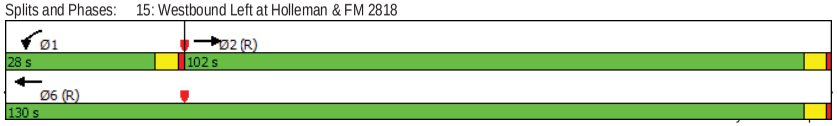
PM PEAK

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	3264	0	502	1747	0	0
Future Volume (vph)	3264	0	502	1747	0	0
Satd. Flow (prot)	5085	0	3433	6408	0	0
Flt Permitted			0.950			
Satd. Flow (perm)	5085	0	3433	6408	0	0
Satd. Flow (RTOR)						
Lane Group Flow (vph)	3627	0	558	1941	0	0
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Total Split (s)	102.0		28.0	130.0		
Total Lost Time (s)	4.5		4.5	4.5		
Act Effct Green (s)	97.9		23.1	130.0		
Actuated g/C Ratio	0.75		0.18	1.00		
v/c Ratio	0.95		0.92	0.30		
Control Delay	9.5		73.5	0.1		
Queue Delay	0.1		0.0	0.0		
Total Delay	9.6		73.5	0.1		
LOS	A		E	A		
Approach Delay	9.6			16.5		
Approach LOS	A			B		
Queue Length 50th (ft)	391		240	0		
Queue Length 95th (ft)	m245		m#330	m0		
Internal Link Dist (ft)	539			231	339	
Turn Bay Length (ft)			450			
Base Capacity (vph)	3829		620	6408		
Starvation Cap Reductn	11		0	0		
Spillback Cap Reductn	0		0	0		
Storage Cap Reductn	0		0	0		
Reduced v/c Ratio	0.95		0.90	0.30		

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 110 (85%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 12.4 — Intersection LOS: B
Intersection Capacity Utilization 84.9% — ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Westbound Left at Holleman & FM 2818



HIGHWAY CAPACITY MANUAL LEVEL OF SERVICE DESCRIPTIONS

Level of Service Criteria for Signalized Intersections

Level-of-Service (LOS)	Average Control Delay (seconds per vehicle)	Description
A	≤ 10.0	Very low vehicle delays, free flow, signal progression extremely favorable, most vehicles arrive during given signal phase.
B	10.1 - 20.0	Good signal progression, more vehicles stop and experience higher delays than for LOS A.
C	20.1 - 35.0	Stable flow, fair signal progression, significant number of vehicles stop at signals.
D	35.1 - 55.0	Congestion noticeable, longer delays and unfavorable signal progression, many vehicles stop at signals.
E	55.1 - 80.0	Limit of acceptable delay, unstable flow, poor signal progression, traffic near roadway capacity, frequent cycle failures.
F	> 80.0	Unacceptable delays, extremely unstable flow and congestion, traffic exceeds roadway capacity, stop-and-go conditions.

SOURCE: Highway Capacity Manual, HCM 2010, Transportation Research Board, 2010.

Level of Service Criteria for Unsignalized Intersections

Level-of-Service (LOS)	Average Control Delay (seconds per vehicle)	Description
A	≤ 10.0	No delays at intersections with continuous flow of traffic. Uncongested operations: high frequency of long gaps available for all left and right turning traffic. No observable queues.
B	10.1 - 15.0	No delays at intersections with continuous flow of traffic. Uncongested operations: high frequency of long gaps available for all left and right turning traffic. No observable queues.
C	15.1 - 25.0	Moderate delays at intersections with satisfactory to good traffic flow. Light congestion; infrequent backups on critical approaches.
D	25.1 - 35.0	Increased probability of delays along every approach. Significant congestion on critical approaches, but intersection functional. No standing long lines formed.
E	35.1 - 50.0	Heavy traffic flow condition. Heavy delays probable. No available gaps for cross-street traffic or main street turning traffic. Limit of stable flow.
F	> 50.0	Unstable traffic flow. Heavy congestion. Traffic moves in forced flow condition. Average delays greater than one minute highly probable. Total breakdown.

SOURCE: Highway Capacity Manual, HCM 2010, Transportation Research Board, 2010.