CDM Smith
1100 Marion St., Suite 300
Knoxville, Tennessee 37921
tel: 865. 963.4300
fax: 865. 524-5311

October 26, 2020 (Revised November 19, 2020)

Ms. Elizabeth Mann, Director Design & Construction
Encompass Health
9001 Liberty Parkway
Birmingham, AL 35242

RE: FORT SANDERS WEST REHABILITATION HOSPITAL, TRAFFIC IMPACT LETTER, KNOXVILLE, TN.

Dear Ms. Mann:

This letter report is a summary of the anticipated impacts of the proposed Encompass Health Rehabilitation Hospital within the Fort Sanders West medical complex. The Fort Sanders West medical complex is located in west Knoxville adjacent to the Pellissippi Parkway (I-140) and Kingston Pike (SR 1) interchange. **Figure 1** illustrates this location along with an inset of the proposed site layout. A larger format of the site plan is provided in the Appendix. The previous land use on this parcel was medical office that has been relocated to the rear of the medical complex.

Project Description
The proposed site at buildout will consist of 80-beds. The initial phase of develop calls for constructing a building with 51-beds with the ability to expand to 80-beds in the future. This Traffic Impact Letter only addresses the ultimate buildout of an 80-bed facility. This facility does not have the same services as a typical hospital with emergency room and surgical procedures. From Encompass Health's description of their facilities, CDM Smith understands that an Encompass Rehabilitation Hospital serves patients who, following treatment for an acute event at a local acute-care hospital, requires physical rehabilitation before returning to a normal home environment. The average length of stay in an Encompass IRH is thirteen (13) days. Encompass does not provide comprehensive inpatient services such as surgical, diagnostic, emergency services nor drug / alcohol or mental rehabilitation. Every Encompass patient receives a minimum of three hours of rehabilitative treatment each day. Clinical care is provided by employed nurses and therapist and is overseen by the patient's physician and by the facility physician medical director. The interior of an Encompass hospital consists of patient rooms, a therapy gym(s), various therapy treatment rooms, a pharmacy, day rooms, a kitchen and a patient dining facility.

Encompass Health described other characteristics of their facilities, which are included in this paragraph. *Although Encompass hospitals operate 24 hours a day, most activity is limited to the hours of 7:00am to 8:00pm. Patients arrive at an Encompass Hospital from a local acute-care hospital via transport vehicles (typically an ambulance). Note that the ambulance transfer is on a non-emergency basis meaning no lights or sirens. Upon discharge, patients typically depart the hospital by private vehicle. Visitors are also welcome during afternoon and*

evening hours, however visiting hours end at 8:00pm. Activity outside of the hospital structure is limited to deliveries, trash pick-up and the arrival and departure of patients, visitors and staff. Deliveries are infrequent - perhaps one to two per day - and are received at a dedicated area at the rear of the facility by way of local delivery vehicles such as box-trucks.

Existing Conditions

The existing traffic control devices and intersection geometry are illustrated in **Figure 2**. Traffic data collection was not an option due to current conditions with COVID-19. Traffic data was derived from a prior Fort Sanders West traffic impact study in 2009 which projected 2019 traffic volumes. A TPO daily count from 2019 was used to develop a factor to confirm the prior report's projected 2019 values. It was determined by the TPO hourly count volumes that the 2019 traffic projection in the 2009 study for the AM peak hour was 16% over-estimated and the PM peak hour was 30% over-estimated. For the purposes of this study, and to be consistent with the available traffic count data, the prior report's 2019 turning movements were adjusted based on these rates. The historical count data from Station 093C007, indicated that the traffic growth was less than 0.5% annually. Therefore, the adjusted 2019 turning movement volumes were increased by a growth factor of 0.5% to derive the 2020 turning movement volumes as shown in **Figure 3**. The Highway Capacity Manual (HCM) levels of service are displayed at each intersection for the 2020 existing conditions. All study intersections are expected to operate at an overall LOS D or better. The southbound stop-controlled off-ramp from Pellissippi Parkway was measured as LOS F in the AM peak hour during the 2020 conditions. These LOS results are based on the existing control timings provided by the City of Knoxville.

Background Conditions

Traffic projections for 2025 were developed based on a 0.5% compounded growth rate. Background turning movement volumes are shown in **Figure 4** for the AM and PM peak hour. The resulting HCM level of service and volume/capacity ratios are displayed in Figure 4 based on the existing traffic controller timings. All intersections should continue to operation at an overall LOS D or better. The southbound off-ramp from Pellissippi Parkway will continue as a LOS F in the AM peak hour during the 2025 background conditions. The volume/capacity ratios increase slightly due to the expected traffic growth. The 2025 background v/c ratios remain below 0.85 at all study intersections, which indicates stable traffic control operation.

Trip Generation & Distribution

The trip generation calculation used Nursing Home (620) in the current 10th edition of **Trip Generation**, the recognized reference published by the Institute of Transportation Engineers (ITE). Based on the operations of the rehabilitation facility, the governmental Review Team determined this to be the most appropriate land use category and CDM Smith concurs. The trip generation for the 80-bed maximum is presented in **Table 1**.

TABLE 1: ENCOMPASS HEALTH REHABILITATION HOSPITAL

LAND USE	L.U.C	SIZE	WEEKDAY					
			DAILY	AM PEAK HOUR			PM PEAK HOUR	
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Nursing Home	620	80 beds	245	10	4	14	6	12	18

REFERENCE: Trip Generation, 10th Edition, Institute of Transportation Engineers (ITE)

New peak hour trips for the Encompass Health facility of 14 and 18 during the AM and PM peak hours, respectively, were assigned to the roadway network using the previously determined patterns of traffic to and from the Fort Sanders West medical complex. **Figure 5** displays the trip distribution percentages and **Figure 6** depicts resulting new trip assignments for each of the study intersections. The expected patterns are projected to be 20% west of the site, 15% east of the site, 45% north on Pellissippi Parkway and 15% south on Pellissippi Parkway.

Build-out Conditions

Traffic projections for 2025 Build-out conditions were analyzed by adding the new trips to the 2025 Background traffic volumes. The modeled 2025 Build-out traffic volumes with the Encompass project are shown in **Figure 7** for the AM and PM peak hour. The resulting HCM level of service and volume/capacity ratios are displayed on Figure 7 based on the optimized traffic controller timings. The Fort Sanders West Boulevard and Kingston Pike intersection was determined to improve from a LOS D to LOS C in both peak hours with the optimized timing parameters. The maximum v/c ratio remained the same because of the small number of new project trips added to the turn lanes and the fact that Kingston Pike thru volumes were not increased. The David Lane and Kingston Pike intersection was determined to operate at a LOS C in both peak hours. The unsignalized study intersections are expected to continue to operation similar to 2025 Background conditions. The volume/capacity ratios remain below 0.85 at all study intersections indicating stable traffic control operation.

Conclusions & Recommendations

With the unique operations of the Encompass Rehabilitation Hospital and the small number of new trips generated during the AM and PM peak hour, it is expected to have a negligible impact to traffic operations. Traffic signal optimization would benefit 2025 background conditions with or without the proposed project to improve intersection operation and average stop delay on Kingston Pike.

Should you have any questions, please call me.

Sincerely,
CDM Smith Inc.

Kevin A. Cole, P.E.
Senior Transportation Engineer

FIGURES
APPENDIX

Project No. 253047

Appendix-

- Scoping Letter
- Turning Movement Counts
- Automatic Turning Counts
- ITE Trip Generation
- Signal Timing Files
- Synchro HCM Reports
- Synchro Signal Timings

Scoping Letter

Planning
KNOXVILLE | KNOX COUNTY

ATTACHMENT B: Pre-Submittal Transportation Impact Analysis (TIA) Scope Determination Form

DEVELOPMENT INFORMATION	
Project name:	Encompass Rehabilitation Hospital
Project Description:	New 51 bed rehabilitation hospital
Project Location	Fort Sanders West Boulevard
Existing Zoning:	OP, CA & PC
Development Name:	Fort Sanders West
Developer name & address:	Encompass Health, 9001 Liberty Parkway, Birmingham AL 35242
Telephone number:	205-970-7850 (Elizabeth Mann Director Design & Construction)
Email:	elizabeth.mann@encompasshealth.com
Tax Map & Parcel #:	131NC0018 & Parts of 131LA00105, 131LA00106 and 131LA00102

CHECKLIST (All items should be available at the time of discussion)		
Complete description of the development that includes:		
	Site Map details (this should be attached):	
■	Building footprints	See site plan
■	Number of units/unit size	51 beds
■	Access points	See site plan
■	Internal roadways (if any)	See site plan
■	Adjacent streets	Fort Sanders West Blvd & Kingston Pk
■	Proposed sidewalks and bicycle facilities, and	See site plan
■	Location and number of proposed parking spaces (if applicable)	See site plan
	Phasing plan (if applicable) that includes:	
■	Phase size, location, & timing	Phase 2 - 29 beds Date undetermined

Planning
KNOXVILLE | KNOX COUNTY

ATTACHMENT B:
Pre-Submittal Transportation Impact Analysis (TIA) Scope Determination Form

DEVELOPMENT INFORMATION	
Project name:	Corporate Office Building - Covenant Health
Project Description:	New corporate office building to replace existing facility
Project Location	Fort Sanders West Boulevard
Existing Zoning:	PC
Development Name:	Fort Sanders West
Developer name & address:	Covenant Health, c/o Land Development Solutions (Rusty Baksa)
Telephone number:	865-671-2281
Email:	rbaksa@ldstn.com
Tax Map & Parcel #:	131LA00101

CHECKLIST (All items should be available at the time of discussion)		
Complete description of the development that includes:		
	Site Map details (this should be attached):	
■	Building footprints	One building approximately 14,650 sf
☐	Number of units/unit size	
■	Access points	via Fort Sanders West Blvd
■	Internal roadways (if any)	see site sketch
■	Adjacent streets	Kingston Pike
■	Proposed sidewalks and bicycle facilities, and	see site sketch
■	Location and number of proposed parking spaces (if applicable)	see site sketch
	Phasing plan (if applicable) that includes:	
■	Phase size, location, & timing	see email explanation

BELOW TO BE FILLED OUT BY KNOXVILLE-KNOX COUNTY PLANNING STAFF

☐ Pre-study scope meeting **needed**

☒ Pre-study scope meeting **not needed**

Intersection(s) to study:

None.

Level of Analysis:

A Transportation Impact Letter (TIL) will be required.

Notes:

The TIL will require the following:

- Around a 2-page report documenting the change in trip generation to the complex. Compare the original land uses of the development to the current and proposed (new bldg of 14,650 sq ft corporate office). Regardless if the future proposal (remodel of the existing 12,600 sq ft bldg) is in the works at this time, please include this in the evaluation as current usable space.
- Attached are documents from the Fort Sanders West 2009 Transportation Impact Study that should be included in the Appendix (separate from the write-up) of the letter and used as references for overall / original trip generation.
- Ensure that you provide a description of what you are doing in the letter as well.

Signature	Date
	August 19, 2020

LAND
DEVELOPMENT
SOLUTIONS

CIVIL ENGINEERING AND SURVEYING CONSULTANTS

September 18, 2020

Tarren Barrett
Transportation Engineer
Knoxville-Knox County Planning
400 Main Street, Suite 403
Knoxville, TN 37902

Re: Revised TIL for New Corporate Office on Fort Sanders West Boulevard

Dear Tarren,

Covenant Health is planning a new corporate office building (COB) at their Fort Sanders West Campus to replace the existing COB that is located within the campus near the intersection of Kingston Pike and Fort Sanders West Blvd. The current COB at 100 Fort Sanders West Blvd. is approximately 12,600 SF. It will be demolished to make way for a future building. The new COB will be 14,600 SF and will be located at the rear of the campus and served by the existing internal road network. The new site is part of the Fort Sanders West Campus which is over 50 acres and is shown on Exhibit 1.

Trip Generation

Traffic generated by the new COB was determined based on the ITE Trip Generation Manual, 10th Edition. While the existing building will be demolished for a future building at its location you have requested that the amount of additional traffic generated by the new COB be presented rather than just the difference in traffic. We have provided both numbers for your review. It is not anticipated that the new COB will house additional employees. The old COB was converted from a childcare facility and despite renovations, does not serve the function of a corporate headquarters very well.

ITE publishes trip generation data for Corporate Headquarters under land use code 714. Based on this land use, the 14,600 SF office should generate approximately 116 trips per day or 16 trips per day more than the existing COB once it is demolished. Table 1 summarizes the trip generation.

Table 1
Trip Generation

Land Use	Rate Per 1000 S.F.	Directional Distribution	Square Feet	Daily In	Out	Total
Corporate Headquarters (ITE code 714)	7.95	50% In 50% Out	14,600 (2,000 more than ex)	58 (8)	58 (8)	116 (16)
AM Peak Hour*	1.46	93% In 7% Out	14,600 (2,000 more than ex)	20 (3)	1 (0)	
PM Peak Hour*	1.40	10% In 90% Out	14,600 (2,000 more than ex)	2 (0)	18 (3)	

* Note peak hour of generator used due to lack of studies for peak hour of adjacent street traffic

310 Simmons Road, Suite K • Knoxville, TN 37922 • 865-671-2281 • Fax 865-671-2283 • Email: rbaksa@ldstn.com

Prior Traffic Impact Study

In 2009, Wilbur Smith Associated prepared a TIS for a new Medical Office Building on the campus, which is attached as an appendix to this TIL. That study found that the street system was capable of accommodating the additional traffic from the MOB but recommended several improvements to the existing street system. Those improvements were implemented and have benefitted the traffic flow into and out of the Fort Sanders West Campus while mitigating the impact to the traffic on the surrounding street system.

Please give me a call if you have any questions.

Sincerely,

Land Development Solutions

E. J. (Rusty) Baksa, Jr., PE

Attachments

KOSC BUILDING AT FORT SANDERS WEST

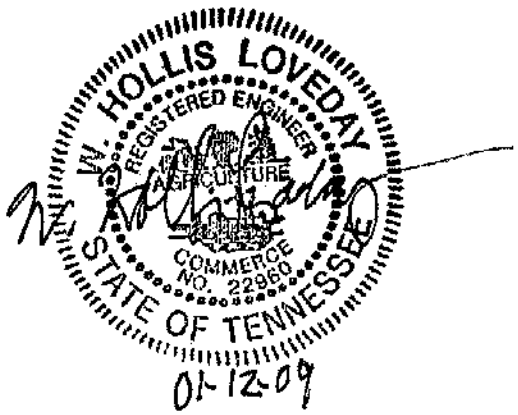
KNOXVILLE, TENNESSEE

TRAFFIC IMPACT STUDY

RETURN TO MPC LIBRARY

Prepared for:

KOSC Properties, LLC
260 Fort Sanders West Boulevard, Suite 200
Knoxville, Tennessee 37922-3355



January 2009

Prepared by:

WILBUR SMITH ASSOCIATES
Alexander Place
1100 Marion Street, Suite 200
Knoxville, Tennessee 37921

Project No. 103244

Projected future traffic conditions were estimated by generating traffic based on the proposed land use, distributing the trips to the transportation network, and again conducting analyses for capacity and level of service.

Trip Generation

Traffic generated by the new KOSC Building was determined using the publication, **Trip Generation, 8th Edition**. This reference is published by the Institute of Transportation Engineers (ITE) and represents national data collected for many different land uses including industrial, residential and commercial uses. **Trip Generation** is an essential tool in calculating the traffic, which may be generated by a proposed development. **Trip Generation** provides a medical office building land use (720) to generate trips on a daily and peak hour of adjacent street basis (AM and PM). Using this land use category, this study generated traffic for the proposed 32,468 square foot surgical center/medical office building. From these trip generation calculations, the proposed site should generate approximately 1,540 daily trips with 75 occurring tin the AM peak hour and 105 in the PM peak hour. The **Table 3** presents the trip generation of this proposed site.

TABLE 3
TRIP GENERATION

LAND USE	S.F.	DAILY			AM PEAK			PM PEAK		
		In	Out	Total	In	Out	Total	In	Out	Total
Medical Office Building (ITE LUC 720)	32,468	770	770	1540	59	16	75	28	77	105
Directional Distribution		50%	50%		79%	21%		27%	73%	

By all accounts, the trip generation estimates derived from data in **Trip Generation** are high. It is understood that the bottom floor of the proposed KOSC Building will be used to perform outpatient surgical procedures and the second floor will be office space. As such, the building will not likely function like a typical medical office building that has doctors offices and sees a steady stream of patients all day. Instead, experts expect that the surgical facilities will accommodate an average of 52 procedures per day, and if an average of 1.5 procedures are performed per patient, the bottom floor of the building would attract an average of 35 patients per day. Patient appointments would be scattered throughout a day, but perhaps be concentrated in the morning. Nevertheless, even when considering doctors, nurses, and administrators, the facility is not likely to generate 75 AM peak hour trips and 105 PM peak hour

CONCLUSION

The proposed 32,468 SF KOSC Building should generate at most approximately 75 AM peak hour and 105 PM peak hour trips if rates in **Trip Generation** are utilized. It is believed that these trip estimates will more than adequately reflect the new traffic generated by the KOSC Building. It is primarily a surgical center and not a medical office building, but the medical office building rates were used to be conservative. The new trips from the proposed KOSC Building were assigned to the street system and an evaluation undertaken to assess the impact to service levels, delays, and queues.

The analysis found that the street system is capable of accommodating the additional traffic with minimal impact to delays, queues, and service levels. Nevertheless, some improvements are recommended and these are described in detail in the preceding section of this report.

The most noticeable unmitigated condition is westbound queues on Kingston Pike at Fort Sanders West Boulevard, which will continue to exceed the distance between that intersection and the southbound Pellissippi Parkway off ramp. This condition exists today, and the recommendations will allow the queues to be maintained primarily at the current length.

Extensive data were collected and extensive analysis conducted to determine the impact of the KOSC Building on the southbound Pellissippi Parkway off ramp. According to the field studies, queues today extend well up the ramp, but do not typically extend to Pellissippi Parkway. New traffic from the KOSC Building should increase the AM peak hour delay on the 'left' right turn lane from 81 to 101 seconds. This is primarily Fort Sanders West traffic and westbound Kingston Pike traffic in this lane may be encouraged to use the right lane by the striping changes proposed.

RECOMMENDATIONS

The alternatives analysis suggests that significant benefit is realized by adding another westbound left turn lane on Kingston Pike at Fort Sanders West Boulevard. Furthermore, it suggests that adding another northbound lane to Fort Sanders West Boulevard will have minimal positive impact, especially considering the cost. Therefore, the following improvements are recommended:

- Optimize the traffic signal splits at the intersections of Kingston Pike with David Lane. At David Lane, the cycle length is 95 seconds and is running free. It should be increased to the current system cycle length of 130 seconds in the AM peak hour and 120 seconds in the PM peak hour and coordinated with the signal at Fort Sanders West Boulevard. Ideally, communication should be added between this signal and the one at Fort Sanders West Boulevard, but if this is not feasible, it should operate in time based coordination.
- Add another westbound left turn lane on westbound Kingston Pike at Fort Sanders West Boulevard, as shown in **Figure 19**, and optimize the traffic signal splits.
- Modify the intersection of Kingston Pike at Fort Sanders West Boulevard to accommodate the second westbound left turn lane.
- Re-strip the southbound Pellissippi Parkway off ramp so that two lanes are provided for the maximum length. Aerial mapping suggest that another 200 to 250 feet of 2 lane section can be added.
- For the new intersection on the Fort Sanders West campus, install pavement markings to allow continuous traffic movement between intersection legs, or modify the design temporarily so that continual flow can occur.

- WB KINGSTON R-TURN LANE ONTO CENTER PARK

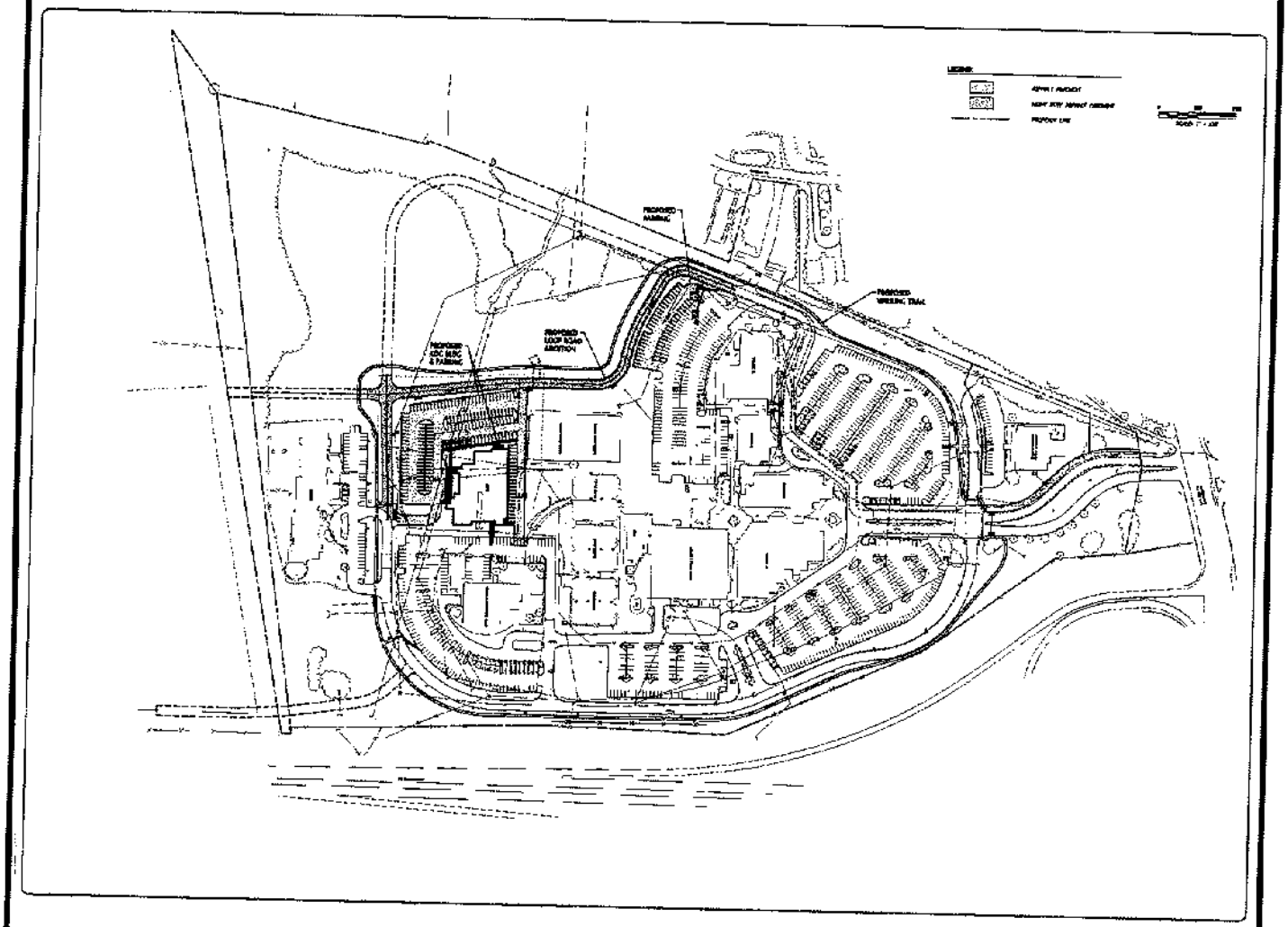


FIGURE 2
Site Plan

ENGINEERS
PLANNERS
ECONOMISTS
WilburSmith
ASSOCIATES

Existing Land Uses on Fort Sanders West Campus

TRIP GENERATION

LAND USE	L.U.C	SIZE		WEEKDAY						
				DAILY	AM PEAK HOUR			PM PEAK HOUR		
					ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
PRIOR 2009										
Medical Office MOB I&II Building	720	83,226	Sq. Ft.	2,896	148	42	190	81	207	288
Executive Office Building	710	11,140	Sq. Ft.	126	32	5	37	2	12	14
Commercial Building	710	44,018	Sq. Ft.	479	58	10	68	8	44	52
Surgery & Diagnostic Center Building	630	20,000	Sq. Ft.	763	58	16	74	19	47	66
New KOC Building	630	32,963	Sq. Ft.	1,258	95	27	122	31	77	108
KOC Surgery Building	630	31,000	Sq. Ft.	1,183	89	25	114	29	73	102
Health & Fitness Center *	492	100,000	Sq. Ft.	3,293	62	76	138	201	152	353
Nanny Day Care	565	24,000	Sq. Ft.	1,143	140	124	264	125	142	267
Total		346,347	Sq. Ft.	11,141	682	325	1,007	496	754	1,250
PROPOSED 2009										
Medical Office Building	720	85,000	Sq. Ft.	840	155	41	196	82	223	305
IT Building	710	60	Employees	290	38	4	42	10	50	60
PROPOSED 2020										
Nursing Home	620	80	beds	245	10	4	14	6	12	18

REFERENCE: **Prior 2009: Trip Generation, 10th Edition,** Institute of Transportation Engineers (ITE)

* Daily Trip information was not available in the 10th Edition, so the 8th Edition was used for this land use.

Proposed 2009: Trip Generation, 8th Edition, Institute of Transportation Engineers (ITE)

Proposed 2020: Trip Generation, 10th Edition, Institute of Transportation Engineers (ITE)

Existing and Future Fort Sanders West Site Plan

Fort Sanders West is situated on 75 acres of property along Pellissippi Parkway at Kingston Pike. **Figure 2** depicts the existing land uses as well as that which is proposed. A list of existing land use is shown below.

- Medical office building space at Fort Sanders West: MOB I & MOB II: 83,226 square feet
- Executive Office Building: 11,140 square feet
- Commercial Building: 44,018 square feet
- Fort Sanders West Surgery Center and Diagnostic Center: 20,000 square feet
- New KOC Building: 32,963 square feet
- KOC Surgery Building: 31,000 square feet
- Health and Fitness Center at Fort Sanders West: 100,000 square feet including the 25,000 square feet. indoor tennis facility
- Nanny Day Care at Fort Sanders West : 24,000 square feet

All told, Fort Sanders West contains 346,347 square feet of space including the KOSC building that is under construction. The "Commercial Building" contains support services for Fort Sanders West like engineering and maintenance and some Covenant Health Fortress corporate functions.

There is some vacant property south of the Nanny's building and west of the new KOSC building as can be seen in Figure 2. The Fort Sanders West Master Plan calls for the 10.4 vacant acres south of the Nanny's building to be developed as approximately 85,000 square feet of medical office building space split between 2 buildings. Additionally, an Information Technology (IT) building is planned west of the new KOSC building that will house about 60 new employees. The size has not been determined yet. The building site will be west of the new road. From the site plan illustration (Figure 2), it can be seen that the internal road system will be enhanced by the completion of the external loop in the southwest quadrant of the site. This proposed new road will provide a better connection between the Durwood Road Driveway and the south portion of the Fort Sanders West site. The original alignment of the southwest quadrant loop road has been abandoned in favor of a more eastern alignment that places the IT building outside or west of the loop road. An integral part of the current site plan is a walking path around the perimeter of the Fort Sanders West site, and it falls on top of the proposed southwest quadrant loop road alignment.

With the proposed 85,000 square feet of MOB space and new IT building, the Fort Sanders West site will reach build out. Obviously, existing parking lots could be used for building sites, and parking structures built to achieve a higher density of development, but this strategy is not feasible.

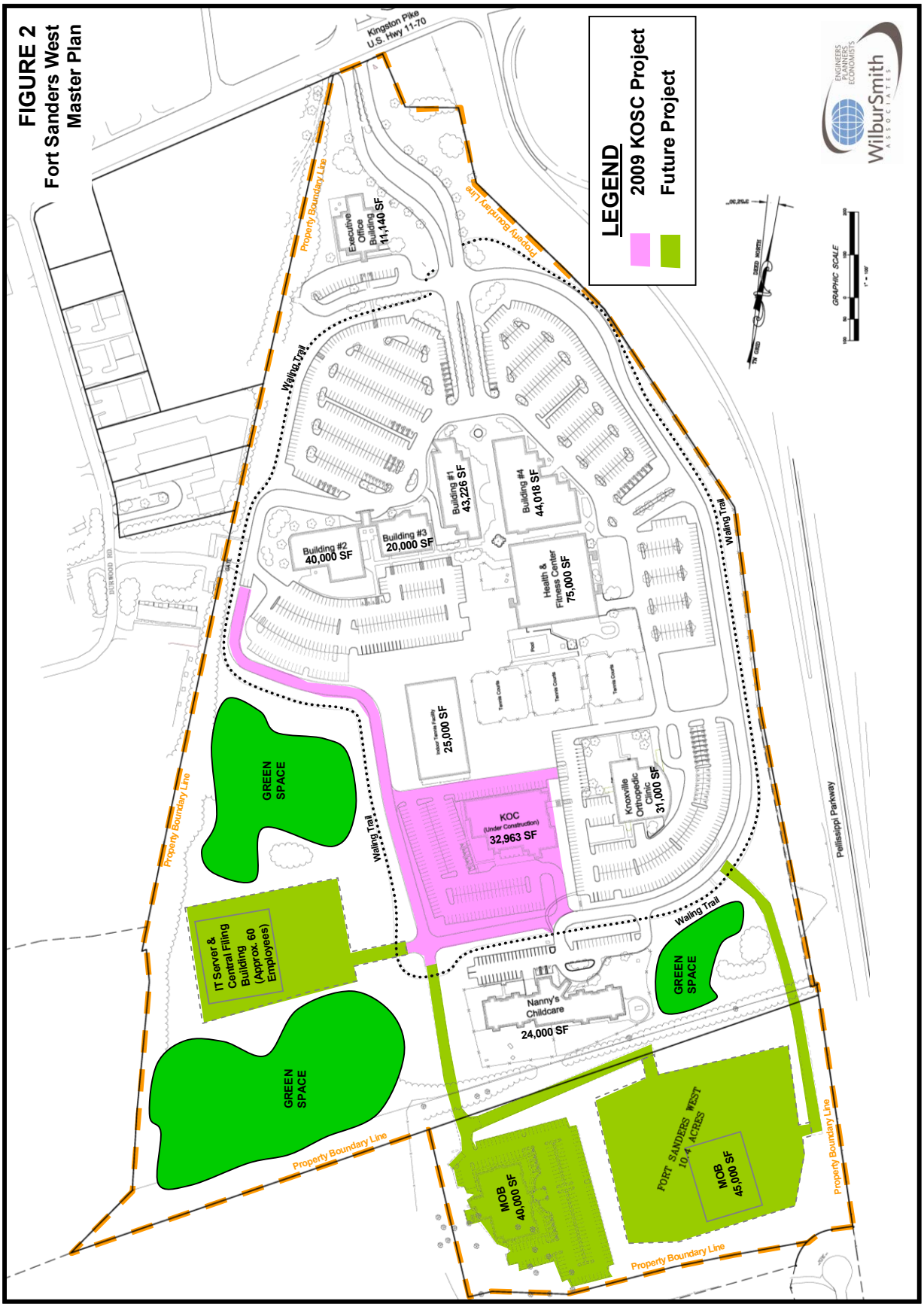


FIGURE 2
Fort Sanders West
Master Plan
LEGEND
2009 KOSC Project
Future Project
Kingston Pike
U.S. Hwy 11-70
Property Boundary Line
Executive Office Building 11,140 SF
Waling Trail
Building #1 43,226 SF
Building #4 44,018 SF
Building #2 40,000 SF
Building #3 20,000 SF
Health & Fitness Center 75,000 SF
25,000 SF
KOC (Under Construction) 32,963 SF
Knoxville Orthopedic Clinic 31,000 SF
Pellissippi Parkway
GREEN SPACE
IT Server & Central Filing Building (Approx. 60 Employees)
Nanny's Childcare 24,000 SF
MOB 40,000 SF
FORT SANDERS WEST 10.4 ACRES
MOB 45,000 SF
GRAPHIC SCALE
WilburSmith ASSOCIATES

FUTURE TRAFFIC CONDITIONS

Trip Generation and Traffic Assignment of New Medical Office Building

According to the Institute of Transportation Engineers' *Trip Generation- 8th Edition*, an 85,000 square foot MOB will generate approximately 840 daily trips with 239 occurring in the morning peak hour and 365 occurring in the afternoon peak hour. The Medical Office Building Code 720 was used to estimate the trip generation of the MOB. **Table 3** summarizes the trip generation anticipated for the 85,000 square feet of MOB space and the 60 employee IT building. Daily and peak hour trips for the IT building were estimated based on the General Office Building category (Code 710) in *Trip Generation*. The IT building should generate about 290 daily trips, bringing the total new daily trips to approximately 1130.

Table 1.

FORT SANDERS WEST TRIP GENERATION

			AM Peak			PM Peak			DAILY		
LAN USE	SIZE	UNIT	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Medical Office Building	85,000	Square Feet	155	41	196	82	223	305	420	420	840
IT Building	60	Employees	38	4	42	10	50	60	145	145	290
	TOTAL		193	45	238	92	273	365	565	565	1130

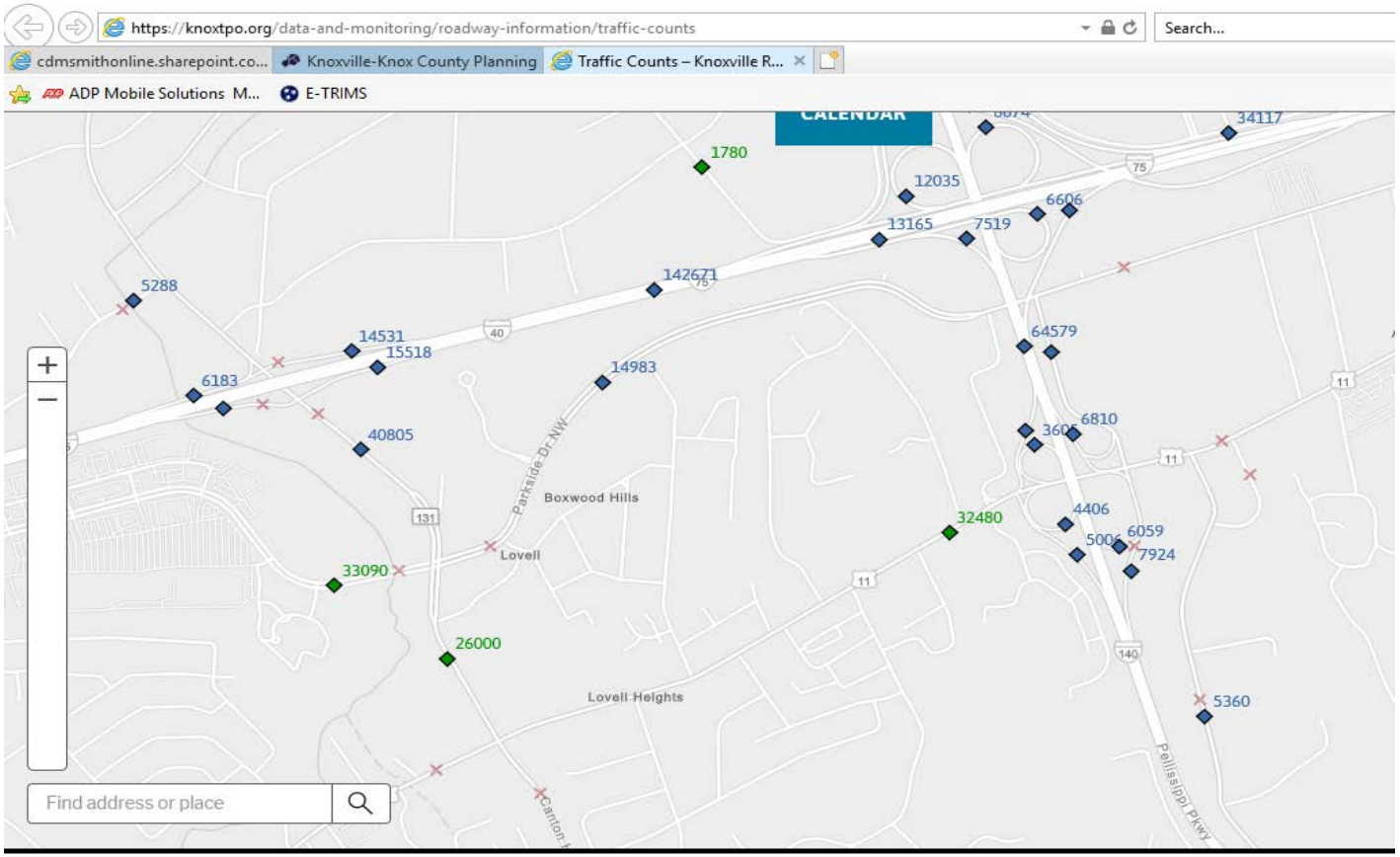
Historical Traffic Counts

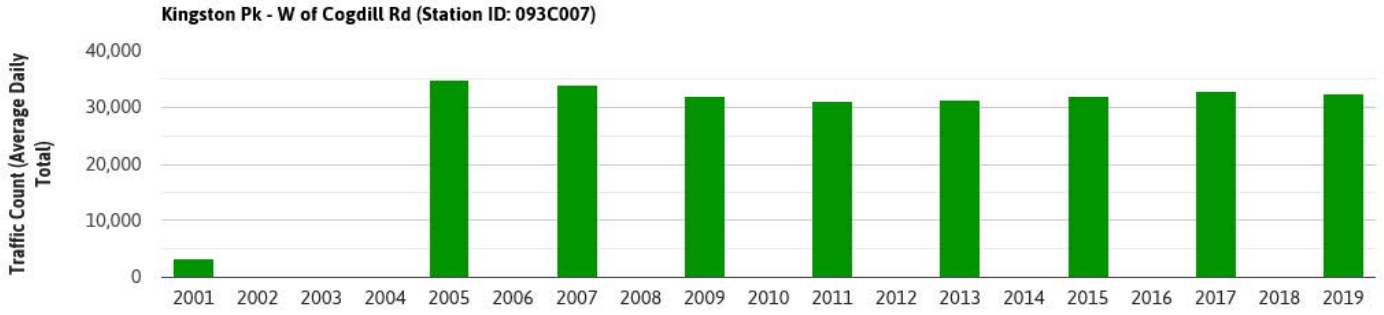
STA: 093C007
Kingston Pk

2009	31989	
2011	30960	
2013	31260	
2015	32090	
2017	32950	
2019	32480	
5-year	0.30%	0.23%
10-year	0.15%	

Primary St Kingston Pk
Cross Stree W of Cogdill Rd

2001	3451
2002	
2003	
2004	
2005	34697
2006	
2007	33920
2008	
2009	31989
2010	
2011	30960
2012	
2013	31260
2014	
2015	32090
2016	
2017	32950
2018	
2019	32480





Turning Movement Counts

AM Peak Hour

CDM Smith

1100 Marion Street, Suite 300
Knoxville, TN 37921
Transportation Services Group

File Name : Fort Sanders West AM
Site Code : 12341234
Start Date : 10/14/2020
Page No : 1

Groups Printed- Unshifted

	Center Park Dr Southbound				Kingston Pk Westbound				Fort Sanders West Northbound				Kingston Pk Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	1	0	1	2	21	130	20	171	1	0	12	13	6	124	2	132	318
07:15 AM	1	0	4	5	65	194	33	292	3	0	8	11	2	123	4	129	437
07:30 AM	5	1	5	11	74	224	43	341	1	4	16	21	9	182	12	203	576
07:45 AM	2	7	7	16	98	282	77	457	11	2	17	30	8	187	16	211	714
Total	9	8	17	34	258	830	173	1261	16	6	53	75	25	616	34	675	2045
08:00 AM	5	5	6	16	58	227	53	338	7	1	15	23	6	176	11	193	570
08:15 AM	7	2	5	14	52	214	43	309	6	0	26	32	7	166	15	188	543
08:30 AM	6	5	3	14	65	257	51	373	4	1	26	31	7	182	12	201	619
08:45 AM	6	3	8	17	56	261	48	365	7	2	20	29	12	192	14	218	629
Total	24	15	22	61	231	959	195	1385	24	4	87	115	32	716	52	800	2361
Grand Total	33	23	39	95	489	1789	368	2646	40	10	140	190	57	1332	86	1475	4406
Apprch %	34.7	24.2	41.1		18.5	67.6	13.9		21.1	5.3	73.7		3.9	90.3	5.8		
Total %	0.7	0.5	0.9	2.2	11.1	40.6	8.4	60.1	0.9	0.2	3.2	4.3	1.3	30.2	2	33.5	

	Center Park Dr Southbound				Kingston Pk Westbound				Fort Sanders West Northbound				Kingston Pk Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	2	**7**	**7**	**16**	**98**	**282**	**77**	**457**	**11**	**2**	17	30	**8**	**187**	**16**	**211**	**714**
08:00 AM	5	5	6	16	58	227	53	338	7	1	15	23	6	176	11	193	570
08:15 AM	**7**	2	5	14	52	214	43	309	6	0	**26**	**32**	7	166	15	188	543
08:30 AM	6	5	3	14	65	257	51	373	4	1	26	31	7	182	12	201	619
Total Volume	20	19	21	60	273	980	224	1477	28	4	84	116	28	711	54	793	2446
% App. Total	33.3	31.7	35		18.5	66.4	15.2		24.1	3.4	72.4		3.5	89.7	6.8		
PHF	.714	.679	.750	.938	.696	.869	.727	.808	.636	.500	.808	.906	.875	.951	.844	.940	.856

CDM Smith

1100 Marion Street, Suite 300
Knoxville, TN 37921
Transportation Services Group

File Name : Fort Sanders West PM
Site Code : 12341234
Start Date : 10/13/2020
Page No : 1

Groups Printed- Unshifted

	Center Park Dr Southbound				Kingston Pk Westbound				Fort Sanders West Northbound				Kingston Pk Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	18	3	16	37	20	268	32	320	12	2	43	57	9	298	11	318	732
04:15 PM	13	1	12	26	32	254	31	317	14	3	48	65	4	249	5	258	666
04:30 PM	16	1	16	33	22	279	25	326	9	0	55	64	5	367	5	377	800
04:45 PM	24	1	20	45	23	286	28	337	15	2	72	89	3	309	10	322	793
Total	71	6	64	141	97	1087	116	1300	50	7	218	275	21	1223	31	1275	2991
05:00 PM	39	1	17	57	15	310	17	342	21	5	73	99	4	376	6	386	884
05:15 PM	11	3	13	27	23	311	17	351	18	1	51	70	8	343	4	355	803
05:30 PM	18	0	13	31	26	279	24	329	15	4	52	71	7	277	7	291	722
05:45 PM	18	0	9	27	15	246	12	273	7	2	36	45	3	279	2	284	629
Total	86	4	52	142	79	1146	70	1295	61	12	212	285	22	1275	19	1316	3038
Grand Total	157	10	116	283	176	2233	186	2595	111	19	430	560	43	2498	50	2591	6029
Apprch %	55.5	3.5	41		6.8	86.1	7.2		19.8	3.4	76.8		1.7	96.4	1.9		
Total %	2.6	0.2	1.9	4.7	2.9	37	3.1	43	1.8	0.3	7.1	9.3	0.7	41.4	0.8	43	

	Center Park Dr Southbound				Kingston Pk Westbound				Fort Sanders West Northbound				Kingston Pk Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	16	1	16	33	22	279	25	326	9	0	55	64	5	367	5	377	800
04:45 PM	24	1	**20**	45	**23**	286	**28**	337	15	2	72	89	3	309	**10**	322	793
05:00 PM	**39**	1	17	**57**	15	310	17	342	**21**	**5**	**73**	**99**	4	**376**	6	**386**	**884**
05:15 PM	11	**3**	13	27	23	**311**	17	**351**	18	1	51	70	**8**	343	4	355	803
Total Volume	90	6	66	162	83	1186	87	1356	63	8	251	322	20	1395	25	1440	3280
% App. Total	55.6	3.7	40.7		6.1	87.5	6.4		19.6	2.5	78		1.4	96.9	1.7		
PHF	.577	.500	.825	.711	.902	.953	.777	.966	.750	.400	.860	.813	.625	.928	.625	.933	.928

Automatic Traffic Counts

Prepared by National Data & Surveying Services

VOLUME

US 11/US 70/SR1/Kingston Pike W/O Cogdill Rd(35.901672, -84.122778)

Day: Wednesday
Date: 10/23/2019

City: Knoxville
Site #: 093C007

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	15,849	16,629	32,478

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
0:00			9		8		17		12:00			220		317		537	
0:15			13		15		28		12:15			329		301		630	
0:30			7		11		18		12:30			284		315		599	
0:45			13	42	10	44	23	86	12:45			337	1170	307	1240	644	2410
1:00			10		14		24		13:00			294		322		616	
1:15			2		10		12		13:15			324		327		651	
1:30			8		5		13		13:30			300		311		611	
1:45			9	29	5	34	14	63	13:45			285	1203	330	1290	615	2493
2:00			3		4		7		14:00			289		316		605	
2:15			7		5		12		14:15			295		333		628	
2:30			8		7		15		14:30			259		269		528	
2:45			7	25	1	17	8	42	14:45			294	1137	351	1269	645	2406
3:00			6		8		14		15:00			310		343		653	
3:15			1		3		4		15:15			282		335		617	
3:30			10		9		19		15:30			311		313		624	
3:45			3	20	6	26	9	46	15:45			338	1241	330	1321	668	2562
4:00			17		8		25		16:00			319		332		651	
4:15			13		9		22		16:15			301		327		628	
4:30			20		9		29		16:30			330		330		660	
4:45			23	73	9	35	32	108	16:45			325	1275	323	1312	648	2587
5:00			17		18		35		17:00			341		349		690	
5:15			43		33		76		17:15			319		331		650	
5:30			63		30		93		17:30			356		339		695	
5:45			47	170	35	116	82	286	17:45			308	1324	278	1297	586	2621
6:00			61		39		100		18:00			332		304		636	
6:15			94		56		150		18:15			278		279		557	
6:30			118		124		242		18:30			225		225		450	
6:45			160	433	155	374	315	807	18:45			211	1046	209	1017	420	2063
7:00			188		203		391		19:00			169		184		353	
7:15			273		245		518		19:15			174		163		337	
7:30			317		277		594		19:30			175		186		361	
7:45			332	1110	280	1005	612	2115	19:45			133	651	175	708	308	1359
8:00			256		256		512		20:00			130		154		284	
8:15			298		259		557		20:15			100		152		252	
8:30			259		250		509		20:30			120		140		260	
8:45			241	1054	283	1048	524	2102	20:45			99	449	121	567	220	1016
9:00			236		247		483		21:00			80		89		169	
9:15			246		251		497		21:15			57		94		151	
9:30			256		245		501		21:30			54		83		137	
9:45			254	992	269	1012	523	2004	21:45			38	229	50	316	88	545
10:00			198		256		454		22:00			37		58		95	
10:15			242		247		489		22:15			44		56		100	
10:30			263		288		551		22:30			28		35		63	
10:45			243	946	304	1095	547	2041	22:45			30	139	29	178	59	317
11:00			272		267		539		23:00			29		26		55	
11:15			259		283		542		23:15			15		15		30	
11:30			248		311		559		23:30			15		28		43	
11:45			245	1024	359	1220	604	2244	23:45			8	67	19	88	27	155
TOTALS				5918		6026		11944	TOTALS				9931		10603		20534
SPLIT %				49.5%		50.5%		36.8%	SPLIT %				48.4%		51.6%		63.2%

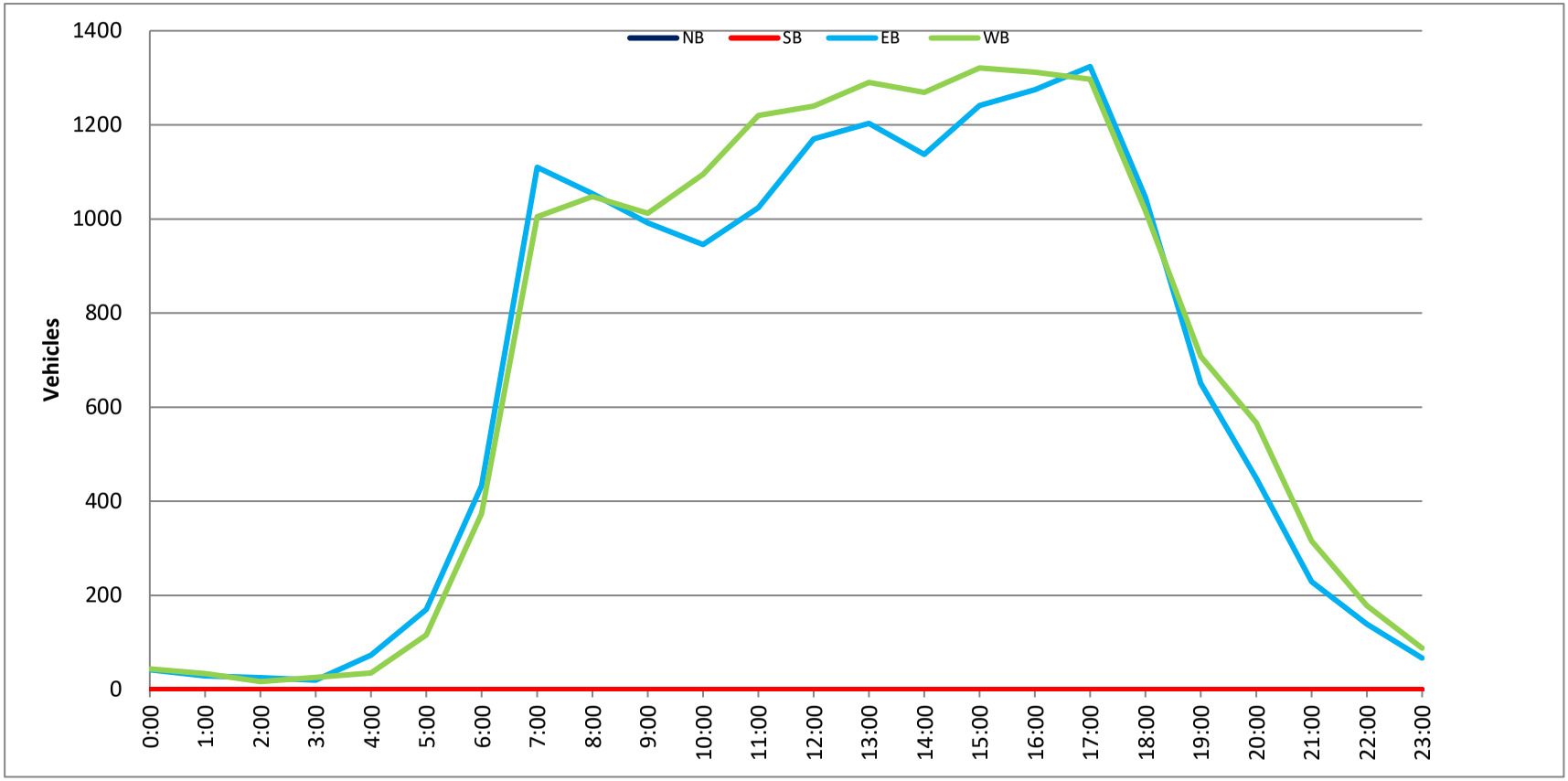
DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	15,849	16,629	32,478

AM Peak Hour			7:30	11:45	11:45	PM Peak Hour	16:45	14:45	16:45
AM Pk Volume			1203	1292	2370	PM Pk Volume	1341	1342	2683
Pk Hr Factor			0.906	0.900	0.940	Pk Hr Factor	0.942	0.956	0.965
7 - 9 Volume	0	0	2164	2053	4217	4 - 6 Volume	0	0	2599	2609	5208
7 - 9 Peak Hour			7:30	7:30	7:30	4 - 6 Peak Hour			16:45	16:45	16:45
7 - 9 Pk Volume	0	0	1203	1072	2275	4 - 6 Pk Volume	0	0	1341	1342	2683
Pk Hr Factor	0.000	0.000	0.906	0.957	0.929	Pk Hr Factor	0.000	0.000	0.942	0.961	0.965

Prepared by National Data & Surveying Services

Project #: 093C007 **City:** Knoxville

Location: US 11/US 70/SR1/Kingston Pike W/O Cogdill **Date:** 10/23/2019



ITE Trip Generation

Nursing Home
(620)

Vehicle Trip Ends vs: **Beds**
On a: **Weekday**

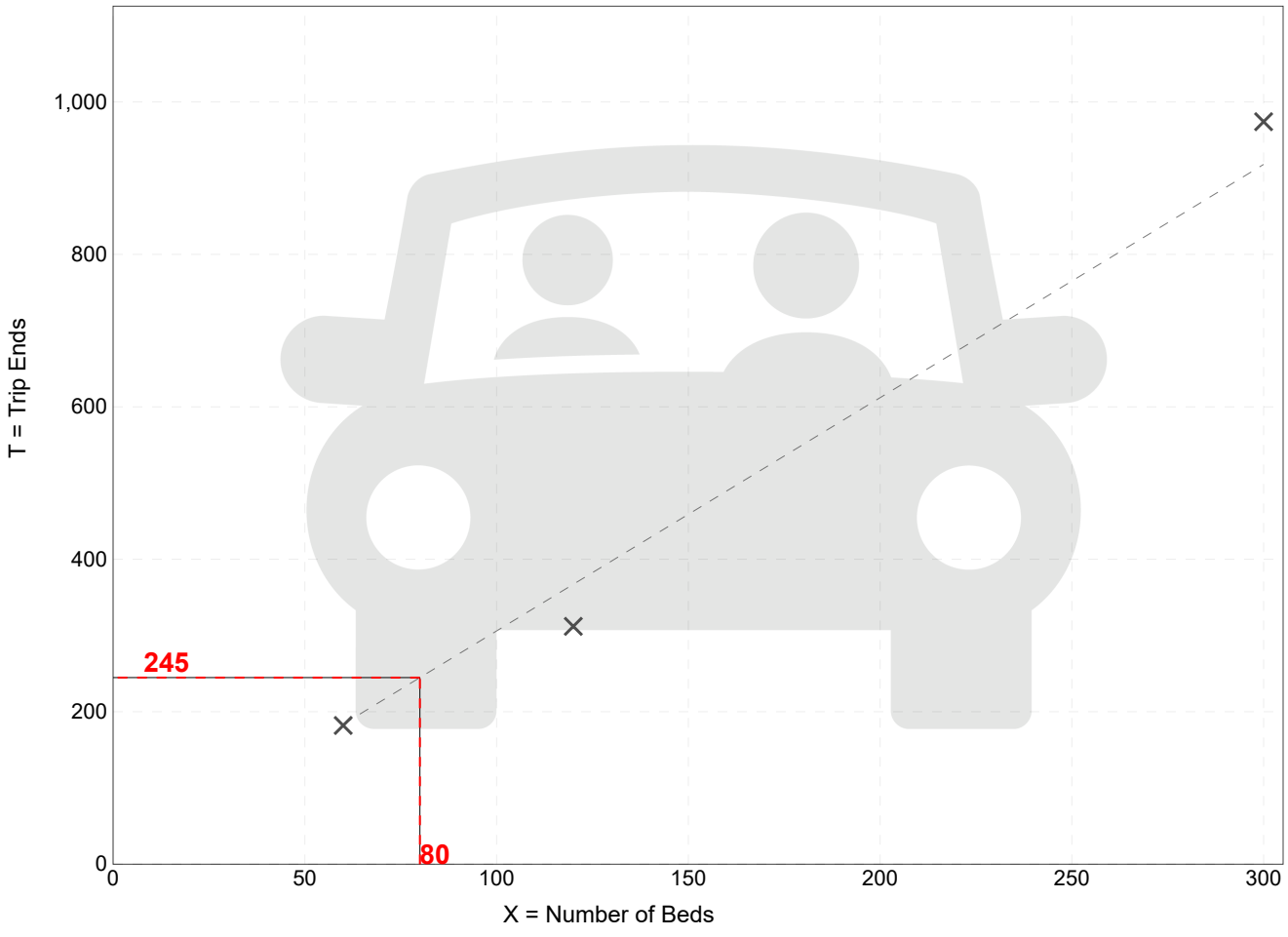
Setting/Location: **General Urban/Suburban**
Number of Studies: 3
Avg. Num. of Beds: 160
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
3.06	2.60 - 3.25	0.33

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= **

Nursing Home
(620)

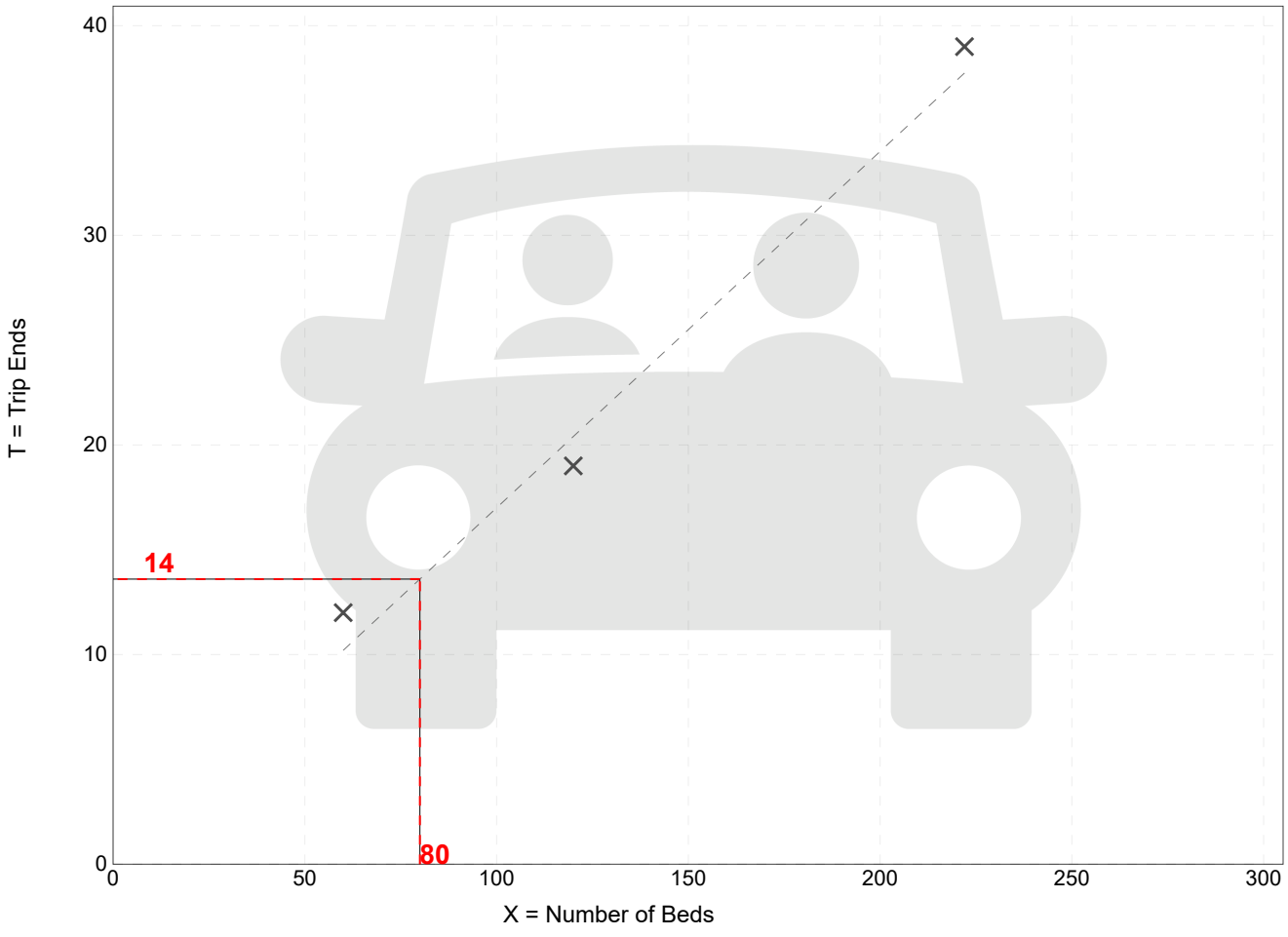
Vehicle Trip Ends vs: **Beds**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 3
Avg. Num. of Beds: 134
Directional Distribution: 72% entering, 28% exiting

Vehicle Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
0.17	0.16 - 0.20	0.02

Data Plot and Equation

Caution – Small Sample Size



× **Study Site** - - - - **Average Rate**

Fitted Curve Equation: Not Given **R^2= ****

Nursing Home
(620)

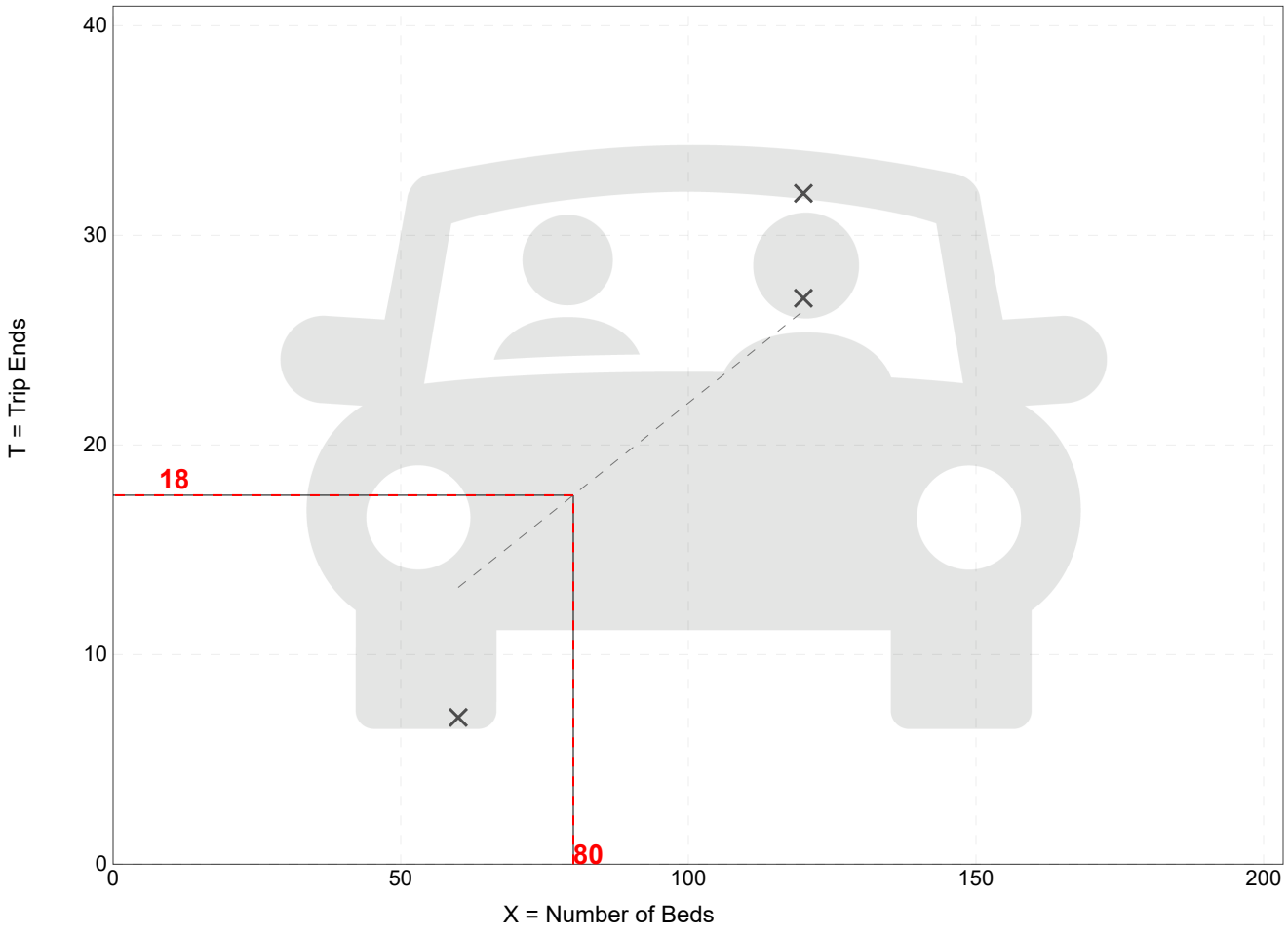
Vehicle Trip Ends vs: **Beds**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 3
Avg. Num. of Beds: 100
Directional Distribution: 33% entering, 67% exiting

Vehicle Trip Generation per Bed

Average Rate	Range of Rates	Standard Deviation
0.22	0.12 - 0.27	0.07

Data Plot and Equation

Caution – Small Sample Size



× **Study Site** - - - - **Average Rate**

Fitted Curve Equation: Not Given **R^2= ****

Signal Timing Files

Database Printout of 1880EL Local
Filename: DATA\INT#4126.EL
Intersection: KINGSTON/DAVID LANE Thu Oct 15 12:42:37 2020

Startup Data:

	Ring 1	2
Start Phases	2	6
UCF Entry Phases	4	8
UCF Exit Phases	2	6

Start Overlaps Yellow at Power-up?	NO	
Start in All Red at Power-up?	NO	
Zone ID:	0	
Controller ID:	0	
Hold 2 sec. Minimum Red Revert?	YES	Red Revert Time: 3.0 sec.
Override Holds if Uniform Code Flash Active?	YES	
Dual Entry 1256?	YES	
Dual Entry 3478?	NO	
Passage Interval Sequential?	YES	
Simultaneous Gap?	NO	
Conditional Service set by Input?	NO	
Conditional Service 1256?	NO	
Conditional Service 3478?	NO	

Timing Data:

Interval	Time by Phase (sec.)							
	1	2	3	4	5	6	7	8
Initial	6	15	0	6	6	15	0	6
Passage	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0
Yellow	4.0	4.5	0.0	4.0	4.0	4.5	0.0	2.0
Red Clear	1.5	1.5	0.0	2.5	1.5	1.5	0.0	2.5
Max 1	20	50	0	25	20	50	0	25
Max 2	25	55	0	30	25	55	0	30
Walk	0	18	0	0	0	18	0	0
Ped Clear	0	0	0	0	0	0	0	0

Max 3 Parameters

	1	2	3	4	5	6	7	8
Adjust (sec.)	0	0	0	0	0	0	0	0
Limit (sec.)	0	0	0	0	0	0	0	0
Set (max outs)	0	0	0	0	0	0	0	0
Clr (gap outs)	0	0	0	0	0	0	0	0

Functions:

	1	2	3	4	5	6	7	8

Min. Recall	N	Y	N	N	N	Y	N	N
Max. Recall	N	Y	N	N	N	Y	N	N
Ped. Recall	N	N	N	N	N	N	N	N
Det. Non-lock	Y	N	Y	Y	Y	N	N	Y
CNA I Active	N	Y	N	N	N	Y	N	N

CNA II Active	N	N	N	N	N	N	N	N
Flashing Walks	N	N	N	N	N	N	N	N
Phase Omitted	N	N	Y	N	N	N	Y	N
Ped Omitted	Y	N	Y	Y	Y	N	Y	Y
Soft Recall	N	N	N	N	N	N	N	N
Ped Cl thru Yel	N	N	N	N	N	N	N	N
Ped Cl thru Red	N	N	N	N	N	N	N	N

Begin Daylight Savings in week: 21
End Daylight Savings in week: 45

Time of Day Changepoints:
Base Day Plan 1

Time	Cycle	Offset	Ckt 1 (Flash)	Ckt 0 (Free)	Ckt 9
00:00	1	3	.	X	.
06:00	2	1	.	.	.
07:00	6	1	.	.	.
09:30	3	1	.	.	.
14:00	3	2	.	.	.
18:30	1	1	.	.	.
23:00	1	3	.	X	.

Base Day Plan 2

Time	Cycle	Offset	Ckt 1 (Flash)	Ckt 0 (Free)	Ckt 9
00:00	1	3	.	X	.
07:00	1	1	.	.	.
08:00	4	1	.	.	.
21:00	1	1	.	.	.
23:00	1	3	.	X	.

Week Plan:

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Plan: 0	2	1	1	1	1	1	2
Plan: 1	0	0	0	0	0	0	0
Plan: 2	0	0	0	0	0	0	0
Plan: 3	0	0	0	0	0	0	0

Plan: 4 0 0 0 0 0 0 0
Plan: 5 0 0 0 0 0 0 0
Plan: 6 0 0 0 0 0 0 0
Plan: 7 0 0 0 0 0 0 0
Plan: 8 0 0 0 0 0 0 0
Plan: 9 0 0 0 0 0 0 0

Week Plan Implementation:

Week 1: 0 Week 14: 0 Week 27: 0 Week 40: 0

Week 2: 0 Week 15: 0 Week 28: 0 Week 41: 0
Week 3: 0 Week 16: 0 Week 29: 0 Week 42: 0
Week 4: 0 Week 17: 0 Week 30: 0 Week 43: 0
Week 5: 0 Week 18: 0 Week 31: 15 Week 44: 0
Week 6: 0 Week 19: 0 Week 32: 0 Week 45: 0
Week 7: 0 Week 20: 0 Week 33: 0 Week 46: 0
Week 8: 0 Week 21: 0 Week 34: 0 Week 47: 0
Week 9: 0 Week 22: 0 Week 35: 0 Week 48: 15
Week 10: 0 Week 23: 0 Week 36: 0 Week 49: 0
Week 11: 0 Week 24: 0 Week 37: 0 Week 50: 0
Week 12: 0 Week 25: 0 Week 38: 0 Week 51: 0
Week 13: 0 Week 26: 0 Week 39: 0 Week 52: 0

Special Day Plan Implementation (Plan-Week-Day):

Slot 1 0 - 0 - 0 Slot 18 0 - 0 - 0 Slot 35 0 - 0 - 0
Slot 2 0 - 0 - 0 Slot 19 0 - 0 - 0 Slot 36 0 - 0 - 0
Slot 3 0 - 0 - 0 Slot 20 0 - 0 - 0 Slot 37 0 - 0 - 0
Slot 4 0 - 0 - 0 Slot 21 0 - 0 - 0 Slot 38 0 - 0 - 0
Slot 5 0 - 0 - 0 Slot 22 0 - 0 - 0 Slot 39 0 - 0 - 0
Slot 6 0 - 0 - 0 Slot 23 0 - 0 - 0 Slot 40 0 - 0 - 0
Slot 7 0 - 0 - 0 Slot 24 0 - 0 - 0 Slot 41 0 - 0 - 0
Slot 8 0 - 0 - 0 Slot 25 0 - 0 - 0 Slot 42 0 - 0 - 0
Slot 9 0 - 0 - 0 Slot 26 0 - 0 - 0 Slot 43 0 - 0 - 0
Slot 10 0 - 0 - 0 Slot 27 0 - 0 - 0 Slot 44 0 - 0 - 0
Slot 11 0 - 0 - 0 Slot 28 0 - 0 - 0 Slot 45 0 - 0 - 0
Slot 12 0 - 0 - 0 Slot 29 0 - 0 - 0 Slot 46 0 - 0 - 0
Slot 13 0 - 0 - 0 Slot 30 0 - 0 - 0 Slot 47 0 - 0 - 0
Slot 14 0 - 0 - 0 Slot 31 0 - 0 - 0 Slot 48 0 - 0 - 0
Slot 15 0 - 0 - 0 Slot 32 0 - 0 - 0 Slot 49 0 - 0 - 0
Slot 16 0 - 0 - 0 Slot 33 0 - 0 - 0 Slot 50 0 - 0 - 0
Slot 17 0 - 0 - 0 Slot 34 0 - 0 - 0

Coordination Operating Modes:

4 Splits / 4 Cycles?	NO
Unused Cycle Time to Side St.?	NO
Ckt 4 enables Aux TOD?	NO
Offset Interruption?	NO
Cycle 4 = 2 A.M. Sync?	NO
Split 2 = 2 A.M. Sync?	NO
Flash with Ckt 1?	NO
Invert Free Output?	NO
Auto Permissive?	NO
Cycle 4 = Flash?	NO
Enable Max 2 with Ckt 9?	NO
Conditional Service with Ckt 9?	NO
Invert Free Input?	NO
Activate CNA 1?	YES

Activate Walk Rest Modifier?	YES
Inhibit Max Termination?	YES
Enhanced Permissive?	NO
Use Split Matrix?	YES
Use Yellow Offset Timer?	NO
Interconnect?	NO
Maximum Dwell Time:	25 sec.
Full Dwell?	NO
Short Route?	NO

Phase Relationships:

	Ring 1 - 2
Hold 1 Phases	2 - 6
Hold 1 Omit Phases	0 - 0
Hold 2 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Ped Omit	0 - 0
Non Early Release Phases	0 - 0
Non Early Release Phases	0 - 0
Non Early Release Phases	0 - 0
Phases Omitted w/ Ckt 9	0 - 0
Phases Omitted w/ Ckt 9	0 - 0
Peds Omitted w/ Ckt 9	0 - 0

Phase	Reverse by	Cyc - Ofst
1 - 2		0 - 0
1 - 2		0 - 0
5 - 6		0 - 0
5 - 6		0 - 0
3 - 4		0 - 0
3 - 4		0 - 0
7 - 8		0 - 0
7 - 8		0 - 0

Split Plans:

	Percent per Phase								Permissives					
	1	2	3	4	5	6	7	8	Begin	End	Begin	End	Begin	End
Split 1	21	53	0	26	21	53	0	26	0	10	0	20	0	30
Split 2	15	64	0	21	15	64	0	21	0	10	0	20	0	30
Split 3	13	64	0	23	13	64	0	23	0	10	0	20	0	30
Split 4	13	67	0	20	13	67	0	20	0	10	0	20	0	30
Split 5	14	68	0	18	14	68	0	18	0	10	0	20	0	30
Split 6	11	64	0	25	11	64	0	25	0	20	0	30	0	40
Split 7	15	67	0	18	15	67	0	18	0	20	0	30	0	40
Split 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Split 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 13	16	52	16	16	16	52	16	16	0	20	0	30	0	40	
Split 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Split Matrix:

	Offset				
Cycle	1	2	3	4	5
1	1	0	0	0	0
2	2	0	0	0	0
3	3	4	0	0	0
4	5	0	0	0	0
5	6	0	0	0	0
6	7	0	0	0	0

Offset Times:

Cycle	Offset 1	2	3	4	5
1	52	0	0	0	0
2	77	0	0	0	0
3	34	7	0	0	0
4	46	0	0	0	0
5	63	0	0	0	0
6	59	0	0	0	0

Cycle Times:

Cycle	
1	95 sec.
2	100 sec.
3	120 sec.
4	125 sec.
5	135 sec.
6	130 sec.

Closed Loop Options:

TOD Flash/Aux? NO
Free w/ Ckt 0? YES

Report Channel Failures to Central
Conflict Flash   (3) Occurence and Resume Normal

Manual/Auto Flash   (3) Occurence and Resume Normal
MCE   (3) Occurence and Resume Normal
Preempt   (0) Auto-log only
Channel # 5   (0) Auto-log only
Channel # 6   (0) Auto-log only
Channel # 7   (0) Auto-log only
Channel # 8   (0) Auto-log only
Door Open   (3) Occurence and Resume Normal

Main Street Phs for Out of Step Test
Ring 1 - 2
2 - 6

Speed Trap Sensor Pairs
1-2 3-4 5-6 7-8

NO NO NO NO

Standard Overlaps:

Internal Overlap Program? YES

Program	Phase 1	2	3	4	5	6	7	8
Ovl A	.	.	.	.	.	.	.	.
Ovl B	.	.	.	.	.	.	.	.
Ovl C	.	.	.	.	.	.	.	.
Ovl D	.	.	.	.	.	.	.	.

Detector Switching:

Programmed Active? NO
No Detector Switching is Programmed

Exclusive Pedestrian Settings:

Programmed Active? NO
Flashing Walks? NO
Input code: Normal

	Ring 1 - 2
Parent Phase	0 - 0

Timing

Walk	0
Ped Clear	0
Red Clear	0.0

Plan: 4 0 0 0 0 0 0 0
Plan: 5 0 0 0 0 0 0 0
Plan: 6 0 0 0 0 0 0 0
Plan: 7 0 0 0 0 0 0 0
Plan: 8 0 0 0 0 0 0 0
Plan: 9 0 0 0 0 0 0 0

Week Plan Implementation:

Week 1: 0 Week 14: 0 Week 27: 0 Week 40: 0

Week 2: 0 Week 15: 0 Week 28: 0 Week 41: 0
Week 3: 0 Week 16: 0 Week 29: 0 Week 42: 0
Week 4: 0 Week 17: 0 Week 30: 0 Week 43: 0
Week 5: 0 Week 18: 0 Week 31: 0 Week 44: 0
Week 6: 0 Week 19: 0 Week 32: 0 Week 45: 0
Week 7: 0 Week 20: 0 Week 33: 0 Week 46: 0
Week 8: 0 Week 21: 0 Week 34: 0 Week 47: 0
Week 9: 0 Week 22: 0 Week 35: 0 Week 48: 0
Week 10: 0 Week 23: 0 Week 36: 0 Week 49: 0
Week 11: 0 Week 24: 0 Week 37: 0 Week 50: 0
Week 12: 0 Week 25: 0 Week 38: 0 Week 51: 0
Week 13: 0 Week 26: 0 Week 39: 0 Week 52: 0

Special Day Plan Implementation (Plan-Week-Day):

Slot 1 0 - 0 - 0 Slot 18 0 - 0 - 0 Slot 35 0 - 0 - 0
Slot 2 0 - 0 - 0 Slot 19 0 - 0 - 0 Slot 36 0 - 0 - 0
Slot 3 0 - 0 - 0 Slot 20 0 - 0 - 0 Slot 37 0 - 0 - 0
Slot 4 0 - 0 - 0 Slot 21 0 - 0 - 0 Slot 38 0 - 0 - 0
Slot 5 0 - 0 - 0 Slot 22 0 - 0 - 0 Slot 39 0 - 0 - 0
Slot 6 0 - 0 - 0 Slot 23 0 - 0 - 0 Slot 40 0 - 0 - 0
Slot 7 0 - 0 - 0 Slot 24 0 - 0 - 0 Slot 41 0 - 0 - 0
Slot 8 0 - 0 - 0 Slot 25 0 - 0 - 0 Slot 42 0 - 0 - 0
Slot 9 0 - 0 - 0 Slot 26 0 - 0 - 0 Slot 43 0 - 0 - 0
Slot 10 0 - 0 - 0 Slot 27 0 - 0 - 0 Slot 44 0 - 0 - 0
Slot 11 0 - 0 - 0 Slot 28 0 - 0 - 0 Slot 45 0 - 0 - 0
Slot 12 0 - 0 - 0 Slot 29 0 - 0 - 0 Slot 46 0 - 0 - 0
Slot 13 0 - 0 - 0 Slot 30 0 - 0 - 0 Slot 47 0 - 0 - 0
Slot 14 0 - 0 - 0 Slot 31 0 - 0 - 0 Slot 48 0 - 0 - 0
Slot 15 0 - 0 - 0 Slot 32 0 - 0 - 0 Slot 49 0 - 0 - 0
Slot 16 0 - 0 - 0 Slot 33 0 - 0 - 0 Slot 50 0 - 0 - 0
Slot 17 0 - 0 - 0 Slot 34 0 - 0 - 0

Coordination Operating Modes:

4 Splits / 4 Cycles?	NO
Unused Cycle Time to Side St.?	NO
Ckt 4 enables Aux TOD?	NO
Offset Interruption?	NO
Cycle 4 = 2 A.M. Sync?	NO
Split 2 = 2 A.M. Sync?	NO
Flash with Ckt 1?	NO
Invert Free Output?	NO
Auto Permissive?	YES
Cycle 4 = Flash?	NO
Enable Max 2 with Ckt 9?	NO
Conditional Service with Ckt 9?	NO
Invert Free Input?	NO
Activate CNA 1?	YES

Activate Walk Rest Modifier?	YES
Inhibit Max Termination?	YES
Enhanced Permissive?	NO
Use Split Matrix?	YES
Use Yellow Offset Timer?	NO
Interconnect?	NO
Maximum Dwell Time:	25 sec.
Full Dwell?	NO
Short Route?	YES

Phase Relationships:

	Ring 1 - 2
Hold 1 Phases	2 - 6
Hold 1 Omit Phases	0 - 0
Hold 2 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Ped Omit	0 - 0
Non Early Release Phases	0 - 0
Non Early Release Phases	0 - 0
Non Early Release Phases	0 - 0
Phases Omitted w/ Ckt 9	0 - 0
Phases Omitted w/ Ckt 9	0 - 0
Peds Omitted w/ Ckt 9	0 - 0

Phase Reverse by	Cyc - Ofst
1 - 2	0 - 0
1 - 2	0 - 0
5 - 6	0 - 0
5 - 6	0 - 0
3 - 4	0 - 0
3 - 4	0 - 0
7 - 8	0 - 0
7 - 8	0 - 0

Split Plans:

	Percent per Phase								Permissives					
	1	2	3	4	5	6	7	8	Begin	End	Begin	End	Begin	End
Split 1	18	41	21	20	18	41	21	20	0	20	0	30	0	40
Split 2	28	39	16	17	16	51	16	17	0	20	0	30	0	40
Split 3	18	49	18	15	13	54	18	15	0	20	0	30	0	40
Split 4	20	48	18	14	13	55	18	14	0	20	0	30	0	40
Split 5	13	60	13	14	13	60	13	14	0	20	0	30	0	40
Split 6	19	44	24	13	12	51	24	13	0	20	0	30	0	40
Split 7	31	44	12	13	12	63	12	13	0	20	0	30	0	40
Split 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Split 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Split Matrix:

	Offset				
Cycle	1	2	3	4	5
1	1	0	0	0	0
2	2	0	0	0	0
3	3	4	0	0	0
4	5	0	0	0	0
5	6	0	0	0	0
6	7	0	0	0	0

Offset Times:

Cycle	Offset _1	2	3	4	5
1	17	0	0	0	0
2	75	0	0	0	0
3	97	1	0	0	0
4	71	0	0	0	0
5	43	0	0	0	0
6	56	0	0	0	0

Cycle Times:

Cycle	
1	95 sec.
2	100 sec.
3	120 sec.
4	125 sec.
5	135 sec.
6	130 sec.

Sync Reference:

Time: 00:00
Sync with Event Time? NO

City Zero:

Active? NO

Cycle	Reference Time
1	0
2	0
3	0
4	0
5	0
6	0

Closed Loop Options:

TOD Flash/Aux? NO
Free w/ Ckt 0? YES

Report Channel Failures to Central

Conflict Flash	(3) Occurence and Resume Normal
Manual/Auto Flash	(3) Occurence and Resume Normal
MCE	(3) Occurence and Resume Normal
Preempt	(0) Auto-log only
Channel# 5	(0) Auto-log only
Channel# 6	(0) Auto-log only
Channel# 7	(0) Auto-log only
Channel# 8	(0) Auto-log only
Door Open	(3) Occurence and Resume Normal

Main Street Phs for Out of Step Test
Ring 1 - 2
2 - 6

Speed Trap Sensor Pairs

1-2	3-4	5-6	7-8
NO	NO	NO	NO

Standard Overlaps:

Internal Overlap Program? YES

Program	Phase 1	2	3	4	5	6	7	8
Ovl A	.	.	.	.	.	.	.	.
Ovl B	.	.	.	.	.	.	.	.
Ovl C	.	.	.	.	.	.	.	.
Ovl D	.	.	.	.	.	.	.	.

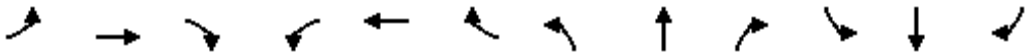
Reverse Phases	1 - 2	3 - 4	5 - 6	7 - 8
	NO	NO	NO	NO

Detector Switching:

Programmed Active? NO
No Detector Switching is Programmed

Synchro HCM Reports

-2020 AM Model



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	1026	125	592	998	259	47	11	135	20	46	29
Future Volume (vph)	57	1026	125	592	998	259	47	11	135	20	46	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3482		3433	3539	1583		1790	1583	1770	1754	
Flt Permitted	0.27	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (perm)	496	3482		3433	3539	1583		1790	1583	1770	1754	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	61	1103	134	637	1073	278	51	12	145	22	49	31
RTOR Reduction (vph)	0	7	0	0	0	71	0	0	87	0	18	0
Lane Group Flow (vph)	61	1230	0	637	1073	207	0	63	58	22	62	0
Turn Type	pm+pt	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		3	3	1	4	4	
Permitted Phases	2					6			3			
Actuated Green, G (s)	59.5	49.5		34.5	73.5	73.5		12.5	47.0	9.5	9.5	
Effective Green, g (s)	59.5	49.5		34.5	73.5	73.5		12.5	47.0	9.5	9.5	
Actuated g/C Ratio	0.46	0.38		0.27	0.57	0.57		0.10	0.36	0.07	0.07	
Clearance Time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Vehicle Extension (s)	3.0	2.0		4.0	2.0	2.0		2.0	4.0	2.0	2.0	
Lane Grp Cap (vph)	325	1325		911	2000	895		172	572	129	128	
v/s Ratio Prot	0.01	c0.35		c0.19	0.30			c0.04	0.03	0.01	c0.04	
v/s Ratio Perm	0.07					0.13			0.01			
v/c Ratio	0.19	0.93		0.70	0.54	0.23		0.37	0.10	0.17	0.49	
Uniform Delay, d1	19.8	38.5		43.1	17.6	14.1		55.0	27.5	56.6	57.9	
Progression Factor	1.24	1.14		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	10.1		4.4	1.0	0.6		5.9	0.4	2.8	12.7	
Delay (s)	25.5	54.0		47.5	18.7	14.7		61.0	27.8	59.4	70.6	
Level of Service	C	D		D	B	B		E	C	E	E	
Approach Delay (s)		52.7			27.4			37.9			68.2	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1218	62	105	854	7	39
Future Volume (Veh/h)	1218	62	105	854	7	39
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1310	67	113	918	8	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)	752			817		
pX, platoon unblocked			0.67		0.75	0.67
vC, conflicting volume			1377		2028	688
vC1, stage 1 conf vol					1344	
vC2, stage 2 conf vol					685	
vCu, unblocked vol			569		698	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			83		98	94
cM capacity (veh/h)			667		350	724

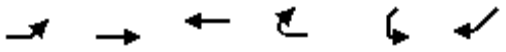
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	873	504	113	459	459	50
Volume Left	0	0	113	0	0	8
Volume Right	0	67	0	0	0	42
cSH	1700	1700	667	1700	1700	618
Volume to Capacity	0.51	0.30	0.17	0.27	0.27	0.08
Queue Length 95th (ft)	0	0	15	0	0	7
Control Delay (s)	0.0	0.0	11.5	0.0	0.0	11.3
Lane LOS			B			B
Approach Delay (s)	0.0		1.3			11.3
Approach LOS						B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1370	31	79	854	42	58	1	67	6	2	3
Future Volume (vph)	20	1370	31	79	854	42	58	1	67	6	2	3
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			4.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.93			0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)	1770	3528		1770	3514			1690			1747	
Flt Permitted	0.23	1.00		0.08	1.00			0.86			0.87	
Satd. Flow (perm)	422	3528		141	3514			1486			1564	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	1473	33	85	918	45	62	1	72	6	2	3
RTOR Reduction (vph)	0	1	0	0	3	0	0	29	0	0	2	0
Lane Group Flow (vph)	22	1505	0	85	960	0	0	106	0	0	9	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	85.9	71.4		85.9	71.4			28.1			26.1	
Effective Green, g (s)	85.9	71.4		85.9	71.4			28.1			26.1	
Actuated g/C Ratio	0.66	0.55		0.66	0.55			0.22			0.20	
Clearance Time (s)	5.5	6.0		5.5	6.0			4.5			6.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	429	1937		274	1929			321			314	
v/s Ratio Prot	0.01	c0.43		c0.03	0.27							
v/s Ratio Perm	0.03			0.17				c0.07			0.01	
v/c Ratio	0.05	0.78		0.31	0.50			0.33			0.03	
Uniform Delay, d1	8.7	23.0		16.3	18.2			43.0			41.7	
Progression Factor	1.00	1.00		2.94	0.40			1.00			1.00	
Incremental Delay, d2	0.2	3.1		2.7	0.8			2.7			0.2	
Delay (s)	9.0	26.2		50.5	8.1			45.7			41.9	
Level of Service	A	C		D	A			D			D	
Approach Delay (s)		25.9			11.5			45.7			41.9	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



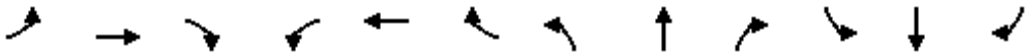
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑	↑↑			↱↱
Traffic Volume (veh/h)	0	1181	901	0	0	948
Future Volume (Veh/h)	0	1181	901	0	0	948
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	1270	969	0	0	1019
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)		246				
pX, platoon unblocked					0.66	
vC, conflicting volume	969				1604	484
vC1, stage 1 conf vol					969	
vC2, stage 2 conf vol					635	
vCu, unblocked vol	969				889	484
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	707				312	528

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1	SW 2
Volume Total	635	635	484	484	510	510
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	510	510
cSH	1700	1700	1700	1700	528	528
Volume to Capacity	0.37	0.37	0.28	0.28	0.96	0.96
Queue Length 95th (ft)	0	0	0	0	317	317
Control Delay (s)	0.0	0.0	0.0	0.0	58.7	58.7
Lane LOS					F	F
Approach Delay (s)	0.0		0.0		58.7	
Approach LOS					F	

Intersection Summary			
Average Delay	18.4		
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

Synchro HCM Reports

-2020 PM Model



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1121	46	263	1221	60	148	26	403	105	26	63
Future Volume (vph)	23	1121	46	263	1221	60	148	26	403	105	26	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3518		3433	3539	1583		1787	1583	1770	1665	
Flt Permitted	0.11	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (perm)	204	3518		3433	3539	1583		1787	1583	1770	1665	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	24	1156	47	271	1259	62	153	27	415	108	27	65
RTOR Reduction (vph)	0	2	0	0	0	34	0	0	61	0	60	0
Lane Group Flow (vph)	24	1201	0	271	1259	28	0	180	354	108	32	0
Turn Type	pm+pt	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		3	3	1	4	4	
Permitted Phases	2					6			3			
Actuated Green, G (s)	56.7	46.7		18.5	54.7	54.7		21.3	39.8	9.5	9.5	
Effective Green, g (s)	56.7	46.7		18.5	54.7	54.7		21.3	39.8	9.5	9.5	
Actuated g/C Ratio	0.47	0.39		0.15	0.46	0.46		0.18	0.33	0.08	0.08	
Clearance Time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Vehicle Extension (s)	3.0	2.0		4.0	2.0	2.0		2.0	4.0	2.0	2.0	
Lane Grp Cap (vph)	226	1369		529	1613	721		317	525	140	131	
v/s Ratio Prot	0.01	c0.34		0.08	c0.36			0.10	c0.10	c0.06	0.02	
v/s Ratio Perm	0.04					0.02			0.12			
v/c Ratio	0.11	0.88		0.51	0.78	0.04		0.57	0.67	0.77	0.25	
Uniform Delay, d1	19.4	34.0		46.6	27.6	18.1		45.1	34.5	54.2	51.9	
Progression Factor	1.21	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	7.8		3.5	3.8	0.1		7.2	6.8	32.9	4.4	
Delay (s)	24.4	41.6		50.1	31.4	18.2		52.3	41.3	87.1	56.3	
Level of Service	C	D		D	C	B		D	D	F	E	
Approach Delay (s)		41.3			34.1			44.7			72.9	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	40.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1027	23	55	1309	15	94
Future Volume (Veh/h)	1027	23	55	1309	15	94
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1059	24	57	1349	15	97
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)	752			817		
pX, platoon unblocked			0.80		0.80	0.80
vC, conflicting volume			1083		1860	542
vC1, stage 1 conf vol					1071	
vC2, stage 2 conf vol					788	
vCu, unblocked vol			594		442	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			93		96	89
cM capacity (veh/h)			779		407	864

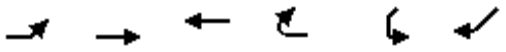
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	706	377	57	674	674	112
Volume Left	0	0	57	0	0	15
Volume Right	0	24	0	0	0	97
cSH	1700	1700	779	1700	1700	751
Volume to Capacity	0.42	0.22	0.07	0.40	0.40	0.15
Queue Length 95th (ft)	0	0	6	0	0	13
Control Delay (s)	0.0	0.0	10.0	0.0	0.0	10.6
Lane LOS			A			B
Approach Delay (s)	0.0		0.4			10.6
Approach LOS						B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	937	23	70	1251	5	75	1	53	70	2	22
Future Volume (vph)	24	937	23	70	1251	5	75	1	53	70	2	22
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			4.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.96	
Satd. Flow (prot)	1770	3526		1770	3537			1709			1739	
Flt Permitted	0.09	1.00		0.19	1.00			0.79			0.71	
Satd. Flow (perm)	174	3526		355	3537			1384			1284	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	25	966	24	72	1290	5	77	1	55	72	2	23
RTOR Reduction (vph)	0	2	0	0	1	0	0	17	0	0	8	0
Lane Group Flow (vph)	25	988	0	72	1294	0	0	116	0	0	89	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	67.8	57.3		67.8	57.3			36.2			34.2	
Effective Green, g (s)	67.8	57.3		67.8	57.3			36.2			34.2	
Actuated g/C Ratio	0.56	0.48		0.56	0.48			0.30			0.29	
Clearance Time (s)	5.5	6.0		5.5	6.0			4.5			6.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	237	1683		324	1688			417			365	
v/s Ratio Prot	0.01	0.28		c0.02	c0.37							
v/s Ratio Perm	0.05			0.11				c0.08			0.07	
v/c Ratio	0.11	0.59		0.22	0.77			0.28			0.24	
Uniform Delay, d1	16.1	22.8		13.7	25.8			31.9			33.0	
Progression Factor	1.00	1.00		0.54	0.35			1.00			1.00	
Incremental Delay, d2	0.9	1.5		1.1	2.5			1.6			1.6	
Delay (s)	17.0	24.3		8.5	11.6			33.6			34.6	
Level of Service	B	C		A	B			C			C	
Approach Delay (s)		24.1			11.4			33.6			34.6	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



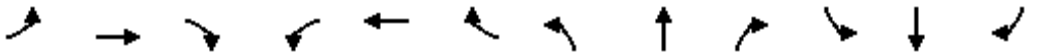
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	1629	982	0	0	562
Future Volume (Veh/h)	0	1629	982	0	0	562
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	1679	1012	0	0	579
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)		246				
pX, platoon unblocked					0.68	
vC, conflicting volume	1012				1852	506
vC1, stage 1 conf vol					1012	
vC2, stage 2 conf vol					840	
vCu, unblocked vol	1012				1315	506
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	681				287	512

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1	SW 2
Volume Total	840	840	506	506	290	290
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	290	290
cSH	1700	1700	1700	1700	512	512
Volume to Capacity	0.49	0.49	0.30	0.30	0.57	0.57
Queue Length 95th (ft)	0	0	0	0	87	87
Control Delay (s)	0.0	0.0	0.0	0.0	20.8	20.8
Lane LOS					C	C
Approach Delay (s)	0.0		0.0		20.8	
Approach LOS					C	

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

Synchro HCM Reports

-2025 Background AM Model



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	1051	128	606	1023	265	48	12	139	20	47	30
Future Volume (vph)	59	1051	128	606	1023	265	48	12	139	20	47	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3481		3433	3539	1583		1791	1583	1770	1755	
Flt Permitted	0.26	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (perm)	483	3481		3433	3539	1583		1791	1583	1770	1755	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	63	1130	138	652	1100	285	52	13	149	22	51	32
RTOR Reduction (vph)	0	7	0	0	0	70	0	0	87	0	18	0
Lane Group Flow (vph)	63	1261	0	652	1100	215	0	65	62	22	65	0
Turn Type	pm+pt	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		3	3	1	4	4	
Permitted Phases	2					6			3			
Actuated Green, G (s)	60.0	50.0		34.5	74.0	74.0		12.0	46.5	9.5	9.5	
Effective Green, g (s)	60.0	50.0		34.5	74.0	74.0		12.0	46.5	9.5	9.5	
Actuated g/C Ratio	0.46	0.38		0.27	0.57	0.57		0.09	0.36	0.07	0.07	
Clearance Time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Vehicle Extension (s)	3.0	2.0		4.0	2.0	2.0		2.0	4.0	2.0	2.0	
Lane Grp Cap (vph)	321	1338		911	2014	901		165	566	129	128	
v/s Ratio Prot	0.02	c0.36		c0.19	0.31			c0.04	0.03	0.01	c0.04	
v/s Ratio Perm	0.08					0.14			0.01			
v/c Ratio	0.20	0.94		0.72	0.55	0.24		0.39	0.11	0.17	0.51	
Uniform Delay, d1	19.5	38.6		43.3	17.5	14.0		55.6	27.9	56.6	58.0	
Progression Factor	1.23	1.13		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	11.3		4.8	1.1	0.6		6.9	0.4	2.8	13.8	
Delay (s)	25.1	55.1		48.1	18.6	14.6		62.5	28.3	59.4	71.8	
Level of Service	C	E		D	B	B		E	C	E	E	
Approach Delay (s)		53.7			27.5			38.7			69.2	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	38.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1248	64	107	876	7	40
Future Volume (Veh/h)	1248	64	107	876	7	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1342	69	115	942	8	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)	752			817		
pX, platoon unblocked			0.66		0.75	0.66
vC, conflicting volume			1411		2078	706
vC1, stage 1 conf vol					1376	
vC2, stage 2 conf vol					701	
vCu, unblocked vol			591		713	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			82		98	94
cM capacity (veh/h)			647		338	715

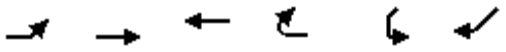
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	895	516	115	471	471	51
Volume Left	0	0	115	0	0	8
Volume Right	0	69	0	0	0	43
cSH	1700	1700	647	1700	1700	609
Volume to Capacity	0.53	0.30	0.18	0.28	0.28	0.08
Queue Length 95th (ft)	0	0	16	0	0	7
Control Delay (s)	0.0	0.0	11.8	0.0	0.0	11.5
Lane LOS			B			B
Approach Delay (s)	0.0		1.3			11.5
Approach LOS						B

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	55.8%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1404	32	81	876	44	59	1	68	6	2	3
Future Volume (vph)	20	1404	32	81	876	44	59	1	68	6	2	3
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			4.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.93			0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)	1770	3528		1770	3514			1690			1747	
Flt Permitted	0.22	1.00		0.07	1.00			0.86			0.87	
Satd. Flow (perm)	411	3528		134	3514			1483			1557	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	1510	34	87	942	47	63	1	73	6	2	3
RTOR Reduction (vph)	0	1	0	0	3	0	0	29	0	0	2	0
Lane Group Flow (vph)	22	1543	0	87	986	0	0	108	0	0	9	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	87.2	72.7		87.2	72.7			26.8			24.8	
Effective Green, g (s)	87.2	72.7		87.2	72.7			26.8			24.8	
Actuated g/C Ratio	0.67	0.56		0.67	0.56			0.21			0.19	
Clearance Time (s)	5.5	6.0		5.5	6.0			4.5			6.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	427	1972		272	1965			305			297	
v/s Ratio Prot	0.01	c0.44		c0.04	0.28							
v/s Ratio Perm	0.03			0.18				c0.07			0.01	
v/c Ratio	0.05	0.78		0.32	0.50			0.35			0.03	
Uniform Delay, d1	8.3	22.4		16.5	17.6			44.2			42.8	
Progression Factor	1.00	1.00		2.94	0.40			1.00			1.00	
Incremental Delay, d2	0.2	3.2		2.8	0.8			3.2			0.2	
Delay (s)	8.6	25.6		51.2	7.9			47.4			43.0	
Level of Service	A	C		D	A			D			D	
Approach Delay (s)		25.4			11.4			47.4			43.0	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



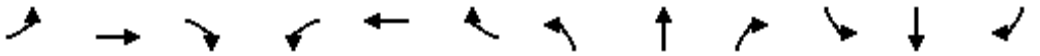
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	1210	923	0	0	971
Future Volume (Veh/h)	0	1210	923	0	0	971
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	1301	992	0	0	1044
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)		246				
pX, platoon unblocked					0.65	
vC, conflicting volume	992				1642	496
vC1, stage 1 conf vol					992	
vC2, stage 2 conf vol					650	
vCu, unblocked vol	992				912	496
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	693				303	519

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1	SW 2
Volume Total	650	650	496	496	522	522
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	522	522
cSH	1700	1700	1700	1700	519	519
Volume to Capacity	0.38	0.38	0.29	0.29	1.01	1.01
Queue Length 95th (ft)	0	0	0	0	354	354
Control Delay (s)	0.0	0.0	0.0	0.0	69.1	69.1
Lane LOS					F	F
Approach Delay (s)	0.0		0.0		69.1	
Approach LOS					F	

Intersection Summary			
Average Delay	21.6		
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

Synchro HCM Reports

-2025 Background PM Model



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1149	48	269	1251	62	151	26	413	108	26	64
Future Volume (vph)	24	1149	48	269	1251	62	151	26	413	108	26	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3518		3433	3539	1583		1787	1583	1770	1664	
Flt Permitted	0.10	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (perm)	194	3518		3433	3539	1583		1787	1583	1770	1664	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	25	1185	49	277	1290	64	156	27	426	111	27	66
RTOR Reduction (vph)	0	2	0	0	0	34	0	0	62	0	61	0
Lane Group Flow (vph)	25	1232	0	277	1290	30	0	183	364	111	32	0
Turn Type	pm+pt	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		3	3	1	4	4	
Permitted Phases	2					6			3			
Actuated Green, G (s)	57.6	47.6		18.5	55.6	55.6		20.4	38.9	9.5	9.5	
Effective Green, g (s)	57.6	47.6		18.5	55.6	55.6		20.4	38.9	9.5	9.5	
Actuated g/C Ratio	0.48	0.40		0.15	0.46	0.46		0.17	0.32	0.08	0.08	
Clearance Time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Vehicle Extension (s)	3.0	2.0		4.0	2.0	2.0		2.0	4.0	2.0	2.0	
Lane Grp Cap (vph)	224	1395		529	1639	733		303	513	140	131	
v/s Ratio Prot	0.01	c0.35		0.08	c0.36			0.10	c0.11	c0.06	0.02	
v/s Ratio Perm	0.04					0.02			0.12			
v/c Ratio	0.11	0.88		0.52	0.79	0.04		0.60	0.71	0.79	0.25	
Uniform Delay, d1	19.1	33.6		46.7	27.2	17.6		46.1	35.6	54.3	51.9	
Progression Factor	1.18	0.96		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	7.9		3.7	3.9	0.1		8.6	8.1	35.6	4.4	
Delay (s)	23.5	40.2		50.4	31.1	17.7		54.7	43.7	89.9	56.3	
Level of Service	C	D		D	C	B		D	D	F	E	
Approach Delay (s)		39.9			33.8			47.0			74.6	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1052	24	56	1341	16	96
Future Volume (Veh/h)	1052	24	56	1341	16	96
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1085	25	58	1382	16	99
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)	752			817		
pX, platoon unblocked			0.79		0.80	0.79
vC, conflicting volume			1110		1904	555
vC1, stage 1 conf vol					1098	
vC2, stage 2 conf vol					807	
vCu, unblocked vol			621		463	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			92		96	89
cM capacity (veh/h)			759		393	862

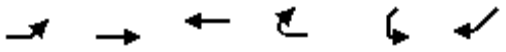
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	723	387	58	691	691	115
Volume Left	0	0	58	0	0	16
Volume Right	0	25	0	0	0	99
cSH	1700	1700	759	1700	1700	739
Volume to Capacity	0.43	0.23	0.08	0.41	0.41	0.16
Queue Length 95th (ft)	0	0	6	0	0	14
Control Delay (s)	0.0	0.0	10.1	0.0	0.0	10.8
Lane LOS			B			B
Approach Delay (s)	0.0		0.4			10.8
Approach LOS						B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	960	24	72	1282	6	77	1	54	72	2	22
Future Volume (vph)	25	960	24	72	1282	6	77	1	54	72	2	22
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			4.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.96	
Satd. Flow (prot)	1770	3526		1770	3537			1710			1739	
Flt Permitted	0.09	1.00		0.19	1.00			0.78			0.70	
Satd. Flow (perm)	170	3526		349	3537			1377			1265	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	26	990	25	74	1322	6	79	1	56	74	2	23
RTOR Reduction (vph)	0	2	0	0	1	0	0	18	0	0	8	0
Lane Group Flow (vph)	26	1013	0	74	1327	0	0	118	0	0	91	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	69.4	58.9		69.4	58.9			34.6			32.6	
Effective Green, g (s)	69.4	58.9		69.4	58.9			34.6			32.6	
Actuated g/C Ratio	0.58	0.49		0.58	0.49			0.29			0.27	
Clearance Time (s)	5.5	6.0		5.5	6.0			4.5			6.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	238	1730		326	1736			397			343	
v/s Ratio Prot	0.01	0.29		c0.02	c0.38							
v/s Ratio Perm	0.05			0.11				c0.09			0.07	
v/c Ratio	0.11	0.59		0.23	0.76			0.30			0.27	
Uniform Delay, d1	15.6	21.8		13.0	24.9			33.2			34.3	
Progression Factor	1.00	1.00		0.53	0.34			1.00			1.00	
Incremental Delay, d2	0.9	1.5		1.1	2.3			1.9			1.9	
Delay (s)	16.6	23.3		8.0	10.9			35.2			36.2	
Level of Service	B	C		A	B			D			D	
Approach Delay (s)		23.1			10.8			35.2			36.2	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



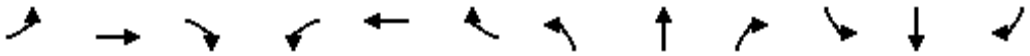
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	1670	1005	0	0	577
Future Volume (Veh/h)	0	1670	1005	0	0	577
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	1722	1036	0	0	595
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)		246				
pX, platoon unblocked					0.67	
vC, conflicting volume	1036				1897	518
vC1, stage 1 conf vol					1036	
vC2, stage 2 conf vol					861	
vCu, unblocked vol	1036				1361	518
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	667				279	502

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1	SW 2
Volume Total	861	861	518	518	298	298
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	298	298
cSH	1700	1700	1700	1700	502	502
Volume to Capacity	0.51	0.51	0.30	0.30	0.59	0.59
Queue Length 95th (ft)	0	0	0	0	95	95
Control Delay (s)	0.0	0.0	0.0	0.0	22.0	22.0
Lane LOS					C	C
Approach Delay (s)	0.0		0.0		22.0	
Approach LOS					C	

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

Synchro HCM Reports

-2025 AM Model with Project



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	1051	130	613	1023	265	49	12	142	20	48	30
Future Volume (vph)	59	1051	130	613	1023	265	49	12	142	20	48	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3481		3433	3539	1583		1791	1583	1770	1756	
Flt Permitted	0.26	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (perm)	483	3481		3433	3539	1583		1791	1583	1770	1756	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	63	1130	140	659	1100	285	53	13	153	22	52	32
RTOR Reduction (vph)	0	8	0	0	0	75	0	0	84	0	16	0
Lane Group Flow (vph)	63	1262	0	659	1100	210	0	66	69	22	68	0
Turn Type	pm+pt	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		3	3	1	4	4	
Permitted Phases	2					6			3			
Actuated Green, G (s)	59.1	53.1		31.5	78.1	78.1		8.5	40.0	12.9	12.9	
Effective Green, g (s)	59.1	53.1		31.5	78.1	78.1		8.5	40.0	12.9	12.9	
Actuated g/C Ratio	0.45	0.41		0.24	0.60	0.60		0.07	0.31	0.10	0.10	
Clearance Time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Vehicle Extension (s)	3.0	2.0		4.0	2.0	2.0		2.0	4.0	2.0	2.0	
Lane Grp Cap (vph)	278	1421		831	2126	951		117	554	175	174	
v/s Ratio Prot	0.01	c0.36		c0.19	0.31			c0.04	0.03	0.01	c0.04	
v/s Ratio Perm	0.09					0.13			0.01			
v/c Ratio	0.23	0.89		0.79	0.52	0.22		0.56	0.12	0.13	0.39	
Uniform Delay, d1	20.0	35.7		46.2	15.0	11.9		59.0	32.4	53.4	54.9	
Progression Factor	0.54	0.44		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	6.6		7.7	0.9	0.5		18.2	0.5	1.5	6.5	
Delay (s)	12.2	22.4		53.9	15.9	12.5		77.2	32.9	54.9	61.3	
Level of Service	B	C		D	B	B		E	C	D	E	
Approach Delay (s)		21.9			27.7			46.2			60.0	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	27.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1250	64	107	877	7	40
Future Volume (Veh/h)	1250	64	107	877	7	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1344	69	115	943	8	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)	752			817		
pX, platoon unblocked			0.66		0.74	0.66
vC, conflicting volume			1413		2080	706
vC1, stage 1 conf vol					1378	
vC2, stage 2 conf vol					702	
vCu, unblocked vol			593		776	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			82		98	94
cM capacity (veh/h)			645		331	715

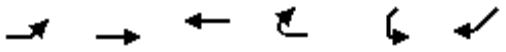
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	896	517	115	472	472	51
Volume Left	0	0	115	0	0	8
Volume Right	0	69	0	0	0	43
cSH	1700	1700	645	1700	1700	605
Volume to Capacity	0.53	0.30	0.18	0.28	0.28	0.08
Queue Length 95th (ft)	0	0	16	0	0	7
Control Delay (s)	0.0	0.0	11.8	0.0	0.0	11.5
Lane LOS			B			B
Approach Delay (s)	0.0		1.3			11.5
Approach LOS						B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1406	32	81	877	44	59	1	68	6	2	3
Future Volume (vph)	20	1406	32	81	877	44	59	1	68	6	2	3
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			4.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.93			0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)	1770	3528		1770	3514			1690			1747	
Flt Permitted	0.21	1.00		0.09	1.00			0.85			0.88	
Satd. Flow (perm)	394	3528		174	3514			1475			1580	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	1512	34	87	943	47	63	1	73	6	2	3
RTOR Reduction (vph)	0	1	0	0	3	0	0	31	0	0	3	0
Lane Group Flow (vph)	22	1545	0	87	987	0	0	106	0	0	8	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	72.8	72.8		85.5	85.0			22.5			20.5	
Effective Green, g (s)	72.8	72.8		85.5	85.0			22.5			20.5	
Actuated g/C Ratio	0.56	0.56		0.66	0.65			0.17			0.16	
Clearance Time (s)	5.5	6.0		5.5	6.0			4.5			6.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	289	1975		344	2297			255			249	
v/s Ratio Prot	0.00	c0.44		0.04	c0.28							
v/s Ratio Perm	0.04			0.13				c0.07			0.01	
v/c Ratio	0.08	0.78		0.25	0.43			0.41			0.03	
Uniform Delay, d1	14.0	22.4		29.1	10.8			47.9			46.4	
Progression Factor	1.00	1.00		0.58	0.24			1.00			1.00	
Incremental Delay, d2	0.5	3.2		1.6	0.5			4.9			0.3	
Delay (s)	14.5	25.6		18.5	3.2			52.8			46.6	
Level of Service	B	C		B	A			D			D	
Approach Delay (s)		25.4			4.4			52.8			46.6	
Approach LOS		C			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

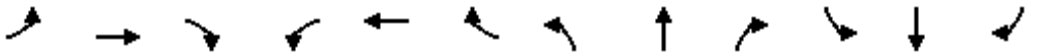
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	1213	926	0	0	975
Future Volume (Veh/h)	0	1213	926	0	0	975
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	1304	996	0	0	1048
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)		246				
pX, platoon unblocked					0.66	
vC, conflicting volume	996				1648	498
vC1, stage 1 conf vol					996	
vC2, stage 2 conf vol					652	
vCu, unblocked vol	996				959	498
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	690				301	518

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1	SW 2
Volume Total	652	652	498	498	524	524
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	524	524
cSH	1700	1700	1700	1700	518	518
Volume to Capacity	0.38	0.38	0.29	0.29	1.01	1.01
Queue Length 95th (ft)	0	0	0	0	360	360
Control Delay (s)	0.0	0.0	0.0	0.0	71.0	71.0
Lane LOS					F	F
Approach Delay (s)	0.0		0.0		71.0	
Approach LOS					F	

Intersection Summary			
Average Delay	22.2		
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	1149	49	274	1251	62	153	27	422	108	26	64
Future Volume (vph)	24	1149	49	274	1251	62	153	27	422	108	26	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3517		3433	3539	1583		1787	1583	1770	1664	
Flt Permitted	0.15	1.00		0.95	1.00	1.00		0.96	1.00	0.95	1.00	
Satd. Flow (perm)	271	3517		3433	3539	1583		1787	1583	1770	1664	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	25	1185	51	282	1290	64	158	28	435	111	27	66
RTOR Reduction (vph)	0	2	0	0	0	32	0	0	61	0	60	0
Lane Group Flow (vph)	25	1234	0	282	1290	32	0	186	374	111	33	0
Turn Type	pm+pt	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		3	3	1	4	4	
Permitted Phases	2					6			3			
Actuated Green, G (s)	51.4	45.4		21.5	60.4	60.4		18.0	39.5	11.1	11.1	
Effective Green, g (s)	51.4	45.4		21.5	60.4	60.4		18.0	39.5	11.1	11.1	
Actuated g/C Ratio	0.43	0.38		0.18	0.50	0.50		0.15	0.33	0.09	0.09	
Clearance Time (s)	6.0	6.5		5.5	6.5	6.5		5.5	5.5	6.5	6.5	
Vehicle Extension (s)	3.0	2.0		4.0	2.0	2.0		2.0	4.0	2.0	2.0	
Lane Grp Cap (vph)	191	1330		615	1781	796		268	521	163	153	
v/s Ratio Prot	0.01	c0.35		0.08	c0.36			0.10	c0.13	c0.06	0.02	
v/s Ratio Perm	0.05					0.02			0.11			
v/c Ratio	0.13	0.93		0.46	0.72	0.04		0.69	0.72	0.68	0.22	
Uniform Delay, d1	20.8	35.7		44.0	23.3	15.1		48.4	35.4	52.7	50.4	
Progression Factor	0.53	0.31		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	11.8		2.5	2.6	0.1		13.8	8.3	20.6	3.2	
Delay (s)	12.3	22.9		46.5	25.9	15.2		62.2	43.6	73.3	53.6	
Level of Service	B	C		D	C	B		E	D	E	D	
Approach Delay (s)		22.7			29.0			49.2			64.4	
Approach LOS		C			C			D			E	

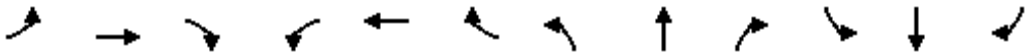
Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1053	24	56	1343	16	96
Future Volume (Veh/h)	1053	24	56	1343	16	96
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1086	25	58	1385	16	99
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)	752			817		
pX, platoon unblocked			0.75		0.84	0.75
vC, conflicting volume			1111		1907	556
vC1, stage 1 conf vol					1098	
vC2, stage 2 conf vol					808	
vCu, unblocked vol			469		350	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			93		96	88
cM capacity (veh/h)			813		444	809

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	724	387	58	692	692	115
Volume Left	0	0	58	0	0	16
Volume Right	0	25	0	0	0	99
cSH	1700	1700	813	1700	1700	726
Volume to Capacity	0.43	0.23	0.07	0.41	0.41	0.16
Queue Length 95th (ft)	0	0	6	0	0	14
Control Delay (s)	0.0	0.0	9.8	0.0	0.0	10.9
Lane LOS			A			B
Approach Delay (s)	0.0		0.4			10.9
Approach LOS						B

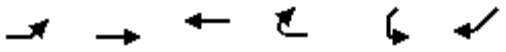
Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	961	24	72	1284	6	77	1	54	72	2	22
Future Volume (vph)	25	961	24	72	1284	6	77	1	54	72	2	22
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			4.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.96	
Satd. Flow (prot)	1770	3526		1770	3537			1710			1739	
Flt Permitted	0.11	1.00		0.19	1.00			0.79			0.69	
Satd. Flow (perm)	200	3526		347	3537			1387			1237	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	26	991	25	74	1324	6	79	1	56	74	2	23
RTOR Reduction (vph)	0	3	0	0	0	0	0	21	0	0	9	0
Lane Group Flow (vph)	26	1013	0	74	1330	0	0	115	0	0	90	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.7	44.7		72.5	72.0			24.5			22.5	
Effective Green, g (s)	44.7	44.7		72.5	72.0			24.5			22.5	
Actuated g/C Ratio	0.37	0.37		0.60	0.60			0.20			0.19	
Clearance Time (s)	5.5	6.0		5.5	6.0			4.5			6.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0			2.0	
Lane Grp Cap (vph)	172	1313		622	2122			283			231	
v/s Ratio Prot	0.01	c0.29		0.03	c0.38							
v/s Ratio Perm	0.05			0.04				c0.08			0.07	
v/c Ratio	0.15	0.77		0.12	0.63			0.41			0.39	
Uniform Delay, d1	27.8	33.2		17.6	15.4			41.4			42.7	
Progression Factor	1.00	1.00		0.35	0.31			1.00			1.00	
Incremental Delay, d2	1.9	4.4		0.3	1.0			4.3			4.9	
Delay (s)	29.7	37.6		6.4	5.8			45.8			47.6	
Level of Service	C	D		A	A			D			D	
Approach Delay (s)		37.4			5.8			45.8			47.6	
Approach LOS		D			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑	↑↑			↱↱
Traffic Volume (veh/h)	0	1679	1012	0	0	575
Future Volume (Veh/h)	0	1679	1012	0	0	575
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	1731	1043	0	0	593
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)		246				
pX, platoon unblocked					0.66	
vC, conflicting volume	1043				1908	522
vC1, stage 1 conf vol					1043	
vC2, stage 2 conf vol					866	
vCu, unblocked vol	1043				1352	522
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	663				276	500

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1	SW 2
Volume Total	866	866	522	522	296	296
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	296	296
cSH	1700	1700	1700	1700	500	500
Volume to Capacity	0.51	0.51	0.31	0.31	0.59	0.59
Queue Length 95th (ft)	0	0	0	0	95	95
Control Delay (s)	0.0	0.0	0.0	0.0	22.2	22.2
Lane LOS					C	C
Approach Delay (s)	0.0		0.0		22.2	
Approach LOS					C	

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

Synchro Signal Timing Reports

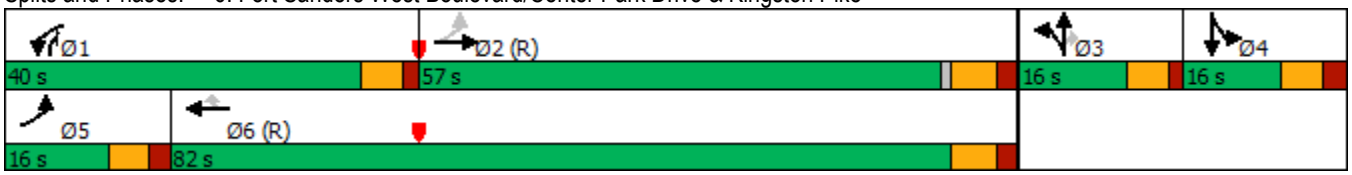
-Existing/No Build AM Timings

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	57	1026	592	998	259	11	135	20	46
Future Volume (vph)	57	1026	592	998	259	11	135	20	46
Turn Type	pm+pt	NA	Prot	NA	Perm	NA	pm+ov	Split	NA
Protected Phases	5	2	1	6		3	1	4	4
Permitted Phases	2				6		3		
Detector Phase	5	2	1	6	6	3	1	4	4
Switch Phase									
Minimum Initial (s)	6.0	15.0	4.0	15.0	15.0	6.0	4.0	6.0	6.0
Minimum Split (s)	12.0	24.5	9.5	24.5	24.5	11.5	9.5	12.5	12.5
Total Split (s)	16.0	57.0	40.0	82.0	82.0	16.0	40.0	16.0	16.0
Total Split (%)	12.3%	43.8%	30.8%	63.1%	63.1%	12.3%	30.8%	12.3%	12.3%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0	1.5	1.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.5	5.5	6.5	6.5	5.5	5.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Min	Max	C-Min	C-Min	Max	Max	Max	Max

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 56 (43%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 6: Fort Sanders West Boulevard/Center Park Drive & Kingston Pike



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	20	1370	79	854	58	1	6	2
Future Volume (vph)	20	1370	79	854	58	1	6	2
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	6.0	15.0	6.0	15.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.5	24.0	11.5	24.0	10.5	10.5	12.5	12.5
Total Split (s)	20.0	87.0	20.0	87.0	23.0	23.0	23.0	23.0
Total Split (%)	15.4%	66.9%	15.4%	66.9%	17.7%	17.7%	17.7%	17.7%
Yellow Time (s)	4.0	4.5	4.0	4.5	2.0	2.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.5	6.0	5.5	6.0		4.5		6.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	Max	C-Min	Max	C-Min	Max	Max	Max	Max

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 59 (45%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 11: S. David lane & Kingston Pike

Synchro Signal Timing Reports

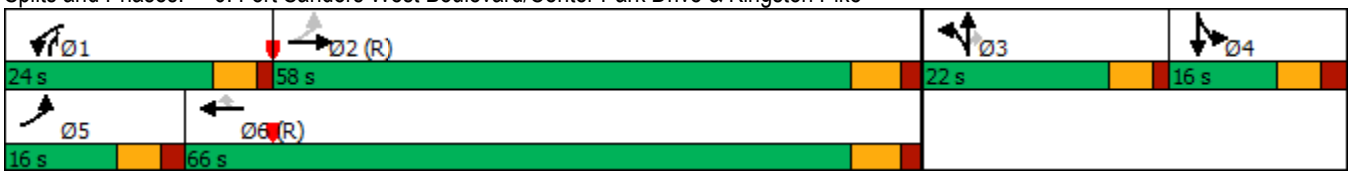
-Existing/No Build PM Timings

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	23	1121	263	1221	60	26	403	105	26
Future Volume (vph)	23	1121	263	1221	60	26	403	105	26
Turn Type	pm+pt	NA	Prot	NA	Perm	NA	pm+ov	Split	NA
Protected Phases	5	2	1	6		3	1	4	4
Permitted Phases	2				6		3		
Detector Phase	5	2	1	6	6	3	1	4	4
Switch Phase									
Minimum Initial (s)	6.0	15.0	4.0	15.0	15.0	6.0	4.0	6.0	6.0
Minimum Split (s)	12.0	24.5	9.5	24.5	24.5	11.5	9.5	12.5	12.5
Total Split (s)	16.0	58.0	24.0	66.0	66.0	22.0	24.0	16.0	16.0
Total Split (%)	13.3%	48.3%	20.0%	55.0%	55.0%	18.3%	20.0%	13.3%	13.3%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0	1.5	1.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.5	5.5	6.5	6.5	5.5	5.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Min	Max	C-Min	C-Min	Max	Max	Max	Max

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 1 (1%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 6: Fort Sanders West Boulevard/Center Park Drive & Kingston Pike



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	24	937	70	1251	75	1	70	2
Future Volume (vph)	24	937	70	1251	75	1	70	2
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	6.0	15.0	6.0	15.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.5	24.0	11.5	24.0	10.5	10.5	12.5	12.5
Total Split (s)	16.0	80.0	16.0	80.0	24.0	24.0	24.0	24.0
Total Split (%)	13.3%	66.7%	13.3%	66.7%	20.0%	20.0%	20.0%	20.0%
Yellow Time (s)	4.0	4.5	4.0	4.5	2.0	2.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.5	6.0	5.5	6.0		4.5		6.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	Max	C-Min	Max	C-Min	Max	Max	Max	Max

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 7 (6%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 11: S. David lane & Kingston Pike

Synchro Signal Timing Reports

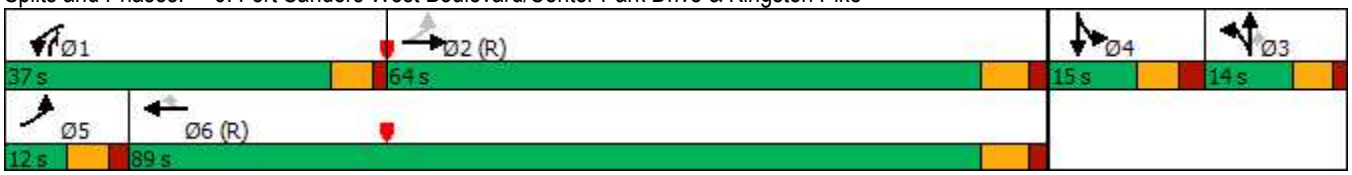
- Optimized Buildout AM Timings

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	59	1051	613	1023	265	12	142	20	48
Future Volume (vph)	59	1051	613	1023	265	12	142	20	48
Turn Type	pm+pt	NA	Prot	NA	Perm	NA	pm+ov	Split	NA
Protected Phases	5	2	1	6		3	1	4	4
Permitted Phases	2				6		3		
Detector Phase	5	2	1	6	6	3	1	4	4
Switch Phase									
Minimum Initial (s)	6.0	15.0	4.0	15.0	15.0	6.0	4.0	6.0	6.0
Minimum Split (s)	12.0	24.5	9.5	24.5	24.5	11.5	9.5	12.5	12.5
Total Split (s)	12.0	64.0	37.0	89.0	89.0	14.0	37.0	15.0	15.0
Total Split (%)	9.2%	49.2%	28.5%	68.5%	68.5%	10.8%	28.5%	11.5%	11.5%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0	1.5	1.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.5	5.5	6.5	6.5	5.5	5.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Min	Max	C-Min	C-Min	Max	Max	Max	Max

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 79 (61%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 6: Fort Sanders West Boulevard/Center Park Drive & Kingston Pike

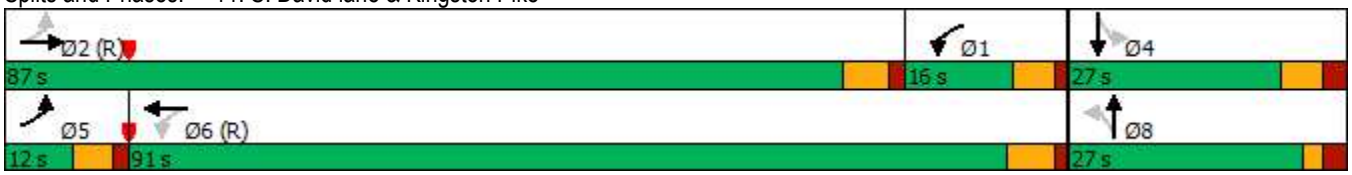


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	20	1406	81	877	59	1	6	2
Future Volume (vph)	20	1406	81	877	59	1	6	2
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	6.0	15.0	6.0	15.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.5	24.0	11.5	24.0	10.5	10.5	12.5	12.5
Total Split (s)	12.0	87.0	16.0	91.0	27.0	27.0	27.0	27.0
Total Split (%)	9.2%	66.9%	12.3%	70.0%	20.8%	20.8%	20.8%	20.8%
Yellow Time (s)	4.0	4.5	4.0	4.5	2.0	2.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.5	6.0	5.5	6.0		4.5		6.5
Lead/Lag	Lead	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	Max	C-Min	Max	C-Min	Max	Max	Max	Max

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 72 (55%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 11: S. David lane & Kingston Pike



Synchro Signal Timing Reports

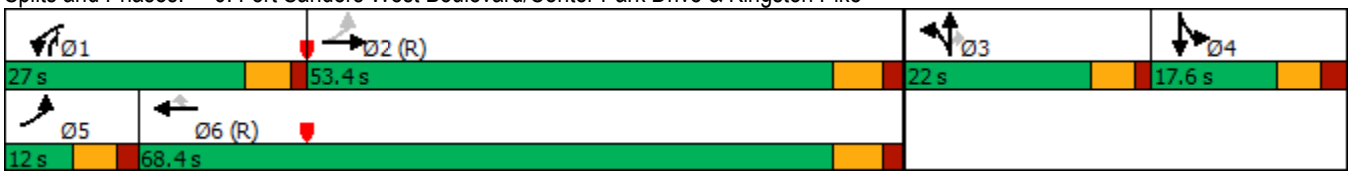
- Optimized Buildout PM Timings

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	24	1149	274	1251	62	27	422	108	26
Future Volume (vph)	24	1149	274	1251	62	27	422	108	26
Turn Type	pm+pt	NA	Prot	NA	Perm	NA	pm+ov	Split	NA
Protected Phases	5	2	1	6		3	1	4	4
Permitted Phases	2				6		3		
Detector Phase	5	2	1	6	6	3	1	4	4
Switch Phase									
Minimum Initial (s)	6.0	15.0	4.0	15.0	15.0	6.0	4.0	6.0	6.0
Minimum Split (s)	12.0	24.5	9.5	24.5	24.5	11.5	9.5	12.5	12.5
Total Split (s)	12.0	53.4	27.0	68.4	68.4	22.0	27.0	17.6	17.6
Total Split (%)	10.0%	44.5%	22.5%	57.0%	57.0%	18.3%	22.5%	14.7%	14.7%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0	1.5	1.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.5	5.5	6.5	6.5	5.5	5.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Min	Max	C-Min	C-Min	Max	Max	Max	Max

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 1 (1%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 6: Fort Sanders West Boulevard/Center Park Drive & Kingston Pike



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	25	961	72	1284	77	1	72	2
Future Volume (vph)	25	961	72	1284	77	1	72	2
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	6.0	15.0	6.0	15.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.5	24.0	11.5	24.0	10.5	10.5	12.5	12.5
Total Split (s)	13.0	77.0	14.0	78.0	29.0	29.0	29.0	29.0
Total Split (%)	10.8%	64.2%	11.7%	65.0%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	4.0	4.5	4.0	4.5	2.0	2.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.5	6.0	5.5	6.0		4.5		6.5
Lead/Lag	Lead	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	Max	C-Min	Max	C-Min	Max	Max	Max	Max

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 11: S. David lane & Kingston Pike

TIL Review Comments & Consultant Responses

NOVEMBER 18, 2020

Kevin Cole
CDM Smith
1100 Marion St, Suite 300
Knoxville, TN 37921

RE: ENCOMPASS HEALTH REHABILITATION HOSPITAL TIL (12-A-20-SU)

Dear Mr. Cole,

The Transportation Impact Letter (TIL) received on October 26, 2020 was submitted for the above referenced development and has been reviewed by staff from the City of Knoxville Department of Engineering and Knoxville-Knox County Planning. We have identified the following issues related to the TIL that need to be revised:

1. Please add the TIA scope determination form with my comments. The document attached in the appendix did not have my signed comments on the second page.

   RESPONSE:

   The signed version is in the Appendix.

2. Compare the original trip generation table from the 2009 study with the current and proposed land uses as mentioned in the signed TIA scope determination form.

   RESPONSE:

   The excerpt from the 2009 Land use descriptions, a figure, and a summary Trip Generation table for all structures are in the Appendix.

3. Provide rationale behind the thought that the original TPO hourly traffic count for 2019 AM & PM were over-estimated. Also, indicate how the values of 16% & 30%, respectively, were chosen.

   RESPONSE:

The sentences on Page 2 were edited to make it clear that the TPO count was the confirmation data to the future projection from the 2009 TIS. "Traffic data was derived from a prior Fort Sanders West traffic impact study in 2009 which projected 2019 traffic volumes. A TPO daily count from 2019 was used to develop a factor to confirm the prior report's projected 2019 values. It was determined by the TPO hourly count volumes that the 2019 traffic projection in the 2009 study for the AM peak hour was 16% over-estimated and the PM peak hour was 30% over-estimated."

4. Provide historical count data from station 093C007 that was used to determine that the traffic growth was less than 0.5% annually. Was this over 5 years? 10 years?

   RESPONSE:

   The historical data and calculation are in the Appendix.

Please provide **a PDF** of the following: **a signed and sealed letter** addressing these concerns in a **comment response sheet** (with the indication of where/how the comments were addressed) attached to the back of a **fully revised TIS**. Revisions are due **no later than Monday, November 23, 2020 by 4pm**. If you have any questions, please contact myself (865-215-3826 or tarren.barrett@knoxplanning.org) or Joshua Frerichs (865-215-2798 or jfrerichs@knoxvilletn.gov).

Sincerely,

Tarren Barrett, P.E.
Knoxville-Knox County Planning

CC: Mike Reynolds, AICP, Knoxville-Knox County Planning
Mike Conger, P.E., Knoxville-Knox County Planning
Joshua Frerichs, P.E., City of Knoxville Dept. of Engineering
Evan Hoffman, P.E., City of Knoxville Dept. of Engineering