

GREENEVILLE
TENNESSEE

Technical Study
SIGNAL SYSTEM EVALUATION, OPTIMIZATION, AND COMMUNICATIONS MASTER PLAN









Prepared for

TN TDOT Department of Transportation

in Cooperation with
TOWN OF GREENEVILLE
PUBLIC WORKS DEPARTMENT

September 2019

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Project No. 234821

EXECUTIVE SUMMARY

This Technical Study evaluates the Town of Greeneville's traffic signal system, providing recommendations for signal operational and timing improvements and establishes a communications master plan. The signal system review and evaluation inventoried Greeneville's signals and assessed current operations, identified operational deficiencies, and provided recommendations for improved signal operations. The evaluation included a review of the signalized intersection crash history, signal timing, and the intersection's capacity and levels of service.

The Town of Greeneville currently has 33 traffic signals with interconnect limited to the downtown and Tusculum Boulevard signals and a few outlying locations where the signal proximity required some coordination for acceptable operations. The Town's signals have primarily Peak 3000 and 3000E controllers, a few Eagle (Siemens) controllers, and a few newer Peak ATC (Advanced Traffic Control) controllers.

The Greeneville signals have two systems with twisted pair (copper) interconnect for the downtown area and Tusculum Boulevard. Four outlying signals also have interconnect using twisted pair cable and radio for the Lowes Home Center and the Walmart center, respectively.

The age of many of the current signal controllers are more than 20 years. The recommended signal controller life is between 10 and 15 years; therefore, many of the current controllers are beyond that recommended life. After 15 years, controllers should be replaced as maintenance will typically increase and technology improved. Twenty-three (23) of the Town's traffic signal controllers exceed 15 years and seventeen (17) of these exceed 20 years.

Therefore, it should be recognized that many of Town of Greeneville's traffic signal controllers have exceeded their recommended life and planning of their replacement should begin. The replacement of the Town's signal controllers should include advancement of the signal systems employed by the Town, providing for improved communications for the Town's signals and establishing accessibility from the Town's Public Works Department for improved operations and maintenance.

Crash history was reviewed between January 2014 and December 2018. Crash diagrams were developed for each signalized intersection with emphasis on angle and rearend collisions. Average rates were determined for the Andrew Johnson Highway, a 4-lane principle arterial, and a 2-lane principle arterial. Critical rates represent crash rates that are significantly higher than the average signalized crash rate. From the analysis, the following signalized intersection have significantly higher than the average rates for Greeneville signalized intersections:

1. Andrew Johnson Highway (US 11E/SR 34) & Rufe Taylor Road
2. Tusculum Boulevard (US 11E Bus/SR 107) & Bernard Avenue
3. Main Street & Depot Street

The Town of Greeneville signals were reviewed and operations modeled to evaluate of current signal operations. The initial review consisted of the Town's timing with regards to the vehicle clearances, both the YELLOW and RED intervals. The minimum time for the yellow clearance is 3.0 seconds. The RED clearance is provided to permit the vehicle at the end of YELLOW to clear the intersection prior to permitting the conflicting traffic to enter. Signal clearances were calculated in accordance with the **Manual on Uniform Traffic Control Devices (MUTCD)** and TDOT. Six (6) signals operate below the minimum YELLOW clearance time. Increased RED clearance time was identified for as many as 17 signals. Increasing the RED clearance should provide for safer signal operations.

The existing Greeneville signal timing was modeled using Synchro, Version 10, a signal modeling software developed by Trafficware. Synchro is often used in the evaluation of signal timing and its optimization. Most Greeneville's existing signalized intersections are currently operating within the intersection's capacity, and delays were found acceptable. Current signalized levels of service (LOS) were found to be a minimum LOS C. With the majority of the signals in Greeneville operating at a LOS C or better, it should be noted which intersections were operating at a lower LOS. Which included the following:

1. Main Street & Summer Street (US 11E Bus)-LOS D during PM peak hour
2. Summer Street (US 11E Bus) & Hwy 70 (SR 70)-LOS F during the AM and PM peak hours
3. Asheville Highway (SR 70) & Vann Road-LOS D for PM peak hour

The LOS F for the intersection of Summer Street (US 11E Bus) and Highway 70 (SR 70) can be readily mitigated with employment of more efficient signal timing. Though a LOS D is considered acceptable in urban conditions, the associated delays may be less acceptable as the town is experiencing higher levels of service thereby expectations may be higher. The LOS D for the PM peak hour of the Main Street and Summer Street (US 11E Bus) intersection can be improved to a LOS C with an update of the signal timing for the downtown system. For the intersection of Asheville Highway (SR 70) and Vann Road, the D LOS can be improved for the PM peak hour but not for the AM peak hour. The capacity ratio of the Asheville Highway (SR 70) and Vann Road signalized intersection is 0.85 for the PM peak hour which indicates the intersection is operating near capacity.

Signal phasing modifications are not found necessary for the Town of Greeneville signals. Improved level of service and/or reduction in delays can be achieved with improved signal timing for signalized intersections. Optimization will mitigate unacceptable levels of service for Summer Street and Highway 70. With intersection of Asheville Highway at Vann Road intersection nearing capacity, delays will increase as traffic grows on Ashville Highway. Asheville Highway (SR 70), with an AADT of 11,930, is approaching the capacity of a 2-lane arterial and its intersection with Vann Road and optimized signal operation indicated 85-percent of the capacity utilized during the PM peak hour. Further study of this section of Asheville Highway would be necessary and plans developed for the necessary improvements for continued acceptable signal operations at the Vann Road. Optimization of the Greenville signals may realize an approximate 30-percent reduction in the average signalized intersection delay.

This Greeneville signal system study identified four subsystems that can be phased for construction. The four subsystems are:

1. Andrew Johnson Highway (US 11E/US 321/SR34)
2. Greeneville Downtown
3. Tusculum Boulevard (US 11E Bus/SR 107)
4. Asheville Highway (SR 70)

These subsystems were divided into seven phases for construction priorities and to develop planning cost estimates. The estimated cost of this system and its subsystems, reflecting a total system buildout including in addition to the signal cabinet and controller replacement with fiber communications, signal reconstruction for several intersections, pedestrian improvements, and vehicle detection, is approximately $3.76 million. The upgrading of the vehicle detection is approximately $992,500. Signal cabinet and controller upgrades and communications is estimated to cost $1.69 million.

The Town of Greeneville has approximately $725,000 currently available for design and construction of the system. This would essentially limit the construction to Phase 1, Andrew Johnson Highway (US 11E/321). However, with an extensive GLPS fiber network available, the fiber communications may be initially leased, saving approximately $670,000 through Phase 5 of the system. There would be associated operating costs for the 7.75 miles of fiber for system communications.

An alternative phasing of construction may be pursued for the initial three primary phases of the system with consideration of a few factors. The alternative would limit the construction of the initial system with realizing these following factors:

- TDOT planned improvement for Andrew Johnson Highway (US 11E/321) that would reconstruct signals and install interconnect from Greeneville Commons to Rufe Taylor Road. Request that this project also include communications to Main Street.
- Greeneville Light and Power System (GLPS) fiber network.
- Ethernet over copper for downtown system communications and limit system improvements along Main Street, removing the signals on Summer Street that require reconstruction.
- Limit the radar detection upgrade to Tusculum Boulevard.

The current fiber-optic cable installed by the Greeneville Light and Power System (GLPS) provides an opportunity to lease fiber for the initial development of the system. With these factors considered, the construction of Phase 1 may be limited to the controller upgrade and modification of the cabinet for fiber communications leased through GLPS until TDOT completes the planned improvements for Andrew Johnson Highway including signals (including radar detection) and communications. There would be ongoing leasing costs until the TDOT road project is completed, 1.7 miles of leased fiber. The cost of the initial three phases of the system can be reduced to an estimated cost of 1.014 million.

Plans should begin to widen Asheville Highway (SR 70) to a 5-lane arterial between Main Street (US 321) and Ashland Drive or Weemes; the traffic signals and its subsystem should be a consideration in

conjunction of this future improvement. The cost of the system of the four primary subsystems may be approximately $1.977 million through Phase 6 and an approximate $2.423 million at buildout.

RECOMMENDATIONS

The recommendations of this study are as follows.

Signal Timing

- Install signal clearances, YELLOW and RED intervals for minimum and recommended standard clearance time.
- Update signal timing for Town of Greeneville traffic signals.

Signal System Upgrades And Communications

General

Signal cabinets and controllers throughout the Town of Greeneville should be replace with the most current technology reflecting the Advance Traffic Controllers (ATC). Fiber-optic communications should be installed for the ultimate Town owed fiber network but phased with initially leased fiber until Town owed fiber can be funded and installed. The current twisted pair interconnect should be utilized until it can be replaced with fiber cable. The backbone of this fiber network should extend along Andrew Johnson Highway, Tusculum Boulevard, and Main Street with connection to the Town Hall for a central traffic control center. The design and installation of the fiber should consider more than the traffic signal control and consider future ITS based applications including video (CCTV) for critical junctions and possible dynamic message signs for Andrew Johnson Highway (US 11E/SR 34).

Signals should be upgraded with radar detection and pedestrian control and improved sidewalk accessibility as required by the American Disabilities Act (ADA).

Andrew Johnson Highway (US 11E/US 321/SR 34)

- Phase 1
  - Upgrade signal controllers and install fiber communications with leased fiber from GLPS.
  - Install fiber communications, upgrade signal cabinets, and radar detection with TDOT planned Andrew Johnson Highway roadway improvements.
  - Develop central traffic signal control from Town Hall
- Phase 4
  - Request TDOT communication from Greeneville Commons to Main Street (US 321)/Kingsport Highway (SR 93) in conjunction with Andrew Johnson Highway roadway improvements.

Tusculum Boulevard (US 11E Bus/SR 107)

- Phase 2
  - Upgrade signal cabinet and controllers with overhead fiber communications from Andrew Johnson Highway to Main Street.
  - Install radar vehicle detection
  - Provide pedestrian signals with push button actuation and improved handicap ramps for the following Tusculum Boulevard intersections:
    - Grove Street
    - Austin Street
    - Snapps Ferry Road
- Reconstruct the signal at the intersection of Tusculum Boulevard and Bernard Avenue.

Greeneville Downtown

- Phase 3
  - Upgrade signal cabinets and controllers for Main Street (US 11 Bus/321) and the intersection of Church Street and College Street.
  - Install ethernet communications with existing twisted-pair cable.
  - Upgrade pedestrian signals with push button actuation and improve handicap ramps for Main Street.
- Phase 5
  - Reconstruct signals for the intersections of Summer Street at Cutler Street and at Irish Street with pedestrian ramp improvements and crosswalks.
  - Replace twisted-pair cable with fiber-optic cable for communication
  - Install radar vehicle detection.

Asheville Highway (SR 70)

- Phase 6
  - Study potential Asheville Highway improvements for adding capacity.
  - Reconstruct the signal at the intersection of Tusculum Boulevard and Bernard Avenue.
  - Upgrade signal controllers and install fiber communications from Main Street to Vann Road.
  - Install radar vehicle detection.

  - Provide pedestrian signals with push button actuation and improved handicap ramps
  - Install a cellular link between this subsystem and central system control.

- Phase 7
  - Extend fiber communication from the Asheville Highway (SR 70) subsystem to central office location providing communications to the isolated intersection of Summer Street and Highway 70.

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INTRODUCTION

PURPOSE OF THE STUDY

This Technical Study evaluates the Town of Greeneville's traffic signal system, providing recommendations for signal operational and timing improvements and establishes a communications master plan. The signal system review and evaluation inventoried Greeneville's signals and assessed current operations, identified operational deficiencies, and provided recommendations for improved signal operations. The evaluation included a review of the signalized intersection crash history, signal timing, and the intersection's capacity and levels of service.

Traffic signal timing was optimized for the peak-hour traffic conditions and timing plans prepared for the Town's signals and arterial coordination. Signal clearances, yellow and red clearances, were updated to reflect current recommended standards.

TRAFFIC DATA COLLECTION

Data collection efforts included a field inventory of the traffic signal equipment, identifying the intersection attributes including geometry and pedestrian facilities, signal timing, obtaining traffic signal maintenance records, conducting turning movement counts (TMC), obtaining TDOT count station data, and obtaining crash data.

Turning movement counts were conducted for the signalized intersections below.

Andrew Johnson Highway (US 11E)

1. Andrew Johnson Hwy (US 11E) & Main St/Kingsport Hwy (SR 93)
2. Andrew Johnson Hwy (US 11E) & Industrial Road
3. Andrew Johnson Hwy (US 11E) & Greeneville Commons
4. Andrew Johnson Hwy (US 11E) & Justice Drive/Bob Smith Blvd
5. Andrew Johnson Hwy (US 11E) & Fairgrounds Road
6. Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance
7. Andrew Johnson Hwy (US 11E) & Erwin Hwy
8. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd
9. Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.
10. Andrew Johnson Hwy (US 11E) & Walmart Driveway
11. Andrew Johnson Hwy (US 11E) & Erwin Hwy (SR 107)
12. Snapps Ferry Rd & Bohannon Ave/Forest Hills Drive

Tusculum Boulevard (/US 11 Bus./SR 107)

1. Tusculum Blvd (SR 107) & Grove St
2. Tusculum Blvd (SR 107) & Austin St
3. Tusculum Blvd (SR 107) & Snapps Ferry Rd
4. Tusculum Blvd (SR 107) & Bernard St
5. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St
6. Tusculum Blvd (SR 107) & Hope Rd
7. Tusculum Blvd (SR 107) & Justice Dr

Downtown

1. Summer St (US 11 Bus) & Cutler St
2. Summer St (US 11 Bus) & Irish St
3. Main St (US 321) & Tusculum Blvd/Spencer St
4. Main St (US 321) & Church St
5. Main St (US 321) & Depot St
6. Main St (US 321) & Summer St
7. Main St (US 321) & McKee St
8. E. McKee St & College St
9. E. McKee St & Bernard Ave
10. Church St & College St.
11. Church St & Bernard Ave

ASHEVILLE HIGHWAY (SR 70)

1. Summer St (US 11 Bus) & Arnold Rd
2. Asheville Hwy (SR 70) & Main St (US 321)
3. Asheville Hwy (SR 70) & Vann Rd

The following Tennessee Department of Transportation average daily traffic (ADT) count station data were reviewed for various signalized corridors in Greeneville.

- Andrew Johnson Hwy (US 11E/SR 34)
  - West Snapps Ferry Road (Station 101),
  - East of Tusculum Blvd (Station 100)
  - East of Erwin Hwy, Tusculum Bypass-SR107 (Station 127)
- Main Street (US 321)
  - Between Depot St and Church St (Station 109)
- Tusculum Blvd (US 11E Bus.)
  - West of Mt Bethel/Mason St (Station 207)
- Asheville Hwy (SR 70)
  - Between Main St and Vann Rd (Station 73)

In addition to the TDOT station counts, directional automated traffic counts (ATC) were conducted by TDOT for several locations:

1. Andrew Johnson Highway (US 11E/321, SR 34) at Justice Drive
2. Main Street (US 11E Bus/321) at Church Street
3. Tusculum Boulevard (US 11E Bus/SR 107) at Mt Bethel Road/Mason Street
4. Tusculum Boulevard at Oak grove Avenue

Daily traffic volumes are illustrated in **Figure 1** reflecting the ADT data reviewed and collected above.

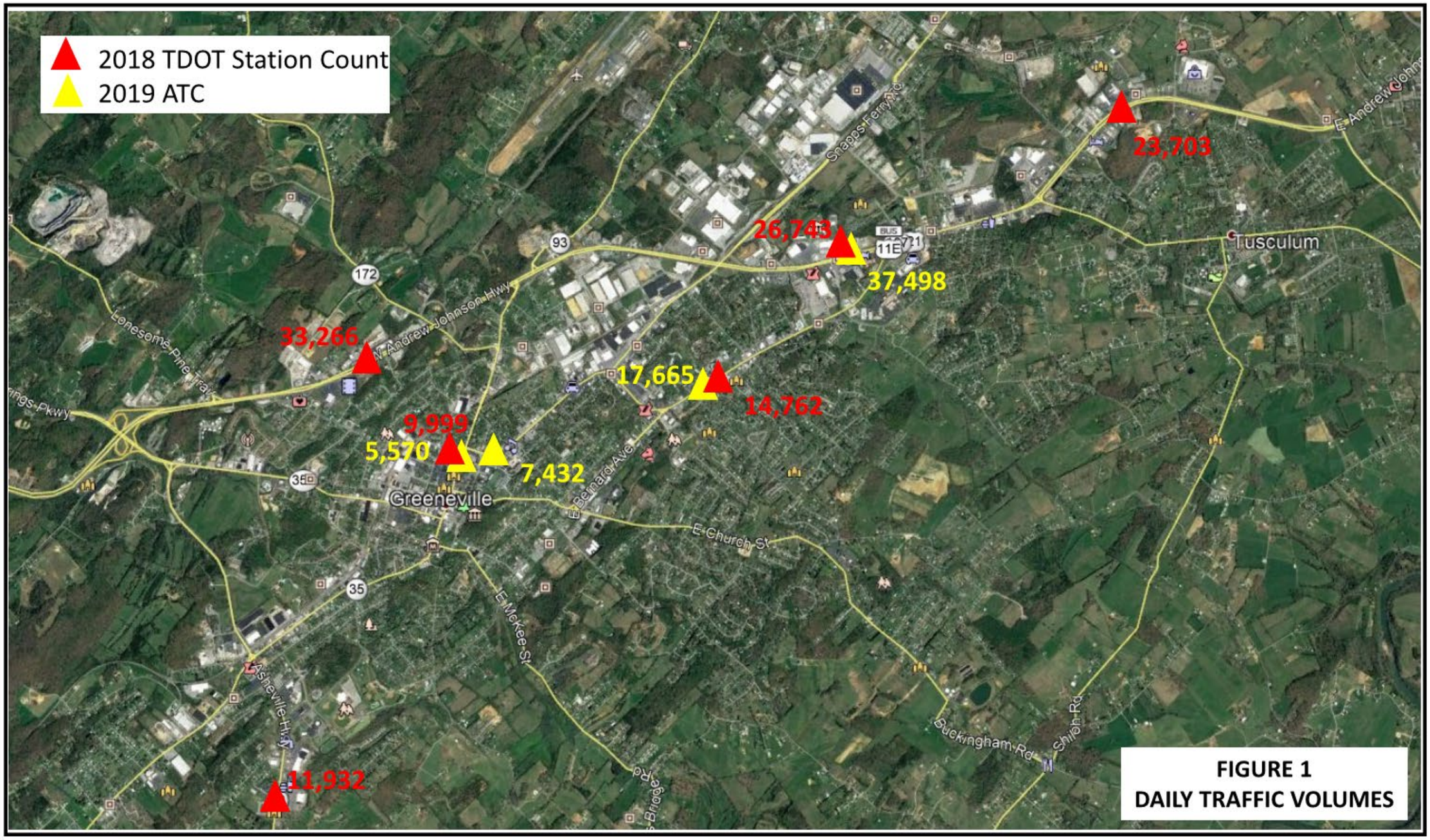


Figure 1: Daily Traffic Volumes

STUDY SIGNALIZED INTERSECTION AND CORRIDORS, SIGNAL AND COMMUNICATIONS

DESCRIPTION OF EXISTING CONDITIONS

The Town of Greeneville currently has 33 traffic signals with interconnect limited to the downtown and Tusculum Boulevard signals and a few outlying locations where the signal proximity required some coordination for operations. The current signal cabinet standard is TS1, and the controller standard is are TS2. The Town's signals are primarily Peak 3000 and 3000E controllers, a few Eagle (Siemens) controllers, and a few newer Peak ATC (Advanced Traffic Control) controllers. The Peak 3000 is a controller introduced in the middle 1990s for the TS2 specification. **Table 1** presents the current inventory of the Town of Greeneville's traffic signal control. The Peak 3000 controllers were replaced by the Peak ATC in the past few years.

The Greeneville signals have two systems with twisted pair (copper) interconnect for the downtown area and Tusculum Boulevard. Four outlying signals also have interconnect using twisted pair cable and radio. Two of the outlying signals, interconnected with twisted pair cable, are associated with the Lowes Home Center located on Andrew Johnson Highway (US 11E) and connects the intersections of Haynes Boulevard (Lowes access) and Fairgrounds Road. This twisted pair interconnect was installed with the signalization of Haynes Boulevard due to its proximity to the Fairgrounds Road traffic signal.

Radio communications are provided for the intersections of Andrew Johnson Highway at Morgan Road and the Walmart primary access driveway on the east town limits. These signals were installed with radio interconnect in conjunction with the Walmart development in 2012.

Figure 2: illustrates the Town of Greeneville's 33 signalized intersections. with 13 connected with interconnect for downtown, Tusculum Boulevard, Lowes, and Walmart. The Town of Greeneville's current communications is illustrated in **Figure 3**.

Table 1: Signal Inventory, Town of Greenville

AGE FLAG	SIGNAL GROUPS		CONTROLLER MANUFACTURER	CONTROLLER DATE	CABINET DATE	EXISTING COMM
	3. ANDREW JOHNSON HIGHWAY (U.S. 11E)					
	1. Andrew Johnson Hwy (US 11E) & Hal Henard Road (potential future signal)					
< 5	2. Andrew Johnson Hwy (US 11E) & Main St/Kingsport Hwy (SR 93)		Peak ATC 1000		11/7/2012	
19	3. Andrew Johnson Hwy (US 11E) & Industrial Road/Burns Street		Eagle EPAC 300	9/6/1999	6/1/2000	
< 5	4. Andrew Johnson Hwy (US 11E) & Greeneville Commons		Peak ATC 1000		4/13/1990	
< 5	5. Andrew Johnson Hwy (US 11E) & Justice Drive/Bob Smith Blvd		Peak ATC 1000		6/21/1990	
	6. Andrew Johnson Hwy (US 11E) & Tusculum Blvd (US 11E Bus., potential future signal)					
22	7. Andrew Johnson Hwy (US 11E) & Fairgrounds Road		Peek 3000	8/6/1997	3/10/1997	Twisted Pair
19	8. Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance	M	Peek 3000	8/7/2000	5/31/2000	
22	9. Andrew Johnson Hwy (US 11E) & Erwin Hwy		Eagle EPAC 300	4/4/1997	5/11/1998	
9	10. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd		Peak 3000E	8/28/2009		
8	11. Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.		Peek 3000E	12/15/2011	9/11/2004	Radio
8	12. Andrew Johnson Hwy (US 11E) & Walmart Driveway	M	Peek 3000E	12/15/2011	5/22/2012	
< 5	13. Snapps Ferry Rd & Bohannon Ave/Forest Hills Dr		Peak ATC 1000		6/10/1991	
	2. TUSCULUM BOULEVARD (US 11 Bus./SR 107)					
23	1. Tusculum Blvd (SR 107) & Grove St		Peek 3000	5/24/1996	5/21/1996	
23	2. Tusculum Blvd (SR 107) & Austin St		Peek 3000	3/29/1996	5/22/1996	
25	3. Tusculum Blvd (SR 107) & Snapps Ferry Rd	M	Peek 3000E	Dec-94	5/7/1996	Twisted Pair
23	4. Tusculum Blvd (SR 107) & Bernard Ave		Peek 3000	4/1/1996	3/10/1997	
23	5. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St		Peek 3000	10/6/1996	6/6/1996	
23	6. Tusculum Blvd (SR 107) & Hope Rd		Peek 3000	5/14/1996	7/27/1996	
12	7. Tusculum Blvd (SR 107) & Justice Dr/Old Tusculum Rd		Peek 3000E	3/30/2007	4/18/1991	
	1. DOWNTOWN					
22	1. Summer St (US 11 Bus) & Cutler St		Peek 3000	2/17/1997	5/14/1996	
23	2. Summer St (US 11 Bus) & Irish St		Peek 3000	12/30/1996	4/30/1996	
24	3. Main St (US 321) & Tusculum Blvd/Spencer St		Peek 3000	12/4/1995	2/12/1996	
23	4. Main St (US 321) & Church St		Peek 3000E	6/12/1996	5/15/1996	Twisted Pair
22	5. Main St (US 321) & Depot St		Peek 3000E	7/20/1997	8/30/1999	
23	6. Main St (US 321) & Summer St	M	Peek 3000E	4/2/2001	2/31/1999	
18	7. Main St (US 321) & McKee St		Peek 3000E	6/7/1996	4/30/1996	
22	8. Church St & College St.		Peek 3000E	10/6/1997	5/21/1996	
> 15	9. E. McKee St (SR 350)& College St		Eagle EPAC 300		9/1/1986	
23	10. E. McKee St (SR 350) & Bernard Ave		Peek Transyt	6/3/1996	7/12/1985	
7	11. Church St & Bernard Ave		Peek 3000E	9/21/2012	8/5/2013	
	ASHEVILLE HIGHWAY (SR 70)					
> 15	1. Summer St (US 11 Bus) & Arnold Rd		Eagle (Siemens)		10/15/1995	
18	2. Asheville Hwy (SR 70) & Main St (US 321)		Peek 3000E	2001		
6	3. Asheville Hwy (SR 70) & Vann Rd		Peek 3000E	12/10/2013	8/20/1992	

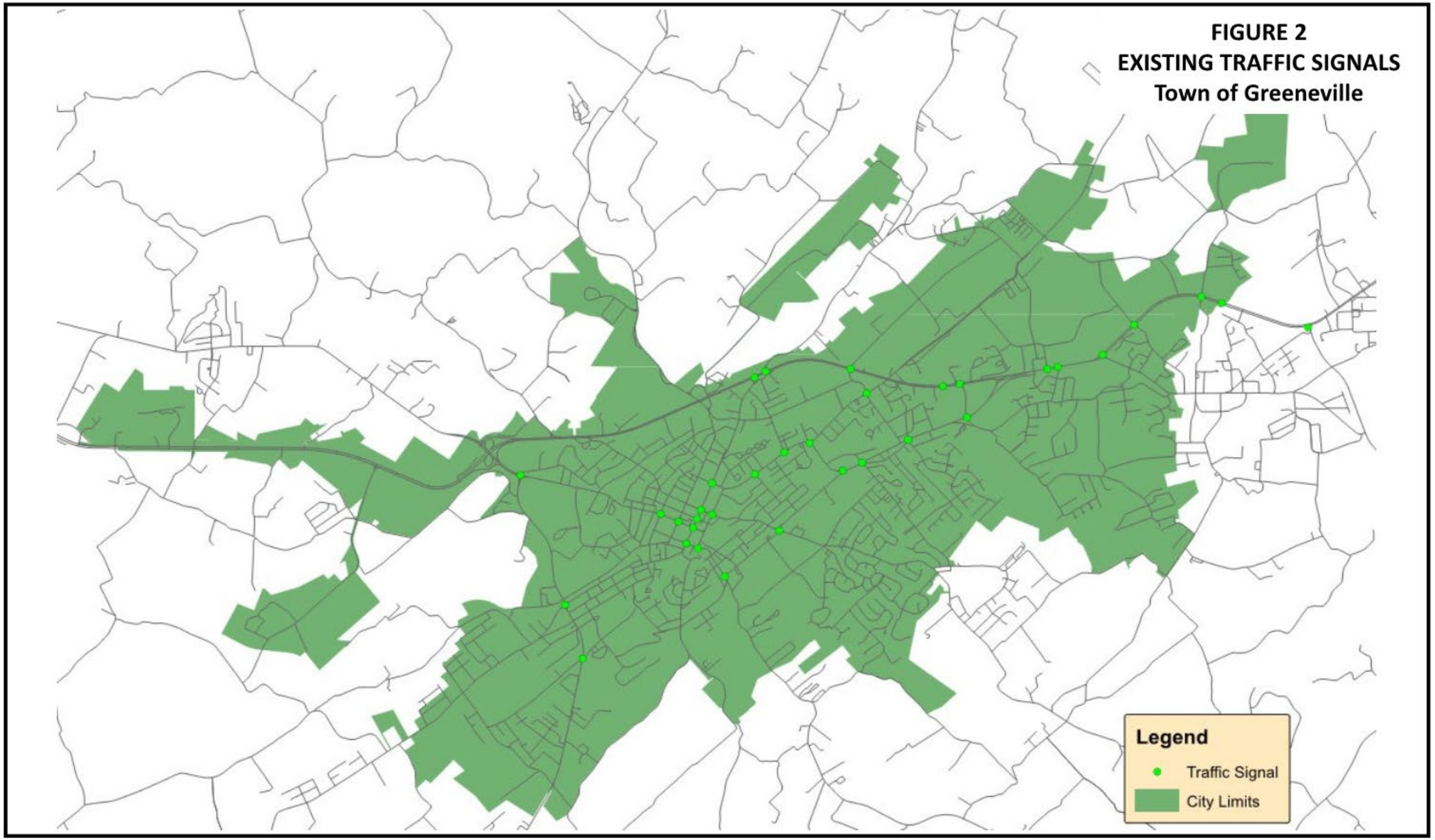


Figure 2: Existing Traffic Signals

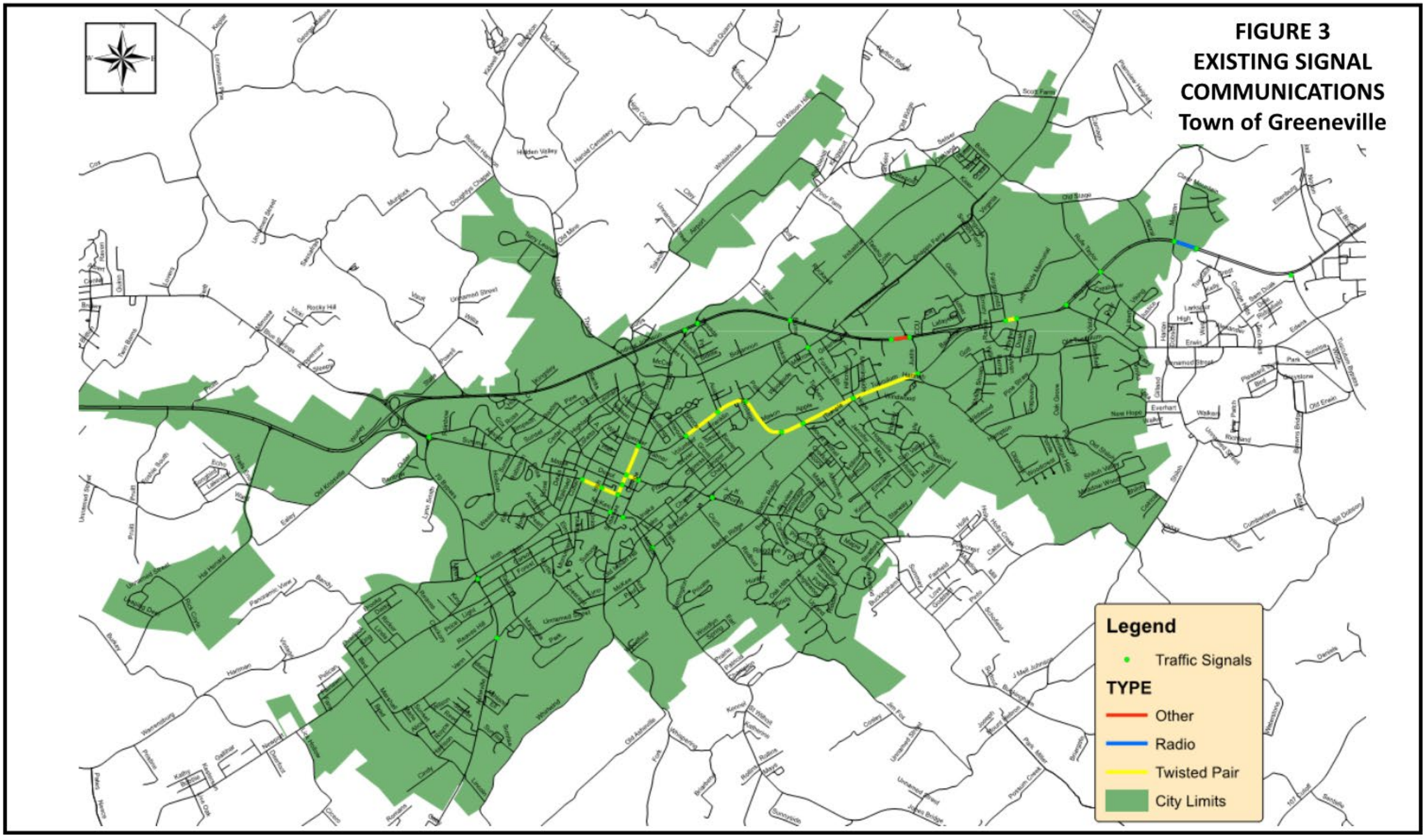


Figure 3: Existing Signal Communications

PURPOSE AND NEED

The TS1 specification was replaced with the TS2 specification back in 1994. A few of the newer signalized intersections have the newer ATC controllers in TS 1 cabinets. The age of many of the current signal controllers are more than 20 years. The recommended signal controller life is between 10 and 15 years; therefore, many of the current controllers in operation are beyond that recommended life. After 15 years, controllers should be replaced as maintenance will typically increase and technology improved. Twenty-three (23) of the Town's traffic signal controllers exceed 15 years and seventeen (17) of these exceed 20 years in age.

The downtown and Tusculum Boulevard signal systems are interconnected with twisted pair cable (copper). These systems are not currently being operated in coordination because signal timing has not been updated, thus the existing timing is not effectively managing the current traffic conditions. Instead signal timing refinements for the Greeneville signals have been more a reaction to public complaints and requests. Signal system timing for the downtown system was last addressed in March of 1999.

Therefore, it should be recognized that the Town of Greeneville's traffic signal controllers have exceeded their recommended life and planning for their replacement should begin. The replacement of the Town's signal controllers should include advancement of the signal systems employed by the Town, providing for improved communications and establishing accessibility from the Town's Public Works Department for improved operations and maintenance. Updating the signal system will bring it up to today's technology standards, which will provide for greater efficiencies and offer tools for better maintenance and control. These upgrades will allow the Town of Greeneville to better manage traffic signal control and traffic flow through and about the town.

The traffic signal timings need to be updated and minimum clearances changed to meet current recommended standards. With the timing updated, coordinated signal operations can be reestablished, minimizing stops, delays, and improving signal operations.

SIGNALIZED INTERSECTION CRASH HISTORY

In reviewing the Town of Greeneville's signal operations and for determination of need to improve safety for the signalized intersections, traffic crash histories were developed for the signalized intersections. Crashes were identified within 300 feet of each signalized intersection's approach, thereby including crashes that may be influenced by signal operations. The crash history was reviewed between January 2014 and December 2018. Crash diagrams were developed for each signalized intersection with emphasis on the angle and rearend collisions as these can often be associated with signal operations, including signal phasing, timing, and the signal's configuration. Crash severity was identified for each signalized intersection. Crash diagrams are provided in the Appendix.

Crash rates were developed for the signalized intersections using the crash history data and the intersection turning movement counts (TMC) conducted by the Tennessee Department of Transportation (TDOT). To calculate the intersection crash rate, ADTs and K-factors were developed. The PM peak-hour entering traffic was factored to an estimated average daily traffic ADT from K-factors calculated from TDOT ADT stations, including Andrew Johnson Highway (US 11E), Main Street (US 321), Tusculum Boulevard (US 11E Bus.), and Asheville Hwy (SR 70). The K-factors estimated from the TDOT count stations are as follows:

- Andrew Johnson Highway (US 11E/SR 34), west of Rufe Taylor Rd 0.077
- Andrew Johnson Highway (US 11E/SR 34), east of Rufe Taylor Rd 0.079
- Main Street (US 321/SR 107) 0.077
- Tusculum Boulevard (US 11E Bus/SR 107) 0.085
- Asheville Highway (SR 70) 0.079

Table 2 presents the crashes and crash rates for the Town of Greeneville signalized intersections. In addition, in order to identify higher than average rates for the signals in Greeneville, average rates and critical rates were determined from the Greeneville crash data. Statewide averages for urban spot locations were not employed as these rates reflect all spots (intersections) including with and without signals and both private driveways and public intersections. Signals will typically experience higher than average statewide crash rates as signal operations interrupt traffic flow and may, thereby, result in increased accidents. Average rates were determined for the Andrew Johnson Highway, a 4-lane principle arterial, and a 2-lane principle arterial. Critical rates represent a value significantly higher than the average signalized crash rate. From the analysis, the following signalized intersections have significantly higher than the average rates for signalized intersections:

1. Andrew Johnson Highway (US 11E/SR 34) & Rufe Taylor Road
2. Tusculum Boulevard (US 11E Bus/SR 107) & Bernard Avenue
3. Main Street & Depot Street

Table 2: Accident Rates Signalized Intersections, Town of Greeneville

SIGNAL GROUPS	ENTERING PM PEAK HOUR	ENTERING ADT	CRASHES	CRASH RATE	STATEWIDE AVERAGE	CRITICAL CRASH RATE	A/C	GREENVILLE SIGNALIZED AVERAGE RATE	GREENEVILLE CRITICAL CRASH RATE	A/C
3. ANDREW JOHNSON HIGHWAY (U.S. 11E)										
1. Andrew Johnson Hwy (US 11E) & Hal Henard Road (potential future signal)	2500	32468	72	1.22	0.192	0.333	3.65	-	-	-
2. Andrew Johnson Hwy (US 11E) & Kingsport Hwy (SR 93)	2873	37312	39	0.57	0.254	0.40	1.42	0.641	0.87	0.66
Andrew Johnson Hwy (US 11E) & Main St (US 321)	2952	38338	23	0.33	0.254	0.40	0.82	0.641	0.87	0.38
3. Andrew Johnson Hwy (US 11E) & Industrial Road/Burns Street	3051	39623	60	0.83	0.254	0.40	2.08	0.641	0.87	0.96
4. Andrew Johnson Hwy (US 11E) & Greeneville Commons	2857	37104	21	0.31	0.254	0.40	0.77	0.641	0.87	0.35
5. Andrew Johnson Hwy (US 11E) & Justice Drive/Bob Smith Blvd	2831	36766	55	0.82	0.254	0.40	2.03	0.641	0.88	0.94
6. Andrew Johnson Hwy (US 11E) & Tusculum Blvd (US 11E Bus., potential future signal)	2500	32468	30	0.51	0.254	0.41	1.22	-	-	-
7. Andrew Johnson Hwy (US 11E) & Fairgrounds Road	3097	40221	46	0.63	0.306	0.46	1.35	0.641	0.87	0.72
8. Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance	3137	40740	40	0.54	0.306	0.46	1.16	0.641	0.86	0.62
9. Andrew Johnson Hwy (US 11E) & Erwin Hwy	3157	41000	52	0.69	0.254	0.40	1.75	0.641	0.86	0.81
10. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd	2873	36367	89	1.34	0.254	0.41	3.31	0.641	0.88	1.53
11. Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.	2712	34329	45	0.72	0.254	0.41	1.75	0.641	0.88	0.81
12. Andrew Johnson Hwy (US 11E) & Walmart Driveway	2489	31506	8	0.14	0.254	0.42	0.33	0.641	0.90	0.16
13. Snapps Ferry Rd & Bohannon Ave/Forest Hills Dr	844	9929	14	0.77	0.313	0.65	1.20	0.641	1.11	0.70
2. TUSCULUM BOULEVARD (US 11 Bus./SR 107)										
1. Tusculum Blvd (SR 107) & Grove St	1070	12588	10	0.44	0.313	**0.61**	0.72	0.917	1.40	0.31
2. Tusculum Blvd (SR 107) & Austin St	1381	16247	29	0.98	0.313	**0.57**	1.72	0.917	1.34	0.73
3. Tusculum Blvd (SR 107) & Snapps Ferry Rd	1717	20200	23	0.62	0.313	**0.54**	1.15	0.917	1.30	0.48
4. Tusculum Blvd (SR 107) & Bernard Ave	2308	27153	81	1.63	0.313	**0.51**	3.22	0.917	1.24	1.31
5. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St	2015	23706	27	0.62	0.313	**0.52**	1.19	0.917	1.27	0.49
6. Tusculum Blvd (SR 107) & Hope Rd	1682	19788	35	0.97	0.313	**0.54**	1.78	0.917	1.30	0.74
7. Tusculum Blvd (SR 107) & Justice Dr/Old Tusculum Rd	1542	18141	28	0.85	0.313	**0.55**	1.53	0.917	1.32	0.64
1. DOWNTOWN										
1. Summer St (US 11 Bus) & Cutler St	656	8519	4	0.26	0.313	**0.68**	0.38	0.917	1.51	0.17
2. Summer St (US 11 Bus) & Irish St	654	8494	17	1.10	0.313	**0.68**	1.62	0.917	1.52	0.72
3. Main St (US 321) & Tusculum Blvd/Spencer St	1113	14455	18	0.68	0.313	**0.59**	1.17	0.917	1.37	0.50
4. Main St (US 321) & Church St	1378	17896	31	0.95	0.313	**0.56**	1.71	0.917	1.32	0.72
5. Main St (US 321) & Depot St	872	11325	39	1.89	0.313	**0.62**	3.03	0.917	1.43	1.32
6. Main St (US 321) & Summer St	1030	13377	12	0.49	0.313	**0.60**	0.82	0.917	1.39	0.35
7. Main St (US 321) & McKee St	890	11558	27	1.28	0.313	**0.62**	2.06	0.917	1.43	0.90
8. Church St & College St.	813	10558	19	0.99	0.313	**0.64**	1.55	0.917	1.45	0.68
9. E. McKee St (SR 350)& College St	687	8922	3	0.18	0.313	**0.67**	0.28	0.917	1.50	0.12
10. E. McKee St (SR 350) & Bernard Ave	1047	13597	19	0.77	0.313	**0.59**	1.29	0.917	1.38	0.55
11. Church St & Bernard Ave	1885	24481	42	0.94	0.313	**0.52**	1.81	0.917	1.26	0.75
4. ASHEVILLE HIGHWAY (SR 70)										
1. Summer St (US 11 Bus) & Arnold Rd	1203	15228	31	1.12	0.313	**0.58**	1.93	0.917	1.36	0.82
2. Asheville Hwy (SR 70) & Main St (US 321)	2237	28316	66	1.28	0.313	**0.50**	2.54	0.917	1.24	1.03
3. Asheville Hwy (SR 70) & Vann Rd	1682	21291	48	1.24	0.313	**0.53**	2.31	0.917	1.29	0.96

Further review of the crash patterns for these signalized intersections found the following.

Andrew Johnson Highway (US 11E/SR 34) & Rufe Taylor Road

- 11 of the 89 crashes appear to be related to driveways within the intersection influence area.
- Rear-end collisions represent 58% of the crashes at the signal (45)
- Angle collisions represent 27% of the crashes at the signal (21)

Many rear-end collisions can be attributed to higher speeds which can occur on Andrew Johnson Highway.

Tusculum Boulevard (US 11E Bus/SR 107) & Bernard Avenue

- Rear-end collisions represent 62% of the crashes at the signal (50)
- Angle collisions represent 30% of the crashes at the signal (24)

Westbound rearend collisions may be attributed to the curve in the roadway and the signal head line-of-sight, possibly correctable with an auxiliary signal head for the westbound approach. The Bernard Avenue approach to Tusculum Boulevard has experienced several rear-end collision as well that also might be attributable to the approach alignment. A nearside auxiliary signal head may also resolve the rear-end collisions for the Bernard Avenue approach. This signal should be considered for reconstruction as this signal configuration could be substantially improved and signal indication should be provided for the driveway approach.

Main Street & Depot Street

- A couple of rear-end collisions occurred on the eastbound approach of Depot Street which may have resulted from parking vehicles
- Rearend collisions represent 24% of the crashes at the signal (9)
- Angle collisions represent 46% of the crashes at the signal (19)

The signalized intersection of Main Street and Depot Street has left-turn restrictions with signs posted on the mast arms, but they appear to be somewhat faded, requiring replacement. Added signs should also be posted on the intersection approaches for reinforcement of the prohibition and the east- and westbound overhead signs may be obstructed with sun glare during periods of the day. Because the buildings and parallel parking at the corners of the intersection can obstruct the lines of sight for right turning traffic on RED, the movement should be prohibited.

The result of the signal phasing and timing evaluation is reported in the next section. Signal clearances (YELLOW and RED intervals) for the Town of Greeneville signalized intersections were reviewed and evaluated against the current recommended practices. The evaluation of signal clearances was conducted to determine necessary improvements that might address the safety of the signalized intersection and its operation.

For the current unsignalized intersections of Andrew Johnson Highway (US 11E/SR 34) with Hal Henard Road and Tusculum Boulevard (US 11E Bus/SR 107) crash rates exceed the statewide average and respective critical rates. Signalization may resolve these higher crash rates but will possibly increase the number of rear-end collisions as these types of crashes are not uncommon for signalized operations.

GREENEVILLE SIGNAL TIMING

The current signal timing was provided by the Town of Greeneville for modeling and review for the evaluation of current signal operations within the town. The initial review was the Town's timing was with regards to the vehicle clearances, yellow and red clearances. The yellow clearances are determined from the approach speeds, often the posted speed limit, and the red clearance is the "all red" interval is clearance time required for a vehicle to travel through the signalized intersection at the end of the yellow clearance. The minimum time for the yellow clearance is 3.0 seconds. If a vehicle has entered the intersection just prior to the termination of the yellow clearance, the red clearance should be sufficient time for the vehicle to clear the intersection prior to the next conflicting signal phase. The total clearance time should not typically exceed 7 seconds but in some instances may be necessary in order to address a specific condition that may exist. A red clearance is not typically recommended over 2.5 seconds unless again necessary for specific condition that may exist. A specific condition might be a wider than usual intersection, an off-set intersection for example.

Signal clearances were calculated for the Greeneville traffic signals in accordance with the **Manual on Uniform Traffic Control Devices (MUTCD)** and TDOT. The calculated clearances can be found in the report Appendix and the recommended clearances were included with the optimized timing developed for the Town of Greenville. Most of the traffic signals in Greeneville currently have the required minimum Yellow clearance though there are some exceptions. These exceptions need to be addressed.

YELLOW CLEARANCE VIOLATIONS

1. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd[1]
2. Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.-Southbound approach
3. Tusculum Blvd (SR 107) & Grove St
4. Tusculum Blvd (SR 107) & Austin St
5. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St[2]
6. Summer St (US 11 Bus) & Arnold Rd

Many of the Greenville signals programmed YELLOW and RED intervals (total clearance time) can be adjusted for increased efficiencies; many of the signals, however, may have the recommended total clearance time but the RED interval might be reduced thereby minimizing loss time for the signal operations. Many other signals, however, were found with less than the recommended total clearance time which suggests the need for added RED clearance time. These signals that should have an increased RED clearance interval are listed below.

[1] This signalized intersection experienced higher than average crashes which the clearance time might be a contributing factor.
[2] This signalized intersection experienced higher than average crashes which the clearance time might be a contributing factor.

ALL RED CLEARANCE

1. Andrew Johnson Hwy (US 11E) & Industrial Road/Burns St
2. Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance
3. Andrew Johnson Hwy (US 11E) & Erwin Hwy
4. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd[3]
5. Snapps Ferry Rd & Bohannon Ave/Forest Hills Dr
6. Tusculum Blvd (SR 107) & Grove St
7. Tusculum Blvd (SR 107) & Austin St
8. Tusculum Blvd (SR 107) & Bernard Ave[4]
9. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St
10. Tusculum Blvd (SR 107) & Hope Rd
11. Main St (US 321) & Church St
12. Church St & College St.
13. E. McKee St (SR 350) & College St
14. Church St & Bernard Ave
15. Summer St (US 11 Bus) & Arnold Rd
16. Asheville Hwy (SR 70) & Main St (US 321)
17. Asheville Hwy (SR 70) & Vann Rd

Further review of several intersections for clearance time deficiencies identified the following signal with recommended total clearance time but more yellow clearance than required and a RED interval that should be increased.

1. Main St (US 321) & Depot St

There are many intersections that may not meet the recommended RED clearance interval. The RED clearances may often need some judgement in its application. Many of the deficiencies are not be severe but should be changed to insure the safest signal operation. For the noted intersections, the added clearance time should increase the signalized intersection safety.

Table C-1, provided in the Appendix, presents the detail of this evaluation showing the calculated clearance time, the recommended clearances with respect to the calculation, and the current Greeneville signal clearances.

SIGNAL CAPACITY AND LEVEL OF SERVICE

In order to evaluate the current operations of the traffic control devices, capacity and level of service were calculated using the **Highway Capacity Manual, Special Report 209** published by the Transportation Research Board (TRB). Signalized and unsignalized intersections are evaluated based on estimated intersection delays, which may be related to level of service (LOS).

[3] This signalized intersection experienced higher than average crashes which the clearance time might be a contributing factor.
[4] This signalized intersection experienced higher than average crashes which the clearance time might be a contributing factor.

Capacity of an intersection represented by the intersection V/C (volume/capacity) or capacity ratio is the calculation of traffic volumes in relation to the intersection geometry, signal phasing, and the green time assignment for any traffic movement. Capacity ratios between 0.80 and 0.90 represents acceptable and efficient use of the intersection's geometry whereas capacity ratios in excess of 0.90, intersections operating near or over capacity, may be less stable and greater delays may occur more often. Signalized delays are attributed to the intersection geometry and the signal timing employed. In saturated traffic conditions or over capacity conditions, delay may be reduced but the capacity may only be marginally improved, and phasing improvements may improve capacity and decrease delays, but more often, capacity issues require intersection geometric improvements.

Level of service and capacity are the measurements of an intersection's ability to accommodate traffic volumes. Levels of service for intersections range from A to F. LOS A is the best, and LOS F is failing. For signalized intersections, a LOS of A has an average estimated intersection delay of less than 10 seconds, and LOS F has an estimated delay of greater than 80 seconds. A LOS of C and D are typical design values. Within urban areas, a LOS D, delay between 35 and 55 seconds, is considered acceptable by the Institute of Transportation Engineers (ITE) for signalized intersections.

Table 3 presents a description of signalized level of service.

Table 3: Level of Service Description for Signalized Intersection

LOS	Average Control Delay per Vehicle (seconds)	Description
A	≤ 10.0	Very low delay with extremely favorable progression. Most vehicles don't stop.
B	> 10.0 and ≤ 20.0	Generally good progression. Increase number of stops from that described for LOS "A" resulting in higher delays
C	> 20.0 and ≤ 35.0	Fair progression with increased delay. Number of stopping vehicles become significant; however, many still pass through the intersection without stopping. Stable flow.
D	> 35.0 and ≤ 55.0	The influence of congestion becomes more noticeable. Longer delays resulting from unfavorable progression, longer cycles, or high V/C ratios. Approaching unstable flow.
E	> 55.0 and ≤ 80.0	Limit of acceptable delay. Long delays associated with poor progression, long cycles, or high V/C ratios.
F	> 80.0	Unacceptable operation resulting from oversaturation (flow rates exceed capacity). Poor progression, long cycles, and high V/C ratios.

SOURCE: Highway Capacity Manual, TRB Special Report 209

The existing Greeneville signal timing was modeled using Synchro, Version 10, a signal modeling software developed by Trafficware. Synchro is often used in the evaluation of signal timing and its optimization. Traffic turning movement count (TMC) data collected, signal phasing, and timing were entered in the Synchro models for the AM and PM peak hours. Most Greeneville's existing signalized

intersections are currently operating below the intersection capacity, and delays are acceptable, with a minimum level of service C. However, improvements can be provided with optimized signal timing, thereby reducing the delays and providing some signal coordination for the reduction of stops that are now experienced. **Table 4** (next page) presents both current and optimized capacity and LOS of the Greeneville signalized intersections.

With the majority of the signals in Greeneville operating at a LOS C or better, it should be noted which intersection were operating at a lower LOS. Three intersections are operating with a lower LOS. These signals operating with a LOS D or less are identified below:

1. Main Street & Summer Street (US 11E Bus)-LOS D during PM peak hour
2. Summer Street (US 11E Bus) & Hwy 70 (SR 70)-LOS F during the AM and PM peak hours
3. Asheville Highway (SR 70) & Vann Road-LOS D for PM peak hour

The LOS F for the intersection of Summer Street (US 11E Bus) and Highway 70 (SR 70) can be readily mitigated with employment of more efficient signal timing. Though a LOS D is considered acceptable in urban conditions, the associated delays may be less acceptable as the town is experiencing higher levels of service and thereby increase expectations of lower delays. The LOS D for the PM peak hour for the Main Street and Summer Street (US 11E Bus) intersection can be improved to a LOS C with an update of the signal timing for the downtown system. For the intersection of Asheville Highway (SR 70) and Vann Road, the D LOS can be improved for the PM peak hour but not for the AM peak hour. The capacity ratio of the Asheville Highway (SR 70) and Vann Road signalized intersection is 0.85 for the PM peak hour, which indicates the intersection is operating near capacity. With a capacity ratio greater than 0.90, unstable traffic conditions can be experienced and result in significant increased delay. The operation of the Asheville Highway (SR 70) and Vann Road intersection is impacted by the Greeneville Middle School.

Signal phasing modifications are not found necessary for the Town of Greeneville signals. Improved level of service and/or reduction in delays can be achieved with improved signal timing for signalized intersections. Optimization will mitigate unacceptable levels of service for the intersection of Summer Street and Highway 70. With intersection of Asheville Highway at Vann Road intersection nearing capacity, delays will increase as traffic grows on Ashville Highway. Asheville Highway (SR 70), with an AADT of 11,930, is approaching the capacity of a 2-lane arterial. Further study of this section of Asheville Highway would be necessary and plans developed for any necessary improvements for continued acceptable signal operations for the Vann Road signal operation.

Figures A-1 through A-7 illustrate the primary corridors and daily/peak-hour traffic volumes with an hourly profile of the traffic flow. A comparison of the TDOT 2018 station count is compared with the 2019 ATC for several location, Andrew Johnson Highway at Justice Drive (Figure A-2c), Tusculum Boulevard at Mt Bethel Road (Figure A-6c), and Main Street at Church Street (Figure A-5c). These profiles identify the peak periods of traffic flow.

Table 4: Signalized Capacity and Level of Service

SIGNAL GROUPS	PEAK HOUR	EXISTING			OPTIMIZED		
		V/C	Average Delay	LOS	V/C	Average Delay	LOS
ANDREW JOHNSON HIGHWAY (U.S. 11E)							
1. Andrew Johnson Hwy (US 11E) & Hal Henard Road (potential future signal)	AM	-	-	-	-	-	-
	PM	-	-	-	-	-	-
2. Andrew Johnson Hwy (US 11E) Kingsport Hwy (SR 93)	AM	0.51	8.5	A	0.51	7.6	A
	PM	0.58	12.2	B	0.58	9.9	A
Andrew Johnson Hwy (US 11E) & Main St	AM	0.59	12.9	B	0.60	12.6	B
	PM	0.71	22.5	C	0.65	15.7	B
3. Andrew Johnson Hwy (US 11E) & Industrial Road/Burns Street	AM	0.50	13.3	B	0.45	10.9	B
	PM	0.68	20.0	C	0.71	23.6	C
4. Andrew Johnson Hwy (US 11E) & Greeneville Commons	AM	0.36	32.5	C	0.39	24.5	C
	PM	0.58	14.1	B	0.61	14.8	B
5. Andrew Johnson Hwy (US 11E) & Bob Smith Blvd	AM	0.41	7.0	A	0.45	4.3	A
	PM	0.58	18.0	B	0.61	16.1	B
Andrew Johnson Hwy (US 11E) & Justice Drive	AM	0.42	12.1	B	0.47	12.0	B
	PM	0.68	21.5	C	0.69	15.2	B
6. Andrew Johnson Hwy (US 11E) & Tusculum Blvd (US 11E Bus., potential future signal)	AM	-	-	-	-	-	-
	PM	-	-	-	-	-	-
7. Andrew Johnson Hwy (US 11E) & Fairgrounds Road	AM	0.55	7.2	A	0.58	4.8	A
	PM	0.62	8.3	A	0.64	5.7	A
8. Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance	AM	0.50	10.1	B	0.53	8.0	A
	PM	0.68	13.0	B	0.70	9.2	A
9. Andrew Johnson Hwy (US 11E) & Erwin Hwy	AM	0.73	20.8	C	0.68	22.6	C
	PM	0.63	17.2	B	0.73	26.5	C
10. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd	AM	0.66	14.0	B	0.59	12.4	B
	PM	0.90	26.5	C	0.77	17.4	B
11. Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.	AM	0.55	21.5	C	0.55	16.3	B
	PM	0.73	24.7	C	0.72	17.4	B
12. Andrew Johnson Hwy (US 11E) & Walmart Driveway	AM	0.48	8.4	A	0.48	7.1	A
	PM	0.58	18.9	B	0.58	14.3	B
13. Snapps Ferry Rd & Bohannon Ave/Forest Hills Dr	AM	0.18	22.1	C	0.30	15.0	B
	PM	0.32	22.1	C	0.45	20.9	C
TUSCULUM BOULEVARD (US 11 Bus./SR 107)							
1. Tusculum Blvd (SR 107) & Grove St	AM	0.32	4.5	A	0.33	3.5	A
	PM	0.38	5.9	A	0.39	5.0	A
2. Tusculum Blvd (SR 107) & Austin St	AM	0.60	19.9	B	0.61	15.7	B
	PM	0.65	27.0	C	0.65	15.7	B
3. Tusculum Blvd (SR 107) & Snapps Ferry Rd	AM	0.43	14.4	B	0.33	10.8	B
	PM	0.57	17.1	B	0.52	14.0	B

Table 5: Signalized Capacity and Level of Service (Continued)

SIGNAL GROUPS	PEAK HOUR	EXISTING			OPTIMIZED		
		V/C	Average Delay	LOS	V/C	Average Delay	LOS
4. Tusculum Blvd (SR 107) & Bernard Ave	AM	0.55	13.3	B	0.57	11.9	B
	PM	0.65	15.7	B	0.67	14.8	B
5. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St	AM	0.67	17.6	B	0.70	16.7	B
	PM	0.66	16.7	B	0.69	14.5	B
6. Tusculum Blvd (SR 107) & Hope Rd	AM	0.52	11.1	B	0.54	9.7	A
	PM	0.64	13.6	B	0.66	12.1	B
7. Tusculum Blvd (SR 107) & Justice Dr/Old Tusculum Rd	AM	0.62	34.1	C	0.64	19.0	C
	PM	0.73	32.5	C	0.77	20.8	C
DOWNTOWN							
1. Summer St (US 11 Bus) & Cutler St	AM	0.23	6.8	A	0.24	7.9	A
	PM	0.29	8.5	A	0.31	9.5	A
2. Summer St (US 11 Bus) & Irish St	AM	0.20	9.0	A	0.18	8.3	A
	PM	0.27	10.6	B	0.34	8.6	A
3. Main St (US 321) & Tusculum Blvd/Spencer St	AM	0.50	14.8	B	0.61	16.2	B
	PM	0.56	29.7	C	0.61	22.0	C
4. Main St (US 321) & Church St	AM	0.58	25.5	C	0.62	23.1	C
	PM	0.55	27.0	C	0.60	26.6	C
5. Main St (US 321) & Depot St	AM	0.37	10.5	B	0.41	7.8	A
	PM	0.36	7.8	A	0.42	8.5	A
6. Main St (US 321) & Summer St	AM	0.52	18.7	B	0.51	18.7	B
	PM	0.69	43.6	D	0.66	27.7	C
7. Main St (US 321) & McKee St	AM	0.59	15.9	B	0.63	19.5	B
	PM	0.45	13.5	B	0.49	15.6	B
8. Church St & College St.	AM	0.35	21.4	C	0.42	15.1	B
	PM	0.33	26.9	C	0.38	17.5	B
9. E. McKee St (SR 350)& College St	AM	0.31	8.0	A	0.31	7.5	A
	PM	0.52	11.3	B	0.50	10.0	A
10. E. McKee St (SR 350) & Bernard Ave	AM	0.70	22.5	C	0.73	19.6	C
	PM	0.60	23.4	C	0.66	17.5	B
11. Church St & Bernard Ave	AM	0.36	11.8	B	0.36	11.5	B
	PM	0.36	11.7	B	0.36	12.8	B
ASHEVILLE HIGHWAY (SR 70)							
1. Summer St (US 11 Bus) & Arnold Rd	AM	0.52	136.3	F	0.48	24.6	C
	PM	0.63	158.2	F	0.57	25.3	C
2. Asheville Hwy (SR 70) & Main St (US 321)	AM	0.56	34.1	C	0.58	19.9	B
	PM	0.66	37.3	D	0.68	25.9	C
3. Asheville Hwy (SR 70) & Vann Rd	AM	0.71	38.7	D	0.77	37.2	D
	PM	0.82	41.7	D	0.85	29.0	C

The AM and PM peak hour signal timing plans for the signalized intersections in Greeneville are found in **Appendix A** of this study. Optimized cycle lengths for the primary corridors are identified in **Table 6**. Several signals in the Greeneville Downtown, along the Main Street corridor can be optimized with half cycles permitting greater efficiencies for the intersection. Timing plans reflect YELLOW and RED clearances that meet or exceed the minimum recommended standards established by the MUTCD and TDOT.

Table 6: Optimized Signal Cycles

CORRIDOR	AM	PM
ANDREW JOHNSON HIGHWAY (U.S. 11E)	95	105
TUSCULUM BOULEVARD (US 11 Bus./SR 107)	70	70
MAIN STREET (US 321)-DOWNTOWN	100	100
ASHEVILLE HIGHWAY (SR 70)	110	90

From the daily traffic data profiles, three peaks are identified, a midday peak period timing plan has merit. These plans would require midday turning movement counts for the system corridors.

However, in reviewing the daily traffic profiles, and the directional traffic flow pattern, and the optimized cycles, the timing plans developed for the AM and PM peak hours can be applied to several midday or "off-peak" periods. For Andrew Johnson Highway near Justice Drive, the direction traffic flow is very comparable between the AM peak traffic and the miday traffic conditions thereby the AM timing plan might be applicable to the off-peak signal operations. For the Asheville Hifgway corridor, the taffic volumes for the AM peak hour is very comparable to the off-peak traffic conditions which should also permit the AM cycle to operate for the off-peak hours.

The review of the Tusculum Boulvard system corridor determined that the PM peak traffic flow is relatively comparable to the off-peak conditions; therefore the timing for the PM peak hour might be applied to the midday peak conditions. It should be noted that the traffic count data for Tusculum Boulevard was collected during the closure of Church Street thereby reflecting detoured traffic this detour is probably represented by the difference in ADT traffic counts. The diference is approximately 20-percent. This difernece may not be significant as the profile of 2018 and 2019 is very similar and the cycle did not appear too sensitive; therefore the plan may provide an acceptble flow of traffic. Turning movement counts should be updated when Church Street is reopened but may be limited to a few intersection impacted by the detour.

The off-peak period of the downtown corridor is more distinct and should have an midday plan. Main Street midday and PM peak hour have higher traffic volumes than the AM peak hour. The cycle of the PM peak should be applicable to the midday, but the directional traffic flow variation between these two periods may affect offsets between signals.

VEHICLE DETECTION

The Town of Greeneville currently employs inductive loops that are in the street pavement. Most of the Greeneville signals employs vehicle detection in the signal operation. The inductive loop type of vehicle detection has been used for vehicle detection for many decades and is still a widely utilized traffic

detection device. Loops can be a maintenance challenge as over time with pavement/weather conditions, loops can get to a point of disrepair that impairs the operations of traffic signals. Maintenance of traffic signals and the associated detection must be readily provided to ensure proper operations and effective control. Technology of vehicle detection has improved significantly over the past decade as deployment of intelligent transportation systems have grown requiring greater and differing alternatives for vehicle detection. Deployment of both video and radar has increased and is proving to be an excellent alternative to the inductive loop.

Other vehicle detection system alternatives include magnetic and magnetometer devices which are probes installed in traffic lanes. The application of the magnetic detection is limited as it can provide for vehicle passage but not vehicle presence detection whereas the magnetometer detection can provide both vehicle passage and presence detection. Magnetometer probes may require a lead-in cable to the side of the roadway, but the magnetometer technology has advanced, and numerous devices are wireless minimizing the installation requirements.

The installation and repair of inductive loops is labor intensive and can be a significance impedance on the traffic flow as it requires lane closures during the installation/repair activities. This activity places workmen in close proximity to the adjacent traffic. Lane closures are also necessary for the installation of a magnetometer detection system, but its installation is more simple and the duration of any lane closure is significantly reduced. With roadway maintenance including resurfacing or utility work, inductive loops are often removed and require replacement. Magnetometer probes may not be lost but do need to be removed and reinstalled. The improved technology in both video and radar detection devices, therefore, are becoming the preferred alternative as they have become a very reliable means of vehicle detection as well as less disruptive to the traffic. They can be more safely maintained as the maintenance work can be more with greater distance distant from prevailing traffic conditions. Vehicle detection can also be maintained during roadway or utility work within or near the signalized intersection.

As loop maintenance is an ongoing activity that is contracted by the Town of Greeneville, Greeneville Public Works Department would like to employ vehicle detection that is less invasive and of a technology that Town personnel can more readily maintain. The video and radar technologies are the two most currently being used by progressive jurisdictions. The initial cost of these detection systems is comparable to inductive loops for a multilane arterial highway where multiple loops (presence and advance) are typically installed requiring pullboxes, conduit and cable. The less invasive video and radar vehicle detection should be very competitive to inductive loops for Andrew Johnson Highway. The alternatives to inductive loops might be less cost competitive for 2-lane arterials as not as many loops are required given the number of lanes and typically lower speeds. However, the maintenance of these detection devices should be less and more manageable with limited personnel.

The replacement of the current Town's loops with an alternative can be a on-going maintenance activity, replacing bad loops with an alternate rather than installing new loops. This approach would permit the use of the current vehicle detection that is in good working order until the detection might otherwise fail. The initial replacement of the current loop detection may not be initially feasible and can be programmed as needed.

COMMUNICATIONS MASTER PLAN

TECHNOLOGY REVIEW

The project team including the Town of Greeneville and CDM Smith reviewed the current signal control equipment and software deployed in East Tennessee. Below is a list of East Tennessee jurisdictions signal equipment employed:

Knoxville	Naztec
Knox County	McCain
Farragut	McCain
Kingsport	Econolite
Johnson City	Siemens
Sevierville/Pigeon Forge	McCain
Maryville/Alcoa	Peak
Morristown	Siemens
Chattanooga	Siemens

The Town of Greeneville, in order to understand the current technology and the various signal manufactures represented in East Tennessee, invited signal manufactures of Trafficware (Naztec), Econolite, Siemens, and McCain to demonstrate their current signal equipment and central software. Each demonstrated their current version of the Advance Traffic Controller (ATC), the controller that is replacing the TS2 controller that has been deployed since 1994 but are compatible with the TS2 standard.

Table 7 presents the manufacturer and their respective representatives for the signal equipment and system central software.

Table 7: Signal System Manufacturers

MANUFACTURE	CONTROLLER	STANDARDS	Software	TRAFFIC MANAGEMENT SYSTEM	LOCAL REPRESENTATIVE	ADAPTIVE CONTROL
Trafficware Cubic (Naztec)	ATC/Hybrid 980 ATC	ATC 5.2b, Proposed ATC 6.0, NEMA TS1, TS2-1, TS2-2	Linux	Streetwise ATMS	Precision Traffic & Safety	SynchroGreen
Econolite	Cobalt ATC	ATC 5.2b, Proposed ATC 6.10	Linux	Centracs ATMS	Southern Lighting and Traffic Systems	Centracs Edaptive and Priority
Siemens	m60 Series ATC	ATC 5.2b	Linux	Tactics	Temple Inc	SCOOT
McCain	ATC eX2	NEMA TS2-2003v2.06,ATC 5.2b,NTCIP1201/1202	Linux	Transparity TMS	Transportation Control Systems	Transparity Adaptive

Each of these providers of controllers and central software indicated ability to collect real-time vehicle data that can be utilized in the development of automated traffic signal performance measures (ATSPM). The ATSPM can be a very effective tool in the refinement of signal systems operations thereby maximizing throughput of traffic by monitoring green time utilization, split failures, and arrivals on green. This data can be used to maximize traffic densities and their arrival during green signal phases. The monitoring of these performance measures permit more optimized signal operations. Fiber-optic communications is ideal for real-time monitoring for ATSPM but cellular modems are often used.

These signal vendors are the current major providers to the East Tennessee region and have provided quality services to the area. For the Town Greeneville, readily available support will be important as the system is developed and operated. Appendix F includes the manufacture's information of their ATC and current TMS central software.

COMMUNICATION INFRASTRUCTURE

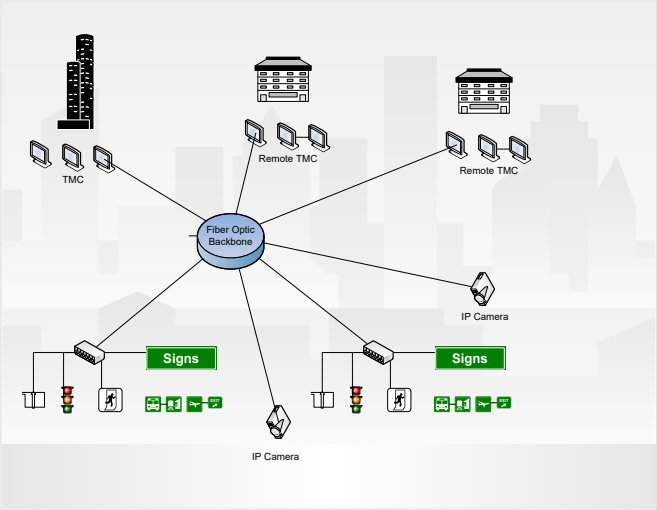
A modern Advanced Traffic Management System (ATMS) system requires extensive communication capabilities from the Traffic Management Centers (TMCs) to the field equipment. The current communication media in the current Knoxville communications system includes underground multimode fiber optic cable, overhead and underground copper pairs, and 900 MHz spread spectrum radio. These have been installed under various projects over the years. Significant communication gaps exist within the current system. There are many sites that currently have intermittent or no communications. There is no system backbone or redundancy built into the system.

Several changes and additions will be needed to adapt the current system to support the use of a modern ATMS. Gaps in communications will need to be bridged and an overall communications architecture will need to be developed. Various communication technologies, sharing communications capacity with other entities, and continued use of existing communications equipment will be explored to minimize project costs. Leasing and lease-to-own will be considered as well as a phased approach to limit the initial costs.

Telecommunications systems have rapidly evolved over recent years. With the fairly recent advent of high capacity data communication links and Internet Protocol (IP) software layers, the interlinking of Intelligent Transportation System (ITS) devices and TMCs has been made considerably more simple and flexible.

COMMUNICATIONS SYSTEM BACKBONE

A high capacity backbone IP based network is needed to interconnect the TMCs and the field sites. The backbone is the most important part of the communications architecture. Properly designing it will provide reliable operation and easy expansion of the system in the future. It will need to be coordinated with both the City of Knoxville Information Systems and Knox County IT departments. This type of network has a great deal of flexibility and can interconnect IP protocols over a mix of different communication technologies including wireless, fiber optic cabling, twisted pair, and DSL. This has several implications:



- Connecting the TMC's to the field equipment requires only a relatively simple physical connection to the communications backbone. This means that a TMC can be located at almost any site that is relatively close to the physical backbone.
- The procurement of the communications network equipment can be separate from procurement of ITS equipment. This has the advantage of the ability to directly employ telecoms specialists for this work.
- Leasing bandwidth would avoid expensive and intrusive cable installation work and maintenance. If leasing can be shown to be cost effective, it could prove a viable option to expand the network coverage.

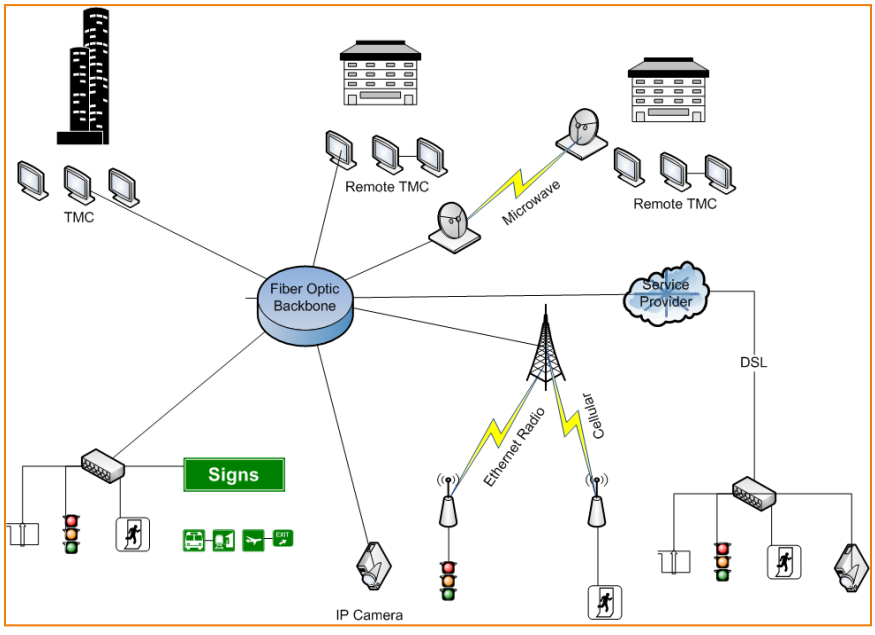
Bandwidth Requirements

The most demanding ITS function is CCTV and other video-streaming based services. For modern CCTV systems it is generally agreed that a bandwidth allocation of 3 Megabits per second (Mbps) for each video channel is required for adequate quality and stability. The TMC's will have the highest bandwidth requirements because of the cumulative demand of the incoming video streams.

Other ITS services are much less demanding. A typical traffic signal controller periodically requires about 10 Kilobits per second (Kbps) during up/down loading of background data. Individual site bandwidth requirements will be calculated at the detailed design stage of this project.

Field Devices Connection

It will be necessary to upgrade and expand the existing communications network to connect all field devices and TMC's efficiently and reliably. The principal issues here are the difficulty and high cost of installing cabled connections, particularly where busy roadways need to be crossed.



Installation of fiber optic technology requires interconnecting numerous Point-of-Presence (PoP) sites with fiber optic cabling, including crossing roadways. This can be done through trenching, burying and backfilling, or by directed boring of conduits beneath the road surface.

Ideally the local connection will be a "hard" cabled connection between the field device and Router interfacing with the Backbone. However, in some cases it may not be possible to bring a Backbone PoP

site close enough to the field device to permit a “hardwired” last-mile connection. In these cases some form of local wireless link will serve the purpose of last-mile connection.

The logical approach to providing a wide-area network over a period of time is to construct and expand the network along defined highway segments in a planned manner. Alternatively, the network could be extended through the use of leased bandwidth.

The communications design will determine:

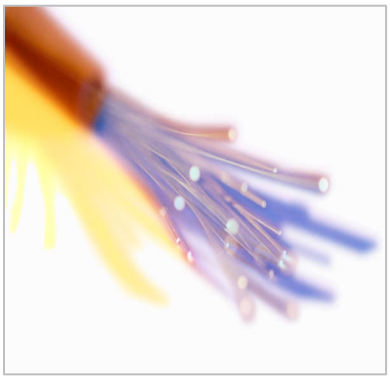
- Bandwidth requirements for each device
- Physical location of each cluster of devices
- Redundant paths needed within the system
- How to bridge gaps in communications coverage

Local Interconnects

There are a wide range of technologies available that can support IP data transmission. The following communications media will be considered for inclusion in the design: fiber optic, wireless, and twisted pair.

Fiber Optic Cable

Fiber optic cable is generally the media of choice. Fiber provides a high bandwidth and easily supports video bandwidth requirements. It is immune to Electro-Magnetic Interference (EMI), lightning, weather, dust and water. It is not immune to damage from road excavations and alternative redundant paths are essential.



One major disadvantage to using fiber is the cost of installation, especially when it is installed underground. Fiber can be placed overhead or underground. Trenching is the most expensive part of installing fiber so it is beneficial to install fiber when the road is already being torn up. Splicing and termination of fibers is a specialist activity and this can add to the cost. However, the fibers can be tested once installed and any damaged parts or poor splices can be relatively easy to detect with an Optical Time Domain Reflectometer (OTDR).

High Bandwidth Microwave Links

Microwave transmission is suitable for point to point backhaul and it requires “line of sight” clearance. It will be used where it is not practical to use fiber optic. It is not practical to use this to interlink individual sites into a network. Also, the capacity of microwave does not match fiber optic cable, though it may be sufficient if properly designed. Microwave does not have the signal resilience in the presence of interference demonstrated by fiber optic cable.



The only significant advantages that microwave has over fiber optic cable are:

- It is relatively cheap
- It can span relatively large distances where it is impractical or undesirable to install cable

Disadvantages of microwave include:

- Much lower bandwidth than offered by fiber
- Susceptible to atmospheric interference; introduces very short term interruptions that are detrimental to CCTV streaming and cumulatively lead to low availability figures
- Visual obstructions must be avoided
- Potential public safety considerations

Low Bandwidth 900 MHz Ethernet and Serial Radios

Ethernet and serial 900 MHz radio are suitable for point-to-multipoint configurations. They require a near "line of sight" condition between sites, so some limited obstruction may be tolerable. It will be used as the link from the nearest connection to the backbone and at master controller sites where it is not practical to use fiber optic cable. For instance, the Knoxville downtown area has sidewalks and underground utilities that may present a challenge to placing underground cables. Like microwave, 900 MHz radios do not have the signal resilience in the presence of interference demonstrated by fiber optic cable.

Some significant advantages that 900 MHz radio has over fiber optic cable are:

- It is relatively cheap
- It can span relatively short distances where it is impractical or undesirable to install cable

Disadvantages of 900 MHz radio include:

- Limited bandwidth
- Susceptible to atmospheric interference which introduce very short term interruptions that are detrimental to CCTV streaming and cumulatively lead to low availability figures
- Visual obstructions must be avoided as much as possible

Periodic maintenance is needed for radio systems. Annual radio maintenance costs are typically 2-3% of installed equipment cost. The items needing attention include:

- Radios (internal component failure, system grounding)
- Radio frequency (RF) cable (corrosion, dielectric deterioration, water infiltration, surge suppressors)
- Antennas (mechanical deterioration, aiming, pole corrosion)

Twisted Pair

In many locations, twisted pairs are currently being used for communication. Twisted pair is best used for low speed branches off of the main lines. They are subject to electrical and RF interference as well as surges from lightning. Surge protectors should be used on these lines and will need periodic replacement as they fail. These lines are the most limited, so they should be and often replaced with fiber optic where possible.

Cellular Service

Wireless communications can also utilize cellar service which is being more widely employed for signal systems and traffic management centers.

SHARING OPPORTUNITIES

In order to keep costs low, the possibility of sharing parts of the network with other town departments, the Tennessee Department of Transportation (TDOT) and other agencies can be explored.

LEASED COMMUNICATIONS

The possibility of leasing a complete communications system with the option to own was explored with In-Line. They can purchase, install, and maintain the communications network for a fixed monthly price with the option of purchase at a later date.

Bandwidth to specific sites can also be leased from the telephone companies (hardwired data), wireless firms (cellular data), and cable companies (cable modems and dark fiber).

Whether the complete network or parts of the network are leased, the advantages of owning compared to leasing are as follows:

The advantages of owning include:

- No service fees
- Independence from service providers
- Sell or lease excess capacity
- Security

The advantages of leasing include:

- Lower equipment purchasing costs
- No need for trained maintenance staff/repair service
- Quicker implementation

The Town of Greeneville with its current twisted pair interconnect has several alternatives for the signal system communications. As stated, the fiber-optic communication is the media of choice and should, therefore, ultimately be the direction pursued by the Town. However, the existing twisted pair in the downtown signal and along Tusculum Boulevard can be utilized with ethernet communication until such

time that it can be replaced with fiber cable. The traffic signal system control is a low bandwidth application which may provide the necessary communication with the Town of Greeneville traffic signals. Another alternative is with available fiber infrastructure that Greeneville Light & Power Service has established and would make available with a leasing agreement with the Town. The Greeneville Light & Power Service fiber network is illustrated in **Figure 4**.

It is therefore recommended that the following items be incorporated into the communication systems design:

- Use Fiber Optic wherever possible
- Twisted pair can be used for low bandwidth applications
- Leasing communications should be evaluated as an alternative approach

A detailed communications design will provide further definition to this approach.

FIGURE 4
GREENEVILLE LIGHT & POWER SYSTEMS
FIBER CABLE NETWORK
Town of Greeneville

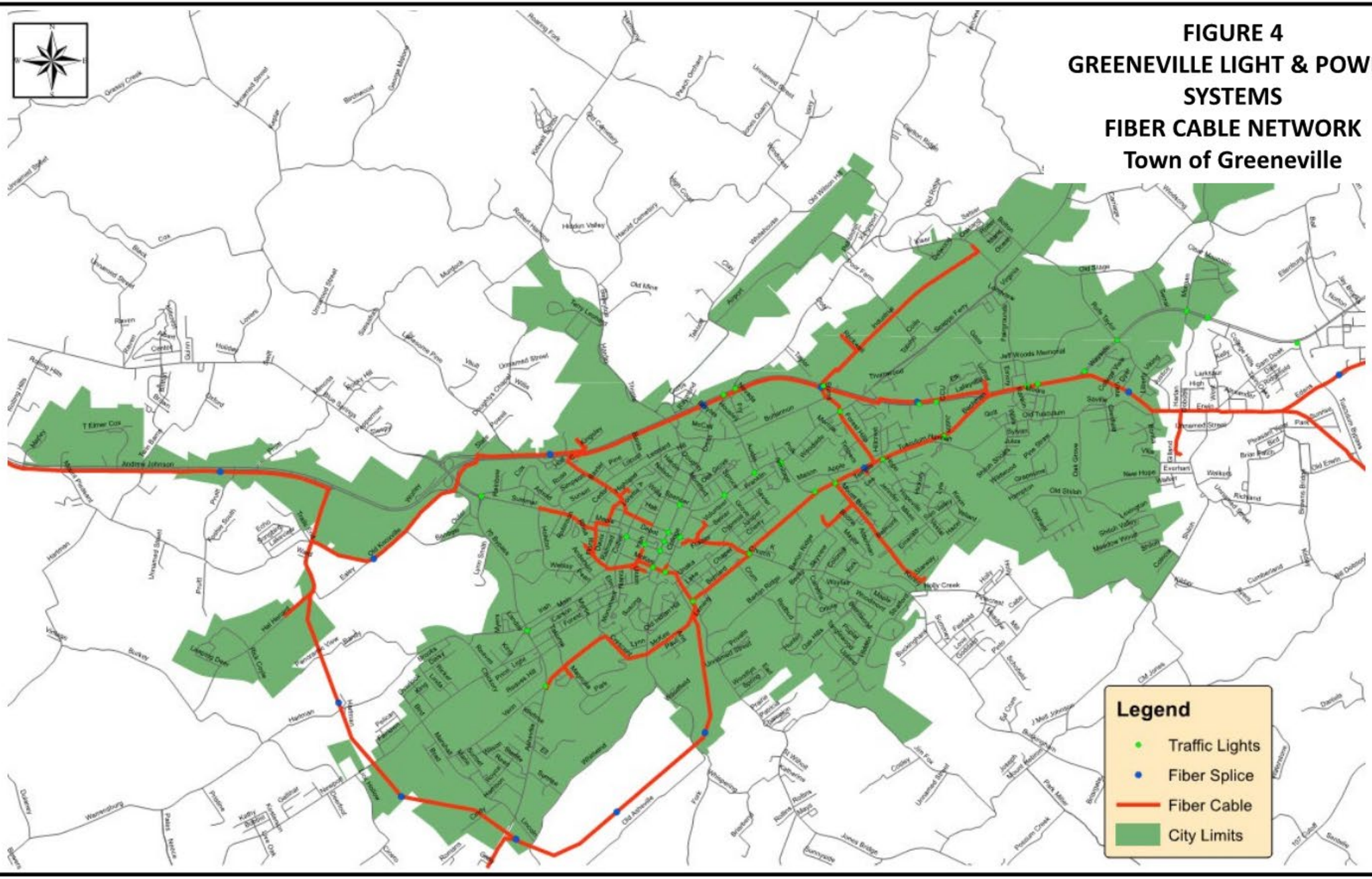


Figure 4: Greeneville Light & Power Systems Fiber Cable Network

GREENEVILLE SIGNAL SYSTEM AND PHASING

SUBSYSTEMS

Greeneville currently has 33 operating signals with 15 operating within two twisted pair systems and another 4 signals having interconnect with an adjacent signal for coordination due to signal spacing. The 15 intersections currently with twisted pair interconnect for downtown and Tusculum Boulevard would be two subsystems that would be maintained and improved with communications that should extended to a central location(s) for monitoring and operations. Andrew Johnson Highway (US 11E/SR 34), a principle highway in Greeneville, would be an additional subsystem to the Greeneville system.

Andrew Johnson Highway through Greeneville is approximately 7 miles in length with an approximate 2017 AADT of 27,175 (Average of Stations 117, 101, 112, 100, 46, and 127). Communications between signals is limited with the signals identified above at Fair Grounds Road and Haynes Boulevard and Morgan Road/Harlan Drive and Walmart.

With the existing systems and Greeneville's principle arterial highway , the Greenville signal system should establish three primary subsystems providing for the monitoring and operations of the Town's signals.

Andrew Johnson Highway (US 11E/US 321/SR34)

Andrew Johnson Highway (US 11E/US 321/SR 34) currently has 12 traffic signals within Greeneville with two possible future signals at the following intersections:

1. Hal Henard Road, City of Greeneville proposed signal
2. Tusculum Boulevard (US 11 Bus), TDOT proposed signal

Andrew Johnson Highway has four signals operating with either twisted pair or radio for coordination between them with an on-street master. These intersections are as follows:

1. Fair Grounds Road and Haynes Boulevard (Twisted Pair)
2. Morgan Road/Harlan Drive and Walmart (Radio)

Signals along Andrew Johnson Highway operate as isolated signals. Spacing of the signals west of Greeneville Commons is more than 3,500 feet. To the east, Andrew Johnson Highway has 6 signals within approximately 1.5 miles, from Greeneville Commons to Rufe Taylor Road. There is approximately 3,000 feet between Rufe Taylor Road and Morgan Road/Harlan Drive. Distances between signals greater than ½ mile are often difficult to coordinate as speeds may vary significantly, unsignalized intersections and driveways may interrupt and dissipate traffic flows and platoons.

The six signals along Andrew Johnson Highway from Green Commons to Rufe Taylor Road within 1.5 miles provides an opportunity for an additional subsystem within the Greeneville signal system. The possible signalization of the Tusculum Boulevard intersection, identified in the November 2016 Technical Report prepared for TDOT for State Route 34 (US 11E) in Greene County, would help maintain traffic platoons between Justice Drive and Fairgrounds Road which is a distance of approximately 3,500 feet, exceeding the ½ mile distance for system progression. The subsystem for Andrew Johnson Highway Green Commons to Rufe Taylor Road was identified in the November 2016 Technical Report and should be part of the SR 34 improvement in Greeneville. The design contract for the Andrew Johnson Highway (US 11E/SR 34) was awarded in 2018 but has not yet begun. This subsystem is the Town's first priority thereby providing signal coordination and communications to Greeneville's most primary corridor with current AADTs between 25,000 and 30,000vpd. This priority could be accomplished with the highway improvements planned by the TDOT, but construction of these improvements may be five years away.

With the establishment of a subsystem on Andrew Johnson initially from Greeneville Commons to Rufe Taylor Road, the communications should later be extended to Industrial Road/Burns Street and Kingsport Highway (SR 93) to the west and Morgan Road/Harlan Drive and Walmart to the east for communications to a central office location for monitoring and operational purposes. Some coordination may be provided but would be more limited in function because of distances greater 3,000 feet. which conditions would interfere with traffic platoons on Andrew Johnson Highway. The current age of controllers for these outlying signals are less than 10 years and do not need immediate upgrade. An initial coordination of the Greeneville Commons to Rufe Taylor may also be initially achieved with time-base control (TBC) but would require upgrading signal controllers.

The later phase of the Andrew Johnson Highway (US 11E/SR 34) extension from Greeneville Commons to Industrial Road/Burns Street and Kingsport Highway (SR 93) to the west should be considered with planned the highway improvements. The interconnect to these signals was not identified in the November 2016 Technical Report prepared for TDOT but might be a consideration in the deployment of a Town ATMS.

Communication with the future signalized intersection of Andrew Johnson Highway with Hal Henard Road should be a longer-range goal. Communication is not immediately needed as this intersection is approximately 3 miles from the Main Street (US 321) signal thereby may operate as an isolated signal. The nearest signal from proposed Hal Henard Road signal is the signal operation of the Summer Street (US 11E Bus.) and State Route 70 which is distance of approximately 1 mile. This may be a more feasible fiber link back to a central location when a later phase addressing Asheville Highway (SR 70) is considered. A cellular link would be an alternative to the possible future signal.

Greeneville Downtown

The current Greeneville Downtown system with twisted pair interconnect includes eight (8) signals which five (5) are at intersections aligned with Business 11E, Summer Street and Main Street (US 321/SR 107) through downtown. Main Street in conjunction as an integral segment of Business 11E is also US 321/SR 107, a primary state route through the Greeneville downtown with an AADT of approximately 11,440vpd. The current twisted pair is extended along Main Street to McKee Street (SR 350) to the south and to the west of Main Street along Church Street to College Street near the Greeneville Town Hall.

With the proximity of the current communications with the Greeneville Town Hall, the Town Hall is a principle consideration of central office location for the Greeneville signal system.

The downtown system is a critical subsystem for the Greeneville signal system and provides the communication link to the Town Hall location for the central control. The twisted pair interconnect should be replaced with fiber cable but may initially be operated with ethernet over the copper (twisted pair) cable. The downtown subsystem can be later expanded to include signals for McKee Street (SR 350) at intersections with College Street and Bernard Avenue and the signal at Bernard Avenue and Church Street.

Because the downtown has many pedestrian facilities, any improvements to the signals must also address ADA requirements and insure acceptable pedestrian and handicap mobility. Some pole locations, sidewalk, and handicap ramps must be brought up to standards for this mobility. The signals operating for the Summer Street intersections at Cutler Street and Irish Street would require replacement because the poles are currently located in the sidewalks prohibiting the ADA accessible movements and interfering with all pedestrians. These two intersections would need to be upgraded with configurations that addresses the limitations of the intersections and permits the required pedestrian accessibility and signals. This consideration will have significant additional associated costs that would impact this subsystem priority until funding is available for the necessary improvements. A consideration might be to exclude these two signals from the system initially until further funding is available. It should be noted that these intersections are low volume; peak hour traffic does not warrant signalization. These signals were likely installed when more traffic was traveling US 11E through downtown Greeneville and are still operational due to possible lines of sight issue with corner buildings and the railroad underpass.

Tusculum Boulevard (US 11E Bus/SR 107)

Tusculum Boulevard (US 11E Bus/SR 107) is another principle arterial serving Greeneville extending from Greeneville downtown to Andrew Johnson Highway (US 11E/US 321/SR 34) to the east. Tusculum Boulevard is the primary access to Greenville High School next to downtown and Town Hall. This current system of seven signals from Grove Street to Justice Drive/Old Tusculum Road is interconnected with twisted pair cable. Its proximity to the downtown system and Town Hall presents an opportunity to link these systems and provide for communications back to a central location at Town Hall. Fiber-optic cable should replace the existing twisted pair cable. The current twisted pair might be initially used with ethernet communications until fiber can be funded and installed.

This Tusculum Boulevard subsystem also presents the opportunity to establish direct communications between a central location (Greeneville Town Hall) to the Andrew Johnson Highway subsystem. This connection may be provided along Tusculum Boulevard between Justice Drive/Old Tusculum Road to Andrew Johnson Highway or along Justice Drive to Andrew Johnson Highway.

Several intersections along this system corridor may require some sidewalk and handicap ramp improvement for ADA requirements. The intersection of Tusculum Boulevard with Bernard Avenue should consider sidewalk improvements due to its proximity to Eastview Elementary School. With ADA and pedestrian considerations less for Tusculum Boulevard than downtown, its priority may be higher than the Greeneville downtown.

With these three subsystems including the extensions along Andrew Johnson Highway (US 11E/SR 34) and McKee Street (SR 350), a system of 31 signals (including the possible signal of Andrew Johnson Highway and Tusculum Boulevard) may be incorporated into a Greenville signal system. With the replacement of the Town's existing twisted pair cable with fiber-optic cable and installation of fiber-optic cable in conjunction with recommended improvements along Andrew Johnson Highway (US 11E/SR 34), this fiber communications may be Town owned and managed fiber that may present further opportunities for Town services and other transportation related activities including CCTV monitoring of critical junctions and/or high accident locations.

One additional subsystem or signal grouping for a later construction phase may be the Asheville Highway (SR 70) corridor, including the intersections with Main Street (US 321) and Vann Road. The distance between these two intersections is approximately 2,300 feet, thereby within the ½ spacing recommended for signal progression. Asheville Highway (SR 70) has a 2018 AADT of 11,930 on a 2-lane arterial facility. Communications with fiber cable back to a central location (Town Hall) may be accomplished along Main Street from Asheville Highway to McKee Street, an approximate 5,600 feet. An alternative of fiber may be along SR 70 to Summer Street and Summer Street to Cutler Street, approximately 11,600 feet. The alternative would result in communication to the isolated signal at SR 70 and Summer Street. This subsystem would be a lower priority as its isolated location is more difficult to establish communications back to a central location. Cellular communication may be an alternative to fiber communication to this isolated subsystem. This subsystem should be in conjunction with improvements for this section of Asheville Highway as it's the only signalized intersection found to be near capacity for this study.

The construction of this system will depend on construction phasing and available funding. With the Town's priority of improving traffic flow on Andrew Johnson Highway (US 11E/321), it would be the first phase of construction that would extend between Greeneville Commons and Rufe Taylor Road. Phases 2 and 3 could follow providing for the subsystems along Tusculum Boulevard and for downtown, respectively. The extensions of the Andrew Johnson Highway and the downtown subsystems could be Phases 4 and 5, respectively. The subsystem for Asheville Highway would be Phases 6 and 7. **Figure 5** illustrates the proposed subsystems, communications to a central location at Town Hall, and construction phasing. Figure 5 also shows future fiber fiber communications for an ultimate fiber system including several communication loops to create system redundancy thereby insuring alternative connectivity to the signal subsystems. **Table 8** present the subsystems and construction phasing.

The design and installation of the fiber network should not be limited to the traffic signal control but should consider future Intelligent transportation systems (ITS) application including video (CCTV) and dynamic message signs for critical junctions and high accident locations. CCTV might be considered in the future for the following junctions:

- Main Street (US 321) & Summer Street
- Main Street (US 321) & Asheville Highway (SR 70)
- Summer Street (US 11Bus) & SR 70
- Andrew Johnson Highway (US 11E/321, SR 34) & Main Street (US 321)/Kingsport Hwy (SR 93)
- Andrew Johnson Highway (US 11E/321, SR 34) & Tusculum Boulevard
- Andrew Johnson Highway (US 11E/321, SR 34) & Tusculum Bypass

Table 8: Signal System Phasing

SIGNAL GROUPS	EXISTING COMM		FO COMM
3. ANDREW JOHNSON HIGHWAY (U.S. 11E)			
1. Andrew Johnson Hwy (US 11E) & Hal Henard Road (potential future signal)			Phase7
2. Andrew Johnson Hwy (US 11E) & Main St/Kingsport Hwy (SR 93)			Phase 4
3. Andrew Johnson Hwy (US 11E) & Industrial Road/Burns Street			
4. Andrew Johnson Hwy (US 11E) & Greeneville Commons			PHASE 1 SYSTEM
5. Andrew Johnson Hwy (US 11E) & Justice Drive/Bob Smith Blvd			
6. Andrew Johnson Hwy (US 11E) & Tusculum Blvd (US 11E Bus., potential future signal)			
7. Andrew Johnson Hwy (US 11E) & Fairgrounds Road		Twisted Pair	
8. Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance	M		
9. Andrew Johnson Hwy (US 11E) & Erwin Hwy			
10. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd			
11. Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.		Radio	Phase 4
12. Andrew Johnson Hwy (US 11E) & Walmart Driveway	M		
13. Snapps Ferry Rd & Bohannon Ave/Forest Hills Dr			
2. TUSCULUM BOULEVARD (US 11 Bus./SR 107)			
1. Tusculum Blvd (SR 107) & Grove St		Twisted Pair	PHASE 2 SYSTEM
2. Tusculum Blvd (SR 107) & Austin St			
3. Tusculum Blvd (SR 107) & Snapps Ferry Rd	M		
4. Tusculum Blvd (SR 107) & Bernard Ave			
5. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St			
6. Tusculum Blvd (SR 107) & Hope Rd			
7. Tusculum Blvd (SR 107) & Justice Dr/Old Tusculum Rd			
1. DOWNTOWN			
1. Summer St (US 11 Bus) & Cutler St		Twisted Pair	Phase 5
2. Summer St (US 11 Bus) & Irish St			
3. Main St (US 321) & Tusculum Blvd/Spencer St			PHASE 3 SYSTEM
4. Main St (US 321) & Church St			
5. Main St (US 321) & Depot St			
6. Main St (US 321) & Summer St	M		
7. Main St (US 321) & McKee St			
8 Church St & College St.			
9. E. McKee St (SR 350)& College St			Phase 5
10. E. McKee St (SR 350) & Bernard Ave			
11. Church St & Bernard Ave			
ASHEVILLE HIGHWAY (SR 70)			
1. Summer St (US 11 Bus) & Arnold Rd			Phase7
2. Asheville Hwy (SR 70) & Main St (US 321)			Phase 6
3. Asheville Hwy (SR 70) & Vann Rd			

NOTES: Existing Subsystem

Initial or primary subsystem for upgrading signals and installing FO communications

Future signal upgrades and extension of the FO communications

FIGURE 5
PROPOSED TRAFFIC SIGNAL COMMUNICATIONS and CONSTRUCTION PHASES
Town of Greeneville

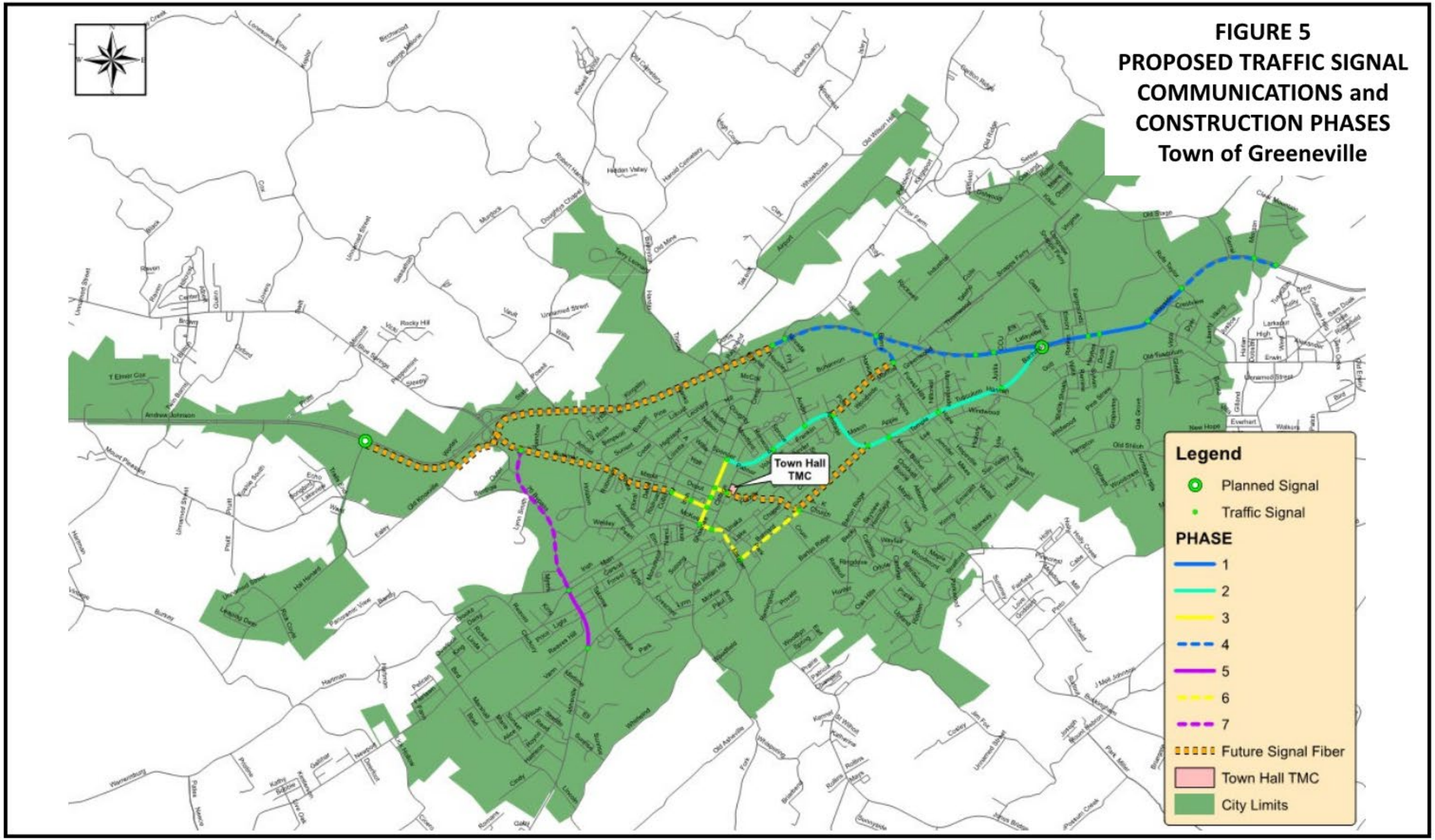


Figure 5: Proposed Traffic Signal Communication and Construction Phases

Construction for each phase and subsystem generally consists of the following:

Andrew Johnson Highway (US 11E/321)-Phases 1 & 4

- Controller/Cabinet Upgrade
- Vehicle Detection Upgrade
- Communications-Underground Fiber (Including Central Software)

The vehicle detection for Andrew Johnson Highway would be improved with STOP bar and advance radar detection.

Tusculum Boulevard (US 11E Bus./SR 107)-Phase 2

- Controller/Cabinet Upgrade
- Signal Reconstruction
- Vehicle Detection Upgrade
- Pedestrian Signal Upgrade
- Handicap Ramp Improvements
- Communications-Replacing Overhead Twisted Pair with Fiber

The Tusculum Boulevard will require some pedestrian signals and associated handicap ramp improvements. Vehicle detection would be improved with STOP bar radar detection. The signal for the intersection of Bernard Avenue should be reconstructed including auxiliary signal heads for better lines of sight and signal displays from the driveway approach.

Downtown (US 11E Bus/321)-Phases 3 & 5

- Controller/Cabinet Upgrade
- Signal Reconstruction
- Vehicle Detection Upgrade
- Pedestrian Signal Upgrade
- Handicap Ramp Improvements
- Communications-Replacing Underground Twisted-Pair with Fiber

The downtown subsystem would require reconstruction of two traffic signals for Summer Street at Cutler Street and Irish Street, pedestrian signal upgrades, and handicap ramp improvements. Vehicle detection would be upgraded with STOP bar detection.

Asheville Highway (SR 70)-Phase 6

- Controller/Cabinet Upgrade
- Vehicle Detection Upgrade
- Pedestrian Signal Upgrade
- Handicap Ramp Improvements
- Communications-Underground Fiber

The estimated cost of this system and its subsystems is provided in **Table 9**, reflecting an estimated total system buildout cost of $3.76 million which includes signal cabinet and controller replacement, fiber communications, signal reconstruction, pedestrian improvements, and vehicle detection. Upgrading the vehicle detection of the traffic signals is approximately $992,500. Signal cabinet and controller upgrades with communications is an estimated $1.69 million. Phase 7 reflects a significant cost of the system, 12-percent of the system buildout cost, but it should be a very distant phase of the system. The estimated cost of the initial three construction phases is $2.28 million.

The Town of Greeneville has approximately $725,000 currently available for design and construction of the system. This would essentially limit the construction to Phase 1, Andrew Johnson Highway (US 11E/321). With an extensive GLPS fiber network available, the fiber communications may be initially leased, saving approximately $670,000 through Phase 5 of the system.

An alternative phasing of construction may be pursued for the initial three primary phases of the system with consideration of a few factors. The alternative would limit the construction of the initial system with realizing these following factors:

- TDOT planned improvement for Andrew Johnson Highway (US 11E/321) that would reconstruct signals and install interconnect from Greeneville Common to Rufe Taylor Road. (Request that this project also include communications to Main Street.)
- Greeneville Light and Power System (GLPS) available fiber network.
- Ethernet over copper for downtown system communications and limit system improvements along Main Street, removing the signal reconstruction along Summer Street.
- Limit the radar detection upgrade to Tusculum Boulevard.

Current fiber-optic cable installed by the Greeneville Light and Power System (GLPS) is illustrated in

Figure 6. Overlaying the proposed Greeneville system and its communications with the available GLPS fiber network provides an opportunity for a possible lease agreement with GLPS. Much of the proposed Town signal communication overlays well with the GLPS network with exception of the downtown where it is more limited and off the 11E Business alignment. The possible leased agreement for fiber with GLPS would have operational cost for 7.75 miles of fiber. The advantages and disadvantages were presented earlier in this report. Town owned or leased communications must be both a short- and long-term consideration. The leased communications may be an alternative to the more isolated signals until Town communications can be extended to those locations.

With these factors considered, the construction of Phase 1 may be limited to the controller upgrade and modification of the cabinet for fiber communications leased through GLPS until TDOT completes the planned improvements for Andrew Johnson Highway including signals (including radar detection) and communications. There would be ongoing leasing costs until the TDOT road project is completed, 1.7 miles of fiber. Communication to the central can use the communications along Tusculum Boulevard. The cost of the initial three phases of the system can be reduced to an estimated cost of $1.014 million.

Table 9: System Construction Estimate

SIGNAL SYSTEM CONSTRUCTION	AJ HWY (US 11E/SR34)		TUSCULUM BLVD	DOWNTOWN		ASHEVILLE HWY (SR 70)		SYSTEM TOTAL
	PHASE 1	PHASE 4	PHASE 2	PHASE 3	PHASE 5	PHASE 6	PHASE 7	
CONTROLLER/CABINET UPGRADE	$110,880.00	$79,200.00	$110,880.00	$79,200.00	$47,520.00	$31,680.00	$15,840.00	$475,200.00
SIGNAL RECONSTRUCTION	$0.00	$0.00	$150,000.00	$450,000.00	$0.00	$0.00	$0.00	$600,000.00
VEHICLE DETECTION UPGRADE	$300,240.00	$150,120.00	$200,160.00	$158,460.00	$83,400.00	$66,720.00	$33,360.00	$992,460.00
PEDESTRIAN SIGNALS UPGRADE	$0.00	$0.00	$54,000.00	$166,080.00	$90,240.00	$69,120.00	$0.00	$379,440.00
HANDICAP RAMP UPGRADES	$0.00	$0.00	$33,600.00	$25,200.00	$67,200.00	$50,400.00	$0.00	$176,400.00
FIBER OPTIC COMMUNICATIONS	$233,522.40	$238,740.00	$75,264.00	$81,630.00	$40,788.00	$19,332.00	$396,648.00	$1,085,924.40
CENTRAL SOFTWARE	$50,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$50,000.00
	$694,642.40	$468,060.00	$623,904.00	$960,570.00	$329,148.00	$237,252.00	$445,848.00	**$3,759,424.40**

Initial phase of each subsystem, Phases 1, 2, 3, and 6.

Extension of each subsystem, Phases 4, 5, and 7.

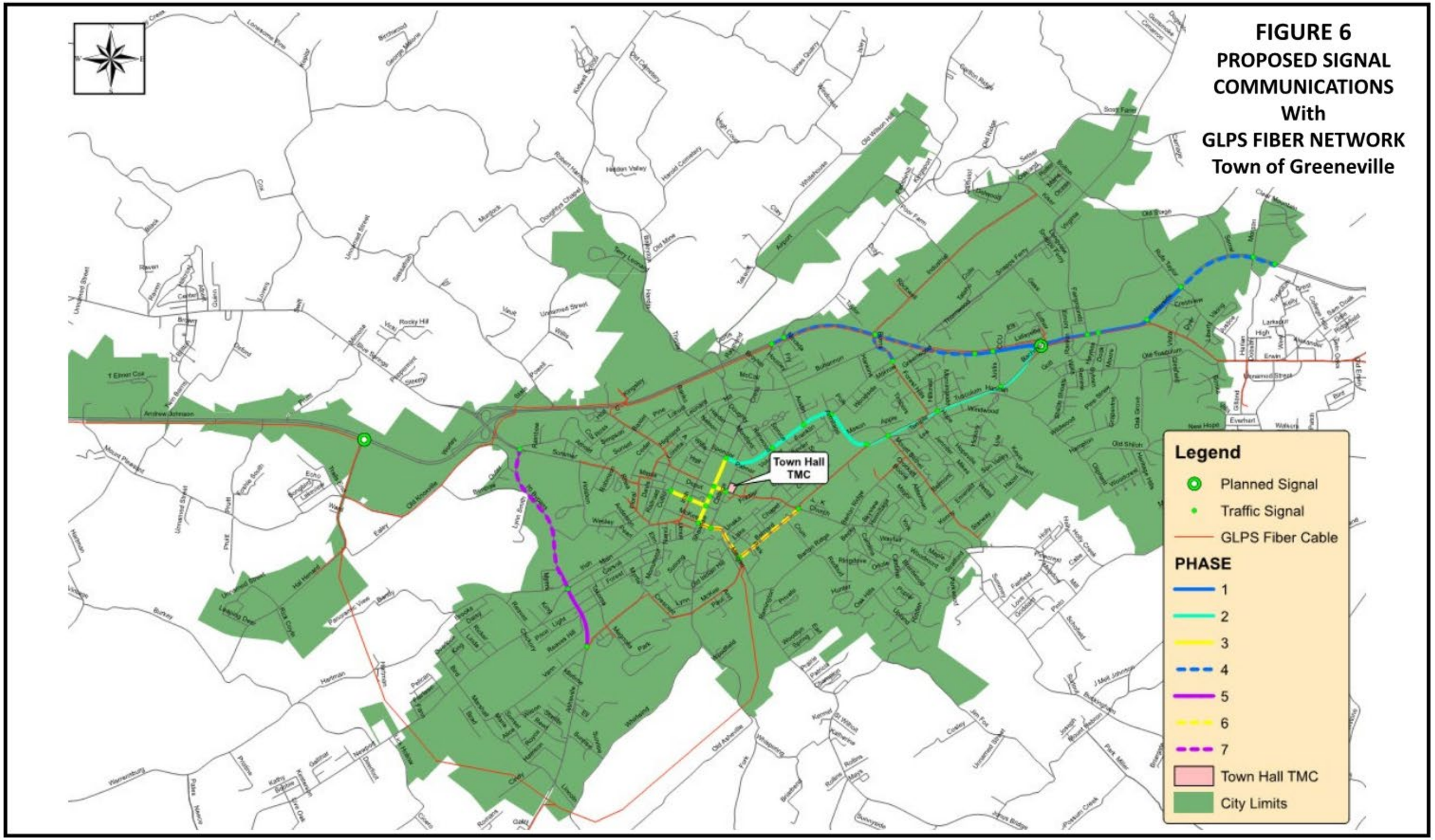


Figure 6: Proposed Signal Communications with GLPS Fiber Network

Plans should begin to Improve Asheville Highway (SR 70) arterial between Main Street (US 321) and Ashland Drive or Weemes, thereby increasing its capacity. The traffic signals and its subsystem might be a consideration in conjunction of this possible improvement. With this in mind, the associated cost of Phase 6 can be reduced from the estimated system planning cost. The cost of the system of the four primary subsystems may be approximately $1.977 million through Phase 6 and an approximate $2.423 million at buildout. **Table 10** presents the estimated cost of this alternative approach for the system buildout.

Table 10: System Alternative Construction Estimate

SIGNAL SYSTEM CONSTRUCTION	AJ HWY (US 11E/SR34)		TUSCULUM BLVD	DOWNTOWN		ASHEVILLE HWY (SR 70)		SYSTEM TOTAL
	PHASE 1	PHASE 4	PHASE 2	PHASE 3	PHASE 5	PHASE 6	PHASE 7	
CONTROLLER/CABINET UPGRADE	$36,960.00	$15,840.00	$110,880.00	$79,200.00	$47,520.00	$0.00	$15,840.00	$306,240.00
SIGNAL RECONSTRUCTION	$0.00	$0.00	$0.00	$150,000.00	$300,000.00	$0.00	$0.00	$450,000.00
VEHICLE DETECTION UPGRADE	$0.00	$33,360.00	$200,160.00	$0.00	$241,860.00	$0.00	$33,360.00	$508,740.00
PEDESTRIAN SIGNALS UPGRADE	$0.00	$0.00	$54,000.00	$166,080.00	$90,240.00	$0.00	$0.00	$310,320.00
HANDICAP RAMP UPGRADES	$0.00	$0.00	$33,600.00	$0.00	$92,400.00	$0.00	$0.00	$126,000.00
FIBER OPTIC COMMUNICATIONS	$43,092.00	$10,104.00	$75,264.00	$14,112.00	$131,946.00	$0.00	$396,648.00	$671,166.00
CENTRAL SOFTWARE	$50,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$50,000.00
	$130,052.00	$59,304.00	$473,904.00	$409,392.00	$903,966.00	$0.00	$445,848.00	**$2,422,466.00**

Initial phase of each subsystem, Phases 1, 2, 3, and 6.

Extension of each subsystem, Phases 4, 5, and 7.

RECOMMENDATIONS

Below are the recommendations for the phased approach to the Greeneville signal system. Future funding should be sought for the buildout of the system including Town owned fiber communication network. These recommendations are also summarized for each intersection in the Appendix with the review and inventory the existing traffic signal control.

SIGNAL TIMING

- Install signal clearances, YELLOW and RED intervals for minimum and recommended standard clearance time.
- Update signal timing for Town of Greeneville traffic signals.

SIGNAL SYSTEM SIGNAL UPGRADES AND COMMUNICATIONS

General

Signal cabinets and controllers throughout the Town of Greeneville should be replace with the most current technology reflecting the Advance Traffic Controllers (ATC). Fiber-optic communications should be installed for the ultimate Town owed fiber network but phased with initially leased fiber until Town owed fiber can be funded and installed. The current twisted pair interconnect should be utilized until it can be replaced with fiber cable. The backbone of this fiber network should extend along Andrew Johnson Highway, Tusculum Boulevard, and Main Street with connection to the Town Hall for a central traffic control center. The design and installation of the fiber should consider more than the traffic signal control and consider future ITS based applications including video (CCTV) for critical junctions and possible dynamic message signs for Andrew Johnson Highway (US 11E/SR 34).

Signals should be upgraded with radar detection and pedestrian control and improved sidewalk accessibility as required by the American Disabilities Act (ADA).

Andrew Johnson Highway (US 11E/US 321/SR34)

- Phase 1
  - Upgrade signal controllers and install fiber communications with leased fiber with GLPS.
  - Install fiber communications, upgrade signal cabinets, and radar detection with TDOT planned Andrew Johnson Highway roadway improvements.
  - Develop central traffic signal control from Town Hall

- Phase 4
  - Request TDOT communication from Greeneville Commons to Main Street (US 321)/Kingsport Highway (SR 93) in conjunction with Andrew Johnson Highway roadway improvements.

Tusculum Boulevard (US 11E Bus/SR 107)

- Phase 2
  - Upgrade signal cabinet and controllers with overhead fiber communications from Andrew Johnson Highway to Main Street.
  - Install radar vehicle detection
  - Provide pedestrian signals with push button actuation and improved handicap ramps for the Tusculum Boulevard intersections:
    - Grove Street
    - Austin Street
    - Snapps Ferry Road
  - Reconstruct the signal for the intersection of Tusculum Boulevard and Bernard Avenue.

Greeneville Downtown

- Phase 3
  - Upgrade signal cabinets and controllers for Main Street (US 11 Bus/321) and intersection of Church Street and College Street.
  - Install ethernet communications with existing twisted-pair cable.
  - Upgrade pedestrian signals with push button actuation and handicap ramps for Main Street.

- Phase 5
  - Reconstruct signals for Summer Street intersections with Cutler Street and Irish Street with pedestrian ramp improvements and crosswalks.
  - Replace twisted-pair cable with fiber-optic cable for communication
  - Install radar vehicle detection.

Asheville Highway (SR 70)

- Phase 6
  - Study potential Asheville Highway improvements for adding capacity.
  - Reconstruct the signal at the intersection of Asheville Highway and Vann Road.
  - Upgrade signal controllers and install fiber communications from Main Street to Vann Road.
  - Install radar vehicle detection.
  - Provide pedestrian signals with push button actuation and improved handicap ramps.
  - Install a cellular link between this subsystem and central system control.

- Phase 7
  - Extend fiber communication from the Asheville Highway (SR 70) subsystem to central office location providing communications to the isolated intersection of Summer Street and Highway 70.

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDICES

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

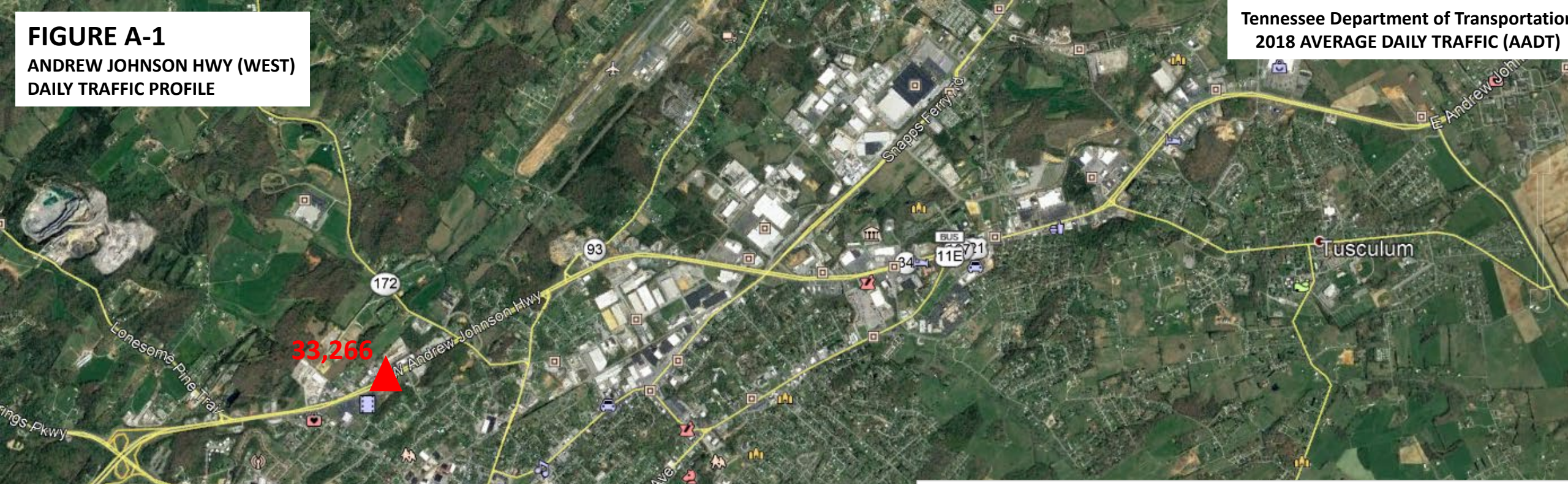
APPENDIX A

Signal System Daily Traffic Profiles

FIGURE A-1

ANDREW JOHNSON HWY (WEST)
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 AVERAGE DAILY TRAFFIC (AADT)



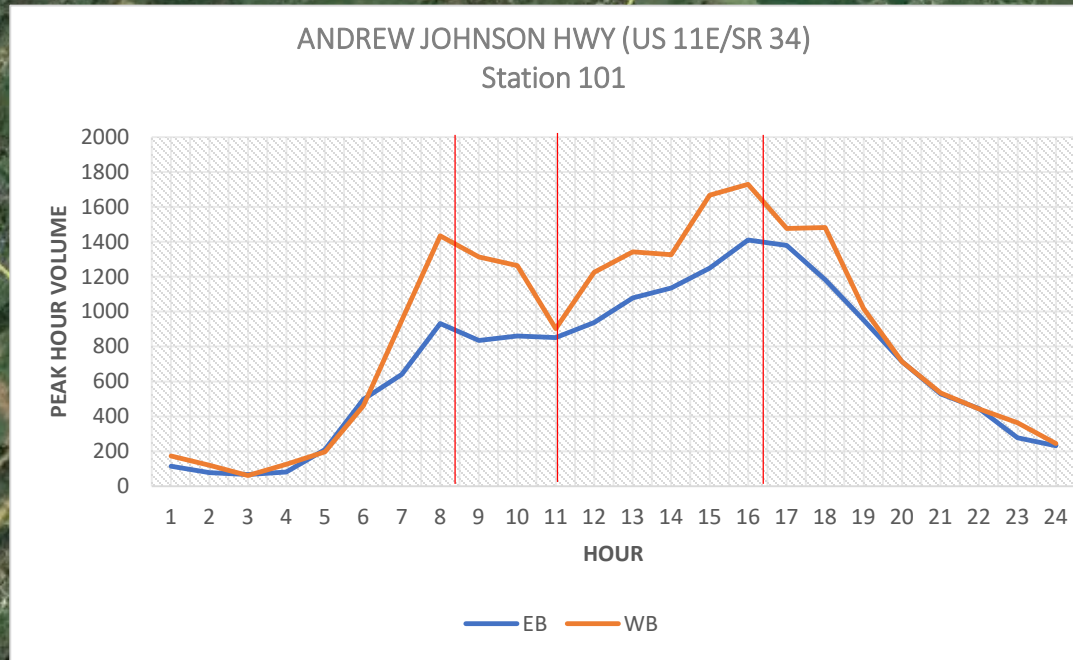
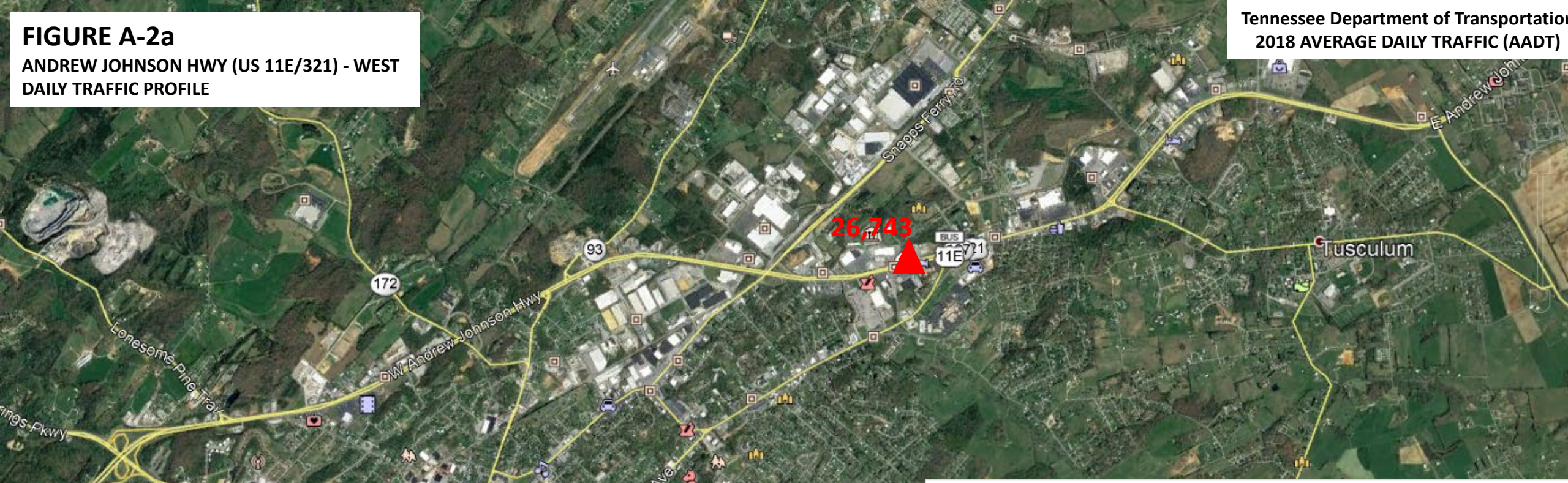


FIGURE A-2a

ANDREW JOHNSON HWY (US 11E/321) - WEST
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 AVERAGE DAILY TRAFFIC (AADT)



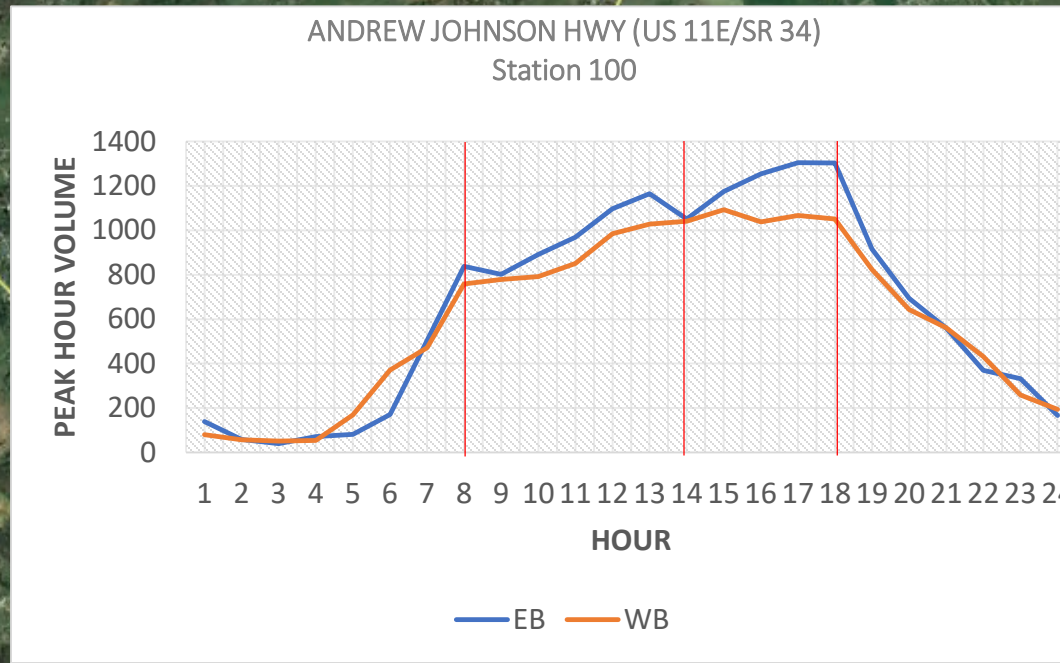


FIGURE A-2b

ANDREW JOHNSON HWY (US 11E/321)
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2019 ATC DAILY TRAFFIC

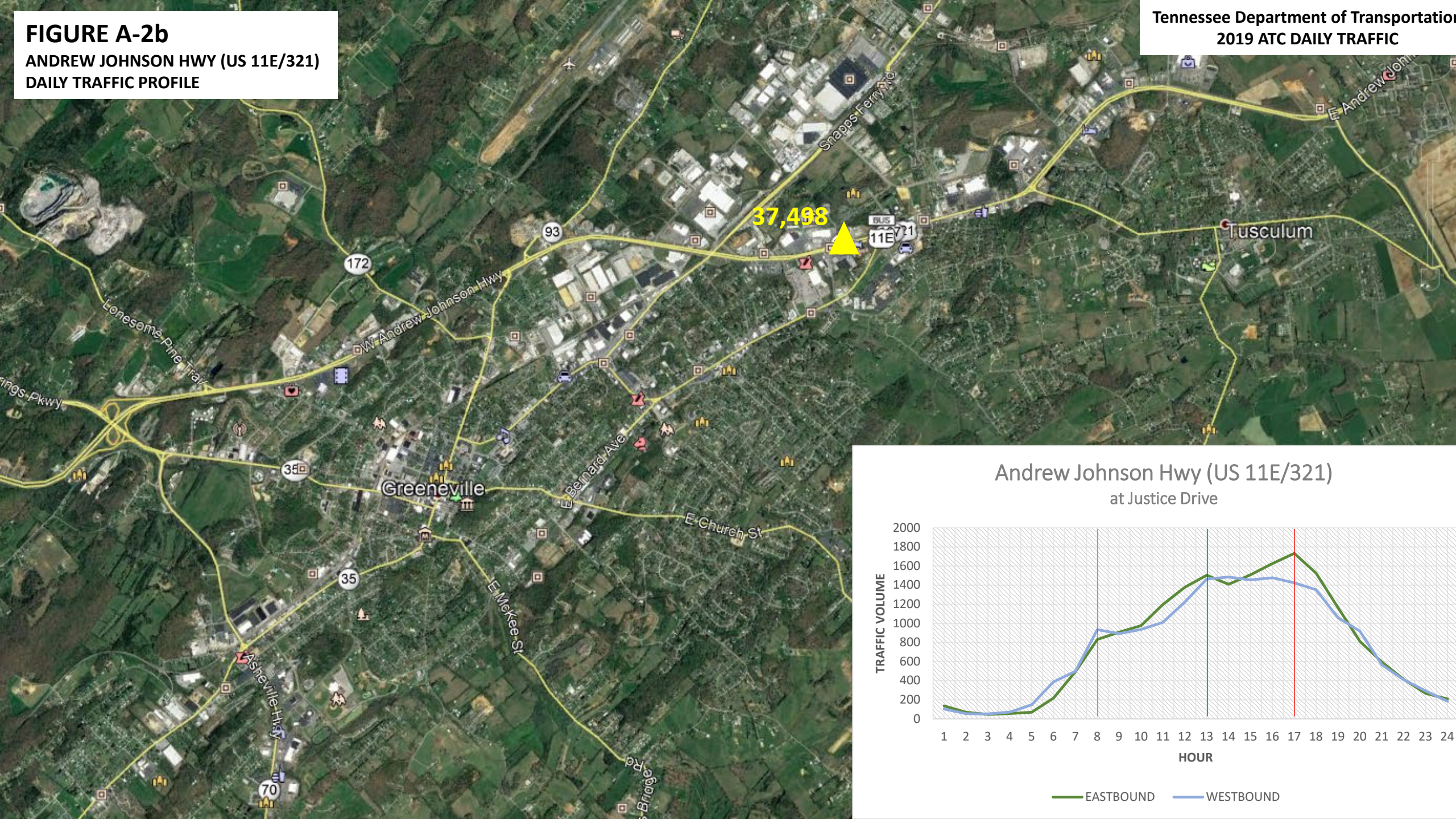


FIGURE A-2c

ANDREW JOHNSON HWY (US 11E/321)
DAILY TRAFFIC PROFILE

2018 TDOT Station Count
2019 ATC

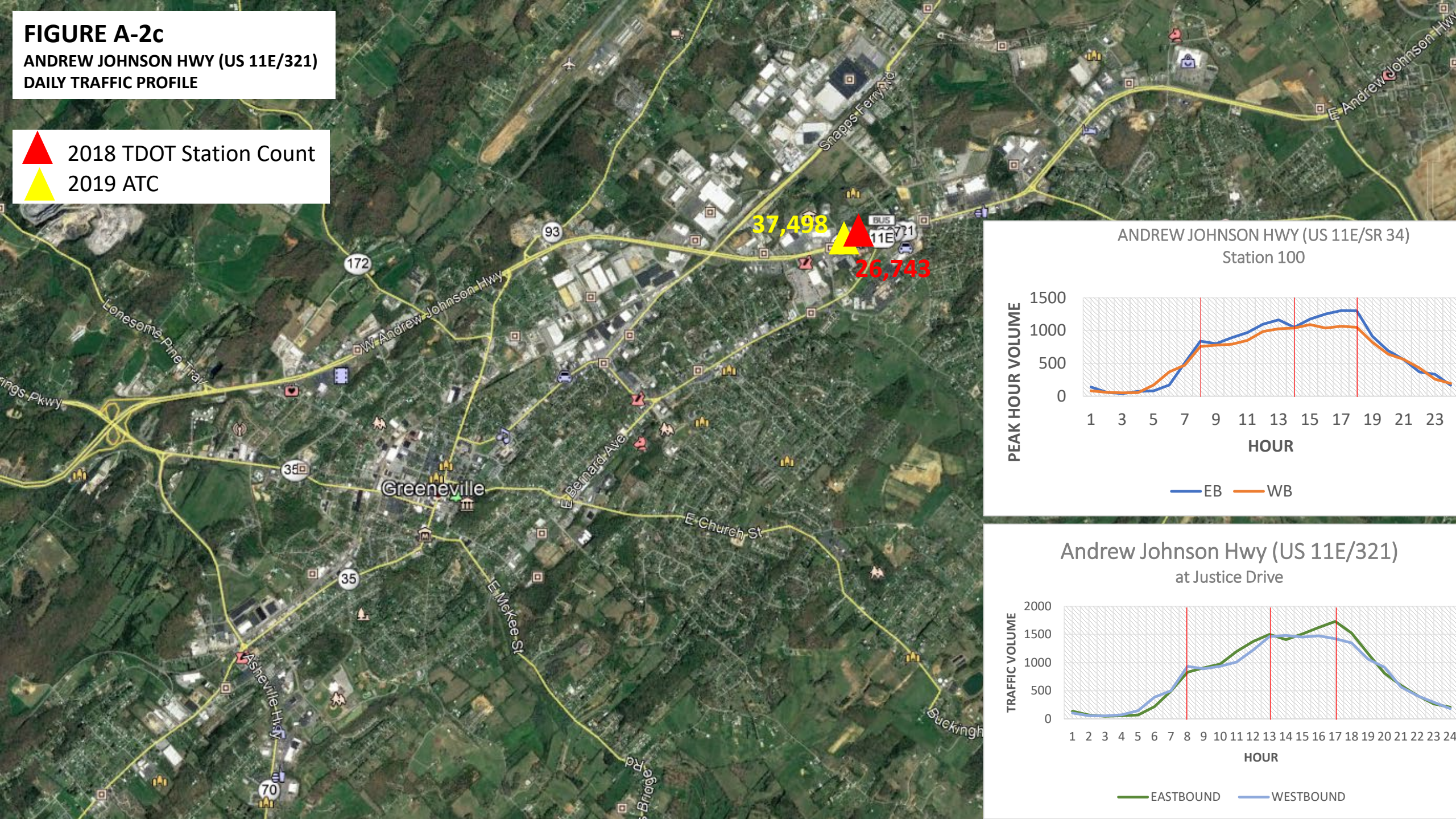


FIGURE A-3

ANDREW JOHNSON HWY (US 11E/321) - EAST
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 AVERAGE DAILY TRAFFIC (AADT)

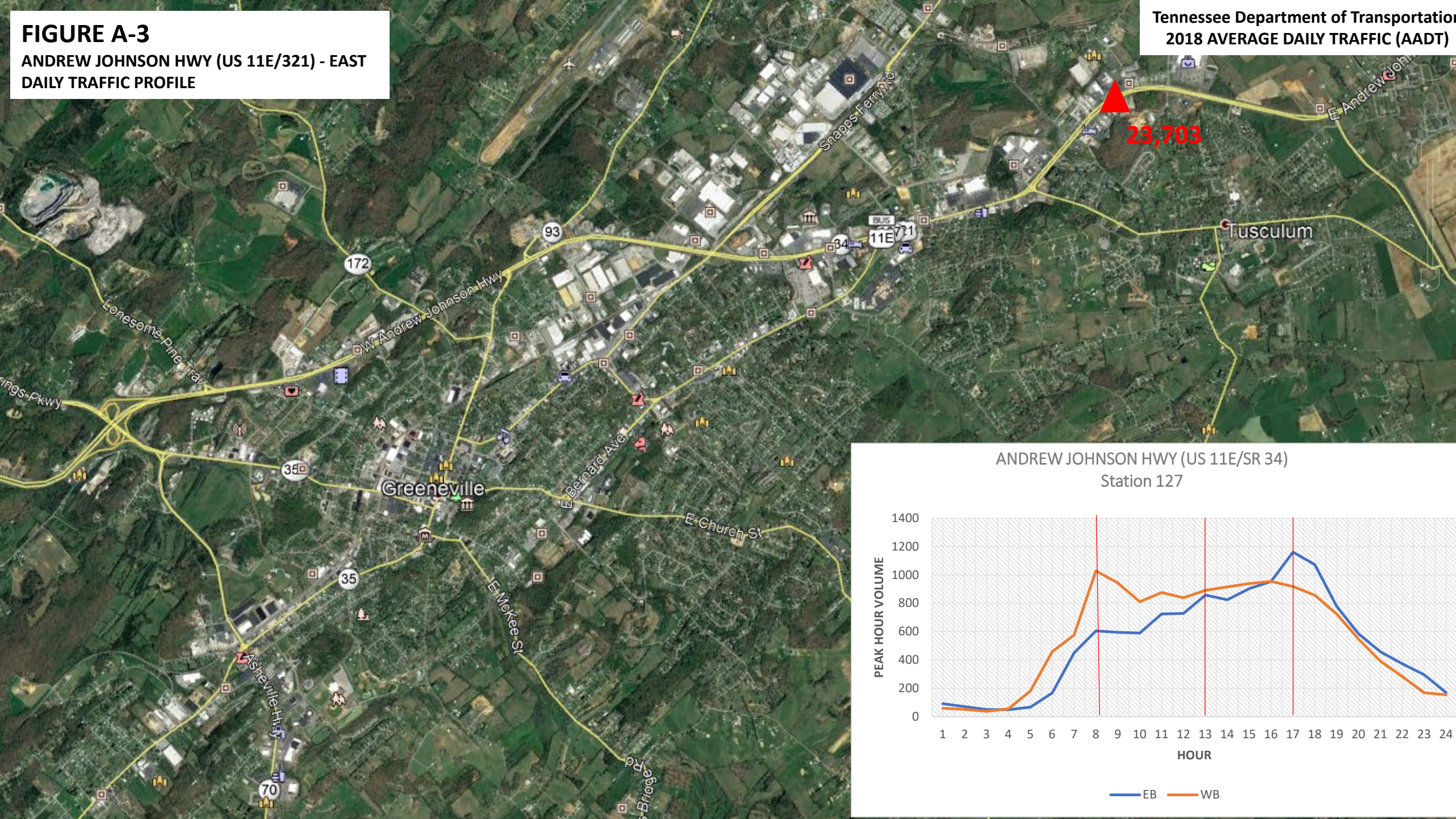


FIGURE A-4
ASHEVILLE HWY (SR 70)
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 AVERAGE DAILY TRAFFIC (AADT)

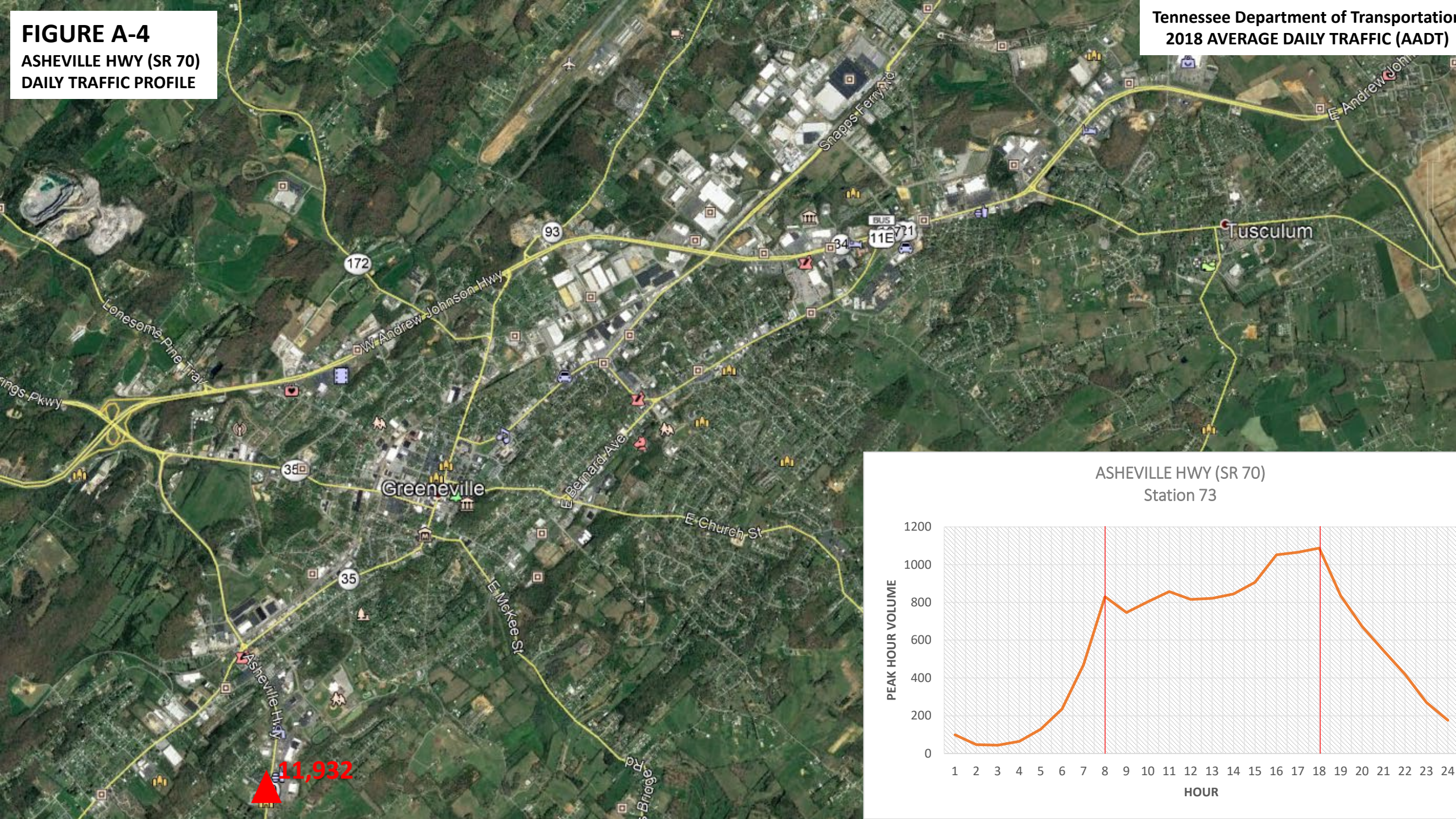


FIGURE A-5a

MAIN STREET (US 11Bus/321)
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 AVERAGE DAILY TRAFFIC (AADT)

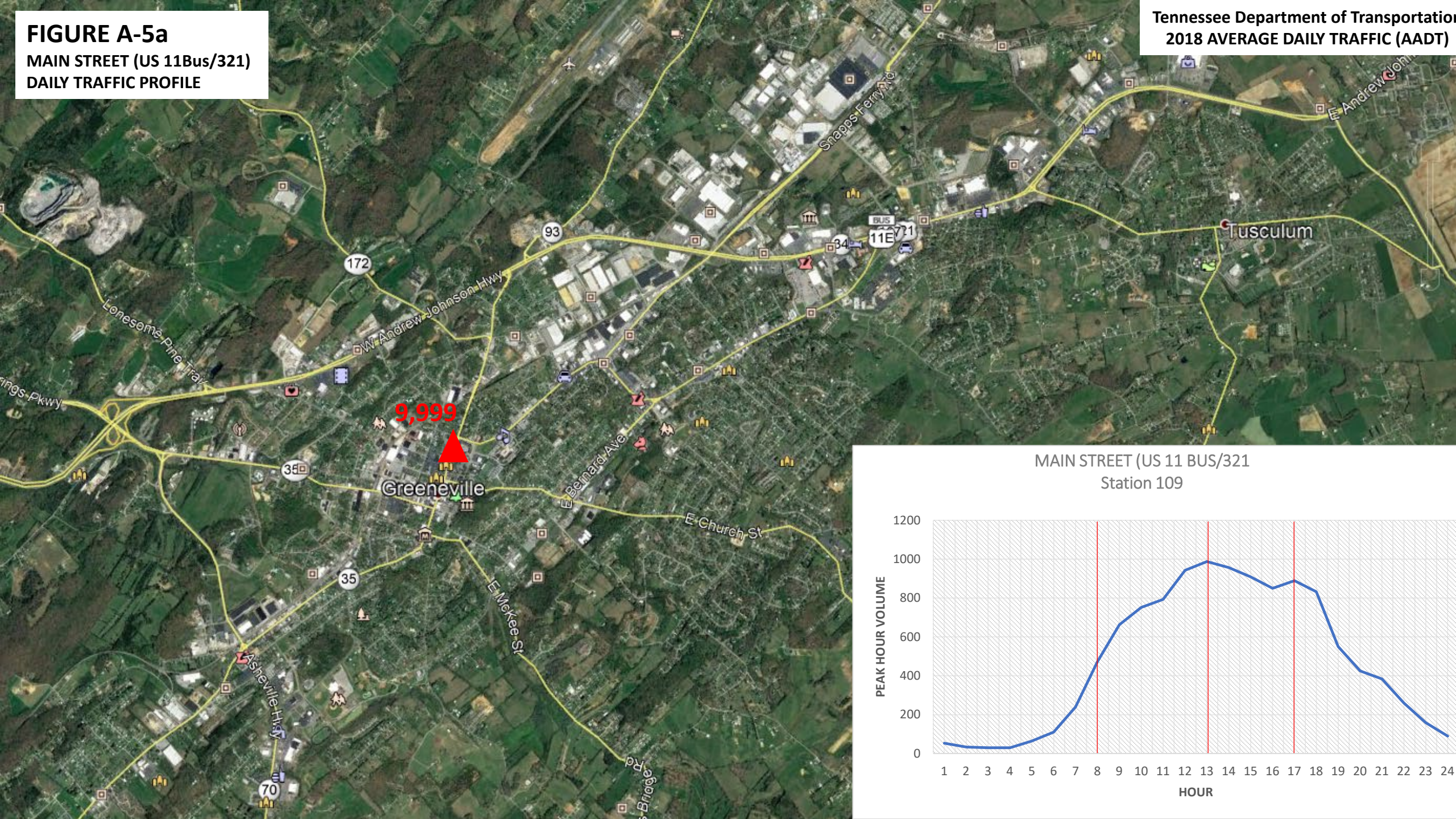


FIGURE A-5b

MAIN STREET (US 11Bus/321)
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 ATC DAILY TRAFFIC

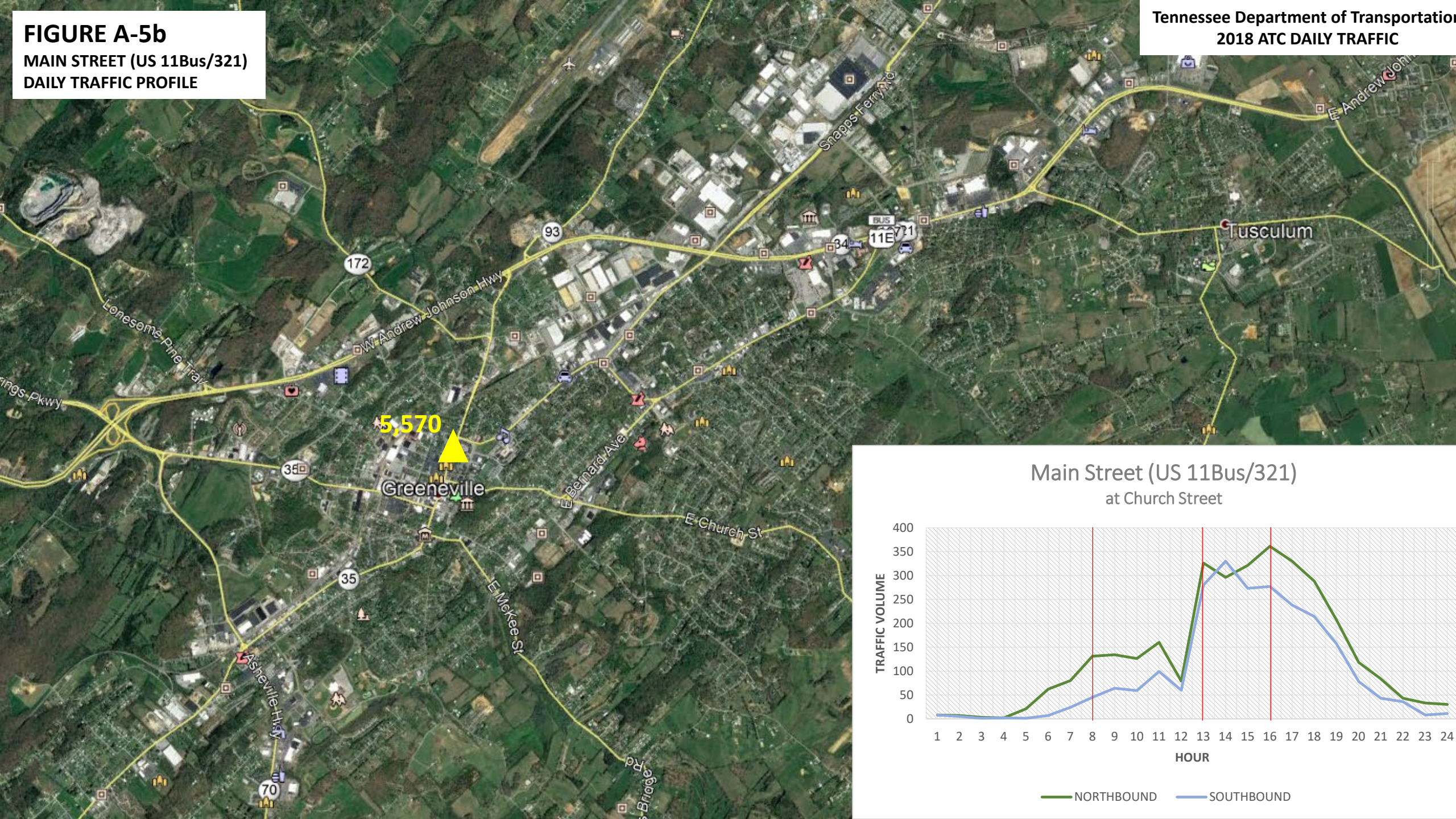


FIGURE A-5c

MAIN STREET (US 11Bus/321)
DAILY TRAFFIC PROFILE

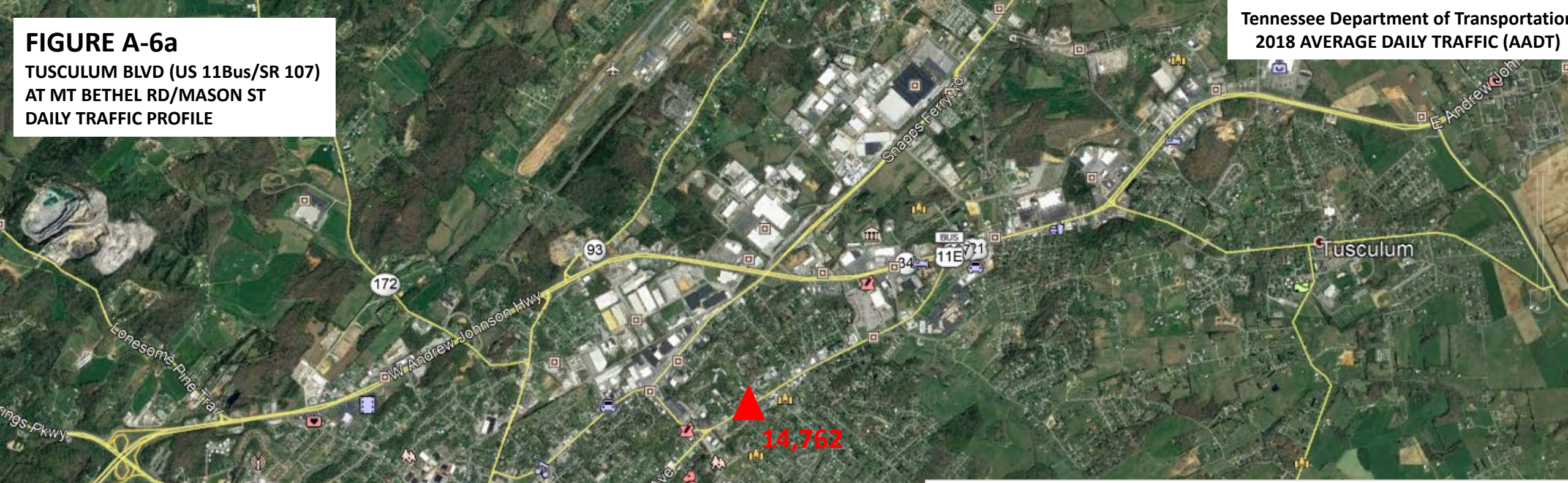
2018 TDOT Station Count
2019 ATC



FIGURE A-6a

TUSCULUM BLVD (US 11Bus/SR 107)
AT MT BETHEL RD/MASON ST
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 AVERAGE DAILY TRAFFIC (AADT)



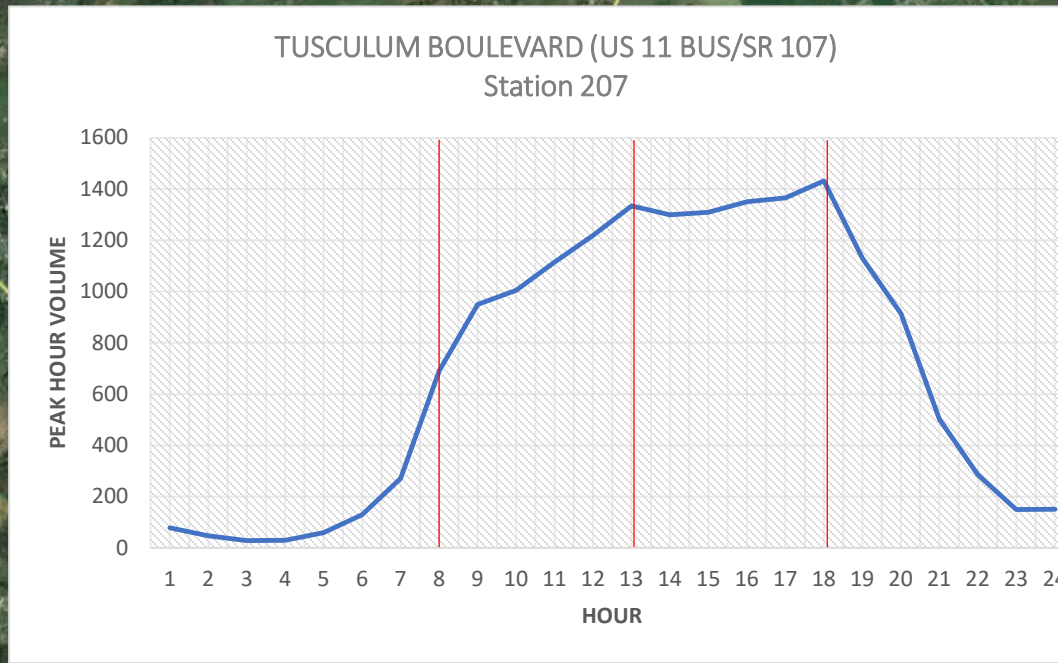


FIGURE A-6b

TUSCULUM BLVD (US 11Bus/SR 107)
AT MT BETHEL RD/MASON ST
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 ATC DAILY TRAFFIC



FIGURE A-6c

TUSCULUM BLVD (US 11Bus/SR 107)
AT MT BETHEL RD/MASON ST
DAILY TRAFFIC PROFILE

2018 TDOT Station Count
2019 ATC

Tennessee Department of Transportation
2018 AVERAGE DAILY TRAFFIC (AADT)

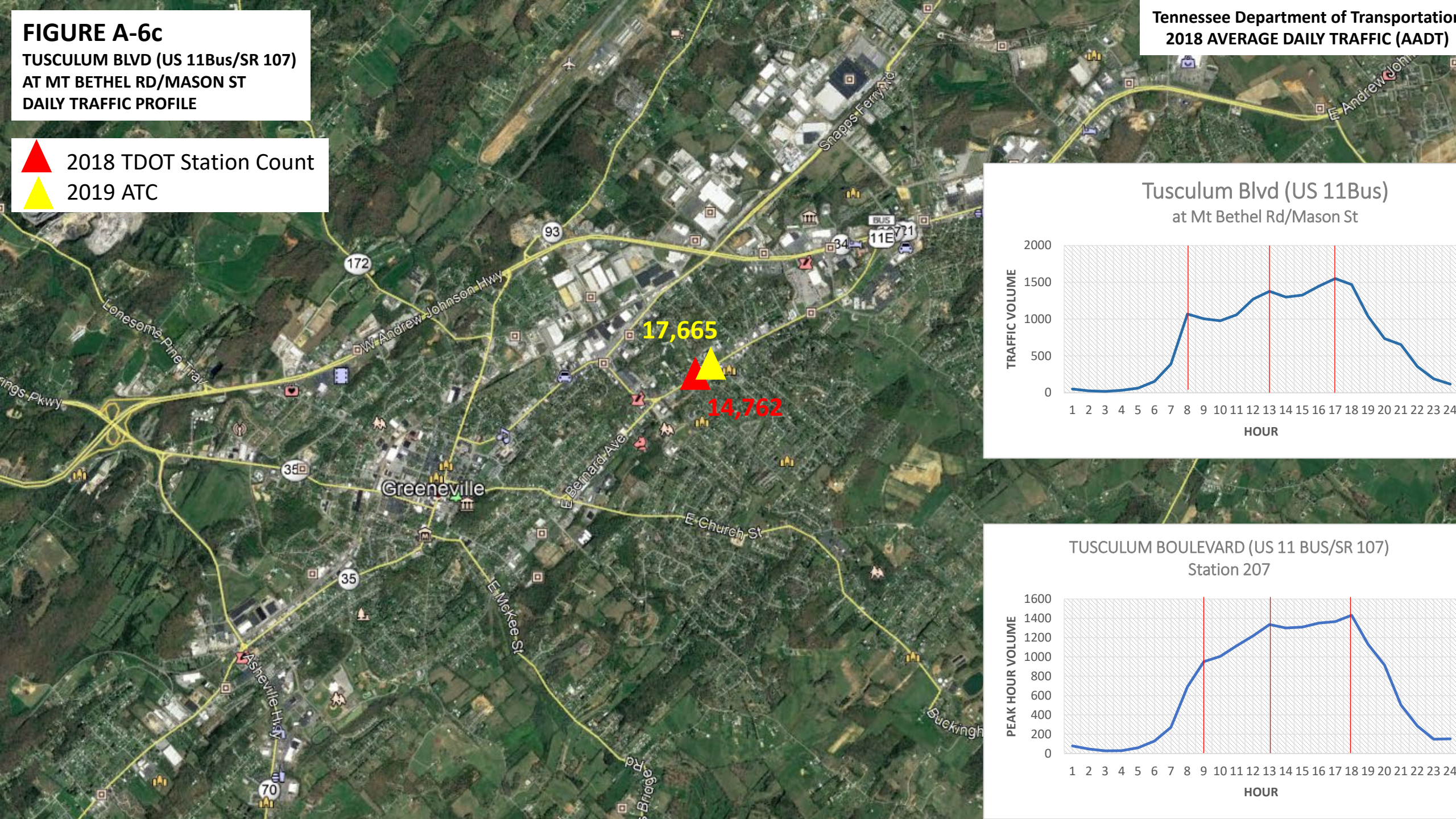
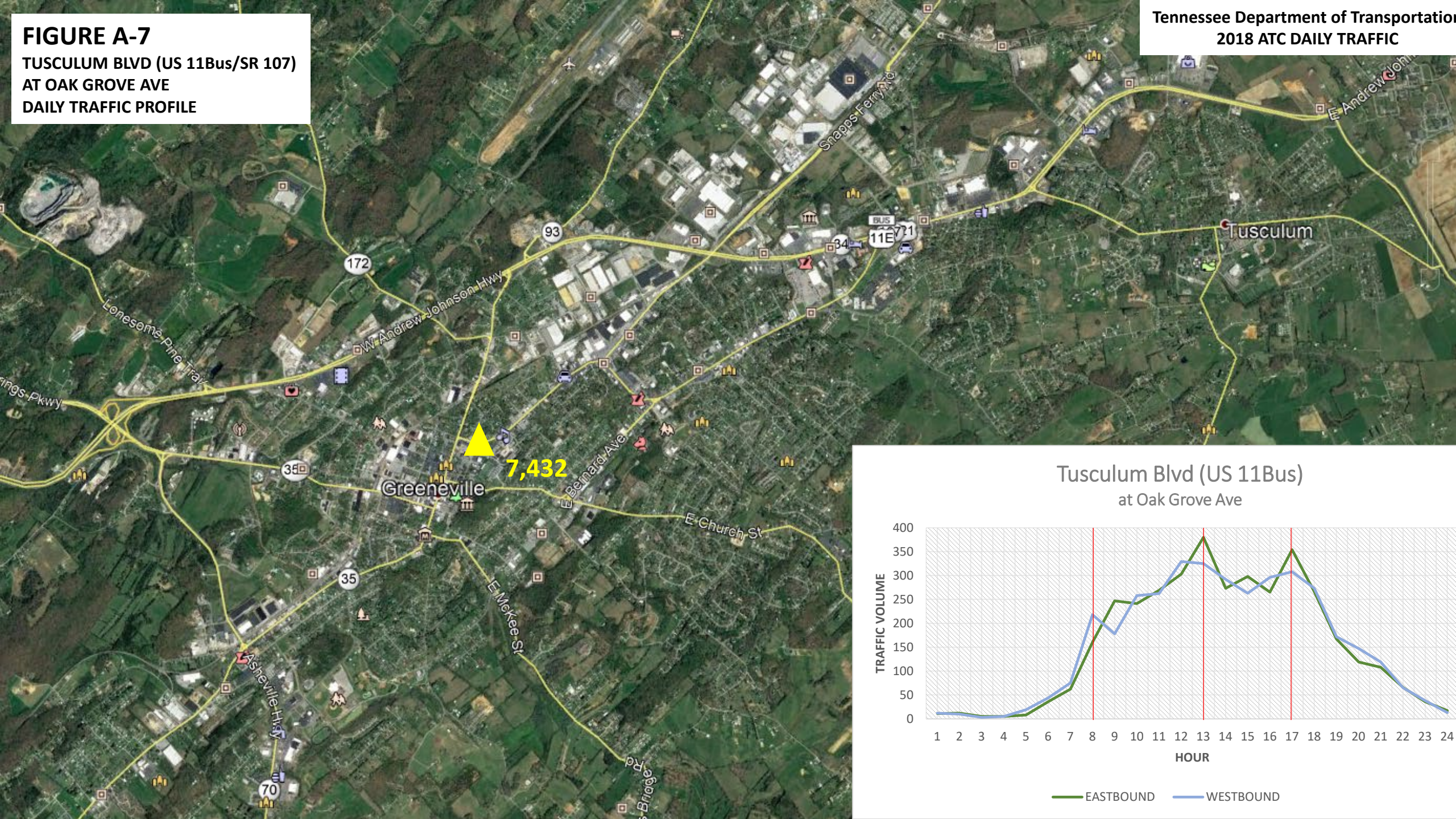


FIGURE A-7

TUSCULUM BLVD (US 11Bus/SR 107)
AT OAK GROVE AVE
DAILY TRAFFIC PROFILE

Tennessee Department of Transportation
2018 ATC DAILY TRAFFIC



TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX A

Signal System Timing

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Main St (US 321)/Kingsport Hwy (SR 93)	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	62		18	20	57		18	20
2	3/3/3	105	18	63		24	22	59		24	45
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20		6	6	20		6	
Extension	2.5	5.0		2.5	2.5	5.0		2.5	
Max 1	25	65		25	25	65		25	
Max 2									
Yellow	3.6	4.5		3.5	3.6	4.5		3.5	
All Red	2.5	2.3		2.5	2.5	2.3		2.5	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Industrial Road/Burns Street	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	23	50		22	17	56		22	4
2	3/3/3	105	21	52		32	15	58		32	0
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20		6	6	20		6	
Extension	2.5	5.0		2.5	2.5	5.0		2.5	
Max 1	25	60		35	20	60		35	
Max 2									
Yellow	3.2	4.5		4.0	3.2	4.5		4.0	
All Red	2.5	2.2		2.5	2.5	2.2		2.5	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Greeneville Commons	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	50	15	15	15	50	15	15	88
2	3/3/3	105	15	59	15	16	15	59	15	16	36
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20	6	6	6	20	6	6	
Extension	2.5	5.0	2.5	2.5	2.5	5.0	2.5	2.5	
Max 1	15	60	15	20	15	60	15	20	
Max 2									
Yellow	3.2	4.5	3.2	3.2	3.2	4.5	3.2	3.2	
All Red	2.5	2.0	2.5	2.5	2.5	2.0	2.5	2.5	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Justice Drive/Bob Smith Blvd	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	40	20	20	15	40			93
2	3/3/3	105	15	50	20	20	15	50			28
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20	6	6	6	20			
Extension	2.5	5.0	2.5	2.5	2.5	5.0			
Max 1	15	50	20	20	15	50			
Max 2									
Yellow	3.2	4.5	3.2	3.2	3.2	4.5			
All Red	2.5	4.0	5.0	5.0	2.5	4.0			
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Fairgrounds Road	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	61		19		76			48
2	3/3/3	105	15	68		22		83			80
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20		6		20			
Extension	2.5	5.0		2.5		5.0			
Max 1	15	85		25		85			
Max 2									
Yellow	3.2	4.5		3.2		4.5			
All Red	2.5	2.0		2.5		2.0			
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	61		19	15	61		19	47
2	3/3/3	105	15	71		19	15	7\		19	59
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20		6	6	20		6	
Extension	2.5	5.0		2.5	2.5	5.0		2.5	
Max 1	15	75		20	15	75		20	
Max 2									
Yellow	3.2	4.5		3.2	3.2	4.5		3.2	
All Red	2.5	2.5		2.5	2.5	2.5		2.5	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Erwin Hwy	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	44	21	15	15	44	15	21	24
2	3/3/3	105	19	53	17	16	15	57	15	18	56
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20	6	6	6	20	6	6	
Extension	2.5	5.0	2.5	2.5	2.5	5.0	2.5	2.5	
Max 1	20	60	25	20	15	60	15	20	
Max 2									
Yellow	3.2	4.5	3.2	3.2	3.2	4.5	3.2	3.2	
All Red	2.5	2.2	2.5	2.5	2.5	2.2	2.5	2.5	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	55		25	15	55		25	82
2	3/3/3	105	15	54		36	15	54		36	97
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20		6	6	20		6	
Extension	2.5	5.0		2.5	2.5	5.0		2.5	
Max 1	15	60		40	15	60		40	
Max 2									
Yellow	3.2	4.5		3.2	3.2	4.5		3.2	
All Red	2.5	2.0		2.5	2.5	2.0		2.5	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	50	15	15		65			40
2	3/3/3	105	24	50	16	15		74			59
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20	6	6		20			
Extension	2.5	5.0	2.5	2.5		5.0			
Max 1	25	75	20	20		75			
Max 2									
Yellow	3.2	4.5	3.2	3.2		4.5			
All Red	2.5	2.0	2.5	2.5		2.0			
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Andrew Johnson Hwy (US 11E) & Walmart Driveway	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	95	15	63		17	15	63		17	41
2	3/3/3	105	15	59		31	15	59		31	60
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20		6	6	20		6	
Extension	2.5	5.0		2.5	2.5	5.0		2.5	
Max 1	20	60		20	15	60		20	
Max 2									
Yellow	3.2	4.5		3.2	3.2	4.5		3.2	
All Red	2.5	2.0		2.5	2.5	2.0		2.5	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Snapps Ferry Rd & Bohannon Ave/Forest Hills Dr	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	75	20	25	15	15	25	20			
2	3/3/3	80	20	30	15	15	29	21			
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15	6	6	15	15			
Extension	2.5	2.5	2.5	2.5	2.5	2.5			
Max 1	20	35	20	20	35	75			
Max 2									
Yellow	3.2	3.5	3.2	3.2	3.5	3.5			
All Red	2.5	4.0	4.5	5.5	4.0	2.0			
Walk									
Flash Don't Walk									
Max/Min Recall		Min			Min				
Coordinated Phases		2			5				

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Tusculum Blvd (SR 107) & Grove St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	70		53		17		53		17	54
2	1/3/3	70		52		18		52		18	54
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15		6		15		6	
Extension		2.5		2.5		2.5		2.5	
Max 1		55		20		55		20	
Max 2									
Yellow		3.5		3.2		3.5		3.2	
All Red		2.0		2.0		2.0		2.0	
Walk		7		7		7		7	
Flash Don't Walk		10		10		10		10	
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Tusculum Blvd (SR 107) & Austin St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	70		47		23		47		23	63
2	1/3/3	70		46		24		46		24	63
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15		6		15		6	
Extension		2.5		2.5		2.5		2.5	
Max 1		50		25		50		25	
Max 2									
Yellow		3.5		3.2		3.5		3.2	
All Red		2.0		2.0		2.0		2.0	
Walk		7		7		7		7	
Flash Don't Walk		10		10		10		10	
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Tusculum Blvd (SR 107) & Snapps Ferry Rd	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	70	17	34		19		51			43
2	1/3/3	70	15	32		23		47			42
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15		6		15			
Extension	2.5	2.5		2.5		2.5			
Max 1	20	55		25		55			
Max 2									
Yellow	3.2	3.5		3.2		3.5			
All Red	2.2	2.0		2.5		2.0			
Walk		7		6					
Flash Don't Walk		20		13					
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Tusculum Blvd (SR 107) & Bernard Ave	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	70	21	29		20		50			67
2	1/3/3	70	19	33		18		52			0
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15		6		15			
Extension	2.5	2.5		2.5		2.5			
Max 1	25	55		20		55			
Max 2									
Yellow	3.2	3.5		3.2		3.5			
All Red	2.5	2.0		2.5		2.0			
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	70	15	33		22		48		22	68
2	1/3/3	70	15	38		17		53		17	69
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15		6		15		6	
Extension	2.5	2.5		2.5		2.5		2.5	
Max 1	15	55		25		55		25	
Max 2									
Yellow	3.2	3.5		3.2		3.5		3.2	
All Red	2.5	2.5		2.0		2.5		2.0	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Tusculum Blvd (SR 107) & Hope Rd	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	70	15	40		15	15	40		15	0
2	1/3/3	70	15	40		15	15	40		15	0
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15		6	6	15		6	
Extension	2.5	2.5		2.5	2.5	2.5		2.5	
Max 1	15	40		20	15	40		20	
Max 2									
Yellow	3.2	3.5		3.2	3.2	3.5		3.2	
All Red	2.5	2.5		2.0	2.5	2.5		2.0	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Tusculum Blvd (SR 107) & Justice Dr/Old Tusculum Rd	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	70	15	26		29		41		29	67
2	1/3/3	70	15	28		27		43		27	0
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15		6		15		6	
Extension	2.5	2.5		2.5		2.5		2.5	
Max 1	15	45		30		45		30	
Max 2									
Yellow	3.2	3.5		3.2		3.5		3.2	
All Red	2.5	2.5		2.0		2.5		2.0	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Summer St (US 11 Bus) & Cutler St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	50		33		17		33		17	0
2	1/3/3	50		33		17		33		17	20
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15		6		15		6	
Extension		2.5		2.5		2.5		2.5	
Max 1		35		20		35		20	
Max 2									
Yellow		3.5		3.2		3.5		3.2	
All Red		2.0		2.0		2.0		2.0	
Walk		7		5		7		5	
Flash Don't Walk		15		10		15		10	
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Summer St (US 11 Bus) & Irish St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	50		31		19		31		19	2
2	1/3/3	50		30		20		30		20	37
3											
4											
5											
6											
7											
8			0	31	0	20	0	31	0	20	

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15		6		15		6	
Extension		2.5		2.5		2.5		2.5	
Max 1		35		20		35		20	
Max 2									
Yellow		3.5		3.2		3.5		3.2	
All Red		2.0		2.0		2.0		2.0	
Walk		7							
Flash Don't Walk		15		15		15		15	
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Main St (US 321) & Tusculum Blvd/Spencer St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	50		25		25		25		25	45
2	1/3/3	100		41		59		41		59	88
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15		6		15		15	
Extension		2.5		2.5		2.5		2.5	
Max 1		45		25		45		60	
Max 2									
Yellow		3.5		3.2		3.5		3.2	
All Red		2.5		2.0		2.5		2.0	
Walk		7				7		7	
Flash Don't Walk		15				16		12	
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Main St (US 321) & Church St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	100	12	48	12	28	12	48	12	28	68
2	1/3/3	100	12	46	12	30	12	46	12	30	40
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15	6	6	6	15	6	6	
Extension	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Max 1	15	50	15	30	15	50	15	30	
Max 2									
Yellow	3.2	3.5	3.2	3.2	3.2	3.5	3.2	3.2	
All Red	2.5	2.0	2.5	2.0	2.5	2.0	2.5	2.0	
Walk		7		7		7		7	
Flash Don't Walk		12		15		12		15	
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Main St (US 321) & Depot St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	100		74		26		74		26	18
2	1/3/3	100		75		25		75		25	89
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15		6		15		6	
Extension		2.5		2.5		2.5		2.5	
Max 1		75		30		75		30	
Max 2									
Yellow		3.5		3.2		3.5		3.2	
All Red		2.0		2.0		2.0		2.0	
Walk		7		7		7		7	
Flash Don't Walk		12		15		12		15	
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Main St (US 321) & Summer St (US 11E Bus)	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	100	12	43	25	20		55			66
2	1/3/3	100	12	48	20	20		60			46
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15	6	6		15			
Extension	2.5	2.5	2.5	2.5		2.5			
Max 1	15	60	25	20		60			
Max 2									
Yellow	3.2	3.5	3.5	3.2		3.5			
All Red	2.5	2.0	2.5	2.0		2.0			
Walk			5	5		7			
Flash Don't Walk			14	13		10			
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Main St (US 321) & McKee St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	100	12	60		28		72		28	38
2	1/3/3	100	12	52		36		64		36	97
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15		6		15		6	
Extension	2.5	2.5		2.5		2.5		2.5	
Max 1	15	75		40		75		40	
Max 2									
Yellow	3.2	3.5		3.2		3.5		3.2	
All Red	2.0	2.0		2.0		2.0		2.0	
Walk		7		7		7		7	
Flash Don't Walk		10		15		10		15	
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Church St & College St.	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	50		28		22		28		22	21
2	1/3/3	50		30		20		30		20	39
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		10		6		10		6	
Extension		2.5		2.5		2.5		2.5	
Max 1		30		25		30		25	
Max 2									
Yellow		3.5		3.2		3.5		3.2	
All Red		2.0		2.0		2.0		2.0	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	E. McKee St (SR 350) & College St	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	50		32		18		32			
2	1/3/3	50		34		16		34			
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15		6		15			
Extension		2.5		2.5		2.5			
Max 1		35		20		35			
Max 2									
Yellow		3.5		3.2		3.5			
All Red		2.5		2.0		2.5			
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases									

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	11:00	1/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	E. McKee St (SR 350) & Bernard Ave	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	60		33				33		27	
2	1/3/3	60		30				30		30	
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15				15		6	
Extension		2.5				2.5		2.5	
Max 1		35				35		30	
Max 2									
Yellow		3.5				3.5		3.2	
All Red		2.0				2.0		2.0	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases									

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Church St & Bernard Ave	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	60		33		27		33		27	
2	3/3/3	55		33		22		33		22	
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		10		10		10		10	
Extension		2.5		2.5		2.5		2.5	
Max 1		35		30		35		30	
Max 2									
Yellow		3.5		3.5		3.5		3.5	
All Red		2.5		2.5		2.5		2.5	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases									

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	10:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Summer St (US 11 Bus) & Arnold Rd	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	75	15	25	23	12		40			
2											
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	15	15	6		15			
Extension	2.5	2.5	2.5	2.5		2.5			
Max 1	15	40	25	15		40			
Max 2									
Yellow	3.2	4.5	4.0	3.0		4.5			
All Red	2.5	2.0	2.5	2.5		2.0			
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases									

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	1	1	1	1	1	1	1
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Asheville Hwy (SR 70) & Main St (US 321)	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	110	16	29	15	50	18	27	15	50	43
2	3/3/3	90	15	26	15	34	15	26	15	34	16
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial	6	20	6	6	6	20	6	6	
Extension	2.5	5.0	2.5	2.5	2.5	5.0	2.5	2.5	
Max 1	20	30	15	50	20	30	15	50	
Max 2									
Yellow	3.2	4.0	3.2	4.0	3.2	4.0	3.2	4.0	
All Red	2.5	2.0	2.5	2.0	2.5	2.0	2.5	2.0	
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases				4				8	

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	15:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

SIGNAL TIMING INVENTORY

INTERSECTION:	Asheville Hwy (SR 70) & Vann Rd	SIGNAL NO.:
Controller Model:		

PLAN	C/O/S	CYCLE	Coordination Splits (sec)								OFFSET
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
1	1/1/1	110		68	21	21	21	47			0
2	3/3/3	90		50	25	15	15	35			60
3											
4											
5											
6											
7											
8											

CONTROLLER	Timing								
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	
Initial		15	6	6	6	15			
Extension		2.5	2.5	2.5	2.5	2.5			
Max 1		70	25	25	25	70			
Max 2									
Yellow		4.0	3.2	3.2	3.2	4.0			
All Red		2.5	2.5	2.5	2.5	2.5			
Walk									
Flash Don't Walk									
Max/Min Recall									
Coordinated Phases		2				6			

DAY PLAN EVENTS

PLAN	HH:MM	C/O/S	CKT PLAN
1	6:00		Free-Off
1	6:00	1/1/1	
1	15:00	3/3/3	
1	18:00	1/1/1	
1	21:00		Free-On
2	06:00		Free-Off
2	06:00	1/1/1	
2	18:00		Free-On

WEEKLY PROGRAM PLAN

PLAN	SUN 1	MON 2	TUE 3	WED 4	THU 5	FRI 6	SAT 7
0	2	1	1	1	1	1	2
1							
2							
3							
4							

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX B

Signal System Intersection Summary

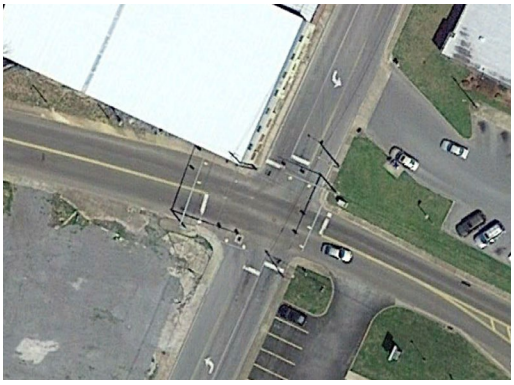
SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 6

TOWN SIGNALIZED INTERSECTION SUMMARY

Summer Street (US 11 Bus) &
Cutler Street
Intersection 1.1

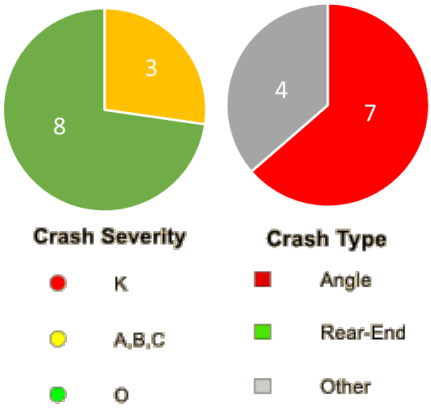
Level of Service AM(PM): A(A)
Optimized: A(A)

Peek 3000 Controller (2/17/97)
Downtown Signal System (Twisted Pair)



Crash History Summary

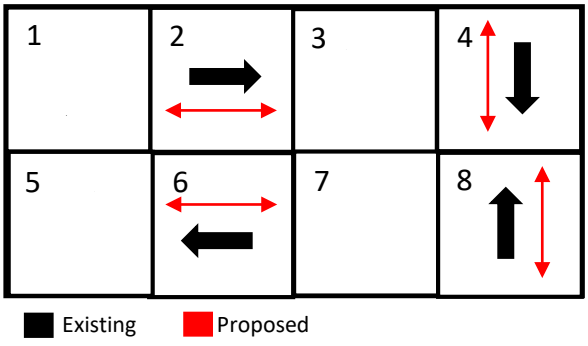
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.26
Critical Crash Rate
1.51



Signal Phasing:







Recommendations

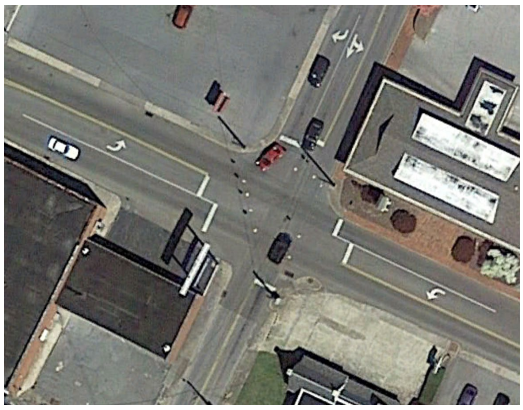
- Retime signal and operate in the Downtown signal system. Adjust clearances.
- Reconstruct signal
- Install fiber communications.
- Improve sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.

SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 6

TOWN SIGNALIZED INTERSECTION SUMMARY

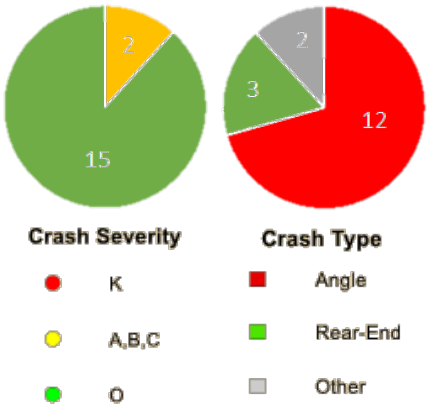
Summer Street (US 11 Bus) &
Irish Street
Intersection 1.2

Level of Service AM(PM): A(B)
Optimized: A(A)



Peek 3000 Controller (12/30/96)
Downtown Signal System (Twisted Pair)

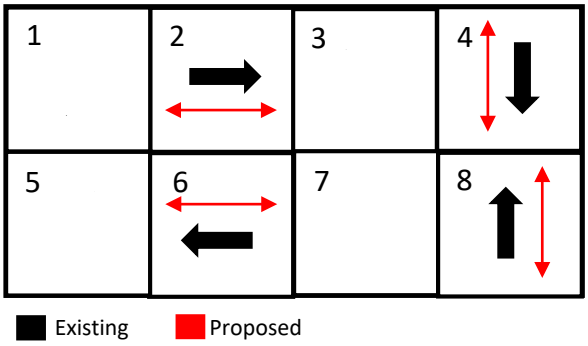
Crash History Summary
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
1.10
Critical Crash Rate
1.52



Signal Phasing:





Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances.
- Reconstruct signal
- Install fiber communications.
- Improve sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.



SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 3

TOWN SIGNALIZED INTERSECTION SUMMARY

Main Street (US 11 Bus/US 321) &
Summer Street
Intersection 1.6

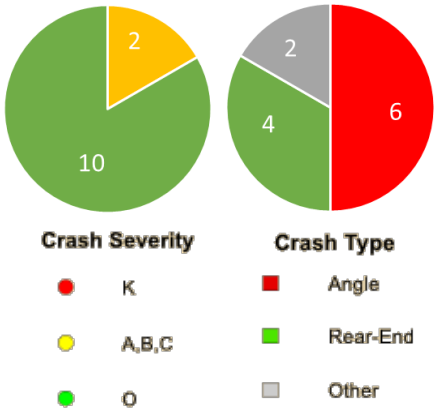
Level of Service AM(PM): B(D)
Optimized: B(C)



Peek 3000E Controller (4/2/01), System Master
Downtown Signal System (Twisted Pair)

Crash History Summary

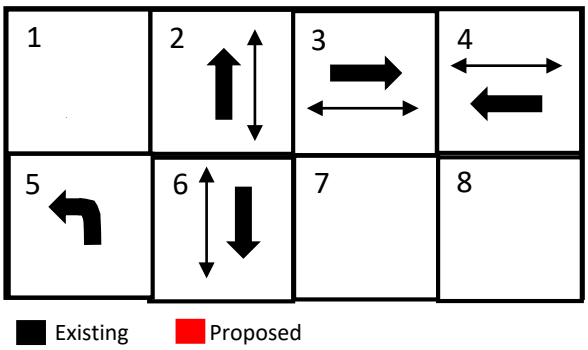
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.49
Critical Crash Rate
1.39



Signal Phasing:





Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Upgrade sidewalk access for ADA compliance, mark crosswalks, and pedestrian signals.
- Provide ethernet communications with twisted pair.
- Replace twisted pair with fiber cable.

SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 3

TOWN SIGNALIZED INTERSECTION SUMMARY

Main Street (US 11 Bus/US 321) &
Depot Street
Intersection 1.5

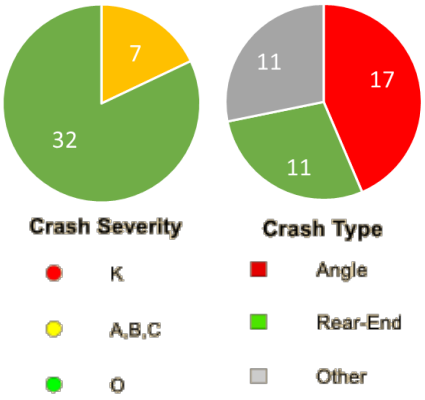
Level of Service AM(PM): B(A)
Optimized: A(A)

Peek 3000E Controller (7/20/97)
Downtown Signal System (Twisted Pair)



Crash History Summary

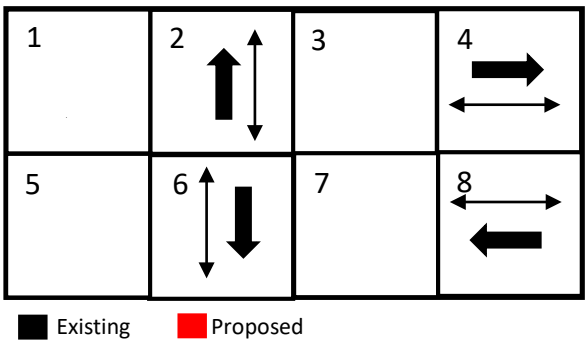
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
1.89
Critical Crash Rate
1.43



Signal Phasing:





Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Upgrade sidewalk access for ADA compliance, mark crosswalks, and pedestrian signals.
- Add post mounted turn restrictions.
- Install NO RIGHT TURN ON RED for EB Depot St. approach.
- Provide ethernet communications with twisted pair.
- Replace twisted pair with fiber cable.



SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 3

TOWN SIGNALIZED INTERSECTION SUMMARY

Main Street (US 11 Bus/US 321) &
Church Street
Intersection 1.4

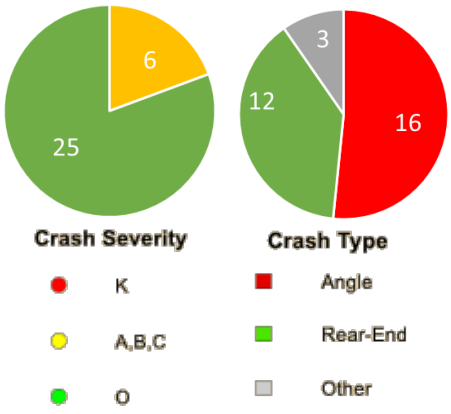
Level of Service AM(PM): C(C)
Optimized: C(C)

Peek 3000E Controller (6/12/96)
Downtown Signal System (Twisted Pair)



Crash History Summary

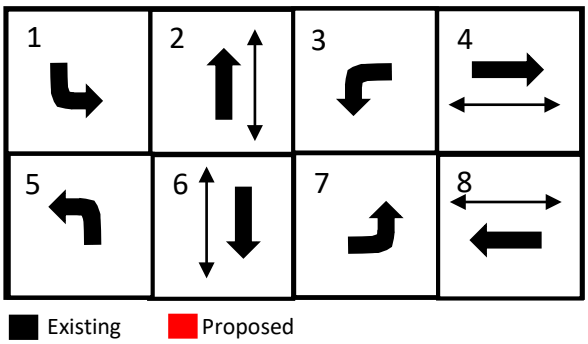
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.95
Critical Crash Rate
1.32



Signal Phasing:







Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Upgrade sidewalk access for ADA compliance, mark crosswalks, and pedestrian signals.
- Provide ethernet communications with twisted pair.
- Replace twisted pair with fiber cable.

SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 3

TOWN SIGNALIZED INTERSECTION SUMMARY

Main Street (US 11 Bus/US 321) &
Tusculum Boulevard (US 11 Bus)/Spencer Street
Intersection 1.3 Level of Service AM(PM): B(C)
Optimized: B(C)

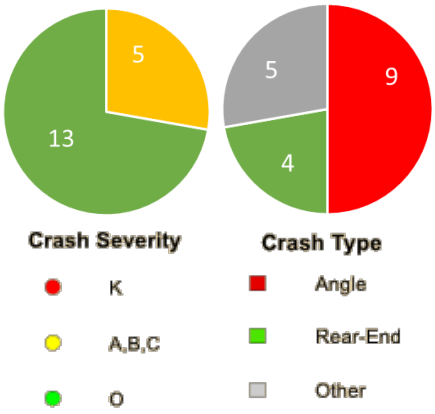
Peek 3000 Controller (12/5/95)
Downtown Signal System (Twisted Pair)

NOTE: Near Greeneville High School and Walter State Community College



Crash History Summary

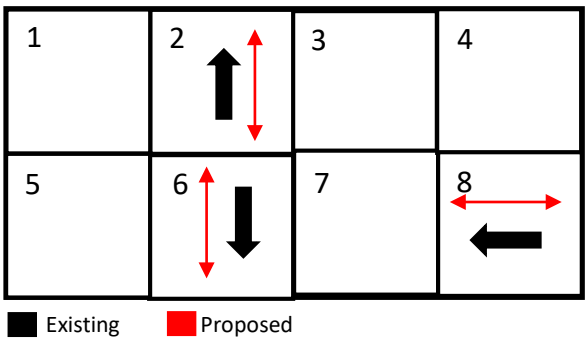
January 2014-December 2018



Statewide Crash Rate
0.917
Intersection Crash Rate
0.68
Critical Crash Rate
1.37



Signal Phasing:





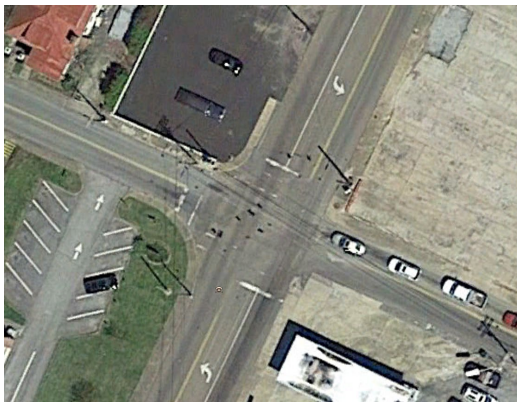


Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances.
- Upgrade signal cabinet and controller.
- Upgrade sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Provide ethernet communications with twisted pair.
- Replace twisted pair with fiber cable.
- Install communication link with Tusculum Blvd subsystem.

SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 3

TOWN SIGNALIZED INTERSECTION SUMMARY



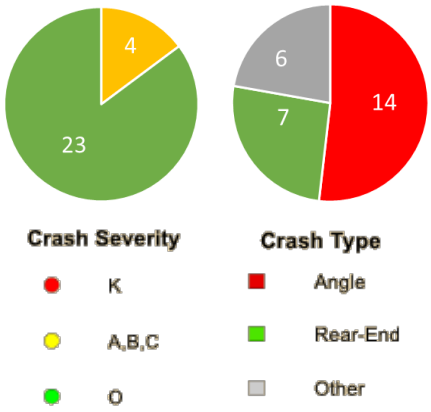
Main Street (US 321) &
McKee Street (SR 350)
Intersection 1.7

Level of Service AM(PM): B(B)
Optimized: B(B)

Peek 3000E Controller (6/7/96)
Downtown Signal System (Twisted Pair)

Crash History Summary

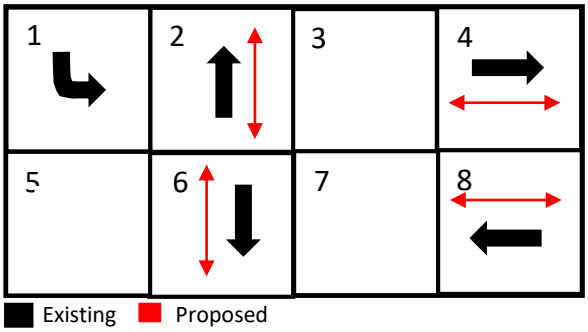
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
1.28
Critical Crash Rate
1.43



Signal Phasing:





Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances.
- Upgrade signal cabinet and controller.
- Upgrade sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Provide ethernet communications with twisted pair.
- Replace twisted pair with fiber cable..

SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 3

TOWN SIGNALIZED INTERSECTION SUMMARY

Church Street &
College Street
Intersection 1.8

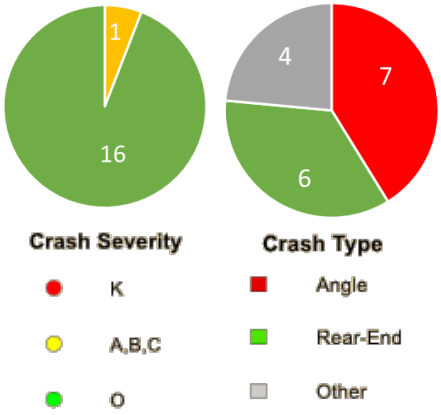
Level of Service AM(PM): C(C)
Optimized: B(B)

Peek 3000E Controller (10/6/97)
Downtown Signal System (Twisted Pair)



Crash History Summary

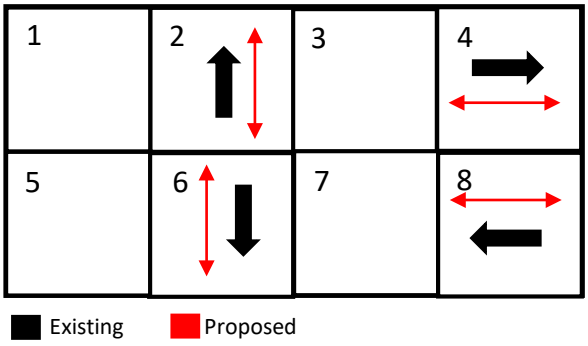
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.99
Critical Crash Rate
1.49



Signal Phasing:







Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances (Increase RED clearance).
- Reconstruct signal.
- Provide ethernet communications with twisted pair.
- Replace twisted pair with fiber cable..
- Improve sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Extend communications into Town Hall.

SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 6

TOWN SIGNALIZED INTERSECTION SUMMARY

Church Street &
Bernard Avenue
Intersection 1.11

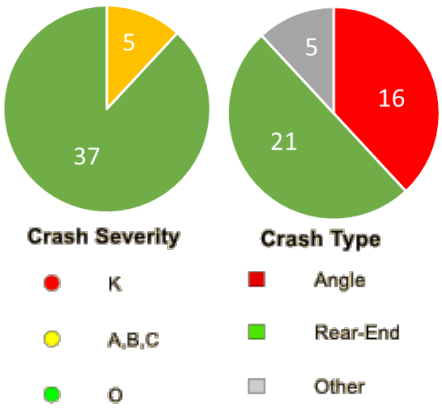
Level of Service AM(PM): B(B)
Optimized: B(B)



Peek 3000E Controller (9/21/12)

Crash History Summary

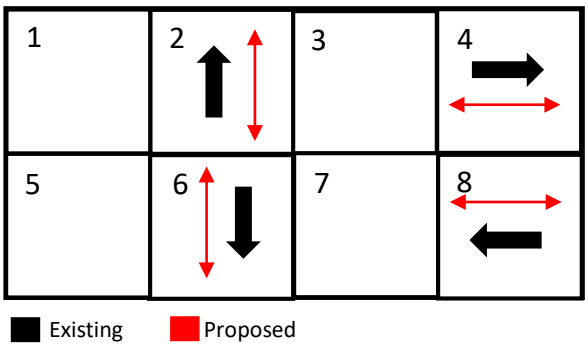
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.94
Critical Crash Rate
1.26



Signal Phasing:





Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances.
- Upgrade signal cabinet and controller.
- Improve sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Install fiber communications.



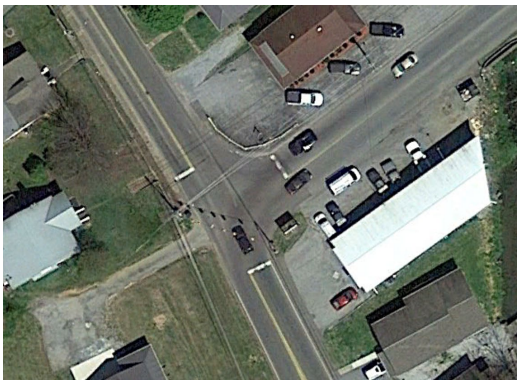
SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 6

TOWN SIGNALIZED INTERSECTION SUMMARY

McKee Street (SR 350) &
Bernard Avenue
Intersection 1.10

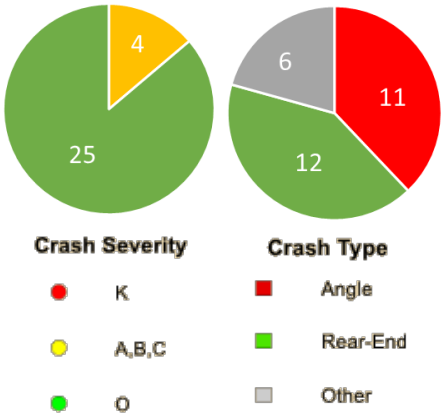
Level of Service AM(PM): C(C)
Optimized: C(B)

Peek Transyt Controller (6/3/96)



Crash History Summary

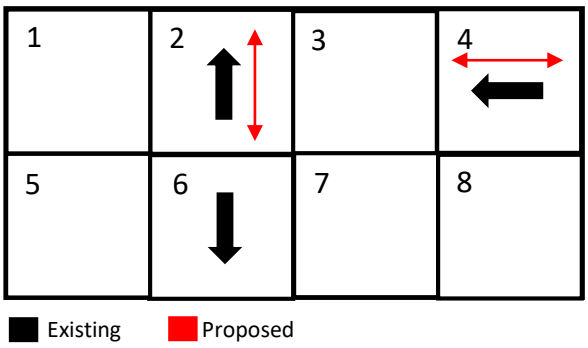
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.77
Critical Crash Rate
1.38



Signal Phasing:





Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances.
- Upgrade signal cabinet and controller.
- Improve sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Install fiber communications.



SYSTEM CONSTRUCTION
DOWNTOWN SUB SYSTEM
PHASE 6

TOWN SIGNALIZED INTERSECTION SUMMARY

McKee Street (SR 350) &
College Street
Intersection 1.9

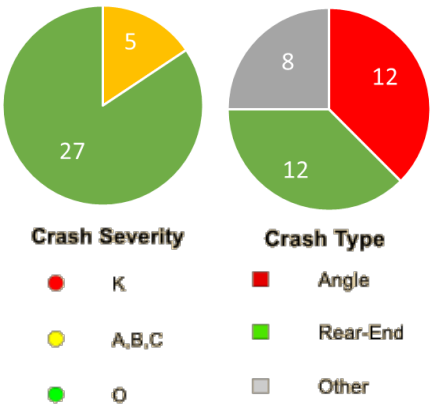
Level of Service AM(PM): A(B)
Optimized: A(A)

Eagle EPAC 300 Controller (10/6/97)



Crash History Summary

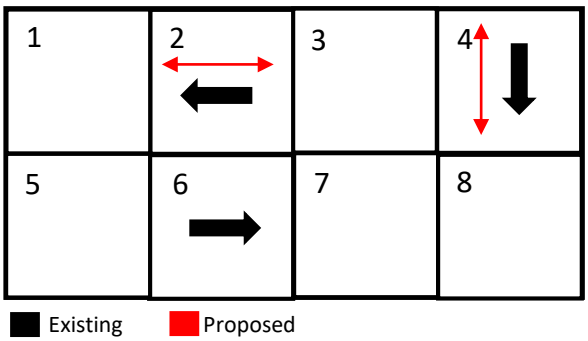
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.18
Critical Crash Rate
1.50



Signal Phasing:





Recommendations

- Retime signal and operate in the Downtown signal system. Adjust clearances.
- Upgrade signal cabinet and controller.
- Improve sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Install fiber communications.



SYSTEM CONSTRUCTION
TUSCULUM BLVD SUB SYSTEM
PHASE 2

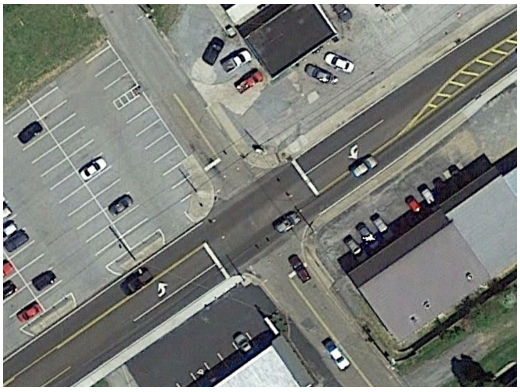
TOWN SIGNALIZED INTERSECTION SUMMARY

Tusculum Boulevard (US 11 Bus/SR 107) &
Grove Street
Intersection 2.1

Level of Service AM(PM): A(A)
Optimized: A(A)

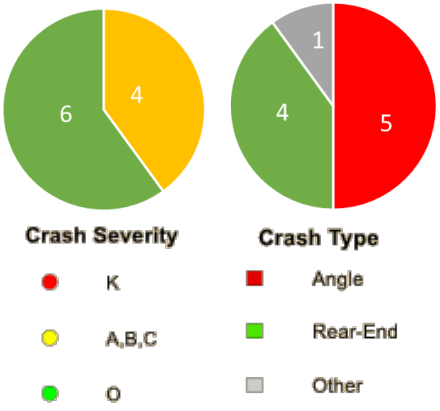
Peak 3000 Controller (5/24/96)
Tusculum Signal System (Twisted Pair)

NOTE: Near Greeneville High School



Crash History Summary

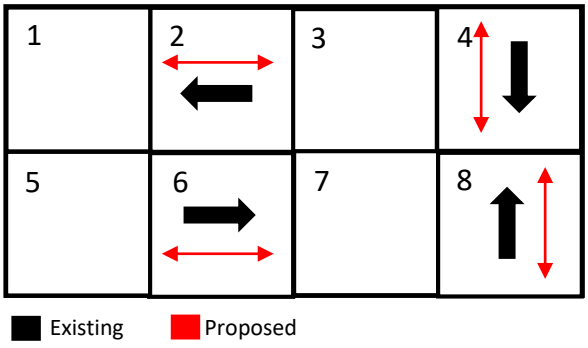
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.44
Critical Crash Rate
1.40



Signal Phasing:





Recommendations

- Retime signal and operate in the Tusculum Blvd. signal system. Adjust clearances (Increase YELLOW/RED clearances).
- Upgrade signal cabinet and controller.
- Upgrade sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Replace twisted pair with fiber cable..



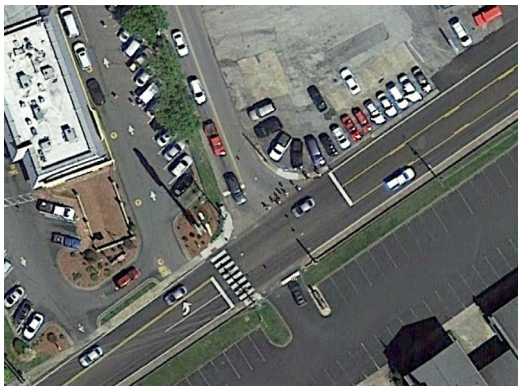
SYSTEM CONSTRUCTION
TUSCULUM BLVD SUB SYSTEM
PHASE 2

TOWN SIGNALIZED INTERSECTION SUMMARY

Tusculum Boulevard (US 11 Bus/SR 107) &
Austin Street
Intersection 2.2

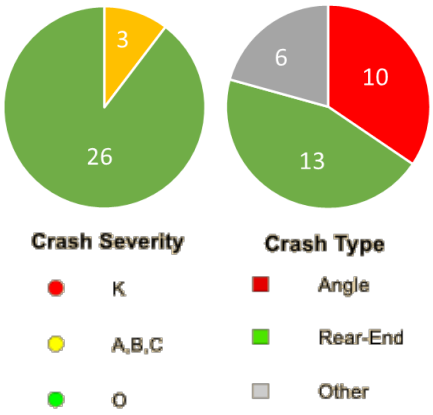
Level of Service AM(PM): B(C)
Optimized: B(B)

Peak 3000 Controller (3/29/96)
Tusculum Signal System (Twisted Pair)



Crash History Summary

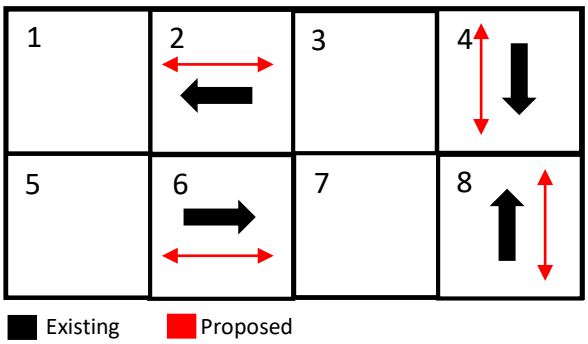
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.98
Critical Crash Rate
1.34



Signal Phasing:







Recommendations

- Retime signal and operate in the Tusculum Blvd. signal system. Adjust clearances (Increase YELLOW/RED clearances).
- Upgrade signal cabinet and controller.
- Upgrade sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Replace twisted pair with fiber cable..

SYSTEM CONSTRUCTION
TUSCULUM BLVD SUB SYSTEM
PHASE 2

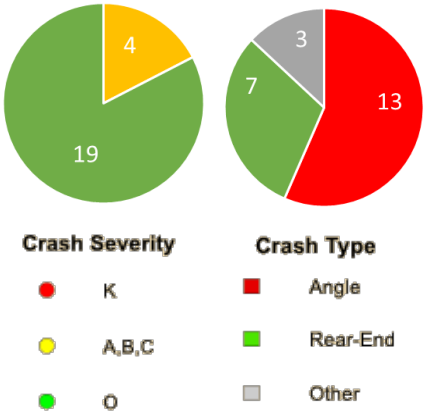
TOWN SIGNALIZED INTERSECTION SUMMARY

Tusculum Boulevard (US 11 Bus/SR 107) &
Snapps Ferry Road
Intersection 2.3 Level of Service AM(PM): B(B)
Optimized: B(B)
Peak 3000E Controller (12/-/94), System Master
Tusculum Signal System (Twisted Pair)



Crash History Summary

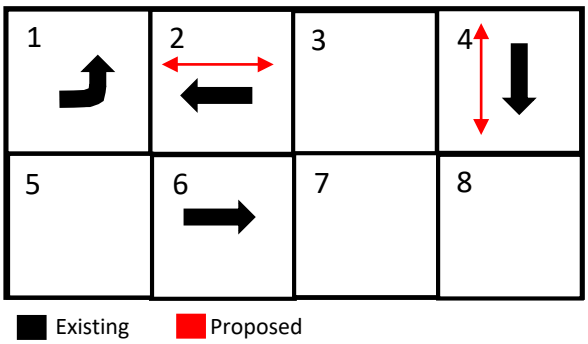
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.62
Critical Crash Rate
1.30



Signal Phasing:





Recommendations

- Retime signal and operate in the Tusculum Blvd. signal system. Adjust clearances.
- Upgrade signal cabinet and controller.
- Upgrade sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Replace twisted pair with fiber cable..



SYSTEM CONSTRUCTION
TUSCULUM BLVD SUB SYSTEM
PHASE 2

TOWN SIGNALIZED INTERSECTION SUMMARY

Tusculum Boulevard (US 11 Bus/SR 107) &
Bernard Avenue
Intersection 2.4

Level of Service AM(PM): C(B)
Optimized: B(B)

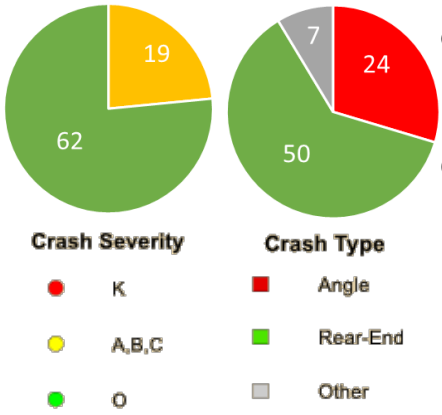
Peak 3000E Controller (12/-/94)
Tusculum Signal System (Twisted Pair)

NOTE: Near Eastview Elementary School



Crash History Summary

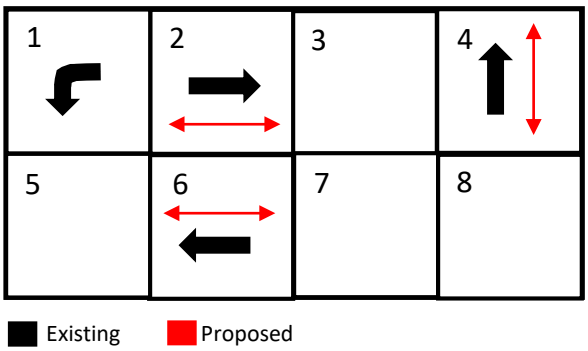
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
1.63
Critical Crash Rate
1.24



Signal Phasing:





Recommendations

- Retime signal and operate in the Tusculum Blvd. signal system. Adjust clearances (Increase RED clearance).
- Reconstruct signal, improve signal head visibility. Provide signal indications for driveway approaches.
- Provide sidewalks with access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Replace twisted pair with fiber cable..

SYSTEM CONSTRUCTION
TUSCULUM BLVD SUB SYSTEM
PHASE 2



TOWN SIGNALIZED INTERSECTION SUMMARY

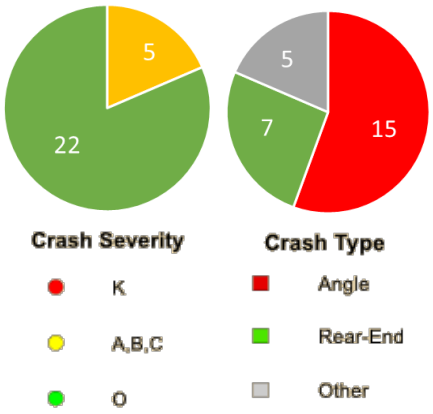
Tusculum Boulevard (US 11 Bus/SR 107) &
Mt. Bethel Road/Mason Street
Intersection 2.5 Level of Service AM(PM): B(B)
Optimized: B(B)

Peak 3000 Controller (10/6/96)
Tusculum Signal System (Twisted Pair)



Crash History Summary

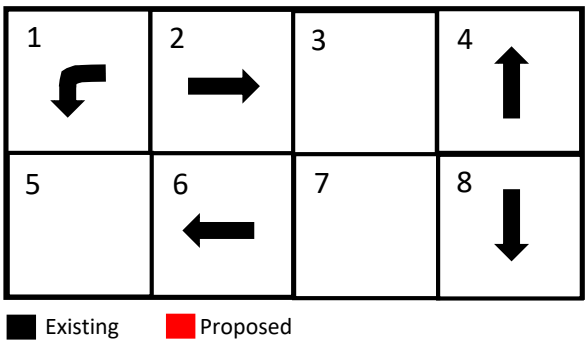
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.62
Critical Crash Rate
1.27



Signal Phasing:

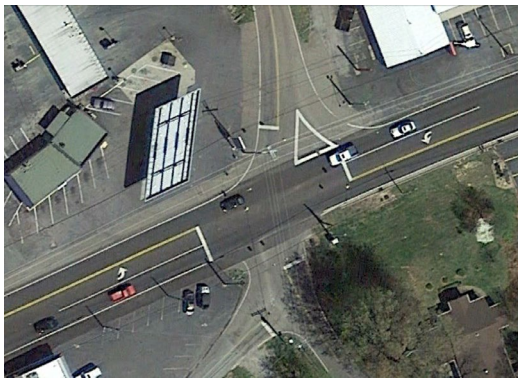




Recommendations

- Retime signal and operate in the Tusculum Blvd. signal system. Adjust clearances.
- Upgrade signal cabinet and controller.
- Replace twisted pair with fiber cable..

SYSTEM CONSTRUCTION
TUSCULUM BLVD SUB SYSTEM
PHASE 2



TOWN SIGNALIZED INTERSECTION SUMMARY

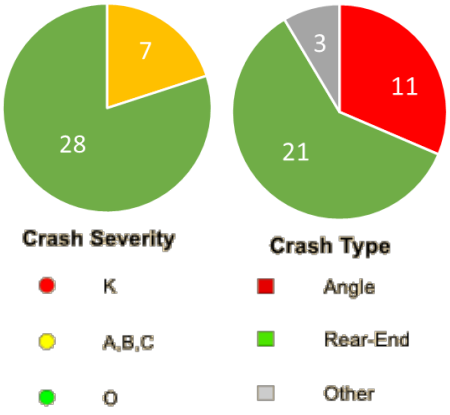
Tusculum Boulevard (US 11 Bus/SR 107) &
Hope Road
Intersection 2.6

Level of Service AM(PM): B(B)
Optimized: A(B)

Peak 3000 Controller (5/14/96)
Tusculum Signal System (Twisted Pair)

Crash History Summary

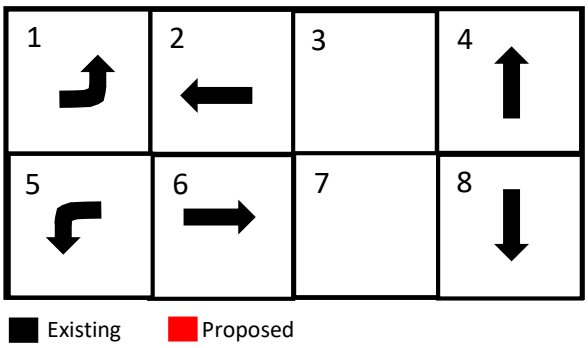
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.97
Critical Crash Rate
1.30



Signal Phasing:





Recommendations

- Retime signal and operate in the Tusculum Blvd. signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Replace twisted pair with fiber cable..



SYSTEM CONSTRUCTION
TUSCULUM BLVD SUB SYSTEM
PHASE 2



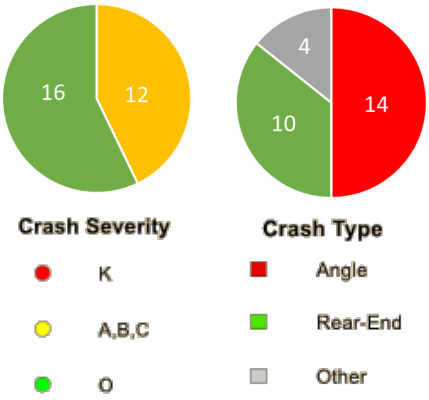
TOWN SIGNALIZED INTERSECTION SUMMARY

Tusculum Boulevard (US 11 Bus/SR 107) &
Justice Drive/Old Tusculum Road
Intersection 2.7 Level of Service AM(PM): C(**C**)
Optimized: C(C)

Peak 3000E Controller (3/30/07)
Tusculum Signal System (Twisted Pair)



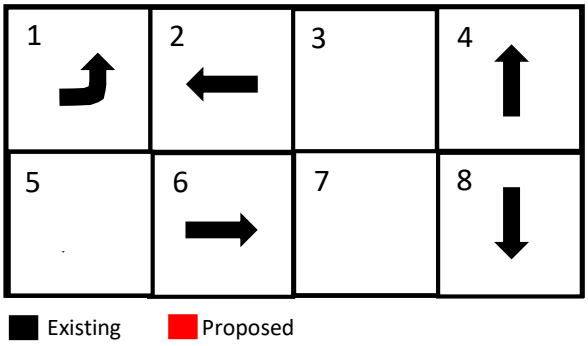
Crash History Summary
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
0.85
Critical Crash Rate
1.32



Signal Phasing:





Recommendations

- Retime signal and operate in the Tusculum Blvd. signal system. Adjust clearances.
- Upgrade signal cabinet and controller.
- Replace twisted pair with fiber cable.
- Extend fiber communications to Andrew Johnson Highway..

TOWN SIGNALIZED INTERSECTION SUMMARY

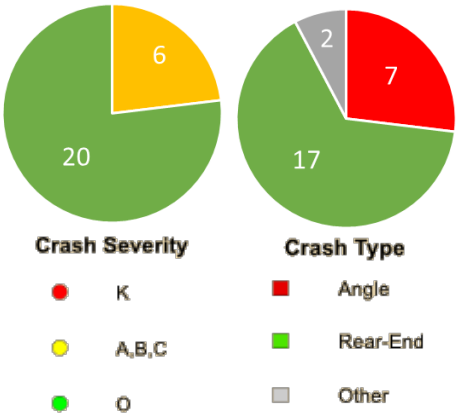
Andrew Johnson Hwy (US 11E) &
Main Street (US 321)/Kingsport Hwy (SR93)
Intersection 3.2-1 Level of Service AM(PM): B(C)
Optimized: B(B)



Peak ATC 1000 Controller

Crash History Summary

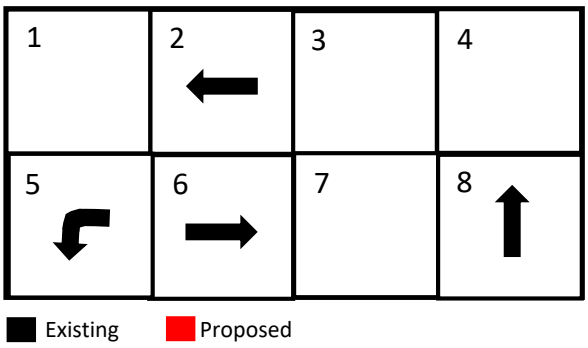
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.33
Critical Crash Rate
0.87



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications west of Greeneville Commons

Note: *Intersection will be reconstructed with planned TDOT improvements for Andrew Johnson Highway (US 11E/SR 34).*

SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 4

TOWN SIGNALIZED INTERSECTION SUMMARY

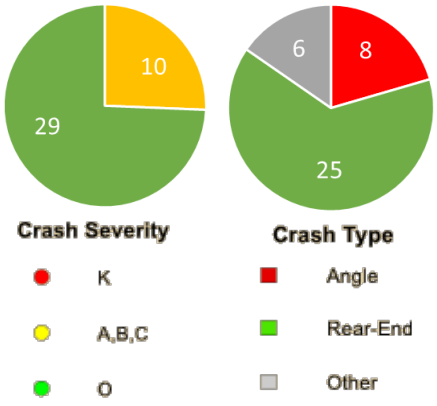
Andrew Johnson Hwy (US 11E) &
Main Street (US 321)/Kingsport Hwy (SR93)
Intersection 3.2-2 Level of Service AM(PM): A(B)
Optimized: A(A)



Peak ATC 1000 Controller

Crash History Summary

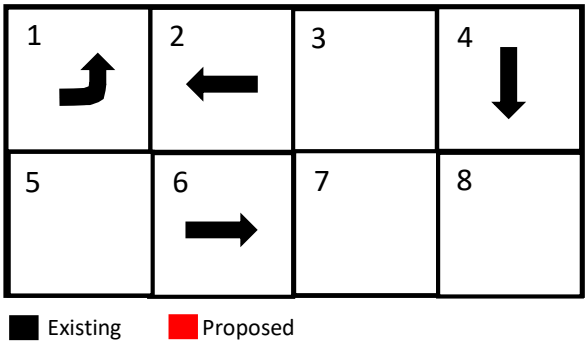
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.57
Critical Crash Rate
0.87



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications west of Greeneville Commons

***Note:** Intersection will be reconstructed with planned TDOT improvements for Andrew Johnson Highway (US 11E/SR 34).*

SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 4

TOWN SIGNALIZED INTERSECTION SUMMARY

Andrew Johnson Hwy (US 11E /US 321) &
Industrial Road/Burns Street
Intersection 3.3

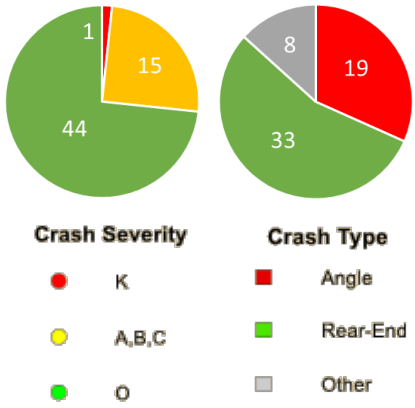
Level of Service AM(PM): B(C)
Optimized: B(C)

Eagle EPAC 300 Controller (9/6/99)



Crash History Summary

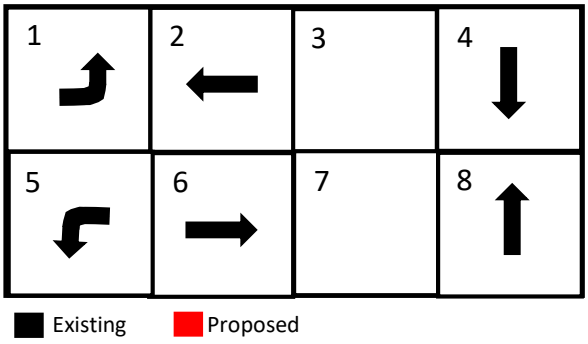
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.83
Critical Crash Rate
0.87



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications west of Greeneville Commons

TOWN SIGNALIZED INTERSECTION SUMMARY

Andrew Johnson Hwy (US 11E /US 321) &
Greeneville Commons
Intersection 3.4

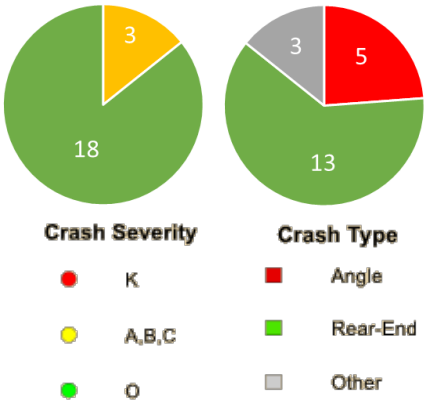
Level of Service AM(PM): C(B)
Optimized: C(B)



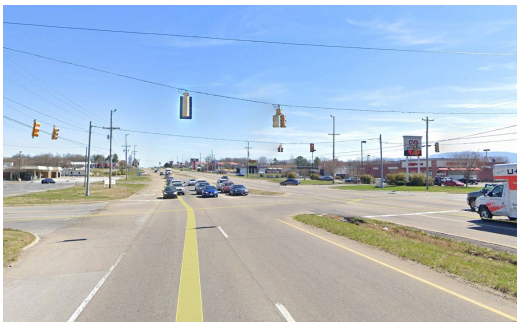
Peak ATC 1000 Controller

Crash History Summary

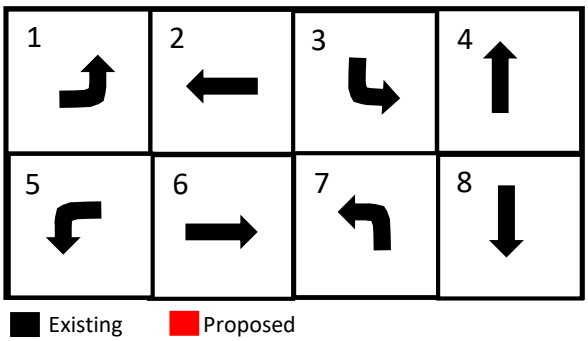
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.31
Critical Crash Rate
0.87



Signal Phasing:

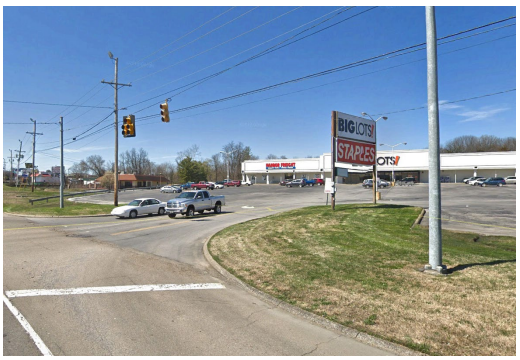




Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications

Note: *Intersection will be reconstructed with planned TDOT improvements for Andrew Johnson Highway (US 11E/SR 34) with interconnect.*



SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 1

TOWN SIGNALIZED INTERSECTION SUMMARY

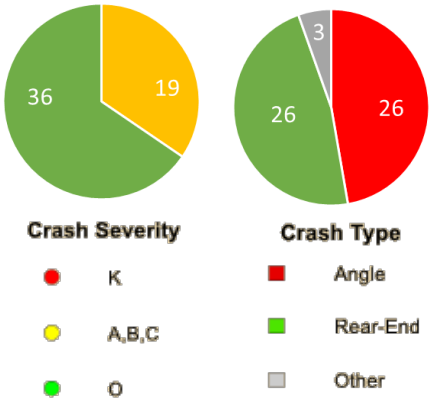
Andrew Johnson Hwy (US 11E /US 321) &
Justice Drive/Bob Smith Boulevard
Intersection 3.5 Level of Service AM(PM): B(C)/A(B)
Optimized: B(B)/A(B)

Peak ATC 1000 Controller



Crash History Summary

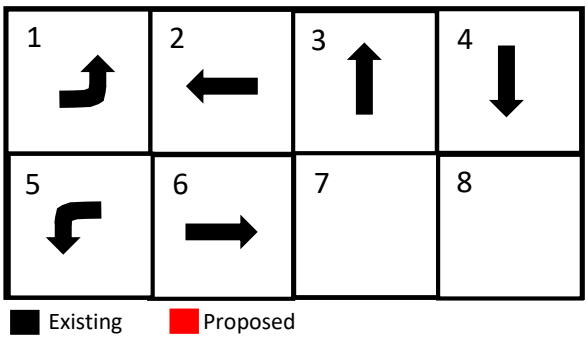
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.82
Critical Crash Rate
0.88



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications

Note: *Intersection will be reconstructed with planned TDOT improvements for Andrew Johnson Highway (US 11E/SR 34).*



SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 1

TOWN SIGNALIZED INTERSECTION SUMMARY

Andrew Johnson Hwy (US 11E /US 321) &
Fairgrounds Road
Intersection 3.7

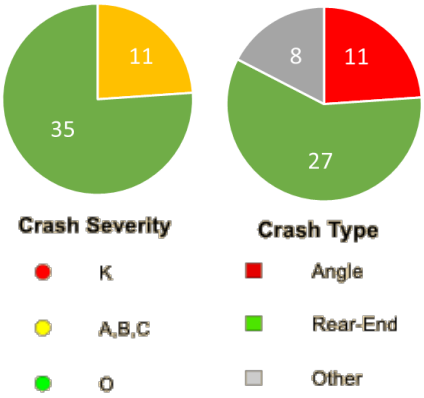
Level of Service AM(PM): A(A)
Optimized: A(A)

Peak 3000 Controller (8/6/97)
Haynes Boulevard/Lowes Signal Interconnect (Twisted Pair)



Crash History Summary

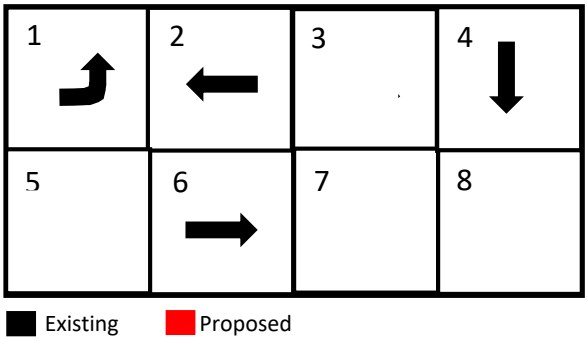
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.63
Critical Crash Rate
0.87



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications.

Note: *Intersection signal communications will be installed with planned TDOT improvements for Andrew Johnson Highway (US 11E/SR 34).*



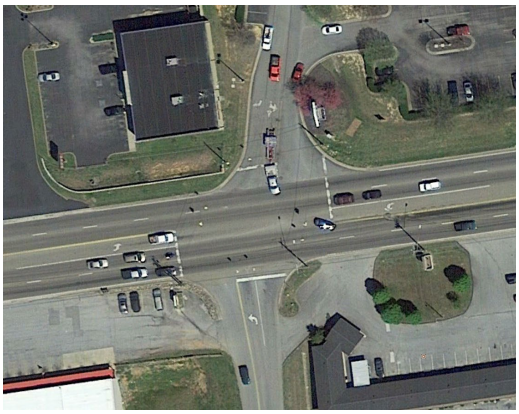
SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 1

TOWN SIGNALIZED INTERSECTION SUMMARY

Andrew Johnson Hwy (US 11E /US 321) &
Haynes Boulevard/Lowes
Intersection 3.8

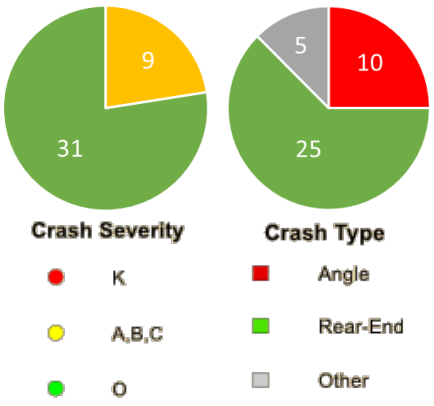
Level of Service AM(PM): B(B)
Optimized: A(A)

Peak 3000 Controller (8/7/00), Master
Fairgrounds Road Signal Interconnect (Twisted Pair)



Crash History Summary

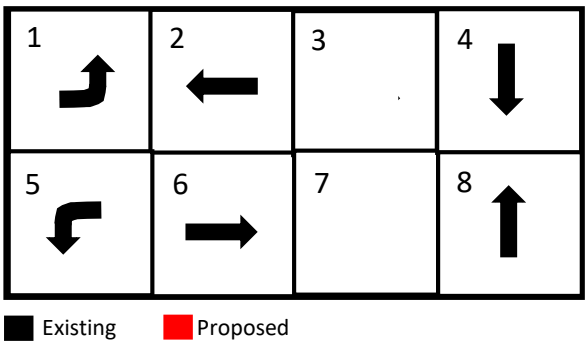
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.54
Critical Crash Rate
0.86



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications.

Note: *Intersection will be reconstructed including communications with planned TDOT improvements for Andrew Johnson Highway (US 11E/SR 34).*

SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 1

TOWN SIGNALIZED INTERSECTION SUMMARY

Andrew Johnson Hwy (US 11E /US 321) &
Erwin Highway
Intersection 3.9

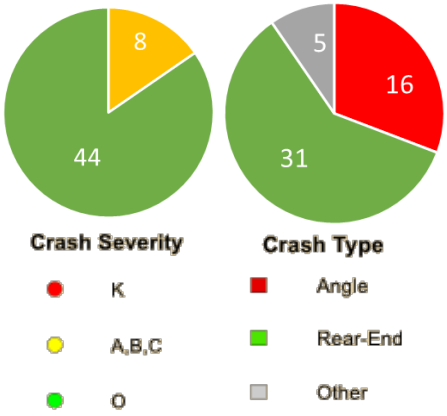
Level of Service AM(PM): C(B)
Optimized: C(C)

Eagle EPAC 300 Controller (4/4/97)



Crash History Summary

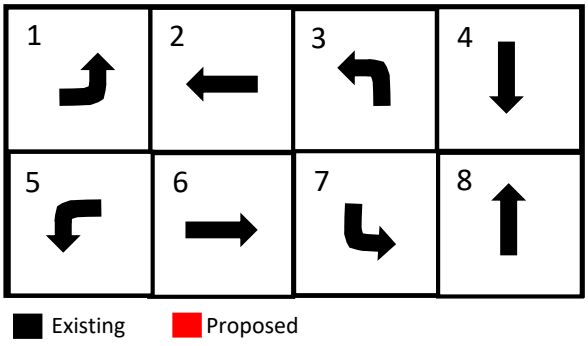
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.54
Critical Crash Rate
0.86



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications.

Note: *Intersection signal communications will be installed with planned TDOT improvements for Andrew Johnson Highway (US 11E/SR 34).*



SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 1

TOWN SIGNALIZED INTERSECTION SUMMARY

Andrew Johnson Hwy (US 11E /US 321) &
Rufe Taylor Road
Intersection 3.10

Level of Service AM(PM): B(C)
Optimized: B(B)

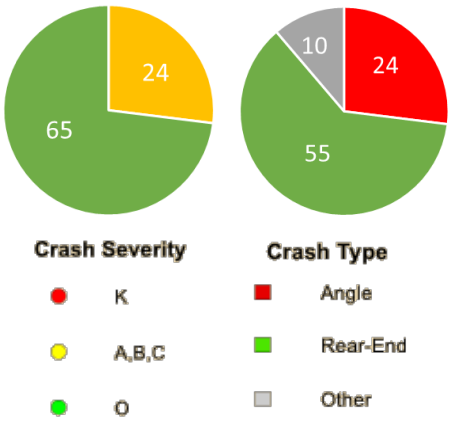
Peak 3000E Controller (8/28/09)





Crash History Summary

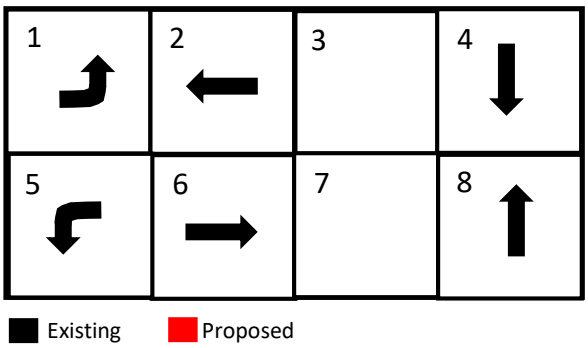
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
1.34
Critical Crash Rate
0.88



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase YELLOW/RED clearances).
- Upgrade signal cabinet and controller.
- Install fiber communications.

***Note:** Intersection signal communications will be installed with planned TDOT improvements for Andrew Johnson Highway (US 11E/SR 34).*

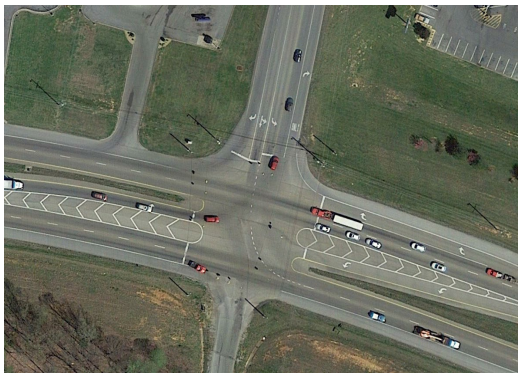
SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 4

TOWN SIGNALIZED INTERSECTION SUMMARY

Andrew Johnson Hwy (US 11E /US 321) &
Morgan Road/Harland Drive
Intersection 3.11

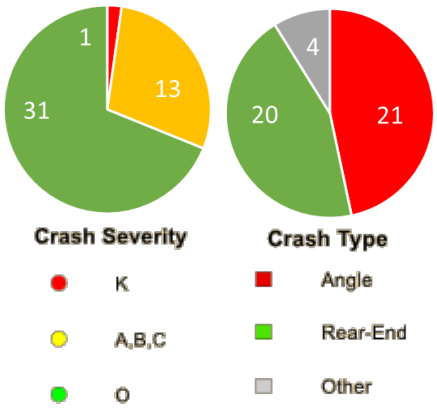
Level of Service AM(PM): A(C)
Optimized: B(B)

Peak 3000E Controller (12/15/11)
Walmart Driveway Signal Interconnect (Radio)



Crash History Summary

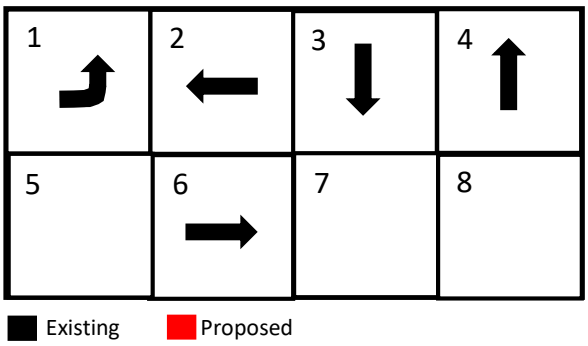
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.72
Critical Crash Rate
0.88



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications.



SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 4

TOWN SIGNALIZED INTERSECTION SUMMARY

Andrew Johnson Hwy (US 11E /US 321) &
Walmart Driveway
Intersection 3.12

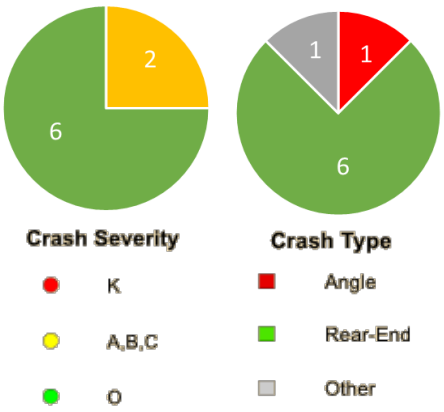
Level of Service AM(PM): A(B)
Optimized: A(B)

Peak 3000E Controller (12/15/11)
Morgan Road/Harland Drive Signal Interconnect (Radio)



Crash History Summary

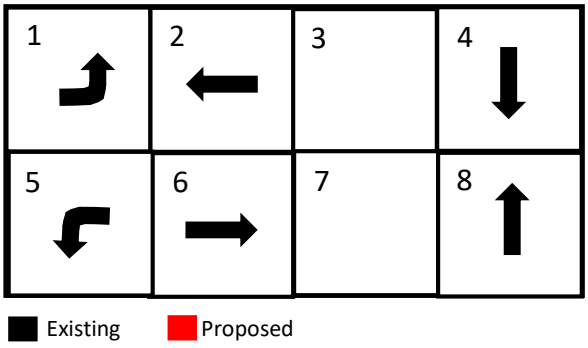
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.14
Critical Crash Rate
0.90



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications.



SYSTEM CONSTRUCTION
AJ HWY SUB SYSTEM
PHASE 4

TOWN SIGNALIZED INTERSECTION SUMMARY

Snapps Ferry Road &
Bohannon Road/Forest Hills Road
Intersection 3.14 Level of Service AM(PM): C(C)/B(C)
Optimized: B(C)/B(C)

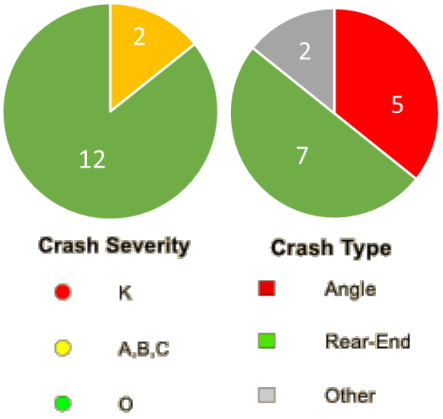
Peak ATC 1000 Controller

NOTE: Railroad Preemption installed



Crash History Summary

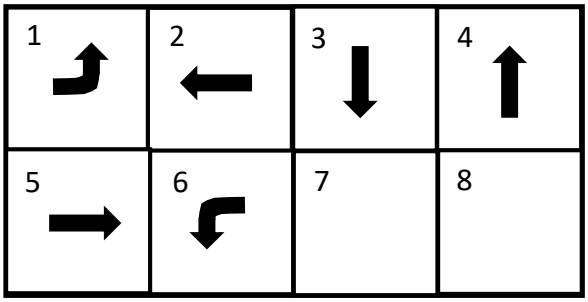
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.641
Intersection Crash Rate
0.77
Critical Crash Rate
1.11



Signal Phasing:





Recommendations

- Retime signal and operate in a Andrew Johnson Highway signal system. Adjust clearances (Increase RED clearance).
- Upgrade signal cabinet and controller.
- Install fiber communications.



TOWN SIGNALIZED INTERSECTION SUMMARY

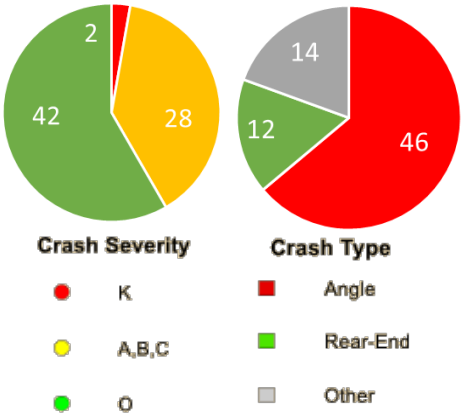
Andrew Johnson Hwy (US 11E /US 321) &
Hal Henard Road
Intersection 3.1

STOP Controlled
Level of Service AM(PM): C(C)



Crash History Summary

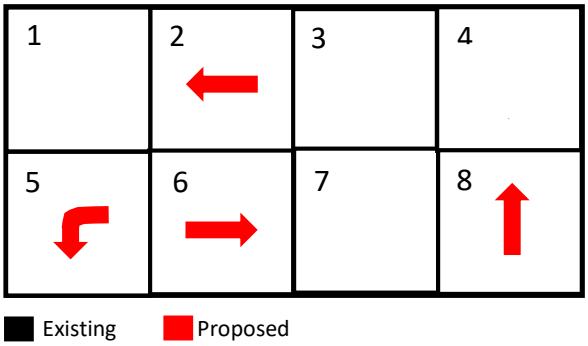
January 2014-December 2018



Statewide Crash Rate
0.254
Intersection Crash Rate
1.22
Critical Crash Rate
0.33



Signal Phasing:







Recommendations

- Install traffic signal

SYSTEM CONSTRUCTION
ASHEVILLE HWY SUB SYSTEM
PHASE 7

TOWN SIGNALIZED INTERSECTION SUMMARY

Summer Street (US 11 Bus) &
Highway 70 (SR 70)
Intersection 4.1

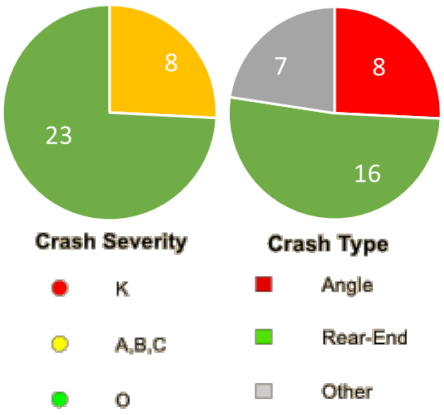
Level of Service AM(PM): F(F)
Optimized: C(C)



Eagle Controller

Crash History Summary

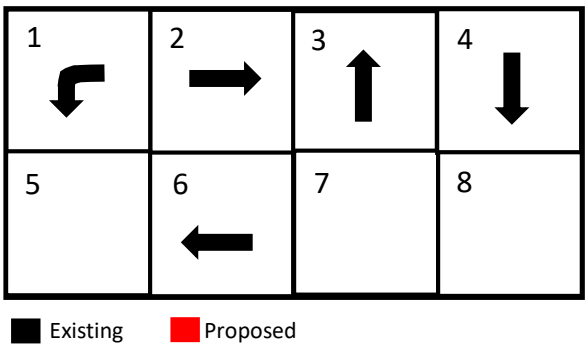
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
1.12
Critical Crash Rate
1.36



Signal Phasing:







Recommendations

- Retime signal. Adjust clearances (Increase YELLOW/RED clearances).
- Upgrade signal cabinet and controller.
- Install fiber communications.

SYSTEM CONSTRUCTION
ASHEVILLE HWY SUB SYSTEM
PHASE 6

TOWN SIGNALIZED INTERSECTION SUMMARY

Asheville Highway (SR 70) &
Main Street (US 321)
Intersection 4.2

Level of Service AM(PM): C(D)
Optimized: B(C)

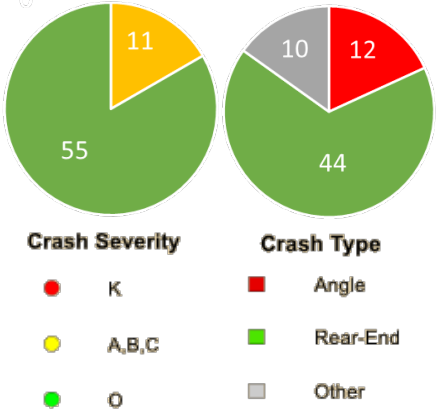
Peak 3000E Controller (2001)

NOTE: Railroad Preemption installed



Crash History Summary

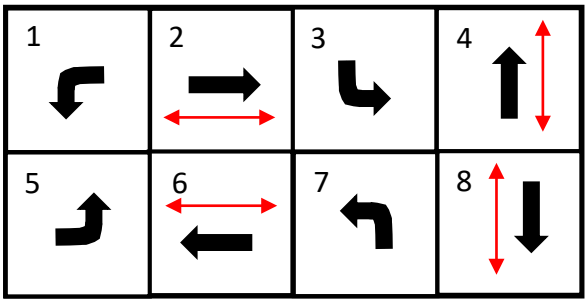
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
1.28
Critical Crash Rate
1.24



Signal Phasing:





Recommendations

- Retime signal and operate in a Asheville Hwy subsystem. signal system. Adjust clearances (Increase RED clearances).
- Improve sidewalk access for ADA compliance, mark crosswalks, and install pedestrian signals.
- Upgrade signal cabinet and controller.
- Install fiber communications. with a cellular link to central office.



SYSTEM CONSTRUCTION
ASHEVILLE HWY SUB SYSTEM
PHASE 6

TOWN SIGNALIZED INTERSECTION SUMMARY

Asheville Highway (SR 70) &
Vann Road
Intersection 4.3

Level of Service AM(PM): D(D)
Optimized: D(C)

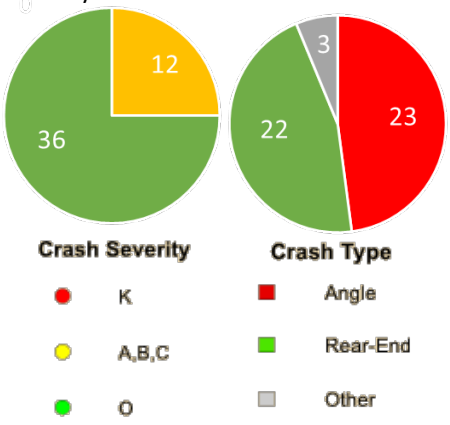
Peak 3000E Controller (12/10/13)

NOTE: Near Greeneville Middle School

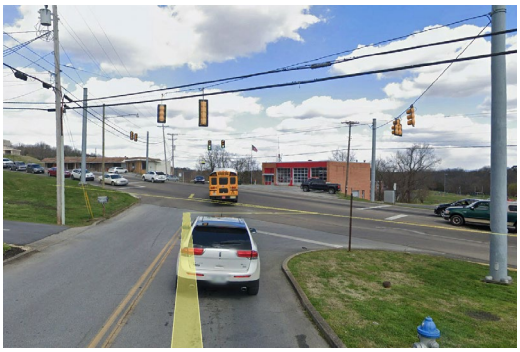


Crash History Summary

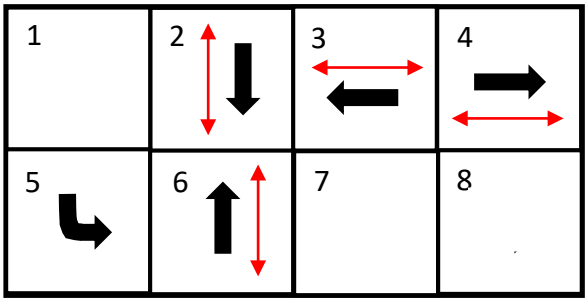
January 2014-December 2018



Greeneville Avg Signal Crash Rate
0.917
Intersection Crash Rate
1.24
Critical Crash Rate
1.29



Signal Phasing:





Recommendations

- Retime signal and operate in a Asheville Hwy subsystem. signal system. Adjust clearances (Increase RED clearances).
- Improve sidewalk access with ADA compliance, mark crosswalks, and install pedestrian signals.
- Upgrade signal cabinet and controller.
- Install fiber communications to Main Street.



Asheville Highway (SR 70) should be improved increasing capacity addressing the lower LOS.

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX C
Signal System Clearance Interval Review

TRAFFIC SIGNAL CLEARANCES

Town of Greeneville

SIGNAL GROUPS		CALCULATED CLEARANCES								RECOMMENDED CLEARANCES								CURRENT 2019 CLEARANCES							
		NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL	NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL	NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL
ANDREW JOHNSON HIGHWAY (U.S. 11E)																									
1. Andrew Johnson Hwy (US 11E) & Main St	SL (mph)		30			45		45	20																
	Yellow (sec)	-	3.2	-	-	4.3	-	4.3	2.5	-	3.2	-	-	4.3	-	4.3	3.0	-	4.0	-	-	4.5	-	4.5	4.0
	Distance (ft)		110			110		110	100																
	All Red (sec)	-	3.0	-	-	2.0	-	2.0	4.1	-	2.5	-	-	2.0	-	2.0	2.5	-	2.5	-	-	1.5	-	1.5	2.0
	Total CLR (sec)	-	6.2	-	-	6.3	-	6.3	6.6	-	5.7	-	-	6.3	-	6.3	5.5	-	6.5	-	-	6.0	-	6.0	6.0
	Yellow CK																	-	Ck	-	-	Ck	-	Ck	Ck
	Total CLR CK																	-	Adj	-	-	Add	-	Add	Adj
2. Andrew Johnson Hwy (US 11E) & Kingsport Hwy (SR 93)	SL (mph)				30	45	20	45																	
	Yellow (sec)	-	-	-	3.2	4.3	2.5	4.3	-	-	-	-	3.2	4.3	3.0	4.3	-	-	-	-	4.0	4.5	4.0	4.5	-
	Distance (ft)				105	130	110	90																	
	All Red (sec)	-	-	-	2.8	2.3	4.4	1.7	-	-	-	-	2.5	2.3	2.5	1.7	-	-	-	-	2.5	1.5	2.0	1.5	-
	Total CLR (sec)	-	-	-	6.0	6.6	6.9	6.0	-	-	-	-	5.7	6.6	5.5	6.0	-	-	-	-	6.5	6.0	6.0	6.0	-
	Yellow CK																	-	-	-	Ck	Ck	Ck	Ck	-
	Total CLR CK																	-	-	-	Adj	Add	Adj	Adj	-
3. Andrew Johnson Hwy (US 11E) & Industrial Road/Burns Street	SL (mph)	30	20	40	20	45	20	45	20																
	Yellow (sec)	3.2	2.5	3.9	2.5	4.3	2.5	4.3	2.5	3.2	3.0	3.9	3.0	4.3	3.0	4.3	3.0	4.0	-	4.0	-	4.5	4.0	4.5	4.0
	Distance (ft)	130	110	150	125	120	105	125	110																
	All Red (sec)	3.4	4.4	2.9	4.9	2.1	4.3	2.2	4.4	2.5	2.5	2.5	2.5	2.1	2.5	2.2	2.5	0.0	-	2.0	-	1.5	1.5	1.5	1.5
	Total CLR (sec)	6.6	6.9	6.8	7.4	6.4	6.7	6.5	6.9	5.7	5.5	6.4	5.5	6.4	5.5	6.5	5.5	4.0	-	6.0	-	6.0	5.5	6.0	5.5
	Yellow CK																	Ck	-	Ck	-	Ck	Ck	Ck	Ck
	Total CLR CK																	Add	-	Add	-	Add	Adj	Add	Adj
4. Andrew Johnson Hwy (US 11E) & Greeneville Commons	SL (mph)	30	20	30	20	40	20	40	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.9	2.5	3.9	2.5	3.2	3.0	3.2	3.0	3.9	3.0	3.9	3.0	4.0	4.0	4.0	4.0	4.5	4.0	4.5	4.5
	Distance (ft)	120	110	115	105	90	95	85	80																
	All Red (sec)	3.2	4.4	3.1	4.3	1.9	3.9	1.8	3.4	2.5	2.5	2.5	2.5	1.9	2.5	1.8	2.5	2.0	1.0	2.0	2.0	1.5	1.5	1.5	1.5
	Total CLR (sec)	6.4	6.9	6.3	6.7	5.8	6.4	5.7	5.9	5.7	5.5	5.7	5.5	5.8	5.5	5.7	5.5	6.0	5.0	6.0	6.0	6.0	5.5	6.0	6.0
	Yellow CK																	Ck	Ck	Ck	Ck	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	Add	Adj	Adj	Adj	Adj	Adj	Adj
5. Andrew Johnson Hwy (US 11E) & Justice Drive/Bob Smith Blvd	SL (mph)	30	20	30	20	40	20	40	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.9	2.5	3.9	2.5	3.2	3.0	3.2	3.0	3.9	3.0	3.9	3.0	4.0	4.0	4.0	4.0	4.5	4.0	4.5	4.0
	Distance (ft)	150	240	220	240	210	85	210	80																
	All Red (sec)	3.9	8.9	5.5	8.9	3.9	3.6	3.9	3.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5.0	5.0	5.0	5.0	3.0	1.5	3.0	1.5
	Total CLR (sec)	7.1	11.3	8.7	11.3	7.9	6.0	7.9	5.9	5.7	5.5	5.7	5.5	6.4	5.5	6.4	5.5	9.0	9.0	9.0	9.0	7.5	5.5	7.5	5.5
	Yellow CK																	Ck	Ck	Ck	Ck	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	Adj	Adj	Adj	Adj	Adj	Adj	Adj
7. Andrew Johnson Hwy (US 11E) & Fairgrounds Road	SL (mph)	30	20	30	20	40	20	40	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.9	2.5	3.9	2.5	3.2	3.0	3.2	3.0	3.9	3.0	3.9	3.0	-	-	-	4.0	4.5	4.0	4.5	-
	Distance (ft)	80	75	70	85	95	80	90	65																
	All Red (sec)	2.3	3.2	2.0	3.6	2.0	3.4	1.9	2.9	2.3	2.5	2.0	2.5	2.0	2.5	1.9	2.5	-	-	-	1.5	1.5	1.5	1.5	-
	Total CLR (sec)	5.5	5.7	5.2	6.0	5.9	5.9	5.8	5.4	5.5	5.5	5.2	5.5	5.9	5.5	5.8	5.5	-	-	-	5.5	6.0	5.5	6.0	-
	Yellow CK																	-	-	-	Ck	Ck	Ck	Ck	-
	Total CLR CK																	-	-	-	Adj	Adj	Adj	Adj	-
8. Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance	SL (mph)	30	20	30	20	40	20	40	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.9	2.5	3.9	2.5	3.2	3.0	3.2	3.0	3.9	3.0	3.9	3.0	4.0	-	4.0	-	4.5	4.0	4.5	4.0
	Distance (ft)	90	70	90	80	95	105	120	105																
	All Red (sec)	2.5	3.1	2.5	3.4	2.0	4.3	2.4	4.3	2.5	2.5	2.5	2.5	2.0	2.5	2.4	2.5	1.5	-	1.5	-	1.5	1.5	1.5	1.5
	Total CLR (sec)	5.7	5.5	5.7	5.9	5.9	6.7	6.3	6.7	5.7	5.5	5.7	5.5	5.9	5.5	6.3	5.5	5.5	-	5.5	-	6.0	5.5	6.0	5.5
	Yellow CK																	Ck	-	Ck	-	Ck	Ck	Ck	Ck
	Total CLR CK																	Add	-	Add	-	Adj	Adj	Add	Adj
9. Andrew Johnson Hwy (US 11E) & Erwin Hwy	SL (mph)	30	20	30	20	40	20	40	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.9	2.5	3.9	2.5	3.2	3.0	3.2	3.0	3.9	3.0	3.9	3.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5	4.5
	Distance (ft)	130	110	120	120	90	110	110	110																
	All Red (sec)	3.4	4.4	3.2	4.8	1.9	4.4	2.2	4.4	2.5	2.5	2.5	2.5	1.9	2.5	2.2	2.5	2.0	2.0	2.0	2.0	1.5	2.5	1.5	2.5
	Total CLR (sec)	6.6	6.9	6.4	7.2	5.8	6.9	6.1	6.9	5.7	5.5	5.7	5.5	5.8	5.5	6.1	5.5	6.0	6.0	6.0	6.0	6.0	7.0	6.0	7.0
	Yellow CK																	Ck	Ck	Ck	Ck	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	Adj	Adj	Adj	Adj	Adj	Add	Adj

TABLE C-1

TRAFFIC SIGNAL CLEARANCES

Town of Greeneville

SIGNAL GROUPS		CALCULATED CLEARANCES								RECOMMENDED CLEARANCES								CURRENT 2019 CLEARANCES							
		NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL	NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL	NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL
10. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd	SL (mph)	30	20	30	20	45	20	45	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	4.3	2.5	4.3	2.5	3.2	3.0	3.2	3.0	4.3	3.0	4.3	3.0	4.0	-	4.0	-	4.0	4.0	4.5	4.0
	Distance (ft)	130	115	130	130	90	95	105	90																
	All Red (sec)	3.4	4.6	3.4	5.1	1.7	3.9	1.9	3.8	2.5	2.5	2.5	2.5	1.7	2.5	1.9	2.5	2.0	-	2.0	-	1.5	2.0	1.5	2.0
	Total CLR (sec)	6.6	7.1	6.6	7.6	6.0	6.4	6.2	6.2	5.7	5.5	5.7	5.5	6.0	5.5	6.2	5.5	6.0	-	6.0	-	5.5	6.0	6.0	6.0
	Yellow CK																	Ck	-	Ck	-	Add	Ck	Ck	Ck
	Total CLR CK																	Adj	-	Adj	-	Add	Ck	Add	Adj
11. Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.	SL (mph)	30	20	30	20	50	20	50	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	4.7	2.5	4.7	2.5	3.2	3.0	3.2	3.0	4.7	3.0	4.7	3.0	4.0	-	4.0	-	5.0	4.0	5.0	-
	Distance (ft)	135	120	125	140	110	100	125	90																
	All Red (sec)	3.5	4.8	3.3	5.5	1.8	4.1	2.0	3.8	2.5	2.5	2.5	2.5	1.8	2.5	2.0	2.5	2.0	-	2.0	-	1.5	1.5	1.5	-
	Total CLR (sec)	6.7	7.2	6.5	7.9	6.4	6.6	6.6	6.2	5.7	5.5	5.7	5.5	6.4	5.5	6.6	5.5	6.0	-	6.0	-	6.5	5.5	6.5	-
	Yellow CK																	Ck	-	Ck	-	Ck	Ck	Ck	-
	Total CLR CK																	Adj	-	Adj	-	Adj	Adj	Add	-
12. Andrew Johnson Hwy (US 11E) & Walmart Driveway	SL (mph)	30	20	30	20	50	20	50	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	4.7	2.5	4.7	2.5	3.2	3.0	3.2	3.0	4.7	3.0	4.7	3.0	4.0	-	4.0	-	5.0	4.0	5.0	4.0
	Distance (ft)	125	115	110	105	80	100	110	85																
	All Red (sec)	3.3	4.6	3.0	4.3	1.4	4.1	1.8	3.6	2.5	2.5	2.5	2.5	1.4	2.5	1.8	2.5	2.0	-	2.0	-	1.5	1.5	1.5	1.5
	Total CLR (sec)	6.5	7.1	6.2	6.7	6.0	6.6	6.4	6.0	5.7	5.5	5.7	5.5	6.0	5.5	6.4	5.5	6.0	-	6.0	-	6.5	5.5	6.5	5.5
	Yellow CK																	Ck	-	Ck	-	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	-	Adj	-	Adj	Adj	Adj	Adj
13. Snapps Ferry Rd & Bohannon Ave/Forest Hills Dr	SL (mph)	20	20	20	20	30	20	30	20																
	Yellow (sec)	2.5	2.5	2.5	2.5	3.2	2.5	3.2	2.5	3.0	3.0	3.0	3.0	3.2	3.0	3.2	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Distance (ft)	110	80	140	130	160	145	145	130																
	All Red (sec)	4.4	3.4	5.5	5.1	4.1	5.6	3.8	5.1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0
	Total CLR (sec)	6.9	5.9	7.9	7.6	7.3	8.1	7.0	7.6	5.5	5.5	5.5	5.5	5.7	5.5	5.7	5.5	6.0	5.0	5.0	6.0	6.0	6.0	6.0	6.0
	Yellow CK																	Ck	Ck	Ck	Ck	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	Add	Add	Adj	Adj	Adj	Adj	Adj
TUSCULUM BOULEVARD (US 11 Bus./SR 107)																									
1. Tusculum Blvd (SR 107) & Grove St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	3.0	-	3.0	-	3.0	-	3.0	-
	Distance (ft)	55	55	60	65	50	45	60	50																
	All Red (sec)	1.7	2.6	1.8	2.9	1.6	2.2	1.8	2.4	1.7	2.5	1.8	2.5	1.6	2.2	1.8	2.4	1.5	-	1.5	-	1.5	-	1.5	-
	Total CLR (sec)	4.9	5.0	5.0	5.4	4.8	4.7	5.0	4.9	4.9	5.5	5.0	5.5	4.8	5.2	5.0	5.4	4.5	-	4.5	-	4.5	-	4.5	-
	Yellow CK																	Add	-	Add	-	Add	-	Add	-
	Total CLR CK																	Add	-	Add	-	Add	-	Add	-
2. Tusculum Blvd (SR 107) & Austin St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	3.0	-	3.0	-	3.0	-	3.0	-
	Distance (ft)	40	50	60	60	55	55	90	75																
	All Red (sec)	1.4	2.4	1.8	2.7	1.7	2.6	2.5	3.2	1.4	2.4	1.8	2.5	1.7	2.5	2.5	2.5	1.0	-	1.0	-	1.5	-	1.5	-
	Total CLR (sec)	4.6	4.9	5.0	5.2	4.9	5.0	5.7	5.7	4.6	5.4	5.0	5.5	4.9	5.5	5.7	5.5	4.0	-	4.0	-	4.5	-	4.5	-
	Yellow CK																	Add	-	Add	-	Add	-	Add	-
	Total CLR CK																	Add	-	Add	-	Add	-	Add	-
3. Tusculum Blvd (SR 107) & Snapps Ferry Rd	SL (mph)			30	20	30	20	30																	
	Yellow (sec)	-	-	3.2	2.5	3.2	2.5	3.2	-	-	-	3.2	3.0	3.2	3.0	3.2	-	-	-	-	4.0	4.0	4.0	4.0	-
	Distance (ft)			60	70	60	45	90																	
	All Red (sec)	-	-	1.8	3.1	1.8	2.2	2.5	-	-	-	1.8	2.5	1.8	2.2	2.5	-	-	-	-	2.0	2.0	2.0	2.0	-
	Total CLR (sec)	-	-	5.0	5.5	5.0	4.7	5.7	-	-	-	5.0	5.5	5.0	5.2	5.7	-	-	-	-	6.0	6.0	6.0	6.0	-
	Yellow CK																	-	-	-	Ck	Ck	Ck	Ck	-
	Total CLR CK																	-	-	-	Adj	Adj	Adj	Adj	-
4. Tusculum Blvd (SR 107) & Bernard Ave	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	-	3.5	-	-	3.5	-	3.5	3.0
	Distance (ft)	50	60	45	60	85	85	100	60																
	All Red (sec)	1.6	2.7	1.5	2.7	2.4	3.6	2.7	2.7	1.6	2.5	1.5	2.5	2.4	2.5	2.5	2.5	-	1.5	-	-	1.5	-	1.5	1.5
	Total CLR (sec)	4.8	5.2	4.7	5.2	5.6	6.0	5.9	5.2	4.8	5.5	4.7	5.5	5.6	5.5	5.7	5.5	-	5.0	-	-	5.0	-	5.0	4.5
	Yellow CK																	-	Ck	-	-	Ck	-	Ck	Ck
	Total CLR CK																	-	Add	-	-	Add	-	Add	Add

TABLE C-1 (Continued)

TRAFFIC SIGNAL CLEARANCES

Town of Greeneville

SIGNAL GROUPS		CALCULATED CLEARANCES								RECOMMENDED CLEARANCES								CURRENT 2019 CLEARANCES							
		NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL	NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL	NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL
5. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	3.0	-	3.0	-	3.0	-	3.0	3.0
	Distance (ft)	50	60	70	85	85	50	70	65																
	All Red (sec)	1.6	2.7	2.0	3.6	2.4	2.4	2.0	2.9	1.6	2.5	2.0	2.5	2.4	2.4	2.0	2.5	1.5	-	1.5	-	1.5	-	1.5	1.5
	Total CLR (sec)	4.8	5.2	5.2	6.0	5.6	4.9	5.2	5.4	4.8	5.5	5.2	5.5	5.6	5.4	5.2	5.5	4.5	-	4.5	-	4.5	-	4.5	4.5
	Yellow CK																	Add	-	Add	-	Add	-	Add	Ck
	Total CLR CK																	Add	-	Add	-	Add	-	Add	Add
6. Tusculum Blvd (SR 107) & Hope Rd	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	3.5	4.0	3.5
	Distance (ft)	60	60	70	70	75	70	85	75																
	All Red (sec)	1.8	2.7	2.0	3.1	2.2	3.1	2.4	3.2	1.8	2.5	2.0	2.5	2.2	2.5	2.4	2.5	1.5	-	1.5	-	2.0	1.0	2.0	1.0
	Total CLR (sec)	5.0	5.2	5.2	5.5	5.4	5.5	5.6	5.7	5.0	5.5	5.2	5.5	5.4	5.5	5.6	5.5	5.5	-	5.5	-	6.0	4.5	6.0	4.5
	Yellow CK																	Ck	-	Ck	-	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	-	Adj	-	Adj	Add	Adj	Add
7. Tusculum Blvd (SR 107) & Justice Dr/Old Tusculum Rd	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Distance (ft)	50	70	50	60	80	85	110	75																
	All Red (sec)	1.6	3.1	1.6	2.7	2.3	3.6	3.0	3.2	1.6	2.5	1.6	2.5	2.3	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Total CLR (sec)	4.8	5.5	4.8	5.2	5.5	6.0	6.2	5.7	4.8	5.5	4.8	5.5	5.5	5.5	5.7	5.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	Yellow CK																	Ck	Ck	Ck	Ck	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	Adj	Adj	Adj	Adj	Adj	Adj	Adj
DOWNTOWN																									
1. Summer St (US 11 Bus) & Cutler St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	-	4.0	-
	Distance (ft)	40	45	40	45	55	55	50	45																
	All Red (sec)	1.4	2.2	1.4	2.2	1.7	2.6	1.6	2.2	1.4	2.2	1.4	2.2	1.7	2.5	1.6	2.2	1.5	-	1.5	-	1.5	-	1.5	-
	Total CLR (sec)	4.6	4.7	4.6	4.7	4.9	5.0	4.8	4.7	4.6	5.2	4.6	5.2	4.9	5.5	4.8	5.2	5.5	-	5.5	-	5.5	-	5.5	-
	Yellow CK																	Ck	-	Ck	-	Ck	-	Ck	-
	Total CLR CK																	Adj	-	Adj	-	Adj	-	Adj	-
2. Summer St (US 11 Bus) & Irish St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	-	4.0	-
	Distance (ft)	45	55	55	60	60	50	55	50																
	All Red (sec)	1.5	2.6	1.7	2.7	1.8	2.4	1.7	2.4	1.5	2.5	1.7	2.5	1.8	2.4	1.7	2.4	1.5	-	1.5	-	1.5	-	1.5	-
	Total CLR (sec)	4.7	5.0	4.9	5.2	5.0	4.9	4.9	4.9	4.7	5.5	4.9	5.5	5.0	5.4	4.9	5.4	5.5	-	5.5	-	5.5	-	5.5	-
																		Ck	-	Ck	-	Ck	-	Ck	-
																		Adj	-	Adj	-	Adj	-	Adj	-
3. Main St (US 321) & Tusculum Blvd/Spencer St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	-	4.0	-
	Distance (ft)	80	60	40	45	50	45	55	60																
	All Red (sec)	2.3	2.7	1.4	2.2	1.6	2.2	1.7	2.7	2.3	2.5	1.4	2.2	1.6	2.2	1.7	2.5	1.5	-	1.5	-	1.5	-	1.5	-
	Total CLR (sec)	5.5	5.2	4.6	4.7	4.8	4.7	4.9	5.2	5.5	5.5	4.6	5.2	4.8	5.2	4.9	5.5	5.5	-	5.5	-	5.5	-	5.5	-
	Yellow CK																	Ck	-	Ck	-	Ck	-	Ck	-
	Total CLR CK																	Adj	-	Adj	-	Adj	-	Adj	-
4. Main St (US 321) & Church St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Distance (ft)	60	55	60	55	70	70	75	65																
	All Red (sec)	1.8	2.6	1.8	2.6	2.0	3.1	2.2	2.9	1.8	2.5	1.8	2.5	2.0	2.5	2.2	2.5	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0
	Total CLR (sec)	5.0	5.0	5.0	5.0	5.2	5.5	5.4	5.4	5.0	5.5	5.0	5.5	5.2	5.5	5.4	5.5	5.5	5.0	5.5	5.0	5.5	5.0	5.5	5.0
	Yellow CK																	Ck	Ck	Ck	Ck	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	Add	Adj	Add	Adj	Add	Adj	Add
5. Main St (US 321) & Depot St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	-	4.0	-
	Distance (ft)	60	60	60	60	65	55	70	60																
	All Red (sec)	1.8	2.7	1.8	2.7	1.9	2.6	2.0	2.7	1.8	2.5	1.8	2.5	1.9	2.5	2.0	2.5	1.5	-	1.5	-	1.5	-	1.5	-
	Total CLR (sec)	5.0	5.2	5.0	5.2	5.1	5.0	5.2	5.2	5.0	5.5	5.0	5.5	5.1	5.5	5.2	5.5	5.5	-	5.5	-	5.5	-	5.5	-
																		Ck	-	Ck	-	Ck	-	Ck	-
																		Adj	-	Adj	-	Adj	-	Adj	-
6. Main St (US 321) & Summer St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	4.0	4.0	4.0
	Distance (ft)	55	55	50	50	60	65	70	55																
	All Red (sec)	1.7	2.6	1.6	2.4	1.8	2.9	2.0	2.6	1.7	2.5	1.6	2.4	1.8	2.5	2.0	2.5	1.5	-	1.5	-	1.5	1.0	1.5	1.0
	Total CLR (sec)	4.9	5.0	4.8	4.9	5.0	5.4	5.2	5.0	4.9	5.5	4.8	5.4	5.0	5.5	5.2	5.5	5.5	-	5.5	-	5.5	5.0	5.5	5.0
	Yellow CK																	Ck	-	Ck	-	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	-	Adj	-	Adj	Add	Adj	Add
7. Main St (US 321) & McKee St	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	-	4.0	-
	Distance (ft)	55	55	50	40	70	65	65	50																
	All Red (sec)	1.7	2.6	1.6	2.0	2.0	2.9	1.9	2.4	1.7	2.5	1.6	2.0	2.0	2.5	1.9	2.4	1.5	-	1.5	-	1.5	-	1.5	-
	Total CLR (sec)	4.9	5.0	4.8	4.5	5.2	5.4	5.1	4.9	4.9	5.5	4.8	5.0	5.2	5.5	5.1	5.4	5.5	-	5.5	-	5.5	-	5.5	-
	Yellow CK																	Ck	-	Ck	-	Ck	-	Ck	-
	Total CLR CK																	Adj	-	Adj	-	Adj	-	Adj	-

TABLE C-1 (Continued)

TRAFFIC SIGNAL CLEARANCES

Town of Greeneville

SIGNAL GROUPS		CALCULATED CLEARANCES								RECOMMENDED CLEARANCES								CURRENT 2019 CLEARANCES							
		NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL	NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL	NBT	NBL	SBT	SBL	EBT	EBL	WBT	WBL
8 Church St & College St.	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	-	4.0	-
	Distance (ft)	70	65	70	55	65	60	65	55																
	All Red (sec)	2.0	2.9	2.0	2.6	1.9	2.7	1.9	2.6	2.0	2.5	2.0	2.5	1.9	2.5	1.9	2.5	1.0	-	1.0	-	1.5	-	1.5	-
	Total CLR (sec)	5.2	5.4	5.2	5.0	5.1	5.2	5.1	5.0	5.2	5.5	5.2	5.5	5.1	5.5	5.1	5.5	5.0	-	5.0	-	5.5	-	5.5	-
	Yellow CK																	Ck	-	Ck	-	Ck	-	Ck	-
	Total CLR CK																	Add	-	Add	-	Adj	-	Adj	-
9. E. McKee St (SR 350)& College St	SL (mph)			30	20	30	20	30																	
	Yellow (sec)	-	-	3.2	2.5	3.2	2.5	3.2	-	-	-	3.2	3.0	3.2	3.0	3.2	-	-	-	-	4.0	4.0	-	4.0	-
	Distance (ft)			50	70	90	55	95																	
	All Red (sec)	-	-	1.6	3.1	2.5	2.6	2.6	-	-	-	1.6	2.5	2.5	2.5	2.5	-	-	-	-	1.0	2.0	-	2.0	-
	Total CLR (sec)	-	-	4.8	5.5	5.7	5.0	5.8	-	-	-	4.8	5.5	5.7	5.5	5.7	-	-	-	-	5.0	6.0	-	6.0	-
	Yellow CK																	-	-	-	Ck	Ck	-	Ck	-
	Total CLR CK																	-	-	-	Add	Adj	-	Adj	-
10. E. McKee St (SR 350) & Bernard Ave	SL (mph)	30		30	20			30	20																
	Yellow (sec)	3.2	-	3.2	2.5	-	-	3.2	2.5	3.2	-	3.2	3.0	-	-	3.2	3.0	4.0	-	4.0	-	-	-	4.0	-
	Distance (ft)	60		60	55			50	55																
	All Red (sec)	1.8	-	1.8	2.6	-	-	1.6	2.6	1.8	-	1.8	2.5	-	-	1.6	2.5	2.0	-	2.0	-	-	-	2.0	-
	Total CLR (sec)	5.0	-	5.0	5.0	-	-	4.8	5.0	5.0	-	5.0	5.5	-	-	4.8	5.5	6.0	-	6.0	-	-	-	6.0	-
	Yellow CK																	Ck	-	Ck	-	-	-	Ck	-
	Total CLR CK																	Adj	-	Adj	-	-	-	Adj	-
11. Church St & Bernard Ave	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	-	4.0	-	4.0	-
	Distance (ft)	75	70	50	60	65	60	70	85																
	All Red (sec)	2.2	3.1	1.6	2.7	1.9	2.7	2.0	3.6	2.2	2.5	1.6	2.5	1.9	2.5	2.0	2.5	2.0	-	2.0	-	2.0	-	2.0	-
	Total CLR (sec)	5.4	5.5	4.8	5.2	5.1	5.2	5.2	6.0	5.4	5.5	4.8	5.5	5.1	5.5	5.2	5.5	6.0	-	6.0	-	6.0	-	6.0	-
	Yellow CK																	Ck	-	Ck	-	Ck	-	Ck	-
	Total CLR CK																	Adj	-	Adj	-	Adj	-	Adj	-
ASHEVILLE HIGHWAY (SR 70)																									
1. Summer St (US 11 Bus) & Arnold Rd	SL (mph)	40	20	30	20	45	20	45	20																
	Yellow (sec)	3.9	2.5	3.2	2.5	4.3	2.5	4.3	2.5	3.9	3.0	3.2	3.0	4.3	3.0	4.3	3.0	3.0	-	3.0	-	3.0	-	3.0	3.5
	Distance (ft)	85	80	95	75	110	115	75	75																
	All Red (sec)	1.8	3.4	2.6	3.2	2.0	4.6	1.4	3.2	1.8	2.5	2.5	2.5	2.0	2.5	1.4	2.5	2.0	-	2.0	-	2.0	-	1.0	1.0
	Total CLR (sec)	5.7	5.9	5.8	5.7	6.3	7.1	5.7	5.7	5.7	5.5	5.7	5.5	6.3	5.5	5.7	5.5	5.0	-	5.0	-	5.0	-	4.0	4.5
	Yellow CK																	Add	-	Add	-	Add	-	Add	Ck
	Total CLR CK																	Add	-	Add	-	Add	-	Add	Add
2. Asheville Hwy (SR 70) & Main St (US 321)	SL (mph)	30	20	30	20	30	20	30	20																
	Yellow (sec)	3.2	2.5	3.2	2.5	3.2	2.5	3.2	2.5	3.2	3.0	3.2	3.0	3.2	3.0	3.2	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Distance (ft)	55	70	65	70	70	115	60	100																
	All Red (sec)	1.7	3.1	1.9	3.1	2.0	4.6	1.8	4.1	1.7	2.5	1.9	2.5	2.0	2.5	1.8	2.5	1.5	1.0	1.5	1.0	2.0	1.0	2.0	1.0
	Total CLR (sec)	4.9	5.5	5.1	5.5	5.2	7.1	5.0	6.6	4.9	5.5	5.1	5.5	5.2	5.5	5.0	5.5	5.5	5.0	5.5	5.0	6.0	5.0	6.0	5.0
	Yellow CK																	Ck	Ck	Ck	Ck	Ck	Ck	Ck	Ck
	Total CLR CK																	Adj	Add	Adj	Add	Adj	Add	Adj	Add
3. Asheville Hwy (SR 70) & Vann Rd	SL (mph)	35	20	35	20	30	20	30	20																
	Yellow (sec)	3.6	2.5	3.6	2.5	3.2	2.5	3.2	2.5	3.6	3.0	3.6	3.0	3.2	3.0	3.2	3.0	4.0	-	4.0	4.0	4.0	-	4.0	-
	Distance (ft)	150	70	100	65	115	115	120	140																
	All Red (sec)	3.3	3.1	2.3	2.9	3.1	4.6	3.2	5.5	2.5	2.5	2.3	2.5	2.5	2.5	2.5	2.5	2.0	-	2.0	2.0	2.0	-	2.0	-
	Total CLR (sec)	6.9	5.5	5.9	5.4	6.3	7.1	6.4	7.9	6.1	5.5	5.9	5.5	5.7	5.5	5.7	5.5	6.0	-	6.0	6.0	6.0	-	6.0	-
	Yellow CK																	Ck	-	Ck	Ck	Ck	-	Ck	-
	Total CLR CK																	Add	-	Adj	Adj	Adj	-	Adj	-

TABLE C-1 (Continued)

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX D

Signalized Intersection Crash History (Diagrams)

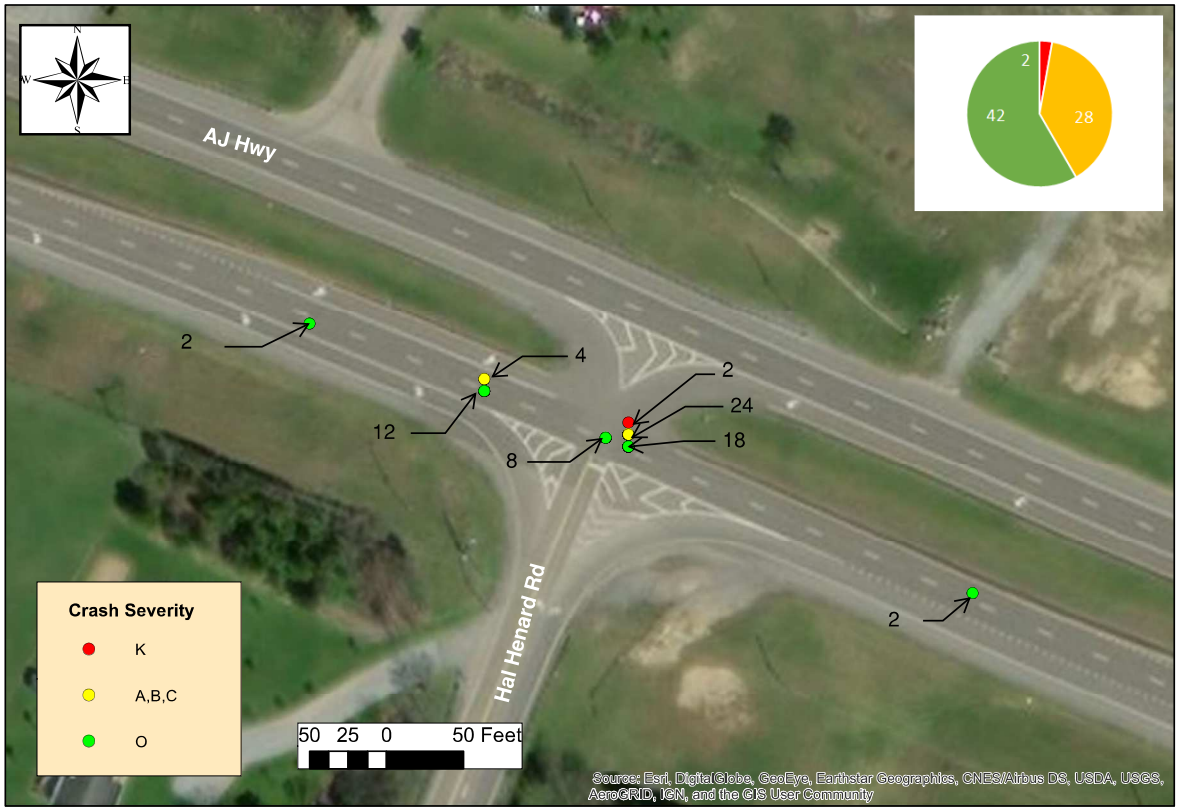
Town of Greeneville

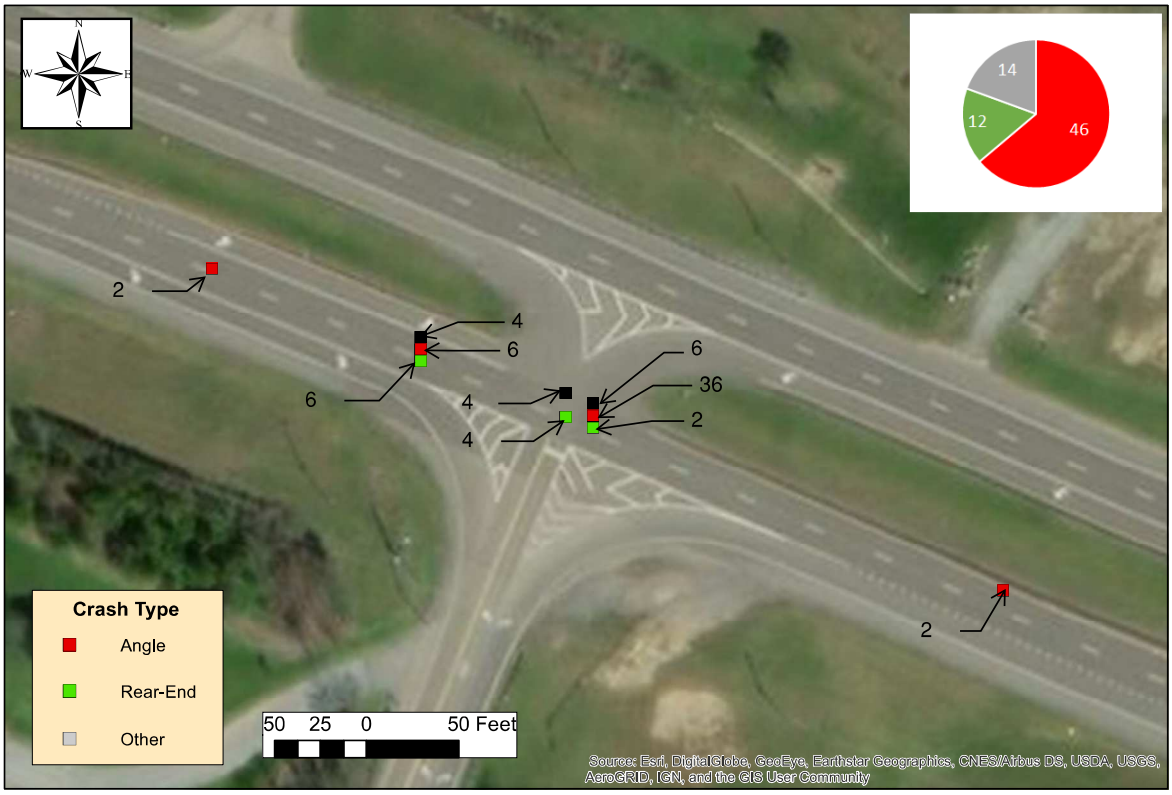
SIGNAL GROUPS	ENTERING PM PEAK HOUR	ENTERING ADT	CRASHES	CRASH RATE	STATEWIDE AVERAGE	CRITICAL CRASH RATE	A/C	GREENVILLE SIGNALIZED AVERAGE RATE	GREENEVILLE CRITICAL CRASH RATE	A/C
3. ANDREW JOHNSON HIGHWAY (U.S. 11E)										
1. Andrew Johnson Hwy (US 11E) & Hal Henard Road (potential future signal)	2500	29412	72	1.34	0.192	0.340	3.94	-	-	-
2. Andrew Johnson Hwy (US 11E) & Kingsport Hwy (SR 93)	2873	33800	39	0.63	0.254	0.41	1.54	0.857	1.14	0.55
Andrew Johnson Hwy (US 11E) & Main St (US 321)	2952	34729	23	0.36	0.254	0.41	0.89	0.857	1.14	0.32
3. Andrew Johnson Hwy (US 11E) & Industrial Road/Burns Street	3051	35894	60	0.92	0.254	0.41	2.25	0.857	1.13	0.81
4. Andrew Johnson Hwy (US 11E) & Greeneville Commons	2857	33612	21	0.34	0.254	0.41	0.83	0.857	1.14	0.30
5. Andrew Johnson Hwy (US 11E) & Justice Drive/Bob Smith Blvd	2831	33306	55	0.90	0.254	0.41	2.19	0.857	1.14	0.79
6. Andrew Johnson Hwy (US 11E) & Tusculum Blvd (US 11E Bus., potential future signal)	2500	29412	30	0.56	0.254	0.42	1.32	-	-	-
7. Andrew Johnson Hwy (US 11E) & Fairgrounds Road	3097	36435	46	0.69	0.306	0.47	1.47	0.857	1.13	0.61
8. Andrew Johnson Hwy (US 11E) & Haynes Blvd/Lowes Entrance	3137	36906	40	0.59	0.306	0.47	1.26	0.857	1.13	0.53
9. Andrew Johnson Hwy (US 11E) & Erwin Hwy	3157	37141	52	0.77	0.254	0.40	1.90	0.857	1.13	0.68
10. Andrew Johnson Hwy (US 11E) & Rufe Taylor Rd	2873	33800	89	1.44	0.254	0.41	3.51	0.857	1.14	1.27
11. Andrew Johnson Hwy (US 11E) & Morgan Rd/Harlan Dr.	2712	31906	45	0.77	0.254	0.42	1.86	0.857	1.15	0.67
12. Andrew Johnson Hwy (US 11E) & Walmart Driveway	2489	29282	8	0.15	0.254	0.42	0.35	0.857	1.16	0.13
13. Andrew Johnson Hwy (US 11E) & Erwin Hwy (SR 107)	2337	27494	97	1.93	0.254	0.43	4.50	0.857	1.17	1.65
14. Snapps Ferry Rd & Bohannon Ave/Forest Hills Dr	844	9929	14	0.77	0.313	0.65	1.20	0.857	1.39	0.56
2. TUSCULUM BOULEVARD (US 11 Bus./SR 107)										
1. Tusculum Blvd (SR 107) & Grove St	1070	12588	10	0.44	0.313	**0.61**	0.72	0.996	1.50	0.29
2. Tusculum Blvd (SR 107) & Austin St	1381	16247	29	0.98	0.313	**0.57**	1.72	0.996	1.44	0.68
3. Tusculum Blvd (SR 107) & Snapps Ferry Rd	1717	20200	23	0.62	0.313	**0.54**	1.15	0.996	1.39	0.45
4. Tusculum Blvd (SR 107) & Bernard Ave	2308	27153	81	1.63	0.313	**0.51**	3.22	0.996	1.34	1.22
5. Tusculum Blvd (SR 107) & Mt Bethel Rd/Mason St	2015	23706	27	0.62	0.313	**0.52**	1.19	0.996	1.36	0.46
6. Tusculum Blvd (SR 107) & Hope Rd	1682	19788	35	0.97	0.313	**0.54**	1.78	0.996	1.40	0.69
7. Tusculum Blvd (SR 107) & Justice Dr/Old Tusculum Rd	1542	18141	28	0.85	0.313	**0.55**	1.53	0.996	1.41	0.60
1. DOWNTOWN										
1. Summer St (US 11 Bus) & Cutler St	750	8824	4	0.25	0.313	**0.67**	0.37	0.996	1.61	0.15
2. Summer St (US 11 Bus) & Irish St	750	8824	17	1.06	0.313	**0.67**	1.58	0.996	1.61	0.66
3. Main St (US 321) & Tusculum Blvd/Spencer St	1113	13094	18	0.75	0.313	**0.60**	1.25	0.996	1.49	0.50
4. Main St (US 321) & Church St	1378	16212	31	1.05	0.313	**0.57**	1.84	0.996	1.44	0.73
5. Main St (US 321) & Depot St	872	10259	39	2.08	0.313	**0.64**	3.25	0.996	1.56	1.34
6. Main St (US 321) & Summer St	1030	12118	12	0.54	0.313	**0.61**	0.89	0.996	1.51	0.36
7. Main St (US 321) & McKee St	890	10471	27	1.41	0.313	**0.64**	2.22	0.996	1.55	0.91
8 Church St & College St.	813	9565	19	1.09	0.313	**0.65**	1.67	0.996	1.58	0.69
9. E. McKee St (SR 350)& College St	687	8082	3	0.20	0.313	**0.69**	0.30	0.996	1.63	0.12
10. E. McKee St (SR 350) & Bernard Ave	1047	12318	32	1.42	0.313	**0.61**	2.33	0.996	1.51	0.94
11. Church St & Bernard Ave	1885	22176	42	1.04	0.313	**0.53**	1.96	0.996	1.37	0.76
4. ASHEVILLE HIGHWAY (SR 70)										
1. Summer St (US 11 Bus) & Arnold Rd	1203	14153	31	1.20	0.313	**0.59**	2.04	0.996	1.47	0.82
2. Asheville Hwy (SR 70) & Main St (US 321)	2237	26318	66	1.37	0.313	**0.51**	2.69	0.996	1.34	1.02
3. Asheville Hwy (SR 70) & Vann Rd	1682	19788	48	1.33	0.313	**0.54**	2.45	0.996	1.40	0.95

Crash data from January 2014 to December 2018

W Andrew Johnson Hwy and Hal Henard Rd

Crashes from Jan 2014 through Dec 2018

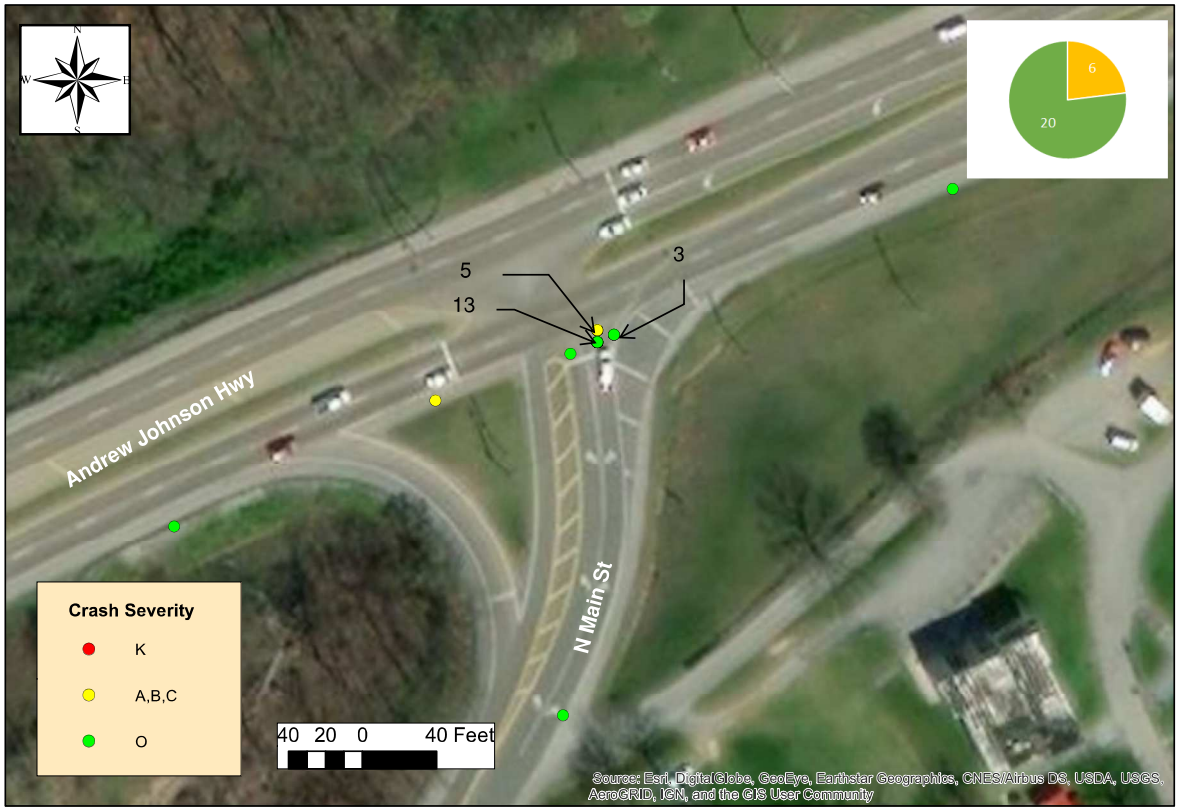




CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

N Main St and AJ Hwy

Crashes from Jan 2014 through Dec 2018

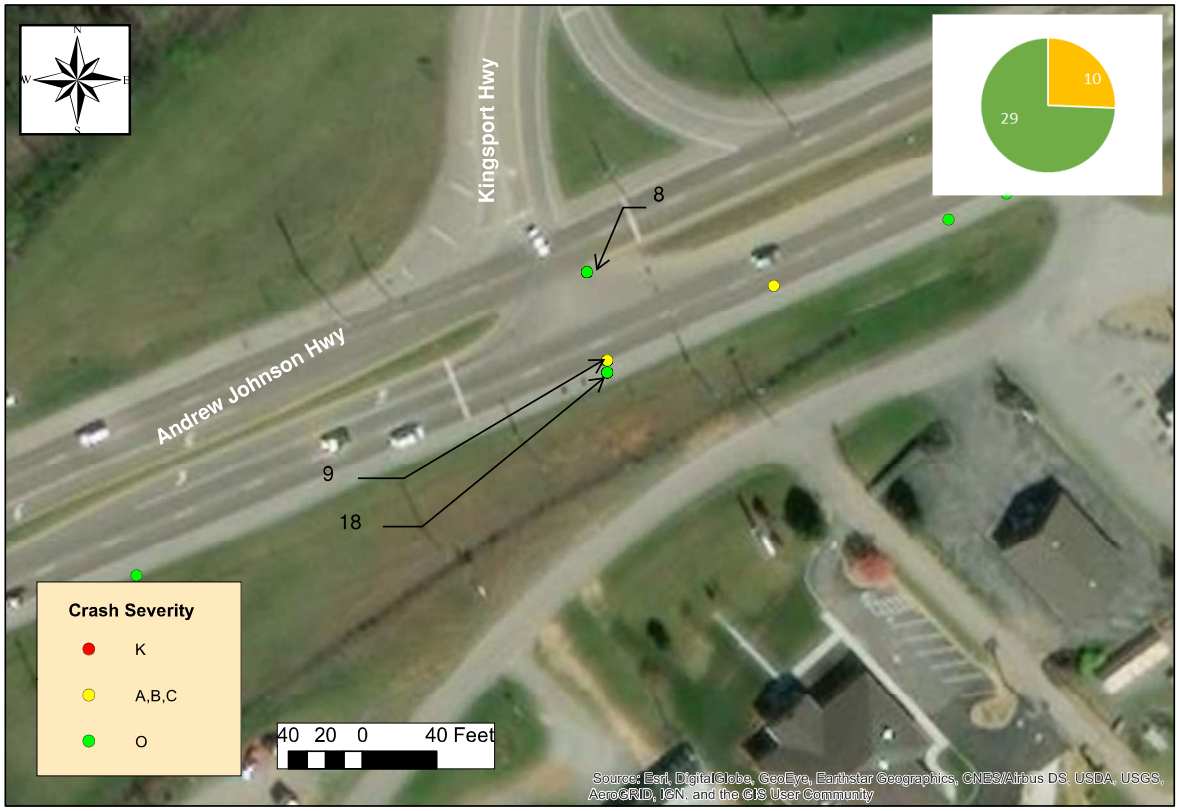


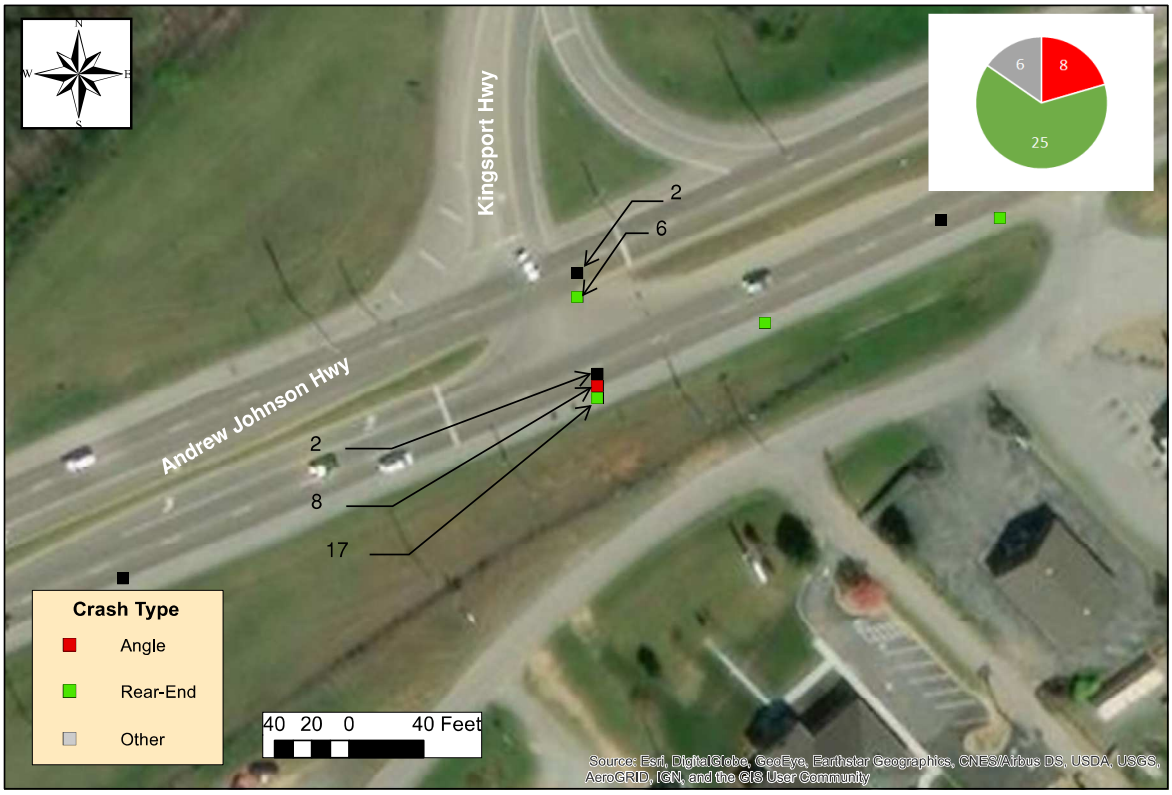


CRASH SEVERITY KEY
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C- Suspected Minor Injury
O- Property Damage Only

Kingsport Hwy and AJ Hwy

Crashes from Jan 2014 through Dec 2018

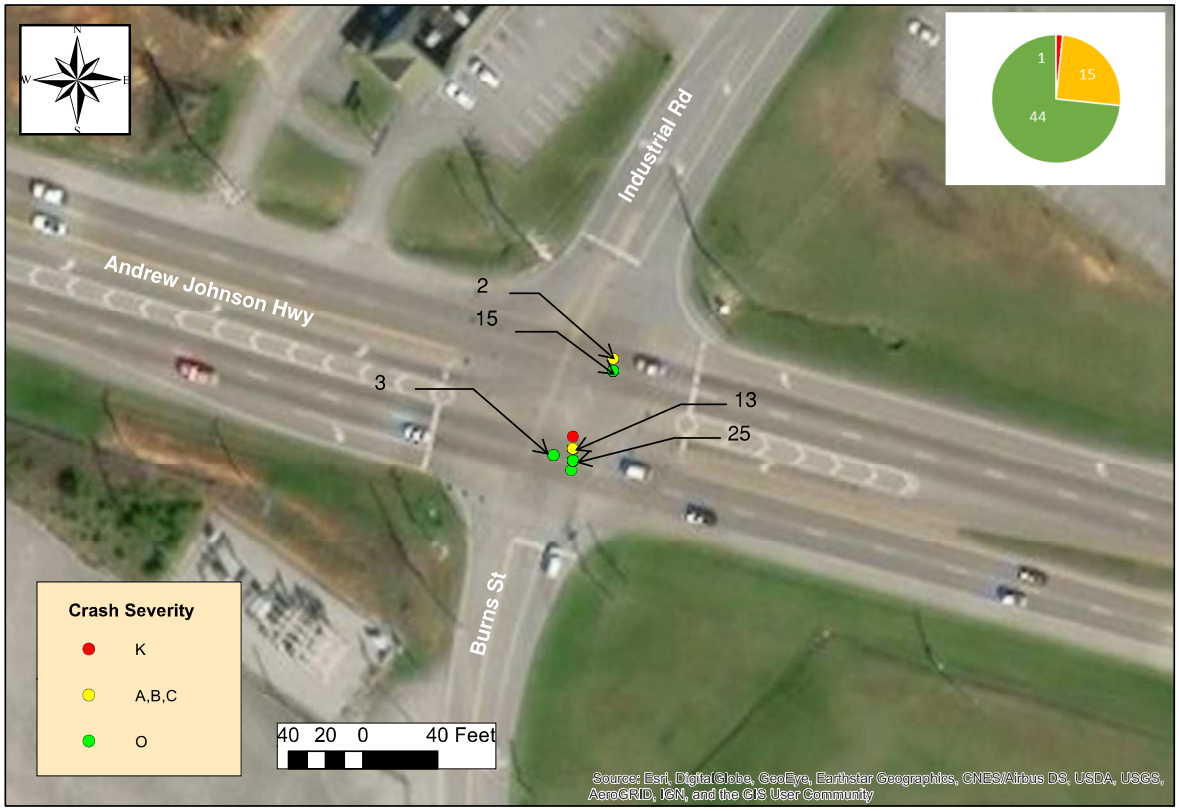


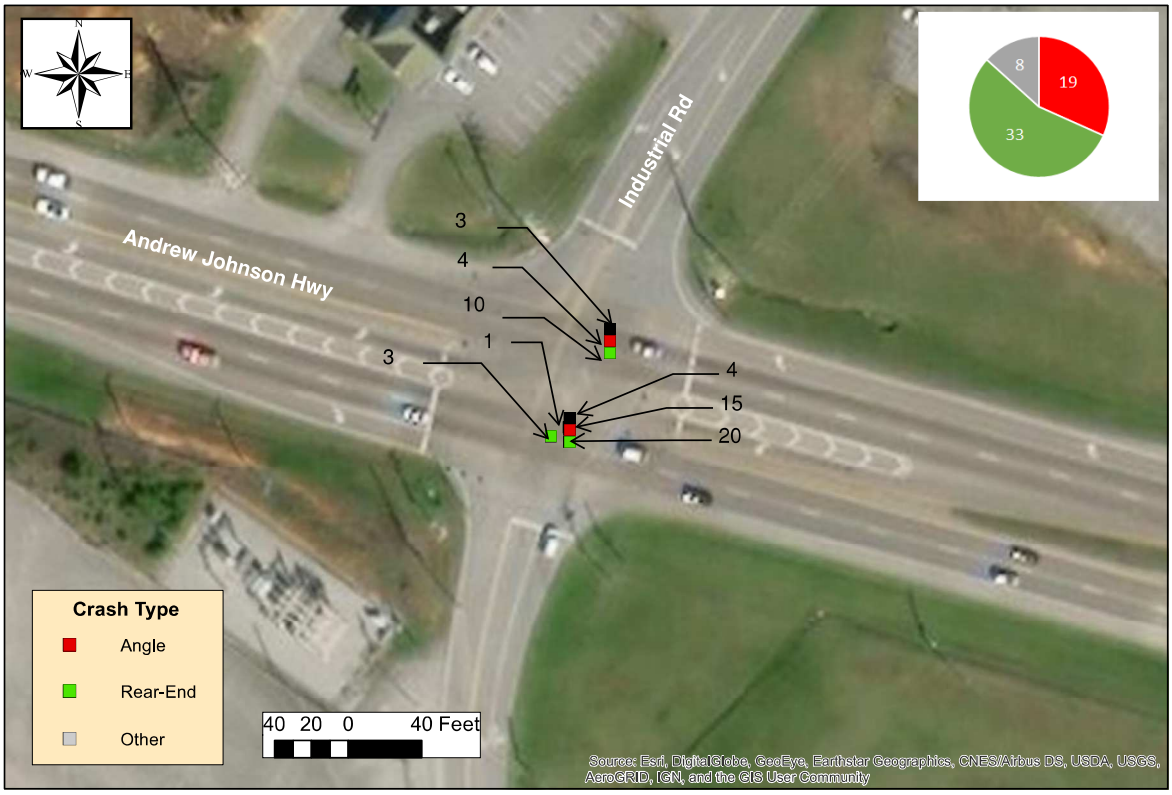


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Burns St, Industrial Rd, and AJ Hwy

Crashes from Jan 2014 through Dec 2018

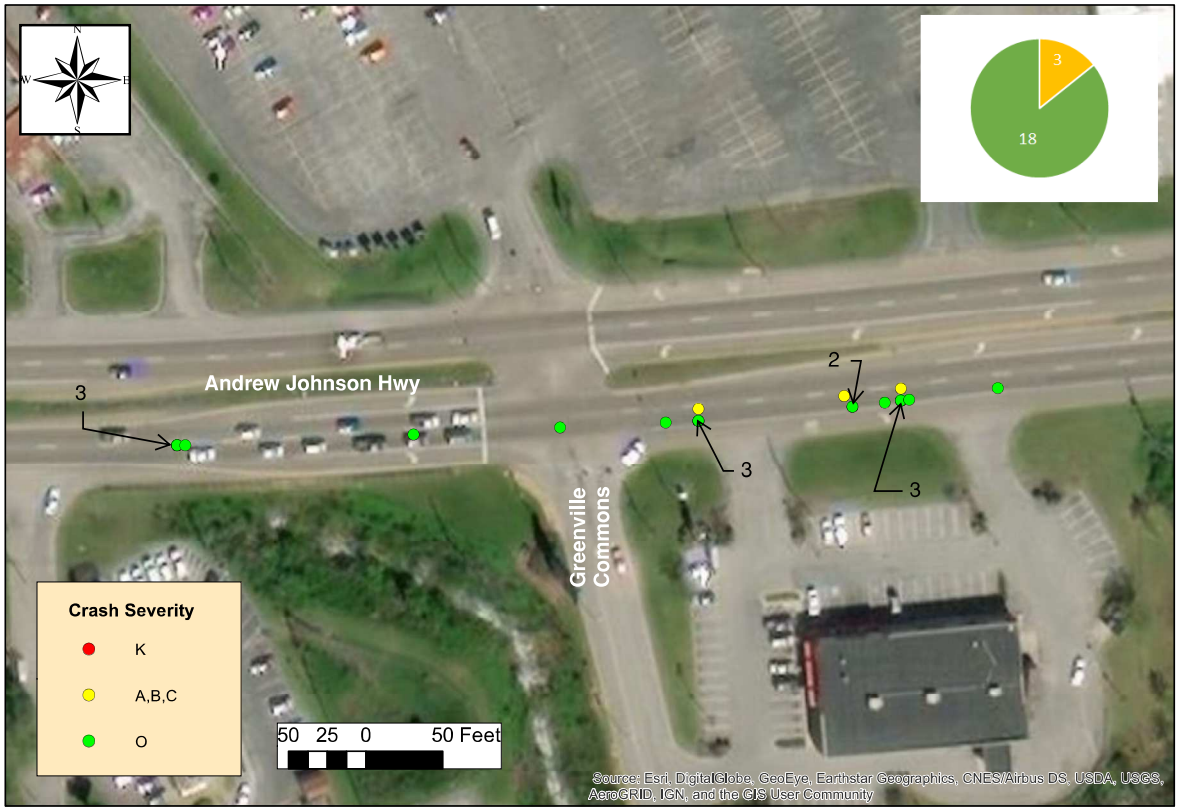


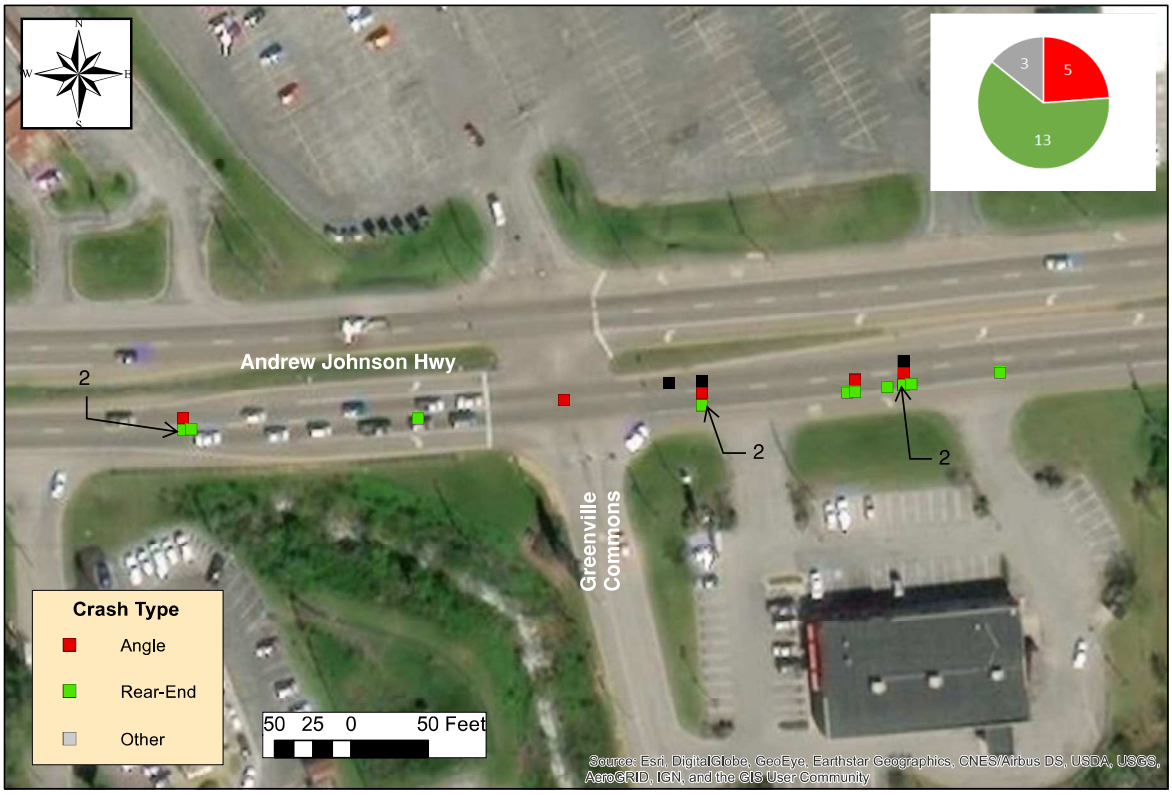


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Greenville Commons and AJ Hwy

Crashes from Jan 2014 through Dec 2018

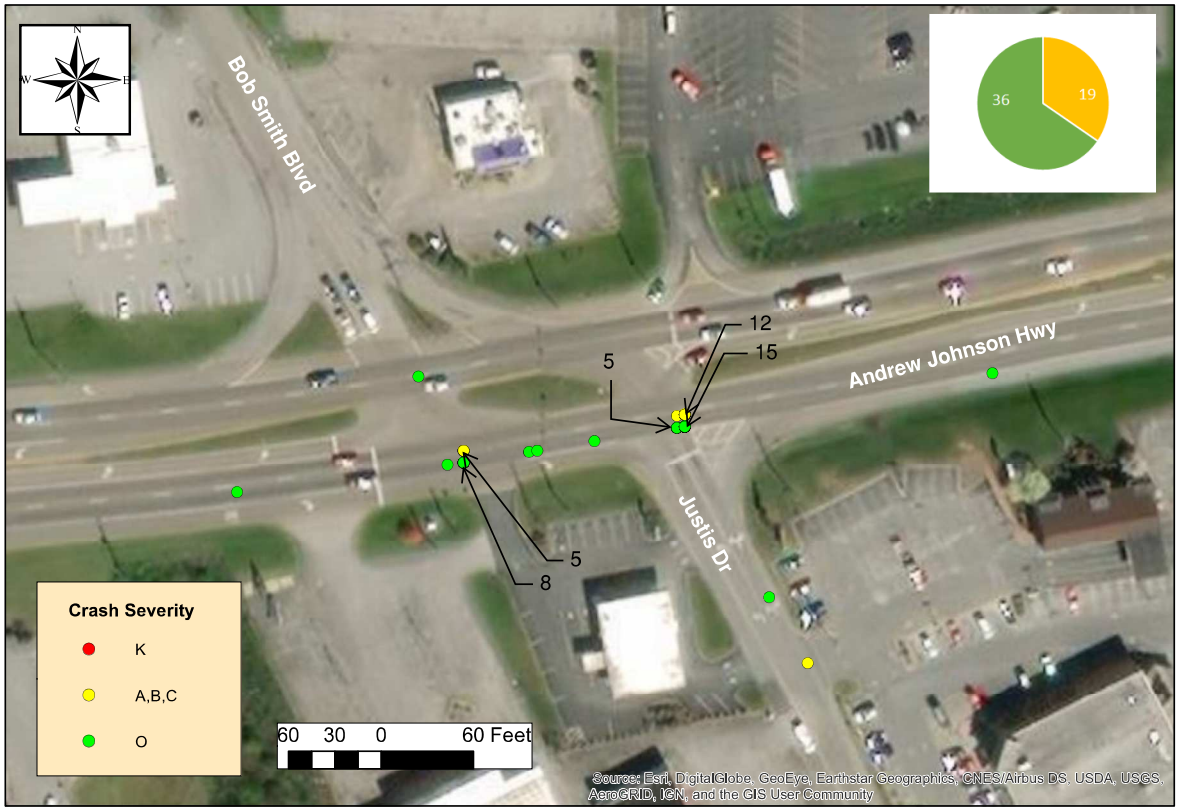


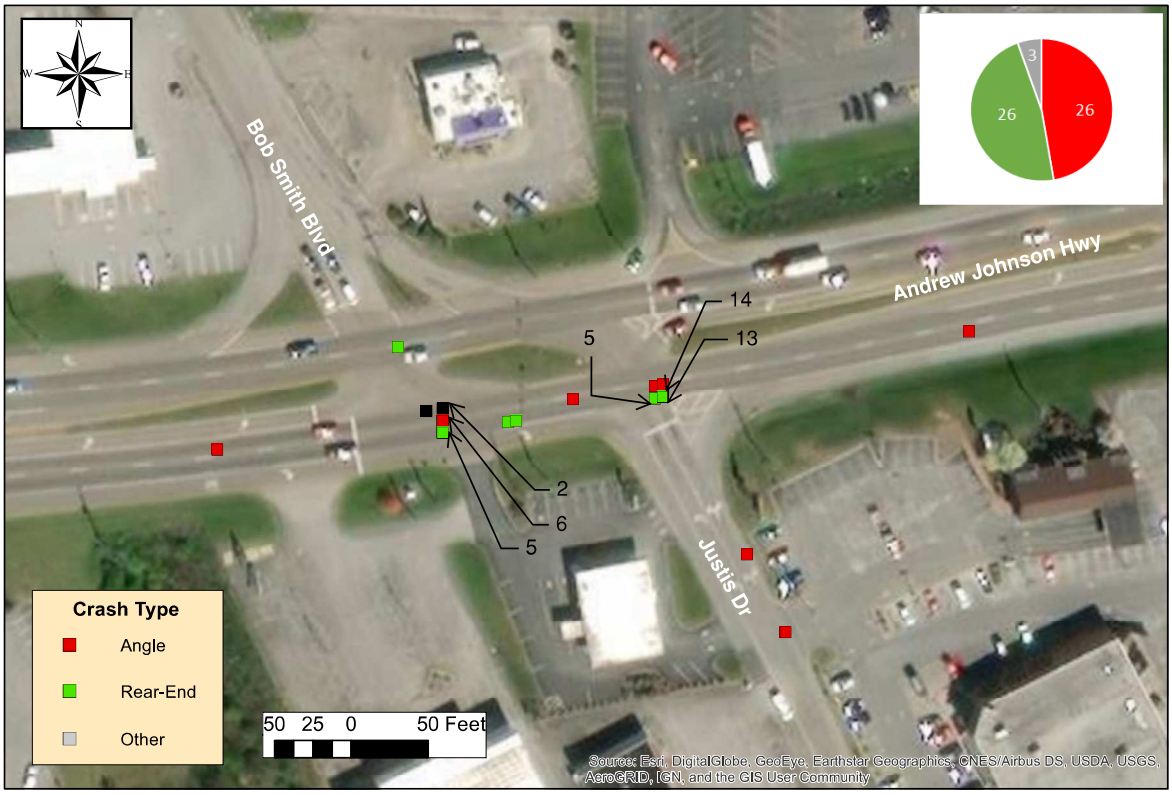


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Bob Smith Blvd, Justis Dr, and AJ Hwy

Crashes from Jan 2014 through Dec 2018

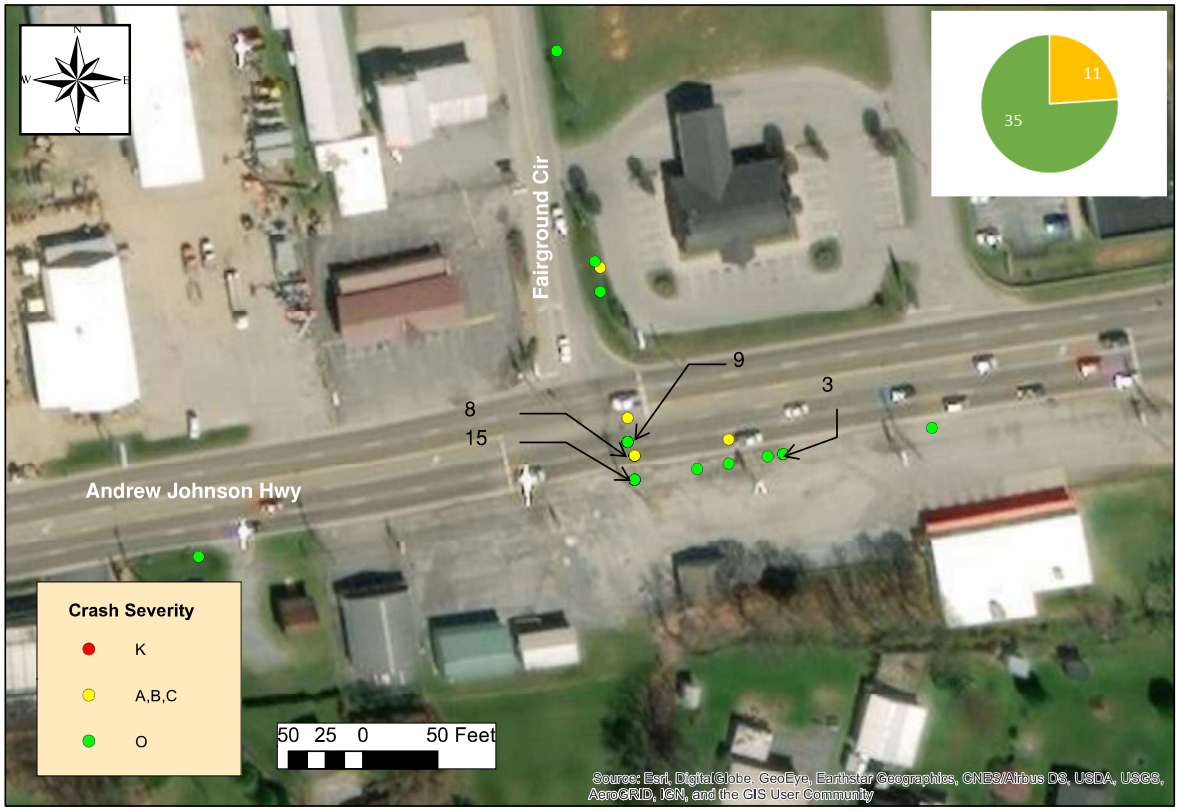


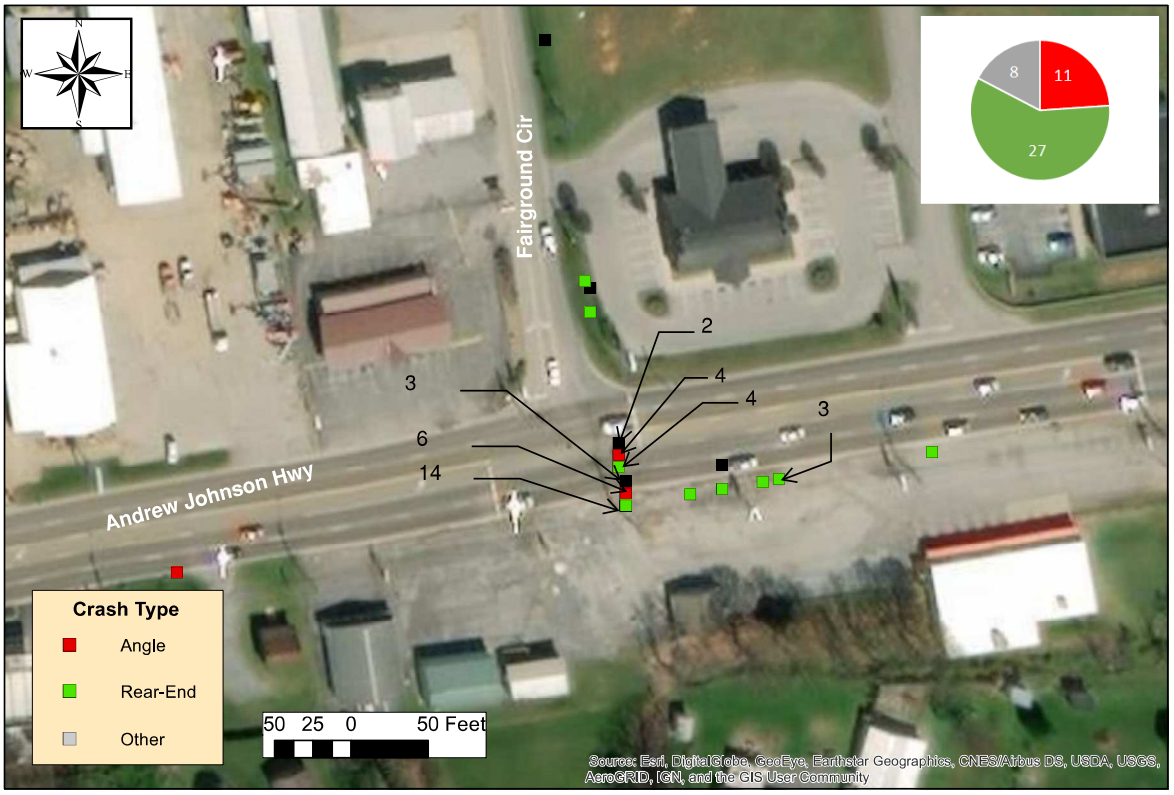


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Fairground Cir and AJ Hwy

Crashes from Jan 2014 through Dec 2018

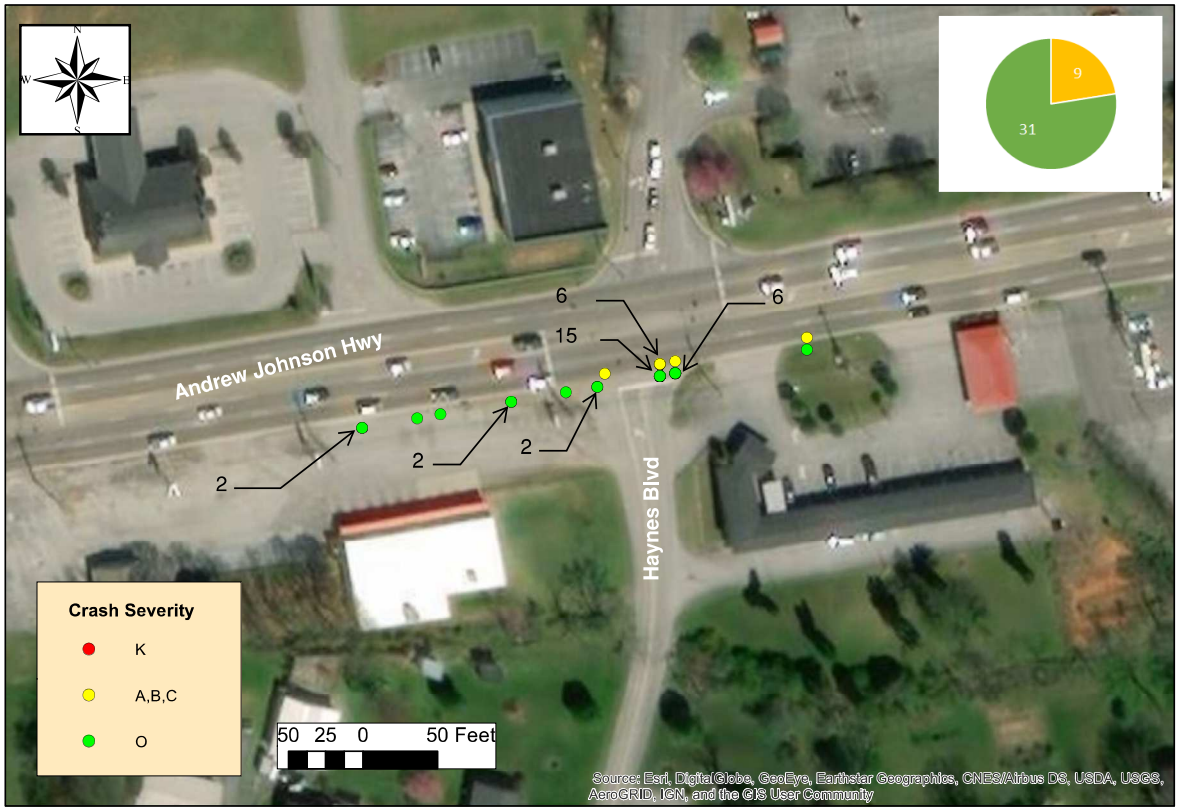


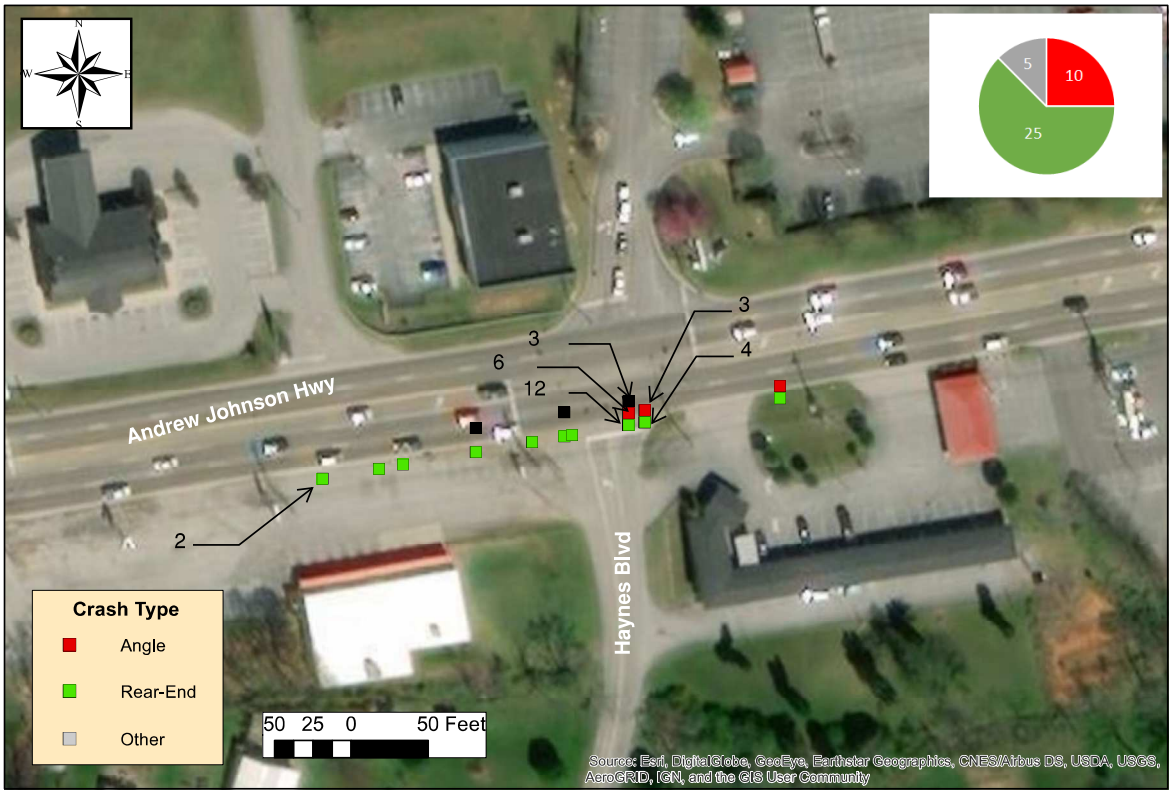


CRASH SEVERITY KEY
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C- Suspected Minor Injury
O- Property Damage Only

Haynes Blvd and AJ Hwy

Crashes from Jan 2014 through Dec 2018

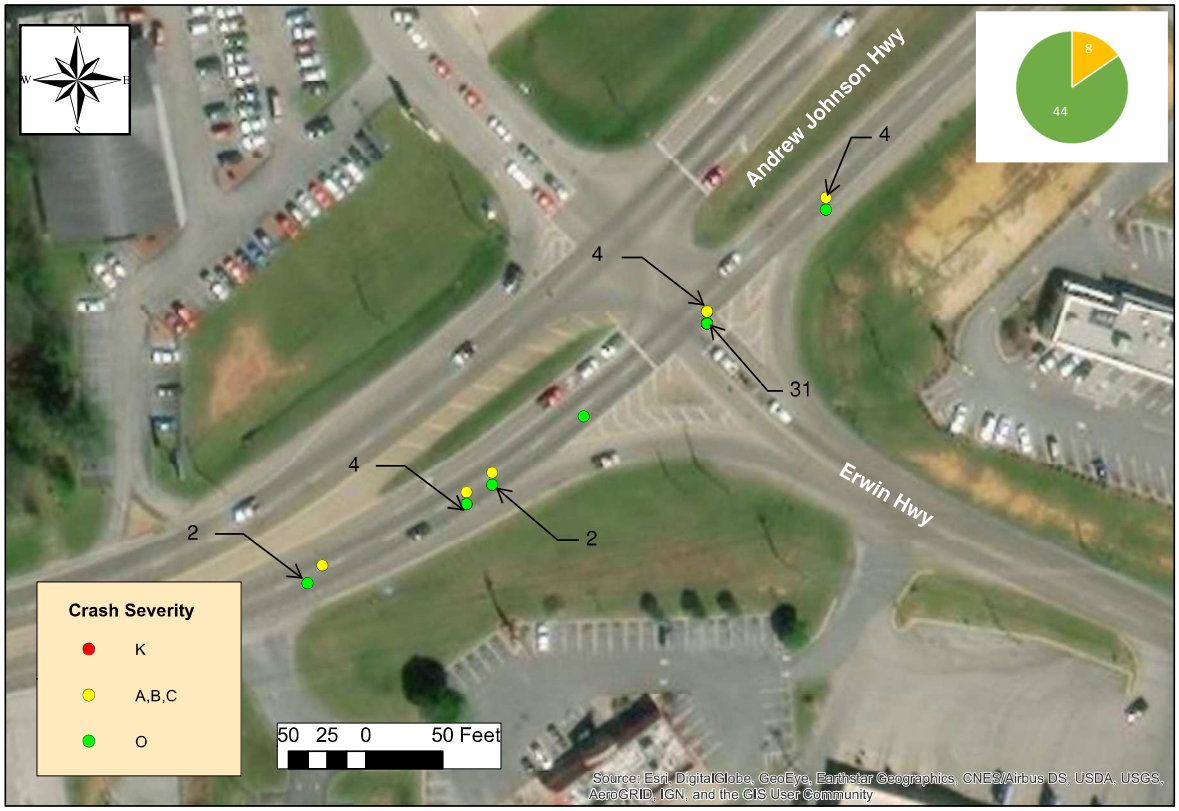


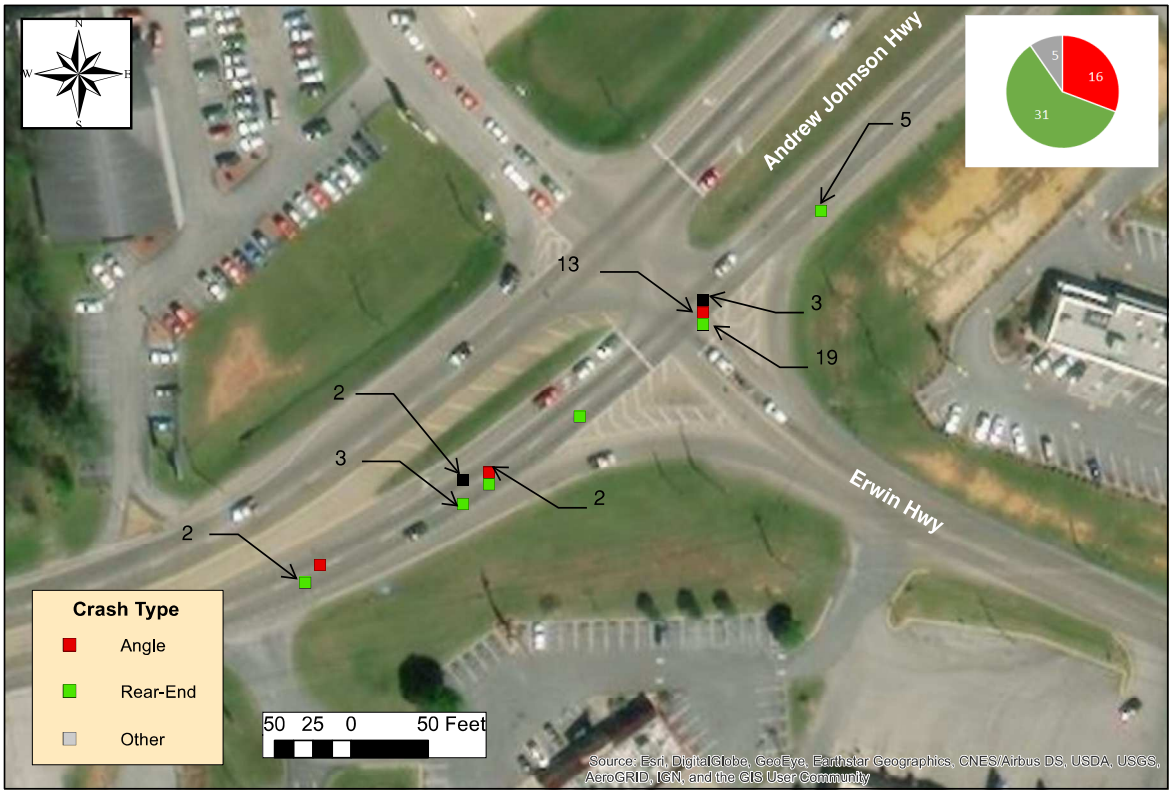


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Erwin Hwy and AJ Hwy

Crashes from Jan 2014 through Dec 2018

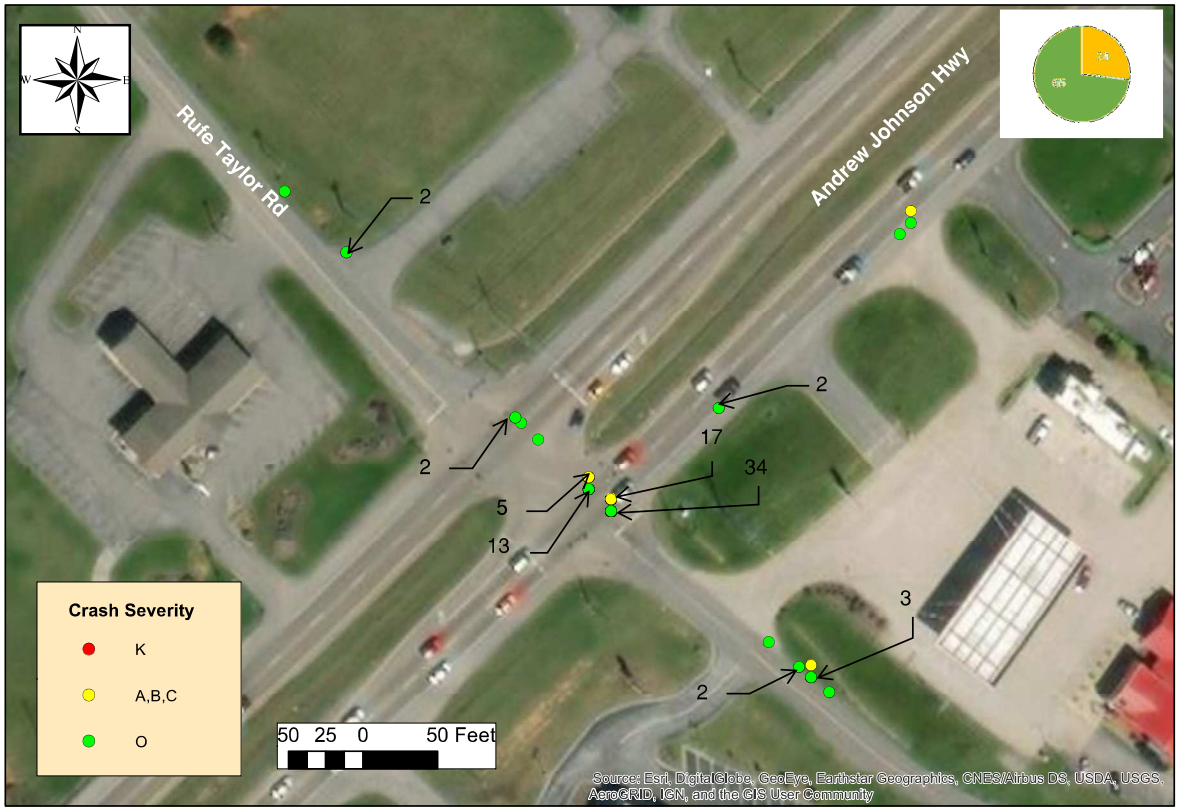


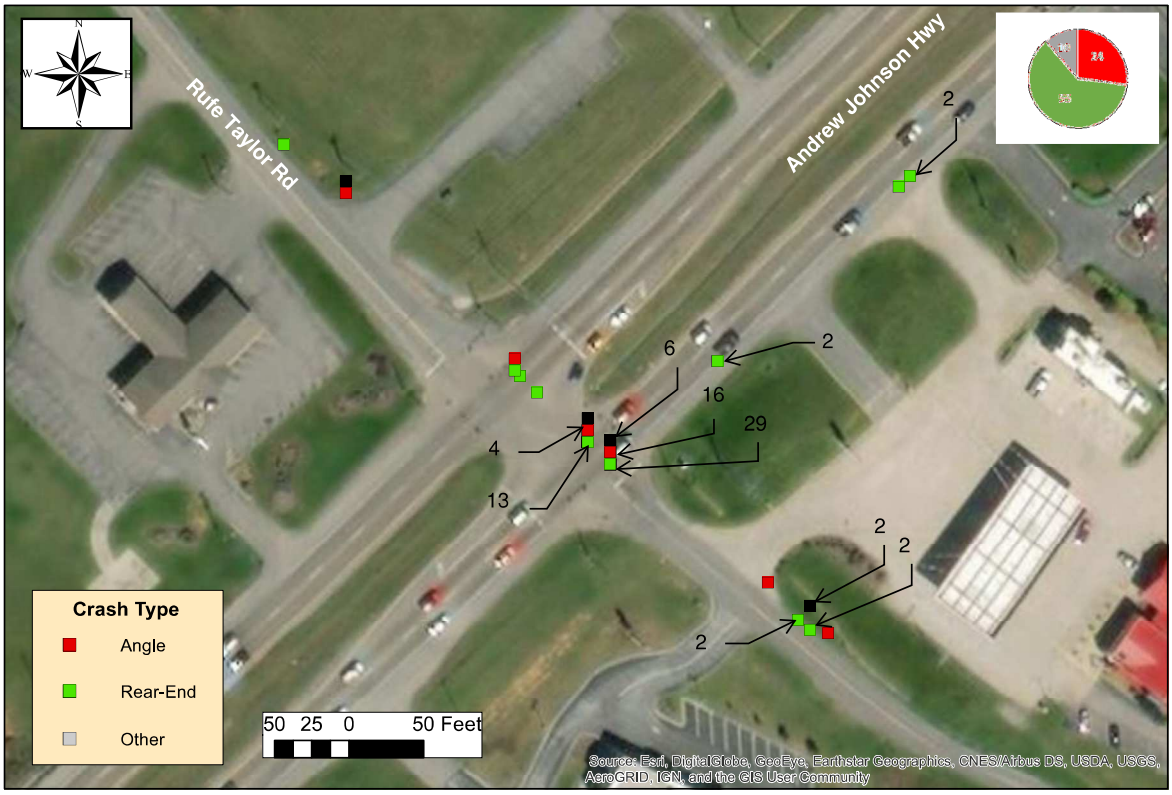


CRASH SEVERITY KEY
K- Fatal
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O- Property Damage Only

Rufe Taylor Rd and AJ Hwy

Crashes from Jan 2014 through Dec 2018

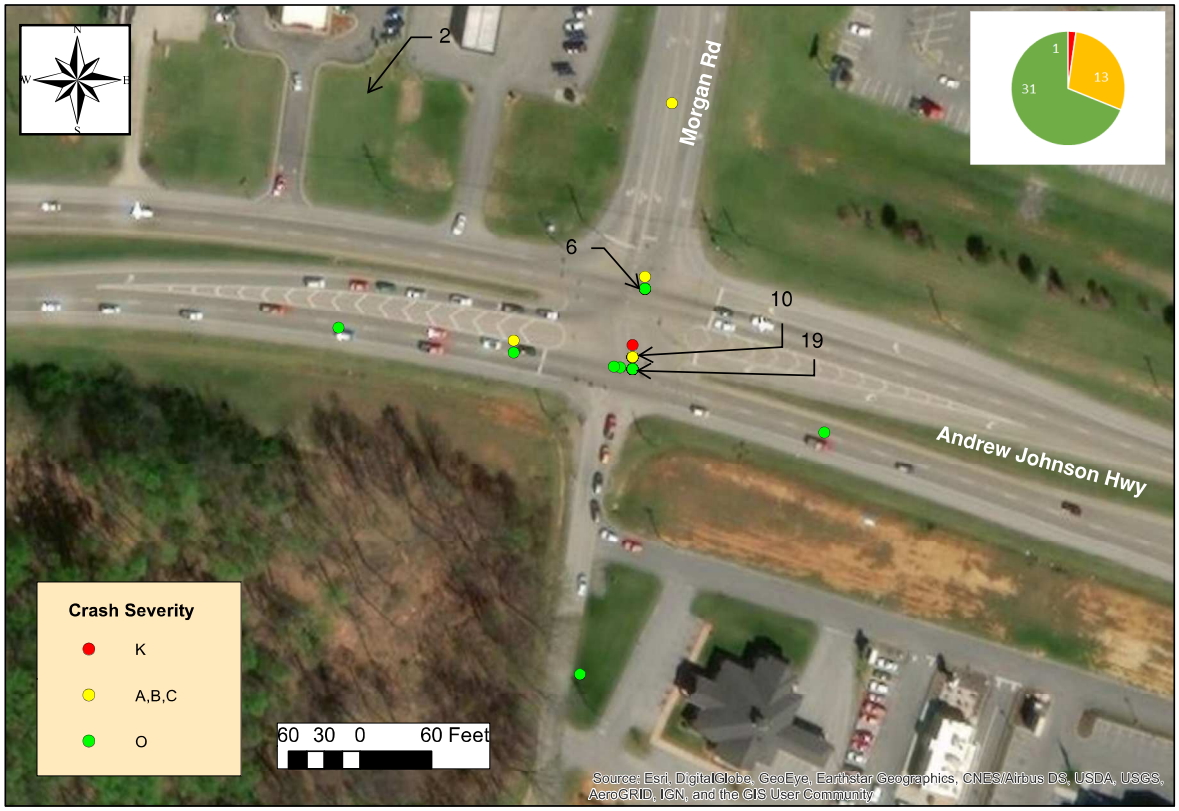


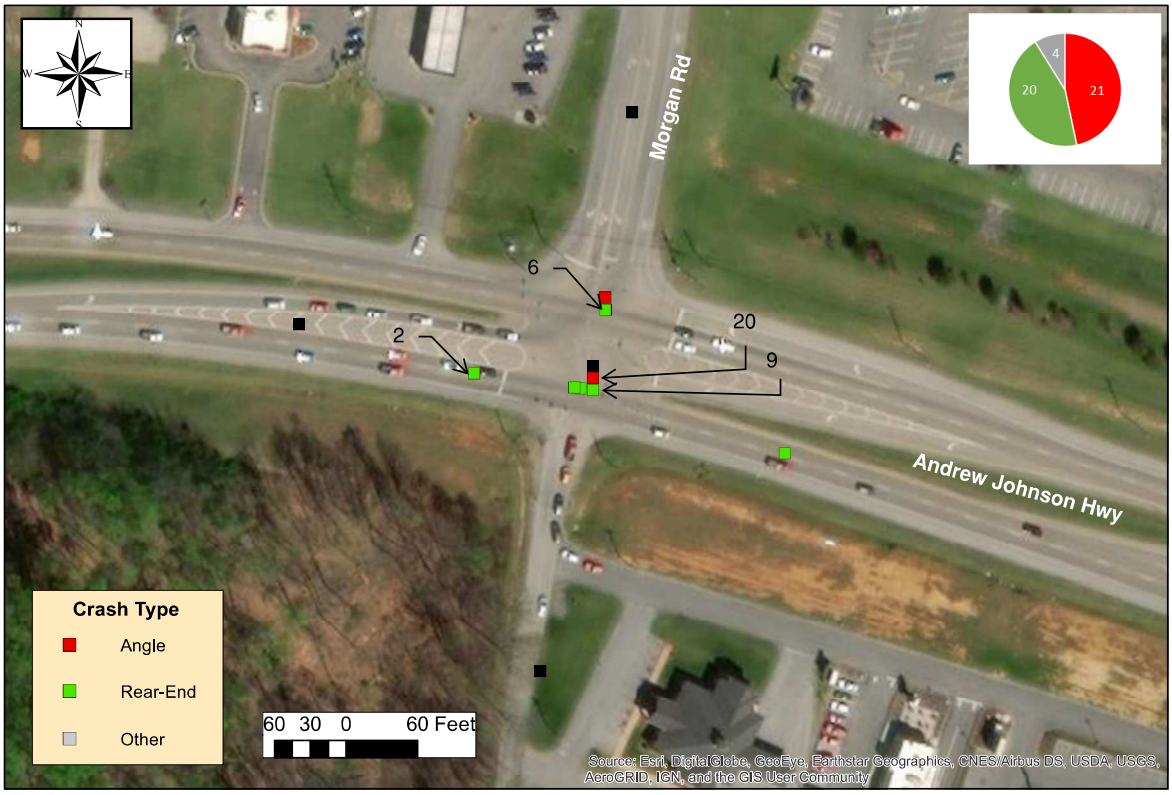


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Morgan Rd and AJ Hwy

Crashes from Jan 2014 through Dec 2018

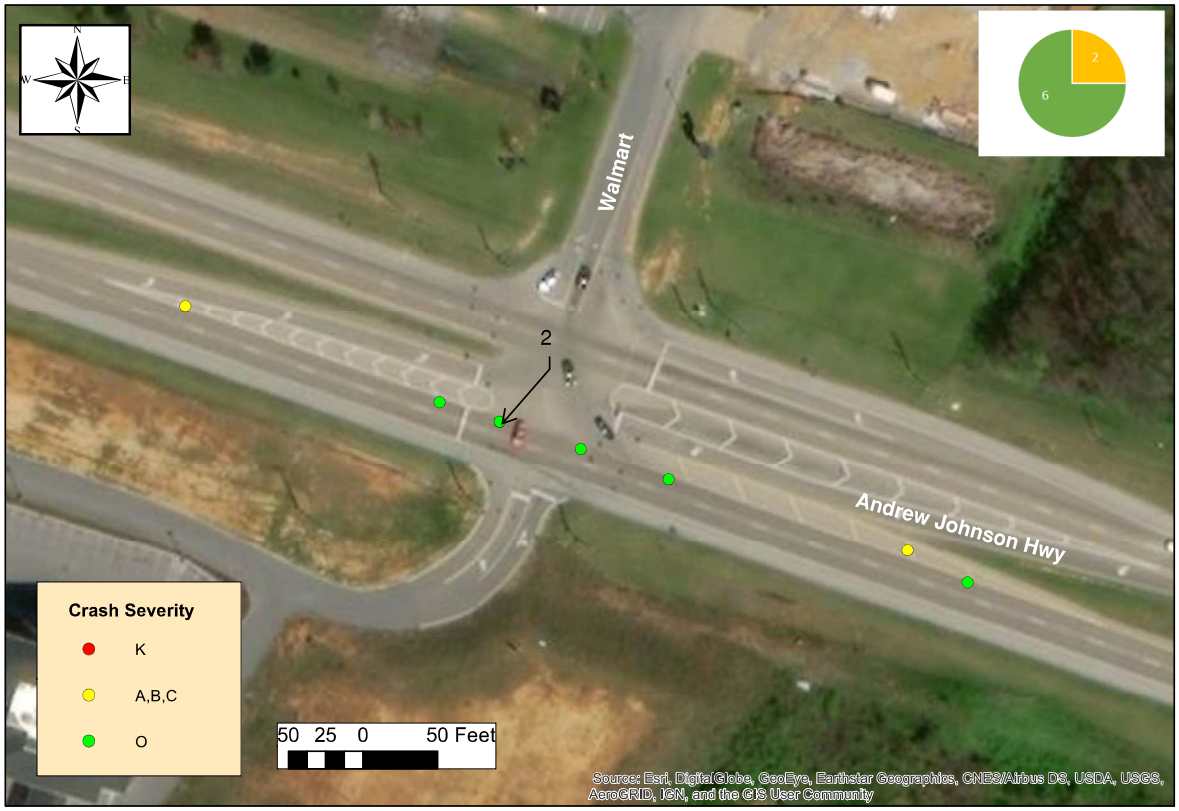


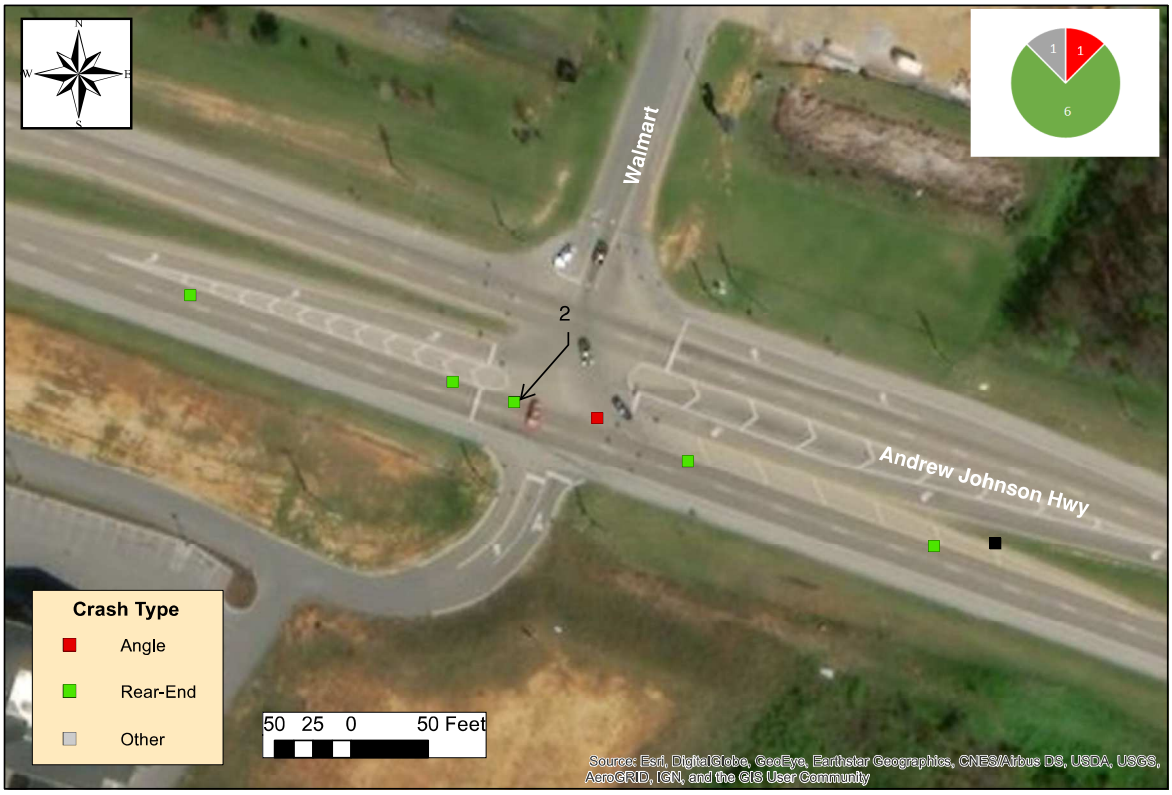


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Walmart and AJ Hwy

Crashes from Jan 2014 through Dec 2018

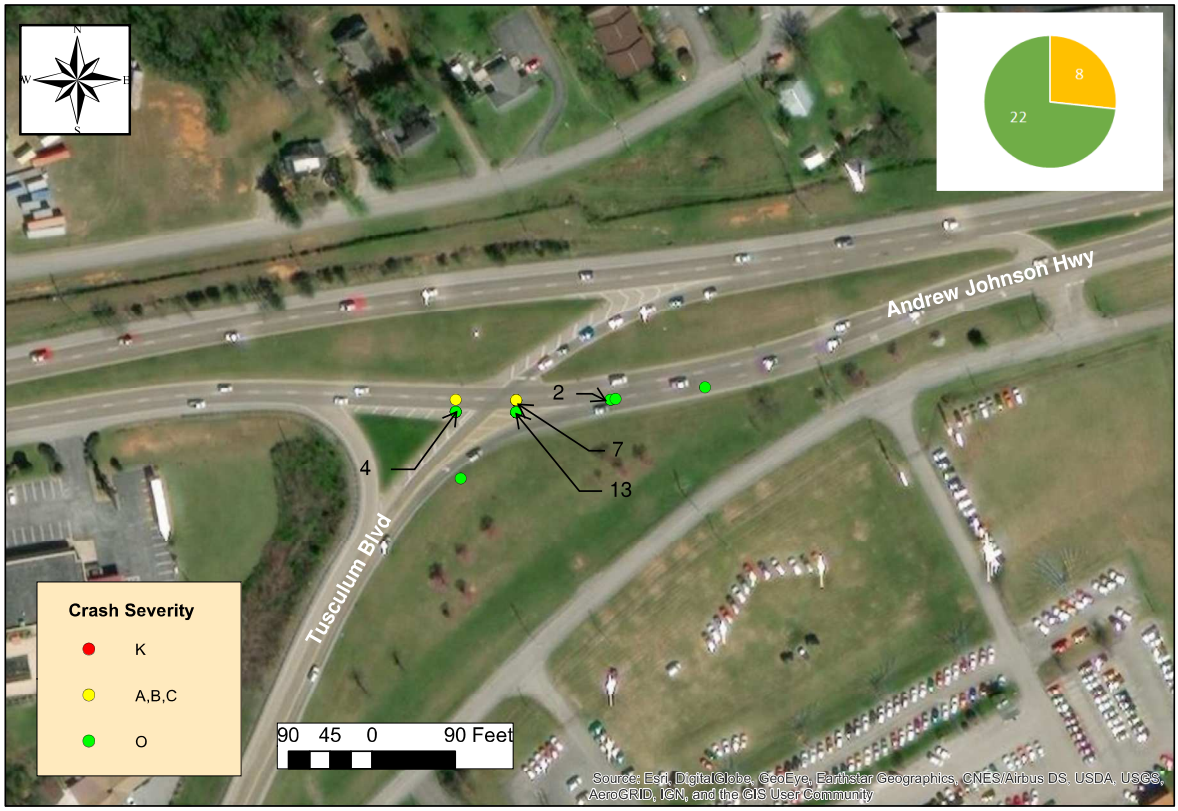


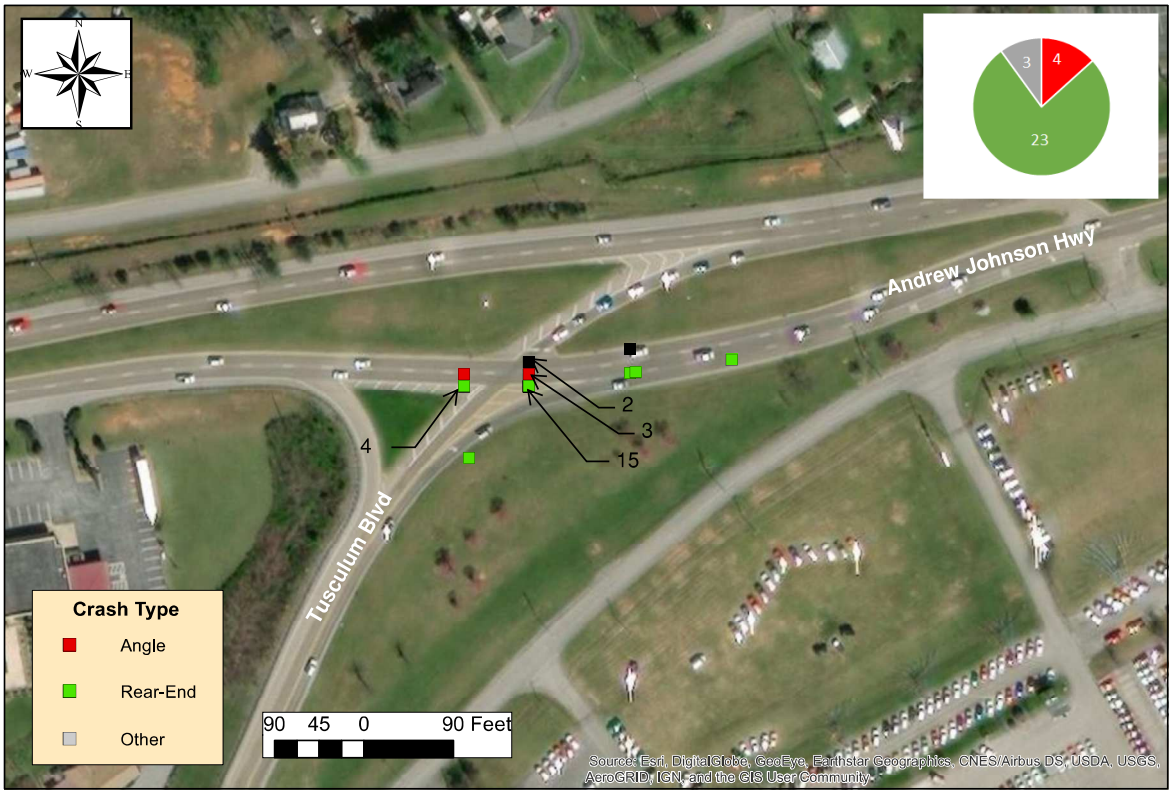


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Tusculum Blvd and AJ Hwy

Crashes from Jan 2014 through Dec 2018



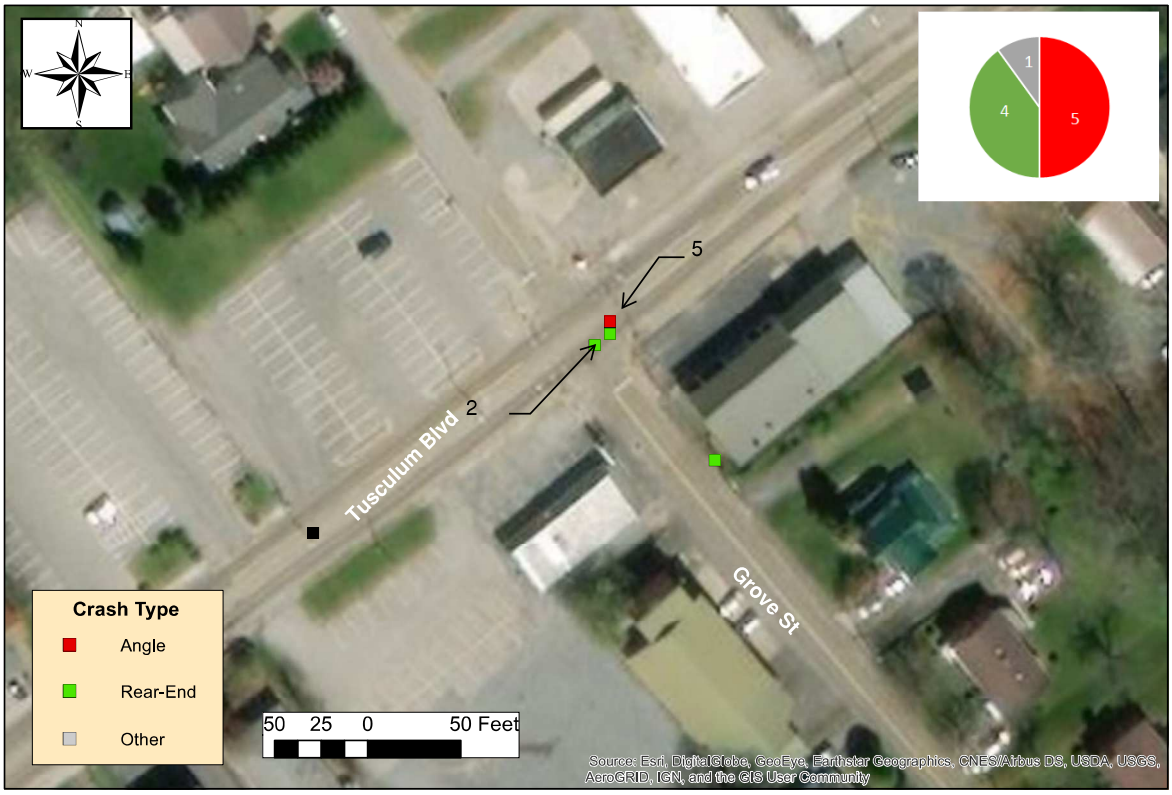


CRASH SEVERITY KEY
K- Fatal
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B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Grove St and Tusculum Blvd

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Austin St and Tusculum Blvd

Crashes from Jan 2014 through Dec 2018



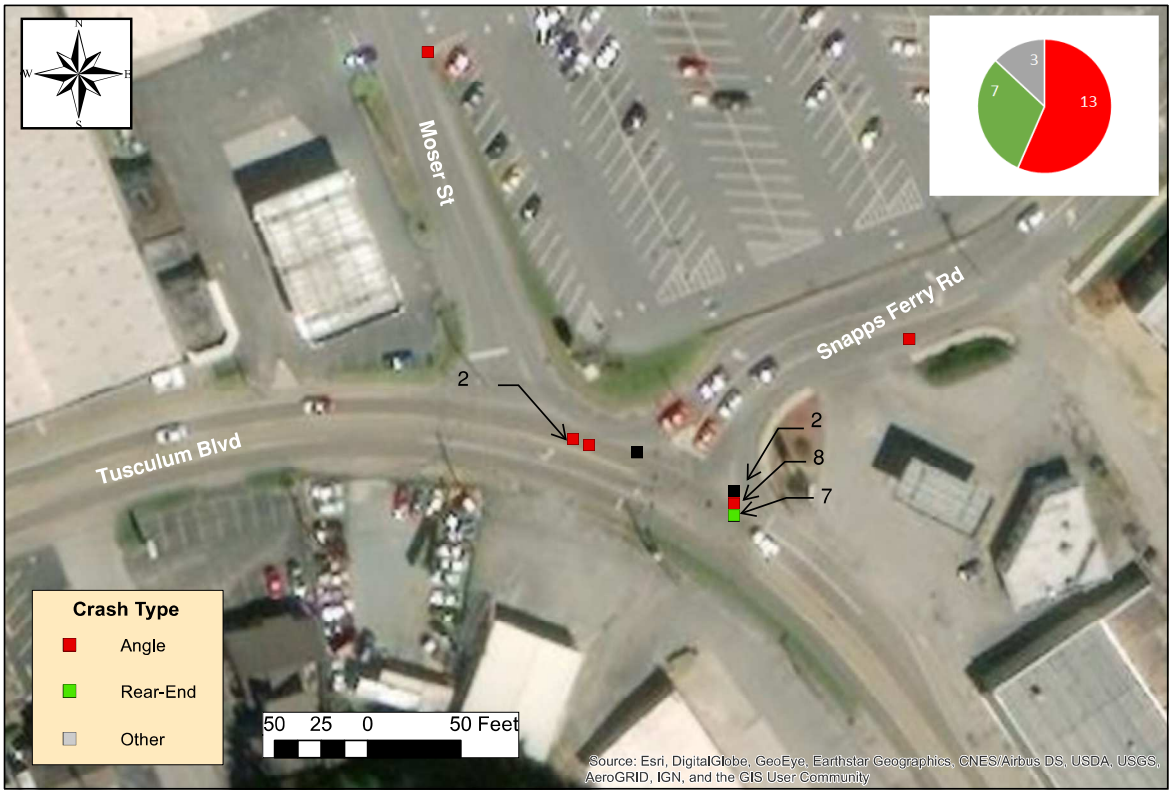


CRASH SEVERITY KEY
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A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Snapps Ferry Rd and Tusculum Blvd

Crashes from Jan 2014 through Dec 2018

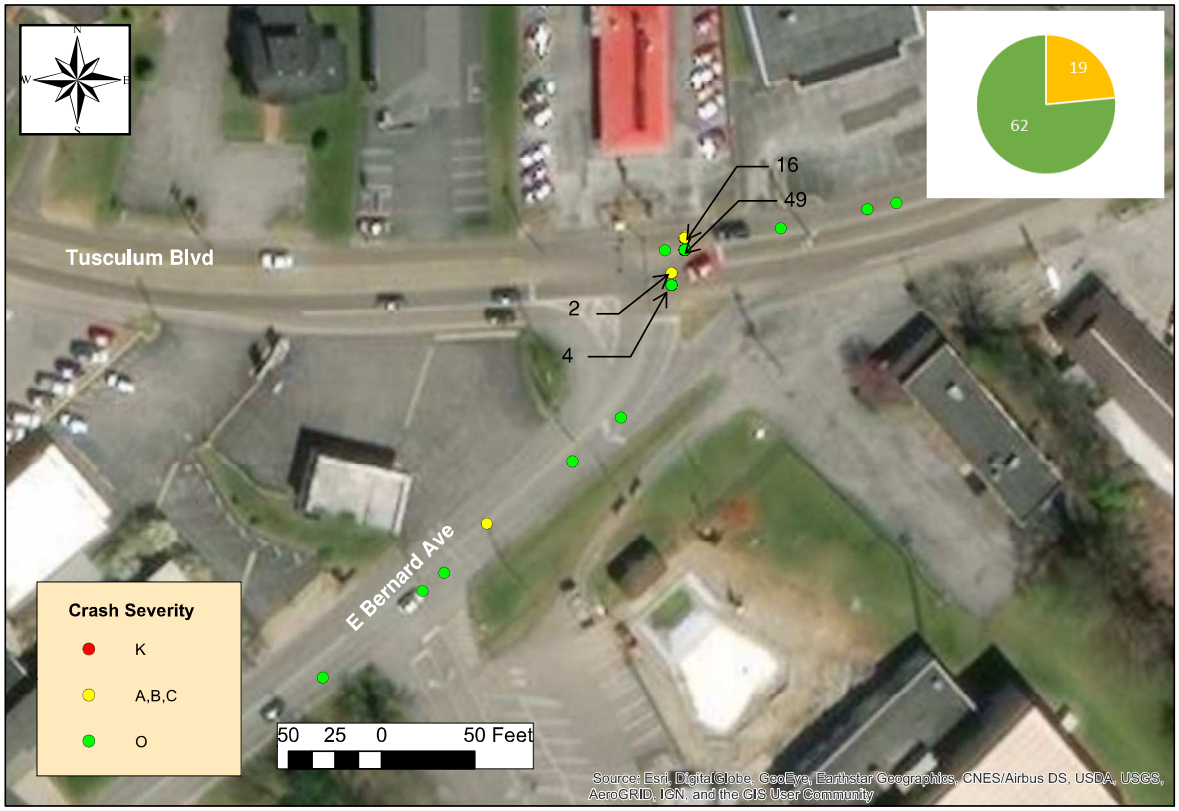


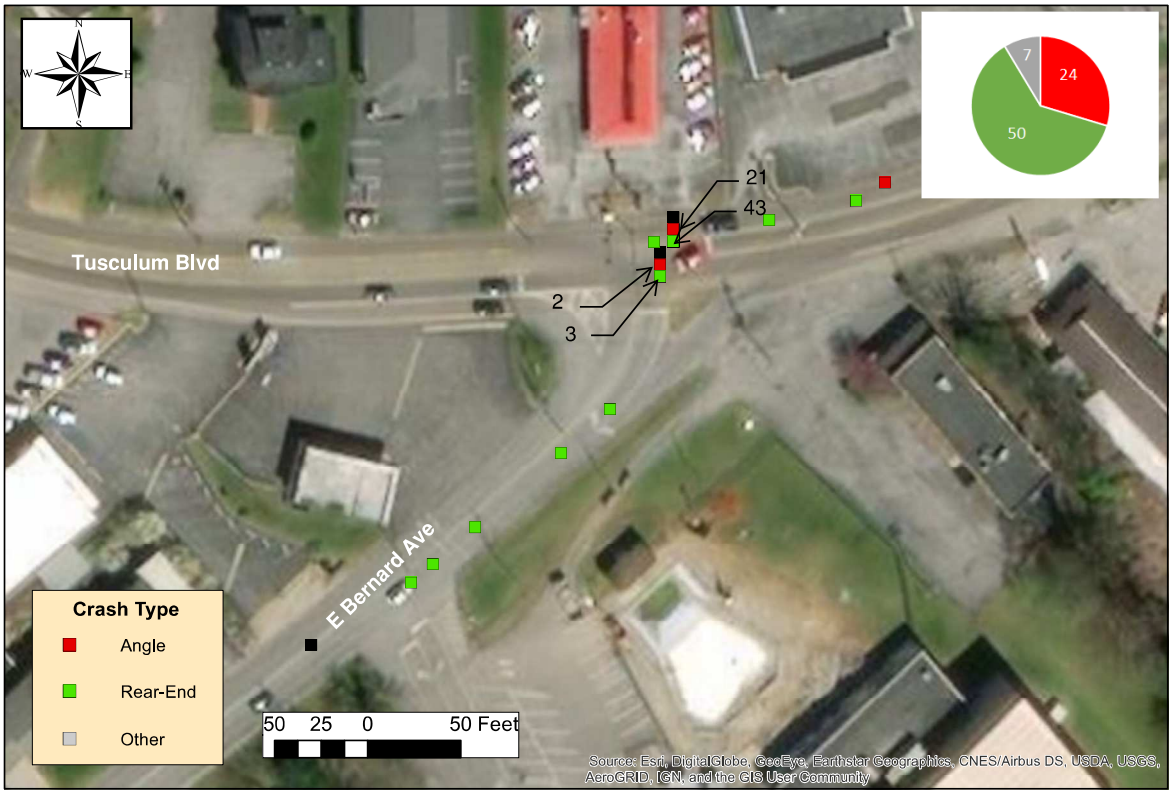


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

E Bernard Ave and Tusculum Blvd

Crashes from Jan 2014 through Dec 2018

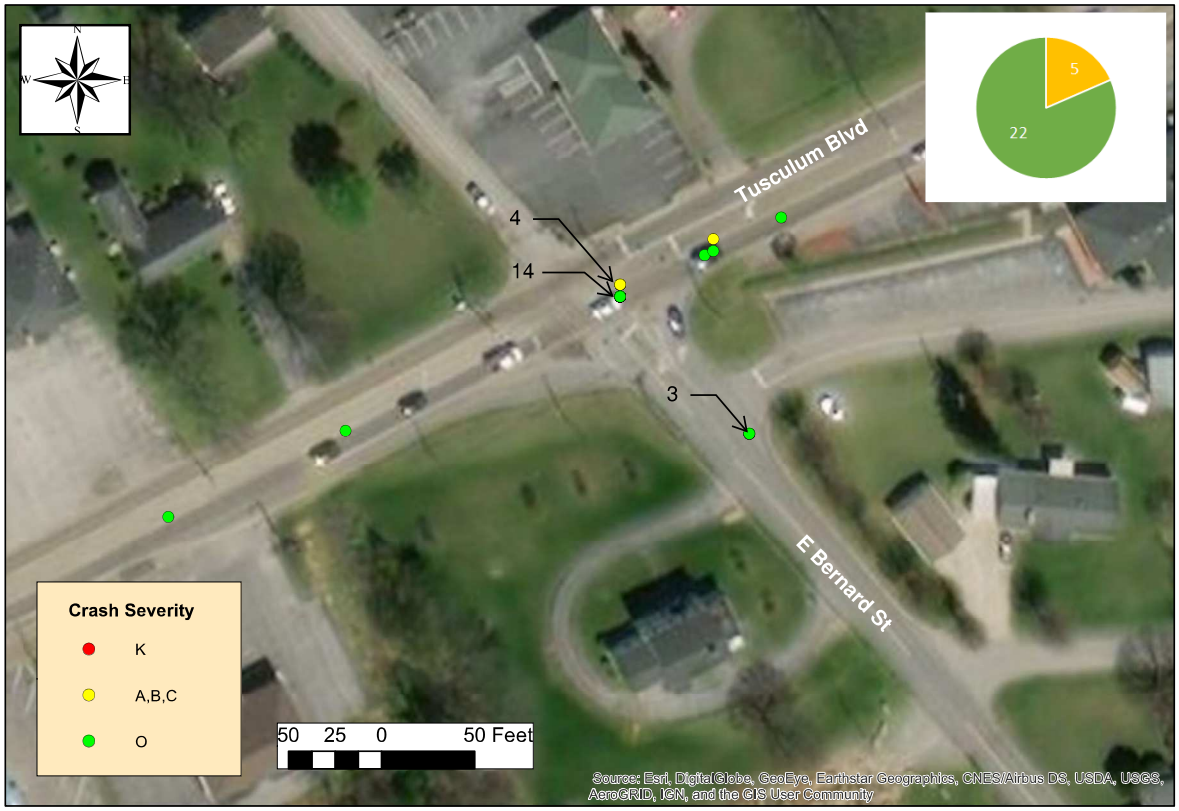


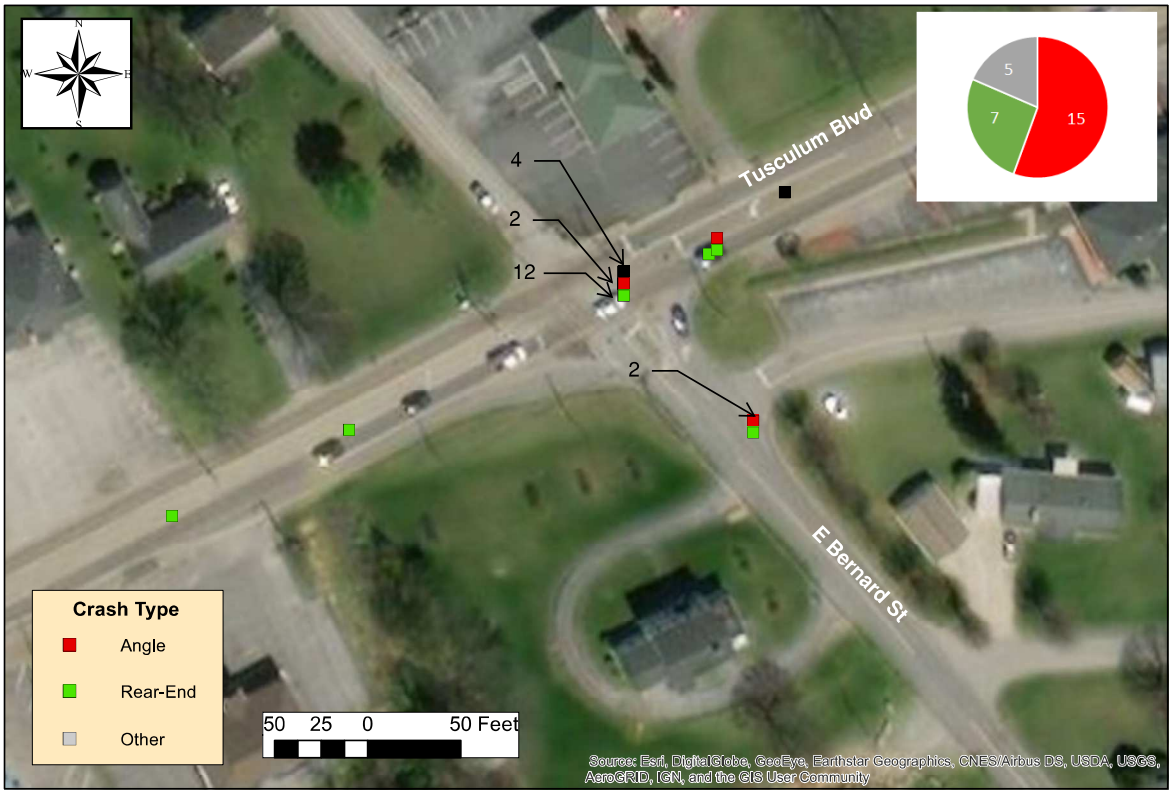


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Mt Bethel Rd and Tusculum Blvd

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Hillcrest Dr and Tusculum Blvd

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Justis Dr, Old Tusculum Rd and Tusculum Blvd

Crashes from Jan 2014 through Dec 2018



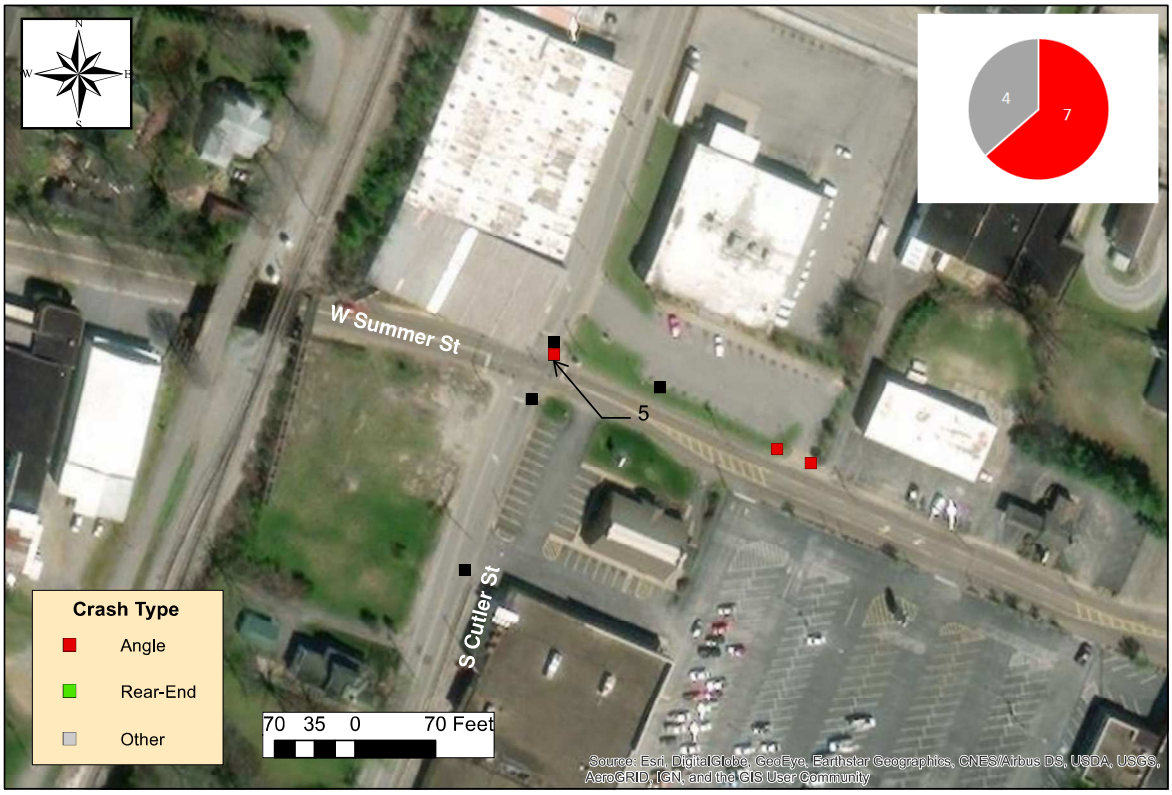


CRASH SEVERITY KEY
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C- Suspected Minor Injury
O- Property Damage Only

W Summer and S Cutler St

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
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B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

W Summer St and S Irish St

Crashes from Jan 2014 through Dec 2018

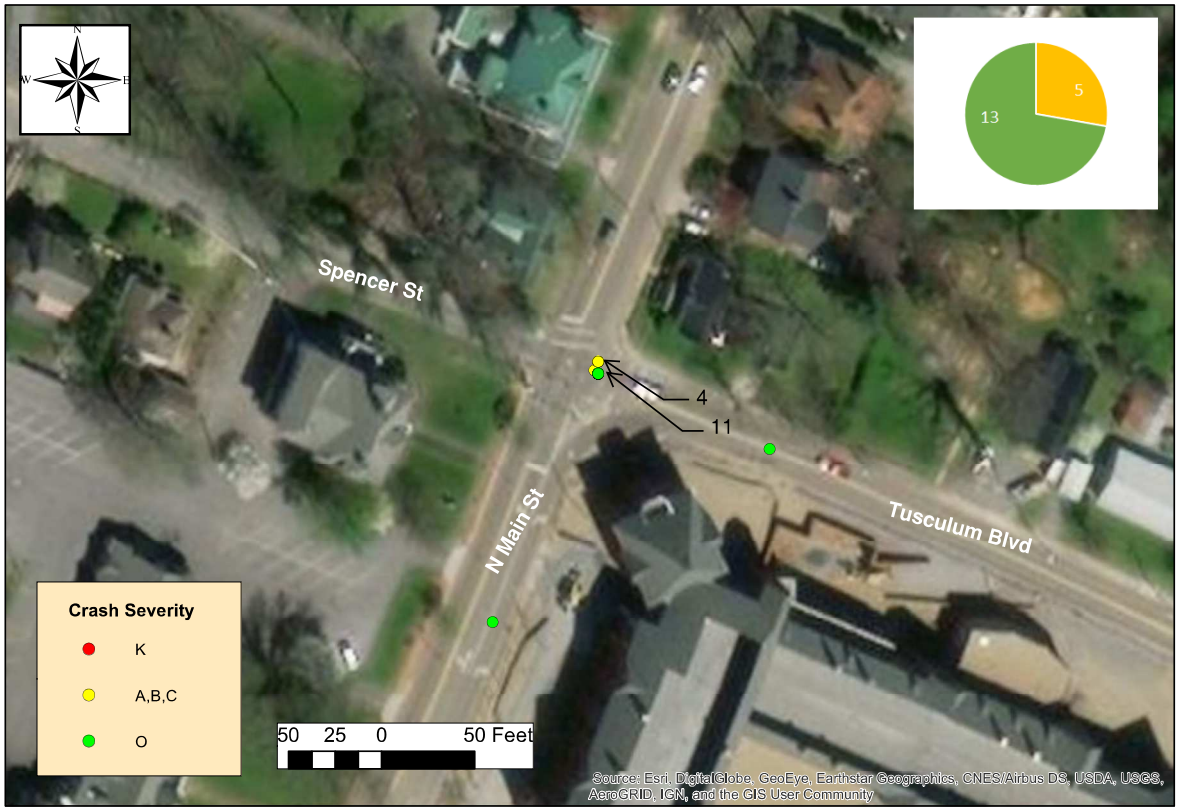


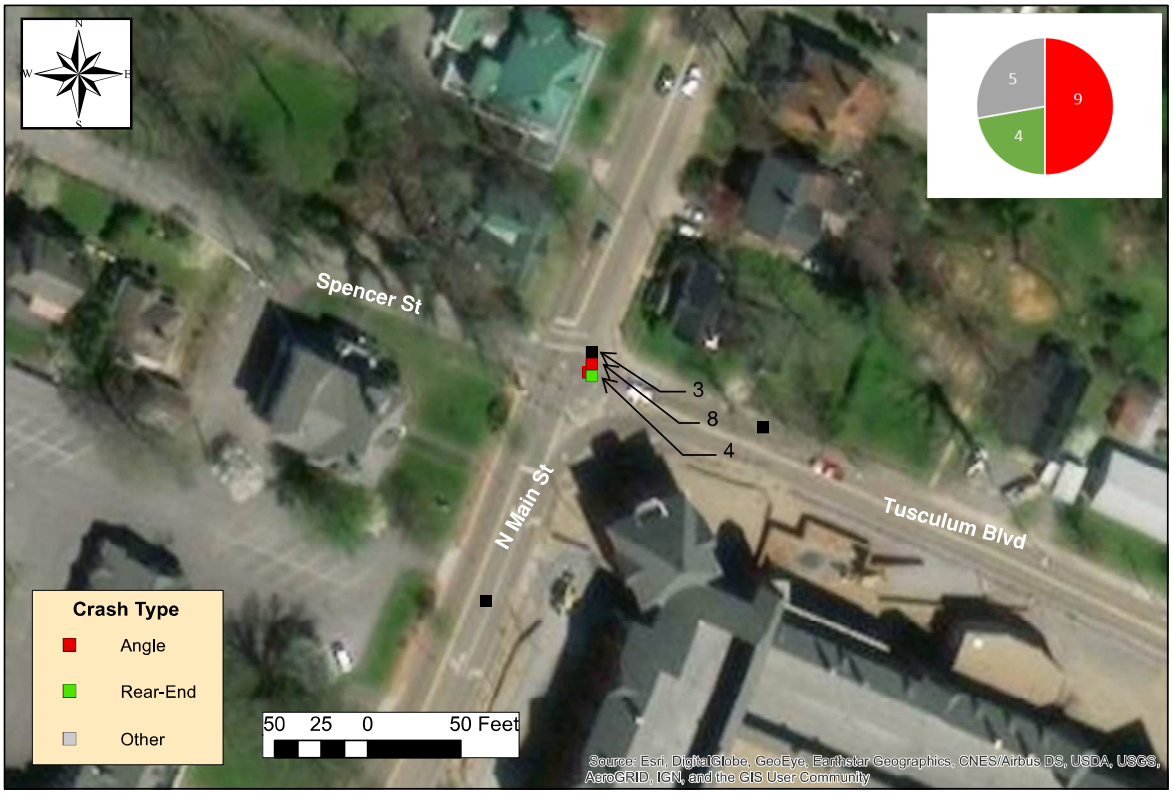


CRASH SEVERITY KEY
K- Fatal
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B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

N Main St, Spencer St and Tusculum Blvd

Crashes from Jan 2014 through Dec 2018

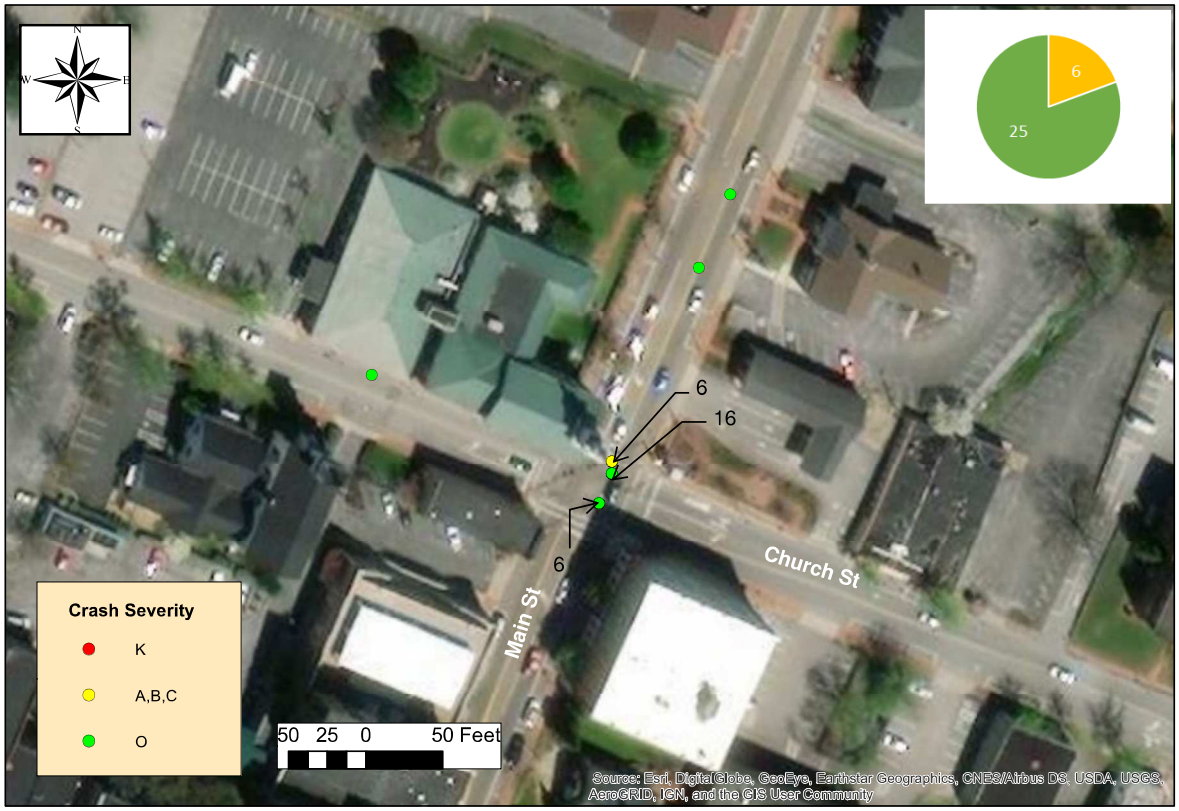


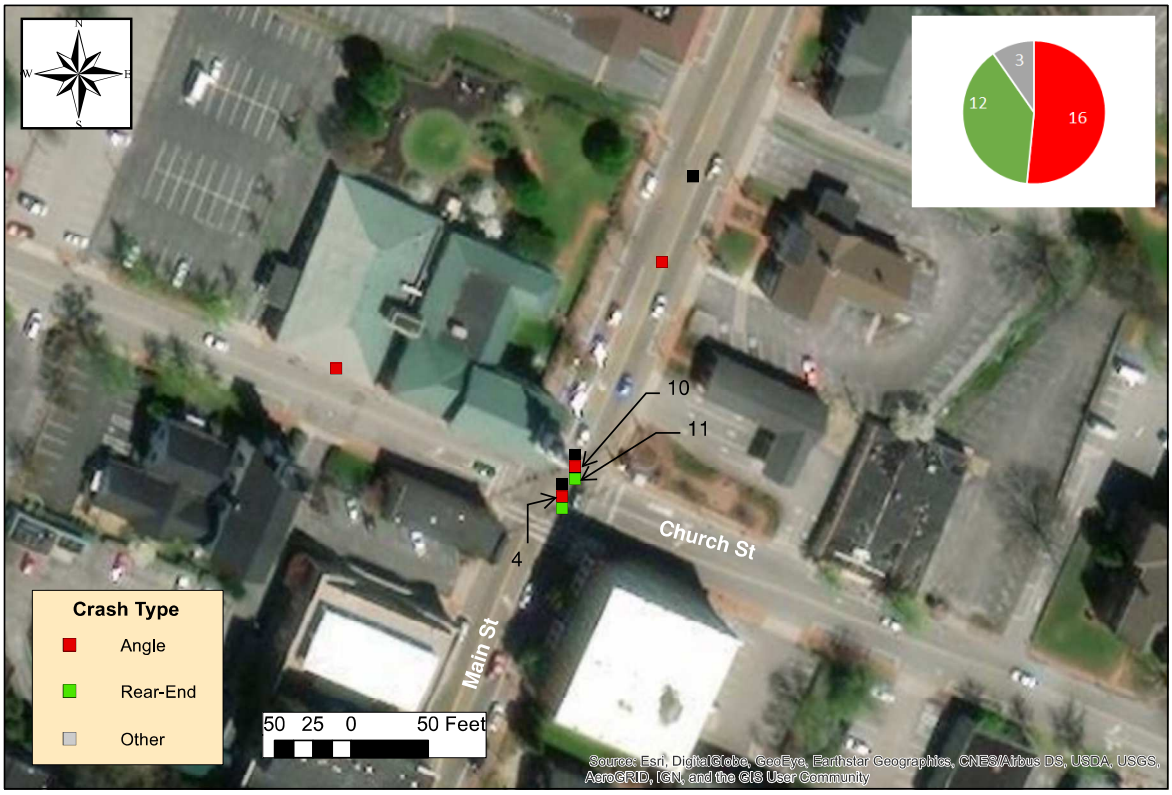


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Church St and Main St

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Depot St and Main St

Crashes from Jan 2014 through Dec 2018



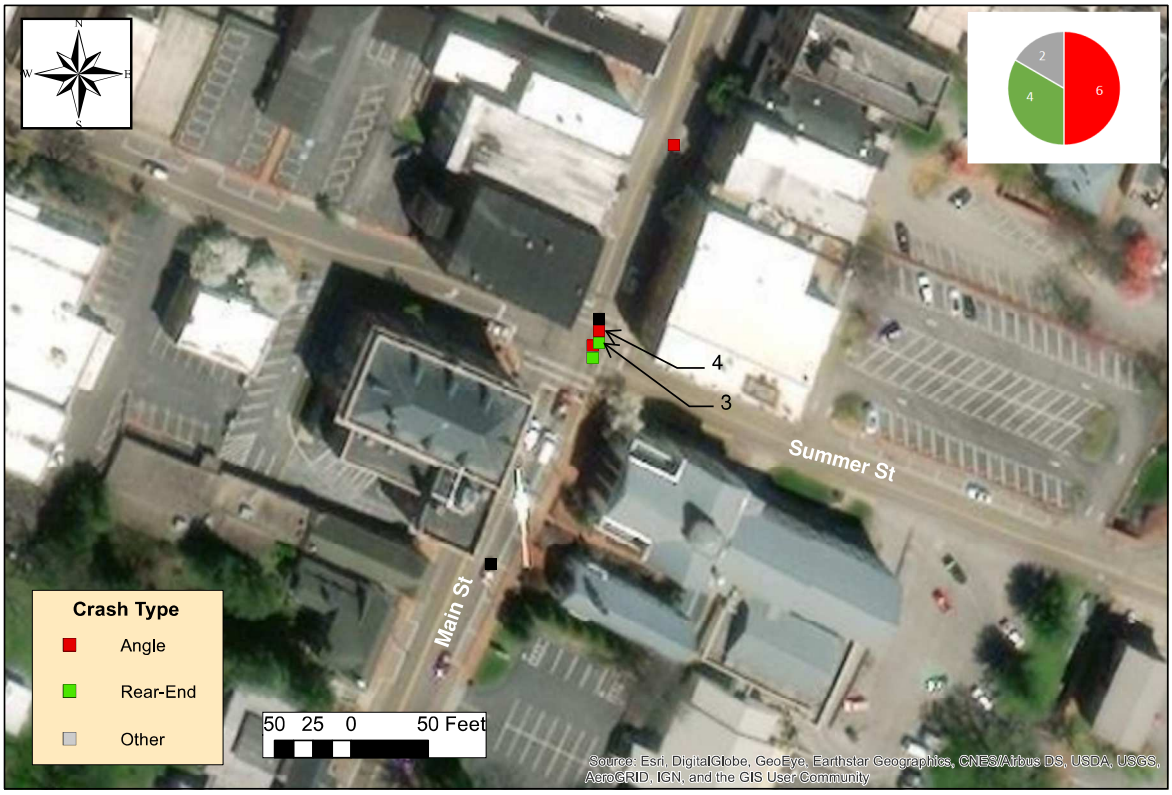


CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Summer St and Main St

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

Main St and McKee St

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

E Church St and N College St

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

College St and McKee St

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
K- Fatal
A- Incapacitating Injury
B- Non- Incapacitating Injury
C- Suspected Minor Injury
O- Property Damage Only

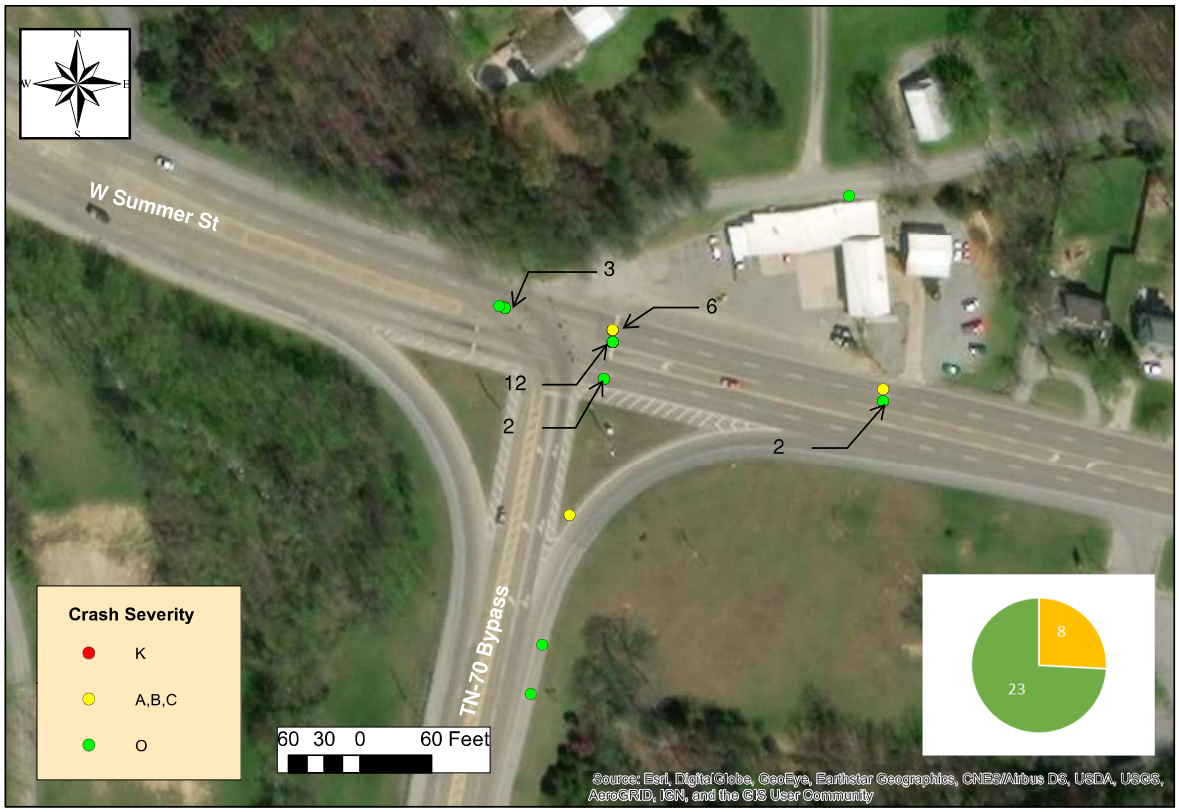
Mckee St and Bernard Ave

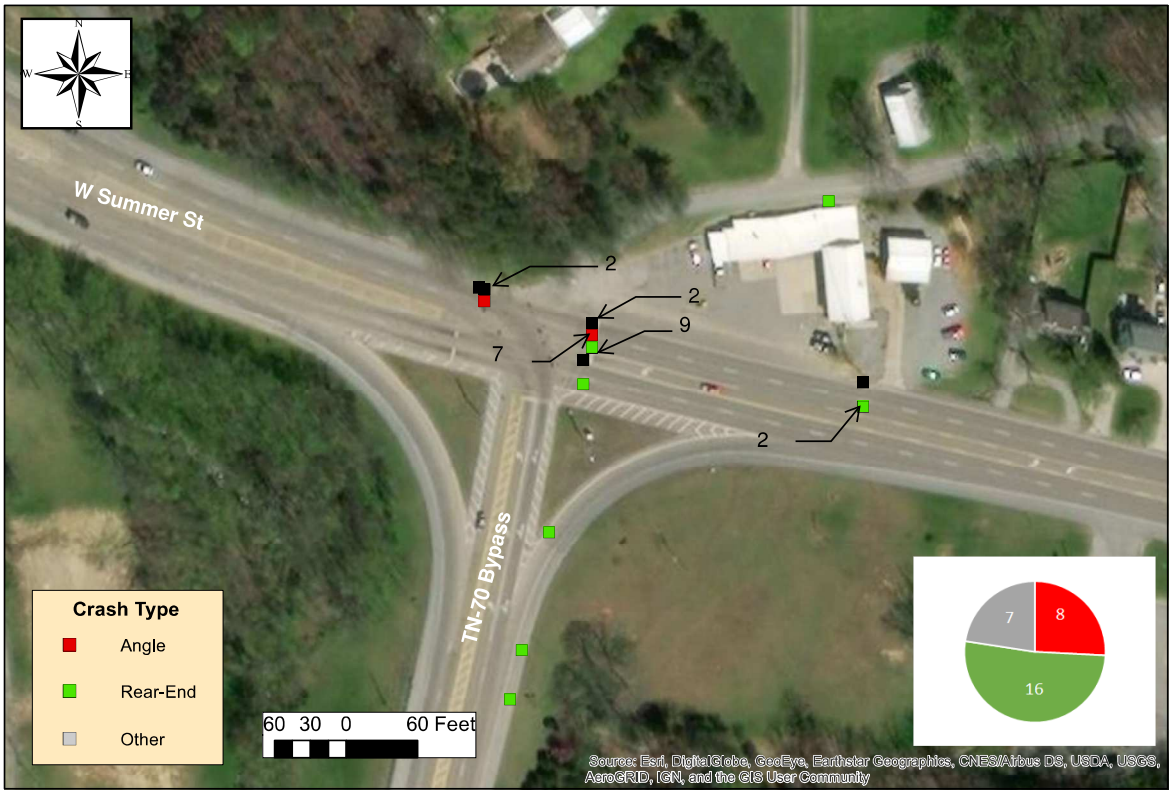




W Summer and TN-70 Bypass

Crashes from Jan 2014 through Dec 2018

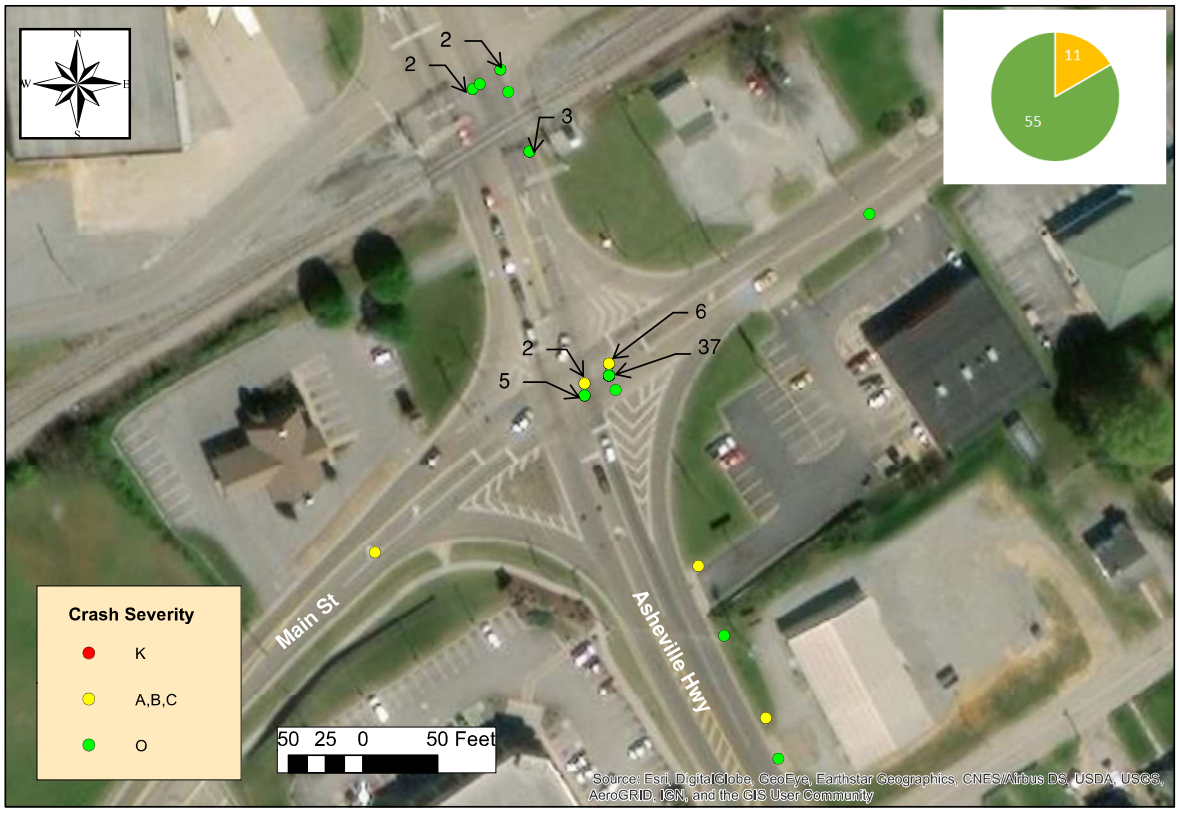


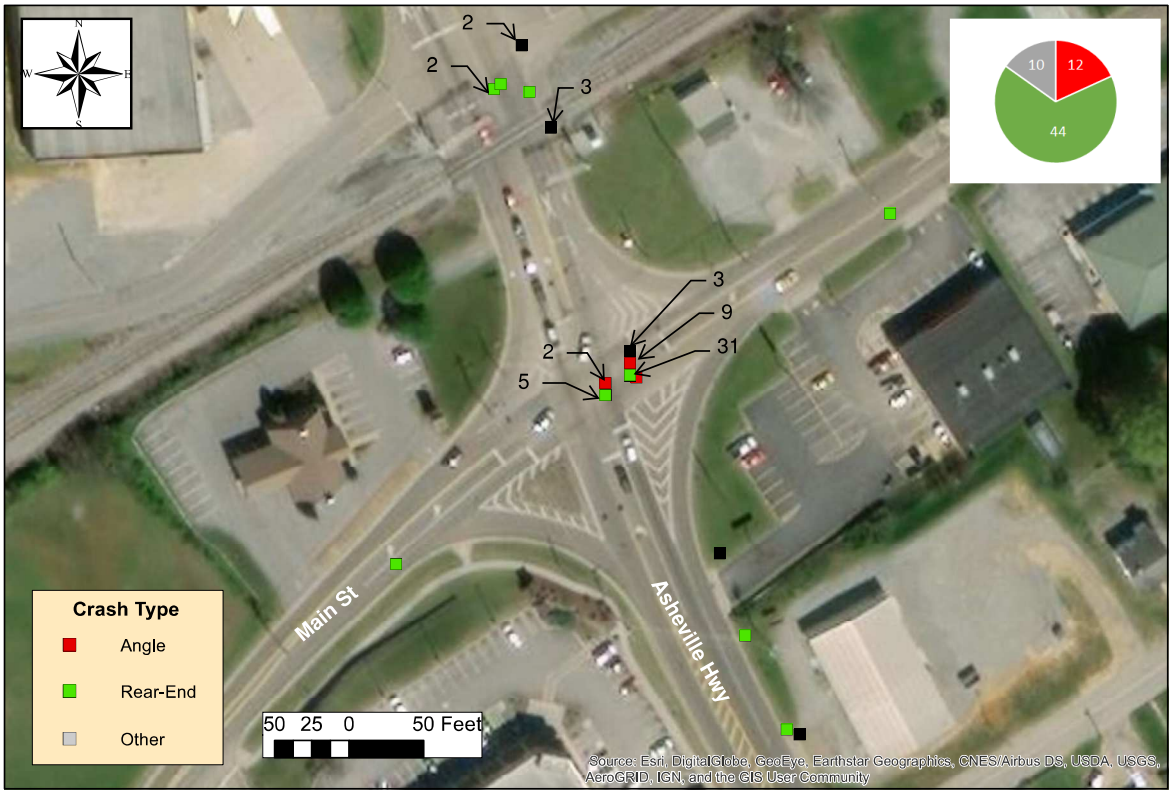


CRASH SEVERITY KEY
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C- Suspected Minor Injury
O- Property Damage Only

Main St and Asheville Hwy

Crashes from Jan 2014 through Dec 2018

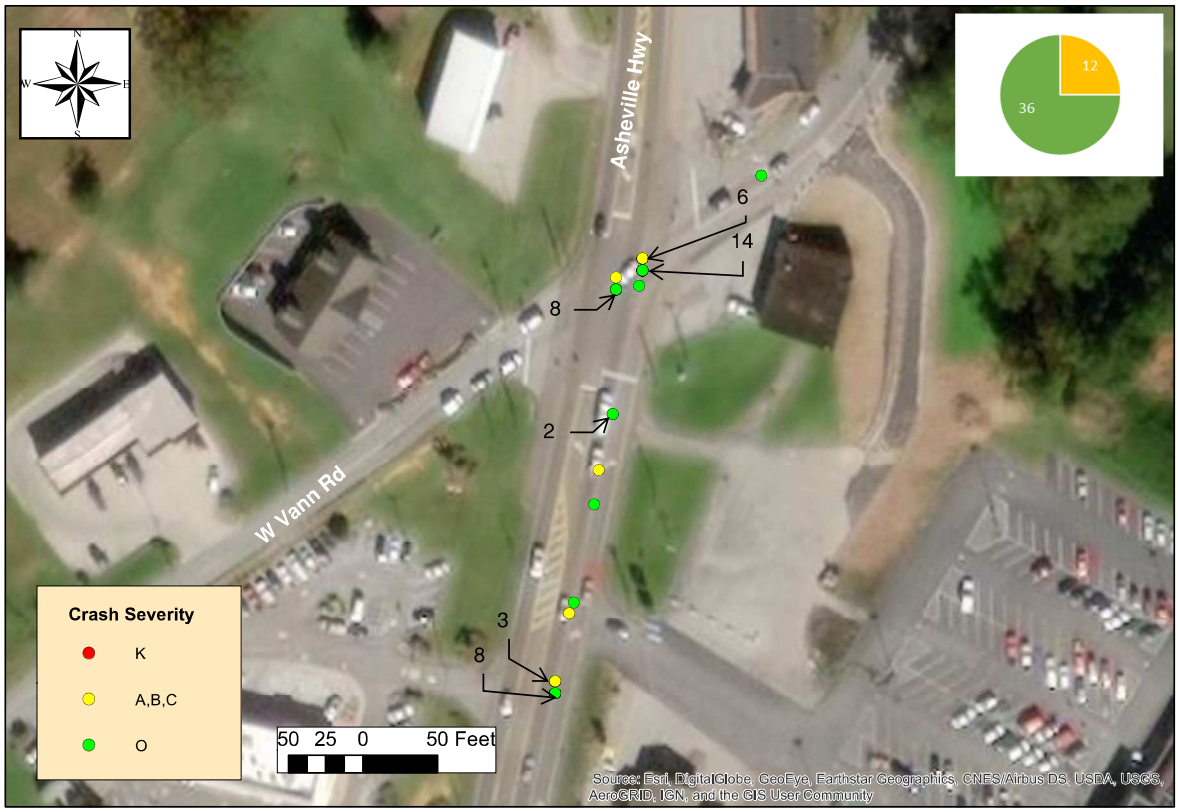


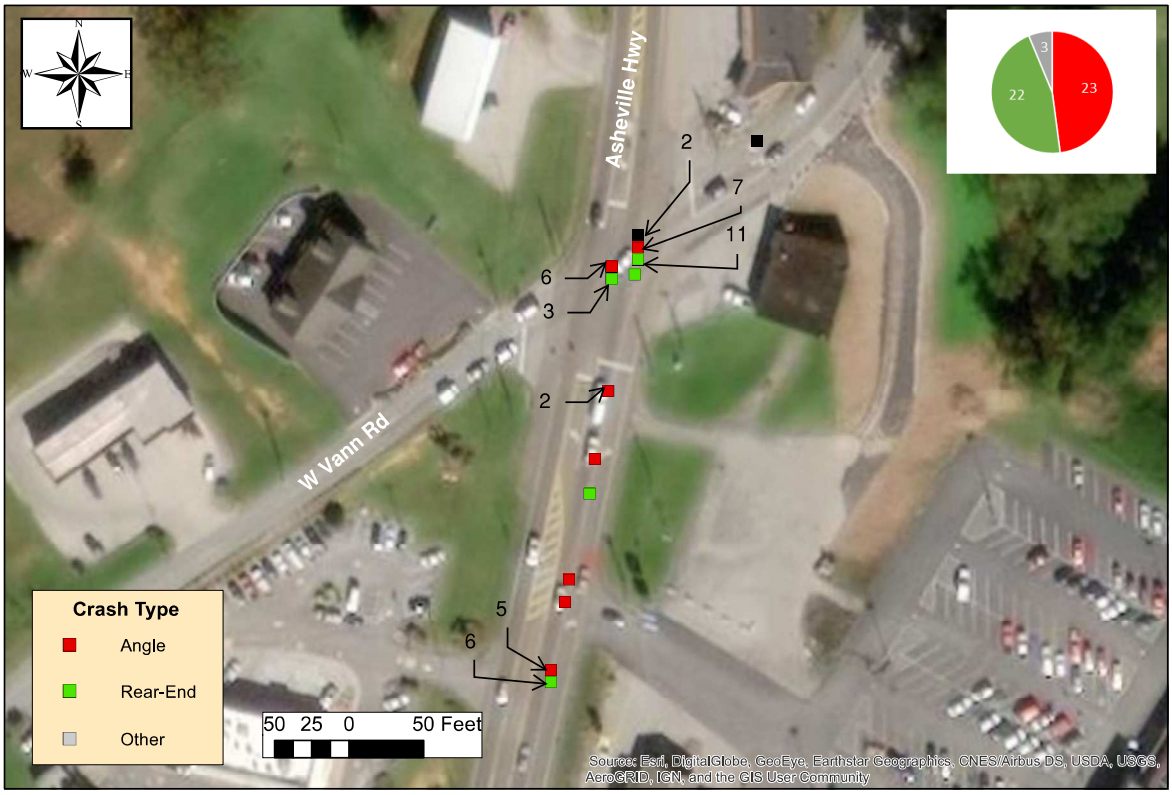


CRASH SEVERITY KEY
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C- Suspected Minor Injury
O- Property Damage Only

W Vann Rd and Asheville Hwy

Crashes from Jan 2014 through Dec 2018

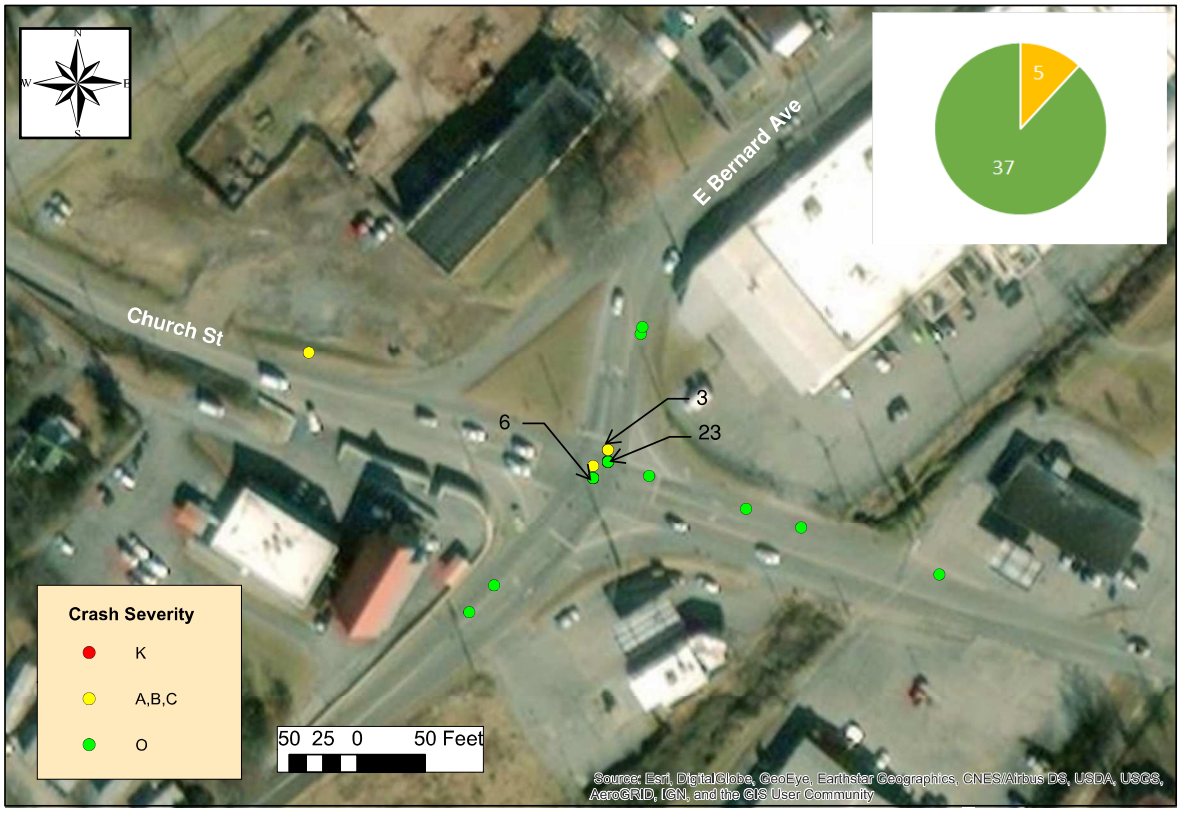


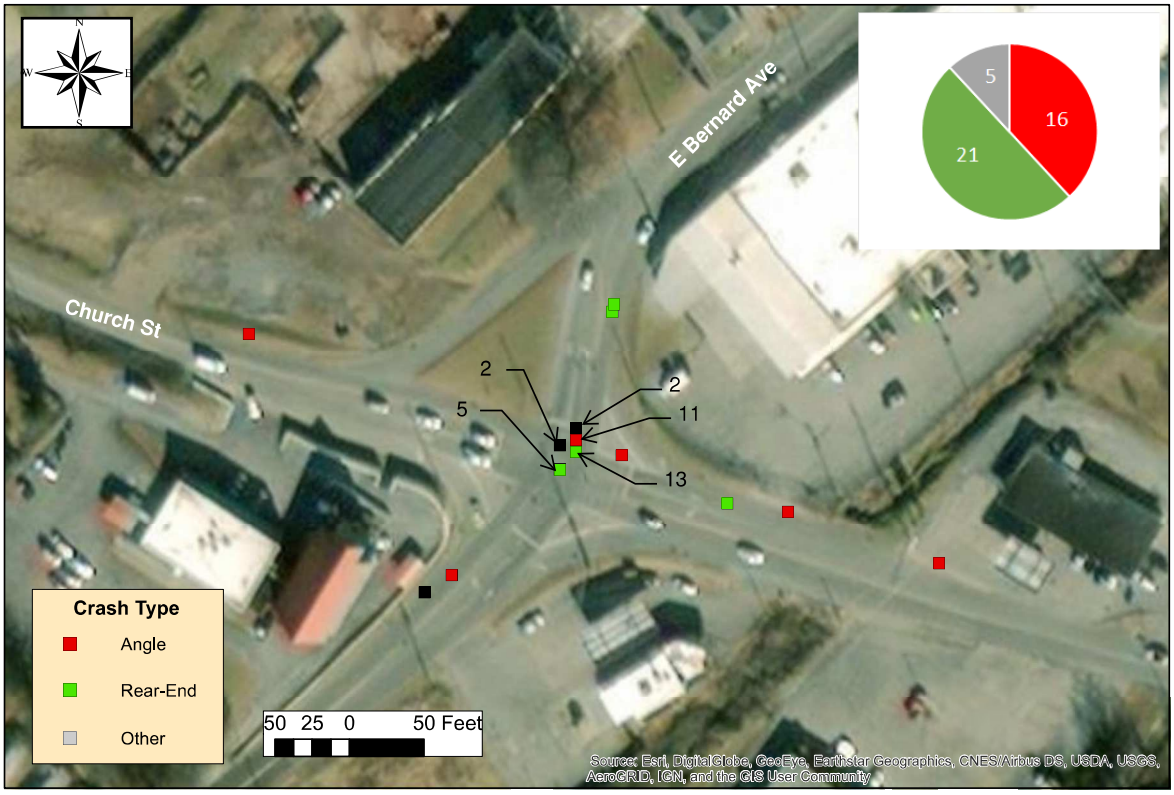


CRASH SEVERITY KEY
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O- Property Damage Only

Church St and Bernard Ave

Crashes from Jan 2014 through Dec 2018





CRASH SEVERITY KEY
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A- Incapacitating Injury
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TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX E

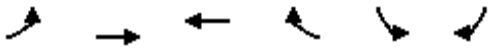
Signal System Intersection Analyses
(Synchro Reports)

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX E

Signal System Intersection Analyses
(Synchro Reports)

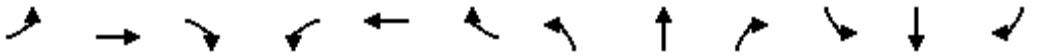
CURRENT OPERATIONS
AM PEAK HOUR ANALYSIS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	86	1056	843	3	18	120
Future Volume (vph)	86	1056	843	3	18	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.5	6.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3535		1770	1583
Flt Permitted	0.27	1.00	1.00		0.95	1.00
Satd. Flow (perm)	504	3539	3535		1770	1583
Peak-hour factor, PHF	0.83	0.81	0.85	0.38	0.56	0.81
Adj. Flow (vph)	104	1304	992	8	32	148
RTOR Reduction (vph)	0	0	0	0	0	132
Lane Group Flow (vph)	104	1304	1000	0	32	16
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6					4
Actuated Green, G (s)	60.8	55.3	60.4		10.4	10.4
Effective Green, g (s)	60.8	55.3	60.4		10.4	10.4
Actuated g/C Ratio	0.64	0.58	0.64		0.11	0.11
Clearance Time (s)	6.0	6.0	6.0		6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	396	2064	2252		194	173
v/s Ratio Prot	c0.02	c0.37	c0.28		c0.02	
v/s Ratio Perm	0.15					0.01
v/c Ratio	0.26	0.63	0.44		0.16	0.09
Uniform Delay, d1	6.5	13.0	8.7		38.3	38.0
Progression Factor	0.52	0.31	1.00		1.00	1.00
Incremental Delay, d2	0.3	0.5	0.1		0.4	0.2
Delay (s)	3.7	4.6	8.8		38.7	38.2
Level of Service	A	A	A		D	D
Approach Delay (s)		4.5	8.8		38.3	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	94.8	Sum of lost time (s)	18.5
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	833	26	54	695	31	39	53	46	28	31	135
Future Volume (vph)	177	833	26	54	695	31	39	53	46	28	31	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0	5.5	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1715		1770	1863	1583
Flt Permitted	0.24	1.00	1.00	0.30	1.00	1.00	0.73	1.00		0.67	1.00	1.00
Satd. Flow (perm)	456	3539	1583	554	3539	1583	1357	1715		1248	1863	1583
Peak-hour factor, PHF	0.76	0.89	0.72	0.90	0.86	0.70	0.81	0.83	0.64	0.78	0.70	0.66
Adj. Flow (vph)	233	936	36	60	808	44	48	64	72	36	44	205
RTOR Reduction (vph)	0	0	17	0	0	25	0	55	0	0	0	175
Lane Group Flow (vph)	233	936	19	60	808	19	48	81	0	36	44	30
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	40.6	32.4	32.4	31.2	27.7	27.7	9.3	9.3		9.3	9.3	9.3
Effective Green, g (s)	40.6	32.4	32.4	31.2	27.7	27.7	9.3	9.3		9.3	9.3	9.3
Actuated g/C Ratio	0.65	0.52	0.52	0.50	0.44	0.44	0.15	0.15		0.15	0.15	0.15
Clearance Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Vehicle Extension (s)	2.5	5.0	5.0	2.5	5.0	5.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	467	1828	818	343	1563	699	201	254		185	276	234
v/s Ratio Prot	c0.07	c0.26		0.01	0.23			c0.05			0.02	
v/s Ratio Perm	0.26		0.01	0.08		0.01	0.04			0.03		0.02
v/c Ratio	0.50	0.51	0.02	0.17	0.52	0.03	0.24	0.32		0.19	0.16	0.13
Uniform Delay, d1	5.6	10.0	7.4	8.2	12.7	9.9	23.6	23.9		23.4	23.3	23.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	0.5	0.0	0.2	0.6	0.0	0.6	0.7		0.5	0.3	0.3
Delay (s)	6.2	10.4	7.4	8.4	13.2	9.9	24.2	24.6		23.9	23.6	23.4
Level of Service	A	B	A	A	B	A	C	C		C	C	C
Approach Delay (s)		9.5			12.8			24.5			23.5	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	17.5
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

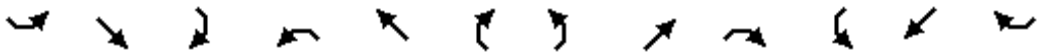
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	738	152	65	784	70	86
Future Volume (vph)	738	152	65	784	70	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	5.5	7.5	9.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	1.00	1.00	0.95	1.00	0.98	
Satd. Flow (prot)	3539	1583	1770	3539	3229	
Flt Permitted	1.00	1.00	0.28	1.00	0.98	
Satd. Flow (perm)	3539	1583	525	3539	3229	
Peak-hour factor, PHF	0.87	0.79	0.68	0.82	0.83	0.72
Adj. Flow (vph)	848	192	96	956	84	119
RTOR Reduction (vph)	0	80	0	0	110	0
Lane Group Flow (vph)	848	112	96	956	93	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	6		5	2	3	
Permitted Phases		6	2			
Actuated Green, G (s)	70.0	70.0	79.7	72.2	8.9	
Effective Green, g (s)	70.0	70.0	79.7	72.2	8.9	
Actuated g/C Ratio	0.58	0.58	0.66	0.60	0.07	
Clearance Time (s)	7.5	7.5	5.5	7.5	9.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2064	923	426	2129	239	
v/s Ratio Prot	0.24		c0.01	c0.27	c0.03	
v/s Ratio Perm		0.07	0.14			
v/c Ratio	0.41	0.12	0.23	0.45	0.39	
Uniform Delay, d1	13.7	11.2	7.8	13.0	53.0	
Progression Factor	0.19	0.02	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.3	0.3	0.7	1.0	
Delay (s)	3.2	0.5	8.0	13.7	54.0	
Level of Service	A	A	A	B	D	
Approach Delay (s)	2.7			13.2	54.0	
Approach LOS	A			B	D	

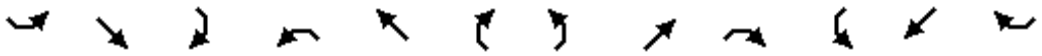
Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	5	26	237	7	56	29	665	145	54	819	12
Future Volume (vph)	10	5	26	237	7	56	29	665	145	54	819	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1761	1853	1575	1770	3539	1583	1770	3539	1583
Flt Permitted	0.85	1.00	1.00	0.37	1.00	1.00	0.14	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)	1585	1863	1583	693	1853	1575	259	3539	1583	553	3539	1583
Peak-hour factor, PHF	0.50	0.42	0.81	0.91	0.35	0.88	0.66	0.93	0.82	0.75	0.76	0.33
Adj. Flow (vph)	20	12	32	260	20	64	44	715	177	72	1078	36
RTOR Reduction (vph)	0	0	30	0	0	51	0	0	106	0	0	21
Lane Group Flow (vph)	20	12	2	260	20	13	44	715	71	72	1078	15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Actuated Green, G (s)	6.9	4.7	4.7	24.6	16.4	16.4	35.0	31.7	31.7	36.0	32.2	32.2
Effective Green, g (s)	6.9	4.7	4.7	24.6	16.4	16.4	35.0	31.7	31.7	36.0	32.2	32.2
Actuated g/C Ratio	0.09	0.06	0.06	0.31	0.21	0.21	0.44	0.40	0.40	0.46	0.41	0.41
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	143	110	94	403	384	326	177	1418	634	310	1440	644
v/s Ratio Prot	0.00	0.01		c0.11	0.01		0.01	0.20		c0.01	c0.30	
v/s Ratio Perm	0.01		0.00	c0.09		0.01	0.10		0.04	0.09		0.01
v/c Ratio	0.14	0.11	0.02	0.65	0.05	0.04	0.25	0.50	0.11	0.23	0.75	0.02
Uniform Delay, d1	33.3	35.2	35.0	22.3	25.1	25.1	14.2	17.8	14.9	12.6	20.0	14.0
Progression 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
Incremental Delay, d2	0.4	0.4	0.1	3.5	0.1	0.1	0.7	0.3	0.1	0.4	2.2	0.0
Delay (s)	33.8	35.7	35.1	25.8	25.2	25.1	14.9	18.1	14.9	13.0	22.2	14.0
Level of Service	C	D	D	C	C	C	B	B	B	B	C	B
Approach Delay (s)		34.8			25.7			17.3			21.4	
Approach LOS		C			C			B			C	

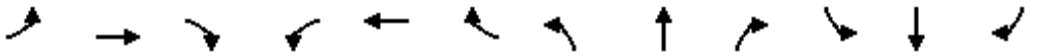
Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	25.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	74	22	19	36	33	21	25	687	19	28	836	118
Future Volume (vph)	74	22	19	36	33	21	25	687	19	28	836	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.97		1.00	0.99		1.00	0.98	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1759			1772		1770	3520		1770	3459	
Flt Permitted		0.79			0.85		0.12	1.00		0.33	1.00	
Satd. Flow (perm)		1434			1533		231	3520		616	3459	
Peak-hour factor, PHF	0.84	0.69	0.59	0.75	0.59	0.66	0.62	0.91	0.68	0.78	0.77	0.61
Adj. Flow (vph)	88	32	32	48	56	32	40	755	28	36	1086	193
RTOR Reduction (vph)	0	12	0	0	13	0	0	3	0	0	18	0
Lane Group Flow (vph)	0	140	0	0	123	0	40	780	0	36	1261	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)		11.0			11.0		36.3	33.2		34.3	32.2	
Effective Green, g (s)		11.0			11.0		36.3	33.2		34.3	32.2	
Actuated g/C Ratio		0.17			0.17		0.56	0.52		0.53	0.50	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		245			262		204	1817		366	1732	
v/s Ratio Prot							c0.01	0.22		0.00	c0.36	
v/s Ratio Perm		c0.10			0.08		0.10			0.05		
v/c Ratio		0.57			0.47		0.20	0.43		0.10	0.73	
Uniform Delay, d1		24.5			24.0		8.0	9.7		7.2	12.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.2			1.3		0.5	0.2		0.1	1.6	
Delay (s)		27.7			25.3		8.4	9.8		7.3	14.2	
Level of Service		C			C		A	A		A	B	
Approach Delay (s)		27.7			25.3			9.8			14.0	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	64.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	614	30	1	931	21	19	7	1	15	4	79
Future Volume (vph)	73	614	30	1	931	21	19	7	1	15	4	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		6.5	6.5	6.5		6.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.99	1.00
Satd. Flow (prot)	1770	3509		1770	3539	1583		1783		1681	1748	1583
Flt Permitted	0.09	1.00		0.33	1.00	1.00		0.83		0.95	0.99	1.00
Satd. Flow (perm)	171	3509		623	3539	1583		1535		1681	1748	1583
Peak-hour factor, PHF	0.73	0.77	0.62	0.25	0.75	0.66	0.68	0.58	0.25	0.75	0.33	0.79
Adj. Flow (vph)	100	797	48	4	1241	32	28	12	4	20	12	100
RTOR Reduction (vph)	0	4	0	0	0	14	0	3	0	0	0	95
Lane Group Flow (vph)	100	841	0	4	1241	18	0	41	0	16	16	6
Turn Type	pm+pt	NA		Perm	NA	pt+ov	Perm	NA		custom	NA	Perm
Protected Phases	5	2			6	6 3		4		3	3	
Permitted Phases	2			6			4			3		3
Actuated Green, G (s)	57.7	57.7		45.4	45.4	57.4		20.3		5.5	5.5	5.5
Effective Green, g (s)	57.7	57.7		45.4	45.4	57.4		20.3		5.5	5.5	5.5
Actuated g/C Ratio	0.58	0.58		0.45	0.45	0.57		0.20		0.06	0.06	0.06
Clearance Time (s)	5.5	6.5		6.5	6.5			6.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	207	2024		282	1606	908		311		92	96	87
v/s Ratio Prot	0.03	c0.24			c0.35	0.01				c0.01	0.01	
v/s Ratio Perm	0.24			0.01				c0.03				0.00
v/c Ratio	0.48	0.42		0.01	0.77	0.02		0.13		0.17	0.17	0.06
Uniform Delay, d1	15.4	11.8		15.0	23.0	9.2		32.6		45.1	45.1	44.8
Progression Factor	1.00	1.00		0.63	1.01	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8	0.6		0.0	2.2	0.0		0.9		0.9	0.8	0.3
Delay (s)	17.2	12.4		9.4	25.4	9.2		33.5		46.0	45.9	45.1
Level of Service	B	B		A	C	A		C		D	D	D
Approach Delay (s)		12.9			25.0			33.5			45.3	
Approach LOS		B			C			C			D	

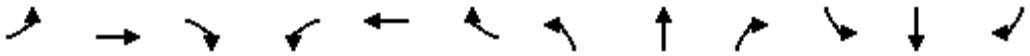
Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	571	111	161	744	272	191
Future Volume (vph)	571	111	161	744	272	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.38	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	712	3539	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	621	121	175	809	296	208
RTOR Reduction (vph)	0	73	0	0	0	85
Lane Group Flow (vph)	621	48	175	809	296	123
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	1415	633	284	1415	1373	633
v/s Ratio Prot	0.18			0.23	c0.09	
v/s Ratio Perm		0.03	c0.25			0.08
v/c Ratio	0.44	0.08	0.62	0.57	0.22	0.19
Uniform Delay, d1	9.8	8.4	10.7	10.5	8.9	8.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.2	9.6	1.7	0.4	0.7
Delay (s)	10.8	8.6	20.4	12.2	9.2	9.5
Level of Service	B	A	C	B	A	A
Approach Delay (s)	10.5			13.6	9.3	
Approach LOS	B			B	A	

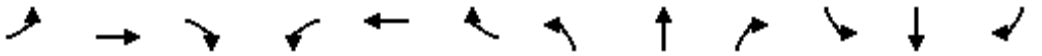
Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	260	518	37	135	0	558	10	57	3	9	11
Future Volume (vph)	5	260	518	37	135	0	558	10	57	3	9	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	4.0	5.0		5.0	5.0	5.0		5.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)		3535	1583	1770	3539		1681	1689	1583		1748	
Flt Permitted		0.95	1.00	0.51	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (perm)		3361	1583	950	3539		1681	1689	1583		1748	
Peak-hour factor, PHF	0.62	0.79	0.93	0.77	0.82	0.92	0.90	0.62	0.75	0.38	0.56	0.73
Adj. Flow (vph)	8	329	557	48	165	0	620	16	76	8	16	15
RTOR Reduction (vph)	0	0	233	0	0	0	0	0	68	0	15	0
Lane Group Flow (vph)	0	337	324	48	165	0	316	320	8	0	24	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases		2		1	6		3	3		4	4	
Permitted Phases	2		2	6					3			
Actuated Green, G (s)		52.2	52.2	61.9	61.9		10.0	10.0	10.0		2.9	
Effective Green, g (s)		52.2	52.2	61.9	61.9		10.0	10.0	10.0		2.9	
Actuated g/C Ratio		0.58	0.58	0.69	0.69		0.11	0.11	0.11		0.03	
Clearance Time (s)		5.0	5.0	4.0	5.0		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		1953	920	706	2439		187	188	176		56	
v/s Ratio Prot				0.00	c0.05		0.19	c0.19			c0.01	
v/s Ratio Perm		0.10	c0.20	0.04					0.01			
v/c Ratio		0.17	0.35	0.07	0.07		1.69	1.70	0.05		0.44	
Uniform Delay, d1		8.7	9.9	4.5	4.5		39.9	39.9	35.6		42.6	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2		0.2	1.1	0.0	0.1		332.4	337.7	0.1		5.4	
Delay (s)		8.9	11.0	4.6	4.6		372.3	377.6	35.8		48.0	
Level of Service		A	B	A	A		F	F	D		D	
Approach Delay (s)		10.2			4.6			338.8			48.0	
Approach LOS		B			A			F			D	

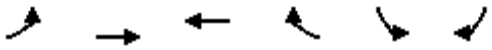
Intersection Summary			
HCM 2000 Control Delay	136.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	137	13	6	189	29	8	111	26	23	65	21
Future Volume (vph)	24	137	13	6	189	29	8	111	26	23	65	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5			5.0			5.0	5.0
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	0.98			0.97			0.98			1.00	0.85
Flt Protected	0.95	1.00			1.00			1.00			0.98	1.00
Satd. Flow (prot)	1770	1831			1811			1640			1834	1583
Flt Permitted	0.37	1.00			0.98			0.98			0.87	1.00
Satd. Flow (perm)	688	1831			1787			1615			1615	1583
Peak-hour factor, PHF	0.75	0.74	0.54	0.56	0.81	0.50	0.50	0.59	0.81	0.48	0.62	0.48
Adj. Flow (vph)	32	185	24	11	233	58	16	188	32	48	105	44
RTOR Reduction (vph)	0	10	0	0	18	0	0	4	0	0	0	16
Lane Group Flow (vph)	32	199	0	0	284	0	0	232	0	0	153	28
Parking (#/hr)							0	0	0			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	18.6	18.6			18.6			50.9			50.9	50.9
Effective Green, g (s)	18.6	18.6			18.6			50.9			50.9	50.9
Actuated g/C Ratio	0.23	0.23			0.23			0.64			0.64	0.64
Clearance Time (s)	5.5	5.5			5.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	159	425			415			1027			1027	1007
v/s Ratio Prot		0.11										
v/s Ratio Perm	0.05				c0.16			c0.14			0.09	0.02
v/c Ratio	0.20	0.47			0.68			0.23			0.15	0.03
Uniform Delay, d1	24.7	26.4			28.0			6.2			5.8	5.4
Progression Factor	0.97	0.97			1.00			1.00			1.00	1.00
Incremental Delay, d2	2.7	3.5			8.8			0.5			0.3	0.1
Delay (s)	26.6	29.2			36.8			6.7			6.2	5.4
Level of Service	C	C			D			A			A	A
Approach Delay (s)		28.9			36.8			6.7			6.0	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	101	110	152	54	57	53
Future Volume (vph)	101	110	152	54	57	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	0.94		0.93	
Flt Protected		0.98	1.00		0.98	
Satd. Flow (prot)		1817	1760		1695	
Flt Permitted		0.72	1.00		0.98	
Satd. Flow (perm)		1339	1760		1695	
Peak-hour factor, PHF	0.77	0.86	0.86	0.44	0.84	0.78
Adj. Flow (vph)	131	128	177	123	68	68
RTOR Reduction (vph)	0	0	23	0	57	0
Lane Group Flow (vph)	0	259	277	0	79	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)		32.1	32.1		8.1	
Effective Green, g (s)		32.1	32.1		8.1	
Actuated g/C Ratio		0.61	0.61		0.16	
Clearance Time (s)		6.0	6.0		6.0	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		823	1082		263	
v/s Ratio Prot			0.16		c0.05	
v/s Ratio Perm		c0.19				
v/c Ratio		0.31	0.26		0.30	
Uniform Delay, d1		4.8	4.6		19.5	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		0.2	0.6		0.6	
Delay (s)		5.0	5.2		20.2	
Level of Service		A	A		C	
Approach Delay (s)		5.0	5.2		20.2	
Approach LOS		A	A		C	

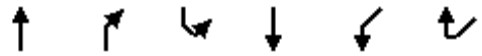
Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	52.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	56	94	42	91	215	93	54	264	82	47	166	113
Future Volume (vph)	56	94	42	91	215	93	54	264	82	47	166	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1749	
Flt Permitted	0.61	1.00	1.00	0.69	1.00	1.00	0.58	1.00	1.00	0.58	1.00	
Satd. Flow (perm)	1129	1863	1583	1287	1863	1583	1072	1863	1583	1088	1749	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	102	46	99	234	101	59	287	89	51	180	123
RTOR Reduction (vph)	0	0	35	0	0	78	0	0	41	0	31	0
Lane Group Flow (vph)	61	102	11	99	234	23	59	287	48	51	272	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	12.4	12.4	12.4	12.4	12.4	12.4	29.1	29.1	29.1	29.1	29.1	
Effective Green, g (s)	12.4	12.4	12.4	12.4	12.4	12.4	29.1	29.1	29.1	29.1	29.1	
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23	0.23	0.54	0.54	0.54	0.54	0.54	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	261	431	366	298	431	366	583	1013	861	591	951	
v/s Ratio Prot		0.05			c0.13			0.15			c0.16	
v/s Ratio Perm	0.05		0.01	0.08		0.01	0.06		0.03	0.05		
v/c Ratio	0.23	0.24	0.03	0.33	0.54	0.06	0.10	0.28	0.06	0.09	0.29	
Uniform Delay, d1	16.7	16.7	15.9	17.1	18.1	16.0	5.9	6.6	5.7	5.8	6.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.3	0.0	0.7	1.4	0.1	0.3	0.7	0.1	0.3	0.8	
Delay (s)	17.2	17.0	15.9	17.8	19.5	16.1	6.2	7.3	5.9	6.1	7.3	
Level of Service	B	B	B	B	B	B	A	A	A	A	A	
Approach Delay (s)		16.8			18.3			6.8			7.2	
Approach LOS		B			B			A			A	

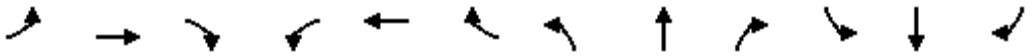
Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



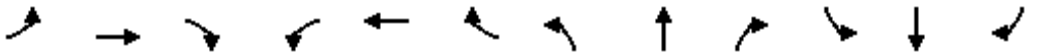
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	148	366	51	98	248	40
Future Volume (vph)	148	366	51	98	248	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.91			1.00	0.99	
Flt Protected	1.00			0.98	0.96	
Satd. Flow (prot)	1702			1826	1758	
Flt Permitted	1.00			0.51	0.96	
Satd. Flow (perm)	1702			955	1758	
Peak-hour factor, PHF	0.65	0.90	0.61	0.77	0.59	0.83
Adj. Flow (vph)	228	407	84	127	420	48
RTOR Reduction (vph)	83	0	0	0	5	0
Lane Group Flow (vph)	552	0	0	211	463	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Actuated Green, G (s)	39.0			39.0	26.0	
Effective Green, g (s)	39.0			39.0	26.0	
Actuated g/C Ratio	0.51			0.51	0.34	
Clearance Time (s)	6.0			6.0	6.0	
Lane Grp Cap (vph)	862			483	593	
v/s Ratio Prot	c0.32				c0.26	
v/s Ratio Perm				0.22		
v/c Ratio	0.64			0.44	0.78	
Uniform Delay, d1	13.9			12.0	22.9	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	3.6			2.9	9.8	
Delay (s)	17.5			14.9	32.7	
Level of Service	B			B	C	
Approach Delay (s)	17.5			14.9	32.7	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	74	17	2	58	6	42	355	7	3	200	57
Future Volume (vph)	55	74	17	2	58	6	42	355	7	3	200	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5		5.0	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96			0.98		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1593	1616			1474		1593	1502		1593	1453	
Flt Permitted	0.95	1.00			1.00		0.46	1.00		0.52	1.00	
Satd. Flow (perm)	1593	1616			1474		777	1502		878	1453	
Peak-hour factor, PHF	0.72	0.84	0.61	0.50	0.93	0.50	0.95	0.90	0.58	0.38	0.91	0.79
Adj. Flow (vph)	76	88	28	4	62	12	44	394	12	8	220	72
RTOR Reduction (vph)	0	16	0	0	8	0	0	1	0	0	12	0
Lane Group Flow (vph)	76	100	0	0	70	0	44	405	0	8	280	0
Parking (#/hr)				0	0	0		0	0		0	0
Turn Type	Split	NA		Split	NA		pm+pt	NA		Perm	NA	
Protected Phases	4	4		3	3		1	6			2	
Permitted Phases							6			2		
Actuated Green, G (s)	11.6	11.6			7.2		44.7	44.7		35.3	35.3	
Effective Green, g (s)	11.6	11.6			7.2		44.7	44.7		35.3	35.3	
Actuated g/C Ratio	0.14	0.14			0.09		0.56	0.56		0.44	0.44	
Clearance Time (s)	5.5	5.5			5.5		5.0	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	234			132		479	839		387	641	
v/s Ratio Prot	0.05	c0.06			c0.05		0.01	c0.27			0.19	
v/s Ratio Perm							0.05			0.01		
v/c Ratio	0.33	0.43			0.53		0.09	0.48		0.02	0.44	
Uniform Delay, d1	30.7	31.2			34.8		8.4	10.7		12.6	15.5	
Progression Factor	0.81	0.78			1.00		0.64	0.89		1.45	1.25	
Incremental Delay, d2	0.8	1.2			3.8		0.1	1.7		0.1	2.1	
Delay (s)	25.7	25.6			38.6		5.4	11.1		18.4	21.5	
Level of Service	C	C			D		A	B		B	C	
Approach Delay (s)		25.7			38.6			10.6			21.4	
Approach LOS		C			D			B			C	

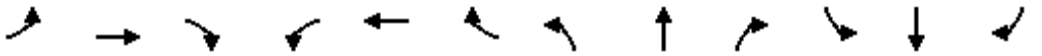
Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	100	7	59	135	41	24	311	67	62	211	53
Future Volume (vph)	58	100	7	59	135	41	24	311	67	62	211	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1835		1770	1798		1770	1813		1770	1792	
Flt Permitted	0.43	1.00		0.68	1.00		0.52	1.00		0.28	1.00	
Satd. Flow (perm)	794	1835		1266	1798		974	1813		521	1792	
Peak-hour factor, PHF	0.81	0.93	0.58	0.82	0.73	0.73	0.55	0.76	0.76	0.74	0.89	0.66
Adj. Flow (vph)	72	108	12	72	185	56	44	409	88	84	237	80
RTOR Reduction (vph)	0	6	0	0	15	0	0	8	0	0	13	0
Lane Group Flow (vph)	72	114	0	72	226	0	44	489	0	84	304	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.7	15.1		20.7	15.1		36.6	32.5		40.0	34.2	
Effective Green, g (s)	20.7	15.1		20.7	15.1		36.6	32.5		40.0	34.2	
Actuated g/C Ratio	0.26	0.19		0.26	0.19		0.46	0.41		0.50	0.43	
Clearance Time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	273	346		362	339		486	736		351	766	
v/s Ratio Prot	c0.02	0.06		0.01	c0.13		0.00	c0.27		c0.02	0.17	
v/s Ratio Perm	0.05			0.04			0.04			0.10		
v/c Ratio	0.26	0.33		0.20	0.67		0.09	0.66		0.24	0.40	
Uniform Delay, d1	23.0	28.1		22.9	30.1		12.1	19.3		11.9	15.8	
Progression Factor	1.00	1.00		0.84	0.94		1.11	1.32		1.09	1.07	
Incremental Delay, d2	0.5	0.6		0.3	4.8		0.1	4.5		0.3	1.4	
Delay (s)	23.6	28.6		19.6	33.1		13.5	30.0		13.2	18.3	
Level of Service	C	C		B	C		B	C		B	B	
Approach Delay (s)		26.7			30.0			28.7			17.2	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	10	6	92	25	13	2	384	167	11	185	1
Future Volume (vph)	3	10	6	92	25	13	2	384	167	11	185	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.98		1.00	0.95		1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1778			1772		1770	1774		1770	1857	
Flt Permitted		0.91			0.77		0.63	1.00		0.95	1.00	
Satd. Flow (perm)		1644			1416		1170	1774		1770	1857	
Peak-hour factor, PHF	0.38	0.62	0.75	0.77	0.78	0.65	0.50	0.89	0.83	0.55	0.91	0.25
Adj. Flow (vph)	8	16	8	119	32	20	4	431	201	20	203	4
RTOR Reduction (vph)	0	7	0	0	7	0	0	17	0	0	1	0
Lane Group Flow (vph)	0	25	0	0	164	0	4	615	0	20	206	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2					
Actuated Green, G (s)		14.9			14.9		46.5	46.5		2.6	54.1	
Effective Green, g (s)		14.9			14.9		46.5	46.5		2.6	54.1	
Actuated g/C Ratio		0.19			0.19		0.58	0.58		0.03	0.68	
Clearance Time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Vehicle Extension (s)		4.0			4.0		4.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		306			263		680	1031		57	1255	
v/s Ratio Prot								c0.35		c0.01	0.11	
v/s Ratio Perm		0.02			c0.12		0.00					
v/c Ratio		0.08			0.63		0.01	0.60		0.35	0.16	
Uniform Delay, d1		26.9			30.0		7.0	10.7		37.9	4.7	
Progression Factor		1.00			1.00		1.00	1.00		0.65	1.08	
Incremental Delay, d2		0.2			5.2		0.0	2.5		1.3	0.3	
Delay (s)		27.1			35.2		7.1	13.3		25.9	5.4	
Level of Service		C			D		A	B		C	A	
Approach Delay (s)		27.1			35.2			13.2			7.2	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1041	47	175	803	28	90
Future Volume (vph)	1041	47	175	803	28	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.5	6.5
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3510		1770	3539	1770	1583
Flt Permitted	1.00		0.12	1.00	0.95	1.00
Satd. Flow (perm)	3510		231	3539	1770	1583
Peak-hour factor, PHF	0.83	0.65	0.80	0.85	0.88	0.83
Adj. Flow (vph)	1254	72	219	945	32	108
RTOR Reduction (vph)	4	0	0	0	0	96
Lane Group Flow (vph)	1322	0	219	945	32	12
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	6		5	2	8	
Permitted Phases			2			8
Actuated Green, G (s)	55.3		71.0	60.4	10.4	10.4
Effective Green, g (s)	55.3		71.0	60.4	10.4	10.4
Actuated g/C Ratio	0.58		0.75	0.64	0.11	0.11
Clearance Time (s)	6.0		6.0	6.0	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2047		345	2254	194	173
v/s Ratio Prot	0.38		c0.07	0.27	c0.02	
v/s Ratio Perm			c0.40			0.01
v/c Ratio	0.65		0.63	0.42	0.16	0.07
Uniform Delay, d1	13.2		10.5	8.5	38.3	37.9
Progression Factor	1.00		2.57	0.41	1.00	1.00
Incremental Delay, d2	0.7		3.5	0.1	0.4	0.2
Delay (s)	13.9		30.5	3.6	38.7	38.0
Level of Service	B		C	A	D	D
Approach Delay (s)	13.9			8.7	38.2	
Approach LOS	B			A	D	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	94.8	Sum of lost time (s)	18.5
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

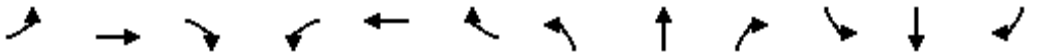
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	140	6	21	186	9	44
Future Volume (vph)	140	6	21	186	9	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	
Lane Util. Factor	0.95		1.00	1.00	1.00	
Frt	0.99		1.00	1.00	0.89	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	3516		1770	1863	1640	
Flt Permitted	1.00		0.95	1.00	0.99	
Satd. Flow (perm)	3516		1770	1863	1640	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	7	23	202	10	48
RTOR Reduction (vph)	3	0	0	0	38	0
Lane Group Flow (vph)	156	0	23	202	20	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	5		6	2	4	
Permitted Phases					4	
Actuated Green, G (s)	39.0		14.0	39.0	24.0	
Effective Green, g (s)	39.0		14.0	39.0	24.0	
Actuated g/C Ratio	0.35		0.13	0.35	0.22	
Clearance Time (s)	6.0		6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1235		223	654	354	
v/s Ratio Prot	c0.04		0.01	c0.11	c0.01	
v/s Ratio Perm						
v/c Ratio	0.13		0.10	0.31	0.06	
Uniform Delay, d1	24.4		42.9	26.2	34.5	
Progression Factor	1.00		0.52	0.19	1.00	
Incremental Delay, d2	0.2		0.9	1.2	0.3	
Delay (s)	24.7		23.1	6.3	34.8	
Level of Service	C		C	A	C	
Approach Delay (s)	24.7			8.0	34.8	
Approach LOS	C			A	C	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	111.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

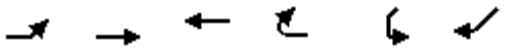
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	345	1	0	410	105	0	0	0	138	0	38
Future Volume (vph)	25	345	1	0	410	105	0	0	0	138	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5						4.0	
Lane Util. Factor	1.00	1.00			1.00						1.00	
Frt	1.00	1.00			0.98						0.97	
Flt Protected	0.95	1.00			1.00						0.96	
Satd. Flow (prot)	1770	1860			1819						1739	
Flt Permitted	0.20	1.00			1.00						0.77	
Satd. Flow (perm)	370	1860			1819						1398	
Peak-hour factor, PHF	0.78	0.73	0.25	0.25	0.67	0.91	0.92	0.92	0.92	0.82	0.25	0.79
Adj. Flow (vph)	32	473	4	0	612	115	0	0	0	168	0	48
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	0	0	13	0
Lane Group Flow (vph)	32	477	0	0	715	0	0	0	0	0	203	0
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		6			2			8			4	
Permitted Phases	6			2			8			4		
Actuated Green, G (s)	42.6	42.6			42.6						28.9	
Effective Green, g (s)	42.6	42.6			42.6						28.9	
Actuated g/C Ratio	0.53	0.53			0.53						0.36	
Clearance Time (s)	4.5	4.5			4.5						4.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	197	990			968						505	
v/s Ratio Prot		0.26			c0.39							
v/s Ratio Perm	0.09										c0.15	
v/c Ratio	0.16	0.48			0.74						0.40	
Uniform Delay, d1	9.6	11.8			14.4						19.1	
Progression Factor	0.96	0.96			1.39						1.00	
Incremental Delay, d2	1.7	1.7			4.4						2.4	
Delay (s)	10.9	12.9			24.5						21.5	
Level of Service	B	B			C						C	
Approach Delay (s)		12.8			24.5			0.0			21.5	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

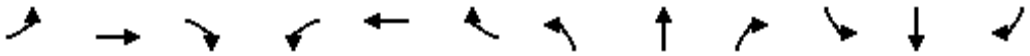
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	144	318	317	88	83	193
Future Volume (vph)	144	318	317	88	83	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.41	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	760	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.80	0.76	0.78	0.76	0.69	0.60
Adj. Flow (vph)	180	418	406	116	120	322
RTOR Reduction (vph)	0	0	0	51	0	279
Lane Group Flow (vph)	180	418	406	65	120	43
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Actuated Green, G (s)	57.2	57.2	42.9	42.9	10.8	10.8
Effective Green, g (s)	57.2	57.2	42.9	42.9	10.8	10.8
Actuated g/C Ratio	0.72	0.72	0.54	0.54	0.14	0.14
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	648	1332	999	848	238	213
v/s Ratio Prot	0.03	c0.22	c0.22		c0.07	
v/s Ratio Perm	0.17			0.04		0.03
v/c Ratio	0.28	0.31	0.41	0.08	0.50	0.20
Uniform Delay, d1	4.5	4.2	11.0	9.0	32.1	30.8
Progression Factor	0.70	0.70	0.99	1.40	1.00	1.00
Incremental Delay, d2	0.2	0.6	1.2	0.2	1.7	0.5
Delay (s)	3.4	3.5	12.1	12.7	33.8	31.3
Level of Service	A	A	B	B	C	C
Approach Delay (s)		3.5	12.2		31.9	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	148	56	30	3	158	178	16	225	22
Future Volume (vph)	0	0	0	148	56	30	3	158	178	16	225	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			5.5	5.5		5.5	
Lane Util. Factor					1.00			1.00	1.00		1.00	
Frt					0.98			1.00	0.85		0.98	
Flt Protected					0.97			1.00	1.00		1.00	
Satd. Flow (prot)					1772			1858	1583		1827	
Flt Permitted					0.81			0.98	1.00		0.97	
Satd. Flow (perm)					1476			1832	1583		1772	
Peak-hour factor, PHF	0.92	0.92	0.92	0.67	0.70	0.63	0.38	0.96	0.68	0.50	0.78	0.55
Adj. Flow (vph)	0	0	0	221	80	48	8	165	262	32	288	40
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	113	0	5	0
Lane Group Flow (vph)	0	0	0	0	341	0	0	173	149	0	355	0
Turn Type				Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)					23.6			45.4	45.4		45.4	
Effective Green, g (s)					23.6			45.4	45.4		45.4	
Actuated g/C Ratio					0.30			0.57	0.57		0.57	
Clearance Time (s)					5.5			5.5	5.5		5.5	
Vehicle Extension (s)					3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)					435			1039	898		1005	
v/s Ratio Prot												
v/s Ratio Perm					c0.23			0.09	0.09		c0.20	
v/c Ratio					0.78			0.17	0.17		0.35	
Uniform Delay, d1					25.9			8.3	8.3		9.4	
Progression Factor					1.00			0.47	0.14		1.00	
Incremental Delay, d2					9.0			0.3	0.3		1.0	
Delay (s)					34.9			4.1	1.4		10.3	
Level of Service					C			A	A		B	
Approach Delay (s)		0.0			34.9			2.5			10.3	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

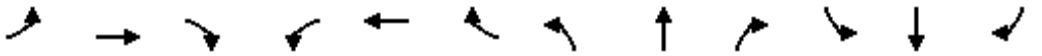
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	256	89	276	322	110	311
Future Volume (vph)	256	89	276	322	110	311
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.46	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	860	1863	1770	1583
Peak-hour factor, PHF	0.80	0.62	0.70	0.77	0.76	0.90
Adj. Flow (vph)	320	144	394	418	145	346
RTOR Reduction (vph)	0	71	0	0	0	295
Lane Group Flow (vph)	320	73	394	418	145	51
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	40.8	40.8	58.1	58.1	11.9	11.9
Effective Green, g (s)	40.8	40.8	58.1	58.1	11.9	11.9
Actuated g/C Ratio	0.51	0.51	0.73	0.73	0.15	0.15
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	950	807	764	1353	263	235
v/s Ratio Prot	0.17		c0.08	0.22	c0.08	
v/s Ratio Perm		0.05	c0.30			0.03
v/c Ratio	0.34	0.09	0.52	0.31	0.55	0.22
Uniform Delay, d1	11.6	10.1	4.6	3.9	31.6	30.0
Progression Factor	0.94	1.21	0.65	0.61	1.00	1.00
Incremental Delay, d2	0.9	0.2	0.5	0.5	2.5	0.5
Delay (s)	11.8	12.4	3.5	2.8	34.1	30.4
Level of Service	B	B	A	A	C	C
Approach Delay (s)	12.0			3.1	31.5	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

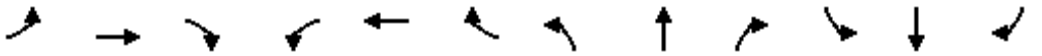
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	376	8	14	224	19	205	78	17	72	65	54
Future Volume (vph)	99	376	8	14	224	19	205	78	17	72	65	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.97		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1855		1770	1838		1770	1802		1770	1726	
Flt Permitted	0.44	1.00		0.51	1.00		0.58	1.00		0.67	1.00	
Satd. Flow (perm)	828	1855		951	1838		1077	1802		1257	1726	
Peak-hour factor, PHF	0.85	0.89	0.67	0.88	0.77	0.68	0.71	0.78	0.61	0.56	0.68	0.59
Adj. Flow (vph)	116	422	12	16	291	28	289	100	28	129	96	92
RTOR Reduction (vph)	0	1	0	0	3	0	0	10	0	0	37	0
Lane Group Flow (vph)	116	433	0	16	316	0	289	118	0	129	151	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	59.0	59.0		44.4	44.4		24.0	24.0		24.0	24.0	
Effective Green, g (s)	59.0	59.0		44.4	44.4		24.0	24.0		24.0	24.0	
Actuated g/C Ratio	0.62	0.62		0.47	0.47		0.25	0.25		0.25	0.25	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	599	1152		444	859		272	455		317	436	
v/s Ratio Prot	0.02	c0.23			0.17			0.07			0.09	
v/s Ratio Perm	0.10			0.02			c0.27			0.10		
v/c Ratio	0.19	0.38		0.04	0.37		1.06	0.26		0.41	0.35	
Uniform Delay, d1	8.0	8.9		13.7	16.3		35.5	28.4		29.6	29.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.9		0.2	1.2		72.0	0.3		0.9	0.5	
Delay (s)	8.2	9.8		13.9	17.5		107.5	28.7		30.4	29.6	
Level of Service	A	A		B	B		F	C		C	C	
Approach Delay (s)		9.5			17.3			83.3			29.9	
Approach LOS		A			B			F			C	

Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

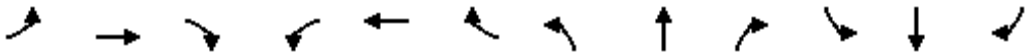
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	908	14	4	833	2	1	0	3	1	1	4
Future Volume (vph)	8	908	14	4	833	2	1	0	3	1	1	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1583		1770	1676	
Flt Permitted	0.12	1.00	1.00	0.13	1.00	1.00	0.75	1.00		0.74	1.00	
Satd. Flow (perm)	219	3539	1583	251	3539	1583	1397	1583		1376	1676	
Peak-hour factor, PHF	0.33	0.91	0.70	0.50	0.87	0.50	0.25	0.25	0.38	0.25	0.25	0.50
Adj. Flow (vph)	24	998	20	8	957	4	4	0	8	4	4	8
RTOR Reduction (vph)	0	0	13	0	0	3	0	5	0	0	5	0
Lane Group Flow (vph)	24	998	7	8	957	1	4	3	0	4	7	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6		6	2		2	4			8		
Actuated Green, G (s)	48.8	44.7	44.7	43.2	41.9	41.9	50.6	49.3		51.4	50.2	
Effective Green, g (s)	48.8	44.7	44.7	43.2	41.9	41.9	50.6	49.3		51.4	50.2	
Actuated g/C Ratio	0.41	0.37	0.37	0.36	0.35	0.35	0.42	0.41		0.43	0.42	
Clearance Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	142	1318	589	106	1235	552	593	650		593	701	
v/s Ratio Prot	c0.01	c0.28		0.00	0.27		c0.00	0.00		0.00	c0.00	
v/s Ratio Perm	0.06		0.00	0.03		0.00	0.00			0.00		
v/c Ratio	0.17	0.76	0.01	0.08	0.77	0.00	0.01	0.01		0.01	0.01	
Uniform Delay, d1	24.6	32.9	23.7	26.8	34.8	25.4	20.1	20.9		19.7	20.4	
Progression Factor	1.00	1.00	1.00	0.21	0.70	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	4.1	0.0	0.3	4.4	0.0	0.0	0.0		0.0	0.0	
Delay (s)	25.2	37.0	23.8	5.9	28.7	25.4	20.1	20.9		19.7	20.4	
Level of Service	C	D	C	A	C	C	C	C		B	C	
Approach Delay (s)		36.5			28.5			20.6			20.2	
Approach LOS		D			C			C			C	

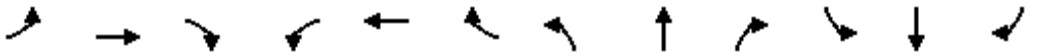
Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	23.5
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	20	7	0	23	10	0	366	10	0	237	22
Future Volume (vph)	0	20	7	0	23	10	0	366	10	0	237	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5			5.5			5.5	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			0.96			1.00			0.99	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		1615			1616			1669			1654	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		1615			1616			1669			1654	
Peak-hour factor, PHF	0.25	0.62	0.58	0.25	0.52	0.62	0.25	0.78	0.62	0.25	0.83	0.69
Adj. Flow (vph)	0	32	12	0	44	16	0	469	16	0	286	32
RTOR Reduction (vph)	0	11	0	0	15	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	33	0	0	45	0	0	484	0	0	316	0
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		5.6			5.6			63.4			63.4	
Effective Green, g (s)		5.6			5.6			63.4			63.4	
Actuated g/C Ratio		0.07			0.07			0.79			0.79	
Clearance Time (s)		5.5			5.5			5.5			5.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		113			113			1322			1310	
v/s Ratio Prot		0.02			c0.03			c0.29			0.19	
v/s Ratio Perm												
v/c Ratio		0.29			0.40			0.37			0.24	
Uniform Delay, d1		35.3			35.6			2.4			2.1	
Progression Factor		1.00			1.00			3.03			2.32	
Incremental Delay, d2		1.4			2.3			0.7			0.4	
Delay (s)		36.7			37.9			8.1			5.4	
Level of Service		D			D			A			A	
Approach Delay (s)		36.7			37.9			8.1			5.4	
Approach LOS		D			D			A			A	

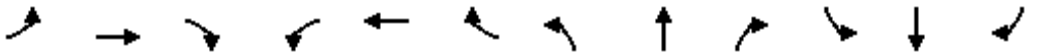
Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	154	7	5	108	15	2	38	6	10	30	61
Future Volume (vph)	35	154	7	5	108	15	2	38	6	10	30	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5			5.5			5.5	5.5
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1770	1845		1770	1817			1822			1830	1583
Flt Permitted	0.66	1.00		0.64	1.00			0.95			0.86	1.00
Satd. Flow (perm)	1235	1845		1192	1817			1735			1593	1583
Peak-hour factor, PHF	0.62	0.88	0.58	0.42	0.87	0.62	0.25	0.73	0.75	0.42	0.68	0.90
Adj. Flow (vph)	56	175	12	12	124	24	8	52	8	24	44	68
RTOR Reduction (vph)	0	5	0	0	10	0	0	7	0	0	0	60
Lane Group Flow (vph)	56	182	0	12	138	0	0	61	0	0	68	8
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	24.1	24.1		24.1	24.1			4.9			4.9	4.9
Effective Green, g (s)	24.1	24.1		24.1	24.1			4.9			4.9	4.9
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.12			0.12	0.12
Clearance Time (s)	5.5	5.5		5.5	5.5			5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	744	1111		718	1094			212			195	193
v/s Ratio Prot		c0.10			0.08							
v/s Ratio Perm	0.05			0.01				0.04			c0.04	0.01
v/c Ratio	0.08	0.16		0.02	0.13			0.29			0.35	0.04
Uniform Delay, d1	3.3	3.5		3.2	3.4			16.0			16.1	15.5
Progression Factor	0.82	0.86		0.83	0.80			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.3		0.0	0.2			0.8			1.1	0.1
Delay (s)	2.9	3.3		2.7	3.0			16.7			17.2	15.6
Level of Service	A	A		A	A			B			B	B
Approach Delay (s)		3.2			3.0			16.7			16.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

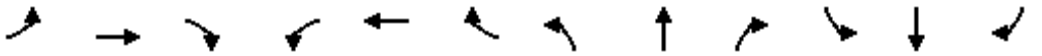
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	176	9	5	133	5	15	25	13	3	15	18
Future Volume (vph)	16	176	9	5	133	5	15	25	13	3	15	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.99			0.99		1.00	0.94		1.00	0.92	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844			1846		1770	1758		1770	1706	
Flt Permitted		0.98			0.98		0.91	1.00		0.91	1.00	
Satd. Flow (perm)		1805			1811		1693	1758		1693	1706	
Peak-hour factor, PHF	0.80	0.77	0.75	0.42	0.81	0.63	0.75	0.62	0.54	0.38	0.54	0.50
Adj. Flow (vph)	20	229	12	12	164	8	20	40	24	8	28	36
RTOR Reduction (vph)	0	3	0	0	3	0	0	21	0	0	32	0
Lane Group Flow (vph)	0	258	0	0	181	0	20	43	0	8	32	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		24.6			24.6		4.4	4.4		4.4	4.4	
Effective Green, g (s)		24.6			24.6		4.4	4.4		4.4	4.4	
Actuated g/C Ratio		0.62			0.62		0.11	0.11		0.11	0.11	
Clearance Time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		1110			1113		186	193		186	187	
v/s Ratio Prot								c0.02			0.02	
v/s Ratio Perm		c0.14			0.10		0.01			0.00		
v/c Ratio		0.23			0.16		0.11	0.22		0.04	0.17	
Uniform Delay, d1		3.5			3.3		16.0	16.2		15.9	16.1	
Progression Factor		1.00			0.67		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			0.3		0.3	0.6		0.1	0.4	
Delay (s)		3.9			2.5		16.3	16.8		16.0	16.6	
Level of Service		A			A		B	B		B	B	
Approach Delay (s)		3.9			2.5			16.7			16.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	224	16	68	85	29	51	432	214	30	351	140
Future Volume (vph)	213	224	16	68	85	29	51	432	214	30	351	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0	5.5	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
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	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.59	1.00	1.00	0.61	1.00	1.00	0.26	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	1104	1863	1583	1132	1863	1583	489	1863	1583	287	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	232	243	17	74	92	32	55	470	233	33	382	152
RTOR Reduction (vph)	0	0	10	0	0	23	0	0	166	0	0	99
Lane Group Flow (vph)	232	243	7	74	92	9	55	470	67	33	382	53
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	51.7	40.1	40.1	34.4	28.3	28.3	35.5	28.8	28.8	29.9	26.0	26.0
Effective Green, g (s)	51.7	40.1	40.1	34.4	28.3	28.3	35.5	28.8	28.8	29.9	26.0	26.0
Actuated g/C Ratio	0.51	0.40	0.40	0.34	0.28	0.28	0.35	0.29	0.29	0.30	0.26	0.26
Clearance Time (s)	5.0	6.0	6.0	5.5	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	687	740	629	424	522	443	257	531	451	142	480	407
v/s Ratio Prot	c0.06	0.13		0.01	0.05		c0.01	c0.25		0.01	0.21	
v/s Ratio Perm	c0.11		0.00	0.05		0.01	0.06		0.04	0.06		0.03
v/c Ratio	0.34	0.33	0.01	0.17	0.18	0.02	0.21	0.89	0.15	0.23	0.80	0.13
Uniform Delay, d1	14.0	21.1	18.4	22.9	27.5	26.3	33.6	34.5	26.9	42.1	35.0	28.8
Progression 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
Incremental Delay, d2	0.3	1.2	0.0	0.2	0.2	0.0	0.4	16.1	0.2	0.8	8.9	0.1
Delay (s)	14.2	22.3	18.4	23.1	27.6	26.3	34.1	50.6	27.0	43.0	43.8	28.9
Level of Service	B	C	B	C	C	C	C	D	C	D	D	C
Approach Delay (s)		18.3			25.7			42.1			39.8	
Approach LOS		B			C			D			D	

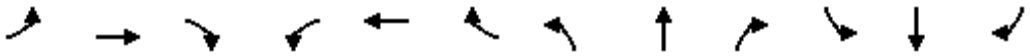
Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.9	Sum of lost time (s)	22.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	4	524	152	97	285	17	53	68	8	116	28	153
Future Volume (vph)	4	524	152	97	285	17	53	68	8	116	28	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99			0.99			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1844			1804			1791	1583
Flt Permitted	0.54	1.00	1.00	0.22	1.00			0.98			0.96	1.00
Satd. Flow (perm)	1015	1863	1583	401	1844			1804			1791	1583
Peak-hour factor, PHF	0.50	0.88	0.64	0.81	0.84	0.71	0.74	0.65	0.40	0.71	0.70	0.55
Adj. Flow (vph)	8	595	238	120	339	24	72	105	20	163	40	278
RTOR Reduction (vph)	0	0	127	0	2	0	0	4	0	0	0	158
Lane Group Flow (vph)	8	595	111	120	361	0	0	193	0	0	203	120
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases		6		5	2		4	4		3	3	
Permitted Phases	6		6	2								3
Actuated Green, G (s)	58.5	58.5	58.5	74.1	74.1			14.0			19.1	19.1
Effective Green, g (s)	58.5	58.5	58.5	74.1	74.1			14.0			19.1	19.1
Actuated g/C Ratio	0.47	0.47	0.47	0.59	0.59			0.11			0.15	0.15
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	474	870	739	342	1091			201			273	241
v/s Ratio Prot		c0.32		0.03	c0.20			c0.11			c0.11	
v/s Ratio Perm	0.01		0.07	0.18								0.08
v/c Ratio	0.02	0.68	0.15	0.35	0.33			0.96			0.74	0.50
Uniform Delay, d1	17.9	26.1	19.1	16.3	13.0			55.3			50.7	48.7
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.1	4.3	0.4	0.6	0.8			52.4			10.4	1.6
Delay (s)	18.0	30.5	19.5	16.9	13.8			107.7			61.2	50.3
Level of Service	B	C	B	B	B			F			E	D
Approach Delay (s)		27.2			14.6			107.7			54.9	
Approach LOS		C			B			F			D	

Intersection Summary			
HCM 2000 Control Delay	38.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	125.2	Sum of lost time (s)	24.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

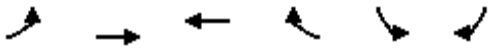
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	607	0	11	963	90	2	5	6	30	1	28
Future Volume (vph)	29	607	0	11	963	90	2	5	6	30	1	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		5.5	6.5	6.5	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.93		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539		1770	3539	1583	1770	1723		1770	1607	
Flt Permitted	0.19	1.00		0.36	1.00	1.00	0.73	1.00		0.74	1.00	
Satd. Flow (perm)	346	3539		669	3539	1583	1352	1723		1381	1607	
Peak-hour factor, PHF	0.72	0.79	0.92	0.69	0.77	0.83	0.50	0.42	0.50	0.68	0.25	0.64
Adj. Flow (vph)	40	768	0	16	1251	108	4	12	12	44	4	44
RTOR Reduction (vph)	0	0	0	0	0	28	0	11	0	0	41	0
Lane Group Flow (vph)	40	768	0	16	1251	80	4	13	0	44	7	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8			4		
Actuated Green, G (s)	75.6	71.8		72.8	70.4	70.4	7.8	7.8		7.8	7.8	
Effective Green, g (s)	75.6	71.8		72.8	70.4	70.4	7.8	7.8		7.8	7.8	
Actuated g/C Ratio	0.76	0.72		0.73	0.70	0.70	0.08	0.08		0.08	0.08	
Clearance Time (s)	5.5	6.5		5.5	6.5	6.5	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	315	2541		513	2491	1114	105	134		107	125	
v/s Ratio Prot	c0.00	0.22		0.00	c0.35			0.01			0.00	
v/s Ratio Perm	0.09			0.02		0.05	0.00			c0.03		
v/c Ratio	0.13	0.30		0.03	0.50	0.07	0.04	0.10		0.41	0.06	
Uniform Delay, d1	3.8	5.1		3.7	6.8	4.6	42.6	42.8		43.9	42.7	
Progression Factor	1.00	0.92		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.0	0.7	0.1	0.1	0.3		2.6	0.2	
Delay (s)	4.0	5.0		3.8	7.5	4.7	42.8	43.1		46.5	42.9	
Level of Service	A	A		A	A	A	D	D		D	D	
Approach Delay (s)		4.9			7.2			43.1			44.6	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

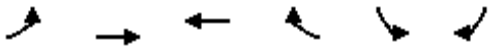
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	26	898	843	16	6	3
Future Volume (vph)	26	898	843	16	6	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	7.5	7.5		9.0	9.0
Lane Util. Factor	1.00	0.91	0.95		0.97	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	3521		3433	1583
Flt Permitted	0.23	1.00	1.00		0.95	1.00
Satd. Flow (perm)	431	5085	3521		3433	1583
Peak-hour factor, PHF	0.65	0.94	0.84	0.44	0.50	0.38
Adj. Flow (vph)	40	955	1004	36	12	8
RTOR Reduction (vph)	0	0	2	0	0	8
Lane Group Flow (vph)	40	955	1038	0	12	0
Turn Type	pm+pt	NA	NA		Prot	Prot
Protected Phases	1	6	2		4	4
Permitted Phases	6					
Actuated Green, G (s)	75.3	70.0	72.2		2.6	2.6
Effective Green, g (s)	75.3	70.0	72.2		2.6	2.6
Actuated g/C Ratio	0.63	0.58	0.60		0.02	0.02
Clearance Time (s)	5.5	7.5	7.5		9.0	9.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	329	2966	2118		74	34
v/s Ratio Prot	c0.01	0.19	c0.29		c0.00	0.00
v/s Ratio Perm	0.07					
v/c Ratio	0.12	0.32	0.49		0.16	0.01
Uniform Delay, d1	9.1	12.8	13.5		57.6	57.4
Progression Factor	1.07	0.75	0.19		1.00	1.00
Incremental Delay, d2	0.1	0.3	0.8		1.0	0.1
Delay (s)	9.9	9.9	3.3		58.7	57.5
Level of Service	A	A	A		E	E
Approach Delay (s)		9.9	3.3		58.2	
Approach LOS		A	A		E	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

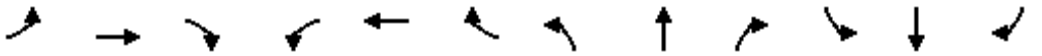
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	853	1034	49	52	13
Future Volume (vph)	25	853	1034	49	52	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0		5.5	5.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3516		1770	1583
Flt Permitted	0.15	1.00	1.00		0.95	1.00
Satd. Flow (perm)	271	3539	3516		1770	1583
Peak-hour factor, PHF	0.62	0.88	0.78	0.82	0.50	0.81
Adj. Flow (vph)	40	969	1326	60	104	16
RTOR Reduction (vph)	0	0	2	0	0	14
Lane Group Flow (vph)	40	969	1384	0	104	2
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6					4
Actuated Green, G (s)	96.1	96.1	85.6		12.4	12.4
Effective Green, g (s)	96.1	96.1	85.6		12.4	12.4
Actuated g/C Ratio	0.80	0.80	0.71		0.10	0.10
Clearance Time (s)	5.5	6.0	6.0		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	279	2834	2508		182	163
v/s Ratio Prot	0.01	c0.27	c0.39		c0.06	
v/s Ratio Perm	0.11					0.00
v/c Ratio	0.14	0.34	0.55		0.57	0.01
Uniform Delay, d1	4.9	3.3	8.1		51.3	48.3
Progression Factor	1.00	1.00	0.61		1.00	1.00
Incremental Delay, d2	0.2	0.3	0.8		4.3	0.0
Delay (s)	5.1	3.6	5.7		55.6	48.3
Level of Service	A	A	A		E	D
Approach Delay (s)		3.7	5.7		54.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	838	13	27	1014	7	34	2	12	16	0	41
Future Volume (vph)	50	838	13	27	1014	7	34	2	12	16	0	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0		5.5	6.0		5.5	5.5			5.5	5.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	3523		1770	3533		1770	1663			1770	1583
Flt Permitted	0.18	1.00		0.29	1.00		0.74	1.00			0.74	1.00
Satd. Flow (perm)	332	3523		533	3533		1380	1663			1377	1583
Peak-hour factor, PHF	0.78	0.93	0.46	0.52	0.79	0.44	0.47	0.25	0.60	0.65	0.25	0.57
Adj. Flow (vph)	64	901	28	52	1284	16	72	8	20	25	0	72
RTOR Reduction (vph)	0	1	0	0	1	0	0	18	0	0	0	66
Lane Group Flow (vph)	64	928	0	52	1299	0	72	10	0	0	25	6
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Actuated Green, G (s)	92.8	87.5		92.6	87.4		10.3	10.3			10.3	10.3
Effective Green, g (s)	92.8	87.5		92.6	87.4		10.3	10.3			10.3	10.3
Actuated g/C Ratio	0.77	0.73		0.77	0.73		0.09	0.09			0.09	0.09
Clearance Time (s)	5.5	6.0		5.5	6.0		5.5	5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	320	2568		464	2573		118	142			118	135
v/s Ratio Prot	c0.01	0.26		0.00	c0.37			0.01				
v/s Ratio Perm	0.15			0.08			c0.05				0.02	0.00
v/c Ratio	0.20	0.36		0.11	0.51		0.61	0.07			0.21	0.05
Uniform Delay, d1	4.2	6.0		3.4	7.0		52.9	50.4			51.1	50.3
Progression Factor	0.78	0.74		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.3	0.4		0.1	0.7		9.0	0.2			0.9	0.1
Delay (s)	3.5	4.8		3.5	7.7		61.9	50.6			52.0	50.5
Level of Service	A	A		A	A		E	D			D	D
Approach Delay (s)		4.7			7.6			58.8			50.9	
Approach LOS		A			A			E			D	

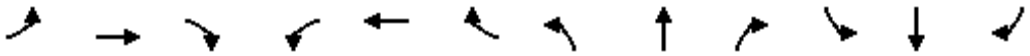
Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	1	441	118	119	401	6	7	3	2	194	9	212
Future Volume (vph)	1	441	118	119	401	6	7	3	2	194	9	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.97			0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1859			1776			1779	1583
Flt Permitted	0.45	1.00	1.00	0.26	1.00			0.81			0.72	1.00
Satd. Flow (perm)	842	1863	1583	486	1859			1488			1338	1583
Peak-hour factor, PHF	0.25	0.81	0.70	0.74	0.72	0.75	0.44	0.38	0.50	0.77	0.56	0.72
Adj. Flow (vph)	4	544	169	161	557	8	16	8	4	252	16	294
RTOR Reduction (vph)	0	0	88	0	1	0	0	3	0	0	0	141
Lane Group Flow (vph)	4	544	81	161	564	0	0	25	0	0	268	153
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)	37.7	37.7	37.7	50.5	50.5			20.5			20.5	20.5
Effective Green, g (s)	37.7	37.7	37.7	50.5	50.5			20.5			20.5	20.5
Actuated g/C Ratio	0.47	0.47	0.47	0.63	0.63			0.26			0.26	0.26
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	396	877	745	440	1173			381			342	405
v/s Ratio Prot		c0.29		0.04	c0.30							
v/s Ratio Perm	0.00		0.05	0.19				0.02			c0.20	0.10
v/c Ratio	0.01	0.62	0.11	0.37	0.48			0.07			0.78	0.38
Uniform Delay, d1	11.2	15.8	11.8	8.6	7.8			22.5			27.7	24.5
Progression Factor	0.97	0.85	0.86	1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.0	3.0	0.3	0.5	1.4			0.1			11.2	0.6
Delay (s)	10.9	16.5	10.5	9.1	9.2			22.6			38.8	25.1
Level of Service	B	B	B	A	A			C			D	C
Approach Delay (s)		15.0			9.2			22.6			31.6	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

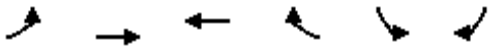
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	557	13	21	472	5	35	8	50	17	11	7
Future Volume (vph)	5	557	13	21	472	5	35	8	50	17	11	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.0		4.5	6.0			5.5			5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.92			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1770	1855		1770	1859			1689			1764	
Flt Permitted	0.38	1.00		0.31	1.00			0.87			0.77	
Satd. Flow (perm)	706	1855		582	1859			1497			1388	
Peak-hour factor, PHF	0.63	0.82	0.65	0.75	0.76	0.63	0.88	0.67	0.69	0.71	0.69	0.58
Adj. Flow (vph)	8	679	20	28	621	8	40	12	72	24	16	12
RTOR Reduction (vph)	0	1	0	0	0	0	0	65	0	0	11	0
Lane Group Flow (vph)	8	698	0	28	629	0	0	59	0	0	41	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	55.2	53.8		58.0	55.2			7.4			7.4	
Effective Green, g (s)	55.2	53.8		58.0	55.2			7.4			7.4	
Actuated g/C Ratio	0.69	0.67		0.72	0.69			0.09			0.09	
Clearance Time (s)	4.5	6.0		4.5	6.0			5.5			5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	505	1247		463	1282			138			128	
v/s Ratio Prot	0.00	c0.38		c0.00	0.34							
v/s Ratio Perm	0.01			0.04				c0.04			0.03	
v/c Ratio	0.02	0.56		0.06	0.49			0.43			0.32	
Uniform Delay, d1	4.1	6.9		4.0	5.8			34.3			34.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.0	1.8		0.1	1.3			2.1			1.5	
Delay (s)	4.1	8.7		4.1	7.2			36.4			35.4	
Level of Service	A	A		A	A			D			D	
Approach Delay (s)		8.6			7.0			36.4			35.4	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

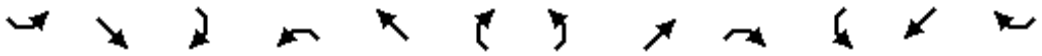
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	3	140	207	44	26	21
Future Volume (vph)	3	140	207	44	26	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	3539	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	152	225	48	28	23
RTOR Reduction (vph)	0	0	0	31	0	21
Lane Group Flow (vph)	3	152	225	17	28	2
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	1	5	2		3	
Permitted Phases				2		3
Actuated Green, G (s)	14.0	39.0	39.0	39.0	10.0	10.0
Effective Green, g (s)	14.0	39.0	39.0	39.0	10.0	10.0
Actuated g/C Ratio	0.13	0.35	0.35	0.35	0.09	0.09
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	223	654	1243	556	159	142
v/s Ratio Prot	0.00	c0.08	c0.06		c0.02	
v/s Ratio Perm				0.01		0.00
v/c Ratio	0.01	0.23	0.18	0.03	0.18	0.01
Uniform Delay, d1	42.5	25.4	24.9	23.6	46.7	46.0
Progression Factor	0.58	0.31	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.8	0.3	0.1	0.5	0.0
Delay (s)	24.8	8.7	25.3	23.7	47.2	46.1
Level of Service	C	A	C	C	D	D
Approach Delay (s)		9.1	25.0		46.7	
Approach LOS		A	C		D	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	111.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	6	4	4	6	1	20	3	315	4	18	358	9
Future Volume (vph)	6	4	4	6	1	20	3	315	4	18	358	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.92		1.00	1.00		1.00	1.00	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1688		1770	1855		1770	1856	
Flt Permitted		0.91			0.88		0.47	1.00		0.51	1.00	
Satd. Flow (perm)		1615			1509		882	1855		958	1856	
Peak-hour factor, PHF	0.75	0.50	0.50	0.38	0.25	0.71	0.38	0.76	0.33	0.64	0.73	0.75
Adj. Flow (vph)	8	8	8	16	4	28	8	414	12	28	490	12
RTOR Reduction (vph)	0	8	0	0	26	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	16	0	0	22	0	8	425	0	28	501	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)		4.7			4.7		66.3	66.3		66.3	66.3	
Effective Green, g (s)		4.7			4.7		66.3	66.3		66.3	66.3	
Actuated g/C Ratio		0.06			0.06		0.83	0.83		0.83	0.83	
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		94			88		730	1537		793	1538	
v/s Ratio Prot								0.23			c0.27	
v/s Ratio Perm		0.01			c0.01		0.01			0.03		
v/c Ratio		0.18			0.25		0.01	0.28		0.04	0.33	
Uniform Delay, d1		35.8			36.0		1.2	1.5		1.2	1.6	
Progression Factor		1.00			1.00		1.00	1.00		1.09	1.03	
Incremental Delay, d2		0.9			1.5		0.0	0.4		0.1	0.5	
Delay (s)		36.7			37.4		1.2	2.0		1.4	2.1	
Level of Service		D			D		A	A		A	A	
Approach Delay (s)		36.7			37.4			2.0			2.1	
Approach LOS		D			D			A			A	

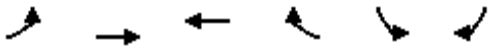
Intersection Summary			
HCM 2000 Control Delay	4.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX E
Signal System Intersection Analyses
(Synchro Reports)

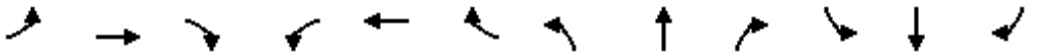
CURRENT OPERATIONS
PM PEAK HOUR ANALYSIS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	123	1232	1387	15	16	94
Future Volume (vph)	123	1232	1387	15	16	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.5	6.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3528		1770	1583
Flt Permitted	0.12	1.00	1.00		0.95	1.00
Satd. Flow (perm)	224	3539	3528		1770	1583
Peak-hour factor, PHF	0.77	0.93	0.97	0.47	0.67	0.71
Adj. Flow (vph)	160	1325	1430	32	24	132
RTOR Reduction (vph)	0	0	2	0	0	117
Lane Group Flow (vph)	160	1325	1460	0	24	15
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6					4
Actuated Green, G (s)	67.4	59.0	61.6		11.0	11.0
Effective Green, g (s)	67.4	59.0	61.6		11.0	11.0
Actuated g/C Ratio	0.68	0.59	0.62		0.11	0.11
Clearance Time (s)	6.0	6.0	6.0		6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	282	2098	2184		195	175
v/s Ratio Prot	c0.05	0.37	c0.41		c0.01	
v/s Ratio Perm	0.34					0.01
v/c Ratio	0.57	0.63	0.67		0.12	0.08
Uniform Delay, d1	9.4	13.2	12.3		39.9	39.7
Progression Factor	2.15	0.36	1.00		1.00	1.00
Incremental Delay, d2	1.9	1.1	1.6		0.3	0.2
Delay (s)	22.2	5.9	14.0		40.2	39.9
Level of Service	C	A	B		D	D
Approach Delay (s)		7.6	14.0		40.0	
Approach LOS		A	B		D	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	99.5	Sum of lost time (s)	18.5
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1067	65	60	1096	33	58	42	106	53	59	282
Future Volume (vph)	130	1067	65	60	1096	33	58	42	106	53	59	282
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0	5.5	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1668		1770	1863	1583
Flt Permitted	0.13	1.00	1.00	0.19	1.00	1.00	0.70	1.00		0.47	1.00	1.00
Satd. Flow (perm)	246	3539	1583	362	3539	1583	1304	1668		884	1863	1583
Peak-hour factor, PHF	0.77	0.95	0.68	0.79	0.91	0.82	0.69	0.62	0.68	0.74	0.67	0.65
Adj. Flow (vph)	169	1123	96	76	1204	40	84	68	156	72	88	434
RTOR Reduction (vph)	0	0	45	0	0	20	0	109	0	0	0	224
Lane Group Flow (vph)	169	1123	51	76	1204	20	84	115	0	72	88	210
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	51.7	43.4	43.4	45.9	40.5	40.5	14.7	14.7		14.7	14.7	14.7
Effective Green, g (s)	51.7	43.4	43.4	45.9	40.5	40.5	14.7	14.7		14.7	14.7	14.7
Actuated g/C Ratio	0.64	0.54	0.54	0.57	0.50	0.50	0.18	0.18		0.18	0.18	0.18
Clearance Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Vehicle Extension (s)	2.5	5.0	5.0	2.5	5.0	5.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	313	1896	848	299	1769	791	236	302		160	338	287
v/s Ratio Prot	c0.06	c0.32		0.02	c0.34			0.07			0.05	
v/s Ratio Perm	0.29		0.03	0.13		0.01	0.06			0.08		c0.13
v/c Ratio	0.54	0.59	0.06	0.25	0.68	0.03	0.36	0.38		0.45	0.26	0.73
Uniform Delay, d1	9.5	12.8	9.0	8.6	15.3	10.3	29.0	29.2		29.5	28.5	31.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	1.4	0.1	0.3	2.1	0.1	0.9	0.8		2.0	0.4	9.2
Delay (s)	10.9	14.2	9.2	8.9	17.5	10.3	29.9	30.0		31.6	28.9	40.5
Level of Service	B	B	A	A	B	B	C	C		C	C	D
Approach Delay (s)		13.4			16.8			29.9			37.7	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1086	137	77	1076	225	92
Future Volume (vph)	1086	137	77	1076	225	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	5.5	7.5	9.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	1.00	1.00	0.95	1.00	0.97	
Satd. Flow (prot)	3539	1583	1770	3539	3334	
Flt Permitted	1.00	1.00	0.95	1.00	0.97	
Satd. Flow (perm)	3539	1583	1770	3539	3334	
Peak-hour factor, PHF	0.91	0.83	0.69	0.96	0.83	0.79
Adj. Flow (vph)	1193	165	112	1121	271	116
RTOR Reduction (vph)	0	79	0	0	41	0
Lane Group Flow (vph)	1193	86	112	1121	346	0
Turn Type	NA	Perm	Prot	NA	Prot	
Protected Phases	6		5	2	3	
Permitted Phases		6				
Actuated Green, G (s)	53.3	53.3	12.2	61.2	16.9	
Effective Green, g (s)	53.3	53.3	12.2	61.2	16.9	
Actuated g/C Ratio	0.44	0.44	0.10	0.51	0.14	
Clearance Time (s)	7.5	7.5	5.5	7.5	9.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1571	703	179	1804	469	
v/s Ratio Prot	c0.34		c0.06	c0.32	c0.10	
v/s Ratio Perm		0.05				
v/c Ratio	0.76	0.12	0.63	0.62	0.74	
Uniform Delay, d1	28.0	19.6	51.7	21.1	49.4	
Progression Factor	0.21	0.03	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.3	6.7	1.6	6.0	
Delay (s)	8.8	0.8	58.4	22.7	55.4	
Level of Service	A	A	E	C	E	
Approach Delay (s)	7.8			26.0	55.4	
Approach LOS	A			C	E	

Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

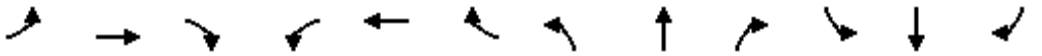
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	73	46	128	145	26	36	144	1170	280	46	1017	34
Future Volume (vph)	73	46	128	145	26	36	144	1170	280	46	1017	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1761	1689		1770	3539	1583	1770	3539	1583
Flt Permitted	0.70	1.00	1.00	0.45	1.00		0.12	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	1304	1863	1583	843	1689		230	3539	1583	286	3539	1583
Peak-hour factor, PHF	0.73	0.82	0.89	0.81	0.72	0.69	0.78	0.91	0.91	0.82	0.92	0.57
Adj. Flow (vph)	100	56	144	179	36	52	185	1286	308	56	1105	60
RTOR Reduction (vph)	0	0	129	0	43	0	0	0	128	0	0	36
Lane Group Flow (vph)	100	56	15	179	45	0	185	1286	180	56	1105	24
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8			6		6	2		2
Actuated Green, G (s)	16.8	10.1	10.1	28.6	16.0		42.6	42.6	42.6	38.6	38.6	38.6
Effective Green, g (s)	16.8	10.1	10.1	28.6	16.0		42.6	42.6	42.6	38.6	38.6	38.6
Actuated g/C Ratio	0.17	0.10	0.10	0.30	0.17		0.44	0.44	0.44	0.40	0.40	0.40
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	259	194	165	369	280		264	1562	698	209	1415	633
v/s Ratio Prot	0.03	0.03		c0.06	0.03		0.07	c0.36		0.02	c0.31	
v/s Ratio Perm	0.04		0.01	c0.08			0.24		0.11	0.09		0.02
v/c Ratio	0.39	0.29	0.09	0.49	0.16		0.70	0.82	0.26	0.27	0.78	0.04
Uniform Delay, d1	34.9	39.9	39.1	26.8	34.5		21.5	23.6	17.0	27.2	25.3	17.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.8	0.2	1.0	0.3		8.1	3.7	0.2	0.7	2.9	0.0
Delay (s)	35.8	40.7	39.3	27.8	34.8		29.6	27.3	17.2	27.9	28.1	17.7
Level of Service	D	D	D	C	C		C	C	B	C	C	B
Approach Delay (s)		38.4			30.1			25.8			27.6	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	96.5	Sum of lost time (s)	25.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	148	32	37	27	25	37	28	1228	25	53	1087	129
Future Volume (vph)	148	32	37	27	25	37	28	1228	25	53	1087	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	5.5		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.94		1.00	1.00		1.00	0.98	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1755			1724		1770	3523		1770	3474	
Flt Permitted		0.73			0.86		0.16	1.00		0.12	1.00	
Satd. Flow (perm)		1314			1505		296	3523		232	3474	
Peak-hour factor, PHF	0.79	0.73	0.62	0.68	0.57	0.51	0.88	0.96	0.62	0.78	0.90	0.77
Adj. Flow (vph)	187	44	60	40	44	73	32	1279	40	68	1208	168
RTOR Reduction (vph)	0	11	0	0	36	0	0	3	0	0	13	0
Lane Group Flow (vph)	0	280	0	0	121	0	32	1316	0	68	1363	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)		12.7			12.7		35.0	35.0		36.1	36.1	
Effective Green, g (s)		12.7			12.7		35.0	35.0		36.1	36.1	
Actuated g/C Ratio		0.18			0.18		0.51	0.51		0.52	0.52	
Clearance Time (s)		6.0			6.0		6.0	5.5		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		241			276		200	1781		209	1812	
v/s Ratio Prot							0.01	c0.37		0.02	c0.39	
v/s Ratio Perm		c0.21			0.08		0.08			0.15		
v/c Ratio		1.16			0.44		0.16	0.74		0.33	0.75	
Uniform Delay, d1		28.2			25.1		13.0	13.5		12.1	13.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		109.3			1.1		0.4	1.6		0.9	1.8	
Delay (s)		137.6			26.2		13.4	15.1		13.0	14.8	
Level of Service		F			C		B	B		B	B	
Approach Delay (s)		137.6			26.2			15.1			14.7	
Approach LOS		F			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	69.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	1054	84	10	906	19	75	13	3	43	15	236
Future Volume (vph)	251	1054	84	10	906	19	75	13	3	43	15	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		6.5	6.5	6.5		4.0		6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96		0.95	0.98	1.00
Satd. Flow (prot)	1770	3502		1770	3539	1583		1782		1681	1739	1583
Flt Permitted	0.13	1.00		0.21	1.00	1.00		0.96		0.95	0.98	1.00
Satd. Flow (perm)	235	3502		388	3539	1583		1782		1681	1739	1583
Peak-hour factor, PHF	0.84	0.86	0.91	0.62	0.85	0.68	0.69	0.65	0.75	0.77	0.54	0.87
Adj. Flow (vph)	299	1226	92	16	1066	28	109	20	4	56	28	271
RTOR Reduction (vph)	0	5	0	0	0	14	0	1	0	0	0	246
Lane Group Flow (vph)	299	1313	0	16	1066	14	0	132	0	41	43	25
Turn Type	pm+pt	NA		Perm	NA	pt+ov	Split	NA		Split	NA	Perm
Protected Phases	5	2			6	6 4	3	3		4	4	
Permitted Phases	2			6								4
Actuated Green, G (s)	63.0	63.0		42.1	42.1	51.2		11.4		9.1	9.1	9.1
Effective Green, g (s)	63.0	63.0		42.1	42.1	51.2		11.4		9.1	9.1	9.1
Actuated g/C Ratio	0.63	0.63		0.42	0.42	0.51		0.11		0.09	0.09	0.09
Clearance Time (s)	5.5	6.5		6.5	6.5			4.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	384	2206		163	1489	810		203		152	158	144
v/s Ratio Prot	c0.12	0.37			0.30	0.01		c0.07		0.02	c0.02	
v/s Ratio Perm	c0.37			0.04								0.02
v/c Ratio	0.78	0.60		0.10	0.72	0.02		0.65		0.27	0.27	0.17
Uniform Delay, d1	20.0	11.0		17.5	24.0	12.0		42.4		42.4	42.4	42.0
Progression Factor	1.00	1.00		0.82	1.14	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	9.6	1.2		1.1	2.7	0.0		7.3		1.0	0.9	0.6
Delay (s)	29.6	12.1		15.5	30.1	12.0		49.7		43.3	43.3	42.5
Level of Service	C	B		B	C	B		D		D	D	D
Approach Delay (s)		15.4			29.5			49.7			42.7	
Approach LOS		B			C			D			D	

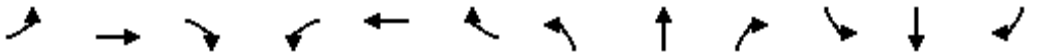
Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	850	297	156	691	201	139
Future Volume (vph)	850	297	156	691	201	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.22	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	414	3539	3433	1583
Peak-hour factor, PHF	0.88	0.81	0.91	0.88	0.97	0.81
Adj. Flow (vph)	966	367	171	785	207	172
RTOR Reduction (vph)	0	220	0	0	0	25
Lane Group Flow (vph)	966	147	171	785	207	147
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	1415	633	165	1415	1373	633
v/s Ratio Prot	0.27			0.22	0.06	
v/s Ratio Perm		0.09	c0.41			c0.09
v/c Ratio	0.68	0.23	1.04	0.55	0.15	0.23
Uniform Delay, d1	11.1	8.9	13.5	10.4	8.6	8.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	0.9	80.0	1.6	0.2	0.9
Delay (s)	13.8	9.8	93.5	12.0	8.9	9.8
Level of Service	B	A	F	B	A	A
Approach Delay (s)	12.7			26.6	9.3	
Approach LOS	B			C	A	

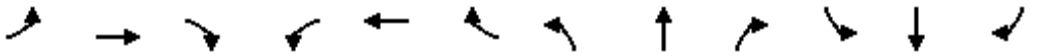
Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	201	691	73	272	1	549	12	40	8	20	15
Future Volume (vph)	12	201	691	73	272	1	549	12	40	8	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.5	4.0		5.0	5.0	5.0		5.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)		3528	1583	1770	3533		1681	1689	1583		1766	
Flt Permitted		0.93	1.00	0.54	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (perm)		3290	1583	1003	3533		1681	1689	1583		1766	
Peak-hour factor, PHF	0.75	0.82	0.91	0.56	0.84	0.25	0.83	0.75	0.77	0.50	0.83	0.94
Adj. Flow (vph)	16	245	759	130	324	4	661	16	52	16	24	16
RTOR Reduction (vph)	0	0	357	0	1	0	0	0	47	0	15	0
Lane Group Flow (vph)	0	261	402	130	327	0	337	340	5	0	41	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases		2		1	6		3	3		4	4	
Permitted Phases	2		2	6					3			
Actuated Green, G (s)		46.6	46.6	61.1	61.1		9.0	9.0	9.0		3.9	
Effective Green, g (s)		46.6	46.6	61.1	61.1		9.0	9.0	9.0		3.9	
Actuated g/C Ratio		0.53	0.53	0.69	0.69		0.10	0.10	0.10		0.04	
Clearance Time (s)		4.0	4.0	4.5	4.0		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		1742	838	783	2453		171	172	161		78	
v/s Ratio Prot				c0.02	0.09		0.20	c0.20			c0.02	
v/s Ratio Perm		0.08	c0.25	0.10					0.00			
v/c Ratio		0.15	0.48	0.17	0.13		1.97	1.98	0.03		0.52	
Uniform Delay, d1		10.6	13.1	4.6	4.5		39.5	39.5	35.6		41.1	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2		0.2	2.0	0.1	0.1		457.3	459.8	0.1		6.2	
Delay (s)		10.8	15.0	4.7	4.6		496.8	499.3	35.7		47.3	
Level of Service		B	B	A	A		F	F	D		D	
Approach Delay (s)		13.9			4.7			465.0			47.3	
Approach LOS		B			A			F			D	

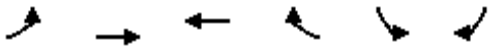
Intersection Summary			
HCM 2000 Control Delay	158.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	88.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	224	19	15	241	44	17	61	55	22	53	30
Future Volume (vph)	32	224	19	15	241	44	17	61	55	22	53	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5			5.0			5.0	5.0
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	0.98			0.98			0.94			1.00	0.85
Flt Protected	0.95	1.00			1.00			0.99			0.98	1.00
Satd. Flow (prot)	1770	1834			1810			1569			1832	1583
Flt Permitted	0.35	1.00			0.95			0.96			0.89	1.00
Satd. Flow (perm)	650	1834			1735			1514			1655	1583
Peak-hour factor, PHF	0.57	0.92	0.68	0.54	0.93	0.69	0.71	0.90	0.81	0.61	0.74	0.83
Adj. Flow (vph)	56	243	28	28	259	64	24	68	68	36	72	36
RTOR Reduction (vph)	0	7	0	0	13	0	0	18	0	0	0	14
Lane Group Flow (vph)	56	264	0	0	338	0	0	142	0	0	108	22
Parking (#/hr)							0	0	0			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	23.7	23.7			23.7			55.8			55.8	55.8
Effective Green, g (s)	23.7	23.7			23.7			55.8			55.8	55.8
Actuated g/C Ratio	0.26	0.26			0.26			0.62			0.62	0.62
Clearance Time (s)	5.5	5.5			5.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	171	482			456			938			1026	981
v/s Ratio Prot		0.14										
v/s Ratio Perm	0.09				c0.19			c0.09			0.07	0.01
v/c Ratio	0.33	0.55			0.74			0.15			0.11	0.02
Uniform Delay, d1	26.7	28.5			30.3			7.2			7.0	6.6
Progression Factor	0.83	0.96			1.00			1.00			1.00	1.00
Incremental Delay, d2	4.4	3.9			10.4			0.3			0.2	0.0
Delay (s)	26.5	31.2			40.7			7.5			7.2	6.6
Level of Service	C	C			D			A			A	A
Approach Delay (s)		30.4			40.7			7.5			7.0	
Approach LOS		C			D			A			A	

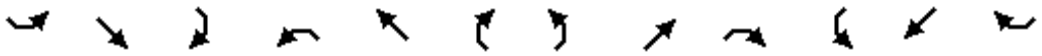
Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	172	172	156	31	73	94
Future Volume (vph)	172	172	156	31	73	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	0.97		0.93	
Flt Protected		0.98	1.00		0.98	
Satd. Flow (prot)		1817	1806		1691	
Flt Permitted		0.72	1.00		0.98	
Satd. Flow (perm)		1337	1806		1691	
Peak-hour factor, PHF	0.83	0.83	0.81	0.55	0.68	0.81
Adj. Flow (vph)	207	207	193	56	107	116
RTOR Reduction (vph)	0	0	11	0	75	0
Lane Group Flow (vph)	0	414	238	0	148	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)		29.0	29.0		11.0	
Effective Green, g (s)		29.0	29.0		11.0	
Actuated g/C Ratio		0.56	0.56		0.21	
Clearance Time (s)		6.0	6.0		6.0	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		745	1007		357	
v/s Ratio Prot			0.13		c0.09	
v/s Ratio Perm		c0.31				
v/c Ratio		0.56	0.24		0.41	
Uniform Delay, d1		7.4	5.9		17.7	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		3.0	0.6		0.8	
Delay (s)		10.3	6.4		18.5	
Level of Service		B	A		B	
Approach Delay (s)		10.3	6.4		18.5	
Approach LOS		B	A		B	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	52.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

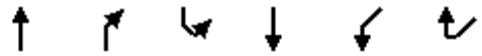
c Critical Lane Group



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	56	94	42	91	215	93	54	264	82	47	166	113
Future Volume (vph)	56	94	42	91	215	93	54	264	82	47	166	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1749	
Flt Permitted	0.61	1.00	1.00	0.69	1.00	1.00	0.58	1.00	1.00	0.58	1.00	
Satd. Flow (perm)	1129	1863	1583	1287	1863	1583	1072	1863	1583	1088	1749	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	102	46	99	234	101	59	287	89	51	180	123
RTOR Reduction (vph)	0	0	35	0	0	78	0	0	41	0	31	0
Lane Group Flow (vph)	61	102	11	99	234	23	59	287	48	51	272	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	12.4	12.4	12.4	12.4	12.4	12.4	29.1	29.1	29.1	29.1	29.1	
Effective Green, g (s)	12.4	12.4	12.4	12.4	12.4	12.4	29.1	29.1	29.1	29.1	29.1	
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23	0.23	0.54	0.54	0.54	0.54	0.54	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	261	431	366	298	431	366	583	1013	861	591	951	
v/s Ratio Prot		0.05			c0.13			0.15			c0.16	
v/s Ratio Perm	0.05		0.01	0.08		0.01	0.06		0.03	0.05		
v/c Ratio	0.23	0.24	0.03	0.33	0.54	0.06	0.10	0.28	0.06	0.09	0.29	
Uniform Delay, d1	16.7	16.7	15.9	17.1	18.1	16.0	5.9	6.6	5.7	5.8	6.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.3	0.0	0.7	1.4	0.1	0.3	0.7	0.1	0.1	0.2	
Delay (s)	17.2	17.0	15.9	17.8	19.5	16.1	6.2	7.3	5.9	5.9	6.8	
Level of Service	B	B	B	B	B	B	A	A	A	A	A	
Approach Delay (s)		16.8			18.3			6.8			6.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

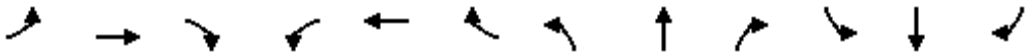
c Critical Lane Group



Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	82	289	66	166	379	65
Future Volume (vph)	82	289	66	166	379	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.89			1.00	0.98	
Flt Protected	1.00			0.99	0.96	
Satd. Flow (prot)	1663			1839	1751	
Flt Permitted	1.00			0.79	0.96	
Satd. Flow (perm)	1663			1467	1751	
Peak-hour factor, PHF	0.89	0.81	0.79	0.70	0.88	0.86
Adj. Flow (vph)	92	357	84	237	431	76
RTOR Reduction (vph)	171	0	0	0	8	0
Lane Group Flow (vph)	278	0	0	321	499	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	4	
Permitted Phases			6			
Actuated Green, G (s)	39.1			39.1	24.0	
Effective Green, g (s)	39.1			39.1	24.0	
Actuated g/C Ratio	0.52			0.52	0.32	
Clearance Time (s)	6.0			6.0	6.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	865			763	559	
v/s Ratio Prot	0.17				c0.28	
v/s Ratio Perm				c0.22		
v/c Ratio	0.32			0.42	0.89	
Uniform Delay, d1	10.4			11.0	24.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.0			1.7	16.4	
Delay (s)	11.3			12.8	40.7	
Level of Service	B			B	D	
Approach Delay (s)	11.3			12.8	40.7	
Approach LOS	B			B	D	

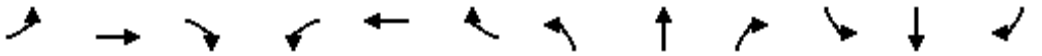
Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	105	33	3	55	4	27	268	4	14	322	97
Future Volume (vph)	98	105	33	3	55	4	27	268	4	14	322	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5		5.0	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96			0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1593	1613			1485		1593	1503		1593	1457	
Flt Permitted	0.95	1.00			1.00		0.18	1.00		0.58	1.00	
Satd. Flow (perm)	1593	1613			1485		298	1503		968	1457	
Peak-hour factor, PHF	0.82	0.88	0.82	0.38	0.72	0.50	0.68	0.92	0.50	0.50	0.86	0.87
Adj. Flow (vph)	120	119	40	8	76	8	40	291	8	28	374	111
RTOR Reduction (vph)	0	13	0	0	4	0	0	1	0	0	12	0
Lane Group Flow (vph)	120	146	0	0	88	0	40	298	0	28	473	0
Parking (#/hr)				0	0	0		0	0		0	0
Turn Type	Split	NA		Split	NA		pm+pt	NA		Perm	NA	
Protected Phases	4	4		3	3		1	6			2	
Permitted Phases							6			2		
Actuated Green, G (s)	22.6	22.6			8.5		42.4	42.4		29.4	29.4	
Effective Green, g (s)	22.6	22.6			8.5		42.4	42.4		29.4	29.4	
Actuated g/C Ratio	0.25	0.25			0.09		0.47	0.47		0.33	0.33	
Clearance Time (s)	5.5	5.5			5.5		5.0	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	400	405			140		255	708		316	475	
v/s Ratio Prot	0.08	c0.09			c0.06		0.01	c0.20			c0.32	
v/s Ratio Perm							0.06			0.03		
v/c Ratio	0.30	0.36			0.63		0.16	0.42		0.09	1.00	
Uniform Delay, d1	27.3	27.8			39.2		15.7	15.7		21.0	30.2	
Progression Factor	1.09	1.10			1.00		1.37	1.18		0.89	0.90	
Incremental Delay, d2	1.9	2.5			8.9		1.3	1.8		0.5	39.5	
Delay (s)	31.6	32.9			48.2		22.8	20.3		19.2	66.7	
Level of Service	C	C			D		C	C		B	E	
Approach Delay (s)		32.3			48.2			20.6			64.1	
Approach LOS		C			D			C			E	

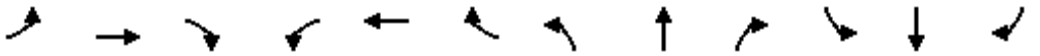
Intersection Summary			
HCM 2000 Control Delay	43.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	196	12	84	140	71	16	294	59	69	322	30
Future Volume (vph)	85	196	12	84	140	71	16	294	59	69	322	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.95		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1845		1770	1765		1770	1809		1770	1835	
Flt Permitted	0.39	1.00		0.39	1.00		0.34	1.00		0.53	1.00	
Satd. Flow (perm)	724	1845		726	1765		640	1809		988	1835	
Peak-hour factor, PHF	0.76	0.84	0.75	0.84	0.88	0.84	0.50	0.93	0.78	0.78	0.97	0.83
Adj. Flow (vph)	112	233	16	100	159	85	32	316	76	88	332	36
RTOR Reduction (vph)	0	2	0	0	22	0	0	9	0	0	4	0
Lane Group Flow (vph)	112	247	0	100	222	0	32	383	0	88	364	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.9	17.1		24.5	16.9		38.0	38.0		40.5	40.0	
Effective Green, g (s)	24.9	17.1		24.5	16.9		38.0	38.0		40.5	40.0	
Actuated g/C Ratio	0.28	0.19		0.27	0.19		0.42	0.42		0.45	0.44	
Clearance Time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	290	350		285	331		324	763		499	815	
v/s Ratio Prot	c0.03	c0.13		0.03	0.13		0.00	c0.21		0.01	c0.20	
v/s Ratio Perm	0.07			0.07			0.04			0.07		
v/c Ratio	0.39	0.70		0.35	0.67		0.10	0.50		0.18	0.45	
Uniform Delay, d1	25.4	34.1		25.5	34.0		16.2	19.1		14.9	17.3	
Progression Factor	1.00	1.00		0.72	0.86		0.97	1.03		1.26	1.28	
Incremental Delay, d2	0.9	6.3		0.7	5.1		0.1	2.3		0.1	1.5	
Delay (s)	26.2	40.4		19.2	34.3		15.8	21.9		19.0	23.6	
Level of Service	C	D		B	C		B	C		B	C	
Approach Delay (s)		36.0			29.9			21.4			22.8	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	28	16	119	18	20	2	254	86	28	305	8
Future Volume (vph)	6	28	16	119	18	20	2	254	86	28	305	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.98		1.00	0.95		1.00	0.99	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1756			1766		1770	1776		1770	1852	
Flt Permitted		0.95			0.79		0.53	1.00		0.43	1.00	
Satd. Flow (perm)		1676			1441		979	1776		807	1852	
Peak-hour factor, PHF	0.50	0.78	0.57	0.88	0.56	0.71	0.25	0.92	0.69	0.58	0.79	0.50
Adj. Flow (vph)	12	36	28	135	32	28	8	276	125	48	386	16
RTOR Reduction (vph)	0	23	0	0	8	0	0	12	0	0	1	0
Lane Group Flow (vph)	0	53	0	0	187	0	8	389	0	48	401	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		8			4			2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		17.6			17.6		52.7	52.7		61.4	61.4	
Effective Green, g (s)		17.6			17.6		52.7	52.7		61.4	61.4	
Actuated g/C Ratio		0.20			0.20		0.59	0.59		0.68	0.68	
Clearance Time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Vehicle Extension (s)		4.0			3.0		4.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		327			281		573	1039		590	1263	
v/s Ratio Prot								c0.22		0.00	c0.22	
v/s Ratio Perm		0.03			c0.13		0.01			0.05		
v/c Ratio		0.16			0.67		0.01	0.37		0.08	0.32	
Uniform Delay, d1		30.1			33.5		7.8	9.9		5.3	5.8	
Progression Factor		1.00			1.00		1.00	1.00		0.29	0.26	
Incremental Delay, d2		0.3			5.8		0.0	1.0		0.0	0.3	
Delay (s)		30.4			39.3		7.8	10.9		1.5	1.9	
Level of Service		C			D		A	B		A	A	
Approach Delay (s)		30.4			39.3			10.9			1.8	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1147	66	172	1303	77	187
Future Volume (vph)	1147	66	172	1303	77	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.5	6.5
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3503		1770	3539	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3503		1770	3539	1770	1583
Peak-hour factor, PHF	0.90	0.72	0.80	0.97	0.62	0.71
Adj. Flow (vph)	1274	92	215	1343	124	263
RTOR Reduction (vph)	5	0	0	0	0	198
Lane Group Flow (vph)	1361	0	215	1343	124	65
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	6		5	2	8	
Permitted Phases						8
Actuated Green, G (s)	59.0		11.0	61.6	11.0	11.0
Effective Green, g (s)	59.0		11.0	61.6	11.0	11.0
Actuated g/C Ratio	0.59		0.11	0.62	0.11	0.11
Clearance Time (s)	6.0		6.0	6.0	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2077		195	2190	195	175
v/s Ratio Prot	c0.39		c0.12	c0.38	c0.07	
v/s Ratio Perm						0.04
v/c Ratio	0.66		1.10	0.61	0.64	0.37
Uniform Delay, d1	13.5		44.2	11.6	42.3	41.0
Progression Factor	1.00		1.28	0.30	1.00	1.00
Incremental Delay, d2	1.6		86.3	1.0	6.6	1.3
Delay (s)	15.1		142.8	4.4	49.0	42.4
Level of Service	B		F	A	D	D
Approach Delay (s)	15.1			23.5	44.5	
Approach LOS	B			C	D	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	99.5	Sum of lost time (s)	18.5
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	251	22	39	256	16	76
Future Volume (vph)	251	22	39	256	16	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	
Lane Util. Factor	0.95		1.00	1.00	1.00	
Frt	0.99		1.00	1.00	0.89	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	3496		1770	1863	1640	
Flt Permitted	1.00		0.95	1.00	0.99	
Satd. Flow (perm)	3496		1770	1863	1640	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	273	24	42	278	17	83
RTOR Reduction (vph)	4	0	0	0	75	0
Lane Group Flow (vph)	293	0	42	278	25	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	5		6	2	4	
Permitted Phases					4	
Actuated Green, G (s)	39.0		24.0	49.0	10.3	
Effective Green, g (s)	39.0		24.0	49.0	10.3	
Actuated g/C Ratio	0.36		0.22	0.45	0.09	
Clearance Time (s)	6.0		6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1253		390	839	155	
v/s Ratio Prot	c0.08		0.02	c0.15	c0.02	
v/s Ratio Perm						
v/c Ratio	0.23		0.11	0.33	0.16	
Uniform Delay, d1	24.4		33.9	19.3	45.3	
Progression Factor	1.00		0.65	0.37	1.00	
Incremental Delay, d2	0.4		0.5	1.0	0.5	
Delay (s)	24.9		22.7	8.3	45.8	
Level of Service	C		C	A	D	
Approach Delay (s)	24.9			10.2	45.8	
Approach LOS	C			B	D	

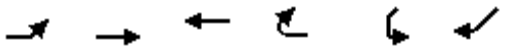
Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	108.8	Sum of lost time (s)	24.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	1	0	1	152	1	44	19	510	0	1	483	166
Future Volume (vph)	1	0	1	152	1	44	19	510	0	1	483	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.93			0.97		1.00	1.00		1.00	0.96	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1695			1735		1770	1863		1770	1784	
Flt Permitted		0.91			0.78		0.16	1.00		0.27	1.00	
Satd. Flow (perm)		1586			1403		306	1863		498	1784	
Peak-hour factor, PHF	0.25	0.25	0.25	0.75	0.25	0.61	0.53	0.87	0.25	0.25	0.94	0.83
Adj. Flow (vph)	4	0	4	203	4	72	36	586	0	4	514	200
RTOR Reduction (vph)	0	5	0	0	14	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	3	0	0	265	0	36	586	0	4	692	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)		32.7			32.7		38.8	38.8		38.8	38.8	
Effective Green, g (s)		32.7			32.7		38.8	38.8		38.8	38.8	
Actuated g/C Ratio		0.41			0.41		0.48	0.48		0.48	0.48	
Clearance Time (s)		4.0			4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		648			573		148	903		241	865	
v/s Ratio Prot								0.31			c0.39	
v/s Ratio Perm		0.00			c0.19		0.12			0.01		
v/c Ratio		0.01			0.46		0.24	0.65		0.02	0.80	
Uniform Delay, d1		14.0			17.2		12.0	15.5		10.7	17.3	
Progression Factor		1.00			1.00		0.93	0.92		1.56	1.79	
Incremental Delay, d2		0.0			2.7		3.7	3.4		0.1	7.1	
Delay (s)		14.0			19.9		14.8	17.7		16.8	38.2	
Level of Service		B			B		B	B		B	D	
Approach Delay (s)		14.0			19.9			17.5			38.1	
Approach LOS		B			B			B			D	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

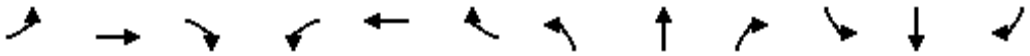
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	182	435	386	112	229	204
Future Volume (vph)	182	435	386	112	229	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.34	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	637	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.88	0.88	0.89	0.94	0.91	0.86
Adj. Flow (vph)	207	494	434	119	252	237
RTOR Reduction (vph)	0	0	0	42	0	188
Lane Group Flow (vph)	207	494	434	77	252	49
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Actuated Green, G (s)	51.3	51.3	36.2	36.2	16.7	16.7
Effective Green, g (s)	51.3	51.3	36.2	36.2	16.7	16.7
Actuated g/C Ratio	0.64	0.64	0.45	0.45	0.21	0.21
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	537	1194	843	716	369	330
v/s Ratio Prot	0.04	c0.27	c0.23		c0.14	
v/s Ratio Perm	0.20			0.05		0.03
v/c Ratio	0.39	0.41	0.51	0.11	0.68	0.15
Uniform Delay, d1	7.4	7.0	15.6	12.6	29.2	25.9
Progression Factor	0.74	0.70	1.14	1.47	1.00	1.00
Incremental Delay, d2	0.4	0.9	2.2	0.3	5.2	0.2
Delay (s)	5.9	5.8	20.0	18.8	34.4	26.1
Level of Service	A	A	B	B	C	C
Approach Delay (s)		5.8	19.7		30.3	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	235	96	23	5	190	300	8	246	9
Future Volume (vph)	0	0	0	235	96	23	5	190	300	8	246	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			5.5	5.5		5.5	
Lane Util. Factor					1.00			1.00	1.00		1.00	
Frt					0.99			1.00	0.85		0.99	
Flt Protected					0.97			1.00	1.00		1.00	
Satd. Flow (prot)					1784			1858	1583		1843	
Flt Permitted					0.81			0.98	1.00		0.99	
Satd. Flow (perm)					1490			1829	1583		1822	
Peak-hour factor, PHF	0.92	0.92	0.92	0.79	0.71	0.52	0.42	0.77	0.80	0.67	0.87	0.45
Adj. Flow (vph)	0	0	0	297	135	44	12	247	375	12	283	20
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	183	0	2	0
Lane Group Flow (vph)	0	0	0	0	472	0	0	259	192	0	313	0
Turn Type				Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)					33.0			46.0	46.0		46.0	
Effective Green, g (s)					33.0			46.0	46.0		46.0	
Actuated g/C Ratio					0.37			0.51	0.51		0.51	
Clearance Time (s)					5.5			5.5	5.5		5.5	
Vehicle Extension (s)					3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)					546			934	809		931	
v/s Ratio Prot												
v/s Ratio Perm					c0.32			0.14	0.12		c0.17	
v/c Ratio					0.86			0.28	0.24		0.34	
Uniform Delay, d1					26.4			12.5	12.2		13.0	
Progression Factor					1.00			1.25	3.17		1.00	
Incremental Delay, d2					13.3			0.7	0.6		1.0	
Delay (s)					39.7			16.3	39.4		14.0	
Level of Service					D			B	D		B	
Approach Delay (s)		0.0			39.7			30.0			14.0	
Approach LOS		A			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

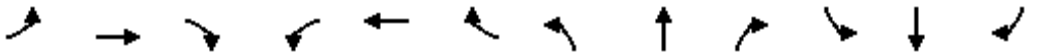
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	462	158	361	380	94	371
Future Volume (vph)	462	158	361	380	94	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.32	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	589	1863	1770	1583
Peak-hour factor, PHF	0.90	0.82	0.89	0.96	0.87	0.89
Adj. Flow (vph)	513	193	406	396	108	417
RTOR Reduction (vph)	0	93	0	0	0	362
Lane Group Flow (vph)	513	100	406	396	108	55
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	41.3	41.3	59.4	59.4	10.6	10.6
Effective Green, g (s)	41.3	41.3	59.4	59.4	10.6	10.6
Actuated g/C Ratio	0.52	0.52	0.74	0.74	0.13	0.13
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	961	817	630	1383	234	209
v/s Ratio Prot	0.28		c0.11	0.21	c0.06	
v/s Ratio Perm		0.06	c0.37			0.03
v/c Ratio	0.53	0.12	0.64	0.29	0.46	0.26
Uniform Delay, d1	12.9	10.0	6.2	3.4	32.1	31.2
Progression Factor	0.91	1.09	1.53	0.72	1.00	1.00
Incremental Delay, d2	1.9	0.3	1.9	0.4	1.4	0.7
Delay (s)	13.7	11.2	11.4	2.9	33.5	31.9
Level of Service	B	B	B	A	C	C
Approach Delay (s)	13.0			7.2	32.2	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

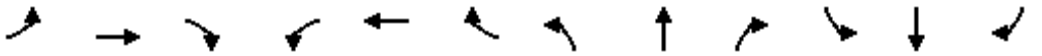
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	399	23	20	373	46	190	70	20	34	88	150
Future Volume (vph)	129	399	23	20	373	46	190	70	20	34	88	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.96		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1848		1770	1825		1770	1793		1770	1690	
Flt Permitted	0.30	1.00		0.51	1.00		0.39	1.00		0.68	1.00	
Satd. Flow (perm)	564	1848		945	1825		733	1793		1276	1690	
Peak-hour factor, PHF	0.70	0.96	0.96	0.71	0.90	0.72	0.93	0.83	0.71	0.85	0.79	0.83
Adj. Flow (vph)	184	416	24	28	414	64	204	84	28	40	111	181
RTOR Reduction (vph)	0	2	0	0	4	0	0	13	0	0	62	0
Lane Group Flow (vph)	184	438	0	28	474	0	204	99	0	40	230	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	59.0	59.0		43.1	43.1		24.0	24.0		24.0	24.0	
Effective Green, g (s)	59.0	59.0		43.1	43.1		24.0	24.0		24.0	24.0	
Actuated g/C Ratio	0.62	0.62		0.45	0.45		0.25	0.25		0.25	0.25	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	475	1147		428	827		185	452		322	426	
v/s Ratio Prot	0.04	c0.24			c0.26			0.06			0.14	
v/s Ratio Perm	0.20			0.03			c0.28			0.03		
v/c Ratio	0.39	0.38		0.07	0.57		1.10	0.22		0.12	0.54	
Uniform Delay, d1	9.9	8.9		14.6	19.2		35.5	28.1		27.4	30.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.0		0.3	2.9		96.3	0.2		0.2	1.3	
Delay (s)	10.5	9.9		14.9	22.0		131.8	28.3		27.6	32.0	
Level of Service	B	A		B	C		F	C		C	C	
Approach Delay (s)		10.1			21.6			95.2			31.5	
Approach LOS		B			C			F			C	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

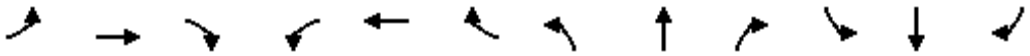
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1165	85	99	1193	11	76	7	77	17	9	49
Future Volume (vph)	44	1165	85	99	1193	11	76	7	77	17	9	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1609		1770	1627	
Flt Permitted	0.16	1.00	1.00	0.15	1.00	1.00	0.42	1.00		0.67	1.00	
Satd. Flow (perm)	304	3539	1583	287	3539	1583	791	1609		1253	1627	
Peak-hour factor, PHF	0.69	0.95	0.82	0.82	0.95	0.34	0.70	0.58	0.64	0.71	0.75	0.77
Adj. Flow (vph)	64	1226	104	121	1256	32	109	12	120	24	12	64
RTOR Reduction (vph)	0	0	43	0	0	12	0	107	0	0	60	0
Lane Group Flow (vph)	64	1226	61	121	1256	20	109	25	0	24	16	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6		6	2		2	4			8		
Actuated Green, G (s)	76.5	70.8	70.8	81.3	73.2	73.2	23.6	13.1		12.0	7.5	
Effective Green, g (s)	76.5	70.8	70.8	81.3	73.2	73.2	23.6	13.1		12.0	7.5	
Actuated g/C Ratio	0.64	0.59	0.59	0.68	0.61	0.61	0.20	0.11		0.10	0.06	
Clearance Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	263	2088	933	294	2158	965	246	175		144	101	
v/s Ratio Prot	0.01	0.35		c0.03	c0.35		c0.04	0.02		0.01	0.01	
v/s Ratio Perm	0.14		0.04	0.25		0.01	c0.05			0.01		
v/c Ratio	0.24	0.59	0.07	0.41	0.58	0.02	0.44	0.14		0.17	0.16	
Uniform Delay, d1	9.9	15.4	10.5	10.0	14.1	9.2	41.4	48.4		49.3	53.3	
Progression Factor	1.00	1.00	1.00	1.09	0.18	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.2	0.1	0.6	0.8	0.0	1.3	0.4		0.5	0.7	
Delay (s)	10.4	16.7	10.6	11.5	3.3	9.3	42.7	48.8		49.8	54.0	
Level of Service	B	B	B	B	A	A	D	D		D	D	
Approach Delay (s)		15.9			4.1			46.0			53.0	
Approach LOS		B			A			D			D	

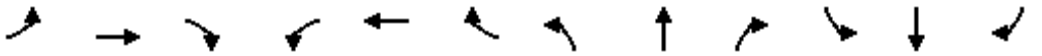
Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	23.5
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	35	17	2	18	7	1	359	10	0	414	9
Future Volume (vph)	0	35	17	2	18	7	1	359	10	0	414	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5			5.5			5.5	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.95			0.96			0.99			1.00	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		1594			1601			1667			1671	
Flt Permitted		1.00			0.96			1.00			1.00	
Satd. Flow (perm)		1594			1541			1662			1671	
Peak-hour factor, PHF	0.25	0.62	0.53	0.50	0.75	0.58	0.25	0.94	0.62	0.25	0.91	0.75
Adj. Flow (vph)	0	56	32	4	24	12	4	382	16	0	455	12
RTOR Reduction (vph)	0	29	0	0	11	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	59	0	0	29	0	0	401	0	0	466	0
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type		NA		Perm	NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.0			8.0			71.0			71.0	
Effective Green, g (s)		8.0			8.0			71.0			71.0	
Actuated g/C Ratio		0.09			0.09			0.79			0.79	
Clearance Time (s)		5.5			5.5			5.5			5.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		141			136			1311			1318	
v/s Ratio Prot		c0.04									c0.28	
v/s Ratio Perm					0.02			0.24				
v/c Ratio		0.42			0.21			0.31			0.35	
Uniform Delay, d1		38.8			38.1			2.6			2.8	
Progression Factor		1.00			1.00			0.76			0.99	
Incremental Delay, d2		2.0			0.8			0.6			0.7	
Delay (s)		40.8			38.9			2.6			3.5	
Level of Service		D			D			A			A	
Approach Delay (s)		40.8			38.9			2.6			3.5	
Approach LOS		D			D			A			A	

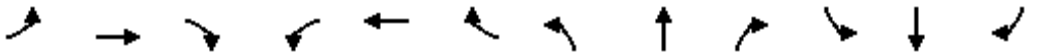
Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	219	23	8	137	12	10	31	11	18	48	96
Future Volume (vph)	41	219	23	8	137	12	10	31	11	18	48	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5			5.5			5.5	5.5
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.98		1.00	0.99			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1770	1818		1770	1837			1793			1831	1583
Flt Permitted	0.65	1.00		0.59	1.00			0.89			0.86	1.00
Satd. Flow (perm)	1208	1818		1098	1837			1608			1600	1583
Peak-hour factor, PHF	0.79	0.94	0.52	0.50	0.88	0.75	0.62	0.86	0.92	0.56	0.80	0.63
Adj. Flow (vph)	52	233	44	16	156	16	16	36	12	32	60	152
RTOR Reduction (vph)	0	12	0	0	6	0	0	10	0	0	0	128
Lane Group Flow (vph)	52	265	0	16	166	0	0	54	0	0	92	24
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	27.0	27.0		27.0	27.0			7.0			7.0	7.0
Effective Green, g (s)	27.0	27.0		27.0	27.0			7.0			7.0	7.0
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.16			0.16	0.16
Clearance Time (s)	5.5	5.5		5.5	5.5			5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	724	1090		658	1102			250			248	246
v/s Ratio Prot		c0.15			0.09							
v/s Ratio Perm	0.04			0.01				0.03			c0.06	0.01
v/c Ratio	0.07	0.24		0.02	0.15			0.22			0.37	0.10
Uniform Delay, d1	3.8	4.2		3.7	4.0			16.6			17.0	16.3
Progression Factor	1.66	1.83		1.15	1.09			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.5		0.1	0.2			0.4			0.9	0.2
Delay (s)	6.4	8.2		4.2	4.5			17.0			18.0	16.5
Level of Service	A	A		A	A			B			B	B
Approach Delay (s)		8.0			4.5			17.0			17.0	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

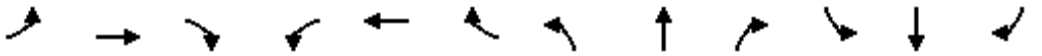
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	256	23	11	148	12	42	12	22	21	46	52
Future Volume (vph)	11	256	23	11	148	12	42	12	22	21	46	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.99			0.99		1.00	0.90		1.00	0.92	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1838			1836		1770	1685		1770	1714	
Flt Permitted		0.99			0.97		0.68	1.00		0.73	1.00	
Satd. Flow (perm)		1820			1792		1266	1685		1357	1714	
Peak-hour factor, PHF	0.92	0.88	0.82	0.69	0.71	0.60	0.81	0.75	0.79	0.66	0.82	0.81
Adj. Flow (vph)	12	291	28	16	208	20	52	16	28	32	56	64
RTOR Reduction (vph)	0	5	0	0	5	0	0	24	0	0	55	0
Lane Group Flow (vph)	0	326	0	0	239	0	52	20	0	32	65	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		27.7			27.7		6.3	6.3		6.3	6.3	
Effective Green, g (s)		27.7			27.7		6.3	6.3		6.3	6.3	
Actuated g/C Ratio		0.62			0.62		0.14	0.14		0.14	0.14	
Clearance Time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		1120			1103		177	235		189	239	
v/s Ratio Prot								0.01			0.04	
v/s Ratio Perm		c0.18			0.13		c0.04			0.02		
v/c Ratio		0.29			0.22		0.29	0.08		0.17	0.27	
Uniform Delay, d1		4.1			3.8		17.4	16.8		17.0	17.3	
Progression Factor		1.00			0.98		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.7			0.4		0.9	0.2		0.4	0.6	
Delay (s)		4.7			4.2		18.3	17.0		17.5	17.9	
Level of Service		A			A		B	B		B	B	
Approach Delay (s)		4.7			4.2			17.7			17.8	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	182	184	37	209	233	63	86	322	125	57	443	296
Future Volume (vph)	182	184	37	209	233	63	86	322	125	57	443	296
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
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	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.46	1.00	1.00	0.59	1.00	1.00	0.13	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)	848	1863	1583	1092	1863	1583	245	1863	1583	566	1863	1583
Peak-hour factor, PHF	0.89	0.92	0.77	0.76	0.75	0.72	0.90	0.89	0.89	0.84	0.89	0.81
Adj. Flow (vph)	204	200	48	275	311	88	96	362	140	68	498	365
RTOR Reduction (vph)	0	0	31	0	0	56	0	0	100	0	0	95
Lane Group Flow (vph)	204	200	17	275	311	32	96	362	40	68	498	270
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	48.7	39.1	39.1	49.3	39.4	39.4	37.8	30.4	30.4	36.2	29.6	29.6
Effective Green, g (s)	48.7	39.1	39.1	49.3	39.4	39.4	37.8	30.4	30.4	36.2	29.6	29.6
Actuated g/C Ratio	0.45	0.36	0.36	0.46	0.37	0.37	0.35	0.28	0.28	0.34	0.28	0.28
Clearance Time (s)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	466	677	575	563	682	580	191	526	447	264	512	435
v/s Ratio Prot	0.04	0.11		c0.04	0.17		c0.03	0.19		0.02	c0.27	
v/s Ratio Perm	0.16		0.01	c0.18		0.02	0.14		0.03	0.07		0.17
v/c Ratio	0.44	0.30	0.03	0.49	0.46	0.06	0.50	0.69	0.09	0.26	0.97	0.62
Uniform Delay, d1	18.5	24.4	22.0	18.9	25.9	22.0	27.0	34.3	28.4	25.4	38.5	34.0
Progression 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
Incremental Delay, d2	0.7	1.1	0.1	0.7	0.5	0.0	2.1	3.7	0.1	0.5	32.6	2.7
Delay (s)	19.2	25.5	22.1	19.5	26.4	22.1	29.1	38.1	28.4	26.0	71.2	36.8
Level of Service	B	C	C	B	C	C	C	D	C	C	E	D
Approach Delay (s)		22.3			23.0			34.4			54.4	
Approach LOS		C			C			C			D	

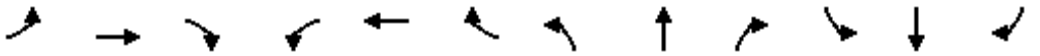
Intersection Summary			
HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	107.5	Sum of lost time (s)	21.5
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	7	394	108	44	638	28	32	47	23	230	33	98
Future Volume (vph)	7	394	108	44	638	28	32	47	23	230	33	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99			0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1847			1768			1786	1583
Flt Permitted	0.29	1.00	1.00	0.28	1.00			0.98			0.96	1.00
Satd. Flow (perm)	535	1863	1583	517	1847			1768			1786	1583
Peak-hour factor, PHF	0.58	0.83	0.79	0.79	0.96	0.70	0.67	0.84	0.64	0.87	0.75	0.82
Adj. Flow (vph)	12	475	137	56	665	40	48	56	36	264	44	120
RTOR Reduction (vph)	0	0	80	0	2	0	0	12	0	0	0	101
Lane Group Flow (vph)	12	475	57	56	703	0	0	128	0	0	308	19
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases		6		5	2		4	4		3	3	
Permitted Phases	6		6	2								3
Actuated Green, G (s)	42.9	42.9	42.9	55.3	55.3			13.0			16.0	16.0
Effective Green, g (s)	42.9	42.9	42.9	55.3	55.3			13.0			16.0	16.0
Actuated g/C Ratio	0.42	0.42	0.42	0.54	0.54			0.13			0.16	0.16
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	224	781	663	357	998			224			279	247
v/s Ratio Prot		0.26		0.01	c0.38			c0.07			c0.17	
v/s Ratio Perm	0.02		0.04	0.07								0.01
v/c Ratio	0.05	0.61	0.09	0.16	0.70			0.57			1.10	0.08
Uniform Delay, d1	17.6	23.1	17.9	13.5	17.4			42.0			43.1	36.8
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.5	3.5	0.3	0.2	4.2			3.5			84.6	0.1
Delay (s)	18.1	26.7	18.2	13.7	21.6			45.5			127.8	37.0
Level of Service	B	C	B	B	C			D			F	D
Approach Delay (s)		24.6			21.0			45.5			102.3	
Approach LOS		C			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	41.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	102.3	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

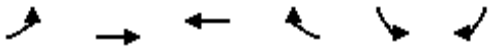
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	980	26	26	764	133	17	32	54	141	27	163
Future Volume (vph)	126	980	26	26	764	133	17	32	54	141	27	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		5.5	6.5	6.5	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.91		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3525		1770	3539	1583	1770	1691		1770	1630	
Flt Permitted	0.24	1.00		0.20	1.00	1.00	0.44	1.00		0.69	1.00	
Satd. Flow (perm)	439	3525		372	3539	1583	814	1691		1285	1630	
Peak-hour factor, PHF	0.93	0.86	0.81	0.81	0.82	0.81	0.53	0.80	0.84	0.88	0.75	0.91
Adj. Flow (vph)	135	1140	32	32	932	164	32	40	64	160	36	179
RTOR Reduction (vph)	0	2	0	0	0	71	0	53	0	0	148	0
Lane Group Flow (vph)	135	1170	0	32	932	93	32	51	0	160	67	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8			4		
Actuated Green, G (s)	68.8	60.7		60.4	56.5	56.5	17.4	17.4		17.4	17.4	
Effective Green, g (s)	68.8	60.7		60.4	56.5	56.5	17.4	17.4		17.4	17.4	
Actuated g/C Ratio	0.69	0.61		0.60	0.56	0.56	0.17	0.17		0.17	0.17	
Clearance Time (s)	5.5	6.5		5.5	6.5	6.5	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	409	2139		279	1999	894	141	294		223	283	
v/s Ratio Prot	c0.03	c0.33		0.00	0.26			0.03			0.04	
v/s Ratio Perm	0.20			0.06		0.06	0.04			c0.12		
v/c Ratio	0.33	0.55		0.11	0.47	0.10	0.23	0.17		0.72	0.24	
Uniform Delay, d1	6.6	11.6		8.5	12.8	10.0	35.5	35.2		39.0	35.6	
Progression Factor	1.67	1.33		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.8		0.2	0.8	0.2	0.8	0.3		10.5	0.4	
Delay (s)	11.3	16.2		8.7	13.6	10.3	36.3	35.5		49.5	36.0	
Level of Service	B	B		A	B	B	D	D		D	D	
Approach Delay (s)		15.7			13.0			35.7			41.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

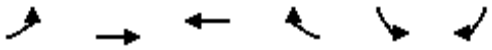
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	28	1232	1262	33	45	52
Future Volume (vph)	28	1232	1262	33	45	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	7.5	7.5		9.0	9.0
Lane Util. Factor	1.00	0.91	0.95		0.97	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	3517		3433	1583
Flt Permitted	0.10	1.00	1.00		0.95	1.00
Satd. Flow (perm)	186	5085	3517		3433	1583
Peak-hour factor, PHF	0.78	0.93	0.94	0.55	0.66	0.81
Adj. Flow (vph)	36	1325	1343	60	68	64
RTOR Reduction (vph)	0	0	2	0	0	60
Lane Group Flow (vph)	36	1325	1401	0	68	4
Turn Type	pm+pt	NA	NA		Prot	Prot
Protected Phases	1	6	2		4	4
Permitted Phases	6					
Actuated Green, G (s)	57.6	53.3	61.2		6.6	6.6
Effective Green, g (s)	57.6	53.3	61.2		6.6	6.6
Actuated g/C Ratio	0.48	0.44	0.51		0.05	0.05
Clearance Time (s)	5.5	7.5	7.5		9.0	9.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	146	2258	1793		188	87
v/s Ratio Prot	c0.01	0.26	c0.40		c0.02	0.00
v/s Ratio Perm	0.11					
v/c Ratio	0.25	0.59	0.78		0.36	0.04
Uniform Delay, d1	19.6	25.1	23.9		54.7	53.7
Progression Factor	1.03	0.71	0.46		1.00	1.00
Incremental Delay, d2	0.7	1.0	2.8		1.2	0.2
Delay (s)	20.8	18.7	13.8		55.9	53.9
Level of Service	C	B	B		E	D
Approach Delay (s)		18.8	13.8		54.9	
Approach LOS		B	B		D	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

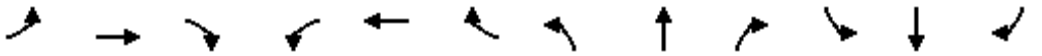
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	53	1562	1302	45	90	45
Future Volume (vph)	53	1562	1302	45	90	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0		5.5	5.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3517		1770	1583
Flt Permitted	0.13	1.00	1.00		0.95	1.00
Satd. Flow (perm)	234	3539	3517		1770	1583
Peak-hour factor, PHF	0.78	0.98	0.93	0.75	0.66	0.80
Adj. Flow (vph)	68	1594	1400	60	136	56
RTOR Reduction (vph)	0	0	2	0	0	49
Lane Group Flow (vph)	68	1594	1458	0	136	7
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6					4
Actuated Green, G (s)	94.1	94.1	83.1		14.4	14.4
Effective Green, g (s)	94.1	94.1	83.1		14.4	14.4
Actuated g/C Ratio	0.78	0.78	0.69		0.12	0.12
Clearance Time (s)	5.5	6.0	6.0		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	253	2775	2435		212	189
v/s Ratio Prot	0.01	c0.45	c0.41		c0.08	
v/s Ratio Perm	0.20					0.00
v/c Ratio	0.27	0.57	0.60		0.64	0.04
Uniform Delay, d1	6.7	5.1	9.7		50.3	46.7
Progression Factor	1.00	1.00	0.41		1.00	1.00
Incremental Delay, d2	0.6	0.9	1.0		6.5	0.1
Delay (s)	7.3	6.0	4.9		56.8	46.7
Level of Service	A	A	A		E	D
Approach Delay (s)		6.0	4.9		53.9	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	1539	32	26	1271	18	24	4	35	48	6	82
Future Volume (vph)	51	1539	32	26	1271	18	24	4	35	48	6	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0		5.5	6.0		5.5	5.5			5.5	5.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3527		1770	3530		1770	1626			1786	1583
Flt Permitted	0.17	1.00		0.08	1.00		0.70	1.00			0.72	1.00
Satd. Flow (perm)	309	3527		148	3530		1304	1626			1338	1583
Peak-hour factor, PHF	0.64	0.88	0.80	0.59	0.98	0.75	0.75	0.50	0.80	0.63	0.50	0.93
Adj. Flow (vph)	80	1749	40	44	1297	24	32	8	44	76	12	88
RTOR Reduction (vph)	0	1	0	0	1	0	0	39	0	0	0	78
Lane Group Flow (vph)	80	1788	0	44	1320	0	32	13	0	0	88	10
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Actuated Green, G (s)	90.3	84.7		89.3	84.2		13.2	13.2			13.2	13.2
Effective Green, g (s)	90.3	84.7		89.3	84.2		13.2	13.2			13.2	13.2
Actuated g/C Ratio	0.75	0.71		0.74	0.70		0.11	0.11			0.11	0.11
Clearance Time (s)	5.5	6.0		5.5	6.0		5.5	5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	300	2489		179	2476		143	178			147	174
v/s Ratio Prot	c0.01	c0.51		0.01	0.37			0.01				
v/s Ratio Perm	0.19			0.17			0.02				c0.07	0.01
v/c Ratio	0.27	0.72		0.25	0.53		0.22	0.07			0.60	0.06
Uniform Delay, d1	5.4	10.5		9.3	8.5		48.7	47.9			50.9	47.8
Progression Factor	0.66	0.86		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.4	1.6		0.7	0.8		0.8	0.2			6.4	0.1
Delay (s)	3.9	10.6		10.0	9.4		49.5	48.1			57.3	48.0
Level of Service	A	B		B	A		D	D			E	D
Approach Delay (s)		10.3			9.4			48.6			52.6	
Approach LOS		B			A			D			D	

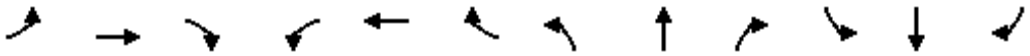
Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	10	608	211	234	592	10	19	20	4	140	7	160
Future Volume (vph)	10	608	211	234	592	10	19	20	4	140	7	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1855			1790			1781	1583
Flt Permitted	0.41	1.00	1.00	0.24	1.00			0.85			0.75	1.00
Satd. Flow (perm)	758	1863	1583	455	1855			1541			1390	1583
Peak-hour factor, PHF	0.50	0.96	0.96	0.89	0.90	0.50	0.68	0.56	0.33	0.80	0.44	0.91
Adj. Flow (vph)	20	633	220	263	658	20	28	36	12	175	16	176
RTOR Reduction (vph)	0	0	90	0	1	0	0	9	0	0	0	127
Lane Group Flow (vph)	20	633	130	263	677	0	0	67	0	0	191	49
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)	42.9	42.9	42.9	55.9	55.9			15.1			15.1	15.1
Effective Green, g (s)	42.9	42.9	42.9	55.9	55.9			15.1			15.1	15.1
Actuated g/C Ratio	0.54	0.54	0.54	0.70	0.70			0.19			0.19	0.19
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	406	999	848	457	1296			290			262	298
v/s Ratio Prot		c0.34		0.06	c0.36							
v/s Ratio Perm	0.03		0.08	0.34				0.04			c0.14	0.03
v/c Ratio	0.05	0.63	0.15	0.58	0.52			0.23			0.73	0.16
Uniform Delay, d1	8.8	13.0	9.4	8.1	5.7			27.5			30.5	27.2
Progression Factor	1.40	1.09	2.27	1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.2	2.5	0.3	1.8	1.5			0.4			9.7	0.3
Delay (s)	12.6	16.7	21.6	9.8	7.2			27.9			40.2	27.4
Level of Service	B	B	C	A	A			C			D	C
Approach Delay (s)		17.8			7.9			27.9			34.1	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

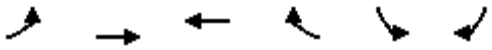
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	708	25	65	739	20	24	10	31	23	17	15
Future Volume (vph)	5	708	25	65	739	20	24	10	31	23	17	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.0		4.5	6.0			5.5			5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.94			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1770	1845		1770	1852			1726			1765	
Flt Permitted	0.27	1.00		0.22	1.00			0.89			0.83	
Satd. Flow (perm)	509	1845		404	1852			1564			1496	
Peak-hour factor, PHF	0.42	0.94	0.48	0.74	0.92	0.63	0.67	0.42	0.70	0.58	0.61	0.75
Adj. Flow (vph)	12	753	52	88	803	32	36	24	44	40	28	20
RTOR Reduction (vph)	0	3	0	0	1	0	0	34	0	0	14	0
Lane Group Flow (vph)	12	802	0	88	834	0	0	70	0	0	74	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	52.1	50.7		60.7	55.0			7.6			7.6	
Effective Green, g (s)	52.1	50.7		60.7	55.0			7.6			7.6	
Actuated g/C Ratio	0.65	0.63		0.76	0.69			0.09			0.09	
Clearance Time (s)	4.5	6.0		4.5	6.0			5.5			5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	353	1169		403	1273			148			142	
v/s Ratio Prot	0.00	0.43		c0.02	c0.45							
v/s Ratio Perm	0.02			0.15				0.04			c0.05	
v/c Ratio	0.03	0.69		0.22	0.65			0.47			0.52	
Uniform Delay, d1	5.7	9.5		5.9	7.1			34.3			34.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.0	3.3		0.3	2.6			2.4			3.5	
Delay (s)	5.8	12.8		6.2	9.7			36.6			37.9	
Level of Service	A	B		A	A			D			D	
Approach Delay (s)		12.7			9.4			36.6			37.9	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

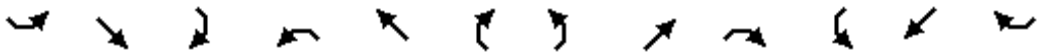
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	244	295	32	53	99
Future Volume (vph)	7	244	295	32	53	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	3539	1583	1770	1583
Peak-hour factor, PHF	0.88	0.90	0.80	0.80	0.60	0.83
Adj. Flow (vph)	8	271	369	40	88	119
RTOR Reduction (vph)	0	0	0	22	0	106
Lane Group Flow (vph)	8	271	369	18	88	13
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	1	5	2		3	
Permitted Phases				2	3	3
Actuated Green, G (s)	14.0	39.0	49.0	49.0	11.5	11.5
Effective Green, g (s)	14.0	39.0	49.0	49.0	11.5	11.5
Actuated g/C Ratio	0.13	0.36	0.45	0.45	0.11	0.11
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	227	667	1593	712	187	167
v/s Ratio Prot	0.00	c0.15	c0.10		c0.05	
v/s Ratio Perm				0.01		0.01
v/c Ratio	0.04	0.41	0.23	0.03	0.47	0.08
Uniform Delay, d1	41.5	26.2	18.3	16.6	45.8	43.9
Progression Factor	0.55	0.30	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.8	0.3	0.1	1.9	0.2
Delay (s)	23.0	9.6	18.7	16.7	47.7	44.0
Level of Service	C	A	B	B	D	D
Approach Delay (s)		10.0	18.5		45.6	
Approach LOS		A	B		D	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	108.8	Sum of lost time (s)	24.0
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	8	7	0	8	9	37	1	497	5	32	456	10
Future Volume (vph)	8	7	0	8	9	37	1	497	5	32	456	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		1.00			0.90		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1817			1668		1770	1859		1770	1850	
Flt Permitted		0.75			0.94		0.46	1.00		0.42	1.00	
Satd. Flow (perm)		1391			1578		860	1859		781	1850	
Peak-hour factor, PHF	0.67	0.58	0.92	0.50	0.75	0.51	0.25	0.85	0.63	0.67	0.93	0.42
Adj. Flow (vph)	12	12	0	16	12	73	4	585	8	48	490	24
RTOR Reduction (vph)	0	0	0	0	67	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	24	0	0	34	0	4	593	0	48	513	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)		6.5			6.5		64.5	64.5		64.5	64.5	
Effective Green, g (s)		6.5			6.5		64.5	64.5		64.5	64.5	
Actuated g/C Ratio		0.08			0.08		0.81	0.81		0.81	0.81	
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		113			128		693	1498		629	1491	
v/s Ratio Prot								c0.32			0.28	
v/s Ratio Perm		0.02			c0.02		0.00			0.06		
v/c Ratio		0.21			0.27		0.01	0.40		0.08	0.34	
Uniform Delay, d1		34.4			34.5		1.5	2.2		1.6	2.1	
Progression Factor		1.00			1.00		1.00	1.00		1.23	0.97	
Incremental Delay, d2		0.9			1.1		0.0	0.8		0.2	0.5	
Delay (s)		35.3			35.6		1.5	3.0		2.1	2.5	
Level of Service		D			D		A	A		A	A	
Approach Delay (s)		35.3			35.6			3.0			2.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX E

Signal System Intersection Analyses
(Synchro Reports)

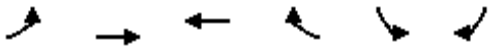
OPTIMIZED OPERATIONS
AM PEAK-HOUR ANALYSIS

Lane Group	EBL	EBT	WBT	SBL	SBR	Ø5	Ø8
Lane Configurations							
Traffic Volume (vph)	86	1056	843	18	120		
Future Volume (vph)	86	1056	843	18	120		
Turn Type	pm+pt	NA	NA	Prot	Perm		
Protected Phases	1	6	2	4		5	8
Permitted Phases	6				4		
Detector Phase	1	6	2	4	4		
Switch Phase							
Minimum Initial (s)	6.0	15.0	15.0	8.5	8.5	6.0	8.5
Minimum Split (s)	15.0	21.0	21.0	15.0	15.0	15.0	15.0
Total Split (s)	15.0	57.0	62.0	18.0	18.0	20.0	18.0
Total Split (%)	15.8%	60.0%	65.3%	18.9%	18.9%	21%	19%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	1.5	1.5	2.5	2.5	2.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.5	6.5		
Lead/Lag	Lead	Lag	Lag			Lead	
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	64.2	57.3	62.9	9.1	9.1		
Actuated g/C Ratio	0.68	0.60	0.66	0.10	0.10		
v/c Ratio	0.24	0.61	0.43	0.19	0.52		
Control Delay	2.9	5.0	6.1	41.8	13.8		
Queue Delay	0.0	0.1	0.0	0.0	0.0		
Total Delay	2.9	5.1	6.1	41.8	13.8		
LOS	A	A	A	D	B		
Approach Delay		4.9	6.1	18.8			
Approach LOS		A	A	B			

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 20 (21%), Referenced to phase 2:WBT and 6:EBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 6.3	Intersection LOS: A
Intersection Capacity Utilization 50.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Andrew Johnson Hwy US 11E & Rogersville Hwy SR 93





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	86	1056	843	3	18	120
Future Volume (vph)	86	1056	843	3	18	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.5	6.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3535		1770	1583
Flt Permitted	0.27	1.00	1.00		0.95	1.00
Satd. Flow (perm)	503	3539	3535		1770	1583
Peak-hour factor, PHF	0.83	0.81	0.85	0.38	0.56	0.81
Adj. Flow (vph)	104	1304	992	8	32	148
RTOR Reduction (vph)	0	0	0	0	0	134
Lane Group Flow (vph)	104	1304	1000	0	32	14
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6					4
Actuated Green, G (s)	63.0	57.3	61.7		9.1	9.1
Effective Green, g (s)	63.0	57.3	61.7		9.1	9.1
Actuated g/C Ratio	0.66	0.60	0.65		0.10	0.10
Clearance Time (s)	6.0	6.0	6.0		6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	409	2134	2295		169	151
v/s Ratio Prot	c0.02	c0.37	c0.28		c0.02	
v/s Ratio Perm	0.15					0.01
v/c Ratio	0.25	0.61	0.44		0.19	0.09
Uniform Delay, d1	5.8	11.8	8.1		39.6	39.2
Progression Factor	0.51	0.31	0.66		1.00	1.00
Incremental Delay, d2	0.3	1.1	0.6		0.5	0.3
Delay (s)	3.2	4.7	5.9		40.1	39.5
Level of Service	A	A	A		D	D
Approach Delay (s)		4.6	5.9		39.6	
Approach LOS		A	A		D	

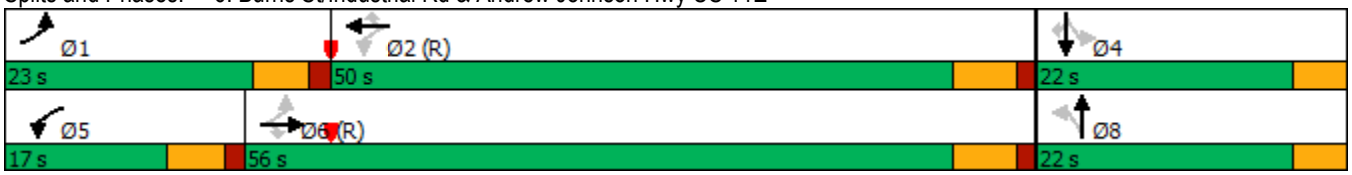
Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

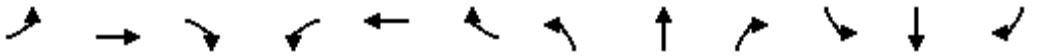
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	177	833	26	54	695	31	39	53	28	31	135
Future Volume (vph)	177	833	26	54	695	31	39	53	28	31	135
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	1	6		5	2			8		4	
Permitted Phases	6		6	2		2	8		4		4
Detector Phase	1	6	6	5	2	2	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	6.0	25.0	25.0	6.0	25.0	25.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	31.0	31.0	15.0	31.0	31.0	15.0	15.0	15.0	15.0	15.0
Total Split (s)	23.0	56.0	56.0	17.0	50.0	50.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	24.2%	58.9%	58.9%	17.9%	52.6%	52.6%	23.2%	23.2%	23.2%	23.2%	23.2%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	0.0	0.0	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?											
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	73.5	64.9	64.9	65.7	59.1	59.1	10.7	10.7	10.7	10.7	10.7
Actuated g/C Ratio	0.77	0.68	0.68	0.69	0.62	0.62	0.11	0.11	0.11	0.11	0.11
v/c Ratio	0.43	0.39	0.03	0.13	0.37	0.04	0.32	0.57	0.35	0.21	0.57
Control Delay	3.9	0.9	0.1	4.1	10.3	0.1	43.2	33.5	47.5	39.4	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.9	0.9	0.1	4.1	10.3	0.1	43.2	33.5	47.5	39.4	12.1
LOS	A	A	A	A	B	A	D	C	D	D	B
Approach Delay		1.4			9.4			36.0		20.8	
Approach LOS		A			A			D		C	

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 4 (4%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 52.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Burns St/Industrial Rd & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	833	26	54	695	31	39	53	46	28	31	135
Future Volume (vph)	177	833	26	54	695	31	39	53	46	28	31	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0	5.5	6.0	6.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1715		1770	1863	1583
Flt Permitted	0.29	1.00	1.00	0.30	1.00	1.00	0.73	1.00		0.49	1.00	1.00
Satd. Flow (perm)	546	3539	1583	559	3539	1583	1357	1715		911	1863	1583
Peak-hour factor, PHF	0.76	0.89	0.72	0.90	0.86	0.70	0.81	0.83	0.64	0.78	0.70	0.66
Adj. Flow (vph)	233	936	36	60	808	44	48	64	72	36	44	205
RTOR Reduction (vph)	0	0	12	0	0	17	0	47	0	0	0	182
Lane Group Flow (vph)	233	936	24	60	808	27	48	89	0	36	44	23
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	73.5	63.8	63.8	64.1	59.1	59.1	10.7	10.7		10.7	10.7	10.7
Effective Green, g (s)	73.5	63.8	63.8	64.1	59.1	59.1	10.7	10.7		10.7	10.7	10.7
Actuated g/C Ratio	0.77	0.67	0.67	0.67	0.62	0.62	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	2.5	5.0	5.0	2.5	5.0	5.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	547	2376	1063	440	2201	984	152	193		102	209	178
v/s Ratio Prot	c0.04	0.26		0.01	0.23			c0.05			0.02	
v/s Ratio Perm	c0.29		0.02	0.08		0.02	0.04			0.04		0.01
v/c Ratio	0.43	0.39	0.02	0.14	0.37	0.03	0.32	0.46		0.35	0.21	0.13
Uniform Delay, d1	3.6	7.0	5.2	5.2	8.8	6.9	38.8	39.5		39.0	38.3	38.0
Progression Factor	0.69	0.07	0.12	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.3	0.4	0.0	0.1	0.5	0.1	1.2	1.7		2.1	0.5	0.3
Delay (s)	2.8	0.9	0.6	5.3	9.3	7.0	40.0	41.2		41.1	38.8	38.3
Level of Service	A	A	A	A	A	A	D	D		D	D	D
Approach Delay (s)		1.2			8.9			40.9			38.7	
Approach LOS		A			A			D			D	

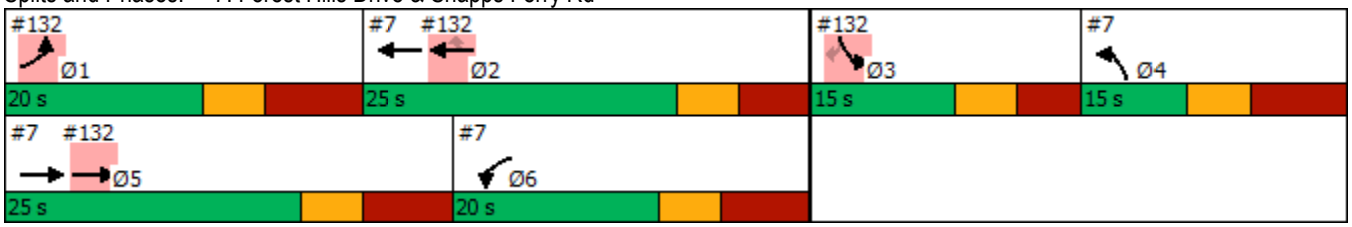
Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	Ø1	Ø3
Lane Configurations						
Traffic Volume (vph)	143	21	186	9		
Future Volume (vph)	143	21	186	9		
Turn Type	NA	Prot	NA	Prot		
Protected Phases	5	6	2	4	1	3
Permitted Phases						
Detector Phase	5	6	2	4		
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	3.0	5.0
Minimum Split (s)	25.0	20.0	25.0	15.0	20.0	15.0
Total Split (s)	25.0	20.0	25.0	15.0	20.0	15.0
Total Split (%)	33.3%	26.7%	33.3%	20.0%	27%	20%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	5.0	5.0	4.0	5.5	5.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		
Total Lost Time (s)	8.5	8.5	7.5	9.0		
Lead/Lag	Lead	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?						
Recall Mode	None	None	Max	None	None	None
Act Effct Green (s)	19.5	14.9	28.0	6.4		
Actuated g/C Ratio	0.42	0.32	0.61	0.14		
v/c Ratio	0.11	0.04	0.18	0.35		
Control Delay	13.6	13.0	3.8	12.2		
Queue Delay	0.0	0.0	0.0	0.3		
Total Delay	13.6	13.0	3.8	12.5		
LOS	B	B	A	B		
Approach Delay	13.6		4.8	12.5		
Approach LOS	B		A	B		

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 46.2	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.35	
Intersection Signal Delay: 9.4	Intersection LOS: A
Intersection Capacity Utilization 36.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 7: Forest Hills Drive & Snapps Ferry Rd





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	143	6	21	186	9	90
Future Volume (vph)	143	6	21	186	9	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.5		8.5	7.5	9.0	
Lane Util. Factor	0.95		1.00	1.00	1.00	
Frt	0.99		1.00	1.00	0.88	
Flt Protected	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3516		1770	1863	1627	
Flt Permitted	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	3516		1770	1863	1627	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	7	23	202	10	98
RTOR Reduction (vph)	5	0	0	0	93	0
Lane Group Flow (vph)	157	0	23	202	15	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	5		6	2	4	
Permitted Phases						
Actuated Green, G (s)	15.0		8.9	23.6	3.1	
Effective Green, g (s)	15.0		8.9	23.6	3.1	
Actuated g/C Ratio	0.24		0.14	0.38	0.05	
Clearance Time (s)	8.5		8.5	7.5	9.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	847		253	706	81	
v/s Ratio Prot	c0.04		0.01	c0.11	c0.01	
v/s Ratio Perm						
v/c Ratio	0.19		0.09	0.29	0.18	
Uniform Delay, d1	18.7		23.1	13.4	28.3	
Progression Factor	1.00		0.54	0.26	1.00	
Incremental Delay, d2	0.1		0.2	1.0	1.1	
Delay (s)	18.9		12.6	4.4	29.4	
Level of Service	B		B	A	C	
Approach Delay (s)	18.9			5.3	29.4	
Approach LOS	B			A	C	

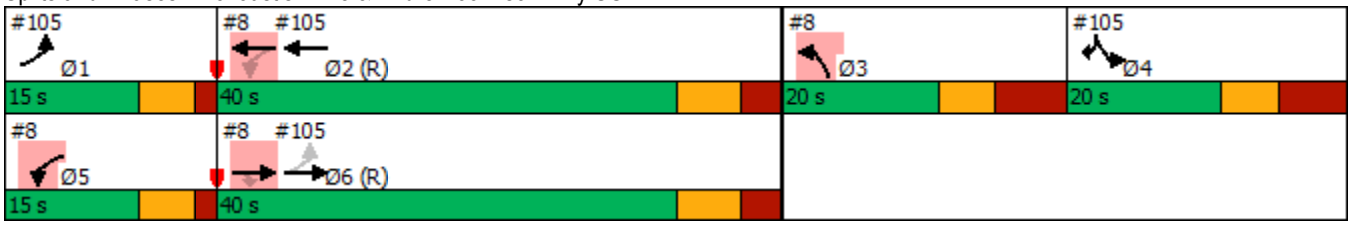
Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	62.2	Sum of lost time (s)	33.0
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	Ø1	Ø4
Lane Configurations							
Traffic Volume (vph)	738	152	65	784	70		
Future Volume (vph)	738	152	65	784	70		
Turn Type	NA	Perm	pm+pt	NA	Prot		
Protected Phases	6		5	2	3	1	4
Permitted Phases		6	2				
Detector Phase	6	6	5	2	3		
Switch Phase							
Minimum Initial (s)	17.5	17.5	6.0	17.5	6.0	6.0	6.0
Minimum Split (s)	25.0	25.0	15.0	25.0	20.0	15.0	20.0
Total Split (s)	40.0	40.0	15.0	40.0	20.0	15.0	20.0
Total Split (%)	42.1%	42.1%	15.8%	42.1%	21.1%	16%	21%
Yellow Time (s)	4.5	4.5	4.0	4.5	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	1.5	3.0	5.0	1.5	5.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	7.5	7.5	5.5	7.5	9.0		
Lead/Lag	Lag	Lag	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	53.5	53.5	63.8	56.8	8.2		
Actuated g/C Ratio	0.56	0.56	0.67	0.60	0.09		
v/c Ratio	0.43	0.20	0.22	0.45	0.53		
Control Delay	2.5	0.4	8.1	14.8	22.8		
Queue Delay	0.2	0.6	0.0	0.0	0.0		
Total Delay	2.7	1.1	8.1	14.8	22.8		
LOS	A	A	A	B	C		
Approach Delay	2.4			14.2	22.8		
Approach LOS	A			B	C		

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 93 (98%), Referenced to phase 2:WBTL and 6:EBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 9.6	Intersection LOS: A
Intersection Capacity Utilization 48.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 8: Justis Drive & Andrew Johnson Hwy US 11E





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	738	152	65	784	70	86
Future Volume (vph)	738	152	65	784	70	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	5.5	7.5	9.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	1.00	1.00	0.95	1.00	0.98	
Satd. Flow (prot)	3539	1583	1770	3539	3229	
Flt Permitted	1.00	1.00	0.26	1.00	0.98	
Satd. Flow (perm)	3539	1583	487	3539	3229	
Peak-hour factor, PHF	0.87	0.79	0.68	0.82	0.83	0.72
Adj. Flow (vph)	848	192	96	956	84	119
RTOR Reduction (vph)	0	97	0	0	109	0
Lane Group Flow (vph)	848	95	96	956	94	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	6		5	2	3	
Permitted Phases		6	2			
Actuated Green, G (s)	46.9	46.9	55.4	49.1	8.2	
Effective Green, g (s)	46.9	46.9	55.4	49.1	8.2	
Actuated g/C Ratio	0.49	0.49	0.58	0.52	0.09	
Clearance Time (s)	7.5	7.5	5.5	7.5	9.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1747	781	369	1829	278	
v/s Ratio Prot	0.24		c0.02	c0.27	c0.03	
v/s Ratio Perm		0.06	0.13			
v/c Ratio	0.49	0.12	0.26	0.52	0.34	
Uniform Delay, d1	16.0	13.0	9.4	15.2	40.8	
Progression Factor	0.13	0.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.3	0.4	1.1	0.7	
Delay (s)	2.9	0.3	9.8	16.3	41.6	
Level of Service	A	A	A	B	D	
Approach Delay (s)	2.5			15.7	41.6	
Approach LOS	A			B	D	

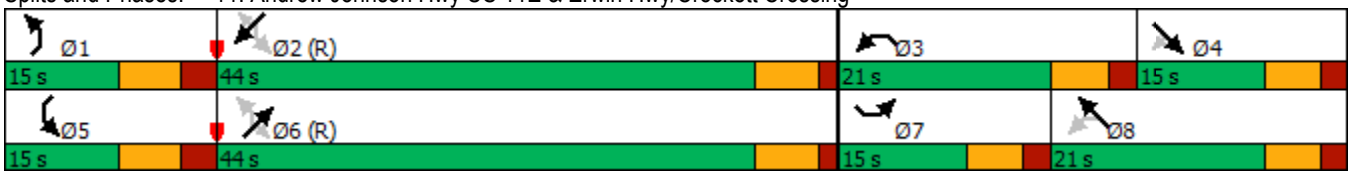
Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	10	5	26	237	7	29	665	145	54	819	12
Future Volume (vph)	10	5	26	237	7	29	665	145	54	819	12
Turn Type	custom	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	1	6		5	2	
Permitted Phases	7		4	8		6		6	2		2
Detector Phase	7	4	4	3	8	1	6	6	5	2	2
Switch Phase											
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0	6.0	19.0	19.0	6.0	19.0	19.0
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0	15.0	30.0	30.0	15.0	30.0	30.0
Total Split (s)	15.0	15.0	15.0	21.0	21.0	15.0	44.0	44.0	15.0	44.0	44.0
Total Split (%)	15.8%	15.8%	15.8%	22.1%	22.1%	15.8%	46.3%	46.3%	15.8%	46.3%	46.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.5	1.5	1.5	2.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	6.8	8.0	8.0	23.1	17.6	52.8	48.3	48.3	55.3	51.4	51.4
Actuated g/C Ratio	0.07	0.08	0.08	0.24	0.19	0.56	0.51	0.51	0.58	0.54	0.54
v/c Ratio	0.16	0.08	0.11	0.78	0.24	0.16	0.40	0.20	0.17	0.56	0.04
Control Delay	43.8	41.4	0.7	47.6	14.6	17.0	25.3	11.5	4.1	9.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.8	41.4	0.7	47.6	14.6	17.0	25.3	11.5	4.1	9.4	0.1
LOS	D	D	A	D	B	B	C	B	A	A	A
Approach Delay		21.8			39.5		22.3			8.8	
Approach LOS		C			D		C			A	

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 24 (25%), Referenced to phase 2:SWTL and 6:NETL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 63.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 11: Andrew Johnson Hwy US 11E & Erwin Hwy/Crockett Crossing





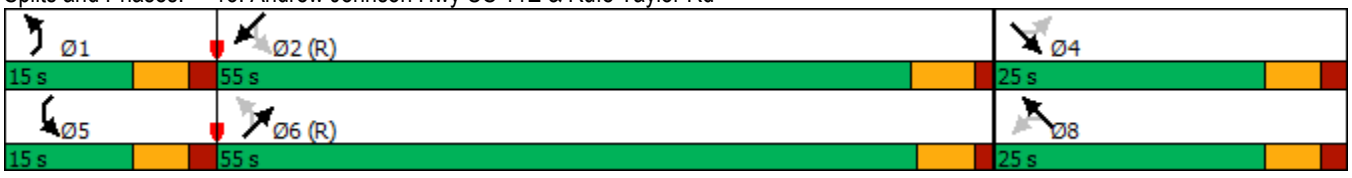
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	5	26	237	7	56	29	665	145	54	819	12
Future Volume (vph)	10	5	26	237	7	56	29	665	145	54	819	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1761	1642		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.37	1.00		0.17	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	695	1642		320	3539	1583	558	3539	1583
Peak-hour factor, PHF	0.50	0.42	0.81	0.91	0.35	0.88	0.66	0.93	0.82	0.75	0.76	0.33
Adj. Flow (vph)	20	12	32	260	20	64	44	715	177	72	1078	36
RTOR Reduction (vph)	0	0	30	0	52	0	0	0	97	0	0	19
Lane Group Flow (vph)	20	12	2	260	32	0	44	715	80	72	1078	17
Turn Type	custom	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	7		4	8			6		6	2		2
Actuated Green, G (s)	3.1	6.0	6.0	26.7	17.6		47.5	43.2	43.2	51.1	45.0	45.0
Effective Green, g (s)	3.1	6.0	6.0	26.7	17.6		47.5	43.2	43.2	51.1	45.0	45.0
Actuated g/C Ratio	0.03	0.06	0.06	0.28	0.19		0.50	0.45	0.45	0.54	0.47	0.47
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	57	117	99	360	304		225	1609	719	377	1676	749
v/s Ratio Prot	0.01	0.01		c0.11	0.02		0.01	0.20		c0.01	c0.30	
v/s Ratio Perm			0.00	c0.09			0.09		0.05	0.09		0.01
v/c Ratio	0.35	0.10	0.02	0.72	0.10		0.20	0.44	0.11	0.19	0.64	0.02
Uniform Delay, d1	45.0	42.0	41.7	29.0	32.2		13.5	17.7	14.9	11.1	18.9	13.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.64	1.42	4.04	0.35	0.46	1.00
Incremental Delay, d2	3.7	0.4	0.1	7.0	0.2		0.4	0.8	0.3	0.2	1.6	0.0
Delay (s)	48.7	42.3	41.8	36.0	32.3		22.5	26.0	60.4	4.1	10.3	13.3
Level of Service	D	D	D	D	C		C	C	E	A	B	B
Approach Delay (s)		44.1			35.1			32.4			10.1	
Approach LOS		D			D			C			B	

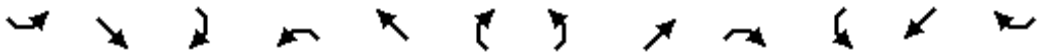
Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	74	22	36	33	25	687	28	836
Future Volume (vph)	74	22	36	33	25	687	28	836
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	4	4	8	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	6.0	15.0
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0	20.5	15.0	21.0
Total Split (s)	25.0	25.0	25.0	25.0	15.0	55.0	15.0	55.0
Total Split (%)	26.3%	26.3%	26.3%	26.3%	15.8%	57.9%	15.8%	57.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	1.5	2.0	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	5.5	6.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
Act Effct Green (s)		14.6		14.6	64.9	61.4	64.7	60.9
Actuated g/C Ratio		0.15		0.15	0.68	0.65	0.68	0.64
v/c Ratio		0.72		0.56	0.13	0.34	0.07	0.57
Control Delay		53.7		41.4	5.4	14.6	2.2	4.7
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		53.7		41.4	5.4	14.6	2.2	4.7
LOS		D		D	A	B	A	A
Approach Delay		53.7		41.4		14.2		4.7
Approach LOS		D		D		B		A

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 82 (86%), Referenced to phase 2:SWTL and 6:NETL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 47.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Andrew Johnson Hwy US 11E & Rufe Taylor Rd





Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	74	22	19	36	33	21	25	687	19	28	836	118
Future Volume (vph)	74	22	19	36	33	21	25	687	19	28	836	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	5.5		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.97		1.00	0.99		1.00	0.98	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1759			1772		1770	3520		1770	3459	
Flt Permitted		0.72			0.82		0.16	1.00		0.32	1.00	
Satd. Flow (perm)		1300			1485		296	3520		603	3459	
Peak-hour factor, PHF	0.84	0.69	0.59	0.75	0.59	0.66	0.62	0.91	0.68	0.78	0.77	0.61
Adj. Flow (vph)	88	32	32	48	56	32	40	755	28	36	1086	193
RTOR Reduction (vph)	0	11	0	0	13	0	0	2	0	0	12	0
Lane Group Flow (vph)	0	141	0	0	123	0	40	781	0	36	1267	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)		14.6			14.6		62.9	59.0		62.4	58.5	
Effective Green, g (s)		14.6			14.6		62.9	59.0		62.4	58.5	
Actuated g/C Ratio		0.15			0.15		0.66	0.62		0.66	0.62	
Clearance Time (s)		6.0			6.0		6.0	5.5		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		199			228		256	2186		443	2130	
v/s Ratio Prot							c0.01	0.22		0.00	c0.37	
v/s Ratio Perm		c0.11			0.08		0.10			0.05		
v/c Ratio		0.71			0.54		0.16	0.36		0.08	0.59	
Uniform Delay, d1		38.2			37.1		7.0	8.8		5.9	11.1	
Progression Factor		1.00			1.00		0.91	1.53		0.41	0.34	
Incremental Delay, d2		11.0			2.6		0.3	0.4		0.1	0.9	
Delay (s)		49.1			39.7		6.7	13.9		2.5	4.7	
Level of Service		D			D		A	B		A	A	
Approach Delay (s)		49.1			39.7			13.5			4.6	
Approach LOS		D			D			B			A	

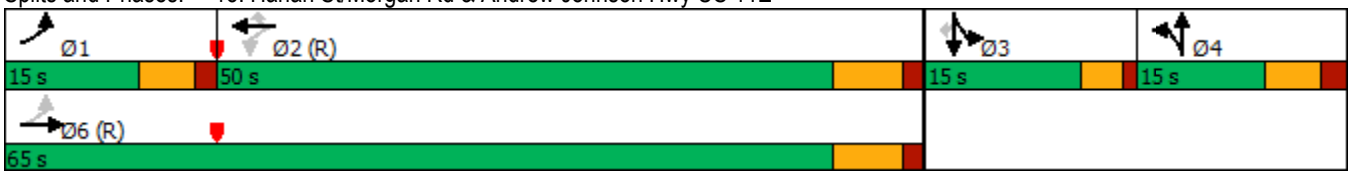
Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

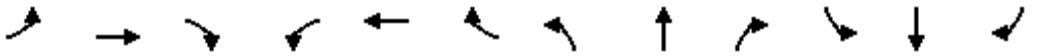
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	73	614	1	931	21	7	15	4	79
Future Volume (vph)	73	614	1	931	21	7	15	4	79
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Split	NA	Perm
Protected Phases	1	6		2		4	3	3	
Permitted Phases	6		2		2				3
Detector Phase	1	6	2	2	2	4	3	3	3
Switch Phase									
Minimum Initial (s)	6.0	15.0	15.0	15.0	15.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	22.5	22.5	22.5	22.5	15.0	15.0	15.0	15.0
Total Split (s)	15.0	65.0	50.0	50.0	50.0	15.0	15.0	15.0	15.0
Total Split (%)	15.8%	68.4%	52.6%	52.6%	52.6%	15.8%	15.8%	15.8%	15.8%
Yellow Time (s)	4.0	5.0	5.0	5.0	5.0	4.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	2.0	1.0	1.0	1.0
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)	5.5	6.5	6.5	6.5	6.5	6.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?									
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	Max	None	None	None
Act Effct Green (s)	59.5	58.5	47.6	47.6	47.6	14.4	8.0	8.0	8.0
Actuated g/C Ratio	0.63	0.62	0.50	0.50	0.50	0.15	0.08	0.08	0.08
v/c Ratio	0.40	0.39	0.01	0.70	0.04	0.16	0.11	0.11	0.34
Control Delay	18.2	9.8	7.0	15.9	0.1	36.3	42.2	42.1	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	9.8	7.0	15.9	0.1	36.3	42.2	42.1	3.8
LOS	B	A	A	B	A	D	D	D	A
Approach Delay		10.7		15.5		36.3		13.1	
Approach LOS		B		B		D		B	

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 40 (42%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 13.8	Intersection LOS: B
Intersection Capacity Utilization 54.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 15: Harlan St/Morgan Rd & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	614	30	1	931	21	19	7	1	15	4	79
Future Volume (vph)	73	614	30	1	931	21	19	7	1	15	4	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		6.5	6.5	6.5		6.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.99	1.00
Satd. Flow (prot)	1770	3509		1770	3539	1583		1783		1681	1748	1583
Flt Permitted	0.11	1.00		0.33	1.00	1.00		0.97		0.95	0.99	1.00
Satd. Flow (perm)	198	3509		623	3539	1583		1783		1681	1748	1583
Peak-hour factor, PHF	0.73	0.77	0.62	0.25	0.75	0.66	0.68	0.58	0.25	0.75	0.33	0.79
Adj. Flow (vph)	100	797	48	4	1241	32	28	12	4	20	12	100
RTOR Reduction (vph)	0	5	0	0	0	17	0	3	0	0	0	93
Lane Group Flow (vph)	100	840	0	4	1241	15	0	41	0	16	16	7
Turn Type	pm+pt	NA		Perm	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6			2		4	4		3	3	
Permitted Phases	6			2		2						3
Actuated Green, G (s)	57.7	57.7		45.7	45.7	45.7		14.4		6.4	6.4	6.4
Effective Green, g (s)	57.7	57.7		45.7	45.7	45.7		14.4		6.4	6.4	6.4
Actuated g/C Ratio	0.61	0.61		0.48	0.48	0.48		0.15		0.07	0.07	0.07
Clearance Time (s)	5.5	6.5		6.5	6.5	6.5		6.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	227	2131		299	1702	761		270		113	117	106
v/s Ratio Prot	0.03	c0.24			c0.35			c0.02		c0.01	0.01	
v/s Ratio Perm	0.24			0.01		0.01						0.00
v/c Ratio	0.44	0.39		0.01	0.73	0.02		0.15		0.14	0.14	0.06
Uniform Delay, d1	12.8	9.6		12.9	19.7	12.9		35.0		41.7	41.7	41.5
Progression Factor	1.91	1.01		0.50	0.71	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	1.3	0.5		0.1	2.5	0.0		1.2		0.6	0.5	0.3
Delay (s)	25.8	10.2		6.5	16.5	13.0		36.2		42.3	42.2	41.7
Level of Service	C	B		A	B	B		D		D	D	D
Approach Delay (s)		11.9			16.4			36.2			41.9	
Approach LOS		B			B			D			D	

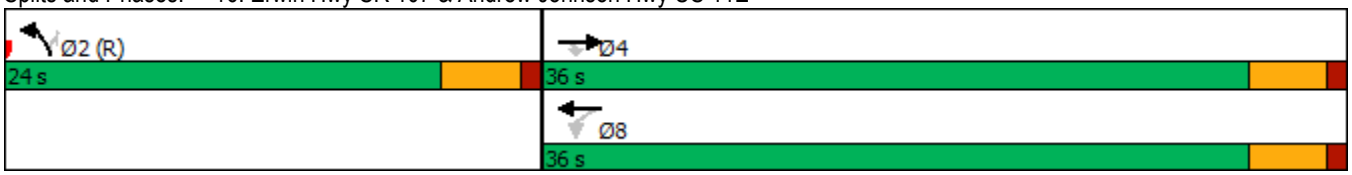
Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	571	111	161	744	272	191
Future Volume (vph)	571	111	161	744	272	191
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	36.0	36.0	36.0	36.0	24.0	24.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	31.5	31.5	31.5	31.5	19.5	19.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.32	0.32
v/c Ratio	0.33	0.14	0.46	0.44	0.27	0.32
Control Delay	8.8	2.2	13.8	9.7	15.8	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	2.2	13.8	9.7	15.8	4.2
LOS	A	A	B	A	B	A
Approach Delay	7.8			10.4	11.0	
Approach LOS	A			B	B	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green	
Natural Cycle: 50	
Control Type: Pretimed	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 9.7	Intersection LOS: A
Intersection Capacity Utilization 43.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 16: Erwin Hwy SR 107 & Andrew Johnson Hwy US 11E





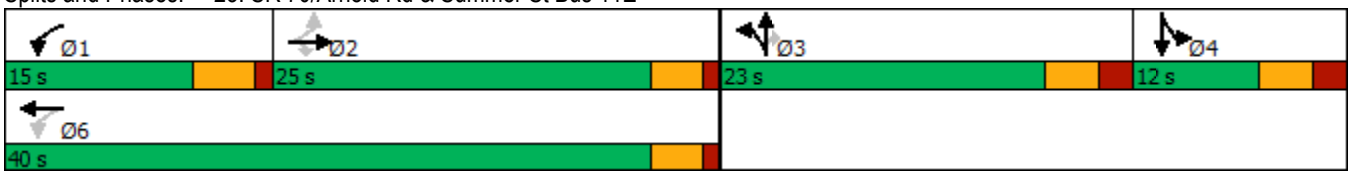
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	571	111	161	744	272	191
Future Volume (vph)	571	111	161	744	272	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.39	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	731	3539	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	621	121	175	809	296	208
RTOR Reduction (vph)	0	57	0	0	0	140
Lane Group Flow (vph)	621	64	175	809	296	68
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	31.5	31.5	31.5	31.5	19.5	19.5
Effective Green, g (s)	31.5	31.5	31.5	31.5	19.5	19.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	1857	831	383	1857	1115	514
v/s Ratio Prot	0.18			0.23	c0.09	
v/s Ratio Perm		0.04	c0.24			0.04
v/c Ratio	0.33	0.08	0.46	0.44	0.27	0.13
Uniform Delay, d1	8.2	7.1	8.9	8.8	15.0	14.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	3.9	0.7	0.6	0.5
Delay (s)	8.7	7.2	12.8	9.5	15.5	14.8
Level of Service	A	A	B	A	B	B
Approach Delay (s)	8.5			10.1	15.2	
Approach LOS	A			B	B	

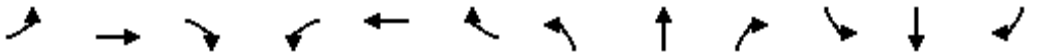
Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations									
Traffic Volume (vph)	5	260	518	37	135	558	10	57	9
Future Volume (vph)	5	260	518	37	135	558	10	57	9
Turn Type	Perm	NA	Perm	pm+pt	NA	Split	NA	Perm	NA
Protected Phases		2		1	6	3	3		4
Permitted Phases	2		2	6				3	
Detector Phase	2	2	2	1	6	3	3	3	4
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0	6.0	6.0	6.0	6.0
Minimum Split (s)	25.0	25.0	25.0	15.0	25.0	20.0	20.0	20.0	12.0
Total Split (s)	25.0	25.0	25.0	15.0	40.0	23.0	23.0	23.0	12.0
Total Split (%)	33.3%	33.3%	33.3%	20.0%	53.3%	30.7%	30.7%	30.7%	16.0%
Yellow Time (s)	3.0	3.0	3.0	3.5	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
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	4.5	4.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead		Lead	Lead	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)		30.1	30.1	36.0	36.5	16.2	16.2	16.2	6.5
Actuated g/C Ratio		0.44	0.44	0.53	0.53	0.24	0.24	0.24	0.10
v/c Ratio		0.23	0.55	0.09	0.09	0.79	0.80	0.15	0.22
Control Delay		16.3	4.5	10.8	9.8	42.2	42.6	0.7	25.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		16.3	4.5	10.8	9.8	42.2	42.6	0.7	25.7
LOS		B	A	B	A	D	D	A	C
Approach Delay		8.9			10.0		37.9		25.7
Approach LOS		A			B		D		C

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 68.3	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 20.5	Intersection LOS: C
Intersection Capacity Utilization 56.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 23: SR 70/Arnold Rd & Summer St Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	260	518	37	135	0	558	10	57	3	9	11
Future Volume (vph)	5	260	518	37	135	0	558	10	57	3	9	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.5	4.0		5.0	5.0	5.0		5.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)		3535	1583	1770	3539		1681	1689	1583		1748	
Flt Permitted		0.95	1.00	0.47	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (perm)		3362	1583	871	3539		1681	1689	1583		1748	
Peak-hour factor, PHF	0.62	0.79	0.93	0.77	0.82	0.92	0.90	0.62	0.75	0.38	0.56	0.73
Adj. Flow (vph)	8	329	557	48	165	0	620	16	76	8	16	15
RTOR Reduction (vph)	0	0	326	0	0	0	0	0	59	0	14	0
Lane Group Flow (vph)	0	337	231	48	165	0	316	320	17	0	25	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases		2		1	6		3	3		4	4	
Permitted Phases	2		2	6					3			
Actuated Green, G (s)		30.1	30.1	38.6	38.6		16.2	16.2	16.2		3.7	
Effective Green, g (s)		30.1	30.1	38.6	38.6		16.2	16.2	16.2		3.7	
Actuated g/C Ratio		0.42	0.42	0.53	0.53		0.22	0.22	0.22		0.05	
Clearance Time (s)		4.0	4.0	4.5	4.0		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		1395	657	513	1884		375	377	353		89	
v/s Ratio Prot				0.01	c0.05		0.19	c0.19			c0.01	
v/s Ratio Perm		0.10	c0.15	0.04					0.01			
v/c Ratio		0.24	0.35	0.09	0.09		0.84	0.85	0.05		0.28	
Uniform Delay, d1		13.8	14.5	8.3	8.3		26.9	27.0	22.1		33.1	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2		0.4	1.5	0.1	0.1		15.7	16.1	0.1		1.7	
Delay (s)		14.2	16.0	8.4	8.4		42.6	43.1	22.2		34.8	
Level of Service		B	B	A	A		D	D	C		C	
Approach Delay (s)		15.3			8.4			40.6			34.8	
Approach LOS		B			A			D			C	

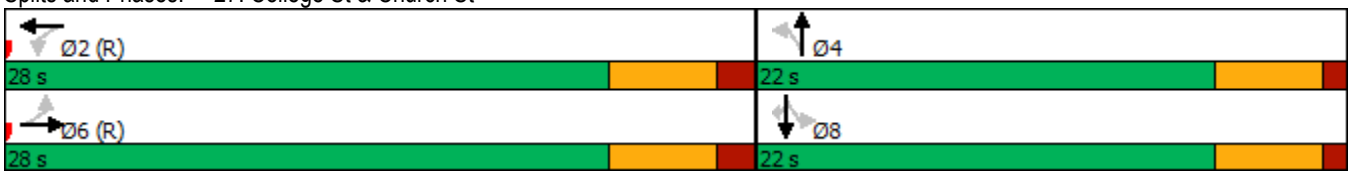
Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	72.5	Sum of lost time (s)	18.5
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

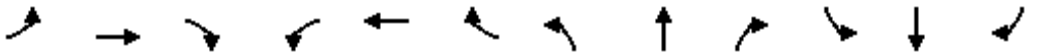
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	24	137	6	189	8	111	23	65	21
Future Volume (vph)	24	137	6	189	8	111	23	65	21
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		6		2		4		8	
Permitted Phases	6		2		4		8		8
Detector Phase	6	6	2	2	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	17.5	17.5	17.5	17.5	13.0	13.0	13.0	13.0	13.0
Total Split (s)	28.0	28.0	28.0	28.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	56.0%	56.0%	56.0%	56.0%	44.0%	44.0%	44.0%	44.0%	44.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0		0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5		5.0		5.0	5.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Min	C-Min	C-Min	C-Min	Max	Max	Max	Max	Max
Act Effct Green (s)	14.0	14.0		14.0		25.5		25.5	25.5
Actuated g/C Ratio	0.28	0.28		0.28		0.51		0.51	0.51
v/c Ratio	0.13	0.44		0.64		0.31		0.21	0.06
Control Delay	16.0	17.5		19.7		9.7		9.4	3.1
Queue Delay	0.0	0.0		0.0		0.0		0.0	0.0
Total Delay	16.0	17.5		19.7		9.7		9.4	3.1
LOS	B	B		B		A		A	A
Approach Delay		17.3		19.7		9.7		8.0	
Approach LOS		B		B		A		A	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 21 (42%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 42.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 27: College St & Church St





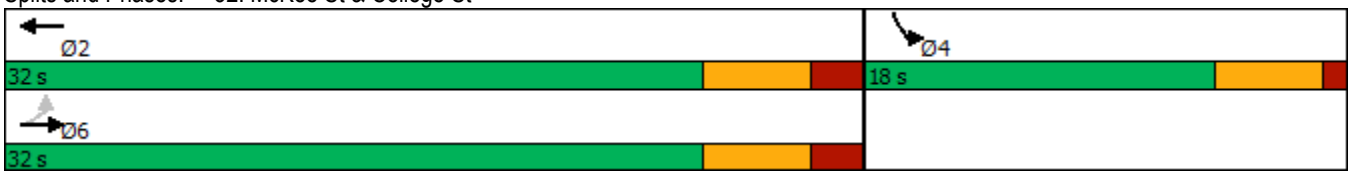
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	137	13	6	189	29	8	111	26	23	65	21
Future Volume (vph)	24	137	13	6	189	29	8	111	26	23	65	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5			5.0			5.0	5.0
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	0.98			0.97			0.98			1.00	0.85
Flt Protected	0.95	1.00			1.00			1.00			0.98	1.00
Satd. Flow (prot)	1593	1648			1630			1476			1651	1425
Flt Permitted	0.52	1.00			0.98			0.98			0.87	1.00
Satd. Flow (perm)	874	1648			1607			1453			1456	1425
Peak-hour factor, PHF	0.75	0.74	0.54	0.56	0.81	0.50	0.50	0.59	0.81	0.48	0.62	0.48
Adj. Flow (vph)	32	185	24	11	233	58	16	188	32	48	105	44
RTOR Reduction (vph)	0	12	0	0	22	0	0	8	0	0	0	22
Lane Group Flow (vph)	32	197	0	0	280	0	0	228	0	0	153	22
Parking (#/hr)							0	0	0			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	14.0	14.0			14.0			25.5			25.5	25.5
Effective Green, g (s)	14.0	14.0			14.0			25.5			25.5	25.5
Actuated g/C Ratio	0.28	0.28			0.28			0.51			0.51	0.51
Clearance Time (s)	5.5	5.5			5.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	244	461			449			741			742	726
v/s Ratio Prot		0.12										
v/s Ratio Perm	0.04				c0.17			c0.16			0.11	0.02
v/c Ratio	0.13	0.43			0.62			0.31			0.21	0.03
Uniform Delay, d1	13.5	14.7			15.7			7.1			6.7	6.1
Progression Factor	1.30	1.17			1.00			1.00			1.00	1.00
Incremental Delay, d2	1.0	2.7			6.4			1.1			0.6	0.1
Delay (s)	18.6	19.9			22.1			8.2			7.3	6.2
Level of Service	B	B			C			A			A	A
Approach Delay (s)		19.8			22.1			8.2			7.1	
Approach LOS		B			C			A			A	

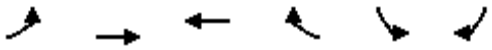
Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	101	110	152	57
Future Volume (vph)	101	110	152	57
Turn Type	Perm	NA	NA	Prot
Protected Phases		6	2	4
Permitted Phases	6			
Detector Phase	6	6	2	4
Switch Phase				
Minimum Initial (s)	15.0	15.0	15.0	10.0
Minimum Split (s)	21.0	21.0	21.0	15.0
Total Split (s)	32.0	32.0	32.0	18.0
Total Split (%)	64.0%	64.0%	64.0%	36.0%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0
Total Lost Time (s)		6.0	6.0	5.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	None	Max	None
Act Effct Green (s)		30.2	30.2	10.2
Actuated g/C Ratio		0.64	0.64	0.22
v/c Ratio		0.30	0.26	0.33
Control Delay		7.0	4.3	11.5
Queue Delay		0.0	0.0	0.0
Total Delay		7.0	4.3	11.5
LOS		A	A	B
Approach Delay		7.0	4.3	11.5
Approach LOS		A	A	B

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 47.2	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.33	
Intersection Signal Delay: 6.7	Intersection LOS: A
Intersection Capacity Utilization 47.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 32: McKee St & College St





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	101	110	152	54	57	53
Future Volume (vph)	101	110	152	54	57	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		5.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	0.94		0.93	
Flt Protected		0.98	1.00		0.98	
Satd. Flow (prot)		1817	1760		1695	
Flt Permitted		0.72	1.00		0.98	
Satd. Flow (perm)		1338	1760		1695	
Peak-hour factor, PHF	0.77	0.86	0.86	0.44	0.84	0.78
Adj. Flow (vph)	131	128	177	123	68	68
RTOR Reduction (vph)	0	0	41	0	56	0
Lane Group Flow (vph)	0	259	259	0	80	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)		29.0	29.0		8.2	
Effective Green, g (s)		29.0	29.0		8.2	
Actuated g/C Ratio		0.60	0.60		0.17	
Clearance Time (s)		6.0	6.0		5.0	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		805	1058		288	
v/s Ratio Prot			0.15		c0.05	
v/s Ratio Perm		c0.19				
v/c Ratio		0.32	0.24		0.28	
Uniform Delay, d1		4.7	4.5		17.4	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		0.2	0.5		0.5	
Delay (s)		5.0	5.0		17.9	
Level of Service		A	A		B	
Approach Delay (s)		5.0	5.0		17.9	
Approach LOS		A	A		B	

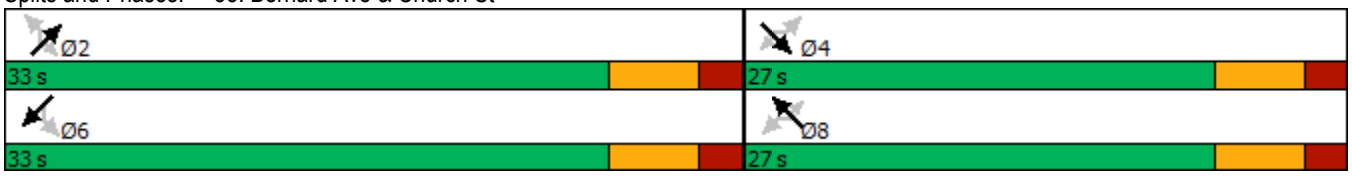
Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	48.2	Sum of lost time (s)	11.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Configurations											
Traffic Volume (vph)	56	94	42	91	215	93	54	264	82	47	166
Future Volume (vph)	56	94	42	91	215	93	54	264	82	47	166
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		4			8			2			6
Permitted Phases	4		4	8		8	2		2	6	
Detector Phase	4	4	4	8	8	8	2	2	2	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	14.0	14.0	14.0	14.0	14.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	27.0	27.0	27.0	27.0	27.0	27.0	33.0	33.0	33.0	33.0	33.0
Total Split (%)	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	55.0%	55.0%	55.0%	55.0%	55.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	12.3	12.3	12.3	12.3	12.3	12.3	27.1	27.1	27.1	27.1	27.1
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.24	0.24	0.53	0.53	0.53	0.53	0.53
v/c Ratio	0.22	0.23	0.11	0.32	0.53	0.22	0.10	0.29	0.10	0.09	0.32
Control Delay	17.2	16.5	4.9	18.6	21.3	5.2	8.1	8.8	2.7	8.0	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	16.5	4.9	18.6	21.3	5.2	8.1	8.8	2.7	8.0	7.1
LOS	B	B	A	B	C	A	A	A	A	A	A
Approach Delay		14.2			16.9			7.5			7.2
Approach LOS		B			B			A			A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 51.5	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 11.2	Intersection LOS: B
Intersection Capacity Utilization 65.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 33: Bernard Ave & Church St



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	56	94	42	91	215	93	54	264	82	47	166	113
Future Volume (vph)	56	94	42	91	215	93	54	264	82	47	166	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1749	
Flt Permitted	0.61	1.00	1.00	0.69	1.00	1.00	0.58	1.00	1.00	0.58	1.00	
Satd. Flow (perm)	1142	1863	1583	1287	1863	1583	1072	1863	1583	1088	1749	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	102	46	99	234	101	59	287	89	51	180	123
RTOR Reduction (vph)	0	0	35	0	0	77	0	0	42	0	35	0
Lane Group Flow (vph)	61	102	11	99	234	24	59	287	47	51	268	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	12.3	12.3	12.3	12.3	12.3	12.3	27.2	27.2	27.2	27.2	27.2	
Effective Green, g (s)	12.3	12.3	12.3	12.3	12.3	12.3	27.2	27.2	27.2	27.2	27.2	
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.24	0.24	0.53	0.53	0.53	0.53	0.53	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	272	444	378	307	444	378	566	983	836	574	923	
v/s Ratio Prot		0.05			c0.13			c0.15			0.15	
v/s Ratio Perm	0.05		0.01	0.08		0.02	0.06		0.03	0.05		
v/c Ratio	0.22	0.23	0.03	0.32	0.53	0.06	0.10	0.29	0.06	0.09	0.29	
Uniform Delay, d1	15.8	15.8	15.0	16.2	17.1	15.1	6.1	6.8	5.9	6.0	6.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.3	0.0	0.6	1.1	0.1	0.4	0.8	0.1	0.3	0.8	
Delay (s)	16.2	16.1	15.1	16.8	18.2	15.2	6.4	7.5	6.0	6.3	7.6	
Level of Service	B	B	B	B	B	B	A	A	A	A	A	
Approach Delay (s)		15.9			17.2			7.1			7.4	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	51.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

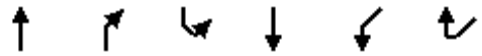
c Critical Lane Group

Lane Group	NBT	SBL	SBT	SWL
Lane Configurations				
Traffic Volume (vph)	148	51	98	248
Future Volume (vph)	148	51	98	248
Turn Type	NA	Perm	NA	Prot
Protected Phases	2		6	8
Permitted Phases		6		
Detector Phase	2	6	6	8
Switch Phase				
Minimum Initial (s)	20.0	20.0	20.0	8.0
Minimum Split (s)	26.0	26.0	26.0	20.0
Total Split (s)	33.0	33.0	33.0	27.0
Total Split (%)	55.0%	55.0%	55.0%	45.0%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0
Total Lost Time (s)	6.0		6.0	6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	Max	Max	Max	None
Act Effct Green (s)	27.1		27.1	18.4
Actuated g/C Ratio	0.47		0.47	0.32
v/c Ratio	0.70		0.48	0.82
Control Delay	14.0		15.9	31.3
Queue Delay	0.0		0.0	0.0
Total Delay	14.0		15.9	31.3
LOS	B		B	C
Approach Delay	14.0		15.9	31.3
Approach LOS	B		B	C

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 57.6	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 20.5	Intersection LOS: C
Intersection Capacity Utilization 76.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 35: McKee St & Bernard Ave





Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	148	366	51	98	248	40
Future Volume (vph)	148	366	51	98	248	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.91			1.00	0.99	
Flt Protected	1.00			0.98	0.96	
Satd. Flow (prot)	1702			1826	1758	
Flt Permitted	1.00			0.50	0.96	
Satd. Flow (perm)	1702			939	1758	
Peak-hour factor, PHF	0.65	0.90	0.61	0.77	0.59	0.83
Adj. Flow (vph)	228	407	84	127	420	48
RTOR Reduction (vph)	103	0	0	0	7	0
Lane Group Flow (vph)	532	0	0	211	461	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Actuated Green, G (s)	27.1			27.1	18.4	
Effective Green, g (s)	27.1			27.1	18.4	
Actuated g/C Ratio	0.47			0.47	0.32	
Clearance Time (s)	6.0			6.0	6.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	802			442	562	
v/s Ratio Prot	c0.31				c0.26	
v/s Ratio Perm				0.22		
v/c Ratio	0.66			0.48	0.82	
Uniform Delay, d1	11.7			10.4	18.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	4.3			3.7	9.1	
Delay (s)	16.0			14.0	27.1	
Level of Service	B			B	C	
Approach Delay (s)	16.0			14.0	27.1	
Approach LOS	B			B	C	

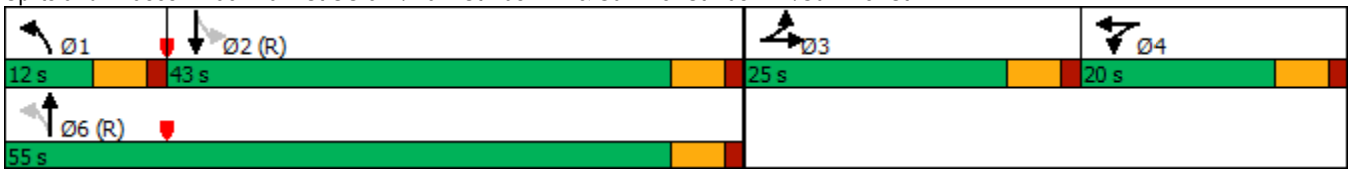
Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

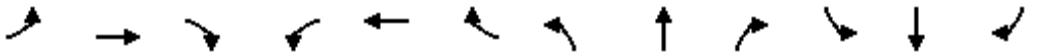
c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	55	74	58	42	355	3	200
Future Volume (vph)	55	74	58	42	355	3	200
Turn Type	Split	NA	NA	pm+pt	NA	Perm	NA
Protected Phases	3	3	4	1	6		2
Permitted Phases				6		2	
Detector Phase	3	3	4	1	6	2	2
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0	14.5	14.5	14.5
Minimum Split (s)	25.0	25.0	20.0	12.0	25.0	25.0	25.0
Total Split (s)	25.0	25.0	20.0	12.0	55.0	43.0	43.0
Total Split (%)	25.0%	25.0%	20.0%	12.0%	55.0%	43.0%	43.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?							
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	12.4	12.4	10.6	62.8	62.8	55.1	55.1
Actuated g/C Ratio	0.12	0.12	0.11	0.63	0.63	0.55	0.55
v/c Ratio	0.38	0.58	0.50	0.08	0.43	0.02	0.36
Control Delay	42.5	49.8	52.4	6.3	9.9	16.3	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay	42.5	49.8	52.4	6.3	9.9	16.3	14.5
LOS	D	D	D	A	A	B	B
Approach Delay		46.9	52.4		9.6		14.5
Approach LOS		D	D		A		B

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 66 (66%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 21.3	Intersection LOS: C
Intersection Capacity Utilization 57.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 38: Main St US 321/Main St Bus 11E & Summer St Bus 11E/Summer St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	74	17	2	58	6	42	355	7	3	200	57
Future Volume (vph)	55	74	17	2	58	6	42	355	7	3	200	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96			0.98		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1593	1616			1474		1593	1502		1593	1453	
Flt Permitted	0.95	1.00			1.00		0.49	1.00		0.52	1.00	
Satd. Flow (perm)	1593	1616			1474		816	1502		878	1453	
Peak-hour factor, PHF	0.72	0.84	0.61	0.50	0.93	0.50	0.95	0.90	0.58	0.38	0.91	0.79
Adj. Flow (vph)	76	88	28	4	62	12	44	394	12	8	220	72
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	76	116	0	0	78	0	44	406	0	8	292	0
Parking (#/hr)				0	0	0		0	0		0	0
Turn Type	Split	NA		Split	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	3		4	4		1	6			2	
Permitted Phases							6			2		
Actuated Green, G (s)	12.4	12.4			9.4		61.7	61.7		51.8	51.8	
Effective Green, g (s)	12.4	12.4			9.4		61.7	61.7		51.8	51.8	
Actuated g/C Ratio	0.12	0.12			0.09		0.62	0.62		0.52	0.52	
Clearance Time (s)	5.5	5.5			5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	197	200			138		537	926		454	752	
v/s Ratio Prot	0.05	c0.07			c0.05		0.00	c0.27			0.20	
v/s Ratio Perm							0.05			0.01		
v/c Ratio	0.39	0.58			0.57		0.08	0.44		0.02	0.39	
Uniform Delay, d1	40.3	41.3			43.3		8.0	10.1		11.7	14.5	
Progression Factor	0.94	0.95			1.00		0.59	0.71		0.90	0.74	
Incremental Delay, d2	1.2	4.0			5.2		0.1	1.2		0.1	1.5	
Delay (s)	39.3	43.1			48.6		4.8	8.4		10.6	12.2	
Level of Service	D	D			D		A	A		B	B	
Approach Delay (s)		41.6			48.6			8.1			12.1	
Approach LOS		D			D			A			B	

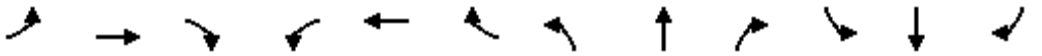
Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	58	100	59	135	24	311	62	211
Future Volume (vph)	58	100	59	135	24	311	62	211
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	6.0	9.5	6.0	9.5	6.0	14.5	6.0	14.5
Minimum Split (s)	12.0	20.0	12.0	20.0	12.0	25.0	12.0	25.0
Total Split (s)	12.0	28.0	12.0	28.0	12.0	48.0	12.0	48.0
Total Split (%)	12.0%	28.0%	12.0%	28.0%	12.0%	48.0%	12.0%	48.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.5	5.0	5.5	5.0	5.5	5.0	5.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	Min	None	Min	None	C-Min	None	C-Min
Act Effct Green (s)	26.1	19.1	25.9	19.0	55.6	49.8	57.3	52.4
Actuated g/C Ratio	0.26	0.19	0.26	0.19	0.56	0.50	0.57	0.52
v/c Ratio	0.30	0.38	0.22	0.79	0.08	0.61	0.22	0.38
Control Delay	26.3	38.0	21.5	51.4	7.5	15.0	11.7	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	26.3	38.0	21.5	51.4	7.5	15.4	11.7	19.0
LOS	C	D	C	D	A	B	B	B
Approach Delay		33.6		44.5		14.8		17.5
Approach LOS		C		D		B		B

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 68 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 24.5	Intersection LOS: C
Intersection Capacity Utilization 60.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 39: Main St Bus 11E & Church St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	100	7	59	135	41	24	311	67	62	211	53
Future Volume (vph)	58	100	7	59	135	41	24	311	67	62	211	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1593	1651		1593	1618		1593	1632		1593	1613	
Flt Permitted	0.38	1.00		0.67	1.00		0.53	1.00		0.32	1.00	
Satd. Flow (perm)	640	1651		1129	1618		880	1632		543	1613	
Peak-hour factor, PHF	0.81	0.93	0.58	0.82	0.73	0.73	0.55	0.76	0.76	0.74	0.89	0.66
Adj. Flow (vph)	72	108	12	72	185	56	44	409	88	84	237	80
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	72	120	0	72	241	0	44	497	0	84	317	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.6	19.1		25.4	19.0		51.8	47.7		55.2	49.4	
Effective Green, g (s)	25.6	19.1		25.4	19.0		51.8	47.7		55.2	49.4	
Actuated g/C Ratio	0.26	0.19		0.25	0.19		0.52	0.48		0.55	0.49	
Clearance Time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	225	315		316	307		485	778		360	796	
v/s Ratio Prot	c0.02	0.07		0.01	c0.15		0.00	c0.30		c0.01	0.20	
v/s Ratio Perm	0.06			0.04			0.04			0.11		
v/c Ratio	0.32	0.38		0.23	0.79		0.09	0.64		0.23	0.40	
Uniform Delay, d1	29.3	35.3		29.1	38.6		12.0	19.7		12.0	15.9	
Progression Factor	1.00	1.00		0.87	0.89		0.68	0.53		1.00	1.00	
Incremental Delay, d2	0.8	0.8		0.4	11.9		0.1	3.8		0.3	1.2	
Delay (s)	30.1	36.1		25.6	46.1		8.2	14.2		12.3	17.2	
Level of Service	C	D		C	D		A	B		B	B	
Approach Delay (s)		33.8			41.4			13.7			16.2	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

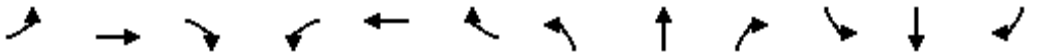
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	3	10	92	25	2	384	11	185
Future Volume (vph)	3	10	92	25	2	384	11	185
Turn Type	Perm	NA	Perm	NA	Perm	NA	Prot	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2			
Detector Phase	4	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	19.5	19.5	6.0	19.5
Minimum Split (s)	20.0	20.0	20.0	20.0	25.0	25.0	12.0	25.0
Total Split (s)	28.0	28.0	28.0	28.0	60.0	60.0	12.0	72.0
Total Split (%)	28.0%	28.0%	28.0%	28.0%	60.0%	60.0%	12.0%	72.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.5		5.5	5.5	5.5	5.0	5.5
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)		18.2		18.2	66.1	66.1	6.3	70.8
Actuated g/C Ratio		0.18		0.18	0.66	0.66	0.06	0.71
v/c Ratio		0.12		0.72	0.01	0.59	0.20	0.17
Control Delay		26.8		54.2	9.5	14.0	34.3	9.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		26.8		54.2	9.5	14.0	34.3	9.8
LOS		C		D	A	B	C	A
Approach Delay		26.8		54.2		14.0		11.9
Approach LOS		C		D		B		B

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 38 (38%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 57.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 40: Main St US 321 & McKee St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	10	6	92	25	13	2	384	167	11	185	1
Future Volume (vph)	3	10	6	92	25	13	2	384	167	11	185	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.98		1.00	0.95		1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1600			1595		1593	1596		1593	1672	
Flt Permitted		0.92			0.77		0.63	1.00		0.95	1.00	
Satd. Flow (perm)		1490			1275		1053	1596		1593	1672	
Peak-hour factor, PHF	0.38	0.62	0.75	0.77	0.78	0.65	0.50	0.89	0.83	0.55	0.91	0.25
Adj. Flow (vph)	8	16	8	119	32	20	4	431	201	20	203	4
RTOR Reduction (vph)	0	7	0	0	5	0	0	14	0	0	1	0
Lane Group Flow (vph)	0	25	0	0	166	0	4	618	0	20	206	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2					
Actuated Green, G (s)		18.2			18.2		63.1	63.1		2.7	70.8	
Effective Green, g (s)		18.2			18.2		63.1	63.1		2.7	70.8	
Actuated g/C Ratio		0.18			0.18		0.63	0.63		0.03	0.71	
Clearance Time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Vehicle Extension (s)		4.0			4.0		4.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		271			232		664	1007		43	1183	
v/s Ratio Prot								c0.39		c0.01	0.12	
v/s Ratio Perm		0.02			c0.13		0.00					
v/c Ratio		0.09			0.72		0.01	0.61		0.47	0.17	
Uniform Delay, d1		34.0			38.5		6.8	11.1		47.9	4.9	
Progression Factor		1.00			1.00		1.00	1.00		0.67	1.71	
Incremental Delay, d2		0.2			10.7		0.0	2.8		2.7	0.3	
Delay (s)		34.2			49.2		6.9	13.9		35.0	8.6	
Level of Service		C			D		A	B		C	A	
Approach Delay (s)		34.2			49.2			13.9			10.9	
Approach LOS		C			D			B			B	

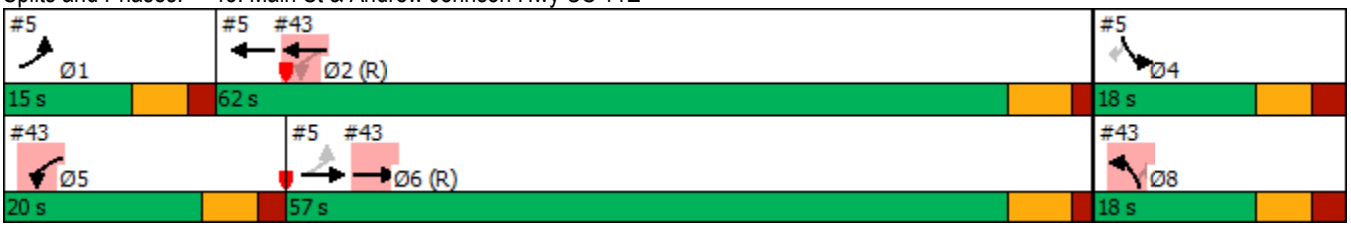
Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR	Ø1	Ø4
Lane Configurations							
Traffic Volume (vph)	1041	175	803	28	90		
Future Volume (vph)	1041	175	803	28	90		
Turn Type	NA	pm+pt	NA	Prot	Perm		
Protected Phases	6	5	2	8		1	4
Permitted Phases		2			8		
Detector Phase	6	5	2	8	8		
Switch Phase							
Minimum Initial (s)	15.0	6.0	15.0	8.5	8.5	6.0	8.5
Minimum Split (s)	21.0	15.0	21.0	15.0	15.0	15.0	15.0
Total Split (s)	57.0	20.0	62.0	18.0	18.0	15.0	18.0
Total Split (%)	60.0%	21.1%	65.3%	18.9%	18.9%	16%	19%
Yellow Time (s)	4.5	4.0	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	2.0	1.5	2.5	2.5	2.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.5	6.5		
Lead/Lag	Lag	Lead	Lag			Lead	
Lead-Lag Optimize?							
Recall Mode	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	57.3	71.7	62.9	9.1	9.1		
Actuated g/C Ratio	0.60	0.75	0.66	0.10	0.10		
v/c Ratio	0.63	0.63	0.40	0.19	0.44		
Control Delay	14.3	27.0	3.8	41.9	13.9		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	14.3	27.0	3.8	41.9	13.9		
LOS	B	C	A	D	B		
Approach Delay	14.3		8.1	20.3			
Approach LOS	B		A	C			

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 20 (21%), Referenced to phase 2:WBT and 6:EBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 43: Main St & Andrew Johnson Hwy US 11E





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1041	47	175	803	28	90
Future Volume (vph)	1041	47	175	803	28	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.5	6.5
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3510		1770	3539	1770	1583
Flt Permitted	1.00		0.13	1.00	0.95	1.00
Satd. Flow (perm)	3510		246	3539	1770	1583
Peak-hour factor, PHF	0.83	0.65	0.80	0.85	0.88	0.83
Adj. Flow (vph)	1254	72	219	945	32	108
RTOR Reduction (vph)	4	0	0	0	0	98
Lane Group Flow (vph)	1322	0	219	945	32	10
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	6		5	2	8	
Permitted Phases			2			8
Actuated Green, G (s)	57.3		71.8	61.7	9.1	9.1
Effective Green, g (s)	57.3		71.8	61.7	9.1	9.1
Actuated g/C Ratio	0.60		0.76	0.65	0.10	0.10
Clearance Time (s)	6.0		6.0	6.0	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2117		347	2298	169	151
v/s Ratio Prot	0.38		c0.07	c0.27	c0.02	
v/s Ratio Perm			c0.41			0.01
v/c Ratio	0.62		0.63	0.41	0.19	0.07
Uniform Delay, d1	12.0		9.3	8.0	39.6	39.1
Progression Factor	1.00		2.76	0.40	1.00	1.00
Incremental Delay, d2	1.4		3.4	0.5	0.5	0.2
Delay (s)	13.4		29.1	3.7	40.1	39.3
Level of Service	B		C	A	D	D
Approach Delay (s)	13.4			8.4	39.5	
Approach LOS	B			A	D	

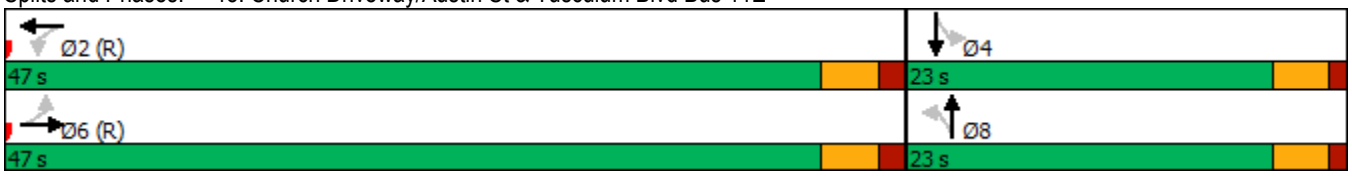
Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

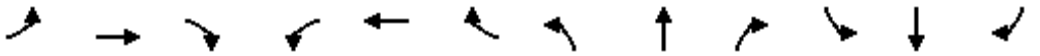
c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL	SBT	Ø8
Lane Configurations						
Traffic Volume (vph)	25	345	410	138	0	
Future Volume (vph)	25	345	410	138	0	
Turn Type	Perm	NA	NA	Perm	NA	
Protected Phases		6	2		4	8
Permitted Phases	6			4		
Detector Phase	6	6	2	4	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	4.0	4.0	4.0
Minimum Split (s)	17.5	17.5	17.5	8.0	8.0	8.0
Total Split (s)	47.0	47.0	47.0	23.0	23.0	23.0
Total Split (%)	67.1%	67.1%	67.1%	32.9%	32.9%	33%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	
Total Lost Time (s)	4.5	4.5	4.5		4.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Min	C-Min	C-Min	Max	Max	Max
Act Effct Green (s)	35.3	35.3	35.3		26.2	
Actuated g/C Ratio	0.50	0.50	0.50		0.37	
v/c Ratio	0.19	0.51	0.78		0.40	
Control Delay	8.8	11.7	16.5		19.6	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	8.8	11.7	16.5		19.6	
LOS	A	B	B		B	
Approach Delay		11.5	16.5		19.6	
Approach LOS		B	B		B	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 63 (90%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 15.2	Intersection LOS: B
Intersection Capacity Utilization 45.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 48: Church Driveway/Austin St & Tusculum Blvd Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	345	1	0	410	105	0	0	0	138	0	38
Future Volume (vph)	25	345	1	0	410	105	0	0	0	138	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5						4.0	
Lane Util. Factor	1.00	1.00			1.00						1.00	
Frt	1.00	1.00			0.98						0.97	
Flt Protected	0.95	1.00			1.00						0.96	
Satd. Flow (prot)	1770	1860			1819						1739	
Flt Permitted	0.18	1.00			1.00						0.78	
Satd. Flow (perm)	334	1860			1819						1402	
Peak-hour factor, PHF	0.78	0.73	0.25	0.25	0.67	0.91	0.92	0.92	0.92	0.82	0.25	0.79
Adj. Flow (vph)	32	473	4	0	612	115	0	0	0	168	0	48
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	0	0	14	0
Lane Group Flow (vph)	32	477	0	0	715	0	0	0	0	0	202	0
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		6			2			8			4	
Permitted Phases	6			2			8			4		
Actuated Green, G (s)	35.3	35.3			35.3						26.2	
Effective Green, g (s)	35.3	35.3			35.3						26.2	
Actuated g/C Ratio	0.50	0.50			0.50						0.37	
Clearance Time (s)	4.5	4.5			4.5						4.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	168	937			917						524	
v/s Ratio Prot		0.26			c0.39							
v/s Ratio Perm	0.10										c0.14	
v/c Ratio	0.19	0.51			0.78						0.38	
Uniform Delay, d1	9.5	11.6			14.2						16.0	
Progression Factor	0.82	0.91			0.78						1.00	
Incremental Delay, d2	2.5	1.9			6.4						2.1	
Delay (s)	10.2	12.4			17.4						18.1	
Level of Service	B	B			B						B	
Approach Delay (s)		12.3			17.4			0.0			18.1	
Approach LOS		B			B			A			B	

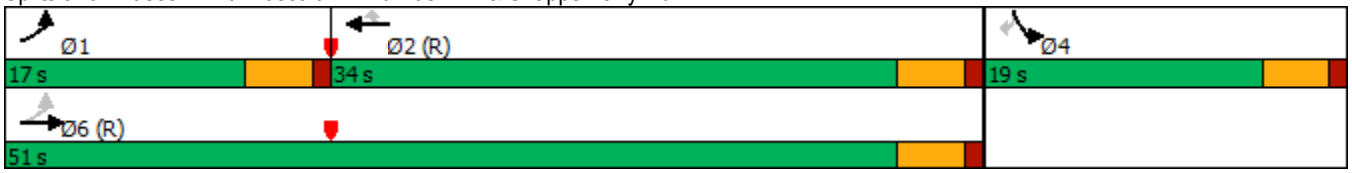
Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

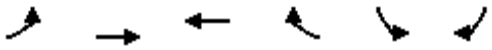
c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	144	318	317	88	83	193
Future Volume (vph)	144	318	317	88	83	193
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Detector Phase	1	6	2	2	4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	15.0	25.0	25.0	25.0	15.0	15.0
Total Split (s)	17.0	51.0	34.0	34.0	19.0	19.0
Total Split (%)	24.3%	72.9%	48.6%	48.6%	27.1%	27.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?						
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	52.1	52.1	40.3	40.3	8.9	8.9
Actuated g/C Ratio	0.74	0.74	0.58	0.58	0.13	0.13
v/c Ratio	0.21	0.25	0.32	0.10	0.40	0.55
Control Delay	2.8	3.3	8.9	3.5	32.7	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.8	3.3	8.9	3.5	32.7	10.2
LOS	A	A	A	A	C	B
Approach Delay		3.1	7.7		17.0	
Approach LOS		A	A		B	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 43 (61%), Referenced to phase 2:WBT and 6:EBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 40.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 49: Tusculum Blvd Bus 11E & Snapps Ferry Rd





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	144	318	317	88	83	193
Future Volume (vph)	144	318	317	88	83	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.47	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	868	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	346	345	96	90	210
RTOR Reduction (vph)	0	0	0	41	0	183
Lane Group Flow (vph)	157	346	345	55	90	27
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Actuated Green, G (s)	52.1	52.1	40.2	40.2	8.9	8.9
Effective Green, g (s)	52.1	52.1	40.2	40.2	8.9	8.9
Actuated g/C Ratio	0.74	0.74	0.57	0.57	0.13	0.13
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	741	1386	1069	909	225	201
v/s Ratio Prot	0.02	c0.19	c0.19		c0.05	
v/s Ratio Perm	0.14			0.03		0.02
v/c Ratio	0.21	0.25	0.32	0.06	0.40	0.13
Uniform Delay, d1	2.9	2.8	7.8	6.6	28.1	27.1
Progression Factor	0.74	0.89	0.92	1.44	1.00	1.00
Incremental Delay, d2	0.1	0.4	0.8	0.1	1.2	0.3
Delay (s)	2.3	2.9	7.9	9.6	29.3	27.4
Level of Service	A	A	A	A	C	C
Approach Delay (s)		2.7	8.3		28.0	
Approach LOS		A	A		C	

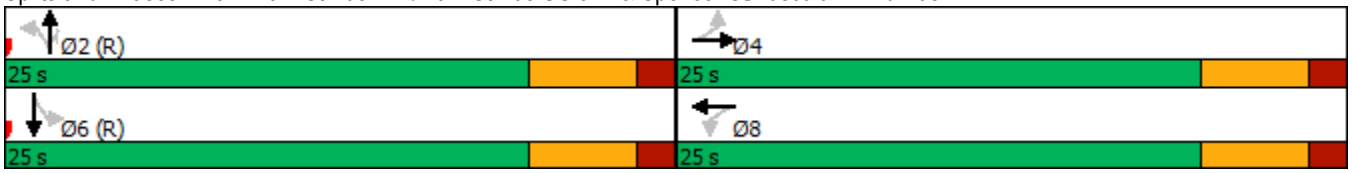
Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

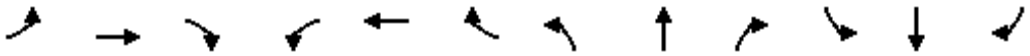
c Critical Lane Group

Lane Group	WBL	WBT	NBL	NBT	NBR	SBL	SBT	Ø4
Lane Configurations								
Traffic Volume (vph)	148	56	3	158	178	16	225	
Future Volume (vph)	148	56	3	158	178	16	225	
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	
Protected Phases		8		2			6	4
Permitted Phases	8		2		2	6		
Detector Phase	8	8	2	2	2	6	6	
Switch Phase								
Minimum Initial (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	
Total Lost Time (s)		5.5		5.5	5.5		5.5	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min	C-Min	None
Act Effct Green (s)		17.9		21.1	21.1		21.1	
Actuated g/C Ratio		0.36		0.42	0.42		0.42	
v/c Ratio		0.72		0.25	0.35		0.53	
Control Delay		22.6		9.8	4.2		14.4	
Queue Delay		0.0		0.0	0.0		0.0	
Total Delay		22.6		9.8	4.2		14.4	
LOS		C		A	A		B	
Approach Delay		22.6		6.4			14.4	
Approach LOS		C		A			B	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 45 (90%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 53.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 51: Main St Bus 11E/Main St Bus US 321 & Spencer St/Tusculum Blvd Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	148	56	30	3	158	178	16	225	22
Future Volume (vph)	0	0	0	148	56	30	3	158	178	16	225	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			5.5	5.5		5.5	
Lane Util. Factor					1.00			1.00	1.00		1.00	
Frt					0.98			1.00	0.85		0.98	
Flt Protected					0.97			1.00	1.00		1.00	
Satd. Flow (prot)					1595			1673	1425		1644	
Flt Permitted					0.81			0.98	1.00		0.96	
Satd. Flow (perm)					1329			1643	1425		1591	
Peak-hour factor, PHF	0.92	0.92	0.92	0.67	0.70	0.63	0.38	0.96	0.68	0.50	0.78	0.55
Adj. Flow (vph)	0	0	0	221	80	48	8	165	262	32	288	40
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	151	0	9	0
Lane Group Flow (vph)	0	0	0	0	337	0	0	173	111	0	351	0
Turn Type				Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)					17.9			21.1	21.1		21.1	
Effective Green, g (s)					17.9			21.1	21.1		21.1	
Actuated g/C Ratio					0.36			0.42	0.42		0.42	
Clearance Time (s)					5.5			5.5	5.5		5.5	
Vehicle Extension (s)					3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)					475			693	601		671	
v/s Ratio Prot												
v/s Ratio Perm					c0.25			0.11	0.08		c0.22	
v/c Ratio					0.71			0.25	0.18		0.52	
Uniform Delay, d1					13.8			9.3	9.1		10.7	
Progression Factor					1.00			0.91	2.30		1.00	
Incremental Delay, d2					4.8			0.7	0.6		2.9	
Delay (s)					18.6			9.2	21.3		13.6	
Level of Service					B			A	C		B	
Approach Delay (s)		0.0			18.6			16.5			13.6	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	256	89	276	322	110	311
Future Volume (vph)	256	89	276	322	110	311
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	3.0	5.0	3.0	3.0
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0	15.0
Total Split (s)	29.0	29.0	21.0	50.0	20.0	20.0
Total Split (%)	41.4%	41.4%	30.0%	71.4%	28.6%	28.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	32.4	32.4	49.1	49.1	10.9	10.9
Actuated g/C Ratio	0.46	0.46	0.70	0.70	0.16	0.16
v/c Ratio	0.37	0.18	0.54	0.32	0.53	0.64
Control Delay	11.0	1.8	7.5	4.7	33.4	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.0	1.8	7.5	4.7	33.4	9.3
LOS	B	A	A	A	C	A
Approach Delay	8.2			6.1	16.4	
Approach LOS	A			A	B	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 67 (96%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 9.5	Intersection LOS: A
Intersection Capacity Utilization 47.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 53: Bernard Ave & Tusculum Blvd Bus 11E





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	256	89	276	322	110	311
Future Volume (vph)	256	89	276	322	110	311
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.44	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	826	1863	1770	1583
Peak-hour factor, PHF	0.80	0.62	0.70	0.77	0.76	0.90
Adj. Flow (vph)	320	144	394	418	145	346
RTOR Reduction (vph)	0	77	0	0	0	292
Lane Group Flow (vph)	320	67	394	418	145	54
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	32.4	32.4	49.1	49.1	10.9	10.9
Effective Green, g (s)	32.4	32.4	49.1	49.1	10.9	10.9
Actuated g/C Ratio	0.46	0.46	0.70	0.70	0.16	0.16
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	862	732	737	1306	275	246
v/s Ratio Prot	0.17		c0.09	0.22	c0.08	
v/s Ratio Perm		0.04	c0.29			0.03
v/c Ratio	0.37	0.09	0.53	0.32	0.53	0.22
Uniform Delay, d1	12.2	10.5	4.8	4.0	27.2	25.8
Progression Factor	0.68	0.42	1.10	0.89	1.00	1.00
Incremental Delay, d2	1.2	0.2	0.6	0.5	1.8	0.5
Delay (s)	9.5	4.6	5.9	4.1	29.0	26.3
Level of Service	A	A	A	A	C	C
Approach Delay (s)	8.0			5.0	27.1	
Approach LOS	A			A	C	

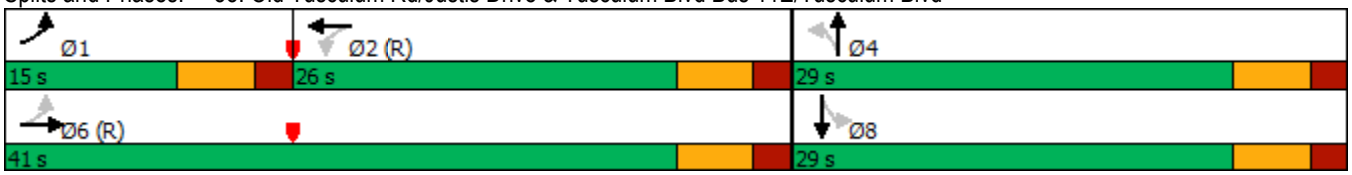
Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

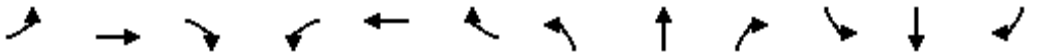
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	99	376	14	224	205	78	72	65
Future Volume (vph)	99	376	14	224	205	78	72	65
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	1	6		2		4		8
Permitted Phases	6		2		4		8	
Detector Phase	1	6	2	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	8.0	19.0	19.0	19.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	25.0	25.0	25.0	15.0	15.0	15.0	15.0
Total Split (s)	15.0	41.0	26.0	26.0	29.0	29.0	29.0	29.0
Total Split (%)	21.4%	58.6%	37.1%	37.1%	41.4%	41.4%	41.4%	41.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	37.7	37.7	26.1	26.1	20.3	20.3	20.3	20.3
Actuated g/C Ratio	0.54	0.54	0.37	0.37	0.29	0.29	0.29	0.29
v/c Ratio	0.23	0.43	0.05	0.46	0.84	0.24	0.35	0.34
Control Delay	6.8	8.3	18.6	21.8	45.1	15.9	21.7	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	8.3	18.6	21.8	45.1	15.9	21.7	12.9
LOS	A	A	B	C	D	B	C	B
Approach Delay		8.0		21.6		36.1		16.5
Approach LOS		A		C		D		B

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 67 (96%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 69.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 55: Old Tusculum Rd/Justis Drive & Tusculum Blvd Bus 11E/Tusculum Blvd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	376	8	14	224	19	205	78	17	72	65	54
Future Volume (vph)	99	376	8	14	224	19	205	78	17	72	65	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.97		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1855		1770	1838		1770	1802		1770	1726	
Flt Permitted	0.39	1.00		0.51	1.00		0.64	1.00		0.67	1.00	
Satd. Flow (perm)	724	1855		951	1838		1191	1802		1257	1726	
Peak-hour factor, PHF	0.85	0.89	0.67	0.88	0.77	0.68	0.71	0.78	0.61	0.56	0.68	0.59
Adj. Flow (vph)	116	422	12	16	291	28	289	100	28	129	96	92
RTOR Reduction (vph)	0	1	0	0	5	0	0	15	0	0	52	0
Lane Group Flow (vph)	116	433	0	16	314	0	289	113	0	129	136	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	37.7	37.7		24.9	24.9		20.3	20.3		20.3	20.3	
Effective Green, g (s)	37.7	37.7		24.9	24.9		20.3	20.3		20.3	20.3	
Actuated g/C Ratio	0.54	0.54		0.36	0.36		0.29	0.29		0.29	0.29	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	491	999		338	653		345	522		364	500	
v/s Ratio Prot	0.02	c0.23			c0.17			0.06			0.08	
v/s Ratio Perm	0.10			0.02			c0.24			0.10		
v/c Ratio	0.24	0.43		0.05	0.48		0.84	0.22		0.35	0.27	
Uniform Delay, d1	8.7	9.7		14.8	17.5		23.3	18.8		19.7	19.2	
Progression Factor	0.65	0.66		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.2		0.3	2.5		16.1	0.2		0.6	0.3	
Delay (s)	5.9	7.6		15.0	20.1		39.4	19.0		20.3	19.5	
Level of Service	A	A		B	C		D	B		C	B	
Approach Delay (s)		7.2			19.8			33.1			19.8	
Approach LOS		A			B			C			B	

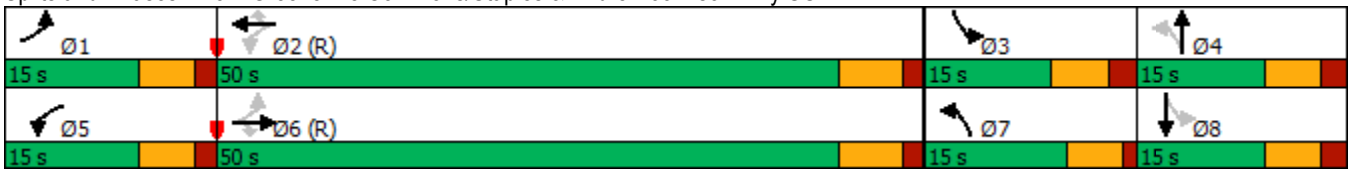
Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

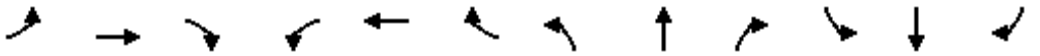
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	8	908	14	4	833	2	1	0	1	1
Future Volume (vph)	8	908	14	4	833	2	1	0	1	1
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	1	6		5	2		7	4	3	8
Permitted Phases	6		6	2		2	4		8	
Detector Phase	1	6	6	5	2	2	7	4	3	8
Switch Phase										
Minimum Initial (s)	6.0	20.0	20.0	6.0	20.0	20.0	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	26.0	26.0	15.0	26.0	26.0	15.0	12.0	15.0	15.0
Total Split (s)	15.0	50.0	50.0	15.0	50.0	50.0	15.0	15.0	15.0	15.0
Total Split (%)	15.8%	52.6%	52.6%	15.8%	52.6%	52.6%	15.8%	15.8%	15.8%	15.8%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	2.0	2.0	2.0
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)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	Max	None	Max
Act Effct Green (s)	45.5	43.7	43.7	44.0	41.1	41.1	36.8	34.6	36.0	34.8
Actuated g/C Ratio	0.48	0.46	0.46	0.46	0.43	0.43	0.39	0.36	0.38	0.37
v/c Ratio	0.11	0.61	0.02	0.04	0.63	0.01	0.01	0.01	0.01	0.02
Control Delay	11.4	21.0	0.1	3.8	11.1	0.0	22.0	0.0	22.0	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.4	21.0	0.1	3.8	11.1	0.0	22.0	0.0	22.0	18.8
LOS	B	C	A	A	B	A	C	A	C	B
Approach Delay		20.4			11.0			7.3		19.6
Approach LOS		C			B			A		B

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 88 (93%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 41.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 57: Greeneville Commons/Staples & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	908	14	4	833	2	1	0	3	1	1	4
Future Volume (vph)	8	908	14	4	833	2	1	0	3	1	1	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1583		1770	1676	
Flt Permitted	0.13	1.00	1.00	0.14	1.00	1.00	0.75	1.00		0.73	1.00	
Satd. Flow (perm)	241	3539	1583	252	3539	1583	1397	1583		1362	1676	
Peak-hour factor, PHF	0.33	0.91	0.70	0.50	0.87	0.50	0.25	0.25	0.38	0.25	0.25	0.50
Adj. Flow (vph)	24	998	20	8	957	4	4	0	8	4	4	8
RTOR Reduction (vph)	0	0	13	0	0	3	0	5	0	0	5	0
Lane Group Flow (vph)	24	998	7	8	957	1	4	3	0	4	7	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6		6	2		2	4			8		
Actuated Green, G (s)	37.2	34.5	34.5	34.2	33.0	33.0	35.8	34.6		36.8	35.6	
Effective Green, g (s)	37.2	34.5	34.5	34.2	33.0	33.0	35.8	34.6		36.8	35.6	
Actuated g/C Ratio	0.39	0.36	0.36	0.36	0.35	0.35	0.38	0.36		0.39	0.37	
Clearance Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	137	1285	574	109	1229	549	531	576		532	628	
v/s Ratio Prot	c0.00	c0.28		0.00	0.27		c0.00	0.00		0.00	c0.00	
v/s Ratio Perm	0.06		0.00	0.03		0.00	0.00			0.00		
v/c Ratio	0.18	0.78	0.01	0.07	0.78	0.00	0.01	0.01		0.01	0.01	
Uniform Delay, d1	19.9	26.8	19.4	21.2	27.7	20.2	18.5	19.2		17.9	18.6	
Progression Factor	1.00	1.00	1.00	0.37	0.45	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	4.7	0.0	0.3	4.4	0.0	0.0	0.0		0.0	0.0	
Delay (s)	20.5	31.5	19.4	8.0	16.7	20.3	18.5	19.3		17.9	18.7	
Level of Service	C	C	B	A	B	C	B	B		B	B	
Approach Delay (s)		31.0			16.7			19.0			18.5	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	23.5
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

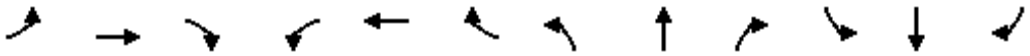
c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	20	23	366	237
Future Volume (vph)	20	23	366	237
Turn Type	NA	NA	NA	NA
Protected Phases	4	8	2	6
Permitted Phases				
Detector Phase	4	8	2	6
Switch Phase				
Minimum Initial (s)	8.0	8.0	15.0	15.0
Minimum Split (s)	20.0	20.0	27.5	27.5
Total Split (s)	26.0	26.0	74.0	74.0
Total Split (%)	26.0%	26.0%	74.0%	74.0%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	None	C-Min	C-Min
Act Effct Green (s)	10.0	10.0	82.8	82.8
Actuated g/C Ratio	0.10	0.10	0.83	0.83
v/c Ratio	0.30	0.41	0.39	0.26
Control Delay	46.4	50.2	3.8	2.2
Queue Delay	0.0	0.0	0.3	0.2
Total Delay	46.4	50.2	4.2	2.5
LOS	D	D	A	A
Approach Delay	46.4	50.2	4.2	2.5
Approach LOS	D	D	A	A

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 18 (18%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 37.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 61: Main St Bus 11E & Depot St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	20	7	0	23	10	0	366	10	0	237	22
Future Volume (vph)	0	20	7	0	23	10	0	366	10	0	237	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5			5.5			5.5	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			0.96			1.00			0.99	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		1453			1455			1502			1488	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		1453			1455			1502			1488	
Peak-hour factor, PHF	0.25	0.62	0.58	0.25	0.52	0.62	0.25	0.78	0.62	0.25	0.83	0.69
Adj. Flow (vph)	0	32	12	0	44	16	0	469	16	0	286	32
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	44	0	0	60	0	0	485	0	0	318	0
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.4			8.4			80.6			80.6	
Effective Green, g (s)		8.4			8.4			80.6			80.6	
Actuated g/C Ratio		0.08			0.08			0.81			0.81	
Clearance Time (s)		5.5			5.5			5.5			5.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		122			122			1210			1199	
v/s Ratio Prot		0.03			c0.04			c0.32			0.21	
v/s Ratio Perm												
v/c Ratio		0.36			0.49			0.40			0.27	
Uniform Delay, d1		43.3			43.8			2.8			2.4	
Progression Factor		1.00			1.00			0.89			0.61	
Incremental Delay, d2		1.8			3.1			0.9			0.5	
Delay (s)		45.1			46.9			3.4			2.0	
Level of Service		D			D			A			A	
Approach Delay (s)		45.1			46.9			3.4			2.0	
Approach LOS		D			D			A			A	

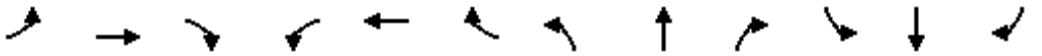
Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	35	154	5	108	2	38	10	30	61
Future Volume (vph)	35	154	5	108	2	38	10	30	61
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	2	2	6	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	20.0	20.0	20.0	20.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	25.5	25.5	25.5	25.5	15.0	15.0	15.0	15.0	15.0
Total Split (s)	31.0	31.0	31.0	31.0	19.0	19.0	19.0	19.0	19.0
Total Split (%)	62.0%	62.0%	62.0%	62.0%	38.0%	38.0%	38.0%	38.0%	38.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5		5.5		5.5	5.5
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	34.5	34.5	34.5	34.5		7.9		7.9	7.9
Actuated g/C Ratio	0.69	0.69	0.69	0.69		0.16		0.16	0.16
v/c Ratio	0.07	0.16	0.02	0.13		0.27		0.30	0.24
Control Delay	3.9	3.8	2.8	2.7		18.9		21.6	8.0
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	3.9	3.8	2.8	2.7		18.9		21.6	8.0
LOS	A	A	A	A		B		C	A
Approach Delay		3.8		2.7		18.9		14.8	
Approach LOS		A		A		B		B	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 2 (4%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.30	
Intersection Signal Delay: 7.7	Intersection LOS: A
Intersection Capacity Utilization 48.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 63: Irish St & Summer St Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	154	7	5	108	15	2	38	6	10	30	61
Future Volume (vph)	35	154	7	5	108	15	2	38	6	10	30	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5			5.5			5.5	5.5
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1593	1660		1593	1636			1640			1647	1425
Flt Permitted	0.66	1.00		0.64	1.00			0.95			0.86	1.00
Satd. Flow (perm)	1111	1660		1072	1636			1562			1434	1425
Peak-hour factor, PHF	0.62	0.88	0.58	0.42	0.87	0.62	0.25	0.73	0.75	0.42	0.68	0.90
Adj. Flow (vph)	56	175	12	12	124	24	8	52	8	24	44	68
RTOR Reduction (vph)	0	4	0	0	8	0	0	7	0	0	0	59
Lane Group Flow (vph)	56	183	0	12	140	0	0	61	0	0	68	9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	32.3	32.3		32.3	32.3			6.7			6.7	6.7
Effective Green, g (s)	32.3	32.3		32.3	32.3			6.7			6.7	6.7
Actuated g/C Ratio	0.65	0.65		0.65	0.65			0.13			0.13	0.13
Clearance Time (s)	5.5	5.5		5.5	5.5			5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	717	1072		692	1056			209			192	190
v/s Ratio Prot		c0.11			0.09							
v/s Ratio Perm	0.05			0.01				0.04			c0.05	0.01
v/c Ratio	0.08	0.17		0.02	0.13			0.29			0.35	0.05
Uniform Delay, d1	3.3	3.5		3.2	3.4			19.5			19.7	18.9
Progression Factor	0.82	0.80		0.62	0.69			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.3		0.0	0.3			0.8			1.1	0.1
Delay (s)	2.9	3.2		2.0	2.6			20.3			20.8	19.0
Level of Service	A	A		A	A			C			C	B
Approach Delay (s)		3.1			2.6			20.3			19.9	
Approach LOS		A			A			C			B	

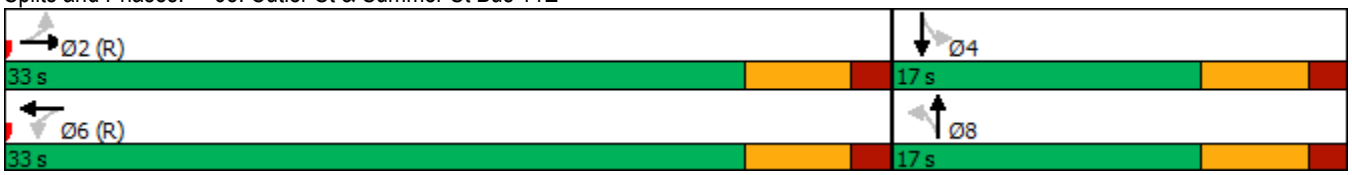
Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

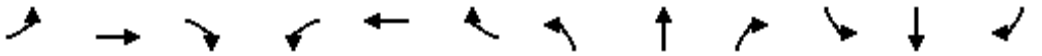
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	16	176	5	133	15	25	3	15
Future Volume (vph)	16	176	5	133	15	25	3	15
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	20.0	20.0	20.0	20.0	6.0	6.0	6.0	6.0
Minimum Split (s)	25.5	25.5	25.5	25.5	15.0	15.0	15.0	15.0
Total Split (s)	33.0	33.0	33.0	33.0	17.0	17.0	17.0	17.0
Total Split (%)	66.0%	66.0%	66.0%	66.0%	34.0%	34.0%	34.0%	34.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.5		5.5	5.5	5.5	5.5	5.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None
Act Effct Green (s)		38.6		38.6	7.2	7.2	7.2	7.2
Actuated g/C Ratio		0.77		0.77	0.14	0.14	0.14	0.14
v/c Ratio		0.21		0.15	0.10	0.26	0.04	0.25
Control Delay		4.0		2.7	18.9	15.8	18.0	13.5
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		4.0		2.7	18.9	15.8	18.0	13.5
LOS		A		A	B	B	B	B
Approach Delay		4.0		2.7		16.6		14.0
Approach LOS		A		A		B		B

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.26	
Intersection Signal Delay: 6.6	Intersection LOS: A
Intersection Capacity Utilization 35.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 65: Cutler St & Summer St Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	176	9	5	133	5	15	25	13	3	15	18
Future Volume (vph)	16	176	9	5	133	5	15	25	13	3	15	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.99			0.99		1.00	0.94		1.00	0.92	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1660			1661		1593	1582		1593	1535	
Flt Permitted		0.98			0.98		0.83	1.00		0.83	1.00	
Satd. Flow (perm)		1627			1633		1397	1582		1397	1535	
Peak-hour factor, PHF	0.80	0.77	0.75	0.42	0.81	0.63	0.75	0.62	0.54	0.38	0.54	0.50
Adj. Flow (vph)	20	229	12	12	164	8	20	40	24	8	28	36
RTOR Reduction (vph)	0	3	0	0	2	0	0	22	0	0	33	0
Lane Group Flow (vph)	0	258	0	0	182	0	20	42	0	8	31	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		34.2			34.2		4.8	4.8		4.8	4.8	
Effective Green, g (s)		34.2			34.2		4.8	4.8		4.8	4.8	
Actuated g/C Ratio		0.68			0.68		0.10	0.10		0.10	0.10	
Clearance Time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		1112			1116		134	151		134	147	
v/s Ratio Prot								c0.03			0.02	
v/s Ratio Perm		c0.16			0.11		0.01			0.01		
v/c Ratio		0.23			0.16		0.15	0.28		0.06	0.21	
Uniform Delay, d1		3.0			2.8		20.7	21.0		20.5	20.9	
Progression Factor		1.00			0.79		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			0.3		0.5	1.0		0.2	0.7	
Delay (s)		3.5			2.5		21.2	22.0		20.7	21.6	
Level of Service		A			A		C	C		C	C	
Approach Delay (s)		3.5			2.5			21.8			21.5	
Approach LOS		A			A			C			C	

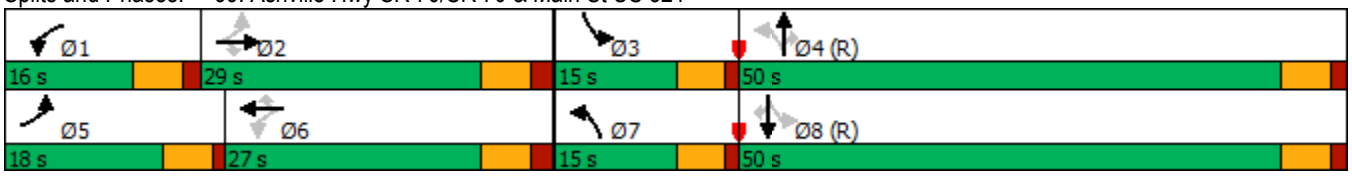
Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

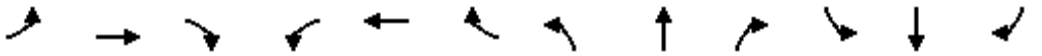
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	224	16	68	85	29	51	432	214	30	351	140
Future Volume (vph)	213	224	16	68	85	29	51	432	214	30	351	140
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	10.0	20.0	20.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	15.0	26.0	26.0	15.5	26.0	26.0	15.0	15.5	15.5	15.0	15.5	15.5
Total Split (s)	18.0	29.0	29.0	16.0	27.0	27.0	15.0	50.0	50.0	15.0	50.0	50.0
Total Split (%)	16.4%	26.4%	26.4%	14.5%	24.5%	24.5%	13.6%	45.5%	45.5%	13.6%	45.5%	45.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	1.5	2.0	2.0	1.0	1.5	1.5	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.5	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	Max	Max	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	37.9	26.5	26.5	27.3	20.8	20.8	57.4	52.2	52.2	55.6	49.4	49.4
Actuated g/C Ratio	0.34	0.24	0.24	0.25	0.19	0.19	0.52	0.47	0.47	0.51	0.45	0.45
v/c Ratio	0.49	0.54	0.04	0.22	0.26	0.08	0.12	0.53	0.27	0.08	0.46	0.19
Control Delay	30.1	43.3	0.1	26.4	40.3	0.4	8.3	12.5	1.1	12.3	24.2	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	43.3	0.1	26.4	40.3	0.4	8.3	12.5	1.1	12.3	24.2	5.2
LOS	C	D	A	C	D	A	A	B	A	B	C	A
Approach Delay		35.6			28.6			8.7			18.4	
Approach LOS		D			C			A			B	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 43 (39%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 19.9	Intersection LOS: B
Intersection Capacity Utilization 75.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 69: Ashville Hwy SR 70/SR 70 & Main St US 321





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	224	16	68	85	29	51	432	214	30	351	140
Future Volume (vph)	213	224	16	68	85	29	51	432	214	30	351	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0	5.5	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
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	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.54	1.00	1.00	0.61	1.00	1.00	0.39	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	1001	1863	1583	1132	1863	1583	728	1863	1583	642	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	232	243	17	74	92	32	55	470	233	33	382	152
RTOR Reduction (vph)	0	0	13	0	0	27	0	0	129	0	0	77
Lane Group Flow (vph)	232	243	4	74	92	5	55	470	104	33	382	75
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	40.2	26.6	26.6	24.9	16.8	16.8	55.1	49.0	49.0	51.5	47.2	47.2
Effective Green, g (s)	40.2	26.6	26.6	24.9	16.8	16.8	55.1	49.0	49.0	51.5	47.2	47.2
Actuated g/C Ratio	0.37	0.24	0.24	0.23	0.15	0.15	0.50	0.45	0.45	0.47	0.43	0.43
Clearance Time (s)	5.0	6.0	6.0	5.5	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	494	450	382	303	284	241	422	829	705	344	799	679
v/s Ratio Prot	c0.08	c0.13		0.02	0.05		c0.01	c0.25		0.00	0.21	
v/s Ratio Perm	0.09		0.00	0.04		0.00	0.06		0.07	0.04		0.05
v/c Ratio	0.47	0.54	0.01	0.24	0.32	0.02	0.13	0.57	0.15	0.10	0.48	0.11
Uniform Delay, d1	25.6	36.4	31.7	34.4	41.5	39.6	15.0	22.6	18.1	16.8	22.6	18.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.66	0.50	0.24	1.00	1.00	1.00
Incremental Delay, d2	0.7	4.6	0.1	0.4	0.7	0.0	0.1	1.6	0.2	0.1	2.0	0.3
Delay (s)	26.3	41.0	31.7	34.8	42.2	39.6	10.0	13.0	4.7	16.9	24.6	19.2
Level of Service	C	D	C	C	D	D	B	B	A	B	C	B
Approach Delay (s)		33.7			39.0			10.2			22.7	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	NET	SWT	SWR
Lane Configurations								
Traffic Volume (vph)	4	524	152	97	285	68	28	153
Future Volume (vph)	4	524	152	97	285	68	28	153
Turn Type	Perm	NA	Perm	pm+pt	NA	NA	NA	Perm
Protected Phases		6		5	2	4	3	
Permitted Phases	6		6	2				3
Detector Phase	6	6	6	5	2	4	3	3
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	15.0	25.0	15.0	15.0	15.0
Minimum Split (s)	31.0	31.0	31.0	21.0	31.0	21.0	21.0	21.0
Total Split (s)	47.0	47.0	47.0	21.0	68.0	21.0	21.0	21.0
Total Split (%)	42.7%	42.7%	42.7%	19.1%	61.8%	19.1%	19.1%	19.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	Max	None	None
Act Effct Green (s)	41.0	41.0	41.0	62.0	62.0	15.0	15.0	15.0
Actuated g/C Ratio	0.37	0.37	0.37	0.56	0.56	0.14	0.14	0.14
v/c Ratio	0.02	0.86	0.32	0.36	0.35	0.79	0.83	0.70
Control Delay	22.2	45.7	4.3	6.7	4.8	68.1	74.2	23.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	45.7	4.3	6.7	4.8	68.1	74.2	23.3
LOS	C	D	A	A	A	E	E	C
Approach Delay		33.8			5.3	68.1	44.8	
Approach LOS		C			A	E	D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 32.9	Intersection LOS: C
Intersection Capacity Utilization 71.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 70: Vann Rd & Ashville Hwy SR 70



Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	4	524	152	97	285	17	53	68	8	116	28	153
Future Volume (vph)	4	524	152	97	285	17	53	68	8	116	28	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99			0.99			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1844			1804			1791	1583
Flt Permitted	0.54	1.00	1.00	0.12	1.00			0.98			0.96	1.00
Satd. Flow (perm)	1015	1863	1583	225	1844			1804			1791	1583
Peak-hour factor, PHF	0.50	0.88	0.64	0.81	0.84	0.71	0.74	0.65	0.40	0.71	0.70	0.55
Adj. Flow (vph)	8	595	238	120	339	24	72	105	20	163	40	278
RTOR Reduction (vph)	0	0	149	0	2	0	0	3	0	0	0	180
Lane Group Flow (vph)	8	595	89	120	361	0	0	194	0	0	203	98
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases		6		5	2		4	4		3	3	
Permitted Phases	6		6	2								3
Actuated Green, G (s)	41.0	41.0	41.0	62.0	62.0			15.0			15.0	15.0
Effective Green, g (s)	41.0	41.0	41.0	62.0	62.0			15.0			15.0	15.0
Actuated g/C Ratio	0.37	0.37	0.37	0.56	0.56			0.14			0.14	0.14
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	378	694	590	337	1039			246			244	215
v/s Ratio Prot		c0.32		0.05	c0.20			c0.11			c0.11	
v/s Ratio Perm	0.01		0.06	0.15								0.06
v/c Ratio	0.02	0.86	0.15	0.36	0.35			0.79			0.83	0.46
Uniform Delay, d1	21.8	31.8	22.9	17.4	13.0			46.0			46.3	43.8
Progression Factor	1.00	1.00	1.00	0.35	0.30			1.00			1.00	1.00
Incremental Delay, d2	0.1	13.0	0.5	0.6	0.9			22.0			20.8	1.5
Delay (s)	21.9	44.8	23.5	6.7	4.7			67.9			67.1	45.3
Level of Service	C	D	C	A	A			E			E	D
Approach Delay (s)		38.5			5.2			67.9			54.5	
Approach LOS		D			A			E			D	

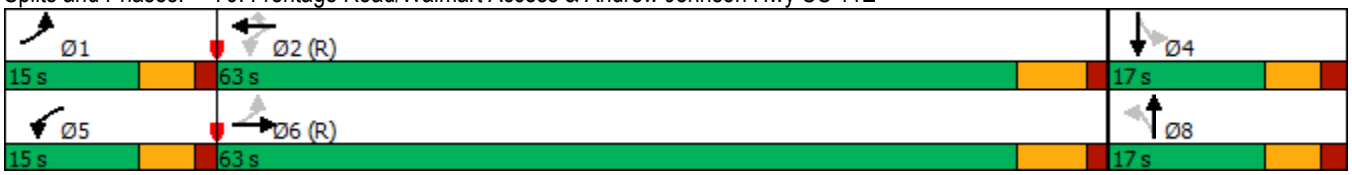
Intersection Summary			
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

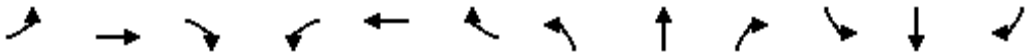
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	29	607	11	963	90	2	5	30	1
Future Volume (vph)	29	607	11	963	90	2	5	30	1
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6	5	2			8		4
Permitted Phases	6		2		2	8		4	
Detector Phase	1	6	5	2	2	8	8	4	4
Switch Phase									
Minimum Initial (s)	6.0	15.0	6.0	15.0	15.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	22.5	15.0	22.5	22.5	15.0	15.0	15.0	15.0
Total Split (s)	15.0	63.0	15.0	63.0	63.0	17.0	17.0	17.0	17.0
Total Split (%)	15.8%	66.3%	15.8%	66.3%	66.3%	17.9%	17.9%	17.9%	17.9%
Yellow Time (s)	4.0	5.0	4.0	5.0	5.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0
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)	5.5	6.5	5.5	6.5	6.5	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?									
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	75.1	72.8	73.6	70.3	70.3	9.2	9.2	9.2	9.2
Actuated g/C Ratio	0.79	0.77	0.77	0.74	0.74	0.10	0.10	0.10	0.10
v/c Ratio	0.11	0.28	0.03	0.48	0.09	0.03	0.14	0.33	0.25
Control Delay	1.1	1.1	2.9	8.1	1.7	38.0	27.4	46.4	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.1	1.1	2.9	8.1	1.7	38.0	27.4	46.4	16.8
LOS	A	A	A	A	A	D	C	D	B
Approach Delay		1.1		7.5			28.9		30.9
Approach LOS		A		A			C		C

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 41 (43%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay: 6.5	Intersection LOS: A
Intersection Capacity Utilization 45.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 79: Frontage Road/Walmart Access & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	607	0	11	963	90	2	5	6	30	1	28
Future Volume (vph)	29	607	0	11	963	90	2	5	6	30	1	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		5.5	6.5	6.5	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.93		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539		1770	3539	1583	1770	1723		1770	1607	
Flt Permitted	0.18	1.00		0.36	1.00	1.00	0.73	1.00		0.74	1.00	
Satd. Flow (perm)	342	3539		669	3539	1583	1352	1723		1381	1607	
Peak-hour factor, PHF	0.72	0.79	0.92	0.69	0.77	0.83	0.50	0.42	0.50	0.68	0.25	0.64
Adj. Flow (vph)	40	768	0	16	1251	108	4	12	12	44	4	44
RTOR Reduction (vph)	0	0	0	0	0	33	0	11	0	0	40	0
Lane Group Flow (vph)	40	768	0	16	1251	75	4	13	0	44	8	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8			4		
Actuated Green, G (s)	70.8	67.0		68.0	65.6	65.6	7.6	7.6		7.6	7.6	
Effective Green, g (s)	70.8	67.0		68.0	65.6	65.6	7.6	7.6		7.6	7.6	
Actuated g/C Ratio	0.75	0.71		0.72	0.69	0.69	0.08	0.08		0.08	0.08	
Clearance Time (s)	5.5	6.5		5.5	6.5	6.5	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	312	2495		506	2443	1093	108	137		110	128	
v/s Ratio Prot	c0.01	0.22		0.00	c0.35			0.01			0.00	
v/s Ratio Perm	0.09			0.02		0.05	0.00			c0.03		
v/c Ratio	0.13	0.31		0.03	0.51	0.07	0.04	0.09		0.40	0.06	
Uniform Delay, d1	4.0	5.3		3.9	7.0	4.8	40.3	40.5		41.5	40.4	
Progression Factor	0.19	0.17		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.0	0.8	0.1	0.1	0.3		2.4	0.2	
Delay (s)	0.9	1.2		3.9	7.8	4.9	40.5	40.8		43.9	40.6	
Level of Service	A	A		A	A	A	D	D		D	D	
Approach Delay (s)		1.2			7.5			40.8			42.2	
Approach LOS		A			A			D			D	

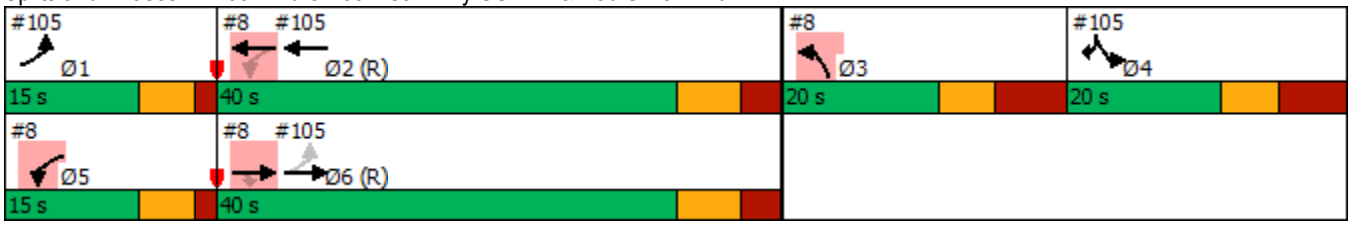
Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

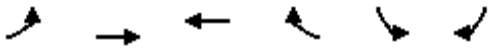
c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL	SBR	Ø3	Ø5
Lane Configurations							
Traffic Volume (vph)	26	898	843	6	3		
Future Volume (vph)	26	898	843	6	3		
Turn Type	pm+pt	NA	NA	Prot	Prot		
Protected Phases	1	6	2	4	4	3	5
Permitted Phases	6						
Detector Phase	1	6	2	4	4		
Switch Phase							
Minimum Initial (s)	6.0	17.5	17.5	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	25.0	25.0	20.0	20.0	20.0	15.0
Total Split (s)	15.0	40.0	40.0	20.0	20.0	20.0	15.0
Total Split (%)	15.8%	42.1%	42.1%	21.1%	21.1%	21%	16%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	3.0	3.0	5.0	5.0	5.0	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.5	7.5	7.5	9.0	9.0		
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	60.8	53.5	56.8	6.2	6.2		
Actuated g/C Ratio	0.64	0.56	0.60	0.07	0.07		
v/c Ratio	0.11	0.33	0.49	0.05	0.07		
Control Delay	2.9	3.3	3.5	42.2	24.7		
Queue Delay	0.0	0.0	0.1	0.0	0.0		
Total Delay	2.9	3.3	3.5	42.2	24.7		
LOS	A	A	A	D	C		
Approach Delay		3.3	3.5	35.2			
Approach LOS		A	A	D			

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 93 (98%), Referenced to phase 2:WBTL and 6:EBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 3.7	Intersection LOS: A
Intersection Capacity Utilization 42.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 105: Andrew Johnson Hwy US 11E & Bob Smith Blvd





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	26	898	843	16	6	3
Future Volume (vph)	26	898	843	16	6	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	7.5	7.5		9.0	9.0
Lane Util. Factor	1.00	0.91	0.95		0.97	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	3521		3433	1583
Flt Permitted	0.21	1.00	1.00		0.95	1.00
Satd. Flow (perm)	400	5085	3521		3433	1583
Peak-hour factor, PHF	0.65	0.94	0.84	0.44	0.50	0.38
Adj. Flow (vph)	40	955	1004	36	12	8
RTOR Reduction (vph)	0	0	2	0	0	8
Lane Group Flow (vph)	40	955	1038	0	12	0
Turn Type	pm+pt	NA	NA		Prot	Prot
Protected Phases	1	6	2		4	4
Permitted Phases	6					
Actuated Green, G (s)	51.0	46.9	49.1		2.6	2.6
Effective Green, g (s)	51.0	46.9	49.1		2.6	2.6
Actuated g/C Ratio	0.54	0.49	0.52		0.03	0.03
Clearance Time (s)	5.5	7.5	7.5		9.0	9.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	273	2510	1819		93	43
v/s Ratio Prot	c0.01	0.19	c0.29		c0.00	0.00
v/s Ratio Perm	0.07					
v/c Ratio	0.15	0.38	0.57		0.13	0.01
Uniform Delay, d1	11.0	15.0	15.7		45.1	44.9
Progression Factor	0.32	0.22	0.19		1.00	1.00
Incremental Delay, d2	0.2	0.4	1.2		0.6	0.0
Delay (s)	3.7	3.6	4.1		45.7	45.0
Level of Service	A	A	A		D	D
Approach Delay (s)		3.6	4.1		45.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	4.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

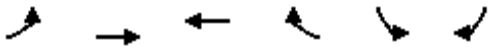
c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	25	853	1034	52	13
Future Volume (vph)	25	853	1034	52	13
Turn Type	pm+pt	NA	NA	Perm	Perm
Protected Phases	1	6	2		
Permitted Phases	6			4	4
Detector Phase	1	6	2	4	4
Switch Phase					
Minimum Initial (s)	6.0	9.0	20.0	8.0	8.0
Minimum Split (s)	15.0	15.0	26.0	15.0	15.0
Total Split (s)	15.0	76.0	61.0	19.0	19.0
Total Split (%)	15.8%	80.0%	64.2%	20.0%	20.0%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	5.5
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?					
Recall Mode	None	C-Min	C-Min	None	None
Act Effct Green (s)	75.6	76.3	69.1	11.1	11.1
Actuated g/C Ratio	0.80	0.80	0.73	0.12	0.12
v/c Ratio	0.13	0.34	0.54	0.50	0.08
Control Delay	4.1	4.0	2.2	47.2	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.1	4.0	2.3	47.2	17.1
LOS	A	A	A	D	B
Approach Delay		4.0	2.3	43.2	
Approach LOS		A	A	D	

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 48 (51%), Referenced to phase 2:WBT and 6:EBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 4.9	Intersection LOS: A
Intersection Capacity Utilization 46.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 107: Andrew Johnson Hwy US 11E & Fairground Rd





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	853	1034	49	52	13
Future Volume (vph)	25	853	1034	49	52	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0		5.5	5.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3516		1770	1583
Flt Permitted	0.14	1.00	1.00		0.95	1.00
Satd. Flow (perm)	258	3539	3516		1770	1583
Peak-hour factor, PHF	0.62	0.88	0.78	0.82	0.50	0.81
Adj. Flow (vph)	40	969	1326	60	104	16
RTOR Reduction (vph)	0	0	3	0	0	14
Lane Group Flow (vph)	40	969	1383	0	104	2
Turn Type	pm+pt	NA	NA		Perm	Perm
Protected Phases	1	6	2			
Permitted Phases	6				4	4
Actuated Green, G (s)	74.0	74.0	64.7		9.5	9.5
Effective Green, g (s)	74.0	74.0	64.7		9.5	9.5
Actuated g/C Ratio	0.78	0.78	0.68		0.10	0.10
Clearance Time (s)	5.5	6.0	6.0		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	261	2756	2394		177	158
v/s Ratio Prot	0.01	c0.27	c0.39			
v/s Ratio Perm	0.11				c0.06	0.00
v/c Ratio	0.15	0.35	0.58		0.59	0.01
Uniform Delay, d1	4.8	3.2	8.0		40.9	38.5
Progression Factor	1.00	1.00	0.17		1.00	1.00
Incremental Delay, d2	0.3	0.4	0.9		4.9	0.0
Delay (s)	5.1	3.6	2.3		45.8	38.5
Level of Service	A	A	A		D	D
Approach Delay (s)		3.6	2.3		44.8	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

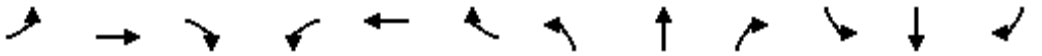
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	50	838	27	1014	34	2	16	0	41
Future Volume (vph)	50	838	27	1014	34	2	16	0	41
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	1	6	5	2		8		4	
Permitted Phases	6		2		8		4		4
Detector Phase	1	6	5	2	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	6.0	20.0	6.0	20.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	37.0	15.0	37.0	15.0	15.0	15.0	15.0	15.0
Total Split (s)	15.0	61.0	15.0	61.0	19.0	19.0	19.0	19.0	19.0
Total Split (%)	15.8%	64.2%	15.8%	64.2%	20.0%	20.0%	20.0%	20.0%	20.0%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	6.0	5.5	6.0	5.5	5.5		5.5	5.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?									
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	71.7	67.1	71.5	67.0	10.7	10.7		10.7	10.7
Actuated g/C Ratio	0.75	0.71	0.75	0.71	0.11	0.11		0.11	0.11
v/c Ratio	0.19	0.37	0.11	0.52	0.46	0.14		0.16	0.27
Control Delay	3.6	6.3	2.3	5.4	48.5	20.6		39.1	6.6
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	3.6	6.4	2.3	5.4	48.5	20.6		39.1	6.6
LOS	A	A	A	A	D	C		D	A
Approach Delay		6.3		5.3		40.7		15.0	
Approach LOS		A		A		D		B	

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 47 (49%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 7.4	Intersection LOS: A
Intersection Capacity Utilization 56.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 108: Haynes Blvd/Lowes Access & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	838	13	27	1014	7	34	2	12	16	0	41
Future Volume (vph)	50	838	13	27	1014	7	34	2	12	16	0	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0		5.5	6.0		5.5	5.5			5.5	5.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	3523		1770	3533		1770	1663			1770	1583
Flt Permitted	0.17	1.00		0.28	1.00		0.74	1.00			0.74	1.00
Satd. Flow (perm)	312	3523		524	3533		1380	1663			1377	1583
Peak-hour factor, PHF	0.78	0.93	0.46	0.52	0.79	0.44	0.47	0.25	0.60	0.65	0.25	0.57
Adj. Flow (vph)	64	901	28	52	1284	16	72	8	20	25	0	72
RTOR Reduction (vph)	0	2	0	0	1	0	0	18	0	0	0	65
Lane Group Flow (vph)	64	927	0	52	1299	0	72	10	0	0	25	7
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Actuated Green, G (s)	69.1	63.8		68.7	63.6		9.1	9.1			9.1	9.1
Effective Green, g (s)	69.1	63.8		68.7	63.6		9.1	9.1			9.1	9.1
Actuated g/C Ratio	0.73	0.67		0.72	0.67		0.10	0.10			0.10	0.10
Clearance Time (s)	5.5	6.0		5.5	6.0		5.5	5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	308	2365		445	2365		132	159			131	151
v/s Ratio Prot	c0.01	0.26		0.01	c0.37			0.01				
v/s Ratio Perm	0.14			0.08			c0.05				0.02	0.00
v/c Ratio	0.21	0.39		0.12	0.55		0.55	0.06			0.19	0.05
Uniform Delay, d1	4.8	7.0		3.9	8.2		41.0	39.1			39.6	39.0
Progression Factor	0.74	0.76		0.60	0.51		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.3	0.5		0.1	0.8		4.5	0.2			0.7	0.1
Delay (s)	3.9	5.7		2.5	4.9		45.5	39.2			40.3	39.1
Level of Service	A	A		A	A		D	D			D	D
Approach Delay (s)		5.6			4.9			43.8			39.4	
Approach LOS		A			A			D			D	

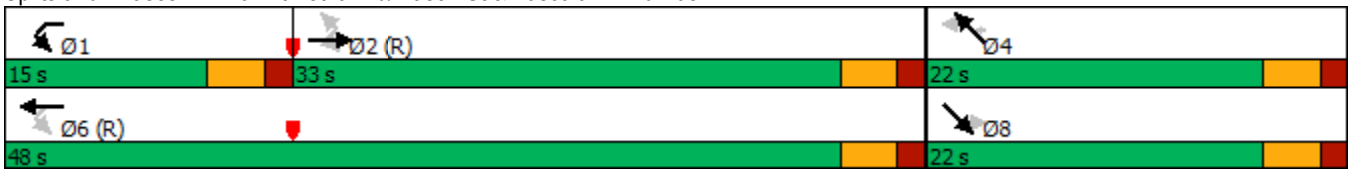
Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	SEL	SET	NWL	NWT	NWR
Lane Configurations										
Traffic Volume (vph)	1	441	118	119	401	7	3	194	9	212
Future Volume (vph)	1	441	118	119	401	7	3	194	9	212
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		1	6		8		4	
Permitted Phases	2		2	6		8		4		4
Detector Phase	2	2	2	1	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	4.0	4.0	5.0	5.0	5.0
Minimum Split (s)	24.5	24.5	24.5	15.0	24.5	15.0	15.0	15.0	15.0	15.0
Total Split (s)	33.0	33.0	33.0	15.0	48.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	47.1%	47.1%	47.1%	21.4%	68.6%	31.4%	31.4%	31.4%	31.4%	31.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5		4.5		4.5	4.5
Lead/Lag	Lag	Lag	Lag	Lead						
Lead-Lag Optimize?										
Recall Mode	C-Min	C-Min	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	31.3	31.3	31.3	44.0	44.0		17.0		17.0	17.0
Actuated g/C Ratio	0.45	0.45	0.45	0.63	0.63		0.24		0.24	0.24
v/c Ratio	0.01	0.65	0.21	0.37	0.48		0.08		0.82	0.53
Control Delay	12.0	15.9	3.2	8.1	9.0		18.5		47.7	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	12.0	15.9	3.2	8.1	9.0		18.5		47.7	10.1
LOS	B	B	A	A	A		B		D	B
Approach Delay		12.9			8.8		18.5		28.0	
Approach LOS		B			A		B		C	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 68 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 15.7	Intersection LOS: B
Intersection Capacity Utilization 66.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 126: Mt Bethal Rd/Mason St & Tusculum Blvd Bus 11E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	1	441	118	119	401	6	7	3	2	194	9	212
Future Volume (vph)	1	441	118	119	401	6	7	3	2	194	9	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.97			0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1859			1776			1779	1583
Flt Permitted	0.45	1.00	1.00	0.25	1.00			0.81			0.72	1.00
Satd. Flow (perm)	842	1863	1583	457	1859			1475			1338	1583
Peak-hour factor, PHF	0.25	0.81	0.70	0.74	0.72	0.75	0.44	0.38	0.50	0.77	0.56	0.72
Adj. Flow (vph)	4	544	169	161	557	8	16	8	4	252	16	294
RTOR Reduction (vph)	0	0	90	0	1	0	0	3	0	0	0	171
Lane Group Flow (vph)	4	544	79	161	564	0	0	25	0	0	268	123
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)	31.3	31.3	31.3	44.0	44.0			17.0			17.0	17.0
Effective Green, g (s)	31.3	31.3	31.3	44.0	44.0			17.0			17.0	17.0
Actuated g/C Ratio	0.45	0.45	0.45	0.63	0.63			0.24			0.24	0.24
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	376	833	707	441	1168			358			324	384
v/s Ratio Prot		c0.29		0.04	c0.30							
v/s Ratio Perm	0.00		0.05	0.19				0.02			c0.20	0.08
v/c Ratio	0.01	0.65	0.11	0.37	0.48			0.07			0.83	0.32
Uniform Delay, d1	10.7	15.1	11.3	7.8	6.9			20.4			25.1	21.8
Progression Factor	0.99	0.73	0.92	1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.0	3.6	0.3	0.5	1.4			0.1			15.7	0.5
Delay (s)	10.7	14.7	10.7	8.3	8.4			20.5			40.9	22.2
Level of Service	B	B	B	A	A			C			D	C
Approach Delay (s)		13.8			8.4			20.5			31.1	
Approach LOS		B			A			C			C	

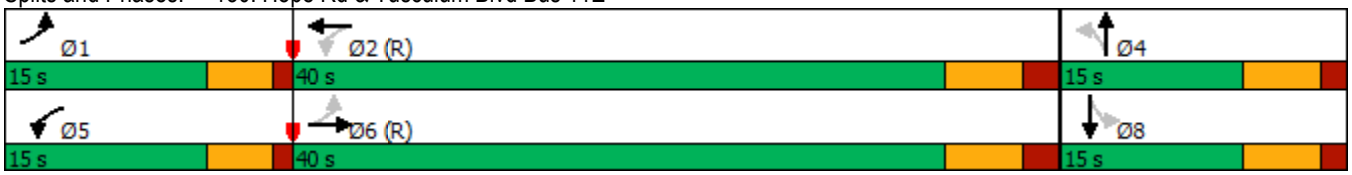
Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

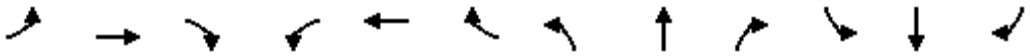
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	5	557	21	472	35	8	17	11
Future Volume (vph)	5	557	21	472	35	8	17	11
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases	6		2		4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	19.0	7.0	19.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	25.0	15.0	25.0	15.0	15.0	15.0	15.0
Total Split (s)	15.0	40.0	15.0	40.0	15.0	15.0	15.0	15.0
Total Split (%)	21.4%	57.1%	21.4%	57.1%	21.4%	21.4%	21.4%	21.4%
Yellow Time (s)	3.5	4.0	3.5	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	4.5	6.0	4.5	6.0		5.5		5.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Min	None	C-Min	None	None	None	None
Act Effct Green (s)	52.3	49.2	53.2	51.5		8.6		8.6
Actuated g/C Ratio	0.75	0.70	0.76	0.74		0.12		0.12
v/c Ratio	0.01	0.54	0.05	0.46		0.50		0.27
Control Delay	2.8	10.2	0.9	3.5		21.5		26.5
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	2.8	10.2	0.9	3.5		21.5		26.5
LOS	A	B	A	A		C		C
Approach Delay		10.2		3.4		21.5		26.5
Approach LOS		B		A		C		C

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 46.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 130: Hope Rd & Tusculum Blvd Bus 11E

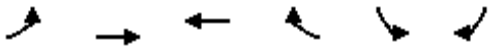




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	557	13	21	472	5	35	8	50	17	11	7
Future Volume (vph)	5	557	13	21	472	5	35	8	50	17	11	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.0		4.5	6.0			5.5			5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.92			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1770	1855		1770	1859			1689			1764	
Flt Permitted	0.37	1.00		0.30	1.00			0.87			0.81	
Satd. Flow (perm)	691	1855		552	1859			1497			1467	
Peak-hour factor, PHF	0.63	0.82	0.65	0.75	0.76	0.63	0.88	0.67	0.69	0.71	0.69	0.58
Adj. Flow (vph)	8	679	20	28	621	8	40	12	72	24	16	12
RTOR Reduction (vph)	0	1	0	0	0	0	0	65	0	0	11	0
Lane Group Flow (vph)	8	698	0	28	629	0	0	59	0	0	41	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	45.6	44.2		48.4	45.6			7.0			7.0	
Effective Green, g (s)	45.6	44.2		48.4	45.6			7.0			7.0	
Actuated g/C Ratio	0.65	0.63		0.69	0.65			0.10			0.10	
Clearance Time (s)	4.5	6.0		4.5	6.0			5.5			5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	471	1171		430	1211			149			146	
v/s Ratio Prot	0.00	c0.38		c0.00	0.34							
v/s Ratio Perm	0.01			0.04				c0.04			0.03	
v/c Ratio	0.02	0.60		0.07	0.52			0.40			0.28	
Uniform Delay, d1	4.5	7.6		4.4	6.4			29.5			29.2	
Progression Factor	1.00	1.00		0.26	0.40			1.00			1.00	
Incremental Delay, d2	0.0	2.2		0.1	1.3			1.7			1.1	
Delay (s)	4.5	9.9		1.2	3.9			31.3			30.2	
Level of Service	A	A		A	A			C			C	
Approach Delay (s)		9.8			3.8			31.3			30.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

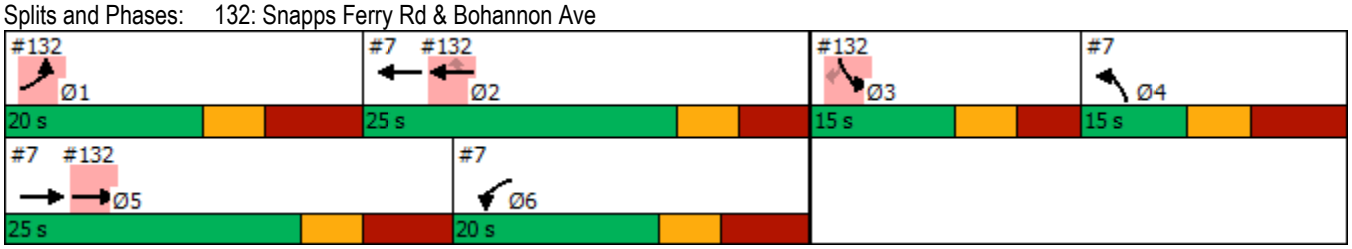
c Critical Lane Group

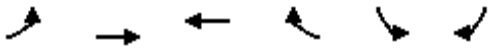


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4	Ø6
Lane Configurations								
Traffic Volume (vph)	3	140	207	44	26	21		
Future Volume (vph)	3	140	207	44	26	21		
Turn Type	Prot	NA	NA	Perm	Prot	Perm		
Protected Phases	1	5	2		3		4	6
Permitted Phases				2		3		
Detector Phase	1	5	2	2	3	3		
Switch Phase								
Minimum Initial (s)	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	20.0	25.0	25.0	25.0	15.0	15.0	15.0	20.0
Total Split (s)	20.0	25.0	25.0	25.0	15.0	15.0	15.0	20.0
Total Split (%)	26.7%	33.3%	33.3%	33.3%	20.0%	20.0%	20%	27%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	5.5	5.0	4.0	4.0	3.5	3.5	5.5	5.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	9.0	8.5	7.5	7.5	7.0	7.0		
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	Max	Max	None	None	None	None
Act Effct Green (s)	6.3	19.5	28.0	28.0	7.0	7.0		
Actuated g/C Ratio	0.14	0.42	0.61	0.61	0.15	0.15		
v/c Ratio	0.01	0.19	0.10	0.05	0.10	0.09		
Control Delay	16.7	6.7	12.4	6.7	24.5	13.3		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	16.7	6.7	12.4	6.7	24.5	13.3		
LOS	B	A	B	A	C	B		
Approach Delay		6.9	11.4		19.5			
Approach LOS		A	B		B			

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 46.2	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.35	
Intersection Signal Delay: 10.8	Intersection LOS: B
Intersection Capacity Utilization 24.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 132: Snapps Ferry Rd & Bohannon Ave





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	3	140	207	44	26	21
Future Volume (vph)	3	140	207	44	26	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	9.0	8.5	7.5	7.5	7.0	7.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	3539	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	152	225	48	28	23
RTOR Reduction (vph)	0	0	0	30	0	22
Lane Group Flow (vph)	3	152	225	18	28	1
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	1	5	2		3	
Permitted Phases				2		3
Actuated Green, G (s)	0.8	15.0	23.6	23.6	2.2	2.2
Effective Green, g (s)	0.8	15.0	23.6	23.6	2.2	2.2
Actuated g/C Ratio	0.01	0.24	0.38	0.38	0.04	0.04
Clearance Time (s)	9.0	8.5	7.5	7.5	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	22	449	1342	600	62	55
v/s Ratio Prot	0.00	c0.08	c0.06		c0.02	
v/s Ratio Perm				0.01		0.00
v/c Ratio	0.14	0.34	0.17	0.03	0.45	0.01
Uniform Delay, d1	30.4	19.5	12.8	12.1	29.4	29.0
Progression Factor	0.64	0.41	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.8	0.4	0.3	0.1	5.2	0.1
Delay (s)	22.2	8.4	13.1	12.2	34.6	29.1
Level of Service	C	A	B	B	C	C
Approach Delay (s)		8.7	12.9		32.1	
Approach LOS		A	B		C	

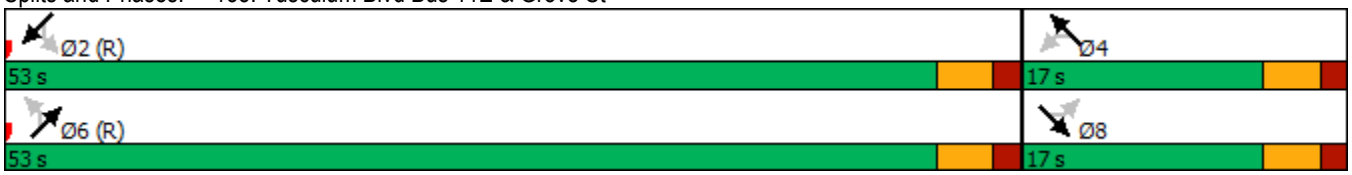
Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	62.2	Sum of lost time (s)	33.0
Intersection Capacity Utilization	24.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	6	4	6	1	3	315	18	358
Future Volume (vph)	6	4	6	1	3	315	18	358
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		8		4		6		2
Permitted Phases	8		4		6		2	
Detector Phase	8	8	4	4	6	6	2	2
Switch Phase								
Minimum Initial (s)	6.0	6.0	6.0	6.0	25.0	25.0	25.0	25.0
Minimum Split (s)	10.5	10.5	10.5	10.5	29.5	29.5	29.5	29.5
Total Split (s)	17.0	17.0	17.0	17.0	53.0	53.0	53.0	53.0
Total Split (%)	24.3%	24.3%	24.3%	24.3%	75.7%	75.7%	75.7%	75.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5		4.5	4.5	4.5	4.5	4.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)		7.0		7.0	60.0	60.0	60.0	60.0
Actuated g/C Ratio		0.10		0.10	0.86	0.86	0.86	0.86
v/c Ratio		0.15		0.27	0.01	0.27	0.03	0.32
Control Delay		24.1		20.5	2.3	2.5	0.6	0.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		24.1		20.5	2.3	2.5	0.6	0.8
LOS		C		C	A	A	A	A
Approach Delay		24.1		20.5		2.5		0.7
Approach LOS		C		C		A		A

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 54 (77%), Referenced to phase 2:SWTL and 6:NETL, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.32	
Intersection Signal Delay: 2.9	Intersection LOS: A
Intersection Capacity Utilization 33.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 135: Tusculum Blvd Bus 11E & Grove St



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	6	4	4	6	1	20	3	315	4	18	358	9
Future Volume (vph)	6	4	4	6	1	20	3	315	4	18	358	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.92		1.00	1.00		1.00	1.00	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1688		1770	1855		1770	1856	
Flt Permitted		0.87			0.88		0.47	1.00		0.51	1.00	
Satd. Flow (perm)		1548			1509		881	1855		958	1856	
Peak-hour factor, PHF	0.75	0.50	0.50	0.38	0.25	0.71	0.38	0.76	0.33	0.64	0.73	0.75
Adj. Flow (vph)	8	8	8	16	4	28	8	414	12	28	490	12
RTOR Reduction (vph)	0	7	0	0	26	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	17	0	0	22	0	8	425	0	28	501	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)		4.6			4.6		56.4	56.4		56.4	56.4	
Effective Green, g (s)		4.6			4.6		56.4	56.4		56.4	56.4	
Actuated g/C Ratio		0.07			0.07		0.81	0.81		0.81	0.81	
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		101			99		709	1494		771	1495	
v/s Ratio Prot								0.23			c0.27	
v/s Ratio Perm		0.01			c0.01		0.01			0.03		
v/c Ratio		0.16			0.22		0.01	0.28		0.04	0.34	
Uniform Delay, d1		30.9			31.0		1.3	1.7		1.4	1.8	
Progression Factor		1.00			1.00		1.00	1.00		0.22	0.16	
Incremental Delay, d2		0.8			1.1		0.0	0.5		0.1	0.5	
Delay (s)		31.6			32.1		1.4	2.2		0.4	0.8	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		31.6			32.1			2.2			0.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	3.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

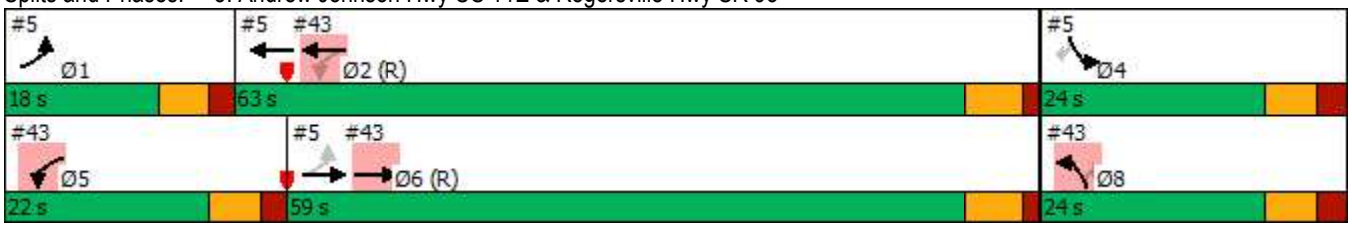
APPENDIX E
Signal System Intersection Analyses
(Synchro Reports)

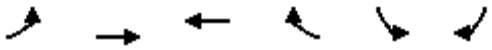
OPTIMIZED OPERATIONS
PM PEAK-HOUR ANALYSIS

Lane Group	EBL	EBT	WBT	SBL	SBR	Ø5	Ø8
Lane Configurations							
Traffic Volume (vph)	123	1232	1387	16	94		
Future Volume (vph)	123	1232	1387	16	94		
Turn Type	pm+pt	NA	NA	Prot	Perm		
Protected Phases	1	6	2	4		5	8
Permitted Phases	6				4		
Detector Phase	1	6	2	4	4		
Switch Phase							
Minimum Initial (s)	6.0	15.0	15.0	8.5	8.5	6.0	8.5
Minimum Split (s)	15.0	21.0	21.0	15.0	15.0	15.0	15.0
Total Split (s)	18.0	59.0	63.0	24.0	24.0	22.0	24.0
Total Split (%)	17.1%	56.2%	60.0%	22.9%	22.9%	21%	23%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	1.5	1.5	2.5	2.5	2.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.5	6.5		
Lead/Lag	Lead	Lag	Lag			Lead	
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	71.3	61.9	64.3	12.8	12.8		
Actuated g/C Ratio	0.68	0.59	0.61	0.12	0.12		
v/c Ratio	0.56	0.64	0.68	0.11	0.43		
Control Delay	24.5	6.5	9.5	40.4	11.5		
Queue Delay	0.0	0.1	0.0	0.0	0.0		
Total Delay	24.5	6.6	9.5	40.4	11.5		
LOS	C	A	A	D	B		
Approach Delay		8.6	9.5	15.9			
Approach LOS		A	A	B			

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 45 (43%), Referenced to phase 2:WBT and 6:EBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 9.4	Intersection LOS: A
Intersection Capacity Utilization 68.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Andrew Johnson Hwy US 11E & Rogersville Hwy SR 93





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	123	1232	1387	15	16	94
Future Volume (vph)	123	1232	1387	15	16	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.5	6.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3528		1770	1583
Flt Permitted	0.12	1.00	1.00		0.95	1.00
Satd. Flow (perm)	216	3539	3528		1770	1583
Peak-hour factor, PHF	0.77	0.93	0.97	0.47	0.67	0.71
Adj. Flow (vph)	160	1325	1430	32	24	132
RTOR Reduction (vph)	0	0	1	0	0	116
Lane Group Flow (vph)	160	1325	1461	0	24	16
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6					4
Actuated Green, G (s)	71.3	61.9	64.3		12.8	12.8
Effective Green, g (s)	71.3	61.9	64.3		12.8	12.8
Actuated g/C Ratio	0.68	0.59	0.61		0.12	0.12
Clearance Time (s)	6.0	6.0	6.0		6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	285	2086	2160		215	192
v/s Ratio Prot	c0.05	0.37	c0.41		c0.01	
v/s Ratio Perm	0.33					0.01
v/c Ratio	0.56	0.64	0.68		0.11	0.08
Uniform Delay, d1	10.3	14.1	13.5		41.0	40.9
Progression Factor	1.87	0.34	0.56		1.00	1.00
Incremental Delay, d2	1.9	1.1	1.3		0.2	0.2
Delay (s)	21.3	6.0	8.8		41.3	41.1
Level of Service	C	A	A		D	D
Approach Delay (s)		7.6	8.8		41.1	
Approach LOS		A	A		D	

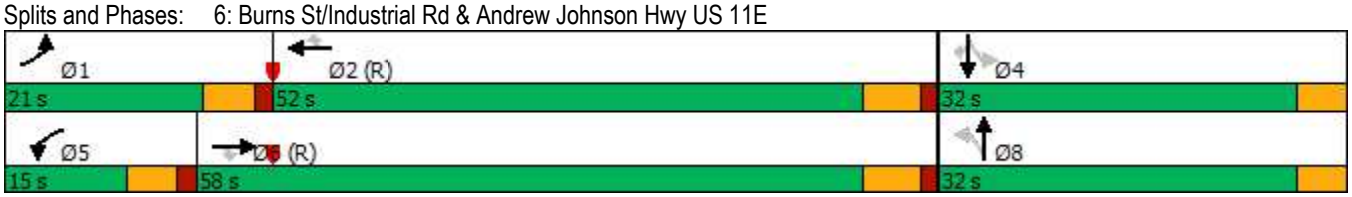
Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

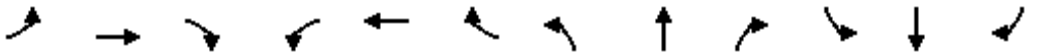
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	130	1067	65	60	1096	33	58	42	53	59	282
Future Volume (vph)	130	1067	65	60	1096	33	58	42	53	59	282
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	1	6		5	2			8		4	
Permitted Phases			6			2	8		4		4
Detector Phase	1	6	6	5	2	2	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	6.0	25.0	25.0	6.0	25.0	25.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	31.0	31.0	15.0	31.0	31.0	15.0	15.0	15.0	15.0	15.0
Total Split (s)	21.0	58.0	58.0	15.0	52.0	52.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	20.0%	55.2%	55.2%	14.3%	49.5%	49.5%	30.5%	30.5%	30.5%	30.5%	30.5%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	0.0	0.0	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?											
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	13.5	61.9	61.9	8.4	54.5	54.5	21.5	21.5	21.5	21.5	21.5
Actuated g/C Ratio	0.13	0.59	0.59	0.08	0.52	0.52	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.74	0.54	0.10	0.54	0.66	0.05	0.32	0.53	0.48	0.23	0.88
Control Delay	79.3	3.2	0.3	60.1	22.5	0.1	36.5	22.1	45.8	33.9	38.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.3	3.2	0.3	60.1	22.5	0.1	36.5	22.1	45.8	33.9	38.5
LOS	E	A	A	E	C	A	D	C	D	C	D
Approach Delay		12.2			23.9			26.1		38.7	
Approach LOS		B			C			C		D	

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 22.1	Intersection LOS: C
Intersection Capacity Utilization 69.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Burns St/Industrial Rd & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1067	65	60	1096	33	58	42	106	53	59	282
Future Volume (vph)	130	1067	65	60	1096	33	58	42	106	53	59	282
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0	5.5	6.0	6.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1668		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.69	1.00		0.39	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1286	1668		731	1863	1583
Peak-hour factor, PHF	0.77	0.95	0.68	0.79	0.91	0.82	0.69	0.62	0.68	0.74	0.67	0.65
Adj. Flow (vph)	169	1123	96	76	1204	40	84	68	156	72	88	434
RTOR Reduction (vph)	0	0	29	0	0	19	0	85	0	0	0	172
Lane Group Flow (vph)	169	1123	67	76	1204	21	84	139	0	72	88	262
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6			2	8			4		4
Actuated Green, G (s)	13.5	60.8	60.8	7.2	54.5	54.5	21.5	21.5		21.5	21.5	21.5
Effective Green, g (s)	13.5	60.8	60.8	7.2	54.5	54.5	21.5	21.5		21.5	21.5	21.5
Actuated g/C Ratio	0.13	0.58	0.58	0.07	0.52	0.52	0.20	0.20		0.20	0.20	0.20
Clearance Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	2.5	5.0	5.0	2.5	5.0	5.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	227	2049	916	121	1836	821	263	341		149	381	324
v/s Ratio Prot	c0.10	0.32		0.04	c0.34			0.08			0.05	
v/s Ratio Perm			0.04			0.01	0.07			0.10		c0.17
v/c Ratio	0.74	0.55	0.07	0.63	0.66	0.03	0.32	0.41		0.48	0.23	0.81
Uniform Delay, d1	44.1	13.6	9.7	47.6	18.4	12.3	35.5	36.2		36.8	34.8	39.8
Progression Factor	1.44	0.15	0.02	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.6	0.8	0.1	8.5	1.8	0.1	0.7	0.8		2.5	0.3	13.8
Delay (s)	73.1	2.9	0.3	56.1	20.3	12.4	36.2	37.0		39.3	35.2	53.6
Level of Service	E	A	A	E	C	B	D	D		D	D	D
Approach Delay (s)		11.3			22.1			36.8			49.1	
Approach LOS		B			C			D			D	

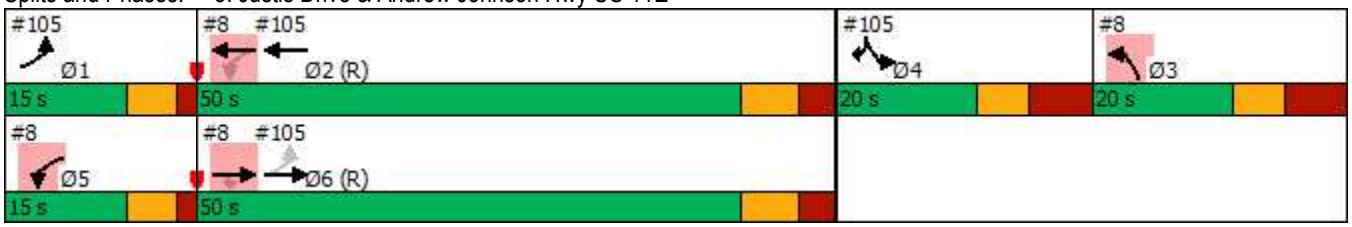
Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	Ø1	Ø4
Lane Configurations							
Traffic Volume (vph)	1086	137	77	1076	225		
Future Volume (vph)	1086	137	77	1076	225		
Turn Type	NA	Perm	pm+pt	NA	Prot		
Protected Phases	6		5	2	3	1	4
Permitted Phases		6	2				
Detector Phase	6	6	5	2	3		
Switch Phase							
Minimum Initial (s)	20.0	20.0	6.0	20.0	6.0	6.0	6.0
Minimum Split (s)	27.5	27.5	15.0	27.5	20.0	15.0	20.0
Total Split (s)	50.0	50.0	15.0	50.0	20.0	15.0	20.0
Total Split (%)	47.6%	47.6%	14.3%	47.6%	19.0%	14%	19%
Yellow Time (s)	4.5	4.5	4.0	4.5	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	1.5	3.0	5.0	1.5	5.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	7.5	7.5	5.5	7.5	9.0		
Lead/Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?							
Recall Mode	C-Min	C-Min	None	C-Min	None	None	None
Act Effct Green (s)	47.1	47.1	60.8	53.3	14.1		
Actuated g/C Ratio	0.45	0.45	0.58	0.51	0.13		
v/c Ratio	0.75	0.21	0.48	0.62	0.78		
Control Delay	8.3	0.6	26.7	9.7	50.2		
Queue Delay	0.0	0.9	0.0	0.1	61.7		
Total Delay	8.3	1.5	26.7	9.8	111.9		
LOS	A	A	C	A	F		
Approach Delay	7.5			11.3	111.9		
Approach LOS	A			B	F		

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 28 (27%), Referenced to phase 2:WBTL and 6:EBT, Start of Green	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 22.6	Intersection LOS: C
Intersection Capacity Utilization 62.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 8: Justis Drive & Andrew Johnson Hwy US 11E





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1086	137	77	1076	225	92
Future Volume (vph)	1086	137	77	1076	225	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	5.5	7.5	9.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	1.00	1.00	0.95	1.00	0.97	
Satd. Flow (prot)	3539	1583	1770	3539	3334	
Flt Permitted	1.00	1.00	0.10	1.00	0.97	
Satd. Flow (perm)	3539	1583	186	3539	3334	
Peak-hour factor, PHF	0.91	0.83	0.69	0.96	0.83	0.79
Adj. Flow (vph)	1193	165	112	1121	271	116
RTOR Reduction (vph)	0	94	0	0	47	0
Lane Group Flow (vph)	1193	71	112	1121	340	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	6		5	2	3	
Permitted Phases		6	2			
Actuated Green, G (s)	45.3	45.3	57.5	49.3	14.1	
Effective Green, g (s)	45.3	45.3	57.5	49.3	14.1	
Actuated g/C Ratio	0.43	0.43	0.55	0.47	0.13	
Clearance Time (s)	7.5	7.5	5.5	7.5	9.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1526	682	225	1661	447	
v/s Ratio Prot	c0.34		c0.04	c0.32	c0.10	
v/s Ratio Perm		0.04	0.23			
v/c Ratio	0.78	0.10	0.50	0.67	0.76	
Uniform Delay, d1	25.6	17.8	16.7	21.6	43.8	
Progression Factor	0.21	0.03	1.77	0.39	1.00	
Incremental Delay, d2	3.4	0.3	1.4	1.8	7.5	
Delay (s)	8.7	0.9	30.8	10.3	51.3	
Level of Service	A	A	C	B	D	
Approach Delay (s)	7.7			12.1	51.3	
Approach LOS	A			B	D	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

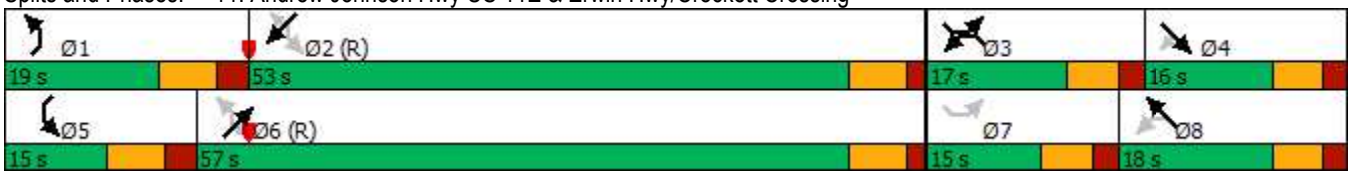
c Critical Lane Group

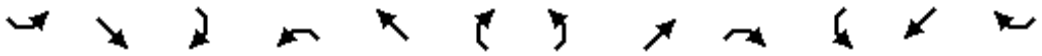
Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	NER	SWL	SWT	SWR	Ø7
Lane Configurations												
Traffic Volume (vph)	73	46	128	145	26	144	1170	280	46	1017	34	
Future Volume (vph)	73	46	128	145	26	144	1170	280	46	1017	34	
Turn Type	custom	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	3!	4		3	8!	1	6		5	2		7
Permitted Phases	7		4	8		6		6	2		2	
Detector Phase	3	4	4	3	8	1	6	6	5	2	2	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0	6.0	9.0	9.0	6.0	9.0	9.0	6.0
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0	15.0	30.0	30.0	15.0	30.0	30.0	15.0
Total Split (s)	17.0	16.0	16.0	17.0	18.0	19.0	57.0	57.0	15.0	53.0	53.0	15.0
Total Split (%)	16.2%	15.2%	15.2%	16.2%	17.1%	18.1%	54.3%	54.3%	14.3%	50.5%	50.5%	14%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5	4.5	4.5	4.5	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.5	1.5	1.5	2.5	1.5	1.5	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min	None
Act Effct Green (s)	11.5	8.9	8.9	26.3	26.3	63.0	55.4	55.4	55.5	49.6	49.6	
Actuated g/C Ratio	0.11	0.08	0.08	0.25	0.25	0.60	0.53	0.53	0.53	0.47	0.47	
v/c Ratio	0.52	0.36	0.51	0.59	0.19	0.62	0.69	0.34	0.25	0.66	0.07	
Control Delay	54.4	51.8	11.5	41.3	15.7	20.0	24.0	12.1	10.2	29.4	2.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	54.4	51.8	11.5	41.3	15.7	20.0	24.0	12.1	10.2	29.4	2.0	
LOS	D	D	B	D	B	C	C	B	B	C	A	
Approach Delay		33.3			32.8		21.5			27.2		
Approach LOS		C			C		C			C		

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 56 (53%), Referenced to phase 2:SWTL and 6:NETL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 25.3	Intersection LOS: C
Intersection Capacity Utilization 67.9%	ICU Level of Service C
Analysis Period (min) 15	

! Phase conflict between lane groups.

Splits and Phases: 11: Andrew Johnson Hwy US 11E & Erwin Hwy/Crockett Crossing





Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	73	46	128	145	26	36	144	1170	280	46	1017	34
Future Volume (vph)	73	46	128	145	26	36	144	1170	280	46	1017	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			1%			0%			0%	
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1761	1689		1770	3539	1583	1770	3539	1583
Flt Permitted	0.00	1.00	1.00	0.43	1.00		0.14	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	0	1863	1583	798	1689		260	3539	1583	235	3539	1583
Peak-hour factor, PHF	0.73	0.82	0.89	0.81	0.72	0.69	0.78	0.91	0.91	0.82	0.92	0.57
Adj. Flow (vph)	100	56	144	179	36	52	185	1286	308	56	1105	60
RTOR Reduction (vph)	0	0	132	0	39	0	0	0	81	0	0	32
Lane Group Flow (vph)	100	56	12	179	49	0	185	1286	227	56	1105	28
Turn Type	custom	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3!	4		3	8!		1	6		5	2	
Permitted Phases	7		4	8			6		6	2		2
Actuated Green, G (s)	11.5	8.9	8.9	26.4	26.4		63.9	53.9	53.9	55.3	49.6	49.6
Effective Green, g (s)	11.5	8.9	8.9	26.4	26.4		63.9	53.9	53.9	55.3	49.6	49.6
Actuated g/C Ratio	0.11	0.08	0.08	0.25	0.25		0.61	0.51	0.51	0.53	0.47	0.47
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	193	157	134	306	424		302	1816	812	207	1671	747
v/s Ratio Prot	0.06	0.03		c0.06	0.03		c0.06	c0.36		0.01	0.31	
v/s Ratio Perm			0.01	c0.08			0.31		0.14	0.13		0.02
v/c Ratio	0.52	0.36	0.09	0.58	0.12		0.61	0.71	0.28	0.27	0.66	0.04
Uniform Delay, d1	44.1	45.3	44.3	32.9	30.3		13.7	19.5	14.5	14.5	21.3	14.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.27	1.13	1.56	0.93	1.26	1.00
Incremental Delay, d2	2.3	1.4	0.3	2.8	0.1		2.6	1.7	0.6	0.5	1.5	0.1
Delay (s)	46.5	46.7	44.6	35.8	30.4		20.1	23.7	23.3	13.9	28.3	14.9
Level of Service	D	D	D	D	C		C	C	C	B	C	B
Approach Delay (s)		45.6			34.0			23.2			27.0	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

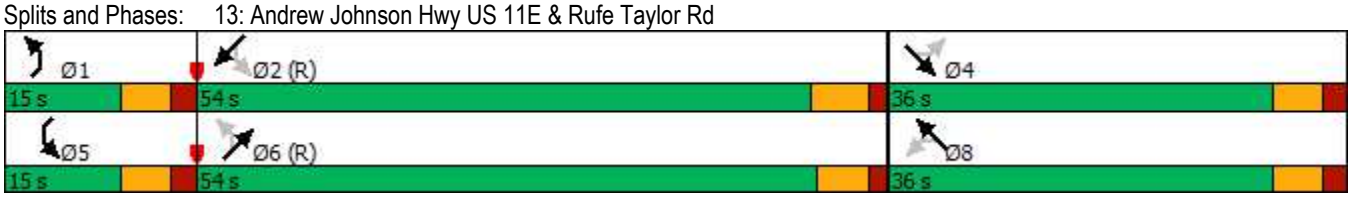
! Phase conflict between lane groups.

c Critical Lane Group

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	148	32	27	25	28	1228	53	1087
Future Volume (vph)	148	32	27	25	28	1228	53	1087
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	4	4	8	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	6.0	15.0
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0	20.5	15.0	21.0
Total Split (s)	36.0	36.0	36.0	36.0	15.0	54.0	15.0	54.0
Total Split (%)	34.3%	34.3%	34.3%	34.3%	14.3%	51.4%	14.3%	51.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	1.5	2.0	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	5.5	6.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
Act Effct Green (s)		26.8		26.8	60.6	55.9	63.3	58.6
Actuated g/C Ratio		0.26		0.26	0.58	0.53	0.60	0.56
v/c Ratio		0.90		0.38	0.15	0.70	0.30	0.71
Control Delay		65.8		25.1	3.4	14.7	12.3	8.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		65.8		25.1	3.4	14.7	12.3	8.8
LOS		E		C	A	B	B	A
Approach Delay		65.8		25.1		14.4		9.0
Approach LOS		E		C		B		A

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 97 (92%), Referenced to phase 2:SWTL and 6:NETL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 17.1	Intersection LOS: B
Intersection Capacity Utilization 72.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 13: Andrew Johnson Hwy US 11E & Rufe Taylor Rd



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	148	32	37	27	25	37	28	1228	25	53	1087	129
Future Volume (vph)	148	32	37	27	25	37	28	1228	25	53	1087	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	5.5		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.94		1.00	1.00		1.00	0.98	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1755			1724		1770	3523		1770	3474	
Flt Permitted		0.68			0.87		0.11	1.00		0.10	1.00	
Satd. Flow (perm)		1238			1514		200	3523		194	3474	
Peak-hour factor, PHF	0.79	0.73	0.62	0.68	0.57	0.51	0.88	0.96	0.62	0.78	0.90	0.77
Adj. Flow (vph)	187	44	60	40	44	73	32	1279	40	68	1208	168
RTOR Reduction (vph)	0	9	0	0	31	0	0	2	0	0	9	0
Lane Group Flow (vph)	0	282	0	0	126	0	32	1317	0	68	1367	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)		26.8			26.8		58.7	54.7		62.2	56.2	
Effective Green, g (s)		26.8			26.8		58.7	54.7		62.2	56.2	
Actuated g/C Ratio		0.26			0.26		0.56	0.52		0.59	0.54	
Clearance Time (s)		6.0			6.0		6.0	5.5		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		315			386		171	1835		204	1859	
v/s Ratio Prot							0.01	0.37		c0.02	c0.39	
v/s Ratio Perm		c0.23			0.08		0.10			0.18		
v/c Ratio		0.90			0.33		0.19	0.72		0.33	0.74	
Uniform Delay, d1		37.7			31.8		13.6	19.2		13.6	18.7	
Progression Factor		1.00			1.00		0.25	0.63		1.11	0.37	
Incremental Delay, d2		26.0			0.5		0.4	1.8		0.7	2.0	
Delay (s)		63.7			32.3		3.8	14.0		15.9	9.0	
Level of Service		E			C		A	B		B	A	
Approach Delay (s)		63.7			32.3			13.8			9.3	
Approach LOS		E			C			B			A	

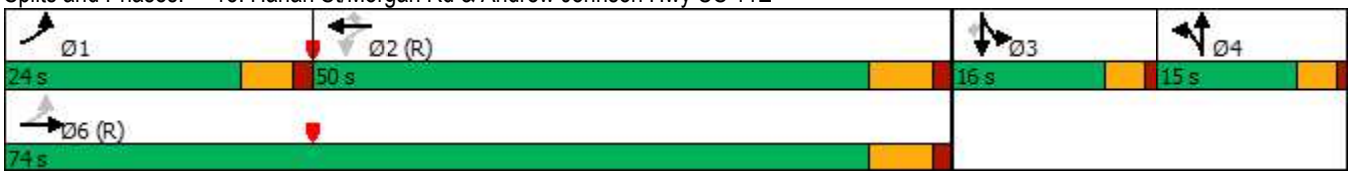
Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

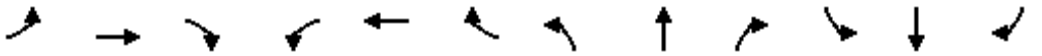
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	251	1054	10	906	19	13	43	15	236
Future Volume (vph)	251	1054	10	906	19	13	43	15	236
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Split	NA	Perm
Protected Phases	1	6		2		4	3	3	
Permitted Phases	6		2		2				3
Detector Phase	1	6	2	2	2	4	3	3	3
Switch Phase									
Minimum Initial (s)	6.0	15.0	15.0	15.0	15.0	8.0	8.0	8.0	8.0
Minimum Split (s)	21.5	24.5	24.5	24.5	24.5	12.0	12.0	12.0	12.0
Total Split (s)	24.0	74.0	50.0	50.0	50.0	15.0	16.0	16.0	16.0
Total Split (%)	22.9%	70.5%	47.6%	47.6%	47.6%	14.3%	15.2%	15.2%	15.2%
Yellow Time (s)	4.0	5.0	5.0	5.0	5.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0
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)	5.5	6.5	6.5	6.5	6.5	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?									
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	70.8	69.8	49.7	49.7	49.7	11.6	9.1	9.1	9.1
Actuated g/C Ratio	0.67	0.66	0.47	0.47	0.47	0.11	0.09	0.09	0.09
v/c Ratio	0.75	0.56	0.09	0.64	0.03	0.67	0.28	0.29	0.71
Control Delay	28.4	5.7	11.7	16.2	0.1	61.9	49.4	49.4	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	5.7	11.7	16.2	0.1	61.9	49.4	49.4	16.3
LOS	C	A	B	B	A	E	D	D	B
Approach Delay		9.9		15.7		61.9		24.2	
Approach LOS		A		B		E		C	

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 59 (56%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 15.6	Intersection LOS: B
Intersection Capacity Utilization 70.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 15: Harlan St/Morgan Rd & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	1054	84	10	906	19	75	13	3	43	15	236
Future Volume (vph)	251	1054	84	10	906	19	75	13	3	43	15	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		6.5	6.5	6.5		4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96		0.95	0.98	1.00
Satd. Flow (prot)	1770	3502		1770	3539	1583		1782		1681	1739	1583
Flt Permitted	0.15	1.00		0.21	1.00	1.00		0.96		0.95	0.98	1.00
Satd. Flow (perm)	282	3502		388	3539	1583		1782		1681	1739	1583
Peak-hour factor, PHF	0.84	0.86	0.91	0.62	0.85	0.68	0.69	0.65	0.75	0.77	0.54	0.87
Adj. Flow (vph)	299	1226	92	16	1066	28	109	20	4	56	28	271
RTOR Reduction (vph)	0	5	0	0	0	15	0	1	0	0	0	248
Lane Group Flow (vph)	299	1313	0	16	1066	13	0	132	0	41	43	23
Turn Type	pm+pt	NA		Perm	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6			2		4	4		3	3	
Permitted Phases	6			2		2						3
Actuated Green, G (s)	69.8	69.8		49.7	49.7	49.7		11.6		9.1	9.1	9.1
Effective Green, g (s)	69.8	69.8		49.7	49.7	49.7		11.6		9.1	9.1	9.1
Actuated g/C Ratio	0.66	0.66		0.47	0.47	0.47		0.11		0.09	0.09	0.09
Clearance Time (s)	5.5	6.5		6.5	6.5	6.5		4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	394	2327		183	1675	749		196		145	150	137
v/s Ratio Prot	c0.11	0.37			0.30			c0.07		0.02	c0.02	
v/s Ratio Perm	c0.40			0.04		0.01						0.01
v/c Ratio	0.76	0.56		0.09	0.64	0.02		0.67		0.28	0.29	0.17
Uniform Delay, d1	15.1	9.4		15.2	20.8	14.7		44.9		44.9	44.9	44.5
Progression Factor	1.47	0.51		0.57	0.65	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	6.1	0.7		0.9	1.7	0.0		8.8		1.1	1.1	0.6
Delay (s)	28.5	5.5		9.5	15.2	14.7		53.7		46.0	46.0	45.1
Level of Service	C	A		A	B	B		D		D	D	D
Approach Delay (s)		9.8			15.1			53.7			45.3	
Approach LOS		A			B			D			D	

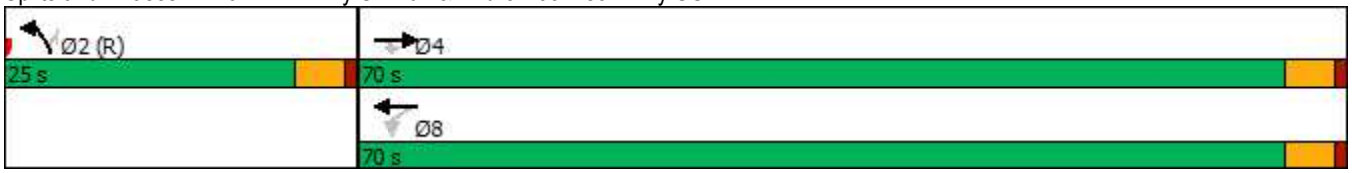
Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	850	297	156	691	201	139
Future Volume (vph)	850	297	156	691	201	139
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	70.0	70.0	70.0	70.0	25.0	25.0
Total Split (%)	73.7%	73.7%	73.7%	73.7%	26.3%	26.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	65.5	65.5	65.5	65.5	20.5	20.5
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.22	0.22
v/c Ratio	0.40	0.30	0.50	0.32	0.28	0.36
Control Delay	6.9	1.2	13.4	6.3	32.3	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	6.9	1.2	13.4	6.3	32.3	7.5
LOS	A	A	B	A	C	A
Approach Delay	5.3			7.6	21.1	
Approach LOS	A			A	C	

Intersection Summary	
Cycle Length: 95	
Actuated Cycle Length: 95	
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 8.4	Intersection LOS: A
Intersection Capacity Utilization 49.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 16: Erwin Hwy SR 107 & Andrew Johnson Hwy US 11E





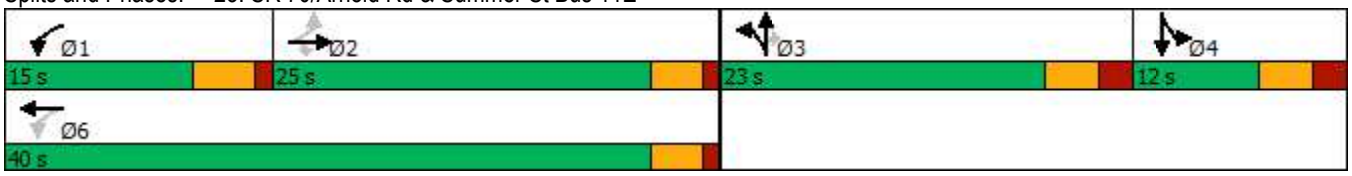
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	850	297	156	691	201	139
Future Volume (vph)	850	297	156	691	201	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted	1.00	1.00	0.26	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	492	3539	3433	1583
Peak-hour factor, PHF	0.88	0.81	0.91	0.88	0.97	0.81
Adj. Flow (vph)	966	367	171	785	207	172
RTOR Reduction (vph)	0	114	0	0	0	135
Lane Group Flow (vph)	966	253	171	785	207	37
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	65.5	65.5	65.5	65.5	20.5	20.5
Effective Green, g (s)	65.5	65.5	65.5	65.5	20.5	20.5
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.22	0.22
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Grp Cap (vph)	2440	1091	339	2440	740	341
v/s Ratio Prot	0.27			0.22	c0.06	
v/s Ratio Perm		0.16	c0.35			0.02
v/c Ratio	0.40	0.23	0.50	0.32	0.28	0.11
Uniform Delay, d1	6.3	5.5	7.0	5.9	31.1	29.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.5	5.3	0.3	0.9	0.6
Delay (s)	6.8	5.9	12.3	6.2	32.0	30.6
Level of Service	A	A	B	A	C	C
Approach Delay (s)	6.6			7.3	31.4	
Approach LOS	A			A	C	

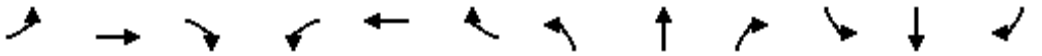
Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations									
Traffic Volume (vph)	12	201	691	73	272	549	12	40	20
Future Volume (vph)	12	201	691	73	272	549	12	40	20
Turn Type	Perm	NA	Perm	pm+pt	NA	Split	NA	Perm	NA
Protected Phases		2		1	6	3	3		4
Permitted Phases	2		2	6				3	
Detector Phase	2	2	2	1	6	3	3	3	4
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0	6.0	6.0	6.0	6.0
Minimum Split (s)	25.0	25.0	25.0	15.0	25.0	20.0	20.0	20.0	12.0
Total Split (s)	25.0	25.0	25.0	15.0	40.0	23.0	23.0	23.0	12.0
Total Split (%)	33.3%	33.3%	33.3%	20.0%	53.3%	30.7%	30.7%	30.7%	16.0%
Yellow Time (s)	3.0	3.0	3.0	3.5	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
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	4.5	4.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead		Lead	Lead	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	Max	Max	Max	None	Max	None	None	None	None
Act Effct Green (s)		26.2	26.2	36.0	36.5	16.8	16.8	16.8	6.6
Actuated g/C Ratio		0.38	0.38	0.52	0.53	0.24	0.24	0.24	0.10
v/c Ratio		0.21	0.71	0.22	0.18	0.82	0.83	0.10	0.30
Control Delay		18.8	6.4	11.6	10.1	44.7	45.0	0.4	29.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		18.8	6.4	11.6	10.1	44.7	45.0	0.4	29.1
LOS		B	A	B	B	D	D	A	C
Approach Delay		9.6			10.5		41.7		29.1
Approach LOS		A			B		D		C

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 69	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 20.6	Intersection LOS: C
Intersection Capacity Utilization 67.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 23: SR 70/Arnold Rd & Summer St Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	201	691	73	272	1	549	12	40	8	20	15
Future Volume (vph)	12	201	691	73	272	1	549	12	40	8	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.5	4.0		5.0	5.0	5.0		5.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.96	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)		3528	1583	1770	3533		1681	1689	1583		1766	
Flt Permitted		0.93	1.00	0.50	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (perm)		3287	1583	939	3533		1681	1689	1583		1766	
Peak-hour factor, PHF	0.75	0.82	0.91	0.56	0.84	0.25	0.83	0.75	0.77	0.50	0.83	0.94
Adj. Flow (vph)	16	245	759	130	324	4	661	16	52	16	24	16
RTOR Reduction (vph)	0	0	484	0	1	0	0	0	40	0	15	0
Lane Group Flow (vph)	0	261	275	130	327	0	337	340	12	0	41	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases		2		1	6		3	3		4	4	
Permitted Phases	2		2	6					3			
Actuated Green, G (s)		26.2	26.2	37.5	37.5		16.8	16.8	16.8		3.9	
Effective Green, g (s)		26.2	26.2	37.5	37.5		16.8	16.8	16.8		3.9	
Actuated g/C Ratio		0.36	0.36	0.52	0.52		0.23	0.23	0.23		0.05	
Clearance Time (s)		4.0	4.0	4.5	4.0		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		1192	574	565	1835		391	393	368		95	
v/s Ratio Prot				c0.02	0.09		0.20	c0.20			c0.02	
v/s Ratio Perm		0.08	c0.17	0.10					0.01			
v/c Ratio		0.22	0.48	0.23	0.18		0.86	0.87	0.03		0.43	
Uniform Delay, d1		15.9	17.7	9.2	9.2		26.6	26.6	21.4		33.1	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2		0.4	2.9	0.2	0.2		17.4	17.7	0.0		3.1	
Delay (s)		16.3	20.6	9.4	9.4		44.0	44.3	21.5		36.2	
Level of Service		B	C	A	A		D	D	C		D	
Approach Delay (s)		19.5			9.4			42.5			36.2	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	72.2	Sum of lost time (s)	18.5
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

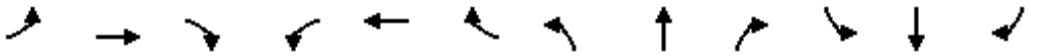
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	32	224	15	241	17	61	22	53	30
Future Volume (vph)	32	224	15	241	17	61	22	53	30
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		6		2		4		8	
Permitted Phases	6		2		4		8		8
Detector Phase	6	6	2	2	4	4	8	8	8
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	20.0	20.0	20.0	20.0	15.0	15.0	15.0	15.0	15.0
Total Split (s)	30.0	30.0	30.0	30.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0		0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5		5.5		5.0		5.0	5.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Min	C-Min	C-Min	C-Min	Max	Max	Max	Max	Max
Act Effct Green (s)	15.9	15.9		15.9		23.6		23.6	23.6
Actuated g/C Ratio	0.32	0.32		0.32		0.47		0.47	0.47
v/c Ratio	0.21	0.51		0.68		0.24		0.15	0.05
Control Delay	17.4	19.7		19.5		7.6		10.5	3.0
Queue Delay	0.0	0.0		0.0		0.0		0.0	0.0
Total Delay	17.4	19.7		19.5		7.6		10.5	3.0
LOS	B	B		B		A		B	A
Approach Delay		19.3		19.5		7.6		8.6	
Approach LOS		B		B		A		A	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 39 (78%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 15.9	Intersection LOS: B
Intersection Capacity Utilization 54.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 27: College St & Church St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	224	19	15	241	44	17	61	55	22	53	30
Future Volume (vph)	32	224	19	15	241	44	17	61	55	22	53	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5			5.0			5.0	5.0
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	0.98			0.98			0.94			1.00	0.85
Flt Protected	0.95	1.00			1.00			0.99			0.98	1.00
Satd. Flow (prot)	1593	1650			1629			1412			1649	1425
Flt Permitted	0.49	1.00			0.96			0.96			0.89	1.00
Satd. Flow (perm)	830	1650			1562			1362			1491	1425
Peak-hour factor, PHF	0.57	0.92	0.68	0.54	0.93	0.69	0.71	0.90	0.81	0.61	0.74	0.83
Adj. Flow (vph)	56	243	28	28	259	64	24	68	68	36	72	36
RTOR Reduction (vph)	0	11	0	0	21	0	0	36	0	0	0	19
Lane Group Flow (vph)	56	260	0	0	330	0	0	124	0	0	108	17
Parking (#/hr)							0	0	0			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	15.9	15.9			15.9			23.6			23.6	23.6
Effective Green, g (s)	15.9	15.9			15.9			23.6			23.6	23.6
Actuated g/C Ratio	0.32	0.32			0.32			0.47			0.47	0.47
Clearance Time (s)	5.5	5.5			5.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	263	524			496			642			703	672
v/s Ratio Prot		0.16										
v/s Ratio Perm	0.07				c0.21			c0.09			0.07	0.01
v/c Ratio	0.21	0.50			0.67			0.19			0.15	0.03
Uniform Delay, d1	12.5	13.8			14.7			7.7			7.5	7.1
Progression Factor	1.48	1.38			1.00			1.00			1.00	1.00
Incremental Delay, d2	1.6	2.9			6.9			0.7			0.5	0.1
Delay (s)	20.1	22.0			21.6			8.3			8.0	7.1
Level of Service	C	C			C			A			A	A
Approach Delay (s)		21.7			21.6			8.3			7.8	
Approach LOS		C			C			A			A	

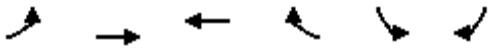
Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	172	172	156	73
Future Volume (vph)	172	172	156	73
Turn Type	Perm	NA	NA	Prot
Protected Phases		6	2	4
Permitted Phases	6			
Detector Phase	6	6	2	4
Switch Phase				
Minimum Initial (s)	15.0	15.0	15.0	10.0
Minimum Split (s)	21.0	21.0	21.0	15.0
Total Split (s)	34.0	34.0	34.0	16.0
Total Split (%)	68.0%	68.0%	68.0%	32.0%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0
Total Lost Time (s)		6.0	6.0	5.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	Max	Max	Max	None
Act Effct Green (s)		31.8	31.8	10.4
Actuated g/C Ratio		0.65	0.65	0.21
v/c Ratio		0.47	0.21	0.51
Control Delay		8.8	4.9	14.6
Queue Delay		0.0	0.0	0.0
Total Delay		8.8	4.9	14.6
LOS		A	A	B
Approach Delay		8.8	4.9	14.6
Approach LOS		A	A	B

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 48.8	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 55.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 32: McKee St & College St





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	172	172	156	31	73	94
Future Volume (vph)	172	172	156	31	73	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		5.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	0.97		0.93	
Flt Protected		0.98	1.00		0.98	
Satd. Flow (prot)		1817	1806		1691	
Flt Permitted		0.72	1.00		0.98	
Satd. Flow (perm)		1337	1806		1691	
Peak-hour factor, PHF	0.83	0.83	0.81	0.55	0.68	0.81
Adj. Flow (vph)	207	207	193	56	107	116
RTOR Reduction (vph)	0	0	18	0	83	0
Lane Group Flow (vph)	0	414	231	0	140	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)		30.6	30.6		8.3	
Effective Green, g (s)		30.6	30.6		8.3	
Actuated g/C Ratio		0.61	0.61		0.17	
Clearance Time (s)		6.0	6.0		5.0	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		819	1107		281	
v/s Ratio Prot			0.13		c0.08	
v/s Ratio Perm		c0.31				
v/c Ratio		0.51	0.21		0.50	
Uniform Delay, d1		5.4	4.3		18.9	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		2.2	0.4		1.4	
Delay (s)		7.6	4.7		20.3	
Level of Service		A	A		C	
Approach Delay (s)		7.6	4.7		20.3	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	49.9	Sum of lost time (s)	11.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

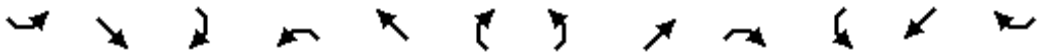
c Critical Lane Group

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Configurations											
Traffic Volume (vph)	56	94	42	91	215	93	54	264	82	47	166
Future Volume (vph)	56	94	42	91	215	93	54	264	82	47	166
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		6			2			4			8
Permitted Phases	6		6	2		2	4		4	8	
Detector Phase	6	6	6	2	2	2	4	4	4	8	8
Switch Phase											
Minimum Initial (s)	15.0	15.0	15.0	25.0	25.0	25.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	21.0	21.0	21.0	31.0	31.0	31.0	21.0	21.0	21.0	21.0	21.0
Total Split (s)	33.0	33.0	33.0	33.0	33.0	33.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	Max	Max	Max	Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	27.0	27.0	27.0	27.0	27.0	27.0	15.4	15.4	15.4	15.4	15.4
Actuated g/C Ratio	0.50	0.50	0.50	0.50	0.50	0.50	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.11	0.11	0.06	0.16	0.25	0.12	0.22	0.54	0.17	0.18	0.56
Control Delay	8.1	7.9	2.2	8.5	8.9	2.5	17.5	21.1	5.5	16.7	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	7.9	2.2	8.5	8.9	2.5	17.5	21.1	5.5	16.7	17.7
LOS	A	A	A	A	A	A	B	C	A	B	B
Approach Delay		6.7			7.3			17.4			17.5
Approach LOS		A			A			B			B

Intersection Summary		
Cycle Length: 55		
Actuated Cycle Length: 54.4		
Natural Cycle: 55		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.56		
Intersection Signal Delay: 12.8	Intersection LOS: B	
Intersection Capacity Utilization 81.5%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 33: Bernard Ave & Church St





Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	56	94	42	91	215	93	54	264	82	47	166	113
Future Volume (vph)	56	94	42	91	215	93	54	264	82	47	166	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1749	
Flt Permitted	0.61	1.00	1.00	0.69	1.00	1.00	0.50	1.00	1.00	0.53	1.00	
Satd. Flow (perm)	1142	1863	1583	1287	1863	1583	940	1863	1583	989	1749	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	102	46	99	234	101	59	287	89	51	180	123
RTOR Reduction (vph)	0	0	23	0	0	51	0	0	62	0	45	0
Lane Group Flow (vph)	61	102	23	99	234	50	59	287	27	51	258	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6		6	2		2	4		4	8		
Actuated Green, G (s)	27.0	27.0	27.0	27.0	27.0	27.0	15.4	15.4	15.4	15.4	15.4	
Effective Green, g (s)	27.0	27.0	27.0	27.0	27.0	27.0	15.4	15.4	15.4	15.4	15.4	
Actuated g/C Ratio	0.50	0.50	0.50	0.50	0.50	0.50	0.28	0.28	0.28	0.28	0.28	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	566	924	785	638	924	785	266	527	448	279	495	
v/s Ratio Prot		0.05			c0.13			c0.15			0.15	
v/s Ratio Perm	0.05		0.01	0.08		0.03	0.06		0.02	0.05		
v/c Ratio	0.11	0.11	0.03	0.16	0.25	0.06	0.22	0.54	0.06	0.18	0.52	
Uniform Delay, d1	7.3	7.3	7.0	7.5	7.9	7.1	14.9	16.5	14.2	14.7	16.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.2	0.1	0.5	0.7	0.2	0.4	1.2	0.1	0.3	1.0	
Delay (s)	7.7	7.5	7.1	8.0	8.6	7.3	15.3	17.7	14.3	15.1	17.4	
Level of Service	A	A	A	A	A	A	B	B	B	B	B	
Approach Delay (s)		7.5			8.1			16.7			17.1	
Approach LOS		A			A			B			B	

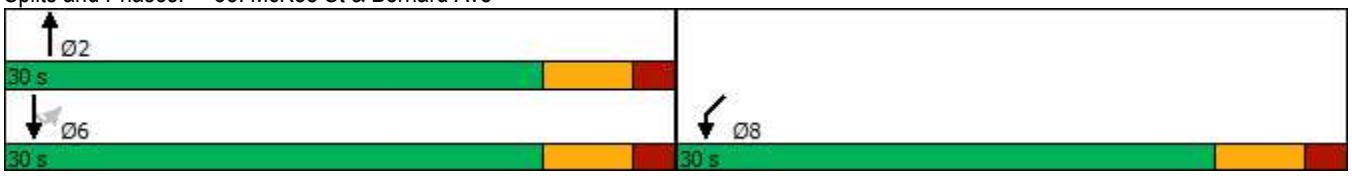
Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	54.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		

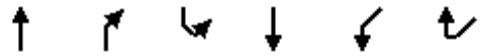
c Critical Lane Group

Lane Group	NBT	SBL	SBT	SWL
Lane Configurations				
Traffic Volume (vph)	82	66	166	379
Future Volume (vph)	82	66	166	379
Turn Type	NA	Perm	NA	Prot
Protected Phases	2		6	8
Permitted Phases		6		
Detector Phase	2	6	6	8
Switch Phase				
Minimum Initial (s)	20.0	20.0	20.0	8.0
Minimum Split (s)	26.0	26.0	26.0	14.0
Total Split (s)	30.0	30.0	30.0	30.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0
Total Lost Time (s)	6.0		6.0	6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	Max	Max	Max	None
Act Effct Green (s)	24.2		24.2	19.5
Actuated g/C Ratio	0.43		0.43	0.35
v/c Ratio	0.49		0.54	0.81
Control Delay	5.2		17.1	27.4
Queue Delay	0.0		0.0	0.0
Total Delay	5.2		17.1	27.4
LOS	A		B	C
Approach Delay	5.2		17.1	27.4
Approach LOS	A		B	C

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 55.7	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 17.0	Intersection LOS: B
Intersection Capacity Utilization 78.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 35: McKee St & Bernard Ave





Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	82	289	66	166	379	65
Future Volume (vph)	82	289	66	166	379	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.89			1.00	0.98	
Flt Protected	1.00			0.99	0.96	
Satd. Flow (prot)	1663			1839	1751	
Flt Permitted	1.00			0.74	0.96	
Satd. Flow (perm)	1663			1373	1751	
Peak-hour factor, PHF	0.89	0.81	0.79	0.70	0.88	0.86
Adj. Flow (vph)	92	357	84	237	431	76
RTOR Reduction (vph)	202	0	0	0	12	0
Lane Group Flow (vph)	247	0	0	321	495	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Actuated Green, G (s)	24.2			24.2	19.5	
Effective Green, g (s)	24.2			24.2	19.5	
Actuated g/C Ratio	0.43			0.43	0.35	
Clearance Time (s)	6.0			6.0	6.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	722			596	613	
v/s Ratio Prot	0.15				c0.28	
v/s Ratio Perm				c0.23		
v/c Ratio	0.34			0.54	0.81	
Uniform Delay, d1	10.5			11.6	16.4	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.3			3.5	7.7	
Delay (s)	11.8			15.1	24.1	
Level of Service	B			B	C	
Approach Delay (s)	11.8			15.1	24.1	
Approach LOS	B			B	C	

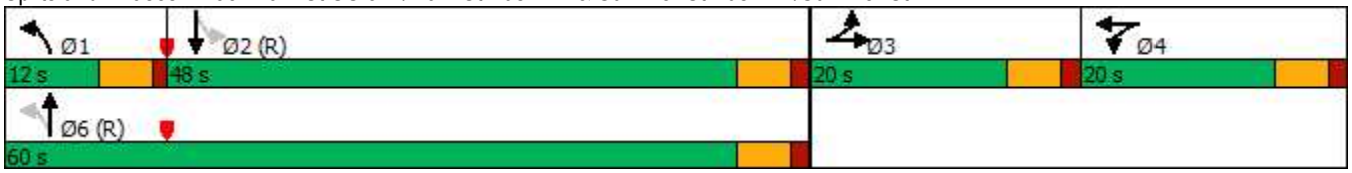
Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

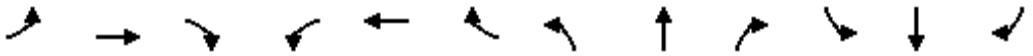
c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	98	105	55	27	268	14	322
Future Volume (vph)	98	105	55	27	268	14	322
Turn Type	Split	NA	NA	pm+pt	NA	Perm	NA
Protected Phases	3	3	4	1	6		2
Permitted Phases				6		2	
Detector Phase	3	3	4	1	6	2	2
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	20.0	20.0	20.0	12.0	25.0	25.0	25.0
Total Split (s)	20.0	20.0	20.0	12.0	60.0	48.0	48.0
Total Split (%)	20.0%	20.0%	20.0%	12.0%	60.0%	48.0%	48.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.0	5.5	5.5	5.5
Lead/Lag	Lead	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?							
Recall Mode	Max	Max	Max	None	C-Max	C-Max	C-Max
Act Effct Green (s)	14.5	14.5	14.5	55.0	54.5	47.4	47.4
Actuated g/C Ratio	0.14	0.14	0.14	0.55	0.54	0.47	0.47
v/c Ratio	0.52	0.68	0.43	0.12	0.37	0.06	0.70
Control Delay	43.8	52.1	45.9	15.9	19.2	11.1	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	43.8	52.1	45.9	15.9	19.2	11.1	20.8
LOS	D	D	D	B	B	B	C
Approach Delay		48.5	45.9		18.8		20.2
Approach LOS		D	D		B		C

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 46 (46%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 28.2	Intersection LOS: C
Intersection Capacity Utilization 47.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 38: Main St US 321/Main St Bus 11E & Summer St Bus 11E/Summer St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	105	33	3	55	4	27	268	4	14	322	97
Future Volume (vph)	98	105	33	3	55	4	27	268	4	14	322	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5		5.0	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96			0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1593	1613			1485		1593	1503		1593	1457	
Flt Permitted	0.95	1.00			1.00		0.30	1.00		0.58	1.00	
Satd. Flow (perm)	1593	1613			1485		498	1503		968	1457	
Peak-hour factor, PHF	0.82	0.88	0.82	0.38	0.72	0.50	0.68	0.92	0.50	0.50	0.86	0.87
Adj. Flow (vph)	120	119	40	8	76	8	40	291	8	28	374	111
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	120	159	0	0	92	0	40	299	0	28	485	0
Parking (#/hr)				0	0	0		0	0		0	0
Turn Type	Split	NA		Split	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	3		4	4		1	6			2	
Permitted Phases							6			2		
Actuated Green, G (s)	14.5	14.5			14.5		54.5	54.5		45.4	45.4	
Effective Green, g (s)	14.5	14.5			14.5		54.5	54.5		45.4	45.4	
Actuated g/C Ratio	0.14	0.14			0.14		0.54	0.54		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5		5.0	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	233			215		316	819		439	661	
v/s Ratio Prot	0.08	c0.10			c0.06		0.01	c0.20			c0.33	
v/s Ratio Perm							0.06			0.03		
v/c Ratio	0.52	0.68			0.43		0.13	0.37		0.06	0.73	
Uniform Delay, d1	39.5	40.6			39.0		12.6	12.9		15.4	22.4	
Progression Factor	0.89	0.89			1.00		1.44	1.36		0.64	0.61	
Incremental Delay, d2	8.0	14.6			6.1		0.2	1.2		0.3	6.7	
Delay (s)	43.1	50.9			45.1		18.4	18.7		10.1	20.4	
Level of Service	D	D			D		B	B		B	C	
Approach Delay (s)		47.6			45.1			18.7			19.8	
Approach LOS		D			D			B			B	

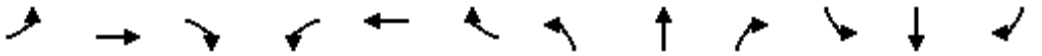
Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	85	196	84	140	16	294	69	322
Future Volume (vph)	85	196	84	140	16	294	69	322
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	6.0	9.5	6.0	9.5	6.0	14.5	6.0	14.5
Minimum Split (s)	12.0	20.0	12.0	20.0	12.0	25.0	12.0	25.0
Total Split (s)	12.0	30.0	12.0	30.0	12.0	46.0	12.0	46.0
Total Split (%)	12.0%	30.0%	12.0%	30.0%	12.0%	46.0%	12.0%	46.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.5	5.0	5.5	5.0	5.5	5.0	5.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	Min	None	Min	None	C-Min	None	C-Min
Act Effct Green (s)	30.6	22.5	28.9	19.8	50.8	45.0	53.4	48.1
Actuated g/C Ratio	0.31	0.22	0.29	0.20	0.51	0.45	0.53	0.48
v/c Ratio	0.40	0.67	0.34	0.78	0.07	0.59	0.21	0.52
Control Delay	27.0	45.0	23.1	51.2	6.5	17.8	12.6	22.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	27.0	45.0	23.1	51.2	6.5	18.2	12.6	22.6
LOS	C	D	C	D	A	B	B	C
Approach Delay		39.4		43.0		17.3		20.7
Approach LOS		D		D		B		C

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 28.9	Intersection LOS: C
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 39: Main St Bus 11E & Church St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	196	12	84	140	71	16	294	59	69	322	30
Future Volume (vph)	85	196	12	84	140	71	16	294	59	69	322	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.95		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1593	1660		1593	1589		1593	1465		1593	1487	
Flt Permitted	0.37	1.00		0.45	1.00		0.46	1.00		0.38	1.00	
Satd. Flow (perm)	628	1660		758	1589		771	1465		643	1487	
Peak-hour factor, PHF	0.76	0.84	0.75	0.84	0.88	0.84	0.50	0.93	0.78	0.78	0.97	0.83
Adj. Flow (vph)	112	233	16	100	159	85	32	316	76	88	332	36
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	112	249	0	100	244	0	32	392	0	88	368	0
Parking (#/hr)								0	0		0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.5	22.5		28.1	20.8		47.1	43.0		51.3	45.1	
Effective Green, g (s)	31.5	22.5		28.1	20.8		47.1	43.0		51.3	45.1	
Actuated g/C Ratio	0.32	0.22		0.28	0.21		0.47	0.43		0.51	0.45	
Clearance Time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	284	373		273	330		396	629		388	670	
v/s Ratio Prot	c0.04	0.15		0.03	c0.15		0.00	c0.27		c0.01	0.25	
v/s Ratio Perm	0.09			0.08			0.03			0.10		
v/c Ratio	0.39	0.67		0.37	0.74		0.08	0.62		0.23	0.55	
Uniform Delay, d1	25.7	35.3		27.7	37.1		14.5	22.2		13.4	20.0	
Progression Factor	1.00	1.00		0.90	0.93		0.52	0.59		0.97	0.95	
Incremental Delay, d2	0.9	4.5		0.8	8.0		0.1	4.5		0.3	2.8	
Delay (s)	26.6	39.8		25.8	42.5		7.6	17.5		13.3	21.8	
Level of Service	C	D		C	D		A	B		B	C	
Approach Delay (s)		35.7			37.6			16.7			20.2	
Approach LOS		D			D			B			C	

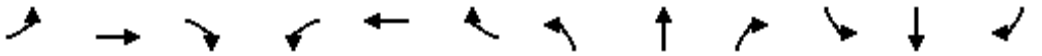
Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	6	28	119	18	2	254	28	305
Future Volume (vph)	6	28	119	18	2	254	28	305
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		8		4		2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	2	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	9.5	9.5	6.0	9.5
Minimum Split (s)	20.0	20.0	20.0	20.0	25.0	25.0	12.0	25.0
Total Split (s)	36.0	36.0	36.0	36.0	52.0	52.0	12.0	64.0
Total Split (%)	36.0%	36.0%	36.0%	36.0%	52.0%	52.0%	12.0%	64.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.5		5.5	5.5	5.5	5.0	5.5
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)		20.1		20.1	62.0	62.0	69.4	68.9
Actuated g/C Ratio		0.20		0.20	0.62	0.62	0.69	0.69
v/c Ratio		0.23		0.74	0.01	0.40	0.09	0.35
Control Delay		22.2		51.0	12.0	12.7	1.7	2.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		22.2		51.0	12.0	12.7	1.7	2.9
LOS		C		D	B	B	A	A
Approach Delay		22.2		51.0		12.7		2.8
Approach LOS		C		D		B		A

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 97 (97%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 16.0	Intersection LOS: B
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 40: Main St US 321 & McKee St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	28	16	119	18	20	2	254	86	28	305	8
Future Volume (vph)	6	28	16	119	18	20	2	254	86	28	305	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.98		1.00	0.95		1.00	0.99	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1581			1589		1593	1598		1593	1666	
Flt Permitted		0.95			0.78		0.53	1.00		0.44	1.00	
Satd. Flow (perm)		1508			1284		881	1598		734	1666	
Peak-hour factor, PHF	0.50	0.78	0.57	0.88	0.56	0.71	0.25	0.92	0.69	0.58	0.79	0.50
Adj. Flow (vph)	12	36	28	135	32	28	8	276	125	48	386	16
RTOR Reduction (vph)	0	22	0	0	7	0	0	12	0	0	1	0
Lane Group Flow (vph)	0	54	0	0	188	0	8	389	0	48	401	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		8			4			2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)		20.1			20.1		60.1	60.1		68.9	68.9	
Effective Green, g (s)		20.1			20.1		60.1	60.1		68.9	68.9	
Actuated g/C Ratio		0.20			0.20		0.60	0.60		0.69	0.69	
Clearance Time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Vehicle Extension (s)		4.0			3.0		4.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		303			258		529	960		538	1147	
v/s Ratio Prot								c0.24		0.00	c0.24	
v/s Ratio Perm		0.04			c0.15		0.01			0.06		
v/c Ratio		0.18			0.73		0.02	0.41		0.09	0.35	
Uniform Delay, d1		33.1			37.4		8.0	10.5		5.6	6.4	
Progression Factor		1.00			1.00		1.00	1.00		0.23	0.30	
Incremental Delay, d2		0.4			9.8		0.1	1.3		0.0	0.6	
Delay (s)		33.5			47.2		8.1	11.8		1.3	2.5	
Level of Service		C			D		A	B		A	A	
Approach Delay (s)		33.5			47.2			11.7			2.4	
Approach LOS		C			D			B			A	

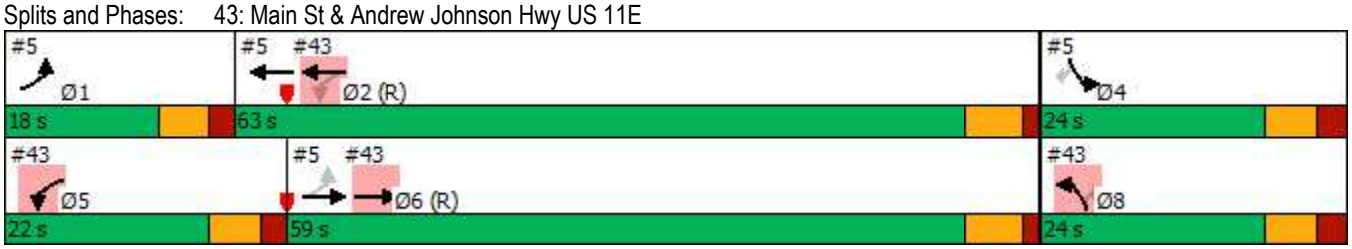
Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR	Ø1	Ø4
Lane Configurations							
Traffic Volume (vph)	1147	172	1303	77	187		
Future Volume (vph)	1147	172	1303	77	187		
Turn Type	NA	pm+pt	NA	Prot	Perm		
Protected Phases	6	5	2	8		1	4
Permitted Phases		2			8		
Detector Phase	6	5	2	8	8		
Switch Phase							
Minimum Initial (s)	15.0	6.0	15.0	8.5	8.5	6.0	8.5
Minimum Split (s)	21.0	15.0	21.0	15.0	15.0	15.0	15.0
Total Split (s)	59.0	22.0	63.0	24.0	24.0	18.0	24.0
Total Split (%)	56.2%	21.0%	60.0%	22.9%	22.9%	17%	23%
Yellow Time (s)	4.5	4.0	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	2.0	1.5	2.5	2.5	2.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.0	6.0	6.0	6.5	6.5		
Lead/Lag	Lag	Lead	Lag			Lead	
Lead-Lag Optimize?							
Recall Mode	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	61.9	76.2	64.3	12.8	12.8		
Actuated g/C Ratio	0.59	0.73	0.61	0.12	0.12		
v/c Ratio	0.66	0.64	0.62	0.58	0.67		
Control Delay	17.7	32.8	4.5	53.7	17.0		
Queue Delay	0.0	0.0	0.1	0.0	0.0		
Total Delay	17.7	32.8	4.6	53.7	17.0		
LOS	B	C	A	D	B		
Approach Delay	17.7		8.5	28.8			
Approach LOS	B		A	C			

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 45 (43%), Referenced to phase 2:WBT and 6:EBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 65.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 43: Main St & Andrew Johnson Hwy US 11E





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1147	66	172	1303	77	187
Future Volume (vph)	1147	66	172	1303	77	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.5	6.5
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3503		1770	3539	1770	1583
Flt Permitted	1.00		0.12	1.00	0.95	1.00
Satd. Flow (perm)	3503		226	3539	1770	1583
Peak-hour factor, PHF	0.90	0.72	0.80	0.97	0.62	0.71
Adj. Flow (vph)	1274	92	215	1343	124	263
RTOR Reduction (vph)	4	0	0	0	0	203
Lane Group Flow (vph)	1362	0	215	1343	124	60
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	6		5	2	8	
Permitted Phases			2			8
Actuated Green, G (s)	61.9		76.1	64.3	12.8	12.8
Effective Green, g (s)	61.9		76.1	64.3	12.8	12.8
Actuated g/C Ratio	0.59		0.72	0.61	0.12	0.12
Clearance Time (s)	6.0		6.0	6.0	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2065		337	2167	215	192
v/s Ratio Prot	0.39		c0.07	0.38	c0.07	
v/s Ratio Perm			c0.39			0.04
v/c Ratio	0.66		0.64	0.62	0.58	0.31
Uniform Delay, d1	14.5		11.7	12.7	43.5	42.1
Progression Factor	1.00		2.60	0.25	1.00	1.00
Incremental Delay, d2	1.7		3.0	1.0	3.7	0.9
Delay (s)	16.1		33.4	4.2	47.3	43.0
Level of Service	B		C	A	D	D
Approach Delay (s)	16.1			8.2	44.4	
Approach LOS	B			A	D	

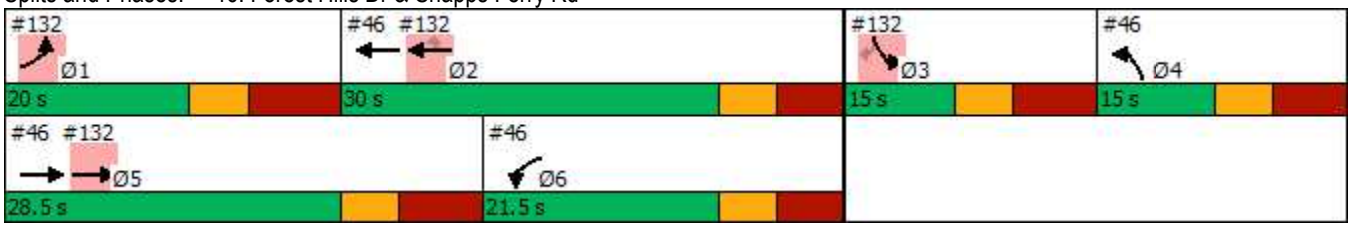
Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	Ø1	Ø3
Lane Configurations						
Traffic Volume (vph)	251	39	256	16		
Future Volume (vph)	251	39	256	16		
Turn Type	NA	Prot	NA	Prot		
Protected Phases	5	6	2	4	1	3
Permitted Phases						
Detector Phase	5	6	2	4		
Switch Phase						
Minimum Initial (s)	20.0	4.5	20.0	5.0	6.0	5.0
Minimum Split (s)	28.5	20.0	27.5	15.0	20.0	15.0
Total Split (s)	28.5	21.5	30.0	15.0	20.0	15.0
Total Split (%)	35.6%	26.9%	37.5%	18.8%	25%	19%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	5.0	4.0	4.0	4.5	5.5	5.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		
Total Lost Time (s)	8.5	7.5	7.5	8.0		
Lead/Lag	Lead	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?						
Recall Mode	None	Max	Max	None	None	None
Act Effct Green (s)	20.6	18.6	47.2	6.4		
Actuated g/C Ratio	0.27	0.24	0.61	0.08		
v/c Ratio	0.32	0.10	0.25	0.48		
Control Delay	25.5	18.2	5.3	20.5		
Queue Delay	0.0	0.0	0.0	74.8		
Total Delay	25.5	18.2	5.3	95.3		
LOS	C	B	A	F		
Approach Delay	25.5		7.0	95.3		
Approach LOS	C		A	F		

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 77.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 27.0	Intersection LOS: C
Intersection Capacity Utilization 46.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 46: Forest Hills Dr & Snapps Ferry Rd





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	251	22	39	256	16	76
Future Volume (vph)	251	22	39	256	16	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.5		7.5	7.5	8.0	
Lane Util. Factor	0.95		1.00	1.00	1.00	
Frt	0.99		1.00	1.00	0.89	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	3496		1770	1863	1640	
Flt Permitted	1.00		0.95	1.00	0.99	
Satd. Flow (perm)	3496		1770	1863	1640	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	273	24	42	278	17	83
RTOR Reduction (vph)	8	0	0	0	79	0
Lane Group Flow (vph)	289	0	42	278	21	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	5		6	2	4	
Permitted Phases						
Actuated Green, G (s)	20.6		26.2	45.0	4.8	
Effective Green, g (s)	20.6		26.2	45.0	4.8	
Actuated g/C Ratio	0.23		0.29	0.51	0.05	
Clearance Time (s)	8.5		7.5	7.5	8.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	810		521	943	88	
v/s Ratio Prot	c0.08		0.02	c0.15	c0.01	
v/s Ratio Perm						
v/c Ratio	0.36		0.08	0.29	0.24	
Uniform Delay, d1	28.6		22.6	12.7	40.3	
Progression Factor	1.00		0.66	0.38	1.00	
Incremental Delay, d2	0.3		0.3	0.8	1.4	
Delay (s)	28.9		15.3	5.6	41.8	
Level of Service	C		B	A	D	
Approach Delay (s)	28.9			6.9	41.8	
Approach LOS	C			A	D	

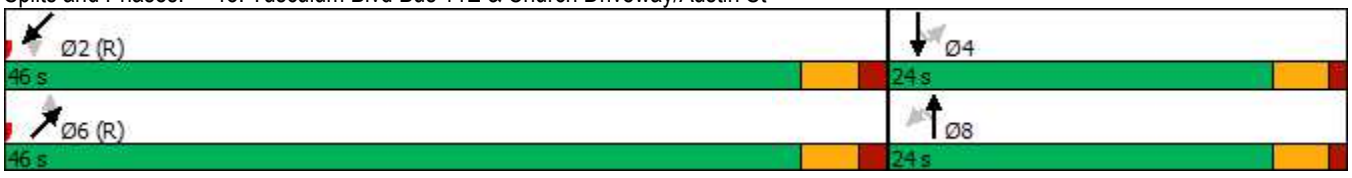
Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	33.0
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	SBL	SBT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	1	0	152	1	19	510	1	483
Future Volume (vph)	1	0	152	1	19	510	1	483
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		8		4		6		2
Permitted Phases	8		4		6		2	
Detector Phase	8	8	4	4	6	6	2	2
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	8.0	8.0	8.0	8.0	17.5	17.5	17.5	17.5
Total Split (s)	24.0	24.0	24.0	24.0	46.0	46.0	46.0	46.0
Total Split (%)	34.3%	34.3%	34.3%	34.3%	65.7%	65.7%	65.7%	65.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.0		4.0	4.5	4.5	4.5	4.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)		27.2		27.2	34.3	34.3	34.3	34.3
Actuated g/C Ratio		0.39		0.39	0.49	0.49	0.49	0.49
v/c Ratio		0.01		0.50	0.23	0.64	0.02	0.79
Control Delay		3.5		21.2	9.4	14.2	9.0	21.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		3.5		21.2	9.4	14.2	9.0	21.1
LOS		A		C	A	B	A	C
Approach Delay		3.5		21.2		14.0		21.1
Approach LOS		A		C		B		C

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 63 (90%), Referenced to phase 2:SWTL and 6:NETL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 48: Tusculum Blvd Bus 11E & Church Driveway/Austin St



Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	1	0	1	152	1	44	19	510	0	1	483	166
Future Volume (vph)	1	0	1	152	1	44	19	510	0	1	483	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.93			0.97		1.00	1.00		1.00	0.96	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1695			1735		1770	1863		1770	1784	
Flt Permitted		0.91			0.78		0.18	1.00		0.28	1.00	
Satd. Flow (perm)		1580			1403		328	1863		519	1784	
Peak-hour factor, PHF	0.25	0.25	0.25	0.75	0.25	0.61	0.53	0.87	0.25	0.25	0.94	0.83
Adj. Flow (vph)	4	0	4	203	4	72	36	586	0	4	514	200
RTOR Reduction (vph)	0	5	0	0	15	0	0	0	0	0	25	0
Lane Group Flow (vph)	0	3	0	0	264	0	36	586	0	4	689	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)		27.2			27.2		34.3	34.3		34.3	34.3	
Effective Green, g (s)		27.2			27.2		34.3	34.3		34.3	34.3	
Actuated g/C Ratio		0.39			0.39		0.49	0.49		0.49	0.49	
Clearance Time (s)		4.0			4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		613			545		160	912		254	874	
v/s Ratio Prot								0.31			c0.39	
v/s Ratio Perm		0.00			c0.19		0.11			0.01		
v/c Ratio		0.01			0.48		0.23	0.64		0.02	0.79	
Uniform Delay, d1		13.1			16.1		10.2	13.3		9.2	14.8	
Progression Factor		1.00			1.00		0.75	0.88		1.36	1.10	
Incremental Delay, d2		0.0			3.1		3.1	3.3		0.1	6.7	
Delay (s)		13.1			19.2		10.7	14.9		12.6	23.1	
Level of Service		B			B		B	B		B	C	
Approach Delay (s)		13.1			19.2			14.7			23.0	
Approach LOS		B			B			B			C	

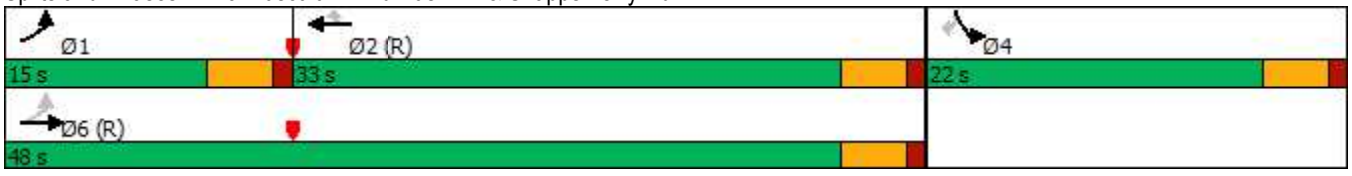
Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

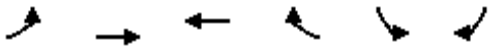
c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	182	435	386	112	229	204
Future Volume (vph)	182	435	386	112	229	204
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Detector Phase	1	6	2	2	4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	15.0	25.0	25.0	25.0	15.0	15.0
Total Split (s)	15.0	48.0	33.0	33.0	22.0	22.0
Total Split (%)	21.4%	68.6%	47.1%	47.1%	31.4%	31.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?						
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	46.7	46.7	33.7	33.7	14.3	14.3
Actuated g/C Ratio	0.67	0.67	0.48	0.48	0.20	0.20
v/c Ratio	0.34	0.38	0.47	0.15	0.69	0.44
Control Delay	7.1	6.9	14.9	4.6	35.6	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	6.9	14.9	4.6	35.6	6.6
LOS	A	A	B	A	D	A
Approach Delay		7.0	12.6		21.9	
Approach LOS		A	B		C	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 54.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 49: Tusculum Blvd Bus 11E & Snapps Ferry Rd





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	182	435	386	112	229	204
Future Volume (vph)	182	435	386	112	229	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.37	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	684	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	198	473	420	122	249	222
RTOR Reduction (vph)	0	0	0	52	0	177
Lane Group Flow (vph)	198	473	420	70	249	45
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Actuated Green, G (s)	46.7	46.7	33.7	33.7	14.3	14.3
Effective Green, g (s)	46.7	46.7	33.7	33.7	14.3	14.3
Actuated g/C Ratio	0.67	0.67	0.48	0.48	0.20	0.20
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	588	1242	896	762	361	323
v/s Ratio Prot	0.04	c0.25	c0.23		c0.14	
v/s Ratio Perm	0.18			0.04		0.03
v/c Ratio	0.34	0.38	0.47	0.09	0.69	0.14
Uniform Delay, d1	5.5	5.2	12.2	9.8	25.8	22.8
Progression Factor	1.13	1.03	0.94	0.99	1.00	1.00
Incremental Delay, d2	0.3	0.8	1.7	0.2	5.4	0.2
Delay (s)	6.4	6.1	13.2	10.0	31.2	23.0
Level of Service	A	A	B	A	C	C
Approach Delay (s)		6.2	12.5		27.4	
Approach LOS		A	B		C	

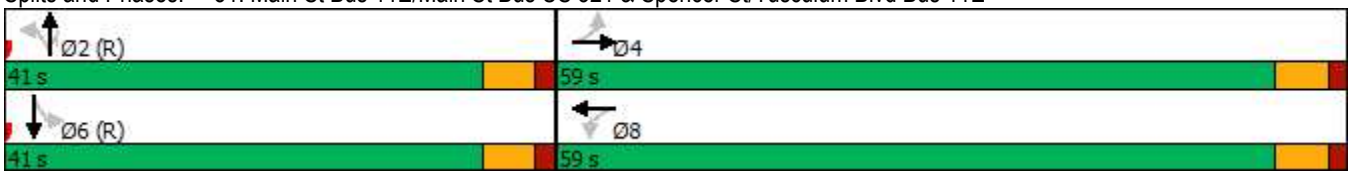
Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

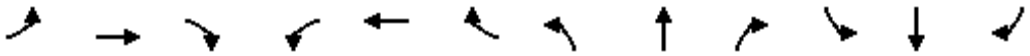
c Critical Lane Group

Lane Group	WBL	WBT	NBL	NBT	NBR	SBL	SBT	Ø4
Lane Configurations								
Traffic Volume (vph)	235	96	5	190	300	8	246	
Future Volume (vph)	235	96	5	190	300	8	246	
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	
Protected Phases		8		2			6	4
Permitted Phases	8		2		2	6		
Detector Phase	8	8	2	2	2	6	6	
Switch Phase								
Minimum Initial (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	59.0	59.0	41.0	41.0	41.0	41.0	41.0	59.0
Total Split (%)	59.0%	59.0%	41.0%	41.0%	41.0%	41.0%	41.0%	59%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	
Total Lost Time (s)		5.5		5.5	5.5		5.5	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	C-Min	C-Min	C-Min	C-Min	C-Min	None
Act Effct Green (s)		42.6		46.4	46.4		46.4	
Actuated g/C Ratio		0.43		0.46	0.46		0.46	
v/c Ratio		0.83		0.34	0.44		0.41	
Control Delay		36.7		17.4	3.3		22.1	
Queue Delay		0.0		0.0	0.0		0.0	
Total Delay		36.7		17.4	3.3		22.1	
LOS		D		B	A		C	
Approach Delay		36.7		9.0			22.1	
Approach LOS		D		A			C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 88 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 21.2	Intersection LOS: C
Intersection Capacity Utilization 53.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 51: Main St Bus 11E/Main St Bus US 321 & Spencer St/Tusculum Blvd Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	235	96	23	5	190	300	8	246	9
Future Volume (vph)	0	0	0	235	96	23	5	190	300	8	246	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			5.5	5.5		5.5	
Lane Util. Factor					1.00			1.00	1.00		1.00	
Frt					0.99			1.00	0.85		0.99	
Flt Protected					0.97			1.00	1.00		1.00	
Satd. Flow (prot)					1605			1673	1425		1659	
Flt Permitted					0.81			0.98	1.00		0.99	
Satd. Flow (perm)					1341			1645	1425		1639	
Peak-hour factor, PHF	0.92	0.92	0.92	0.79	0.71	0.52	0.42	0.77	0.80	0.67	0.87	0.45
Adj. Flow (vph)	0	0	0	297	135	44	12	247	375	12	283	20
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	201	0	2	0
Lane Group Flow (vph)	0	0	0	0	471	0	0	259	174	0	313	0
Turn Type				Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)					42.6			46.4	46.4		46.4	
Effective Green, g (s)					42.6			46.4	46.4		46.4	
Actuated g/C Ratio					0.43			0.46	0.46		0.46	
Clearance Time (s)					5.5			5.5	5.5		5.5	
Vehicle Extension (s)					3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)					571			763	661		760	
v/s Ratio Prot												
v/s Ratio Perm					c0.35			0.16	0.12		c0.19	
v/c Ratio					0.83			0.34	0.26		0.41	
Uniform Delay, d1					25.4			17.1	16.4		17.8	
Progression Factor					1.00			0.82	0.72		1.00	
Incremental Delay, d2					9.5			1.1	0.9		1.6	
Delay (s)					34.9			15.0	12.7		19.4	
Level of Service					C			B	B		B	
Approach Delay (s)		0.0			34.9			13.7			19.4	
Approach LOS		A			C			B			B	

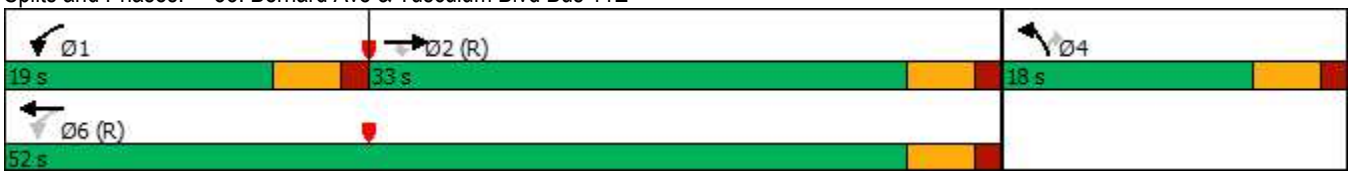
Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	462	158	361	380	94	371
Future Volume (vph)	462	158	361	380	94	371
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	3.0	5.0	3.0	3.0
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0	15.0
Total Split (s)	33.0	33.0	19.0	52.0	18.0	18.0
Total Split (%)	47.1%	47.1%	27.1%	74.3%	25.7%	25.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	33.7	33.7	50.5	50.5	9.5	9.5
Actuated g/C Ratio	0.48	0.48	0.72	0.72	0.14	0.14
v/c Ratio	0.57	0.22	0.67	0.29	0.45	0.73
Control Delay	16.9	3.9	13.0	3.3	33.1	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	3.9	13.0	3.3	33.1	11.2
LOS	B	A	B	A	C	B
Approach Delay	13.3			8.2	15.7	
Approach LOS	B			A	B	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 62.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 53: Bernard Ave & Tusculum Blvd Bus 11E





Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	462	158	361	380	94	371
Future Volume (vph)	462	158	361	380	94	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.30	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	553	1863	1770	1583
Peak-hour factor, PHF	0.90	0.82	0.89	0.96	0.87	0.89
Adj. Flow (vph)	513	193	406	396	108	417
RTOR Reduction (vph)	0	100	0	0	0	360
Lane Group Flow (vph)	513	93	406	396	108	57
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	33.7	33.7	50.5	50.5	9.5	9.5
Effective Green, g (s)	33.7	33.7	50.5	50.5	9.5	9.5
Actuated g/C Ratio	0.48	0.48	0.72	0.72	0.14	0.14
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	896	762	604	1344	240	214
v/s Ratio Prot	0.28		c0.11	0.21	c0.06	
v/s Ratio Perm		0.06	c0.37			0.04
v/c Ratio	0.57	0.12	0.67	0.29	0.45	0.26
Uniform Delay, d1	13.0	10.0	6.3	3.4	27.8	27.1
Progression Factor	0.96	1.32	1.76	0.72	1.00	1.00
Incremental Delay, d2	2.4	0.3	2.5	0.5	1.3	0.7
Delay (s)	14.9	13.5	13.6	3.0	29.2	27.8
Level of Service	B	B	B	A	C	C
Approach Delay (s)	14.5			8.3	28.1	
Approach LOS	B			A	C	

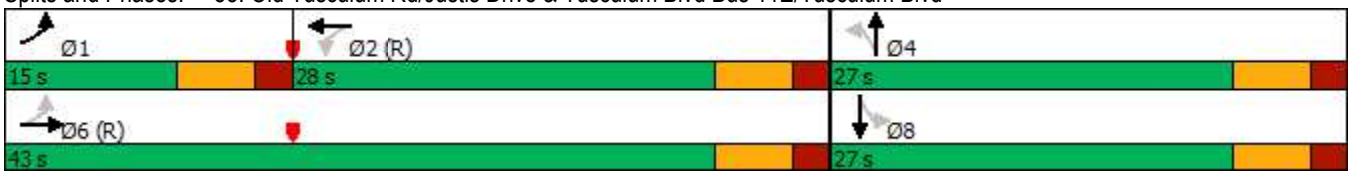
Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

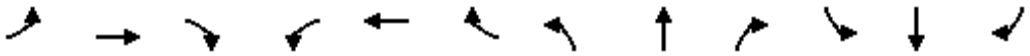
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	129	399	20	373	190	70	34	88
Future Volume (vph)	129	399	20	373	190	70	34	88
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	1	6		2		4		8
Permitted Phases	6		2		4		8	
Detector Phase	1	6	2	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	8.0	14.0	14.0	14.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	20.0	20.0	20.0	15.0	15.0	15.0	15.0
Total Split (s)	15.0	43.0	28.0	28.0	27.0	27.0	27.0	27.0
Total Split (%)	21.4%	61.4%	40.0%	40.0%	38.6%	38.6%	38.6%	38.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	39.3	39.3	24.7	24.7	18.7	18.7	18.7	18.7
Actuated g/C Ratio	0.56	0.56	0.35	0.35	0.27	0.27	0.27	0.27
v/c Ratio	0.46	0.42	0.08	0.73	0.89	0.23	0.12	0.54
Control Delay	7.3	3.4	17.9	29.3	64.5	16.1	19.0	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	3.4	17.9	29.3	64.5	16.1	19.0	16.1
LOS	A	A	B	C	E	B	B	B
Approach Delay		4.6		28.6		47.3		16.4
Approach LOS		A		C		D		B

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 21.2	Intersection LOS: C
Intersection Capacity Utilization 78.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 55: Old Tusculum Rd/Justis Drive & Tusculum Blvd Bus 11E/Tusculum Blvd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	399	23	20	373	46	190	70	20	34	88	150
Future Volume (vph)	129	399	23	20	373	46	190	70	20	34	88	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.96		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1848		1770	1825		1770	1793		1770	1690	
Flt Permitted	0.23	1.00		0.51	1.00		0.46	1.00		0.68	1.00	
Satd. Flow (perm)	426	1848		945	1825		855	1793		1276	1690	
Peak-hour factor, PHF	0.70	0.96	0.96	0.71	0.90	0.72	0.93	0.83	0.71	0.85	0.79	0.83
Adj. Flow (vph)	184	416	24	28	414	64	204	84	28	40	111	181
RTOR Reduction (vph)	0	3	0	0	8	0	0	18	0	0	88	0
Lane Group Flow (vph)	184	437	0	28	470	0	204	94	0	40	204	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	39.3	39.3		24.7	24.7		18.7	18.7		18.7	18.7	
Effective Green, g (s)	39.3	39.3		24.7	24.7		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.56	0.56		0.35	0.35		0.27	0.27		0.27	0.27	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	404	1037		333	643		228	478		340	451	
v/s Ratio Prot	0.06	c0.24			c0.26			0.05			0.12	
v/s Ratio Perm	0.20			0.03			c0.24			0.03		
v/c Ratio	0.46	0.42		0.08	0.73		0.89	0.20		0.12	0.45	
Uniform Delay, d1	9.9	8.8		15.1	19.8		24.7	19.8		19.4	21.4	
Progression Factor	0.54	0.25		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.9		0.5	7.2		32.7	0.2		0.2	0.7	
Delay (s)	6.0	3.2		15.6	26.9		57.4	20.0		19.6	22.1	
Level of Service	A	A		B	C		E	C		B	C	
Approach Delay (s)		4.0			26.3			44.2			21.8	
Approach LOS		A			C			D			C	

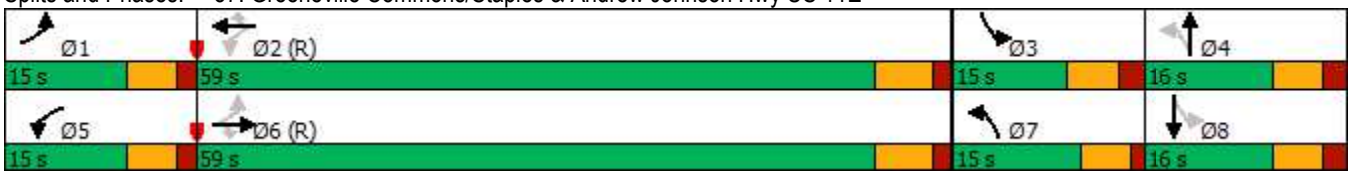
Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

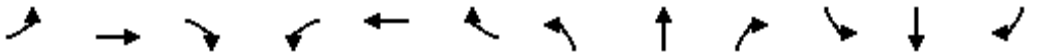
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	44	1165	85	99	1193	11	76	7	17	9
Future Volume (vph)	44	1165	85	99	1193	11	76	7	17	9
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	1	6		5	2		7	4	3	8
Permitted Phases	6		6	2		2	4		8	
Detector Phase	1	6	6	5	2	2	7	4	3	8
Switch Phase										
Minimum Initial (s)	6.0	20.0	20.0	6.0	20.0	20.0	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	26.0	26.0	15.0	26.0	26.0	15.0	15.0	15.0	15.0
Total Split (s)	15.0	59.0	59.0	15.0	59.0	59.0	15.0	16.0	15.0	16.0
Total Split (%)	14.3%	56.2%	56.2%	14.3%	56.2%	56.2%	14.3%	15.2%	14.3%	15.2%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	2.0	2.0	2.0
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)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	66.8	59.4	59.4	70.0	62.7	62.7	20.2	14.7	12.9	7.2
Actuated g/C Ratio	0.64	0.57	0.57	0.67	0.60	0.60	0.19	0.14	0.12	0.07
v/c Ratio	0.24	0.61	0.11	0.43	0.59	0.03	0.43	0.40	0.13	0.44
Control Delay	8.8	18.3	1.0	18.6	2.3	0.0	39.2	14.0	33.4	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	18.3	1.0	18.6	2.4	0.0	39.2	14.0	33.4	23.4
LOS	A	B	A	B	A	A	D	B	C	C
Approach Delay		16.6			3.8			25.4		25.8
Approach LOS		B			A			C		C

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 36 (34%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 63.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 57: Greeneville Commons/Staples & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1165	85	99	1193	11	76	7	77	17	9	49
Future Volume (vph)	44	1165	85	99	1193	11	76	7	77	17	9	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1609		1770	1627	
Flt Permitted	0.15	1.00	1.00	0.14	1.00	1.00	0.45	1.00		0.67	1.00	
Satd. Flow (perm)	272	3539	1583	252	3539	1583	830	1609		1253	1627	
Peak-hour factor, PHF	0.69	0.95	0.82	0.82	0.95	0.34	0.70	0.58	0.64	0.71	0.75	0.77
Adj. Flow (vph)	64	1226	104	121	1256	32	109	12	120	24	12	64
RTOR Reduction (vph)	0	0	49	0	0	14	0	103	0	0	59	0
Lane Group Flow (vph)	64	1226	55	121	1256	18	109	29	0	24	17	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6		6	2		2	4			8		
Actuated Green, G (s)	61.5	55.8	55.8	65.9	58.0	58.0	23.8	14.7		11.6	8.5	
Effective Green, g (s)	61.5	55.8	55.8	65.9	58.0	58.0	23.8	14.7		11.6	8.5	
Actuated g/C Ratio	0.59	0.53	0.53	0.63	0.55	0.55	0.23	0.14		0.11	0.08	
Clearance Time (s)	5.5	6.0	6.0	5.5	6.0	6.0	5.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	1880	841	272	1954	874	280	225		153	131	
v/s Ratio Prot	0.01	0.35		c0.03	c0.35		c0.04	0.02		0.00	0.01	
v/s Ratio Perm	0.14		0.03	0.25		0.01	c0.05			0.01		
v/c Ratio	0.27	0.65	0.07	0.44	0.64	0.02	0.39	0.13		0.16	0.13	
Uniform Delay, d1	11.4	17.6	11.9	11.5	16.3	10.6	33.6	39.5		42.1	44.8	
Progression Factor	1.00	1.00	1.00	2.37	0.10	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.8	0.2	0.7	1.0	0.0	0.9	0.3		0.5	0.5	
Delay (s)	12.0	19.4	12.1	28.1	2.6	10.7	34.5	39.8		42.6	45.3	
Level of Service	B	B	B	C	A	B	C	D		D	D	
Approach Delay (s)		18.5			5.0			37.4			44.6	
Approach LOS		B			A			D			D	

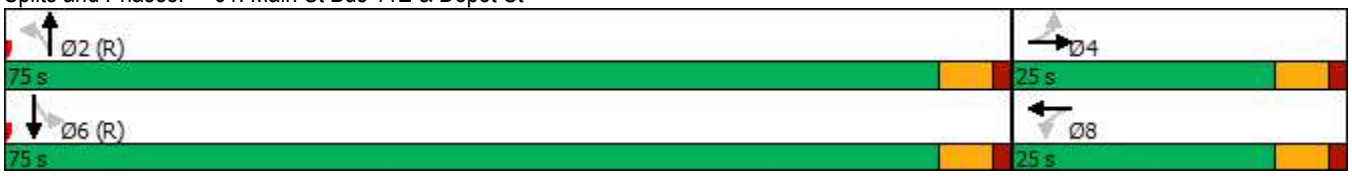
Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	23.5
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

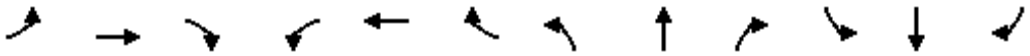
c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations						
Traffic Volume (vph)	35	2	18	1	359	414
Future Volume (vph)	35	2	18	1	359	414
Turn Type	NA	Perm	NA	Perm	NA	NA
Protected Phases	4		8		2	6
Permitted Phases		8		2		
Detector Phase	4	8	8	2	2	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	15.0	15.0	15.0
Minimum Split (s)	20.0	20.0	20.0	25.0	25.0	25.0
Total Split (s)	25.0	25.0	25.0	75.0	75.0	75.0
Total Split (%)	25.0%	25.0%	25.0%	75.0%	75.0%	75.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	5.5		5.5		5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effct Green (s)	11.7		11.7		81.1	81.1
Actuated g/C Ratio	0.12		0.12		0.81	0.81
v/c Ratio	0.53		0.25		0.33	0.38
Control Delay	52.1		42.4		3.4	2.9
Queue Delay	0.0		0.0		0.2	0.4
Total Delay	52.1		42.4		3.6	3.3
LOS	D		D		A	A
Approach Delay	52.1		42.4		3.6	3.3
Approach LOS	D		D		A	A

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 89 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 9.3	Intersection LOS: A
Intersection Capacity Utilization 40.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 61: Main St Bus 11E & Depot St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	35	17	2	18	7	1	359	10	0	414	9
Future Volume (vph)	0	35	17	2	18	7	1	359	10	0	414	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5			5.5			5.5	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.95			0.96			0.99			1.00	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		1435			1441			1500			1504	
Flt Permitted		1.00			0.96			1.00			1.00	
Satd. Flow (perm)		1435			1396			1496			1504	
Peak-hour factor, PHF	0.25	0.62	0.53	0.50	0.75	0.58	0.25	0.94	0.62	0.25	0.91	0.75
Adj. Flow (vph)	0	56	32	4	24	12	4	382	16	0	455	12
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	88	0	0	40	0	0	402	0	0	467	0
Parking (#/hr)		0	0		0	0		0	0		0	0
Turn Type		NA		Perm	NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.1			10.1			78.9			78.9	
Effective Green, g (s)		10.1			10.1			78.9			78.9	
Actuated g/C Ratio		0.10			0.10			0.79			0.79	
Clearance Time (s)		5.5			5.5			5.5			5.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		144			140			1180			1186	
v/s Ratio Prot		c0.06									c0.31	
v/s Ratio Perm					0.03			0.27				
v/c Ratio		0.61			0.29			0.34			0.39	
Uniform Delay, d1		43.1			41.6			3.0			3.2	
Progression Factor		1.00			1.00			0.71			0.51	
Incremental Delay, d2		7.5			1.1			0.7			0.9	
Delay (s)		50.5			42.7			2.9			2.5	
Level of Service		D			D			A			A	
Approach Delay (s)		50.5			42.7			2.9			2.5	
Approach LOS		D			D			A			A	

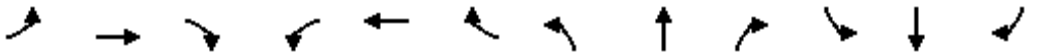
Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	41	279	8	137	10	31	18	48	96
Future Volume (vph)	41	279	8	137	10	31	18	48	96
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	2	2	6	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	14.5	14.5	14.5	14.5	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	20.0	20.0	20.0	20.0	15.0	15.0	15.0	15.0	15.0
Total Split (s)	30.0	30.0	30.0	30.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5		5.5		5.5	5.5
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None
Act Effct Green (s)	33.7	33.7	33.7	33.7		8.7		8.7	8.7
Actuated g/C Ratio	0.67	0.67	0.67	0.67		0.17		0.17	0.17
v/c Ratio	0.07	0.31	0.03	0.15		0.24		0.37	0.41
Control Delay	3.4	4.0	2.2	2.3		16.5		21.5	7.2
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	3.4	4.0	2.2	2.3		16.5		21.5	7.2
LOS	A	A	A	A		B		C	A
Approach Delay		3.9		2.3		16.5		12.6	
Approach LOS		A		A		B		B	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 37 (74%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 53.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 63: Irish St & Summer St Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	279	23	8	137	12	10	31	11	18	48	96
Future Volume (vph)	41	279	23	8	137	12	10	31	11	18	48	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5			5.5			5.5	5.5
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.98		1.00	0.99			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1593	1644		1593	1653			1614			1648	1425
Flt Permitted	0.65	1.00		0.56	1.00			0.89			0.86	1.00
Satd. Flow (perm)	1087	1644		932	1653			1447			1440	1425
Peak-hour factor, PHF	0.79	0.94	0.52	0.50	0.88	0.75	0.62	0.86	0.92	0.56	0.80	0.63
Adj. Flow (vph)	52	297	44	16	156	16	16	36	12	32	60	152
RTOR Reduction (vph)	0	8	0	0	5	0	0	10	0	0	0	129
Lane Group Flow (vph)	52	333	0	16	167	0	0	54	0	0	92	23
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	31.5	31.5		31.5	31.5			7.5			7.5	7.5
Effective Green, g (s)	31.5	31.5		31.5	31.5			7.5			7.5	7.5
Actuated g/C Ratio	0.63	0.63		0.63	0.63			0.15			0.15	0.15
Clearance Time (s)	5.5	5.5		5.5	5.5			5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	684	1035		587	1041			217			216	213
v/s Ratio Prot		c0.20			0.10							
v/s Ratio Perm	0.05			0.02				0.04			c0.06	0.02
v/c Ratio	0.08	0.32		0.03	0.16			0.25			0.43	0.11
Uniform Delay, d1	3.6	4.3		3.5	3.8			18.8			19.3	18.4
Progression Factor	0.61	0.62		0.44	0.47			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.8		0.1	0.3			0.6			1.4	0.2
Delay (s)	2.4	3.5		1.6	2.1			19.4			20.6	18.6
Level of Service	A	A		A	A			B			C	B
Approach Delay (s)		3.3			2.0			19.4			19.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

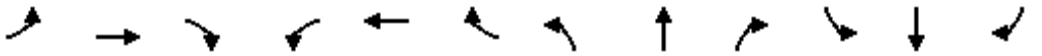
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	11	256	11	148	42	12	21	46
Future Volume (vph)	11	256	11	148	42	12	21	46
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	20.0	20.0	20.0	20.0	6.0	6.0	6.0	6.0
Minimum Split (s)	25.5	25.5	25.5	25.5	15.0	15.0	15.0	15.0
Total Split (s)	33.0	33.0	33.0	33.0	17.0	17.0	17.0	17.0
Total Split (%)	66.0%	66.0%	66.0%	66.0%	34.0%	34.0%	34.0%	34.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.5		5.5	5.5	5.5	5.5	5.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None
Act Effct Green (s)		34.4		34.4	8.0	8.0	8.0	8.0
Actuated g/C Ratio		0.69		0.69	0.16	0.16	0.16	0.16
v/c Ratio		0.29		0.22	0.29	0.17	0.16	0.40
Control Delay		5.4		5.5	21.9	11.5	19.1	14.2
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		5.4		5.5	21.9	11.5	19.1	14.2
LOS		A		A	C	B	B	B
Approach Delay		5.4		5.5		17.1		15.2
Approach LOS		A		A		B		B

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 20 (40%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.40	
Intersection Signal Delay: 8.6	Intersection LOS: A
Intersection Capacity Utilization 38.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 65: Cutler St & Summer St Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	256	23	11	148	12	42	12	22	21	46	52
Future Volume (vph)	11	256	23	11	148	12	42	12	22	21	46	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.99			0.99		1.00	0.90		1.00	0.92	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1653		1593	1516		1593	1542	
Flt Permitted		0.99			0.97		0.68	1.00		0.73	1.00	
Satd. Flow (perm)		1639			1614		1140	1516		1221	1542	
Peak-hour factor, PHF	0.92	0.88	0.82	0.69	0.71	0.60	0.81	0.75	0.79	0.66	0.82	0.81
Adj. Flow (vph)	12	291	28	16	208	20	52	16	28	32	56	64
RTOR Reduction (vph)	0	5	0	0	5	0	0	24	0	0	55	0
Lane Group Flow (vph)	0	326	0	0	239	0	52	20	0	32	65	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		32.2			32.2		6.8	6.8		6.8	6.8	
Effective Green, g (s)		32.2			32.2		6.8	6.8		6.8	6.8	
Actuated g/C Ratio		0.64			0.64		0.14	0.14		0.14	0.14	
Clearance Time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		1055			1039		155	206		166	209	
v/s Ratio Prot								0.01			0.04	
v/s Ratio Perm		c0.20			0.15		c0.05			0.03		
v/c Ratio		0.31			0.23		0.34	0.10		0.19	0.31	
Uniform Delay, d1		4.0			3.7		19.6	18.9		19.2	19.5	
Progression Factor		1.00			1.23		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.5		1.3	0.2		0.6	0.8	
Delay (s)		4.7			5.1		20.8	19.1		19.7	20.3	
Level of Service		A			A		C	B		B	C	
Approach Delay (s)		4.7			5.1			20.0			20.2	
Approach LOS		A			A			C			C	

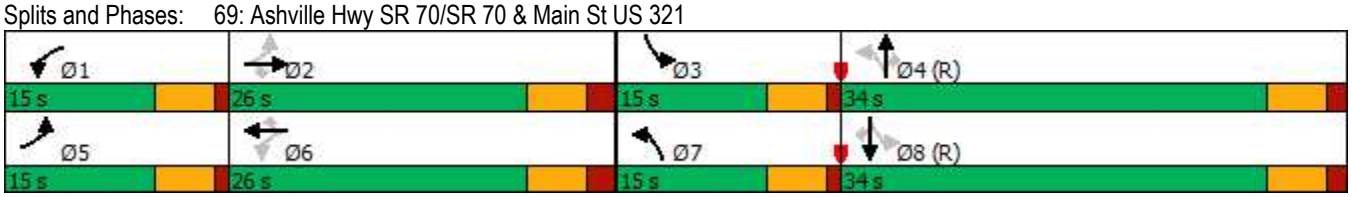
Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

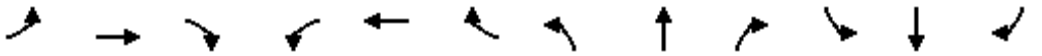
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	182	184	37	209	233	63	86	322	125	57	443	296
Future Volume (vph)	182	184	37	209	233	63	86	322	125	57	443	296
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	15.0	26.0	26.0	15.0	26.0	26.0	15.0	15.5	15.5	15.0	15.5	15.5
Total Split (s)	15.0	26.0	26.0	15.0	26.0	26.0	15.0	34.0	34.0	15.0	34.0	34.0
Total Split (%)	16.7%	28.9%	28.9%	16.7%	28.9%	28.9%	16.7%	37.8%	37.8%	16.7%	37.8%	37.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	1.0	1.5	1.5	1.0	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	Max	Max	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	30.7	20.0	20.0	31.3	20.3	20.3	40.5	33.2	33.2	39.5	32.6	32.6
Actuated g/C Ratio	0.34	0.22	0.22	0.35	0.23	0.23	0.45	0.37	0.37	0.44	0.36	0.36
v/c Ratio	0.61	0.48	0.10	0.63	0.74	0.19	0.31	0.53	0.20	0.16	0.74	0.53
Control Delay	27.4	35.1	0.4	27.8	44.7	1.6	6.4	9.3	0.6	13.5	34.7	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	35.1	0.4	27.8	44.7	1.6	6.4	9.3	0.6	13.5	34.7	16.0
LOS	C	D	A	C	D	A	A	A	A	B	C	B
Approach Delay		27.9			32.2			6.8			25.8	
Approach LOS		C			C			A			C	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 16 (18%), Referenced to phase 4:NBTL and 8:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 75.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 69: Ashville Hwy SR 70/SR 70 & Main St US 321





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	182	184	37	209	233	63	86	322	125	57	443	296
Future Volume (vph)	182	184	37	209	233	63	86	322	125	57	443	296
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
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	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.34	1.00	1.00	0.54	1.00	1.00	0.22	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	625	1863	1583	1001	1863	1583	411	1863	1583	744	1863	1583
Peak-hour factor, PHF	0.89	0.92	0.77	0.76	0.75	0.72	0.90	0.89	0.89	0.84	0.89	0.81
Adj. Flow (vph)	204	200	48	275	311	88	96	362	140	68	498	365
RTOR Reduction (vph)	0	0	37	0	0	68	0	0	90	0	0	112
Lane Group Flow (vph)	204	200	11	275	311	20	96	362	50	68	498	253
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	29.7	20.0	20.0	30.3	20.3	20.3	39.1	32.2	32.2	37.9	31.6	31.6
Effective Green, g (s)	29.7	20.0	20.0	30.3	20.3	20.3	39.1	32.2	32.2	37.9	31.6	31.6
Actuated g/C Ratio	0.33	0.22	0.22	0.34	0.23	0.23	0.43	0.36	0.36	0.42	0.35	0.35
Clearance Time (s)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	5.5	5.5	5.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	329	414	351	422	420	357	282	666	566	385	654	555
v/s Ratio Prot	0.07	0.11		c0.07	c0.17		c0.03	0.19		0.01	c0.27	
v/s Ratio Perm	0.14		0.01	0.15		0.01	0.12		0.03	0.06		0.16
v/c Ratio	0.62	0.48	0.03	0.65	0.74	0.06	0.34	0.54	0.09	0.18	0.76	0.46
Uniform Delay, d1	23.3	30.5	27.4	23.8	32.4	27.3	17.1	23.0	19.2	16.1	25.9	22.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.29	0.02	1.00	1.00	1.00
Incremental Delay, d2	3.6	4.0	0.2	3.6	6.9	0.1	0.6	2.6	0.2	0.2	8.2	2.7
Delay (s)	26.9	34.5	27.6	27.4	39.3	27.4	6.3	9.2	0.7	16.3	34.0	25.3
Level of Service	C	C	C	C	D	C	A	A	A	B	C	C
Approach Delay (s)		30.3			32.9			6.7			29.3	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	NET	SWT	SWR
Lane Configurations								
Traffic Volume (vph)	7	394	108	44	638	47	33	98
Future Volume (vph)	7	394	108	44	638	47	33	98
Turn Type	Perm	NA	Perm	pm+pt	NA	NA	NA	Perm
Protected Phases		6		5	2	4	3	
Permitted Phases	6		6	2				3
Detector Phase	6	6	6	5	2	4	3	3
Switch Phase								
Minimum Initial (s)	14.0	14.0	14.0	6.0	14.0	6.0	6.0	6.0
Minimum Split (s)	20.0	20.0	20.0	15.0	20.0	15.0	15.0	15.0
Total Split (s)	35.0	35.0	35.0	15.0	50.0	15.0	25.0	25.0
Total Split (%)	38.9%	38.9%	38.9%	16.7%	55.6%	16.7%	27.8%	27.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	34.4	34.4	34.4	45.2	45.2	8.8	18.1	18.1
Actuated g/C Ratio	0.38	0.38	0.38	0.50	0.50	0.10	0.20	0.20
v/c Ratio	0.06	0.67	0.19	0.17	0.76	0.76	0.86	0.26
Control Delay	22.0	30.9	2.1	11.3	17.3	61.2	58.4	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	30.9	2.1	11.3	17.3	61.2	58.4	2.6
LOS	C	C	A	B	B	E	E	A
Approach Delay		24.4			16.8	61.2	42.8	
Approach LOS		C			B	E	D	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 60 (67%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 28.1	Intersection LOS: C
Intersection Capacity Utilization 67.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 70: Vann Rd & Ashville Hwy SR 70



Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	7	394	108	44	638	28	32	47	23	230	33	98
Future Volume (vph)	7	394	108	44	638	28	32	47	23	230	33	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99			0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1847			1768			1786	1583
Flt Permitted	0.27	1.00	1.00	0.24	1.00			0.98			0.96	1.00
Satd. Flow (perm)	494	1863	1583	440	1847			1768			1786	1583
Peak-hour factor, PHF	0.58	0.83	0.79	0.79	0.96	0.70	0.67	0.84	0.64	0.87	0.75	0.82
Adj. Flow (vph)	12	475	137	56	665	40	48	56	36	264	44	120
RTOR Reduction (vph)	0	0	86	0	2	0	0	14	0	0	0	96
Lane Group Flow (vph)	12	475	51	56	703	0	0	126	0	0	308	24
Turn Type	Perm	NA	Perm	pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases		6		5	2		4	4		3	3	
Permitted Phases	6		6	2								3
Actuated Green, G (s)	33.2	33.2	33.2	45.1	45.1			8.8			18.1	18.1
Effective Green, g (s)	33.2	33.2	33.2	45.1	45.1			8.8			18.1	18.1
Actuated g/C Ratio	0.37	0.37	0.37	0.50	0.50			0.10			0.20	0.20
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	182	687	583	307	925			172			359	318
v/s Ratio Prot		0.26		0.01	c0.38			c0.07			c0.17	
v/s Ratio Perm	0.02		0.03	0.08								0.02
v/c Ratio	0.07	0.69	0.09	0.18	0.76			0.74			0.86	0.08
Uniform Delay, d1	18.4	24.1	18.5	14.0	18.1			39.5			34.7	29.2
Progression Factor	1.00	1.00	1.00	0.85	0.67			1.00			1.00	1.00
Incremental Delay, d2	0.7	5.6	0.3	0.2	4.4			15.0			18.0	0.1
Delay (s)	19.1	29.7	18.8	12.1	16.4			54.5			52.7	29.3
Level of Service	B	C	B	B	B			D			D	C
Approach Delay (s)		27.1			16.1			54.5			46.1	
Approach LOS		C			B			D			D	

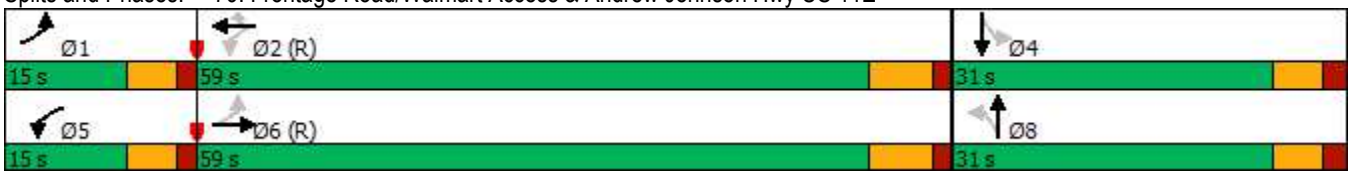
Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

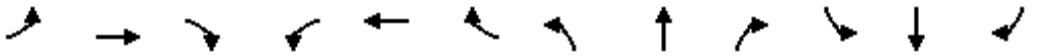
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	126	980	26	764	133	17	32	141	27
Future Volume (vph)	126	980	26	764	133	17	32	141	27
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6	5	2			8		4
Permitted Phases	6		2		2	8		4	
Detector Phase	1	6	5	2	2	8	8	4	4
Switch Phase									
Minimum Initial (s)	6.0	15.0	6.0	15.0	15.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	22.5	15.0	22.5	22.5	15.0	15.0	15.0	15.0
Total Split (s)	15.0	59.0	15.0	59.0	59.0	31.0	31.0	31.0	31.0
Total Split (%)	14.3%	56.2%	14.3%	56.2%	56.2%	29.5%	29.5%	29.5%	29.5%
Yellow Time (s)	4.0	5.0	4.0	5.0	5.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0
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)	5.5	6.5	5.5	6.5	6.5	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?									
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	73.5	66.9	67.7	60.4	60.4	18.4	18.4	18.4	18.4
Actuated g/C Ratio	0.70	0.64	0.64	0.58	0.58	0.18	0.18	0.18	0.18
v/c Ratio	0.33	0.52	0.10	0.46	0.17	0.23	0.30	0.71	0.50
Control Delay	3.9	5.2	6.7	15.0	2.7	38.6	17.5	57.2	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.9	5.2	6.7	15.0	2.7	38.6	17.5	57.2	12.4
LOS	A	A	A	B	A	D	B	E	B
Approach Delay		5.1		13.0			22.5		31.5
Approach LOS		A		B			C		C

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 60 (57%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 62.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 79: Frontage Road/Walmart Access & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	980	26	26	764	133	17	32	54	141	27	163
Future Volume (vph)	126	980	26	26	764	133	17	32	54	141	27	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		5.5	6.5	6.5	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.91		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3525		1770	3539	1583	1770	1691		1770	1630	
Flt Permitted	0.24	1.00		0.20	1.00	1.00	0.43	1.00		0.69	1.00	
Satd. Flow (perm)	443	3525		374	3539	1583	799	1691		1285	1630	
Peak-hour factor, PHF	0.93	0.86	0.81	0.81	0.82	0.81	0.53	0.80	0.84	0.88	0.75	0.91
Adj. Flow (vph)	135	1140	32	32	932	164	32	40	64	160	36	179
RTOR Reduction (vph)	0	2	0	0	0	70	0	53	0	0	148	0
Lane Group Flow (vph)	135	1170	0	32	932	94	32	51	0	160	67	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2		2	8			4		
Actuated Green, G (s)	72.9	64.7		64.3	60.4	60.4	18.4	18.4		18.4	18.4	
Effective Green, g (s)	72.9	64.7		64.3	60.4	60.4	18.4	18.4		18.4	18.4	
Actuated g/C Ratio	0.69	0.62		0.61	0.58	0.58	0.18	0.18		0.18	0.18	
Clearance Time (s)	5.5	6.5		5.5	6.5	6.5	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	411	2172		280	2035	910	140	296		225	285	
v/s Ratio Prot	c0.03	c0.33		0.00	0.26			0.03			0.04	
v/s Ratio Perm	0.20			0.07		0.06	0.04			c0.12		
v/c Ratio	0.33	0.54		0.11	0.46	0.10	0.23	0.17		0.71	0.24	
Uniform Delay, d1	6.6	11.6		8.6	12.9	10.1	37.2	36.8		40.8	37.3	
Progression Factor	0.36	0.36		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.8		0.2	0.7	0.2	0.8	0.3		10.1	0.4	
Delay (s)	2.8	4.9		8.8	13.6	10.3	38.0	37.1		50.9	37.7	
Level of Service	A	A		A	B	B	D	D		D	D	
Approach Delay (s)		4.7			13.0			37.3			43.3	
Approach LOS		A			B			D			D	

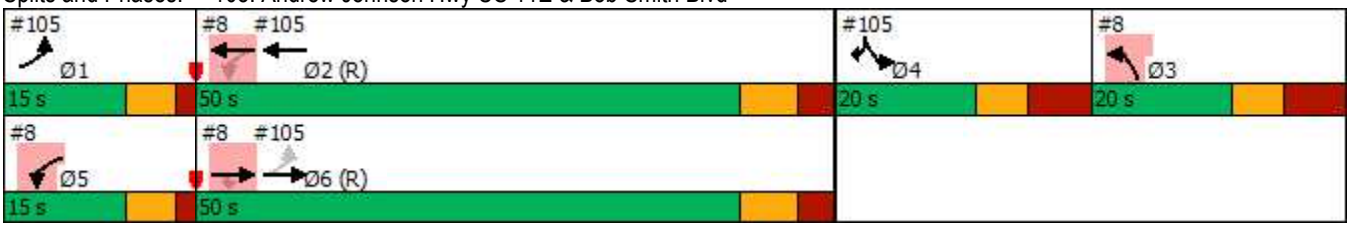
Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

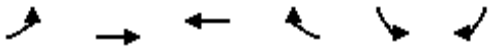
c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL	SBR	Ø3	Ø5
Lane Configurations							
Traffic Volume (vph)	28	1232	1262	45	52		
Future Volume (vph)	28	1232	1262	45	52		
Turn Type	pm+pt	NA	NA	Prot	Prot		
Protected Phases	1	6	2	4	4	3	5
Permitted Phases	6						
Detector Phase	1	6	2	4	4		
Switch Phase							
Minimum Initial (s)	6.0	20.0	20.0	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	27.5	27.5	20.0	20.0	20.0	15.0
Total Split (s)	15.0	50.0	50.0	20.0	20.0	20.0	15.0
Total Split (%)	14.3%	47.6%	47.6%	19.0%	19.0%	19%	14%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	3.0	3.0	5.0	5.0	5.0	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.5	7.5	7.5	9.0	9.0		
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Min	C-Min	None	None	None	None
Act Effct Green (s)	55.6	47.1	53.3	7.6	7.6		
Actuated g/C Ratio	0.53	0.45	0.51	0.07	0.07		
v/c Ratio	0.19	0.58	0.78	0.27	0.37		
Control Delay	11.8	14.7	13.6	48.5	18.0		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	11.8	14.8	13.6	48.5	18.0		
LOS	B	B	B	D	B		
Approach Delay		14.7	13.6	33.7			
Approach LOS		B	B	C			

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 28 (27%), Referenced to phase 2:WBTL and 6:EBT, Start of Green	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 15.0	Intersection LOS: B
Intersection Capacity Utilization 54.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 105: Andrew Johnson Hwy US 11E & Bob Smith Blvd





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	28	1232	1262	33	45	52
Future Volume (vph)	28	1232	1262	33	45	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	7.5	7.5		9.0	9.0
Lane Util. Factor	1.00	0.91	0.95		0.97	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	3517		3433	1583
Flt Permitted	0.09	1.00	1.00		0.95	1.00
Satd. Flow (perm)	164	5085	3517		3433	1583
Peak-hour factor, PHF	0.78	0.93	0.94	0.55	0.66	0.81
Adj. Flow (vph)	36	1325	1343	60	68	64
RTOR Reduction (vph)	0	0	3	0	0	60
Lane Group Flow (vph)	36	1325	1400	0	68	4
Turn Type	pm+pt	NA	NA		Prot	Prot
Protected Phases	1	6	2		4	4
Permitted Phases	6					
Actuated Green, G (s)	49.5	45.3	49.3		6.4	6.4
Effective Green, g (s)	49.5	45.3	49.3		6.4	6.4
Actuated g/C Ratio	0.47	0.43	0.47		0.06	0.06
Clearance Time (s)	5.5	7.5	7.5		9.0	9.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	141	2193	1651		209	96
v/s Ratio Prot	c0.01	0.26	c0.40		c0.02	0.00
v/s Ratio Perm	0.11					
v/c Ratio	0.26	0.60	0.85		0.33	0.04
Uniform Delay, d1	18.8	23.0	24.6		47.2	46.4
Progression Factor	0.94	0.60	0.41		1.00	1.00
Incremental Delay, d2	0.8	1.0	4.3		0.9	0.2
Delay (s)	18.4	14.9	14.3		48.1	46.6
Level of Service	B	B	B		D	D
Approach Delay (s)		15.0	14.3		47.4	
Approach LOS		B	B		D	

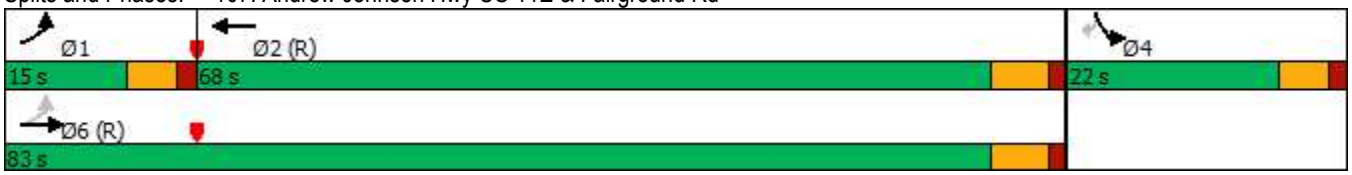
Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	31.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

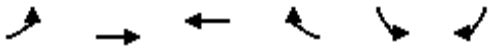
c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	53	1562	1302	90	45
Future Volume (vph)	53	1562	1302	90	45
Turn Type	pm+pt	NA	NA	Prot	Perm
Protected Phases	1	6	2	4	
Permitted Phases	6				4
Detector Phase	1	6	2	4	4
Switch Phase					
Minimum Initial (s)	6.0	20.0	20.0	8.0	8.0
Minimum Split (s)	15.0	26.0	26.0	15.0	15.0
Total Split (s)	15.0	83.0	68.0	22.0	22.0
Total Split (%)	14.3%	79.0%	64.8%	21.0%	21.0%
Yellow Time (s)	4.0	4.5	4.5	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0	6.0	5.5	5.5
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?					
Recall Mode	None	C-Min	C-Min	None	None
Act Effct Green (s)	80.7	80.2	70.4	13.3	13.3
Actuated g/C Ratio	0.77	0.76	0.67	0.13	0.13
v/c Ratio	0.26	0.59	0.62	0.61	0.22
Control Delay	4.4	3.0	3.7	54.3	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.4	3.0	3.7	54.3	12.7
LOS	A	A	A	D	B
Approach Delay		3.0	3.7	42.2	
Approach LOS		A	A	D	

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 80 (76%), Referenced to phase 2:WBT and 6:EBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 5.6	Intersection LOS: A
Intersection Capacity Utilization 60.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 107: Andrew Johnson Hwy US 11E & Fairground Rd





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	53	1562	1302	45	90	45
Future Volume (vph)	53	1562	1302	45	90	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0	6.0		5.5	5.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3517		1770	1583
Flt Permitted	0.12	1.00	1.00		0.95	1.00
Satd. Flow (perm)	219	3539	3517		1770	1583
Peak-hour factor, PHF	0.78	0.98	0.93	0.75	0.66	0.80
Adj. Flow (vph)	68	1594	1400	60	136	56
RTOR Reduction (vph)	0	0	2	0	0	49
Lane Group Flow (vph)	68	1594	1458	0	136	7
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6					4
Actuated Green, G (s)	80.2	80.2	69.3		13.3	13.3
Effective Green, g (s)	80.2	80.2	69.3		13.3	13.3
Actuated g/C Ratio	0.76	0.76	0.66		0.13	0.13
Clearance Time (s)	5.5	6.0	6.0		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	247	2703	2321		224	200
v/s Ratio Prot	0.01	c0.45	c0.41		c0.08	
v/s Ratio Perm	0.20					0.00
v/c Ratio	0.28	0.59	0.63		0.61	0.04
Uniform Delay, d1	7.1	5.3	10.4		43.4	40.2
Progression Factor	0.69	0.37	0.23		1.00	1.00
Incremental Delay, d2	0.5	0.8	1.1		4.6	0.1
Delay (s)	5.4	2.8	3.5		48.0	40.3
Level of Service	A	A	A		D	D
Approach Delay (s)		2.9	3.5		45.7	
Approach LOS		A	A		D	

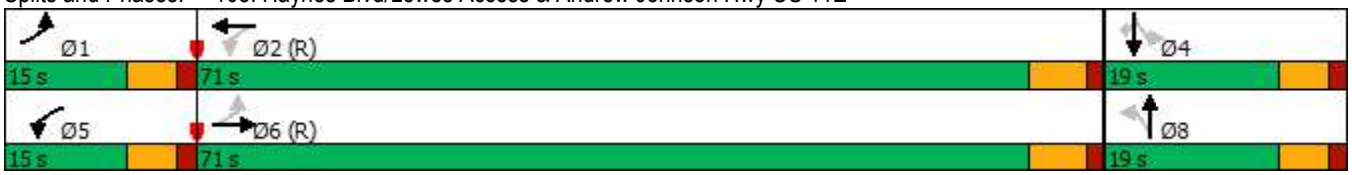
Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

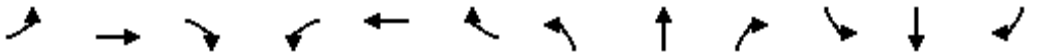
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	51	1539	26	1271	24	4	48	6	82
Future Volume (vph)	51	1539	26	1271	24	4	48	6	82
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	1	6	5	2		8		4	
Permitted Phases	6		2		8		4		4
Detector Phase	1	6	5	2	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	6.0	20.0	6.0	20.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	37.0	15.0	37.0	15.0	15.0	15.0	15.0	15.0
Total Split (s)	15.0	71.0	15.0	71.0	19.0	19.0	19.0	19.0	19.0
Total Split (%)	14.3%	67.6%	14.3%	67.6%	18.1%	18.1%	18.1%	18.1%	18.1%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.5	6.0	5.5	6.0	5.5	5.5		5.5	5.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?									
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	79.7	74.9	77.7	72.2	11.4	11.4		11.4	11.4
Actuated g/C Ratio	0.76	0.71	0.74	0.69	0.11	0.11		0.11	0.11
v/c Ratio	0.25	0.71	0.21	0.54	0.23	0.24		0.61	0.35
Control Delay	3.6	6.4	6.7	3.9	45.8	18.4		61.9	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	3.6	6.4	6.7	3.9	45.8	18.4		61.9	13.2
LOS	A	A	A	A	D	B		E	B
Approach Delay		6.3		4.0		28.8		37.6	
Approach LOS		A		A		C		D	

Intersection Summary	
Cycle Length: 105	
Actuated Cycle Length: 105	
Offset: 64 (61%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 63.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 108: Haynes Blvd/Lowes Access & Andrew Johnson Hwy US 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	1539	32	26	1271	18	24	4	35	48	6	82
Future Volume (vph)	51	1539	32	26	1271	18	24	4	35	48	6	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.0		5.5	6.0		5.5	5.5			5.5	5.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	3527		1770	3530		1770	1626			1786	1583
Flt Permitted	0.16	1.00		0.08	1.00		0.70	1.00			0.72	1.00
Satd. Flow (perm)	297	3527		147	3530		1304	1626			1338	1583
Peak-hour factor, PHF	0.64	0.88	0.80	0.59	0.98	0.75	0.75	0.50	0.80	0.63	0.50	0.93
Adj. Flow (vph)	80	1749	40	44	1297	24	32	8	44	76	12	88
RTOR Reduction (vph)	0	1	0	0	1	0	0	39	0	0	0	78
Lane Group Flow (vph)	80	1788	0	44	1320	0	32	13	0	0	88	10
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6			2			8			4		4
Actuated Green, G (s)	78.3	72.8		74.9	71.1		11.4	11.4			11.4	11.4
Effective Green, g (s)	78.3	72.8		74.9	71.1		11.4	11.4			11.4	11.4
Actuated g/C Ratio	0.75	0.69		0.71	0.68		0.11	0.11			0.11	0.11
Clearance Time (s)	5.5	6.0		5.5	6.0		5.5	5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	298	2445		163	2390		141	176			145	171
v/s Ratio Prot	c0.01	c0.51		0.01	0.37			0.01				
v/s Ratio Perm	0.19			0.18			0.02				c0.07	0.01
v/c Ratio	0.27	0.73		0.27	0.55		0.23	0.07			0.61	0.06
Uniform Delay, d1	5.3	10.0		8.9	8.7		42.8	42.1			44.7	42.0
Progression Factor	0.67	0.47		1.52	0.35		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.4	1.7		0.7	0.7		0.8	0.2			7.0	0.1
Delay (s)	3.9	6.4		14.1	3.7		43.6	42.2			51.7	42.1
Level of Service	A	A		B	A		D	D			D	D
Approach Delay (s)		6.3			4.1			42.7			46.9	
Approach LOS		A			A			D			D	

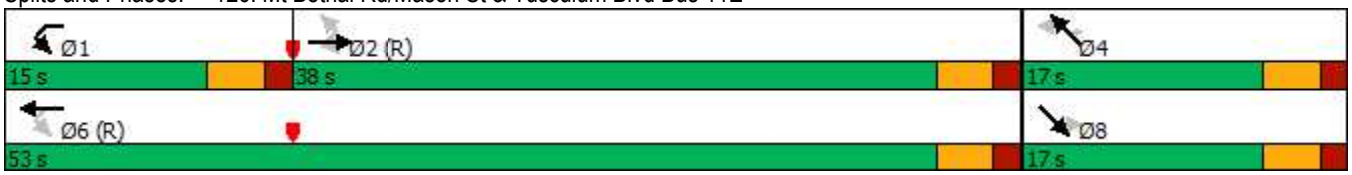
Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	SEL	SET	NWL	NWT	NWR
Lane Configurations										
Traffic Volume (vph)	10	608	211	234	592	19	20	140	7	160
Future Volume (vph)	10	608	211	234	592	19	20	140	7	160
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2		1	6		8		4	
Permitted Phases	2		2	6		8		4		4
Detector Phase	2	2	2	1	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0	4.0	4.0	5.0	5.0	5.0
Minimum Split (s)	24.5	24.5	24.5	15.0	24.5	15.0	15.0	15.0	15.0	15.0
Total Split (s)	38.0	38.0	38.0	15.0	53.0	17.0	17.0	17.0	17.0	17.0
Total Split (%)	54.3%	54.3%	54.3%	21.4%	75.7%	24.3%	24.3%	24.3%	24.3%	24.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5		4.5		4.5	4.5
Lead/Lag	Lag	Lag	Lag	Lead						
Lead-Lag Optimize?										
Recall Mode	C-Min	C-Min	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	35.0	35.0	35.0	48.6	48.6		12.4		12.4	12.4
Actuated g/C Ratio	0.50	0.50	0.50	0.69	0.69		0.18		0.18	0.18
v/c Ratio	0.05	0.68	0.25	0.57	0.53		0.27		0.75	0.42
Control Delay	11.8	16.2	4.0	9.1	7.1		24.2		47.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	11.8	16.2	4.0	9.1	7.1		24.2		47.8	8.2
LOS	B	B	A	A	A		C		D	A
Approach Delay		13.0			7.7		24.2		28.8	
Approach LOS		B			A		C		C	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 69 (99%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 13.7	Intersection LOS: B
Intersection Capacity Utilization 74.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 126: Mt Bethal Rd/Mason St & Tusculum Blvd Bus 11E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	10	608	211	234	592	10	19	20	4	140	7	160
Future Volume (vph)	10	608	211	234	592	10	19	20	4	140	7	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1855			1790			1781	1583
Flt Permitted	0.41	1.00	1.00	0.22	1.00			0.84			0.77	1.00
Satd. Flow (perm)	758	1863	1583	411	1855			1528			1437	1583
Peak-hour factor, PHF	0.50	0.96	0.96	0.89	0.90	0.50	0.68	0.56	0.33	0.80	0.44	0.91
Adj. Flow (vph)	20	633	220	263	658	20	28	36	12	175	16	176
RTOR Reduction (vph)	0	0	103	0	2	0	0	10	0	0	0	142
Lane Group Flow (vph)	20	633	117	263	676	0	0	66	0	0	191	34
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)	35.0	35.0	35.0	48.6	48.6			12.4			12.4	12.4
Effective Green, g (s)	35.0	35.0	35.0	48.6	48.6			12.4			12.4	12.4
Actuated g/C Ratio	0.50	0.50	0.50	0.69	0.69			0.18			0.18	0.18
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	379	931	791	462	1287			270			254	280
v/s Ratio Prot		c0.34		0.07	c0.36							
v/s Ratio Perm	0.03		0.07	0.32				0.04			c0.13	0.02
v/c Ratio	0.05	0.68	0.15	0.57	0.53			0.24			0.75	0.12
Uniform Delay, d1	9.0	13.3	9.4	7.7	5.2			24.8			27.3	24.2
Progression Factor	1.13	0.89	1.58	1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.2	3.2	0.3	1.6	1.5			0.5			11.8	0.2
Delay (s)	10.4	15.0	15.3	9.3	6.7			25.2			39.2	24.4
Level of Service	B	B	B	A	A			C			D	C
Approach Delay (s)		15.0			7.4			25.2			32.1	
Approach LOS		B			A			C			C	

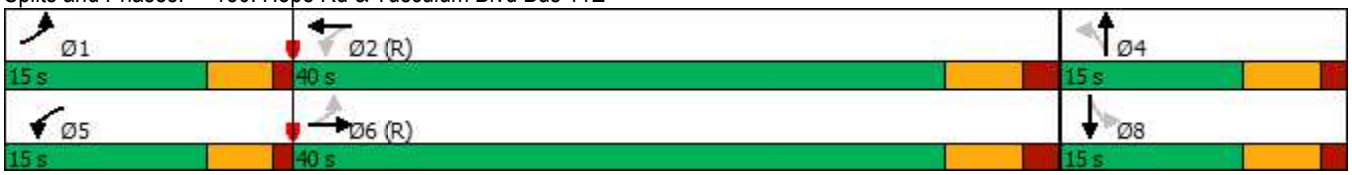
Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

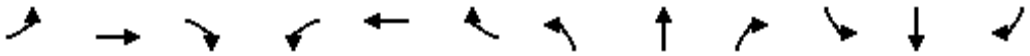
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	5	708	65	739	24	10	23	17
Future Volume (vph)	5	708	65	739	24	10	23	17
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases	6		2		4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	30.0	7.0	30.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	36.0	15.0	36.0	15.0	15.0	15.0	15.0
Total Split (s)	15.0	40.0	15.0	40.0	15.0	15.0	15.0	15.0
Total Split (%)	21.4%	57.1%	21.4%	57.1%	21.4%	21.4%	21.4%	21.4%
Yellow Time (s)	3.5	4.0	3.5	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	4.5	6.0	4.5	6.0		5.5		5.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Min	None	C-Min	None	None	None	None
Act Effct Green (s)	50.3	44.4	53.2	51.4		8.7		8.7
Actuated g/C Ratio	0.72	0.63	0.76	0.73		0.12		0.12
v/c Ratio	0.03	0.69	0.21	0.61		0.44		0.42
Control Delay	3.0	16.4	2.1	6.2		24.3		29.9
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	3.0	16.4	2.1	6.2		24.3		29.9
LOS	A	B	A	A		C		C
Approach Delay		16.2		5.8		24.3		29.9
Approach LOS		B		A		C		C

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 65.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 130: Hope Rd & Tusculum Blvd Bus 11E





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	708	25	65	739	20	24	10	31	23	17	15
Future Volume (vph)	5	708	25	65	739	20	24	10	31	23	17	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.0		4.5	6.0			5.5			5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.94			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)	1770	1845		1770	1852			1726			1765	
Flt Permitted	0.26	1.00		0.19	1.00			0.90			0.86	
Satd. Flow (perm)	482	1845		354	1852			1575			1549	
Peak-hour factor, PHF	0.42	0.94	0.48	0.74	0.92	0.63	0.67	0.42	0.70	0.58	0.61	0.75
Adj. Flow (vph)	12	753	52	88	803	32	36	24	44	40	28	20
RTOR Reduction (vph)	0	3	0	0	1	0	0	40	0	0	16	0
Lane Group Flow (vph)	12	802	0	88	834	0	0	64	0	0	72	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	42.6	41.2		51.2	45.5			7.1			7.1	
Effective Green, g (s)	42.6	41.2		51.2	45.5			7.1			7.1	
Actuated g/C Ratio	0.61	0.59		0.73	0.65			0.10			0.10	
Clearance Time (s)	4.5	6.0		4.5	6.0			5.5			5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	319	1085		374	1203			159			157	
v/s Ratio Prot	0.00	c0.43		c0.02	c0.45							
v/s Ratio Perm	0.02			0.15				0.04			c0.05	
v/c Ratio	0.04	0.74		0.24	0.69			0.41			0.46	
Uniform Delay, d1	6.3	10.5		6.5	7.8			29.5			29.6	
Progression Factor	1.00	1.00		0.40	0.41			1.00			1.00	
Incremental Delay, d2	0.0	4.5		0.3	2.7			1.7			2.1	
Delay (s)	6.3	15.0		2.9	5.9			31.2			31.7	
Level of Service	A	B		A	A			C			C	
Approach Delay (s)		14.9			5.6			31.2			31.7	
Approach LOS		B			A			C			C	

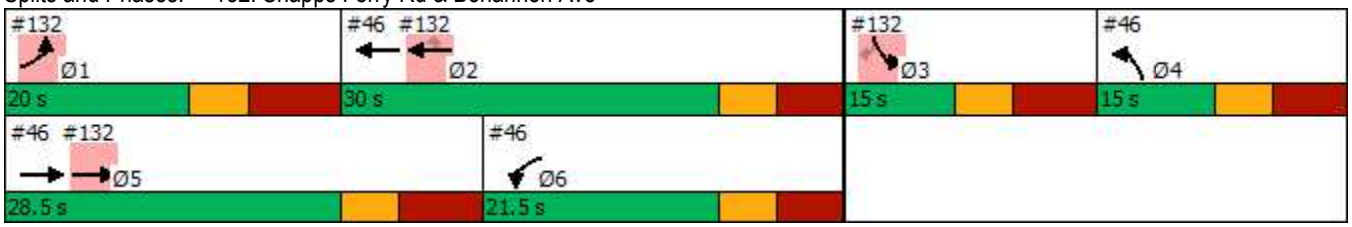
Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

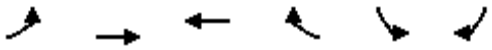
c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4	Ø6
Lane Configurations								
Traffic Volume (vph)	7	244	295	32	53	99		
Future Volume (vph)	7	244	295	32	53	99		
Turn Type	Prot	NA	NA	Perm	Prot	Perm		
Protected Phases	1	5	2		3		4	6
Permitted Phases				2	3	3		
Detector Phase	1	5	2	2	3	3		
Switch Phase								
Minimum Initial (s)	6.0	20.0	20.0	20.0	5.0	5.0	5.0	4.5
Minimum Split (s)	20.0	28.5	27.5	27.5	15.0	15.0	15.0	20.0
Total Split (s)	20.0	28.5	30.0	30.0	15.0	15.0	15.0	21.5
Total Split (%)	25.0%	35.6%	37.5%	37.5%	18.8%	18.8%	19%	27%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	5.5	5.0	4.0	4.0	5.0	5.0	4.5	4.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	9.0	8.5	7.5	7.5	8.5	8.5		
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	Max	Max	None	None	None	Max
Act Effct Green (s)	6.4	20.6	47.2	47.2	6.4	6.4		
Actuated g/C Ratio	0.08	0.27	0.61	0.61	0.08	0.08		
v/c Ratio	0.05	0.54	0.28	0.04	0.40	0.50		
Control Delay	30.6	12.2	13.5	5.8	45.4	15.7		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.6		
Total Delay	30.6	12.2	13.5	5.8	45.4	16.3		
LOS	C	B	B	A	D	B		
Approach Delay		12.7	12.8		25.8			
Approach LOS		B	B		C			

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 77.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 15.6	Intersection LOS: B
Intersection Capacity Utilization 36.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 132: Snapps Ferry Rd & Bohannon Ave





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	244	295	32	53	99
Future Volume (vph)	7	244	295	32	53	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	9.0	8.5	7.5	7.5	8.5	8.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.88	0.92	0.92	0.92	0.92	0.83
Adj. Flow (vph)	8	265	321	35	58	119
RTOR Reduction (vph)	0	0	0	17	0	113
Lane Group Flow (vph)	8	265	321	18	58	6
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	1	5	2		3	
Permitted Phases				2	3	3
Actuated Green, G (s)	1.3	20.6	45.0	45.0	4.8	4.8
Effective Green, g (s)	1.3	20.6	45.0	45.0	4.8	4.8
Actuated g/C Ratio	0.01	0.23	0.51	0.51	0.05	0.05
Clearance Time (s)	9.0	8.5	7.5	7.5	8.5	8.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	25	431	943	801	95	85
v/s Ratio Prot	0.00	c0.14	c0.17		c0.03	
v/s Ratio Perm				0.01		0.00
v/c Ratio	0.32	0.61	0.34	0.02	0.61	0.08
Uniform Delay, d1	43.4	30.6	13.1	11.0	41.1	39.9
Progression Factor	0.83	0.30	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	2.5	1.0	0.1	11.1	0.4
Delay (s)	42.9	11.6	14.1	11.0	52.2	40.3
Level of Service	D	B	B	B	D	D
Approach Delay (s)		12.5	13.8		44.2	
Approach LOS		B	B		D	

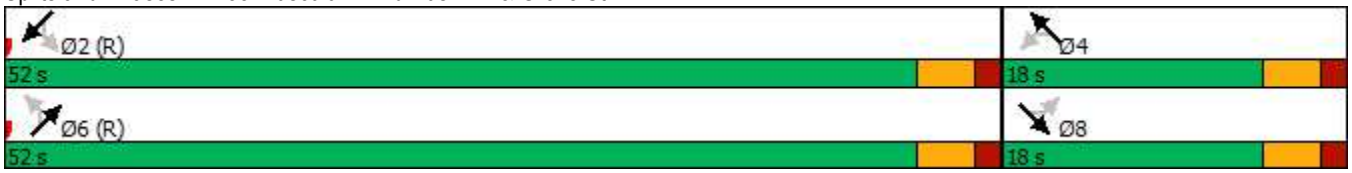
Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	33.0
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

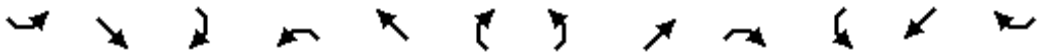
c Critical Lane Group

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	8	7	8	9	1	497	32	456
Future Volume (vph)	8	7	8	9	1	497	32	456
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		8		4		6		2
Permitted Phases	8		4		6		2	
Detector Phase	8	8	4	4	6	6	2	2
Switch Phase								
Minimum Initial (s)	6.0	6.0	6.0	6.0	25.0	25.0	25.0	25.0
Minimum Split (s)	10.5	10.5	10.5	10.5	29.5	29.5	29.5	29.5
Total Split (s)	18.0	18.0	18.0	18.0	52.0	52.0	52.0	52.0
Total Split (%)	25.7%	25.7%	25.7%	25.7%	74.3%	74.3%	74.3%	74.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5		4.5	4.5	4.5	4.5	4.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	C-Min	C-Min	C-Min
Act Effct Green (s)		7.5		7.5	56.5	56.5	56.5	56.5
Actuated g/C Ratio		0.11		0.11	0.81	0.81	0.81	0.81
v/c Ratio		0.15		0.43	0.01	0.40	0.08	0.34
Control Delay		29.3		17.5	3.0	3.8	1.1	1.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		29.3		17.5	3.0	3.8	1.1	1.4
LOS		C		B	A	A	A	A
Approach Delay		29.3		17.5		3.8		1.3
Approach LOS		C		B		A		A

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 54 (77%), Referenced to phase 2:SWTL and 6:NETL, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 4.3	Intersection LOS: A
Intersection Capacity Utilization 39.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 135: Tusculum Blvd Bus 11E & Grove St





Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	8	7	0	8	9	37	1	497	5	32	456	10
Future Volume (vph)	8	7	0	8	9	37	1	497	5	32	456	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		1.00			0.90		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1817			1668		1770	1859		1770	1850	
Flt Permitted		0.81			0.94		0.46	1.00		0.42	1.00	
Satd. Flow (perm)		1501			1578		857	1859		775	1850	
Peak-hour factor, PHF	0.67	0.58	0.92	0.50	0.75	0.51	0.25	0.85	0.63	0.67	0.93	0.42
Adj. Flow (vph)	12	12	0	16	12	73	4	585	8	48	490	24
RTOR Reduction (vph)	0	0	0	0	66	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	24	0	0	35	0	4	593	0	48	512	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)		6.3			6.3		54.7	54.7		54.7	54.7	
Effective Green, g (s)		6.3			6.3		54.7	54.7		54.7	54.7	
Actuated g/C Ratio		0.09			0.09		0.78	0.78		0.78	0.78	
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		135			142		669	1452		605	1445	
v/s Ratio Prot								c0.32			0.28	
v/s Ratio Perm		0.02			c0.02		0.00			0.06		
v/c Ratio		0.18			0.24		0.01	0.41		0.08	0.35	
Uniform Delay, d1		29.5			29.6		1.7	2.5		1.8	2.3	
Progression Factor		1.00			1.00		1.00	1.00		0.36	0.31	
Incremental Delay, d2		0.6			0.9		0.0	0.9		0.2	0.5	
Delay (s)		30.1			30.5		1.7	3.3		0.8	1.2	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		30.1			30.5			3.3			1.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

TOWN OF GREENEVILLE
TRAFFIC SIGNAL SYSTEM STUDY

APPENDIX F

Signal System
Advance Traffic Controller (ATC)
and
Traffic Management System
Central Control
Information

CUBIC | Trafficware

COMMANDER™

NEMA TS1, TS2-1 and TS2-2
ATC Controller



Advanced Traffic Controller

The new COMMANDER™ ATC Traffic Signal Controller is designed to meet and exceed the latest NEMA TS1, TS2-1, TS2-2 and ATC standards. COMMANDER is the result of customer guidance, Cubic | Trafficware's extensive experience in electrical design and the latest innovations in industrial design & software engineering concepts. COMMANDER provides unparalleled performance in all signal control applications with advanced functionality for complex phasing, detector processing, coordination, preemption, communications, adaptive timing, systems operation and Connected/Autonomous Vehicle applications.

COMMANDER'S ground-breaking industrial design is compact for those tight-fit cabinets and *easily carried* with dual handles, capturing the essence of COMMANDER'S functional design elements. Its enhanced usability includes a large, sloped and recessed front panel with bright color display for day and night time use, touch screen, large keypad, and graphical user interface (GUI) as well as a classic mode user interface.

Performance includes full compliance with the Version 6 ATC standard and more... enhanced Version 6 engine board with an additional QUICC processor for communications co-processing, and a separate processor for graphics and other secondary control functions. COMMANDER is designed to operate with Cubic | Trafficware's SCOUT controller firmware.

522 Gillingham | Sugar Land | Texas | 77478
For more information, call 281-269-6512 or visit www.trafficware.com.
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Product Features

Industrial Design
- Strong, sturdy construction to withstand rough handling
- Compact - 8.2" x 15" x 6.5"
- Solid, flat top - resists drips & condensation and allows items to be placed on top
- Sloped front face for greatest viewing angle at a variety of heights
- Dual handles - designed and placed for comfort
- Recessed front panel provides additional protection
- Side-mounted 2070-A2 Comm module slot
- Recessed module face reduces shelf width needed for cable connectors
- Non-skid, screw-mounted, wide-temperature feet

Performance
- Full compliance with Version 6 ATC...and more
- Enhanced Version 6 engine board
- 2nd powerful processor module for graphics and secondary functions

Removable Storage
- SD Card
  - Up to 8GB
- Datakey
  - 3.3V
  - Up to 32Mb
- Both devices
  - Receptacles installed, storage devices optional
  - Industrial temperature rated
  - Configuration and log data
  - Recessed to protect from damage

Display
- 7" color 800 x 480 TFT display
- High-brightness, sunlight-readable
- Resistive touch panel, unaffected by moisture
- Both graphical user interface and Classic Mode UI
- Display and touch screen sealed to front panel

Graphics Processor
- ARM Cortex-A7 processor @ 800MHz
- 256MB SDRAM memory
- 256MB Flash memory
- Two 10/100MBit ethernet ports
- USB 2.0 high-speed
- TFT LCD interface
- Linux ver. 4
- Ethernet link to engine board – allows loosely-coupled co-processing



Keypad
- Firm rubber keypad with large keys
- Metal dome tactile switches
- Generous 0.8" spacing
- Key assignments friendly to 2070 and 980 ATC users
  - Dual-labels provide 1-1 mapping to 2070
  - Retains ATC controller 980 alternate functions
  - Dedicated brightness function key

5 Ethernet Ports
- 2 - Ethernet switches, one per engine board ethernet
- 2 - 10/100 ethernet ports per switch
- 1 - 10/100 ethernet port to graphics processor

"Active" Indicator
- Bi-color LED - Red and Green

3 USB 2.0 High Speed Ports
- 2 - USB ports from engine board
- 1 - USB port to graphics processor

ATC Console Port
- ASYNC EIA-694 (RS232), also for devices (SP4)
- 115.2Kbaud, Tx/Rx

NEMA TS-2 Port 1
- SDLC port for cabinet communications
- 153.6Kbps

NEMA TS-2 Port 2
- ASYNC EIA-694 (RS232) for devices (SP8)
- 115.2Kbaud, with modem control

Speaker
- Loud, front-mounted speaker
- Supports tones and full audio

Graphical User Interface
- Allows user to switch between GUI and Classic Mode UI
- Day and night mode
- Table data entry with collapsed arrays and pop-ups
- Message Center and Alerts
- Graphic real-time status

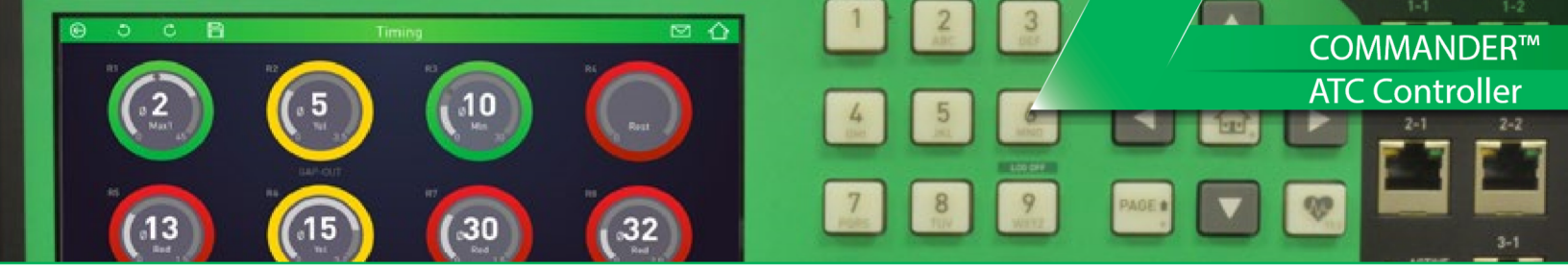
Engine Board - Ver. 6
- Meets and exceeds ATC Standard ver. 6.25
- Meets Caltrans TEES 2009 + Errata 1 & 2
- Supports ATC API
- PowerQUICC 2 Pro @ 400MHz
- 2nd QUICC for port expansion
- 128MB DRAM - 512MB ready
- 256MB Flash - 1GB ready
- 2MB SRAM (SuperCap-backed) – 4MB ready
- Linux ver. 3.4.118
- SD Card – high-speed SDIO interface











Features Comparison

FEATURE	COMMANDER™	Brand X*	Brand Y*	ATC v6.25 / (TEES)
Enclosure				
Dimensions (H x W x D)	8.2" x 15" x 6.5"	8.5" x 14.8" x 6.4"	10.5" x 14.8" x 7.8"	
Carrying Handle	2, integral, sides	integral, rear		
Engine Board				
ATC Standard Compliance	ver 6.25	ver 5.2b	ver 5.2b	
Processor	PowerQUICC 2 Pro	PowerQUICC 2 Pro		PowerQUICC 2 (TEES)
Additional Comm Processor	QUICC			
Speed (MHz)	400	233		
DRAM (MB)	128	128	64	64
FLASH Memory (MB)	256	64	64	32
SRAM (backed up) (MB)	2	2	1	1
Linux Version	3.4.118	2.6.3x	3.4	2.6.18
User Interface				
Display - Color Graphic	800 x 480		240 x 120	
Sunlight Readable	Y	Y		
Display Heater Option	Y			Optional
Graphics Support	HTML5		Android™	
Keypad (# of keys)	29	28	28 (2070)	28
Key Spacing	0.8"	~0.8"	0.5"	
Tactile Keys	Y	N	Y	
Touch Panel	Y	Y	Y	
Speaker	Y	Y		Beeper
Communication Ports				
Ethernet	5	4	4	4
Ethernet (Graphics Processor)	1			
Serial Port (NEMA Ports 1 & 2, C50S)	Y	Y	Y	
USB Ports	3	2	4	1
USB (Graphics Processor)	1			
Datakey Socket (side)	Y	Y	Y	Optional
SD Card Socket, Internal (Speed)	Fast			Optional
SD Card Socket, External (Speed)	Serial			
24V DC Over-Current	Electronic	Electronic		Yes
Comm Status Indicators	Y		Y	Yes
Comm Slot (side)	Y	Y	Y	Optional

*Other controller specifications based upon published data as of 04/01/2018

CUBIC | Trafficware

ATMS

Central Management System



ATMS

Central Transportation Management System

522 Gillingham | Sugar Land | Texas | 77478
For more information, call 281-269-6512 or visit www.trafficware.com.
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What is ATMS?

ATMS is a modular central transportation management platform that serves as the foundation of an effective ITS solution for cities, counties, and states.

Field Proven

Cubic | Trafficware has over three decades of experience designing, engineering, and manufacturing the industry's most durable and reliable traffic control hardware. The company is also well known for the development of the industry's most stable central transportation management software, which has been implemented in over 200 separate systems since 1994. When deploying such a fundamental element of an agency's ITS strategy, it is important to partner with a company that has field-proven systems that stand up to the rigors and mission critical demands of a transportation management system.

ATMS

ATMS builds upon the legacy of Cubic | Trafficware's flagship central transportation management platform and delivers a powerful tool for monitoring and controlling an agency's traffic control and ITS infrastructure. ATMS provides a modern graphical user interface (GUI), intuitive controls and new feature sets that maximize agency productivity and resources. Like previous versions of ATMS, this newest installment implements standards such as NTCIP and NEMA and is designed to specifications published by FHWA, ITE, IMSA, Caltrans and other industry leaders. ATMS provides a level of integration with other manufacturers and devices that is unparalleled and offers unmatched flexibility in order for the agency to maximize and leverage current infrastructure investments.

"ATMS is another example of Cubic | Trafficware investing in product development to provide the most cutting edge offerings to their customers." – Greg Heldreth, City of Victorville, CA Traffic Engineering Specialist

While ATMS interoperates with other manufacturers, there are numerous advantages to operate the system with other Cubic | Trafficware products and leveraging Cubic | Trafficware's vertical depth of ITS products. All Cubic | Trafficware systems ship fully integrated and tested - both hardware and software. This ensures that Cubic | Trafficware products can be deployed quickly with minimal integration costs. Cubic | Trafficware is the only company in the industry that provides such a broad spectrum of ITS products with seamless integration.

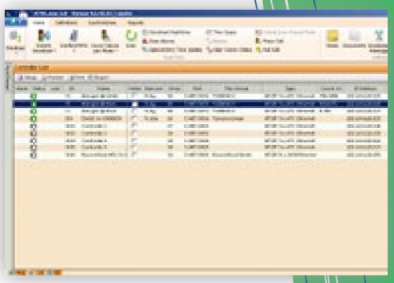
Platform for the 21st Century

ATMS supports initiatives proposed in MAP-21 that promote the need for performance management on ITS projects. ATMS is designed to allow the user to quickly generate real time and historical measures of effectiveness (MOEs). Tools within ATMS such as level-of-service (LOS) reports, assist the agency, and provide invaluable performance data to decision-makers.

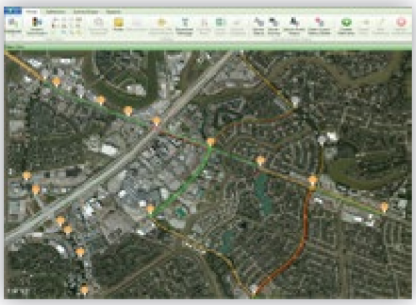


ATMS provides a global command post, providing real time data across the agency for manual and/or autonomous action.

Key Features in ATMS



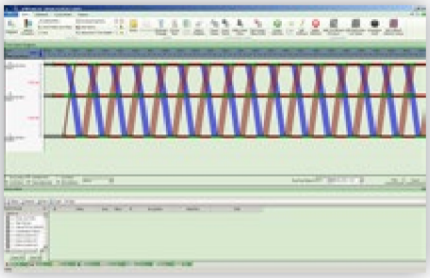
Modern Interface – Cubic | Trafficware has created a modern, intuitive interface for our customers. ATMS is based on Microsoft standards and is immediately familiar to new users. ATMS comes standard with several configuration templates, but also has an array of customization options for power users. ATMS comes standard with "ribbon" controls featuring intuitive icons for all system commands and functions.



Map View – ATMS features the Map View as the default status view. The Map View graphically illustrates system status, activity, devices and performance. The Map View not only indicates traffic signal status, but also shows congestion levels (MOEs), live camera feeds, dynamic message signs (DMS), roadway closures and more. The Map View features Bing™ Maps and allows the user to view system status on roadway or aerial backgrounds.

Time-Space Diagrams – The new ATMS time-space diagram has the same look and feel as the time-space diagram within Cubic | Trafficware's flagship simulation software, Synchro™ and has been a trusted tool for traffic engineers throughout the world for nearly two decades. The new ATMS time-space diagram allows the user to plot real time signal controller data by selecting a group of intersections in order to optimize traffic signal coordination.





Signal Controller Scans – The updated Signal Controller Scan improves upon Cubic | Trafficware's pioneering concept from previous versions of ATMS. The new Signal Controller Scan provides an intuitive interface and modern graphics that illustrate real time signal status. The Signal Controller Scan is designed to be a "heads-up-display" for all traffic signal activity.

ATMS Advantages

Cubic | Trafficware's ATMS provides a **global command post** for an agency's transportation network, allowing for integration with various traffic and ITS technologies in order to optimize traffic flow and support motorist safety. ATMS integrates an agency's traffic signal network into a single repository allowing for a 360-degree view of real time and historical traffic operational data.

ATMS features include:

- Continuous real time scanning. ATMS can manage a multitude of events autonomously, improving reach across the enterprise and facilitating a quicker response time. For example, the system constantly monitors itself and can automatically direct cameras to preset positions or execute a series of triggers that execute actions at various locations within the traffic signal system, such as pattern changes or preemption.
- Integration with other ITS manufacturers and devices, such as closed-circuit television (CCTV) cameras and dynamic message signs (DMS).
- Integration with third-party applications such as Microsoft SQL. This allows for expansive logging of system data and the ability to quickly and easily query ATMS for desired system data.
- Integration with Crystal Reports. This common reporting tool allows the agency to create custom reports that provide rich system data and performance measures.
- Integration with Cubic | Trafficware's Synchro™ Suite. This allows the user to easily import/export settings between ATMS and Synchro™ Suite.

ATMS, a Powerful Platform

ATMS is a full featured stand-alone central management system. However, it is also a flexible software platform that supports additional functionality such as Adaptive Signal Control, Fleet Management, Transit Signal Priority and Emergency Priority Response. Each module provides powerful tools and capabilities, but also leverages tools within the ATMS platform.

Ensuring a Successful Deployment

The right central management system vendor requires more than just the right feature sets.

ATMS functionality and performance is a primary consideration for product selection. However, a successful long-term deployment also has to consider ease of implementation and system support over the life of the product. Cubic | Trafficware has a seasoned staff of Field Application Engineers, with a proven track record of smooth ATMS deployments of all sizes, mixed communication environments, and across all leading hardware manufacturers.

The "turn-on" isn't the end, but instead the mid-point of a successful ATMS deployment. The deployment should also include essentials like a formal and flexible training curriculum, maintenance programs, on-the-ground field support, and a structured trouble ticket response and escalation protocol. Trafficware offers the total solution, including a feature-rich central management platform, experienced systems integration, and continued support, ensuring a successful deployment over the life of the system.

Cubic | Trafficware leads the industry in pre- and post-deployment training with Trafficware University – a knowledge center that has trained thousands of people around the world with both online and classroom instruction.



The "turn-on" isn't the end, but instead the mid-point of a successful ATMS deployment.

ABOUT Cubic | TRAFFICWARE

Cubic | Trafficware specializes in researching, designing, and developing electronic equipment and enterprise software designed to enhance the transportation industry. Our industry expertise comes from:

1. Hands on experience attained while solving traffic management challenges across the country since 1979.
2. Our in-house team including: professional traffic engineers, hardware and software design and development staff, manufacturing personnel, and customer service/field application engineers.
3. Regular dialogue with our customers to address their real-world operational issues and future traffic management requirements.

Cubic | Trafficware manufactures a full line of traffic equipment in its 90,000 square-foot technology center located in Sugar Land, Texas. In over three decades of manufacturing in the USA, our products have earned a reputation for unmatched quality and reliability.



ECONOLITE

Traffic Controllers for Traffic Operations

cobalt by Econolite Cobalt C ATC

What, exactly, is the Cobalt C-Series?

Cobalt is the next-generation in Advanced Transportation Controller (ATC) specifically designed for the mobile computing environment. Fully meeting ATC standards, Cobalt features a breakthrough hardened seven-inch screen matched with Linux-based OS that makes programming and access to functions the easiest in the industry.

Why do agencies use the Cobalt C-Series?

Cobalt is designed to be reliable, powerful, and user friendly. With the option to run various software solutions, it is the ideal platform for modern ITS traffic systems. Cobalt fully supports Signal Phase and Timing (SPaT)/MAP data messaging capabilities, providing a fundamental V2I element for connected vehicle applications.

How does the Cobalt C-Series benefit the driving public?

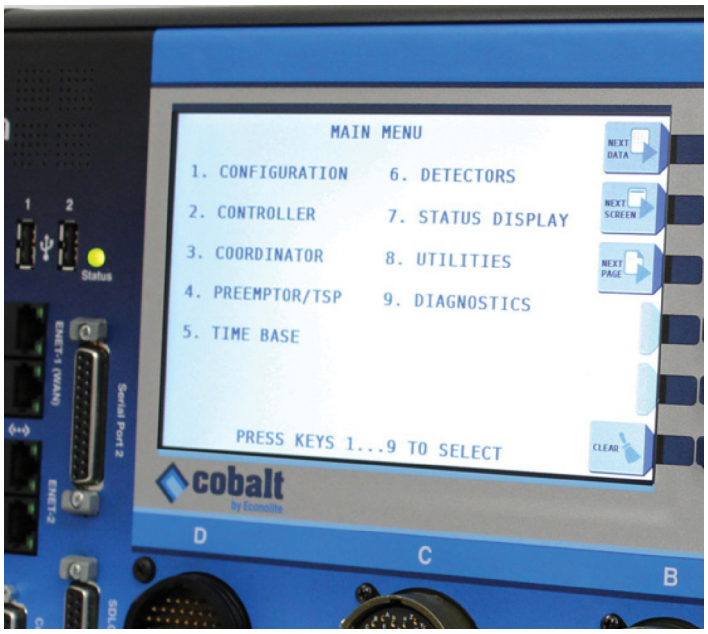
Helping to ensure safety, the traffic signal controller represents one of the most important intelligent technology and communication components of a signalized intersection. The Cobalt ATC family of controllers are designed to increase safety and traffic signal operations for years to come.



Cobalt C ATC Hardware

Cobalt ATC controllers may be configured with Econolite's robust Cobalt ASC/3-LX application software package, or other pre-qualified ATC/Linux software application software meeting current ATC standards. OS and software upgrades can be made easily by USB memory stick, SD card, or Ethernet via Econolite's Windows software installation application.

Cobalt-C includes a high-power, Linux-based Engine Board that is compliant with 6.25 ATC standard for a NEMA standard TS2 Type-1 or Type-2 I/O connectors: four Ethernet ports, two USB ports, and an SD Card slot. Additionally, the Cobalt-C seven-inch, high brightness TFT LCD module is readable in direct sunlight, and is not affected by condensation or water drops.



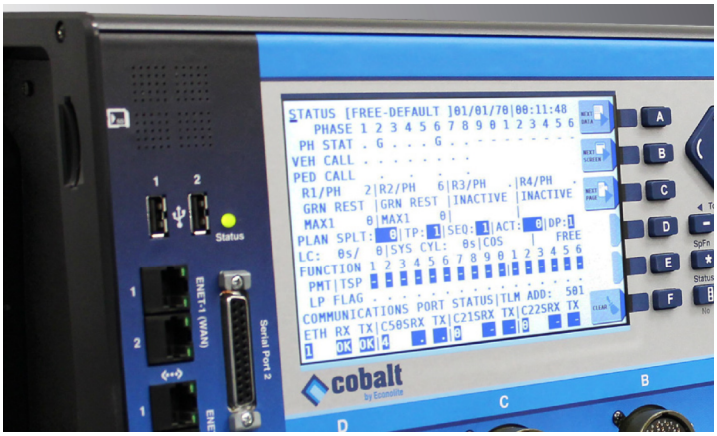
Hardware Details

- Supports Econolite Linux-based software or other pre-qualified ATC/Linux software
- ATC Engine Board
  - *Fully compliant with the 6.25 ATC Standard*
  - *233MHz PowerQUICC II Pro-processor that provides 10 times more processing power than previous generation controller processor*
  - *128Mbytes of DDR2 DRAM memory for application and OS program execution*
  - *64 Mbytes of FLASH for storage of OS Software and user applications*
  - *2MB of SRAM memory for non-volatile parameter storage*
- Two integral Ethernet switches for two networks, LAN and WAN Advanced Graphics Controller
  - *Managed switches for advanced networking solutions*
  - *Broadcast storm filtering built into the switch to protect safety critical processing resources*
- Two USB 2.0 ports used to:
  - *Update application software*
  - *Upload or download configuration*
  - *Upload logged data*
- Datakey socket for an optional 3.3V Datakey, 2 through 32MB
- SD Memory Card socket
- CPU Active LED
- Three communications ports standard:
  - *NEMA-ATC SDLC serial port 1*
  - *25 pin serial port 2*
  - *9 pin console serial port*
- Built in speaker for enhanced audio controller feedback
- Integral carrying handle in back of controller
- Power Supply
  - *Meets all requirements of ATC standard v6.25*
  - *External 24VDC protected by a self-resetting electronic fuse*
- Operating system
  - *Linux 3.12*
  - *Compliant to ATC Standard 6.25 specifications*

Hardware Options

- Two models,
  - *TS2 type 2 connectors*
  - *TS2 type 1 connector*
- Connected and Automated vehicle options:
  - *Connected Vehicle Co-Processor*
- Communications module options:
  - *FSK Module that can be configured for RS232 operation*
  - *2070 TEES 2009 standard 6A, 6B, and 7A plug-in modules*
- Datakey 3.3V, 2 through 32MB

Capabilities



Control Features

- 16 phases, 8 configurable concurrent groups in 4 timing rings
- 16 vehicle overlaps that can be configured as normal, -green/yellow, PPLT/FYA or Econolite
- 16 pedestrian phases that can be configured as pedestrian overlaps
- Exclusive pedestrian operation
- Dynamic max operation
- Extendable walk and pedestrian clearance
- Advanced Walk
- Bike input and green timing
- Extendable red clearance
- Transit Signal Priority

Coordination Features

- 120 coordination event plans, each with its own cycle, offsets, split timing, coordinated phases, vehicle and pedestrian recall and phase omits
- Offset and split entries displayed in percent or seconds
- Automatic permissive periods
- Fixed or floating force-off
- Crossing arterial coordination

Preemption Features

- Ten preemption sequences. Each may be configured as priority, first-come-first-serve, or bus preemption operation
- ECPI interlock to provide added monitoring
- Railroad gate-down input and timing
- Conditional delay when entering preemption
- Multiple exit preemption options
  - *Exit to selected exit phase*
  - *Exit to coordination (no transition)*
  - *Exit to interrupted pedestrian phase*
  - *Exit to interrupted vehicle phase*
  - *Use timing from an exit timing plan once, then the normal timing plan*
  - *Exit to a selected phase first, then to free or coordination (selectable)*
  - *Exit free for one complete cycle, then resume coordination (no transition)*
  - *Exit to the phases where the most drivers have waited the longest*

Time Base Features

- 200 schedule programs, configurable for any combination of months, days of the week, and days of the month
- Fixed or floating exception day programs that override the day plan event on a specific day
- 50 day plan events that can use any of the 100 action plans
- 100 action plans that can be used by any of the 50 day plans

Status Display Features

- Keyboard selection of detailed dynamic status displays for each of the main controller unit functions including: controller, coordinator, preemptor, time base, detectors, and MMU

Detector Features

- 64 vehicle detectors
- 16 system or speed detectors
- Unique detector types and operation
- Individually assignable to phase and functions
- Lock/non-lock function by detector
- 4 detector plans
- 4 detector diagnostics plans
- Logging of volume and/or occupancy assignable by detector
- 4 pedestrian diagnostic plans

Logging Features

- Separate buffers for detector activity, detector failures, controller events, and MMU events
- Logged data can be:
  - *Viewed on front panel*
  - *Retrieved via a RS-232 terminal port, USB flash drive, or SD Card*
  - *Transferred with High Resolution Signal Performance Measures to local file system or SD card*
  - *Transferred via telemetry to a traffic management center*

Systems

- NTCIP level 2 compliance
- Supports Centracs®, Aries® and TS2 NTCIP Level 2-compliant pre-qualified central applications
- Lock down open services and use only encrypted communications to system.

Cobalt Software

Cobalt ASC/3 Linux Software

- Provides menu selection
- Field-proven for over 14 years
- Allows for an agency-specific default database
- Automatic backup of controller database to optional Datakey, SD card, or manual back up to USB flash drive
- Context sensitive help
- 100-statement logic processor to test inputs, outputs or timers and take actions based on the results
- Peer-to-Peer operation allows controllers to share information with other controllers, independent of the central system (one controller can communicate with up to 15 other controllers through Ethernet)

Optional Software

- Centracs Adaptive

Basic Specifications

- Temperature
  - *-34.6°F to +165°F (-37°C to +74°C)*
- Power
  - *110VAC @ 50/60 HZ or optional 220/240 VAC @ 50/60 HZ*
  - *Fuse protection for either 110 or 220/240V*
  - *Protection for the 24VDC supply is provided by a resettable electronic fuse*
- Dimensions
  - *14.84"W x 8.50"H x 6.13"D*

User Interface

At its foundation, Cobalt-C has an intuitive navigation system that can be used with a laptop. Mobile device connectivity includes four Ethernet ports and two Universal Serial Bus (USB) ports that include support for an external Wi-Fi device. Cobalt-C also includes a Secure Digital (SD) port to provide almost unlimited file storage capability.

ECONOLITE

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ECONOLITE

Transportation Management Systems

Centracs®

What, exactly, is Centracs?

Centracs ATMS. Centracs is an intuitive GUI-based enterprise-class traffic software solution, providing powerful and flexible ITS management, traffic control, and data sharing in a single ATMS platform. Centracs leverages proven and robust client-server architecture and distributed processing for adding ITS system modules. This provides unmatched return on investment through system scalability, communications, and implementation of various ITS strategies. It enables agencies to employ customized configurations to meet the specific needs unique to any traffic operations.

Why do agencies use Centracs?

ATMS enable agencies to monitor traffic throughout an entire transportation network and make real-time decision making from a Traffic Management Center (TMC). The ATMS allows a minimal staff to manage an entire traffic operation from the TMC.

How does Centracs benefit the driving public?

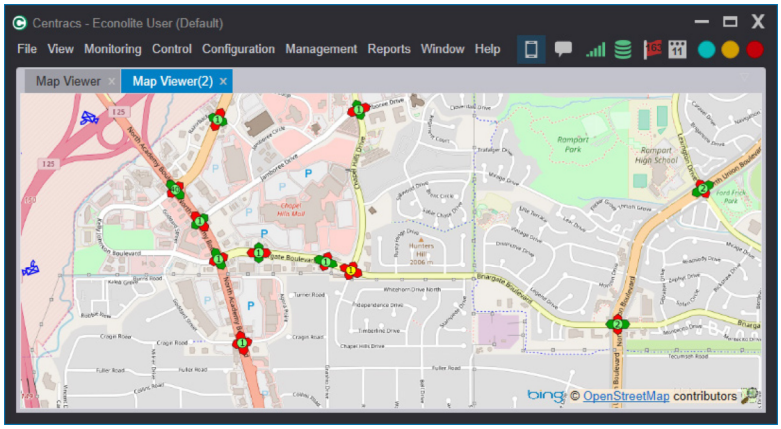
Centracs provides agencies real-time management capabilities for their roadway network, ensuring the highest levels of safety and mobility for all roadway users.



Graphical User Interface and "Containers"

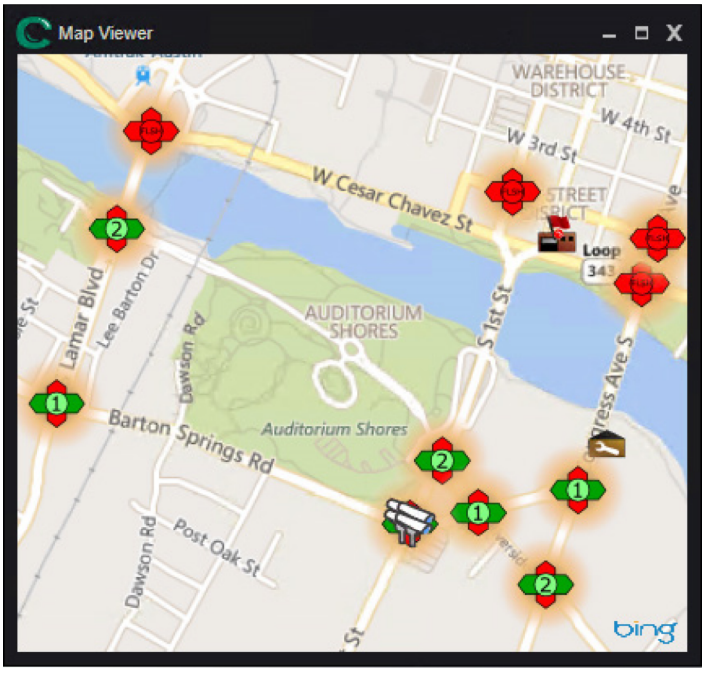
Modern Graphical User Interface (GUI) design is an integral part of Centracs 2.0. The intuitive GUI provides a short system learning curve, helping new users to immediately become productive while allowing experienced users to leverage the full power of Centracs 2.0's advanced features. Centracs 2.0 offers an extensive and flexible suite of tools, encouraging users to establish individual workflows and environments for increased efficiency.

User versatility is made possible by the Centracs 2.0 user interface, which utilizes powerful "Container" technology. Containers assist the user in managing the various maps, status, and control screens by enabling the user to drag-and-drop open windows into containers.



Interactive GIS Based Maps

The modern GIS map technology and rendering tools behind Centracs 2.0 map interfaces make the map a truly convenient tool for managing and monitoring field devices. Simple mouse gestures are used to pan and zoom, while the Centracs 2.0 Container technology allows users to customize, display and store multiple maps. Agencies can select from a variety of commercial or government GIS data sources including their own GIS databases. The local intersection map editor in Centracs 2.0 is easy to use allowing users to add fully functioning intersection displays in a matter of minutes.



Centracs 2.0 takes care of the positioning and sizing of contained windows, leaving the user free to focus on more important tasks. When a user exits Centracs 2.0, the entire layout is remembered and then restored on the next login. Additionally, all system configuration actions are performed through the GUI - no need to edit configuration text files or registry entries.

Scalable Architecture

Centracs 2.0 implements a distributed layer architecture providing scalability and expandability. The "Core" or application server manages the system scheduler, traffic control algorithms, field device time management, alert generation, and more. Communication or "Comm Servers" perform the communications to field devices. The entire system can reside on a single computer or it can be spread across multiple computers. This allows Centracs 2.0 to efficiently manage a small agency's needs on a single, inexpensive computer, or to scale up for a large agency needing to manage thousands of devices by distributing the processing across multiple computers.



Powerful Traffic Management Tools

The true value of a modern ATMS system depends on the tools provided to monitor and manage the system. Centracs 2.0 offers a wide range of reports and real-time monitors for nearly every aspect of the system. Real-time detector monitors, Time-Space and split monitors, coordination, Traffic Responsive, communication status, system performance monitors, alert monitors and detailed reports allow the various users of the system to track those aspects of the system that are most important. A real-time text-mode remote front panel for ASC/3 and Cobalt controllers allow Centracs 2.0 users to interface with controllers as if they were standing at the intersection. The signal database editor for Cobalt and ASC/3 controllers offers advanced features such as timing templates, spreadsheet style editing features and version management. Whether the user is a Traffic Engineer, a TMC manager, a System Administrator, or a signal shop manager, Centracs 2.0 provides the most effective tools for the job.

Communications and Device Support

Robust, dependable communication to field devices is key to a successful ATMS system and is a critical component of Centracs 2.0. Most communications media is supported, including fiber optics, twisted-pair, leased lines, and wireless. Protocol support includes: TCP/IP, UDP/IP, RS232 serial, ACT, PMPP, STMP, and SNMP. Traffic signal device support includes: Econolite's NTCIP-based Cobalt, ASC/2, ASC/2S, and ASC/3 (1000, 2100, or Rack Mount) NEMA TS1/TS2 controllers, 2070 (L or LN) controllers running ATC/2070, ASC/3 2070, or Oasis firmware, or controllers running EPAC version 4.01D,170-type controllers running certain versions of Wapiti W4IKS firmware, and NTCIP 1202 compliant controllers.

Centracs Maintenance Management System (MMS) (optional)

Centracs 2.0 MMS is a simple to use GIS-based asset management and maintenance system. It allows ITS and signal maintenance organizations to track assets in real-time through the products' entire life cycle. Offering both workstation and mobile device interfaces, it supports preventative maintenance planning and execution along with trouble ticket dispatch and work-order scheduling. Centracs 2.0 MMS is available as an optional module to Centracs 2.0, or as a stand-alone system.

Centracs DCMS (Data Collection Management System) (optional)

Centracs 2.0 DCMS turns new or existing detection systems into virtual count stations that gather and distribute traffic data without interruption, providing the accurate information needed for faster incident response, real-time changes to traffic signal timing,
or to anticipate special event traffic conditions.

Centracs Adaptive Module (optional)

Centracs 2.0 Adaptive is an arterial-based adaptive control module. Centracs 2.0 Adaptive uses the Centracs 2.0 native interface, simplifying the creation and management of adaptive intersection groups or sections. As a bonus, while the Centracs 2.0 Adaptive algorithms adjust splits and offsets, cycle length adjustments can be achieved by coupling our adaptive software with Centracs 2.0 Traffic Responsive techniques. Working directly with Econolite's ASC/3 controller software and avoiding adding undesirable hardware at the cabinet, Centracs 2.0 also allows the creation of multiple groups that can easily be managed using the Centracs 2.0 Time-of-Day scheduler. The power of Centracs 2.0 Adaptive provides a cost effective means of achieving real and measurable improvements in traffic flows without the cost of adding new servers, hardware, and by using existing controller coordination plans and existing communications channels.

Advanced Measures of Effectiveness (MOE) Module (optional)

The Centracs 2.0 MOE module was developed in conjunction with Purdue University. These reports use high density detector data collected 10 times per second from ASC/3 and Cobalt controllers to offer users a unique set of tools for understanding the factors influencing coordination and the effectiveness of timing at the intersection.

Dynamic Message Sign (DMS) Management (optional)

The Centracs 2.0 DMS module provides users the direct and instantaneous control to update and display valuable traveler information messages. By providing timely traffic condition or incident messages, Centracs 2.0 DMS can help provide congestion mitigation and increase roadway safety.

Server-to-Server Module (optional)

The Centracs 2.0 Server-to-Server module provides a unique interface allowing agencies to achieve unparalleled benefits through cooperative operations and system management. Adjoining Centracs 2.0 - managed cities can seamlessly share data and manage arterial traffic across agency boundaries providing true Center-to-Center communications. Centracs 2.0 Server-to-Server also allows agencies to participate in cross-jurisdictional management and monitoring of neighboring agency intersections.

CCTV (optional)

Close Circuit Television (CCTV) cameras have proven a valuable tool for many agencies. Econolite offers the Centracs Advanced CCTV module as an optional component of the Centracs ATMS. This module is an enterprise-class IP video surveillance solution that provides seamless management of digital video across IP networks.

Centracs Optional Modules

- Centracs MMS
- Centracs DCMS
- Centracs Travel Time
- Centracs Adaptive
- Centracs MOE
- Centracs DMS
- Centracs Server-to-Server
- Centracs CCTV
- Centracs SPM

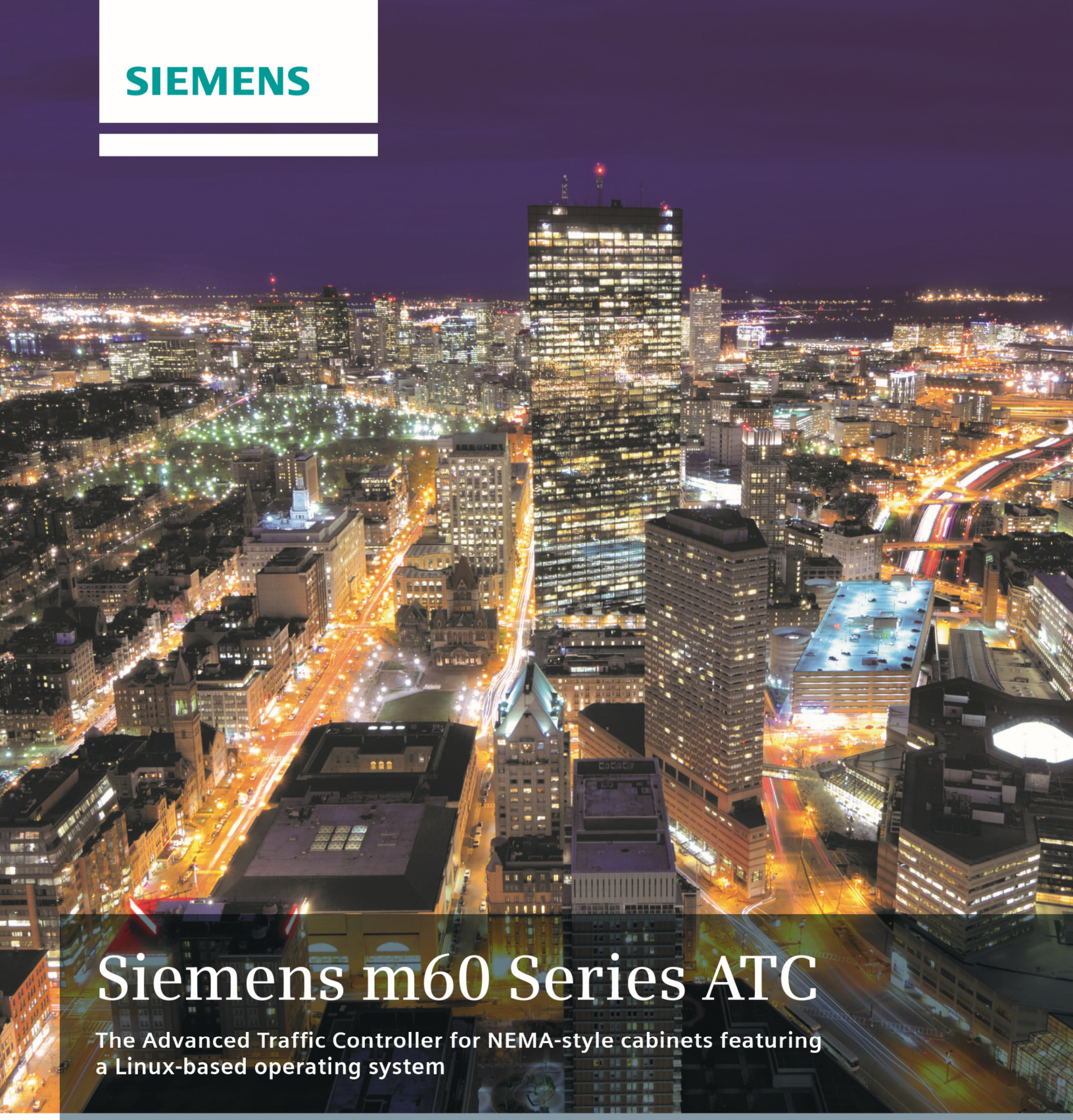
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SIEMENS



Siemens m60 Series ATC

The Advanced Traffic Controller for NEMA-style cabinets featuring a Linux-based operating system

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If you haven't heard about Siemens traffic controllers recently, it's because we have been so busy enhancing them

The idea behind Siemens new m60 ATC controller is simple: The less you have to hear about traffic, the better.

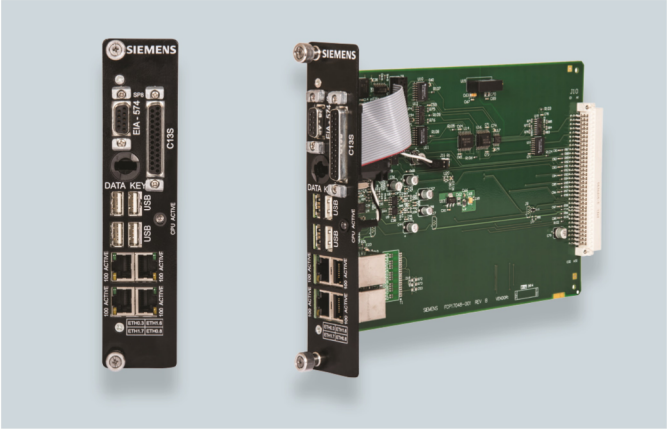
Introducing the new Siemens m60 ATC with SEPAC

The Siemens m60 ATC gives you better control of your traffic signals, cost of ownership and – to an extent – your signal system's future. Siemens has made the m60 ATC a feature-rich traffic signal controller, along with the robust performance required to meet ever-changing traffic demands. Because the advanced functionality of the m60 series is designed to exceed industry ATC 5.2b standards and specifications, upgrading your controllers and software to m60 ATC with SEPAC will keep your city ahead of the traffic curve.

Siemens remembered not to skimp on memory

Choosing a controller with more brainpower is a smart move. The m60 ATC's MPC 8270 processor, operating at 266MHz, provides enough power to future-proof the most demanding of intersections. Combine this with the 512MB FLASH, 64MB DRAM and 2MB SRAM, and the m60 has the memory space to host multiple applications on its Linux-based operating system.

The more we put into it, the more you get out of it



The best ideas need a solid hardware backbone to succeed in the real world. The m60's modular communications hub brings all the communication ports required to keep a signalized intersection communicating with the traffic management center. The communications hub also includes a network switch and two ports for both ENET1 and ENET2, allowing the user to communicate with many different devices inside the signal control cabinet. Four USB ports on the front of the hub ensure that the m60 ATC will have enough expansion ports for years to come. Inclusion of a datakey port extends the backward compatibility with legacy systems that only Siemens can deliver. To keep all communications traffic on schedule, the new direct connect GPS serial port makes for an easy connection to a GPS unit.



The idea behind our new m60 ATC controller is simple:

The less you have to hear about traffic, the better

Putting our best features on display

The Siemens Multiview Display (SMD) will change the way users interrogate the operations of signalized intersections. Split viewing, on the SMD, allows changes to the configuration of the m60 ATC while simultaneously viewing any one of five active status windows. The 5 1/8-inch active Thin Film Transistor (TFT) backlit LCD display facilitates low-light configuration changes. With Siemens unparalleled backward compatibility, a quick software upgrade to existing m50 controllers will bring new life and functionality to a trusted controller.



With 40 characters and 16 lines, the new look and feel of the m60 ATC display makes it easier for users to view and use. User-programmable hot keys simplify entering time-based controls and time-of-day values. In short, the m60 ATC will help make jobs easier, so traffic can flow more efficiently.

Priority routines are a top priority

Siemens is the industry leader in Priority routines. The m60 with SEPAC can receive signals from an approaching bus or light rail train and prioritize it with minimal impact on the flow of other vehicles approaching the intersection.

With full priority, the m60 ATC will aggressively prioritize the approaching transit vehicle by skipping directly to the appropriate transit phase to minimize delays seen by the transit agency. Partial Priority is a more balanced approach, where phases have a preprogrammed amount of time reduction and extension. With the balanced approach, users can prioritize the transit vehicle while minimizing delays on all approaches, even during coordination.

Siemens best features begin with something other than vehicles in mind

For greater visibility, pedestrian-walk offset points allow pedestrians to enter the crosswalk before any turning traffic is allowed. Pedestrian-exclusive phasing stops all traffic before pedestrians are allowed to cross. Prioritizing pedestrian movement allots longer pedestrian cross times than the associated signal timing within the active coordination plan.

Siemens solution to the yellow go/no go zone dilemma

The MUTCD stipulates some of the safety features built into all controllers; all others, Siemens has enhanced. The advance-vehicle density setting helps identify safe gaps between vehicles approaching a signalized intersection to reduce the effects of the dilemma zone. Using the advanced features of collision avoidance routines, the Siemens m60 ATC can extend the all-red clearance interval to reduce the risk of side-impact collisions.

The Siemens m60 ATC: Part of the bigger and better picture of traffic management

The m60 ATC advanced traffic controller is part of a network of Siemens innovations for better traffic management that includes the TACTICS Central Advanced Traffic Management System (ATMS) and TACTICS smartGuard web-based mobile traffic control center. Working together, or independently, these capabilities put the most advanced technologies into your traffic management configurations.



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Printed in USA
Order No.: RCM-BRO-0008
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m60 Linux Series Controllers

Advanced Traffic Controllers for ATC and NEMA

The Siemens m60 Linux Series controllers complies with industry's latest standards, with variants compatible for ATC (Advanced Traffic Controller) and NEMA (National Electrical Manufacturers Association) standards.

Built on the proven m50 hardware architecture and combined with state-of-the-art SEPAC traffic controller software, the m60 controllers are Linux-based, with a number of functions to meet the needs of traffic agencies of all sizes.

The m60 series controllers provide multiple Ethernet, USB and other interfaces to facilitate backwards compatibility. The field devices also enable easy hosting of third-party applications, exceeding industry standards by providing usability features that include the new Siemens Multiview Display concept of real-time active status, context-sensitive HELP screens and user-programmable favorite buttons.



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General features

- Linux operating system
- Operates in both TS-2 Type 1 and 2 cabinets
- 64MB DRAM, 512MB FLASH, 2MB SRAM
- Five RJ-45 Ethernet connectors
- 4 Port USB hubs
- Active TFT backlit LCD display
- Siemens Multiview Display technology designed for the everyday user in mind
- m50 USB upgrade package available
- Compatible with SEPAC traffic controller software

ATC variant

- Exceeds ATC 5.2 standard compliance
- Modular ATC communications hub
- m60 ATC upgrade package available

NEMA variant

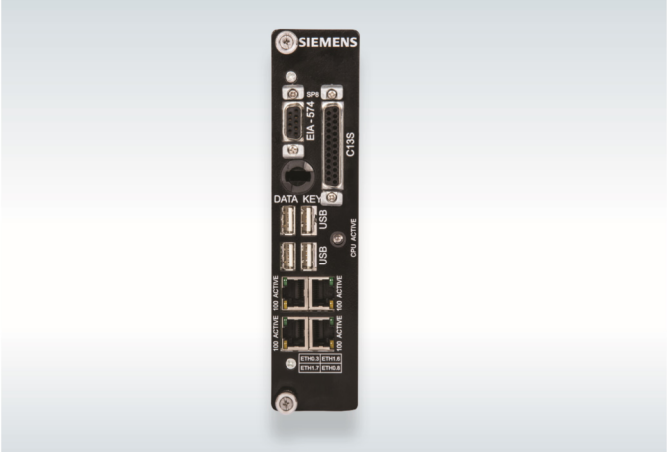
- Exceeds NEMA TS-2 requirements
- m60 NEMA upgrade package available

Central Processor Unit (CPU)

- Open architecture platform with standard Linux operating system
- MPC 8270 266MHz processor
- 512MB FLASH, 64MB DRAM and 2MB SRAM
- TOD Clock with automatic daylight savings time adjustment
- Power supply will power the SRAM during power failures
  - Supports SEPAC controller software
  - SD memory card
  - Operating System: Linux 2.6.39

Keyboard and Display

- Siemens Multiview Display with dual view screens
  - 5 1/8 inch active TFT display
  - Easily removable display and keypad
  - Easily identifiable, discrete HELP button
  - Real-time context sensitive HELP screens
  - User programmable function buttons F1 to F5



- Removable LED backlit LCD with 16 lines of 40 characters with adjustable contrast
- Emulation of terminal per Joint NEMA/AASHTO/ITE Standard
- Key quantity and function per Joint NEMA/AASHTO/ITE Standard

m60 Communications Module

- 10 Base-T Ethernet with built-in switch and 4 front panel RJ-45 connectors
  - ENET1 and ENET2 network switches
  - 5 10/100 TCP/IP ports
- 4 USB 2.0 Ports and a Datakey Port
- Dedicated GPS - SP8 Port (9pin EIA-574)
- Unique MAC address assigned by the Institute of Electrical and Electronic Engineers (IEEE)

Controller Housing

- 7 slots with card guides for standard size Versa Modules
- 2 slots with card guides for standard Joint NEMA/AASHTO. ITE ATC modems (optional) or ATC Communication Module or USB Plate
- Polycarbonate construction (excluding back panel), rear mounting tabs and aluminum power supply mounting plate for electrical grounding
- Carrying handle

Parts List

Controllers	
m62 ATC	8133-0004-SSS
m62 ATC Lite	8133-0000-SSS
m62 NEMA Linux, No Software	8132-0000-000
m62 NEMA Linux No Communications, Any Software	8132-0000-SSS
m62 NEMA Linux Any Communications, Any Software	8132-YYZZ-SSS

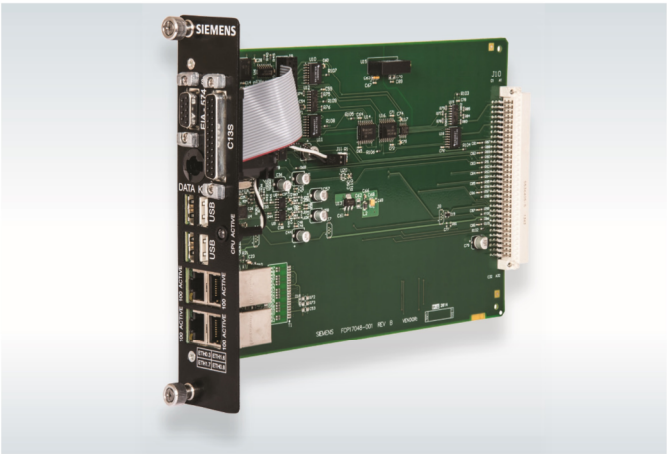
Upgrade Kits	
m62 NEMA Linux to M62 ATC Armadillo Upgrade Kit*	MBV17086-SSS
m52 OS9 to M62 NEMA Linux Armadillo Upgrade Kit	MBV17085-SSS
m52 OS9 to FIO/USB and Armadillo Upgrade Kit	MBV17084-SSS
m52 OS9 to Linux Armadillo Upgrade Kit	MBV17046-SSS

Modules and Spare Parts	
m60 16 Line Display	AAD17047-001
m60 Power Supply Module	AAD17098-001
ATC Communications Module	AAD17048-001
Field I/O Module	ACP16826-002
m60 Backplane	ACP17049-001

Accessories	
Datakey and 2 PORT3 RS232 for OS9 Standard (P001)	AAD15288P001
Datakey for OS9 Standard (P002)	AAD15288P002
2 PORT3 RS232 for OS9 Standard (P003)	AAD15288P003
Datakey and 2 PORT3 RS232 for OS9 FSK 2-Wire (P004)	AAD15288P004
Datakey for OS9 FSK 2-Wire (P005)	AAD15288P005
2 PORT3 RS232 for OS9 FSK 2-Wire (P006)	AAD15288P006
Datakey and 2 PORT3 RS232 for OS9 MMF (P010)	AAD15288P010

** = Factory upgradeable only*





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Order No.: DAT-ATC-0818
Printed in USA
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ATC eX2 NEMA Controllers

TS 2 Type 1
TS 2 Type 2



TS 2 Type 1



TS 2 Type 2

Overview

McCain's ATC eX2 NEMA Controller is an advanced, multi-application controller that simultaneously supports multiple software applications through a single platform. Designed in full compliance with NEMA TS 2 and ATC 5.2b standards, the ATC eX2 NEMA Controller provides revolutionary flexibility and control. Best of all, the single ATC eX compliant housing can be configured for either TS 2 Type 1 or TS 2 Type 2 applications and is backward compatible with TS 1. This allows end users to upgrade existing intersections to a modern, high-performance platform without replacing cabinet hardware.

Benefits

- Compliant with NEMA and ATC 5.2b standards
- Powerful CPU and generous memory configurations
- Multi-tasking ability minimizes the amount of hardware required at intersections
- Robust, open-architecture Linux platform supports application software from multiple vendors
- Wide variety of communication options for connectivity in any environment
- Multiple configuration options include NEMA TS 1, TS 2 Type 1, and TS 2 Type 2

Product Description

The McCain ATC eX2 NEMA Controller is a revolutionary, multi-application controller.

The ATC eX2 NEMA Controller features a wide variety of communication options, including a standard 3-port hardened switch, two USB ports, serial, and Ethernet for secure connectivity in any kind of environment. Quick data transfers, firmware upgrades, and log retrievals can be done via USB directly from the front panel.

The oversized screen features auto-contrast making it easily legible in a variety of conditions.

The controller's Linux operating system provides a robust, flexible, open-architecture platform that can support application software from multiple vendors.

Hardware Features

Operating system

- Linux

Microprocessor

- Freescale PowerQUICC II Pro microprocessor

Memory

- 256MB Flash memory
- 256MB DRAM
- 2MB Non-volatile SRAM

Backup Real-Time Clock (RTC)

Applicable standards

- NEMA TS 2-2003 v2.06
- ATC 5.2b
- NTCIP 1201, 1202 and applicable base standards

Controller Interfaces

Communication interfaces

- SDLC ports (2) including SP3 routed to NEMA TS 2 Port 1
- Serial (asynchronous) on front panel (3)
- Serial (asynchronous) on 2070 compatible modem slot (2)
- ENET 1: 100 Base-T Ethernet switch, 1 uplink, and 1 additional port
- ENET 2: 100 Base-T Ethernet port dedicated for local communications (i.e. laptop or similar)
- USB ports (2)

Front panel interface

- Display: 16 lines x 40 characters
- Keyboard: 7 x 4 keypad (28 key)

Cabinet interfaces

- NEMA TS 2 Type 1 Port 1 (SDLC)
- NEMA TS 2 Type 1 A connector
- NEMA TS 2 Type 2 A, B, C and D connectors

Software

- Compatible with McCain's Omni eX® Intersection Control Software (see separate data sheet for details).

General Specifications

Dimensions:	TS 2 Type 1: 7" H x 10"W x 10.5" D TS 2 Type 2: 10" H x 10"W x 10.5" D (rounded to the nearest 0.1")
Form Factor:	Shelf mount configuration
Power:	89 VAC to 135 VAC, 60 Hz (± 3 Hz)
Environment:	Operating Temperature: -37° C to +74° C Humidity: 0 to 95% (non-condensing)
Weight:	TS 2 Type 1: 7 lbs TS 2 Type 2: 10 lbs

Options

- Available Modules
  - Various communication modules (2070 form factor)
  - GPS module
- Custom D connectors
- International Input Voltage: 190VAC to 253VAC, 50 Hz (± 3 Hz)

To learn more about McCain's Integrated Traffic Solutions, please contact info@mccain-inc.com or call (760) 727-8100

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Transparity® TMS

Traffic Management System



Overview

Transparity® Traffic Management System (TMS) enables transportation professionals to proactively manage traffic flow and promote mobility through real-time traffic data collection and management tools. Built around user input and decades of industry expertise, the modern architecture of *Transparity* TMS is designed to meet the demands of today's transportation network and adapt with your needs as they evolve. With a simple, yet powerful means of collecting and displaying information, and access to data anytime, anywhere; *Transparity* TMS will take your traffic operations to new heights.

Benefits

- Monitor system-wide traffic conditions and devices
- Command innovative control strategies
- Analyze performance and trends
- Enable proactive management
- Centralize documentation and inventory control
- Ensure system integrity through data validation
- Boost accountability through user security, controller and activity logs
- Connect communities and jurisdictions
- Enable connected vehicle applications

Product Description

Transparity TMS provides dependable monitoring and control of signalized intersections in small and large environments. Intuitive and user-friendly, *Transparity* TMS is easy to learn, use, and customize; allowing it to quickly be implemented and mastered.

The newest release of *Transparity* TMS offers support for connected and autonomous vehicle (CAV) applications and data subscriptions. Additionally, *Transparity* TMS opens the door to cloud-based hosting and integration with other jurisdictions and community outreach programs.

Designed in compliance with NTCIP standards and featuring built-in support for select legacy firmware, *Transparity* TMS offers agencies a viable and cost-effective migration path to modern technology.

Best of all, robust data collection and control strategies help reduce congestion and harmful emissions in accordance with requirements for federal and state funding initiatives.

Transparity TMS is a powerful combination of standard-compliant technology, advanced algorithms, and tried-and-true methodology.

Standard Compliance

Developed based on the latest national protocols to ensure the system will evolve with your needs over time. Adheres to NTCIP 1201, NTCIP 1202, TMDD, and underlying base standards.

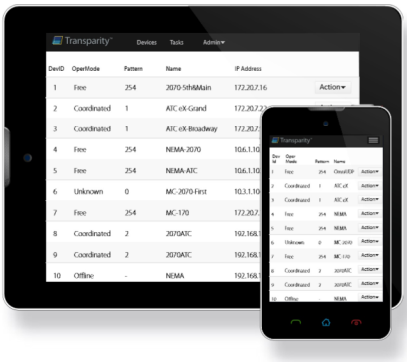
Device Compatibility

Compatible with 170, 2070, NEMA TS 1 and TS 2, and ATC controllers running NTCIP-compliant local control software and select 170 and 2070 traffic controller programs. Permits integration with IP-enabled devices such as CCTV cameras, battery backup systems (BBS), EV preemption devices, and traffic signal monitors (CMU/MMU).

System Architecture

Windows-based application using client-server architecture, .NET framework, and MS SQL Server database.

Using the latest in web services, *Transparity* TMS opens the door for interoperability with web and mobile clients. Providing the foundation for efficient and reliable center-to-center data exchange and secure methods for exposing the operational status of traffic systems to external networks.



System Functionality

Monitor System-Wide Traffic & Devices

- Survey traffic conditions remotely
- Monitor system-wide device status in real-time
- Log detailed intersection operations
- Receive instant notifications of device or traffic performance issues
- Record user activity and controller access

Analyze Traffic Trends

- Measure performance for individual intersections and coordinated systems
- Generate reports on current or historic trends, and performance measures
- Analyze vehicular, pedestrian, EV preemption, and transit signal priority data
- Integrate with FHWA high-resolution event reports

Implement Control Strategies

- Command controller TOD operations
- Modify phase sequence and pattern in response to specific traffic conditions
- Reduce congestion and increase efficiency
- Implement adaptive signal control strategies

Manage Assets, Tasks & Users

- Schedule controller operations, device log retrieval, and event notification from one central scheduler
- Consolidate system-wide information in central database
- Track assets and inventory
- Enforce system security through unique user permissions
- Reduce inefficiencies and issues related to mismanagement of controller timing
- Verify and validate timing parameters

Connect Users, Agencies & Devices

- Support inter-jurisdictional data exchange and control strategies in regional deployments
- Integrate NTCIP-compliant devices
- Enable multiple data subscription services for CAV applications

Customer Support

McCain's ITS Solutions group provides support from system selection through integration, ensuring end-to-end functionality.

Ongoing support is available with online user groups and trainings. Comprehensive software maintenance plans offer feature upgrades, technical support, and quarterly maintenance, including back-ups and updates.

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