

**BEN WILSON STREET  
CORRIDOR STUDY**

Prepared for:

**Victoria MPO**

Prepared by:

**FREESE AND NICHOLS, INC.**

In association with  
**CivilCorp, LLC**



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## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	1
1.0 BASIS FOR THE PLAN.....	1
1.1 Background .....	1
1.2 Stakeholder Interviews.....	2
1.3 University of Houston – Victoria.....	3
1.4 Victoria College Growth South of Ben Wilson Street .....	4
1.5 Citizens Medical Center .....	5
1.6 Bronson Terrace.....	6
1.7 Emergency Services .....	7
1.8 Other Corridor Land Uses.....	7
1.9 Evaluation Criteria.....	8
2.0 CORRIDOR TRAFFIC OPERATIONS.....	9
2.1 City Thoroughfare Network.....	9
2.2 Traffic Volumes .....	10
2.3 Traffic Crash Data.....	16
3.0 ALTERNATIVE CONFIGURATIONS.....	17
3.1 Combinations of Configurations.....	18
3.2 Potential Corridor Treatments .....	20
3.3 Potential Treatments to Cross Streets .....	23
3.4 Evaluation Methodology.....	24
3.5 Alternative 1A: Enhanced Existing Five-Lane Roadway.....	25
3.6 Alternative 1B: Combination Five-Lane and Four-Lane Roadway .....	26
3.7 Alternative 2A: Five & Four Lane Roadway with Pedestrian Underpass at UH-V....	27
3.8 Alternative 2B: Five & Three Lane Roadway with Pedestrian Underpass at UH-V..	28
3.9 Alternative 3A: Combination Five-Lane and Three-Lane Roadway .....	29
3.10 Alternative 3B: Three-Lane Roadway with Enhanced Intersections.....	30
3.11 Comparative Summary of Alternatives .....	31
4.0 RECOMMENDATIONS.....	32
4.1 Preferred Alternatives.....	32
4.2 Recommended Improvements.....	33
4.3 Options for Design with Cost Implications.....	35
4.4 Other Project and Corridor Considerations.....	35

## List of Figures

- Figure 1. Study Area Location Map
- Figure 2. Study Area Development Map
- Figure 3. UH-V Campus Development Plan Map
- Figure 4. Victoria College Campus Map
- Figure 5. Citizens Medical Center
- Figure 6. Bronson Terrace Access onto Ben Wilson Street
- Figure 7. North End Development
- Figure 8. South End Development
- Figure 9. Areawide Roadway Network
- Figure 10. Alternative 1A
- Figure 11. Alternative 1B
- Figure 12. Alternative 2A
- Figure 13. Alternative 2B
- Figure 14. Alternative 3A
- Figure 15. Alternative 3B
- Figure 16. Recommended Configuration
- Figure 17. Intersection Configuration at Airline Road
- Figure 18. HAWK Signal Configuration at UH-V Campus
- Figure 19. Intersection Configuration at Red River Street
- Figure 20. Typical Section, Airline Road to UH-V Campus
- Figure 21. Typical Section, UH-V Campus to Red River Street
- Figure 22. Typical Section, Red River Street to US 59 Business

## List of Tables

- Table 1. Historical Daily Traffic Volumes on Roadways near the Ben Wilson Street Corridor
- Table 2. LOS Assessment of Existing and Potential Street Diet (2015 volumes)
- Table 3. Intersection Capacity Utilization (2015 volumes)
- Table 4. Evaluation of Enhanced Existing Five Lane Roadway Condition Alternative 1A
- Table 5. Evaluation of Five Lane & Four Lane Roadway Alternative 1B
- Table 6. Evaluation of Five & Four Lane Roadway with Pedestrian Underpass Alternative 2A
- Table 7. Evaluation of Five and Three Lane Roadway with Pedestrian Underpass Alternative 2B
- Table 8. Evaluation of Five Lane & Three Lane Roadway Alternative 3A
- Table 9. Evaluation of Three Lane Roadway Alternative 3B
- Table 10. Comparison of Alternatives Evaluation Scores

## APPENDICES

- Appendix A - Traffic Count Data
- Appendix B - Synchro Model Run Output for Existing and Minimal Roadway Configurations
- Appendix C - Estimated Development Costs of the Alternatives

## EXECUTIVE SUMMARY

The Victoria Metropolitan Planning Organization (MPO) retained Freese and Nichols, Inc. (FNI) to provide design alternatives to address both the safety of pedestrians, bicyclists, and other alternative transportation modes, and the flow of traffic along Ben Wilson Street given the planned expansion of the University of Houston – Victoria campus. The study section extended between Sam Houston Drive and US Business 59.

**Project Goals** - The design alternatives were developed to address the following weighted goals: Traffic Operations (30%), Pedestrian and Bicycle Mobility and Safety (30%), Cost Effective Solution (25%) and Corridor Aesthetics (15%).

**Stakeholder Input** - The FNI project team and the MPO met with key stakeholders along the corridor to review current conditions, operations, issues and planned improvements along the corridor. Interviews were conducted with representatives from University of Houston – Victoria, Victoria College, Citizens Medical Center and resident representatives from the Bronson Terrace neighborhood homeowners association. Discussions were also held with a representative from the Victoria Fire Department.

**Traffic Operations** – Existing traffic operations were modeled to facilitate the analysis. Peak period traffic turning movement counts taken at the significant intersections along Ben Wilson Street indicate that the key intersections operate overall at Level of Service (LOS) B during the AM and PM peak hours, with some of the individual turning movements operating at LOS C. This very good level of service during the peak hours of operation indicated a significant amount of excess capacity available for growth in the corridor. It also indicated the potential for a reduction in the number of travel lanes, which could allow for reallocation of street right-of-way to pedestrian accommodations and aesthetics for the corridor. Future travel demand on Ben Wilson Street, including the MPO-modeled area growth plus the projected UH-V growth, is expected to grow by about 20% over the next 25 years to year 2040. This study also assessed future travel growth at a 40% growth rate to assess the sensitivity of the configurations. Traffic modeling with these projected volumes indicate that expected growth of 20%, and even as high as 40%, could be accommodated with one less lane in each direction on Ben Wilson Street.

**Alternative Configurations** - Alternatives were evaluated that considered various options including minimal roadway modifications, a pedestrian grade separation, and reduced number of travel lanes for a context sensitive street corridor. Six alternatives were evaluated comparatively to meet project goals:

1A - Enhanced Existing Five-Lane Roadway. Mill and overlay the existing pavement, convert the center turn lane to a raised median at the UH-V frontage to the extent possible. Install midblock pedestrian activated pedestrian activated hybrid beacons (known as HAWK signals) to facilitate student crossings of Ben Wilson Street.

1B - Five-Lane/Four-Lane Roadway. Reconstruct the street pavement, but reducing the segment north of the UH-V campus to four lanes of traffic to allow for enhanced pedestrian/bicycle sidepaths on each side. A raised median would be provided in front of the UH-V campus. Add additional stormwater improvements and make needed improvements to utilities. Install the HAWK pedestrian signals.

2A - Five/Four with Ped Underpass. Similar to Alternative 1B, but raising Ben Wilson Street over a new pedestrian underpass to create a pedestrian flow between sides of campus unimpeded by traffic flow.

2B - Five/Three with Ped Underpass. Same as 2A, but reducing Ben Wilson to one lane each direction plus a center turn lane north of the UH-V campus.

3A - Five-Lane/Three-Lane Roadway. Reducing Ben Wilson Street to one lane each direction plus a center turn lane north of Red River Street, but keeping the five lanes south to US Business 59. Includes the added underground stormwater improvements and the raised medians and HAWK pedestrian signals at the UH-V campus.

3B - Three-Lane Roadway. Same as 3A, but extending the 3-lane section south to US Business 59.

**Evaluation of the Alternatives** - The six alternatives were evaluated regarding their ability to address the project goals. Using the weighting allocated to the project goals, the resulting comparative scoring of the alternatives is shown in the table below.

**Comparison of Alternatives Evaluation Scores**

Alternative	Traffic Operations	Pedestrian Mobility and Safety	Cost Effective Solution	Corridor Aesthetics	Total Score	Est'd Cost, Millions
1A: Enhanced Existing Five-Lane Roadway	21	13	16	3	53	\$3.12
1B: Five-Lane/Four-Lane Roadway	23	17	15	6	61	\$7.88
2A: Five/Four with Ped Underpass	20	27	7	5	59	\$10.25
2B: Five/Three with Ped Underpass	22	27	7	7	64	\$10.35
3A: Five-Lane/Three-Lane Roadway	26	24	19	14	83	\$8.76
3B: Three-Lane Roadway	24	25	17	15	81	\$8.44

**Recommendations** - Alternatives 3A and 3B attained the highest score, well above the rest, and both were recommended for consideration by the City. Both alternatives reduced Ben Wilson Street to three lanes north of Red River Street, with 3A retaining five lanes south of Red River Street and 3B extending the 3 lane section to US Business 59. The recommendation of this study included a preference for Alternative 3A from a traffic operations standpoint due to the minimal impacts at US Business 59 and the potential for future commercial densification of development south of Red River Street.

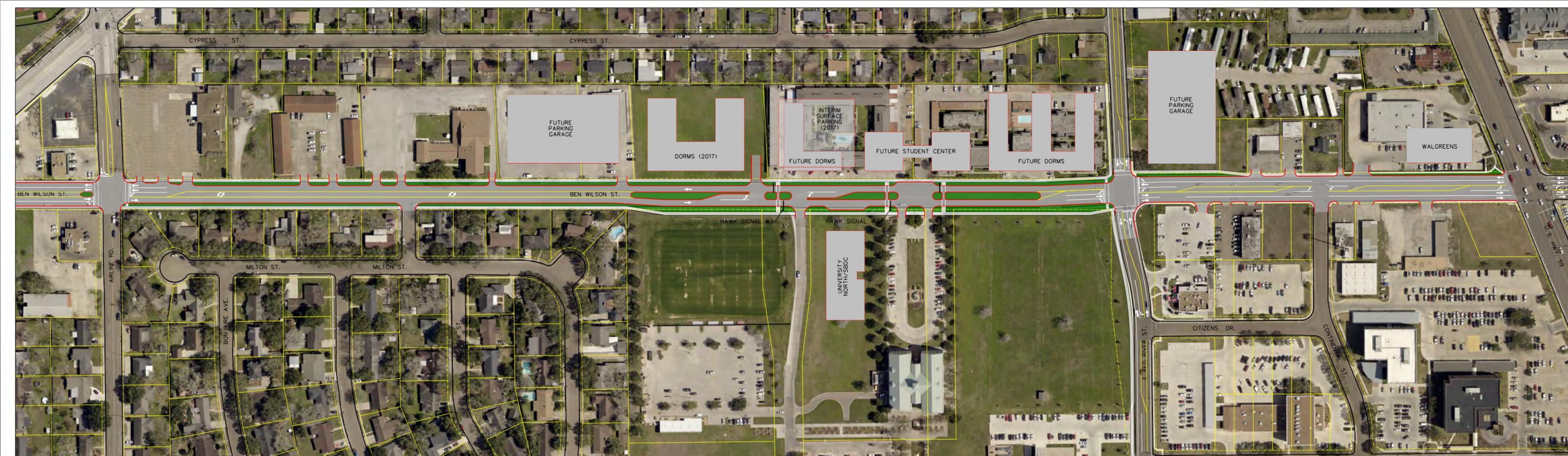
**Agency Reviews** - The MPO Policy Advisory Committee reviewed the findings and recommendation of the study and recommended that both Alternatives 3A and 3B be brought forward to Victoria City Council for their preference and approval. Victoria City Council approved on January 19, 2016 that both Alternatives 3A and 3B were acceptable configurations.

**Implementation** – Funding and implementation discussions for Alternative 3A will be pursued in the future, as this option can accommodate all stakeholders. Alternative 3A is illustrated in the following figure, which shows the lane configurations, intersection approach lanes, and location of the proposed HAWK pedestrian signals. The leadership of UH-V has expressed great interest in making these improvements happen sooner than later and have indicated an interest in participating in the funding of the needed improvements.

Refinement of the concept and cost estimate for Alternative 3A identified two options for design of the pavement for the preferred configuration:

1. Complete reconstruction, as was included for all but Alternative 1A, at an estimated cost of \$8.76 million. This option includes the addition of underground storm water lines to reduce the level of accumulated storm water during high rainfall events ; or
2. Reconstruction of the outer edges and median areas (cut pavement to size, new curblines, new sidewalks) and mill and overlay of the remaining existing pavement at an estimated cost of \$5.92 million. This option does not include the addition of underground stormwater lines as the existing concrete pavement would not be removed to allow their placement.

Alternative 3A is shown in the graphic on the following page, followed by a conceptual illustration of the configuration near the UH-V campus. Detailed cost estimates are included in Appendix C.



**BEN WILSON STREET RECOMMENDED CONFIGURATION**



Conceptual Illustration of the Ben Wilson Street Preferred Configuration at the UH-V Campus

## 1.0 BASIS FOR THE PLAN

### 1.1 BACKGROUND

The Victoria Metropolitan Planning Organization (MPO) retained Freese and Nichols, Inc. (FNI) to complete a corridor study along Ben Wilson Street between US Business 59 (Houston Highway) and Sam Houston Drive. The study corridor extends for approximately 0.8 mile through commercial, residential and university land uses, as depicted in **Figure 1**. The purpose of this study is to provide design alternatives to address both the safety of pedestrians, bicyclists, and other alternative transportation modes, and the flow of traffic along Ben Wilson Street given the planned expansion of the University of Houston – Victoria campus.

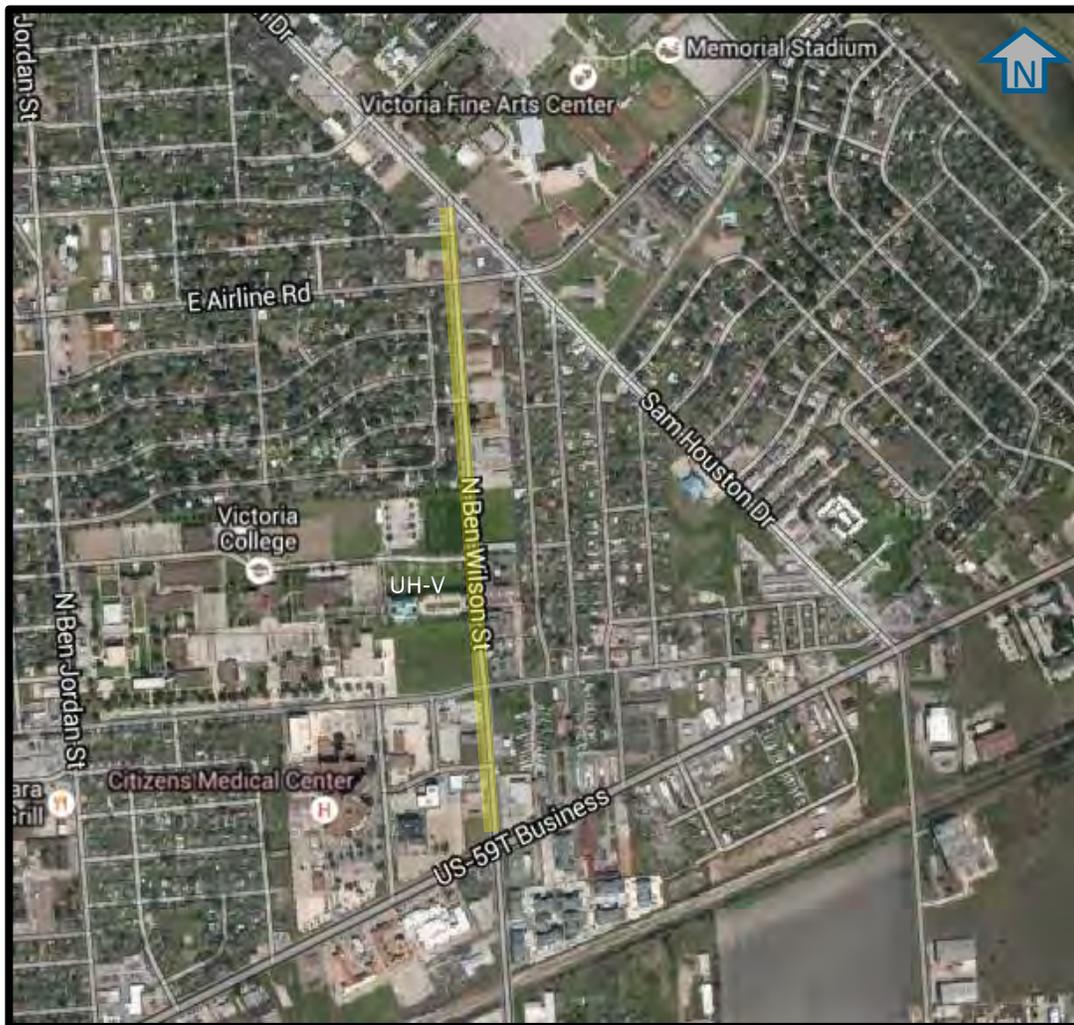
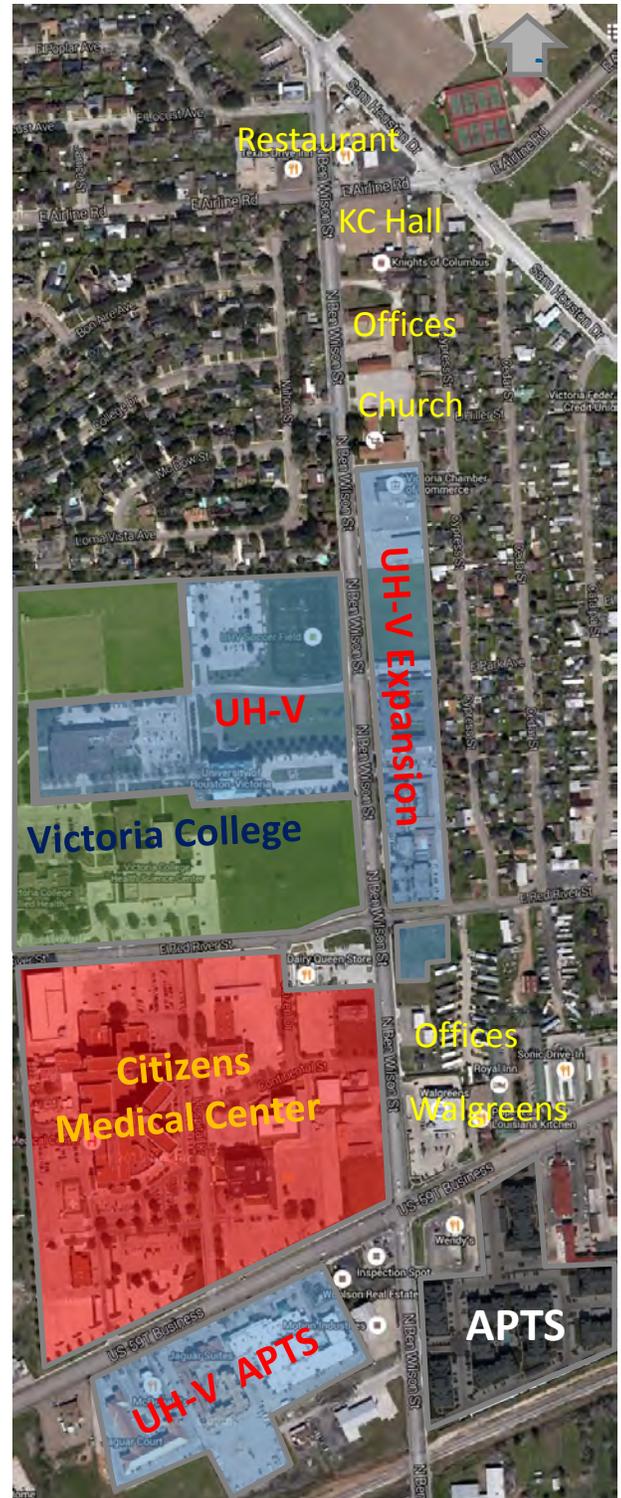


Figure 1. Study Area Location Map

Ben Wilson Street is classified as a minor arterial roadway and currently provides a five-lane cross section – two travel lanes in each direction plus a continuous left turn lane, with sidewalks along each side - and serves the University of Houston-Victoria, Victoria College, and provides access to Citizens Medical Center and other commercial, office and residential uses along the corridor, as depicted in **Figure 2**. Two apartment complexes (The Arlington and Casa del Rio) located on the east side of Ben Wilson Street have been purchased by UH-V and are schedule to be raised in November 2015 in preparation for construction of future student housing. UH-V owns the properties along the east side of Ben Wilson Street across from the rest of campus, as well as the southeast corner of the intersection of Ben Wilson Street at Red River Street. The current UH-V student housing located south of US Business 59 will be relocated to the new student housing east of Ben Wilson Street, and the buildings south of US Business 59 will be sold by UH-V.

## 1.2 STAKEHOLDER INTERVIEWS

The FNI project team and the MPO met with key stakeholders along the corridor to review current conditions, operations, issues and planned improvements along the corridor. Interviews were conducted with representatives from University of Houston – Victoria, Victoria College, Citizens Medical Center and resident representatives from Bronson Terrace neighborhood homeowners association. Discussions were also held with a representative from the Victoria Fire Department.



**Figure 2. Study Area Development Map**

### 1.3 UNIVERSITY OF HOUSTON – VICTORIA

Discussions were held with a representative of the University of Houston – Victoria (UH-V) regarding the growth plans of the university to increase from 1,500 students in 2015 to 6,000 students by 2025. UH-V recently added a new academic building and is scheduled to begin an expansion project on the east side of Ben Wilson Street in 2016. This new housing will relocate student housing from south of US Business 59 and reduce the need for students to cross this major roadway to access campus. The long range facility plan for UH-V growth, shown in **Figure 3**, to create campus housing in close proximity to campus, would create significant pedestrian activity crossing Ben Wilson Street.

- UH-V Growth West of Ben Wilson Street – A new academic building opened in September 2015. A future academic building is planned adjacent to it in the current location of the soccer field. Collaboration with Victoria College would develop additional campus buildings, including a potential building on the currently undeveloped tract of land on the northwest corner of Ben Wilson Street at Red River Street.
- UH-V Growth East of Ben Wilson Street - This expansion will ultimately include a student center, student housing (1,200 beds in three buildings by 2017, as shown in Figure 3, and 2,000 beds by 2025), and parking (over 800 spaces in two garages). The planned Student Center would be a focal point for the planned expansion of UH-V.

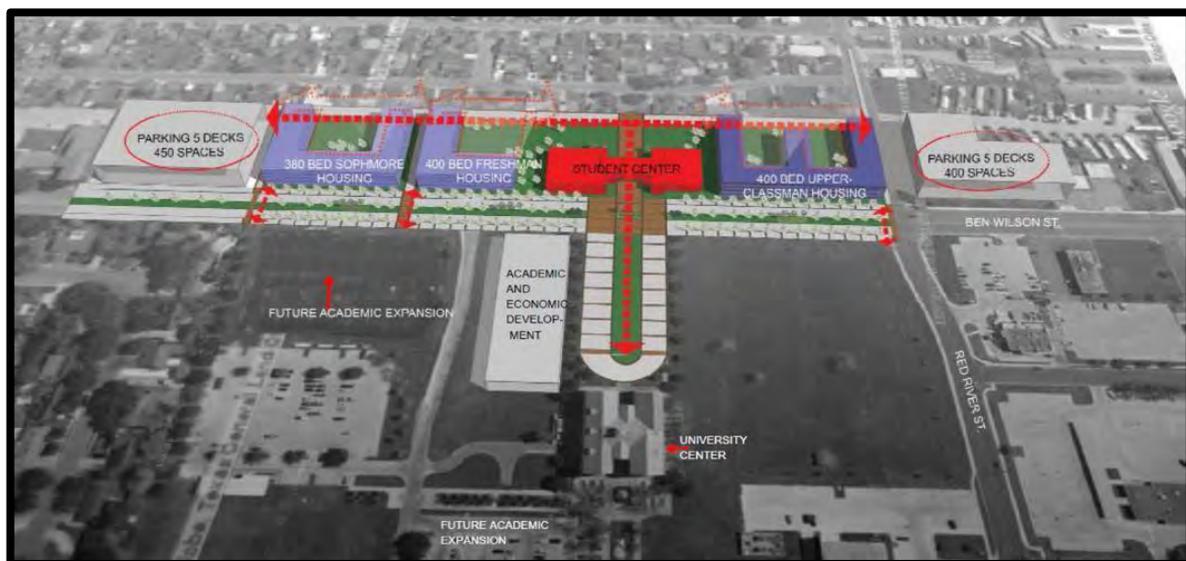


Figure 3. UH-V Campus Development Plan Map (map source: UH-V)

### 1.4 VICTORIA COLLEGE GROWTH SOUTH OF BEN WILSON STREET

Discussions were held with a representative of Victoria College (VC) regarding the growth plans of the college and access needs along Ben Wilson Street. Victoria College is a public, open-admission college that provides Associate Degrees and Certificates and academic courses that apply to baccalaureate degrees and to meet the educational needs of students planning to transfer to a university. Victoria College currently has over 4,000 for-credit students and considers a healthy UH-V important to the mission of the college. The college, shown in **Figure 4**, is currently updating their campus master plan, to be completed in February 2016, and some of the planned improvements at the main campus are anticipated to include:

- Modernization of Existing Buildings - Some of the older buildings will be refurbished and some repurposed as UH-V adds more academic buildings.
- Relocation of Interior Parking to Edges of Campus – Gradually move parking from the center of campus (lots J, K, L, P) to the outer edges.
- Potential Development of Corner Lot Red River Road at Ben Wilson Street – Victoria College owns the vacant lot at the northwest corner of Ben Wilson Street and Red River Street.

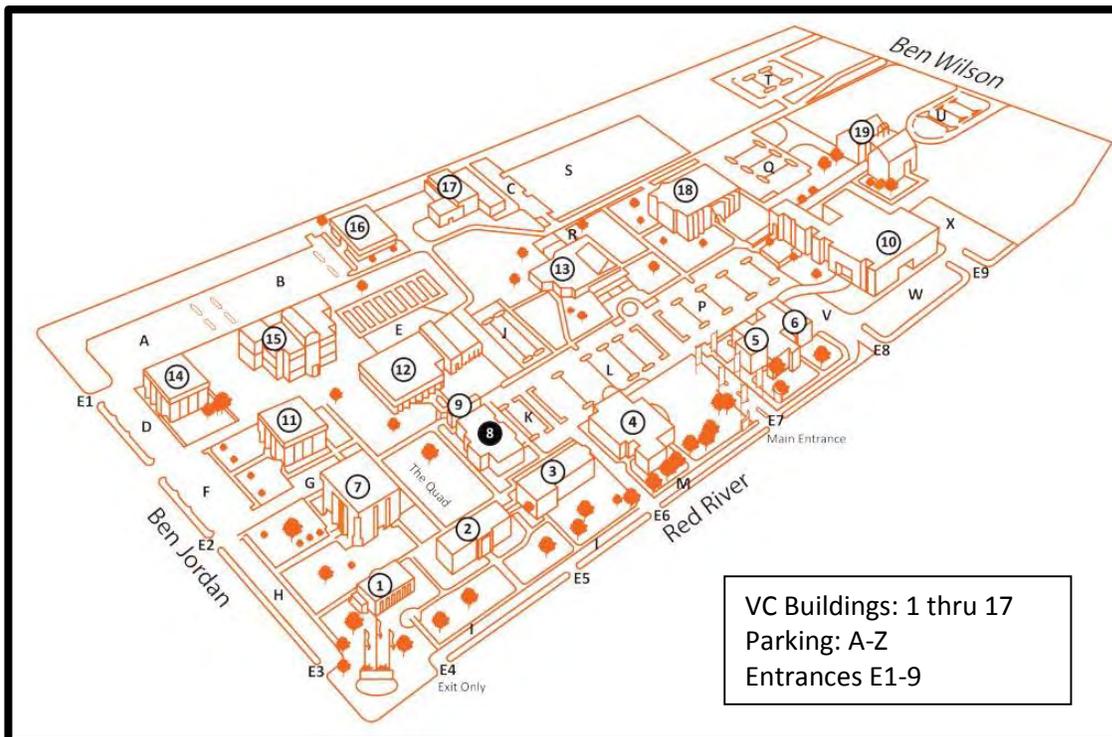


Figure 4 . Victoria College Campus Map (map source: Victoria College)

## 1.5 CITIZENS MEDICAL CENTER

Discussions were held with a representative of the Citizens Medical Center, regarding the growth plans of the medical center and emergency access needs along Ben Wilson Street. There is a synergy between the medical center and the Victoria College Health Science Center, with significant pedestrian crossings of Red River Street between the two facilities at an unsignalized midblock crosswalk. The primary points of access to the medical center are from US Business 59 and Red River Street. Planned improvements by the medical center includes:

- Emergency Room Expansion – The emergency room on the southwest side of the main building is proposed to have a significant expansion to improve patient waiting and service areas. The expansion will consume a portion of the existing parking area, but access to the emergency room will remain essentially the same.
- Additional Patient Tower – The expansion for the emergency room will include supporting structure for an increase in the number of patient rooms.
- Redevelopment of underutilized Lots between Hospital Drive and Ben Wilson Street – Citizens Medical Center owns much of the property to the east of the current medical center to Ben Wilson Street.



Figure 5. Citizens Medical Center

## 1.6 BRONSON TERRACE

Discussions were held with resident leaders of the Bronson Terrace subdivision HOA regarding the residents' access and mobility needs along Ben Wilson Street. Issues expressed during the discussions include the street noise and traffic speeds along Ben Wilson Street. The representatives indicated a preference for modifications to Ben Wilson Street that calms traffic and enhances pedestrian conveyance along and crossing of the street, and consideration of the following attributes:

- College Drive Point of Access – Though just one of several points of access, College Drive provides ready access to Ben Wilson Street for residents living on the eastern end of Bronson Terrace.
- Crossing of Ben Wilson Street – There are residents that walk to work at the businesses and to the church across Ben Wilson Street. Pedestrian crossing of a 3-lane roadway with slower travel speeds would be preferable to crossing a four or five lane roadway that would foster faster speeds.
- Sidewalks along Ben Wilson Street– The sidewalks along the west side of Ben Wilson Street, though about 8 feet wide, are paved between the fence and the back of curb of the travel lane. A reduction in roadway pavement width would be desirable to provide an additional landscaped buffer between the sidewalk and the travel lanes.

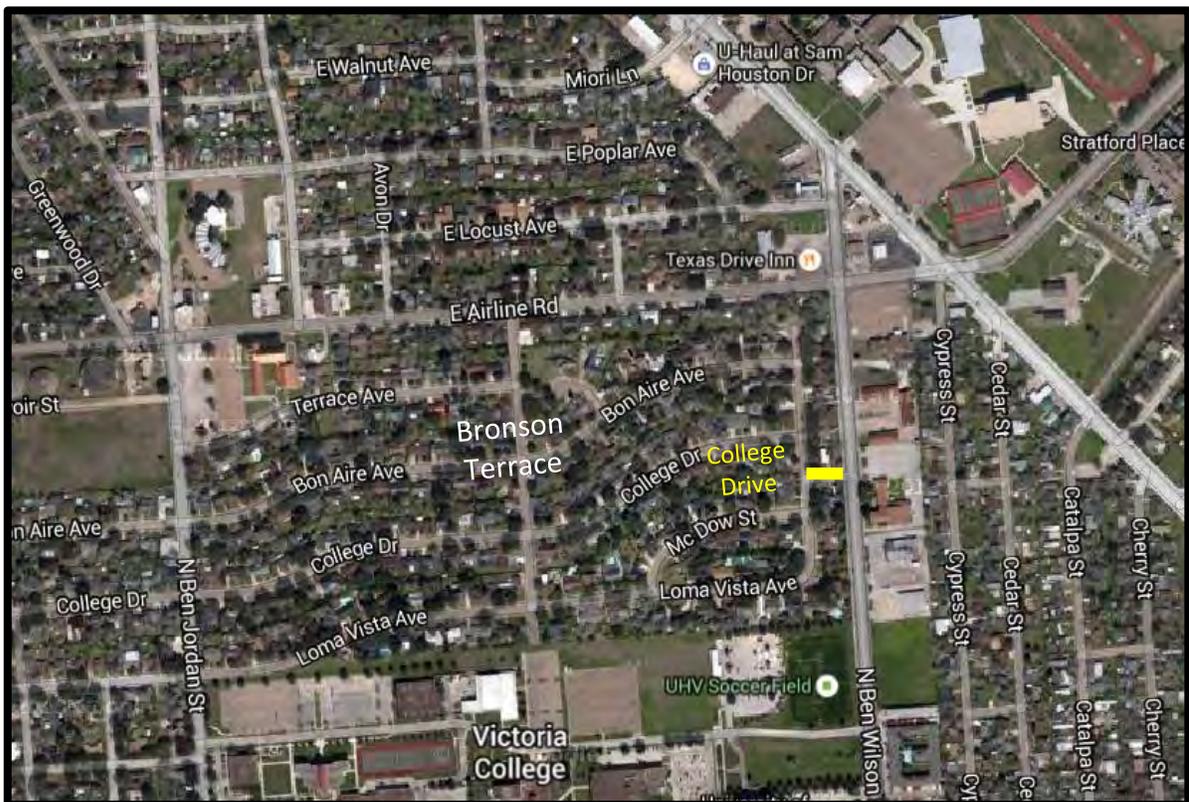


Figure 6. Bronson Terrace Access onto Ben Wilson Street

## 1.7 EMERGENCY SERVICES

Discussions were held with a representative of the Victoria Fire Department (VFD) regarding the emergency access operations along Ben Wilson Street. The VFD also provided information from their discussions with EMS services of the Citizens Medical Center and discussed some of Police Department activities along the corridor.

- Fire trucks could better maneuver around cars if two lanes were provided in each direction, but would be able to utilize the center lane of a three-lane alternative as well;
- Ambulance access to the Medical Center prefers to use access roadways that have good pavement condition. Speed of access is secondary to comfort of ride for their passengers. The three-lane alternative was not a concern, nor was the landscaping of the center turn lane.

## 1.8 OTHER CORRIDOR LAND USES

In addition to the major land uses described above, there are other uses that have developed along the corridor, including:

- On the Northern End of Ben Wilson Street – A church, a small set of offices, a Knights of Columbus Hall south of Airline Road, and two small fast food restaurants and a car wash north of Airline Road generate very little traffic during weekday peak hours of operation.
- On the Southern End of Ben Wilson Street - Small businesses on the west side of Ben Wilson Street south of Red River Road include

a Dairy Queen, some offices related to the medical center and miscellaneous small offices. These land uses are expected to intensify as Citizens Medical Center continues to grow. On the east side of Ben Wilson Street, Walgreens has a driveway, as does a small business and a residence. The southeast corner of the intersection of Ben Wilson Street at Red River Street has been purchased by UH-V with the intention of building a parking garage for students.

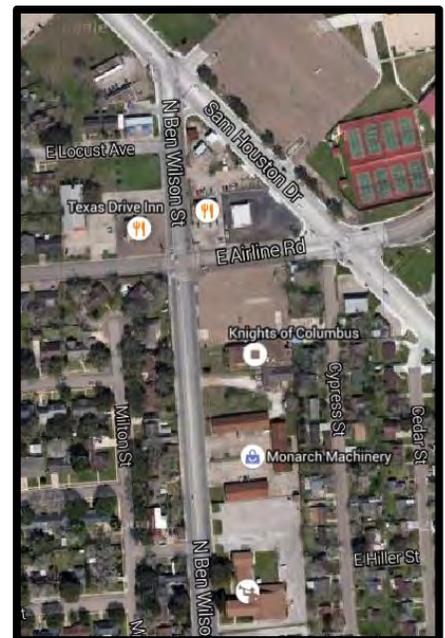


Figure 7. North End Development

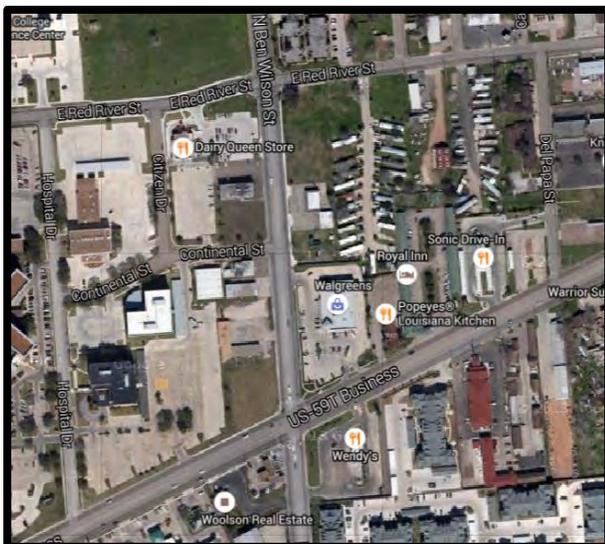


Figure 8. South End Development

## 1.9 EVALUATION CRITERIA

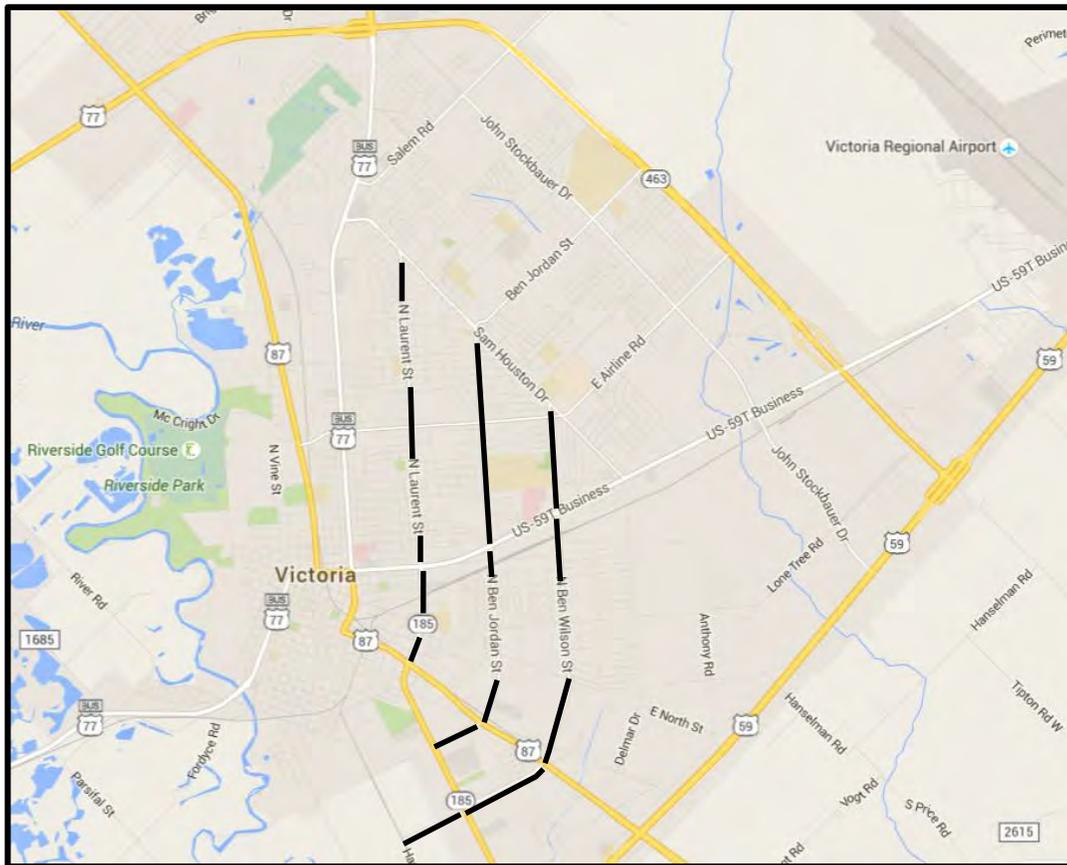
The following project goals and objectives were established for the development of concepts, initial screening, and further evaluation of the alternatives:

- **Goal: Traffic Operations** – Provide adequate traffic access and circulation for corridor users.
  - Objective: Process current and anticipated future traffic volumes without incurring significant delays along the corridor and at intersections.
  - Objective: Create a traffic operations environment that is appropriate to serve the context of the adjacent land uses while continuing to serve the functional classification of the roadway.
  - Objective: Accommodate emergency access as directly as possible to the Medical Center with a good riding surface.
  - Objective: Accommodate transit vehicles and passenger service along the corridor.
- **Goal: Pedestrian and Bicycle Mobility and Safety** – Provide facilities for the conveyance of pedestrians and bicyclists along and connecting to the corridor.
  - Objective: Enhance the safety of pedestrians and bicyclists crossing Ben Wilson Street, especially at the UH-V campus frontage, including pedestrian crossing and traffic calming treatments.
  - Objective: Enhance the safety and mobility/accessibility of pedestrian and bicyclist conveyance along Ben Wilson Street, including adequately sized sidewalks/sidepaths and accessible ramps.
- **Goal: Cost Effective Solution** – Provide facilities that wisely invest and leverage city funds.
  - Objective: Construct cost effective improvements that balance the public cost with the public need, and that promote and leverage the investment of private entities in the corridor.
  - Objective: Minimize the lifecycle cost of public investment in the roadway corridor.
- **Goal: Corridor Aesthetics** - Provide a unique identity to the corridor between Sam Houston Drive and US Business 59.
  - Objective: Enhance the aesthetics of traversing the entire corridor for pedestrians, bicyclists, and motorists.

## 2.0 CORRIDOR TRAFFIC OPERATIONS

### 2.1 CITY THOROUGHFARE NETWORK

Ben Wilson Street is part of a network of arterial streets that provide cross-city mobility in Victoria, as depicted in **Figure 9**.



**Figure 9. Victoria Roadway Network Parallel to Ben Wilson Street**

- A. Ben Wilson Street extends between Sam Houston Drive and US 87 as a five-lane roadway – two lanes in each direction and a center turn lane. South of US Business 59, destinations include the Youth Sports Complex. The corridor extends from US 87 to SH 185 as a four-lane roadway and changes name to Odom Street.
- B. Ben Jordan Street parallels Ben Wilson Street from Sam Houston Street to SH 185. South of US Business 59, Ben Jordan is a five-lane roadway, but from US Business 59 to Sam Houston Drive, it reduces to a four lane roadway with no center turn lane. Ben Jordan Street continues north from Sam Houston Drive, as a two-lane roadway, to an interchange at Loop 463.
- C. Sam Houston Drive is a newly reconstructed five-lane roadway that extends between Navarro Street (US Business 77) and US Business 59. It serves as a spine roadway from which extends Laurent Street, Ben Jordan Street and Ben Wilson Street.

- D. Airline Road extends from an interchange at Loop 463 to Sam Houston Drive as a five-lane road, then bends east-west to cross Ben Wilson Street, Ben Jordan Street and Laurent Street and connecting to Navarro Street and US 87. Airline Road reduces to a four-lane roadway between Ben Wilson and Ben Jordan Streets and west of Laurent Street.
- E. Red River Street is a four lane roadway that extends from an awkward intersection at Sam Houston Drive to Navarro Street and US 87. West of US 87, Red River Street is a two-lane roadway extending into Riverside Park.

Ben Wilson Street is an important link in the Victoria roadway network. **Thus, no alternative should be considered that would close a portion of Ben Wilson Street.**

## 2.2 TRAFFIC VOLUMES

The traffic volumes that are expected to use Ben Wilson Street will be a determinant of the sizing of the roadway configuration options that may be considered. Traffic volumes of importance include the total daily amount of traffic, the peak hour amount of traffic, and the peak hour directional turning movements.

### A. Existing Daily Traffic Counts

Traffic counts on roadways in the study area have been collected by both the Victoria MPO (MPO) and the Texas Department of Transportation (TxDOT). Traffic counts were taken as part of the study in late August 2015, after all schools were in session, to assess relative traffic growth and to further study the operations of the intersections, and are included in **Appendix A**. Daily traffic volumes near the Ben Wilson Street corridor are summarized in **Table 1**.

**Table 1. Historical Daily Traffic Volumes on Roadways near the Ben Wilson Street Corridor**

Count Location	2012 (TxDOT)	2013 (MPO)	2015 (FNI)
Ben Wilson St. south of Red River St.	12,630	12,714	12,848
Ben Wilson St. north of Red River St.	n/a	n/a	13,277
Ben Wilson St. south of Airline Rd.	n/a	n/a	12,139
Ben Wilson St. north of Airline Rd.	7,970	n/a	n/a
Red River St. west of Ben Wilson St.	9,120	9,170	8,499
Airline Rd. west of Ben Wilson St.	7,170	7,870	6,944
Ben Jordan St. south of Red River St.	12,760	11,478	n/a
Ben Jordan St. north of Red River St.	14,950	13,105	n/a
BUS 59, west of Ben Wilson St.	25,150	25,991	n/a
BUS 59, east of Ben Wilson St.	18,190	19,343	n/a

Some observations based upon these daily traffic volumes include:

- The following street segments should be able to operate well as a three lane roadway, providing one lane in each direction with a center turn lane:
  - Red River Street east and west of Ben Wilson Street – At less than 10,000 vehicles per day, the recently reconstructed four-lane roadway, from east of Ben Wilson Street to Ben Jordan Street, could be re-stripped as three lanes with bike lanes along each outer edge.
  - Airline Road west of Ben Wilson Street - At less than 10,000 vehicles per day, the four lane roadway, from Ben Wilson Street to Ben Jordan Street, could be re-constructed to provide only one through travel lanes in each direction plus a center turn lane. This treatment would allow flexibility to provide much needed room for improving the pedestrian landings at the corners. Other enhancements on this segment of Airline Road may include providing enhanced sidewalk and landscaping along the residential frontage.
- The following street segments may be able to operate well as a three lane roadway, depending on peak hour intersection operations, but may need to provide two lanes in each direction:
  - Ben Wilson Street north of Airline Road – At less than 10,000 vehicles per day, this segment could be modified from a five-lane to a four-lane or three-lane roadway, allocating more space to enhancing the sidewalk and streetscape.
  - Ben Wilson Street south of Airline Road to Red River Street – At between 10,000 and 15,000 vehicles per day, this section of Ben Wilson Street passing between the two portions of the UH-V campus could operate acceptably as a three-lane roadway as long as adequate lane provisions are provided at the intersections with Airline Road and Red River Road. The narrower roadway would reduce traffic exposure for pedestrians crossing of the street and make installation of traffic control measures more effective.
  - Ben Wilson Street south of Red River Street to US Business 59 - At between 10,000 and 15,000 vehicles per day, Ben Wilson Street could operate acceptably as a three-lane roadway as long as adequate lane provisions are provided at the intersections of Red River Street, Continental Street and US Business 59. The northbound Ben Wilson approach to US Business 59 would be required to have the rightmost lane designated as right turn only, reducing its capacity for the northbound through movement.

Noteworthy traffic patterns include:

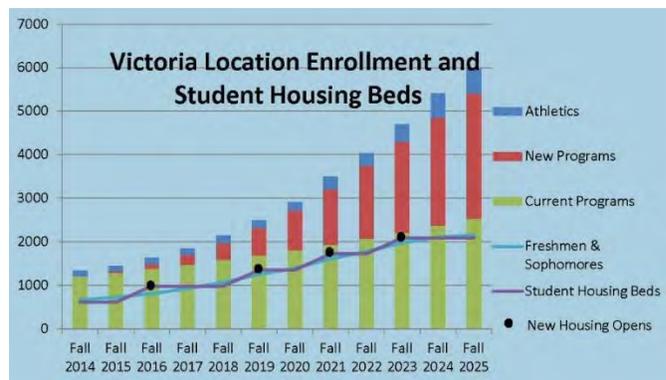
- A significant right turn movement from northbound Ben Wilson Street to eastbound Airline Road (heaviest during the PM peak at 181 vph), with a corresponding significant left turn movement from westbound Airline Road to southbound Ben Wilson Street (heaviest in the AM peak at 260 vph), and
- A significant left turn movement from northbound Ben Wilson Street to northwest bound Airline Drive (heaviest during the PM peak at 445 vph), with a corresponding significant movement from southeast bound Sam Houston Drive to southbound Ben Wilson Street (heaviest in the AM peak at 509 vph).

B. Anticipated Future Traffic Growth

The MPO completed an assessment of the transportation needs for the Victoria area in the 2040 Metropolitan Transportation Plan (MTP). In that assessment, a modest growth of the UH-V campus was included. The traffic volumes on Ben Wilson Street, north of US Business 59, were forecast to increase slightly from about 13,000 vehicles per day in 2012 to about 16,000 vpd in 2040, a traffic growth rate of about 0.8% per year.

C. Anticipated Traffic Growth due to UH-V Expansion

UH-V recently constructed their University North/SBDC building and plans to build a nearly 400-bed dormitory in 2017 to replace the current university housing apartments on the south side of US Business 59 across from Citizens Medical Center.



UH-V plans to add another classroom facility where the current soccer fields are and add nearly 1,600 more beds in additional dormitories plus a new Student Center and parking garages east of Ben Wilson Road, phased as demand for courses and on-campus housing increases as student enrollment increases from the current 1,500 to a planned 6,000 students over the next 10 years. Creation of a walkable campus environment will be essential to significantly reduce the AM and PM peak hour trips that would be otherwise generated from the increase in student population. The proposed placement of an off-campus student parking garage at the southwest corner of the intersection of Ben Wilson Street at Red River Street

will contain much of the commuting students from areas north and east of Victoria to the segment of Ben Wilson Street south of Red River Street.

#### D. Traffic Projections Due to UH-V Growth

The Institute of Transportation Engineers Trip Generation Manual, 9<sup>th</sup> Edition, indicates an average of the sampling of universities generates about 1.75 trips per day per student, with about 10% of these occurring during each of the AM and PM peak hours. Given that UH-V student housing is planned to accommodate 2,000 of the planned 6,000 student enrollment, the 1.75 rate is discounted by 33% to a rate of 1.17 trips per day per student for this analysis. Thus, it is estimated that the addition of 4,500 students attending UH-V would generate an additional 4,786 vehicles per day (vpd) to Ben Wilson Street, assuming a 1.1 persons per vehicle average occupancy.

Given the position of UH-V and Victoria within the regional roadway network, it is estimated that approximately 2/3 of the growth in traffic, or about 3,200 vpd, would access the UH-V campus to/from the north via US Business 59 and to/from the east via Ben Wilson Street, and would utilize Ben Wilson Street mostly at and south of Red River Street. The other third of the additional UH-V traffic, about 1,600 vpd, would access campus from the northern end of Ben Wilson Street, half via Airline Road from the Loop and the other half from Sam Houston Drive.

Thus, the estimated growth in UH-V traffic would increase traffic on Ben Wilson Street south of Red River Street from 13,000 vpd in 2015 to about 16,200 vpd within the next 10 years - a net increase of about 24% over 10 years. North of UH-V, traffic would increase over those same 10 years from 13,000 vpd to about 14,600 vpd, an increase of about 12% over 10 years. These 2025 daily traffic volumes are expected to supplant those estimated by the 2040 MTP.

#### E. Peak Hour Traffic Operations

Level of Service (LOS) is a commonly used indicator of traffic operations performance. LOS is given a letter grade, A through F, with LOS A traffic flow experiencing very little delay and LOS F indicating traffic flow that experiences significant and generally unacceptable levels of delay. A traffic model is used to simulate the traffic flow through a network of intersections and produce the performance measures for delay and LOS at the intersections and the overall corridor. Many communities designate LOS D as the least acceptable LOS for intersection traffic flows during the peak hours of the day, and performance of approaches or individual

turning movements at LOS E or worse would indicate a need for modifications at the intersection. Peak hour traffic operations at LOS C or better indicate an intersection with excess capacity for growth or conversion of travel lanes to other purposes.

Traffic operations were modeled using the software package, Synchro by TrafficWare. Peak period traffic turning movement counts taken at the significant intersections along Ben Wilson Street indicate that the key intersections operate overall at LOS B during the AM and PM peak hours, with some of the individual turning movements operating at LOS C. This very good level of service during the peak hours of operation indicate a significant amount of excess capacity available for growth in the corridor, or for potential reduction in the ROW allocated to travel lanes that could be reallocated to pedestrian accommodations and aesthetics for the corridor.

#### F. Potential for Lane Reductions

An assessment was made of lanes reductions that would still operate at acceptable LOS – the street diet potential of Ben Wilson Street. This “minimal lanes” assessment consists of a 3-lane roadway on Ben Wilson from Airline Road to BUS 59, plus a 3-lane roadway on Red River Street each side of Ben Wilson Street and on Airline Road west of Ben Wilson Street. The comparison of existing and minimal lanes configuration is shown in **Table 2**, and detailed output from the Synchro model runs are included in **Appendix B**.

#### G. Available Capacity for Growth

The Synchro modeling of the existing and minimal lane configurations used the 2015 traffic counts gathered for the study, and produced values for how much of the available capacity was used under each of the two configurations, called the Intersection Capacity Utilization (ICU), which are summarized in **Table 3**. The critical intersection for the minimal lane configuration is at Airline Road, with ICU of 68% in the AM and 71% in the PM peak. The growth projections anticipate a 20% growth for Ben Wilson Street at this intersection with the growth of the school to 6,000 students. Running the Synchro analysis for the minimal lanes configurations, with traffic volumes for all movements on all approaches increased by an additional 20%, would produce the following performance at Airline Road:

- AM Peak: increase ICU from 68% up to 79%, reduce LOS from C to D; and
- PM peak: increase ICU from 71% up to 82%, reduce LOS from B to C.

**Table 2. LOS Comparison of Existing and Potential Street Diet (2015 volumes)**

Intersection	Existing Lanes (1)		Minimal Lanes (2)	
	AM Peak Hr	PM Peak Hr	AM Peak Hr	PM Peak Hr
<b>Ben Wilson @ Sam Houston</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>
Northbound	C	B	C	B
Southbound	B	C	B	C
Eastbound	B	B	B	B
Westbound	A	B	A	B
<b>Ben Wilson @ Airline</b>	<b>B</b>	<b>B</b>	<b>C</b>	<b>B</b>
Northbound - Through	B	B	B	B
- Left	B	B	C	A
Southbound	B	C	C	A
Eastbound - Through	A	A	B	C
- Left	C	C	C	B
Westbound - Through	A	A	C	B
- Left	B	B	C	B
<b>Ben Wilson @ Red River</b>	<b>B</b>	<b>A</b>	<b>C</b>	<b>B</b>
Northbound - Through	A	A	B	B
- Left	B	B	D	B
Southbound - Through	B	A	C	B
- Left	B	A	B	B
Eastbound - Through	A	A	B	A
- Left	A	A	B	B
Westbound - Through	A	A	C	B
- Left	B	A	B	C
<b>Ben Wilson @ BUS 59</b>	<b>B</b>	<b>B</b>	<b>C</b>	<b>B</b>
Northbound - Through	C	B	D	C
- Left	B	B	B	B
Southbound - Through	B	B	C	B
- Left	B	B	B	B
Eastbound - Through	B	C	B	C
- Left	C	C	D	C
Westbound - Through	C	B	C	B
- Left	B	C	B	C

(1) Existing 5-lane roadway with optimized signal timings.

(2) Predominantly a 3-lane roadway on Ben Wilson St. from Airline Rd. to BUS 59, plus a 3-lane roadway on Red River St. and on Airline Rd. west of Ben Wilson St.

**Table 3. Intersection Capacity Utilization (2015 volumes)**

Intersection (controlling movement)	ICU of Existing Lanes (LOS)		ICU of Minimal Lanes (LOS)	
	AM Peak Hr	PM Peak Hr	AM Peak Hr	PM Peak Hr
Ben Wilson @ Sam Houston	50% (B)	48% (B)	50% (B)	48% (B)
Ben Wilson @ Airline	52% (A)	50% (A)	68% (C)	71% (C)
Ben Wilson @ Red River	52% (A)	48% (A)	58% (B)	57% (B)
Ben Wilson @ BUS 59	53% (A)	57% (B)	59% (B)	60% (B)

### 2.3 TRAFFIC CRASH DATA

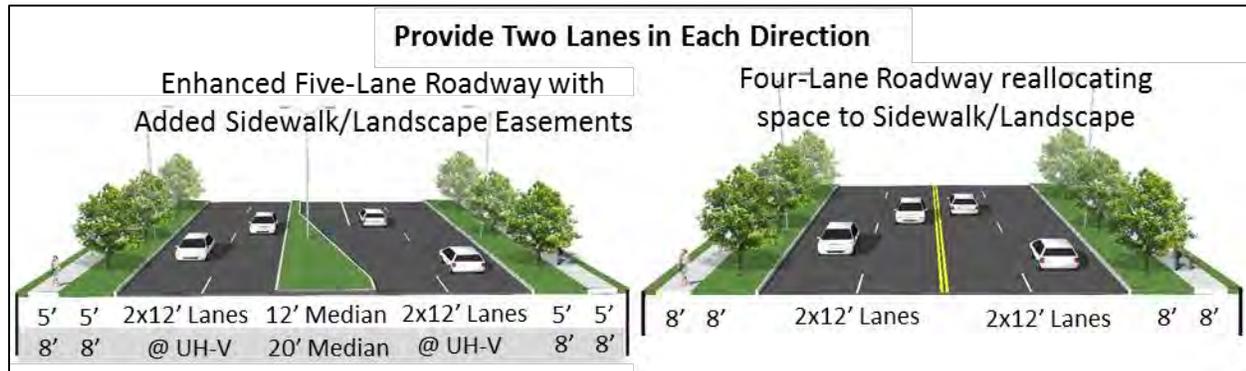
A summary of traffic crash information for the most recent two years (October 2013 to September 2015) from the Victoria Police Department was provided by the Victoria MPO. The summary information indicates the following:

- Of the 38 crashes that occurred in the study corridor, 18 were at US Business 59 and 16 were at Airline Road. The number of crashes at the Airline Road intersection is significant, as it experiences only half the traffic and at lower speeds but almost as many crashes at the US Business 59 intersection. Running the red light and failure to yield to the left turn are the primary causal factors for these crashes.
- The geometric configuration and lane allocations at the intersection of Ben Wilson Street and Airline Road appear to play a significant role in the crash frequency of this intersection. There is not an eastbound left turn lane on Airline Road, and this opposes a fairly heavy westbound left turn lane movement on south/westbound Airline Road. In addition, at the southwest corner of Ben Wilson Street at Airline Road there is a very narrow space between the fence and the travel lane, with the fence corner causing a line-of-sight constraint for eastbound Airline Road vehicles to see northbound Ben Wilson Street vehicles.

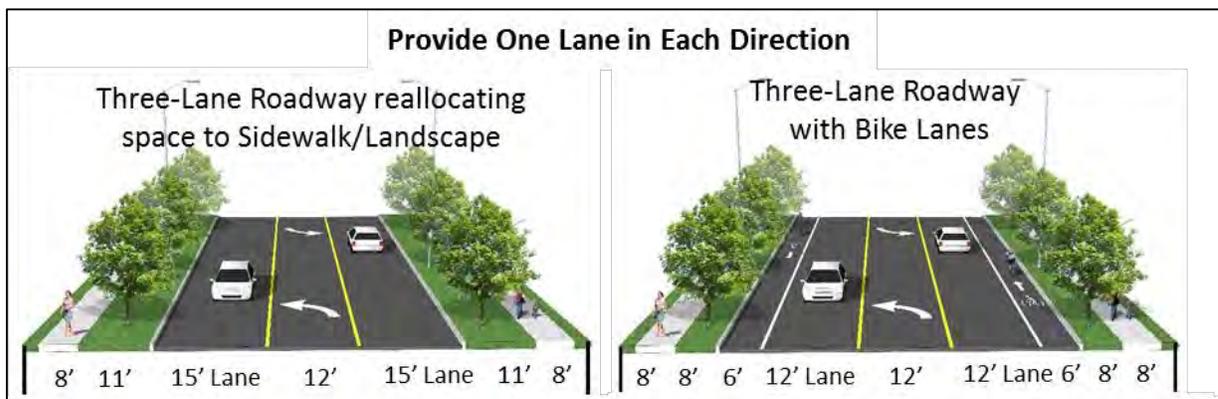
Within the last two years, there was one reported non-fatal crash (in September 2014) involving a pedestrian crossing US Business 59 at or near Ben Wilson Street. It is expected that the potential for crashes involving pedestrians will greatly diminish when the UH-V student housing is relocated to the east side of Ben Wilson Street north of Red River Street. However, due to adaptive reuse of these apartment/hotel style residential developments, the safety of the pedestrian crossing of US Business 59 will still be an issue to be addressed. With the planned concentration of student housing along the east side of Ben Wilson Street, the safety of the pedestrians walking along and crossing Ben Wilson Street will need to be accommodated in the considerations for the potential configuration of Ben Wilson Street.

### 3.0 ALTERNATIVE CONFIGURATIONS

Various alternative configurations were examined for application along Ben Wilson Street, between Sam Houston Drive and Business 59. The alternative configurations that were considered include various forms of providing two lanes or one lane in each direction, and are described further in the following paragraphs.



- Existing Five Lane Roadway – Outside curb lines unchanged, create raised medians from existing center turn lane, add landscaping at UH-V and elsewhere, as appropriate.
- Enhanced Five Lane Roadway - Outside curb lines modified at UH-V frontage to create wider landscaped median and pedestrian refuges, create raised medians as feasible at other locations along the corridor and add landscaping, negotiate landscape easements where appropriate to increase landscaping along outer edges.
- Four Lane Roadway – Narrows existing pavement to provide two lanes in each direction and no center left turn lane; reallocates the ROW space to enhance landscaping or sidewalks.



- Three Lane Roadway - Narrows existing pavement to provide one lane in each direction and a center left turn lane; reallocates the ROW space to enhance landscaping and sidewalks and/or to add bike lanes. Allows for addition of bike lanes and/or bus pullover bays to serve bus stops.

### 3.1 COMBINATIONS OF CONFIGURATIONS

The corridor consists of three distinct segments for which one or more of the alternative configurations may be most appropriate. The corridor configuration alternatives under consideration may employ different configurations for the three segments of the corridor.

#### A. South Section, US Business 59 to Red River Street

This southern segment is expected to carry the highest volumes of the three segments – over 18,000 vehicles per day with the growth of UH-V - as it is adjacent to the Citizens Medical Center and south of the proposed UH-V parking garage. Both the five-lane and three-lane configurations will operate at acceptable traffic operations during the AM and PM peak hours, though the three lane configuration would approach the capacity of this segment. The three-lane configuration would allow for enhanced sidewalks and landscaping along this entry way to the UH-V and Victoria College campuses, though such enhancements may be feasible through agreements with or easements from the adjacent properties.

#### B. Middle Section, Adjacent to UH-V

This middle section at UH-V is expected to have a significant number of pedestrians crossing Ben Wilson Street at uncontrolled locations between the dorms and student center on the east side and the academic and administration building on the west side. This level of pedestrian crossing activity warrants consideration for special treatments to enhance the safety of pedestrian crossings of Ben Wilson Street. Two options are considered:

1. A three-lane roadway section would create a shorter distance for pedestrians to cross. To enhance the safety of the midblock crossings near the new student housing, the placement of a pedestrian activated crossing signal would be considered. (See 3.2.A)

With the provision of the pedestrian crossing signal, a five-lane configuration could also be considered, but is less desirable. With two travel lanes in each direction, sometimes one lane of traffic blocks the view of the pedestrian from vehicles in the adjacent lane, creating a potentially hazardous condition when the signal is transitioning out of the red phase for Ben Wilson Street traffic.

2. A grade separated pedestrian crossing could be created by raising Ben Wilson Street from north of Red River Street to the east-west roadway through the UH-V/Victoria College campus. The current entry driveway to the circular roadway would be closed at Ben Wilson Street to create the pedestrian way, and the circular entry driveway be converted to a smaller circular parking area with an entrance off of the east-west campus roadway. This configuration would greatly enhance the safety of pedestrians crossing Ben Wilson

Street at the Student Center location, especially if the campus pedestrian flow layout focusses them to that location. However, the raising of the elevation of Ben Wilson Street would create a significant visual protrusion into the UH-V campus environment (the option to bring pedestrians into a tunnel under the existing roadway or onto a pedestrian bridge over the roadway were considered not practical for use by pedestrians at this location). Raising the elevation of Ben Wilson Street would be costly and may also increase the traffic noise levels for the surrounding area.

**C. North Section, North of UH-V to Sam Houston Drive**

The northern section of Ben Wilson Street could benefit greatly from the reduction in roadway pavement to provide additional pedestrian and landscaping. The sidewalks could be enhanced by widening both sides to 8-foot sidewalks and adding at least five feet of greenspace between the sidewalk and the outside traffic lane. The pavement reduction can be accomplished in two manners:

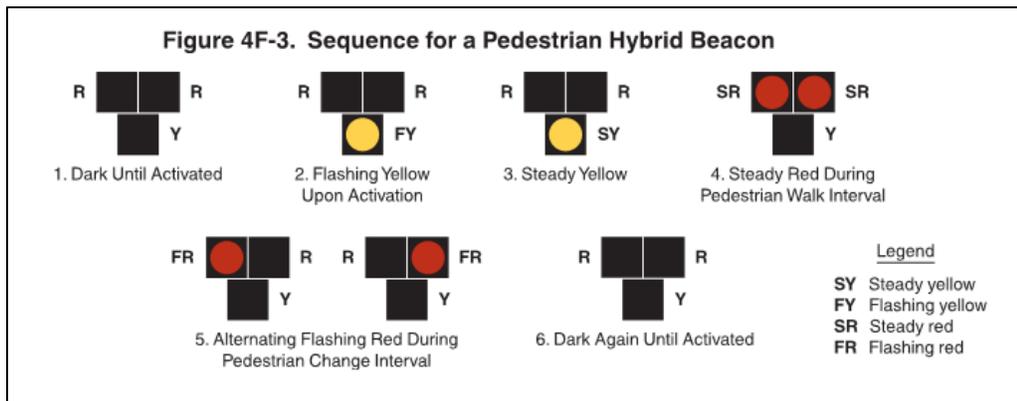
1. Reduce the roadway to a four-lane configuration, eliminating the center turn lane, modifying the curblines on one or both sides to remove pavement and add landscaping and/or sidewalk width.
2. Reduce the roadway section to a three-lane configuration, removing both of the outside lanes to remove pavement and add landscaping and/or sidewalk width.

The intersection of Ben Wilson Street and Airline Road could benefit from a modification in lane allocations at the intersection:

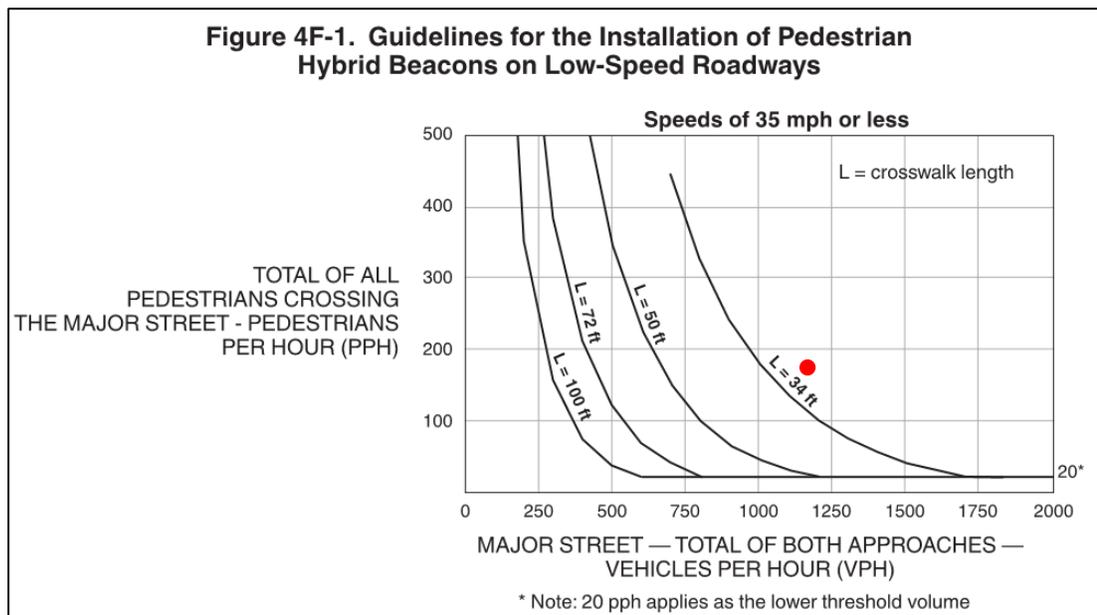
- Converting Airline Road west of Ben Wilson Road to a three-lane roadway, which works for traffic since half of the westbound Airline traffic turns southbound onto Ben Wilson Street. This improvement adds a left turn lane for eastbound Airline Road at Ben Wilson. It also creates a better line of sight condition for the eastbound movements.
- The three-lane section on Airline Road west of Ben Wilson Street allows the westbound approach of Airline Road at Ben Wilson Street to also be reduced to provide one left turn lane and one through lane, with one eastbound lane for the opposing movement (though two eastbound lanes would work as well).

### 3.2 POTENTIAL CORRIDOR TREATMENTS

A. **Pedestrian Hybrid Beacon (HAWK)** - A pedestrian hybrid beacon, sometimes referred to as a HAWK signal, is a special type of traffic signal used at an uncontrolled location to assist pedestrians to cross a street or highway. The HAWK signal has proven to experience a high level of compliance by drivers (some reports stating as high as 90% compared to a cross). The signal head display that controls the flow of traffic is shown below (Figure 4F- from the Texas Manual on Uniform Traffic Control Devices (MUTCD), and are complemented by pedestrian signal heads for the crosswalk.



The warrant for a pedestrian hybrid beacon are described in the Texas MUTCD, and the threshold for the combination of traffic volumes and pedestrian volumes should be above the curves shown in the MUTCD Figure 4F-1 shown below. The maximum one hour volume of two-way traffic (1,171 vph in 2015) and anticipated pedestrian crossing volumes (at least 150 per hour for 34-foot roadway) would meet the warrants for the pedestrian hybrid beacon.



- A HAWK signal would be provided at key crossing locations. In 2017, when the first dorms and parking lot are built, a new HAWK signal #1 would be placed as shown at the small island area between opposing left turns. Subsequently, a HAWK Signal #2 would be placed across from the new Student Center and additional dorms, when they are provided (unless the grade separation alternative is provided). Notably, the HAWK signal would provide for crossing of pedestrians in groups, and would only be able to stop traffic on Ben Wilson Street for a short while to give the right of way for pedestrians to cross. Settings on the HAWK signal controller will provide for coordination with the signal at Red River Street to allow for progression of traffic along Ben Wilson Street. Thus, pedestrians would need to wait for the traffic signal cycle to be completed before the HAWK signal could interrupt the flow of traffic on Ben Wilson Street again. Thus, the cycle length for the signal at Red River Street should be as short as feasible – 60 second or less.
- B. **Pedestrian Signals** – All pedestrian signals would be equipped with countdown meters to show the crossing pedestrian how many seconds remain in the pedestrian WALK indication.
  - C. **Sidewalks** - Adjacent to the UH-V campus, and as feasible along the entire corridor, 8 to 10-foot wide sidewalks should be provided, with a minimum of 5 feet of landscaping between the sidewalk and travel lane. Sidewalks elsewhere in the corridor would be a minimum of 5 feet and preferably 8 feet, offset by at least 5 feet from the back of curb with landscaping as space permits in each alternative.
  - D. **Corridor Aesthetics** - It is anticipated that the UH-V building improvements will include significant landscaping to enhance the aesthetics of the corridor in front of their facility. Lighting, too, would be added to enhance the safety for pedestrians. These enhancements should be made along the entire UH-V frontage with the 2017 building improvements, to create an attractive frontage after the existing apartment buildings are torn down before the new dorms and student center are built. North and south of the UH-V frontage, the lighting and streetscape should be enhanced to the extent possible by participating with adjacent property owners to add landscaping.
  - E. **Creation of a Pedestrian Underpass of Ben Wilson Street** - As a potential treatment, a pedestrian underpass at the UH-V east-west pedestrian spine could be incorporated into either the five, four or three lane concept. The creation of a tunnel under Ben Wilson Street

was not considered a feasible option due to the extensive utilities beneath the roadway. Nor was the creation of a pedestrian bridge over Ben Wilson Street considered to be feasible as it would be an inconvenience for students to use. But, with the configuration of the planned Student Center to have a lower gathering plaza with an upper crossing level between two separate halves, a concept was considered feasible to raise Ben Wilson Street up about 12 to 14 feet adjacent to this plaza area to create a passageway that would allow pedestrians to flow freely from one side of Ben Wilson Street to the other.

- F. **Raised Medians/Median Refuge** – The existing Ben Wilson configuration is referred to as a 5-lane roadway, since the center turn lane is available for use by vehicles at any point along the roadway. The creation of raised medians provides many benefits, including:
- Reduction in the number of potential conflict points along the roadway
  - Creation of a pedestrian-only space in the middle of the road that can be used as a refuge area allowing pedestrians to focus on crossing one direction of travel at a time.
  - Providing space for enhanced aesthetics along the center of the roadway.

Creating the raised medians needs to be planned carefully so as not to unduly constrain access to adjacent properties along the roadway.

- G. **Right Sizing/Road Diet** – As development patterns mature within a city, the opportunity exists for the city to assess the roadway provisions for potential reallocation of space utilization within the street right-of-way. Ben Wilson Street, as well as Red River Street and Airline Road, have needs for pedestrian, bicyclist and transit mode accommodations as well as street aesthetics that could be better met if some of the right-of-way usage for roadway pavement were reduced. As was shown in Table 2 (on page 15), there are good opportunities for right sizing of Ben Wilson Street.
- H. **Complete Streets/Context Sensitive Solutions** – The right sizing of the Ben Wilson Street roadway should serve more than just the throughput of traffic. The street configuration needs to also fit with the context of the corridor development and surroundings. The design should encourage lower speeds, frequent pedestrian crossing locations and enhanced aesthetics appropriate for the pedestrian nature of the UH-V campus environment and the street crossing locations. For context sensitive solutions, roadways are designed to encourage desired speeds, which would be about 30 MPH or less for the segment passing through the UH-V campus and residential areas.

### 3.3 POTENTIAL TREATMENTS TO CROSS STREETS

Potential treatments to Red River Street and to Airline Road were considered as part of the overall assessment of Ben Wilson Street. The treatments along the lengths of these roadways should be considered as an optional treatment in the final recommendations for Ben Wilson Street.

- A. **Treatments to Red River Street** – Under all scenarios, the Red River Street existing pavement could be re-stripped to provide one travel lane and one bike lane in each direction and a center turn lane, from Sam Houston Drive to Ben Jordan Street. The beginning of a bicycling corridor would be established that would connect across Victoria, from UH-V and Victoria College to Riverside Park at the western end of Red River Street.
- B. **Treatments to Airline Road at Ben Wilson Street** – An assessment was conducted to look at the minimum number of lanes that could be provided to serve existing traffic at acceptable LOS, the results of which were shown in Table 2 (on page 15). The resulting levels of service at the three intersections at the northern end of this corridor, and the LOS for individual movements, are shown in the figure below.



This analysis produced the following observations:

1. There were only 3 cars in the peak hour that were observed to turn left from southbound Ben Wilson Street onto eastbound Airline Road. The pavement space allocated to the

southbound left turn movement could be converted to a raised island for crossing pedestrian refuge and roadway enhancement.

2. About half of the westbound Airline Road traffic at the Ben Wilson Street approach turned left, in both the AM and PM peak periods. The leftmost westbound lane travel lane on Airline Road, after crossing Sam Houston Drive, can become a dedicated left turn lane at Ben Wilson Street with the right most lane for through and right turn movements. This would transition well into a three-lane roadway section west of Ben Wilson Street, resulting in a dedicated left turn lane for eastbound Airline Road at Ben Wilson Street, which may serve to reduce the crashes at the intersection
3. If Airline Road were to provide only three lanes of pavement at each approach to Ben Wilson Street, then approximately 12 feet of street right-of-way could be made available for other uses to the west of Ben Wilson Street on Airline Road. This reallocation of space in the right-of-way could greatly benefit:
  - a. The pedestrian landing at the southwest corner of the Ben Wilson/Airline intersection, which will greatly enhance the pedestrian safety at the intersection.
  - b. The line of sight at the Ben Wilson/Airline intersection, which may contribute to a reduction in crashes at the intersection.

### 3.4 EVALUATION METHODOLOGY

The goals and objectives for the project were presented in section 1.9, from which the following methodology was derived for evaluation of the alternatives:

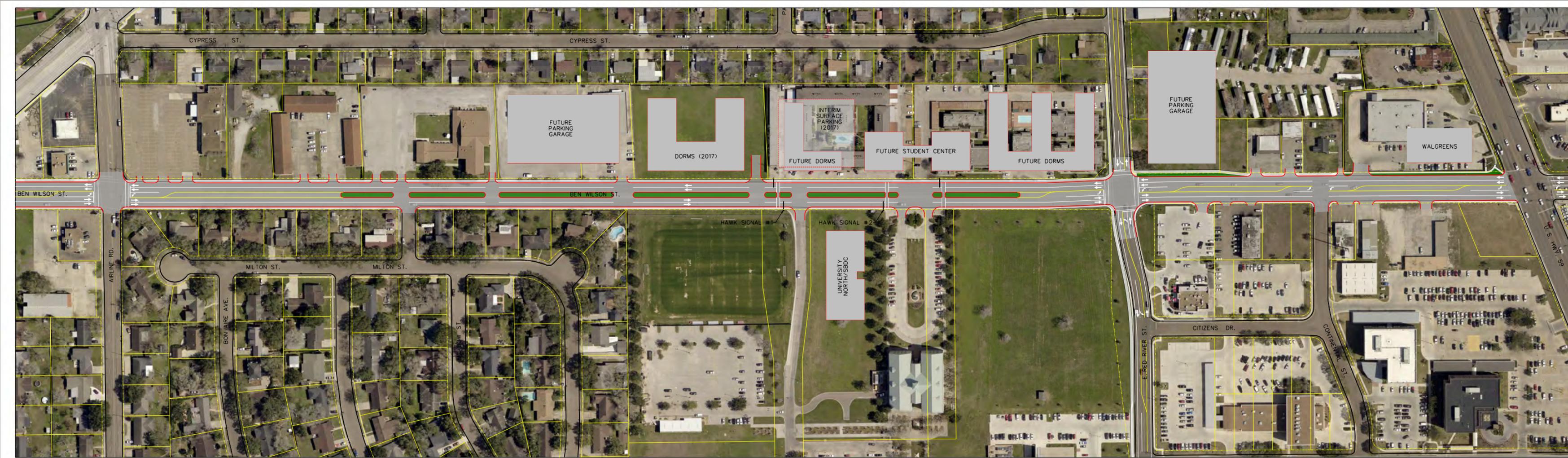
- **Goal: Traffic Operations** (30 points)
  - Objective: Process traffic volumes with acceptable Level of Service (10 points)
  - Objective: Context sensitive traffic operations (10 points)
  - Objective: Accommodate emergency access (5 points)
  - Objective: Accommodate transit vehicles and passenger service (5 points).
- **Goal: Pedestrian and Bicycle Mobility and Safety** (30 points)
  - Objective: Enhance the crossing safety of peds and bicyclists at UH-V (20 points)
  - Objective: Enhance the crossing safety of peds and bicyclists at intersections (5 points)
  - Objective: Enhance the pedestrian and bicyclist conveyance along Ben Wilson (5 points)
- **Goal: Cost Effective Solution** (25 points)
  - Objective: Cost effective improvements that leverages private investments (15 points)
  - Objective: Minimize the lifecycle cost of public investment (10 points)
- **Goal Corridor Aesthetics** (15 points)
  - Objective: Enhance the aesthetics for pedestrian, bicyclist and motorists (15 points)

### 3.5 ALTERNATIVE 1A: ENHANCED EXISTING FIVE-LANE ROADWAY

As a baseline for comparison of alternatives, a readily implemented and phased treatment to Ben Wilson Street would be to create raised medians along the corridor, incrementally as funding becomes available, and add landscaping in the medians and along the edge of the rights-of-way, in front of the UH-V and Victoria College campus and wherever else possible along the corridor between Sam Houston Drive and US Business 59. This baseline alternative would not move any existing outside curb lines. The alternative is depicted in **Figure 10**. The attributes of the performance measures and the scoring of the evaluation criteria for this alternative are shown in **Table 4**. The estimated cost of the improvements associated with Alternative 1A is \$3.12 Million, the details of which are included in **Appendix C**.

**Table 4. Evaluation of Enhanced Existing Five Lane Roadway Condition Alternative 1A**

Evaluation Criteria	Criteria Maximum	Score
<b>Goal: Traffic Operations</b> <ul style="list-style-type: none"> <li>• All intersections operate at LOS B or better; all movements are at LOS C or better</li> <li>• High capacity, moderate speed roadway through campus and residential area</li> <li>• Two lanes in each direction allow cars to pullover for emergency access</li> <li>• Transit vehicles stop in lane to serve bus stop, vehicles pass in second thru lane</li> </ul>	<p style="text-align: center;">10</p> <p style="text-align: center;">10</p> <p style="text-align: center;">5</p> <p style="text-align: center;">5</p>	<p style="text-align: center;"><b>10</b></p> <p style="text-align: center;"><b>5</b></p> <p style="text-align: center;"><b>4</b></p> <p style="text-align: center;"><b>2</b></p>
<b>Goal: Pedestrian and Bicycle Mobility and Safety</b> <ul style="list-style-type: none"> <li>• HAWK signals for ped/bike crossing safety across 4 lanes with 12-foot median</li> <li>• Ped crossings at Airline Rd SW corner still constrained, others unchanged</li> <li>• Sidewalks at back of curb in some areas, others mostly 4 and 5 feet wide</li> </ul>	<p style="text-align: center;">20</p> <p style="text-align: center;">5</p> <p style="text-align: center;">5</p>	<p style="text-align: center;"><b>10</b></p> <p style="text-align: center;"><b>2</b></p> <p style="text-align: center;"><b>1</b></p>
<b>Goal: Cost Effective Solution</b> <ul style="list-style-type: none"> <li>• Retain curb lines, limited raised medians, mill &amp; overlay street, some UH-V funds</li> <li>• Maintain 5-lane street, reconstruct 5 lane street in a few years</li> </ul>	<p style="text-align: center;">15</p> <p style="text-align: center;">10</p>	<p style="text-align: center;"><b>14</b></p> <p style="text-align: center;"><b>2</b></p>
<b>Goal: Corridor Aesthetics</b> <ul style="list-style-type: none"> <li>• Landscaping along sidewalks at UH-V, raised medians limited by multiple driveways</li> </ul>	<p style="text-align: center;">15</p>	<p style="text-align: center;"><b>3</b></p>
<b>TOTAL SCORE</b>		<b>53</b>



BEN WILSON STREET ALTERNATIVE 1A

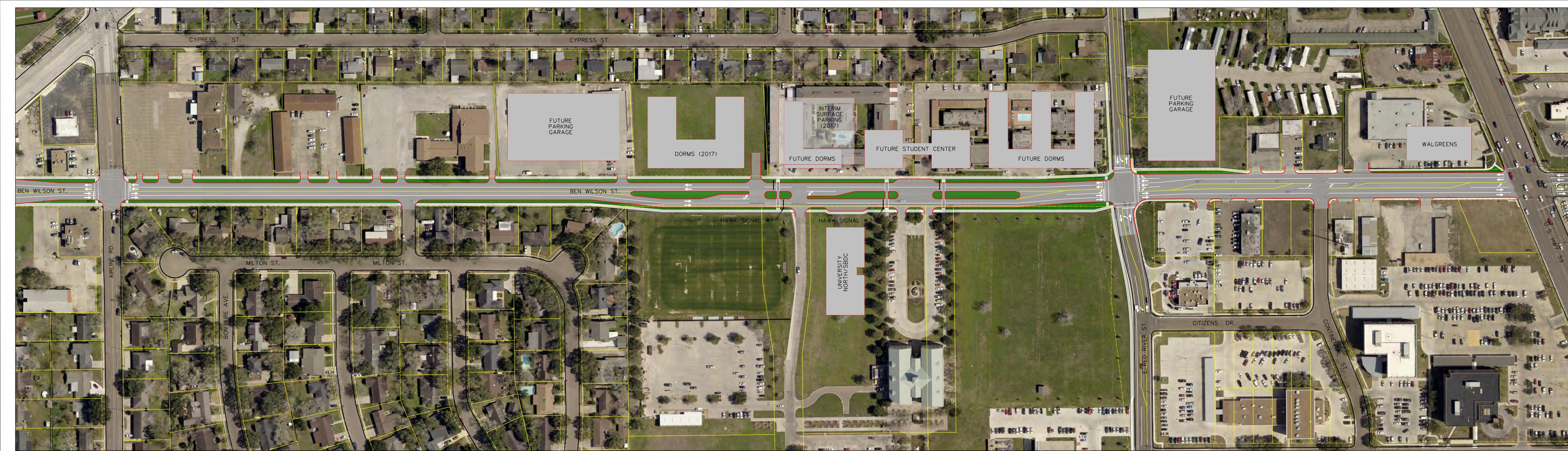
FIGURE 10

### 3.6 ALTERNATIVE 1B: COMBINATION FIVE-LANE AND FOUR-LANE ROADWAY

A refinement to the existing five-lane Ben Wilson Street is depicted in **Figure 11**. The concept would be to reduce the roadway to a four-lane undivided configuration north of the UH-V campus, retaining the five-lane configuration for the rest of the corridor as described in the base conditions, but widening the median to 20 feet in front of UH-V to Red River Street to enhance the safety of the pedestrian refuge area in the median. The reduced width of the pavement north of UH-V to north of Airline Road would allow for the enhancement of the pedestrian edge of that segment. The attributes of the performance measures and the scoring of the evaluation criteria for this alternative are shown in **Table 5**. The estimated cost of the improvements associated with Alternative 1B is \$7.88 Million, the details of which are included in **Appendix C**.

**Table 5. Evaluation of Five Lane & Four Lane Roadway Alternative 1B**

Evaluation Criteria	Criteria Maximum	Score
<b>Goal: Traffic Operations</b> <ul style="list-style-type: none"> <li>• All intersections operate at LOS B or better; all movements are at LOS C or better</li> <li>• High capacity, moderate speed roadway through campus and residential area</li> <li>• Two lanes in each direction allow cars to pull over for emergency access</li> <li>• Transit vehicles stop in lane to serve bus stop, vehicles pass in second thru lane</li> </ul>	<p style="text-align: center;">10</p> <p style="text-align: center;">10</p> <p style="text-align: center;">5</p> <p style="text-align: center;">5</p>	<p style="text-align: center;"><b>10</b></p> <p style="text-align: center;"><b>6</b></p> <p style="text-align: center;"><b>4</b></p> <p style="text-align: center;"><b>3</b></p>
<b>Goal: Pedestrian and Bicycle Mobility and Safety</b> <ul style="list-style-type: none"> <li>• HAWK signals for ped/bike crossing safety across 4 lanes with 20-foot median</li> <li>• The crossing at the Airline Rd. intersection would be improved</li> <li>• Sidewalks in front of UH-V would be 8’ wide, 5’ to 8’ north of UH-V</li> </ul>	<p style="text-align: center;">20</p> <p style="text-align: center;">5</p> <p style="text-align: center;">5</p>	<p style="text-align: center;"><b>12</b></p> <p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>2</b></p>
<b>Goal: Cost Effective Solution</b> <ul style="list-style-type: none"> <li>• Modify curb lines north of UH-V, create selected raised medians as funds available</li> <li>• Construct and maintain 4 and 5-lane roadway</li> </ul>	<p style="text-align: center;">15</p> <p style="text-align: center;">10</p>	<p style="text-align: center;"><b>10</b></p> <p style="text-align: center;"><b>5</b></p>
<b>Goal: Corridor Aesthetics</b> <ul style="list-style-type: none"> <li>• Landscaping along sidewalks at UH-V, raised medians limited by multiple driveways</li> </ul>	<p style="text-align: center;">15</p>	<p style="text-align: center;"><b>6</b></p>
<b>TOTAL SCORE</b>		<b>61</b>



**BEN WILSON STREET ALTERNATIVE 1B**

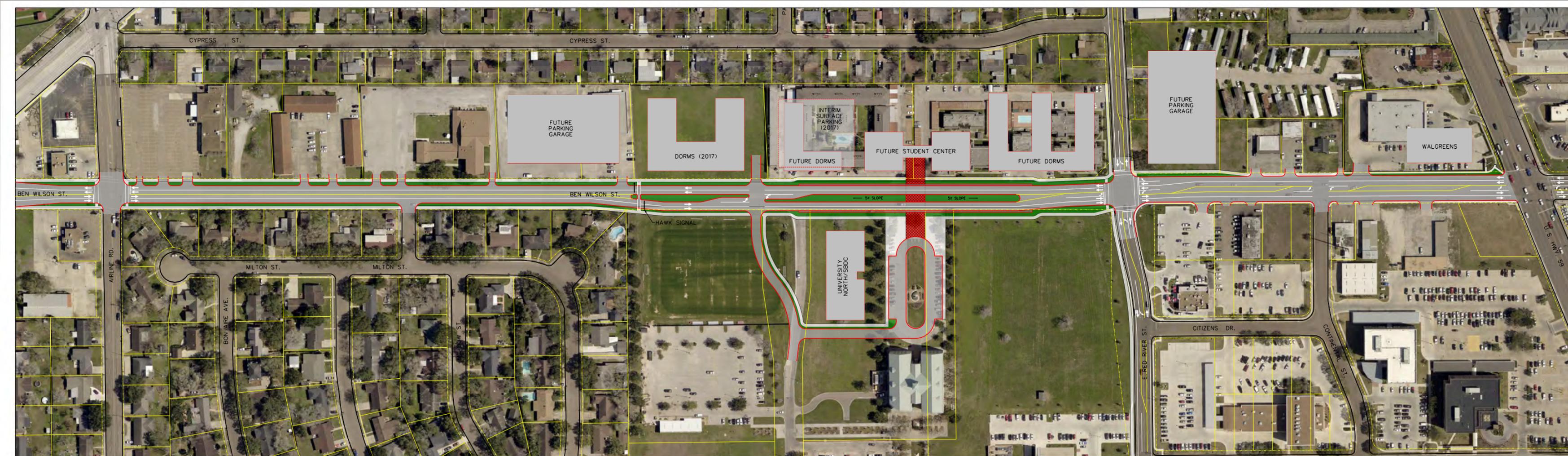
**FIGURE 11**

### 3.7 ALTERNATIVE 2A: FIVE & FOUR LANE ROADWAY WITH PEDESTRIAN UNDERPASS AT UH-V.

A refinement to Alternative 1B would be to elevate Ben Wilson Street at the current main entrance to the UH-V campus, retaining the four-lane configuration north of UH-V and the five-lane configuration through UH-V southward. This concept, shown in **Figure 12**, would create a grade-separated crossing at the current street level for pedestrians passing between the current campus and the expanded campus east of Ben Wilson Street. The attributes of the performance measures and evaluation of this alternative are shown in **Table 6**. The estimated cost of the improvements associated with Alternative 2A is \$10.25 Million, the details of which are included in **Appendix C**.

**Table 6. Evaluation of Five & Four Lane Roadway with Pedestrian Underpass Alternative 2A**

Evaluation Criteria	Criteria Maximum	Score
<b>Goal: Traffic Operations</b> <ul style="list-style-type: none"> <li>All intersections operate at LOS B or better; all movements are at LOS C or better</li> <li>Addresses high crash intersection at Airline, tendency for high speeds</li> <li>Two lanes in each direction allow cars to pullover for emergency access</li> <li>Transit vehicles pullover to serve bus stop; bus stop relocated further north</li> </ul>	<p>10</p> <p>10</p> <p>5</p> <p>5</p>	<p><b>10</b></p> <p><b>4</b></p> <p><b>4</b></p> <p><b>2</b></p>
<b>Goal: Pedestrian and Bicycle Mobility and Safety</b> <ul style="list-style-type: none"> <li>Pedestrian underpass at focal point of ped activity, HAWK signal near garage</li> <li>Crossing at Airline Rd. would be improved</li> <li>The pedestrian conveyance along Ben Wilson Rd north of UH-V would be improved</li> </ul>	<p>20</p> <p>5</p> <p>5</p>	<p><b>20</b></p> <p><b>4</b></p> <p><b>3</b></p>
<b>Goal: Cost Effective Solution</b> <ul style="list-style-type: none"> <li>Embankment and bridge to create pedestrian underpass is costly, reduce HAWKs</li> <li>Raised roadway must coincide with Student Center, maintain bridges &amp; 5 lanes</li> </ul>	<p>15</p> <p>10</p>	<p><b>5</b></p> <p><b>2</b></p>
<b>Goal: Corridor Aesthetics</b> <ul style="list-style-type: none"> <li>Landscaping along sidewalks at UH-V, raised medians limited by multiple driveways</li> </ul>	<p>15</p>	<p><b>5</b></p>
<b>TOTAL SCORE</b>		<b>59</b>



BEN WILSON STREET ALTERNATIVE 2A

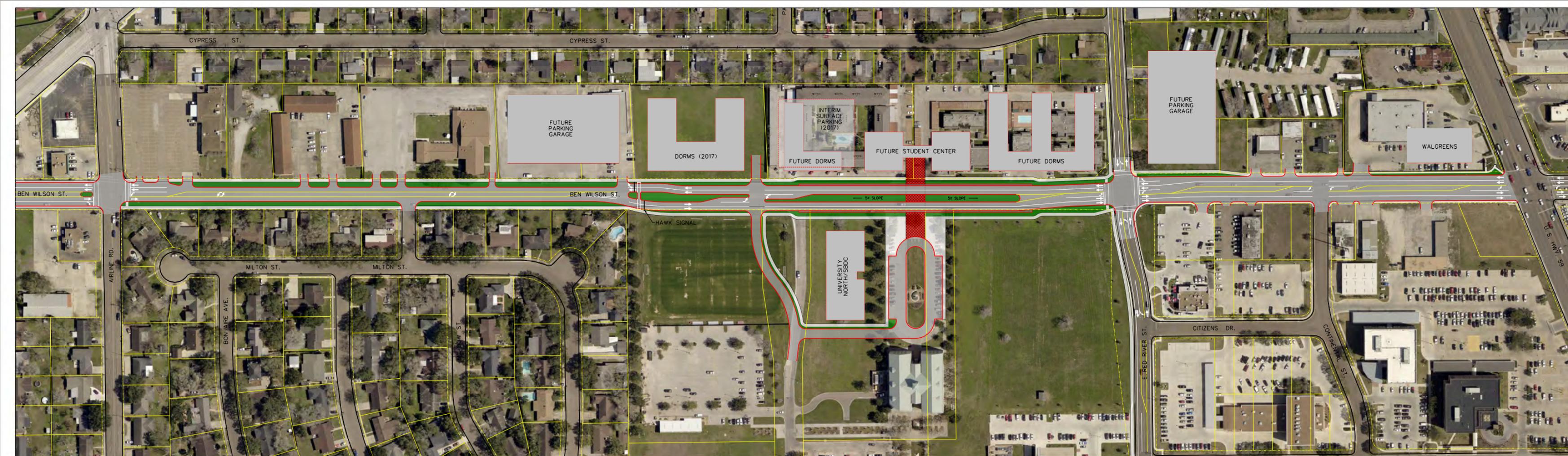
FIGURE 12

### 3.8 ALTERNATIVE 2B: FIVE & THREE LANE ROADWAY WITH PEDESTRIAN UNDERPASS AT UH-V.

A refinement to Alternative 2A would be to reduce the roadway north of the UH-V campus to a three-lane configuration, still elevating Ben Wilson Street at the current main entrance to the UH-V campus, and retaining the five-lane configuration south of Red River Street. This concept, shown in **Figure 13**, would create a grade-separated crossing at the current street level for pedestrians passing between the current campus and the expanded campus east of Ben Wilson Street, while reducing the footprint of the travel lanes past the residential neighborhood and small businesses. The attributes of the performance measures and evaluation of this alternative are shown in **Table 7**. The estimated cost of the improvements associated with Alternative 2B is \$10.35 Million, the details of which are included in **Appendix C**.

**Table 7. Evaluation of Five and Three Lane Roadway with Pedestrian Underpass Alternative 2B**

Evaluation Criteria	Criteria Maximum	Score
<b>Goal: Traffic Operations</b> <ul style="list-style-type: none"> <li>All intersections operate at LOS B or better; all movements are at LOS C or better</li> <li>Improves high crash intersection at Airline, some tendency for high speeds</li> <li>Two lanes in each direction allow cars to pullover for emergency access</li> <li>Transit vehicles pullover to serve bus stop; bus stop relocated further north</li> </ul>	<p>10</p> <p>10</p> <p>5</p> <p>5</p>	<p><b>10</b></p> <p><b>6</b></p> <p><b>4</b></p> <p><b>2</b></p>
<b>Goal: Pedestrian and Bicycle Mobility and Safety</b> <ul style="list-style-type: none"> <li>Pedestrian underpass at focal point of ped activity, HAWK signal near garage</li> <li>Crossing at Airline Rd. would be improved</li> <li>Pedestrian conveyance along Ben Wilson Rd north of UH-V would be improved</li> </ul>	<p>20</p> <p>5</p> <p>5</p>	<p><b>20</b></p> <p><b>4</b></p> <p><b>3</b></p>
<b>Goal: Cost Effective Solution</b> <ul style="list-style-type: none"> <li>Embankment and bridge to create pedestrian underpass is costly, reduce HAWKS</li> <li>Raised roadway must coincide with Student Center, maintain bridges, some 5 lanes</li> </ul>	<p>15</p> <p>10</p>	<p><b>5</b></p> <p><b>3</b></p>
<b>Goal: Corridor Aesthetics</b> <ul style="list-style-type: none"> <li>Landscaping along sidewalks at and north of UH-V, raised median limited, elevated roadway visual impact on UH-V</li> </ul>	<p>15</p>	<p><b>7</b></p>
<b>TOTAL SCORE</b>		<b>64</b>



**BEN WILSON STREET ALTERNATIVE 2B**

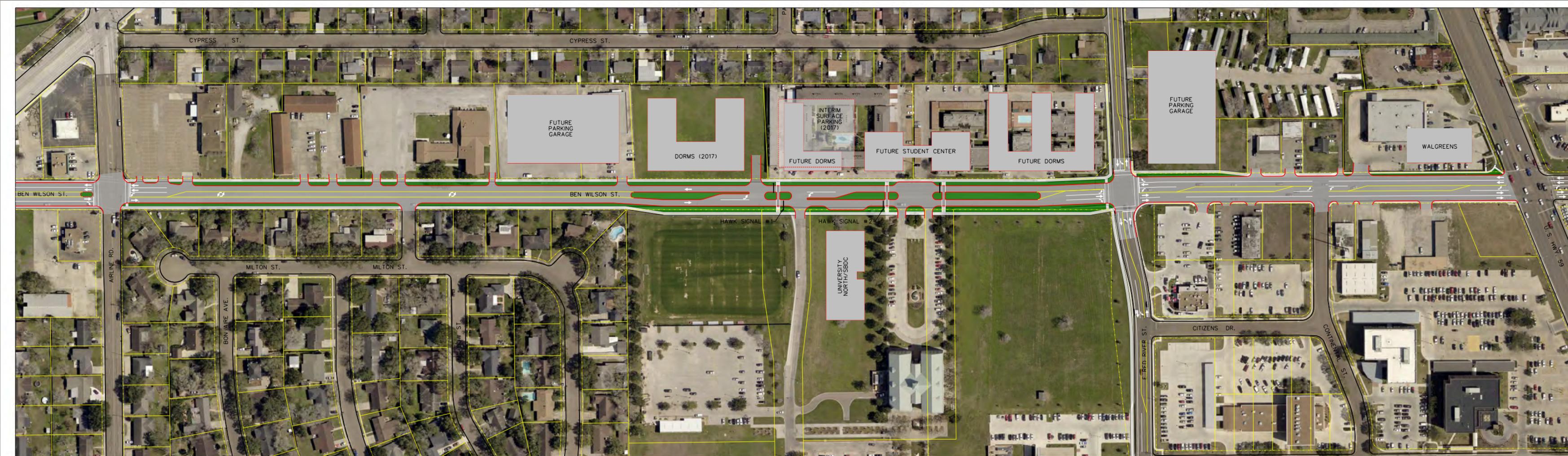
**FIGURE 13**

### 3.9 ALTERNATIVE 3A: COMBINATION FIVE-LANE AND THREE-LANE ROADWAY

This alternative is a variation on Alternative 2B, but without the pedestrian grade separation, and extends the three-lane configuration through the UH-V frontage to Red River Street and adds back the HAWK pedestrian activated crossing signals. This concept, shown in **Figure 14**, would provide a 9 to 12-foot wide landscaped buffer between the sidewalk and the travel lane on each side of the roadway, and more room for a better pedestrian landing at the corners at Airline Road. A pedestrian activated traffic signal, also called a HAWK signal, would be provided at key crossing locations. The attributes of the performance measures and evaluation of this alternative are shown in **Table 8**. The estimated cost of the improvements associated with Alternative 3A is \$8.76 Million, the details of which are included in **Appendix C**.

**Table 8. Evaluation of Five Lane & Three Lane Roadway Alternative 3A**

Evaluation Criteria	Criteria Maximum	Score
<b>Goal: Traffic Operations</b> <ul style="list-style-type: none"> <li>• All intersections operate at LOS B or better; all movements are at LOS C or better</li> <li>• 3-lanes encourages slower speeds, 5-lanes allows for commercial to south</li> <li>• Areas of raised medians limit pullover for emergency access</li> <li>• Transit vehicles pull over to serve bus stop</li> </ul>	<p style="text-align: center;">10</p> <p style="text-align: center;">10</p> <p style="text-align: center;">5</p> <p style="text-align: center;">5</p>	<p style="text-align: center;"><b>10</b></p> <p style="text-align: center;"><b>10</b></p> <p style="text-align: center;"><b>2</b></p> <p style="text-align: center;"><b>4</b></p>
<b>Goal: Pedestrian and Bicycle Mobility and Safety</b> <ul style="list-style-type: none"> <li>• HAWK signals for ped/bike crossing safety across 2 lanes with 20-foot median</li> <li>• Crossing for peds greatly improved at Airline Dr and somewhat at Red River St</li> <li>• 8-to10-foot sidewalks north of Red River Rd</li> </ul>	<p style="text-align: center;">20</p> <p style="text-align: center;">5</p> <p style="text-align: center;">5</p>	<p style="text-align: center;"><b>15</b></p> <p style="text-align: center;"><b>4</b></p> <p style="text-align: center;"><b>5</b></p>
<b>Goal: Cost Effective Solution</b> <ul style="list-style-type: none"> <li>• Rebuild curb lines, create selected raised medians, UH-V funds for enhancements</li> <li>• Maintain and operate a 3-lane street with a 5-lane segment</li> </ul>	<p style="text-align: center;">15</p> <p style="text-align: center;">10</p>	<p style="text-align: center;"><b>11</b></p> <p style="text-align: center;"><b>8</b></p>
<b>Goal: Corridor Aesthetics</b> <ul style="list-style-type: none"> <li>• Landscaping along sidewalks north of Red River St, raised medians to extent possible</li> </ul>	<p style="text-align: center;">15</p>	<p style="text-align: center;"><b>14</b></p>
<b>TOTAL SCORE</b>		<b>83</b>



BEN WILSON STREET ALTERNATIVE 3A

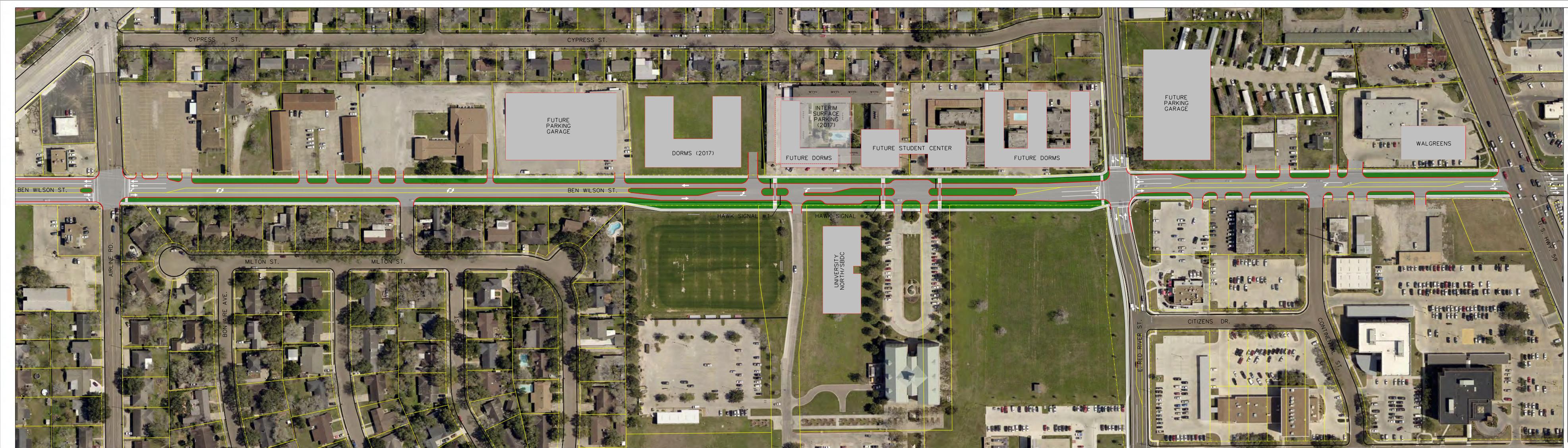
FIGURE 14

### 3.10 ALTERNATIVE 3B: THREE-LANE ROADWAY WITH ENHANCED INTERSECTIONS

This variation on Alternative 3A creates a three-lane Ben Wilson Street from Airline Road to US Business 59. This concept, shown in **Figure 15**, would be to create selected raised and/or landscaped medians along the Ben Wilson Street between Airline Road and US Business 59, and with 20-foot wide medians in front of UH-V to Red River Street. This concept would provide a 9 to 12-foot wide landscaped buffer between 8-foot sidewalks and the travel lane on each side of the roadway, and more room for a better pedestrian landing at the corners, especially at Airline Road. A pedestrian activated traffic signal, also called a HAWK signal, would be provided at key crossing locations at UH-V. This alternative require only one through lane northbound at US Business 59, producing LOS D for that movement, as was shown in Table 2, and one or two other LOS D movements south of Red River Street for the existing traffic conditions. With the anticipated additional traffic from growth of the UH-V campus and citizens Medical Center, the segment south of Red River Street may experience some congestion in the future. The attributes of the performance measures and evaluation of this alternative are shown in **Table 9**. The estimated cost of the improvements associated with Alternative 3B is \$8.44 Million, as detailed in **Appendix C**.

**Table 9. Evaluation of Three Lane Roadway Alternative 3B**

Evaluation Criteria	Criteria Maximum	Score
<b>Goal: Traffic Operations</b> <ul style="list-style-type: none"> <li>All intersections operate at LOS B or better; all movements are at LOS D or better</li> <li>3-lanes encourages slower speeds and lower crash severity</li> <li>Areas of raised medians limit pullover for emergency access</li> <li>Transit vehicles pull over to serve bus stop</li> </ul>	<p>10</p> <p>10</p> <p>5</p> <p>5</p>	<p><b>10</b></p> <p><b>8</b></p> <p><b>2</b></p> <p><b>4</b></p>
<b>Goal: Pedestrian and Bicycle Mobility and Safety</b> <ul style="list-style-type: none"> <li>HAWK signals for ped/bike crossing safety across 2 lanes with 20-foot median</li> <li>Crossing for peds greatly improved at Airline Dr and at Red River St</li> <li>8-to10-foot sidewalks along entire corridor</li> </ul>	<p>20</p> <p>5</p> <p>5</p>	<p><b>15</b></p> <p><b>5</b></p> <p><b>5</b></p>
<b>Goal: Cost and Constructability</b> <ul style="list-style-type: none"> <li>Rebuild curb lines, create selected raised medians, UH-V funds for enhancements</li> <li>Maintain and operate a 3-lane street, possible future widening south of Red River</li> </ul>	<p>15</p> <p>10</p>	<p><b>10</b></p> <p><b>7</b></p>
<b>Goal: Corridor Aesthetics</b> <ul style="list-style-type: none"> <li>Landscaping along sidewalks for the length of the corridor, raised medians to extent possible</li> </ul>	<p>15</p>	<p><b>15</b></p>
<b>TOTAL SCORE</b>		<b>81</b>



**BEN WILSON STREET ALTERNATIVE 3B**

**FIGURE 15**

### 3.11 COMPARATIVE SUMMARY OF ALTERNATIVES

The evaluation scores for each of the alternatives, from Tables 3 through 8, are tabulated for comparison in **Table 10**. The following are observations on the comparison of the alternatives.

**Table 10: Comparison of Alternatives Evaluation Scores**

Alternative	Traffic Operations	Pedestrian Mobility and Safety	Cost Effective Solution	Corridor Aesthetics	Total Score	Est'd Cost, Millions
1A: Enhanced Existing Five-Lane Roadway	21	13	16	3	53	\$3.12
1B: Five-Lane/Four-Lane Roadway	23	17	15	6	61	\$7.88
2A: Five/Four with Ped Underpass	20	27	7	5	59	\$10.25
2B: Five/Three with Ped Underpass	22	27	7	7	64	\$10.35
3A: Five-Lane/Three-Lane Roadway	26	24	19	14	83	\$8.76
3B: Three-Lane Roadway	24	25	17	15	81	\$8.44

The following observations are made on the comparative assessment of the alternatives:

- The reduction in travel lanes does not cause an increase in traffic delays or a worsening of operations, so the scores for Traffic Operations issues are not significantly diminished for the alternatives that include a three-lane roadway section on Ben Wilson Street.
- The Pedestrian Mobility and Safety scores are greatly enhanced by the provision of the grade separated pedestrian underpass in Alternatives 2A and 2B. However, the increase in evaluation score on that criteria are offset by the costs of the constructing the roadway bridge, which makes the overall project less scalable for incremental implementation, requiring a large capital investment at one time.
- The road diet Alternatives 3A and 3B, using HAWK signals to cross a two lane divided roadway at UH-V, scored higher than 2A and 2B, which provided a grade separated pedestrian crossing, due to the comparative weighting between costs and aesthetics versus the other criteria.

## 4.0 RECOMMENDATIONS

The following are the preferred alternatives, recommendations and options for implementation of the improvements.

### 4.1 PREFERRED ALTERNATIVES

Alternatives 3A and 3B attained the highest score, well above the rest. Both reduced Ben Wilson Street to three lanes north of Red River Street, with 3A retaining five lanes south of Red River Street and 3B extending the 3 lane section all the way to Business 59. The findings of the study were reviewed with representatives of UH-V and Citizens Hospital, with the following responses:

- The UH-V representatives favor Alternative 3B as it extends the feel of the campus environment to begin at a gateway entry off of Business 59. The extended three-lane roadway section would set up a traffic calming effect right at the transition from major arterial to minor arterial and encourage slower traffic approaching the Ben Wilson corridor. The extended three-lane section would also extend the campus environment to encompass the medical complex with enhanced landscaping and pedestrian amenities. However, operations within the Ben Wilson Street @ BUS 59 intersection would be affected and the potential for accommodating significant development between BUS 59 and Red River Street on Ben Wilson Street could be constrained.
- The Citizen's Medical Center representatives were generally in favor of the reduction of Ben Wilson Street to a three-lane section north of Red River Street, though they wanted to make sure that the pavement width at any point along that section would allow a car to pull over and an ambulance to pass by the pulled over traffic. They were concerned with the three-lane section in Alternative 3B south of Red River Street and its ability to accommodate the traffic access and circulation needs for the potential future increased development intensity of the area between Hospital Drive and Ben Wilson Street. Many of the parcels in that area are owned by Citizen's Medical Center and, though they have no immediate plans, they would not want future growth potential to be inhibited by a lack of street capacity. They prefer Alternative 3A.

The recommendations of this study are to implement Alternative 3A, the road diet north of Red River Street to Airline Road, retaining five lanes south of Red River Street, as represented in **Figure 16**.

## 4.2 RECOMMENDED IMPROVEMENTS

- A. **Intersection Modification at Airline Road** – As described in Section 3.3 of this report, this intersection will be the point of transition back to the terminus of Ben Wilson Street at the Sam Houston Drive intersection. The following modifications are proposed for this intersection, as represented in **Figure 17**.

North Side of the Intersection – Since its traffic use is minimal, the left turn lane on southbound Ben Wilson Street onto eastbound Airline Road would be converted to create a raised island for a pedestrian crossing refuge and roadway enhancement.

East Side of the Intersection - About half of the westbound Airline Road traffic at the Ben Wilson Street approach turned left, in both the AM and PM peak periods. The leftmost westbound lane travel lane on Airline Road, after crossing Sam Houston Drive, would become a dedicated left turn lane at Ben Wilson Street with the right most lane for through and right turn movements.

South Side of the Intersection – The five lanes would be converted to four lanes, one southbound and three northbound – one lane for each of the three movements.

West Side of the Intersection – For now, the west side of the intersection can remain as currently configured. However, the conversions being made on the east side of the intersection would transition well into a potential future three-lane roadway section west of Ben Wilson Street, resulting in a dedicated left turn lane for eastbound Airline Road at Ben Wilson Street, which may serve to reduce the crashes at the intersection. The narrower roadway width would also allow more room for the pedestrian landing at the corners. This shifting of the eastbound lanes could greatly benefit the line of sight at the Ben Wilson/Airline intersection, which may contribute to a reduction in crashes at the intersection.

- B. **HAWK Signals at UH-V Campus** – Two pedestrian activated hybrid beacon (HAWK) signals are recommended to facilitate student crossing of Ben Wilson Street between the two sides of the UH-V campus, with locations as shown in **Figure 18**.

HAWK Signal #1- The first UH-V building to be built on the east side of Ben Wilson Street will be a 300-bed student housing dorm across the street from the existing soccer field. A temporary surface parking lot to the south side of the new dorm, with an entry drive across from the existing east-west roadway through the UH-V/Victoria College campus. A HAWK signal would be provided at the new median opening for the east-west roadway and driveway.

HAWK Signal #2 – Subsequent UH-V buildings on the east side of Ben Wilson Street are planned to include two more student housing dorms and a student center. The student center will be located directly across from the existing main entry drive to the UH-V administration building, and will be the location for a second HAWK signal on Ben Wilson Street.

- C. **Intersection Modification at Red River Street** - This intersection will be the point of transition back to the five-lane Ben Wilson Street south of Red River Street to US 59 Business. The following modifications are proposed for this intersection, as represented in **Figure 19**.

North Side of the Intersection – A 100-foot left turn bay plus taper will be cut into the 20-foot median. In addition to the one southbound through lane, a right turn lane will be provided to the southbound approach, facilitating the current relatively heavy right turn volume and emergency access to Citizens Hospital. One lane will proceed northbound.

East Side of the Intersection – Red River Street would be re-striped as a three lane roadway with bike lanes on each side, from Sam Houston Drive to Ben Wilson Road.

South Side of the Intersection – The rightmost northbound lane will become a right turn only lane at the intersection. One lane will extend southbound at the intersection, transitioning to the two southbound lanes 100 feet south of the intersection.

West Side of the Intersection Red River Street would be re-striped as a three lane roadway with bike lanes on each side, from Ben Wilson Street to Ben Jordan Street. Further study on this re-striping of Red River Street should be conducted to clarify the treatment at the Ben Jordan Street intersection.

- D. **Typical Cross Sections along Ben Wilson Street** – The approved roadway reconfiguration for Ben Wilson Street would eliminate one travel lane in each direction between Red River Street and Airline Road. The Ben Wilson Street corridor will have three distinct typical cross sections plus various transitional sections.

Airline Road to Northern Edge of UH-V Campus – As illustrated in **Figure 20**, Ben Wilson Street south of Airline Road would provide one 11-foot travel lane in each direction plus a center median. Due to the numerous driveway openings along the east side of the street, the center median would be striped as a continuous left turn lane. A designated northbound left turn lane would be striped at College Drive. Future discussions with the property owners along the east side of Ben Wilson Street could result in identifying locations for potential raised medians to enhance the safety and appearance of this section of roadway. A 10-foot wide multi-use sidepath would be provided each side of Ben Wilson Street with landscaped buffers between the sidepaths and the travel lanes. Street lighting would be added for the safety of all roadway users.

UH-V Campus to Red River Street – As illustrated in **Figure 21**, Ben Wilson Street south of Airline Road would provide one 16-foot travel lane in each direction plus a raised center median. The 20-foot wide median would be landscaped, but would provide for good pedestrian visibility at the designated pedestrian crossings. A median opening with left turn lanes will be provided at the east-west roadway through the UH-V/Victoria college campus. HAWK pedestrian signals will be provided at the crossing near the east-west roadway and ultimately at the new Student Center. A 10-foot wide multi-use sidepath would be provided

each side of Ben Wilson Street with landscaped buffers between the sidepaths and the travel lanes. Street lighting would be added for the safety of all roadway users.

Red River Street to US 59 Business - As illustrated in **Figure 22**, Ben Wilson Street south of Red River Street would retain its five lane cross section. However, the curblines would be re-configured to provide two 11-foot travel lanes in each direction plus a center median. Due to the numerous driveway openings along both sides of the street, the center median would be striped as a continuous left turn lane. A designated northbound left turn lane would be striped at Continental Street. Future discussions with the property owners along both sides of Ben Wilson Street could result in identifying locations for potential raised medians to enhance the safety and appearance of this section of roadway. A 5-foot wide sidewalk would be provided each side of Ben Wilson Street with landscaped buffers between the sidewalks and the travel lanes. Future collaborations with the adjacent land owners should consider sidewalk easements to allow the extension of the 10-foot wide sidepaths southward from Red River Street. Street lighting would be added for the safety of all roadway users.

### 4.3 OPTIONS FOR DESIGN WITH COST IMPLICATIONS

There are two options for design of the pavement for this improvement as shown in detail in **Appendix C**:

1. Alternative 3A, Option 1: Complete reconstruction, as initially assumed, at an estimated cost of \$8.76 million, which includes full depth reconstruction of the remaining pavement area and installation of additional underground storm drainage improvements; OR
2. Alternative 3A, Option 2: Reconstruction of the outer edges and median areas (cut pavement to size, new curb lines, new sidewalks) and, rather than full depth reconstruction of the remaining pavement area, a mill and overlay of the remaining existing pavement, which would reduce the cost of the project to an estimated cost of \$5.92 million. However, since the existing concrete pavement will not be removed, this option does not install the additional underground storm drainage improvements that were included in Option 1.

The landscaping in the median adjacent to UH-V was considered to consist of more than just grass and the cost estimate included trees and other more intense landscaping. UH-V may desire a greater intensity of landscaping and streetscape features, which can be incorporated during future project development discussions between UH-V and the City of Victoria.

### 4.4 OTHER PROJECT AND CORRIDOR CONSIDERATIONS

The process of analysis and the results of this study indicate the need to further evaluation the following:

- The potential to reduce Red River Street to a three-lane section for its entire length between Sam Houston Drive and N. Main Street.
- The potential to reduce travel lanes on Airline Road west of Ben Wilson Street to provide one travel lane in each direction plus auxiliary lanes.



**FIGURE 16A**

**BEN WILSON RECOMMENDED CONFIGURATION**

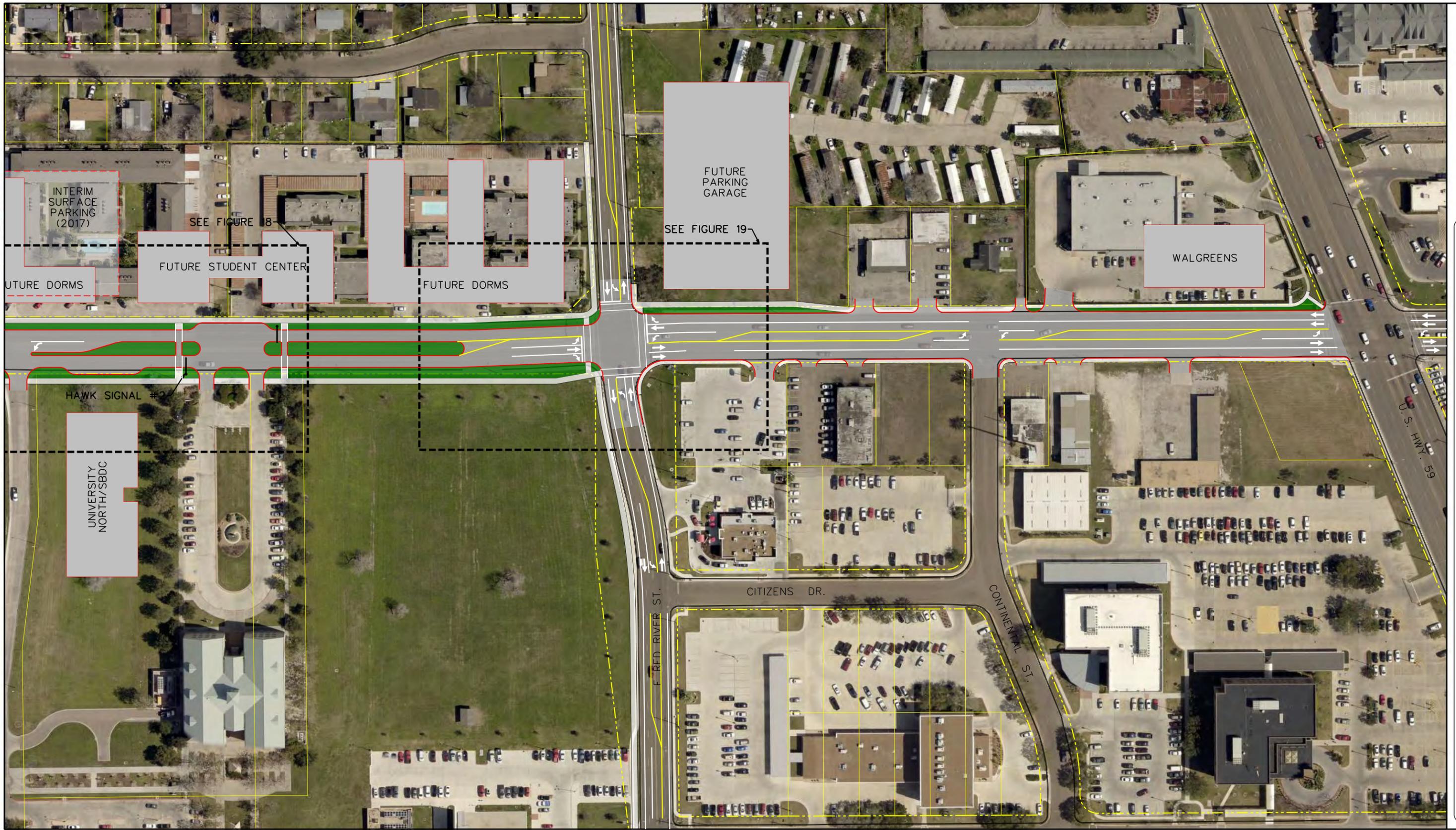


FIGURE 16B

BEN WILSON RECOMMENDED CONFIGURATION

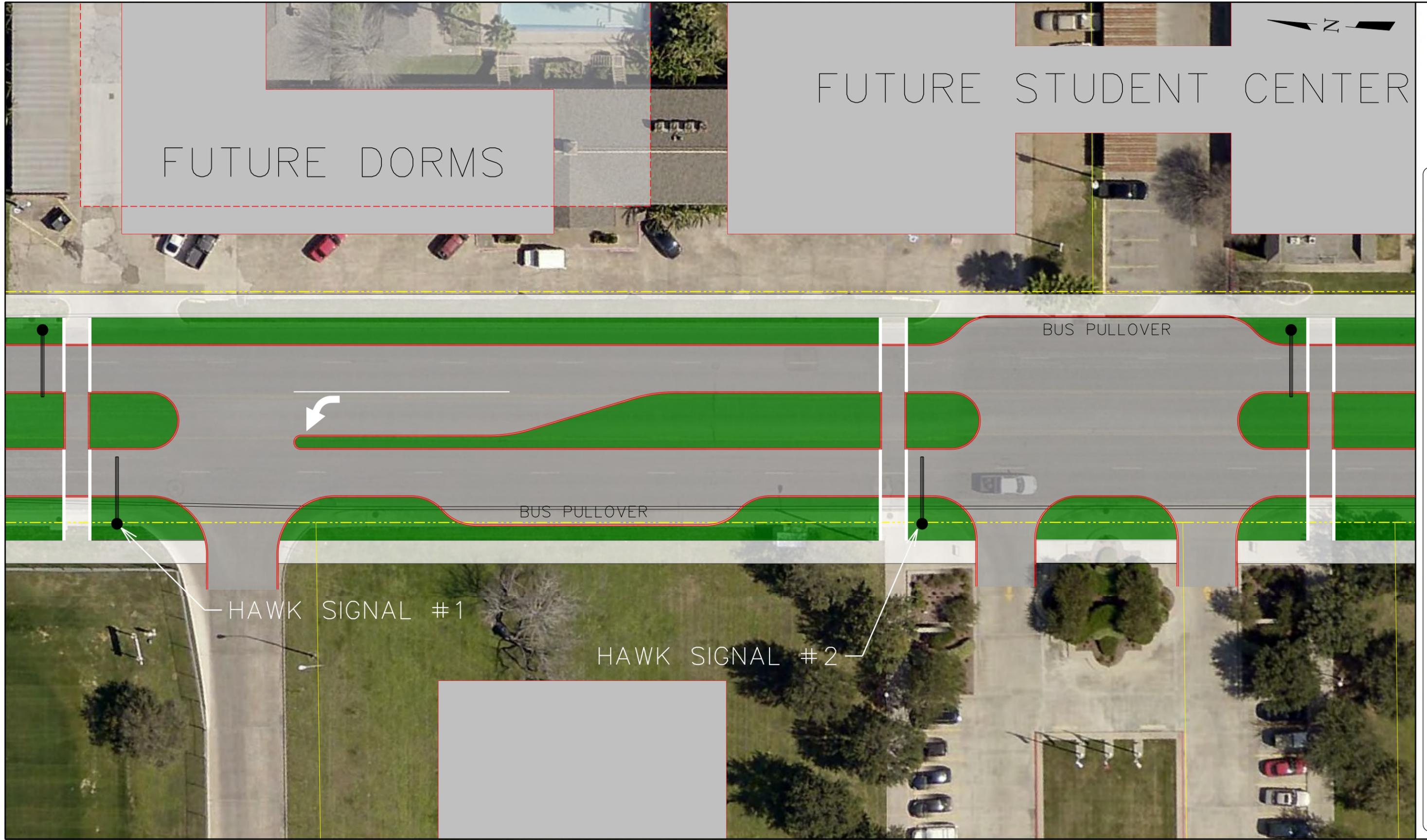


BEN WILSON ST.

AIRLINE RD

AIRLINE RD

INTERSECTION CONFIGURATION AT AIRLINE RD **FIGURE 17**



HAWK SIGNAL AT UH-V CAMPUS

FIGURE 18



INTERSECTION CONFIGURATION AT RED RIVER ST **FIGURE 19**



Figure 20. Typical Section, Airline Road to UH-V Campus

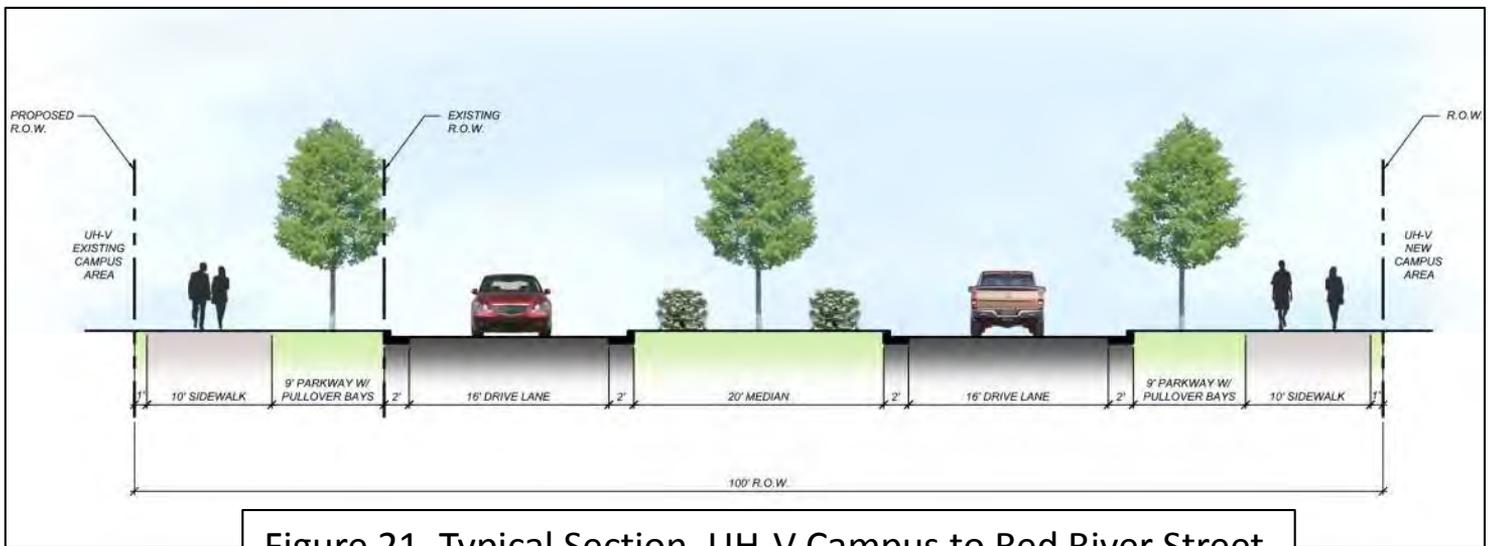


Figure 21. Typical Section, UH-V Campus to Red River Street

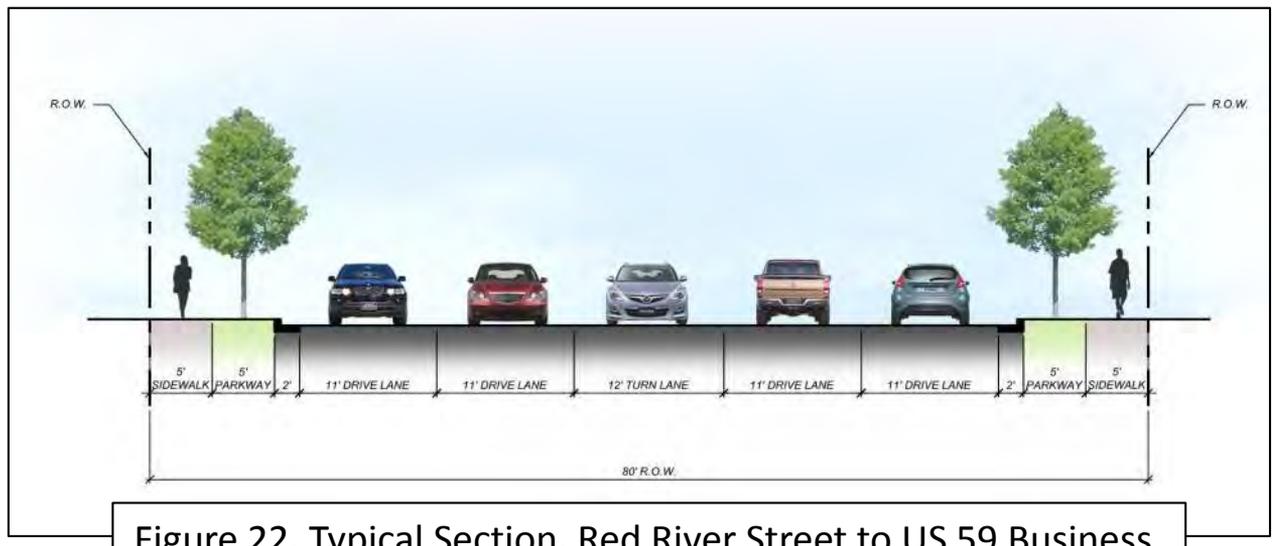


Figure 22. Typical Section, Red River Street to US 59 Business

**Appendix A**  
**Traffic Count Data**

**Study Name** Airline Rd at Ben Wilson St  
**Start Date** Thursday, August 27, 2015 7:00 AM  
**End Date** Thursday, August 27, 2015 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound						Westbound						Northbound						Eastbound						Crosswalk			
		L	T	R	U	I	O	L	T	R	U	I	O	L	T	R	U	I	O	L	T	R	U	I	O	Total	destria	Total	
<b>Peak 1</b>	cles (no classii	3	476	44	0	523	356	260	274	9	0	543	175	41	301	48	0	390	782	46	124	46	0	216	359	1672	N	0	0
Specified Period	%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%		0%	
7:00 AM - 9:00 AM	<b>Total</b>	<b>3</b>	<b>476</b>	<b>44</b>	<b>0</b>	<b>523</b>	<b>356</b>	<b>260</b>	<b>274</b>	<b>9</b>	<b>0</b>	<b>543</b>	<b>175</b>	<b>41</b>	<b>301</b>	<b>48</b>	<b>0</b>	<b>390</b>	<b>782</b>	<b>46</b>	<b>124</b>	<b>46</b>	<b>0</b>	<b>216</b>	<b>359</b>	<b>1672</b>	E	0	0
One Hour Peak	PHF	0.75	0.72	0.85	0	0.73	0.86	0.81	0.82	0.45	0	0.8	0.71	0.57	0.89	0.71	0	0.81	0.74	0.82	0.7	0.61	0	0.7	0.78	0.77		0%	
7:15 AM - 8:15 AM	Approach %					31%	21%					32%	10%					23%	47%					13%	21%		S	0	0
																											W	1	1
																												100%	
																												1	1
<b>Peak 2</b>	cles (no classii	3	276	32	0	311	463	91	213	16	0	320	430	63	397	181	0	641	428	50	246	61	0	357	308	1629	N	2	2
Specified Period	%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%		100%	
4:00 PM - 6:00 PM	<b>Total</b>	<b>3</b>	<b>276</b>	<b>32</b>	<b>0</b>	<b>311</b>	<b>463</b>	<b>91</b>	<b>213</b>	<b>16</b>	<b>0</b>	<b>320</b>	<b>430</b>	<b>63</b>	<b>397</b>	<b>181</b>	<b>0</b>	<b>641</b>	<b>428</b>	<b>50</b>	<b>246</b>	<b>61</b>	<b>0</b>	<b>357</b>	<b>308</b>	<b>1629</b>	E	0	0
One Hour Peak	PHF	0.75	0.87	0.73	0	0.88	0.84	0.67	0.72	0.8	0	0.85	0.71	0.79	0.79	0.68	0	0.76	0.85	0.69	0.74	0.9	0	0.83	0.74	0.82		0%	
4:30 PM - 5:30 PM	Approach %					19%	28%					20%	26%					39%	26%					22%	19%		S	1	1
																											W	2	2
																												100%	
																												5	5





**Study Name** Ben Wilson St at Sam Houston Dr  
**Start Date** Thursday, August 27, 2015 7:00 AM  
**End Date** Thursday, August 27, 2015 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound				Westbound				Northbound				Eastbound				Total	Crosswalk											
		L	T	R	U	I	O	L	T	R	U	I	O	L	T	R	U		I	O	destria	Total								
<b>Peak 1</b>	cles (no classii	0	8	1	0	9	23	1	408	2	0	411	381	339	18	7	0	364	518	3	374	509	0	886	748	1670	N	0	0	
Specified Period	%	0%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%		0%		
7:00 AM - 9:00 AM	<b>Total</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>9</b>	<b>23</b>	<b>1</b>	<b>408</b>	<b>2</b>	<b>0</b>	<b>411</b>	<b>381</b>	<b>339</b>	<b>18</b>	<b>7</b>	<b>0</b>	<b>364</b>	<b>518</b>	<b>3</b>	<b>374</b>	<b>509</b>	<b>0</b>	<b>886</b>	<b>748</b>	<b>1670</b>	E	0	0	
One Hour Peak	PHF	0	0.67	0.25	0	0.56	0.82	0.25	0.78	0.25	0	0.77	0.67	0.88	0.64	0.58	0	0.87	0.78	0.25	0.67	0.78	0	0.73	0.83	0.79		0%		
7:15 AM - 8:15 AM	Approach %					1%	1%					25%	23%					22%	31%					53%	45%		S	2	2	
																											W	1	1	
																												100%	3	3
<b>Peak 2</b>	cles (no classii	5	16	24	0	45	24	2	451	2	0	455	455	445	7	4	0	456	316	15	446	298	0	759	920	1715	N	8	8	
Specified Period	%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%		100%	
4:00 PM - 6:00 PM	<b>Total</b>	<b>5</b>	<b>16</b>	<b>24</b>	<b>0</b>	<b>45</b>	<b>24</b>	<b>2</b>	<b>451</b>	<b>2</b>	<b>0</b>	<b>455</b>	<b>455</b>	<b>445</b>	<b>7</b>	<b>4</b>	<b>0</b>	<b>456</b>	<b>316</b>	<b>15</b>	<b>446</b>	<b>298</b>	<b>0</b>	<b>759</b>	<b>920</b>	<b>1715</b>	E	2	2	
One Hour Peak	PHF	0.62	0.67	0.46	0	0.54	0.67	0.25	0.74	0.5	0	0.73	0.81	0.79	0.58	0.5	0	0.79	0.89	0.54	0.81	0.86	0	0.87	0.75	0.87		100%		
4:15 PM - 5:15 PM	Approach %					3%	1%					27%	27%					27%	18%					44%	54%		S	0	0	
																											W	6	6	
																												100%	16	16

**Study Name** Hospital Dr at E Red River St  
**Start Date** Thursday, August 27, 2015 7:00 AM  
**End Date** Thursday, August 27, 2015 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound				Westbound				Northbound				Eastbound				Total	Crosswalk											
		L	T	R	U	I	O	L	T	R	U	I	O	L	T	R	U		I	O	destria	Total								
<b>Peak 1</b>	cles (no classii	1	1	13	0	15	86	29	423	59	0	511	179	17	3	14	0	34	79	24	164	49	0	237	453	797	N	2	2	
Specified Period	%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%		100%		
7:00 AM - 9:00 AM	<b>Total</b>	<b>1</b>	<b>1</b>	<b>13</b>	<b>0</b>	<b>15</b>	<b>86</b>	<b>29</b>	<b>423</b>	<b>59</b>	<b>0</b>	<b>511</b>	<b>179</b>	<b>17</b>	<b>3</b>	<b>14</b>	<b>0</b>	<b>34</b>	<b>79</b>	<b>24</b>	<b>164</b>	<b>49</b>	<b>0</b>	<b>237</b>	<b>453</b>	<b>797</b>	E	2	2	
One Hour Peak	PHF	0.25	0.25	0.54	0	0.54	0.55	0.72	0.75	0.53	0	0.78	0.83	0.53	0.38	0.7	0	0.77	0.66	0.67	0.84	0.61	0	0.87	0.74	0.82		100%		
7:15 AM - 8:15 AM	Approach %					2%	11%					64%	22%					4%	10%					30%	57%		S	0	0	
																											W	2	2	
																												100%	6	6
<b>Peak 2</b>	cles (no classii	18	0	5	0	23	43	16	280	31	0	327	384	36	0	38	0	74	44	12	328	28	0	368	321	792	N	1	1	
Specified Period	%	100%	0%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	0%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%		100%		
4:00 PM - 6:00 PM	<b>Total</b>	<b>18</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>23</b>	<b>43</b>	<b>16</b>	<b>280</b>	<b>31</b>	<b>0</b>	<b>327</b>	<b>384</b>	<b>36</b>	<b>0</b>	<b>38</b>	<b>0</b>	<b>74</b>	<b>44</b>	<b>12</b>	<b>328</b>	<b>28</b>	<b>0</b>	<b>368</b>	<b>321</b>	<b>792</b>	E	1	1	
One Hour Peak	PHF	0.56	0	0.42	0	0.57	0.83	0.67	0.89	0.78	0	0.89	0.9	0.64	0	0.79	0	0.77	0.73	0.75	0.88	0.7	0	0.87	0.84	0.86		100%		
4:30 PM - 5:30 PM	Approach %					3%	5%					41%	48%					9%	6%					46%	41%		S	1	1	
																											W	0	0	
																												100%	3	3



**Study Name** N Ben Wilson St at US 59 Bus.  
**Start Date** Thursday, August 27, 2015 7:00 AM  
**End Date** Thursday, August 27, 2015 6:00 PM  
**Site Code**

## Report Summary

Time Period	Class.	Southbound				Westbound				Northbound				Eastbound				Total	Crosswalk										
		L	T	R	U	I	O	L	T	R	U	I	O	L	T	R	U		I	O	destria	Total							
<b>Peak 1</b>	cles (no classii	41	253	118	0	412	642	89	612	110	0	811	539	137	407	89	0	633	427	125	409	85	0	619	867	2475	N	0	0
Specified Period	%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%		0%	
7:00 AM - 9:00 AM	<b>Total</b>	<b>41</b>	<b>253</b>	<b>118</b>	<b>0</b>	<b>412</b>	<b>642</b>	<b>89</b>	<b>612</b>	<b>110</b>	<b>0</b>	<b>811</b>	<b>539</b>	<b>137</b>	<b>407</b>	<b>89</b>	<b>0</b>	<b>633</b>	<b>427</b>	<b>125</b>	<b>409</b>	<b>85</b>	<b>0</b>	<b>619</b>	<b>867</b>	<b>2475</b>	E	2	2
One Hour Peak	PHF	0.93	0.79	0.78	0	0.94	0.81	0.93	0.81	0.72	0	0.85	0.86	0.82	0.72	0.77	0	0.8	0.8	0.69	0.84	0.69	0	0.81	0.84	0.93		100%	
7:15 AM - 8:15 AM	Approach %					17%	26%					33%	22%					26%	17%					25%	35%		S	0	0
																											W	2	2
																												100%	
																												<b>4</b>	<b>4</b>
<b>Peak 2</b>	cles (no classii	121	283	151	0	555	534	121	598	69	0	788	942	133	305	122	0	560	556	160	699	152	0	1011	882	2914	N	1	1
Specified Period	%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%		100%	
4:00 PM - 6:00 PM	<b>Total</b>	<b>121</b>	<b>283</b>	<b>151</b>	<b>0</b>	<b>555</b>	<b>534</b>	<b>121</b>	<b>598</b>	<b>69</b>	<b>0</b>	<b>788</b>	<b>942</b>	<b>133</b>	<b>305</b>	<b>122</b>	<b>0</b>	<b>560</b>	<b>556</b>	<b>160</b>	<b>699</b>	<b>152</b>	<b>0</b>	<b>1011</b>	<b>882</b>	<b>2914</b>	E	3	3
One Hour Peak	PHF	0.6	0.92	0.8	0	0.82	0.93	0.86	0.9	0.75	0	0.89	0.83	0.85	0.88	0.76	0	0.92	0.95	0.91	0.79	0.95	0	0.83	0.91	0.89		100%	
5:00 PM - 6:00 PM	Approach %					19%	18%					27%	32%					19%	19%					35%	30%		S	3	3
																											W	0	0
																												0%	
																												<b>7</b>	<b>7</b>

**Appendix B**  
**Synchro Model Run Output for Existing and Minimal Roadway Configurations**

Lanes, Volumes, Timings

3:

3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	339	0	7	0	8	1	0	377	509	1	408	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Fr <sub>t</sub>		0.991			0.962			0.919				0.998
Fl <sub>t</sub> Protected	0.950	0.955								0.950		
Satd. Flow (prot)	1681	1675	0	1863	1792	0	1863	3253	0	1770	3532	0
Fl <sub>t</sub> Permitted	0.950	0.955								0.118		
Satd. Flow (perm)	1681	1675	0	1863	1792	0	1863	3253	0	220	3532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		68			4			456				2
Link Speed (mph)		30			30			30				30
Link Distance (ft)		527			136			347				693
Travel Time (s)		12.0			3.1			7.9				15.8
Peak Hour Factor	0.88	0.92	0.58	0.92	0.67	0.25	0.92	0.67	0.78	0.25	0.78	0.25
Adj. Flow (vph)	385	0	12	0	12	4	0	563	653	4	523	8
Shared Lane Traffic (%)	48%											
Lane Group Flow (vph)	200	197	0	0	16	0	0	1216	0	4	531	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	2	2		6	6			4				8
Permitted Phases							4			8		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	22.0	22.0		20.0	20.0		38.0	38.0		38.0	38.0	
Total Split (%)	27.5%	27.5%		25.0%	25.0%		47.5%	47.5%		47.5%	47.5%	
Maximum Green (s)	18.0	18.0		16.0	16.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	18.0	18.0			16.0			34.0		34.0	34.0	
Actuated g/C Ratio	0.22	0.22			0.20			0.42		0.42	0.42	
v/c Ratio	0.53	0.46			0.04			0.74		0.04	0.35	
Control Delay	27.0	15.9			22.6			14.8		6.0	6.2	

Lanes, Volumes, Timings

3:

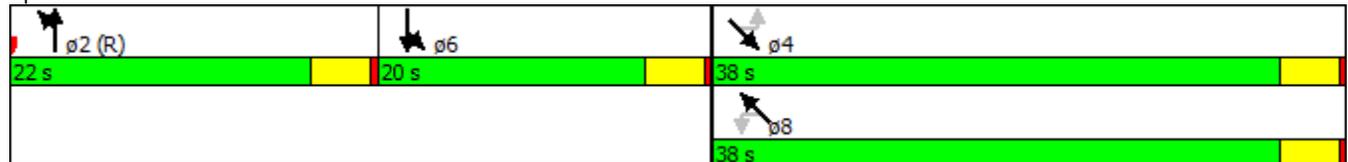
3/28/2016

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay	0.0	0.0			0.0			0.0		0.0	0.0	
Total Delay	27.0	15.9			22.6			14.8		6.0	6.2	
LOS	C	B			C			B		A	A	
Approach Delay		21.5			22.6			14.8				6.2
Approach LOS		C			C			B				A
Queue Length 50th (ft)	96	62			5			161		0	33	
Queue Length 95th (ft)	162	128			15			120		1	33	
Internal Link Dist (ft)		447			56			267				613
Turn Bay Length (ft)										100		
Base Capacity (vph)	378	429			361			1644		93	1502	
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	0.53	0.46			0.04			0.74		0.04	0.35	

Intersection Summary

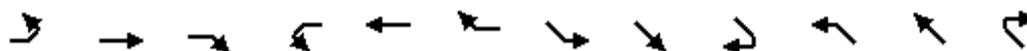
Area Type:	Other
Cycle Length:	80
Actuated Cycle Length:	80
Offset:	19 (24%), Referenced to phase 2:NBTL, Start of Green
Natural Cycle:	60
Control Type:	Pretimed
Maximum v/c Ratio:	0.74
Intersection Signal Delay:	14.0
Intersection LOS:	B
Intersection Capacity Utilization	49.7%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 3:



Lanes, Volumes, Timings  
5: Sam Houston Dr

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	129	46	85	458	64	68	306	9	96	346	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.962			0.981			0.993				0.978
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1863	3405	0	1770	3472	0	1770	3514	0	1770	3461	0
Flt Permitted				0.411			0.430			0.252		
Satd. Flow (perm)	1863	3405	0	766	3472	0	801	3514	0	469	3461	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		53			22			6				26
Link Speed (mph)		30			30			30				30
Link Distance (ft)		470			905			693				1061
Travel Time (s)		10.7			20.6			15.8				24.1
Peak Hour Factor	0.92	0.61	0.64	0.57	0.82	0.80	0.59	0.73	0.45	0.73	0.69	0.78
Adj. Flow (vph)	0	211	72	149	559	80	115	419	20	132	501	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	283	0	149	639	0	115	439	0	132	589	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA										
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Minimum Split (s)	8.0	20.0		20.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	8.0	20.0		20.0	32.0		10.0	27.0		13.0	30.0	
Total Split (%)	10.0%	25.0%		25.0%	40.0%		12.5%	33.8%		16.3%	37.5%	
Maximum Green (s)	4.0	16.0		16.0	28.0		6.0	23.0		9.0	26.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes										
Walk Time (s)		5.0		5.0	5.0			5.0			5.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0		0	0			0			0	
Act Effct Green (s)		16.0		36.0	28.0		23.0	23.0		26.0	26.0	
Actuated g/C Ratio		0.20		0.45	0.35		0.29	0.29		0.32	0.32	
v/c Ratio		0.39		0.27	0.52		0.38	0.43		0.44	0.52	
Control Delay		10.5		14.7	21.7		19.1	16.1		24.9	22.8	

Lanes, Volumes, Timings

5: Sam Houston Dr

3/28/2016

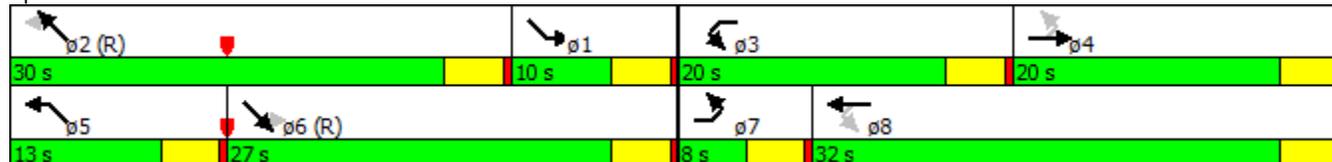


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		10.5		14.7	21.7		19.1	16.1		24.9	22.8	
LOS		B		B	C		B	B		C	C	
Approach Delay		10.5			20.4			16.7			23.2	
Approach LOS		B			C			B			C	
Queue Length 50th (ft)		22		43	126		23	45		48	118	
Queue Length 95th (ft)		21		47	156		32	60		71	118	
Internal Link Dist (ft)		390			825			613			981	
Turn Bay Length (ft)				100			100			100		
Base Capacity (vph)		723		545	1229		302	1014		298	1142	
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		0.39		0.27	0.52		0.38	0.43		0.44	0.52	

Intersection Summary

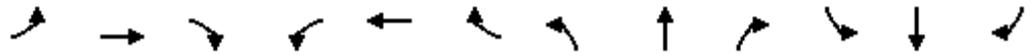
Area Type:	Other
Cycle Length:	80
Actuated Cycle Length:	80
Offset:	75 (94%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle:	70
Control Type:	Pretimed
Maximum v/c Ratio:	0.52
Intersection Signal Delay:	19.2
Intersection LOS:	B
Intersection Capacity Utilization	46.9%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: Sam Houston Dr



Lanes, Volumes, Timings  
6: Airline Rd

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↖	↕↕		↖	↕↕			↕↕	
Volume (vph)	46	124	46	260	274	9	41	301	48	3	476	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	100		0	100		0	100		0
Storage Lanes	0		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	0.95
Frt		0.963			0.992			0.975			0.989	
Flt Protected		0.991		0.950			0.950					
Satd. Flow (prot)	0	3378	0	1770	3511	0	1770	3451	0	0	3500	0
Flt Permitted		0.824		0.499			0.207				0.953	
Satd. Flow (perm)	0	2808	0	930	3511	0	386	3451	0	0	3336	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			10			38				11
Link Speed (mph)		30			30			30				30
Link Distance (ft)		769			470			1792				527
Travel Time (s)		17.5			10.7			40.7				12.0
Peak Hour Factor	0.82	0.70	0.61	0.81	0.82	0.45	0.57	0.89	0.71	0.75	0.72	0.85
Adj. Flow (vph)	56	177	75	321	334	20	72	338	68	4	661	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	308	0	321	354	0	72	406	0	0	717	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		8.0	20.0		8.0	20.0		20.0	20.0	
Total Split (s)	20.0	20.0		20.0	40.0		9.0	40.0		31.0	31.0	
Total Split (%)	25.0%	25.0%		25.0%	50.0%		11.3%	50.0%		38.8%	38.8%	
Maximum Green (s)	16.0	16.0		16.0	36.0		5.0	36.0		27.0	27.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)		4.0		4.0	4.0		4.0	4.0			4.0	
Lead/Lag	Lead	Lead		Lag			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Walk Time (s)	5.0	5.0			5.0			5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0			11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0			0		0	0	
Act Effct Green (s)		16.0		36.0	36.0		36.0	36.0			27.0	
Actuated g/C Ratio		0.20		0.45	0.45		0.45	0.45			0.34	
v/c Ratio		0.51		0.55	0.22		0.28	0.26			0.63	
Control Delay		27.4		13.1	7.7		15.5	12.8			13.6	

Lanes, Volumes, Timings

6: Airline Rd

3/28/2016

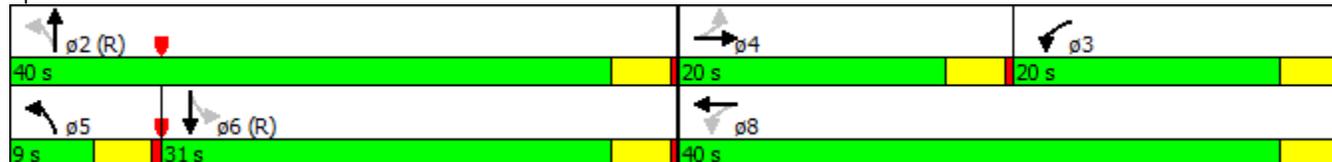


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay		27.4		13.1	7.7		15.5	12.8			13.6	
LOS		C		B	A		B	B			B	
Approach Delay		27.4			10.3			13.2			13.6	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)		61		44	23		20	57			125	
Queue Length 95th (ft)		72		56	30		27	85			88	
Internal Link Dist (ft)		689			390			1712			447	
Turn Bay Length (ft)				100			100					
Base Capacity (vph)		600		586	1585		260	1573			1133	
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		0.55	0.22		0.28	0.26			0.63	

Intersection Summary

Area Type:	Other
Cycle Length:	80
Actuated Cycle Length:	80
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	60
Control Type:	Pretimed
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	14.4
Intersection LOS:	B
Intersection Capacity Utilization	58.5%
ICU Level of Service	B
Analysis Period (min)	15

Splits and Phases: 6: Airline Rd



Lanes, Volumes, Timings  
9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕		↕	↕↕		↕	↕↕	
Volume (vph)	55	56	42	30	135	41	168	413	31	8	427	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.958			0.964			0.989			0.943	
Flt Protected		0.986			0.995		0.950			0.950		
Satd. Flow (prot)	0	3343	0	0	3395	0	1770	3500	0	1770	3337	0
Flt Permitted		0.805			0.907		0.200			0.438		
Satd. Flow (perm)	0	2729	0	0	3095	0	373	3500	0	816	3337	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		64			80			23			278	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		960			976			520			863	
Travel Time (s)		21.8			22.2			11.8			19.6	
Peak Hour Factor	0.86	0.56	0.66	0.83	0.62	0.51	0.69	0.78	0.78	0.33	0.76	0.63
Adj. Flow (vph)	64	100	64	36	218	80	243	529	40	24	562	346
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	228	0	0	334	0	243	569	0	24	908	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		8.0	20.0		20.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		10.0	30.0		20.0	20.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		20.0%	60.0%		40.0%	40.0%	
Maximum Green (s)	16.0	16.0		16.0	16.0		6.0	26.0		16.0	16.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		16.0			16.0		26.0	26.0		16.0	16.0	
Actuated g/C Ratio		0.32			0.32		0.52	0.52		0.32	0.32	
v/c Ratio		0.25			0.32		0.67	0.31		0.09	0.72	
Control Delay		9.8			10.7		18.8	7.1		13.1	14.2	

Lanes, Volumes, Timings

9: Red River St

3/28/2016

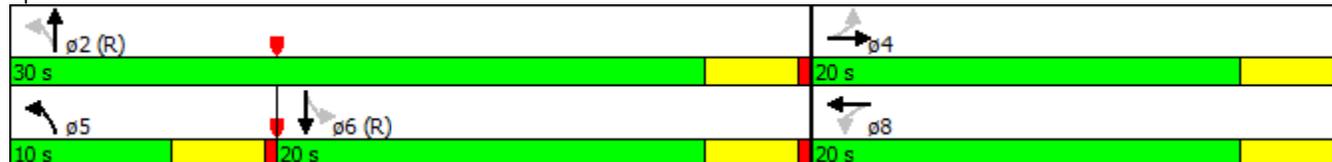


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		9.8			10.7		18.8	7.1		13.1	14.2	
LOS		A			B		B	A		B	B	
Approach Delay		9.8			10.7			10.6			14.1	
Approach LOS		A			B			B			B	
Queue Length 50th (ft)		17			28		35	42		5	80	
Queue Length 95th (ft)		20			32		49	55		6	98	
Internal Link Dist (ft)		880			896			440			783	
Turn Bay Length (ft)							100			100		
Base Capacity (vph)		916			1044		361	1831		261	1256	
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		0.25			0.32		0.67	0.31		0.09	0.72	

Intersection Summary

Area Type:	Other
Cycle Length:	50
Actuated Cycle Length:	50
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	50
Control Type:	Pretimed
Maximum v/c Ratio:	0.72
Intersection Signal Delay:	12.0
Intersection LOS:	B
Intersection Capacity Utilization	51.8%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 9: Red River St



Lanes, Volumes, Timings  
12: BUS 59

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕↕↗		↖	↕↕↗		↖	↕↗		↖	↕↗	
Volume (vph)	125	409	85	89	612	110	137	407	89	41	253	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.970			0.975			0.974			0.952	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4933	0	1770	4958	0	1770	3447	0	1770	3369	0
Flt Permitted	0.235			0.382			0.378			0.267		
Satd. Flow (perm)	438	4933	0	712	4958	0	704	3447	0	497	3369	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		103			70			41			130	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		674			1028			271			521	
Travel Time (s)		15.3			23.4			6.2			11.8	
Peak Hour Factor	0.69	0.84	0.69	0.93	0.81	0.72	0.82	0.72	0.77	0.93	0.79	0.78
Adj. Flow (vph)	181	487	123	96	756	153	167	565	116	44	320	151
Shared Lane Traffic (%)												
Lane Group Flow (vph)	181	610	0	96	909	0	167	681	0	44	471	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	10.0	21.0		9.0	20.0		9.0	22.0		8.0	21.0	
Total Split (%)	16.7%	35.0%		15.0%	33.3%		15.0%	36.7%		13.3%	35.0%	
Maximum Green (s)	6.0	17.0		5.0	16.0		5.0	18.0		4.0	17.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	23.0	17.0		21.0	16.0		23.0	18.0		21.0	17.0	
Actuated g/C Ratio	0.38	0.28		0.35	0.27		0.38	0.30		0.35	0.28	
v/c Ratio	0.60	0.41		0.28	0.66		0.47	0.64		0.17	0.45	
Control Delay	20.9	15.4		12.8	20.8		15.8	20.3		11.8	14.2	

Lanes, Volumes, Timings

12: BUS 59

3/28/2016

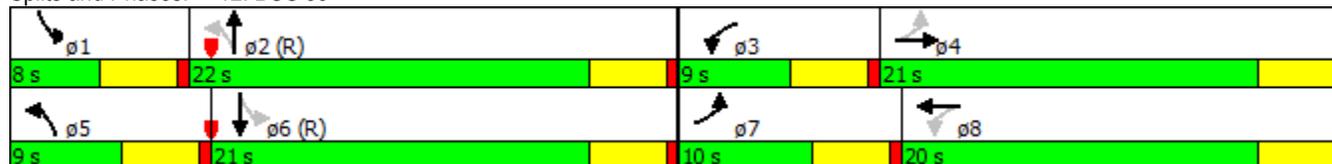


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.9	15.4		12.8	20.8		15.8	20.3		11.8	14.2	
LOS	C	B		B	C		B	C		B	B	
Approach Delay		16.6			20.0			19.4			14.0	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	39	53		20	98		36	103		9	51	
Queue Length 95th (ft)	55	73		44	118		63	113		24	72	
Internal Link Dist (ft)		594			948			191			441	
Turn Bay Length (ft)	100			100			100			100		
Base Capacity (vph)	301	1471		337	1373		358	1062		258	1047	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.60	0.41		0.28	0.66		0.47	0.64		0.17	0.45	

Intersection Summary

Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	60
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	60
Control Type:	Pretimed
Maximum v/c Ratio:	0.66
Intersection Signal Delay:	18.0
Intersection LOS:	B
Intersection Capacity Utilization	52.9%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 12: BUS 59



Lanes, Volumes, Timings  
15: VC & UH-V Driveway

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	8	20	177	366	620	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.904				0.976	
Flt Protected	0.986		0.950			
Satd. Flow (prot)	1660	0	1770	3539	3454	0
Flt Permitted	0.986		0.950			
Satd. Flow (perm)	1660	0	1770	3539	3454	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	573			863	1792	
Travel Time (s)	13.0			19.6	40.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	22	192	398	674	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	0	192	398	804	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	44.1%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings  
17: Continental

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	3	6	42	624	447	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.919				0.979	
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1678	0	1770	3539	3465	0
Flt Permitted	0.980		0.950			
Satd. Flow (perm)	1678	0	1770	3539	3465	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	302			521	520	
Travel Time (s)	6.9			11.8	11.8	
Peak Hour Factor	0.38	0.50	0.66	0.79	0.88	0.63
Adj. Flow (vph)	8	12	64	790	508	84
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	0	64	790	592	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	30.7%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings

3:

3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	339	18	7	0	8	1	0	374	509	1	408	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Fr <sub>t</sub>		0.992			0.961			0.919				
Fl <sub>t</sub> Protected	0.950	0.961								0.950		
Satd. Flow (prot)	1681	1687	0	1863	1790	0	1863	3253	0	1770	3539	0
Fl <sub>t</sub> Permitted	0.745	0.753								0.250		
Satd. Flow (perm)	1318	1322	0	1863	1790	0	1863	3253	0	466	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			5			324				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		510			116			347				670
Travel Time (s)		11.6			2.6			7.9				15.2
Peak Hour Factor	0.88	0.64	0.58	0.92	0.67	0.25	0.92	0.67	0.78	0.25	0.78	0.92
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	462	34	14	0	14	5	0	670	783	5	628	0
Shared Lane Traffic (%)	45%											
Lane Group Flow (vph)	254	256	0	0	19	0	0	1453	0	5	628	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		36			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		custom		NA
Protected Phases	5	2			6			4				8
Permitted Phases	2			6			4			3		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0		20.0
Total Split (s)	20.0	41.0		21.0	21.0		59.0	59.0		20.0		79.0
Total Split (%)	16.7%	34.2%		17.5%	17.5%		49.2%	49.2%		16.7%		65.8%
Maximum Green (s)	16.0	37.0		17.0	17.0		55.0	55.0		16.0		75.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5		3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5		0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0		4.0
Lead/Lag	Lag			Lead	Lead		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0		5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0		11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0		0
Act Effct Green (s)	37.0	37.0			17.0			55.0		16.0		75.0
Actuated g/C Ratio	0.31	0.31			0.14			0.46		0.13		0.62
v/c Ratio	0.56	0.56			0.07			0.87		0.08		0.28

Lanes, Volumes, Timings

3:

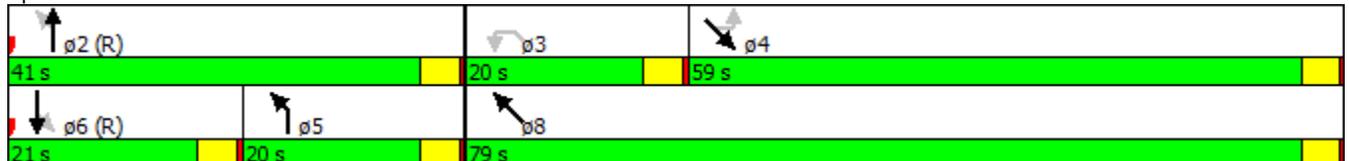
3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Control Delay	34.6	34.1			37.2			29.4		65.0	1.4	
Queue Delay	0.0	0.0			0.0			1.0		0.0	0.0	
Total Delay	34.6	34.1			37.2			30.4		65.0	1.4	
LOS	C	C			D			C		E	A	
Approach Delay		34.4			37.2			30.4				1.9
Approach LOS		C			D			C				A
Queue Length 50th (ft)	167	167			10			427		4	7	
Queue Length 95th (ft)	260	178			23			289		4	7	
Internal Link Dist (ft)		430			36			267			590	
Turn Bay Length (ft)										100		
Base Capacity (vph)	454	458			257			1666		62	2211	
Starvation Cap Reductn	0	0			0			0		0	0	
Spillback Cap Reductn	0	0			0			67		0	0	
Storage Cap Reductn	0	0			0			0		0	0	
Reduced v/c Ratio	0.56	0.56			0.07			0.91		0.08	0.28	

Intersection Summary

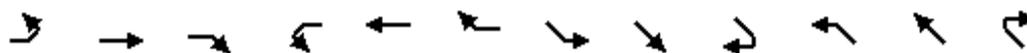
Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 50 (42%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 100  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 24.3  
 Intersection Capacity Utilization 57.5%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service B

Splits and Phases: 3:



Lanes, Volumes, Timings  
5: Sam Houston Dr & Airline Rd

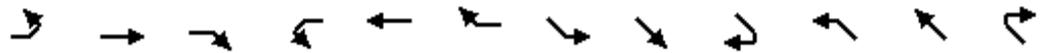
3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	129	46	85	458	64	68	306	9	96	346	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	75		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.964			0.972			0.996			0.974	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1863	3412	0	1770	3440	0	1770	3525	0	1770	3447	0
Flt Permitted				0.488			0.244			0.245		
Satd. Flow (perm)	1863	3412	0	909	3440	0	455	3525	0	456	3447	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33			26			3			20	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		444			684			670			1061	
Travel Time (s)		10.1			15.5			15.2			24.1	
Peak Hour Factor	0.73	0.69	0.78	0.59	0.73	0.45	0.25	0.61	0.64	0.57	0.82	0.80
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	0	224	71	173	753	171	326	602	17	202	506	104
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	295	0	173	924	0	326	619	0	202	610	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Minimum Split (s)	20.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	32.0	32.0		17.0	49.0		35.0	46.0		25.0	36.0	
Total Split (%)	26.7%	26.7%		14.2%	40.8%		29.2%	38.3%		20.8%	30.0%	
Maximum Green (s)	28.0	28.0		13.0	45.0		31.0	42.0		21.0	32.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lead		Lag			Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes	
Walk Time (s)	5.0	5.0			5.0			5.0			5.0	
Flash Dont Walk (s)	11.0	11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0			0			0			0	
Act Effct Green (s)		28.0		45.0	45.0		67.0	42.0		53.0	32.0	
Actuated g/C Ratio		0.23		0.38	0.38		0.56	0.35		0.44	0.27	
v/c Ratio		0.36		0.40	0.71		0.55	0.50		0.47	0.65	

Lanes, Volumes, Timings  
5: Sam Houston Dr & Airline Rd

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Control Delay		12.1		32.8	34.5		18.3	23.6		28.6	41.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		12.1		32.8	34.6		18.3	23.6		28.6	41.6	
LOS		B		C	C		B	C		C	D	
Approach Delay		12.1			34.3			21.8			38.4	
Approach LOS		B			C			C			D	
Queue Length 50th (ft)		27		92	308		84	109		74	214	
Queue Length 95th (ft)		30		91	286		18	105		69	247	
Internal Link Dist (ft)		364			604			590			981	
Turn Bay Length (ft)				100			100			100		
Base Capacity (vph)		821		434	1306		593	1235		431	933	
Starvation Cap Reductn		0		0	0		0	0		0	0	
Spillback Cap Reductn		0		0	7		0	0		0	0	
Storage Cap Reductn		0		0	0		0	0		0	0	
Reduced v/c Ratio		0.36		0.40	0.71		0.55	0.50		0.47	0.65	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	2 (2%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle:	60
Control Type:	Pretimed
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	29.5
Intersection LOS:	C
Intersection Capacity Utilization:	52.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 5: Sam Houston Dr & Airline Rd

p2 (R) 36 s	p1 35 s	p4 32 s	p3 17 s
p6 (R) 46 s	p5 25 s	p8 49 s	

Lanes, Volumes, Timings  
6: Airline Rd

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	124	46	260	274	9	41	301	48	3	476	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	100		100	100		0
Storage Lanes	1		0	1		0	1		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.955			0.992				0.850			0.850
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1770	3380	0	1770	1848	0	1770	1863	1583	0	1863	1583
Flt Permitted	0.235			0.567			0.088				0.998	
Satd. Flow (perm)	438	3380	0	1056	1848	0	164	1863	1583	0	1859	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			3				82			118
Link Speed (mph)		30			30			30				30
Link Distance (ft)		764			444			1799				510
Travel Time (s)		17.4			10.1			40.9				11.6
Peak Hour Factor	0.82	0.70	0.61	0.81	0.82	0.45	0.57	0.89	0.71	0.75	0.72	0.85
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	67	213	90	385	401	24	86	406	81	5	793	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	67	303	0	385	425	0	86	406	81	0	798	62
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			24			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2				6
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	8.0	20.0		20.0	20.0		8.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	8.0	25.0		26.0	43.0		8.0	69.0	69.0	61.0	61.0	61.0
Total Split (%)	6.7%	20.8%		21.7%	35.8%		6.7%	57.5%	57.5%	50.8%	50.8%	50.8%
Maximum Green (s)	4.0	21.0		22.0	39.0		4.0	65.0	65.0	57.0	57.0	57.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lag			Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Walk Time (s)		5.0		5.0	5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0			0	0	0	0	0
Act Effct Green (s)	21.0	21.0		39.0	39.0		65.0	65.0	65.0		57.0	57.0
Actuated g/C Ratio	0.18	0.18		0.32	0.32		0.54	0.54	0.54		0.48	0.48
v/c Ratio	0.55	0.48		0.81	0.71		0.61	0.40	0.09		0.90	0.08

Lanes, Volumes, Timings  
6: Airline Rd

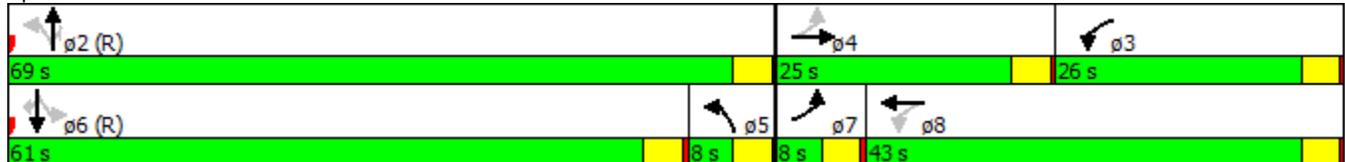
3/28/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	61.2	40.3		32.1	22.2		49.4	17.6	3.0		19.6	0.1
Queue Delay	0.0	0.0		0.0	1.3		0.0	0.0	0.0		2.0	0.0
Total Delay	61.2	40.3		32.1	23.5		49.4	17.6	3.0		21.7	0.1
LOS	E	D		C	C		D	B	A		C	A
Approach Delay		44.1			27.6			20.3			20.1	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	45	94		101	110		31	177	0		134	0
Queue Length 95th (ft)	80	102		135	148		35	248	11		99	m0
Internal Link Dist (ft)		684			364			1719			430	
Turn Bay Length (ft)	200						100		100			
Base Capacity (vph)	121	630		474	602		142	1009	895		883	813
Starvation Cap Reductn	0	0		0	57		0	0	0		28	0
Spillback Cap Reductn	0	0		0	0		0	0	0		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.55	0.48		0.81	0.78		0.61	0.40	0.09		0.93	0.08

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.90  
 Intersection Signal Delay: 25.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 74.0%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Airline Rd



Lanes, Volumes, Timings  
9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	56	42	30	135	41	168	413	31	8	427	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		100
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.941			0.960			0.989				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1753	0	1770	1788	0	1770	1842	0	1770	1863	1583
Flt Permitted	0.325			0.601			0.170			0.451		
Satd. Flow (perm)	605	1753	0	1120	1788	0	317	1842	0	840	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			26			9				277
Link Speed (mph)		30			30			30				30
Link Distance (ft)		963			976			524				865
Travel Time (s)		21.9			22.2			11.9				19.7
Peak Hour Factor	0.86	0.56	0.66	0.83	0.62	0.51	0.69	0.78	0.78	0.33	0.76	0.63
Adj. Flow (vph)	64	100	64	36	218	80	243	529	40	24	562	346
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	164	0	36	298	0	243	569	0	24	562	346
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2				6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	8.0	18.0		8.0	18.0		8.0	20.0		20.0	20.0	20.0
Total Split (s)	8.0	18.0		8.0	18.0		10.0	39.0		29.0	29.0	29.0
Total Split (%)	12.3%	27.7%		12.3%	27.7%		15.4%	60.0%		44.6%	44.6%	44.6%
Maximum Green (s)	4.0	14.0		4.0	14.0		6.0	35.0		25.0	25.0	25.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0			11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0			0		0	0	0
Act Effct Green (s)	18.0	14.0		18.0	14.0		35.0	35.0		25.0	25.0	25.0
Actuated g/C Ratio	0.28	0.22		0.28	0.22		0.54	0.54		0.38	0.38	0.38
v/c Ratio	0.27	0.40		0.10	0.74		0.80	0.57		0.07	0.78	0.44
Control Delay	18.0	19.1		15.5	34.7		31.4	12.7		13.5	27.5	5.6

Lanes, Volumes, Timings

9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	18.0	19.1		15.5	34.7		31.4	12.7		13.5	27.5	5.6
LOS	B	B		B	C		C	B		B	C	A
Approach Delay		18.8			32.6			18.3			19.0	
Approach LOS		B			C			B			B	
Queue Length 50th (ft)	17	40		9	101		47	135		6	190	17
Queue Length 95th (ft)	39	46		24	109		60	174		7	235	21
Internal Link Dist (ft)		883			896			444			785	
Turn Bay Length (ft)	100			100			100			100		100
Base Capacity (vph)	239	412		350	405		304	996		323	716	779
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.27	0.40		0.10	0.74		0.80	0.57		0.07	0.78	0.44

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 65

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 20.7

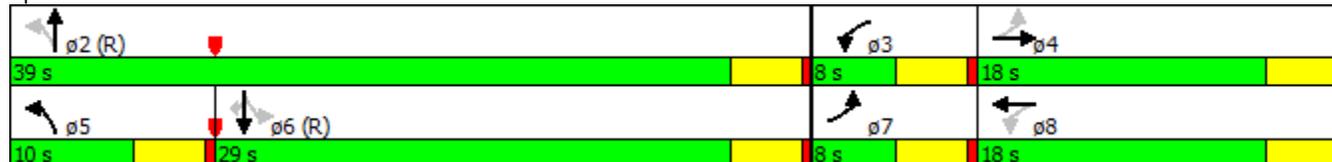
Intersection LOS: C

Intersection Capacity Utilization 58.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 9: Red River St



Lanes, Volumes, Timings  
12: BUS 59

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	409	85	89	612	110	137	407	89	41	293	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		100
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970			0.975				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4933	0	1770	4958	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.250			0.353			0.334			0.211		
Satd. Flow (perm)	466	4933	0	658	4958	0	622	1863	1583	393	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		101			70				164			164
Link Speed (mph)		30			30			30				30
Link Distance (ft)		674			1028			270				535
Travel Time (s)		15.3			23.4			6.1				12.2
Peak Hour Factor	0.69	0.84	0.69	0.93	0.81	0.72	0.82	0.72	0.77	0.93	0.79	0.78
Adj. Flow (vph)	181	487	123	96	756	153	167	565	116	44	371	151
Shared Lane Traffic (%)												
Lane Group Flow (vph)	181	610	0	96	909	0	167	565	116	44	371	151
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	8.0	20.0		8.0	20.0		9.0	24.0	24.0	8.0	23.0	23.0
Total Split (%)	13.3%	33.3%		13.3%	33.3%		15.0%	40.0%	40.0%	13.3%	38.3%	38.3%
Maximum Green (s)	4.0	16.0		4.0	16.0		5.0	20.0	20.0	4.0	19.0	19.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0			5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0			11.0
Pedestrian Calls (#/hr)		0			0			0	0			0
Act Effct Green (s)	20.0	16.0		20.0	16.0		25.0	20.0	20.0	23.0	19.0	19.0
Actuated g/C Ratio	0.33	0.27		0.33	0.27		0.42	0.33	0.33	0.38	0.32	0.32
v/c Ratio	0.75	0.44		0.33	0.66		0.47	0.91	0.18	0.18	0.63	0.25
Control Delay	36.4	16.3		15.0	20.8		14.6	41.8	2.0	10.9	23.2	3.8

Lanes, Volumes, Timings  
12: BUS 59

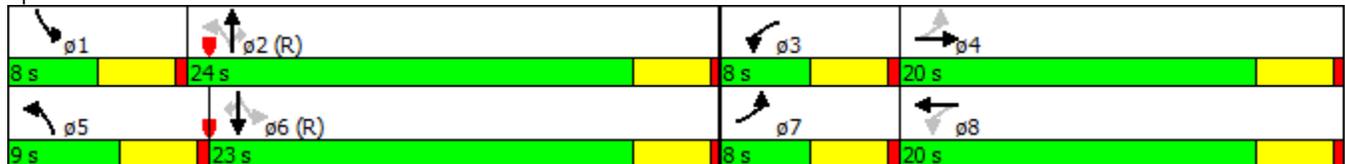
3/28/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	16.3		15.0	20.8		14.6	41.8	2.0	10.9	23.2	3.8
LOS	D	B		B	C		B	D	A	B	C	A
Approach Delay		20.9			20.2			31.0			17.1	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	42	54		21	98		33	192	0	8	112	0
Queue Length 95th (ft)	#59	75		47	118		58	#225	7	22	160	20
Internal Link Dist (ft)		594			948			190			455	
Turn Bay Length (ft)	100			100			100			100		100
Base Capacity (vph)	242	1389		293	1373		354	621	637	242	589	613
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	0.75	0.44		0.33	0.66		0.47	0.91	0.18	0.18	0.63	0.25

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 22.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 59.3%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 12: BUS 59



Lanes, Volumes, Timings  
15: VC & UH-V Driveway

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	8	20	177	366	620	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.885				0.980	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1635	0	1770	1863	1825	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1635	0	1770	1863	1825	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	573			865	1799	
Travel Time (s)	13.0			19.7	40.9	
Peak Hour Factor	0.80	0.36	0.68	0.79	0.70	0.79
Adj. Flow (vph)	10	56	260	463	886	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	0	260	463	1038	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	63.1%
Analysis Period (min)	15
	ICU Level of Service B

Lanes, Volumes, Timings  
17: Continental

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	3	6	42	624	447	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.919				0.989	
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1678	0	1770	1863	1842	0
Flt Permitted	0.980		0.950			
Satd. Flow (perm)	1678	0	1770	1863	1842	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	302			535	524	
Travel Time (s)	6.9			12.2	11.9	
Peak Hour Factor	0.38	0.50	0.66	0.79	0.63	0.88
Adj. Flow (vph)	8	12	64	790	710	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	0	64	790	770	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	43.4%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings

3:

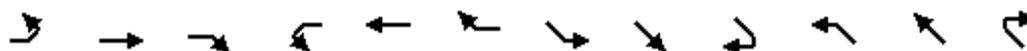
3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	339	18	7	0	8	1	0	374	509	1	408	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Fr <sub>t</sub>		0.991			0.961			0.919				
Fl <sub>t</sub> Protected	0.950	0.961								0.950		
Satd. Flow (prot)	1681	1685	0	1863	1790	0	1863	3253	0	1770	3539	0
Fl <sub>t</sub> Permitted	0.594	0.600								0.250		
Satd. Flow (perm)	1051	1052	0	1863	1790	0	1863	3253	0	466	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			6			330				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		510			116			347				670
Travel Time (s)		11.6			2.6			7.9				15.2
Peak Hour Factor	0.88	0.64	0.58	0.92	0.67	0.25	0.92	0.67	0.78	0.25	0.78	0.92
Growth Factor	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%
Adj. Flow (vph)	539	39	17	0	17	6	0	781	914	6	732	0
Shared Lane Traffic (%)	45%											
Lane Group Flow (vph)	296	299	0	0	23	0	0	1695	0	6	732	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		36			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		custom		NA
Protected Phases	5	2			6			4				8
Permitted Phases	2			6			4			3		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0		20.0
Total Split (s)	20.0	40.0		20.0	20.0		60.0	60.0		20.0		80.0
Total Split (%)	16.7%	33.3%		16.7%	16.7%		50.0%	50.0%		16.7%		66.7%
Maximum Green (s)	16.0	36.0		16.0	16.0		56.0	56.0		16.0		76.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5		3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5		0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0		4.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0		5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0		11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0		0
Act Effct Green (s)	36.0	36.0			16.0			56.0		16.0		76.0
Actuated g/C Ratio	0.30	0.30			0.13			0.47		0.13		0.63
v/c Ratio	0.74	0.74			0.09			1.00		0.10		0.33



Lanes, Volumes, Timings  
5: Sam Houston Dr & Airline Rd

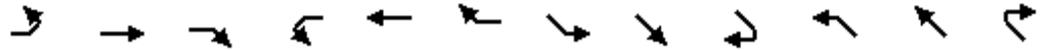
3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	129	46	85	458	64	68	306	9	96	346	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	75		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.964			0.972			0.996			0.975	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1863	3412	0	1770	3440	0	1770	3525	0	1770	3451	0
Flt Permitted				0.361			0.381			0.333		
Satd. Flow (perm)	1863	3412	0	672	3440	0	710	3525	0	620	3451	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			26			3			20	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		444			684			670			1061	
Travel Time (s)		10.1			15.5			15.2			24.1	
Peak Hour Factor	0.73	0.69	0.78	0.59	0.73	0.45	0.25	0.61	0.64	0.57	0.82	0.80
Growth Factor	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%
Adj. Flow (vph)	0	262	83	202	878	199	381	702	20	236	591	121
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	345	0	202	1077	0	381	722	0	236	712	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Minimum Split (s)	20.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	31.0	31.0		18.0	49.0		34.0	46.0		25.0	37.0	
Total Split (%)	25.8%	25.8%		15.0%	40.8%		28.3%	38.3%		20.8%	30.8%	
Maximum Green (s)	27.0	27.0		14.0	45.0		30.0	42.0		21.0	33.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes	
Walk Time (s)	5.0	5.0			5.0			5.0			5.0	
Flash Dont Walk (s)	11.0	11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0			0			0			0	
Act Effct Green (s)		27.0		45.0	45.0		42.0	42.0		33.0	33.0	
Actuated g/C Ratio		0.22		0.38	0.38		0.35	0.35		0.28	0.28	
v/c Ratio		0.44		0.53	0.82		0.74	0.58		0.64	0.74	

Lanes, Volumes, Timings  
5: Sam Houston Dr & Airline Rd

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Control Delay		16.5		32.2	39.5		29.0	18.2		45.1	43.9	
Queue Delay		0.0		0.0	0.9		0.0	0.0		0.0	0.0	
Total Delay		16.5		32.2	40.5		29.0	18.2		45.1	43.9	
LOS		B		C	D		C	B		D	D	
Approach Delay		16.5			39.1			21.9			44.2	
Approach LOS		B			D			C			D	
Queue Length 50th (ft)		35		109	385		170	163		153	257	
Queue Length 95th (ft)		m37		105	346		45	121		136	290	
Internal Link Dist (ft)		364			604			590			981	
Turn Bay Length (ft)				100			100			100		
Base Capacity (vph)		792		380	1306		513	1235		371	963	
Starvation Cap Reductn		0		0	0		0	0		0	0	
Spillback Cap Reductn		0		0	70		0	0		0	0	
Storage Cap Reductn		0		0	0		0	0		0	0	
Reduced v/c Ratio		0.44		0.53	0.87		0.74	0.58		0.64	0.74	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 18 (15%), Referenced to phase 2:NWTL and 6:SETL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.82  
 Intersection Signal Delay: 33.1  
 Intersection LOS: C  
 Intersection Capacity Utilization 59.0%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Sam Houston Dr & Airline Rd



Lanes, Volumes, Timings  
6: Airline Rd

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	124	46	260	274	9	41	301	48	3	476	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	100		100	100		0
Storage Lanes	1		0	1		0	1		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.955			0.992				0.850			0.850
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1770	3380	0	1770	1848	0	1770	1863	1583	0	1863	1583
Flt Permitted	0.267			0.540			0.066				0.997	
Satd. Flow (perm)	497	3380	0	1006	1848	0	123	1863	1583	0	1857	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			3				82			118
Link Speed (mph)		30			30			30				30
Link Distance (ft)		764			444			1799				510
Travel Time (s)		17.4			10.1			40.9				11.6
Peak Hour Factor	0.82	0.70	0.61	0.81	0.82	0.45	0.57	0.89	0.71	0.75	0.72	0.85
Growth Factor	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%
Adj. Flow (vph)	79	248	106	449	468	28	101	473	95	6	926	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	354	0	449	496	0	101	473	95	0	932	72
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			24			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2				6
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	8.0	20.0		20.0	20.0		8.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	9.0	24.0		27.0	42.0		8.0	69.0	69.0	61.0	61.0	61.0
Total Split (%)	7.5%	20.0%		22.5%	35.0%		6.7%	57.5%	57.5%	50.8%	50.8%	50.8%
Maximum Green (s)	5.0	20.0		23.0	38.0		4.0	65.0	65.0	57.0	57.0	57.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lag			Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Walk Time (s)		5.0		5.0	5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0			0	0	0	0	0
Act Effct Green (s)	20.0	20.0		38.0	38.0		65.0	65.0	65.0		57.0	57.0
Actuated g/C Ratio	0.17	0.17		0.32	0.32		0.54	0.54	0.54		0.48	0.48
v/c Ratio	0.59	0.59		0.97	0.84		0.83	0.47	0.11		1.06	0.09

Lanes, Volumes, Timings  
6: Airline Rd

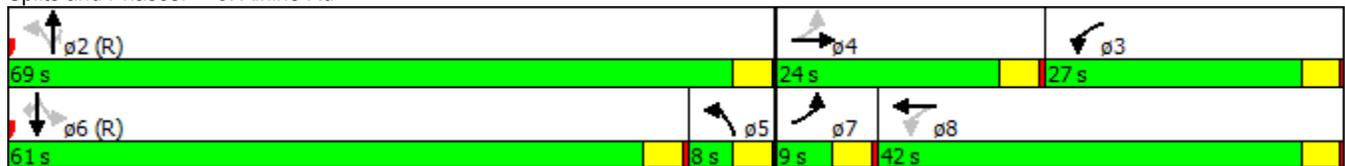
3/28/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	62.4	44.2		53.8	32.2		85.9	18.8	4.0		49.1	0.1
Queue Delay	0.0	0.0		0.0	5.2		0.0	0.0	0.0		12.0	0.0
Total Delay	62.4	44.2		53.8	37.4		85.9	18.8	4.0		61.2	0.1
LOS	E	D		D	D		F	B	A		E	A
Approach Delay		47.5			45.2			26.8			56.8	
Approach LOS		D			D			C			E	
Queue Length 50th (ft)	54	116		217	260		36	216	4		~773	0
Queue Length 95th (ft)	92	121		#382	323		40	298	17		213	m0
Internal Link Dist (ft)		684			364			1719			430	
Turn Bay Length (ft)	200						100		100			
Base Capacity (vph)	135	603		465	587		121	1009	895		882	813
Starvation Cap Reductn	0	0		0	52		0	0	0		25	0
Spillback Cap Reductn	0	0		0	0		0	0	0		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.59	0.59		0.97	0.93		0.83	0.47	0.11		1.09	0.09

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 110  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.06  
 Intersection Signal Delay: 45.3      Intersection LOS: D  
 Intersection Capacity Utilization 84.7%      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: 6: Airline Rd



Lanes, Volumes, Timings  
9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	56	42	30	135	41	168	413	31	8	427	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		100
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.941			0.960			0.989				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1753	0	1770	1788	0	1770	1842	0	1770	1863	1583
Flt Permitted	0.325			0.601			0.170			0.451		
Satd. Flow (perm)	605	1753	0	1120	1788	0	317	1842	0	840	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			26			9				277
Link Speed (mph)		30			30			30				30
Link Distance (ft)		963			976			524				865
Travel Time (s)		21.9			22.2			11.9				19.7
Peak Hour Factor	0.86	0.56	0.66	0.83	0.62	0.51	0.69	0.78	0.78	0.33	0.76	0.63
Adj. Flow (vph)	64	100	64	36	218	80	243	529	40	24	562	346
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	164	0	36	298	0	243	569	0	24	562	346
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2				6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	8.0	18.0		8.0	18.0		8.0	20.0		20.0	20.0	20.0
Total Split (s)	8.0	18.0		8.0	18.0		10.0	39.0		29.0	29.0	29.0
Total Split (%)	12.3%	27.7%		12.3%	27.7%		15.4%	60.0%		44.6%	44.6%	44.6%
Maximum Green (s)	4.0	14.0		4.0	14.0		6.0	35.0		25.0	25.0	25.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0			11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0			0		0	0	0
Act Effct Green (s)	18.0	14.0		18.0	14.0		35.0	35.0		25.0	25.0	25.0
Actuated g/C Ratio	0.28	0.22		0.28	0.22		0.54	0.54		0.38	0.38	0.38
v/c Ratio	0.27	0.40		0.10	0.74		0.80	0.57		0.07	0.78	0.44
Control Delay	18.0	19.1		15.5	34.7		31.4	12.7		13.5	27.5	5.6

Lanes, Volumes, Timings

9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	18.0	19.1		15.5	34.7		31.4	12.7		13.5	27.5	5.6
LOS	B	B		B	C		C	B		B	C	A
Approach Delay		18.8			32.6			18.3			19.0	
Approach LOS		B			C			B			B	
Queue Length 50th (ft)	17	40		9	101		47	135		6	190	17
Queue Length 95th (ft)	39	46		24	109		60	174		7	235	21
Internal Link Dist (ft)		883			896			444			785	
Turn Bay Length (ft)	100			100			100			100		100
Base Capacity (vph)	239	412		350	405		304	996		323	716	779
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.27	0.40		0.10	0.74		0.80	0.57		0.07	0.78	0.44

Intersection Summary

Area Type:	Other
Cycle Length:	65
Actuated Cycle Length:	65
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	60
Control Type:	Pretimed
Maximum v/c Ratio:	0.80
Intersection Signal Delay:	20.7
Intersection LOS:	C
Intersection Capacity Utilization:	58.0%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 9: Red River St



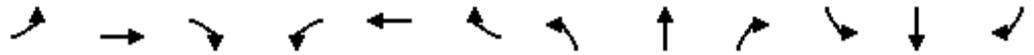
Lanes, Volumes, Timings  
12: BUS 59

3/28/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	409	85	89	612	110	137	407	89	41	293	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		100
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970			0.975				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4933	0	1770	4958	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.250			0.353			0.334			0.211		
Satd. Flow (perm)	466	4933	0	658	4958	0	622	1863	1583	393	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		101			70				164			164
Link Speed (mph)		30			30			30				30
Link Distance (ft)		674			1028			270				535
Travel Time (s)		15.3			23.4			6.1				12.2
Peak Hour Factor	0.69	0.84	0.69	0.93	0.81	0.72	0.82	0.72	0.77	0.93	0.79	0.78
Adj. Flow (vph)	181	487	123	96	756	153	167	565	116	44	371	151
Shared Lane Traffic (%)												
Lane Group Flow (vph)	181	610	0	96	909	0	167	565	116	44	371	151
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	8.0	20.0		8.0	20.0		9.0	24.0	24.0	8.0	23.0	23.0
Total Split (%)	13.3%	33.3%		13.3%	33.3%		15.0%	40.0%	40.0%	13.3%	38.3%	38.3%
Maximum Green (s)	4.0	16.0		4.0	16.0		5.0	20.0	20.0	4.0	19.0	19.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0			5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0			11.0
Pedestrian Calls (#/hr)		0			0			0	0			0
Act Effct Green (s)	20.0	16.0		20.0	16.0		25.0	20.0	20.0	23.0	19.0	19.0
Actuated g/C Ratio	0.33	0.27		0.33	0.27		0.42	0.33	0.33	0.38	0.32	0.32
v/c Ratio	0.75	0.44		0.33	0.66		0.47	0.91	0.18	0.18	0.63	0.25
Control Delay	36.4	16.3		15.0	20.8		14.6	41.8	2.0	10.9	23.2	3.8

Lanes, Volumes, Timings  
12: BUS 59

3/28/2016

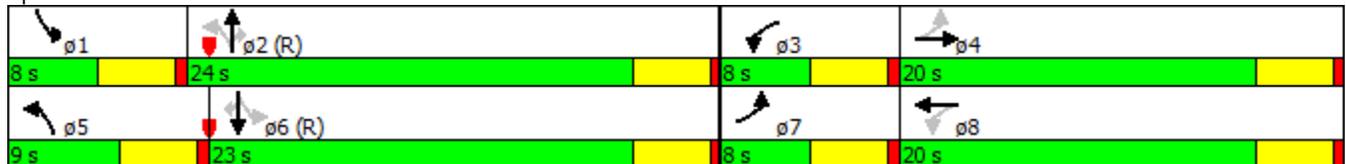


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	16.3		15.0	20.8		14.6	41.8	2.0	10.9	23.2	3.8
LOS	D	B		B	C		B	D	A	B	C	A
Approach Delay		20.9			20.2			31.0			17.1	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	42	54		21	98		33	192	0	8	112	0
Queue Length 95th (ft)	#59	75		47	118		58	#225	7	22	160	20
Internal Link Dist (ft)		594			948			190			455	
Turn Bay Length (ft)	100			100			100			100		100
Base Capacity (vph)	242	1389		293	1373		354	621	637	242	589	613
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	0.75	0.44		0.33	0.66		0.47	0.91	0.18	0.18	0.63	0.25

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 22.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 59.3%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 12: BUS 59



Lanes, Volumes, Timings  
15: VC & UH-V Driveway

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	8	20	177	366	620	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.885				0.980	
Flt Protected	0.992		0.950			
Satd. Flow (prot)	1635	0	1770	1863	1825	0
Flt Permitted	0.992		0.950			
Satd. Flow (perm)	1635	0	1770	1863	1825	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	573			865	1799	
Travel Time (s)	13.0			19.7	40.9	
Peak Hour Factor	0.80	0.36	0.68	0.79	0.70	0.79
Adj. Flow (vph)	10	56	260	463	886	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	0	260	463	1038	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	63.1%
Analysis Period (min)	15
	ICU Level of Service B

Lanes, Volumes, Timings  
17: Continental

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	3	6	42	624	447	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.919				0.989	
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1678	0	1770	1863	1842	0
Flt Permitted	0.980		0.950			
Satd. Flow (perm)	1678	0	1770	1863	1842	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	302			535	524	
Travel Time (s)	6.9			12.2	11.9	
Peak Hour Factor	0.38	0.50	0.66	0.79	0.63	0.88
Adj. Flow (vph)	8	12	64	790	710	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	0	64	790	770	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	43.4%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings

3:

3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	445	7	4	5	16	24	15	446	298	2	451	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	0		0	0		0	100		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Fr <sub>t</sub>		0.996			0.897			0.942			0.999	
Fl <sub>t</sub> Protected	0.950	0.956		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1685	0	1770	1671	0	1770	3334	0	1770	3536	0
Fl <sub>t</sub> Permitted	0.950	0.956		0.574			0.329			0.180		
Satd. Flow (perm)	1681	1685	0	1069	1671	0	613	3334	0	335	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			52			202			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		504			132			347			647	
Travel Time (s)		11.5			3.0			7.9			14.7	
Peak Hour Factor	0.79	0.58	0.50	0.62	0.67	0.46	0.54	0.81	0.86	0.25	0.74	0.50
Adj. Flow (vph)	563	12	8	8	24	52	28	551	347	8	609	4
Shared Lane Traffic (%)	48%											
Lane Group Flow (vph)	293	290	0	8	76	0	28	898	0	8	613	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	2	2			6			4			8	
Permitted Phases				6			4			8		
Minimum Split (s)	20.0	20.0		8.0	8.0		20.0	20.0		20.0	20.0	
Total Split (s)	34.0	34.0		11.0	11.0		35.0	35.0		35.0	35.0	
Total Split (%)	42.5%	42.5%		13.8%	13.8%		43.8%	43.8%		43.8%	43.8%	
Maximum Green (s)	30.0	30.0		7.0	7.0		31.0	31.0		31.0	31.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	30.0	30.0		7.0	7.0		31.0	31.0		31.0	31.0	
Actuated g/C Ratio	0.38	0.38		0.09	0.09		0.39	0.39		0.39	0.39	
v/c Ratio	0.47	0.46		0.09	0.39		0.12	0.63		0.06	0.45	
Control Delay	11.8	11.6		35.8	22.3		17.5	17.5		10.0	10.6	

# Lanes, Volumes, Timings

3:

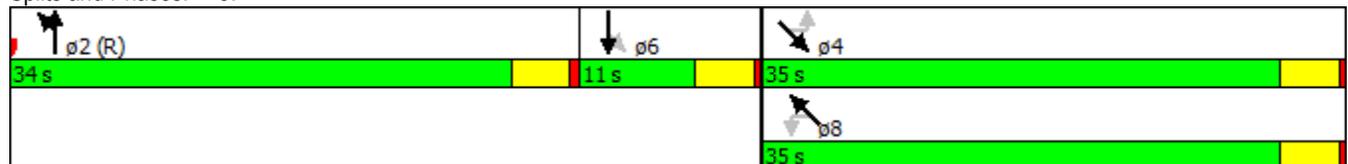
3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	11.8	11.6		35.8	22.3		17.5	17.5		10.0	10.6	
LOS	B	B		D	C		B	B		A	B	
Approach Delay		11.7			23.6			17.5			10.6	
Approach LOS		B			C			B			B	
Queue Length 50th (ft)	58	57		4	11		9	143		1	61	
Queue Length 95th (ft)	71	50		11	30		15	171		2	64	
Internal Link Dist (ft)		424			52			267			567	
Turn Bay Length (ft)	100									100		
Base Capacity (vph)	630	633		93	193		237	1415		129	1370	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.47	0.46		0.09	0.39		0.12	0.63		0.06	0.45	

## Intersection Summary

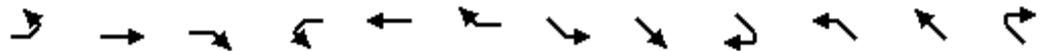
Area Type:	Other
Cycle Length:	80
Actuated Cycle Length:	80
Offset:	14 (18%), Referenced to phase 2:NBTL, Start of Green
Natural Cycle:	50
Control Type:	Pretimed
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	14.2
Intersection LOS:	B
Intersection Capacity Utilization	47.8%
ICU Level of Service	A
Analysis Period (min)	15

## Splits and Phases: 3:



Lanes, Volumes, Timings  
5: Sam Houston Dr

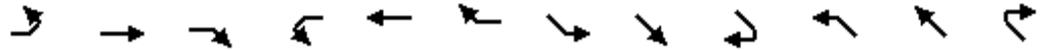
3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	5	337	80	70	246	67	92	384	5	77	404	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	2		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.973			0.963			0.997			0.961	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3444	0	1770	3408	0	1770	3529	0	1770	3401	0
Flt Permitted	0.333			0.353			0.428			0.400		
Satd. Flow (perm)	620	3444	0	658	3408	0	797	3529	0	745	3401	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			61			2			64	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		421			920			647			1061	
Travel Time (s)		9.6			20.9			14.7			24.1	
Peak Hour Factor	0.62	0.67	0.74	0.73	0.88	0.73	0.79	0.89	0.62	0.71	0.92	0.74
Adj. Flow (vph)	8	503	108	96	280	92	116	431	8	108	439	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	611	0	96	372	0	116	439	0	108	592	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA										
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Minimum Split (s)	8.0	20.0		20.0	20.0		8.0	20.0		20.0	20.0	
Total Split (s)	8.0	20.0		20.0	32.0		10.0	20.0		20.0	30.0	
Total Split (%)	10.0%	25.0%		25.0%	40.0%		12.5%	25.0%		25.0%	37.5%	
Maximum Green (s)	4.0	16.0		16.0	28.0		6.0	16.0		16.0	26.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes										
Walk Time (s)		5.0		5.0	5.0			5.0		5.0	5.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	16.0	16.0		28.0	28.0		16.0	16.0		26.0	26.0	
Actuated g/C Ratio	0.20	0.20		0.35	0.35		0.20	0.20		0.32	0.32	
v/c Ratio	0.04	0.86		0.21	0.30		0.50	0.62		0.24	0.52	
Control Delay	18.2	34.2		22.0	16.4		21.6	17.8		21.1	21.3	

Lanes, Volumes, Timings  
5: Sam Houston Dr

3/28/2016

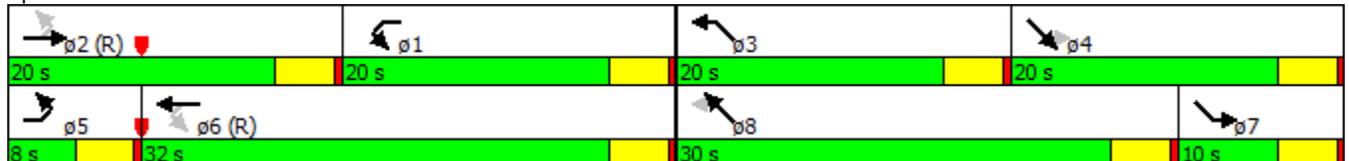


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.2	34.2		22.0	16.4		21.6	17.8		21.1	21.3	
LOS	B	C		C	B		C	B		C	C	
Approach Delay		34.0			17.6			18.6			21.2	
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	3	147		32	57		24	64		38	110	
Queue Length 95th (ft)	m6	130		52	88		m36	81		58	159	
Internal Link Dist (ft)		341			840			567			981	
Turn Bay Length (ft)	100			100			100			100		
Base Capacity (vph)	181	711		452	1232		232	707		447	1148	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.04	0.86		0.21	0.30		0.50	0.62		0.24	0.52	

Intersection Summary

Area Type: Other  
 Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 28 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 80  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 23.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 49.0%  
 ICU Level of Service A  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Sam Houston Dr



Lanes, Volumes, Timings  
6: Airline Rd

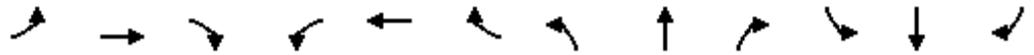
3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↖	↕↕		↖	↕↕		↖	↕↕	
Volume (vph)	50	246	61	91	213	16	63	397	181	3	276	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	100		0	100		0	100		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.978			0.973			0.948				0.982
Flt Protected		0.992		0.950			0.950			0.950		
Satd. Flow (prot)	0	3434	0	1770	3444	0	1770	3355	0	1770	3476	0
Flt Permitted		0.835		0.319			0.482			0.214		
Satd. Flow (perm)	0	2890	0	594	3444	0	898	3355	0	399	3476	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			44			150				19
Link Speed (mph)		30			30			30				30
Link Distance (ft)		764			421			1810				504
Travel Time (s)		17.4			9.6			41.1				11.5
Peak Hour Factor	0.69	0.74	0.90	0.67	0.72	0.25	0.79	0.79	0.68	0.75	0.87	0.73
Adj. Flow (vph)	72	332	68	136	296	64	80	503	266	4	317	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	472	0	136	360	0	80	769	0	4	361	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		24			24			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		4		3	8		5	2				6
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		8.0	20.0		8.0	20.0		20.0	20.0	
Total Split (s)	27.0	27.0		15.0	42.0		11.0	38.0		27.0	27.0	
Total Split (%)	33.8%	33.8%		18.8%	52.5%		13.8%	47.5%		33.8%	33.8%	
Maximum Green (s)	23.0	23.0		11.0	38.0		7.0	34.0		23.0	23.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Walk Time (s)	5.0	5.0			5.0			5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0			11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0			0		0	0	
Act Effct Green (s)		23.0		38.0	38.0		34.0	34.0		23.0	23.0	
Actuated g/C Ratio		0.29		0.48	0.48		0.42	0.42		0.29	0.29	
v/c Ratio		0.56		0.31	0.22		0.18	0.51		0.04	0.36	
Control Delay		25.9		9.7	7.0		16.2	14.3		11.7	14.1	

Lanes, Volumes, Timings  
6: Airline Rd

3/28/2016

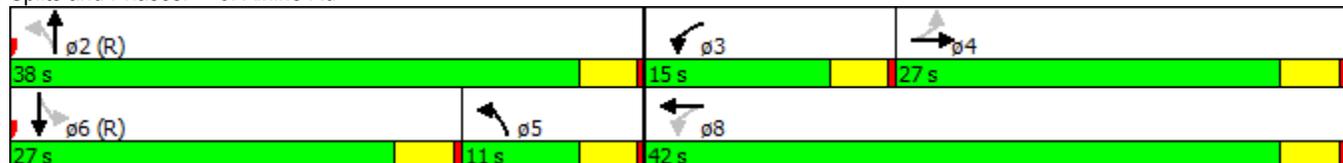


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		25.9		9.7	7.0		16.2	14.3		11.7	14.1	
LOS		C		A	A		B	B		B	B	
Approach Delay		25.9			7.7			14.5			14.0	
Approach LOS		C			A			B			B	
Queue Length 50th (ft)		98		40	50		24	110		2	81	
Queue Length 95th (ft)		114		44	48		43	130		m2	117	
Internal Link Dist (ft)		684			341			1730			424	
Turn Bay Length (ft)				100			100			100		
Base Capacity (vph)		847		443	1659		457	1512		114	1012	
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		0.56		0.31	0.22		0.18	0.51		0.04	0.36	

Intersection Summary

Area Type: Other  
 Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 8 (10%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.56  
 Intersection Signal Delay: 15.3  
 Intersection Capacity Utilization 50.0%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service A  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Airline Rd



Lanes, Volumes, Timings  
9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕		↕	↕↕		↕	↕↕	
Volume (vph)	178	102	123	40	103	16	86	424	36	18	369	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.963			0.982			0.988			0.961	
Flt Protected		0.976			0.984		0.950			0.950		
Satd. Flow (prot)	0	3326	0	0	3420	0	1770	3497	0	1770	3401	0
Flt Permitted		0.735			0.764		0.421			0.418		
Satd. Flow (perm)	0	2505	0	0	2655	0	784	3497	0	779	3401	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		132			24			26			147	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		960			976			520			863	
Travel Time (s)		21.8			22.2			11.8			19.6	
Peak Hour Factor	0.67	0.77	0.93	0.62	0.92	0.67	0.90	0.81	0.82	0.75	0.89	0.74
Adj. Flow (vph)	266	132	132	65	112	24	96	523	44	24	415	147
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	530	0	0	201	0	96	567	0	24	562	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA										
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		16.0			16.0		16.0	16.0		16.0	16.0	
Actuated g/C Ratio		0.40			0.40		0.40	0.40		0.40	0.40	
v/c Ratio		0.49			0.19		0.31	0.40		0.08	0.39	
Control Delay		8.5			7.4		11.6	9.2		7.9	7.7	

# Lanes, Volumes, Timings

## 9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		8.5			7.4		11.6	9.2		7.9	7.7	
LOS		A			A		B	A		A	A	
Approach Delay		8.5			7.4			9.6			7.8	
Approach LOS		A			A			A			A	
Queue Length 50th (ft)		31			12		14	42		6	77	
Queue Length 95th (ft)		46			27		39	61		m13	113	
Internal Link Dist (ft)		880			896			440			783	
Turn Bay Length (ft)							100			100		
Base Capacity (vph)		1081			1076		313	1414		311	1448	
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		0.49			0.19		0.31	0.40		0.08	0.39	

### Intersection Summary

Area Type: Other

Cycle Length: 40

Actuated Cycle Length: 40

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 40

Control Type: Pretimed

Maximum v/c Ratio: 0.49

Intersection Signal Delay: 8.5

Intersection LOS: A

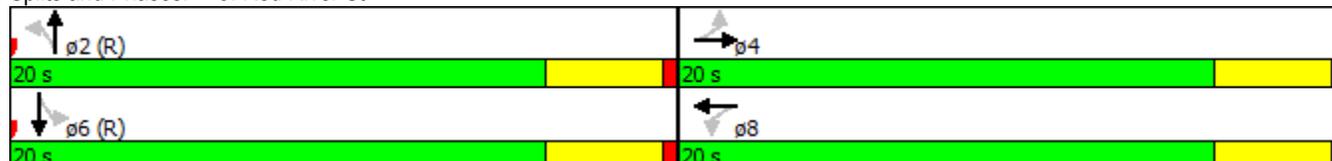
Intersection Capacity Utilization 48.2%

ICU Level of Service A

Analysis Period (min) 15

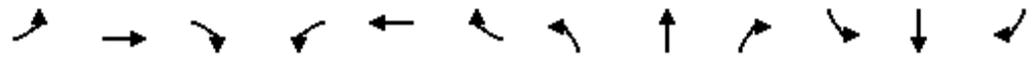
m Volume for 95th percentile queue is metered by upstream signal.

### Splits and Phases: 9: Red River St



Lanes, Volumes, Timings  
12: BUS 59

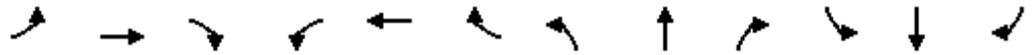
3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖↖		↖	↖↖	
Volume (vph)	160	699	152	121	598	69	133	305	122	121	283	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.977			0.982			0.952			0.943	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4968	0	1770	4994	0	1770	3369	0	1770	3337	0
Flt Permitted	0.249			0.250			0.378			0.369		
Satd. Flow (perm)	464	4968	0	466	4994	0	704	3369	0	687	3337	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		60			41			127			189	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		674			1028			271			521	
Travel Time (s)		15.3			23.4			6.2			11.8	
Peak Hour Factor	0.91	0.79	0.95	0.86	0.90	0.75	0.85	0.88	0.76	0.60	0.92	0.80
Adj. Flow (vph)	176	885	160	141	664	92	156	347	161	202	308	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	176	1045	0	141	756	0	156	508	0	202	497	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	9.0	21.0		8.0	20.0		10.0	21.0		10.0	21.0	
Total Split (%)	15.0%	35.0%		13.3%	33.3%		16.7%	35.0%		16.7%	35.0%	
Maximum Green (s)	5.0	17.0		4.0	16.0		6.0	17.0		6.0	17.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	22.0	17.0		20.0	16.0		23.0	17.0		23.0	17.0	
Actuated g/C Ratio	0.37	0.28		0.33	0.27		0.38	0.28		0.38	0.28	
v/c Ratio	0.63	0.72		0.58	0.56		0.41	0.49		0.54	0.46	
Control Delay	24.5	21.6		23.6	19.7		13.8	15.0		16.9	12.3	

Lanes, Volumes, Timings  
12: BUS 59

3/28/2016

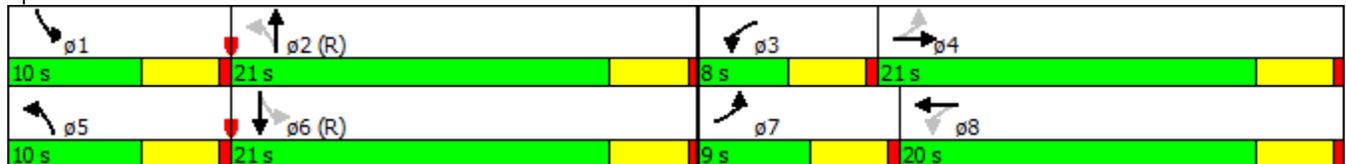


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.5	21.6		23.6	19.7		13.8	15.0		16.9	12.3	
LOS	C	C		C	B		B	B		B	B	
Approach Delay		22.0			20.3			14.7			13.6	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	39	116		31	80		32	57		43	45	
Queue Length 95th (ft)	#79	132		#63	114		59	94		50	82	
Internal Link Dist (ft)		594			948			191			441	
Turn Bay Length (ft)	100			100			100			100		
Base Capacity (vph)	278	1450		242	1361		376	1045		371	1080	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.63	0.72		0.58	0.56		0.41	0.49		0.54	0.46	

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 18.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 57.0%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 12: BUS 59



Lanes, Volumes, Timings  
15: VC & UH-V Driveway

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	48	61	26	603	482	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.924				0.996	
Flt Protected	0.978		0.950			
Satd. Flow (prot)	1683	0	1770	3539	3525	0
Flt Permitted	0.978		0.950			
Satd. Flow (perm)	1683	0	1770	3539	3525	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	573			863	1810	
Travel Time (s)	13.0			19.6	41.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	66	28	655	524	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	118	0	28	655	539	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	33.5%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings  
17: Continental

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	57	10	519	538	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.916				0.998	
Flt Protected	0.981		0.950			
Satd. Flow (prot)	1674	0	1770	3539	3532	0
Flt Permitted	0.981		0.950			
Satd. Flow (perm)	1674	0	1770	3539	3532	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	302			521	520	
Travel Time (s)	6.9			11.8	11.8	
Peak Hour Factor	0.51	0.51	0.63	0.90	0.91	0.50
Adj. Flow (vph)	69	112	16	577	591	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	181	0	16	577	599	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	27.1%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings

3:

3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	445	7	4	5	16	24	15	446	298	2	451	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.996			0.897			0.942			0.999	
Flt Protected	0.950	0.956		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1685	0	1770	1671	0	1770	3334	0	1770	3536	0
Flt Permitted	0.950	0.956		0.667			0.242			0.200		
Satd. Flow (perm)	1681	1685	0	1242	1671	0	451	3334	0	373	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			63			248				1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		532			106			347				685
Travel Time (s)		12.1			2.4			7.9				15.6
Peak Hour Factor	0.79	0.58	0.50	0.62	0.67	0.46	0.92	0.81	0.86	0.25	0.74	0.50
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	676	14	10	10	29	63	20	661	416	10	731	5
Shared Lane Traffic (%)	48%											
Lane Group Flow (vph)	352	348	0	10	92	0	20	1077	0	10	736	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	2	2			6			4			8	
Permitted Phases				6			4			8		
Minimum Split (s)	20.0	20.0		8.0	8.0		20.0	20.0		20.0	20.0	
Total Split (s)	26.0	26.0		10.0	10.0		24.0	24.0		24.0	24.0	
Total Split (%)	43.3%	43.3%		16.7%	16.7%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	22.0	22.0		6.0	6.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	22.0	22.0		6.0	6.0		20.0	20.0		20.0	20.0	
Actuated g/C Ratio	0.37	0.37		0.10	0.10		0.33	0.33		0.33	0.33	
v/c Ratio	0.57	0.56		0.08	0.41		0.13	0.84		0.08	0.62	

Lanes, Volumes, Timings

3:

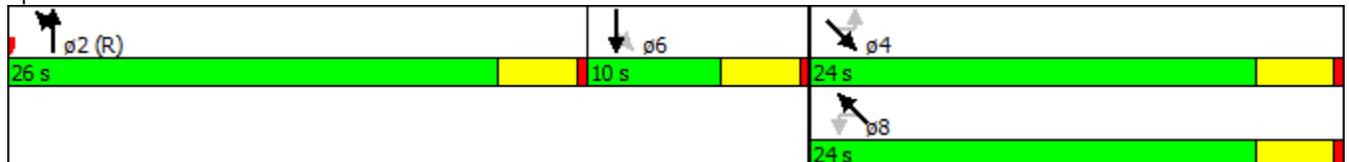
3/28/2016

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Control Delay	10.0	9.7		26.2	17.9		16.8	22.1		10.0	14.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.0	9.7		26.2	17.9		16.8	22.1		10.0	14.9	
LOS	A	A		C	B		B	C		A	B	
Approach Delay		9.8			18.7			22.0			14.9	
Approach LOS		A			B			C			B	
Queue Length 50th (ft)	35	30		3	10		5	144		3	131	
Queue Length 95th (ft)	m63	37		11	28		19	179		3	142	
Internal Link Dist (ft)		452			26			267			605	
Turn Bay Length (ft)										100		
Base Capacity (vph)	616	619		124	223		150	1276		124	1179	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.57	0.56		0.08	0.41		0.13	0.84		0.08	0.62	

Intersection Summary

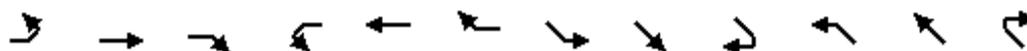
Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 22 (37%), Referenced to phase 2:NBT, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 16.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 54.7%  
 ICU Level of Service A  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3:



Lanes, Volumes, Timings  
5: Sam Houston Dr & Airline Rd

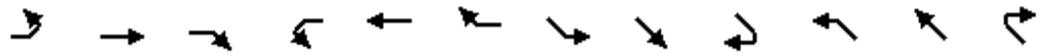
3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	5	337	80	70	246	67	92	348	5	77	404	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.966			0.958			0.998			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3419	0	1770	3391	0	1770	3532	0	1770	3405	0
Flt Permitted	0.413			0.326			0.400			0.412		
Satd. Flow (perm)	769	3419	0	607	3391	0	745	3532	0	767	3405	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		64			99			2			75	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		462			903			685			1061	
Travel Time (s)		10.5			20.5			15.6			24.1	
Peak Hour Factor	0.71	0.92	0.74	0.79	0.89	0.62	0.62	0.67	0.74	0.73	0.88	0.73
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	8	440	130	106	332	130	178	623	8	127	551	186
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	570	0	106	462	0	178	631	0	127	737	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA										
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	8.0	21.0		9.0	22.0		10.0	20.0		10.0	20.0	
Total Split (%)	13.3%	35.0%		15.0%	36.7%		16.7%	33.3%		16.7%	33.3%	
Maximum Green (s)	4.0	17.0		5.0	18.0		6.0	16.0		6.0	16.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes										
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	21.0	17.0		23.0	18.0		16.0	16.0		16.0	16.0	
Actuated g/C Ratio	0.35	0.28		0.38	0.30		0.27	0.27		0.27	0.27	
v/c Ratio	0.02	0.56		0.32	0.43		0.59	0.67		0.42	0.77	

Lanes, Volumes, Timings  
5: Sam Houston Dr & Airline Rd

3/28/2016

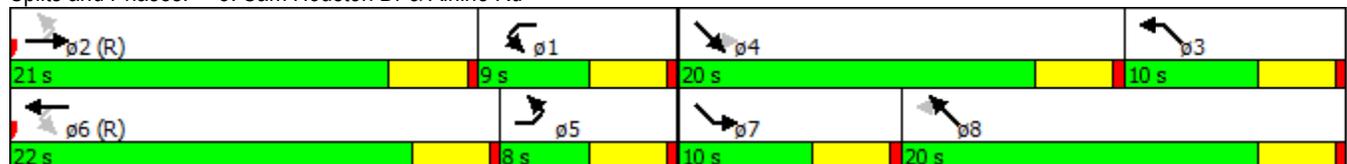


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Control Delay	7.2	10.2		15.7	14.5		13.9	11.4		24.7	24.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.2	10.2		15.7	14.5		13.9	11.4		24.7	24.6	
LOS	A	B		B	B		B	B		C	C	
Approach Delay		10.2			14.7			12.0			24.7	
Approach LOS		B			B			B			C	
Queue Length 50th (ft)	0	35		22	53		19	48		36	115	
Queue Length 95th (ft)	m2	m57		41	87		m21	40		59	167	
Internal Link Dist (ft)		382			823			605			981	
Turn Bay Length (ft)	50			100			100			100		
Base Capacity (vph)	335	1014		329	1086		301	943		304	963	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.02	0.56		0.32	0.43		0.59	0.67		0.42	0.77	

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 48 (80%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.77  
 Intersection Signal Delay: 16.0  
 Intersection LOS: B  
 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: 5: Sam Houston Dr & Airline Rd



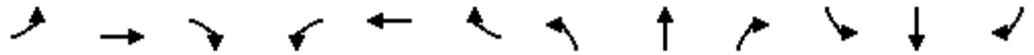
Lanes, Volumes, Timings  
6: Airline Rd

3/28/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	246	61	91	213	16	63	397	181	3	276	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	100		100	100		0
Storage Lanes	1		0	1		0	1		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr <sub>t</sub>		0.975			0.973				0.850			0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950				0.999	
Satd. Flow (prot)	1770	1816	0	1770	1812	0	1770	1863	1583	0	1861	1583
Fl <sub>t</sub> Permitted	0.286			0.375			0.255				0.992	
Satd. Flow (perm)	533	1816	0	699	1812	0	475	1863	1583	0	1848	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			19				280			236
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		764			462			1787			532	
Travel Time (s)		17.4			10.5			40.6			12.1	
Peak Hour Factor	0.69	0.74	0.90	0.67	0.72	0.25	0.79	0.79	0.68	0.73	0.87	0.75
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	87	399	81	163	355	77	96	603	319	5	381	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	480	0	163	432	0	96	603	319	0	386	51
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		14			14			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	8.0	22.0		8.0	22.0		8.0	30.0	30.0	22.0	22.0	22.0
Total Split (%)	13.3%	36.7%		13.3%	36.7%		13.3%	50.0%	50.0%	36.7%	36.7%	36.7%
Maximum Green (s)	4.0	18.0		4.0	18.0		4.0	26.0	26.0	18.0	18.0	18.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0			0	0	0	0	0
Act Effct Green (s)	18.0	18.0		18.0	18.0		26.0	26.0	26.0		18.0	18.0
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.43	0.43	0.43		0.30	0.30
v/c Ratio	0.36	0.86		0.58	0.78		0.33	0.75	0.38		0.70	0.08

Lanes, Volumes, Timings  
6: Airline Rd

3/28/2016

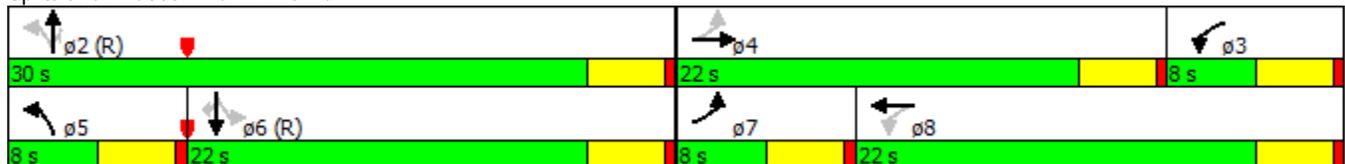


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	20.1	37.9		23.4	24.6		11.5	19.2	3.3		13.4	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay	20.1	37.9		23.4	24.6		11.5	19.2	3.3		13.4	0.2
LOS	C	D		C	C		B	B	A		B	A
Approach Delay		35.2			24.2			13.5			11.9	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	23	157		27	91		16	170	7		76	0
Queue Length 95th (ft)	39	#200		45	124		m27	198	11		m88	m0
Internal Link Dist (ft)		684			382			1707			452	
Turn Bay Length (ft)	200						100		100			
Base Capacity (vph)	242	556		281	556		292	807	844		554	640
Starvation Cap Reductn	0	0		0	0		0	0	0		0	0
Spillback Cap Reductn	0	0		0	0		0	0	0		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.36	0.86		0.58	0.78		0.33	0.75	0.38		0.70	0.08

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 16 (27%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 20.4 Intersection LOS: C  
 Intersection Capacity Utilization 82.1% 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: 6: Airline Rd



Lanes, Volumes, Timings  
9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	102	123	40	103	16	86	424	36	18	369	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		100
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.974			0.988				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1723	0	1770	1814	0	1770	1840	0	1770	1863	1583
Flt Permitted	0.670			0.515			0.260			0.390		
Satd. Flow (perm)	1248	1723	0	959	1814	0	484	1840	0	726	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		100			18			9				164
Link Speed (mph)		30			30			30				30
Link Distance (ft)		963			976			524				865
Travel Time (s)		21.9			22.2			11.9				19.7
Peak Hour Factor	0.67	0.77	0.93	0.62	0.92	0.67	0.90	0.81	0.82	0.75	0.89	0.74
Adj. Flow (vph)	266	132	132	65	112	24	96	523	44	24	415	147
Shared Lane Traffic (%)												
Lane Group Flow (vph)	266	264	0	65	136	0	96	567	0	24	415	147
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4			8		5	2				6
Permitted Phases	4			8			2			6		6
Minimum Split (s)	8.0	20.0		20.0	20.0		8.0	20.0		20.0	20.0	20.0
Total Split (s)	8.0	28.0		20.0	20.0		8.0	32.0		24.0	24.0	24.0
Total Split (%)	13.3%	46.7%		33.3%	33.3%		13.3%	53.3%		40.0%	40.0%	40.0%
Maximum Green (s)	4.0	24.0		16.0	16.0		4.0	28.0		20.0	20.0	20.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lag			Lead	Lead		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Walk Time (s)		5.0		5.0	5.0			5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0			0		0	0	0
Act Effct Green (s)	24.0	24.0		16.0	16.0		28.0	28.0		20.0	20.0	20.0
Actuated g/C Ratio	0.40	0.40		0.27	0.27		0.47	0.47		0.33	0.33	0.33
v/c Ratio	0.50	0.35		0.25	0.27		0.31	0.66		0.10	0.67	0.23
Control Delay	17.8	9.2		20.6	16.8		10.9	13.9		10.2	16.3	1.9

# Lanes, Volumes, Timings

## 9: Red River St

3/28/2016

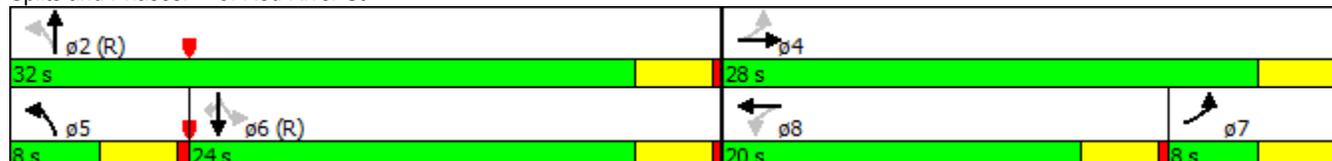


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	17.8	9.2		20.6	16.8		10.9	13.9		10.2	16.3	1.9
LOS	B	A		C	B		B	B		B	B	A
Approach Delay		13.5			18.0			13.5			12.4	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	65	38		18	33		17	110		4	74	1
Queue Length 95th (ft)	81	65		31	73		m31	141		m7	m110	m2
Internal Link Dist (ft)		883			896			444			785	
Turn Bay Length (ft)	100			100			100			100		100
Base Capacity (vph)	534	749		255	496		311	863		242	621	637
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.50	0.35		0.25	0.27		0.31	0.66		0.10	0.67	0.23

### Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 14 (23%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.67  
 Intersection Signal Delay: 13.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 57.4%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

### Splits and Phases: 9: Red River St



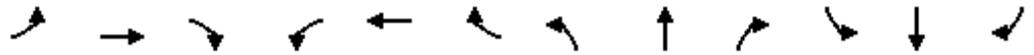
Lanes, Volumes, Timings  
12: BUS 59

3/28/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  							
Volume (vph)	160	699	152	121	598	69	133	305	122	121	283	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		100
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.982				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4968	0	1770	4994	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.249			0.250			0.490			0.312		
Satd. Flow (perm)	464	4968	0	466	4994	0	913	1863	1583	581	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		60			41				164			189
Link Speed (mph)		30			30			30				30
Link Distance (ft)		674			1028			270				535
Travel Time (s)		15.3			23.4			6.1				12.2
Peak Hour Factor	0.91	0.79	0.95	0.86	0.90	0.75	0.85	0.88	0.76	0.60	0.92	0.80
Adj. Flow (vph)	176	885	160	141	664	92	156	347	161	202	308	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	176	1045	0	141	756	0	156	347	161	202	308	189
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	9.0	21.0		8.0	20.0		8.0	21.0	21.0	10.0	23.0	23.0
Total Split (%)	15.0%	35.0%		13.3%	33.3%		13.3%	35.0%	35.0%	16.7%	38.3%	38.3%
Maximum Green (s)	5.0	17.0		4.0	16.0		4.0	17.0	17.0	6.0	19.0	19.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	22.0	17.0		20.0	16.0		21.0	17.0	17.0	25.0	19.0	19.0
Actuated g/C Ratio	0.37	0.28		0.33	0.27		0.35	0.28	0.28	0.42	0.32	0.32
v/c Ratio	0.63	0.72		0.58	0.56		0.41	0.66	0.28	0.56	0.52	0.30
Control Delay	24.5	21.6		23.6	19.7		14.8	26.0	4.8	10.8	14.6	3.7

Lanes, Volumes, Timings  
12: BUS 59

3/28/2016

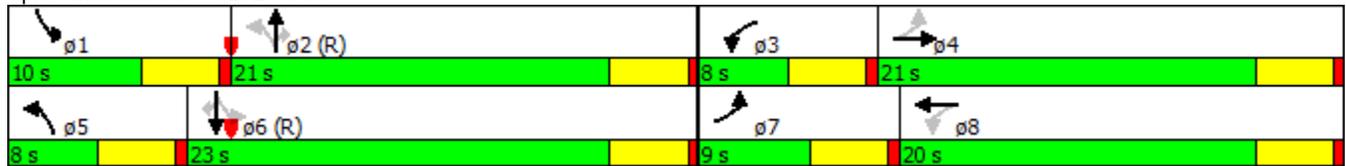


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	21.6		23.6	19.7		14.8	26.0	4.8	10.8	14.6	3.7
LOS	C	C		C	B		B	C	A	B	B	A
Approach Delay		22.0			20.3			18.3			10.6	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	39	116		31	80		32	110	0	14	97	20
Queue Length 95th (ft)	#79	132		#63	114		59	183	22	17	m144	m22
Internal Link Dist (ft)		594			948			190			455	
Turn Bay Length (ft)	100			100			100			100		100
Base Capacity (vph)	278	1450		242	1361		376	527	566	360	589	630
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	0.63	0.72		0.58	0.56		0.41	0.66	0.28	0.56	0.52	0.30

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 53 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 18.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 59.7%  
 ICU Level of Service B  
 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: 12: BUS 59



Lanes, Volumes, Timings  
15: VC & UH-V Driveway

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	48	61	26	603	483	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.916				0.996	
Flt Protected	0.982		0.950			
Satd. Flow (prot)	1676	0	1770	1863	1855	0
Flt Permitted	0.982		0.950			
Satd. Flow (perm)	1676	0	1770	1863	1855	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	573			865	1787	
Travel Time (s)	13.0			19.7	40.6	
Peak Hour Factor	0.80	0.61	0.72	0.77	0.82	0.70
Adj. Flow (vph)	60	100	36	783	589	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	160	0	36	783	609	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	44.8%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings  
17: Continental

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	47	8	572	503	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.916				0.997	
Flt Protected	0.982		0.950			
Satd. Flow (prot)	1676	0	1770	1863	1857	0
Flt Permitted	0.982		0.950			
Satd. Flow (perm)	1676	0	1770	1863	1857	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	302			535	524	
Travel Time (s)	6.9			12.2	11.9	
Peak Hour Factor	0.52	0.42	0.50	0.75	0.89	0.50
Adj. Flow (vph)	67	112	16	763	565	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	0	16	763	577	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	41.6%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings

3:

3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	445	7	4	5	16	24	15	446	298	2	451	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.996			0.897			0.942			0.999	
Flt Protected	0.950	0.956		0.950			0.950			0.950		
Satd. Flow (prot)	1681	1685	0	1770	1671	0	1770	3334	0	1770	3536	0
Flt Permitted	0.950	0.956		0.800			0.211			0.143		
Satd. Flow (perm)	1681	1685	0	1490	1671	0	393	3334	0	266	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			60			236			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		532			106			347			685	
Travel Time (s)		12.1			2.4			7.9			15.6	
Peak Hour Factor	0.79	0.58	0.50	0.62	0.67	0.46	0.92	0.81	0.86	0.25	0.74	0.50
Growth Factor	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%
Adj. Flow (vph)	789	17	11	11	33	73	23	771	485	11	853	6
Shared Lane Traffic (%)	48%											
Lane Group Flow (vph)	410	407	0	11	106	0	23	1256	0	11	859	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	2	2			6			4			8	
Permitted Phases				6			4			8		
Minimum Split (s)	20.0	20.0		8.0	8.0		20.0	20.0		20.0	20.0	
Total Split (s)	29.0	29.0		9.0	9.0		32.0	32.0		32.0	32.0	
Total Split (%)	41.4%	41.4%		12.9%	12.9%		45.7%	45.7%		45.7%	45.7%	
Maximum Green (s)	25.0	25.0		5.0	5.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		5.0	5.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.36	0.36		0.07	0.07		0.40	0.40		0.40	0.40	
v/c Ratio	0.68	0.67		0.10	0.61		0.15	0.85		0.10	0.61	

Lanes, Volumes, Timings

3:

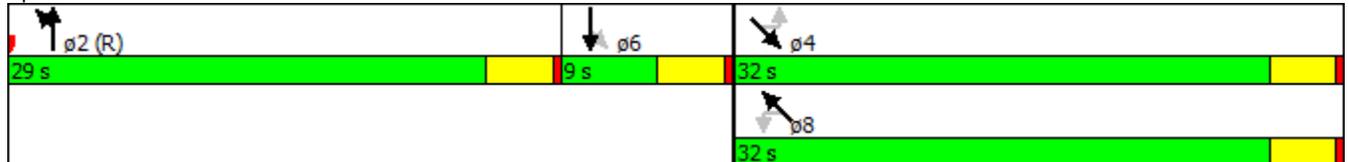
3/28/2016

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Control Delay	13.5	13.2		32.7	32.8		16.4	22.6		12.7	17.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.5	13.2		32.7	32.8		16.4	22.6		12.7	17.1	
LOS	B	B		C	C		B	C		B	B	
Approach Delay		13.3			32.8			22.5			17.1	
Approach LOS		B			C			C			B	
Queue Length 50th (ft)	90	88		5	19		6	207		4	185	
Queue Length 95th (ft)	m108	37		13	40		22	239		4	191	
Internal Link Dist (ft)		452			26			267			605	
Turn Bay Length (ft)										100		
Base Capacity (vph)	600	603		106	175		157	1475		106	1415	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.68	0.67		0.10	0.61		0.15	0.85		0.10	0.61	

Intersection Summary

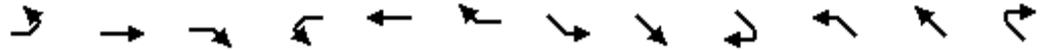
Area Type: Other  
 Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 10 (14%), Referenced to phase 2:NBTL, Start of Green  
 Natural Cycle: 50  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 18.9  
 Intersection LOS: B  
 Intersection Capacity Utilization 61.7%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3:



Lanes, Volumes, Timings  
5: Sam Houston Dr & Airline Rd

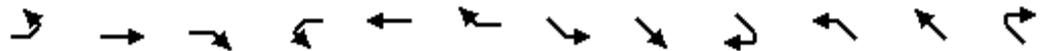
3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	5	337	80	70	246	67	92	348	5	77	404	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.966			0.958			0.998			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3419	0	1770	3391	0	1770	3532	0	1770	3405	0
Flt Permitted	0.331			0.239			0.308			0.372		
Satd. Flow (perm)	617	3419	0	445	3391	0	574	3532	0	693	3405	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		55			82			2			68	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		462			903			685			1061	
Travel Time (s)		10.5			20.5			15.6			24.1	
Peak Hour Factor	0.71	0.92	0.74	0.79	0.89	0.62	0.62	0.67	0.74	0.73	0.88	0.73
Growth Factor	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%
Adj. Flow (vph)	10	513	151	124	387	151	208	727	9	148	643	217
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	664	0	124	538	0	208	736	0	148	860	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA										
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	8.0	24.0		8.0	24.0		13.0	26.0		12.0	25.0	
Total Split (%)	11.4%	34.3%		11.4%	34.3%		18.6%	37.1%		17.1%	35.7%	
Maximum Green (s)	4.0	20.0		4.0	20.0		9.0	22.0		8.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes										
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	24.0	20.0		24.0	20.0		22.0	22.0		21.0	21.0	
Actuated g/C Ratio	0.34	0.29		0.34	0.29		0.31	0.31		0.30	0.30	
v/c Ratio	0.04	0.65		0.54	0.52		0.62	0.66		0.45	0.80	

Lanes, Volumes, Timings  
5: Sam Houston Dr & Airline Rd

3/28/2016

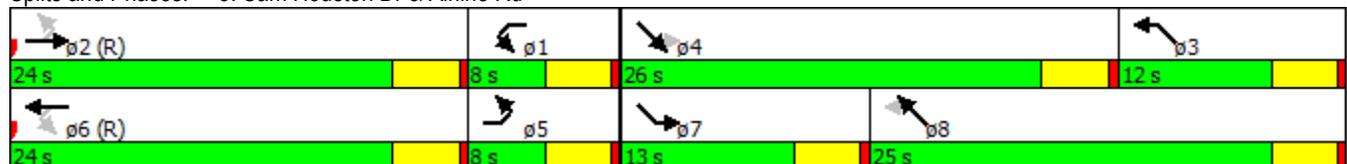


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Control Delay	9.6	14.3		29.3	19.8		14.7	11.1		27.3	27.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	9.6	14.3		29.3	19.8		14.7	11.1		27.3	27.9	
LOS	A	B		C	B		B	B		C	C	
Approach Delay		14.2			21.6			11.9			27.9	
Approach LOS		B			C			B			C	
Queue Length 50th (ft)	1	56		33	85		31	81		48	164	
Queue Length 95th (ft)	m3	m92		57	128		32	63		72	224	
Internal Link Dist (ft)		382			823			605			981	
Turn Bay Length (ft)	50			100			100			100		
Base Capacity (vph)	277	1016		228	1027		334	1111		330	1069	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.04	0.65		0.54	0.52		0.62	0.66		0.45	0.80	

Intersection Summary

Area Type: Other  
 Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 38 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 19.2  
 Intersection LOS: B  
 Intersection Capacity Utilization 63.2%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Sam Houston Dr & Airline Rd



Lanes, Volumes, Timings  
6: Airline Rd

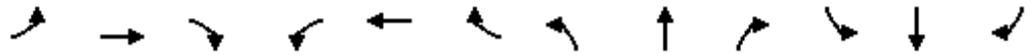
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	246	61	91	213	16	63	397	181	3	276	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	100		100	100		0
Storage Lanes	1		0	1		0	1		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr't		0.975			0.973				0.850			0.850
Flt Protected	0.950			0.950			0.950				0.999	
Satd. Flow (prot)	1770	1816	0	1770	1812	0	1770	1863	1583	0	1861	1583
Flt Permitted	0.211			0.234			0.211				0.991	
Satd. Flow (perm)	393	1816	0	436	1812	0	393	1863	1583	0	1846	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			17				245			203
Link Speed (mph)		30			30			30				30
Link Distance (ft)		764			462			1787				532
Travel Time (s)		17.4			10.5			40.6				12.1
Peak Hour Factor	0.69	0.74	0.90	0.67	0.72	0.25	0.79	0.79	0.68	0.73	0.87	0.75
Growth Factor	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%	140%
Adj. Flow (vph)	101	465	95	190	414	90	112	704	373	6	444	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	101	560	0	190	504	0	112	704	373	0	450	60
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		14			14			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2				6
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	8.0	27.0		8.0	27.0		8.0	35.0	35.0	27.0	27.0	27.0
Total Split (%)	11.4%	38.6%		11.4%	38.6%		11.4%	50.0%	50.0%	38.6%	38.6%	38.6%
Maximum Green (s)	4.0	23.0		4.0	23.0		4.0	31.0	31.0	23.0	23.0	23.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0			0	0	0	0	0
Act Effct Green (s)	23.0	23.0		23.0	23.0		31.0	31.0	31.0		23.0	23.0
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.44	0.44	0.44		0.33	0.33
v/c Ratio	0.49	0.92		0.87	0.83		0.44	0.85	0.45		0.74	0.09

Lanes, Volumes, Timings  
6: Airline Rd

3/28/2016

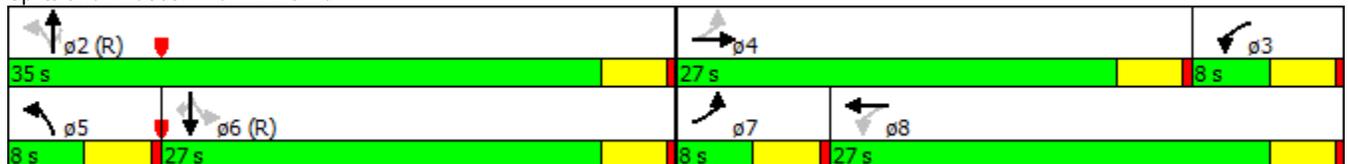


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	25.6	46.3		53.6	26.2		17.7	30.0	6.6		15.9	0.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay	25.6	46.3		53.6	26.2		17.7	30.0	6.6		15.9	0.4
LOS	C	D		D	C		B	C	A		B	A
Approach Delay		43.1			33.7			21.5			14.0	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	30	223		36	116		27	259	32		163	0
Queue Length 95th (ft)	47	#271		#59	153		48	324	42		m178	m0
Internal Link Dist (ft)		684			382			1707			452	
Turn Bay Length (ft)	200						100		100			
Base Capacity (vph)	207	607		219	606		252	825	837		606	656
Starvation Cap Reductn	0	0		0	0		0	0	0		0	0
Spillback Cap Reductn	0	0		0	0		0	0	0		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.49	0.92		0.87	0.83		0.44	0.85	0.45		0.74	0.09

Intersection Summary

Area Type: Other  
 Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 70  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 27.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 93.5%  
 ICU Level of Service F  
 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: 6: Airline Rd



Lanes, Volumes, Timings  
9: Red River St

3/28/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	102	123	40	103	16	86	424	36	18	369	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		100
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.974			0.988				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1723	0	1770	1814	0	1770	1840	0	1770	1863	1583
Flt Permitted	0.670			0.515			0.260			0.390		
Satd. Flow (perm)	1248	1723	0	959	1814	0	484	1840	0	726	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		100			18			9				164
Link Speed (mph)		30			30			30				30
Link Distance (ft)		963			976			524				865
Travel Time (s)		21.9			22.2			11.9				19.7
Peak Hour Factor	0.67	0.77	0.93	0.62	0.92	0.67	0.90	0.81	0.82	0.75	0.89	0.74
Adj. Flow (vph)	266	132	132	65	112	24	96	523	44	24	415	147
Shared Lane Traffic (%)												
Lane Group Flow (vph)	266	264	0	65	136	0	96	567	0	24	415	147
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Minimum Split (s)	8.0	20.0		20.0	20.0		8.0	20.0		20.0	20.0	20.0
Total Split (s)	8.0	28.0		20.0	20.0		8.0	32.0		24.0	24.0	24.0
Total Split (%)	13.3%	46.7%		33.3%	33.3%		13.3%	53.3%		40.0%	40.0%	40.0%
Maximum Green (s)	4.0	24.0		16.0	16.0		4.0	28.0		20.0	20.0	20.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lag			Lead	Lead		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Walk Time (s)		5.0		5.0	5.0			5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0	0			0		0	0	0
Act Effct Green (s)	24.0	24.0		16.0	16.0		28.0	28.0		20.0	20.0	20.0
Actuated g/C Ratio	0.40	0.40		0.27	0.27		0.47	0.47		0.33	0.33	0.33
v/c Ratio	0.50	0.35		0.25	0.27		0.31	0.66		0.10	0.67	0.23
Control Delay	17.8	9.2		20.6	16.8		10.9	13.9		15.2	23.5	3.4

Lanes, Volumes, Timings

9: Red River St

3/28/2016

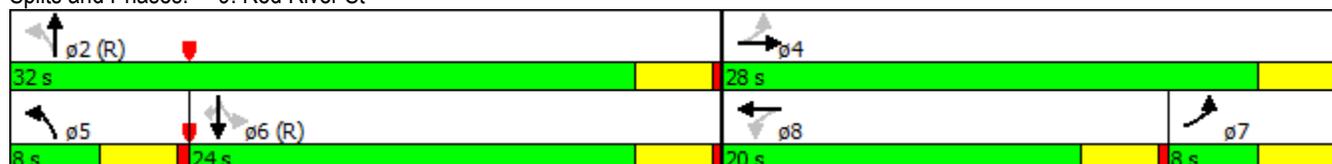


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	17.8	9.2		20.6	16.8		10.9	13.9		15.2	23.5	3.4
LOS	B	A		C	B		B	B		B	C	A
Approach Delay		13.5			18.0			13.5			18.1	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	65	38		18	33		17	110		6	126	0
Queue Length 95th (ft)	81	65		31	73		m31	141		17	210	15
Internal Link Dist (ft)		883			896			444			785	
Turn Bay Length (ft)	100			100			100			100		100
Base Capacity (vph)	534	749		255	496		311	863		242	621	637
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.50	0.35		0.25	0.27		0.31	0.66		0.10	0.67	0.23

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 14 (23%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.67  
 Intersection Signal Delay: 15.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 57.4%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Red River St



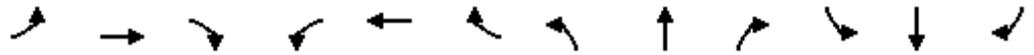
Lanes, Volumes, Timings  
12: BUS 59

3/28/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	699	152	121	598	69	133	305	122	121	283	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		100
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.982				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4968	0	1770	4994	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.249			0.250			0.490			0.312		
Satd. Flow (perm)	464	4968	0	466	4994	0	913	1863	1583	581	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		60			41				164			189
Link Speed (mph)		30			30			30				30
Link Distance (ft)		674			1028			270				535
Travel Time (s)		15.3			23.4			6.1				12.2
Peak Hour Factor	0.91	0.79	0.95	0.86	0.90	0.75	0.85	0.88	0.76	0.60	0.92	0.80
Adj. Flow (vph)	176	885	160	141	664	92	156	347	161	202	308	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	176	1045	0	141	756	0	156	347	161	202	308	189
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	9.0	21.0		8.0	20.0		8.0	21.0	21.0	10.0	23.0	23.0
Total Split (%)	15.0%	35.0%		13.3%	33.3%		13.3%	35.0%	35.0%	16.7%	38.3%	38.3%
Maximum Green (s)	5.0	17.0		4.0	16.0		4.0	17.0	17.0	6.0	19.0	19.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	22.0	17.0		20.0	16.0		21.0	17.0	17.0	25.0	19.0	19.0
Actuated g/C Ratio	0.37	0.28		0.33	0.27		0.35	0.28	0.28	0.42	0.32	0.32
v/c Ratio	0.63	0.72		0.58	0.56		0.41	0.66	0.28	0.56	0.52	0.30
Control Delay	24.5	21.6		23.6	19.7		14.8	26.0	4.8	10.8	14.5	3.7

Lanes, Volumes, Timings  
12: BUS 59

3/28/2016

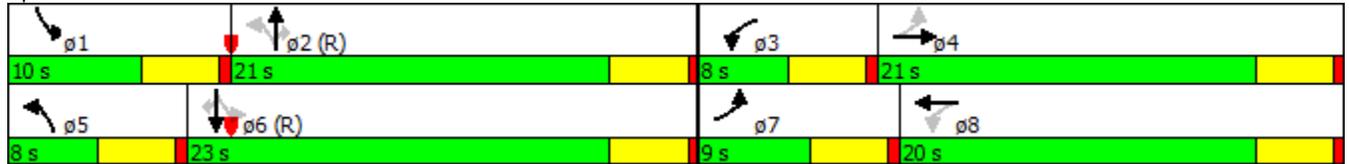


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	21.6		23.6	19.7		14.8	26.0	4.8	10.8	14.5	3.7
LOS	C	C		C	B		B	C	A	B	B	A
Approach Delay		22.0			20.3			18.3			10.5	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	39	116		31	80		32	110	0	14	92	16
Queue Length 95th (ft)	#79	132		#63	114		59	183	22	17	m144	m22
Internal Link Dist (ft)		594			948			190			455	
Turn Bay Length (ft)	100			100			100			100		100
Base Capacity (vph)	278	1450		242	1361		376	527	566	360	589	630
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	0.63	0.72		0.58	0.56		0.41	0.66	0.28	0.56	0.52	0.30

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 53 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 18.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 59.7%  
 ICU Level of Service B  
 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: 12: BUS 59



Lanes, Volumes, Timings  
15: VC & UH-V Driveway

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	48	61	26	603	483	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.916				0.996	
Flt Protected	0.982		0.950			
Satd. Flow (prot)	1676	0	1770	1863	1855	0
Flt Permitted	0.982		0.950			
Satd. Flow (perm)	1676	0	1770	1863	1855	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	573			865	1787	
Travel Time (s)	13.0			19.7	40.6	
Peak Hour Factor	0.80	0.61	0.72	0.77	0.82	0.70
Adj. Flow (vph)	60	100	36	783	589	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	160	0	36	783	609	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	44.8%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings  
17: Continental

3/28/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	47	8	572	503	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.916				0.997	
Flt Protected	0.982		0.950			
Satd. Flow (prot)	1676	0	1770	1863	1857	0
Flt Permitted	0.982		0.950			
Satd. Flow (perm)	1676	0	1770	1863	1857	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	302			535	524	
Travel Time (s)	6.9			12.2	11.9	
Peak Hour Factor	0.52	0.42	0.50	0.75	0.89	0.50
Adj. Flow (vph)	67	112	16	763	565	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	0	16	763	577	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	41.6%
Analysis Period (min)	15
	ICU Level of Service A

## **Appendix C**

### **Estimated Development Costs of the Alternatives**

**BEN WILSON STREET**

ITEM	DESCRIPTION	UNIT	OPTION 1A (Baseline w/ Median)		
			QUANTITY	UNIT PRICE	TOTAL PRICE
<b>GENERAL</b>					
1	Mobilization, Insurance & Bonds (Max 5% of Base Bid)	LS	1	\$ 89,607.00	\$ 89,607.00
2	Barricades, Signs & Traffic Control	LS	1	\$ 60,000.00	\$ 60,000.00
<b>SUBTOTAL GENERAL</b>					<b>\$ 149,607.00</b>
<b>RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					
3	Remove Existing Sidewalk	SY	4585	\$ 11.00	\$ 50,435.00
<b>SUBTOTAL RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					<b>\$ 50,435.00</b>
<b>WATER SYSTEM IMPROVEMENTS</b>					
4	Water Service Adjustments and Misc.	LS	1	\$ 72,000.00	\$ 72,000.00
<b>SUBTOTAL WATER SYSTEM IMPROVEMENTS</b>					<b>\$ 72,000.00</b>
<b>PAVING IMPROVEMENTS</b>					
5	Mill 1.5" ACP	SY	17553	\$ 2.00	\$ 35,106.00
6	Hot Mix Ty C	TON	1198	\$ 110.00	\$ 131,780.00
7	Stamped Colored Concrete Median	SY	3051	\$ 120.00	\$ 366,120.00
8	Striping (W)(4")(BRK)	LF	1270	\$ 0.50	\$ 635.00
9	Striping (W)(8")(SLD)	LF	250	\$ 1.00	\$ 250.00
10	Striping (W)(12")(SLD)	LF	567	\$ 1.25	\$ 708.75
11	Striping (W)(24")(SLD)	LF	60	\$ 7.00	\$ 420.00
12	Striping (Y)(4")(SLD)(DBL)	LF	5600	\$ 0.50	\$ 2,800.00
13	Striping (Y)(4")(BRK)	LF	0	\$ 0.50	\$ -
14	Striping (Arrow)	EA	4	\$ 120.00	\$ 480.00
15	Ramps	EA	63	\$ 1,800.00	\$ 113,400.00
16	Concrete Sidewalk (4")	SY	5174	\$ 62.00	\$ 320,788.00
17	Concrete Curb & Gutter (6")	LF	5592	\$ 16.00	\$ 89,472.00
<b>SUBTOTAL PAVING IMPROVEMENTS</b>					<b>\$ 1,061,959.75</b>
<b>MISCELLANEOUS IMPROVEMENTS</b>					
18	Block Sod (St. Augustine)	SY	5779	\$ 5.00	\$ 28,895.00
19	Top Soil (4")	SY	5779	\$ 3.50	\$ 20,226.50
20	Install Sprinkler System	LS	1	\$ 45,000.00	\$ 45,000.00
21	Install Lighting System	EA	10	\$ 3,500.00	\$ 35,000.00
22	Temporary Sediment Control Fence	LF	2200	\$ 4.50	\$ 9,900.00
23	Temporary Sediment Control Fence (Remove)	LF	2200	\$ 1.50	\$ 3,300.00
24	HAWK Signals (Set of two signals)	EA	2	\$ 150,000.00	\$ 300,000.00
25	New Traffic Signals	EA	2	\$ 250,000.00	\$ 500,000.00
<b>SUBTOTAL MISCELLANEOUS IMPROVEMENTS</b>					<b>\$ 942,321.50</b>
<b>OTHER COSTS</b>					
26	Construction Services and Testing (5%)	LS	1	\$ 113,816.16	\$ 113,816.16
27	Construction Contingencies (20%)	LS	1	\$ 455,264.65	\$ 455,264.65
28	Engineering and Surveying (10%)	LS	1	\$ 273,158.79	\$ 273,158.79
<b>SUBTOTAL OTHER COSTS</b>					<b>\$ 842,239.60</b>
<b>TOTAL PRIMARY BID</b>					<b>\$ 3,118,562.85</b>

**BEN WILSON STREET**

			OPTION 1B (Combination 5 and 4 Lane)		
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
<b>GENERAL</b>					
1	Mobilization, Insurance & Bonds (Max 5% of Base Bid)	LS	1	\$ 253,810.00	\$ 253,810.00
2	Barricades, Signs & Traffic Control	LS	1	\$ 90,000.00	\$ 90,000.00
<b>SUBTOTAL GENERAL</b>					<b>\$ 343,810.00</b>
<b>RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					
3	Remove Existing Concrete (Curb & Gutter)	LF	8458	\$ 6.00	\$ 50,748.00
4	Remove Existing Sidewalk	SY	4585	\$ 11.00	\$ 50,435.00
5	Remove Existing Driveways/Parking Areas	SY	2100	\$ 11.00	\$ 23,100.00
6	Remove Existing Signs	SY	120	\$ 75.00	\$ 9,000.00
<b>SUBTOTAL RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					<b>\$ 133,283.00</b>
<b>STORM SEWER IMPROVEMENTS</b>					
7	Remove Existing Inlet/MH	EA	27	\$ 310.00	\$ 8,370.00
8	Remove Existing Pipe (10"-18")	LF	167	\$ 21.00	\$ 3,507.00
9	Remove Existing Pipe (24"-36")	LF	2211	\$ 22.00	\$ 48,642.00
10	Construct H-Inlet w/Grate MOD (0'-5' Depth), Complete In Place	EA	6	\$ 2,500.00	\$ 15,000.00
11	Construct H-Inlet w/Lid MOD (0'-5' Depth), Complete In Place	EA	6	\$ 3,500.00	\$ 21,000.00
12	Grouted Storm Sewer Connection	EA	5	\$ 1,000.00	\$ 5,000.00
13	Construct Junction Box TY M (0'-7' Depth), Complete In Place	EA	15	\$ 8,000.00	\$ 120,000.00
14	Construct Curb Inlet TY C Special, Complete In Place	EA	30	\$ 6,000.00	\$ 180,000.00
15	Furnish & Install 12" HDPE (0'-3' Depth) (Non-Traffic)	LF	45	\$ 55.00	\$ 2,475.00
16	Furnish & Install 15" RCP (0'-5' Depth) (Traffic) (Class III)	LF	200	\$ 70.00	\$ 14,000.00
17	Furnish & Install 18" RCP (0'-5' Depth) (Traffic) (Class III)	LF	122	\$ 55.00	\$ 6,710.00
18	Furnish & Install 24" RCP (0'-5' Depth) (Traffic) (Class III)	LF	2156	\$ 75.00	\$ 161,700.00
19	Furnish & Install 30" RCP (0'-5' Depth) (Traffic) (Class III)	LF	394	\$ 85.00	\$ 33,490.00
20	Furnish & Install 36" RCP (0'-6' Depth) (Traffic) (Class III)	LF	2743	\$ 115.00	\$ 315,445.00
21	Furnish & Install 42" RCP (0'-6' Depth) (Traffic) (Class III)	LF	1862	\$ 140.00	\$ 260,680.00
22	Furnish & Install 7'x5' Box (0'-7' Depth) (Traffic)	LF	143	\$ 475.00	\$ 67,925.00
23	Place Concrete Riprap (5")	SY	25	\$ 57.00	\$ 1,425.00
24	Storm Trench Excavation Protection	LF	2000	\$ 1.40	\$ 2,800.00
<b>SUBTOTAL STORM SEWER IMPROVEMENTS</b>					<b>\$ 1,268,169.00</b>
<b>WATER SYSTEM IMPROVEMENTS</b>					
25	Water Service Adjustments and Misc.	LS	1	\$ 72,000.00	\$ 72,000.00
<b>SUBTOTAL WATER SYSTEM IMPROVEMENTS</b>					<b>\$ 72,000.00</b>
<b>SANITARY SEWER SYSTEM IMPROVEMENTS</b>					
26	Rehabilitate Existing 5' Diameter Manhole	VF	121	\$ 500.00	\$ 60,500.00
27	Remove and Replace Exist. Manhole Lid and Frame	EA	11	\$ 2,000.00	\$ 22,000.00
28	Addit. Manhole Wall Build Up (Cementitious Repair Material) per 1" Thick Lifes	VF	200	\$ 150.00	\$ 30,000.00
29	By-Pass Flow Control	LS	1	\$ 10,000.00	\$ 10,000.00
30	Remove and Replace Exist. 6" Sewer Service	LF	825	\$ 50.00	\$ 41,250.00
31	Install 6" Service Cleanout	EA	13	\$ 400.00	\$ 5,200.00
<b>SUBTOTAL SANITARY SEWER SYSTEM IMPROVEMENTS</b>					<b>\$ 168,950.00</b>
<b>PAVING IMPROVEMENTS</b>					
32	Roadway Embankment	CY	3962	\$ 9.00	\$ 35,658.00
33	Roadway Excavation	CY	70159	\$ 9.50	\$ 666,510.50
34	Concrete Pavement	SY	16559	\$ 65.00	\$ 1,076,335.00
35	Lime Treated Subgrade	SY	16559	\$ 2.00	\$ 33,118.00
36	Lime	TON	196	\$ 110.00	\$ 21,560.00
37	Mill 1.5" ACP	SY	11308	\$ 2.00	\$ 22,616.00
38	Hot Mix Ty C	TON	935	\$ 110.00	\$ 102,850.00
39	Stamped Colored Concrete Median	SY	769	\$ 120.00	\$ 92,280.00
40	Striping (W)(4")(BRK)	LF	2245	\$ 0.50	\$ 1,122.50
41	Striping (W)(8")(SLD)	LF	705	\$ 1.00	\$ 705.00
42	Striping (W)(12")(SLD)	LF	1050	\$ 1.25	\$ 1,312.50
43	Striping (W)(24")(SLD)	LF	597	\$ 7.00	\$ 4,179.00
44	Striping (Y)(4")(SLD)(DBL)	LF	7060	\$ 0.50	\$ 3,530.00
45	Striping (Y)(4")(BRK)	LF	0	\$ 0.50	\$ -
46	Striping (Arrow)	EA	11	\$ 120.00	\$ 1,320.00
47	Ramps	EA	63	\$ 1,800.00	\$ 113,400.00
48	Concrete Sidewalk (4")	SY	5174	\$ 62.00	\$ 320,788.00
49	Concrete Curb & Gutter (6")	LF	10223	\$ 16.00	\$ 163,568.00
<b>SUBTOTAL PAVING IMPROVEMENTS</b>					<b>\$ 2,660,852.50</b>
<b>MISCELLANEOUS IMPROVEMENTS</b>					
50	Block Sod (St. Augustine)	SY	5779	\$ 5.00	\$ 28,895.00
51	Top Soil (4")	SY	5779	\$ 3.50	\$ 20,226.50
52	Install Sprinkler System	LS	1	\$ 45,000.00	\$ 45,000.00
53	Install Lighting System	EA	10	\$ 3,500.00	\$ 35,000.00
54	Temporary Sediment Control Fence	LF	2200	\$ 4.50	\$ 9,900.00
55	Temporary Sediment Control Fence (Remove)	LF	2200	\$ 1.50	\$ 3,300.00
56	Construct Detour	STA	41	\$ 4,000.00	\$ 165,200.00
57	HAWK Signals (Set of two signals)	EA	2	\$ 150,000.00	\$ 300,000.00
58	New Traffic Signals	EA	2	\$ 250,000.00	\$ 500,000.00
<b>SUBTOTAL MISCELLANEOUS IMPROVEMENTS</b>					<b>\$ 1,107,521.50</b>
<b>OTHER COSTS</b>					
59	Construction Services and Testing (5%)	LS	1	\$ 287,729.30	\$ 287,729.30
60	Construction Contingencies (20%)	LS	1	\$ 1,150,917.20	\$ 1,150,917.20
61	Engineering and Surveying (10%)	LS	1	\$ 690,550.32	\$ 690,550.32
<b>SUBTOTAL OTHER COSTS</b>					<b>\$ 2,129,196.82</b>
<b>TOTAL PRIMARY BID</b>					<b>\$ 7,883,782.82</b>

**BEN WILSON STREET**

			OPTION 2A (5 and 4 Lane w/ Pedestrian UP)		
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
<b>GENERAL</b>					
1	Mobilization, Insurance & Bonds (Max 5% of Base Bid)	LS	1	\$ 324,610.00	\$ 324,610.00
2	Barricades, Signs & Traffic Control	LS	1	\$ 90,000.00	\$ 90,000.00
<b>SUBTOTAL GENERAL</b>					<b>\$ 414,610.00</b>
<b>RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					
3	Remove Existing Concrete (Curb & Gutter)	LF	8458	\$ 6.00	\$ 50,748.00
4	Remove Existing Sidewalk	SY	4585	\$ 11.00	\$ 50,435.00
5	Remove Existing Driveways/Parking Areas	SY	2100	\$ 11.00	\$ 23,100.00
6	Remove Existing Signs	SY	120	\$ 75.00	\$ 9,000.00
<b>SUBTOTAL RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					<b>\$ 133,283.00</b>
<b>STORM SEWER IMPROVEMENTS</b>					
7	Remove Existing Inlet/MH	EA	27	\$ 310.00	\$ 8,370.00
8	Remove Existing Pipe (10"-18")	LF	167	\$ 21.00	\$ 3,507.00
9	Remove Existing Pipe (24"-36")	LF	2211	\$ 22.00	\$ 48,642.00
10	Construct H-Inlet w/Grate MOD (0'-5' Depth), Complete In Place	EA	6	\$ 2,500.00	\$ 15,000.00
11	Construct H-Inlet w/Lid MOD (0'-5' Depth), Complete In Place	EA	6	\$ 3,500.00	\$ 21,000.00
12	Grouted Storm Sewer Connection	EA	5	\$ 1,000.00	\$ 5,000.00
13	Construct Junction Box TY M (0'-7' Depth), Complete In Place	EA	15	\$ 8,000.00	\$ 120,000.00
14	Construct Curb Inlet TY C Special, Complete In Place	EA	30	\$ 6,000.00	\$ 180,000.00
15	Furnish & Install 12" HDPE (0'-3' Depth) (Non-Traffic)	LF	45	\$ 55.00	\$ 2,475.00
16	Furnish & Install 15" RCP (0'-5' Depth) (Traffic) (Class III)	LF	200	\$ 70.00	\$ 14,000.00
17	Furnish & Install 18" RCP (0'-5' Depth) (Traffic) (Class III)	LF	122	\$ 55.00	\$ 6,710.00
18	Furnish & Install 24" RCP (0'-5' Depth) (Traffic) (Class III)	LF	2156	\$ 75.00	\$ 161,700.00
19	Furnish & Install 30" RCP (0'-5' Depth) (Traffic) (Class III)	LF	394	\$ 85.00	\$ 33,490.00
20	Furnish & Install 36" RCP (0'-6' Depth) (Traffic) (Class III)	LF	2743	\$ 115.00	\$ 315,445.00
21	Furnish & Install 42" RCP (0'-6' Depth) (Traffic) (Class III)	LF	1862	\$ 140.00	\$ 260,680.00
22	Furnish & Install 7'x5' Box (0'-7' Depth) (Traffic)	LF	143	\$ 475.00	\$ 67,925.00
23	Place Concrete Riprap (5")	SY	25	\$ 57.00	\$ 1,425.00
24	Storm Trench Excavation Protection	LF	2000	\$ 1.40	\$ 2,800.00
<b>SUBTOTAL STORM SEWER IMPROVEMENTS</b>					<b>\$ 1,268,169.00</b>
<b>WATER SYSTEM IMPROVEMENTS</b>					
25	Water Service Adjustments and Misc.	LS	1	\$ 72,000.00	\$ 72,000.00
<b>SUBTOTAL WATER SYSTEM IMPROVEMENTS</b>					<b>\$ 72,000.00</b>
<b>SANITARY SEWER SYSTEM IMPROVEMENTS</b>					
26	Rehabilitate Existing 5' Diameter Manhole	VF	121	\$ 500.00	\$ 60,500.00
27	Remove and Replace Exist. Manhole Lid and Frame	EA	11	\$ 2,000.00	\$ 22,000.00
28	Addit. Manhole Wall Build Up (Cementitious Repair Material) per 1" Thick Lifes	VF	200	\$ 150.00	\$ 30,000.00
29	By-Pass Flow Control	LS	1	\$ 10,000.00	\$ 10,000.00
30	Remove and Replace Exist. 6" Sewer Service	LF	825	\$ 50.00	\$ 41,250.00
31	Install 6" Service Cleanout	EA	13	\$ 400.00	\$ 5,200.00
<b>SUBTOTAL SANITARY SEWER SYSTEM IMPROVEMENTS</b>					<b>\$ 168,950.00</b>
<b>PAVING IMPROVEMENTS</b>					
32	Roadway Embankment	CY	17014	\$ 9.00	\$ 153,126.00
33	Roadway Excavation	CY	78659	\$ 9.50	\$ 747,260.50
34	Concrete Pavement	SY	19934	\$ 65.00	\$ 1,295,710.00
35	Lime Treated Subgrade	SY	19934	\$ 2.00	\$ 39,868.00
36	Lime	TON	235	\$ 110.00	\$ 25,850.00
37	Mill 1.5" ACP	SY	11308	\$ 2.00	\$ 22,616.00
38	Hot Mix Ty C	TON	935	\$ 110.00	\$ 102,850.00
39	Stamped Colored Concrete Median	SY	769	\$ 120.00	\$ 92,280.00
40	Striping (W)(4")(BRK)	LF	2245	\$ 0.50	\$ 1,122.50
41	Striping (W)(8")(SLD)	LF	705	\$ 1.00	\$ 705.00
42	Striping (W)(12")(SLD)	LF	1050	\$ 1.25	\$ 1,312.50
43	Striping (W)(24")(SLD)	LF	597	\$ 7.00	\$ 4,179.00
44	Striping (Y)(4")(SLD)(DBL)	LF	7060	\$ 0.50	\$ 3,530.00
45	Striping (Y)(4")(BRK)	LF	0	\$ 0.50	\$ -
46	Striping (Arrow)	EA	11	\$ 120.00	\$ 1,320.00
47	Ramps	EA	63	\$ 1,800.00	\$ 113,400.00
48	Concrete Sidewalk (4")	SY	7677	\$ 62.00	\$ 475,974.00
49	Concrete Curb & Gutter (6")	LF	12770	\$ 16.00	\$ 204,320.00
<b>SUBTOTAL PAVING IMPROVEMENTS</b>					<b>\$ 3,285,423.50</b>
<b>MISCELLANEOUS IMPROVEMENTS</b>					
50	Block Sod (St. Augustine)	SY	7070	\$ 5.00	\$ 35,350.00
51	Top Soil (4")	SY	7070	\$ 3.50	\$ 24,745.00
52	Install Sprinkler System	LS	1	\$ 45,000.00	\$ 45,000.00
53	Install Lighting System	EA	10	\$ 3,500.00	\$ 35,000.00
54	Temporary Sediment Control Fence	LF	2200	\$ 4.50	\$ 9,900.00
55	Temporary Sediment Control Fence (Remove)	LF	2200	\$ 1.50	\$ 3,300.00
56	Construct Detour	STA	41	\$ 4,000.00	\$ 164,000.00
57	HAWK Signals (Set of two signals)	EA	1	\$ 150,000.00	\$ 150,000.00
58	New Traffic Signals	EA	2	\$ 250,000.00	\$ 500,000.00
59	Pedestrian Underpass	LS	1	\$ 740,000.00	\$ 740,000.00
60	Retaining Wall	SF	9984	\$ 43.00	\$ 429,312.00
<b>SUBTOTAL MISCELLANEOUS IMPROVEMENTS</b>					<b>\$ 2,136,607.00</b>
<b>OTHER COSTS</b>					
61	Construction Services and Testing (5%)	LS	1	\$ 373,952.13	\$ 373,952.13
62	Construction Contingencies (20%)	LS	1	\$ 1,495,808.50	\$ 1,495,808.50
63	Engineering and Surveying (10%)	LS	1	\$ 897,485.10	\$ 897,485.10
<b>SUBTOTAL OTHER COSTS</b>					<b>\$ 2,767,245.73</b>
<b>TOTAL PRIMARY BID</b>					<b>\$ 10,246,288.23</b>

**BEN WILSON STREET**

			OPTION 2B (5 and 3 Lane w/ Pedestrian UP)		
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
<b>GENERAL</b>					
1	Mobilization, Insurance & Bonds (Max 5% of Base Bid)	LS	1	\$ 319,375.00	\$ 319,375.00
2	Barricades, Signs & Traffic Control	LS	1	\$ 90,000.00	\$ 90,000.00
<b>SUBTOTAL GENERAL</b>					<b>\$ 409,375.00</b>
<b>RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					
3	Remove Existing Concrete (Curb & Gutter)	LF	8458	\$ 6.00	\$ 50,748.00
4	Remove Existing Sidewalk	SY	4585	\$ 11.00	\$ 50,435.00
5	Remove Existing Driveways/Parking Areas	SY	2100	\$ 11.00	\$ 23,100.00
6	Remove Existing Signs	SY	120	\$ 75.00	\$ 9,000.00
<b>SUBTOTAL RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					<b>\$ 133,283.00</b>
<b>STORM SEWER IMPROVEMENTS</b>					
7	Remove Existing Inlet/MH	EA	27	\$ 310.00	\$ 8,370.00
8	Remove Existing Pipe (10"-18")	LF	167	\$ 21.00	\$ 3,507.00
9	Remove Existing Pipe (24"-36")	LF	2211	\$ 22.00	\$ 48,642.00
10	Construct H-Inlet w/Grate MOD (0'-5' Depth), Complete In Place	EA	6	\$ 2,500.00	\$ 15,000.00
11	Construct H-Inlet w/Lid MOD (0'-5' Depth), Complete In Place	EA	6	\$ 3,500.00	\$ 21,000.00
12	Grouted Storm Sewer Connection	EA	5	\$ 1,000.00	\$ 5,000.00
13	Construct Junction Box TY M (0'-7' Depth), Complete In Place	EA	15	\$ 8,000.00	\$ 120,000.00
14	Construct Curb Inlet TY C Special, Complete In Place	EA	30	\$ 6,000.00	\$ 180,000.00
15	Furnish & Install 12" HDPE (0'-3' Depth) (Non-Traffic)	LF	45	\$ 55.00	\$ 2,475.00
16	Furnish & Install 15" RCP (0'-5' Depth) (Traffic) (Class III)	LF	200	\$ 70.00	\$ 14,000.00
17	Furnish & Install 18" RCP (0'-5' Depth) (Traffic) (Class III)	LF	122	\$ 55.00	\$ 6,710.00
18	Furnish & Install 24" RCP (0'-5' Depth) (Traffic) (Class III)	LF	2156	\$ 75.00	\$ 161,700.00
19	Furnish & Install 30" RCP (0'-5' Depth) (Traffic) (Class III)	LF	394	\$ 85.00	\$ 33,490.00
20	Furnish & Install 36" RCP (0'-6' Depth) (Traffic) (Class III)	LF	2743	\$ 115.00	\$ 315,445.00
21	Furnish & Install 42" RCP (0'-6' Depth) (Traffic) (Class III)	LF	1862	\$ 140.00	\$ 260,680.00
22	Furnish & Install 7'x5' Box (0'-7' Depth) (Traffic)	LF	143	\$ 475.00	\$ 67,925.00
23	Place Concrete Riprap (5")	SY	25	\$ 57.00	\$ 1,425.00
24	Storm Trench Excavation Protection	LF	2000	\$ 1.40	\$ 2,800.00
<b>SUBTOTAL STORM SEWER IMPROVEMENTS</b>					<b>\$ 1,268,169.00</b>
<b>WATER SYSTEM IMPROVEMENTS</b>					
25	Water Service Adjustments and Misc.	LS	1	\$ 72,000.00	\$ 72,000.00
<b>SUBTOTAL WATER SYSTEM IMPROVEMENTS</b>					<b>\$ 72,000.00</b>
<b>SANITARY SEWER SYSTEM IMPROVEMENTS</b>					
26	Rehabilitate Existing 5' Diameter Manhole	VF	121	\$ 500.00	\$ 60,500.00
27	Remove and Replace Exist. Manhole Lid and Frame	EA	11	\$ 2,000.00	\$ 22,000.00
28	Addit. Manhole Wall Build Up (Cementitious Repair Material) per 1" Thick Lifes	VF	200	\$ 150.00	\$ 30,000.00
29	By-Pass Flow Control	LS	1	\$ 10,000.00	\$ 10,000.00
30	Remove and Replace Exist. 6" Sewer Service	LF	825	\$ 50.00	\$ 41,250.00
31	Install 6" Service Cleanout	EA	13	\$ 400.00	\$ 5,200.00
<b>SUBTOTAL SANITARY SEWER SYSTEM IMPROVEMENTS</b>					<b>\$ 168,950.00</b>
<b>PAVING IMPROVEMENTS</b>					
32	Roadway Embankment	CY	17014	\$ 9.00	\$ 153,126.00
33	Roadway Excavation	CY	78659	\$ 9.50	\$ 747,260.50
34	Concrete Pavement	SY	17767	\$ 65.00	\$ 1,154,855.00
35	Lime Treated Subgrade	SY	17767	\$ 2.00	\$ 35,534.00
36	Lime	TON	210	\$ 110.00	\$ 23,100.00
37	Mill 1.5" ACP	SY	11308	\$ 2.00	\$ 22,616.00
38	Hot Mix Ty C	TON	935	\$ 110.00	\$ 102,850.00
39	Stamped Colored Concrete Median	SY	769	\$ 120.00	\$ 92,280.00
40	Striping (W)(4")(BRK)	LF	1317	\$ 0.50	\$ 658.50
41	Striping (W)(8")(SLD)	LF	1050	\$ 1.00	\$ 1,050.00
42	Striping (W)(12")(SLD)	LF	700	\$ 1.25	\$ 875.00
43	Striping (W)(24")(SLD)	LF	204	\$ 7.00	\$ 1,428.00
44	Striping (Y)(4")(SLD)(DBL)	LF	11138	\$ 0.50	\$ 5,569.00
45	Striping (Y)(4")(BRK)	LF	0	\$ 0.50	\$ -
46	Striping (Arrow)	EA	19	\$ 120.00	\$ 2,280.00
47	Ramps	EA	66	\$ 1,800.00	\$ 118,800.00
48	Concrete Sidewalk (4")	SY	10986	\$ 62.00	\$ 681,132.00
49	Concrete Curb & Gutter (6")	LF	12770	\$ 16.00	\$ 204,320.00
<b>SUBTOTAL PAVING IMPROVEMENTS</b>					<b>\$ 3,347,734.00</b>
<b>MISCELLANEOUS IMPROVEMENTS</b>					
50	Block Sod (St. Augustine)	SY	8833	\$ 5.00	\$ 44,165.00
51	Top Soil (4")	SY	8833	\$ 3.50	\$ 30,915.50
52	Install Sprinkler System	LS	1	\$ 45,000.00	\$ 45,000.00
53	Install Lighting System	EA	10	\$ 3,500.00	\$ 35,000.00
54	Temporary Sediment Control Fence	LF	2200	\$ 4.50	\$ 9,900.00
55	Temporary Sediment Control Fence (Remove)	LF	2200	\$ 1.50	\$ 3,300.00
56	Construct Detour	STA	41	\$ 4,000.00	\$ 164,000.00
57	HAWK Signals (Set of two signals)	EA	1	\$ 150,000.00	\$ 150,000.00
58	New Traffic Signals	EA	2	\$ 250,000.00	\$ 500,000.00
59	Pedestrian Underpass	LS	1	\$ 740,000.00	\$ 740,000.00
60	Retaining Wall	SF	9984	\$ 43.00	\$ 429,312.00
<b>SUBTOTAL MISCELLANEOUS IMPROVEMENTS</b>					<b>\$ 2,151,592.50</b>
<b>OTHER COSTS</b>					
61	Construction Services and Testing (5%)	LS	1	\$ 377,555.18	\$ 377,555.18
62	Construction Contingencies (20%)	LS	1	\$ 1,510,220.70	\$ 1,510,220.70
63	Engineering and Surveying (10%)	LS	1	\$ 906,132.42	\$ 906,132.42
<b>SUBTOTAL OTHER COSTS</b>					<b>\$ 2,793,908.30</b>
<b>TOTAL PRIMARY BID</b>					<b>\$ 10,345,011.80</b>

BEN WILSON STREET

			OPTION 3A (3 Lane and 5 Lane w/ Enhanced Intersections)		
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
<b>GENERAL</b>					
1	Mobilization, Insurance & Bonds (Max 5% of Base Bid)	LS	1	\$ 265,396.00	\$ 319,525.00
2	Barricades, Signs & Traffic Control	LS	1	\$ 90,000.00	\$ 90,000.00
<b>SUBTOTAL GENERAL</b>					<b>\$ 409,525.00</b>
<b>RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					
3	Remove Existing Concrete (Curb & Gutter)	LF	8458	\$ 6.00	\$ 50,748.00
4	Remove Existing Sidewalk	SY	4585	\$ 11.00	\$ 50,435.00
5	Remove Existing Driveways/Parking Areas	SY	2100	\$ 11.00	\$ 23,100.00
6	Remove Existing Signs	EA	120	\$ 75.00	\$ 9,000.00
<b>SUBTOTAL RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					<b>\$ 133,283.00</b>
<b>STORM SEWER IMPROVEMENTS</b>					
7	Remove Existing Inlet/MH	EA	27	\$ 650.00	\$ 17,550.00
8	Remove Existing Pipe (10"-18")	LF	167	\$ 21.00	\$ 3,507.00
9	Remove Existing Pipe (24"-36")	LF	2211	\$ 22.00	\$ 48,642.00
10	Construct H-Inlet w/Grate MOD (0'-5' Depth), Complete In Place	EA	6	\$ 2,500.00	\$ 15,000.00
11	Construct H-Inlet w/Lid MOD (0'-5' Depth), Complete In Place	EA	6	\$ 3,500.00	\$ 21,000.00
12	Grouted Storm Sewer Connection	EA	5	\$ 1,000.00	\$ 5,000.00
13	Construct Junction Box TY M (0'-7' Depth), Complete In Place	EA	15	\$ 8,000.00	\$ 120,000.00
14	Construct Curb Inlet TY C Special, Complete In Place	EA	30	\$ 6,000.00	\$ 180,000.00
15	Furnish & Install 12" HDPE (0'-3' Depth) (Non-Traffic)	LF	45	\$ 55.00	\$ 2,475.00
16	Furnish & Install 15" RCP (0'-5' Depth) (Traffic) (Class III)	LF	200	\$ 70.00	\$ 14,000.00
17	Furnish & Install 18" RCP (0'-5' Depth) (Traffic) (Class III)	LF	122	\$ 60.00	\$ 7,320.00
18	Furnish & Install 24" RCP (0'-5' Depth) (Traffic) (Class III)	LF	2156	\$ 75.00	\$ 161,700.00
19	Furnish & Install 30" RCP (0'-5' Depth) (Traffic) (Class III)	LF	394	\$ 85.00	\$ 33,490.00
20	Furnish & Install 36" RCP (0'-6' Depth) (Traffic) (Class III)	LF	2743	\$ 115.00	\$ 315,445.00
21	Furnish & Install 42" RCP (0'-6' Depth) (Traffic) (Class III)	LF	1862	\$ 140.00	\$ 260,680.00
22	Furnish & Install 7'x5' Box (0'-7' Depth) (Traffic)	LF	143	\$ 475.00	\$ 67,925.00
23	Place Concrete Riprap (5')	SY	25	\$ 57.00	\$ 1,425.00
24	Storm Trench Excavation Protection	LF	2500	\$ 1.40	\$ 3,500.00
<b>SUBTOTAL STORM SEWER IMPROVEMENTS</b>					<b>\$ 1,278,659.00</b>
<b>WATER SYSTEM IMPROVEMENTS</b>					
25	Water Service Adjustments and Misc.	LS	1	\$ 72,000.00	\$ 72,000.00
<b>SUBTOTAL WATER SYSTEM IMPROVEMENTS</b>					<b>\$ 72,000.00</b>
<b>SANITARY SEWER SYSTEM IMPROVEMENTS</b>					
26	Rehabilitate Existing 5' Diameter Manhole	VF	121	\$ 500.00	\$ 60,500.00
27	Remove and Replace Exist. Manhole Lid and Frame	EA	11	\$ 2,000.00	\$ 22,000.00
28	Addl. Manhole Wall Build Up (Cementitious Repair Material) per 1" Thick Lifes	VF	200	\$ 150.00	\$ 30,000.00
29	By-Pass Flow Control	LS	1	\$ 10,000.00	\$ 10,000.00
30	Remove and Replace Exist. 6" Sewer Service	LF	825	\$ 50.00	\$ 41,250.00
31	Install 6" Service Cleanout	EA	13	\$ 400.00	\$ 5,200.00
<b>SUBTOTAL SANITARY SEWER SYSTEM IMPROVEMENTS</b>					<b>\$ 168,950.00</b>
<b>PAVING IMPROVEMENTS</b>					
32	Roadway Embankment	CY	3962	\$ 9.00	\$ 35,658.00
33	Roadway Excavation	CY	70159	\$ 9.50	\$ 666,510.50
34	Concrete Pavement	SY	25195	\$ 65.00	\$ 1,637,675.00
35	Lime Treated Subgrade	SY	25195	\$ 2.00	\$ 50,390.00
36	Lime	TON	399	\$ 110.00	\$ 43,890.00
37	Stamped Colored Concrete Median	SY	760	\$ 120.00	\$ 91,200.00
38	Striping (W)(4")(BRK)	LF	1093	\$ 0.50	\$ 546.50
39	Striping (W)(8")(SLD)	LF	840	\$ 1.00	\$ 840.00
40	Striping (W)(12")(SLD)	LF	1046	\$ 1.25	\$ 1,307.50
41	Striping (W)(24")(SLD)	LF	192	\$ 7.00	\$ 1,344.00
42	Striping (Y)(4")(SLD)(DBL)	LF	5852	\$ 0.50	\$ 2,926.00
43	Striping (Y)(4")(BRK)	LF	714	\$ 0.50	\$ 357.00
44	Striping (Arrow)	EA	19	\$ 120.00	\$ 2,280.00
45	Ramps	EA	82	\$ 1,800.00	\$ 147,600.00
46	Concrete Sidewalk (4")	SY	6010	\$ 62.00	\$ 372,620.00
47	Concrete Curb & Gutter (6")	LF	10223	\$ 16.00	\$ 163,568.00
<b>SUBTOTAL PAVING IMPROVEMENTS</b>					<b>\$ 3,218,712.50</b>
<b>MISCELLANEOUS IMPROVEMENTS</b>					
48	Block Sod (St. Augustine)	SY	6355	\$ 5.00	\$ 31,775.00
49	Top Soil (4")	SY	6355	\$ 3.50	\$ 22,242.50
50	Install Sprinkler System	LS	1	\$ 45,000.00	\$ 45,000.00
51	Install Lighting System	EA	10	\$ 3,500.00	\$ 35,000.00
52	Temporary Sediment Control Fence	LF	2200	\$ 4.50	\$ 9,900.00
53	Temporary Sediment Control Fence (Remove)	LF	2200	\$ 1.50	\$ 3,300.00
54	Construct Detour	STA	41	\$ 4,000.00	\$ 165,200.00
55	HAWK Signals (Set of two signals)	EA	2	\$ 150,000.00	\$ 300,000.00
56	New Traffic Signals	EA	2	\$ 250,000.00	\$ 500,000.00
<b>SUBTOTAL MISCELLANEOUS IMPROVEMENTS</b>					<b>\$ 1,112,417.50</b>
<b>OTHER COSTS</b>					
57	Construction Services and Testing (5%)	LS	1	\$ 319,677.35	\$ 319,677.35
58	Construction Contingencies (20%)	LS	1	\$ 1,278,709.40	\$ 1,278,709.40
59	Engineering and Surveying (10%)	LS	1	\$ 767,225.64	\$ 767,225.64
<b>SUBTOTAL OTHER COSTS</b>					<b>\$ 2,365,612.39</b>
<b>TOTAL PRIMARY BID</b>					<b>\$ 8,759,159.39</b>

BEN WILSON STREET

			OPTION 3A (Mill & Overlay, No added Storm Drain Capacity)		
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
<b>GENERAL</b>					
1	Mobilization, Insurance & Bonds (Max 5% of Base Bid)	LS	1	\$ 216,872.00	\$ 216,872.00
2	Barricades, Signs & Traffic Control	LS	1	\$ 90,000.00	\$ 90,000.00
<b>SUBTOTAL GENERAL</b>					<b>\$ 306,872.00</b>
<b>RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					
3	Remove Existing Concrete (Curb & Gutter)	LF	5218	\$ 6.00	\$ 31,308.00
4	Remove Existing Sidewalk	SY	1900	\$ 11.00	\$ 20,900.00
5	Remove Existing Driveways/Parking Areas	SY	2100	\$ 11.00	\$ 23,100.00
6	Remove Existing Signs	EA	120	\$ 75.00	\$ 9,000.00
<b>SUBTOTAL RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					<b>\$ 84,308.00</b>
<b>STORM SEWER IMPROVEMENTS</b>					
7	Remove Existing Inlet/MH	EA	12	\$ 750.00	\$ 9,000.00
8	Remove Existing Pipe (24"-36")	LF	150	\$ 22.00	\$ 3,300.00
9	Construct H-Inlet w/Grate MOD (0'-5' Depth), Complete In Place	EA	6	\$ 6,000.00	\$ 36,000.00
10	Construct H-Inlet w/Lid MOD (0'-5' Depth), Complete In Place	EA	6	\$ 3,500.00	\$ 21,000.00
11	Grouted Storm Sewer Connection	EA	40	\$ 1,000.00	\$ 40,000.00
12	Construct Junction Box TY M (0'-7' Depth), Complete In Place	EA	30	\$ 4,500.00	\$ 135,000.00
13	Construct Curb Inlet TY C Special, Complete In Place	EA	30	\$ 4,500.00	\$ 135,000.00
14	Furnish & Install 18" RCP (0'-5' Depth) (Traffic) (Class III)	LF	422	\$ 55.00	\$ 23,210.00
15	Furnish & Install 24" RCP (0'-5' Depth) (Traffic) (Class III)	LF	940	\$ 75.00	\$ 70,500.00
16	Furnish & Install 30" RCP (0'-5' Depth) (Traffic) (Class III)	LF	3472	\$ 85.00	\$ 295,120.00
17	Furnish & Install 36" RCP (0'-6' Depth) (Traffic) (Class III)	LF	844	\$ 135.00	\$ 113,940.00
18	Place Concrete Riprap (5")	SY	25	\$ 57.00	\$ 1,425.00
19	Storm Trench Excavation Protection	LF	2500	\$ 2.50	\$ 6,250.00
<b>SUBTOTAL STORM SEWER IMPROVEMENTS</b>					<b>\$ 889,745.00</b>
<b>WATER SYSTEM IMPROVEMENTS</b>					
20	Water Service Adjustments and Misc.	LS	1	\$ 72,000.00	\$ 72,000.00
<b>SUBTOTAL WATER SYSTEM IMPROVEMENTS</b>					<b>\$ 72,000.00</b>
<b>SANITARY SEWER SYSTEM IMPROVEMENTS</b>					
21	Rehabilitate Existing 5' Diameter Manhole	VF	121	\$ 500.00	\$ 60,500.00
22	Remove and Replace Exist. Manhole Lid and Frame	EA	11	\$ 2,000.00	\$ 22,000.00
23	Addtl. Manhole Wall Build Up (Cementitious Repair Material) per 1" Thick Lifes	VF	200	\$ 150.00	\$ 30,000.00
24	By-Pass Flow Control	LS	1	\$ 10,000.00	\$ 10,000.00
25	Remove and Replace Exist. 6" Sewer Service	LF	825	\$ 50.00	\$ 41,250.00
26	Install 6" Service Cleanout	EA	13	\$ 400.00	\$ 5,200.00
<b>SUBTOTAL SANITARY SEWER SYSTEM IMPROVEMENTS</b>					<b>\$ 168,950.00</b>
<b>PAVING IMPROVEMENTS</b>					
27	Roadway Embankment	CY	3962	\$ 11.00	\$ 43,582.00
28	Roadway Excavation	CY	4500	\$ 9.00	\$ 40,500.00
29	Repair Roadway	SY	3500	\$ 47.00	\$ 164,500.00
30	Mill 1.5" ACP	SY	25450	\$ 2.00	\$ 50,900.00
31	Seal Coat (Aggr)	CY	255	\$ 85.00	\$ 21,675.00
32	Seal Coat (Asph)	GAL	7635	\$ 5.00	\$ 38,175.00
33	Hot Mix Ty C	TON	5471	\$ 110.00	\$ 601,810.00
34	Stamped Colored Concrete Median	SY	760	\$ 120.00	\$ 91,200.00
35	Striping (W)(4")(BRK)	LF	1093	\$ 0.50	\$ 546.50
36	Striping (W)(8")(SLD)	LF	840	\$ 1.00	\$ 840.00
37	Striping (W)(12")(SLD)	LF	1046	\$ 1.25	\$ 1,307.50
38	Striping (W)(24")(SLD)	LF	192	\$ 7.00	\$ 1,344.00
39	Striping (Y)(4")(SLD)(DBL)	LF	5852	\$ 0.50	\$ 2,926.00
40	Striping (Y)(4")(BRK)	LF	714	\$ 0.50	\$ 357.00
41	Striping (Arrow)	EA	19	\$ 120.00	\$ 2,280.00
42	Ramps	EA	82	\$ 1,800.00	\$ 147,600.00
43	Concrete Sidewalk (4")	SY	6010	\$ 62.00	\$ 372,620.00
44	Concrete Curb & Gutter (6")	LF	10223	\$ 16.00	\$ 163,568.00
45	Driveways/Parking Areas	SY	2100	\$ 75.00	\$ 157,500.00
<b>SUBTOTAL PAVING IMPROVEMENTS</b>					<b>\$ 1,903,231.00</b>
<b>MISCELLANEOUS IMPROVEMENTS</b>					
46	Block Sod (St. Augustine)	SY	6355	\$ 5.00	\$ 31,775.00
47	Top Soil (4")	SY	6355	\$ 3.50	\$ 22,242.50
48	Install Sprinkler System	LS	1	\$ 45,000.00	\$ 45,000.00
49	Install Lighting System	EA	10	\$ 3,500.00	\$ 35,000.00
50	Temporary Sediment Control Fence	LF	2200	\$ 4.50	\$ 9,900.00
51	Temporary Sediment Control Fence (Remove)	LF	2200	\$ 1.50	\$ 3,300.00
52	Construct Detour	STA	41	\$ 4,000.00	\$ 165,200.00
53	HAWK Signals (Set of two signals)	EA	2	\$ 150,000.00	\$ 300,000.00
54	Adjust Traffic Signals	EA	2	\$ 150,000.00	\$ 300,000.00
<b>SUBTOTAL MISCELLANEOUS IMPROVEMENTS</b>					<b>\$ 912,417.50</b>
<b>OTHER COSTS</b>					
55	Construction Services and Testing (5%)	LS	1	\$ 216,876.18	\$ 216,876.18
56	Construction Contingencies (20%)	LS	1	\$ 867,504.70	\$ 867,504.70
57	Engineering and Surveying (10%)	LS	1	\$ 520,502.82	\$ 520,502.82
<b>SUBTOTAL OTHER COSTS</b>					<b>\$ 1,604,883.70</b>
<b>TOTAL PRIMARY BID</b>					<b>\$ 5,942,407.20</b>

BEN WILSON STREET

			OPTION 3B (3 Lane w/ Enhanced Intersections)		
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
<b>GENERAL</b>					
1	Mobilization, Insurance & Bonds (Max 5% of Base Bid)	LS	1	\$ 265,396.00	\$ 265,396.00
2	Barricades, Signs & Traffic Control	LS	1	\$ 90,000.00	\$ 90,000.00
<b>SUBTOTAL GENERAL</b>					<b>\$ 355,396.00</b>
<b>RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					
3	Remove Existing Concrete (Curb & Gutter)	LF	8458	\$ 6.00	\$ 50,748.00
4	Remove Existing Sidewalk	SY	4585	\$ 11.00	\$ 50,435.00
5	Remove Existing Driveways/Parking Areas	SY	2100	\$ 11.00	\$ 23,100.00
6	Remove Existing Signs	SY	120	\$ 75.00	\$ 9,000.00
<b>SUBTOTAL RIGHT-OF-WAY PREPARATION &amp; DEMOLITION</b>					<b>\$ 133,283.00</b>
<b>STORM SEWER IMPROVEMENTS</b>					
7	Remove Existing Inlet/MH	EA	27	\$ 310.00	\$ 8,370.00
8	Remove Existing Pipe (10"-18")	LF	167	\$ 21.00	\$ 3,507.00
9	Remove Existing Pipe (24"-36")	LF	2211	\$ 22.00	\$ 48,642.00
10	Construct H-Inlet w/Grate MOD (0'-5' Depth), Complete In Place	EA	6	\$ 2,500.00	\$ 15,000.00
11	Construct H-Inlet w/Lid MOD (0'-5' Depth), Complete In Place	EA	6	\$ 3,500.00	\$ 21,000.00
12	Grouted Storm Sewer Connection	EA	5	\$ 1,000.00	\$ 5,000.00
13	Construct Junction Box TY M (0'-7' Depth), Complete In Place	EA	15	\$ 8,000.00	\$ 120,000.00
14	Construct Curb Inlet TY C Special, Complete In Place	EA	30	\$ 6,000.00	\$ 180,000.00
15	Furnish & Install 12" HDPE (0'-3' Depth) (Non-Traffic)	LF	45	\$ 55.00	\$ 2,475.00
16	Furnish & Install 15" RCP (0'-5' Depth) (Traffic) (Class III)	LF	200	\$ 70.00	\$ 14,000.00
17	Furnish & Install 18" RCP (0'-5' Depth) (Traffic) (Class III)	LF	122	\$ 55.00	\$ 6,710.00
18	Furnish & Install 24" RCP (0'-5' Depth) (Traffic) (Class III)	LF	2156	\$ 75.00	\$ 161,700.00
19	Furnish & Install 30" RCP (0'-5' Depth) (Traffic) (Class III)	LF	394	\$ 85.00	\$ 33,490.00
20	Furnish & Install 36" RCP (0'-6' Depth) (Traffic) (Class III)	LF	2743	\$ 115.00	\$ 315,445.00
21	Furnish & Install 42" RCP (0'-6' Depth) (Traffic) (Class III)	LF	1862	\$ 140.00	\$ 260,680.00
22	Furnish & Install 7'x5' Box (0'-7' Depth) (Traffic)	LF	143	\$ 475.00	\$ 67,925.00
23	Place Concrete Riprap (5")	SY	25	\$ 57.00	\$ 1,425.00
24	Storm Trench Excavation Protection	LF	2000	\$ 1.40	\$ 2,800.00
<b>SUBTOTAL STORM SEWER IMPROVEMENTS</b>					<b>\$ 1,268,169.00</b>
<b>WATER SYSTEM IMPROVEMENTS</b>					
25	Water Service Adjustments and Misc.	LS	1	\$ 72,000.00	\$ 72,000.00
<b>SUBTOTAL WATER SYSTEM IMPROVEMENTS</b>					<b>\$ 72,000.00</b>
<b>SANITARY SEWER SYSTEM IMPROVEMENTS</b>					
26	Rehabilitate Existing 5' Diameter Manhole	VF	121	\$ 500.00	\$ 60,500.00
27	Remove and Replace Exist. Manhole Lid and Frame	EA	11	\$ 2,000.00	\$ 22,000.00
28	Addtl. Manhole Wall Build Up (Cementitious Repair Material) per 1" Thick Lifes	VF	200	\$ 150.00	\$ 30,000.00
29	By-Pass Flow Control	LS	1	\$ 10,000.00	\$ 10,000.00
30	Remove and Replace Exist. 6" Sewer Service	LF	825	\$ 50.00	\$ 41,250.00
31	Install 6" Service Cleanout	EA	13	\$ 400.00	\$ 5,200.00
<b>SUBTOTAL SANITARY SEWER SYSTEM IMPROVEMENTS</b>					<b>\$ 168,950.00</b>
<b>PAVING IMPROVEMENTS</b>					
32	Roadway Embankment	CY	3962	\$ 9.00	\$ 35,658.00
33	Roadway Excavation	CY	70159	\$ 9.50	\$ 666,510.50
34	Concrete Pavement	SY	20731	\$ 65.00	\$ 1,347,515.00
35	Lime Treated Subgrade	SY	20731	\$ 2.00	\$ 41,462.00
36	Lime	TON	245	\$ 110.00	\$ 26,950.00
37	Stamped Colored Concrete Median	SY	769	\$ 120.00	\$ 92,280.00
38	Striping (W)(4")(BRK)	LF	612	\$ 0.50	\$ 306.00
39	Striping (W)(8")(SLD)	LF	1110	\$ 1.00	\$ 1,110.00
40	Striping (W)(12")(SLD)	LF	1007	\$ 1.25	\$ 1,258.75
41	Striping (W)(24")(SLD)	LF	191	\$ 7.00	\$ 1,337.00
42	Striping (Y)(4")(SLD)(DBL)	LF	10868	\$ 0.50	\$ 5,434.00
43	Striping (Y)(4")(BRK)	LF	0	\$ 0.50	\$ -
44	Striping (Arrow)	EA	19	\$ 120.00	\$ 2,280.00
45	Ramps	EA	71	\$ 1,800.00	\$ 127,800.00
46	Concrete Sidewalk (4")	SY	8152	\$ 62.00	\$ 505,424.00
47	Concrete Curb & Gutter (6")	LF	10223	\$ 16.00	\$ 163,568.00
<b>SUBTOTAL PAVING IMPROVEMENTS</b>					<b>\$ 3,018,893.25</b>
<b>MISCELLANEOUS IMPROVEMENTS</b>					
48	Block Sod (St. Augustine)	SY	10186	\$ 5.00	\$ 50,930.00
49	Top Soil (4")	SY	10186	\$ 3.50	\$ 35,651.00
50	Install Sprinkler System	LS	1	\$ 45,000.00	\$ 45,000.00
51	Install Lighting System	EA	10	\$ 3,500.00	\$ 35,000.00
52	Temporary Sediment Control Fence	LF	2200	\$ 4.50	\$ 9,900.00
53	Temporary Sediment Control Fence (Remove)	LF	2200	\$ 1.50	\$ 3,300.00
54	Construct Detour	STA	41	\$ 4,000.00	\$ 165,200.00
55	HAWK Signals (Set of two signals)	EA	2	\$ 150,000.00	\$ 300,000.00
56	New Traffic Signals	EA	2	\$ 250,000.00	\$ 500,000.00
<b>SUBTOTAL MISCELLANEOUS IMPROVEMENTS</b>					<b>\$ 1,144,981.00</b>
<b>OTHER COSTS</b>					
57	Construction Services and Testing (5%)	LS	1	\$ 308,083.61	\$ 308,083.61
58	Construction Contingencies (20%)	LS	1	\$ 1,232,334.45	\$ 1,232,334.45
59	Engineering and Surveying (10%)	LS	1	\$ 739,400.67	\$ 739,400.67
<b>SUBTOTAL OTHER COSTS</b>					<b>\$ 2,279,818.73</b>
<b>TOTAL PRIMARY BID</b>					<b>\$ 8,441,490.98</b>