State Street Operational and Safety Study
William Street to Washington Street
City of Ann Arbor

Final Report

February 22, 2022

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State Street Operational and Safety Study

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EXECUTIVE SUMMARY

The City of Ann Arbor Downtown Development Authority (DDA) has developed a Healthy Streets program intended to create a connected network of streets which provide safe and equitable mobility for all users, particularly in the downtown area. During the Healthy Streets pilot project that took place as part of the DDA's People Friendly Streets program from July to November of 2020, a temporary two-way separated bikeway was added on the east side of State Street. Based on the success of the project, conceptual plans were developed by Smithgroup for a permanent bikeway on State Street. Within the downtown, the State Street corridor between Washington Street at the north and Willian to the south has been selected for a corridor-wide operational investigation as described in the present report in order to assist in the design of the road and bikeway. The report analyzes and presents the operational impacts and proposes adjustments in geometry and operations to meet the needs of the proposed People Friendly Streets design changes for the following intersections in the project area:

- Washington Street and State Street
- Liberty Street and State Street
- North University Avenue and State Street
- William Street and State Street

The intersections of I-94 BL (Huron Street) at State Street just north of the project limits and South University Avenue at State Street just south of the project limits were included in the Synchro modeling to evaluate whether the proposed changes to traffic conditions impact operations to adjacent intersections within the project limits.

The State Street study corridor was analyzed for the morning and afternoon peak hours for the following conditions:

- Proposed Build Conditions
- Mitigated Build Conditions
- Alternative Build Conditions

The elements to be covered in the operational investigation were discussed with the DDA prior to the study commencing. A comprehensive crash analysis for the State Street study corridor was also completed and is attached in **Appendix B.** On the State Street corridor during the five-year study period, it was found that safety is of particular concern for nonmotorized users, as 5 of the 8 pedestrian and bicycle crashes involved injury (62.5 percent). The Crash Modification Factors for the proposed safety treatments at the four intersections including addition of the two-way protected bike lanes, other traffic calming measures, and modifying signal phasing are expected to reduce corridor-wide total crashes and have a positive safety impact.

Proposed Conditions

The proposed People Friendly design changes to the State Street corridor are as follows:

- Construct parking bump-outs on each side of State Street between Washington Street and William Street
- Turn-lane removals between Liberty Street and William Street
    - Remove northbound left-turn lane on State Street at Liberty Street
    - Remove northbound right-turn lane on State Street at North University Avenue
- Replace exclusive right- and left-turn lanes on the North University Avenue approach to State Street
- Shared bicyclist and pedestrian "sidepath" along the east side of State Street between William Street and North University Avenue
- Implement bi-directional bikeway crossing east / west on the north side of William Street and State Street intersection

The existing weekday counts for the study intersections were provided by the City of Ann Arbor and were collected in November 2019 prior to the COVID pandemic. Based on the turning movement counts, the morning peak hour on the State Street study corridor was found to generally occur between the hour of 8:00 a.m. and 9:00 a.m. while the afternoon peak hour was found to occur between the hour of 4:45 p.m. and 5:45 p.m. These two time periods were selected for analysis of Proposed conditions.

The capacity analysis for Proposed conditions revealed that all study area intersections and approaches will operate at an acceptable level of service (LOS) for vehicles, pedestrians, and bicycles during both the weekday morning and weekday afternoon peak hours. Thus, all proposed People Friendly Streets design modifications are recommended with operational adjustments as recommended as part of this study.

Mitigated Build Conditions

While the results of the capacity analysis for Proposed conditions determined that all intersections and approaches will operate at an acceptable LOS for vehicles, pedestrians, and bicycles, traffic microsimulation analysis determined that queuing will be expected on the State Street approaches to the intersections. Thus, minor adjustments to signal timing phase splits and offsets were pursued to mitigate the queuing and improve progression along the study corridor. The AM and PM Peak hour cycle length remained at 90 seconds at each intersection under the Mitigated conditions operational analysis. The signal timing adjustments to accommodate the geometric changes were found to maintain similar overall intersection LOS for motor vehicles and at every signalized intersection within the study corridor during both peak hours. In addition, walking and biking delays were estimated in the traffic models which indicated that pedestrians are expected to operate at LOS B and bicycling at LOS B or LOSC for all movements during peak hours. Thus, the study recommends adjusting the signal timing at the study intersections to reflect the design changes.

Alternative Build Conditions

In discussions with the project team consisting of the Ann Arbor DDA, city of Ann Arbor engineering, Smithgroup, Wade Trim and Toole Design, three alternative design alternatives were selected for investigation. These alternatives include:

1. Converting the signalized intersections of Liberty Street at State Street and North University Avenue at State Street to stop-control on each intersection approach.
2. Implementing an exclusive pedestrian phase (EPP) to the intersections of Liberty Street, North University Avenue, and William Street at State Street, to operate all day except when the signals are running in nighttime Flash mode.
3. Removing all intersection traffic control at the intersections of Liberty Street and North University Avenue at State Street.
4. Retain dedicated right-turn lane along northbound State Street on approach to North University Avenue

The three-way stop-control alternative was found to result in excessive queues on all intersection approaches at Liberty Street and North University Avenue, particularly during the PM Peak hour. The queues on State Street were found to spillback beyond adjacent intersections resulting in unacceptable vehicle delay mainly attributed to the very large volumes of pedestrians crossing per hour at the intersection. A signal warrant analysis was performed for each intersection and determined that both intersections meet the criteria for signalization as required by vehicular volumes and pedestrian volumes. Thus, converting the intersections of Liberty Street and State and North University Avenue at State Street to three-way stop-control is not recommended.

Implementing an exclusive pedestrian phase in addition to the existing WALK indications at the intersections of Liberty Street, North University Avenue, and William Street at State Street was found to provide acceptable intersection LOS for vehicles, pedestrians and bicycles at each intersection during both the AM and PM Peak hours. Given that the observed traffic and multimodal volumes are highest during the AM and PM Peak hours, it was found that the exclusive pedestrian phase in combination with WALK phases will operate satisfactorily (with lower vehicle delays) during all other daily hours under normal signal operation. The exclusive pedestrian phase and WALK phases would not be present during nighttime Flash operation.

Due to the existing crash pattern related to vehicles turning right on red and pedestrian and bicycle movement conflicts, it is also recommended to prohibit right-turns on red during the exclusive pedestrian phase only. This can be accomplished via the installation of R10-11 “No Turn on Red” signs at the intersections. It was discussed by the project team to test this operation by implementing the timing changes to the signal controllers, and then conducting an evaluation on traffic safety and operations for a period of time.

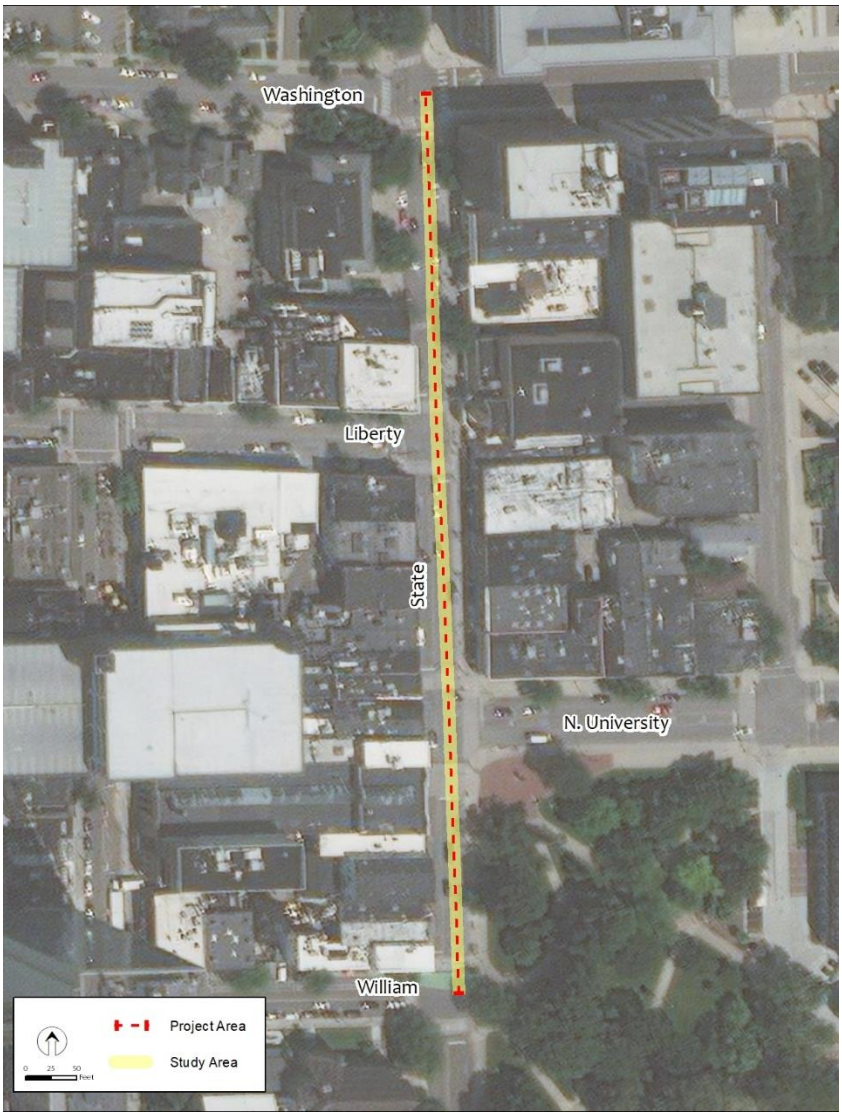
Traffic microsimulation analysis determined that removing all traffic control at the intersections of Liberty Street and North University Avenue at State Street would in effect operate very similarly to the three-way stop-control alternative due to high pedestrian utilization at the intersections. Thus, the removal of all traffic control at the intersections is not recommended.

Retaining the dedicated northbound right-turn lane on State Street on approach to North University Avenue is expected to provide only marginal operational benefit at the intersection, and thus the study finds it feasible to provide space for the proposed bikeway by removing the right-turn lane as proposed in the People Friendly Streets design.

1.0 INTRODUCTION

In partnership with Smithgroup and the Ann Arbor Downtown Development Authority (DDA), Wade Trim has conducted a traffic operational analysis to investigate capacity issues due to the proposed roadway and traffic design changes on State Street. As shown in **Figure 1-1**, the geometric design changes on the State Street study corridor stretches from Washington Street to William Street. Additional adjacent intersections at Huron Street and South University Avenue are included in the Synchro modeling to evaluate whether there are operational impacts to the adjacent network. This report presents the results of the operational analyses conducted along the study corridor. Following a description of the methodology and data collection, this study includes a narrative of the existing and proposed conditions, a crash and safety analysis, issues relating to human factors, and a capacity analysis. A summary of recommendations is presented in the final section of the report.

Figure 1-1. State Street Project Location and Study Area.



1.1 OBJECTIVE

The objective of this study was to conduct a comprehensive investigation into the operational effects resulting from the proposed People Friendly Streets infrastructure changes on the State Street corridor in the City of Ann Arbor. A Healthy Streets Pilot Project was conducted in 2020, and a report was developed that recommended further evaluation of the proposed changes to improve safety and operations on the corridor. This study evaluates the proposed geometric alternatives, as well as new operational alternatives developed as part of the Wade Trim analysis. A comprehensive operational investigation was conducted for each major intersection to determine the need for road design improvements based on crash history, geometric and human factors deficiencies, operational issues, and land development in the area.

2.0 METHODOLOGY AND DATA COLLECTION

This section of the report describes the methodology and analytical procedures that were used to identify and analyze operational conditions on the State Street study corridor. The investigation consisted of several phases including data collection, geometric and human factors analysis, capacity analysis and recommendations. A brief overview of the data collected for the study is given in the following paragraphs.

2.1 DATA COLLECTION

To accomplish the study objectives, the work effort involved the collection of data pertaining to roadway geometry, traffic counts and turning movements, and traffic control information, as well as other field data such as posted traffic regulations and observations of driver behavior. A discussion of the data collection procedure and analysis of the data is presented in subsequent sections of this report.

2.1.1 Existing Roadway Geometry

The existing roadway geometry for the study area was obtained from historical survey, existing plans, and aerial photos. These resources were supplemented by field reviews of the study area by the project team to verify lane widths, intersection configuration, turning radii, lane usage, and other roadway features.

2.1.2 Intersection Turning Movement Counts and Traffic Volume Counts

Directional turning movement counts for the study intersections were collected by Mannik Smith Group on Thursday, November 7, 2019 while local schools were in session and prior to the COVID-19 pandemic response. The turning movement counts were furnished by the City of Ann Arbor for use in the study. Truck volumes and the number of pedestrians crossing the roadway were also recorded. The counts were conducted during the AM, mid-day, and PM hours. For the purposes of this project, AM Peak and PM Peak hours were examined. The time of the peak hours varied by intersection but were generally found to adhere to the following patterns. On State Street, the AM Peak hour was typically between 8:00 and 9:00 AM and the PM Peak hour was typically between 4:45 and 5:45 PM. These data were used in the intersection capacity analyses as well as in the other study processes. Summary reports of the count data used in the analysis are attached in **Appendix A.**

2.2 GEOMETRIC ANALYSIS AND HUMAN FACTORS ANALYSIS

2.2.1 Quantitative Intersection Analyses

Quantitative intersection analyses were conducted to identify safety, geometric, capacity, and other design deficiencies at the study intersections. The procedures used to conduct the analyses are each briefly described in the following paragraphs.

2.2.2 Crash Analysis

A comprehensive crash analysis for the State Street study corridor was completed and is attached in **Appendix B.** This analysis was conducted to identify any abnormally high crash characteristics such as collision type, severity, environmental conditions, contributing factors, and other crash features at the study intersections. The crash analysis involved conducting a review of the characteristics for the crashes within the study area. The data were quantified by characterizing the crashes by location, type of collision (such as rear end, angle, pedestrian, etc.), severity, and environmental conditions. Crash Modification Factors (CMFs) were used to determine the expected change in crashes resulting from the Healthy Streets design modifications. The results of the crash analysis were used during the capacity analysis.

On the State Street corridor from Washington Street to William Street, there were a total of 115 crashes reported during the five-year study period (2016-2020). No crashes were reported which resulted in a Type A injury or fatality. However, 3 Type B, and 8 Type C injury crashes occurred along the corridor. The predominate crash types involved either a sideswipe – same direction collision, rear end, or backing collision. There were 4 crashes involving a bicyclist and 4 crashes involving a pedestrian. 5 of the 8 bicyclist and pedestrian crashes reported at least one injury (62.5 percent). The CMFs for the proposed safety treatments at the four intersections including addition of the two-way protected bike lanes, other traffic calming measures, and modifying signal phasing are expected to reduce corridor-wide total crashes by 7.35 crashes per year.

2.2.3 Geometric Analysis and Human Factors Analysis

A geometric analysis was conducted for the purpose of reviewing the proposed roadway geometry to ensure that it will operate an acceptable Level of Service (LOS) for vehicles, pedestrians and bicycles, and to determine whether any adjustments were needed to the design.

A thorough field study of existing conditions at the intersections and the surrounding areas was conducted. Existing conditions were compared with safety guidelines and design standards, including the *2012 Michigan Manual on Uniform Traffic Control Devices* (MMUTCD), the *2018 American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets*, and other MDOT traffic standards and design notes.

A human factors analysis was also conducted to observe driver behavior and examine the relationship between existing geometric and traffic control conditions and safety performance. This analysis included observation of vehicle approach speeds; directional, warning, and regulatory signing; pavement marking usage; violations of driver expectancy; and landscaping from the perspective of the driver.

2.2.4 Intersection Capacity Analysis

The software package Synchro 11 was used to conduct intersection analyses for proposed roadway conditions. Synchro 11 is a software used for modeling and optimizing traffic signal timing at intersections. The program utilizes the methods of the *Highway Capacity Manuals 2000* to calculate capacity. Although newer versions of the Highway Capacity Manual are available, the intersection and/or signal timing configurations for vehicles are not supported for LOS in the newer manuals. Pedestrian and Bicycle LOS was determined using the HCM 6th methodology at signalized intersections. The delay calculated in Synchro is average control delay, which is the same measure used to describe intersection operations in the *Highway Capacity Manual 2000* and related software (HCS). The key features and capabilities of Synchro include capacity analysis, coordination, actuated signals, and the development of time-space diagrams. The program optimizes the split, cycle length, and offsets to reduce delays.

Capacity analyses were conducted to measure the performance of intersections in terms of Level of Service (LOS). Levels of service range from A, which represents the best traffic condition, to F, which is the worst condition. Along with the LOS, intersection capacity is quantified in terms of average control delay, which is measured in seconds of delay per vehicle. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and acceleration delay. The vehicle level of service criteria for signalized intersections is given in **Table 2-1** and unsignalized in **Table 2-2**.

Table 2-1. Vehicle Level of Service Criteria for Signalized Intersections.

Level of Service	Description	Control Delay per vehicle in seconds
A	Little delay, favorable progression.	≤ 10
B	Low delay, good progression.	>10-20
C	Average delay, fair progression.	>20-35
D	Longer delay, unfavorable progression.	>35-55
E	High delay, poor progression.	>55-80
F	Unacceptable delay, very poor progression.	>80

Source: Transportation Research Board, *Highway Capacity Manual 2000.*

Table 2-2. Vehicle Level of Service Criteria for Unsignalized Intersections.

Level of Service	Description	Control Delay per vehicle in seconds
A	Little delay, favorable progression.	≤ 10
B	Low delay, good progression.	>10-15
C	Average delay, fair progression.	>15-25
D	Longer delay, unfavorable progression.	>25-35
E	High delay, poor progression.	>35-50
F	Unacceptable delay, very poor progression.	>50

Source: Transportation Research Board, *Highway Capacity Manual 2000.*

One important factor used in calculating capacity at intersections is the peak-hour factor. The peak-hour factor is found by dividing the total hourly volume observed on an approach leg by four times the highest 15-minute volume. As manual traffic counts based on 15-minute data were obtained for the intersections, the peak-hour factors used in the analyses are based on actual count data.

3.0 EXISTING AND PROPOSED DESIGN CONDITIONS

The Ann Arbor Downtown Development Authority (DDA) has proposed new bike lanes and other geometric changes on State Street. The purpose of this investigation is to determine whether the proposed changes will impact the corridor's level of service due to the removal of lanes and turn lanes.

3.1 EXISTING CONDITIONS

Within the Ann Arbor DDA, there is currently of mix of infrastructure designs that support bicyclists. Some stretches include bike lanes while other areas have sharrow pavement markings painted on the roadway. In addition, downtown Ann Arbor has a combination of two-way and one-way streets. These elements combine for a complex transportation system.

State Street is a north-south corridor in the downtown area of the City of Ann Arbor. The study section is approximately 0.17 miles and extends between Washington Street on the northern end and William St on the southern end. The speed limit on State Street in this area is 25 miles per hour.

The existing roadway geometric characteristics are as follows:

- The existing corridor consists of a two-lane cross section with one northbound land and one southbound lane.
- Between Huron Street and Washington Street, parking is available on the east side of the roadway, and northbound traffic has a left turn lane with a storage length of approximately 50 feet. The two-lane cross section continues from Washington Street to Liberty Street with parking on both sides of the roadway.
- Between Liberty Street and North University Avenue, parking is available on the west side of the roadway and northbound traffic has a left turn lane with a storage length of approximately 100 feet.
- Between North University Avenue and William Street, parking is available on the west side of the roadway and northbound traffic has a thru lane and a shared thru and right-turn lane with a storage length of approximately 50 feet.
- Between William Street and South University Avenue, parking available on both sides of the roadway and south bound traffic has a left turn lane with a storage length of approximately 50 feet.
- Northbound bike sharrow pavement markings are present on the roadway between Huron Street and Liberty Street.
- Southbound bike sharrow pavement markings are present between Huron Street and South University Avenue.

Land use along the State Street corridor is a mix of commercial, residential, and institutional land uses. Two church buildings are located along the corridor as well as a college dormitory. Multiple university buildings are present along the corridor, including academic buildings, a student union, and a university museum. Commercial uses include restaurants and shopping areas.

3.2 PROPOSED CONDITIONS

The proposed Healthy Street design roadway geometric characteristics are as follows:

- Parking bump-outs are proposed along State Street on the east and west sides of the roadway between Washington Street and William Street.
- On State Street between Washington Street and William Street, traffic will be configured to a two-lane cross section with one northbound lane and one southbound lane with no auxiliary turn lanes present.
- ”Super Sharrow” pavement markings (or larger, lane-centered sharrows) will be installed between North University Avenue and William Street, where the bikeway will connect and continue onto North University Avenue.
- A shared bicyclist and pedestrian “sidepath” will be present along the east side of State Street between William Street and North University Avenue.
- A bi-directional bikeway will be installed crossing east / west on the north side of William Street and State Street intersection.
- The separate right- and left-turn lanes on the eastbound North University Avenue approach to State Street will be replaced with a single lane serving all movements.
- Directional protected bike lanes will be implemented on each side of the North University Avenue approach to State Street.
- Traffic calming such as raised intersections, curbless design, high visibility materials, reduced travel lane width will be implemented.

A conceptual exhibit which depicts these modifications is attached in **Appendix C.**

4.0 CAPACITY ANALYSIS

4.1 TRAFFIC VOLUME DATA

As previously mentioned in Section 2.1.2 of this report, the traffic counts were collected at various times and by various organizations over the past ten years. The time of the peak hours varied by intersection but were generally found to adhere to the following patterns. The AM Peak hour was typically between 8:00 and 9:00 AM and the PM Peak hour was typically between 4:45 and 5:45 PM. The AM Peak and PM Peak hour vehicle counts are shown in **Figure 4-1.** The AM Peak and PM Peak hour pedestrian and bicyclist counts are shown in **Figure 4-2**.

Figure 4-1. Existing Vehicle Traffic Volumes on State Street.

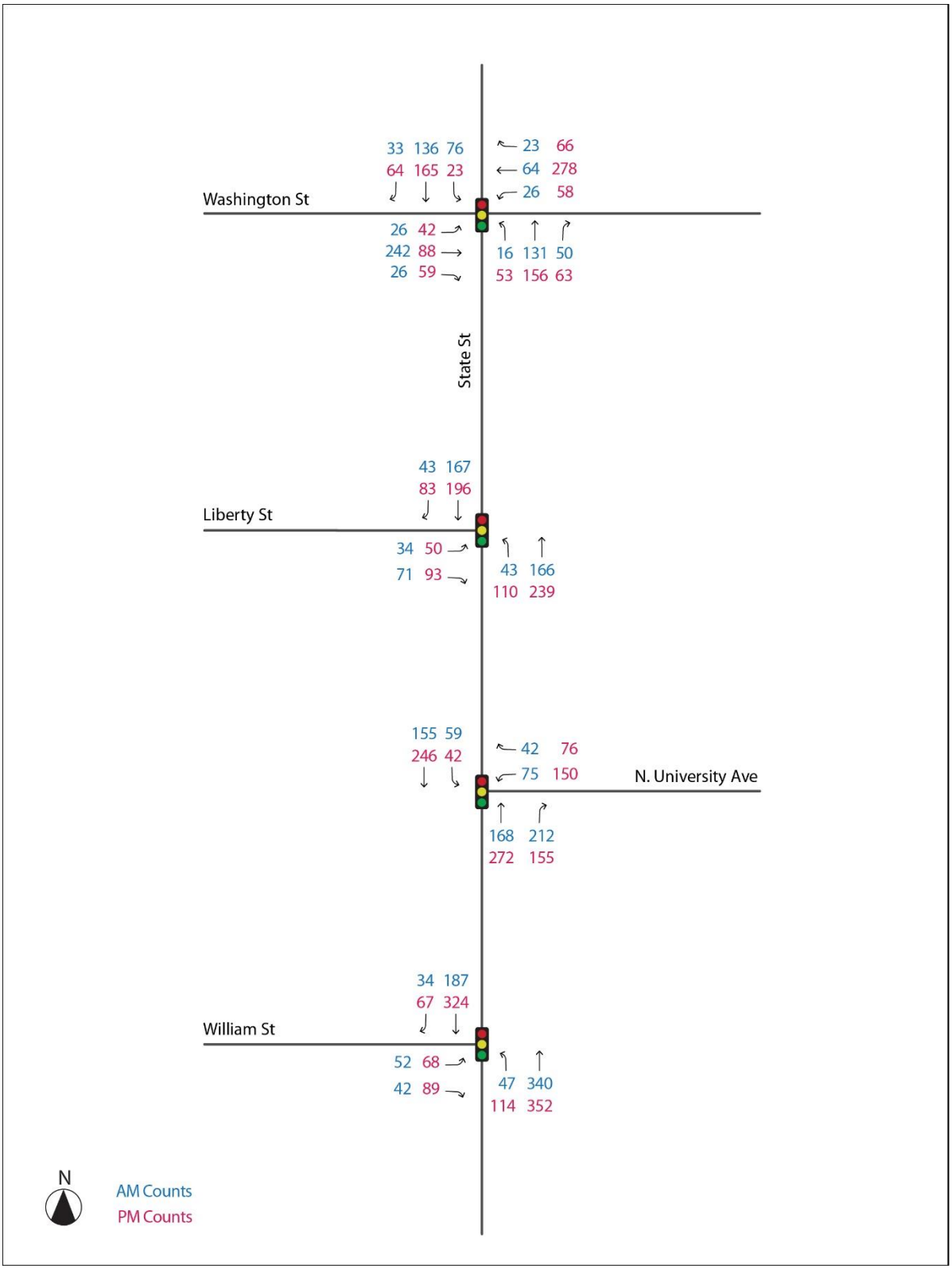
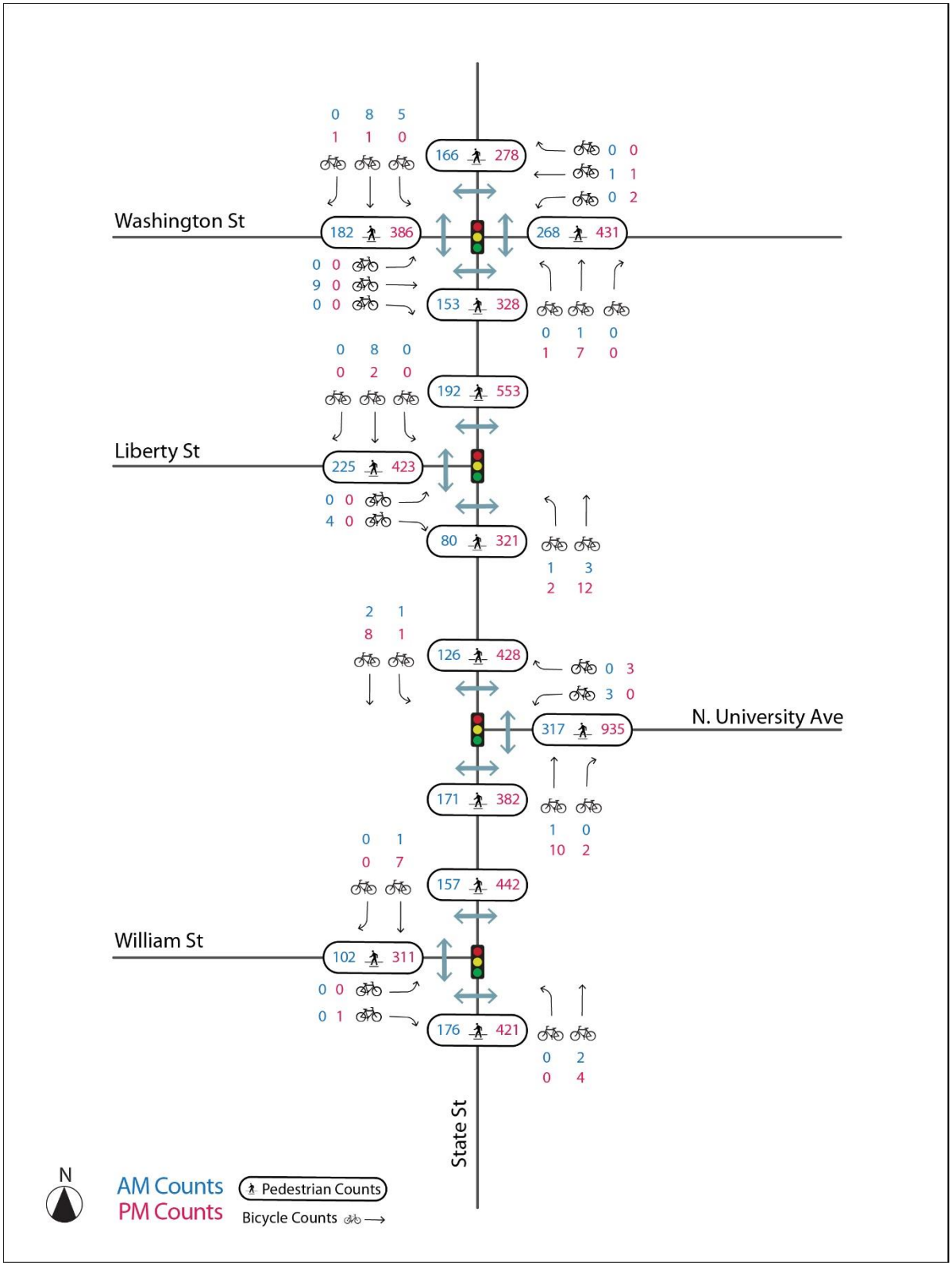


Figure 4-2. Existing Pedestrian and Bicyclist Traffic Volumes on State Street.



4.2 CAPACITY ANALYSIS OF PROPOSED AND MITIGATED CONDITIONS

The capacity analyses conducted for the Proposed conditions were based on the available traffic count information, current lane geometry, heavy vehicle usage, and existing signal timing. Signal timing changes were investigated to mitigate capacity deficiencies discovered during the analysis. A subsequent capacity analysis was conducted under Mitigated conditions. A summary of the results of the capacity analysis for the Proposed and Mitigated conditions on State Street follows.

4.2.1 Proposed Conditions

A summary of the vehicle delay and level of service (LOS) expected under Proposed conditions with geometric changes only on State Street is displayed in **Table 4-1**. As shown, all study intersections are expected to operate at acceptable LOS C or better for vehicles during the AM Peak and PM Peak hours. Additionally, all intersection approaches are likewise anticipated to operate at LOS D or better for vehicles during each of the Peak hours. The SimTraffic vehicle queuing results are depicted in **Table 4-2**. Vehicle capacity and queuing worksheets for Proposed conditions are included in **Appendix D.**

4.2.2 Mitigated Conditions

Corridor-wide signal timing changes were investigated to improve traffic operations at each intersection. The existing 90 second cycle length was maintained at each intersection on State Street. Minor adjustments were made to phase splits and offsets to improve total intersection LOS and coordination between intersections. Leading pedestrian intervals (LPIs) were included at the intersections of State Street at Liberty Street, North University Avenue, and William Street. Additionally, it is recommended to update the clearance intervals based on the final design. A summary of the vehicle delay and LOS expected under these Mitigated conditions is shown in **Table 4-3.** The SimTraffic queuing results are depicted in **Table 4-4**. As shown, relative to Proposed conditions, the signal timing adjustments tend to improve queuing on the northbound and southbound State Street approaches while increasing the queue lengths on the side-street approaches to the intersections.

Comparisons of vehicle delay and LOS between Proposed and Mitigated conditions are depicted in **Figure 4-3** and **Figure 4-4** for the AM Peak hour and in **Figure 4-5** and **Figure 4-6** for the PM Peak hour. As seen, the minor adjustments to signal timing to accommodate the geometric changes improved overall intersection LOS for vehicles compared to Proposed conditions at every signalized intersection during both peak hours. Vehicle capacity and queuing worksheets for Mitigated conditions are included in **Appendix E.**

Table 4-1. Capacity Results for Proposed Conditions on State Street.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Washington Street (Signal)	LOS	C	B	C	B	B	B	C	C	B	B
	Delay (sec)	20.6	16.0	28.8	11.6	19.3	19.8	22.4	23.6	11.7	19.7
State Street and Liberty Street (Signal)	LOS	D	-	A	A	B	D	-	B	A	B
	Delay (sec)	40.6	-	8.4	7.4	14.8	48.0	-	12.2	7.4	16.9
State Street and N. University Avenue (Signal)	LOS	-	C	B	B	B	-	D	B	B	C
	Delay (sec)	-	27.5	11.5	15.8	15.5	-	40.2	12.8	16.6	20.5
State Street and William Street (Signal)	LOS	C	-	B	B	B	D	-	C	B	C
	Delay (sec)	27.9	-	15.8	13.3	16.3	41.9	-	31.3	12.6	25.4

Table 4-2. Queuing Results for Proposed Conditions on State Street.

Intersection	Measure	AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
State Street and Washington Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LTR: 208'** (464')	**L: 20'** (150') **TR: 86'** (466')	**LTR: 174'** (280')	**LTR: 168'** (244')	**LTR: 150'** (464')	**L: 110'** (150') **TR: 249'** (466')	**LTR: 247'** (280')	**LTR: 162'** (244')
State Street and Liberty Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 97'** (470')	-	**LT: 175'** (246')	**TR: 164'** (280')	**LR: 137'** (470')	-	**LT: 259'** (246')	**TR: 163'** (280')
State Street and N. University Avenue (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 115'** (472')	**TR: 133'** (192')	**LT: 197'** (246')	-	**LR: 215'** (472')	**TR: 187'** (192')	**LT: 253'** (246')
State Street and William Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 117'** (472')	-	**LT: 227'** (720')	**TR: 149'** (192')	**LR: 169'** (472')	-	**LT: 596'** (720')	**TR: 206'** (192')

Table 4-3. Capacity Results for Mitigated Conditions on State Street.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Washington Street (Signal)	LOS	C	B	B	B	B	B	C	B	B	B
	Delay (sec)	20.6	16.0	13.7	10.9	15.6	19.8	22.4	17.6	12.4	18.4
State Street and Liberty Street (Signal)	LOS	D	-	A	A	B	D	-	A	A	B
	Delay (sec)	40.6	-	3.5	3.7	11.5	50.0	-	6.5	5.5	14.0
State Street and N. University Avenue (Signal)	LOS	-	D	A	A	B	-	D	B	B	C
	Delay (sec)	-	37.6	7.5	9.2	13.0	-	50.4	11.0	10.8	20.2
State Street and William Street (Signal)	LOS	C	-	B	B	B	D	-	C	B	C
	Delay (sec)	31.2	-	13.6	11.6	15.0	48.5	-	25.2	10.6	23.2

Table 4-4. Queuing Results for Mitigated Conditions on State Street.

Intersection	Measure	AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
State Street and Washington Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LTR: 210'** (464')	**L: 56'** (150') **TR: 99'** (466')	**LTR: 150'** (280')	**LTR: 183'** (244')	**LTR: 198'** (464')	**L: 110'** (150') **TR: 298'** (466')	**LTR: 259'** (280')	**LTR: 170'** (244')
State Street and Liberty Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 97'** (470')	-	**LT: 127'** (246')	**TR: 122'** (280')	**LR: 137'** (470')	-	**LT: 214'** (246')	**TR: 146'** (280')
State Street and N. University Avenue (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 119'** (472')	**TR: 88'** (192')	**LT: 148'** (246')	-	**LR: 196'** (472')	**TR: 156'** (192')	**LT: 231'** (246')
State Street and William Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 123'** (472')	-	**LT: 216'** (720')	**TR: 159'** (192')	**LR: 155'** (472')	-	**LT: 441'** (720')	**TR: 191'** (192')

Figure 4-3. Proposed and Mitigated AM Peak Hour Delay and LOS for Intersection Movements on State Street.

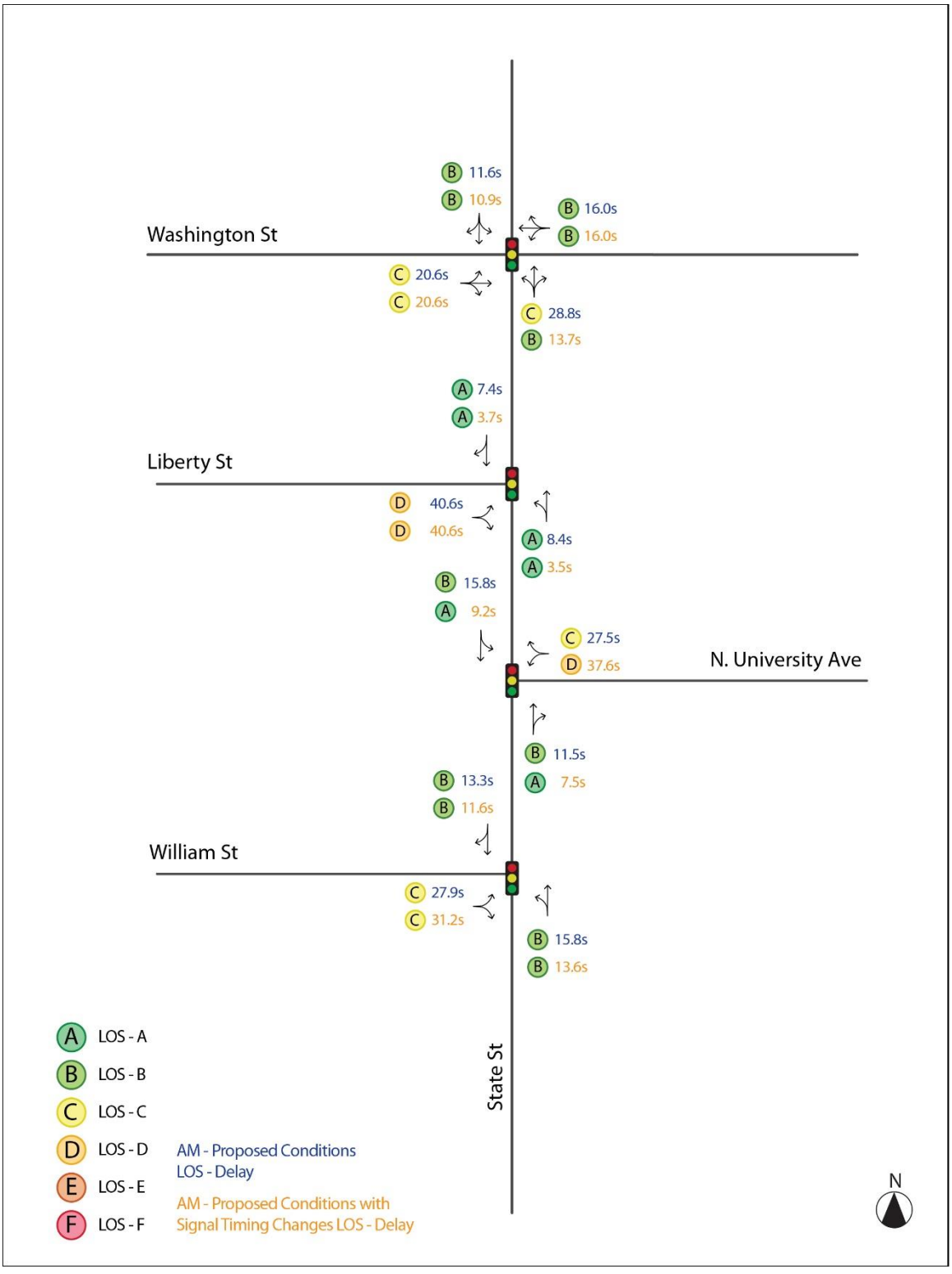


Figure 4-4. Proposed and Mitigated AM Peak Hour Delay and LOS for Total Intersection on State Street.

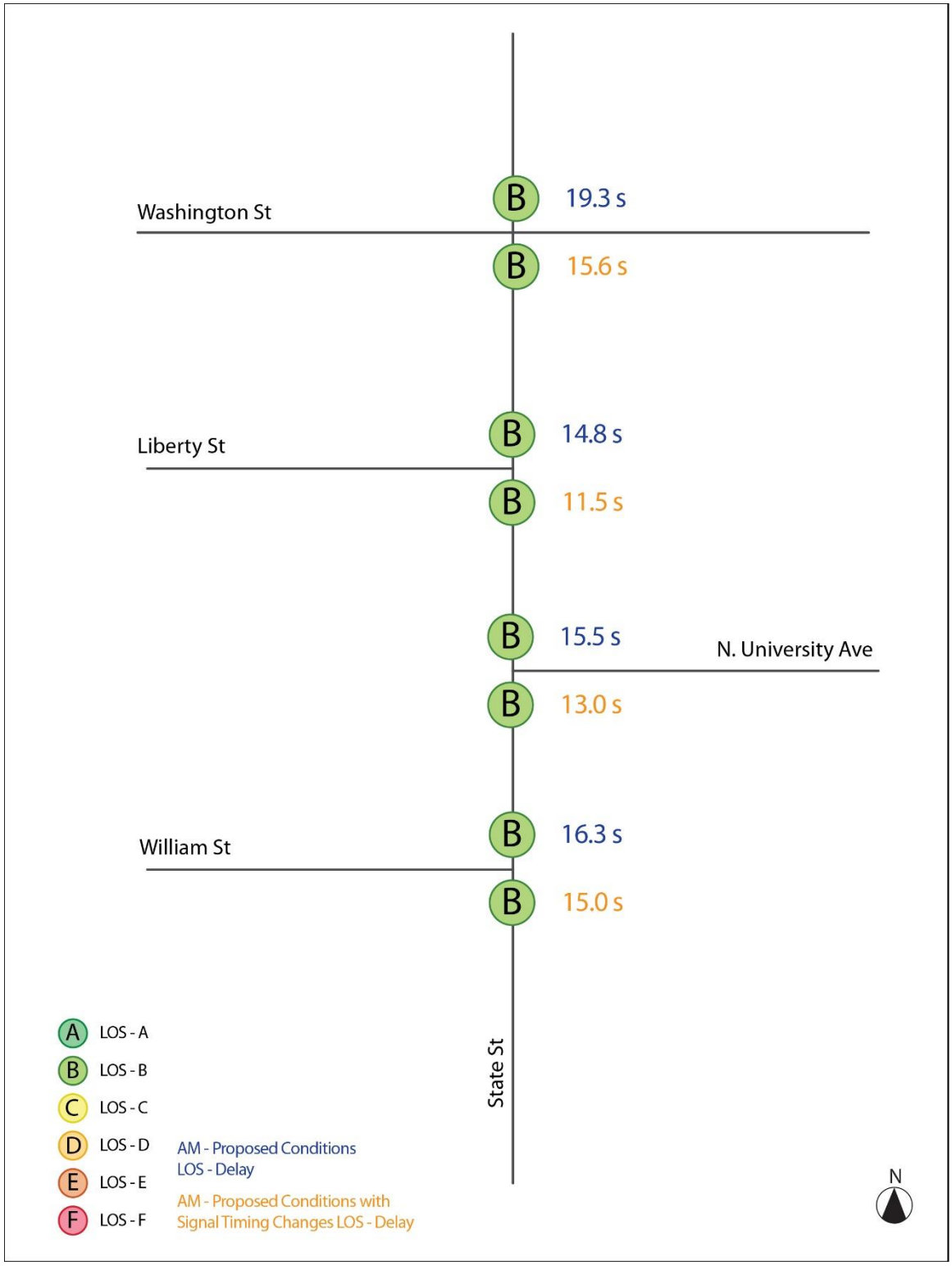


Figure 4-5. Proposed and Mitigated PM Peak Hour Delay and LOS for Intersection Movements on State Street.

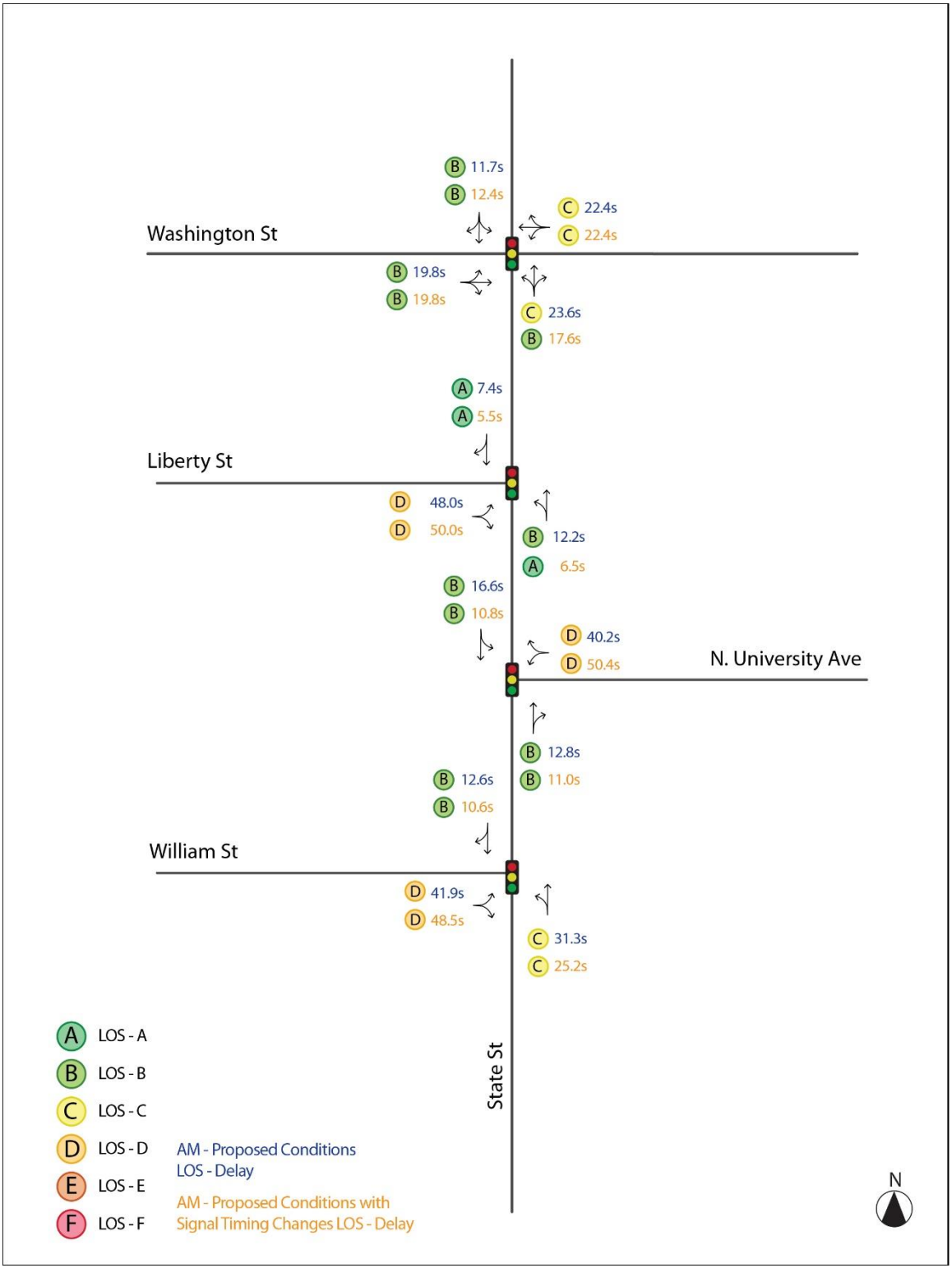
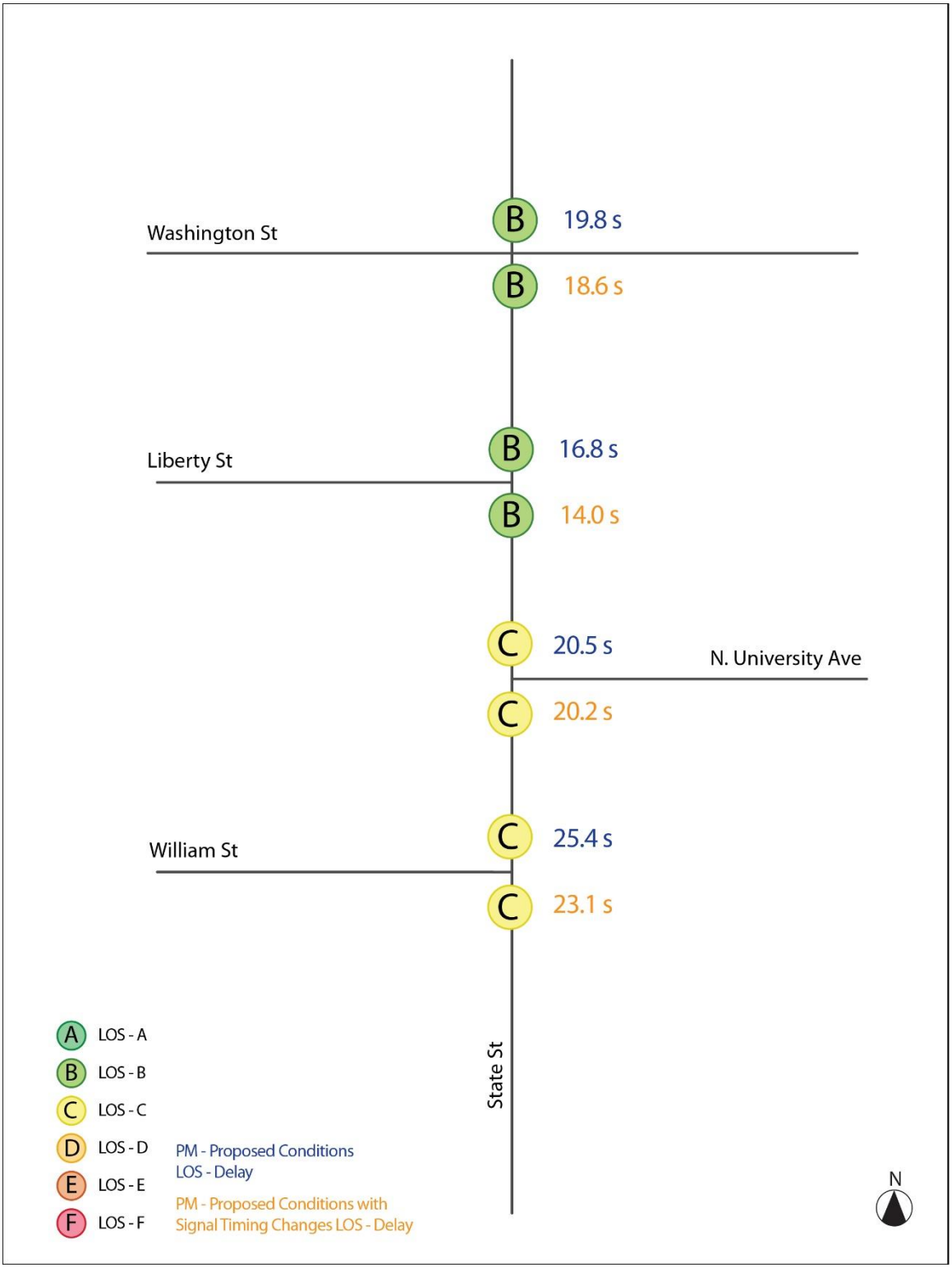


Figure 4-6. Proposed and Mitigated PM Peak Hour Delay and LOS for Total Intersection on State Street.



4.2.3 Pedestrian and Bicycle Level of Service

Delay and level of service (LOS) as determined by the Highway Capacity Manual methodology represent quantitative measures of the adequacy of a facility to serve the operational needs of non-motorized users. The perceived quality of service of a facility for non-motorized users is also influenced by qualitative measures such as security, safety, grades, lighting, surface conditions, street activity levels, separation from vehicle traffic, speed of adjacent vehicles, frequency of heavy vehicles, provision of on-street parking, and other factors. As qualitative measures, these indicators can be difficult to quantify, but most, if not all, are improved via the proposed changes in the People Friendly Streets design on State Street.

The traffic models produced in this analysis were used to determine anticipated pedestrian and bicycle level of service (LOS) in addition to vehicular LOS at signalized intersections (traffic models do not support nonmotorized pedestrian and bicycle results for all-way and two-way stop-controlled intersections). Synchro provides the functionality to report the delay and LOS expected by non-motorized users and was used to report these quantitative measures in the present study. A summary of the pedestrian and bicycle level of service (LOS) expected under Mitigated conditions at the signalized study intersections is displayed in **Table 4-5**. As shown, walking and biking delays were estimated in the traffic models which indicated that pedestrians are expected to operate at acceptable LOS B and bicycling at LOS B or LOS C for all movements during peak hours. Pedestrian and Bicycle LOS worksheets for Mitigated conditions are included in **Appendix F.**

Table 4-5. Pedestrian and Bicycle LOS Results.

Intersection	Measure	AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
State Street and Washington Street (Signal)	Pedestrian LOS	B	B	B	B	B	B	B	B
	Bicycle LOS	B	B	C	C	B	C	C	C
State Street and Liberty Street (Signal)	Pedestrian LOS	B	-	B	B	B	-	B	B
	Bicycle LOS	B	-	B	B	B	-	C	B
State Street and N. University Avenue (Signal)	Pedestrian LOS	-	B	B	B	-	B	B	B
	Bicycle LOS	-	B	C	B	-	B	C	B
State Street and William Street (Signal)	Pedestrian LOS	B	-	B	B	B	-	B	B
	Bicycle LOS	B	-	C	B	B	-	C	C

4.3 CAPACITY ANALYSIS OF ALTERNATIVE CONDITIONS

In discussions with the project team consisting of the Ann Arbor DDA, City of Ann Arbor engineering, Smithgroup, Wade Trim and Toole Design, three alternative design alternatives were selected for investigation. These alternatives include:

1. Converting the signalized intersections of Liberty Street at State Street and North University Avenue at State Street to stop-control on each intersection approach.
2. Implementing an exclusive pedestrian phase to the intersections of Liberty Street and North University Avenue, and William Street at State Street, to operate all-day except when the signals are running in nighttime Flash mode.
3. Removing all intersection traffic control at the intersections of Liberty Street and North University Avenue at State Street.

4.3.1 Alternative One – Three-way Stop-Control

For the alternative which removes signalization and places each approach under stop-control at the intersections of Liberty Street and North University Avenue at State Street, two different lane configurations were explored:

- The first lane configuration is the conceptual design previously described in Section 3.2. of this report. With this design, all vehicle turning movements are served by a single approach.
- The second lane configuration is the same as the first, except the existing turn lanes are retained at the intersections.

A capacity analysis of each of these options was performed and the results are shown in **Table 4-5.** While the vehicle delay and corresponding LOS for each of the intersection approaches fall within the acceptable range, the SimTraffic analyses exhibited excessive queues on each approach – particularly during the PM Peak hour, which is mainly attributed to the very large volumes of pedestrians crossing per hour at the intersection. A signal warrant analysis was performed for each intersection and determined that both intersections meet the criteria for signalization as required by vehicular volumes and pedestrian volumes. The SimTraffic vehicle queuing results are depicted in **Table 4-6**. The vehicle capacity and queuing reports for the three-way stop-control alternative are included in **Appendix E.**

Table 4-5. Capacity Results for Three-Way Stop-Control on State Street at Liberty Street and North University Avenue.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Liberty Street (3-Way Stop)	LOS	A	-	A	A	A	A	-	B	B	B
	Delay (sec)	8.9	-	9.9	9.9	9.7	9.7	-	13.1	10.8	11.6
State Street and Liberty Street (3-Way Stop with Turn Lanes)	LOS	A	-	A	B	A	A	-	A	B	B
	Delay (sec)	8.9	-	8.8	10.2	9.4	9.7	-	10.0	11.0	10.3
State Street and N. University Avenue (3-Way Stop)	LOS	-	B	B	B	B	-	B	C	B	C
	Delay (sec)	-	10.1	12.5	11.1	11.6	-	13.3	19.0	14.5	16.2
State Street and N. University Avenue (3-Way Stop with Turn Lanes)	LOS	-	A	A	B	B	-	B	B	C	B
	Delay (sec)	-	9.2	8.9	12.2	10.0	-	11.3	11.9	16.0	13.1

Table 4-6. Queuing Results for Three-Way Stop-Control on State Street at Liberty Street and North University Avenue.

Intersection	Measure	AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
State Street and Liberty Street (3-Way Stop)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 124'** (470')	-	**LT: 97'** (246')	**LTR: 163'** (280')	**LR: 580'** (470')	-	**LT: 198'** (246')	**LTR: 292'** (280')
State Street and Liberty Street (3-Way Stop with Turn Lanes)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 73'** (470')	-	**L: 46'** (246') **T: 93'** (246')	**TR: 159'** (280')	**LR: 567'** (470')	-	**L: 119'** (246') **T: 222'** (246')	**TR: 296'** (280')
State Street and N. University Avenue (3-Way Stop)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 101'** (472')	**TR: 238'** (192')	**LT: 217'** (246')	-	**LR: 503'** (472')	**TR: 208'** (192')	**LT: 272'** (246')
State Street and N. University Avenue (3-Way Stop with Turn Lanes)	95th Percentile Queue (ft) (Link Distance (ft))	-	**L: 77'** (472') **R: 62'** (472')	**T: 111'** (192') **R: 192'** (192')	**LT: 190'** (246')	-	**L: 126'** (472') **R: 494'** (472')	**T: 209'** (192') **R: 205'** (192')	**LT: 253'** (246')

4.3.2 Alternative Two – Exclusive Pedestrian Signal Phasing

Implementing an exclusive pedestrian phase was investigated for operational performance at each of the intersections of Liberty Street at State Street, North University Avenue at State Street, and William Street at State Street. Conventionally, a pedestrian scramble phase prohibits vehicle movements from all approaches while only pedestrian movements are allowed. The duration of the Flashing Don't Walk (FDW) portion of the scramble phase is determined by the maximum crossing distance. The pedestrian scramble was evaluated but would require new pedestrian signal equipment which is not included in the scope of work for this project. In the exclusive pedestrian phase, pedestrians may cross perpendicular to the conflicting vehicle travel approach like normal.

A review was performed of criteria established by state and national transportation agencies for consideration of implementation of an exclusive pedestrian phase. While the criteria varied by agency, some of the measures included:

- FHWA PEDSAFE – "Case Study No. 23 Exclusive Pedestrian Phasing"
    - Total pedestrian crossing volume should be preferably more than 1,000 pedestrians per hour during at least four hours a day
    - Vehicular volumes shall be moderate (recommended total intersection approach volume less than 2,000 vehicle per hour) and steady for many hours of the day with high percentage of left or right turns
    - Vehicle volume peak times should coincide with pedestrian volume peak times
    - Intersections with existing level of service C or lower
- Boston Transportation Department – "Boston Complete Streets Guidelines"
    - Conflicting turning vehicle volumes should be equal or greater than 250 vehicles per hour
    - Locations with restricted sight distance
    - Locations with complex intersection geometry
    - Locations near elderly housing, schools, recreational areas, medical facilities, or other facilities within a safety zone
- New York City DOT – "Exclusive Pedestrian Signal Phase Treatments Study"
    - "T"-intersection geometry is preferrable

Table 4-7 on the following page compares the intersections against these criteria. As seen, numerous criteria are met at each intersection.

Table 4-7. Comparison of Intersections against Exclusive Pedestrian Phasing Criteria.

Measure	Libery Street @ State Street	N University Avenue @ State Street	William Street @ State Street
Total pedestrian crossing volume should be preferably more than 1,000 pedestrians per hour during at least four hours a day	**Yes:** 11 AM - 2 PM, 4 PM - 6 PM	**Yes:** 11 AM - 2 PM, 4 PM - 6 PM	No: 12 PM & 5 PM
Total intersection vehicle volumes less than 2,000 vehicles per hour (vph), with high percentage of left or right turns	**Yes:** All hours counted less than 2,000 vph (26% NB LT, 28% SB RT)	**Yes:** All hours counted less than 2,000 vph (40% NB RT, 16% SB LT)	**Yes:** All hours counted less than 2,000 vph (19% NB LT, 20% SB RT)
Vehicle volume peaks coincide with pedestrian volume peaks	**Yes**	**Yes**	**Yes**
Existing level of service C or worse	LOS B during AM & PM Peaks under mitigated conditions	LOS B during AM Peak, LOS C during PM Peak under mitigated conditions	LOS B during AM Peak, LOS C during PM Peak under mitigated conditions
Conflicting turning vehicle volumes equal or greater than 250 vehicles per hour	**Yes**	**Yes**	**Yes**
Location with restricted sight distance	No	No	No
Location with complex intersection geometry	**Yes**	**Yes**	**Yes**
Location near elderly housing, school, recreational area, medical facility, or other facility within a safety zone	**Yes**	**Yes**	**Yes**
"T"-Intersection geometry	**Yes**	**Yes**	**Yes**

Given that the safety analysis indicated an existing crash pattern involving pedestrians being struck by vehicles performing right turns on red (RTOR), a modification to the exclusive pedestrian phase alternative was investigated whereby RTOR would be prohibited on all approaches. Additionally, retaining the existing exclusive right- and left-turn lanes on the North University Avenue approach was analyzed. A capacity analysis of the exclusive pedestrian phase alternative with, and without, these modifications was performed, and the results are shown in **Table 4-8.** The SimTraffic vehicle queuing results are depicted in **Table 4-9**, while the volume to capacity (V/C) ratios and upstream block time percentages at the intersections with RTOR restrictions are shown in **Table 4-10**. The vehicle capacity and queuing reports for the exclusive pedestrian phase alternative are included in **Appendix E.**

As seen in **Table 4-8,** each intersection is expected to operate at LOS C or better for vehicles during both peak hours for any of the various implementations of the exclusive pedestrian phase at the intersections. Acceptable LOS is maintained when prohibiting right-turns on red at any of the intersections, resulting in only minor increases to delay. Retaining the existing exclusive right- and left-turn lanes on the westbound North University Avenue approach would slightly improve delay at the intersection.

Table 4-8. Capacity Results for Exclusive Pedestrian Phasing on State Street at Liberty Street, North University Avenue, and William Street.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Liberty Street (EPP with RTOR)	LOS	C	-	A	B	B	C	-	B	B	B
	Delay (sec)	34.5	-	9.6	10.5	15.3	33.0	-	11.8	12.0	15.7
State Street and Liberty Street (EPP with No RTOR)	LOS	D	-	A	B	B	D	-	B	B	B
	Delay (sec)	41.5	-	8.4	10.9	16.5	37.9	-	11.2	12.5	16.5
State Street and N. University Avenue (EPP with RTOR)	LOS	-	D	A	B	B	-	D	B	B	C
	Delay (sec)	-	38.7	9.4	12.7	15.2	-	45.5	15.0	19.7	23.6
State Street and N. University Avenue (EPP with No RTOR)	LOS	-	D	B	B	B	-	D	B	C	C
	Delay (sec)	-	41.1	11.5	14.4	17.3	-	49.5	18.7	21.2	26.7
State Street and N. University Avenue (EPP with N University Turn Lanes and RTOR)	LOS	-	C	A	B	B	-	C	B	B	C
	Delay (sec)	-	34.6	9.4	12.7	14.6	-	34.4	15.0	19.7	21.0
State Street and N. University Avenue (EPP with N University Turn Lanes and No RTOR)	LOS	-	D	B	B	B	-	D	B	C	C
	Delay (sec)	-	35.5	13.2	14.4	17.2	-	35.6	16.4	21.2	22.4
State Street and William Street (EPP with No RTOR)	LOS	D	-	B	B	B	D	-	D	B	C
	Delay (sec)	38.7	-	17.8	14.1	18.9	53.3	-	36.7	15.6	30.8

As shown in **Table 4-9**, relative to Proposed and Mitigated conditions, the exclusive pedestrian phase alternative is expected to increase queue lengths on each intersection approach on State Street. The table shows the 95th percentile queue length in feet for the right-turn and left-turn lanes at the study intersections. The 95th percentile queue is the maximum back of queue length that can accommodated by the 95th percentile of traffic volumes. This length is used to determine the length of the full-width storage lanes that should be available to accommodate the traffic demand. There are some roadway segments where 95th-percentile queue lengths may expect to exceed link lengths; however during the simulation of the entire peak hour, these queue lengths were infrequent and generally occurred during the peak 15-minute interval. Significantly shorter queue lengths are anticipated during most cycles of the peak hour and the majority of a typical day. The exhibited slight increases in traffic delays and queue lengths are a trade-off that is expected with the removal of the turn lanes for the proposed People-Friendly Streets design changes. Retaining the turn lanes on westbound North University Avenue is anticipated to reduce the queue lengths on the approach.

Table 4-9. Queuing Results for Exclusive Pedestrian Phasing on State Street at Liberty Street, North University Avenue, and William Street.

Intersection	Measure	AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
State Street and Liberty Street (Ex. Ped. Phase with RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 97'** (470')	-	**LT: 96'** (246')	**TR: 109'** (280')	**LR: 179'** (470')	-	**LT: 194'** (246')	**TR: 198'** (280')
State Street and Liberty Street (Ex. Ped. Phase with No RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 135'** (470')	-	**LT: 116'** (246')	**TR: 101'** (280')	**LR: 318'** (470')	-	**LT: 192'** (246')	**TR: 236'** (280')
State Street and N. University Avenue (Ex. Ped. Phase with RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 123'** (472')	**TR: 144'** (192')	**LT: 165'** (246')	-	**LR: 230'** (472')	**TR: 240'** (192')	**LT: 271'** (246')
State Street and N. University Avenue (Ex. Ped. Phase with No RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 130'** (472')	**TR: 131'** (192')	**LT: 195'** (246')	-	**LR: 234'** (472')	**TR: 225'** (192')	**LT: 298'** (246')
State Street and N. University Avenue (Ex. Ped. Phase with N University Turn Lanes and RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	-	**L: 95'** (100') **R: 55'** (472')	**TR: 145'** (192')	**LT: 207'** (246')	-	**L: 129'** (100') **R: 82'** (472')	**TR: 234'** (192')	**LT: 276'** (246')
State Street and N. University Avenue (Ex. Ped. Phase with N University Turn Lanes and No RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	-	**L: 105'** (100') **R: 84'** (472')	**TR: 183'** (192')	**LT: 237'** (246')	-	**L: 136'** (100') **R: 130'** (472')	**TR: 239'** (192')	**LT: 270'** (246')
State Street and William Street (Ex. Ped. Phase with No RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 126'** (472')	-	**TR: 240'** (720')	**LT: 149'** (192')	**LR: 221'** (472')	-	**TR: 618'** (720')	**LT: 188'** (192')

As shown in **Table 4-10**, the volume to capacity ratios are within the acceptable range, under 0.85 for urban intersections, at all approaches during each peak hour, except for the northbound State Street approach at William Street during the PM Peak hour (0.87). The percentage of upstream block time presented in **Table 4-10** indicates negligible likelihood of upstream intersections being blocked by vehicle queues at all intersection during each peak hour, except the southbound State Street approach to North University Avenue during the PM Peak hour. The 18% upstream block time indicates that the southbound queue may be expected to spill back to Liberty Street up to 7 of the 40 cycles during the PM Peak hour under a 90 second cycle length.

Table 4-10. V/C Ratios and Upstream Block Time Percentages for Exclusive Pedestrian Phasing on State Street, North University Avenue, and William Street.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Liberty Street (EPP with No RTOR)	V/C	0.52	-	0.31	0.32	0.30	0.49	-	0.61	0.37	0.46
	Upstream Block %	0%	-	0%	0%	n/a	1%	-	0%	3%	n/a
State Street and N. University Avenue (EPP with No RTOR)	V/C	-	0.51	0.58	0.49	0.43	-	0.77	0.68	0.57	0.54
	Upstream Block %	-	0%	0%	1%	n/a	-	0%	7%	18%	n/a
State Street and William Street (EPP with No RTOR)	V/C	0.42	-	0.52	0.42	0.40	0.75	-	0.87	0.53	0.67
	Upstream Block %	0%	-	0%	0%	n/a	0%	-	1%	1%	n/a

As seen in **Table 4-8**, although implementation of no RTOR restrictions is expected to result in greater delays, particularly for the Liberty Street approaches, an acceptable LOS is expected to be maintained with no RTOR. While greater vehicle delays are expected due to the no RTOR restriction, queue lengths are marginally impacted by RTOR restrictions, as shown in **Table 4-9**.

Right turns on red at the intersection approaches may be prohibited via the installation of R10-11 “No Turn on Red” signs. It was discussed by the project team to test this operation by implementing the timing changes to the signal controllers and installing temporary R10-11 “No Turn on Red” signs.

Two viable strategies concerning the operation of an exclusive pedestrian phase (EPP) at the intersections are described below.

- **EPP Option 1 –EPP During the Daytime with Pedestrian Recall Overnight**
  In this scenario, the intersection operates with pedestrian recall each cycle all day (no pedestrian pushbutton actuation). The EPP runs during the day while the vehicle and pedestrian volumes are substantial and consistent, with EPP turned off overnight when pedestrian demand is diminished and set to flashing mode as it currently operates. If the flash mode were removed at the intersection, it could be set for pedestrian signal phasing to run concurrent with vehicle movement overnight.

- **EPP Option 2 – Pushbutton Activation**
  Here the EPP operates with pedestrian recall each cycle during the majority of the day when pedestrian demand is substantial and steady but actuate the exclusive pedestrian phase via a pushbutton activation during times of day with diminished and/or more sporadic pedestrian demand.

It is recommended to introduce a pilot project for EPP Option 1 utilizing Pedestrian Recall with EPP During the Daytime. An ideal timeframe may be just prior to a new U of M semester in order for students to acclimate to the changes in traffic patterns. At the three study intersections, there would be insufficient benefit to installing the pushbuttons. With high pedestrian activity consistently throughout the day, pedestrians are present for each cycle to push the buttons and the EPP would likely be running with nearly all cycles.

Based on discussion with the City at the 1/18/22 State St signal meeting, in addition to an Exclusive Pedestrian Phase (EPP), further evaluation was conducted to determine whether the pedestrian phasing should operate concurrent with the associated vehicle phase to reduce the potential maximum delay that a pedestrian may experience at the intersection. This operation cannot be fully analyzed in Synchro as the conflicting peds are removed due to the EPP (the peds are no longer conflicting peds with vehicles). Due to this restriction, an estimated maximum delay was determined for the intersection of State Street and North University for comparison purposes and is shown in **Table 4-11**. The maximum delay a pedestrian may experience under signal operation with only an EPP is 70 seconds per pedestrian. The maximum delay a pedestrian may experience under signal operation with an EPP in addition to pedestrian phasing concurrent with vehicle phasing is 47 seconds per pedestrian (pedestrians crossing along State Street). Based on this data to reduce pedestrian delay and eliminate the potential conflict of pedestrians walking on a prolonged DO NOT WALK indication, it is recommended to include the concurrent WALK (recall) phases in addition to the EPP.

Table 4-11. Maximum Pedestrian Delay Comparison for North University Avenue at State Street

Crosswalk	Pedestrians Crossing	Max Delay with EPP Only (sec/ped)	Max Delay with EPP & Concurrent WALK (sec/ped)
State St - South Leg	382	70	47
N University Ave - West Leg	935	70	26
State St - North Leg	428	70	47

Time of Day Evaluation

The pedestrian crossing volumes exceed the 1,000 pedestrians per hour threshold for the four or more hours indicated in the table for the Liberty Street, N University and William intersections. A summary of the observed crossing pedestrian volumes for the AM, mid-day, and PM hours at each intersection is included below. While the crossing pedestrian volumes do not exceed 1,000 per hour during the AM hours, the volumes are still substantial, and it was considered operating the EPP during this time to provide consistent daily operation at the intersection.

Table 4-12. Total Pedestrians Crossing Intersections with Proposed Exclusive Pedestrian Phasing during AM Hours.

Intersection	Total Pedestrians 7:00 – 8:00 AM	Total Pedestrians 8:00 – 9:00 AM
N University Ave @ State St	283	743
Liberty St @ State St	199	497
William St @ State St	183	524

Table 4-13. Total Pedestrians Crossing Intersections with Proposed Exclusive Pedestrian Phasing during Mid-Day Hours.

Intersection	Total Pedestrians 10:00 – 11:00 AM	Total Pedestrians 11:00 – 12:00 PM	Total Pedestrians 12:00 – 1:00 PM	Total Pedestrians 1:00 – 2:00 PM
N University Ave @ State St	974	1869	2317	1767
Liberty St @ State St	675	1236	1376	1112
William St @ State St	No data available	960	1073	No data available

Table 4-14. Total Pedestrians Crossing Intersections with Proposed Exclusive Pedestrian Phasing during PM Hours.

Intersection	Total Pedestrians 4:00 – 5:00 PM	Total Pedestrians 5:00 – 6:00 PM
N University Ave @ State St	1601	1745
Liberty St @ State St	1313	1297
William St @ State St	884	1174

During the initial stage of the pilot project, the flash schedules can be set as they currently exist from midnight to 6:30 AM which coincides with other flash schedules at nearby intersections. This operation can then be evaluated and adjusted depending on the safety and operational outcomes of the pilot project. If it is found after the initial monitoring that the flash schedule should be modified or removed, the signal could be set for pedestrian signal phasing to run concurrent with vehicle movement overnight.

4.3.3 Alternative Three – Removal of All Intersection Traffic Control

An alternative which removes all intersection traffic control was explored at the intersections of Liberty Street and North University Avenue at State Street. The intention of this alternative is to remove all intersection traffic control devices and allow all users to negotiate priority at the intersection movement conflict points. Synchro software does not provide capacity outputs for uncontrolled intersections, so PTV Vissim traffic microsimulation software was used instead to analyze the traffic operations of the alternative. The preliminary simulation analysis determined that removing all forms of traffic control at the intersections would in effect operate very similarly to three-way stop-control, due to the robust pedestrian demand during the peak hours. Excessive vehicle queuing was exhibited on each intersection approach, particularly during the PM Peak hour.

4.3.4 Alternative Four – Northbound State Street Right Turn at North University Avenue

An analysis was performed to determine the impact of removing the northbound right-turn lane along State Street at North University Avenue. The build option under consideration in this analysis is the option which incorporates exclusive pedestrian phasing (EPP) with No Right Turns on Red and otherwise proposed geometry at the intersection. During analysis of Mitigated conditions as described in Section 4.2.2, signal timing adjustments were performed corridor-wide to provide more green time to the State Street approaches, thus minimizing additional delay otherwise expected by removal of the turn lanes along State Street at Liberty Street and North University Avenue. These signal timing adjustments were incorporated as a baseline in the analysis with the EPP at the intersection, with and without the northbound right-turn lane. The November 2019 traffic volumes were used in the analysis. The results of the capacity analyses are depicted in **Table 4-15**.

As seen, removal of the right turn late results in minor increases in delay during both the AM Peak and PM Peak hours for the State Street approaches at North University Avenue. All approach LOS values are expected to remain the same with removal of the right-turn lane, except for the southbound approach during the PM Peak hour (level of service falls from LOS B to LOS C with a 2.1 second increase in delay). The increase in delay to the southbound approach results from consolidation of the northbound through and right-turn movements to a single lane, thus reducing the frequency and duration of gaps for southbound left-turning traffic. Removing the turn lane does not change overall intersection LOS during either Peak hours.

Table 4-15. Capacity Results for Removal of Northbound Right-Turn Lane on State Street at North University Avenue.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and N. University Avenue (EPP - With NB RTL)	LOS	-	D	A	B	B	-	D	B	B	C
	Delay (sec)	-	41.1	8.8	13.1	15.5	-	49.5	11.9	19.1	23.0
State Street and N. University Avenue (EPP - No NB RTL)	LOS	-	D	B	B	B	-	D	B	C	C
	Delay (sec)	-	41.1	13.2	14.4	18.1	-	49.5	16.4	21.2	25.7

5.0 FUTURE CONDITIONS

To analyze the feasibility of the Proposed, Mitigated, and Alternative Conditions under future traffic volumes, a background growth rate of 0.3% per year over 20 years was applied to the models. This background growth rate was obtained by consulting with the Washtenaw Area Transportation Study (WATS) model. A growth rate of 0.3% per year over 20 years results in a growth factor of 1.06.

5.1 FUTURE CAPACITY ANALYSIS OF PROPOSED AND MITIGATED CONDITIONS

A summary of the vehicle delay and LOS expected with future traffic volumes under Proposed conditions with geometric changes only is displayed in **Table 5-1**, while the queuing results are shown in **Table 5-2**. A summary of the vehicle delay and LOS expected with future traffic volumes under Mitigated conditions with signal timing adjustments is displayed in **Table 5-3**, while the queuing results are shown in **Table 5-4**.

As seen, all approaches are expected to continue operating at LOS C or better for vehicles during both the AM and PM Peak hours. Compared to the expected delay values under existing traffic volumes as shown in **Tables 4-1 and 4-3,** slight increases to delay are expected on each approach as a result of the increased traffic volumes. All approach and intersection vehicle LOS are expected to remain the same expect for those highlighted**,** where the increase in delay was large enough to exceed the previous LOS threshold. No LOS values increased larger than one letter grade threshold. As shown in **Tables 5-1** and **5-3**, the 95th percentile queue lengths are expected to increase on almost all intersection approach due to the increase in traffic volumes. The signal timing adjustments under Mitigated conditions tend to decrease the queue lengths on the State Street approaches, while increasing queue lengths on the side-street approaches.

Table 5-1. Capacity Results for Proposed Conditions on State Street – Future Traffic Volumes.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Washington Street (Signal)	LOS	C	B	C	B	B	C	C	C	B	C
	Delay (sec)	21.2	16.2	28.6	12.1	19.7	20.6	23.3	23.8	12.0	20.3
State Street and Liberty Street (Signal)	LOS	D	-	A	A	B	D	-	B	A	B
	Delay (sec)	40.6	-	8.4	7.8	15.0	49.3	-	12.2	7.9	17.4
State Street and N. University Avenue (Signal)	LOS	-	C	B	B	B	-	D	B	B	C
	Delay (sec)	-	27.9	12.8	16.8	16.6	-	43.3	13.9	16.4	21.6
State Street and William Street (Signal)	LOS	C	-	B	B	B	D	-	D	B	C
	Delay (sec)	28.2	-	16.5	13.6	16.7	45.1	-	42.1	12.9	30.7

Table 5-2. Queuing Results for Proposed Conditions on State Street – Future Traffic Volumes.

Intersection	Measure	AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
State Street and Washington Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LTR: 230'** (464')	**L: 59'** (150') **TR: 105'** (466')	**LTR: 215'** (280')	**LTR: 189'** (244')	**LTR: 198'** (464')	**L: 106'** (150') **TR: 242'** (466')	**LTR: 261'** (280')	**LTR: 183'** (244')
State Street and Liberty Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 105'** (470')	-	**LT: 197'** (246')	**TR: 166'** (280')	**LR: 139'** (470')	-	**LT: 279'** (246')	**TR: 181'** (280')
State Street and N. University Avenue (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 127'** (472')	**TR: 168'** (192')	**LT: 229'** (246')	-	**LR: 274'** (472')	**TR: 212'** (192')	**LT: 265'** (246')
State Street and William Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 130'** (472')	-	**LT: 273'** (720')	**TR: 142'** (192')	**LR: 172'** (472')	-	**LT: 576'** (720')	**TR: 229'** (192')

Table 5-3. Capacity Results for Mitigated Conditions on State Street – Future Traffic Volumes.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Washington Street (Signal)	LOS	C	B	B	B	B	C	C	B	B	B
	Delay (sec)	21.2	16.2	13.9	11.5	16.0	20.6	23.3	19.9	12.7	19.5
State Street and Liberty Street (Signal)	LOS	D	-	A	A	B	D	-	A	A	B
	Delay (sec)	40.6	-	3.8	4.1	11.8	52.8	-	7.0	6.0	15.0
State Street and N. University Avenue (Signal)	LOS	-	D	A	A	B	-	D	B	B	C
	Delay (sec)	-	38.6	8.1	9.4	13.5	-	51.1	13.1	11.4	21.5
State Street and William Street (Signal)	LOS	C	-	B	B	B	D	-	C	B	C
	Delay (sec)	31.6	-	14.1	11.9	15.4	53.3	-	32.4	11.1	27.2

Table 5-4. Queuing Results for Mitigated Conditions on State Street – Future Traffic Volumes.

Intersection	Measure	AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
State Street and Washington Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LTR: 222'** (464')	**L: 59'** (150') **TR: 98'** (466')	**LTR: 140'** (280')	**LTR: 184'** (244')	**LTR: 303'** (464')	**L: 113'** (150') **TR: 369'** (466')	**LTR: 254'** (280')	**LTR: 182'** (244')
State Street and Liberty Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 101'** (470')	-	**LT: 157'** (246')	**TR: 114'** (280')	**LR: 164'** (470')	-	**LT: 227'** (246')	**TR: 161'** (280')
State Street and N. University Avenue (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 117'** (472')	**TR: 120'** (192')	**LT: 177'** (246')	-	**LR: 253'** (472')	**TR: 189'** (192')	**LT: 237'** (246')
State Street and William Street (Signal)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 149'** (472')	-	**LT: 251'** (720')	**TR: 156'** (192')	**LR: 219'** (472')	-	**LT: 578'** (720')	**TR: 210'** (192')

5.2 FUTURE CAPACITY ANALYSIS OF EXCLUSIVE PEDESTRIAN PHASING ALTERNATIVE

A summary of the vehicle delay and LOS expected with future traffic volumes under the exclusive pedestrian phase alternative is displayed in **Table 5-5**. As seen, the approaches and overall intersections are expected to continue operating at LOS C or better for vehicles during both the AM and PM Peak hours, except for the intersection of William Street at State Street which is expected to operate at LOS D during the PM Peak hour with a LOS E (66.1 seconds / vehicle delay) on the eastbound approach. Given that the observed traffic volumes are highest during the AM and PM Peak hours, it is reasonable to ascertain that the exclusive pedestrian phase will operate satisfactorily (with lower vehicle delays) during all other daily hours under normal signal operation. The exclusive pedestrian phase would not be present during nighttime Flash operation. Pedestrian crosswalk LOS was indeterminate as the HCM 6e methodology does not support exclusive pedestrian phasing.

The approach and intersection vehicle LOS values are highlighted where the increase in delay was large enough to exceed the previous LOS threshold. No LOS values increased larger than one letter grade threshold. As shown in **Table 5-6**, queue lengths under future traffic volumes are expected to increase moderately on the approaches as a result of the no RTOR restrictions. Table 5-7 indicates that V/C ratios are expected to remain at or under the acceptable threshold of 0.85 except for the northbound State Street approach to William Street during the PM Peak hour, where the ratio is expected to increase by 0.07 compared to existing traffic volumes. Additionally, upstream block time percentages are expected to remain negligible to none during the AM Peak hour and negligible to moderate during the PM Peak hour (all approaches at or under 20% with most under 5%).

Table 5-5. Capacity Results for Exclusive Pedestrian Phasing on State Street at Liberty Street, North University Avenue, and William Street – Future Traffic Volumes.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Liberty Street (EPP with RTOR)	LOS	C	-	A	B	B	C	-	B	B	B
	Delay (sec)	34.8	-	9.6	10.6	15.4	33.6	-	13.1	12.7	16.7
State Street and Liberty Street (EPP with No RTOR)	LOS	D	-	A	B	B	D	-	B	B	B
	Delay (sec)	42.7	-	8.5	10.9	16.8	38.8	-	12.2	13.2	17.4
State Street and N. University Avenue (EPP with RTOR)	LOS	-	D	A	B	B	-	D	B	C	C
	Delay (sec)	-	39.6	9.8	14.0	16.1	-	48.8	16.3	22.2	25.8
State Street and N. University Avenue (EPP with No RTOR)	LOS	-	D	B	B	B	-	D	C	C	C
	Delay (sec)	-	42.2	11.9	15.6	18.1	-	54.0	22.1	23.6	30.1
State Street and N. University Avenue (EPP with N University Turn Lanes and RTOR)	LOS	-	C	A	B	B	-	C	B	C	C
	Delay (sec)	-	34.9	9.8	14.0	15.3	-	34.9	16.3	22.2	22.5
State Street and N. University Avenue (EPP with N University Turn Lanes and No RTOR)	LOS	-	D	B	B	B	-	D	B	C	C
	Delay (sec)	-	35.9	13.7	15.6	18.0	-	36.2	17.6	23.7	23.9
State Street and William Street (EPP with No RTOR)	LOS	D	-	B	B	B	E	-	D	B	D
	Delay (sec)	39.3	-	18.5	14.3	19.4	66.1	-	47.4	16.6	37.9

Table 5-6. Capacity Results for Exclusive Pedestrian Phasing on State Street at Liberty Street, North University Avenue, and William Street – Future Traffic Volumes.

Intersection	Measure	AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
State Street and Liberty Street (Ex. Ped. Phase with RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 100'** (470')	-	**LT: 104'** (246')	**TR: 109'** (280')	**LR: 449'** (470')	-	**LT: 238'** (246')	**TR: 275'** (280')
State Street and Liberty Street (Ex. Ped. Phase with No RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 168'** (470')	-	**LT: 122'** (246')	**TR: 125'** (280')	**LR: 353'** (470')	-	**LT: 228'** (246')	**TR: 276'** (280')
State Street and N. University Avenue (Ex. Ped. Phase with RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 121'** (472')	**TR: 159'** (192')	**LT: 216'** (246')	-	**LR: 239'** (472')	**TR: 234'** (192')	**LT: 305'** (246')
State Street and N. University Avenue (Ex. Ped. Phase with No RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	-	**LR: 148'** (472')	**TR: 153'** (192')	**LT: 239'** (246')	-	**LR: 238'** (472')	**TR: 242'** (192')	**LT: 307'** (246')
State Street and N. University Avenue (Ex. Ped. Phase with N University Turn Lanes and RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	-	**L: 96'** (100') **R: 59'** (472')	**TR: 154'** (192')	**LT: 241'** (246')	-	**L: 137'** (100') **R: 118'** (472')	**TR: 236'** (192')	**LT: 299'** (246')
State Street and N. University Avenue (Ex. Ped. Phase with N University Turn Lanes and No RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	-	**L: 107'** (100') **R: 76'** (472')	**TR: 188'** (192')	**LT: 254'** (246')	-	**L: 145'** (100') **R: 168'** (472')	**TR: 244'** (192')	**LT: 292'** (246')
State Street and William Street (Ex. Ped. Phase with No RTOR)	95th Percentile Queue (ft) (Link Distance (ft))	**LR: 129'** (472')	-	**TR: 284'** (720')	**LT: 162'** (192')	**LR: 401'** (472')	-	**TR: 773'** (720')	**LT: 185'** (192')

Table 5-7. V/C Ratios and Upstream Block Time Percentages for Exclusive Pedestrian Phasing on State Street, North University Avenue, and William Street – Future Traffic Volumes.

Intersection	Measure	AM Peak Hour					PM Peak Hour				
		EB	WB	NB	SB	Total	EB	WB	NB	SB	Total
State Street and Liberty Street (EPP with No RTOR)	V/C	0.56	-	0.33	0.34	0.32	0.52	-	0.67	0.39	0.50
	Upstream Block %	0%	-	0%	0%	n/a	2%	-	2%	5%	n/a
State Street and N. University Avenue (EPP with No RTOR)	V/C	-	0.55	0.62	0.54	0.46	-	0.82	0.72	0.65	0.58
	Upstream Block %	-	0%	0%	4%	n/a	-	0%	15%	20%	n/a
State Street and William Street (EPP with No RTOR)	V/C	0.43	-	0.55	0.44	0.42	0.85	-	0.94	0.55	0.74
	Upstream Block %	0%	-	0%	0%	n/a	4%	-	10%	1%	n/a

6.0 RECOMMENDATIONS

The following design changes are recommended for the State Street DDA corridor based on the findings of this operational study and the crash analysis report. Various corridor-wide as well as individual intersection improvements are recommended. On the State Street corridor during the five-year study period, it was found that safety is of particular concern for nonmotorized users, as 5 of the 8 pedestrian and bicycle crashes involved injury (62.5 percent). The Crash Modification Factors for the proposed safety treatments at the four intersections including addition of the two-way protected bike lanes, other traffic calming measures, and modifying signal phasing are expected to reduce corridor-wide total crashes by 7.35 crashes per year.

6.1 CORRIDOR-WIDE IMPROVEMENTS

Based on the results of the operational and crash analyses, the study recommends pursuit of each of the proposed People Friendly corridor design changes on State Street depicted in the conceptual exhibit attached in **Appendix C**. These design changes include:

- Parking bump-outs on each side of State Street between Washington Street and William Street
- Turn lane removals between Liberty Street and William Street
    - Remove northbound left-turn lane on State Street at Liberty Street
    - Remove northbound right-turn lane on State Street at North University Avenue
- Widened sidewalk along the east side of State Street between William Street and North University Avenue
- “Super Sharrow” pavement markings on State Street between William Street and North University Avenue to emphasize shared vehicle / bicycle use

In addition to these changes, minor adjustments to signal timing phase splits and offsets are recommended at each intersection to accommodate the design changes and improve traffic progression along the State Street corridor. These minor adjustments to signal timing are expected to improve intersection vehicle LOS while maintaining the existing 90 second cycle length along the corridor.

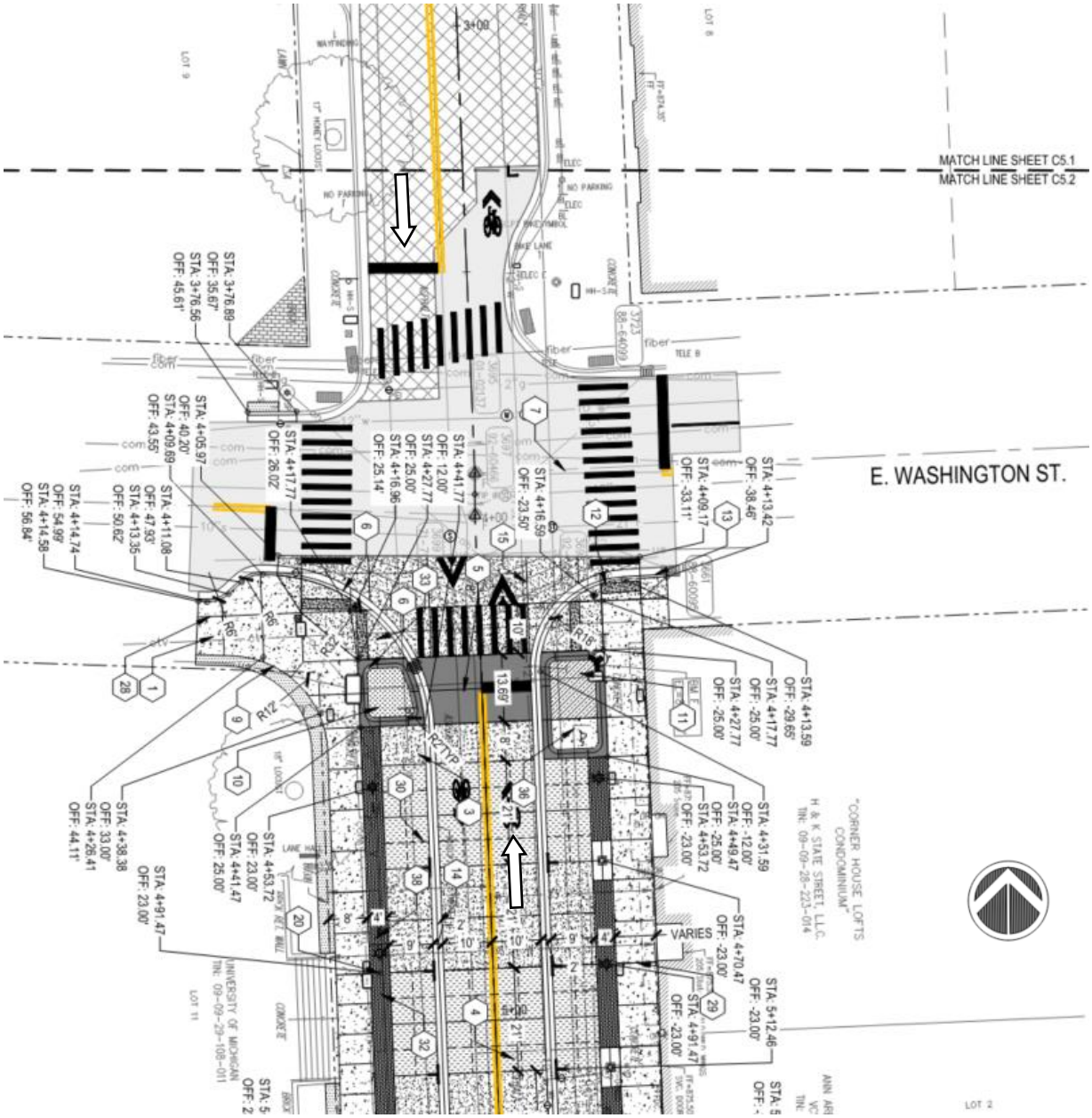
6.2 MAJOR INTERSECTION IMPROVEMENTS

6.2.1 State Street and East Washington Street

At the signalized intersection of State Street and East Washington Street, the study recommends implementing the proposed design changes as depicted in **Figure 6-1** and listed below:

- Construct parking bumpouts on both sides of the south leg of the intersection

Figure 6-1. Proposed Design Changes at Intersection of State Street and East Washington Street.



6.2.2 State Street and Liberty Street

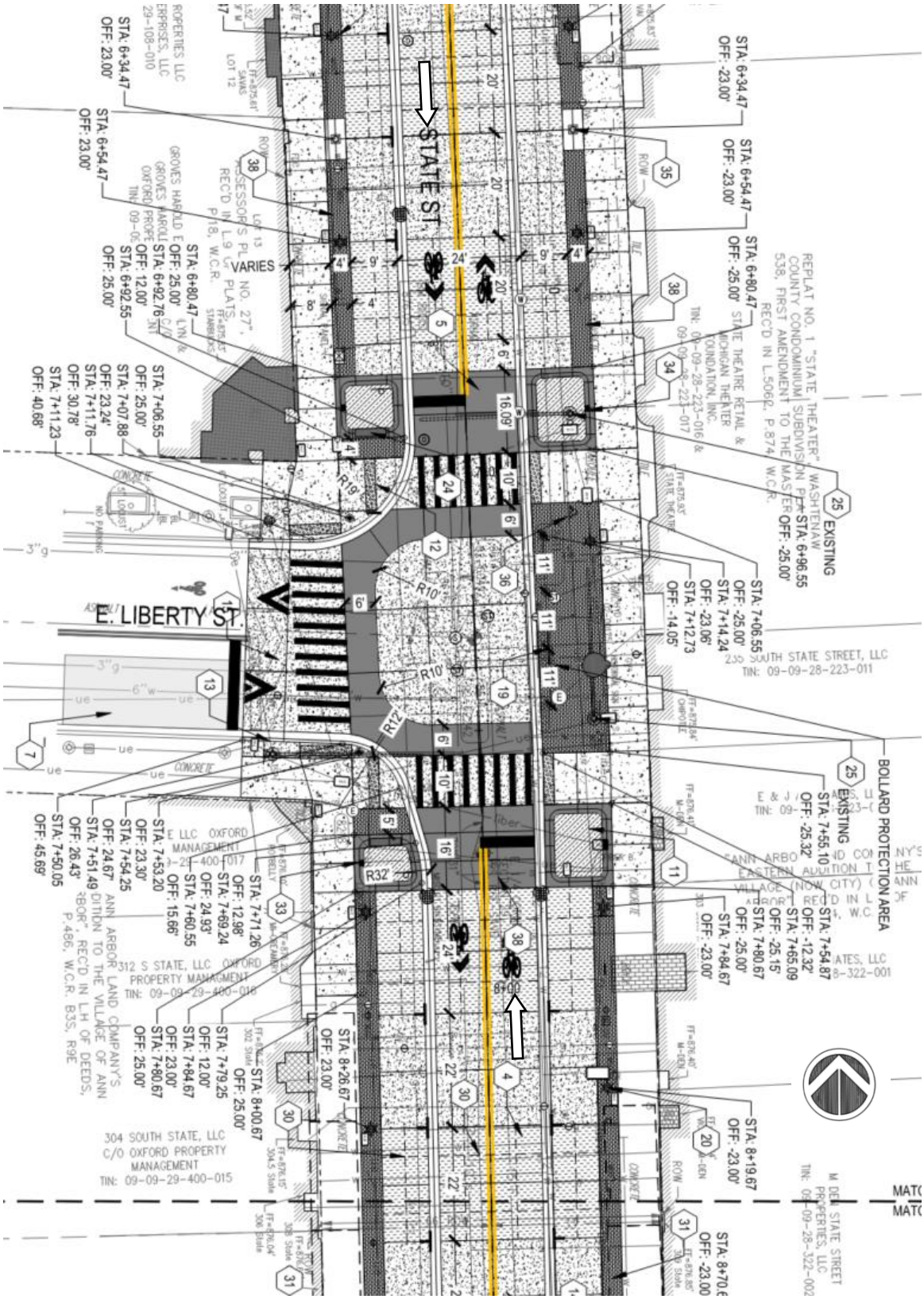
At the signalized intersection of State Street and Liberty Street, the study recommends implementing the proposed design changes as depicted in **Figure 6-2** and listed below:

- Construct parking bumpouts on both sides of the north and south legs of the intersection
- Remove the northbound left-turn lane

The study additionally recommends implementing an exclusive pedestrian phase (EPP) to the signal timing operations. The study recommends that the City pursue EPP Option 1 as described in Section 4.3.2. While the signal is operating with an exclusive pedestrian phase, vehicle movements will be prohibited. To reduce pedestrian delay and eliminate the potential conflict of pedestrians walking on a prolonged DO NOT WALK indication, the concurrent WALK (recall) phases will remain. A R10-11 “No Turn on Red” sign should be installed facing the eastbound and southbound approaches. It was discussed by the project team to test this operation by implementing the timing changes to the signal controllers and installing temporary R10-11 “No Turn on Red” signs. The test case will allow the City to conduct an evaluation on traffic safety and operations for a period of time and make adjustments as necessary. Preliminary analysis determined that the signalized intersection would operate optimally at the following phase splits:

- 90 Second Cycle Length (AM Peak and PM Peak)
    - Exclusive Pedestrian Phase: 20 Seconds in AM Peak and PM Peak
    - State Street Phase: 50 Seconds in AM Peak; 48 Seconds in PM Peak
    - Liberty Street Phase: 20 Seconds in AM Peak; 22 Seconds in PM Peak

Figure 6-2. Proposed Design Changes at Intersection of State Street and Liberty Street.



6.2.3 State Street and North University Avenue

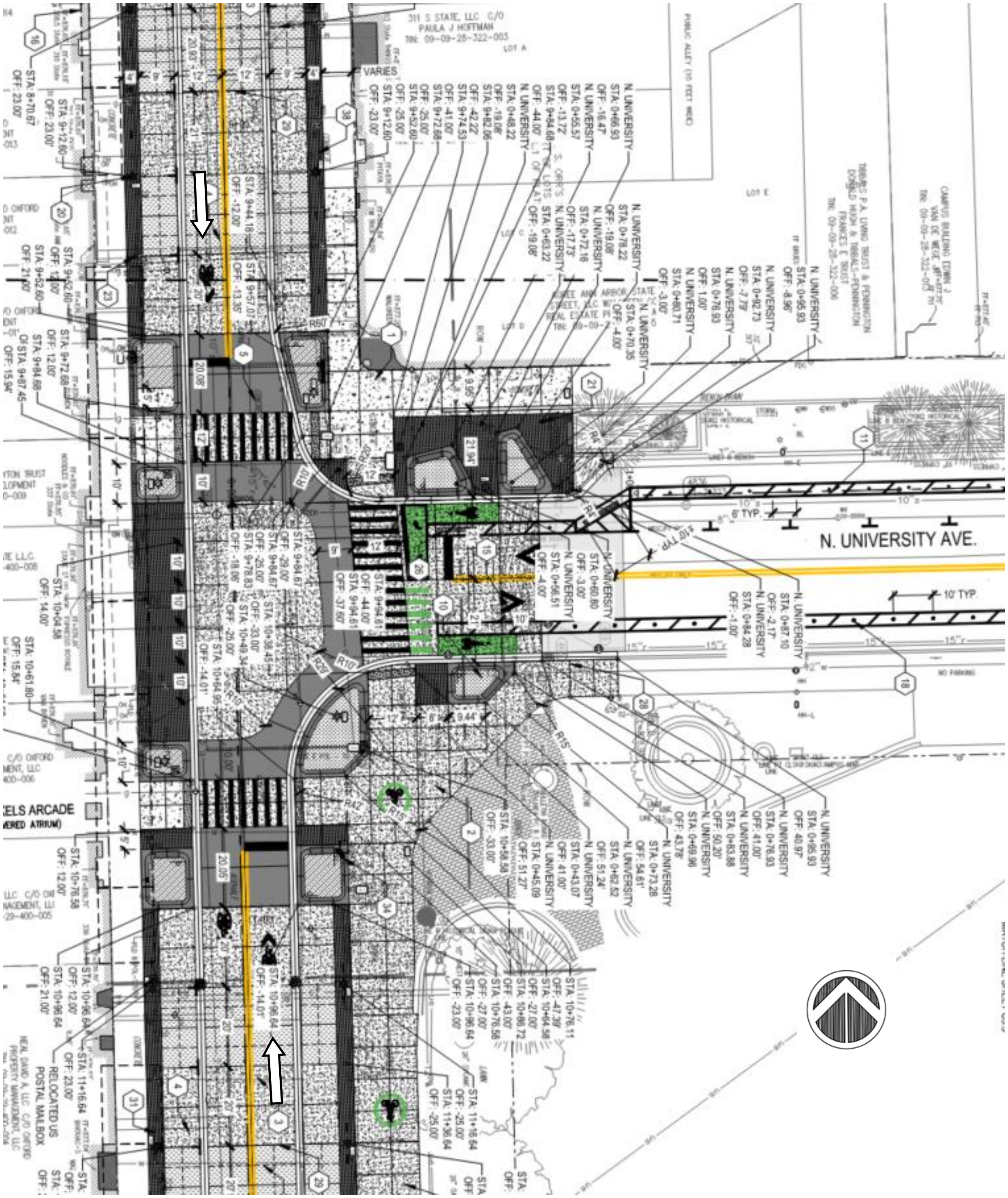
At the signalized intersection of State Street and North University Avenue, the study recommends implementing the proposed design changes as depicted in **Figure 6-3** and listed below:

- Replace the exclusive right- and left-turn lanes on the east leg with a single lane
- Remove the northbound right-turn lane
- Provide a protected bike lane on each side of the east leg
- Provide a bike box on the east leg and a marked bike crossing
- Provide shared path markings on the east sidewalk south to William Street
- Construct parking bumpouts on each side of the north and south legs

The study additionally recommends implementing an exclusive pedestrian phase (EPP) to the signal timing operations. The study recommends that the City pursue EPP Option 1 as described in Section 4.3.2. While the signal is operating with an exclusive pedestrian phase, vehicle movements will be prohibited. To reduce pedestrian delay and eliminate the potential conflict of pedestrians walking on a prolonged DO NOT WALK indication, the concurrent WALK (recall) phases will remain. A R10-11 “No Turn on Red” sign should be installed facing the westbound and northbound approaches. It was discussed by the project team to test this operation by implementing the timing changes to the signal controllers and installing temporary R10-11 “No Turn on Red” signs. The test case will allow the City to conduct an evaluation on traffic safety and operations for a period of time and make adjustments as necessary. Preliminary analysis determined that the signalized intersection would operate optimally at the following phase splits:

- 90 Second Cycle Length (AM Peak and PM Peak)
    - Exclusive Pedestrian Phase: 23 Seconds in AM Peak and PM Peak
    - State Street Phase: 47 Seconds in AM Peak; 44 Seconds in PM Peak
    - North University Avenue Phase: 20 Seconds in AM Peak; 23 Seconds in PM Peak

Figure 6-3. Proposed Design Changes at Intersection of State Street and North University Avenue.



6.2.4 State Street and William Street

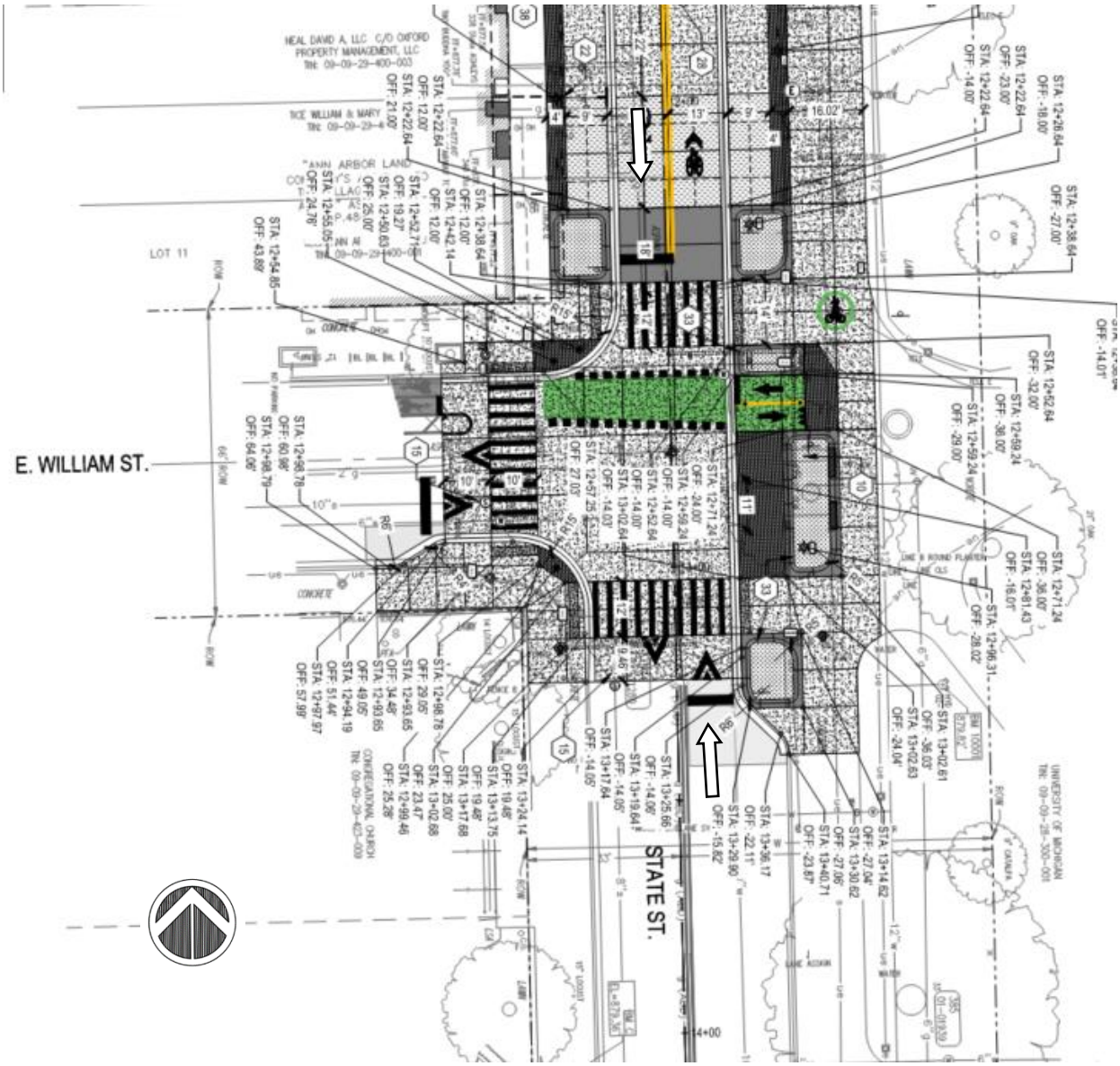
At the signalized intersection of State Street and William Street, the study recommends implementing the proposed design changes as depicted in **Figure 6-4** and listed below:

- Construct parking bumpouts on each side of the north leg and the east side of the south leg of the intersection
- Bi-directional bikeway crossing east / west on north side of William Street and State Street intersection
- Provide shared path markings on the east sidewalk north to North University Avenue

The study additionally recommends implementing an exclusive pedestrian phase (EPP) to the signal timing operations. The study recommends that the City pursue EPP Option 1 as described in Section 4.3.2. While the signal is operating with an exclusive pedestrian phase, vehicle movements will be prohibited. To reduce pedestrian delay and eliminate the potential conflict of pedestrians walking on a prolonged DO NOT WALK indication, the concurrent WALK (recall) phases will remain. A R10-11 “No Turn on Red” sign should be installed facing the westbound and northbound approaches. It was discussed by the project team to test this operation by implementing the timing changes to the signal controllers and installing temporary R10-11 “No Turn on Red” signs. The test case will allow the City to conduct an evaluation on traffic safety and operations for a period of time and make adjustments as necessary. Preliminary analysis determined that the signalized intersection would operate optimally at the following phase splits:

- 90 Second Cycle Length (AM Peak and PM Peak)
    - Exclusive Pedestrian Phase: 20 Seconds in AM Peak and PM Peak
    - State Street Phase: 50 Seconds in AM Peak and PM Peak
    - William Street Phase: 20 Seconds in AM Peak and PM Peak

Figure 6-4. Proposed Design Changes at Intersection of State Street and William Street.



APPENDIX A. COUNT DATA

(090)_S State Street & W Washington Street - TMC
Thu Nov 7, 2019
Full Length (7 AM-9 AM, 10 AM-2 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724343, Location: 42.280273, -83.740839, Site Code: 090

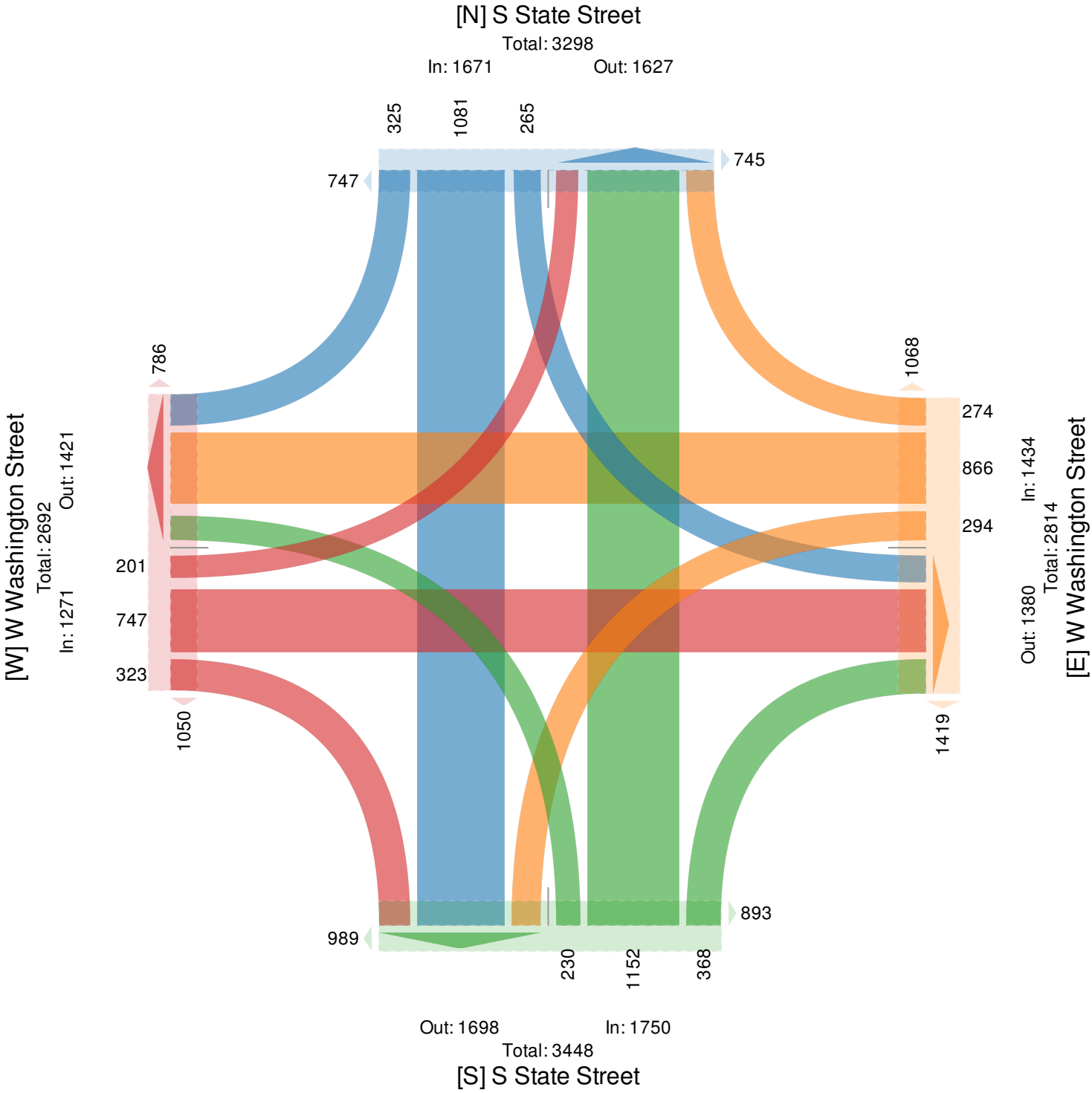
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg	S State Street						S State Street						W Washington Street						W Washington Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2019-11-07 7:00AM	6	28	3	0	**37**	11	7	22	3	0	**32**	7	6	15	5	0	**26**	8	3	5	5	0	**13**	13	**108**
7:15AM	2	28	5	0	**35**	14	11	22	2	0	**35**	6	5	30	6	0	**41**	16	0	3	3	0	**6**	5	**117**
7:30AM	5	33	7	0	**45**	14	10	26	6	0	**42**	14	6	36	8	0	**50**	26	3	3	3	0	**9**	17	**146**
7:45AM	4	30	11	0	**45**	34	15	32	5	0	**52**	30	7	71	6	0	**84**	34	8	14	7	0	**29**	42	**210**
Hourly Total	17	119	26	0	**162**	73	43	102	16	0	**161**	57	24	152	25	0	**201**	84	14	25	18	0	**57**	77	**581**
8:00AM	8	30	9	0	**47**	26	11	29	11	0	**51**	39	7	59	4	0	**70**	35	5	9	6	0	**20**	48	**188**
8:15AM	2	27	16	0	**45**	49	22	43	8	0	**73**	50	4	56	7	0	**67**	59	6	19	1	0	**26**	98	**211**
8:30AM	2	44	14	0	**60**	44	28	32	9	0	**69**	47	8	56	9	0	**73**	54	7	22	9	0	**38**	80	**240**
8:45AM	2	28	10	0	**40**	51	25	52	12	0	**89**	49	4	39	10	0	**53**	70	5	13	12	0	**30**	95	**212**
Hourly Total	14	129	49	0	**192**	170	86	156	40	0	**282**	185	23	210	30	0	**263**	218	23	63	28	0	**114**	321	**851**
10:00AM	9	44	8	0	**61**	50	6	32	6	0	**44**	38	4	15	16	0	**35**	55	11	31	2	0	**44**	70	**184**
10:15AM	4	24	4	0	**32**	39	2	26	5	0	**33**	22	4	10	12	0	**26**	22	3	21	8	0	**32**	27	**123**
10:30AM	10	27	2	0	**39**	33	3	21	15	0	**39**	35	2	13	3	0	**18**	37	9	11	4	0	**24**	48	**120**
10:45AM	5	21	13	0	**39**	57	5	31	5	0	**41**	41	1	10	9	0	**20**	58	7	18	7	0	**32**	68	**132**
Hourly Total	28	116	27	0	**171**	179	16	110	31	0	**157**	136	11	48	40	0	**99**	172	30	81	21	0	**132**	213	**559**
11:00AM	5	31	13	0	**49**	46	6	18	8	0	**32**	32	4	9	7	0	**20**	44	10	12	11	0	**33**	56	**134**
11:15AM	5	40	13	0	**58**	88	4	29	4	0	**37**	60	5	24	7	0	**36**	64	12	23	5	0	**40**	124	**171**
11:30AM	4	32	16	0	**52**	69	5	44	16	0	**65**	79	11	12	4	0	**27**	58	13	13	3	0	**29**	92	**173**
11:45AM	6	31	9	0	**46**	86	6	26	9	0	**41**	45	8	14	10	0	**32**	58	7	23	8	0	**38**	112	**157**
Hourly Total	20	134	51	0	**205**	289	21	117	37	0	**175**	216	28	59	28	0	**115**	224	42	71	27	0	**140**	384	**635**
12:00PM	9	46	13	0	**68**	79	6	35	8	0	**49**	37	4	13	10	0	**27**	70	7	21	9	0	**37**	58	**181**
12:15PM	8	28	7	0	**43**	61	7	29	6	0	**42**	51	2	11	8	0	**21**	49	8	18	4	0	**30**	73	**136**
12:30PM	9	37	10	0	**56**	68	7	31	15	0	**53**	70	8	14	12	0	**34**	64	9	18	8	0	**35**	70	**178**
12:45PM	5	45	15	0	**65**	125	8	44	13	0	**65**	81	5	22	17	0	**44**	85	10	21	11	0	**42**	147	**216**
Hourly Total	31	156	45	0	**232**	333	28	139	42	0	**209**	239	19	60	47	0	**126**	268	34	78	32	0	**144**	348	**711**
1:00PM	13	59	13	0	**85**	83	9	31	12	0	**52**	59	9	11	13	0	**33**	73	17	19	8	0	**44**	97	**214**
1:15PM	6	33	10	0	**49**	47	7	16	8	0	**31**	47	4	8	11	0	**23**	62	8	22	6	0	**36**	70	**139**
1:30PM	6	43	9	0	**58**	48	4	34	13	0	**51**	32	5	11	8	0	**24**	44	7	13	9	0	**29**	89	**162**
1:45PM	3	39	13	0	**55**	63	4	48	7	0	**59**	50	5	18	12	0	**35**	51	12	21	7	0	**40**	80	**189**
Hourly Total	28	174	45	0	**247**	241	24	129	40	0	**193**	188	23	48	44	0	**115**	230	44	75	30	0	**149**	336	**704**
4:00PM	10	37	20	0	**67**	73	5	37	15	0	**57**	61	14	18	14	0	**46**	74	12	46	13	0	**71**	93	**241**
4:15PM	10	45	14	0	**69**	65	4	41	13	0	**58**	47	6	18	11	0	**35**	60	13	40	10	0	**63**	93	**225**
4:30PM	13	49	13	0	**75**	58	7	47	14	0	**68**	48	5	18	15	0	**38**	62	10	63	14	0	**87**	91	**268**
4:45PM	9	28	17	0	**54**	88	5	42	17	0	**64**	83	5	23	13	0	**41**	122	10	81	19	0	**110**	99	**269**
Hourly Total	42	159	64	0	**265**	284	21	167	59	0	**247**	239	30	77	53	0	**160**	318	45	230	56	0	**331**	376	**1003**
5:00PM	18	50	13	0	**81**	64	5	32	16	0	**53**	92	12	21	18	0	**51**	114	18	86	11	0	**115**	111	**300**
5:15PM	14	34	13	0	**61**	97	6	35	16	0	**57**	54	12	24	19	0	**55**	78	14	56	18	0	**88**	124	**261**
5:30PM	12	44	20	0	**76**	79	7	56	15	0	**78**	49	13	20	9	0	**42**	72	16	55	18	0	**89**	97	**285**
5:45PM	6	37	15	0	**58**	73	8	38	13	0	**59**	37	6	28	10	0	**44**	58	14	46	15	0	**75**	100	**236**
Hourly Total	50	165	61	0	**276**	313	26	161	60	0	**247**	232	43	93	56	0	**192**	322	62	243	62	0	**367**	432	**1082**
Total	230	1152	368	0	**1750**	1882	265	1081	325	0	**1671**	1492	201	747	323	0	**1271**	1836	294	866	274	0	**1434**	2487	**6126**
% Approach	13.1%	65.8%	21.0%	0%	**-**	-	15.9%	64.7%	19.4%	0%	**-**	-	15.8%	58.8%	25.4%	0%	**-**	-	20.5%	60.4%	19.1%	0%	**-**	-	-
% Total	3.8%	18.8%	6.0%	0%	**28.6%**	-	4.3%	17.6%	5.3%	0%	**27.3%**	-	3.3%	12.2%	5.3%	0%	**20.7%**	-	4.8%	14.1%	4.5%	0%	**23.4%**	-	-
Lights	221	1091	345	0	**1657**	-	254	1021	275	0	**1550**	-	164	658	315	0	**1137**	-	271	750	255	0	**1276**	-	5620
% Lights	96.1%	94.7%	93.8%	0%	**94.7%**	-	95.8%	94.4%	84.6%	0%	**92.8%**	-	81.6%	88.1%	97.5%	0%	**89.5%**	-	92.2%	86.6%	93.1%	0%	**89.0%**	-	91.7%
Articulated Trucks and Single-Unit Trucks	5	36	14	0	**55**	-	3	28	9	0	**40**	-	4	9	3	0	**16**	-	11	8	9	0	**28**	-	139
% Articulated Trucks and Single-Unit Trucks	2.2%	3.1%	3.8%	0%	**3.1%**	-	1.1%	2.6%	2.8%	0%	**2.4%**	-	2.0%	1.2%	0.9%	0%	**1.3%**	-	3.7%	0.9%	3.3%	0%	**2.0%**	-	2.3%
Buses	0	2	3	0	**5**	-	0	6	40	0	**46**	-	33	49	0	0	**82**	-	6	69	4	0	**79**	-	212
% Buses	0%	0.2%	0.8%	0%	**0.3%**	-	0%	0.6%	12.3%	0%	**2.8%**	-	16.4%	6.6%	0%	0%	**6.5%**	-	2.0%	8.0%	1.5%	0%	**5.5%**	-	3.5%
Bicycles on Road	4	23	6	0	**33**	-	8	26	1	0	**35**	-	0	31	5	0	**36**	-	6	39	6	0	**51**	-	155
% Bicycles on Road	1.7%	2.0%	1.6%	0%	**1.9%**	-	3.0%	2.4%	0.3%	0%	**2.1%**	-	0%	4.1%	1.5%	0%	**2.8%**	-	2.0%	4.5%	2.2%	0%	**3.6%**	-	2.5%
Pedestrians	-	-	-	-	-	1856	-	-	-	-	-	1467	-	-	-	-	-	1820	-	-	-	-	-	2450	
% Pedestrians	-	-	-	-	-	98.6%	-	-	-	-	-	98.3%	-	-	-	-	-	99.1%	-	-	-	-	-	98.5%	-
Bicycles on Crosswalk	-	-	-	-	-	26	-	-	-	-	-	25	-	-	-	-	-	16	-	-	-	-	-	37	
% Bicycles on Crosswalk	-	-	-	-	-	1.4%	-	-	-	-	-	1.7%	-	-	-	-	-	0.9%	-	-	-	-	-	1.5%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(090)_S State Street & W Washington Street - TMC
Thu Nov 7, 2019
Full Length (7 AM-9 AM, 10 AM-2 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724343, Location: 42.280273, -83.740839, Site Code: 090

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(090)_S State Street & W Washington Street - TMC
Thu Nov 7, 2019
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724343, Location: 42.280273, -83.740839, Site Code: 090

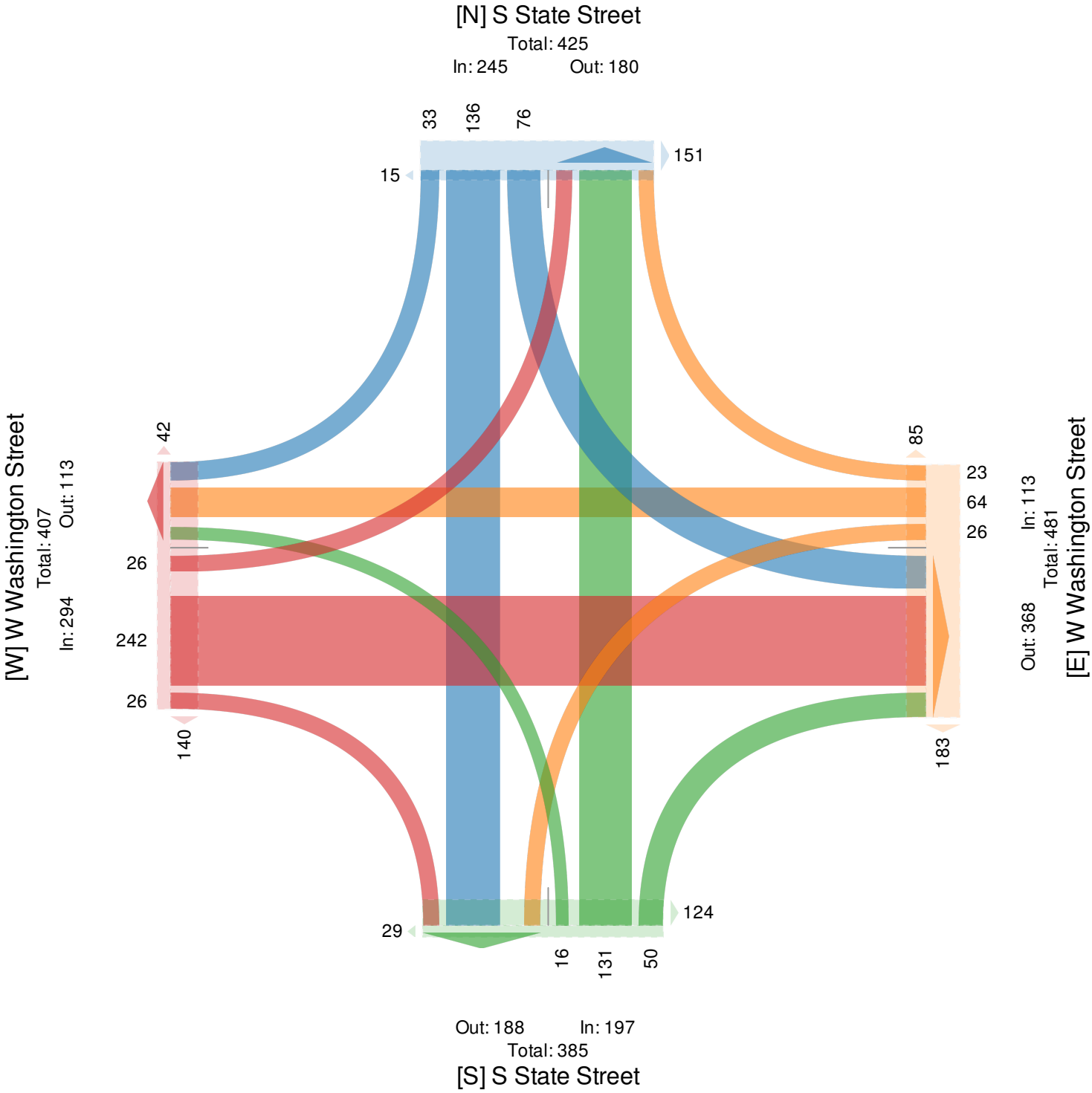
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg	S State Street						S State Street						W Washington Street						W Washington Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2019-11-07 7:45AM	4	30	11	0	**45**	34	15	32	5	0	**52**	30	7	71	6	0	**84**	34	8	14	7	0	**29**	42	**210**
8:00AM	8	30	9	0	**47**	26	11	29	11	0	**51**	39	7	59	4	0	**70**	35	5	9	6	0	**20**	48	**188**
8:15AM	2	27	16	0	**45**	49	22	43	8	0	**73**	50	4	56	7	0	**67**	59	6	19	1	0	**26**	98	**211**
8:30AM	2	44	14	0	**60**	44	28	32	9	0	**69**	47	8	56	9	0	**73**	54	7	22	9	0	**38**	80	**240**
Total	16	131	50	0	**197**	153	76	136	33	0	**245**	166	26	242	26	0	**294**	182	26	64	23	0	**113**	268	**849**
% Approach	8.1%	66.5%	25.4%	0%	**-**	-	31.0%	55.5%	13.5%	0%	**-**	-	8.8%	82.3%	8.8%	0%	**-**	-	23.0%	56.6%	20.4%	0%	**-**	-	-
% Total	1.9%	15.4%	5.9%	0%	**23.2%**	-	9.0%	16.0%	3.9%	0%	**28.9%**	-	3.1%	28.5%	3.1%	0%	**34.6%**	-	3.1%	7.5%	2.7%	0%	**13.3%**	-	-
PHF	0.500	0.756	0.781	-	**0.831**	-	0.683	0.842	0.750	-	**0.879**	-	0.813	0.844	0.722	-	**0.869**	-	0.813	0.716	0.639	-	**0.737**	-	0.885
Lights	15	126	46	0	**187**	-	70	122	28	0	**220**	-	22	226	26	0	**274**	-	23	49	22	0	**94**	-	775
% Lights	93.8%	96.2%	92.0%	0%	**94.9%**	-	92.1%	89.7%	84.8%	0%	**89.8%**	-	84.6%	93.4%	100%	0%	**93.2%**	-	88.5%	76.6%	95.7%	0%	**83.2%**	-	91.3%
Articulated Trucks and Single-Unit Trucks	1	4	3	0	**8**	-	1	5	2	0	**8**	-	0	0	0	0	**0**	-	3	0	0	0	**3**	-	19
% Articulated Trucks and Single-Unit Trucks	6.3%	3.1%	6.0%	0%	**4.1%**	-	1.3%	3.7%	6.1%	0%	**3.3%**	-	0%	0%	0%	0%	**0%**	-	11.5%	0%	0%	0%	**2.7%**	-	2.2%
Buses	0	0	1	0	**1**	-	0	1	3	0	**4**	-	4	7	0	0	**11**	-	0	14	1	0	**15**	-	31
% Buses	0%	0%	2.0%	0%	**0.5%**	-	0%	0.7%	9.1%	0%	**1.6%**	-	15.4%	2.9%	0%	0%	**3.7%**	-	0%	21.9%	4.3%	0%	**13.3%**	-	3.7%
Bicycles on Road	0	1	0	0	**1**	-	5	8	0	0	**13**	-	0	9	0	0	**9**	-	0	1	0	0	**1**	-	24
% Bicycles on Road	0%	0.8%	0%	0%	**0.5%**	-	6.6%	5.9%	0%	0%	**5.3%**	-	0%	3.7%	0%	0%	**3.1%**	-	0%	1.6%	0%	0%	**0.9%**	-	2.8%
Pedestrians	-	-	-	-	-	148	-	-	-	-	-	164	-	-	-	-	-	180	-	-	-	-	-	264	
% Pedestrians	-	-	-	-	-	96.7%	-	-	-	-	-	98.8%	-	-	-	-	-	98.9%	-	-	-	-	-	98.5%	-
Bicycles on Crosswalk	-	-	-	-	-	5	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	4	
% Bicycles on Crosswalk	-	-	-	-	-	3.3%	-	-	-	-	-	1.2%	-	-	-	-	-	1.1%	-	-	-	-	-	1.5%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(090)_S State Street & W Washington Street - TMC
Thu Nov 7, 2019
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724343, Location: 42.280273, -83.740839, Site Code: 090

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(090)_S State Street & W Washington Street - TMC
Thu Nov 7, 2019
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724343, Location: 42.280273, -83.740839, Site Code: 090

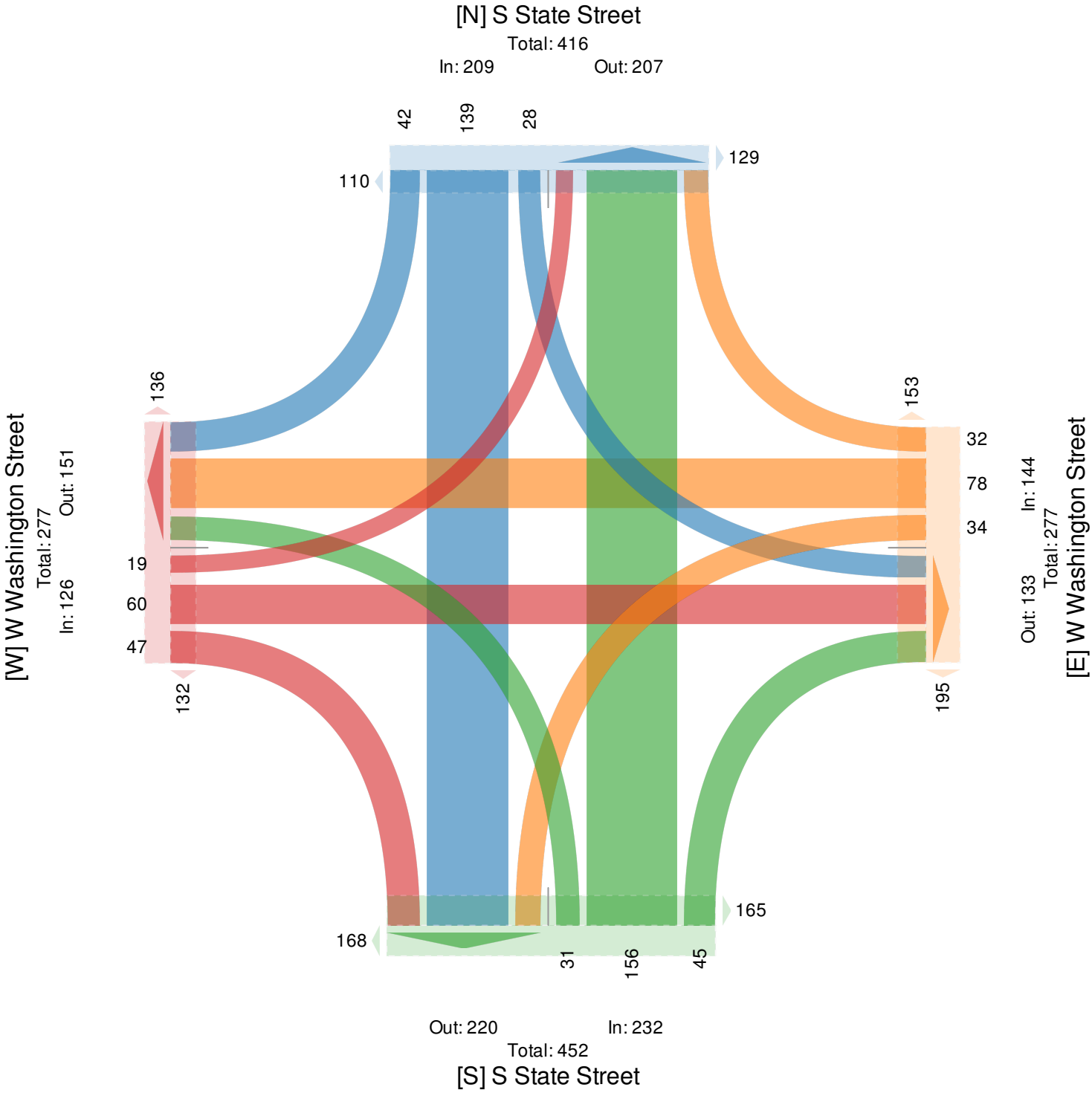
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg	S State Street						S State Street						W Washington Street						W Washington Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2019-11-07 12:00PM	9	46	13	0	**68**	79	6	35	8	0	**49**	37	4	13	10	0	**27**	70	7	21	9	0	**37**	58	**181**
12:15PM	8	28	7	0	**43**	61	7	29	6	0	**42**	51	2	11	8	0	**21**	49	8	18	4	0	**30**	73	**136**
12:30PM	9	37	10	0	**56**	68	7	31	15	0	**53**	70	8	14	12	0	**34**	64	9	18	8	0	**35**	70	**178**
12:45PM	5	45	15	0	**65**	125	8	44	13	0	**65**	81	5	22	17	0	**44**	85	10	21	11	0	**42**	147	**216**
Total	31	156	45	0	**232**	333	28	139	42	0	**209**	239	19	60	47	0	**126**	268	34	78	32	0	**144**	348	**711**
% Approach	13.4%	67.2%	19.4%	0%	-	-	13.4%	66.5%	20.1%	0%	-	-	15.1%	47.6%	37.3%	0%	-	-	23.6%	54.2%	22.2%	0%	-	-	-
% Total	4.4%	21.9%	6.3%	0%	**32.6%**	-	3.9%	19.5%	5.9%	0%	**29.4%**	-	2.7%	8.4%	6.6%	0%	**17.7%**	-	4.8%	11.0%	4.5%	0%	**20.3%**	-	-
PHF	0.861	0.850	0.732	-	**0.879**	-	0.813	0.838	0.700	-	**0.828**	-	0.594	0.614	0.703	-	**0.686**	-	0.889	0.947	0.775	-	**0.912**	-	0.829
Lights	31	145	39	0	**215**	-	26	127	36	0	**189**	-	12	45	45	0	**102**	-	31	64	29	0	**124**	-	630
% Lights	100%	92.9%	86.7%	0%	**92.7%**	-	92.9%	91.4%	85.7%	0%	**90.4%**	-	63.2%	75.0%	95.7%	0%	**81.0%**	-	91.2%	82.1%	90.6%	0%	**86.1%**	-	88.6%
Articulated Trucks and Single-Unit Trucks	0	7	2	0	**9**	-	0	4	1	0	**5**	-	3	4	0	0	**7**	-	0	3	2	0	**5**	-	26
% Articulated Trucks and Single-Unit Trucks	0%	4.5%	4.4%	0%	**3.9%**	-	0%	2.9%	2.4%	0%	**2.4%**	-	15.8%	6.7%	0%	0%	**5.6%**	-	0%	3.8%	6.3%	0%	**3.5%**	-	3.7%
Buses	0	1	0	0	**1**	-	0	3	5	0	**8**	-	4	5	0	0	**9**	-	1	5	0	0	**6**	-	24
% Buses	0%	0.6%	0%	0%	**0.4%**	-	0%	2.2%	11.9%	0%	**3.8%**	-	21.1%	8.3%	0%	0%	**7.1%**	-	2.9%	6.4%	0%	0%	**4.2%**	-	3.4%
Bicycles on Road	0	3	4	0	**7**	-	2	5	0	0	**7**	-	0	6	2	0	**8**	-	2	6	1	0	**9**	-	31
% Bicycles on Road	0%	1.9%	8.9%	0%	**3.0%**	-	7.1%	3.6%	0%	0%	**3.3%**	-	0%	10.0%	4.3%	0%	**6.3%**	-	5.9%	7.7%	3.1%	0%	**6.3%**	-	4.4%
Pedestrians	-	-	-	-	-	331	-	-	-	-	-	238	-	-	-	-	-	268	-	-	-	-	-	342	
% Pedestrians	-	-	-	-	-	99.4%	-	-	-	-	-	99.6%	-	-	-	-	-	100%	-	-	-	-	-	98.3%	-
Bicycles on Crosswalk	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	6	
% Bicycles on Crosswalk	-	-	-	-	-	0.6%	-	-	-	-	-	0.4%	-	-	-	-	-	0%	-	-	-	-	-	1.7%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(090)_S State Street & W Washington Street - TMC
Thu Nov 7, 2019
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724343, Location: 42.280273, -83.740839, Site Code: 090

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(090)_S State Street & W Washington Street - TMC
Thu Nov 7, 2019
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724343, Location: 42.280273, -83.740839, Site Code: 090

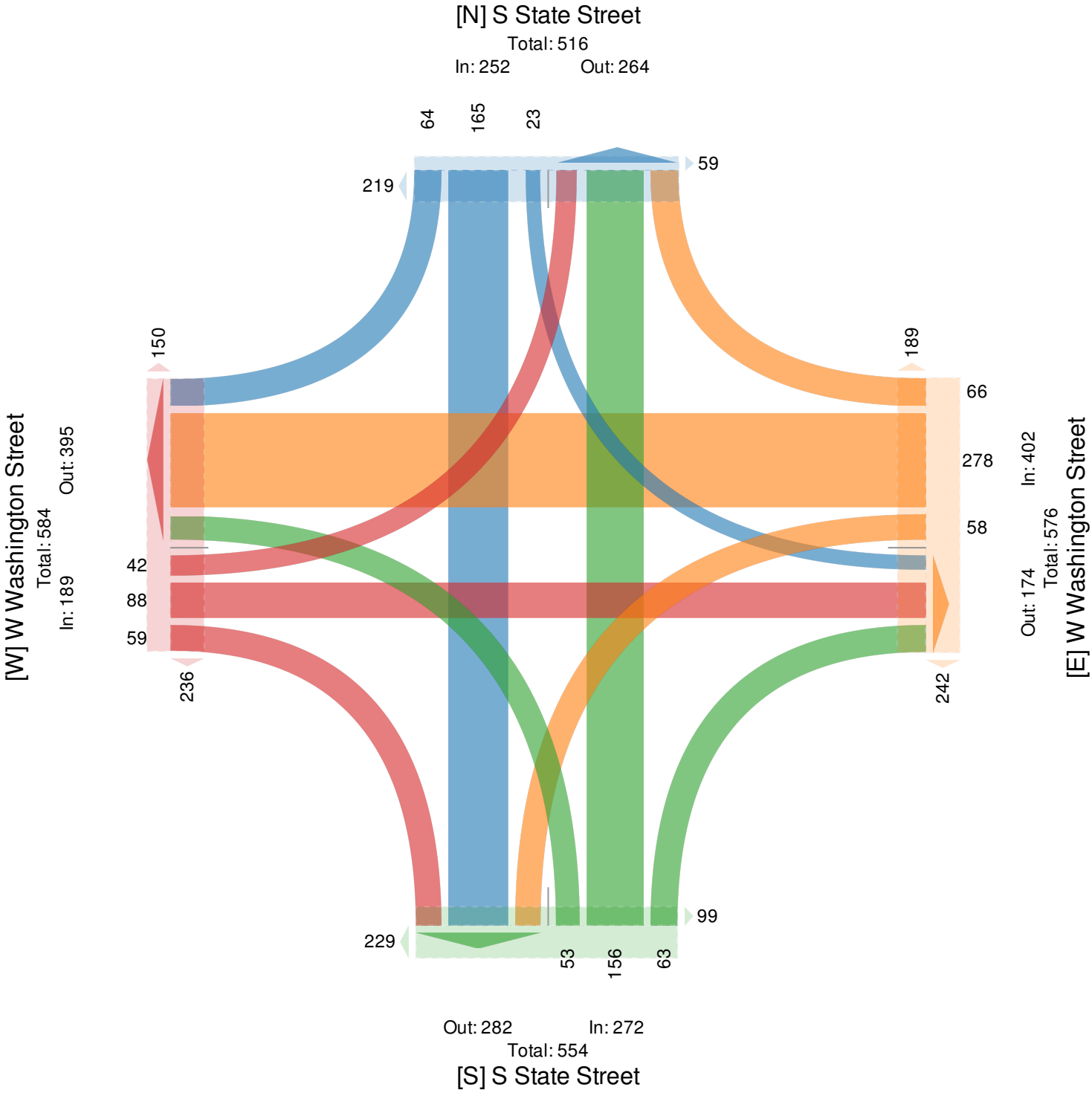
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg	S State Street						S State Street						W Washington Street						W Washington Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2019-11-07 4:45PM	9	28	17	0	**54**	88	5	42	17	0	**64**	83	5	23	13	0	**41**	122	10	81	19	0	**110**	99	**269**
5:00PM	18	50	13	0	**81**	64	5	32	16	0	**53**	92	12	21	18	0	**51**	114	18	86	11	0	**115**	111	**300**
5:15PM	14	34	13	0	**61**	97	6	35	16	0	**57**	54	12	24	19	0	**55**	78	14	56	18	0	**88**	124	**261**
5:30PM	12	44	20	0	**76**	79	7	56	15	0	**78**	49	13	20	9	0	**42**	72	16	55	18	0	**89**	97	**285**
Total	53	156	63	0	**272**	328	23	165	64	0	**252**	278	42	88	59	0	**189**	386	58	278	66	0	**402**	431	**1115**
% Approach	19.5%	57.4%	23.2%	0%	-	-	9.1%	65.5%	25.4%	0%	-	-	22.2%	46.6%	31.2%	0%	-	-	14.4%	69.2%	16.4%	0%	-	-	-
% Total	4.8%	14.0%	5.7%	0%	**24.4%**	-	2.1%	14.8%	5.7%	0%	**22.6%**	-	3.8%	7.9%	5.3%	0%	**17.0%**	-	5.2%	24.9%	5.9%	0%	**36.1%**	-	-
PHF	0.722	0.793	0.788	-	**0.846**	-	0.821	0.719	0.941	-	**0.795**	-	0.808	0.906	0.806	-	**0.866**	-	0.838	0.790	0.889	-	**0.865**	-	0.944
Lights	52	148	61	0	**261**	-	23	160	55	0	**238**	-	38	81	58	0	**177**	-	52	246	64	0	**362**	-	1038
% Lights	98.1%	94.9%	96.8%	0%	**96.0%**	-	100%	97.0%	85.9%	0%	**94.4%**	-	90.5%	92.0%	98.3%	0%	**93.7%**	-	89.7%	88.5%	97.0%	0%	**90.0%**	-	93.1%
Articulated Trucks and Single-Unit Trucks	0	1	1	0	**2**	-	0	1	1	0	**2**	-	0	0	0	0	**0**	-	2	1	0	0	**3**	-	7
% Articulated Trucks and Single-Unit Trucks	0%	0.6%	1.6%	0%	**0.7%**	-	0%	0.6%	1.6%	0%	**0.8%**	-	0%	0%	0%	0%	**0%**	-	3.4%	0.4%	0%	0%	**0.7%**	-	0.6%
Buses	0	0	1	0	**1**	-	0	0	8	0	**8**	-	4	6	0	0	**10**	-	3	9	0	0	**12**	-	31
% Buses	0%	0%	1.6%	0%	**0.4%**	-	0%	0%	12.5%	0%	**3.2%**	-	9.5%	6.8%	0%	0%	**5.3%**	-	5.2%	3.2%	0%	0%	**3.0%**	-	2.8%
Bicycles on Road	1	7	0	0	**8**	-	0	4	0	0	**4**	-	0	1	1	0	**2**	-	1	22	2	0	**25**	-	39
% Bicycles on Road	1.9%	4.5%	0%	0%	**2.9%**	-	0%	2.4%	0%	0%	**1.6%**	-	0%	1.1%	1.7%	0%	**1.1%**	-	1.7%	7.9%	3.0%	0%	**6.2%**	-	3.5%
Pedestrians	-	-	-	-	-	325	-	-	-	-	-	270	-	-	-	-	-	384	-	-	-	-	-	424	
% Pedestrians	-	-	-	-	-	99.1%	-	-	-	-	-	97.1%	-	-	-	-	-	99.5%	-	-	-	-	-	98.4%	-
Bicycles on Crosswalk	-	-	-	-	-	3	-	-	-	-	-	8	-	-	-	-	-	2	-	-	-	-	-	7	
% Bicycles on Crosswalk	-	-	-	-	-	0.9%	-	-	-	-	-	2.9%	-	-	-	-	-	0.5%	-	-	-	-	-	1.6%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(090)_S State Street & W Washington Street - TMC
Thu Nov 7, 2019
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724343, Location: 42.280273, -83.740839, Site Code: 090

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(054)_S State Street & E Liberty Street - TMC

Thu Nov 7, 2019
Full Length (7 AM-9 AM, 10 AM-2 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724338, Location: 42.27936, -83.740821, Site Code: 054

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

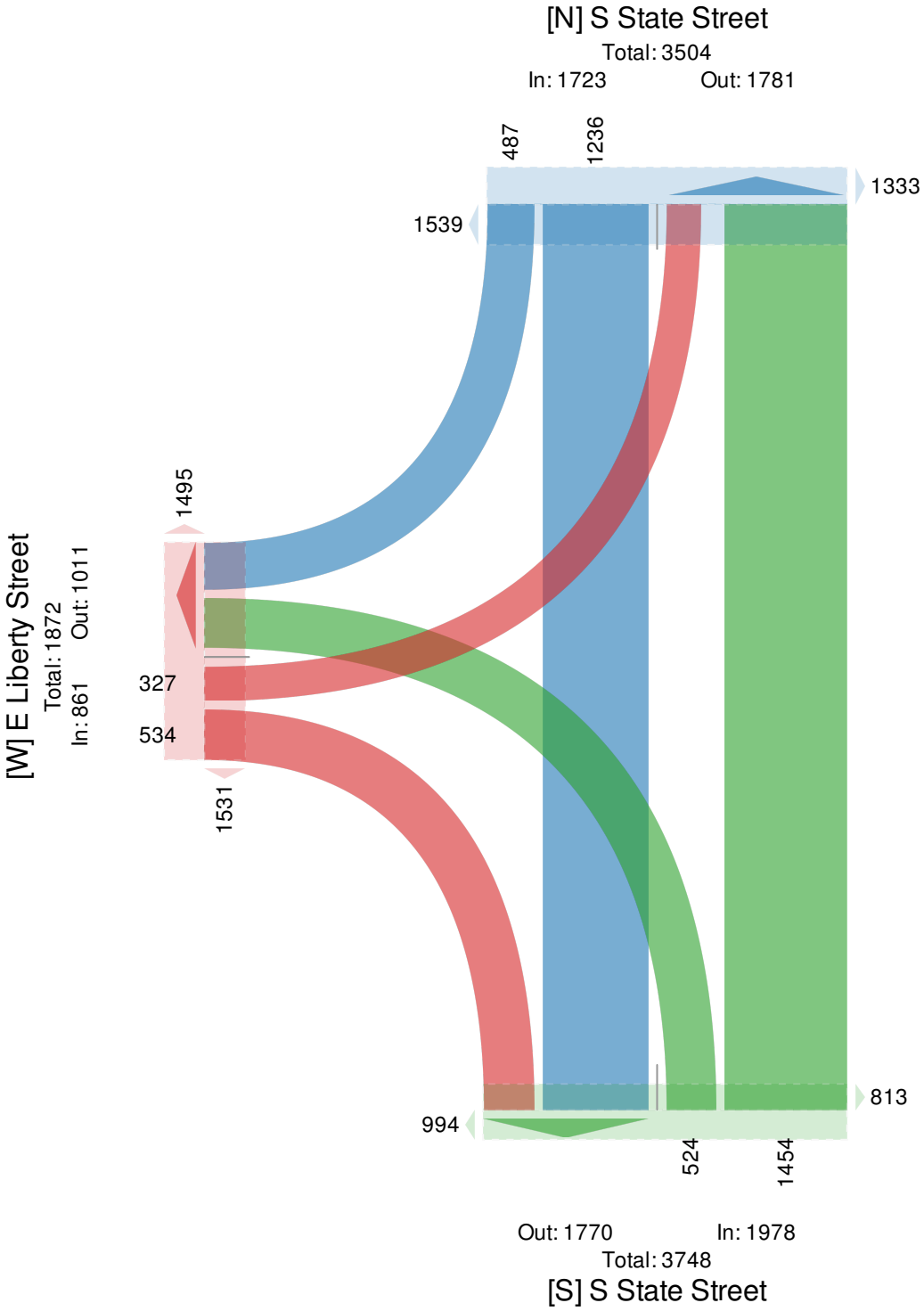
Leg / Direction	S State Street Northbound					S State Street Southbound					E Liberty Street Eastbound					
Time	L	T	U	App	Ped*	T	R	U	App	Ped*	L	R	U	App	Ped*	Int
2019-11-07 7:00AM	4	29	0	**33**	6	26	3	0	**29**	10	5	3	0	**8**	8	**70**
7:15AM	9	40	0	**49**	8	23	2	0	**25**	13	4	5	0	**9**	13	**83**
7:30AM	12	36	0	**48**	13	27	14	0	**41**	11	11	14	0	**25**	21	**114**
7:45AM	14	36	0	**50**	16	38	8	0	**46**	40	2	12	0	**14**	40	**110**
Hourly Total	39	141	0	**180**	43	114	27	0	**141**	74	22	34	0	**56**	82	**377**
8:00AM	8	42	0	**50**	11	34	7	0	**41**	50	7	10	0	**17**	32	**108**
8:15AM	9	47	0	**56**	12	40	10	0	**50**	49	5	30	0	**35**	62	**141**
8:30AM	12	46	0	**58**	17	41	12	0	**53**	37	15	18	0	**33**	58	**144**
8:45AM	14	31	0	**45**	40	52	14	0	**66**	56	7	13	0	**20**	73	**131**
Hourly Total	43	166	0	**209**	80	167	43	0	**210**	192	34	71	0	**105**	225	**524**
10:00AM	20	45	0	**65**	32	42	24	0	**66**	75	7	24	0	**31**	92	**162**
10:15AM	16	26	0	**42**	28	27	12	0	**39**	47	5	14	0	**19**	60	**100**
10:30AM	10	36	0	**46**	37	21	13	0	**34**	48	9	13	0	**22**	60	**102**
10:45AM	13	35	0	**48**	34	27	14	0	**41**	70	8	22	0	**30**	92	**119**
Hourly Total	59	142	0	**201**	131	117	63	0	**180**	240	29	73	0	**102**	304	**483**
11:00AM	10	32	0	**42**	53	29	12	0	**41**	97	14	15	0	**29**	92	**112**
11:15AM	16	47	0	**63**	89	36	13	0	**49**	136	10	20	0	**30**	160	**142**
11:30AM	15	43	0	**58**	65	39	24	0	**63**	129	10	12	0	**22**	109	**143**
11:45AM	13	42	0	**55**	78	37	12	0	**49**	111	10	21	0	**31**	117	**135**
Hourly Total	54	164	0	**218**	285	141	61	0	**202**	473	44	68	0	**112**	478	**532**
12:00PM	19	55	0	**74**	88	30	19	0	**49**	116	10	14	0	**24**	119	**147**
12:15PM	12	35	0	**47**	77	27	20	0	**47**	112	12	9	0	**21**	134	**115**
12:30PM	13	47	0	**60**	61	32	17	0	**49**	121	15	19	0	**34**	121	**143**
12:45PM	11	48	0	**59**	103	57	16	0	**73**	134	8	17	0	**25**	190	**157**
Hourly Total	55	185	0	**240**	329	146	72	0	**218**	483	45	59	0	**104**	564	**562**
1:00PM	23	67	0	**90**	80	49	20	0	**69**	115	17	19	0	**36**	125	**195**
1:15PM	18	47	0	**65**	56	21	11	0	**32**	95	9	19	0	**28**	91	**125**
1:30PM	9	46	0	**55**	94	38	15	0	**53**	90	12	18	0	**30**	118	**138**
1:45PM	22	43	0	**65**	70	50	20	0	**70**	87	16	16	0	**32**	91	**167**
Hourly Total	72	203	0	**275**	300	158	66	0	**224**	387	54	72	0	**126**	425	**625**
4:00PM	30	55	0	**85**	90	53	13	0	**66**	97	14	19	0	**33**	150	**184**
4:15PM	16	52	0	**68**	83	42	24	0	**66**	113	13	21	0	**34**	108	**168**
4:30PM	22	58	0	**80**	49	57	14	0	**71**	89	17	14	0	**31**	105	**182**
4:45PM	24	49	0	**73**	96	45	21	0	**66**	171	5	10	0	**15**	162	**154**
Hourly Total	92	214	0	**306**	318	197	72	0	**269**	470	49	64	0	**113**	525	**688**
5:00PM	27	70	0	**97**	81	48	17	0	**65**	226	20	18	0	**38**	124	**200**
5:15PM	28	53	0	**81**	91	54	17	0	**71**	121	11	18	0	**29**	138	**181**
5:30PM	26	65	0	**91**	76	59	20	0	**79**	116	7	30	0	**37**	92	**207**
5:45PM	29	51	0	**80**	73	35	29	0	**64**	90	12	27	0	**39**	69	**183**
Hourly Total	110	239	0	**349**	321	196	83	0	**279**	553	50	93	0	**143**	423	**771**
Total	524	1454	0	**1978**	1807	1236	487	0	**1723**	2872	327	534	0	**861**	3026	**4562**
% Approach	26.5%	73.5%	0%	-	-	71.7%	28.3%	0%	-	-	38.0%	62.0%	0%	-	-	-
% Total	11.5%	31.9%	0%	**43.4%**	-	27.1%	10.7%	0%	**37.8%**	-	7.2%	11.7%	0%	**18.9%**	-	-
Lights	485	1354	0	**1839**	-	1154	475	0	**1629**	-	313	505	0	**818**	-	4286
% Lights	92.6%	93.1%	0%	**93.0%**	-	93.4%	97.5%	0%	**94.5%**	-	95.7%	94.6%	0%	**95.0%**	-	94.0%
Articulated Trucks and Single-Unit Trucks	22	48	0	**70**	-	42	8	0	**50**	-	8	13	0	**21**	-	141
% Articulated Trucks and Single-Unit Trucks	4.2%	3.3%	0%	**3.5%**	-	3.4%	1.6%	0%	**2.9%**	-	2.4%	2.4%	0%	**2.4%**	-	3.1%
Buses	2	5	0	**7**	-	12	1	0	**13**	-	2	0	0	**2**	-	22
% Buses	0.4%	0.3%	0%	**0.4%**	-	1.0%	0.2%	0%	**0.8%**	-	0.6%	0%	0%	**0.2%**	-	0.5%
Bicycles on Road	15	47	0	**62**	-	28	3	0	**31**	-	4	16	0	**20**	-	113

Leg	S State Street					S State Street					E Liberty Street					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
% Bicycles on Road	2.9%	3.2%	0%	**3.1%**	-	2.3%	0.6%	0%	**1.8%**	-	1.2%	3.0%	0%	**2.3%**	-	2.5%
Pedestrians	-	-	-	-	1796	-	-	-	-	2867	-	-	-	-	3004	
% Pedestrians	-	-	-	-	99.4%	-	-	-	-	99.8%	-	-	-	-	99.3%	-
Bicycles on Crosswalk	-	-	-	-	11	-	-	-	-	5	-	-	-	-	22	
% Bicycles on Crosswalk	-	-	-	-	0.6%	-	-	-	-	0.2%	-	-	-	-	0.7%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(054)_S State Street & E Liberty Street - TMC
Thu Nov 7, 2019
Full Length (7 AM-9 AM, 10 AM-2 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724338, Location: 42.27936, -83.740821, Site Code: 054

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(054)_S State Street & E Liberty Street - TMC

Thu Nov 7, 2019
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724338, Location: 42.27936, -83.740821, Site Code: 054

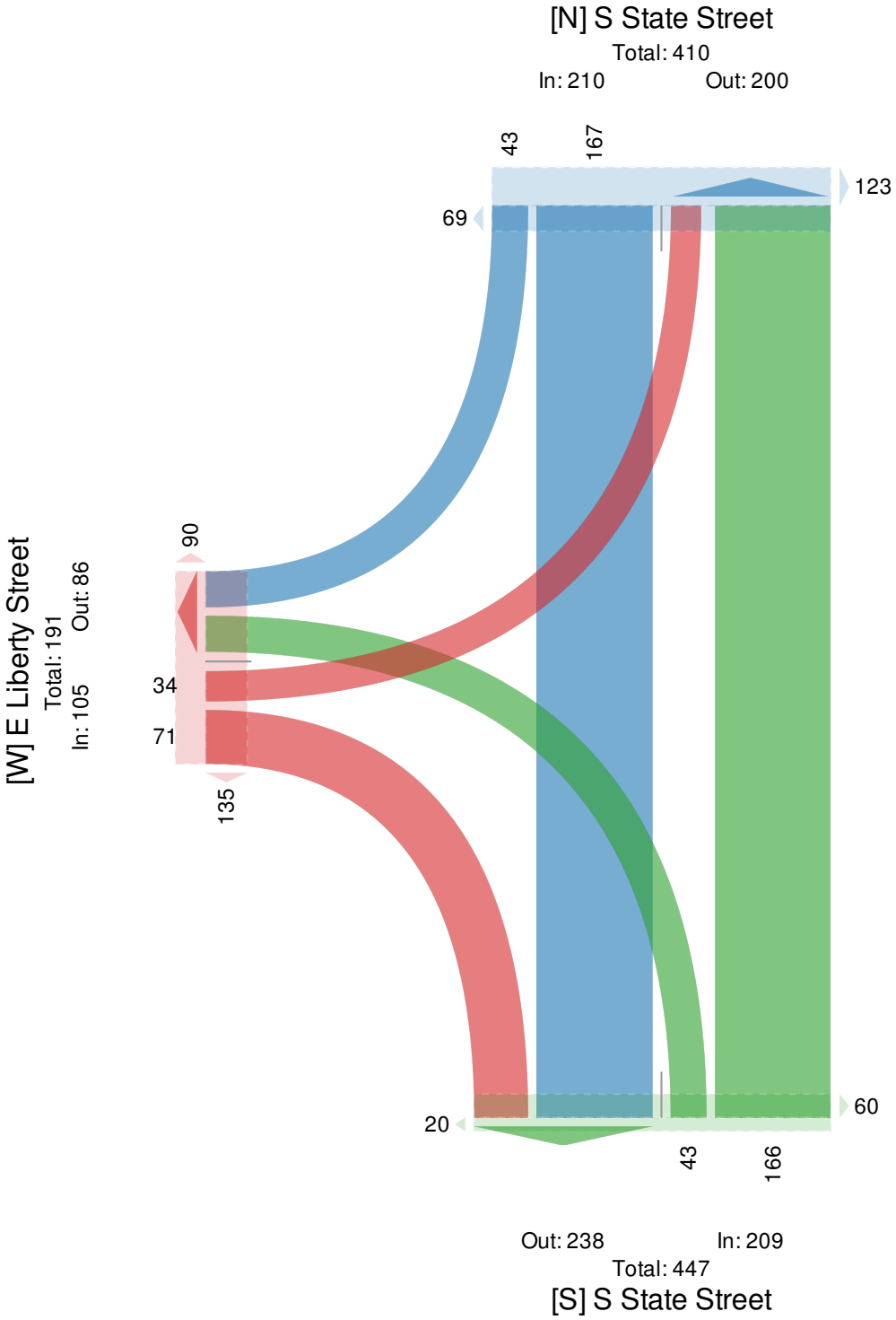
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg / Direction	S State Street Northbound					S State Street Southbound					E Liberty Street Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2019-11-07 8:00AM	8	42	0	**50**	11	34	7	0	**41**	50	7	10	0	**17**	32	**108**
8:15AM	9	47	0	**56**	12	40	10	0	**50**	49	5	30	0	**35**	62	**141**
8:30AM	12	46	0	**58**	17	41	12	0	**53**	37	15	18	0	**33**	58	**144**
8:45AM	14	31	0	**45**	40	52	14	0	**66**	56	7	13	0	**20**	73	**131**
Total	43	166	0	**209**	80	167	43	0	**210**	192	34	71	0	**105**	225	**524**
% Approach	20.6%	79.4%	0%	**-**	-	79.5%	20.5%	0%	**-**	-	32.4%	67.6%	0%	**-**	-	-
% Total	8.2%	31.7%	0%	**39.9%**	-	31.9%	8.2%	0%	**40.1%**	-	6.5%	13.5%	0%	**20.0%**	-	-
PHF	0.750	0.867	-	**0.899**	-	0.779	0.768	-	**0.777**	-	0.567	0.620	-	**0.765**	-	0.907
Lights	38	153	0	**191**	-	149	41	0	**190**	-	34	65	0	**99**	-	480
% Lights	88.4%	92.2%	0%	**91.4%**	-	89.2%	95.3%	0%	**90.5%**	-	100%	91.5%	0%	**94.3%**	-	91.6%
Articulated Trucks and Single-Unit Trucks	3	10	0	**13**	-	7	2	0	**9**	-	0	2	0	**2**	-	24
% Articulated Trucks and Single-Unit Trucks	7.0%	6.0%	0%	**6.2%**	-	4.2%	4.7%	0%	**4.3%**	-	0%	2.8%	0%	**1.9%**	-	4.6%
Buses	1	0	0	**1**	-	3	0	0	**3**	-	0	0	0	**0**	-	4
% Buses	2.3%	0%	0%	**0.5%**	-	1.8%	0%	0%	**1.4%**	-	0%	0%	0%	**0%**	-	0.8%
Bicycles on Road	1	3	0	**4**	-	8	0	0	**8**	-	0	4	0	**4**	-	16
% Bicycles on Road	2.3%	1.8%	0%	**1.9%**	-	4.8%	0%	0%	**3.8%**	-	0%	5.6%	0%	**3.8%**	-	3.1%
Pedestrians	-	-	-	-	77	-	-	-	-	192	-	-	-	-	222	
% Pedestrians	-	-	-	-	96.3%	-	-	-	-	100%	-	-	-	-	98.7%	-
Bicycles on Crosswalk	-	-	-	-	3	-	-	-	-	0	-	-	-	-	3	
% Bicycles on Crosswalk	-	-	-	-	3.8%	-	-	-	-	0%	-	-	-	-	1.3%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(054)_S State Street & E Liberty Street - TMC
Thu Nov 7, 2019
AM Peak (8 AM - 9 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724338, Location: 42.27936, -83.740821, Site Code: 054

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(054)_S State Street & E Liberty Street - TMC

Thu Nov 7, 2019
Midday Peak (11:15 AM - 12:15 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724338, Location: 42.27936, -83.740821, Site Code: 054

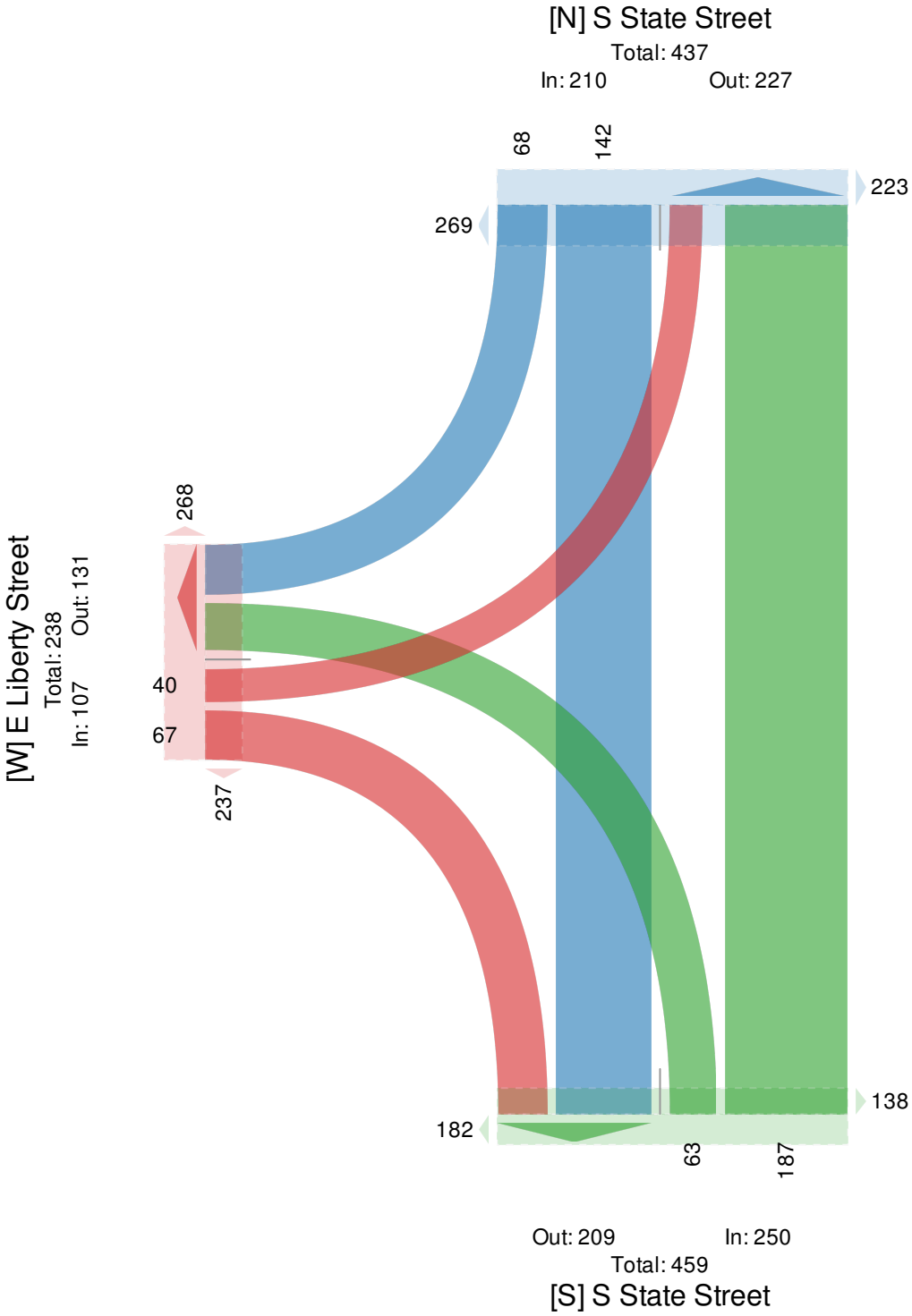
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg Direction	S State Street Northbound					S State Street Southbound					E Liberty Street Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2019-11-07 11:15AM	16	47	0	**63**	89	36	13	0	**49**	136	10	20	0	**30**	160	**142**
11:30AM	15	43	0	**58**	65	39	24	0	**63**	129	10	12	0	**22**	109	**143**
11:45AM	13	42	0	**55**	78	37	12	0	**49**	111	10	21	0	**31**	117	**135**
12:00PM	19	55	0	**74**	88	30	19	0	**49**	116	10	14	0	**24**	119	**147**
Total	63	187	0	**250**	320	142	68	0	**210**	492	40	67	0	**107**	505	**567**
% Approach	25.2%	74.8%	0%	-	-	67.6%	32.4%	0%	-	-	37.4%	62.6%	0%	-	-	-
% Total	11.1%	33.0%	0%	**44.1%**	-	25.0%	12.0%	0%	**37.0%**	-	7.1%	11.8%	0%	**18.9%**	-	-
PHF	0.816	0.856	-	**0.845**	-	0.908	0.708	-	**0.831**	-	1.000	0.847	-	**0.902**	-	0.956
Lights	57	174	0	**231**	-	135	65	0	**200**	-	40	58	0	**98**	-	529
% Lights	90.5%	93.0%	0%	**92.4%**	-	95.1%	95.6%	0%	**95.2%**	-	100%	86.6%	0%	**91.6%**	-	93.3%
Articulated Trucks and Single-Unit Trucks	5	4	0	**9**	-	3	3	0	**6**	-	0	3	0	**3**	-	18
% Articulated Trucks and Single-Unit Trucks	7.9%	2.1%	0%	**3.6%**	-	2.1%	4.4%	0%	**2.9%**	-	0%	4.5%	0%	**2.8%**	-	3.2%
Buses	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Buses	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Bicycles on Road	1	9	0	**10**	-	4	0	0	**4**	-	0	6	0	**6**	-	20
% Bicycles on Road	1.6%	4.8%	0%	**4.0%**	-	2.8%	0%	0%	**1.9%**	-	0%	9.0%	0%	**5.6%**	-	3.5%
Pedestrians	-	-	-	-	320	-	-	-	-	492	-	-	-	-	501	
% Pedestrians	-	-	-	-	100%	-	-	-	-	100%	-	-	-	-	99.2%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	4	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0.8%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(054)_S State Street & E Liberty Street - TMC
Thu Nov 7, 2019
Midday Peak (11:15 AM - 12:15 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724338, Location: 42.27936, -83.740821, Site Code: 054

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(054)_S State Street & E Liberty Street - TMC

Thu Nov 7, 2019
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724338, Location: 42.27936, -83.740821, Site Code: 054

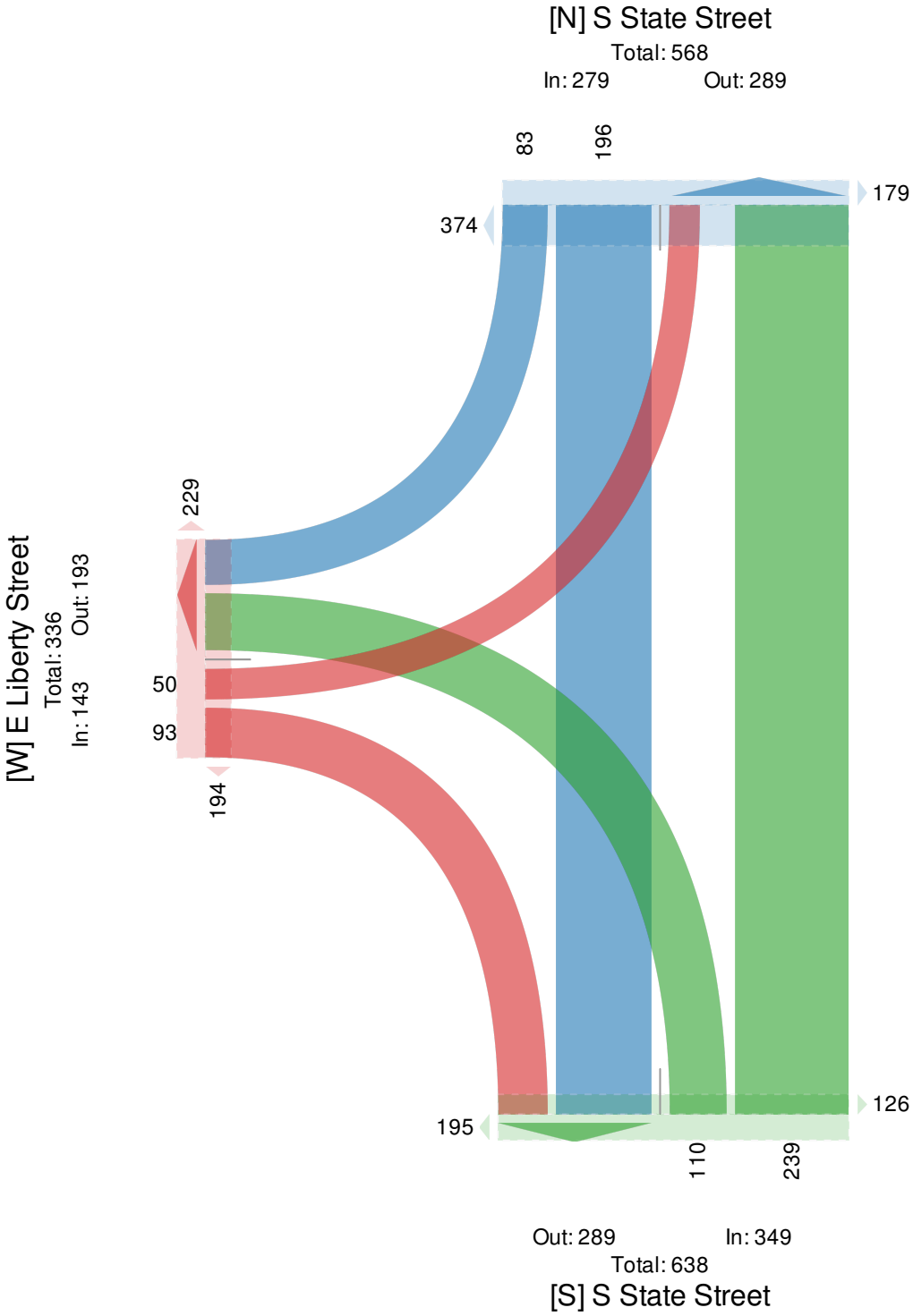
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg / Direction	S State Street Northbound					S State Street Southbound					E Liberty Street Eastbound					
Time	L	T	U	App	Ped*	T	R	U	App	Ped*	L	R	U	App	Ped*	Int
2019-11-07 5:00PM	27	70	0	**97**	81	48	17	0	**65**	226	20	18	0	**38**	124	**200**
5:15PM	28	53	0	**81**	91	54	17	0	**71**	121	11	18	0	**29**	138	**181**
5:30PM	26	65	0	**91**	76	59	20	0	**79**	116	7	30	0	**37**	92	**207**
5:45PM	29	51	0	**80**	73	35	29	0	**64**	90	12	27	0	**39**	69	**183**
Total	110	239	0	**349**	321	196	83	0	**279**	553	50	93	0	**143**	423	**771**
% Approach	31.5%	68.5%	0%	-	-	70.3%	29.7%	0%	-	-	35.0%	65.0%	0%	-	-	-
% Total	14.3%	31.0%	0%	**45.3%**	-	25.4%	10.8%	0%	**36.2%**	-	6.5%	12.1%	0%	**18.5%**	-	-
PHF	0.964	0.860	-	**0.901**	-	0.836	0.716	-	**0.888**	-	0.625	0.775	-	**0.917**	-	0.930
Lights	105	226	0	**331**	-	189	83	0	**272**	-	49	92	0	**141**	-	744
% Lights	95.5%	94.6%	0%	**94.8%**	-	96.4%	100%	0%	**97.5%**	-	98.0%	98.9%	0%	**98.6%**	-	96.5%
Articulated Trucks and Single-Unit Trucks	3	0	0	**3**	-	3	0	0	**3**	-	1	1	0	**2**	-	8
% Articulated Trucks and Single-Unit Trucks	2.7%	0%	0%	**0.9%**	-	1.5%	0%	0%	**1.1%**	-	2.0%	1.1%	0%	**1.4%**	-	1.0%
Buses	0	1	0	**1**	-	2	0	0	**2**	-	0	0	0	**0**	-	3
% Buses	0%	0.4%	0%	**0.3%**	-	1.0%	0%	0%	**0.7%**	-	0%	0%	0%	**0%**	-	0.4%
Bicycles on Road	2	12	0	**14**	-	2	0	0	**2**	-	0	0	0	**0**	-	16
% Bicycles on Road	1.8%	5.0%	0%	**4.0%**	-	1.0%	0%	0%	**0.7%**	-	0%	0%	0%	**0%**	-	2.1%
Pedestrians	-	-	-	-	321	-	-	-	-	553	-	-	-	-	422	
% Pedestrians	-	-	-	-	100%	-	-	-	-	100%	-	-	-	-	99.8%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0.2%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(054)_S State Street & E Liberty Street - TMC
Thu Nov 7, 2019
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724338, Location: 42.27936, -83.740821, Site Code: 054

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(036)_S State Street & N University Avenue - TMC

Thu Nov 7, 2019
Full Length (7 AM-9 AM, 10 AM-2 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724323, Location: 42.278576, -83.74078, Site Code: 036

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

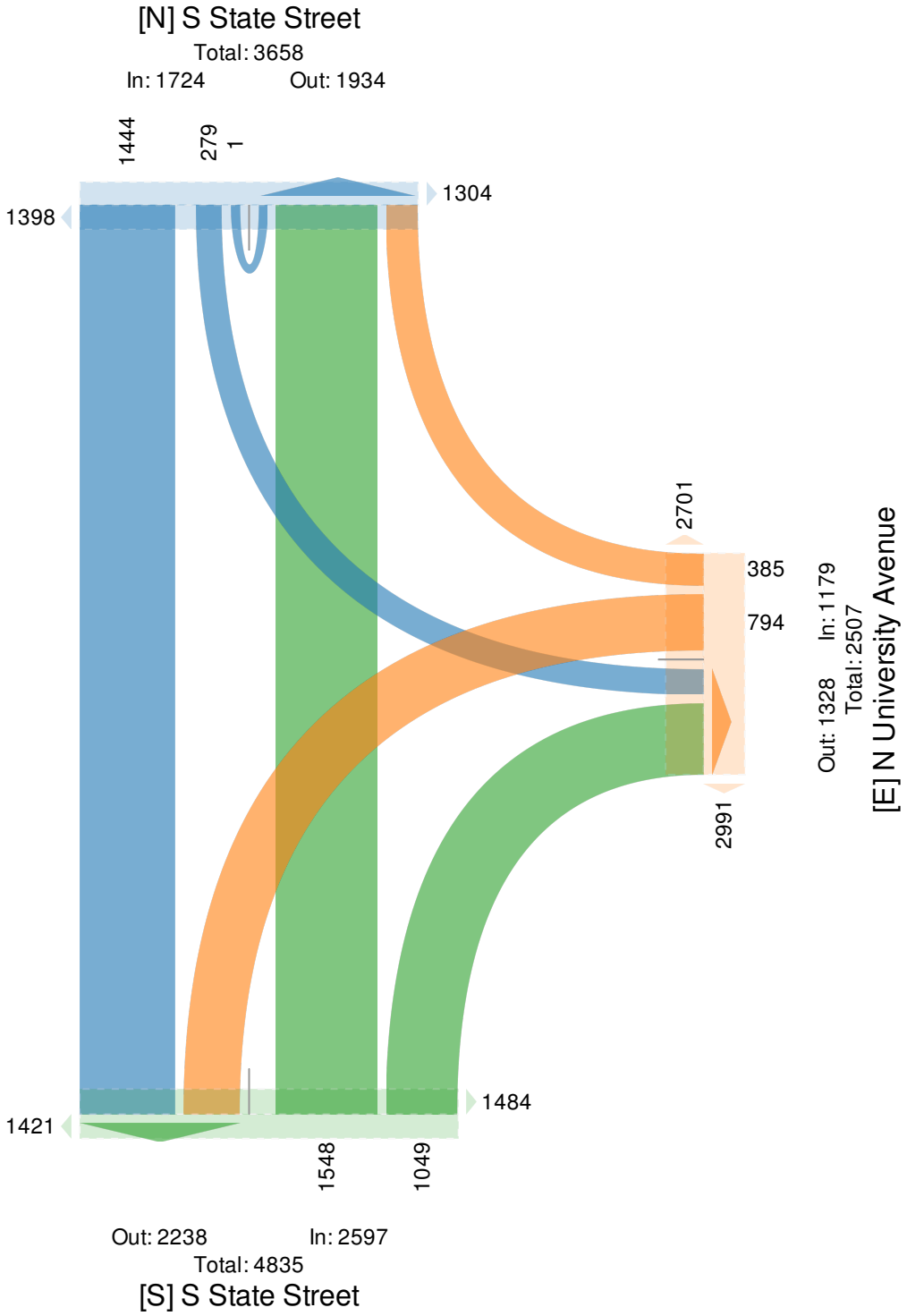
Leg	S State Street					S State Street					N University Avenue					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	App	Ped*	L	T	U	App	Ped*	L	R	U	App	Ped*	Int
2019-11-07 7:00AM	33	18	0	**51**	24	4	24	0	**28**	12	4	4	0	**8**	15	**87**
7:15AM	41	20	0	**61**	13	6	23	0	**29**	16	10	5	0	**15**	11	**105**
7:30AM	40	38	0	**78**	23	10	28	0	**38**	29	14	8	0	**22**	14	**138**
7:45AM	36	56	0	**92**	39	6	41	0	**47**	30	19	12	0	**31**	57	**170**
Hourly Total	150	132	0	**282**	99	26	116	0	**142**	87	47	29	0	**76**	97	**500**
8:00AM	41	55	0	**96**	43	13	31	0	**44**	23	25	10	0	**35**	67	**175**
8:15AM	44	39	0	**83**	47	21	50	0	**71**	43	14	10	0	**24**	116	**178**
8:30AM	47	62	0	**109**	42	19	33	0	**52**	30	17	10	0	**27**	77	**188**
8:45AM	36	36	0	**72**	91	18	49	0	**67**	38	18	8	0	**26**	126	**165**
Hourly Total	168	192	0	**360**	223	71	163	0	**234**	134	74	38	0	**112**	386	**706**
10:00AM	54	38	0	**92**	88	7	61	0	**68**	73	27	11	0	**38**	139	**198**
10:15AM	31	24	0	**55**	53	6	35	0	**41**	60	20	11	0	**31**	80	**127**
10:30AM	42	17	0	**59**	55	8	25	0	**33**	33	23	4	0	**27**	86	**119**
10:45AM	40	22	0	**62**	89	6	39	1	**46**	69	26	8	0	**34**	149	**142**
Hourly Total	167	101	0	**268**	285	27	160	1	**188**	235	96	34	0	**130**	454	**586**
11:00AM	31	30	0	**61**	93	8	35	0	**43**	64	27	6	0	**33**	160	**137**
11:15AM	42	30	0	**72**	147	6	47	0	**53**	143	16	15	0	**31**	335	**156**
11:30AM	47	27	0	**74**	116	7	49	0	**56**	115	41	11	0	**52**	206	**182**
11:45AM	43	33	0	**76**	147	6	49	0	**55**	100	25	15	0	**40**	243	**171**
Hourly Total	163	120	0	**283**	503	27	180	0	**207**	422	109	47	0	**156**	944	**646**
12:00PM	52	26	0	**78**	140	5	33	0	**38**	143	26	15	0	**41**	199	**157**
12:15PM	40	30	0	**70**	136	6	31	0	**37**	131	19	7	0	**26**	195	**133**
12:30PM	47	23	0	**70**	128	12	35	0	**47**	164	23	11	0	**34**	211	**151**
12:45PM	46	32	0	**78**	219	6	58	0	**64**	211	18	14	0	**32**	440	**174**
Hourly Total	185	111	0	**296**	623	29	157	0	**186**	649	86	47	0	**133**	1045	**615**
1:00PM	68	32	0	**100**	137	10	59	0	**69**	120	16	13	0	**29**	298	**198**
1:15PM	48	34	0	**82**	84	5	35	0	**40**	93	21	14	0	**35**	180	**157**
1:30PM	48	25	0	**73**	150	5	43	0	**48**	87	20	10	0	**30**	183	**151**
1:45PM	50	22	0	**72**	139	13	52	0	**65**	93	23	13	0	**36**	203	**173**
Hourly Total	214	113	0	**327**	510	33	189	0	**222**	393	80	50	0	**130**	864	**679**
4:00PM	65	30	0	**95**	30	6	65	0	**71**	75	45	17	0	**62**	291	**228**
4:15PM	57	22	0	**79**	63	11	53	0	**64**	75	33	13	0	**46**	198	**189**
4:30PM	56	36	0	**92**	88	6	64	0	**70**	100	44	18	0	**62**	168	**224**
4:45PM	51	37	0	**88**	99	1	51	0	**52**	104	30	16	0	**46**	310	**186**
Hourly Total	229	125	0	**354**	280	24	233	0	**257**	354	152	64	0	**216**	967	**827**
5:00PM	81	40	0	**121**	90	8	54	0	**62**	94	34	16	0	**50**	202	**233**
5:15PM	65	43	0	**108**	108	15	59	0	**74**	110	34	16	0	**50**	293	**232**
5:30PM	71	33	0	**104**	92	10	75	0	**85**	101	45	18	0	**63**	232	**252**
5:45PM	55	39	0	**94**	92	9	58	0	**67**	123	37	26	0	**63**	208	**224**
Hourly Total	272	155	0	**427**	382	42	246	0	**288**	428	150	76	0	**226**	935	**941**
Total	1548	1049	0	**2597**	2905	279	1444	1	**1724**	2702	794	385	0	**1179**	5692	**5500**
% Approach	59.6%	40.4%	0%	-	-	16.2%	83.8%	0.1%	-	-	67.3%	32.7%	0%	-	-	-
% Total	28.1%	19.1%	0%	**47.2%**	-	5.1%	26.3%	0%	**31.3%**	-	14.4%	7.0%	0%	**21.4%**	-	-
Lights	1468	889	0	**2357**	-	263	1375	1	**1639**	-	748	362	0	**1110**	-	5106
% Lights	94.8%	84.7%	0%	**90.8%**	-	94.3%	95.2%	100%	**95.1%**	-	94.2%	94.0%	0%	**94.1%**	-	92.8%
Articulated Trucks and Single-Unit Trucks	45	28	0	**73**	-	8	39	0	**47**	-	25	12	0	**37**	-	157
% Articulated Trucks and Single-Unit Trucks	2.9%	2.7%	0%	**2.8%**	-	2.9%	2.7%	0%	**2.7%**	-	3.1%	3.1%	0%	**3.1%**	-	2.9%
Buses	4	126	0	**130**	-	4	11	0	**15**	-	12	4	0	**16**	-	161
% Buses	0.3%	12.0%	0%	**5.0%**	-	1.4%	0.8%	0%	**0.9%**	-	1.5%	1.0%	0%	**1.4%**	-	2.9%
Bicycles on Road	31	6	0	**37**	-	4	19	0	**23**	-	9	7	0	**16**	-	76

Leg Direction	S State Street Northbound					S State Street Southbound					N University Avenue Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
% Bicycles on Road	2.0%	0.6%	0%	**1.4%**	-	1.4%	1.3%	0%	**1.3%**	-	1.1%	1.8%	0%	**1.4%**	-	1.4%
Pedestrians	-	-	-	-	2889	-	-	-	-	2686	-	-	-	-	5612	
% Pedestrians	-	-	-	-	99.4%	-	-	-	-	99.4%	-	-	-	-	98.6%	-
Bicycles on Crosswalk	-	-	-	-	16	-	-	-	-	16	-	-	-	-	80	
% Bicycles on Crosswalk	-	-	-	-	0.6%	-	-	-	-	0.6%	-	-	-	-	1.4%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(036)_S State Street & N University Avenue - TMC
Thu Nov 7, 2019
Full Length (7 AM-9 AM, 10 AM-2 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724323, Location: 42.278576, -83.74078, Site Code: 036

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(036)_S State Street & N University Avenue - TMC

Thu Nov 7, 2019
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724323, Location: 42.278576, -83.74078, Site Code: 036

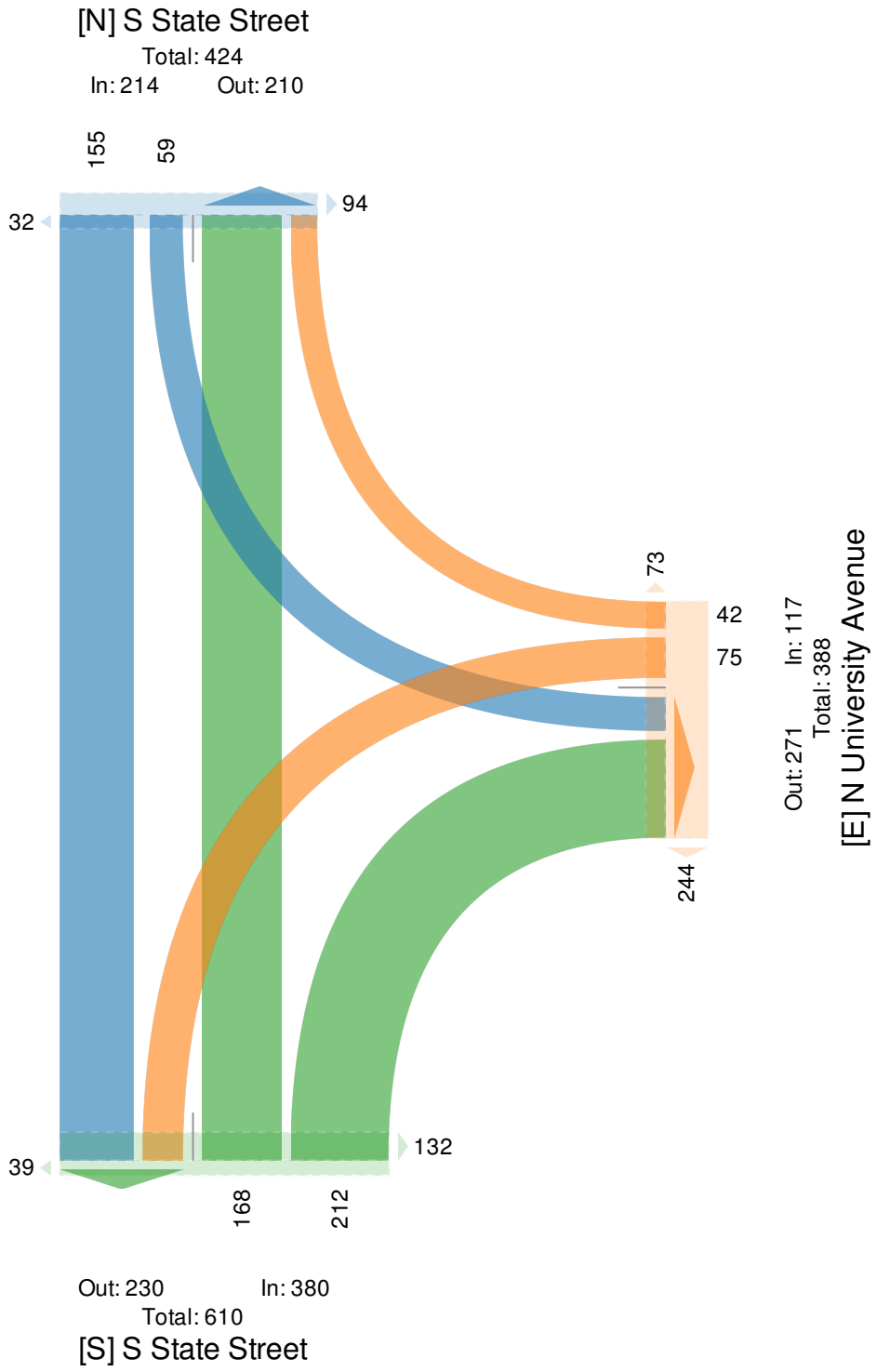
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg / Direction	S State Street Northbound					S State Street Southbound					N University Avenue Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2019-11-07 7:45AM	36	56	0	**92**	39	6	41	0	**47**	30	19	12	0	**31**	57	**170**
8:00AM	41	55	0	**96**	43	13	31	0	**44**	23	25	10	0	**35**	67	**175**
8:15AM	44	39	0	**83**	47	21	50	0	**71**	43	14	10	0	**24**	116	**178**
8:30AM	47	62	0	**109**	42	19	33	0	**52**	30	17	10	0	**27**	77	**188**
Total	168	212	0	**380**	171	59	155	0	**214**	126	75	42	0	**117**	317	**711**
% Approach	44.2%	55.8%	0%	**-**	-	27.6%	72.4%	0%	**-**	-	64.1%	35.9%	0%	**-**	-	-
% Total	23.6%	29.8%	0%	**53.4%**	-	8.3%	21.8%	0%	**30.1%**	-	10.5%	5.9%	0%	**16.5%**	-	-
PHF	0.908	0.855	-	**0.877**	-	0.725	0.781	-	**0.764**	-	0.750	0.875	-	**0.836**	-	0.950
Lights	159	192	0	**351**	-	52	147	0	**199**	-	70	40	0	**110**	-	660
% Lights	94.6%	90.6%	0%	**92.4%**	-	88.1%	94.8%	0%	**93.0%**	-	93.3%	95.2%	0%	**94.0%**	-	92.8%
Articulated Trucks and Single-Unit Trucks	7	5	0	**12**	-	4	5	0	**9**	-	2	2	0	**4**	-	25
% Articulated Trucks and Single-Unit Trucks	4.2%	2.4%	0%	**3.2%**	-	6.8%	3.2%	0%	**4.2%**	-	2.7%	4.8%	0%	**3.4%**	-	3.5%
Buses	1	15	0	**16**	-	2	1	0	**3**	-	3	0	0	**3**	-	22
% Buses	0.6%	7.1%	0%	**4.2%**	-	3.4%	0.6%	0%	**1.4%**	-	4.0%	0%	0%	**2.6%**	-	3.1%
Bicycles on Road	1	0	0	**1**	-	1	2	0	**3**	-	0	0	0	**0**	-	4
% Bicycles on Road	0.6%	0%	0%	**0.3%**	-	1.7%	1.3%	0%	**1.4%**	-	0%	0%	0%	**0%**	-	0.6%
Pedestrians	-	-	-	-	170	-	-	-	-	125	-	-	-	-	311	
% Pedestrians	-	-	-	-	99.4%	-	-	-	-	99.2%	-	-	-	-	98.1%	-
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	1	-	-	-	-	6	
% Bicycles on Crosswalk	-	-	-	-	0.6%	-	-	-	-	0.8%	-	-	-	-	1.9%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(036)_S State Street & N University Avenue - TMC
Thu Nov 7, 2019
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724323, Location: 42.278576, -83.74078, Site Code: 036

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(036)_S State Street & N University Avenue - TMC

Thu Nov 7, 2019
Midday Peak (11:15 AM - 12:15 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724323, Location: 42.278576, -83.74078, Site Code: 036

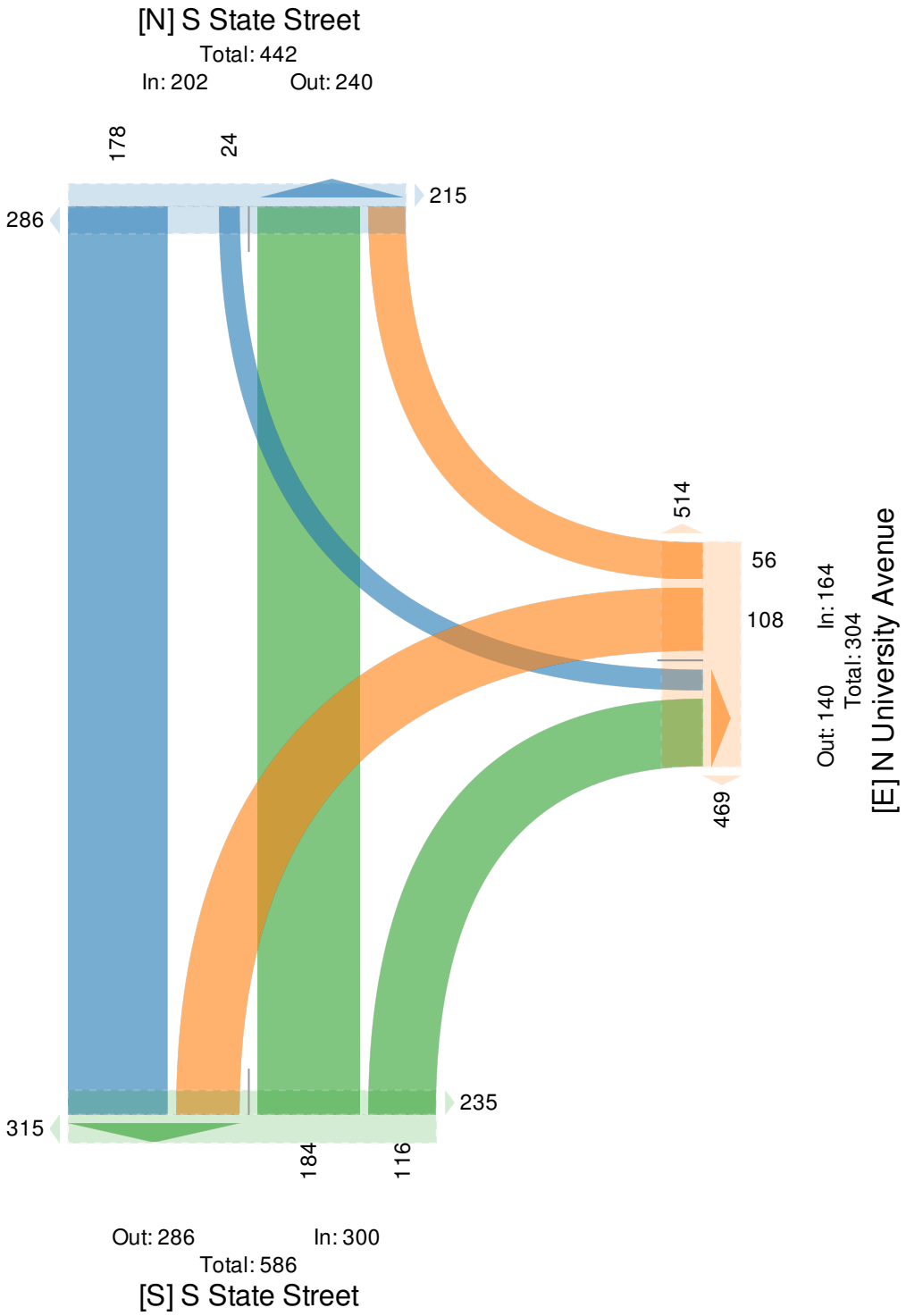
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg / Direction	S State Street Northbound					S State Street Southbound					N University Avenue Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2019-11-07 11:15AM	42	30	0	**72**	147	6	47	0	**53**	143	16	15	0	**31**	335	**156**
11:30AM	47	27	0	**74**	116	7	49	0	**56**	115	41	11	0	**52**	206	**182**
11:45AM	43	33	0	**76**	147	6	49	0	**55**	100	25	15	0	**40**	243	**171**
12:00PM	52	26	0	**78**	140	5	33	0	**38**	143	26	15	0	**41**	199	**157**
Total	184	116	0	**300**	550	24	178	0	**202**	501	108	56	0	**164**	983	**666**
% Approach	61.3%	38.7%	0%	**-**	-	11.9%	88.1%	0%	**-**	-	65.9%	34.1%	0%	**-**	-	-
% Total	27.6%	17.4%	0%	**45.0%**	-	3.6%	26.7%	0%	**30.3%**	-	16.2%	8.4%	0%	**24.6%**	-	-
PHF	0.873	0.879	-	**0.955**	-	0.857	0.896	-	**0.891**	-	0.646	0.933	-	**0.779**	-	0.911
Lights	172	97	0	**269**	-	23	168	0	**191**	-	101	54	0	**155**	-	615
% Lights	93.5%	83.6%	0%	**89.7%**	-	95.8%	94.4%	0%	**94.6%**	-	93.5%	96.4%	0%	**94.5%**	-	92.3%
Articulated Trucks and Single-Unit Trucks	6	3	0	**9**	-	1	3	0	**4**	-	5	2	0	**7**	-	20
% Articulated Trucks and Single-Unit Trucks	3.3%	2.6%	0%	**3.0%**	-	4.2%	1.7%	0%	**2.0%**	-	4.6%	3.6%	0%	**4.3%**	-	3.0%
Buses	0	16	0	**16**	-	0	1	0	**1**	-	0	0	0	**0**	-	17
% Buses	0%	13.8%	0%	**5.3%**	-	0%	0.6%	0%	**0.5%**	-	0%	0%	0%	**0%**	-	2.6%
Bicycles on Road	6	0	0	**6**	-	0	6	0	**6**	-	2	0	0	**2**	-	14
% Bicycles on Road	3.3%	0%	0%	**2.0%**	-	0%	3.4%	0%	**3.0%**	-	1.9%	0%	0%	**1.2%**	-	2.1%
Pedestrians	-	-	-	-	543	-	-	-	-	499	-	-	-	-	970	
% Pedestrians	-	-	-	-	98.7%	-	-	-	-	99.6%	-	-	-	-	98.7%	-
Bicycles on Crosswalk	-	-	-	-	7	-	-	-	-	2	-	-	-	-	13	
% Bicycles on Crosswalk	-	-	-	-	1.3%	-	-	-	-	0.4%	-	-	-	-	1.3%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(036)_S State Street & N University Avenue - TMC
Thu Nov 7, 2019
Midday Peak (11:15 AM - 12:15 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724323, Location: 42.278576, -83.74078, Site Code: 036

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(036)_S State Street & N University Avenue - TMC

Thu Nov 7, 2019
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724323, Location: 42.278576, -83.74078, Site Code: 036

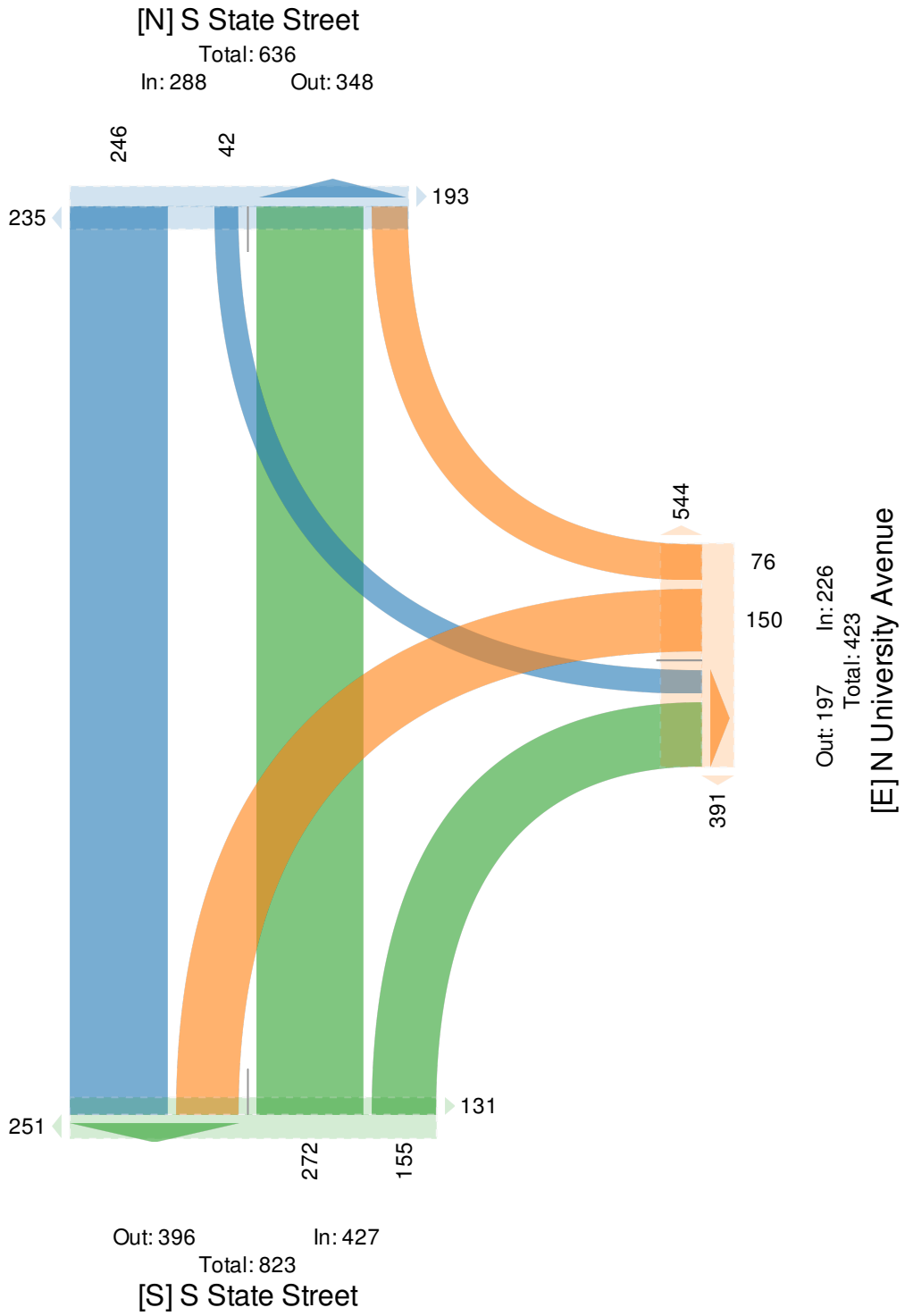
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg / Direction	S State Street Northbound					S State Street Southbound					N University Avenue Westbound					
Time	T	R	U	App	Ped*	L	T	U	App	Ped*	L	R	U	App	Ped*	Int
2019-11-07 5:00PM	81	40	0	**121**	90	8	54	0	**62**	94	34	16	0	**50**	202	**233**
5:15PM	65	43	0	**108**	108	15	59	0	**74**	110	34	16	0	**50**	293	**232**
5:30PM	71	33	0	**104**	92	10	75	0	**85**	101	45	18	0	**63**	232	**252**
5:45PM	55	39	0	**94**	92	9	58	0	**67**	123	37	26	0	**63**	208	**224**
Total	272	155	0	**427**	382	42	246	0	**288**	428	150	76	0	**226**	935	**941**
% Approach	63.7%	36.3%	0%	**-**	-	14.6%	85.4%	0%	**-**	-	66.4%	33.6%	0%	**-**	-	-
% Total	28.9%	16.5%	0%	**45.4%**	-	4.5%	26.1%	0%	**30.6%**	-	15.9%	8.1%	0%	**24.0%**	-	-
PHF	0.840	0.911	-	**0.879**	-	0.683	0.815	-	**0.840**	-	0.833	0.730	-	**0.885**	-	0.924
Lights	261	137	0	**398**	-	41	233	0	**274**	-	147	71	0	**218**	-	890
% Lights	96.0%	88.4%	0%	**93.2%**	-	97.6%	94.7%	0%	**95.1%**	-	98.0%	93.4%	0%	**96.5%**	-	94.6%
Articulated Trucks and Single-Unit Trucks	1	0	0	**1**	-	0	3	0	**3**	-	0	1	0	**1**	-	5
% Articulated Trucks and Single-Unit Trucks	0.4%	0%	0%	**0.2%**	-	0%	1.2%	0%	**1.0%**	-	0%	1.3%	0%	**0.4%**	-	0.5%
Buses	0	16	0	**16**	-	0	2	0	**2**	-	3	1	0	**4**	-	22
% Buses	0%	10.3%	0%	**3.7%**	-	0%	0.8%	0%	**0.7%**	-	2.0%	1.3%	0%	**1.8%**	-	2.3%
Bicycles on Road	10	2	0	**12**	-	1	8	0	**9**	-	0	3	0	**3**	-	24
% Bicycles on Road	3.7%	1.3%	0%	**2.8%**	-	2.4%	3.3%	0%	**3.1%**	-	0%	3.9%	0%	**1.3%**	-	2.6%
Pedestrians	-	-	-	-	382	-	-	-	-	424	-	-	-	-	926	
% Pedestrians	-	-	-	-	100%	-	-	-	-	99.1%	-	-	-	-	99.0%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	4	-	-	-	-	9	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	0.9%	-	-	-	-	1.0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(036)_S State Street & N University Avenue - TMC
Thu Nov 7, 2019
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724323, Location: 42.278576, -83.74078, Site Code: 036

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(057)_W William Street & S State Street - TMC

Thu Nov 7, 2019
Full Length (7 AM-9 AM, 11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724341, Location: 42.277846, -83.740759, Site Code: 057

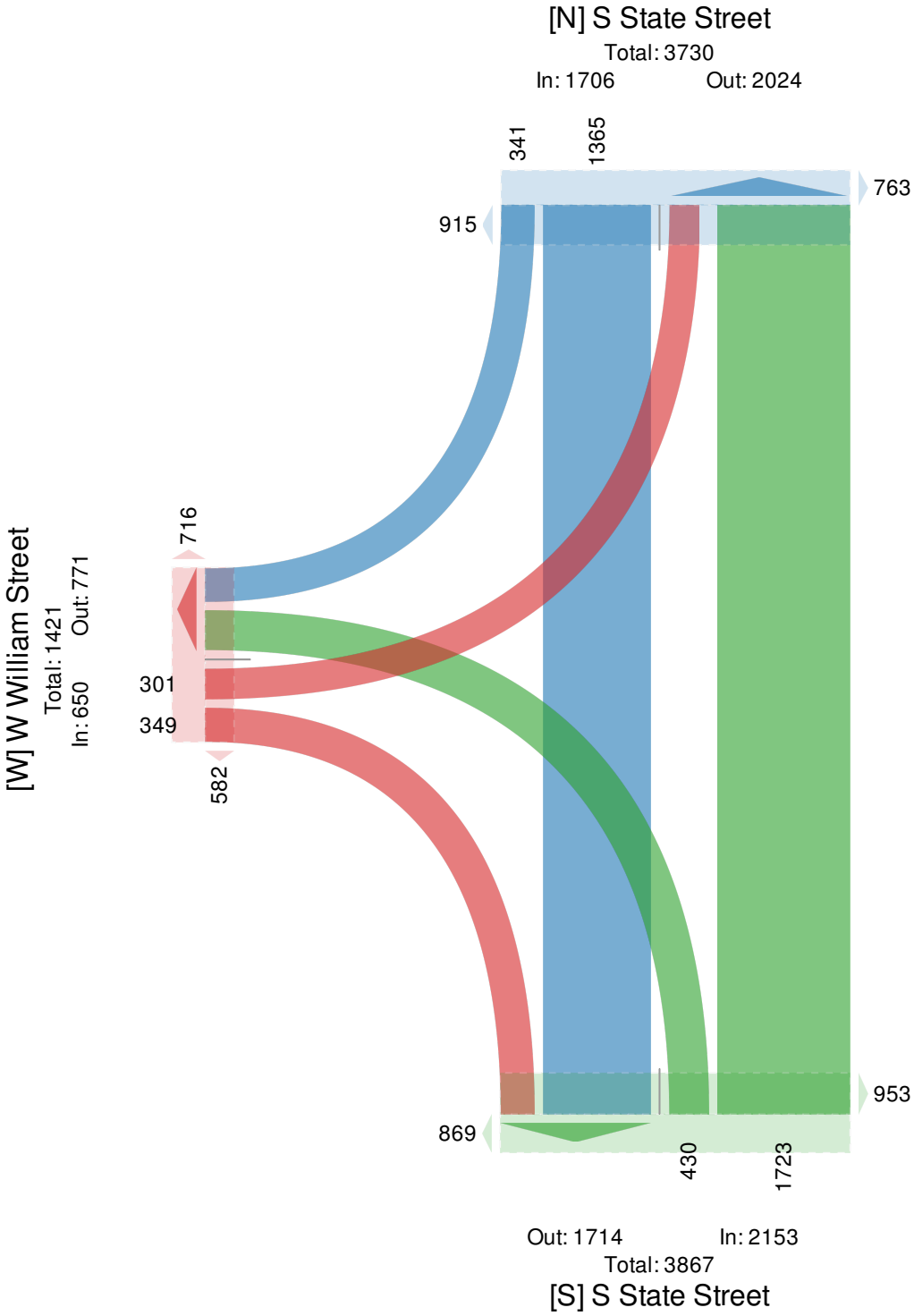
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg	S State Street					S State Street					W William Street					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	App	Ped*	T	R	U	App	Ped*	L	R	U	App	Ped*	Int
2019-11-07 7:00AM	5	45	0	**50**	6	22	5	0	**27**	5	3	6	0	**9**	7	**86**
7:15AM	6	54	0	**60**	9	27	7	0	**34**	13	6	8	0	**14**	13	**108**
7:30AM	5	67	0	**72**	29	37	2	0	**39**	6	10	3	0	**13**	9	**124**
7:45AM	11	76	0	**87**	40	46	11	0	**57**	34	16	10	0	**26**	12	**170**
Hourly Total	27	242	0	**269**	84	132	25	0	**157**	58	35	27	0	**62**	41	**488**
8:00AM	8	95	0	**103**	28	49	7	0	**56**	33	7	9	0	**16**	28	**175**
8:15AM	16	77	0	**93**	70	54	8	0	**62**	58	12	14	0	**26**	33	**181**
8:30AM	12	92	0	**104**	38	38	8	0	**46**	32	17	9	0	**26**	29	**176**
8:45AM	16	60	0	**76**	81	58	9	0	**67**	61	10	9	0	**19**	33	**162**
Hourly Total	52	324	0	**376**	217	199	32	0	**231**	184	46	41	0	**87**	123	**694**
11:00AM	20	48	0	**68**	65	43	14	0	**57**	72	12	11	0	**23**	44	**148**
11:15AM	16	64	0	**80**	128	46	19	0	**65**	93	15	14	0	**29**	67	**174**
11:30AM	19	63	0	**82**	73	72	17	0	**89**	85	9	15	0	**24**	52	**195**
11:45AM	18	67	0	**85**	103	48	19	0	**67**	98	13	13	0	**26**	80	**178**
Hourly Total	73	242	0	**315**	369	209	69	0	**278**	348	49	53	0	**102**	243	**695**
12:00PM	21	74	0	**95**	70	52	17	0	**69**	91	4	24	0	**28**	67	**192**
12:15PM	17	62	0	**79**	65	42	11	0	**53**	56	14	15	0	**29**	63	**161**
12:30PM	16	57	0	**73**	80	43	18	0	**61**	74	15	14	0	**29**	71	**163**
12:45PM	20	67	0	**87**	203	64	15	0	**79**	138	17	16	0	**33**	95	**199**
Hourly Total	74	260	0	**334**	418	201	61	0	**262**	359	50	69	0	**119**	296	**715**
4:00PM	20	81	0	**101**	81	80	26	0	**106**	81	14	17	0	**31**	98	**238**
4:15PM	24	68	0	**92**	58	74	17	0	**91**	52	11	16	0	**27**	59	**210**
4:30PM	19	78	0	**97**	59	84	24	0	**108**	53	15	19	0	**34**	42	**239**
4:45PM	27	76	0	**103**	115	62	20	0	**82**	101	13	18	0	**31**	85	**216**
Hourly Total	90	303	0	**393**	313	300	87	0	**387**	287	53	70	0	**123**	284	**903**
5:00PM	29	90	0	**119**	108	76	9	0	**85**	128	28	22	0	**50**	80	**254**
5:15PM	27	87	0	**114**	91	80	14	0	**94**	104	19	26	0	**45**	80	**253**
5:30PM	27	86	0	**113**	93	99	19	0	**118**	96	13	21	0	**34**	68	**265**
5:45PM	31	89	0	**120**	129	69	25	0	**94**	114	8	20	0	**28**	83	**242**
Hourly Total	114	352	0	**466**	421	324	67	0	**391**	442	68	89	0	**157**	311	**1014**
Total	430	1723	0	**2153**	1822	1365	341	0	**1706**	1678	301	349	0	**650**	1298	**4509**
% Approach	20.0%	80.0%	0%	-	-	80.0%	20.0%	0%	-	-	46.3%	53.7%	0%	-	-	-
% Total	9.5%	38.2%	0%	**47.7%**	-	30.3%	7.6%	0%	**37.8%**	-	6.7%	7.7%	0%	**14.4%**	-	-
Lights	400	1584	0	**1984**	-	1296	325	0	**1621**	-	274	313	0	**587**	-	4192
% Lights	93.0%	91.9%	0%	**92.2%**	-	94.9%	95.3%	0%	**95.0%**	-	91.0%	89.7%	0%	**90.3%**	-	93.0%
Articulated Trucks and Single-Unit Trucks	6	41	0	**47**	-	33	16	0	**49**	-	13	7	0	**20**	-	116
% Articulated Trucks and Single-Unit Trucks	1.4%	2.4%	0%	**2.2%**	-	2.4%	4.7%	0%	**2.9%**	-	4.3%	2.0%	0%	**3.1%**	-	2.6%
Buses	24	85	0	**109**	-	16	0	0	**16**	-	13	24	0	**37**	-	162
% Buses	5.6%	4.9%	0%	**5.1%**	-	1.2%	0%	0%	**0.9%**	-	4.3%	6.9%	0%	**5.7%**	-	3.6%
Bicycles on Road	0	13	0	**13**	-	20	0	0	**20**	-	1	5	0	**6**	-	39
% Bicycles on Road	0%	0.8%	0%	**0.6%**	-	1.5%	0%	0%	**1.2%**	-	0.3%	1.4%	0%	**0.9%**	-	0.9%
Pedestrians	-	-	-	-	1784	-	-	-	-	1542	-	-	-	-	1266	
% Pedestrians	-	-	-	-	97.9%	-	-	-	-	91.9%	-	-	-	-	97.5%	-
Bicycles on Crosswalk	-	-	-	-	38	-	-	-	-	136	-	-	-	-	32	
% Bicycles on Crosswalk	-	-	-	-	2.1%	-	-	-	-	8.1%	-	-	-	-	2.5%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(057)_W William Street & S State Street - TMC
Thu Nov 7, 2019
Full Length (7 AM-9 AM, 11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724341, Location: 42.277846, -83.740759, Site Code: 057

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(057)_W William Street & S State Street - TMC

Thu Nov 7, 2019
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724341, Location: 42.277846, -83.740759, Site Code: 057

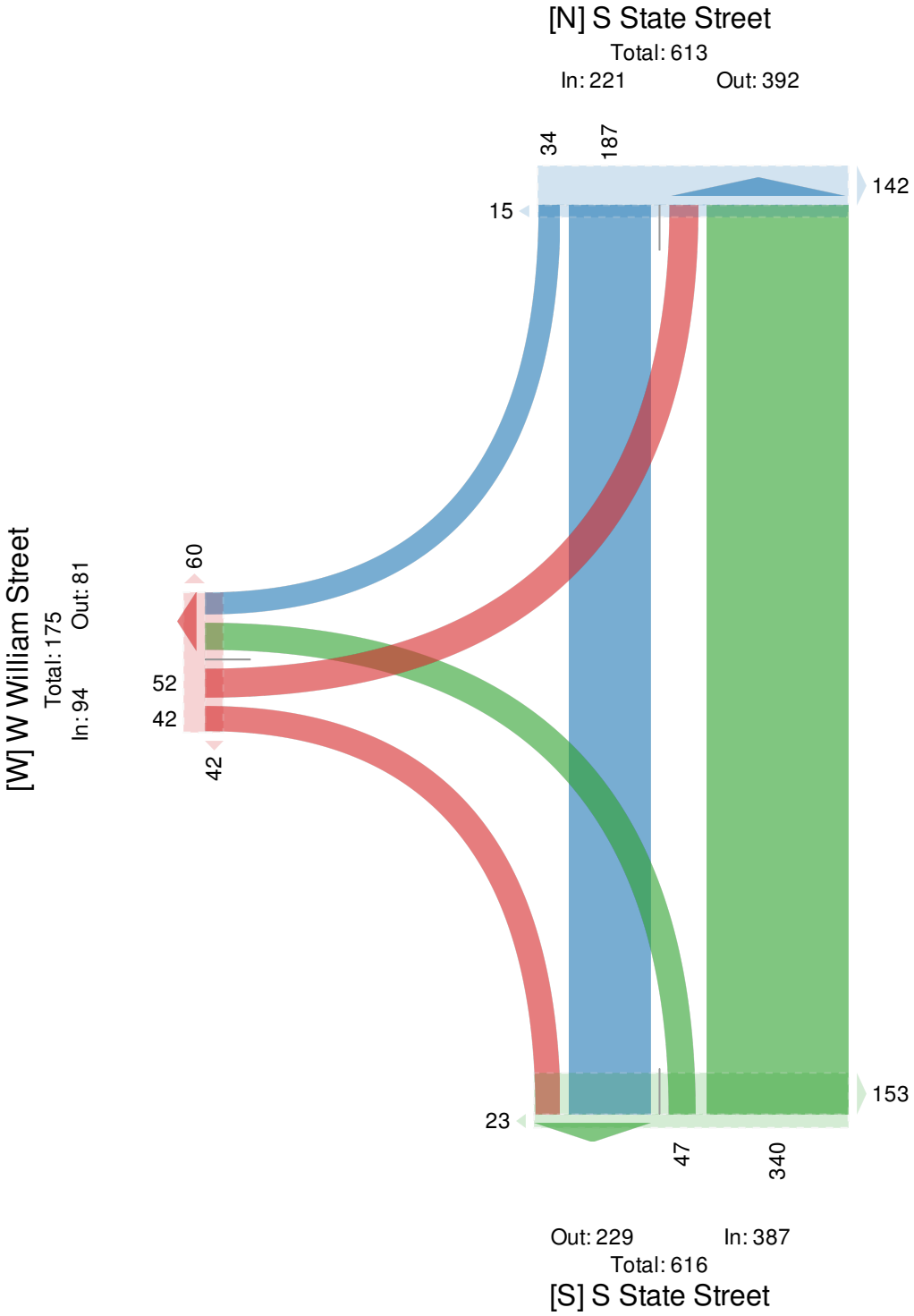
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg / Direction	S State Street Northbound					S State Street Southbound					W William Street Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2019-11-07 7:45AM	11	76	0	**87**	40	46	11	0	**57**	34	16	10	0	**26**	12	**170**
8:00AM	8	95	0	**103**	28	49	7	0	**56**	33	7	9	0	**16**	28	**175**
8:15AM	16	77	0	**93**	70	54	8	0	**62**	58	12	14	0	**26**	33	**181**
8:30AM	12	92	0	**104**	38	38	8	0	**46**	32	17	9	0	**26**	29	**176**
Total	47	340	0	**387**	176	187	34	0	**221**	157	52	42	0	**94**	102	**702**
% Approach	12.1%	87.9%	0%	**-**	-	84.6%	15.4%	0%	**-**	-	55.3%	44.7%	0%	**-**	-	-
% Total	6.7%	48.4%	0%	**55.1%**	-	26.6%	4.8%	0%	**31.5%**	-	7.4%	6.0%	0%	**13.4%**	-	-
PHF	0.734	0.899	-	**0.934**	-	0.877	0.773	-	**0.902**	-	0.765	0.750	-	**0.904**	-	0.971
Lights	43	315	0	**358**	-	177	30	0	**207**	-	48	35	0	**83**	-	648
% Lights	91.5%	92.6%	0%	**92.5%**	-	94.7%	88.2%	0%	**93.7%**	-	92.3%	83.3%	0%	**88.3%**	-	92.3%
Articulated Trucks and Single-Unit Trucks	0	8	0	**8**	-	6	4	0	**10**	-	2	3	0	**5**	-	23
% Articulated Trucks and Single-Unit Trucks	0%	2.4%	0%	**2.1%**	-	3.2%	11.8%	0%	**4.5%**	-	3.8%	7.1%	0%	**5.3%**	-	3.3%
Buses	4	15	0	**19**	-	3	0	0	**3**	-	2	4	0	**6**	-	28
% Buses	8.5%	4.4%	0%	**4.9%**	-	1.6%	0%	0%	**1.4%**	-	3.8%	9.5%	0%	**6.4%**	-	4.0%
Bicycles on Road	0	2	0	**2**	-	1	0	0	**1**	-	0	0	0	**0**	-	3
% Bicycles on Road	0%	0.6%	0%	**0.5%**	-	0.5%	0%	0%	**0.5%**	-	0%	0%	0%	**0%**	-	0.4%
Pedestrians	-	-	-	-	169	-	-	-	-	135	-	-	-	-	100	
% Pedestrians	-	-	-	-	96.0%	-	-	-	-	86.0%	-	-	-	-	98.0%	-
Bicycles on Crosswalk	-	-	-	-	7	-	-	-	-	22	-	-	-	-	2	
% Bicycles on Crosswalk	-	-	-	-	4.0%	-	-	-	-	14.0%	-	-	-	-	2.0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(057)_W William Street & S State Street - TMC
Thu Nov 7, 2019
AM Peak (7:45 AM - 8:45 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724341, Location: 42.277846, -83.740759, Site Code: 057

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(057)_W William Street & S State Street - TMC

Thu Nov 7, 2019
Midday Peak (11:15 AM - 12:15 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724341, Location: 42.277846, -83.740759, Site Code: 057

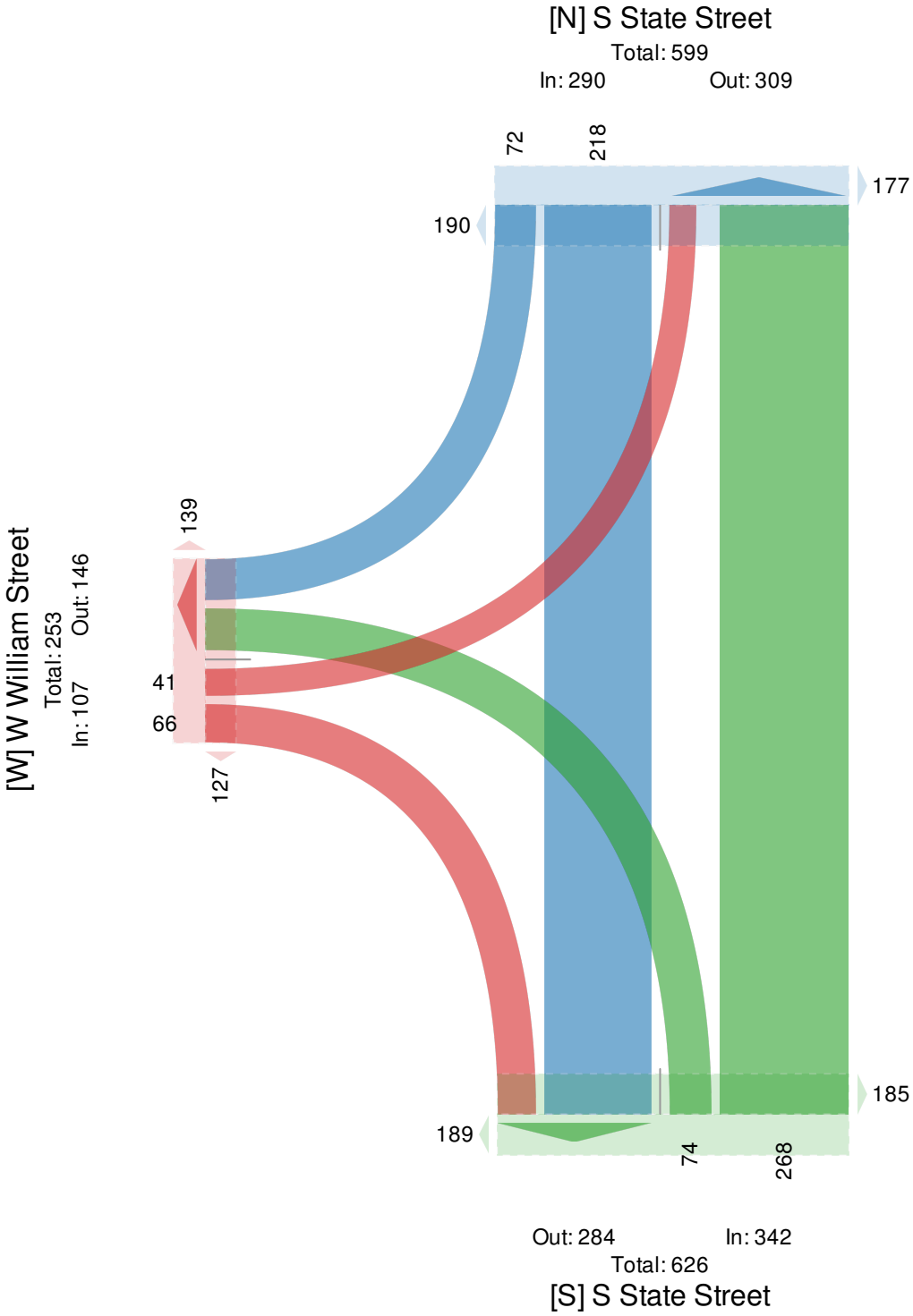
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg / Direction	S State Street Northbound					S State Street Southbound					W William Street Eastbound					
Time	L	T	U	App	Ped*	T	R	U	App	Ped*	L	R	U	App	Ped*	Int
2019-11-07 11:15AM	16	64	0	**80**	128	46	19	0	**65**	93	15	14	0	**29**	67	**174**
11:30AM	19	63	0	**82**	73	72	17	0	**89**	85	9	15	0	**24**	52	**195**
11:45AM	18	67	0	**85**	103	48	19	0	**67**	98	13	13	0	**26**	80	**178**
12:00PM	21	74	0	**95**	70	52	17	0	**69**	91	4	24	0	**28**	67	**192**
Total	74	268	0	**342**	374	218	72	0	**290**	367	41	66	0	**107**	266	**739**
% Approach	21.6%	78.4%	0%	**-**	-	75.2%	24.8%	0%	**-**	-	38.3%	61.7%	0%	**-**	-	-
% Total	10.0%	36.3%	0%	**46.3%**	-	29.5%	9.7%	0%	**39.2%**	-	5.5%	8.9%	0%	**14.5%**	-	-
PHF	0.881	0.911	-	**0.904**	-	0.754	0.947	-	**0.813**	-	0.683	0.688	-	**0.922**	-	0.945
Lights	67	245	0	**312**	-	208	67	0	**275**	-	35	60	0	**95**	-	682
% Lights	90.5%	91.4%	0%	**91.2%**	-	95.4%	93.1%	0%	**94.8%**	-	85.4%	90.9%	0%	**88.8%**	-	92.3%
Articulated Trucks and Single-Unit Trucks	3	7	0	**10**	-	6	5	0	**11**	-	3	2	0	**5**	-	26
% Articulated Trucks and Single-Unit Trucks	4.1%	2.6%	0%	**2.9%**	-	2.8%	6.9%	0%	**3.8%**	-	7.3%	3.0%	0%	**4.7%**	-	3.5%
Buses	4	14	0	**18**	-	0	0	0	**0**	-	3	4	0	**7**	-	25
% Buses	5.4%	5.2%	0%	**5.3%**	-	0%	0%	0%	**0%**	-	7.3%	6.1%	0%	**6.5%**	-	3.4%
Bicycles on Road	0	2	0	**2**	-	4	0	0	**4**	-	0	0	0	**0**	-	6
% Bicycles on Road	0%	0.7%	0%	**0.6%**	-	1.8%	0%	0%	**1.4%**	-	0%	0%	0%	**0%**	-	0.8%
Pedestrians	-	-	-	-	366	-	-	-	-	347	-	-	-	-	261	
% Pedestrians	-	-	-	-	97.9%	-	-	-	-	94.6%	-	-	-	-	98.1%	-
Bicycles on Crosswalk	-	-	-	-	8	-	-	-	-	20	-	-	-	-	5	
% Bicycles on Crosswalk	-	-	-	-	2.1%	-	-	-	-	5.4%	-	-	-	-	1.9%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(057)_W William Street & S State Street - TMC
Thu Nov 7, 2019
Midday Peak (11:15 AM - 12:15 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724341, Location: 42.277846, -83.740759, Site Code: 057

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



(057)_W William Street & S State Street - TMC

Thu Nov 7, 2019
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724341, Location: 42.277846, -83.740759, Site Code: 057

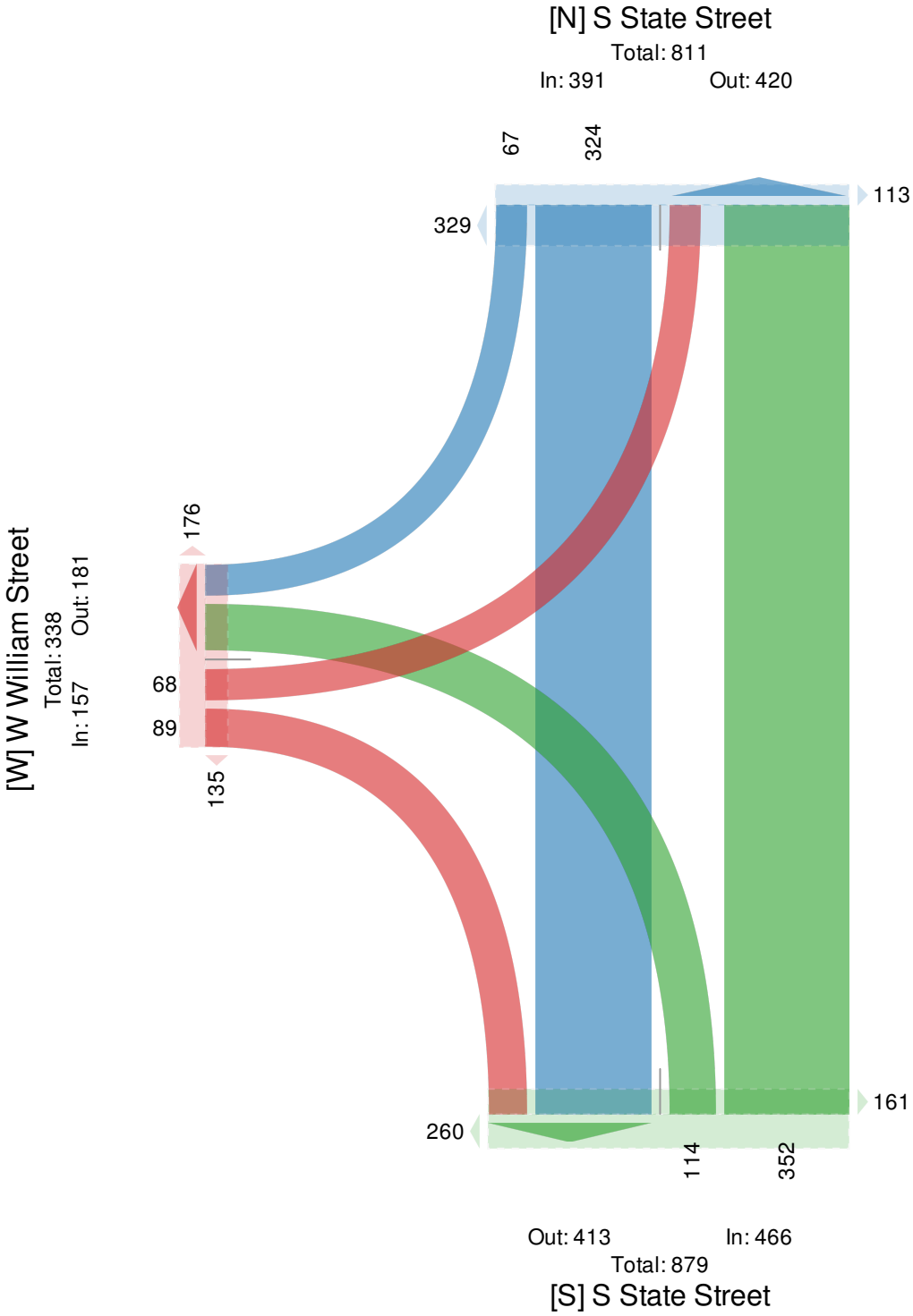
Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US

Leg Direction	S State Street Northbound					S State Street Southbound					W William Street Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2019-11-07 5:00PM	29	90	0	**119**	108	76	9	0	**85**	128	28	22	0	**50**	80	**254**
5:15PM	27	87	0	**114**	91	80	14	0	**94**	104	19	26	0	**45**	80	**253**
5:30PM	27	86	0	**113**	93	99	19	0	**118**	96	13	21	0	**34**	68	**265**
5:45PM	31	89	0	**120**	129	69	25	0	**94**	114	8	20	0	**28**	83	**242**
Total	114	352	0	**466**	421	324	67	0	**391**	442	68	89	0	**157**	311	**1014**
% Approach	24.5%	75.5%	0%	**-**	-	82.9%	17.1%	0%	**-**	-	43.3%	56.7%	0%	**-**	-	-
% Total	11.2%	34.7%	0%	**46.0%**	-	32.0%	6.6%	0%	**38.6%**	-	6.7%	8.8%	0%	**15.5%**	-	-
PHF	0.919	0.978	-	**0.963**	-	0.809	0.670	-	**0.821**	-	0.607	0.846	-	**0.796**	-	0.949
Lights	109	332	0	**441**	-	308	67	0	**375**	-	66	83	0	**149**	-	965
% Lights	95.6%	94.3%	0%	**94.6%**	-	95.1%	100%	0%	**95.9%**	-	97.1%	93.3%	0%	**94.9%**	-	95.2%
Articulated Trucks and Single-Unit Trucks	0	2	0	**2**	-	4	0	0	**4**	-	0	1	0	**1**	-	7
% Articulated Trucks and Single-Unit Trucks	0%	0.6%	0%	**0.4%**	-	1.2%	0%	0%	**1.0%**	-	0%	1.1%	0%	**0.6%**	-	0.7%
Buses	5	14	0	**19**	-	5	0	0	**5**	-	2	4	0	**6**	-	30
% Buses	4.4%	4.0%	0%	**4.1%**	-	1.5%	0%	0%	**1.3%**	-	2.9%	4.5%	0%	**3.8%**	-	3.0%
Bicycles on Road	0	4	0	**4**	-	7	0	0	**7**	-	0	1	0	**1**	-	12
% Bicycles on Road	0%	1.1%	0%	**0.9%**	-	2.2%	0%	0%	**1.8%**	-	0%	1.1%	0%	**0.6%**	-	1.2%
Pedestrians	-	-	-	-	415	-	-	-	-	408	-	-	-	-	302	
% Pedestrians	-	-	-	-	98.6%	-	-	-	-	92.3%	-	-	-	-	97.1%	-
Bicycles on Crosswalk	-	-	-	-	6	-	-	-	-	34	-	-	-	-	9	
% Bicycles on Crosswalk	-	-	-	-	1.4%	-	-	-	-	7.7%	-	-	-	-	2.9%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

(057)_W William Street & S State Street - TMC
Thu Nov 7, 2019
PM Peak (5 PM - 6 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 724341, Location: 42.277846, -83.740759, Site Code: 057

Provided by: The Mannik & Smith Group
1800 Indian Wood Circle,
Maumee, OH, 43537, US



APPENDIX B. SAFETY ANALYSIS

1.0 INTRODUCTION

The City of Ann Arbor Downtown Development Authority (DDA) has developed a Healthy Streets program intended to create a connected network of streets which provide safe and equitable mobility for all users, particularly in the downtown area. Within the downtown, the State Street corridor has been selected for a corridor-wide safety evaluation as described in the present report. A five-year crash analysis between 2016 to 2020 is performed to determine corridor-wide summary statistics such as crash frequency, year of occurrence, type, and severity. Individual intersections are further investigated to provide stakeholders insight into the expected safety impacts garnered by planned and/or potential engineering modifications. The individual Crash Modification Factors (CMFs) for each engineering treatment are applied to the existing crash frequencies to calculate the anticipated change in total crashes.

2.0 CRASH ANALYSIS FOR STATE STREET

To provide an overview of the crash history of State Street from William Street to Washington Street, this analysis includes all of the crash data throughout the study corridor. The crashes are separated into various categories based on the circumstances of each crash, and the corresponding discussions can be used to determine causal factors and corrective action. Figure 1 shows the vehicle crash density, both total and injury crashes only, for each of the intersections on State Street. Figure 2 shows the pedestrian and bicyclist crashes at each intersection.

Figure 1. State Street Vehicle Crash Density Diagram.

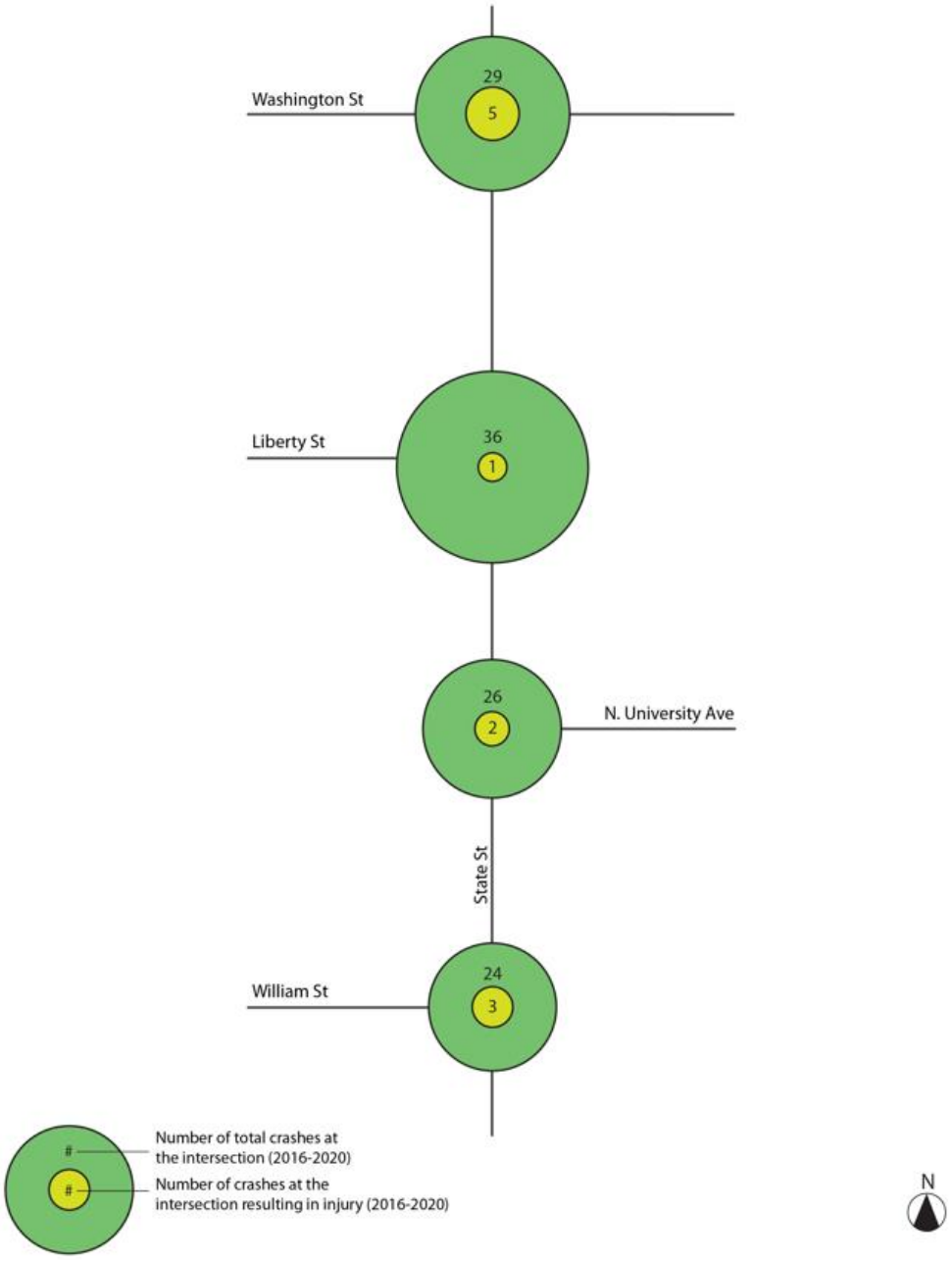
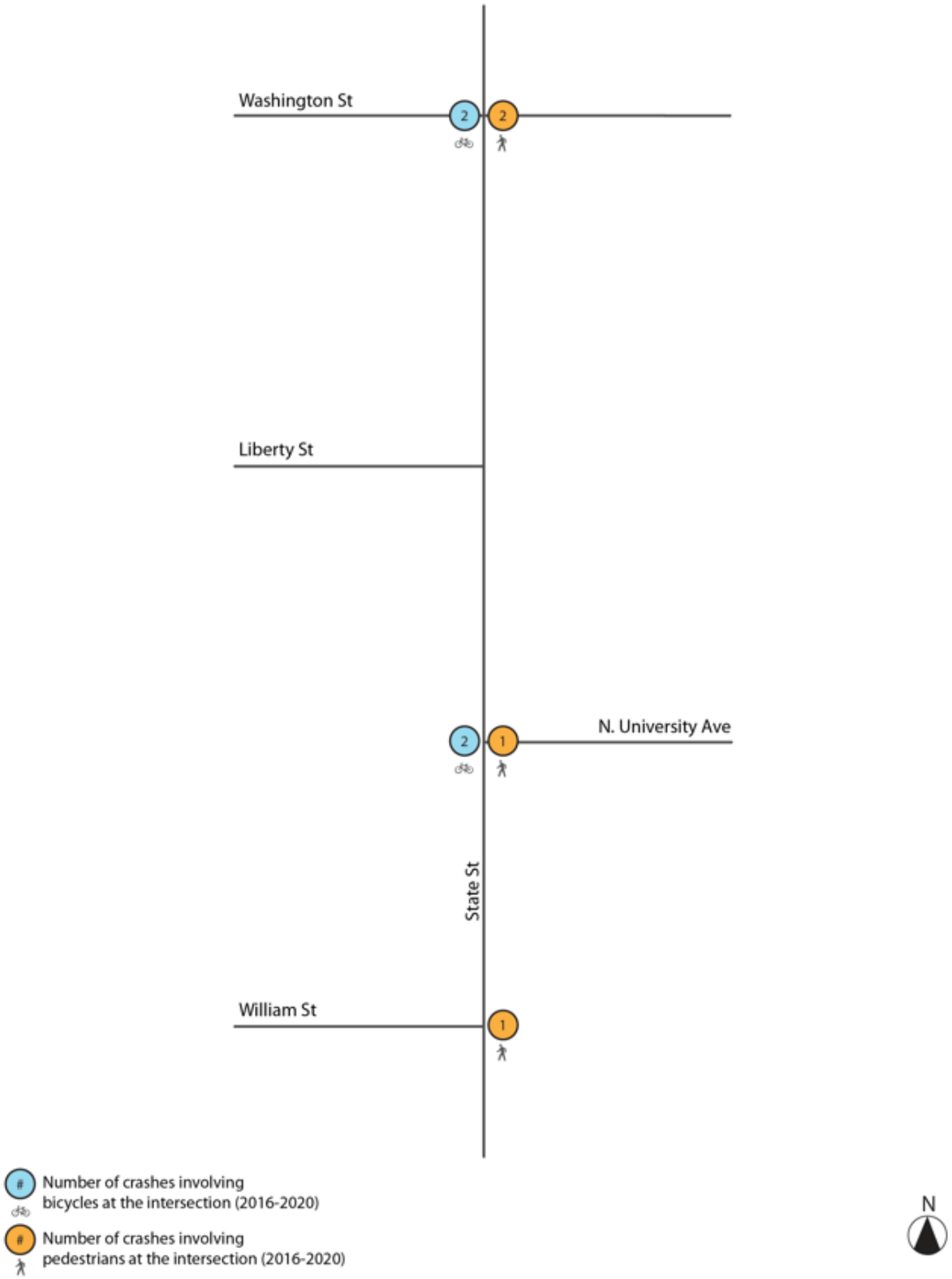


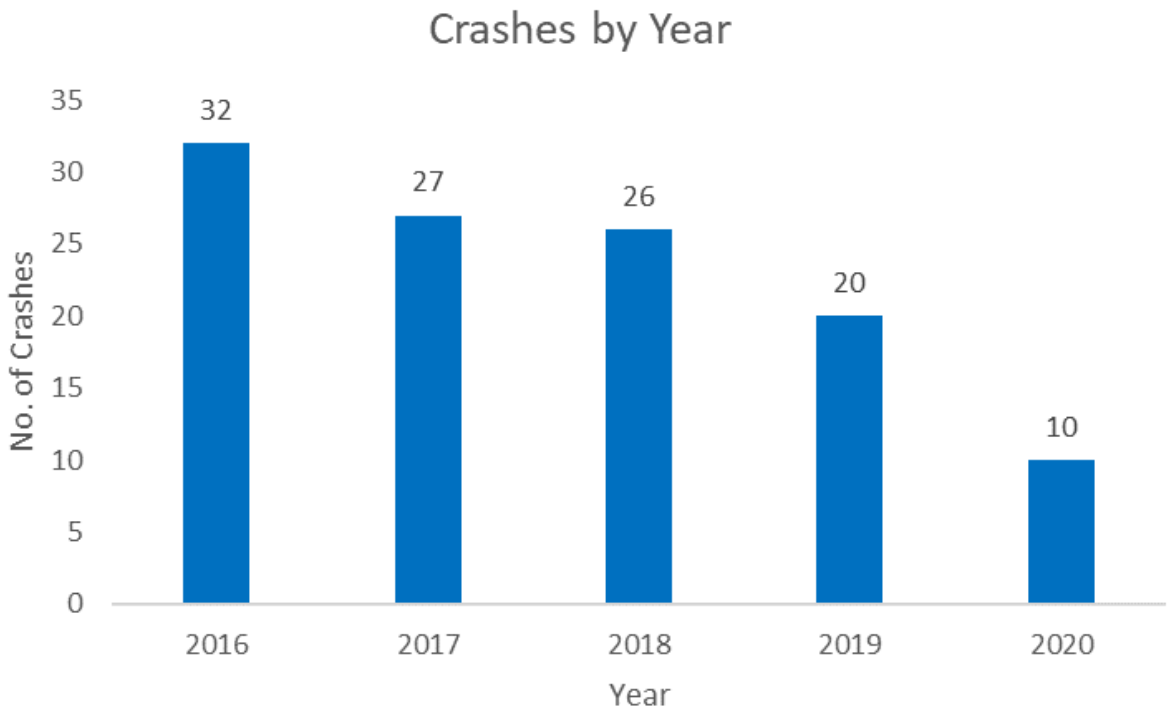
Figure 2. State Street Bicyclist and Pedestrian Crash Diagram.



2.1 TOTAL CRASHES ON STATE STREET

During the five-year study period between January 1, 2016 and December 31, 2020, a total of 115 crashes were reported within the State Street project limits. Of this total, 41.7% of the crashes were sideswipe – same direction, 19.1% were rear end, and 13.0% were backing collisions. Overall, 90.4% of the crashes were property damage only and there were no reported fatalities. Figure 3 displays the number of crashes per year along State Street from 2016 to 2020.

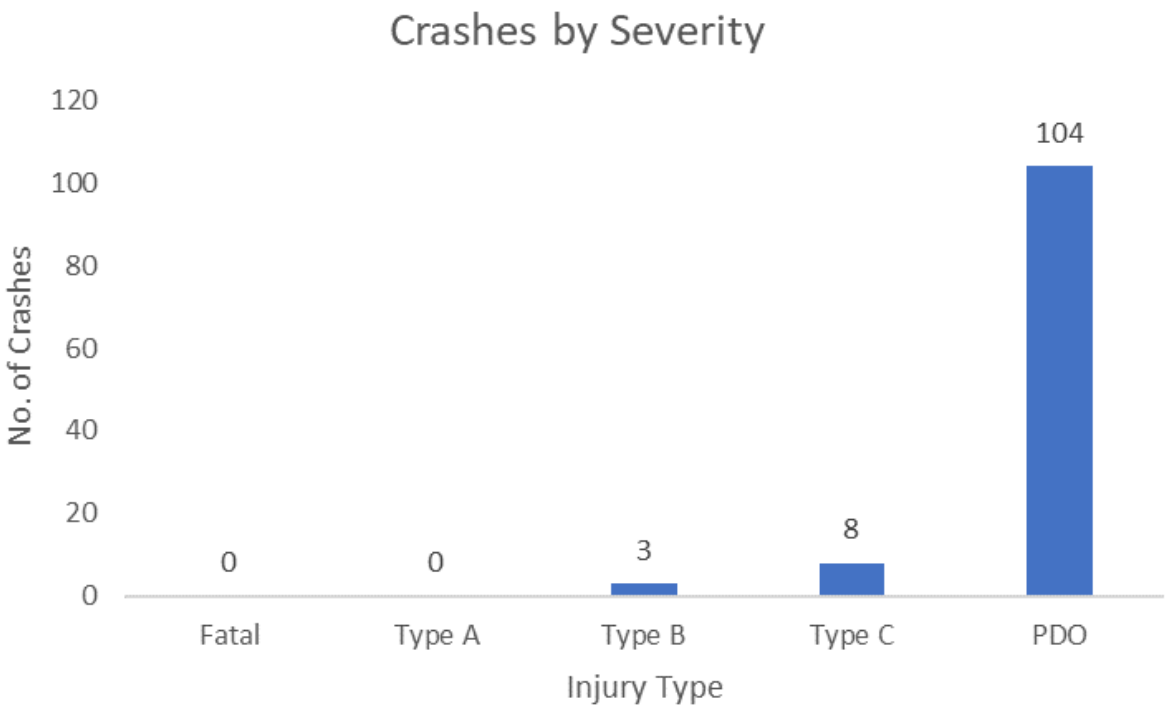
Figure 3. State Street Crashes by Year, 2016 to 2020.



2.2 CRASH SEVERITY

Crash severity, as classified as fatal, injury collisions Type A, B, or C; or property damage only (PDO) crashes, is summarized in Figure 4 for the 5-year study. As shown in Figure 4, 90.4% of the crashes involved property damage only collisions. There were no fatal, no Type A, 3 Type B, and 8 Type C injury crashes. The balance of crashes resulted in PDO.

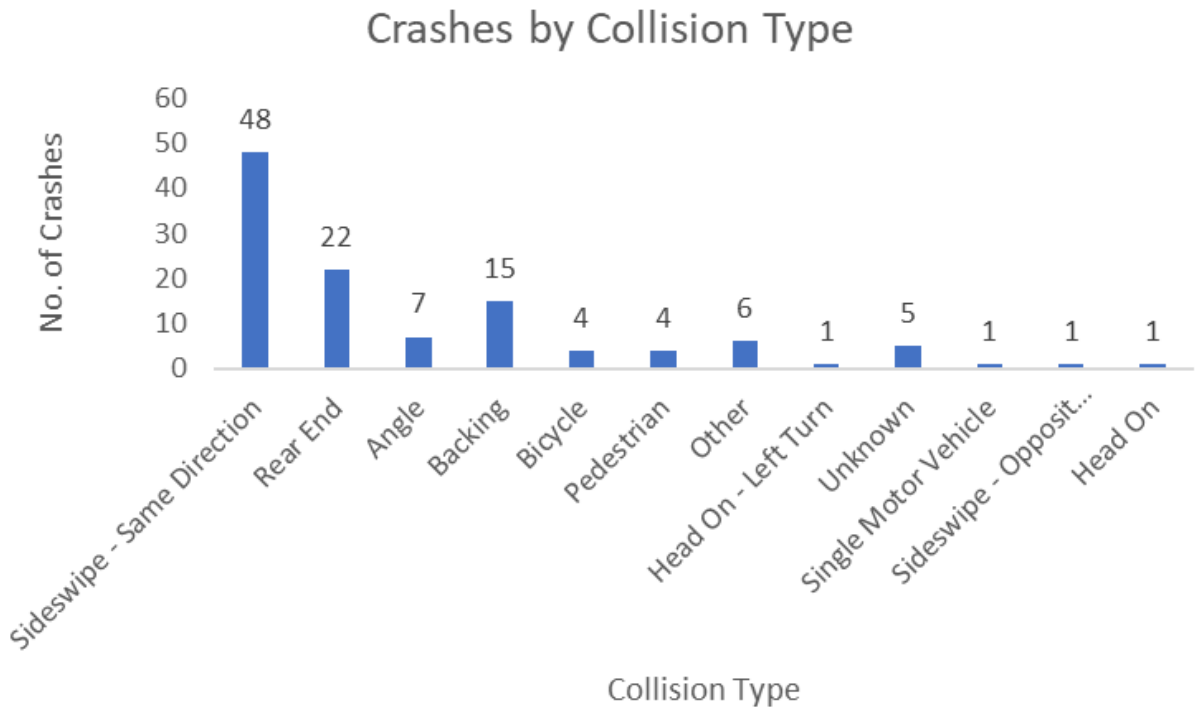
Figure 4 State Street Crashes by Severity, 2016-2020.



2.3 CRASHES BY COLLISION TYPE

As shown in Figure 5, the three predominate types of collisions on State Street were sideswipe/same direction, rear-end, and backing crashes. There are other collision types that also deserve attention. Bicyclist crashes make up 3.5% of the crashes, and pedestrian crashes account for 3.5%. The pedestrian and bicyclist crashes are of particular concern as these groups have a much higher risk of injury. 5 of the 8 bicyclist and pedestrian crashes reported at least one injury.

Figure 5 Crashes by Collision Type on State Street During the Five-year Period.

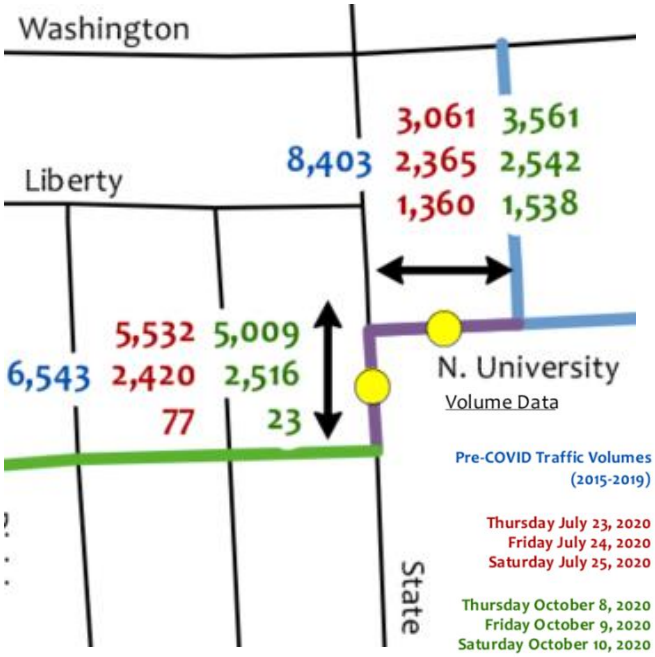


2.4 CRASHES BY INTERSECTION

The segment of State Street from William Street to Washington Street includes four intersections. The intersection with the highest crash frequency is the intersection with Liberty Street, where 36 crashes occurred in the five-year period. The intersection with Washington Street experienced the highest number and percent of crashes resulting in injury with five crashes.

As part of the Healthy Streets pilot project, motor vehicle, pedestrian, and bicycle volumes were collected at 13 sites throughout the city utilizing a combination of video and tube traffic counters, and specialized bike counters. As shown in Figure 6, observed weekday 2020 traffic volumes were between approximately 16% (before Healthy Streets pilot project) to 23% (after Healthy Streets pilot project) lower than pre-COVID traffic volumes at the State Street count location.

Figure 6 COVID-19 Traffic Volume Comparisons



As shown in Figure 3, the average crash rate between 2016 to 2019 on the State Street study corridor was 46 crashes per year, while only 13 crashes occurred in 2020, resulting in a reduction in the average total crash rate of 72%. Conventional understanding is that crash frequency is directly correlated to traffic volumes, as the potential for crashes is related to motor vehicle and non-motorized user exposure at conflict points. The disparity between the relatively lower reduction in traffic volumes compared to the reduction in crash rate on State Street before and after the COVID-19 pandemic suggests additional factors causing the observed decrease in crashes. One of these factors may be the implementation of leading pedestrian intervals (LPIs) at the William Street, North University Avenue, and Liberty Street intersections on State Street. Thus, at these intersections, the 2020 crash data was removed from the crash modification factors analysis, as described in the next sections of this report.

Crash Modification Factors (CMFs) are used to compute the expected number of crashes after implementing a countermeasure on a road or intersection and are obtained from similar projects and studies. The CMF Clearinghouse website database (http://www.cmfclearinghouse.org/) was used to determine the safety benefits of the intersection treatments and provide an estimate of potential crash reductions or increases at the intersections with proposed modifications. Tables showing these estimates are provided for each intersection where modifications impact the expected number of crashes. Using these CMFs, the proposed modifications for the State Street project area could potentially ***decrease*** **total crashes by up to 7.35 crashes per year.**

2.4.2 Crashes at State Street and William Street

As shown in Table 2, 24 crashes occurred at the signalized intersection of State Street and William Street during the five-year period. Seven of these crashes involved rear end crashes, including all three injury crashes. There was also one pedestrian crash at this intersection where a pedestrian was struck in the crosswalk, but no injuries were reported.

Table 2 Crash Frequency at Intersection of State Street and William Street During the Five-year Period.

Crash Characteristics	No. of Crashes	No. of Crashes / Year	Percentage
Rear End	7	1.4	29.2
Sideswipe – Same Direction	6	1.2	25.0
Backing	3	0.6	12.5
Other	3	0.6	12.5
Angle	2	0.4	8.3
Pedestrian	1	0.2	4.2
Head On	1	0.2	4.2
Unknown	1	0.2	4.2
Total	24	4.8	100.0
Injury Type C	3	0.6	12.5

Table 3 summarizes the crash modification factors (CMFs) which can be applied to the existing crashes as a result of the proposed geometric and operational changes at the intersection. The City of Ann Arbor implemented leading pedestrian intervals (LPIs) for each signal phase prior to 2020. As a result, the three crashes which occurred in 2020 were removed from the CMF analysis, producing an average total crash rate of 5.3 crashes per year. As seen, the proposed countermeasures are expected to produce a net reduction of 2.07 total crashes per year at the intersection of State Street and William Street.

Table 3 CMFs at Intersection of State Street and William Street During the Four-year Period.

Countermeasure	**CMF**	**CRF (%)**
Remove a lane	1.336	-33.6%
Install pedestrian countdown timer	0.912	8.8%
Modify signal phasing (implement a leading pedestrian interval)	0.90	10.0%
Install advanced yield or stop markings and signs (R10-15 sign)	0.886	11.4%
Traffic calming	0.68	32.0%
Increase total change interval (greater than ITE recommended practice)	0.922	7.8%
Net change in *Total* crashes (1.336*0.912*0.90*0.886*0.68*0.922)	**0.609**	**39.1%**

Note: Adding a two-way protected bike lane is expected to reduce bicycle related crashes by 70 percent. Since that crash modification factor is only applied to bicycle crashes, it cannot be combined with the other modification factors.

2.4.3 Crashes at State Street and North University Avenue

As shown in Table 4, 26 crashes occurred at the signalized intersection of State Street and North University Avenue during the five-year period, ten of which were reported as sideswipe-same direction crashes. The following two bicyclist crashes and one pedestrian crash occurred, which accounted for both of the injury crashes reported at this intersection:

- One bicyclist crash occurred when a vehicle turned right from the left lane in order to pass a bus, and as such was unable to see the bicyclist approaching the crosswalk, striking them and resulting in a Type B injury.
- One bicyclist crash occurred without injuries when a person in a parked vehicle opened the door, and a bicyclist was unable to stop and struck the door.
- The pedestrian crash at this intersection resulted in a Type B injury when a turning vehicle struck a pedestrian in the crosswalk.

Table 4 Crash Frequency at Intersection of State Street and North University Avenue During the Five-year Period.

Crash Characteristics	No. of Crashes	No. of Crashes / Year	Percentage
Sideswipe – Same Direction	10	2.0	38.5
Rear End	7	1.4	26.9
Backing	4	0.8	15.4
Bicyclist	2	0.4	7.7
Pedestrian	1	0.2	3.8
Unknown	1	0.2	3.8
Other	1	0.2	3.8
Total	26	5.2	100.0
Injury Type B	2	0.4	7.7

Table 5 summarizes the crash modification factors (CMFs) which can be applied to the existing crashes as a result of the proposed geometric and operational changes at the intersection. The City of Ann Arbor implemented leading pedestrian intervals (LPIs) for each signal phase prior to 2020. As a result, the one crash which occurred in 2020 was removed from the CMF analysis, producing an average total crash rate of 6.3 crashes per year. As seen, the proposed countermeasures are expected to produce a net decrease of 2.46 total crashes per year at the intersection of State Street and North University Ave.

Table 5 CMFs at Intersection of State Street and North University Avenue During the Four-year Period.

Countermeasure	**CMF**	**CRF (%)**
Remove a lane	1.336	-33.6%
Install pedestrian countdown timer	0.912	8.8%
Modify signal phasing (implement a leading pedestrian interval)	0.90	10.0%
Install advanced yield or stop markings and signs (R10-15 sign)	0.886	11.4%
Traffic calming	0.68	32.0%
Increase total change interval (greater than ITE recommended practice)	0.922	7.8%
Net change in *Total* crashes (1.336*0.912*0.90*0.886*0.68*0.922)	**0.609**	**39.1%**

Note: Adding a two-way protected bike lane is expected to reduce bicycle related crashes by 70 percent. Since that crash modification factor is only applied to bicycle crashes, it cannot be combined with the other modification factors.

2.4.4 Crashes at State Street and Liberty Street

As shown in Table 6, 36 crashes at the signalized intersection of State Street and Liberty Street during the five-year period. The most prominent crash type was the sideswipe-same direction collision with 19 crashes of this type. One crash resulted in a Type C injury. No crashes involved pedestrians or bicyclists at this intersection.

Table 6 Crash Frequency at Intersection of State Street and Liberty Street During the Five-year Period.

Crash Characteristics	No. of Crashes	No. of Crashes / Year	Percentage
Sideswipe – Same Direction	19	3.8	52.8
Backing	5	1.0	13.9
Rear End	3	0.6	8.3
Unknown	3	0.6	8.3
Angle	2	0.4	5.6
Other	2	0.4	5.6
Single Motor Vehicle	1	0.2	2.8
Sideswipe – Opposite Direction	1	0.2	2.8
Total	36	7.2	100.0
Injury Type C	1	0.2	2.8

Table 7 summarizes the crash modification factors (CMFs) which can be applied to the existing crashes as a result of the proposed geometric and operational changes at the intersection. The City of Ann Arbor implemented leading pedestrian intervals (LPIs) for each signal phase prior to 2020. As a result, the four crashes which occurred in 2020 were removed from the CMF analysis, producing an average total crash rate of 8.0 crashes per year. As seen, the proposed countermeasures are expected to produce a net reduction of 2.82 total crashes per year at the intersection of State Street and Liberty Street.

Table 7 CMFs at Intersection of State Street and Liberty Street During the Four-year Period.

Countermeasure	CMF	CRF (%)
Remove a left-turn lane on one major-road approach	1.42	-42.0%
Install pedestrian countdown timer	0.912	8.8%
Modify signal phasing (implement a leading pedestrian interval)	0.90	10.0%
Install advanced yield or stop markings and signs (R10-15 sign)	0.886	11.4%
Traffic calming	0.68	32.0%
Increase total change interval (greater than ITE recommended practice)	0.922	7.8%
Net change in *Total* crashes (1.42*0.912*0.90*0.886*0.68*0.922)	**0.647**	**35.3%**

2.4.5 Crashes at State Street and Washington Street

As shown in Table 8, 29 crashes occurred at the signalized intersection of State Street and Washington Street during the five-year period, including 13 classified as sideswipe-same direction collisions. The following two pedestrian crashes and two bicyclist crashes, which accounted for three of the five total injury crashes at this intersection:

- Both bicyclist crashes were recorded as injury crashes, including a Type B injury where the bicyclist turned left in front of a vehicle, and a Type C injury resulted from by a vehicle striking a bicyclist while pulling out from a parking spot.
- One pedestrian crash that resulted in a Type C injury occurred when a turning vehicle struck a pedestrian in the crosswalk.
- One pedestrian crash happened when a vehicle struck a pedestrian in the crosswalk at night when they did not see the pedestrian, but no injuries were reported.

Table 8 Crash Frequency at Intersection of State Street and Washington Street During the Five-year Period.

Crash Characteristics	No. of Crashes	No. of Crashes / Year	Percentage
Sideswipe – Same Direction	13	2.6	44.8
Rear End	5	1.0	17.2
Angle	3	0.6	10.3
Backing	3	0.6	10.3
Bicyclist	2	0.4	6.9
Pedestrian	2	0.4	6.9
Head On – Left Turn	1	0.2	3.4
Total	29	5.8	100.0
Injury Type B	1	0.2	3.4
Injury Type C	4	0.8	13.8

3.0 CONCLUSION

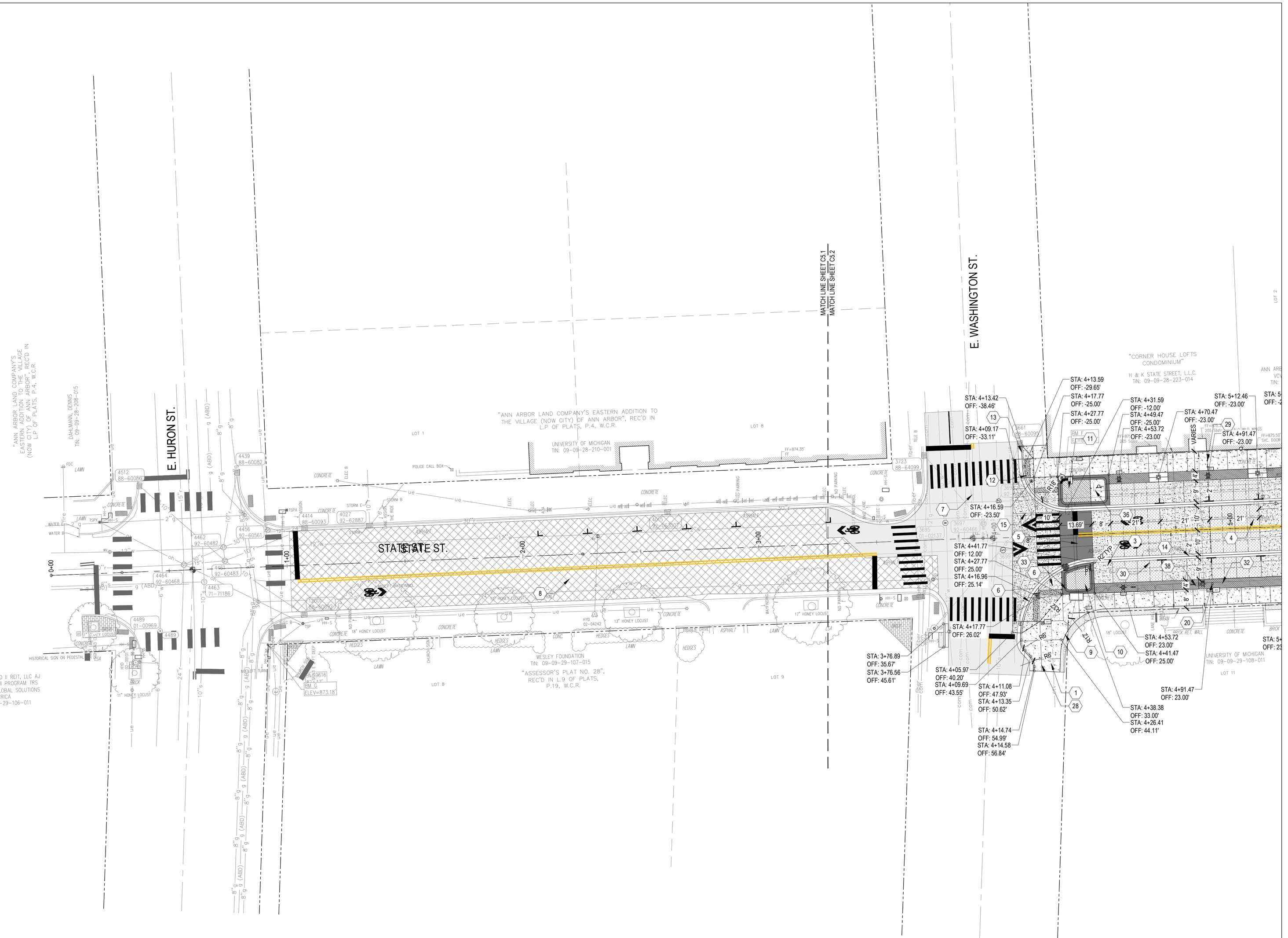
In this report, the crash history between 2016 to 2020 was summarized by frequency, year of occurrence, type, and severity along the State Street corridor in the City of Ann Arbor. The crash history was used to develop a profile which could aid in the selection of targeted engineering countermeasures to improve safety and meet the goals of the City's Healthy Streets program. One of these goals is to promote physical distancing by increasing outdoor space for pedestrian and bicycle travel and connecting critical gaps in the bike network. Based on the crash patterns and known future improvements by the City, various safety treatments, which differ by intersection, were selected as potential countermeasures for crash mitigation analysis. These countermeasures along with their associated Crash Modification Factors (CMFs) are provided in Table 11 below.

Table 11 Summary of Countermeasures.

Countermeasure	CMF	CRF (%)	Crash Type
Remove a left-turn lane on one major-road approach	1.42	-42.0	All
Remove a lane	1.336	-33.6	All
Add two-way protected bike lane	0.3	70.0	Bicyclist
Install pedestrian countdown timer	0.912	8.8	All
Modify signal phasing (implement a leading pedestrian interval)	0.9	10.0	All
Install advanced yield or stop markings and signs (R10-15 sign)	0.886	11.4	All
Traffic calming	0.68	32.0	All
Increase total change interval (greater than ITE recommended practice)	0.922	7.8	All

On the State Street corridor from William Street to Washington Street, there were a total of 115 crashes reported during the five-year period. No crashes were reported which resulted in a Type A injury or fatality. However, three Type B, and eight Type C injury crashes occurred along the corridor. The predominate crash types involved either a sideswipe – same direction collision, rear end, or backing collision. There were 4 crashes involving a bicyclist and 4 crashes involving a pedestrian. 5 of the 8 bicyclist and pedestrian crashes reported at least one injury. The CMFs for the proposed safety treatments at the four intersections could potentially ***reduce*** **corridor-wide total crashes by up to 7.35 crashes per year**. Like the other two corridors under evaluation, implementing a two-way protected bike lane and a leading pedestrian interval at signalized intersections where they are not already present are anticipated to provide the most safety benefit.

APPENDIX C. CONCEPT EXHIBIT



LEGEND

1	CONCRETE SIDEWALK, 6 INCH, TYP. (1 C9.1)	9	LAWN, TYP.	17	BIKEWAY POST, TYP. (3 C9.3)	24	URBAN BENCH, TYP. (1 C9.2)
2	CONCRETE SIDEWALK, 8 INCH, TYP.	10	PLANTER BED, TYP. (8 C9.3)	18	RE-USED FLEXIBLE BOLLARD, TYP.	25	TRAFFIC SIGNAL POLE,TYP.
3	ROAD CONCRETE PAVEMENT, 8 INCH, TYPE 1,TYP.	11	RAIN GARDEN,TYP. (7 C9.3)	20	BOLLARD,TYP. (4 C9.4)	26	BIKEWAY CURB,TYP. (1 C9.3)
4	ROAD CONCRETE PAVEMENT, 8 INCH, TYPE 2,TYP. (2 C9.1)	12	DETECTABLE WARNING SURFACE, MODIFIED,TYP. (1 C9.2)	21	LIGHT POLE, TYP. (2 E2.1)	27	RIGHT OF WAY, TYP.
5	ROAD CONCRETE PAVEMENT, COLORED, 8 INCH,, TYP.	13	STANDARD CURB AND GUTTER, TYP. (9 C9.1)	22	FESTOON LIGHT POLE,TYP. (1 E2.1)	28	CONTRACTION JOINT, TYP. (8 C9.1)
6	SIDEWALK RAMP, 8 INCH, TYP. (1 C9.2)	14	VALLEY GUTTER, TYP. (4 C9.1)	23	NEW SIGNAGE, TYP.	29	EXPANSION JOINT,TYP. (6 C9.1)
7	HMA PAVEMENT, FULL DEPTH RECONSTRUCTION, TYP. (10 C9.1)	15	RAMP, TYP.		PARKING METER POST, TYP.	30	DECORATIVE JOINT, TYP. (5 C9.1)
8	1 LIFT MILL & FILL, TYP.	16	EXISTING VAULT, TYP.				

31	PARKING PAY MACHINE, TYP.	35	TREE GRATE & TREE GUARD, TYP. (1 C9.4)				
32	BIKE HOOP, TYP. (6 C9.3)	36	FIRE HYDRANT, TYP.				
33	PLANTER CURB,TYP. (14 C9.1)	37	PEDESTRIAN SIGNAL,TYP.				
34	PLANTER CURB CUT,TYP.	38	PAVERS, TYP. (3 C9.1)				

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			100% BID SET	02-18-2022		
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STATE ST STREETSCAPE - CITY OF ANN ARBOR

STREETSCAPE LAYOUT AND MATERIALS PLAN 1

APPROVED BY _____

SCALE: INCH

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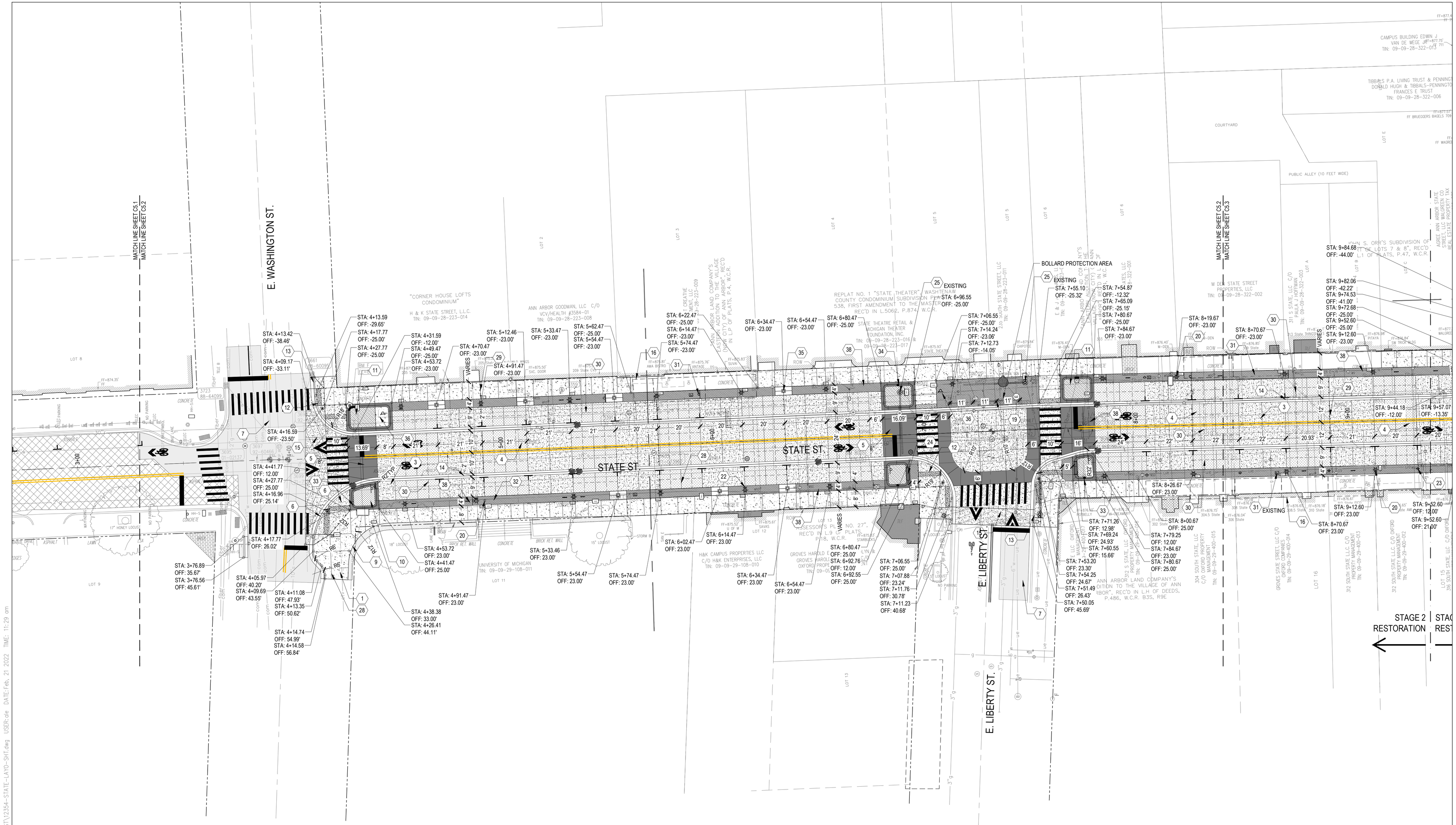

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1. CONCRETE SIDEWALK, 6 INCH, TYP.
2. CONCRETE SIDEWALK, 8 INCH, TYP.
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4. ROAD CONCRETE PAVEMENT, 8 INCH, TYPE 2,TYP.
5. ROAD CONCRETE PAVEMENT, COLORED, 8 INCH,, TYP.
6. SIDEWALK RAMP, 8 INCH, TYP.
7. HMA PAVEMENT, FULL DEPTH RECONSTRUCTION, TYP.
8. 1 LIFT MILL & FILL, TYP.
9. LAWN, TYP.
10. PLANTER BED, TYP.
11. RAIN GARDEN,TYP.
12. DETECTABLE WARNING SURFACE, MODIFIED,TYP.
13. STANDARD CURB AND GUTTER, TYP.
14. VALLEY GUTTER, TYP.
15. RAMP, TYP.
16. EXISTING VAULT, TYP.
17. BIKEWAY POST, TYP.
18. RE-USED FLEXIBLE BOLLARD, TYP.
18. BOLLARD,TYP.
20. LIGHT POLE, TYP.
21. FESTOON LIGHT POLE,TYP.
22. NEW SIGNAGE, TYP.
23. PARKING METER POST, TYP.
24. URBAN BENCH, TYP.
25. TRAFFIC SIGNAL POLE,TYP.
26. BIKEWAY CURB,TYP.
27. RIGHT OF WAY, TYP.
28. CONTRACTION JOINT, TYP.
29. EXPANSION JOINT,TYP.
30. DECORATIVE JOINT, TYP.
31. PARKING PAY MACHINE, TYP.
32. BIKE HOOP, TYP.
33. PLANTER CURB,TYP.
34. PLANTER CURB CUT,TYP.
35. TREE GRATE & TREE GUARD, TYP.
36. FIRE HYDRANT, TYP.
37. PEDESTRIAN SIGNAL,TYP.
38. PAVERS, TYP.

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			100% BID SET	02-18-2022		

STATE ST STREETSCAPE - CITY OF ANN ARBOR

STREETSCAPE LAYOUT AND MATERIALS PLAN 2

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4	▭	ROAD CONCRETE PAVEMENT, 8 INCH, TYPE 2,TYP.	2 / C9.1
5	■	ROAD CONCRETE PAVEMENT, COLORED, 8 INCH,, TYP.	
6		SIDEWALK RAMP, 8 INCH, TYP.	1 / C9.2
7	▭	HMA PAVEMENT, FULL DEPTH RECONSTRUCTION, TYP.	10 / C9.1
8	▨	1 LIFT MILL & FILL, TYP.	
9	▭	LAWN, TYP.	
10	▨	PLANTER BED, TYP.	8 / C9.3
11	▨	RAIN GARDEN,TYP.	7 / C9.3
12	▨	DETECTABLE WARNING SURFACE, MODIFIED,TYP.	1 / C9.2
13	▭	STANDARD CURB AND GUTTER, TYP.	9 / C9.1
14	▭	VALLEY GUTTER, TYP.	4 / C9.1
15	▨	RAMP, TYP.	
16	▭	EXISTING VAULT, TYP.	
17	●	BIKEWAY POST, TYP.	3 / C9.3
18	●	RE-USED FLEXIBLE BOLLARD, TYP.	
18	●	BOLLARD,TYP.	4 / C9.4
20	✳	LIGHT POLE, TYP.	2 / E2.1
21	●	FESTOON LIGHT POLE,TYP.	1 / E2.1
22		NEW SIGNAGE, TYP.	
23	●	PARKING METER POST, TYP.	
24	■	URBAN BENCH, TYP.	1 / C9.2
25		TRAFFIC SIGNAL POLE,TYP.	
26	▨	BIKEWAY CURB,TYP.	1 / C9.3
27		RIGHT OF WAY, TYP.	
28		CONTRACTION JOINT, TYP.	8 / C9.1
29		EXPANSION JOINT,TYP.	6 / C9.1
30		DECORATIVE JOINT, TYP.	5 / C9.1
31		PARKING PAY MACHINE, TYP.	
32		BIKE HOOP, TYP.	6 / C9.3
33	▭	PLANTER CURB,TYP.	14 / C9.1
34		PLANTER CURB CUT,TYP.	
35		TREE GRATE & TREE GUARD, TYP.	1 / C9.4
36		FIRE HYDRANT, TYP.	
37		PEDESTRIAN SIGNAL,TYP.	
38	▨	PAVERS, TYP.	3 / C9.1

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0 20 40 Feet

STATE ST STREETSCAPE - CITY OF ANN ARBOR

STREETSCAPE LAYOUT AND MATERIALS PLAN 3

SCALE INCH

DRAWING NO. C5.3

SHEET NO. ____ OF ____

APPENDIX D. PROPOSED CONDITIONS CAPACITY WORKSHEETS

105: State St & Washington St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Entered	26	242	30	25	66	24	16	142	50	79	153	38
Vehicles Exited	26	243	30	25	66	24	16	143	50	79	154	38
Hourly Exit Rate	26	243	30	25	66	24	16	143	50	79	154	38
Input Volume	26	242	26	26	64	23	16	140	50	76	147	34
% of Volume	99	100	114	96	103	105	100	102	100	104	105	113

105: State St & Washington St Performance by movement

Movement	All
Vehicles Entered	891
Vehicles Exited	894
Hourly Exit Rate	894
Input Volume	870
% of Volume	103

109: State St & Liberty St Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Vehicles Entered	29	74	40	186	173	45	547
Vehicles Exited	30	74	41	186	173	45	549
Hourly Exit Rate	30	74	41	186	173	45	549
Input Volume	34	71	43	179	167	43	537
% of Volume	88	104	96	104	104	105	102

111: State St & N. University Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Vehicles Entered	74	44	184	213	61	187	763
Vehicles Exited	74	44	184	213	61	187	763
Hourly Exit Rate	74	44	184	213	61	187	763
Input Volume	75	42	182	212	59	178	748
% of Volume	99	105	101	101	103	105	102

112: State St & William St Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Vehicles Entered	48	44	46	351	215	36	740
Vehicles Exited	48	44	46	352	215	37	742
Hourly Exit Rate	48	44	46	352	215	37	742
Input Volume	52	42	47	345	209	34	728
% of Volume	92	105	97	102	103	109	102

115: State St & S. University Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Vehicles Entered	51	81	273	77	78	197	757
Vehicles Exited	52	81	274	77	79	198	761
Hourly Exit Rate	52	81	274	77	79	198	761
Input Volume	54	80	270	75	80	189	748
% of Volume	97	101	102	102	98	105	102

1008: State St & Huron St (I-94BL) Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Vehicles Entered	1089	71	6	533	34	31	82	69	113	171	43	2242
Vehicles Exited	1087	71	6	533	34	32	82	69	112	170	42	2238
Hourly Exit Rate	1087	71	6	533	34	32	82	69	112	170	42	2238
Input Volume	1088	71	5	543	35	36	79	65	108	159	49	2238
% of Volume	100	100	114	98	98	89	104	106	103	107	86	100

Total Zone Performance

Vehicles Entered	3077
Vehicles Exited	114
Hourly Exit Rate	114
Input Volume	5870
% of Volume	2

3: State St & S. University Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Vehicles Entered	101	123	286	57	97	312	976
Vehicles Exited	100	122	286	57	97	312	974
Hourly Exit Rate	100	122	286	57	97	312	974
Input Volume	103	124	286	59	100	314	986
% of Volume	97	99	100	97	97	99	99

33: State St & N. University Ave Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Vehicles Entered	147	75	266	154	40	261	943
Vehicles Exited	147	75	266	154	40	261	943
Hourly Exit Rate	147	75	266	154	40	261	943
Input Volume	150	76	276	155	42	262	960
% of Volume	98	99	96	99	96	100	98

35: State St & Washington St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Entered	43	84	62	54	285	66	51	167	65	23	230	66
Vehicles Exited	43	84	62	54	284	66	51	169	65	24	231	66
Hourly Exit Rate	43	84	62	54	284	66	51	169	65	24	231	66
Input Volume	42	88	59	58	278	66	53	174	63	23	234	64
% of Volume	102	95	105	93	102	100	96	97	104	104	99	103

35: State St & Washington St Performance by movement

Movement	All
Vehicles Entered	1196
Vehicles Exited	1199
Hourly Exit Rate	1199
Input Volume	1202
% of Volume	100

106: State St & Liberty St Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Vehicles Entered	50	96	107	233	205	84	775
Vehicles Exited	51	97	107	234	205	84	778
Hourly Exit Rate	51	97	107	234	205	84	778
Input Volume	50	93	110	241	210	83	787
% of Volume	101	105	97	97	98	101	99

108: State St & William St Performance by movement

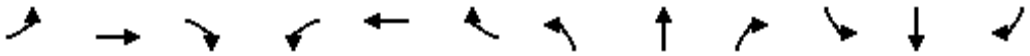
Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Vehicles Entered	62	92	111	348	329	69	1011
Vehicles Exited	62	92	110	348	329	69	1010
Hourly Exit Rate	62	92	110	348	329	69	1010
Input Volume	68	89	114	352	336	67	1026
% of Volume	92	103	96	99	98	103	98

1008: State St & Huron St (I-94BL) Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Vehicles Entered	707	105	26	1024	33	83	115	63	58	172	72	2458
Vehicles Exited	708	105	27	1028	33	83	115	63	58	172	72	2464
Hourly Exit Rate	708	105	27	1028	33	83	115	63	58	172	72	2464
Input Volume	681	105	30	1018	34	87	114	64	60	173	69	2435
% of Volume	104	100	91	101	97	96	100	98	96	99	105	101

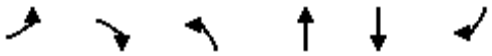
Total Zone Performance

Vehicles Entered	3645
Vehicles Exited	189
Hourly Exit Rate	189
Input Volume	7396
% of Volume	3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	242	26	26	64	23	16	131	50	76	136	33
Future Volume (vph)	26	242	26	26	64	23	16	131	50	76	136	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6		5.6	5.6			5.6			5.6	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		0.96		1.00	0.86			0.86			0.93	
Flpb, ped/bikes		0.96		0.79	1.00			0.98			0.90	
Frt		0.99		1.00	0.96			0.97			0.98	
Flt Protected		1.00		0.95	1.00			1.00			0.98	
Satd. Flow (prot)		1608		1272	1337			1454			1388	
Flt Permitted		0.97		0.50	1.00			0.96			0.84	
Satd. Flow (perm)		1566		671	1337			1408			1179	
Peak-hour factor, PHF	0.87	0.87	0.87	0.74	0.74	0.74	0.83	0.83	0.83	0.88	0.88	0.88
Adj. Flow (vph)	30	278	30	35	86	31	19	158	60	86	155	38
RTOR Reduction (vph)	0	4	0	0	15	0	0	13	0	0	6	0
Lane Group Flow (vph)	0	334	0	35	102	0	0	224	0	0	273	0
Confl. Peds. (#/hr)	166		153	153		166	182		268	268		182
Confl. Bikes (#/hr)			9			1			1			8
Heavy Vehicles (%)	15%	7%	0%	12%	23%	4%	6%	4%	8%	8%	10%	15%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		39.4		39.4	39.4			39.4			39.4	
Effective Green, g (s)		39.4		39.4	39.4			39.4			39.4	
Actuated g/C Ratio		0.44		0.44	0.44			0.44			0.44	
Clearance Time (s)		5.6		5.6	5.6			5.6			5.6	
Vehicle Extension (s)		5.0		5.0	5.0			4.0			4.0	
Lane Grp Cap (vph)		685		293	585			616			516	
v/s Ratio Prot					0.08							
v/s Ratio Perm		c0.21		0.05				0.16			c0.23	
v/c Ratio		0.49		0.12	0.18			0.36			0.53	
Uniform Delay, d1		18.1		15.0	15.4			16.9			18.5	
Progression Factor		1.00		1.00	1.00			1.61			0.44	
Incremental Delay, d2		2.5		0.8	0.7			1.6			3.3	
Delay (s)		20.6		15.8	16.1			28.8			11.6	
Level of Service		C		B	B			C			B	
Approach Delay (s)		20.6			16.0			28.8			11.6	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.2
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

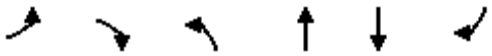


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	34	71	43	166	167	43
Future Volume (vph)	34	71	43	166	167	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	9.6			9.6	9.6	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.82			1.00	0.89	
Flpb, ped/bikes	1.00			0.92	1.00	
Frt	0.91			1.00	0.97	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1309			1562	1495	
Flt Permitted	0.98			0.89	1.00	
Satd. Flow (perm)	1309			1402	1495	
Peak-hour factor, PHF	0.77	0.77	0.90	0.90	0.78	0.78
Adj. Flow (vph)	44	92	48	184	214	55
RTOR Reduction (vph)	84	0	0	0	8	0
Lane Group Flow (vph)	52	0	0	232	261	0
Confl. Peds. (#/hr)	192	80	225			225
Confl. Bikes (#/hr)		4				8
Heavy Vehicles (%)	0%	9%	8%	12%	11%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	7.5			63.3	63.3	
Effective Green, g (s)	7.5			63.3	63.3	
Actuated g/C Ratio	0.08			0.70	0.70	
Clearance Time (s)	9.6			9.6	9.6	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	109			986	1051	
v/s Ratio Prot	c0.04				c0.17	
v/s Ratio Perm				0.17		
v/c Ratio	0.47			0.24	0.25	
Uniform Delay, d1	39.4			4.7	4.8	
Progression Factor	1.00			1.67	1.44	
Incremental Delay, d2	1.2			0.4	0.5	
Delay (s)	40.6			8.4	7.4	
Level of Service	D			A	A	
Approach Delay (s)	40.6			8.4	7.4	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.6		8.6			8.6
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	0.82		0.67			1.00
Flpb, ped/bikes	1.00		1.00			0.92
Frt	0.95		0.92			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1343		1090			1621
Flt Permitted	0.97		1.00			0.77
Satd. Flow (perm)	1343		1090			1265
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Adj. Flow (vph)	89	50	191	241	78	204
RTOR Reduction (vph)	22	0	51	0	0	0
Lane Group Flow (vph)	117	0	381	0	0	282
Confl. Peds. (#/hr)	171	126		317	317	
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	25.4		47.4			47.4
Effective Green, g (s)	25.4		47.4			47.4
Actuated g/C Ratio	0.28		0.53			0.53
Clearance Time (s)	8.6		8.6			8.6
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	379		574			666
v/s Ratio Prot	c0.09		c0.35			
v/s Ratio Perm						0.22
v/c Ratio	0.31		0.66			0.42
Uniform Delay, d1	25.4		15.5			13.0
Progression Factor	1.00		0.39			1.07
Incremental Delay, d2	2.1		5.4			1.9
Delay (s)	27.5		11.5			15.8
Level of Service	C		B			B
Approach Delay (s)	27.5		11.5			15.8
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

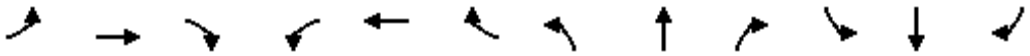


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	52	42	47	340	187	34
Future Volume (vph)	52	42	47	340	187	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.6			8.6	8.6	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.77			1.00	0.87	
Flpb, ped/bikes	1.00			0.98	1.00	
Frt	0.94			1.00	0.95	
Flt Protected	0.97			0.99	1.00	
Satd. Flow (prot)	1187			1722	1456	
Flt Permitted	0.97			0.91	1.00	
Satd. Flow (perm)	1187			1583	1456	
Peak-hour factor, PHF	0.90	0.90	0.93	0.93	0.90	0.25
Adj. Flow (vph)	58	47	51	366	208	136
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	105	0	0	417	344	0
Confl. Peds. (#/hr)	157	176	102			102
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	8%	17%	9%	7%	5%	12%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	25.4			47.4	47.4	
Effective Green, g (s)	25.4			47.4	47.4	
Actuated g/C Ratio	0.28			0.53	0.53	
Clearance Time (s)	8.6			8.6	8.6	
Vehicle Extension (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	334			833	766	
v/s Ratio Prot	c0.09				0.24	
v/s Ratio Perm				c0.26		
v/c Ratio	0.31			0.50	0.45	
Uniform Delay, d1	25.4			13.7	13.2	
Progression Factor	1.00			1.00	0.87	
Incremental Delay, d2	2.5			2.1	1.8	
Delay (s)	27.9			15.8	13.3	
Level of Service	C			B	B	
Approach Delay (s)	27.9			15.8	13.3	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

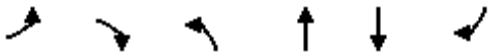
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.6		8.6			8.6
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	0.75		0.67			1.00
Flpb, ped/bikes	1.00		1.00			0.95
Frt	0.95		0.95			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1263		1136			1712
Flt Permitted	0.97		1.00			0.87
Satd. Flow (perm)	1263		1136			1507
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Adj. Flow (vph)	169	85	309	176	50	293
RTOR Reduction (vph)	2	0	23	0	0	0
Lane Group Flow (vph)	252	0	462	0	0	343
Confl. Peds. (#/hr)	382	428		935	935	
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	25.4		47.4			47.4
Effective Green, g (s)	25.4		47.4			47.4
Actuated g/C Ratio	0.28		0.53			0.53
Clearance Time (s)	8.6		8.6			8.6
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	356		598			793
v/s Ratio Prot	c0.20		c0.41			
v/s Ratio Perm						0.23
v/c Ratio	0.71		0.77			0.43
Uniform Delay, d1	29.0		17.0			13.1
Progression Factor	1.00		0.40			1.16
Incremental Delay, d2	11.3		6.1			1.6
Delay (s)	40.2		12.8			16.8
Level of Service	D		B			B
Approach Delay (s)	40.2		12.8			16.8
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



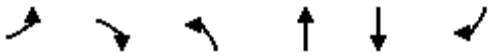
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	88	59	58	278	66	53	156	63	23	165	64
Future Volume (vph)	42	88	59	58	278	66	53	156	63	23	165	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6		5.6	5.6			5.6			5.6	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		0.81		1.00	0.89			0.85			0.84	
Flpb, ped/bikes		0.95		0.62	1.00			0.94			0.97	
Frt		0.96		1.00	0.97			0.97			0.97	
Flt Protected		0.99		0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1298		1016	1488			1394			1407	
Flt Permitted		0.85		0.61	1.00			0.88			0.95	
Satd. Flow (perm)		1121		657	1488			1237			1342	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.85	0.85	0.85	0.80	0.80	0.80
Adj. Flow (vph)	48	101	68	67	320	76	62	184	74	29	206	80
RTOR Reduction (vph)	0	18	0	0	10	0	0	12	0	0	13	0
Lane Group Flow (vph)	0	199	0	67	386	0	0	308	0	0	302	0
Confl. Peds. (#/hr)	278		328	328		278	386		431	431		386
Confl. Bikes (#/hr)						1			7			2
Heavy Vehicles (%)	10%	8%	2%	10%	12%	3%	2%	5%	3%	0%	3%	14%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		39.4		39.4	39.4			39.4			39.4	
Effective Green, g (s)		39.4		39.4	39.4			39.4			39.4	
Actuated g/C Ratio		0.44		0.44	0.44			0.44			0.44	
Clearance Time (s)		5.6		5.6	5.6			5.6			5.6	
Vehicle Extension (s)		5.0		5.0	5.0			4.0			4.0	
Lane Grp Cap (vph)		490		287	651			541			587	
v/s Ratio Prot					c0.26							
v/s Ratio Perm		0.18		0.10				c0.25			0.22	
v/c Ratio		0.41		0.23	0.59			0.57			0.51	
Uniform Delay, d1		17.3		15.8	19.2			19.0			18.4	
Progression Factor		1.00		1.00	1.00			1.05			0.48	
Incremental Delay, d2		2.5		1.9	4.0			3.8			2.8	
Delay (s)		19.8		17.7	23.2			23.6			11.7	
Level of Service		B		B	C			C			B	
Approach Delay (s)		19.8			22.4			23.6			11.7	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.2
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	93	110	239	196	83
Future Volume (vph)	50	93	110	239	196	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	9.6			9.6	9.6	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.61			1.00	0.80	
Flpb, ped/bikes	1.00			0.87	1.00	
Frt	0.91			1.00	0.96	
Flt Protected	0.98			0.98	1.00	
Satd. Flow (prot)	1021			1544	1447	
Flt Permitted	0.98			0.78	1.00	
Satd. Flow (perm)	1021			1227	1447	
Peak-hour factor, PHF	0.92	0.92	0.90	0.90	0.89	0.89
Adj. Flow (vph)	54	101	122	266	220	93
RTOR Reduction (vph)	80	0	0	0	14	0
Lane Group Flow (vph)	75	0	0	388	299	0
Confl. Peds. (#/hr)	553	321	423			423
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	2%	1%	5%	5%	0%	4%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	10.2			60.6	60.6	
Effective Green, g (s)	10.2			60.6	60.6	
Actuated g/C Ratio	0.11			0.67	0.67	
Clearance Time (s)	9.6			9.6	9.6	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	115			826	974	
v/s Ratio Prot	c0.07				0.21	
v/s Ratio Perm				c0.32		
v/c Ratio	0.65			0.47	0.31	
Uniform Delay, d1	38.2			7.0	6.1	
Progression Factor	1.00			1.56	1.10	
Incremental Delay, d2	9.7			1.2	0.7	
Delay (s)	48.0			12.2	7.4	
Level of Service	D			B	A	
Approach Delay (s)	48.0			12.2	7.4	
Approach LOS	D			B	A	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	89	114	352	324	67
Future Volume (vph)	68	89	114	352	324	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.6			8.6	8.6	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.62			1.00	0.90	
Flpb, ped/bikes	1.00			0.94	1.00	
Frt	0.92			1.00	0.98	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1004			1677	1651	
Flt Permitted	0.98			0.66	1.00	
Satd. Flow (perm)	1004			1115	1651	
Peak-hour factor, PHF	0.80	0.80	0.95	0.95	0.82	0.82
Adj. Flow (vph)	85	111	120	371	395	82
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	196	0	0	491	477	0
Confl. Peds. (#/hr)	442	421	311			311
Confl. Bikes (#/hr)		1				7
Heavy Vehicles (%)	3%	7%	4%	6%	0%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	25.4			47.4	47.4	
Effective Green, g (s)	25.4			47.4	47.4	
Actuated g/C Ratio	0.28			0.53	0.53	
Clearance Time (s)	8.6			8.6	8.6	
Vehicle Extension (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	283			587	869	
v/s Ratio Prot	c0.20				0.29	
v/s Ratio Perm				c0.44		
v/c Ratio	0.69			0.84	0.55	
Uniform Delay, d1	28.8			18.0	14.2	
Progression Factor	1.00			1.00	0.74	
Incremental Delay, d2	13.1			13.3	2.2	
Delay (s)	41.9			31.3	12.6	
Level of Service	D			C	B	
Approach Delay (s)	41.9			31.3	12.6	
Approach LOS	D			C	B	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	229	74	98	200	223
Average Queue (ft)	122	20	42	104	82
95th Queue (ft)	208	56	86	174	168
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)		150			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	123	205	195
Average Queue (ft)	50	98	90
95th Queue (ft)	97	175	164
Link Distance (ft)	470	246	280
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	136	178	218
Average Queue (ft)	58	66	109
95th Queue (ft)	115	133	197
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		0	1
Queuing Penalty (veh)		0	3
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	142	254	175
Average Queue (ft)	60	138	75
95th Queue (ft)	117	227	149
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	112	266	90	30	106	175
Average Queue (ft)	55	128	37	2	45	86
95th Queue (ft)	96	237	69	21	84	151
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		4				
Queuing Penalty (veh)		0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Zone Summary

Zone wide Queuing Penalty: 4

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	149	233	62	25	92	245	49
Average Queue (ft)	73	107	34	2	48	104	2
95th Queue (ft)	128	203	58	19	81	190	29
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		3				2	
Queuing Penalty (veh)		0				3	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 33: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	289	202	253
Average Queue (ft)	112	94	154
95th Queue (ft)	215	187	253
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		1	4
Queuing Penalty (veh)		4	11
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	198	172	306	276	213
Average Queue (ft)	77	39	136	143	82
95th Queue (ft)	150	110	249	247	162
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)				1	0
Queuing Penalty (veh)				2	0
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			7		
Queuing Penalty (veh)			5		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	166	257	202
Average Queue (ft)	73	161	80
95th Queue (ft)	137	259	163
Link Distance (ft)	470	246	280
Upstream Blk Time (%)		1	0
Queuing Penalty (veh)		5	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

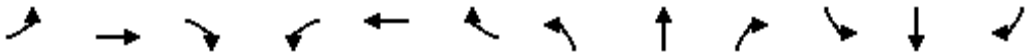
Intersection: 108: State St & William St

Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	229	606	43	208
Average Queue (ft)	94	301	4	121
95th Queue (ft)	169	596	44	206
Link Distance (ft)	472	720	233	192
Upstream Blk Time (%)		2	0	2
Queuing Penalty (veh)		9	0	7
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

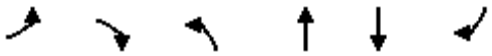
Zone wide Queuing Penalty: 45

APPENDIX E. MITIGATED & ALTERNATIVE CONDITIONS CAPACITY WORKSHEETS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	242	26	26	64	23	16	131	50	76	136	33
Future Volume (vph)	26	242	26	26	64	23	16	131	50	76	136	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6		5.6	5.6			5.6			5.6	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		0.96		1.00	0.86			0.86			0.93	
Flpb, ped/bikes		0.96		0.79	1.00			0.98			0.90	
Frt		0.99		1.00	0.96			0.97			0.98	
Flt Protected		1.00		0.95	1.00			1.00			0.98	
Satd. Flow (prot)		1608		1272	1337			1454			1388	
Flt Permitted		0.97		0.50	1.00			0.96			0.84	
Satd. Flow (perm)		1566		671	1337			1408			1179	
Peak-hour factor, PHF	0.87	0.87	0.87	0.74	0.74	0.74	0.83	0.83	0.83	0.88	0.88	0.88
Adj. Flow (vph)	30	278	30	35	86	31	19	158	60	86	155	38
RTOR Reduction (vph)	0	4	0	0	15	0	0	13	0	0	6	0
Lane Group Flow (vph)	0	334	0	35	102	0	0	224	0	0	273	0
Confl. Peds. (#/hr)	166		153	153		166	182		268	268		182
Confl. Bikes (#/hr)			9			1			1			8
Heavy Vehicles (%)	15%	7%	0%	12%	23%	4%	6%	4%	8%	8%	10%	15%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		39.4		39.4	39.4			39.4			39.4	
Effective Green, g (s)		39.4		39.4	39.4			39.4			39.4	
Actuated g/C Ratio		0.44		0.44	0.44			0.44			0.44	
Clearance Time (s)		5.6		5.6	5.6			5.6			5.6	
Vehicle Extension (s)		5.0		5.0	5.0			4.0			4.0	
Lane Grp Cap (vph)		685		293	585			616			516	
v/s Ratio Prot					0.08							
v/s Ratio Perm		c0.21		0.05				0.16			c0.23	
v/c Ratio		0.49		0.12	0.18			0.36			0.53	
Uniform Delay, d1		18.1		15.0	15.4			16.9			18.5	
Progression Factor		1.00		1.00	1.00			0.72			0.41	
Incremental Delay, d2		2.5		0.8	0.7			1.6			3.3	
Delay (s)		20.6		15.8	16.1			13.7			10.9	
Level of Service		C		B	B			B			B	
Approach Delay (s)		20.6			16.0			13.7			10.9	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.2
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

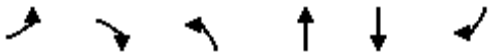


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	34	71	43	166	167	43
Future Volume (vph)	34	71	43	166	167	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	9.6			9.6	9.6	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.82			1.00	0.89	
Flpb, ped/bikes	1.00			0.92	1.00	
Frt	0.91			1.00	0.97	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1309			1562	1495	
Flt Permitted	0.98			0.89	1.00	
Satd. Flow (perm)	1309			1402	1495	
Peak-hour factor, PHF	0.77	0.77	0.90	0.90	0.78	0.78
Adj. Flow (vph)	44	92	48	184	214	55
RTOR Reduction (vph)	84	0	0	0	8	0
Lane Group Flow (vph)	52	0	0	232	261	0
Confl. Peds. (#/hr)	192	80	225			225
Confl. Bikes (#/hr)		4				8
Heavy Vehicles (%)	0%	9%	8%	12%	11%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	7.5			63.3	63.3	
Effective Green, g (s)	7.5			63.3	63.3	
Actuated g/C Ratio	0.08			0.70	0.70	
Clearance Time (s)	9.6			9.6	9.6	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	109			986	1051	
v/s Ratio Prot	c0.04				c0.17	
v/s Ratio Perm				0.17		
v/c Ratio	0.47			0.24	0.25	
Uniform Delay, d1	39.4			4.7	4.8	
Progression Factor	1.00			0.65	0.67	
Incremental Delay, d2	1.2			0.5	0.5	
Delay (s)	40.6			3.5	3.7	
Level of Service	D			A	A	
Approach Delay (s)	40.6			3.5	3.7	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.6		8.6			8.6
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	0.82		0.67			1.00
Flpb, ped/bikes	1.00		1.00			0.92
Frt	0.95		0.92			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1343		1090			1607
Flt Permitted	0.97		1.00			0.79
Satd. Flow (perm)	1343		1090			1282
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Adj. Flow (vph)	89	50	191	241	78	204
RTOR Reduction (vph)	23	0	50	0	0	0
Lane Group Flow (vph)	116	0	382	0	0	282
Confl. Peds. (#/hr)	171	126		317	317	
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	17.4		55.4			55.4
Effective Green, g (s)	17.4		55.4			55.4
Actuated g/C Ratio	0.19		0.62			0.62
Clearance Time (s)	8.6		8.6			8.6
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	259		670			789
v/s Ratio Prot	c0.09		c0.35			
v/s Ratio Perm						0.22
v/c Ratio	0.45		0.57			0.36
Uniform Delay, d1	32.1		10.2			8.5
Progression Factor	1.00		0.42			0.94
Incremental Delay, d2	5.5		3.2			1.2
Delay (s)	37.6		7.5			9.2
Level of Service	D		A			A
Approach Delay (s)	37.6		7.5			9.2
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	52	42	47	340	187	34
Future Volume (vph)	52	42	47	340	187	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.6			8.6	8.6	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.77			1.00	0.87	
Flpb, ped/bikes	1.00			0.98	1.00	
Frt	0.94			1.00	0.95	
Flt Protected	0.97			0.99	1.00	
Satd. Flow (prot)	1187			1721	1456	
Flt Permitted	0.97			0.91	1.00	
Satd. Flow (perm)	1187			1584	1456	
Peak-hour factor, PHF	0.90	0.90	0.93	0.93	0.90	0.25
Adj. Flow (vph)	58	47	51	366	208	136
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	105	0	0	417	344	0
Confl. Peds. (#/hr)	157	176	102			102
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	8%	17%	9%	7%	5%	12%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	22.4			50.4	50.4	
Effective Green, g (s)	22.4			50.4	50.4	
Actuated g/C Ratio	0.25			0.56	0.56	
Clearance Time (s)	8.6			8.6	8.6	
Vehicle Extension (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	295			887	815	
v/s Ratio Prot	c0.09				0.24	
v/s Ratio Perm				c0.26		
v/c Ratio	0.36			0.47	0.42	
Uniform Delay, d1	27.9			11.8	11.4	
Progression Factor	1.00			1.00	0.89	
Incremental Delay, d2	3.3			1.8	1.5	
Delay (s)	31.2			13.6	11.6	
Level of Service	C			B	B	
Approach Delay (s)	31.2			13.6	11.6	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	255	76	133	199	236
Average Queue (ft)	120	18	46	77	90
95th Queue (ft)	210	56	99	150	183
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)				0	0
Queuing Penalty (veh)				0	1
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	122	150	151
Average Queue (ft)	48	62	59
95th Queue (ft)	97	127	122
Link Distance (ft)	470	246	280
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	127	118	217
Average Queue (ft)	71	41	66
95th Queue (ft)	119	88	148
Link Distance (ft)	472	192	246
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	148	265	191
Average Queue (ft)	61	123	81
95th Queue (ft)	123	216	159
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

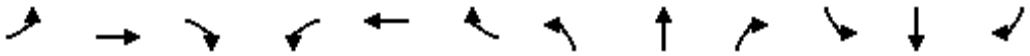
Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	166	256	78	34	101	196
Average Queue (ft)	57	128	36	2	45	80
95th Queue (ft)	118	235	64	22	84	144
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		5				0
Queuing Penalty (veh)		0				0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Zone Summary

Zone wide Queuing Penalty: 4

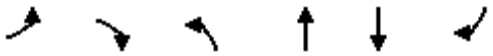
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.6		8.6			8.6
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	0.75		0.67			1.00
Flpb, ped/bikes	1.00		1.00			0.95
Frt	0.95		0.95			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1263		1136			1708
Flt Permitted	0.97		1.00			0.88
Satd. Flow (perm)	1263		1136			1506
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Adj. Flow (vph)	169	85	309	176	50	293
RTOR Reduction (vph)	4	0	23	0	0	0
Lane Group Flow (vph)	250	0	462	0	0	343
Confl. Peds. (#/hr)	382	428		935	935	
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	22.4		50.4			50.4
Effective Green, g (s)	22.4		50.4			50.4
Actuated g/C Ratio	0.25		0.56			0.56
Clearance Time (s)	8.6		8.6			8.6
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	314		636			843
v/s Ratio Prot	c0.20		c0.41			
v/s Ratio Perm						0.23
v/c Ratio	0.80		0.73			0.41
Uniform Delay, d1	31.7		14.7			11.3
Progression Factor	1.00		0.42			0.83
Incremental Delay, d2	18.7		4.8			1.4
Delay (s)	50.4		11.0			10.8
Level of Service	D		B			B
Approach Delay (s)	50.4		11.0			10.8
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



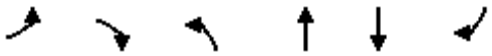
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	88	59	58	278	66	53	156	63	23	165	64
Future Volume (vph)	42	88	59	58	278	66	53	156	63	23	165	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6		5.6	5.6			5.6			5.6	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes		0.81		1.00	0.89			0.85			0.84	
Flpb, ped/bikes		0.95		0.62	1.00			0.94			0.97	
Frt		0.96		1.00	0.97			0.97			0.97	
Flt Protected		0.99		0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1298		1016	1488			1394			1407	
Flt Permitted		0.85		0.61	1.00			0.88			0.95	
Satd. Flow (perm)		1121		657	1488			1237			1342	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.85	0.85	0.85	0.80	0.80	0.80
Adj. Flow (vph)	48	101	68	67	320	76	62	184	74	29	206	80
RTOR Reduction (vph)	0	18	0	0	10	0	0	12	0	0	13	0
Lane Group Flow (vph)	0	199	0	67	386	0	0	308	0	0	302	0
Confl. Peds. (#/hr)	278		328	328		278	386		431	431		386
Confl. Bikes (#/hr)						1			7			2
Heavy Vehicles (%)	10%	8%	2%	10%	12%	3%	2%	5%	3%	0%	3%	14%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		39.4		39.4	39.4			39.4			39.4	
Effective Green, g (s)		39.4		39.4	39.4			39.4			39.4	
Actuated g/C Ratio		0.44		0.44	0.44			0.44			0.44	
Clearance Time (s)		5.6		5.6	5.6			5.6			5.6	
Vehicle Extension (s)		5.0		5.0	5.0			4.0			4.0	
Lane Grp Cap (vph)		490		287	651			541			587	
v/s Ratio Prot					c0.26							
v/s Ratio Perm		0.18		0.10				c0.25			0.22	
v/c Ratio		0.41		0.23	0.59			0.57			0.51	
Uniform Delay, d1		17.3		15.8	19.2			19.0			18.4	
Progression Factor		1.00		1.00	1.00			0.72			0.52	
Incremental Delay, d2		2.5		1.9	4.0			3.9			2.8	
Delay (s)		19.8		17.7	23.2			17.6			12.4	
Level of Service		B		B	C			B			B	
Approach Delay (s)		19.8			22.4			17.6			12.4	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.2
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	93	110	239	196	83
Future Volume (vph)	50	93	110	239	196	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	9.6			9.6	9.6	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.61			1.00	0.80	
Flpb, ped/bikes	1.00			0.87	1.00	
Frt	0.91			1.00	0.96	
Flt Protected	0.98			0.98	1.00	
Satd. Flow (prot)	1021			1544	1447	
Flt Permitted	0.98			0.78	1.00	
Satd. Flow (perm)	1021			1226	1447	
Peak-hour factor, PHF	0.92	0.92	0.90	0.90	0.89	0.89
Adj. Flow (vph)	54	101	122	266	220	93
RTOR Reduction (vph)	72	0	0	0	12	0
Lane Group Flow (vph)	83	0	0	388	301	0
Confl. Peds. (#/hr)	553	321	423			423
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	2%	1%	5%	5%	0%	4%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	10.7			60.1	60.1	
Effective Green, g (s)	10.7			60.1	60.1	
Actuated g/C Ratio	0.12			0.67	0.67	
Clearance Time (s)	9.6			9.6	9.6	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	121			818	966	
v/s Ratio Prot	c0.08				0.21	
v/s Ratio Perm				c0.32		
v/c Ratio	0.68			0.47	0.31	
Uniform Delay, d1	38.0			7.3	6.3	
Progression Factor	1.00			0.73	0.76	
Incremental Delay, d2	12.0			1.3	0.8	
Delay (s)	50.0			6.5	5.5	
Level of Service	D			A	A	
Approach Delay (s)	50.0			6.5	5.5	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	89	114	352	324	67
Future Volume (vph)	68	89	114	352	324	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.6			8.6	8.6	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.62			1.00	0.90	
Flpb, ped/bikes	1.00			0.94	1.00	
Frt	0.92			1.00	0.98	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1004			1674	1651	
Flt Permitted	0.98			0.68	1.00	
Satd. Flow (perm)	1004			1149	1651	
Peak-hour factor, PHF	0.80	0.80	0.95	0.95	0.82	0.82
Adj. Flow (vph)	85	111	120	371	395	82
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	196	0	0	491	477	0
Confl. Peds. (#/hr)	442	421	311			311
Confl. Bikes (#/hr)		1				7
Heavy Vehicles (%)	3%	7%	4%	6%	0%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	23.4			49.4	49.4	
Effective Green, g (s)	23.4			49.4	49.4	
Actuated g/C Ratio	0.26			0.55	0.55	
Clearance Time (s)	8.6			8.6	8.6	
Vehicle Extension (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	261			630	906	
v/s Ratio Prot	c0.20				0.29	
v/s Ratio Perm				c0.43		
v/c Ratio	0.75			0.78	0.53	
Uniform Delay, d1	30.6			16.0	12.9	
Progression Factor	1.00			1.00	0.68	
Incremental Delay, d2	17.9			9.2	1.9	
Delay (s)	48.5			25.2	10.6	
Level of Service	D			C	B	
Approach Delay (s)	48.5			25.2	10.6	
Approach LOS	D			C	B	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	227	239	77	34	96	204
Average Queue (ft)	85	110	31	1	44	96
95th Queue (ft)	175	207	61	18	79	166
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		3				0
Queuing Penalty (veh)		0				1
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 33: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	250	188	246
Average Queue (ft)	109	78	132
95th Queue (ft)	196	156	231
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		0	1
Queuing Penalty (veh)		2	4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	244	148	359	290	223
Average Queue (ft)	93	41	164	143	86
95th Queue (ft)	198	110	298	259	170
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)			0	3	0
Queuing Penalty (veh)			0	8	0
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			9		
Queuing Penalty (veh)			5		

Intersection: 106: State St & Liberty St

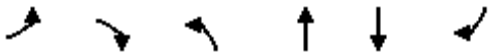
Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	174	235	184
Average Queue (ft)	74	121	74
95th Queue (ft)	137	214	146
Link Distance (ft)	470	246	280
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		3	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	188	507	205
Average Queue (ft)	86	248	112
95th Queue (ft)	155	441	191
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			1
Queuing Penalty (veh)			4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 27



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	34	71	43	166	167	43
Future Volume (vph)	34	71	43	166	167	43
Peak Hour Factor	0.77	0.77	0.90	0.90	0.78	0.78
Hourly flow rate (vph)	44	92	48	184	214	55

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	136	232	269
Volume Left (vph)	44	48	0
Volume Right (vph)	92	0	55
Hadj (s)	-0.24	0.23	0.04
Departure Headway (s)	4.8	4.8	4.6
Degree Utilization, x	0.18	0.31	0.34
Capacity (veh/h)	679	723	755
Control Delay (s)	8.9	9.9	9.9
Approach Delay (s)	8.9	9.9	9.9
Approach LOS	A	A	A

Intersection Summary			
Delay	9.7		
Level of Service	A		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Peak Hour Factor	0.84	0.84	0.88	0.88	0.76	0.76
Hourly flow rate (vph)	89	50	191	241	78	204

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	139	432	282
Volume Left (vph)	89	0	78
Volume Right (vph)	50	241	0
Hadj (s)	0.02	-0.21	0.17
Departure Headway (s)	5.5	4.5	5.0
Degree Utilization, x	0.21	0.53	0.39
Capacity (veh/h)	582	785	694
Control Delay (s)	10.1	12.5	11.1
Approach Delay (s)	10.1	12.5	11.1
Approach LOS	B	B	B

Intersection Summary			
Delay	11.6		
Level of Service	B		
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	288	90	117	147	232
Average Queue (ft)	114	17	54	70	99
95th Queue (ft)	201	55	100	121	184
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)		150			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	222	135	202
Average Queue (ft)	50	61	92
95th Queue (ft)	124	97	163
Link Distance (ft)	470	246	280
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	131	207	261
Average Queue (ft)	54	164	98
95th Queue (ft)	101	238	217
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		10	3
Queuing Penalty (veh)		39	8
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	311	443	202
Average Queue (ft)	77	175	77
95th Queue (ft)	193	319	164
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			1
Queuing Penalty (veh)			2
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	118	320	53	128	98	160
Average Queue (ft)	43	129	34	4	42	75
95th Queue (ft)	79	243	46	43	75	137
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		7				
Queuing Penalty (veh)		0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

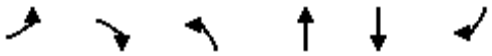
Zone Summary

Zone wide Queuing Penalty: 49

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Peak Hour Factor	0.89	0.89	0.88	0.88	0.84	0.84
Hourly flow rate (vph)	169	85	309	176	50	293

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	254	485	343
Volume Left (vph)	169	0	50
Volume Right (vph)	85	176	0
Hadj (s)	-0.01	-0.10	0.11
Departure Headway (s)	6.0	5.2	5.5
Degree Utilization, x	0.42	0.69	0.53
Capacity (veh/h)	552	676	625
Control Delay (s)	13.3	19.0	14.5
Approach Delay (s)	13.3	19.0	14.5
Approach LOS	B	C	B

Intersection Summary			
Delay	16.2		
Level of Service	C		
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	50	93	110	239	196	83
Future Volume (vph)	50	93	110	239	196	83
Peak Hour Factor	0.92	0.92	0.90	0.90	0.89	0.89
Hourly flow rate (vph)	54	101	122	266	220	93

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	155	388	313
Volume Left (vph)	54	122	0
Volume Right (vph)	101	0	93
Hadj (s)	-0.30	0.15	-0.16
Departure Headway (s)	5.2	4.9	4.7
Degree Utilization, x	0.23	0.52	0.40
Capacity (veh/h)	616	719	740
Control Delay (s)	9.7	13.1	10.8
Approach Delay (s)	9.7	13.1	10.8
Approach LOS	A	B	B

Intersection Summary			
Delay	11.6		
Level of Service	B		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	494	307	280	240	56	80
Average Queue (ft)	448	283	35	213	27	46
95th Queue (ft)	546	292	149	254	50	77
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)	89	98		95		
Queuing Penalty (veh)	0	0		0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 33: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	524	211	260
Average Queue (ft)	489	204	245
95th Queue (ft)	503	208	272
Link Distance (ft)	472	192	246
Upstream Blk Time (%)	97	76	41
Queuing Penalty (veh)	0	317	118
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	479	224	519	111	269
Average Queue (ft)	214	162	350	52	247
95th Queue (ft)	460	268	607	105	257
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)	6		56		90
Queuing Penalty (veh)	0		0		277
Storage Bay Dist (ft)		150			
Storage Blk Time (%)		64	7		
Queuing Penalty (veh)		217	4		

Intersection: 106: State St & Liberty St

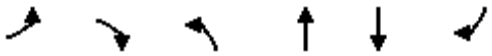
Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	485	218	292
Average Queue (ft)	399	115	288
95th Queue (ft)	580	198	292
Link Distance (ft)	470	246	280
Upstream Blk Time (%)	52		81
Queuing Penalty (veh)	0		228
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	511	839	281	118
Average Queue (ft)	375	797	242	69
95th Queue (ft)	641	815	255	117
Link Distance (ft)	472	720	233	192
Upstream Blk Time (%)	50	100	81	
Queuing Penalty (veh)	0	410	334	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 1906



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	34	71	43	166	167	43
Future Volume (vph)	34	71	43	166	167	43
Peak Hour Factor	0.77	0.77	0.90	0.90	0.78	0.78
Hourly flow rate (vph)	44	92	48	184	214	55

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	136	48	184	269
Volume Left (vph)	44	48	0	0
Volume Right (vph)	92	0	0	55
Hadj (s)	-0.24	0.64	0.20	0.04
Departure Headway (s)	4.9	5.7	5.3	4.7
Degree Utilization, x	0.18	0.08	0.27	0.35
Capacity (veh/h)	678	607	657	739
Control Delay (s)	8.9	8.0	9.1	10.2
Approach Delay (s)	8.9	8.8		10.2
Approach LOS	A	A		B

Intersection Summary			
Delay	9.4		
Level of Service	A		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Peak Hour Factor	0.84	0.84	0.88	0.88	0.76	0.76
Hourly flow rate (vph)	89	50	191	241	78	204

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	89	50	191	241	282
Volume Left (vph)	89	0	0	0	78
Volume Right (vph)	0	50	0	241	0
Hadj (s)	0.62	-0.61	0.09	-0.55	0.17
Departure Headway (s)	6.8	5.5	5.3	4.7	5.4
Degree Utilization, x	0.17	0.08	0.28	0.31	0.42
Capacity (veh/h)	490	591	656	743	650
Control Delay (s)	9.9	7.8	9.2	8.6	12.2
Approach Delay (s)	9.2		8.9		12.2
Approach LOS	A		A		B

Intersection Summary			
Delay	10.0		
Level of Service	B		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	220	70	109	175	196
Average Queue (ft)	131	15	44	88	80
95th Queue (ft)	222	52	96	148	155
Link Distance (ft)	464		467	280	244
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		150			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 109: State St & Liberty St

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	96	49	118	215
Average Queue (ft)	45	22	58	89
95th Queue (ft)	73	46	93	159
Link Distance (ft)	464		235	280
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100		
Storage Blk Time (%)			1	
Queuing Penalty (veh)			0	

Intersection: 111: State St & N. University Ave

Movement	WB	WB	NB	NB	SB
Directions Served	L	R	T	R	LT
Maximum Queue (ft)	109	84	137	208	248
Average Queue (ft)	38	29	69	121	98
95th Queue (ft)	77	62	111	192	190
Link Distance (ft)		454	192	192	235
Upstream Blk Time (%)				1	1
Queuing Penalty (veh)				1	3
Storage Bay Dist (ft)	100				
Storage Blk Time (%)	1	0			
Queuing Penalty (veh)	0	0			

Intersection: 112: State St & William St

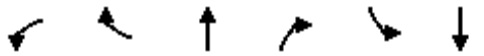
Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	94	268	176
Average Queue (ft)	56	132	74
95th Queue (ft)	94	224	144
Link Distance (ft)	471	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	106	286	74	120	93	201
Average Queue (ft)	43	132	37	8	46	76
95th Queue (ft)	76	239	64	54	79	136
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		8				
Queuing Penalty (veh)		0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Zone Summary

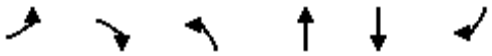
Zone wide Queuing Penalty: 5



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Peak Hour Factor	0.89	0.89	0.88	0.88	0.84	0.84
Hourly flow rate (vph)	169	85	309	176	50	293

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	169	85	309	176	343
Volume Left (vph)	169	0	0	0	50
Volume Right (vph)	0	85	0	176	0
Hadj (s)	0.53	-0.58	0.07	-0.50	0.11
Departure Headway (s)	7.1	6.0	5.9	5.3	5.9
Degree Utilization, x	0.33	0.14	0.51	0.26	0.56
Capacity (veh/h)	473	555	595	653	597
Control Delay (s)	12.5	8.8	13.6	9.0	16.0
Approach Delay (s)	11.3		11.9		16.0
Approach LOS	B		B		C

Intersection Summary			
Delay	13.1		
Level of Service	B		
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	50	93	110	239	196	83
Future Volume (vph)	50	93	110	239	196	83
Peak Hour Factor	0.92	0.92	0.90	0.90	0.89	0.89
Hourly flow rate (vph)	54	101	122	266	220	93

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	155	122	266	313
Volume Left (vph)	54	122	0	0
Volume Right (vph)	101	0	0	93
Hadj (s)	-0.30	0.58	0.09	-0.16
Departure Headway (s)	5.2	5.8	5.3	4.7
Degree Utilization, x	0.22	0.20	0.39	0.41
Capacity (veh/h)	628	601	658	731
Control Delay (s)	9.7	9.0	10.5	11.0
Approach Delay (s)	9.7	10.0		11.0
Approach LOS	A	B		B

Intersection Summary			
Delay	10.3		
Level of Service	B		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	512	331	56	264	32	95
Average Queue (ft)	455	282	13	209	17	46
95th Queue (ft)	578	306	46	278	42	76
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)	89	97		94		
Queuing Penalty (veh)	0	0		0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 33: State St & N. University Ave

Movement	WB	WB	NB	NB	SB
Directions Served	L	R	T	R	LT
Maximum Queue (ft)	125	469	209	203	250
Average Queue (ft)	124	464	203	104	244
95th Queue (ft)	126	494	209	205	253
Link Distance (ft)		454	192	192	235
Upstream Blk Time (%)		90	75	7	58
Queuing Penalty (veh)		0	158	15	167
Storage Bay Dist (ft)	100				
Storage Blk Time (%)	99	6			
Queuing Penalty (veh)	75	9			

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	527	222	506	246	260
Average Queue (ft)	429	208	473	69	247
95th Queue (ft)	589	214	601	136	255
Link Distance (ft)	464		467	280	244
Upstream Blk Time (%)	65		91		99
Queuing Penalty (veh)	0		0		305
Storage Bay Dist (ft)		150			
Storage Blk Time (%)		100			
Queuing Penalty (veh)		344			

Intersection: 106: State St & Liberty St

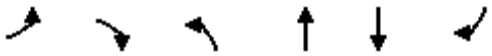
Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	480	174	247	295
Average Queue (ft)	448	45	102	290
95th Queue (ft)	567	119	222	296
Link Distance (ft)	464		235	280
Upstream Blk Time (%)	80		5	87
Queuing Penalty (veh)	0		16	245
Storage Bay Dist (ft)		100		
Storage Blk Time (%)		3	27	
Queuing Penalty (veh)		6	28	

Intersection: 108: State St & William St

Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	510	839	249	75
Average Queue (ft)	427	794	240	43
95th Queue (ft)	584	816	248	72
Link Distance (ft)	471	720	233	192
Upstream Blk Time (%)	57	100	79	
Queuing Penalty (veh)	0	408	325	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 2103



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	34	71	43	166	167	43
Future Volume (vph)	34	71	43	166	167	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.3	5.3	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.91			1.00	0.97	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1570			1692	1674	
Flt Permitted	0.98			0.89	1.00	
Satd. Flow (perm)	1570			1526	1674	
Peak-hour factor, PHF	0.77	0.77	0.90	0.90	0.78	0.78
Adj. Flow (vph)	44	92	48	184	214	55
RTOR Reduction (vph)	77	0	0	0	10	0
Lane Group Flow (vph)	59	0	0	232	259	0
Confl. Bikes (#/hr)		4				8
Heavy Vehicles (%)	0%	9%	8%	12%	11%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	15.0			44.7	44.7	
Effective Green, g (s)	15.0			44.7	44.7	
Actuated g/C Ratio	0.17			0.50	0.50	
Clearance Time (s)	5.0			5.3	5.3	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	261			757	831	
v/s Ratio Prot	c0.04				c0.15	
v/s Ratio Perm				0.15		
v/c Ratio	0.23			0.31	0.31	
Uniform Delay, d1	32.5			13.4	13.5	
Progression Factor	1.00			0.64	0.71	
Incremental Delay, d2	2.0			0.9	0.9	
Delay (s)	34.5			9.6	10.5	
Level of Service	C			A	B	
Approach Delay (s)	34.5			9.6	10.5	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7			5.7
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	1.00		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.92			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1648		1619			1753
Flt Permitted	0.97		1.00			0.71
Satd. Flow (perm)	1648		1619			1267
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Adj. Flow (vph)	89	50	191	241	78	204
RTOR Reduction (vph)	23	0	50	0	0	0
Lane Group Flow (vph)	116	0	382	0	0	282
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	14.8		41.3			41.3
Effective Green, g (s)	14.8		41.3			41.3
Actuated g/C Ratio	0.16		0.46			0.46
Clearance Time (s)	5.2		5.7			5.7
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	271		742			581
v/s Ratio Prot	c0.07		c0.24			
v/s Ratio Perm						0.22
v/c Ratio	0.43		0.51			0.49
Uniform Delay, d1	33.8		17.2			17.0
Progression Factor	1.00		0.41			0.59
Incremental Delay, d2	4.9		2.3			2.8
Delay (s)	38.7		9.4			12.7
Level of Service	D		A			B
Approach Delay (s)	38.7		9.4			12.7
Approach LOS	D		A			B

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	273	67	130	169	187
Average Queue (ft)	119	21	46	66	81
95th Queue (ft)	220	53	104	132	157
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	121	116	130
Average Queue (ft)	50	43	51
95th Queue (ft)	97	96	109
Link Distance (ft)	470	246	280
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	158	202	199
Average Queue (ft)	67	71	84
95th Queue (ft)	123	144	165
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		1	1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	170	245	145
Average Queue (ft)	70	127	70
95th Queue (ft)	130	215	132
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	110	284	87	138	112	177
Average Queue (ft)	56	139	37	15	43	85
95th Queue (ft)	95	276	69	92	86	146
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		12		0		
Queuing Penalty (veh)		0		0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	294	293	178	165	71	146	105	242
Average Queue (ft)	177	171	99	80	23	56	68	102
95th Queue (ft)	265	271	156	140	55	112	117	199
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					100		80	
Storage Blk Time (%)					0	3	8	16
Queuing Penalty (veh)					0	1	19	18

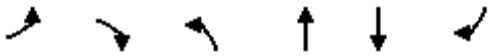
Network Summary

Network wide Queuing Penalty: 40

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7			5.7
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	0.99		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.95			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1679		1672			1804
Flt Permitted	0.97		1.00			0.77
Satd. Flow (perm)	1679		1672			1404
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Adj. Flow (vph)	169	85	309	176	50	293
RTOR Reduction (vph)	20	0	23	0	0	0
Lane Group Flow (vph)	234	0	462	0	0	343
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	17.8		38.3			38.3
Effective Green, g (s)	17.8		38.3			38.3
Actuated g/C Ratio	0.20		0.43			0.43
Clearance Time (s)	5.2		5.7			5.7
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	332		711			597
v/s Ratio Prot	c0.14		c0.28			
v/s Ratio Perm						0.24
v/c Ratio	0.70		0.65			0.57
Uniform Delay, d1	33.6		20.5			19.7
Progression Factor	1.00		0.59			0.81
Incremental Delay, d2	11.9		2.9			3.8
Delay (s)	45.5		15.0			19.7
Level of Service	D		B			B
Approach Delay (s)	45.5		15.0			19.7
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	93	110	239	196	83
Future Volume (vph)	50	93	110	239	196	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.3	5.3	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	1.00			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.91			1.00	0.96	
Flt Protected	0.98			0.98	1.00	
Satd. Flow (prot)	1681			1782	1791	
Flt Permitted	0.98			0.75	1.00	
Satd. Flow (perm)	1681			1349	1791	
Peak-hour factor, PHF	0.92	0.92	0.90	0.90	0.89	0.89
Adj. Flow (vph)	54	101	122	266	220	93
RTOR Reduction (vph)	75	0	0	0	17	0
Lane Group Flow (vph)	80	0	0	388	296	0
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	2%	1%	5%	5%	0%	4%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	17.0			42.7	42.7	
Effective Green, g (s)	17.0			42.7	42.7	
Actuated g/C Ratio	0.19			0.47	0.47	
Clearance Time (s)	5.0			5.3	5.3	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	317			640	849	
v/s Ratio Prot	c0.05				0.17	
v/s Ratio Perm				c0.29		
v/c Ratio	0.25			0.61	0.35	
Uniform Delay, d1	31.1			17.4	14.9	
Progression Factor	1.00			0.50	0.73	
Incremental Delay, d2	1.9			3.1	1.0	
Delay (s)	33.0			11.8	12.0	
Level of Service	C			B	B	
Approach Delay (s)	33.0			11.8	12.0	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	182	207	70	4	95	227
Average Queue (ft)	81	107	30	0	42	101
95th Queue (ft)	149	190	56	0	77	187
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		1				0
Queuing Penalty (veh)		0				1
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 33: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	273	208	257
Average Queue (ft)	128	139	153
95th Queue (ft)	230	240	271
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		5	12
Queuing Penalty (veh)		20	34
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	211	175	330	250	250
Average Queue (ft)	89	32	154	107	103
95th Queue (ft)	178	101	274	210	205
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)				0	3
Queuing Penalty (veh)				0	9
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			8		
Queuing Penalty (veh)			5		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	242	228	275
Average Queue (ft)	82	104	90
95th Queue (ft)	179	194	198
Link Distance (ft)	470	246	280
Upstream Blk Time (%)		0	2
Queuing Penalty (veh)		1	5
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

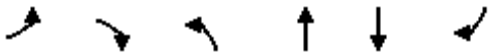
Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	212	650	94	188
Average Queue (ft)	102	310	11	115
95th Queue (ft)	180	636	84	181
Link Distance (ft)	472	720	233	192
Upstream Blk Time (%)		6	0	1
Queuing Penalty (veh)		23	1	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	220	254	368	366	128	167	171	321
Average Queue (ft)	119	114	196	186	54	71	62	160
95th Queue (ft)	193	202	332	333	104	133	156	335
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)						0		5
Queuing Penalty (veh)						0		0
Storage Bay Dist (ft)					100		115	
Storage Blk Time (%)					2	5	0	26
Queuing Penalty (veh)					3	5	1	16

Network Summary

Network wide Queuing Penalty: 125



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	34	71	43	166	167	43
Future Volume (vph)	34	71	43	166	167	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.3	5.3	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.91			1.00	0.97	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1570			1692	1674	
Flt Permitted	0.98			0.89	1.00	
Satd. Flow (perm)	1570			1526	1674	
Peak-hour factor, PHF	0.77	0.77	0.90	0.90	0.78	0.78
Adj. Flow (vph)	44	92	48	184	214	55
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	136	0	0	232	269	0
Confl. Bikes (#/hr)		4				8
Heavy Vehicles (%)	0%	9%	8%	12%	11%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	15.0			44.7	44.7	
Effective Green, g (s)	15.0			44.7	44.7	
Actuated g/C Ratio	0.17			0.50	0.50	
Clearance Time (s)	5.0			5.3	5.3	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	261			757	831	
v/s Ratio Prot	c0.09				c0.16	
v/s Ratio Perm				0.15		
v/c Ratio	0.52			0.31	0.32	
Uniform Delay, d1	34.2			13.4	13.6	
Progression Factor	1.00			0.56	0.73	
Incremental Delay, d2	7.3			0.9	1.0	
Delay (s)	41.5			8.4	10.9	
Level of Service	D			A	B	
Approach Delay (s)	41.5			8.4	10.9	
Approach LOS	D			A	B	

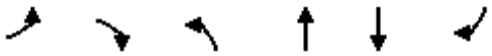
Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7			5.7
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	1.00		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.92			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1648		1619			1753
Flt Permitted	0.97		1.00			0.71
Satd. Flow (perm)	1648		1619			1267
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Adj. Flow (vph)	89	50	191	241	78	204
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	139	0	432	0	0	282
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	14.8		41.3			41.3
Effective Green, g (s)	14.8		41.3			41.3
Actuated g/C Ratio	0.16		0.46			0.46
Clearance Time (s)	5.2		5.7			5.7
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	271		742			581
v/s Ratio Prot	c0.08		c0.27			
v/s Ratio Perm						0.22
v/c Ratio	0.51		0.58			0.49
Uniform Delay, d1	34.3		18.0			17.0
Progression Factor	1.00		0.48			0.69
Incremental Delay, d2	6.8		2.9			2.7
Delay (s)	41.1		11.5			14.4
Level of Service	D		B			B
Approach Delay (s)	41.1		11.5			14.4
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	52	42	47	340	187	34
Future Volume (vph)	52	42	47	340	187	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3			5.5	5.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	1.00			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.94			1.00	0.95	
Flt Protected	0.97			0.99	1.00	
Satd. Flow (prot)	1551			1761	1655	
Flt Permitted	0.97			0.92	1.00	
Satd. Flow (perm)	1551			1630	1655	
Peak-hour factor, PHF	0.90	0.90	0.93	0.93	0.90	0.25
Adj. Flow (vph)	58	47	51	366	208	136
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	105	0	0	417	344	0
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	8%	17%	9%	7%	5%	12%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	14.7			44.5	44.5	
Effective Green, g (s)	14.7			44.5	44.5	
Actuated g/C Ratio	0.16			0.49	0.49	
Clearance Time (s)	5.3			5.5	5.5	
Vehicle Extension (s)	3.0			4.0	4.0	
Lane Grp Cap (vph)	253			805	818	
v/s Ratio Prot	c0.07				0.21	
v/s Ratio Perm				c0.26		
v/c Ratio	0.42			0.52	0.42	
Uniform Delay, d1	33.8			15.5	14.5	
Progression Factor	1.00			1.00	0.87	
Incremental Delay, d2	5.0			2.4	1.5	
Delay (s)	38.7			17.8	14.1	
Level of Service	D			B	B	
Approach Delay (s)	38.7			17.8	14.1	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	224	57	125	161	197
Average Queue (ft)	105	18	42	64	86
95th Queue (ft)	178	50	93	119	166
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	165	146	134
Average Queue (ft)	70	54	44
95th Queue (ft)	135	116	101
Link Distance (ft)	470	246	280
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	150	177	218
Average Queue (ft)	71	65	100
95th Queue (ft)	130	131	195
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		0	1
Queuing Penalty (veh)		0	3
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	159	288	162
Average Queue (ft)	66	145	78
95th Queue (ft)	127	240	149
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	110	272	66	63	93	168
Average Queue (ft)	51	121	34	4	45	79
95th Queue (ft)	89	228	59	36	79	134
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		5				
Queuing Penalty (veh)		0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	294	291	205	208	61	115	105	230
Average Queue (ft)	177	168	105	84	23	51	66	104
95th Queue (ft)	266	262	169	157	55	95	117	195
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					100		80	
Storage Blk Time (%)						1	9	14
Queuing Penalty (veh)						0	21	16

Network Summary

Network wide Queuing Penalty: 42

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7	5.7		5.7
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.98		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	0.95		1.00	0.85		1.00
Flt Protected	0.97		1.00	1.00		0.99
Satd. Flow (prot)	1648		1810	1451		1753
Flt Permitted	0.97		1.00	1.00		0.86
Satd. Flow (perm)	1648		1810	1451		1532
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Adj. Flow (vph)	89	50	191	241	78	204
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	139	0	191	241	0	282
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	3		2			2
Permitted Phases				2	2	
Actuated Green, G (s)	14.8		41.3	41.3		41.3
Effective Green, g (s)	14.8		41.3	41.3		41.3
Actuated g/C Ratio	0.16		0.46	0.46		0.46
Clearance Time (s)	5.2		5.7	5.7		5.7
Vehicle Extension (s)	4.0		4.0	4.0		4.0
Lane Grp Cap (vph)	271		830	665		703
v/s Ratio Prot	c0.08		0.11			
v/s Ratio Perm				0.17		c0.18
v/c Ratio	0.51		0.23	0.36		0.40
Uniform Delay, d1	34.3		14.7	15.8		16.1
Progression Factor	1.00		0.51	0.50		0.71
Incremental Delay, d2	6.8		0.6	1.4		1.6
Delay (s)	41.1		8.1	9.3		13.1
Level of Service	D		A	A		B
Approach Delay (s)	41.1		8.8			13.1
Approach LOS	D		A			B

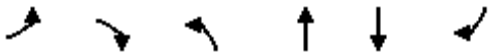
Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7			5.7
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	0.99		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.95			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1679		1672			1804
Flt Permitted	0.97		1.00			0.77
Satd. Flow (perm)	1679		1672			1404
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Adj. Flow (vph)	169	85	309	176	50	293
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	254	0	485	0	0	343
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	17.8		38.3			38.3
Effective Green, g (s)	17.8		38.3			38.3
Actuated g/C Ratio	0.20		0.43			0.43
Clearance Time (s)	5.2		5.7			5.7
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	332		711			597
v/s Ratio Prot	c0.15		c0.29			
v/s Ratio Perm						0.24
v/c Ratio	0.77		0.68			0.57
Uniform Delay, d1	34.1		20.9			19.7
Progression Factor	1.00		0.75			0.89
Incremental Delay, d2	15.4		3.1			3.8
Delay (s)	49.5		18.7			21.2
Level of Service	D		B			C
Approach Delay (s)	49.5		18.7			21.2
Approach LOS	D		B			C

Intersection Summary			
HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

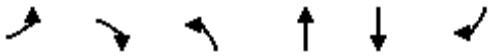
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	93	110	239	196	83
Future Volume (vph)	50	93	110	239	196	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.3	5.3	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	1.00			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.91			1.00	0.96	
Flt Protected	0.98			0.98	1.00	
Satd. Flow (prot)	1681			1782	1791	
Flt Permitted	0.98			0.75	1.00	
Satd. Flow (perm)	1681			1349	1791	
Peak-hour factor, PHF	0.92	0.92	0.90	0.90	0.89	0.89
Adj. Flow (vph)	54	101	122	266	220	93
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	155	0	0	388	313	0
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	2%	1%	5%	5%	0%	4%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	17.0			42.7	42.7	
Effective Green, g (s)	17.0			42.7	42.7	
Actuated g/C Ratio	0.19			0.47	0.47	
Clearance Time (s)	5.0			5.3	5.3	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	317			640	849	
v/s Ratio Prot	c0.09				0.17	
v/s Ratio Perm				c0.29		
v/c Ratio	0.49			0.61	0.37	
Uniform Delay, d1	32.6			17.4	15.1	
Progression Factor	1.00			0.47	0.75	
Incremental Delay, d2	5.3			3.0	1.1	
Delay (s)	37.9			11.2	12.5	
Level of Service	D			B	B	
Approach Delay (s)	37.9			11.2	12.5	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	89	114	352	324	67
Future Volume (vph)	68	89	114	352	324	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3			5.5	5.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.99			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.92			1.00	0.98	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1611			1779	1832	
Flt Permitted	0.98			0.63	1.00	
Satd. Flow (perm)	1611			1143	1832	
Peak-hour factor, PHF	0.80	0.80	0.95	0.95	0.82	0.82
Adj. Flow (vph)	85	111	120	371	395	82
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	196	0	0	491	477	0
Confl. Bikes (#/hr)		1				7
Heavy Vehicles (%)	3%	7%	4%	6%	0%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	14.7			44.5	44.5	
Effective Green, g (s)	14.7			44.5	44.5	
Actuated g/C Ratio	0.16			0.49	0.49	
Clearance Time (s)	5.3			5.5	5.5	
Vehicle Extension (s)	3.0			4.0	4.0	
Lane Grp Cap (vph)	263			565	905	
v/s Ratio Prot	c0.12				0.26	
v/s Ratio Perm				c0.43		
v/c Ratio	0.75			0.87	0.53	
Uniform Delay, d1	35.9			20.2	15.6	
Progression Factor	1.00			1.00	0.89	
Incremental Delay, d2	17.4			16.5	1.7	
Delay (s)	53.3			36.7	15.6	
Level of Service	D			D	B	
Approach Delay (s)	53.3			36.7	15.6	
Approach LOS	D			D	B	

Intersection Summary			
HCM 2000 Control Delay	30.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	178	239	70	17	116	232	36
Average Queue (ft)	79	107	32	1	47	108	2
95th Queue (ft)	146	198	58	12	87	197	27
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		2				1	
Queuing Penalty (veh)		0				2	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 33: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	273	207	259
Average Queue (ft)	137	140	183
95th Queue (ft)	234	225	298
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		7	18
Queuing Penalty (veh)		29	54
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	249	142	329	202	230
Average Queue (ft)	94	34	139	94	94
95th Queue (ft)	195	92	258	179	183
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)				0	2
Queuing Penalty (veh)				1	5
Storage Bay Dist (ft)		150			
Storage Blk Time (%)		1	8		
Queuing Penalty (veh)		2	5		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	380	228	272
Average Queue (ft)	142	103	115
95th Queue (ft)	318	192	236
Link Distance (ft)	470	246	280
Upstream Blk Time (%)	1	0	3
Queuing Penalty (veh)	0	1	10
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	262	697	15	194
Average Queue (ft)	114	335	1	120
95th Queue (ft)	221	618	12	188
Link Distance (ft)	472	720	233	192
Upstream Blk Time (%)		1		1
Queuing Penalty (veh)		5		4
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	200	198	369	364	108	149	190	355
Average Queue (ft)	118	112	202	188	52	65	51	151
95th Queue (ft)	183	185	343	334	91	121	131	319
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								3
Queuing Penalty (veh)								0
Storage Bay Dist (ft)					100		115	
Storage Blk Time (%)					1	4	0	22
Queuing Penalty (veh)					2	3	0	14

Network Summary

Network wide Queuing Penalty: 137

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7	5.7		5.7
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	0.99		1.00	0.97		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	0.95		1.00	0.85		1.00
Flt Protected	0.97		1.00	1.00		0.99
Satd. Flow (prot)	1679		1827	1398		1804
Flt Permitted	0.97		1.00	1.00		0.91
Satd. Flow (perm)	1679		1827	1398		1653
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Adj. Flow (vph)	169	85	309	176	50	293
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	254	0	309	176	0	343
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	3		2			2
Permitted Phases				2	2	
Actuated Green, G (s)	17.8		38.3	38.3		38.3
Effective Green, g (s)	17.8		38.3	38.3		38.3
Actuated g/C Ratio	0.20		0.43	0.43		0.43
Clearance Time (s)	5.2		5.7	5.7		5.7
Vehicle Extension (s)	4.0		4.0	4.0		4.0
Lane Grp Cap (vph)	332		777	594		703
v/s Ratio Prot	c0.15		0.17			
v/s Ratio Perm				0.13		c0.21
v/c Ratio	0.77		0.40	0.30		0.49
Uniform Delay, d1	34.1		17.9	17.0		18.7
Progression Factor	1.00		0.62	0.63		0.90
Incremental Delay, d2	15.4		1.0	0.8		2.3
Delay (s)	49.5		12.1	11.6		19.1
Level of Service	D		B	B		B
Approach Delay (s)	49.5		11.9			19.1
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.2	5.7			5.7
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.92			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1687	1538	1619			1753
Flt Permitted	0.95	1.00	1.00			0.71
Satd. Flow (perm)	1687	1538	1619			1267
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Adj. Flow (vph)	89	50	191	241	78	204
RTOR Reduction (vph)	0	42	50	0	0	0
Lane Group Flow (vph)	89	8	382	0	0	282
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases		3			2	
Actuated Green, G (s)	14.8	14.8	41.3			41.3
Effective Green, g (s)	14.8	14.8	41.3			41.3
Actuated g/C Ratio	0.16	0.16	0.46			0.46
Clearance Time (s)	5.2	5.2	5.7			5.7
Vehicle Extension (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	277	252	742			581
v/s Ratio Prot	c0.05		c0.24			
v/s Ratio Perm		0.01				0.22
v/c Ratio	0.32	0.03	0.51			0.49
Uniform Delay, d1	33.2	31.6	17.2			17.0
Progression Factor	1.00	1.00	0.41			0.59
Incremental Delay, d2	3.0	0.2	2.3			2.8
Delay (s)	36.2	31.8	9.4			12.7
Level of Service	D	C	A			B
Approach Delay (s)	34.6		9.4			12.7
Approach LOS	C		A			B

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	222	65	119	157	191
Average Queue (ft)	111	19	39	66	82
95th Queue (ft)	205	53	90	125	156
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	128	120	161
Average Queue (ft)	55	41	53
95th Queue (ft)	107	96	126
Link Distance (ft)	470	234	280
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	112	71	195	233
Average Queue (ft)	46	24	70	101
95th Queue (ft)	95	55	145	207
Link Distance (ft)		472	192	234
Upstream Blk Time (%)			0	3
Queuing Penalty (veh)			1	8
Storage Bay Dist (ft)	100			
Storage Blk Time (%)	1	0		
Queuing Penalty (veh)	1	0		

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	172	290	169
Average Queue (ft)	60	143	71
95th Queue (ft)	120	234	140
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	139	290	110	74	100	147
Average Queue (ft)	59	135	36	5	44	73
95th Queue (ft)	106	247	80	50	77	126
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		5		0		
Queuing Penalty (veh)		0		0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	282	283	168	160	96	136	105	339
Average Queue (ft)	174	170	97	76	22	54	65	117
95th Queue (ft)	257	263	155	138	62	104	120	251
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (ft)					100		80	
Storage Blk Time (%)					0	2	9	19
Queuing Penalty (veh)					0	1	21	23

Network Summary

Network wide Queuing Penalty: 55

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.2	5.7			5.7
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	0.97	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.95			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1770	1471	1672			1804
Flt Permitted	0.95	1.00	1.00			0.77
Satd. Flow (perm)	1770	1471	1672			1404
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Adj. Flow (vph)	169	85	309	176	50	293
RTOR Reduction (vph)	0	68	23	0	0	0
Lane Group Flow (vph)	169	17	462	0	0	343
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases		3			2	
Actuated Green, G (s)	17.8	17.8	38.3			38.3
Effective Green, g (s)	17.8	17.8	38.3			38.3
Actuated g/C Ratio	0.20	0.20	0.43			0.43
Clearance Time (s)	5.2	5.2	5.7			5.7
Vehicle Extension (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	350	290	711			597
v/s Ratio Prot	c0.10		c0.28			
v/s Ratio Perm		0.01				0.24
v/c Ratio	0.48	0.06	0.65			0.57
Uniform Delay, d1	32.0	29.3	20.5			19.7
Progression Factor	1.00	1.00	0.59			0.81
Incremental Delay, d2	4.7	0.4	2.9			3.8
Delay (s)	36.7	29.7	15.0			19.7
Level of Service	D	C	B			B
Approach Delay (s)	34.4		15.0			19.7
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	199	238	63	32	100	235	15
Average Queue (ft)	84	110	34	2	45	106	1
95th Queue (ft)	162	209	60	19	82	200	11
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		3				2	
Queuing Penalty (veh)		0				4	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 33: State St & N. University Ave

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	141	122	210	251
Average Queue (ft)	79	39	140	165
95th Queue (ft)	129	82	234	276
Link Distance (ft)		472	192	234
Upstream Blk Time (%)			4	15
Queuing Penalty (veh)			18	44
Storage Bay Dist (ft)	100			
Storage Blk Time (%)	9	0		
Queuing Penalty (veh)	7	0		

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	170	175	327	279	224
Average Queue (ft)	84	39	149	106	92
95th Queue (ft)	155	105	267	212	184
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)				1	0
Queuing Penalty (veh)				3	1
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			9		
Queuing Penalty (veh)			6		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	324	233	250
Average Queue (ft)	111	96	102
95th Queue (ft)	284	202	217
Link Distance (ft)	470	234	280
Upstream Blk Time (%)	1	1	3
Queuing Penalty (veh)	0	4	8
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	195	603	197
Average Queue (ft)	97	257	117
95th Queue (ft)	165	502	187
Link Distance (ft)	472	720	192
Upstream Blk Time (%)		0	1
Queuing Penalty (veh)		1	4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	196	207	320	307	129	192	166	257
Average Queue (ft)	123	114	180	168	54	79	48	127
95th Queue (ft)	180	177	276	265	103	151	119	229
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)						0		
Queuing Penalty (veh)						1		
Storage Bay Dist (ft)					100		115	
Storage Blk Time (%)					1	6	0	18
Queuing Penalty (veh)					2	5	1	11

Network Summary

Network wide Queuing Penalty: 119

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.2	5.7			5.7
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.92			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1687	1538	1619			1753
Flt Permitted	0.95	1.00	1.00			0.71
Satd. Flow (perm)	1687	1538	1619			1267
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Adj. Flow (vph)	89	50	191	241	78	204
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	89	50	432	0	0	282
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases		3			2	
Actuated Green, G (s)	14.8	14.8	41.3			41.3
Effective Green, g (s)	14.8	14.8	41.3			41.3
Actuated g/C Ratio	0.16	0.16	0.46			0.46
Clearance Time (s)	5.2	5.2	5.7			5.7
Vehicle Extension (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	277	252	742			581
v/s Ratio Prot	c0.05		c0.27			
v/s Ratio Perm		0.03				0.22
v/c Ratio	0.32	0.20	0.58			0.49
Uniform Delay, d1	33.2	32.5	18.0			17.0
Progression Factor	1.00	1.00	0.57			0.69
Incremental Delay, d2	3.0	1.8	3.0			2.7
Delay (s)	36.2	34.2	13.2			14.4
Level of Service	D	C	B			B
Approach Delay (s)	35.5		13.2			14.4
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	242	61	139	164	214
Average Queue (ft)	121	19	49	60	93
95th Queue (ft)	212	52	107	120	173
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	228	139	204
Average Queue (ft)	76	58	59
95th Queue (ft)	159	118	146
Link Distance (ft)	470	234	280
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	112	123	205	246
Average Queue (ft)	51	34	96	124
95th Queue (ft)	105	84	183	237
Link Distance (ft)		472	192	234
Upstream Blk Time (%)			1	4
Queuing Penalty (veh)			3	12
Storage Bay Dist (ft)	100			
Storage Blk Time (%)	2	0		
Queuing Penalty (veh)	1	0		

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	178	232	64	43	105	249	6
Average Queue (ft)	78	112	32	11	44	100	0
95th Queue (ft)	149	218	54	87	80	191	4
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		7		2		1	
Queuing Penalty (veh)		0		0		3	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 33: State St & N. University Ave

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	143	165	210	253
Average Queue (ft)	82	62	146	161
95th Queue (ft)	136	130	239	270
Link Distance (ft)		472	192	234
Upstream Blk Time (%)			5	13
Queuing Penalty (veh)			22	38
Storage Bay Dist (ft)	100			
Storage Blk Time (%)	9	3		
Queuing Penalty (veh)	7	4		

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	249	194	326	212	222
Average Queue (ft)	92	43	152	100	97
95th Queue (ft)	188	125	269	184	196
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)				0	2
Queuing Penalty (veh)				1	8
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			9		
Queuing Penalty (veh)			5		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	266	246	247
Average Queue (ft)	119	121	111
95th Queue (ft)	273	224	222
Link Distance (ft)	470	234	280
Upstream Blk Time (%)	0	1	4
Queuing Penalty (veh)	0	3	11
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	280	599	34	200
Average Queue (ft)	112	264	2	123
95th Queue (ft)	219	528	26	198
Link Distance (ft)	472	720	233	192
Upstream Blk Time (%)		2		2
Queuing Penalty (veh)		7		7
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	213	228	402	391	140	190	174	355
Average Queue (ft)	122	115	211	203	48	75	56	134
95th Queue (ft)	181	189	423	415	105	147	138	272
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)						0		0
Queuing Penalty (veh)						0		0
Storage Bay Dist (ft)					100		115	
Storage Blk Time (%)					1	6	0	19
Queuing Penalty (veh)					1	5	1	12

Network Summary

Network wide Queuing Penalty: 133

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	153	337	164
Average Queue (ft)	69	139	73
95th Queue (ft)	129	259	137
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	102	254	74	50	98	172
Average Queue (ft)	53	130	39	5	44	77
95th Queue (ft)	90	239	62	58	79	135
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		6		1		
Queuing Penalty (veh)		0		0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	289	294	165	170	69	125	105	248
Average Queue (ft)	177	172	105	86	23	63	69	109
95th Queue (ft)	254	260	160	153	58	115	117	202
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					100		80	
Storage Blk Time (%)					0	4	9	18
Queuing Penalty (veh)					0	2	21	21

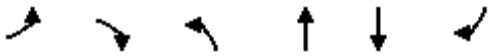
Network Summary

Network wide Queuing Penalty: 61

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.2	5.7			5.7
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	0.97	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.95			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1770	1471	1672			1804
Flt Permitted	0.95	1.00	1.00			0.77
Satd. Flow (perm)	1770	1471	1672			1404
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Adj. Flow (vph)	169	85	309	176	50	293
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	169	85	485	0	0	343
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases		3			2	
Actuated Green, G (s)	17.8	17.8	38.3			38.3
Effective Green, g (s)	17.8	17.8	38.3			38.3
Actuated g/C Ratio	0.20	0.20	0.43			0.43
Clearance Time (s)	5.2	5.2	5.7			5.7
Vehicle Extension (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	350	290	711			597
v/s Ratio Prot	c0.10		c0.29			
v/s Ratio Perm		0.06				0.24
v/c Ratio	0.48	0.29	0.68			0.57
Uniform Delay, d1	32.0	30.7	20.9			19.7
Progression Factor	1.00	1.00	0.62			0.89
Incremental Delay, d2	4.7	2.6	3.4			3.8
Delay (s)	36.7	33.3	16.4			21.2
Level of Service	D	C	B			C
Approach Delay (s)	35.6		16.4			21.2
Approach LOS	D		B			C

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	34	71	43	166	167	43
Future Volume (vph)	34	71	43	166	167	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.3	5.3	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.91			1.00	0.97	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1570			1692	1674	
Flt Permitted	0.98			0.89	1.00	
Satd. Flow (perm)	1570			1517	1674	
Peak-hour factor, PHF	0.77	0.77	0.90	0.90	0.78	0.78
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	47	98	51	196	227	58
RTOR Reduction (vph)	82	0	0	0	10	0
Lane Group Flow (vph)	63	0	0	247	275	0
Confl. Bikes (#/hr)		4				8
Heavy Vehicles (%)	0%	9%	8%	12%	11%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	15.0			44.7	44.7	
Effective Green, g (s)	15.0			44.7	44.7	
Actuated g/C Ratio	0.17			0.50	0.50	
Clearance Time (s)	5.0			5.3	5.3	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	261			753	831	
v/s Ratio Prot	c0.04				c0.16	
v/s Ratio Perm				0.16		
v/c Ratio	0.24			0.33	0.33	
Uniform Delay, d1	32.6			13.6	13.6	
Progression Factor	1.00			0.63	0.70	
Incremental Delay, d2	2.2			1.0	1.0	
Delay (s)	34.8			9.6	10.6	
Level of Service	C			A	B	
Approach Delay (s)	34.8			9.6	10.6	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7			5.7
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	1.00		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.92			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1648		1619			1753
Flt Permitted	0.97		1.00			0.67
Satd. Flow (perm)	1648		1619			1199
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	95	53	202	255	82	216
RTOR Reduction (vph)	23	0	50	0	0	0
Lane Group Flow (vph)	125	0	407	0	0	298
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	14.8		41.3			41.3
Effective Green, g (s)	14.8		41.3			41.3
Actuated g/C Ratio	0.16		0.46			0.46
Clearance Time (s)	5.2		5.7			5.7
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	271		742			550
v/s Ratio Prot	c0.08		c0.25			
v/s Ratio Perm						0.25
v/c Ratio	0.46		0.55			0.54
Uniform Delay, d1	34.0		17.6			17.5
Progression Factor	1.00		0.41			0.59
Incremental Delay, d2	5.6		2.5			3.6
Delay (s)	39.6		9.8			14.0
Level of Service	D		A			B
Approach Delay (s)	39.6		9.8			14.0
Approach LOS	D		A			B

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	305	68	118	145	251
Average Queue (ft)	124	18	44	64	95
95th Queue (ft)	226	51	97	118	197
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					0
Queuing Penalty (veh)					1
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	128	136	154
Average Queue (ft)	50	48	51
95th Queue (ft)	100	104	109
Link Distance (ft)	470	246	280
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	150	199	246
Average Queue (ft)	68	77	102
95th Queue (ft)	121	159	216
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		0	2
Queuing Penalty (veh)		1	7
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	143	318	178
Average Queue (ft)	66	142	71
95th Queue (ft)	118	243	138
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	149	280	84	54	122	176
Average Queue (ft)	63	137	38	4	49	80
95th Queue (ft)	118	250	69	33	95	140
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		7				
Queuing Penalty (veh)		0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 1008: State St & Huron St (I-94BL)

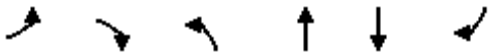
Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	370	363	237	230	74	137	105	280
Average Queue (ft)	204	196	114	95	27	56	69	117
95th Queue (ft)	302	295	183	177	63	109	118	229
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					100		80	
Storage Blk Time (%)					0	2	8	16
Queuing Penalty (veh)					0	1	20	20

Network Summary

Network wide Queuing Penalty: 52

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7			5.7
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	0.99		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.95			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1678		1671			1804
Flt Permitted	0.97		1.00			0.72
Satd. Flow (perm)	1678		1671			1305
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	179	91	328	187	53	310
RTOR Reduction (vph)	20	0	23	0	0	0
Lane Group Flow (vph)	250	0	492	0	0	363
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	17.8		38.3			38.3
Effective Green, g (s)	17.8		38.3			38.3
Actuated g/C Ratio	0.20		0.43			0.43
Clearance Time (s)	5.2		5.7			5.7
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	331		711			555
v/s Ratio Prot	c0.15		c0.29			
v/s Ratio Perm						0.28
v/c Ratio	0.76		0.69			0.65
Uniform Delay, d1	34.0		21.0			20.6
Progression Factor	1.00		0.63			0.81
Incremental Delay, d2	14.8		3.0			5.6
Delay (s)	48.8		16.3			22.2
Level of Service	D		B			C
Approach Delay (s)	48.8		16.3			22.2
Approach LOS	D		B			C

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	93	110	239	196	83
Future Volume (vph)	50	93	110	239	196	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.3	5.3	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	1.00			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.91			1.00	0.96	
Flt Protected	0.98			0.98	1.00	
Satd. Flow (prot)	1681			1781	1790	
Flt Permitted	0.98			0.71	1.00	
Satd. Flow (perm)	1681			1290	1790	
Peak-hour factor, PHF	0.92	0.92	0.90	0.90	0.89	0.89
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	58	107	130	281	233	99
RTOR Reduction (vph)	74	0	0	0	17	0
Lane Group Flow (vph)	91	0	0	411	315	0
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	2%	1%	5%	5%	0%	4%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	17.0			42.7	42.7	
Effective Green, g (s)	17.0			42.7	42.7	
Actuated g/C Ratio	0.19			0.47	0.47	
Clearance Time (s)	5.0			5.3	5.3	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	317			612	849	
v/s Ratio Prot	c0.05				0.18	
v/s Ratio Perm				c0.32		
v/c Ratio	0.29			0.67	0.37	
Uniform Delay, d1	31.3			18.2	15.1	
Progression Factor	1.00			0.50	0.77	
Incremental Delay, d2	2.3			4.0	1.1	
Delay (s)	33.6			13.1	12.7	
Level of Service	C			B	B	
Approach Delay (s)	33.6			13.1	12.7	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	255	278	78	59	101	270	26
Average Queue (ft)	98	123	33	3	46	118	2
95th Queue (ft)	194	229	62	34	83	222	23
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		6				2	
Queuing Penalty (veh)		0				4	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 33: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	276	209	261
Average Queue (ft)	136	143	189
95th Queue (ft)	239	234	305
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		4	21
Queuing Penalty (veh)		18	66
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	349	196	334	290	250
Average Queue (ft)	124	47	154	130	122
95th Queue (ft)	295	123	264	255	234
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)	2			2	5
Queuing Penalty (veh)	0			5	18
Storage Bay Dist (ft)		150			
Storage Blk Time (%)		3	8		
Queuing Penalty (veh)		11	5		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	390	251	275
Average Queue (ft)	172	129	136
95th Queue (ft)	449	238	275
Link Distance (ft)	470	246	280
Upstream Blk Time (%)	14	1	9
Queuing Penalty (veh)	0	5	28
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

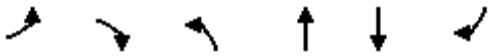
Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	241	685	24	203
Average Queue (ft)	107	340	2	129
95th Queue (ft)	195	628	21	204
Link Distance (ft)	472	720	233	192
Upstream Blk Time (%)		2		2
Queuing Penalty (veh)		7		11
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	242	268	602	591	137	149	190	433
Average Queue (ft)	131	127	259	251	59	70	68	191
95th Queue (ft)	216	229	545	531	108	124	173	406
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								4
Queuing Penalty (veh)								0
Storage Bay Dist (ft)					100		115	
Storage Blk Time (%)					2	5	0	33
Queuing Penalty (veh)					4	4	0	22

Network Summary

Network wide Queuing Penalty: 208

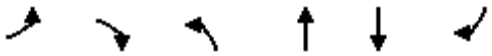


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	34	71	43	166	167	43
Future Volume (vph)	34	71	43	166	167	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.3	5.3	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.91			1.00	0.97	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1570			1692	1674	
Flt Permitted	0.98			0.89	1.00	
Satd. Flow (perm)	1570			1517	1674	
Peak-hour factor, PHF	0.77	0.77	0.90	0.90	0.78	0.78
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	47	98	51	196	227	58
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	145	0	0	247	285	0
Confl. Bikes (#/hr)		4				8
Heavy Vehicles (%)	0%	9%	8%	12%	11%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	15.0			44.7	44.7	
Effective Green, g (s)	15.0			44.7	44.7	
Actuated g/C Ratio	0.17			0.50	0.50	
Clearance Time (s)	5.0			5.3	5.3	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	261			753	831	
v/s Ratio Prot	c0.09				c0.17	
v/s Ratio Perm				0.16		
v/c Ratio	0.56			0.33	0.34	
Uniform Delay, d1	34.4			13.6	13.7	
Progression Factor	1.00			0.55	0.72	
Incremental Delay, d2	8.3			0.9	1.1	
Delay (s)	42.7			8.5	10.9	
Level of Service	D			A	B	
Approach Delay (s)	42.7			8.5	10.9	
Approach LOS	D			A	B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7			5.7
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	1.00		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.92			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1648		1619			1753
Flt Permitted	0.97		1.00			0.67
Satd. Flow (perm)	1648		1619			1199
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	95	53	202	255	82	216
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	148	0	457	0	0	298
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	14.8		41.3			41.3
Effective Green, g (s)	14.8		41.3			41.3
Actuated g/C Ratio	0.16		0.46			0.46
Clearance Time (s)	5.2		5.7			5.7
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	271		742			550
v/s Ratio Prot	c0.09		c0.28			
v/s Ratio Perm						0.25
v/c Ratio	0.55		0.62			0.54
Uniform Delay, d1	34.5		18.4			17.5
Progression Factor	1.00		0.47			0.69
Incremental Delay, d2	7.7		3.3			3.5
Delay (s)	42.2		11.9			15.6
Level of Service	D		B			B
Approach Delay (s)	42.2		11.9			15.6
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	52	42	47	340	187	34
Future Volume (vph)	52	42	47	340	187	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3			5.5	5.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	1.00			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.94			1.00	0.95	
Flt Protected	0.97			0.99	1.00	
Satd. Flow (prot)	1551			1761	1655	
Flt Permitted	0.97			0.92	1.00	
Satd. Flow (perm)	1551			1622	1655	
Peak-hour factor, PHF	0.90	0.90	0.93	0.93	0.90	0.25
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	61	49	54	388	220	144
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	110	0	0	442	364	0
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	8%	17%	9%	7%	5%	12%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	14.7			44.5	44.5	
Effective Green, g (s)	14.7			44.5	44.5	
Actuated g/C Ratio	0.16			0.49	0.49	
Clearance Time (s)	5.3			5.5	5.5	
Vehicle Extension (s)	3.0			4.0	4.0	
Lane Grp Cap (vph)	253			801	818	
v/s Ratio Prot	c0.07				0.22	
v/s Ratio Perm				c0.27		
v/c Ratio	0.43			0.55	0.44	
Uniform Delay, d1	33.9			15.8	14.7	
Progression Factor	1.00			1.00	0.87	
Incremental Delay, d2	5.4			2.7	1.6	
Delay (s)	39.3			18.5	14.3	
Level of Service	D			B	B	
Approach Delay (s)	39.3			18.5	14.3	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	270	64	137	156	232
Average Queue (ft)	115	17	48	72	92
95th Queue (ft)	210	50	107	138	183
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	218	164	175
Average Queue (ft)	82	59	57
95th Queue (ft)	168	122	125
Link Distance (ft)	470	246	280
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	166	176	250
Average Queue (ft)	83	78	131
95th Queue (ft)	148	153	239
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		0	4
Queuing Penalty (veh)		2	12
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	149	353	187
Average Queue (ft)	69	170	87
95th Queue (ft)	129	284	162
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	157	300	128	172	115	211	12
Average Queue (ft)	59	164	41	31	48	85	0
95th Queue (ft)	112	300	86	151	86	157	3
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		18		7		0	
Queuing Penalty (veh)		0		0		0	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 1008: State St & Huron St (I-94BL)

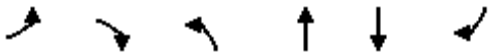
Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	327	344	205	194	81	156	105	314
Average Queue (ft)	188	184	103	88	27	61	71	117
95th Queue (ft)	281	289	171	159	61	122	122	233
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					100		80	
Storage Blk Time (%)					0	5	9	17
Queuing Penalty (veh)					0	2	21	22

Network Summary

Network wide Queuing Penalty: 60

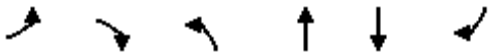
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2		5.7			5.7
Lane Util. Factor	1.00		1.00			1.00
Frpb, ped/bikes	0.99		0.99			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.95		0.95			1.00
Flt Protected	0.97		1.00			0.99
Satd. Flow (prot)	1678		1671			1804
Flt Permitted	0.97		1.00			0.72
Satd. Flow (perm)	1678		1671			1305
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	179	91	328	187	53	310
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	270	0	515	0	0	363
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot		NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases					2	
Actuated Green, G (s)	17.8		38.3			38.3
Effective Green, g (s)	17.8		38.3			38.3
Actuated g/C Ratio	0.20		0.43			0.43
Clearance Time (s)	5.2		5.7			5.7
Vehicle Extension (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	331		711			555
v/s Ratio Prot	c0.16		c0.31			
v/s Ratio Perm						0.28
v/c Ratio	0.82		0.72			0.65
Uniform Delay, d1	34.5		21.5			20.6
Progression Factor	1.00		0.89			0.88
Incremental Delay, d2	19.5		3.1			5.5
Delay (s)	54.0		22.1			23.6
Level of Service	D		C			C
Approach Delay (s)	54.0		22.1			23.6
Approach LOS	D		C			C

Intersection Summary			
HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	50	93	110	239	196	83
Future Volume (vph)	50	93	110	239	196	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.3	5.3	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	1.00			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.91			1.00	0.96	
Flt Protected	0.98			0.98	1.00	
Satd. Flow (prot)	1681			1781	1790	
Flt Permitted	0.98			0.71	1.00	
Satd. Flow (perm)	1681			1290	1790	
Peak-hour factor, PHF	0.92	0.92	0.90	0.90	0.89	0.89
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	58	107	130	281	233	99
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	165	0	0	411	332	0
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	2%	1%	5%	5%	0%	4%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	17.0			42.7	42.7	
Effective Green, g (s)	17.0			42.7	42.7	
Actuated g/C Ratio	0.19			0.47	0.47	
Clearance Time (s)	5.0			5.3	5.3	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	317			612	849	
v/s Ratio Prot	c0.10				0.19	
v/s Ratio Perm				c0.32		
v/c Ratio	0.52			0.67	0.39	
Uniform Delay, d1	32.8			18.2	15.3	
Progression Factor	1.00			0.46	0.78	
Incremental Delay, d2	6.0			3.8	1.2	
Delay (s)	38.8			12.2	13.2	
Level of Service	D			B	B	
Approach Delay (s)	38.8			12.2	13.2	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	89	114	352	324	67
Future Volume (vph)	68	89	114	352	324	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3			5.5	5.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.99			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.92			1.00	0.98	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1611			1779	1832	
Flt Permitted	0.98			0.61	1.00	
Satd. Flow (perm)	1611			1093	1832	
Peak-hour factor, PHF	0.80	0.80	0.95	0.95	0.82	0.82
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	90	118	127	393	419	87
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	208	0	0	520	506	0
Confl. Bikes (#/hr)		1				7
Heavy Vehicles (%)	3%	7%	4%	6%	0%	5%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	7			2	2	
Permitted Phases			2			
Actuated Green, G (s)	13.7			45.5	45.5	
Effective Green, g (s)	13.7			45.5	45.5	
Actuated g/C Ratio	0.15			0.51	0.51	
Clearance Time (s)	5.3			5.5	5.5	
Vehicle Extension (s)	3.0			4.0	4.0	
Lane Grp Cap (vph)	245			552	926	
v/s Ratio Prot	c0.13				0.28	
v/s Ratio Perm				c0.48		
v/c Ratio	0.85			0.94	0.55	
Uniform Delay, d1	37.1			21.0	15.2	
Progression Factor	1.00			1.00	0.98	
Incremental Delay, d2	29.0			26.4	1.7	
Delay (s)	66.1			47.4	16.6	
Level of Service	E			D	B	
Approach Delay (s)	66.1			47.4	16.6	
Approach LOS	E			D	B	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	224	281	106	148	105	277	25
Average Queue (ft)	90	143	34	21	47	118	1
95th Queue (ft)	165	276	77	121	85	220	13
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		14		5		2	
Queuing Penalty (veh)		0		0		5	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 33: State St & N. University Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	273	209	265
Average Queue (ft)	144	169	190
95th Queue (ft)	238	242	307
Link Distance (ft)	472	192	246
Upstream Blk Time (%)		15	20
Queuing Penalty (veh)		65	62
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	299	175	332	253	248
Average Queue (ft)	118	48	158	110	114
95th Queue (ft)	257	118	274	211	229
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)	0			1	3
Queuing Penalty (veh)	0			2	9
Storage Bay Dist (ft)		150			
Storage Blk Time (%)		0	10		
Queuing Penalty (veh)		2	6		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	425	253	291
Average Queue (ft)	155	124	139
95th Queue (ft)	353	228	276
Link Distance (ft)	470	246	280
Upstream Blk Time (%)	2	2	5
Queuing Penalty (veh)	0	9	16
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	382	774	144	205
Average Queue (ft)	189	447	18	114
95th Queue (ft)	401	773	113	185
Link Distance (ft)	472	720	233	192
Upstream Blk Time (%)	4	10	1	1
Queuing Penalty (veh)	0	42	4	4
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	208	202	388	373	144	180	190	430
Average Queue (ft)	126	125	214	200	58	76	69	183
95th Queue (ft)	190	199	349	329	114	145	179	383
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)						0		4
Queuing Penalty (veh)						0		0
Storage Bay Dist (ft)					100		115	
Storage Blk Time (%)					3	5	0	32
Queuing Penalty (veh)					4	5	0	22

Network Summary

Network wide Queuing Penalty: 257

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.2	5.7			5.7
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.92			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1687	1538	1619			1753
Flt Permitted	0.95	1.00	1.00			0.67
Satd. Flow (perm)	1687	1538	1619			1199
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	95	53	202	255	82	216
RTOR Reduction (vph)	0	44	50	0	0	0
Lane Group Flow (vph)	95	9	407	0	0	298
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases		3			2	
Actuated Green, G (s)	14.8	14.8	41.3			41.3
Effective Green, g (s)	14.8	14.8	41.3			41.3
Actuated g/C Ratio	0.16	0.16	0.46			0.46
Clearance Time (s)	5.2	5.2	5.7			5.7
Vehicle Extension (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	277	252	742			550
v/s Ratio Prot	c0.06		c0.25			
v/s Ratio Perm		0.01				0.25
v/c Ratio	0.34	0.03	0.55			0.54
Uniform Delay, d1	33.3	31.6	17.6			17.5
Progression Factor	1.00	1.00	0.41			0.59
Incremental Delay, d2	3.4	0.3	2.5			3.6
Delay (s)	36.6	31.9	9.8			14.0
Level of Service	D	C	A			B
Approach Delay (s)	34.9		9.8			14.0
Approach LOS	C		A			B

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	274	80	120	160	236
Average Queue (ft)	131	20	43	71	103
95th Queue (ft)	224	59	96	133	204
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					1
Queuing Penalty (veh)					3
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	197	127	218
Average Queue (ft)	64	47	68
95th Queue (ft)	145	105	178
Link Distance (ft)	470	234	280
Upstream Blk Time (%)			2
Queuing Penalty (veh)			4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	111	75	196	248
Average Queue (ft)	50	26	74	120
95th Queue (ft)	96	59	154	241
Link Distance (ft)		472	192	234
Upstream Blk Time (%)			0	6
Queuing Penalty (veh)			1	19
Storage Bay Dist (ft)	100			
Storage Blk Time (%)	1	0		
Queuing Penalty (veh)	1	0		

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	166	401	174
Average Queue (ft)	66	156	75
95th Queue (ft)	123	296	140
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	134	309	157	127	103	241	14
Average Queue (ft)	57	157	41	19	43	91	0
95th Queue (ft)	105	286	97	112	78	174	10
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		14		3		1	
Queuing Penalty (veh)		0		0		1	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	331	330	190	166	108	159	105	357
Average Queue (ft)	192	183	106	90	24	59	70	136
95th Queue (ft)	294	288	165	153	68	112	119	280
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (ft)					100		80	
Storage Blk Time (%)						3	8	23
Queuing Penalty (veh)						1	17	27

Network Summary

Network wide Queuing Penalty: 76

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.2	5.7			5.7
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	0.97	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.95			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1770	1471	1671			1804
Flt Permitted	0.95	1.00	1.00			0.72
Satd. Flow (perm)	1770	1471	1671			1305
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	179	91	328	187	53	310
RTOR Reduction (vph)	0	73	23	0	0	0
Lane Group Flow (vph)	179	18	492	0	0	363
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases		3			2	
Actuated Green, G (s)	17.8	17.8	38.3			38.3
Effective Green, g (s)	17.8	17.8	38.3			38.3
Actuated g/C Ratio	0.20	0.20	0.43			0.43
Clearance Time (s)	5.2	5.2	5.7			5.7
Vehicle Extension (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	350	290	711			555
v/s Ratio Prot	c0.10		c0.29			
v/s Ratio Perm		0.01				0.28
v/c Ratio	0.51	0.06	0.69			0.65
Uniform Delay, d1	32.2	29.3	21.0			20.6
Progression Factor	1.00	1.00	0.63			0.81
Incremental Delay, d2	5.3	0.4	3.0			5.6
Delay (s)	37.5	29.7	16.3			22.2
Level of Service	D	C	B			C
Approach Delay (s)	34.9		16.3			22.2
Approach LOS	C		B			C

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB	B117
Directions Served	LR	T	R	T	L	T	T
Maximum Queue (ft)	211	301	64	112	108	221	8
Average Queue (ft)	106	155	33	20	45	113	0
95th Queue (ft)	208	296	56	108	84	193	6
Link Distance (ft)	459	212	212	201	233	233	720
Upstream Blk Time (%)		18		3		1	
Queuing Penalty (veh)		0		0		1	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 33: State St & N. University Ave

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	146	184	208	254
Average Queue (ft)	86	48	149	190
95th Queue (ft)	137	118	236	299
Link Distance (ft)		472	192	234
Upstream Blk Time (%)			7	23
Queuing Penalty (veh)			33	69
Storage Bay Dist (ft)	100			
Storage Blk Time (%)	11	1		
Queuing Penalty (veh)	9	2		

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	300	201	358	301	239
Average Queue (ft)	109	52	165	118	112
95th Queue (ft)	241	144	304	248	222
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)	0		1	2	4
Queuing Penalty (veh)	0		0	8	13
Storage Bay Dist (ft)		150			
Storage Blk Time (%)		3	10		
Queuing Penalty (veh)		11	6		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	281	240	283
Average Queue (ft)	132	117	141
95th Queue (ft)	344	229	283
Link Distance (ft)	470	234	280
Upstream Blk Time (%)	5	4	7
Queuing Penalty (veh)	0	14	21
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

Movement	EB	NB	B117	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	224	709	140	204
Average Queue (ft)	108	380	19	130
95th Queue (ft)	194	742	118	200
Link Distance (ft)	472	720	233	192
Upstream Blk Time (%)		9	1	1
Queuing Penalty (veh)		38	5	6
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	208	211	452	438	133	173	189	356
Average Queue (ft)	123	117	225	215	55	76	63	167
95th Queue (ft)	186	189	366	359	106	139	157	332
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)						0		5
Queuing Penalty (veh)						0		0
Storage Bay Dist (ft)					100		115	
Storage Blk Time (%)					2	6	0	30
Queuing Penalty (veh)					3	6	1	19

Network Summary

Network wide Queuing Penalty: 266

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	75	42	168	212	59	155
Future Volume (vph)	75	42	168	212	59	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.2	5.7			5.7
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.92			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1687	1538	1619			1753
Flt Permitted	0.95	1.00	1.00			0.67
Satd. Flow (perm)	1687	1538	1619			1199
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.76	0.76
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	95	53	202	255	82	216
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	95	53	457	0	0	298
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	7%	5%	5%	9%	12%	5%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases		3			2	
Actuated Green, G (s)	14.8	14.8	41.3			41.3
Effective Green, g (s)	14.8	14.8	41.3			41.3
Actuated g/C Ratio	0.16	0.16	0.46			0.46
Clearance Time (s)	5.2	5.2	5.7			5.7
Vehicle Extension (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	277	252	742			550
v/s Ratio Prot	c0.06		c0.28			
v/s Ratio Perm		0.03				0.25
v/c Ratio	0.34	0.21	0.62			0.54
Uniform Delay, d1	33.3	32.5	18.4			17.5
Progression Factor	1.00	1.00	0.56			0.69
Incremental Delay, d2	3.4	1.9	3.3			3.5
Delay (s)	36.6	34.4	13.7			15.6
Level of Service	D	C	B			B
Approach Delay (s)	35.9		13.7			15.6
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 105: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	268	74	130	145	194
Average Queue (ft)	122	22	43	66	88
95th Queue (ft)	221	59	97	122	171
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)					1
Queuing Penalty (veh)					2
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 109: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	312	126	225
Average Queue (ft)	127	54	73
95th Queue (ft)	347	108	179
Link Distance (ft)	470	234	280
Upstream Blk Time (%)	6		1
Queuing Penalty (veh)	0		3
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 111: State St & N. University Ave

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	123	95	205	250
Average Queue (ft)	52	35	95	129
95th Queue (ft)	107	76	188	254
Link Distance (ft)		472	192	234
Upstream Blk Time (%)			1	10
Queuing Penalty (veh)			3	28
Storage Bay Dist (ft)	100			
Storage Blk Time (%)	3	1		
Queuing Penalty (veh)	1	0		

Intersection: 112: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	156	289	177
Average Queue (ft)	73	146	75
95th Queue (ft)	135	248	147
Link Distance (ft)	472	720	192
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 115: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	122	288	121	143	121	167
Average Queue (ft)	59	156	42	22	48	83
95th Queue (ft)	101	288	87	119	89	140
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		17		3		
Queuing Penalty (veh)		0		0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	327	320	225	217	124	155	105	246
Average Queue (ft)	193	187	107	88	29	60	67	109
95th Queue (ft)	280	276	173	167	78	114	117	210
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					100		80	
Storage Blk Time (%)					0	3	9	15
Queuing Penalty (veh)					1	1	21	19

Network Summary

Network wide Queuing Penalty: 80

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	150	76	272	155	42	246
Future Volume (vph)	150	76	272	155	42	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	5.2	5.7			5.7
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	0.97	0.99			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	0.95			1.00
Flt Protected	0.95	1.00	1.00			0.99
Satd. Flow (prot)	1770	1471	1671			1804
Flt Permitted	0.95	1.00	1.00			0.72
Satd. Flow (perm)	1770	1471	1671			1305
Peak-hour factor, PHF	0.89	0.89	0.88	0.88	0.84	0.84
Growth Factor (vph)	106%	106%	106%	106%	106%	106%
Adj. Flow (vph)	179	91	328	187	53	310
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	179	91	515	0	0	363
Confl. Bikes (#/hr)		3		12		
Heavy Vehicles (%)	2%	7%	4%	12%	2%	5%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	3		2			2
Permitted Phases		3			2	
Actuated Green, G (s)	17.8	17.8	38.3			38.3
Effective Green, g (s)	17.8	17.8	38.3			38.3
Actuated g/C Ratio	0.20	0.20	0.43			0.43
Clearance Time (s)	5.2	5.2	5.7			5.7
Vehicle Extension (s)	4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	350	290	711			555
v/s Ratio Prot	c0.10		c0.31			
v/s Ratio Perm		0.06				0.28
v/c Ratio	0.51	0.31	0.72			0.65
Uniform Delay, d1	32.2	30.9	21.5			20.6
Progression Factor	1.00	1.00	0.66			0.88
Incremental Delay, d2	5.3	2.8	3.4			5.5
Delay (s)	37.5	33.7	17.6			23.7
Level of Service	D	C	B			C
Approach Delay (s)	36.2		17.6			23.7
Approach LOS	D		B			C

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 3: State St & S. University Ave

Movement	WB	NB	NB	B118	SB	SB
Directions Served	LR	T	R	T	L	T
Maximum Queue (ft)	224	269	63	69	113	238
Average Queue (ft)	97	128	33	9	51	112
95th Queue (ft)	184	243	56	78	90	194
Link Distance (ft)	459	212	212	201	233	233
Upstream Blk Time (%)		7		2		0
Queuing Penalty (veh)		0		0		1
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 33: State St & N. University Ave

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	149	227	209	254
Average Queue (ft)	92	69	157	183
95th Queue (ft)	145	168	244	292
Link Distance (ft)		472	192	234
Upstream Blk Time (%)			7	18
Queuing Penalty (veh)			34	55
Storage Bay Dist (ft)	100			
Storage Blk Time (%)	14	3		
Queuing Penalty (veh)	11	4		

Intersection: 35: State St & Washington St

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	261	218	296	270	245
Average Queue (ft)	100	45	152	107	110
95th Queue (ft)	201	123	254	222	210
Link Distance (ft)	464		466	280	244
Upstream Blk Time (%)				1	1
Queuing Penalty (veh)				2	3
Storage Bay Dist (ft)		150			
Storage Blk Time (%)		0	9		
Queuing Penalty (veh)		1	5		

Intersection: 106: State St & Liberty St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	303	250	287
Average Queue (ft)	118	131	127
95th Queue (ft)	258	245	248
Link Distance (ft)	470	234	280
Upstream Blk Time (%)	1	3	3
Queuing Penalty (veh)	0	12	8
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 108: State St & William St

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	243	665	206
Average Queue (ft)	112	352	131
95th Queue (ft)	212	618	206
Link Distance (ft)	472	720	192
Upstream Blk Time (%)		0	2
Queuing Penalty (veh)		1	10
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 1008: State St & Huron St (I-94BL)

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	217	216	384	379	140	147	190	360
Average Queue (ft)	127	121	211	205	53	66	68	159
95th Queue (ft)	193	194	333	328	101	121	164	304
Link Distance (ft)	1348	1348	1419	1419		244		458
Upstream Blk Time (%)								0
Queuing Penalty (veh)								0
Storage Bay Dist (ft)					100		115	
Storage Blk Time (%)					2	4	1	30
Queuing Penalty (veh)					4	4	1	19

Network Summary

Network wide Queuing Penalty: 177

APPENDIX F. PEDESTRIAN AND BICYCLE LOS WORKSHEETS

Approach	EB	WB	NB	SB
Crosswalk Length (ft)	36.2	36.3	24.0	36.1
Crosswalk Width (ft)	12.0	12.0	12.0	12.0
Total Number of Lanes Crossed	2	3	2	2
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	2	2	4	4
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (mph)	25	25	25	25
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.92	2.11	1.91	1.93
Pedestrian Crosswalk LOS	B	B	B	B

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	338	152	237	279
Effct. Green for Bike (s)	39.4	39.4	39.4	39.4
Cross Street Width (ft)	24.0	36.1	36.3	36.2
Through Lanes Number	1	1	1	1
Through Lane Width (ft)	12.0	12.0	12.0	12.0
Bicycle Lane Width (ft)	0.0	0.0	0.0	0.0
Striped Parking Lane Width (ft)	0.0	0.0	0.0	0.0
Paved Shoulder Width (ft)	0.0	0.0	0.0	0.0
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	876	876	876	876
Bicycle Delay (s/bike)	14.2	14.2	14.2	14.2
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	2.48	2.36	2.51	2.57
Bicycle LOS	B	B	C	C

Approach	EB	NB	SB
Crosswalk Length (ft)	24.1	24.0	24.0
Crosswalk Width (ft)	12.0	12.0	12.0
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	7	2
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (mph)	25	25	25
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.82	1.94	1.93
Pedestrian Crosswalk LOS	B	B	B

Approach	EB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	136	232	269
Effct. Green for Bike (s)	7.5	63.3	63.3
Cross Street Width (ft)	24.0	24.0	24.1
Through Lanes Number	1	1	1
Through Lane Width (ft)	12.0	12.0	12.0
Bicycle Lane Width (ft)	0.0	0.0	0.0
Striped Parking Lane Width (ft)	0.0	0.0	0.0
Paved Shoulder Width (ft)	0.0	0.0	0.0
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	167	1407	1407
Bicycle Delay (s/bike)	37.8	4.0	4.0
Bicycle Compliance	Poor	Good	Good
Bicycle LOS Score	2.15	2.31	2.37
Bicycle LOS	B	B	B

Approach	WB	NB	SB
Crosswalk Length (ft)	24.0	24.0	24.0
Crosswalk Width (ft)	12.0	12.0	12.0
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	2	3
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (mph)	25	25	25
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.91	2.02	1.94
Pedestrian Crosswalk LOS	B	B	B

Approach	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	139	432	282
Effct. Green for Bike (s)	17.4	55.4	55.4
Cross Street Width (ft)	24.0	24.0	24.0
Through Lanes Number	1	1	1
Through Lane Width (ft)	12.0	12.0	12.0
Bicycle Lane Width (ft)	0.0	0.0	0.0
Striped Parking Lane Width (ft)	0.0	0.0	0.0
Paved Shoulder Width (ft)	0.0	0.0	0.0
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	387	1231	1231
Bicycle Delay (s/bike)	29.3	6.7	6.7
Bicycle Compliance	Fair	Good	Good
Bicycle LOS Score	2.16	2.64	2.39
Bicycle LOS	B	C	B

Approach	EB	NB	SB
Crosswalk Length (ft)	24.0	24.0	24.0
Crosswalk Width (ft)	12.0	12.0	12.0
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	7	2
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (mph)	25	25	25
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.84	2.00	2.04
Pedestrian Crosswalk LOS	B	B	B

Approach	EB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	105	417	344
Effct. Green for Bike (s)	22.4	50.4	50.4
Cross Street Width (ft)	24.0	24.0	24.0
Through Lanes Number	1	1	1
Through Lane Width (ft)	12.0	12.0	12.0
Bicycle Lane Width (ft)	0.0	0.0	0.0
Striped Parking Lane Width (ft)	0.0	0.0	0.0
Paved Shoulder Width (ft)	0.0	0.0	0.0
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	498	1120	1120
Bicycle Delay (s/bike)	25.4	8.7	8.7
Bicycle Compliance	Fair	Good	Good
Bicycle LOS Score	2.10	2.61	2.49
Bicycle LOS	B	C	B

Approach	WB	NB	SB
Crosswalk Length (ft)	24.0	24.0	24.0
Crosswalk Width (ft)	12.0	12.0	12.0
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	2	3
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (mph)	25	25	25
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.92	2.11	2.02
Pedestrian Crosswalk LOS	B	B	B

Approach	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	254	485	343
Effct. Green for Bike (s)	22.4	50.4	50.4
Cross Street Width (ft)	24.0	24.0	24.0
Through Lanes Number	1	1	1
Through Lane Width (ft)	12.0	12.0	12.0
Bicycle Lane Width (ft)	0.0	0.0	0.0
Striped Parking Lane Width (ft)	0.0	0.0	0.0
Paved Shoulder Width (ft)	0.0	0.0	0.0
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	498	1120	1120
Bicycle Delay (s/bike)	25.4	8.7	8.7
Bicycle Compliance	Fair	Good	Good
Bicycle LOS Score	2.35	2.73	2.49
Bicycle LOS	B	C	B

Approach	EB	WB	NB	SB
Crosswalk Length (ft)	36.2	36.3	24.0	36.1
Crosswalk Width (ft)	12.0	12.0	12.0	12.0
Total Number of Lanes Crossed	2	3	2	2
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	2	2	4	4
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (mph)	25	25	25	25
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.00	2.13	1.99	1.98
Pedestrian Crosswalk LOS	B	B	B	B

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	217	463	320	315
Effct. Green for Bike (s)	39.4	39.4	39.4	39.4
Cross Street Width (ft)	24.0	36.1	36.3	36.2
Through Lanes Number	1	1	1	1
Through Lane Width (ft)	12.0	12.0	12.0	12.0
Bicycle Lane Width (ft)	0.0	0.0	0.0	0.0
Striped Parking Lane Width (ft)	0.0	0.0	0.0	0.0
Paved Shoulder Width (ft)	0.0	0.0	0.0	0.0
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	876	876	876	876
Bicycle Delay (s/bike)	14.2	14.2	14.2	14.2
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	2.28	2.88	2.64	2.63
Bicycle LOS	B	C	C	C

Approach	EB	NB	SB
Crosswalk Length (ft)	24.1	24.0	24.0
Crosswalk Width (ft)	12.0	12.0	12.0
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	7	2
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (mph)	25	25	25
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.88	2.01	1.98
Pedestrian Crosswalk LOS	B	B	B

Approach	EB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	155	388	313
Effct. Green for Bike (s)	10.7	60.1	60.1
Cross Street Width (ft)	24.0	24.0	24.1
Through Lanes Number	1	1	1
Through Lane Width (ft)	12.0	12.0	12.0
Bicycle Lane Width (ft)	0.0	0.0	0.0
Striped Parking Lane Width (ft)	0.0	0.0	0.0
Paved Shoulder Width (ft)	0.0	0.0	0.0
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	238	1336	1336
Bicycle Delay (s/bike)	34.9	5.0	5.0
Bicycle Compliance	Poor	Good	Good
Bicycle LOS Score	2.18	2.57	2.44
Bicycle LOS	B	C	B

Approach	EB	NB	SB
Crosswalk Length (ft)	24.0	24.0	24.0
Crosswalk Width (ft)	12.0	12.0	12.0
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	7	2
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (mph)	25	25	25
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.89	2.13	2.10
Pedestrian Crosswalk LOS	B	B	B

Approach	EB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	196	491	477
Effct. Green for Bike (s)	23.4	49.4	49.4
Cross Street Width (ft)	24.0	24.0	24.0
Through Lanes Number	1	1	1
Through Lane Width (ft)	12.0	12.0	12.0
Bicycle Lane Width (ft)	0.0	0.0	0.0
Striped Parking Lane Width (ft)	0.0	0.0	0.0
Paved Shoulder Width (ft)	0.0	0.0	0.0
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	520	1098	1098
Bicycle Delay (s/bike)	24.6	9.2	9.2
Bicycle Compliance	Fair	Good	Good
Bicycle LOS Score	2.25	2.74	2.71
Bicycle LOS	B	C	C