APPENDIX A:

RESUME OF STUDY PREPARER

WILLIAM A. STIMPSON, P.E.

Senior Traffic Engineer

PROFESSIONAL EXPERIENCE

Two degrees in civil engineering and 47 years of experience in transportation and traffic engineering, specializing in traffic safety and site planning. Traffic safety work has included driver performance research, facility safety auditing, and crash litigation support. Site planning work has included plan development and review, traffic impact analysis, and access management. Has also dealt with parking, ridesharing and bicycling incentives, and freight transportation. Registered Professional Engineer in Michigan since 1980 and expert witness since 1987. Practical experience as a countywide Traffic Engineering Supervisor, 1991-93.

1998 to Present GIFFELS WEBSTER (formerly Clearzoning/Birchler Arroyo Associates) – Washington, Michigan
Senior Traffic Engineer

Mr. Stimpson has performed traffic reviews of hundreds of site plans; prepared shared parking studies, thoroughfare plans, crash data studies, corridor safety evaluations, and access management studies; conducted and reviewed numerous traffic impact studies; and completed signal warrant evaluations and cut-through traffic studies for both public and private clients. He has also investigated individual traffic crashes relative to alleged highway-tort, premises, and/or personal liability, and has provided expert testimony as needed. Mr. Stimpson:

- Is a skilled site plan reviewer, providing valuable advice to municipalities and private developers. His comprehensive traffic review of a site plan can dramatically improve on-site circulation, access to and from the public road network, and pedestrian safety. He is also an expert in shared parking analysis, offering the ability to reduce unnecessary impervious surface area and increase site efficiency.
- Has provided traffic engineering, parking, and safety consulting services to several Michigan communities, including the cities of Novi, Rochester, Woodhaven, and Lathrup Village; townships of Shelby, Grand Blanc, and Lenox; and villages of Bingham Farms and Mattawan.
- Formulated a new comprehensive policy for traffic impact studies (subsequently adopted by several client communities); reviews such studies for our municipal clients; and prepares such studies for our private clients.
- Developed access management plans for Southfield Road in Lathrup Village; Van Dyke Avenue in Shelby Township; M-24 in Lapeer County; Novi Road in Novi; and Allen and West Roads in Woodhaven.
- Consults nationally in crash litigation matters. Has deposition and trial experience in both civil and criminal cases. Court-accepted expert witness in traffic engineering and crash causation analysis.

1995 to 1998 WILLIAM A. STIMPSON, P.E. – Rochester, Michigan
Self-Employed Consultant

- Served as primary author of traffic safety manual for statewide use, under direction of the Southeast Michigan Council of Governments and sponsorship of Michigan's Office of Highway Safety Planning.
- Consulted nationally in crash litigation involving alleged personal and highway tort liability. Investigated crashes involving grade crossings, curves, trucks, pedestrians, and poor weather.
- Conducted and evaluated several traffic impact studies.

1993 to 1995 A/E GROUP, INC. – McLean, Virginia, Program Manager,
Federal Highway Administration Geometric Design Lab

- Set up and managed national lab to coordinate development of Interactive Highway Safety Design Model, a suite of CAD-interactive software for visualizing and assessing the safety of prospective highway designs.
- Edited research reports, set up studies on curve speeds and roadway design consistency, evaluated research proposals for driver performance model, and wrote paper on vehicle dynamics modeling.
- Organized and chaired national workshop on accident analysis methods. Also reviewed 250 police accident reports in search of causal factors.

1991 to 1993 ADA COUNTY HIGHWAY DISTRICT – Boise, Idaho
Traffic Engineering Supervisor

- Evaluated warrants for – and specified design and placement of – new signs, signals, and markings on ACHD's 1,500 miles of city streets and county roads.
- Oversaw design, construction, and/or operation of traffic signals at 260 intersections.
- Conceived and directed special traffic engineering and safety studies.
- Participated in conceptual planning and public-meeting review of all capital improvements.
- Evaluated traffic safety of all construction plans for intersections, roadways, and bridges.
- Approved traffic control plans for all significant road-related construction and maintenance.
- Evaluated traffic impacts of proposed land developments, and specified needed roadway and traffic control improvements.
- Analyzed traffic planning issues, such as downtown circulation and parking, new route and intersection alternatives, and regional pathways.

1987 to 1991 WILLIAM A. STIMPSON, P.E. – Rochester Hills, Michigan
Self-Employed Consultant

- As Ford Motor Company's Proving Ground Safety Consultant in 1990, reviewed all aspects of driving safety at the company's four domestic proving grounds. Recommended new traffic control devices and numerous roadside safety improvements.
- Consulted in accident litigation, investigating crashes involving a construction zone, winter conditions, grade crossings, intersection sight distance, curves, and obstacle visibility. Also analyzed mass crash data, looking for evidence of vehicle design and operational problems.
- Established relationship between driver age and frequency of vehicle rollover crashes.
- Conducted several traffic impact studies and developed site plans for two shopping centers.

1979 to 1986 GENERAL MOTORS RESEARCH LABORATORIES – Warren, Michigan,
Senior Research Engineer

- Researched crash causation, traffic signal coordination, in-vehicle navigation, and freight transportation.
- Used mass accident data to determine heavy-truck accident involvement trends, and to detect statistically different safety effects of alternative automobile bumper standards.
- Demonstrated through in-traffic measurements that re-timing and coordinating a network of vehicle-actuated traffic signals can reduce fuel use by as much as 15%.
- Established, for users of an in-vehicle navigation system, a relationship between excess travel and road network familiarity.
- Helped develop concept initially referred to as a "cooperative highway," where in-vehicle navigation, cellular communications, and computerized traffic control might improve travel efficiency and safety (a precursor to Intelligent Transportation Systems, or ITS).
- Developed analytic procedure for trading off receiving dock inventory and unloading costs.
- Helped develop, test, and implement a new production scheduling method proven to reduce finished vehicle logistics costs by as much a $1 million per year per assembly plant.

1974 to 1979 ALAN M. VOORHEES & ASSOCIATES – McLean, Virginia
Associate Engineer

- Managed and participated in studies of driver response to traffic control devices under various roadway design and environmental conditions; heavy truck safety; traffic operations; and parking.
- Directed development of accident-probability model based on traffic performance, and used model to evaluate alternative road delineation systems. Research led to new national standard for broken-line striping.
- Directed study of driver response to alternative durations of the yellow traffic signal.
- Assisted in comprehensive research study leading to national policy for right-turn-on-red.
- Evaluated benefits and costs of methods for alleviating adverse aerodynamic effects of large trucks.
- Compiled and analyzed data on 600 downgrade truck accidents.
- Directed comprehensive study of fringe parking lots for carpoolers at 150 lots in four states.

- Estimated cost-effectiveness of area-wide express bus service.
- Contributed to development of U.S. Capitol Hill Master Plan.
- Evaluated traffic circulation, traffic impact, parking, and signal timing optimization.

1972 to 1974 NATIONAL MILITARY COMMAND SYSTEM SUPPORT CENTER – The Pentagon, Transportation Analyst

- Worked as a junior Army officer in the NMCSSC, an arm of the Defense Communications Agency providing systems analysis support to the Organization of the Joint Chiefs of Staff.
- Developed multi-modal transportation data bases for foreign theaters of operation.
- Consulted with senior officers of OJCS on intra-theater strategic mobility modeling needs, and directed revisions to a large multi-modal transportation simulation model.

1970 to 1971 TEXAS TRANSPORTATION INSTITUTE, Texas A&M University, College Station, Texas, Research Assistant

- Researched Highway Visual Communications Systems within TTI's Driving Environment Program.
- Synthesized findings of diagnostic field studies of driver behavior and performance, and used findings to recommend improved roadway design and traffic control practices.
- With a research psychologist, co-authored detailed "Driver Expectancy Checklist" for roadway design (condensed checklist later published by American Association of State Highway Officials, nka as AASHTO).
- Helped conduct daytime and nighttime sign legibility tests.

EDUCATION

B.S.E. Civil Engineering, University of Michigan
Dean's Honor List, College of Engineering; top 1/3 of civil engineering graduating class

M.Eng. Civil Engineering, Texas A&M University
Top 10% of graduating class; Elected to Chi Epsilon, 1970, and Phi Kappa Phi, 1972

U.S. Army Transportation School – Diploma, Transportation Officer Basic Course
Familiarization with all transportation modes; top 10% of graduating class

PROFESSIONAL REGISTRATION AND AFFILIATIONS

REGISTRATION
Professional Engineer (P.E.) – State of Michigan, No. 27420 (since 1980)

AFFILIATIONS
Institute of Transportation Engineers (ITE), Fellow (since 1994) & Life Member (effective January 2013)
ITE, Member, Transportation Forensics and Risk Management Council (fka Expert Witness Council)

PUBLICATIONS AND NON-PROPRIETARY MAJOR REPORTS

1. "Crash-Data-Assisted Safety Evaluation of 12 Intersections in City of Novi." Prepared for City of Novi, Jun 2012.

2. "Identification of High-Crash Intersections in the City of Novi, 2006-2010." Prepared for City of Novi, Jan 2012.

3. "Aguirre v. Delta Sonic." Prepared for Packer Engineering, Inc. & Delta Sonic Car Wash Systems, Inc., Mar 2010.

4. "Evaluation of Cronin / Greene Motorcycle Crash at Intersection of Western Avenue and 63rd Street in City of Chicago." Prepared for Packer Engineering, Inc. & City of Chicago, Dec 2009.

5. "An Evaluation of Golf Cart Utilization for Burnham Harbor Security Patrols." Prepared for Packer Engineering, Inc. & Hector Espitia, Esq., Nov 2009.

6. "An Evaluation of Driver, Vehicle, and Roadway Causal Factors in the Matter of Kachel v. Hetrick, et al. v. PennDOT." Prepared in association with Engineering Analysis Associates, Inc., Jul 2000.

7. "Bridge Management Data for Southeast Michigan." Prepared for Southeast Michigan Council of Governments by William A. Stimpson, P.E., Jun 1996.

8. "SEMCOG Traffic Safety Manual – First Edition." Prepared for Southeast Michigan Council of Governments by William A. Stimpson, P.E., Feb 1996.

9. Workshop on Development of the Interactive Highway Safety Design Model (IHSDM) Accident Analysis Module," co-authored with D.W. Harwood, K.M. Bauer, and J. M. Mason. Prepared for Federal Highway Administration (FHWA) by Midwest Research Institute, Nov 1995.

10. "Influence of Vehicle Dynamics on Geometric Design," co-authored with J.A. Reagan. Presented at the Transportation Research Board's (First) International Symposium on Highway Design Practices, Boston, Massachusetts, Aug 1995.

11. "Technical Summary: Horizontal Alignment Design Consistency for Rural Two-Lane Highways (Publication No. FHWA-RD-94-034, Jan 1995)." Pub. No. FHWA-RD-130. Prepared for FHWA by A/E Group, Inc., Jan 1995.

12. "The Special Intersection Study: A Public/Private Partnership to Expand System Capacity in Concert with Land Development Needs." Presented at Annual Meeting of the Intermountain Section of the Institute of Transportation Engineers, Jackson Hole, Wyoming, May 1993.

13. "Rollover Accident Frequency and Driver Age." Unpublished paper, Jun 1987.

14. "Co-ordinating Vehicle-Actuated Traffic Signals to Reduce Vehicular Fuel Consumption," co-authored by G.M. Takasaki. Traffic Engineering & Control, Vol. 23, No. 10, Oct 1982.

15. "The Influence of the Time Duration of Yellow Traffic Signals on Driver Response," co-authored by P.L. Zador and P. J. Tarnoff. ITE Journal, Nov 1980.

16. "Corridor Parking Facilities for Carpoolers," co-authored with J. W. Flora and J. R. Wroble. Final Report on Contract DOT-FH-11-9463. Prepared for FHWA by Alan M. Voorhees & Associates, Jun 1980.

17. "Methodologies for Evaluating TSM Actions in Bombay." Working paper prepared for municipality of Bombay, India, under World Bank-sponsored study conducted by Alan M. Voorhees & Associates, Apr 1979.

18. "Downgrade Truck Accidents and Their Prevention," co-authored by D.T. Gallagher. Prepared for Systems Technology, Inc. & Federal Highway Administration by Alan M. Voorhees & Associates, Jan 1979.

19. "Impact of Park-and-Ride and Express Bus Improvements." Chapter C of Transportation System Management: an Assessment of Impacts. Prepared for Urban Mass Transportation Administration under contract UMTA-VA-06-0047 by Alan M. Voorhees & Associates, Nov 1978.

20. "A Cost-Effectiveness Evaluation of Devices for Reducing the Adverse Aerodynamic Effects of Large Trucks," co-authored by S.R. Shapiro. Prepared for Systems Technology, Inc. & Federal Highway Administration by Alan M. Voorhees & Associates, Aug 1978.

21. "The Traffic Safety Effectiveness of Selected Delineation Treatments Applied to Two-Lane Rural Highways." Winner of Honorable Mention in Past Presidents' Award competition, Institute of Transportation Engineers, Aug 1978.

22. "Study of the Effectiveness of Lane Markings for Traffic Safety," co-authored with M.L. Altman. Prepared for Illinois Department of Transportation by Alan M. Voorhees & Associates, Apr 1978.

23. "Field Evaluation of Selected Delineation Treatments on Two-Lane Rural Highways," co-authored by H.W. McGee, W.K. Kittelson, and R.H. Ruddy. Report Nos. FHWA-RD-77-118, 119. Prepared for Federal Highway Administration by Alan M. Voorhees & Associates, Oct 1977.

24. "Predicting the Traffic Safety Effects of Alternative Roadway Delineation Treatments," co-authored by W.K. Kittelson. AMV Tech Notes, Alan. M. Voorhees & Associates, Mar 1977.

25. "Methods for Field Evaluation of Roadway Delineation Treatments," co-authored by W.K. Kittelson and W.D. Berg. Transportation Research Record 630, 1977.

26. "Right-Turn-On-Red," Vols. I and II, co-authored with H.W. McGee, J. Cohen, G.F. King, and R.F. Morris. Report Nos. FHWA-RD-76-89, 90. Prepared for Federal Highway Admin. by Alan M. Voorhees & Associates, May 1976.

27. "The Effects of Larger Trucks on Highway Operations and Design," co-authored with C.R. Keller. AMV Tech Notes, Alan M. Voorhees & Associates, Sep 1975.

28. "Data Base Development for the Transportation Requirements and Capabilities Simulator Model (TRACS)." National Military Command System Support Center, Nov 1974.

29. "TRACS: A Computer Model of Intra-theater Strategic Mobility," co-authored by B.D. Nussbaum. Presented at 44th National Meeting of Operations Research Society of America, San Diego, California, Nov 1973.

30. "Three Schemes for Improved Line-Haul Bus Rapid Transit." Traffic Engineering, Feb 1973.

31. "Driver Expectancy Checklist – A Design Review Tool," co-authored by N.C. Ellis. Prepared by Texas Transportation Institute and published by American Association of State Highway Officials, 1972.

32. "A New Warning Sign." TexITE, Vol. XVIII, No. 1, Sep 1971.

33. "A Critical Review of Climbing Lane Design Practices," co-authored by J.C. Glennon. Highway Research Record 371, 1971.

34. "Highway Engineering Tips." Prepared for Multi-State Policy Committee of Project HPR-2(108), Diagnostic Studies of Highway Visual Communication Systems. Prepared by Texas Transportation Institute, 1970.

OTHER HONORS

- Honorable Mention, Institute of Transportation Engineers Past Presidents' Award, 1978
- Defense Communications Agency Certificate of Achievement, 1974

MILITARY SERVICE

- 2LT, US Army Reserve, 1970-1973, and 1LT, US Army Reserve, 1973-1976
- Active duty in the Pentagon, 1972-1974 (see Experience section, above)

SELECTED SHORT COURSES

- SIMSCRIPT II.5 computer simulation language
- Computerized control of traffic signals
- Applied multivariate analysis (Princeton University)
- Highway Capacity Software 2000
- Roundabout design, operation, and analysis (M. Wallwork)
- Access Management Guidebook – Train the Trainer (MDOT)
- Syncho 6 / SimTraffic software
- Designing Pedestrian Facilities for Accessibility
- ADA Standards for Accessible Design

Last updated: March 2017

APPENDIX B:

CITY OF BIRMINGHAM
FORM B – FULL TRAFFIC STUDY QUESTIONNAIRE

FORM B - FULL TRAFFIC STUDY QUESTIONNAIRE

Applicant: _____ Case#:_____

Date:_____ Address:_____

1. Proposed Project

Brief description of the proposed project: _____
_____
_____
_____
_____
_____

Use of building(s):_____ Gross square footage:_____
_____ Net square footage:_____
_____ Number of parking spaces:_____
Site plan attached:_____

2. Existing Traffic

Provide Map 1 depicting recent a.m. and p.m. peak hour turning movement counts at all critical intersections within the project's impact area. Critical intersections should be defined in consultation with the City's Traffic Consultant. In general, small projects will have critical intersection within 0.5 to 1 mile from the site. Large projects may have an impact area expending two or more miles form the site.

Provide Map 2 depicting all roadways within the impact area of the project, the number of lanes on each road, and the most recent a.m. peak hour, p.m. peak hour and ADT counts on each road that are available from the City or Road Commission.

Using methodologies in the Highway Capacity Manual, Special Report 209, by the Transportation Research Board, provide tables below depicting the existing stopped time delay per vehicle and Level of Service for each critical intersection during a.m. and p.m. peak hours:

Intersection:
A.M. Peak Hour:_____ P.M. Peak Hour:_____
Ex. Stopped Time Delay/Vehicle:_____ Ex. Stopped Time Delay/Vehicle:_____
Level of Service:_____ Level of Service:_____

Intersection:
A.M. Peak Hour:_____ P.M. Peak Hour:_____
Ex. Stopped Time Delay/Vehicle:_____ Ex. Stopped Time Delay/Vehicle:_____
Level of Service:_____ Level of Service:_____

Intersection:

A.M. Peak Hour:_____ P.M. Peak Hour:_____
Ex. Stopped Time Delay/Vehicle: _____ Ex. Stopped Time Delay/Vehicle:_____
Level of Service:_____ Level of Service:_____

3. Background Growth and Other Development Traffic

Determine the historical growth rate of traffic on roadways in the impact area by examining traffic counts over the last 3 to 5 years. Once an annual growth rate has been identified, apply the growth rate to existing traffic for the number of years until project completion. Show the background growth assignment on Map 4.

In some cases it may be necessary to assign trips for other large projects in the impact area to the road network in conjunction with or in lieu of using a background growth rate. This would be done to more accurately reflect future conditions. Consult with the City's Traffic Consultant.

Using the Highway Capacity Manual, provide tables as below depicting the Stopped Time Delay and Level of Service for each critical intersection for the existing plus background/other development scenario. For multi-phase projects, provide a separate table for each phase.

Intersection 1

A.M. Peak Hour:_____ P.M. Peak Hour:_____
Ex. Stopped Time Delay/Vehicle: _____ Ex. Stopped Time Delay/Vehicle: _____
Level of Service: _____ Level of Service: _____

A.M. Peak Hour:_____ P.M. Peak Hour:_____
Dev. Scenario Stopped Time Delay/Vehicle: _____ Dev. Stopped Time Delay/Vehicle: _____
Dev. Scenario Level of Service: _____ Dev. Scenario Level of Service:_____

Intersection 2

A.M. Peak Hour:_____ P.M. Peak Hour:_____
Ex. Stopped Time Delay/Vehicle: _____ Ex. Stopped Time Delay/Vehicle: _____
Level of Service: _____ Level of Service: _____

A.M. Peak Hour:_____ P.M. Peak Hour:_____
Dev. Scenario Stopped Time Delay/Vehicle: _____ Dev. Stopped Time Delay/Vehicle: _____
Dev. Scenario Level of Service: _____ Dev. Scenario Level of Service:_____

4. Project Traffic

Determine the number of trips generated by the proposed project, identify the directional distribution of the trips and assign the trips to the road network. Show the directional distribution on Map 5.

On Map 6, show the assignment of a.m. and p.m. peak hour trips from the project and show the number of a.m. and p.m. peak hour trips for the total of existing background/other development and project traffic.

Provide Map 7 (see below) for each critical intersection showing separately: number of turning movements made by existing traffic; existing plus background/other development; and existing plus background/other development plus project.

Using the Highway Capacity Manual, provide a table showing the stopped time delay and level of service for each critical intersection for the total traffic scenario (existing plus background/other plus project). Use the same form as example in section 3 above. For multi-phase projects, provide a separate table for each phase.

5. Driveway Movements (a.m. and p.m. peak hours)

Driveway:_____ Driveway:_____
Left In: _____ Left In: _____
Right In: _____ Right In: _____
Left Out: _____ Left Out: _____
Right Out: _____ Right Out:_____

Driveway:_____ Driveway:_____
Left In: _____ Left In: _____
Right In: _____ Right In: _____
Left Out: _____ Left Out: _____
Right Out: _____ Right Out:_____

6. Recommended Improvements

Attach a separate sheet outlining recommended improvements to intersections and roadways necessary to accommodate future volumes. Provide appropriate capacity analyses to demonstrate the impact of the improvement(s).

7. Transportation Standards

Using the City Design and Construction standards or where appropriate, County Road Commission and Michigan Department of Transportation standards, identify and evaluate the following:

Passing lanes:_____
_____
Tapers:_____
_____
Turn Lanes: _____
_____
Vehicle stacking analysis (if drive-up facilities are proposed): _____
_____
_____
_____
_____
_____
_____

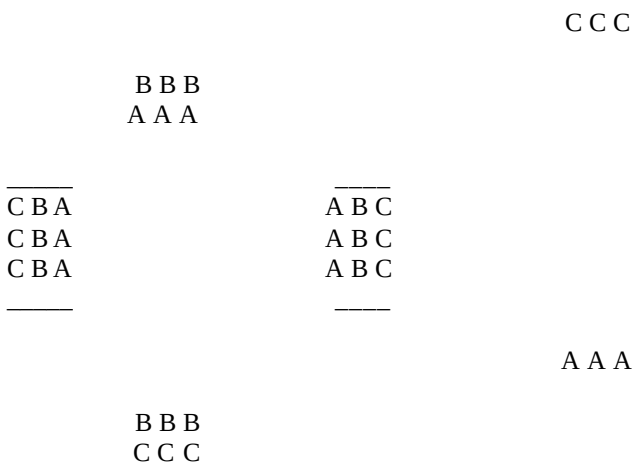
8. Sight Distance

Provide evaluations of sight distances at project driveways to demonstrate that they meet applicable City, County or State criteria.

*All maps and tables referenced above should be provided in the applicant's traffic study.
**Some projects with a low a.m. peak hour trip generation my not require Level of Service analysis for the a.m. peak hour. Consult with the City' Traffic Consultant.

Map 7

CRITICAL INTERSECTION
PHASE _____ (if applicable)



A = Existing traffic

B = Existing plus background/other traffic

C = Existing plus background/other plus project traffic

Note: In addition to the above information, the Petitioner must acknowledge and address all of the pertinent goals, objectives, requirements and standards enumerated in the Birmingham Master Traffic Study.

APPENDIX C:

SIGNAL TIMING AT OLD WOODWARD AND BROWN

Table C-1. Signal Phase Durations (in Seconds) at Old Woodward and Brown

Scenario	AM Peak Hour (Dial 2)		PM Peak Hour (Dial 3)	
	Phase 2 (Brown)	Phase 4 (Old WW)	Phase 2 (Brown)	Phase 4 (Old WW)
Permit of 12-07-15	36	44	44	36
2016 Synchro "Existing"	36	44	44	36
2016 Synchro "Optimized"	37	53	44	46
2017 Synchro "Existing"	**36**	**44**	**44**	**36**

OAKLAND COUNTY ROAD COMMISSION
TRAFFIC - SAFETY DEPARTMENT
SIGNAL WORK ORDER

LOCATION: BROWN & OLD WOODWARD DATE: 12-7-15

CITY/TOWNSHIP: BIRMINGHAM BY: RACHEL JONES

COUNTY#: 278 STATE#: ——— CHARGES: 50741-0981

PLEASE PERFORM THE FOLLOWING:

ROAD... CAP...

DEC 15 2015

____ ELECTRICAL DEVICE: ____ INSTALL ____ MODERNIZE ____ MAINTENANCE

____ UNDERGROUND: ———

____ EDISON OK: ____ YES ____ NO JOB#: ———

____ COORDINATE W/DISTRICT 7: ———

	DIAL..	1	1	1	1		2	2	2	2		3	3	3	3		4	4	4	4
	SPLIT.	1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4
X	CHANGE TIMING.....	X					X													
X	CHANGE OFFSET.....	X					X													
____	CHANGE CYCLE LENGTH.....																			
X	ADD DIAL/SPLIT.....											X								

____ CHANGE BREAKOUT OR EPROM: ———

____ CHANGE HOURS OF OPERATION:

OLD: ———

NEW: ———

X REPROGRAM TBC (TRAFFIC EVENTS; DST)

____ INSTALL INTERCONNECT: ____ TBC ____ MINITROL ____ TONE

____ MBT OK: ____ YES ____ NO

____ NO CHANGE - RECORD CORRECTION

X OTHER: 3. PHASE DATA - 3. PED TIMINGS

(Rev 3) (2011 Retiming)

APPROVED BY: ——— DATE: 12/7/15

DATE INSTALLED: 12/11/15

INSTALLED BY: JORDAN / HOLLER

ZONE
BL-4

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

INTERSECTION: BROWN & OLD WOODWARD

CITY/VILLAGE/TOWNSHIP: BIRMINGHAM

COUNTY#: 278 MDOT#: — REV#: 13 DETROIT EDISON#:

DRAWN BY: Rachel Jones APPROVED BY: RD DATE DRAWN: 12/7/15

INSTALLED BY: DATE INSTLD: / /

HOURS OF OPERATION: 7 DAYS : 24 HRS

HOURS OF FLASHING: NONE

2. UTILITIES - 1. ACCESS

CODE.....: 1642 CODE: Four digits (0000 - 9999)

4. UNIT DATA - 5. RING STRUCTURE

********** NOTE: INSERT ALL RING #'S FIRST, THEN NXT & CONCUR **********

CHANNEL:	RING	PHNXT	CONCURRENT PHASES																CHANNEL	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	VEH	PED
PHASE 1:			1																	
PHASE 2:	1	4		1															2	9
PHASE 3:					1															
PHASE 4:	1	2				1													4	10
PHASE 5:							1													
PHASE 6:								1												
PHASE 7:									1											
PHASE 8:										1										
PHASE 9:											1									
PHASE 10:												1								
PHASE 11:													1							
PHASE 12:														1						
PHASE 13:															1					
PHASE 14:																1				
PHASE 15:																	1			
PHASE 16:																		1		

CODES:

RING ..... Ring Number for Phase (1-4)
PHNXT ..... Phase Next In Ring (1-16)
CONCUR PH ..... Phases To Be Concurrent (0=NO, 1=YES)

For vehicle channel & ped channel, enter "1" under channel# shown.

3. PHASE DATA - 1. BASIC TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE
Minimum Green		5		5													00-99
Passage																	0.0-9.9
Maximum #1		32		36													000-999
Maximum #2																	000-999
Yellow Clearance		3.5		3.5													3.0-9.9
Red Clearance		2.5		2.5													0.0-9.9

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

3. PHASE DATA - 2. DENSITY TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE (SEC)
Seconds/Actuation																	0.0-9.9
Maximum Initial																	00-99
Time B4 Reduction																	00-99
Cars B4 Reduction																	00-99
Time To Reduce																	00-99
Minimum Gap																	0.0-9.9

3. PHASE DATA - 3. PEDESTRIAN TIMINGS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	RANGE (SEC)
Walk		7		7													00-99
Pedest Clearance		19		11													00-99
Flashing Walk		1															
Extend Ped Clear																	
Act Rest in Walk		1		1													

3. PHASE DATA - 4. INITIALIZE & NON ACTUATED RESPONSE

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Initial		4		1												
NA Response																

CODES:	0	1	2	3	4
Initial	none	inactive	red	yellow	green
NA Response	none	to 1	to 2	both	------

3. PHASE DATA - 5. VEHICLE & PEDESTRIAN RECALLS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Vehicle Recall		3		3												
Pedestrian Recall		2		2												

CODES:	0	1	2	3	4
Vehicle	none	1 call	min	max	soft
Pedestrian	none	1 call	ped	bo N. A.	------

3. PHASE DATA - 6. NONLOCK & MISC CONTROLS

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nonlock Memory																
Dual Entry																
Last Car Passage																
Conditional Service																

CODES: 0 = NO 1 = YES

4. UNIT DATA - 1. STARTUP & MISCELLANEOUS

Start up time : 10 (00-99) State : 0 (0 = fl, 1 = red)
Auto ped clear : 0 Red revert : 7 (2.0 - 9.9)
Stop time reset : 0 (0 = No, 1 = Yes)

4. UNIT DATA - 8. I/O MISCELLANEOUS

Ring#	1	2	3	4	CONN	MODE
Input Response	1				"D"	
Output Select	1				"D"	

Connector "D" : 0 = Standard & 1 = Alternate

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

LEVEL 2

DIAL 1 / SPLIT 1 CYCLE LENGTH: 80 SEC

PHASE	1	2	3	4	5	6	7	8
TIME		36		44				
MODE		1		7				

DIAL 1 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 1 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 1 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

LEVEL 1

OFFSET	1	2	3
TIME	65		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

DIAL 2 / SPLIT 1 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		36		44				
MODE		1		7				

DIAL 2 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 2 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 2 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

OFFSET	1	2	3
TIME	25		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

5. COORDINATION DATA - 3. DIAL/SPLIT DATA

LEVEL 2

DIAL 3 / SPLIT 1 CYCLE LENGTH: 80

PHASE	1	2	3	4	5	6	7	8
TIME		44		36				
MODE		\		7				

DIAL 3 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 3 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 3 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 1 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 2 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 3 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

DIAL 4 / SPLIT 4 CYCLE LENGTH:

PHASE	1	2	3	4	5	6	7	8
TIME								
MODE								

LEVEL 1

OFFSET	1	2	3
TIME	25		
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			
OFFSET	1	2	3
TIME			
SEQUENCE			
RING 2 LAG			
RING 3 LAG			
RING 4 LAG			

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

6. TIME BASE DATA - 2. SET TIME / DATE

-- DATE -- MM/DD/YY	-- TIME -- HH:MM:SS	MON & WEEK:	BEG -- DST MM	SW	-- END MM	SW
/ /	: :					

CYCLE ZERO: 24 : 00 (HH:MM - EVENT)

6. TIME BASE DATA - 3. TRAFFIC EVENTS

PRO DAY	TIME HH : MM	COORD PATRN		MAX 2 PHASE #S									OMIT PHASE #S							
* * *	* * * * *	D / S / O		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*
01	00:00	1/1/1																		
02	00:00	1/1/1																		
02	07:00	2/1/1																		
02	10:00	1/1/1																		
02	15:00	3/1/1																		
02	19:00	1/1/1																		
	:	/ /																		
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REFERENCE DATA
PRO DAY = 01 - 99
(Program day)

HH:MM = 24 Hour clock

PATTERN: (D/S/O)
FLASH =5/5/
FREE =0/0/4

MAX2 & OMITS:
Call free, set pattern to 0/0/0.

D = DIAL #
S = SPLIT #
0 = OFFSET #

ROAD COMMISSION FOR OAKLAND COUNTY, WATERFORD, MICHIGAN
PROGRAM LOG FOR EAGLE SIGNAL COMPANY EPAC300 V.2.34a CONTROLLER

7. PREEMPT DATA - 1. ALL PREEMPTS

RING TIMES		1	2	3	4	
MIN GREEN/WALK						
OVERRIDE	FL	1/2	2/3	3/4	4/5	5/6
STATUS						

CODES 0 = NO, 1 = YES

7. PREEMPT DATA - PREEMPT 1

1. MISC DATA: (0 = no, 1 = yes)

TEST..: ___ N-LOCK.: ___ LINK PR#..: ___
DELAY: ___ EXTEND: ___ DURATION: ___
MXCALL: ___ LOCK OUT: ___

RING	1	2	3	4	5	6	7	8
EXIT								
CALLS								

2. INTERVAL TIMES:

SEL PED CLR : _____ TRK YEL CHG : __ . __
SEL YEL CHG : __ . __ TRK RED CLR : __ . __
SEL RED CLR : __ . __ DWELL GREEN: _____
TRACK GREEN: _____ RET PED CLR : _____
TRK PED CLR : _____ RET YEL CHG : __ . __
RET YEL CLR : __ . __

3. VEHICLE STATUS:

PHASE	1	2	3	4	5	6	7	8
TRK GRN								
DWELL								

(0=red, 1=grn, 2=flr, 3=fly, 4=dark)

CYCLE								

(0=no, 1=act, 2=min recall, 3=max recall)

4. PEDESTRIAN STATUS:

PHASE	1	2	3	4	5	6	7	8
TRK GRN								
DWELL								

(0=dont wlk, 1=wlk, 2=flwlk, 3=dark)

CYCLE								

(0 = no, 1 = act, 2 = recall)

5. OVERLAP STATUS:

OVERLAP	A	B	C	D
TRK GRN				
DWELL				

(0=red, 1=grn, 2=flr, 3=fly, 4=dark)

CYCLE								

(0 = no, 1 = act)

6. LOW PRIORITY: (0=no, 1=yes)

TEST..: __ N-LOCK.: __ SKIP.....: __
DELAY: __ EXTEND: __ DURATION: __
DWELL: MXCALL: LOCK OUT:

RING	1	2	3	4	5	6	7	8
DWELL								
CALLS								

SIGNAL PHASING

PHASE#	ROAD	PHASE	LOAD SW	FLASH
1				
2	BROWN	A,C	2	A
3				
4	OLD WOODWARD	B,D	4	R
5				
6				
7				
8				
OLA				
OLB				
OLC				
OLD				
1PED				
2PED	BROWN PED	WA, WC	6	
3PED				
4PED	OLD WOODWARD PED	WB, WD	8	
5PED				
6PED				
7PED				
8PED				

APPENDIX D:

BUS SERVICE NEAR SITE

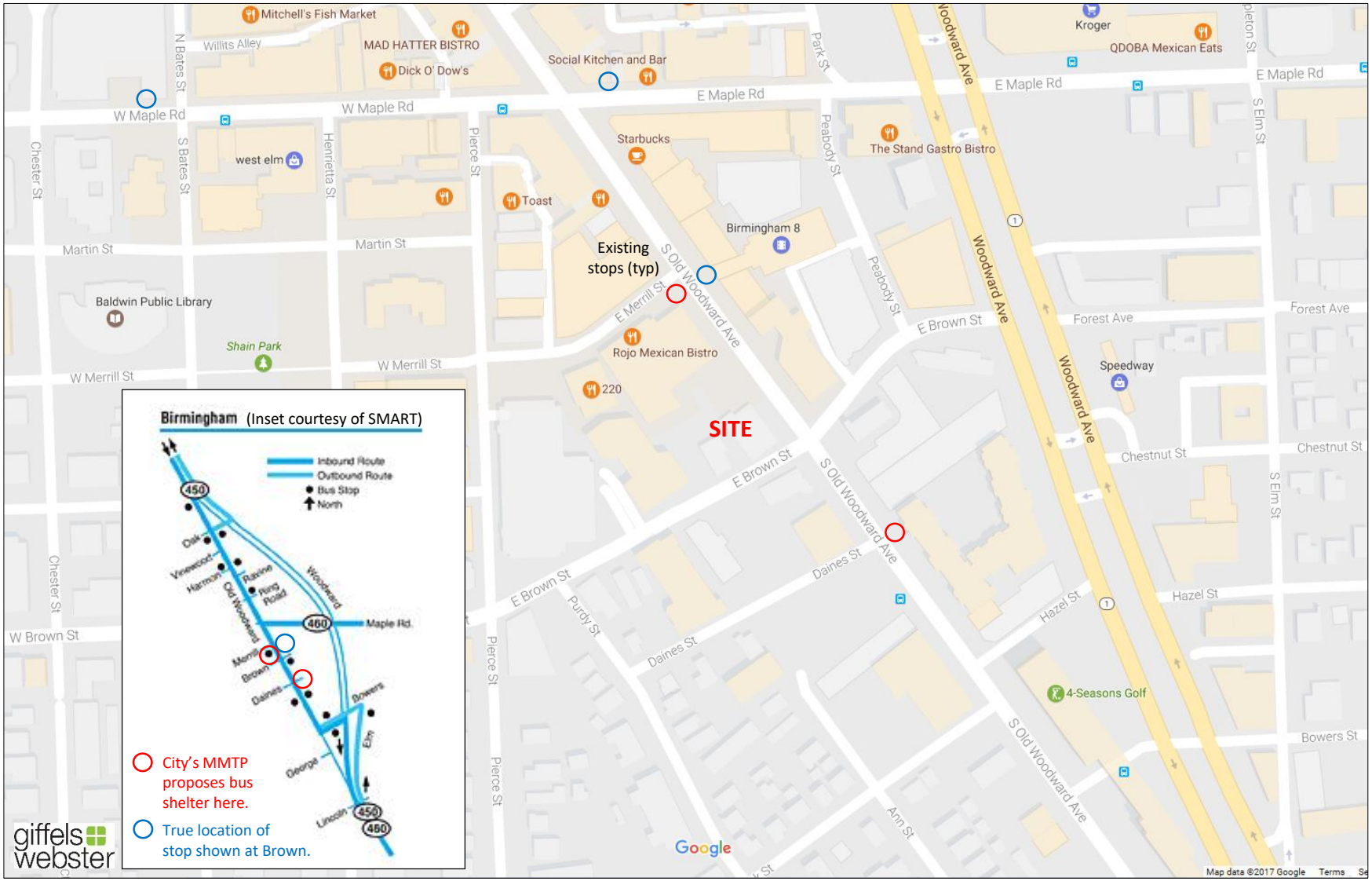

Figure D-1. SMART Bus Stops in South-Central Birmingham

Figure D-2. SW Corner of Old Woodward and Merrill: Existing SB Bus Stop and Bike Parking

Figure D-3. Above Location Showing Single Existing Bike Rack and Delivery Truck Using Bus Bay

Figure D-4. Existing SB Bus Shelter Just South of Daines

Figure D-5. Existing NB Bus Stop on Old Woodward Opposite Daines

Figure D-6. Existing NB Bus Stop Shown on SMART Map at Brown Is Actually Opposite Merrill

APPENDIX E:

SUMMARY OF PARKING DECK OCCUPANCY DATA
PROVIDED BY SP+

Table E-1. Use of Pierce Street Parking Deck in July 2016

Hour	Weekday Spaces						Weekend Spaces			
	Tue 7/19	Wed 7/20	Thu 7/21	Fri 7/22	Average	Available	Sat 7/23	Sun 7/24	Average	Available
12:00 AM		111	79	102	97	609		30	30	676
1:00 AM		95	58	80	78	628		27	27	679
2:00 AM		90	54	70	71	635		24	24	682
3:00 AM		86	53	68	69	637		24	24	682
4:00 AM	24	88	54	67	58	648	20	24	22	684
5:00 AM	11	11	14		12	694	10		10	696
6:00 AM	16	18	21		18	688	16		16	690
7:00 AM	34	42	40		39	667	22		22	684
8:00 AM	142	142	140		141	565	33		33	673
9:00 AM	294	327	312		311	395	45		45	661
10:00 AM	452	516	477		482	224	51		51	655
11:00 AM	528	589	559		559	147	55		55	651
12:00 PM	614	616	595		608	98	53		53	653
1:00 PM	664	651	619		645	61	56		56	650
2:00 PM	631	638	625		631	75	58		58	648
3:00 PM	567	567	609		581	125	58		58	648
4:00 PM	531	539	541		537	169	59		59	647
5:00 PM	453	498	472		474	232	53		53	653
6:00 PM	365	403	413		394	312	44		44	662
7:00 PM	394	458	447		433	273	42		42	664
8:00 PM	418	494	436		449	257	40		40	666
9:00 PM	353	371	363		362	344	38		38	668
10:00 PM	230	253	230		238	468	37		37	669
11:00 PM	148	134	162		148	558	33		33	673

Table E-2. Use of Pierce Street Parking Deck in March 2017

Hour	Weekday Spaces						Weekend Spaces			
	Tue 3/07	Wed 3/08	Thu 3/09	Fri 3/10	Average	Available	Sat 3/11	Sun 3/12	Average	Available
12:00 AM		50	76	20	49	657		131	131	575
1:00 AM		35	60	42	46	660		82	82	624
2:00 AM		35	53	52	47	659		60	60	646
3:00 AM		36	52	54	47	659		58	58	648
4:00 AM	19	33	51	55	40	667	48	56	52	654
5:00 AM	11	10	11		11	695	12		12	694
6:00 AM	21	21	22		21	685	17		17	689
7:00 AM	47	46	39		44	662	30		30	676
8:00 AM	137	174	120		144	562	66		66	640
9:00 AM	318	427	290		345	361	126		126	580
10:00 AM	497	592	437		509	197	226		226	480
11:00 AM	553	651	506		570	136	305		305	401
12:00 PM	670	702	565		646	60	370		370	336
1:00 PM	688	635	635		653	53	423		423	283
2:00 PM	638	601	646		628	78	426		426	280
3:00 PM	574	574	585		578	128	383		383	323
4:00 PM	521	528	578		542	164	348		348	358
5:00 PM	456	458	504		473	233	312		312	394
6:00 PM	346	384	427		386	320	288		288	418
7:00 PM	344	407	465		405	301	327		327	379
8:00 PM	311	369	469		383	323	360		360	346
9:00 PM	226	263	359		283	423	328		328	378
10:00 PM	117	163	230		170	536	267		267	439
11:00 PM	78	106	26		70	636	186		186	520

Table E-3. Use of Peabody Street Parking Deck in July 2016

Hour	Weekday Spaces						Weekend Spaces			
	Tue 7/19	Wed 7/20	Thu 7/21	Fri 7/22	Average	Available	Sat 7/23	Sun 7/24	Average	Available
12:00 AM		86	33	36	52	385		291	291	146
1:00 AM		86	32	36	51	386		103	103	334
2:00 AM		86	32	37	52	385		42	42	395
3:00 AM		86	32	36	51	386		41	41	396
4:00 AM	18	15	32	36	25	412	19	41	30	407
5:00 AM	12	15	12		13	424	12		12	425
6:00 AM	27	33	25		28	409	14		14	423
7:00 AM	38	44	42		41	396	15		15	422
8:00 AM	94	104	103		100	337	6		6	431
9:00 AM	200	256	245		234	203	38		38	399
10:00 AM	293	390	370		351	86	39		39	398
11:00 AM	333	140	409		294	143	55		55	382
12:00 PM	356	423	430		403	34	84		84	353
1:00 PM	362	428	431		407	30	112		112	325
2:00 PM	352	424	421		399	38	126		126	311
3:00 PM	311	418	408		379	58	123		123	314
4:00 PM	281	404	398		361	76	141		141	296
5:00 PM	197	323	230		250	187	157		157	280
6:00 PM	163	202	208		191	246	180		180	257
7:00 PM	148	181	177		169	268	203		203	234
8:00 PM	112	120	130		121	316	228		228	209
9:00 PM	46	81	72		66	371	251		251	186
10:00 PM	35	61	42		46	391	279		279	158
11:00 PM	70	40	41		50	387	282		282	155

Table E-4. Use of Peabody Street Parking Deck in March 2017

Hour	Weekday Spaces						Weekend Spaces			
	Tue 3/07	Wed 3/08	Thu 3/09	Fri 3/10	Average	Available	Sat 3/11	Sun 3/12	Average	Available
12:00 AM		39	38	57	45	392		45	45	392
1:00 AM		39	36	56	44	393		27	27	410
2:00 AM		39	34	56	43	394		26	26	411
3:00 AM		39	34	56	43	394		26	26	411
4:00 AM	106	39	34	56	59	378	10	26	18	419
5:00 AM	12	12	12		12	425	10		10	427
6:00 AM	40	35	43		39	398	10		10	427
7:00 AM	62	55	55		57	380	15		15	422
8:00 AM	110	110	113		111	326	54		54	383
9:00 AM	296	294	274		288	149	111		111	326
10:00 AM	412	409	385		402	35	137		137	300
11:00 AM	420	430	427		426	11	125		125	312
12:00 PM	428	434	426		429	8	146		146	291
1:00 PM	421	437	429		429	8	172		172	265
2:00 PM	417	434	436		429	8	188		188	249
3:00 PM	413	432	420		422	15	143		143	294
4:00 PM	407	413	394		405	32	133		133	304
5:00 PM	333	305	314		317	120	133		133	304
6:00 PM	230	212	225		222	215	130		130	307
7:00 PM	185	186	230		200	237	133		133	304
8:00 PM	120	163	178		154	283	152		152	285
9:00 PM	81	98	144		108	329	163		163	274
10:00 PM	55	66	105		75	362	119		119	318
11:00 PM	41	40	67		49	388	66		66	371

APPENDIX F:

MAY 2016 PEAK-HOUR TRAFFIC COUNTS
AT OLD WOODWARD & BROWN

Project:: City of Birmingham Traffic Signal Optimization Study
Corridor:: Maple Road & Old Woodward Ave.
Weather:: Sunny, Dry Deg's 60
Video VCU ID#:: SCU 34G

Traffic Data Collection (MI)
7504 Sawgrass Drive
www.tdccounts.com
Washington, Michigan, United States 48094
Ph. (586) 786-5407
Reliable Traffic Data

Count Name: S. Old Woodward Avenue & E. Brown Street
Site Code: TMC_11
Start Date: 05/05/2016

Turning Movement Data

Start Time	S. Old Woodward Avenue Southbound					E. Brown Street Westbound					S. Old Woodward Avenue Northbound					E. Brown Street Eastbound					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
7:00 AM	3	17	1	1	21	4	19	0	3	23	5	18	24	3	47	12	34	7	0	53	144
7:15 AM	0	14	5	5	19	4	25	1	3	30	6	27	26	4	59	13	38	8	4	59	167
7:30 AM	4	17	2	2	23	4	26	5	8	35	9	33	32	4	74	19	36	10	6	65	197
7:45 AM	5	22	2	10	29	8	31	5	3	44	11	34	48	1	93	22	53	6	5	81	247
Hourly Total	12	70	10	18	92	20	101	11	17	132	31	112	130	12	273	66	161	31	15	258	755
8:00 AM	6	37	13	6	56	4	36	1	7	41	19	30	44	1	93	35	63	15	4	113	303
8:15 AM	6	26	11	10	43	9	45	6	5	60	18	36	53	0	107	35	61	15	3	111	321
8:30 AM	5	36	12	8	53	8	41	5	7	54	11	51	54	1	116	19	59	11	3	89	312
8:45 AM	7	33	12	11	52	6	37	2	5	45	16	51	60	0	127	25	47	13	1	85	309
Hourly Total	24	132	48	35	204	27	159	14	24	200	64	168	211	2	443	114	230	54	11	398	1245
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	15	33	8	12	56	15	20	9	10	44	14	58	36	4	108	29	46	14	8	89	297
11:15 AM	14	46	9	7	69	14	40	9	9	63	15	65	44	4	124	19	55	17	10	91	347
11:30 AM	21	45	18	7	84	15	39	12	23	66	7	56	48	7	111	30	52	32	14	114	375
11:45 AM	22	30	14	7	66	25	38	10	19	73	17	60	45	3	122	41	73	27	11	141	402
Hourly Total	72	154	49	33	275	69	137	40	61	246	53	239	173	18	465	119	226	90	43	435	1421
12:00 PM	18	46	14	12	78	25	34	6	22	65	18	52	37	14	107	44	69	22	20	135	385
12:15 PM	10	47	12	13	69	13	33	6	29	52	18	61	28	11	107	50	67	19	28	136	364
12:30 PM	22	50	20	11	92	19	25	8	15	52	16	62	40	11	118	34	78	18	27	130	392
12:45 PM	21	46	23	10	90	20	27	5	37	52	20	63	36	17	119	42	65	16	24	123	384
Hourly Total	71	189	69	46	329	77	119	25	103	221	72	238	141	53	451	170	279	75	99	524	1525
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	6	37	17	4	60	12	39	10	12	61	5	45	39	2	89	41	66	7	2	114	324
4:15 PM	9	33	15	6	57	17	40	11	5	68	11	57	43	2	111	47	65	10	8	122	358
4:30 PM	13	43	16	7	72	20	46	10	11	76	11	61	49	4	121	59	71	13	7	143	412
4:45 PM	5	36	13	7	54	9	41	14	15	64	7	39	29	1	75	35	85	16	11	136	329
Hourly Total	33	149	61	24	243	58	166	45	43	269	34	202	160	9	396	182	287	46	28	515	1423
5:00 PM	8	51	18	18	77	17	44	11	20	72	13	46	35	3	94	59	96	19	8	174	417
5:15 PM	8	46	10	2	64	16	43	8	10	67	15	59	32	4	106	77	83	17	10	177	414
5:30 PM	16	47	11	4	74	19	50	6	14	75	8	59	32	3	99	35	95	15	14	145	393
5:45 PM	12	41	14	3	67	8	33	9	10	50	9	56	45	3	110	44	78	15	13	137	364
Hourly Total	44	185	53	27	282	60	170	34	54	264	45	220	144	13	409	215	352	66	45	633	1588
Grand Total	256	879	290	183	1425	311	852	169	302	1332	299	1179	959	107	2437	866	1535	362	241	2763	7957
Approach %	18.0	61.7	20.4	-	-	23.3	64.0	12.7	-	-	12.3	48.4	39.4	-	-	31.3	55.6	13.1	-	-	-
Total %	3.2	11.0	3.6	-	17.9	3.9	10.7	2.1	-	16.7	3.8	14.8	12.1	-	30.6	10.9	19.3	4.5	-	34.7	-
Motorcycles	0	1	0	-	1	0	0	0	-	0	0	1	1	-	2	1	1	0	-	2	5
% Motorcycles	0.0	0.1	0.0	-	0.1	0.0	0.0	0.0	-	0.0	0.0	0.1	0.1	-	0.1	0.1	0.1	0.0	-	0.1	0.1
Cars	234	741	275	-	1250	285	802	163	-	1250	281	1049	899	-	2229	812	1417	335	-	2564	7293
% Cars	91.4	84.3	94.8	-	87.7	91.6	94.1	96.4	-	93.8	94.0	89.0	93.7	-	91.5	93.8	92.3	92.5	-	92.8	91.7
Light Goods Vehicles	17	94	9	-	120	21	40	5	-	66	11	81	48	-	140	42	98	19	-	159	485
% Light Goods Vehicles	6.6	10.7	3.1	-	8.4	6.8	4.7	3.0	-	5.0	3.7	6.9	5.0	-	5.7	4.8	6.4	5.2	-	5.8	6.1
Buses	2	25	0	-	27	2	1	0	-	3	0	29	1	-	30	0	3	2	-	5	65
% Buses	0.8	2.8	0.0	-	1.9	0.6	0.1	0.0	-	0.2	0.0	2.5	0.1	-	1.2	0.0	0.2	0.6	-	0.2	0.8
Single-Unit Trucks	2	16	6	-	24	2	8	1	-	11	5	16	9	-	30	11	15	6	-	32	97
% Single-Unit Trucks	0.8	1.8	2.1	-	1.7	0.6	0.9	0.6	-	0.8	1.7	1.4	0.9	-	1.2	1.3	1.0	1.7	-	1.2	1.2
Articulated Trucks	1	1	0	-	2	0	1	0	-	1	2	1	1	-	4	0	1	0	-	1	8
% Articulated Trucks	0.4	0.1	0.0	-	0.1	0.0	0.1	0.0	-	0.1	0.7	0.1	0.1	-	0.2	0.0	0.1	0.0	-	0.0	0.1
Bicycles on Road	0	1	0	-	1	1	0	0	-	1	0	2	0	-	2	0	0	0	-	0	4
% Bicycles on Road	0.0	0.1	0.0	-	0.1	0.3	0.0	0.0	-	0.1	0.0	0.2	0.0	-	0.1	0.0	0.0	0.0	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	2	-	-	-	-	2	-	-	-	-	5	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.7	-	-	-	-	1.9	-	-	-	-	2.1	-	-

Project:: City of Birmingham Traffic Signal Optimization Study
Corridor:: Maple Road & Old Woodward Ave.
Weather:: Sunny, Dry Deg's 60
Video VCU ID#:: SCU 34G

TDC
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Traffic Data Collection (MI)
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Washington, Michigan, United States 48094
Ph. (586) 786-5407
Reliable Traffic Data

Count Name: S. Old Woodward Avenue & E. Brown Street
Site Code: TMC_11
Start Date: 05/05/2016

Turning Movement Peak Hour Data (8:00 AM)

Start Time	S. Old Woodward Avenue Southbound					E. Brown Street Westbound					S. Old Woodward Avenue Northbound					E. Brown Street Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
8:00 AM	6	37	13	6	56	4	36	1	7	41	19	30	44	1	93	35	63	15	4	113	303
8:15 AM	6	26	11	10	43	9	45	6	5	60	18	36	53	0	107	35	61	15	3	111	321
8:30 AM	5	36	12	8	53	8	41	5	7	54	11	51	54	1	116	19	59	11	3	89	312
8:45 AM	7	33	12	11	52	6	37	2	5	45	16	51	60	0	127	25	47	13	1	85	309
Total	24	132	48	35	204	27	159	14	24	200	64	168	211	2	443	114	230	54	11	398	1245
Approach %	11.8	64.7	23.5	-	-	13.5	79.5	7.0	-	-	14.4	37.9	47.6	-	-	28.6	57.8	13.6	-	-	-
Total %	1.9	10.6	3.9	-	16.4	2.2	12.8	1.1	-	16.1	5.1	13.5	16.9	-	35.6	9.2	18.5	4.3	-	32.0	-
PHF	0.857	0.892	0.923	-	0.911	0.750	0.883	0.583	-	0.833	0.842	0.824	0.879	-	0.872	0.814	0.913	0.900	-	0.881	0.970
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Cars	22	113	46	-	181	25	150	13	-	188	63	147	202	-	412	104	216	50	-	370	1151
% Cars	91.7	85.6	95.8	-	88.7	92.6	94.3	92.9	-	94.0	98.4	87.5	95.7	-	93.0	91.2	93.9	92.6	-	93.0	92.4
Light Goods Vehicles	1	15	1	-	17	1	7	1	-	9	1	14	8	-	23	10	12	2	-	24	73
% Light Goods Vehicles	4.2	11.4	2.1	-	8.3	3.7	4.4	7.1	-	4.5	1.6	8.3	3.8	-	5.2	8.8	5.2	3.7	-	6.0	5.9
Buses	0	3	0	-	3	0	1	0	-	1	0	5	1	-	6	0	0	0	-	0	10
% Buses	0.0	2.3	0.0	-	1.5	0.0	0.6	0.0	-	0.5	0.0	3.0	0.5	-	1.4	0.0	0.0	0.0	-	0.0	0.8
Single-Unit Trucks	1	1	1	-	3	1	1	0	-	2	0	2	0	-	2	0	2	2	-	4	11
% Single-Unit Trucks	4.2	0.8	2.1	-	1.5	3.7	0.6	0.0	-	1.0	0.0	1.2	0.0	-	0.5	0.0	0.9	3.7	-	1.0	0.9
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	35	-	-	-	-	24	-	-	-	-	2	-	-	-	-	11	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-

Project:: City of Birmingham Traffic Signal Optimization Study
Corridor:: Maple Road & Old Woodward Ave.
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Washington, Michigan, United States 48094
Ph. (586) 786-5407
Reliable Traffic Data

Count Name: S. Old Woodward Avenue & E. Brown Street
Site Code: TMC_11
Start Date: 05/05/2016

Turning Movement Peak Hour Data (5:00 PM)

Start Time	S. Old Woodward Avenue Southbound					E. Brown Street Westbound					S. Old Woodward Avenue Northbound					E. Brown Street Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
5:00 PM	8	51	18	18	77	17	44	11	20	72	13	46	35	3	94	59	96	19	8	174	417
5:15 PM	8	46	10	2	64	16	43	8	10	67	15	59	32	4	106	77	83	17	10	177	414
5:30 PM	16	47	11	4	74	19	50	6	14	75	8	59	32	3	99	35	95	15	14	145	393
5:45 PM	12	41	14	3	67	8	33	9	10	50	9	56	45	3	110	44	78	15	13	137	364
Total	44	185	53	27	282	60	170	34	54	264	45	220	144	13	409	215	352	66	45	633	1588
Approach %	15.6	65.6	18.8	-	-	22.7	64.4	12.9	-	-	11.0	53.8	35.2	-	-	34.0	55.6	10.4	-	-	-
Total %	2.8	11.6	3.3	-	17.8	3.8	10.7	2.1	-	16.6	2.8	13.9	9.1	-	25.8	13.5	22.2	4.2	-	39.9	-
PHF	0.688	0.907	0.736	-	0.916	0.789	0.850	0.773	-	0.880	0.750	0.932	0.800	-	0.930	0.698	0.917	0.868	-	0.894	0.952
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	1	0	0	-	1	2
% Motorcycles	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	0.0	-	0.2	0.5	0.0	0.0	-	0.2	0.1
Cars	40	168	51	-	259	56	165	32	-	253	41	190	137	-	368	206	333	65	-	604	1484
% Cars	90.9	90.8	96.2	-	91.8	93.3	97.1	94.1	-	95.8	91.1	86.4	95.1	-	90.0	95.8	94.6	98.5	-	95.4	93.5
Light Goods Vehicles	4	11	1	-	16	4	4	1	-	9	4	20	6	-	30	8	14	0	-	22	77
% Light Goods Vehicles	9.1	5.9	1.9	-	5.7	6.7	2.4	2.9	-	3.4	8.9	9.1	4.2	-	7.3	3.7	4.0	0.0	-	3.5	4.8
Buses	0	4	0	-	4	0	0	0	-	0	0	6	0	-	6	0	1	0	-	1	11
% Buses	0.0	2.2	0.0	-	1.4	0.0	0.0	0.0	-	0.0	0.0	2.7	0.0	-	1.5	0.0	0.3	0.0	-	0.2	0.7
Single-Unit Trucks	0	1	1	-	2	0	1	1	-	2	0	1	1	-	2	0	4	1	-	5	11
% Single-Unit Trucks	0.0	0.5	1.9	-	0.7	0.0	0.6	2.9	-	0.8	0.0	0.5	0.7	-	0.5	0.0	1.1	1.5	-	0.8	0.7
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	1	0	-	1	0	0	0	-	0	0	2	0	-	2	0	0	0	-	0	3
% Bicycles on Road	0.0	0.5	0.0	-	0.4	0.0	0.0	0.0	-	0.0	0.0	0.9	0.0	-	0.5	0.0	0.0	0.0	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	1.9	-	-	-	-	0.0	-	-	-	-	6.7	-	-
Pedestrians	-	-	-	27	-	-	-	-	53	-	-	-	-	13	-	-	-	-	42	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	98.1	-	-	-	-	100.0	-	-	-	-	93.3	-	-

APPENDIX G:

SHARED PARKING ANALYSIS USING CITY PARKING RATIOS –
INPUTS & OUTPUTS

Table G-1. Selected ULI Parking Ratios Adjusted to Match Birmingham Requirements

ULI-Recommended Parking Ratios AND Applicable City of Birmingham Parking Ratios[1]					
Spaces required per unit land use					
Land Use	Weekday		Weekend		Unit
	Visitor	Employee	Visitor	Employee	
Community Shopping Center (<400 ksf)	2.90	0.70	3.20	0.80	/ksf GLA
Regional Shopping Center (400 to 600 ksf)	Linear 2.9<x<3.2				/ksf GLA
Super Regional Shopping Center (>600 ksf)	3.20	0.80	3.60	0.90	/ksf GLA
Fine/Casual Dining Restaurant	15.25	2.75	17.00	3.00	/ksf GLA
Family Restaurant	9.00	1.50	12.75	2.25	/ksf GLA
Fast Food Restaurant	12.75	2.25	12.00	2.00	/ksf GLA
Nightclub	15.25	1.25	17.50	1.50	/ksf GLA
Cineplex	0.19	0.01	0.26	0.01	/seat
Performing Arts Theater	0.30	0.07	0.33	0.07	/seat
Arena	0.27	0.03	0.30	0.03	/seat
Pro Football Stadium	0.30	0.01	0.30	0.01	/seat
Pro Baseball Stadium	0.31	0.01	0.34	0.01	/seat
Health Club	6.60	0.40	5.50	0.25	/ksf GLA
Convention Center	5.50	0.50	5.50	0.50	/ksf GLA
Hotel-Business	1.00	0.04	1.00	0.04	/room
Hotel-Leisure	0.90	0.25	1.00	0.18	/room
Restaurant/Lounge	13.33		13.33		/ksf GLA
Conference Ctr/Banquet (20 to 50 sq ft/guest room)	22.22		22.22		/ksf GLA
Convention Space (>50 sq ft/guest room)	20.00		10.00		/ksf GLA
Residential, Rental, Shared Spaces *	0.15	1.50	0.15	1.50	/unit
Residential, Owned, Shared Spaces *	0.15	1.7	0.15	1.7	/unit
Office <25 ksf	0.30	3.5	0.03	0.35	/unit
Office 25 to 100 ksf	Linear 0.3<x<0.25				/ksf GLA
Office 100 to 500 ksf	Linear 0.25<x<0.2				/ksf GLA
Office >500 ksf	0.20	2.60	0.02	0.26	/ksf GLA
Data Processing Office	0.25	5.75	0.03	0.58	/ksf GLA
Medical/Dental Office	3.00	1.50	3.00	1.50	/ksf GLA
Bank (Branch) with Drive-In	3.00	1.60	3.00	1.60	/ksf GLA

* 1.0 space reserved for residents' sole use; remainder may be shared.

[1] Giffels Webster edit:
Red = Uses present in proposed boutique hotel. Parking ratios shown in red are those specified in (or equivalent to) those found in the Birmingham Zoning Ordinance. Ratios remaining black are those recommended by ULI.

Note: Conference Ctr category applies if only the proposed Banquet Rm is considered (=31.8 sf/room).

Table G-2. Parking Demand Study Prepared by Others for Aparium Hotel Proposed in Tempe, Arizona

PARKING DEMAND STUDY
TEMPE, AZ

HOTEL KEYS	165
AVERAGE LENGTH OF STAY (1)	1.35
RESTAURANT / BAR SEATS	125
BALLROOM / MEETING SEATS	250

AVERAGE HOTEL PARKING BY DAY OF WEEK (NIGHTLY HOTEL (NIGHT) (2)	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY	AVERAGE	PEAK	MAX
HOTEL OCCUPANCY (3)	69.5%	79.4%	79.1%	70.8%	65.9%	66.6%	50.1%	68.7%	100%	100%
ROOMS OCCUPIED	115	131	131	117	109	110	83	113	165	165
ANTICIPATED DRIVE PERCENTAGE (4)	40%	40%	40%	40%	40%	40%	40%	40%	50%	60%
TOTAL PARKING REQUIREMENT	**46**	**52**	**52**	**47**	**43**	**44**	**33**	**45**	**83**	**99**
AVERAGE DINNER COVERS / DAY	116	134	134	119	140	141	91	125	125	125
ANTICIPATED DRIVE PERCENTAGE (ADDITIONAL) (4)	20%	20%	20%	20%	20%	20%	20%	20%	25%	40%
TOTAL PARKING REQUIREMENT	**23**	**27**	**27**	**24**	**28**	**28**	**18**	**25**	**31**	**50**
AVERAGE EVENT COVERS / DAY	30	35	35	31	29	29	22	30	250	250
ANTICIPATED DRIVE PERCENTAGE (ADDITIONAL) (4)	15%	15%	15%	15%	15%	15%	15%	15%	20%	35%
TOTAL PARKING REQUIREMENT	**5**	**5**	**5**	**5**	**4**	**4**	**3**	**4.5**	**50**	**87.5**
TOTAL EVENING PARKING REQUIREMENT	**74**	**84**	**84**	**75**	**76**	**77**	**55**	**75**	**164**	**237**

AVERAGE HOTEL PARKING BY DAY OF WEEK (DAY) HOTEL (DAY)	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY	AVERAGE	PEAK	MAX
NUMBER OF STAYS LONGER THAN ONE NIGHT (6)	30	34	34	30	28	28	21	29	43	43
ANTICIPATED DRIVE PERCENTAGE (4)	40%	40%	40%	40%	40%	40%	40%	40%	50%	60%
TOTAL PARKING REQUIREMENT (DAY)	**12**	**14**	**14**	**12**	**11**	**11**	**9**	**12**	**21**	**26**
AVERAGE BREAKFAST COVERS / DAY	38	43	43	39	36	36	27	37.5	125	125
ANTICIPATED DRIVE PERCENTAGE (ADDITIONAL) (4)	15%	15%	15%	15%	15%	15%	15%	15%	20%	40%
TOTAL PARKING REQUIREMENT	**6**	**7**	**6**	**6**	**5**	**5**	**4**	**6**	**25**	**50**
AVERAGE LUNCH COVERS / DAY	63	72	72	64	60	61	46	62.5	125	125
ANTICIPATED DRIVE PERCENTAGE (ADDITIONAL) (4)	20%	20%	20%	20%	20%	20%	20%	20%	25%	40%
TOTAL PARKING REQUIREMENT	**13**	**14**	**14**	**13**	**12**	**12**	**9**	**13**	**31**	**50**
AVERAGE POOL BAR COVERS / DAY	46	58	58	88	122	122	102	85	85	85
ANTICIPATED DRIVE PERCENTAGE (ADDITIONAL) (4)	15%	15%	15%	15%	15%	15%	15%	15%	20%	40%
TOTAL PARKING REQUIREMENT	**7**	**9**	**9**	**13**	**18**	**18**	**15**	**13**	**17**	**34**
AVERAGE EVENT COVERS / DAY	30	35	35	31	29	29	22	30	250	250
ANTICIPATED DRIVE PERCENTAGE (ADDITIONAL) (4)	15%	15%	15%	15%	15%	15%	15%	15%	20%	35%
TOTAL PARKING REQUIREMENT	**5**	**5**	**5**	**5**	**4**	**4**	**3**	**4.5**	**50**	**87.5**
TOTAL DAY PARKING REQUIREMENT	**42**	**48**	**48**	**49**	**51**	**52**	**40**	**47**	**145**	**247**

PARKING BY TIME OF DAY	6:00 AM	9:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	12:00 AM
ZONING REQUIREMENT	365	365	365	365	365	365	365
ANTIPICATED MAX	149	237	197	197	237	237	99
ANTICIPATED PEAK	108	158	120	120	164	164	83
ANTICIPATED AVERAGE	51	56	42	42	75	75	45

GENERAL: Information including number of restaurant, bar and meeting seats is subject to change and based on program estimates
(1) Average length of stay based on typical hotel
(2) Assumes a typically check for hotel is in the evening and not before 3pm; Check out by 11 am
(3) Based on historical average occupancy in Tempe per day of week
(4) Percentages provided by ABM parking
(5) Parking requirement by day is determined by stays longer than one night

Table G-3. Parking Demand Summary from ULI Shared Parking Model (3/30/17)

Project: Birmingham Boutique Hotel
Description: Using City of Birmingham Parking Ratios and GW's Assumed Mode Adjustments and Noncaptive Ratios

SHARED PARKING DEMAND SUMMARY

PEAK MONTH: JUNE – PEAK PERIOD: 9 PM, WEEKEND

			Weekday					Weekend					Weekday			Weekend		
Land Use	Project Data Quantity	Unit	Base Rate	Mode Adj	Non-Captive Ratio	Project Rate	Unit	Base Rate	Mode Adj	Non-Captive Ratio	Project Rate	Unit	Peak Hr Adj 9 PM	Peak Mo Adj June	Estimated Parking Demand	Peak Hr Adj 9 PM	Peak Mo Adj June	Estimated Parking Demand
Hotel-Business	126	rooms	1.00	0.50	1.00	0.50	/rooms	1.00	0.50	1.00	0.50	/rooms	0.85	1.00	54	0.85	1.00	54
Restaurant/Lounge	5,369	sf GLA	13.33	0.70	0.60	5.60	/ksf GLA	13.33	0.70	0.60	5.60	/ksf GLA	0.67	0.95	19	0.67	0.95	19
Conference Ctr/Banquet (20 to 50 sq ft/gue	4,004	sf GLA	22.22	0.90	0.70	14.00	/ksf GLA	22.22	0.90	0.70	14.00	/ksf GLA	1.00	1.00	56	1.00	1.00	56
Hotel Employees			0.04	0.90	1.00	0.04	/rooms	0.04	0.90	1.00	0.04	/rooms	0.20	1.00	1	0.55	1.00	2
													Customer		129	Customer		129
													Employee		1	Employee		2
													Reserved		0	Reserved		0
													Total		130	Total		131
													Shared Parking Reduction		55%			55%

ULI base data have been modified from default values.

Table G-4. Peak Month Parking Demand by Hour (3/30/17)

Project: Birmingham Boutique Hotel
Description: Using City of Birmingham Parking Ratios and GW's Assumed Mode Adjustments and Noncaptive Ratios

June
Weekday Estimated Peak-Hour Parking Demand

	Monthly Adj	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	12 AM	Overall Pk 9 PM	AM Peak Hr 9 AM	PM Peak Hr 5 PM	Eve Peak Hr 9 PM
Hotel-Business	100%	60	57	50	44	38	38	35	35	38	38	41	44	47	47	50	54	60	63	63	54	44	44	54
Restaurant/Lounge	95%	-	3	9	3	3	1	29	29	10	3	3	9	16	17	20	19	17	12	9	19	3	9	19
Conference Ctr/Banquet (20 to 50 sq ft/guest room)	100%	-	-	17	34	34	34	36	36	36	36	36	56	56	56	56	56	28	-	-	56	34	56	56
Employee	100%	-	1	4	4	5	5	5	5	5	5	4	3	2	1	1	1	1	-	-	1	4	3	1
TOTAL DEMAND	Customer	60	60	76	81	75	73	100	100	84	77	80	109	119	120	126	129	105	75	72	129	81	109	129
	Employee	-	1	4	4	5	5	5	5	5	5	4	3	2	1	1	1	1	-	-	1	4	3	1
	Reserved	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		60	61	80	85	80	78	105	105	89	82	84	112	121	121	127	130	106	75	72	130	85	112	130

ULI base data have been modified from default values. 130 85 112 130

Footnote(s):

June
Weekend Estimated Peak-Hour Parking Demand

		6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	12 AM	Overall Pk 9 PM	AM Peak Hr 9 AM	PM Peak Hr 5 PM	Eve Peak Hr 9 PM
Hotel-Business	100%	60	57	50	44	38	38	35	35	38	38	41	44	47	47	50	54	60	63	63	54	44	44	54
Restaurant/Lounge	95%	-	3	9	3	3	1	29	29	10	3	3	9	16	17	20	19	17	12	9	19	3	9	19
Conference Ctr/Banquet (20 to 50 sq ft/guest room)	100%	-	-	17	34	34	34	36	36	36	36	36	56	56	56	56	56	28	-	-	56	34	56	56
Employee	100%	-	1	4	4	5	5	5	5	5	5	4	3	3	2	2	2	2	2	1	2	4	3	2
TOTAL DEMAND	Customer	60	60	76	81	75	73	100	100	84	77	80	109	119	120	126	129	105	75	72	129	81	109	129
	Employee	-	1	4	4	5	5	5	5	5	5	4	3	3	2	2	2	2	2	1	2	4	3	2
	Reserved	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		60	61	80	85	80	78	105	105	89	82	84	112	122	122	128	131	107	77	73	131	85	112	131

ULI base data have been modified from default values. 131 85 112 131

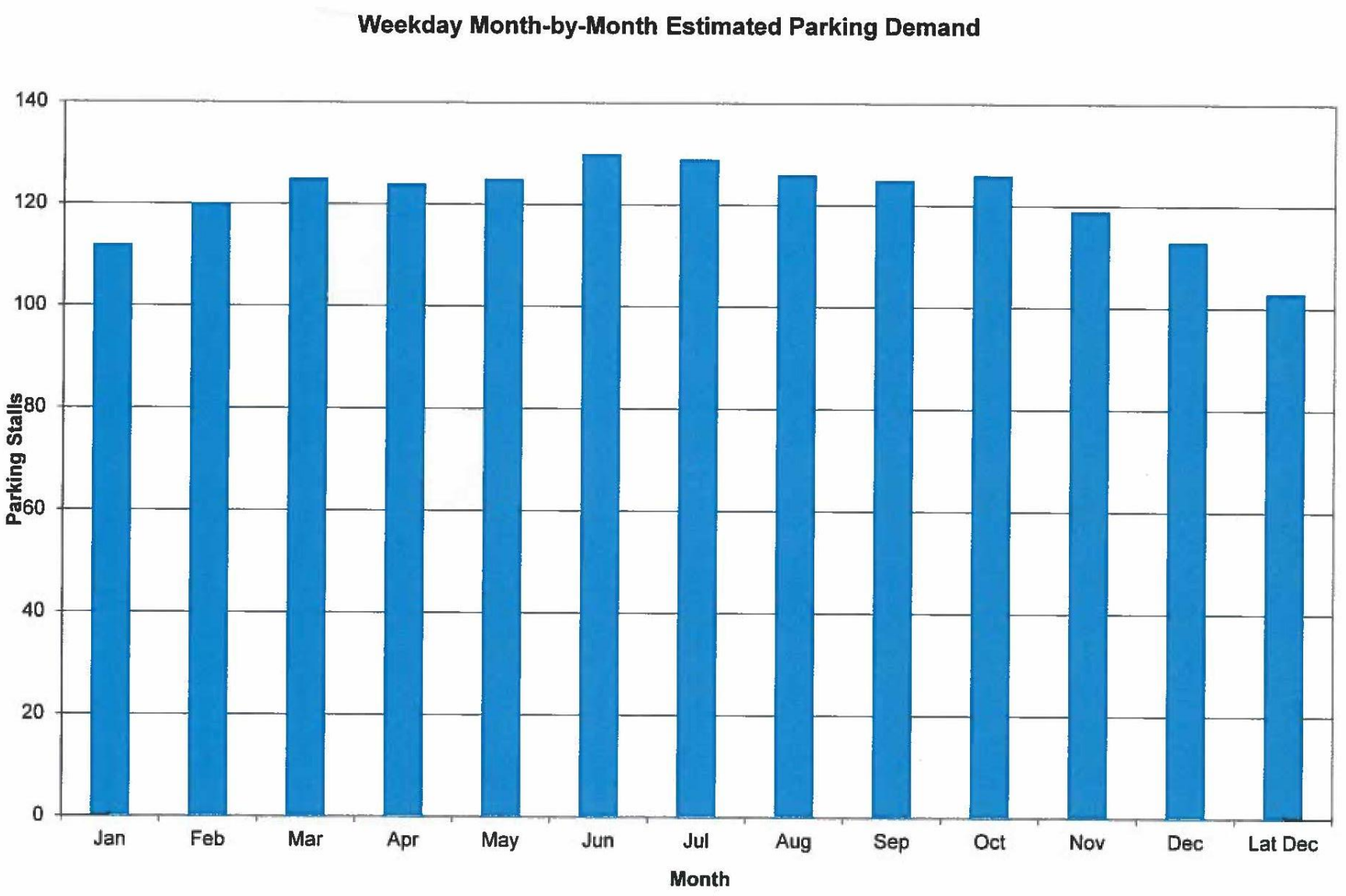

Figure G-1. Weekday Month-by-Month Parking Demand (3/30/17)

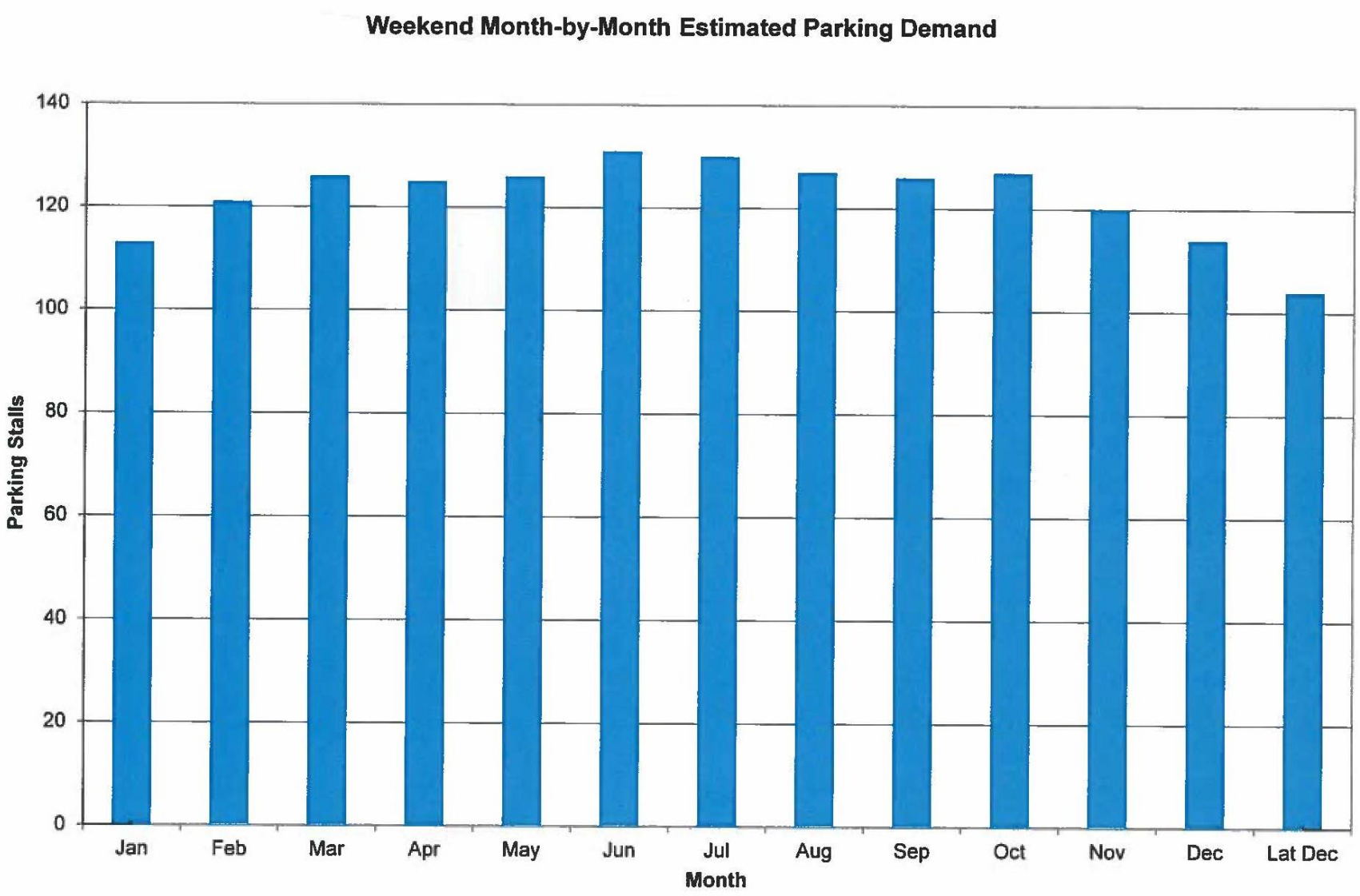

Figure G-2. Weekend Month-by-Month Parking Demand (3/30/17)

APPENDIX H:

ASSIGNMENTS OF SITE TRAFFIC BY TYPE

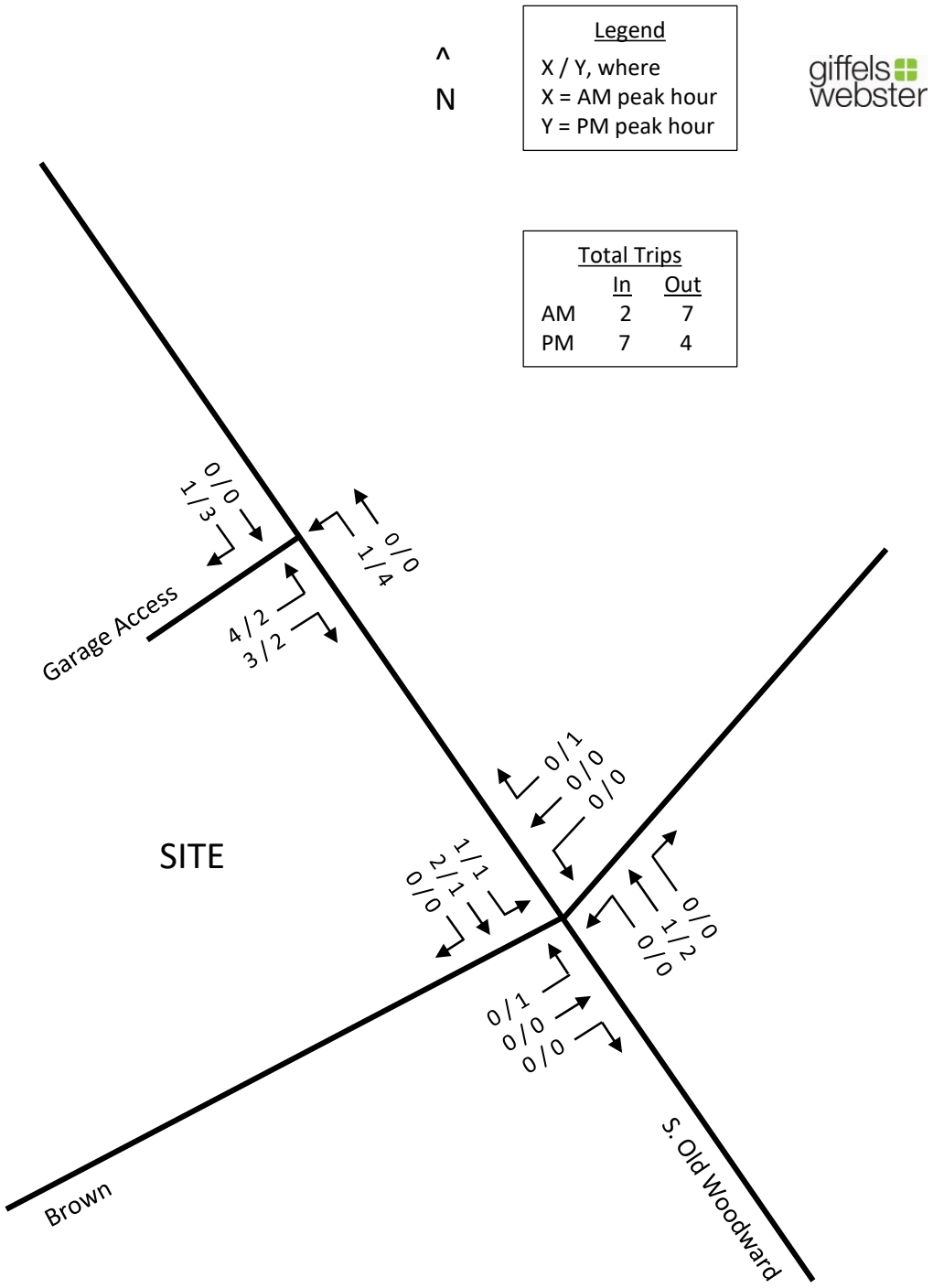

Figure H-1. Peak-Hour Apartment Trips

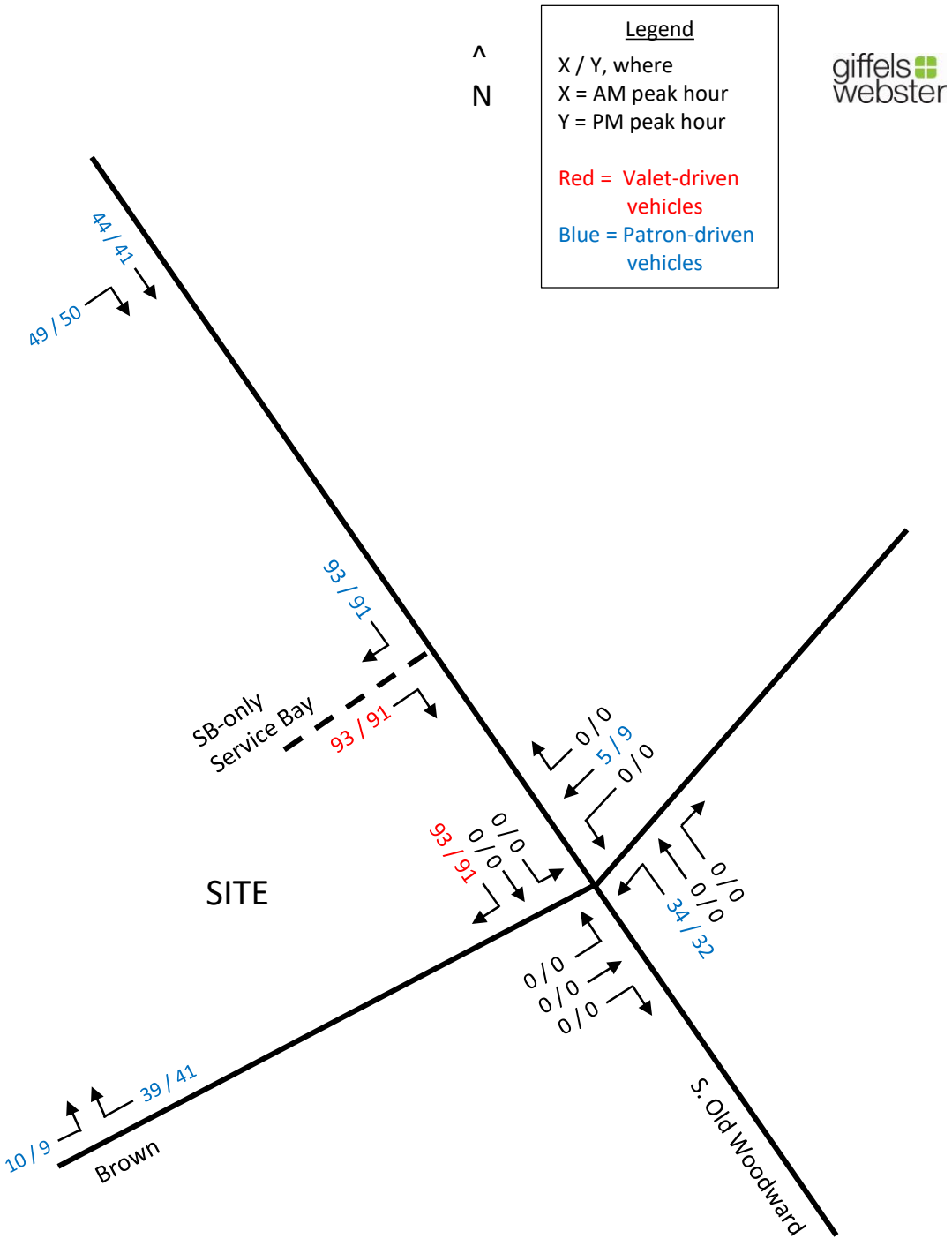

Figure H-2. Peak-Hour Hotel Arrival Trips (Patrons In & Valets Out)

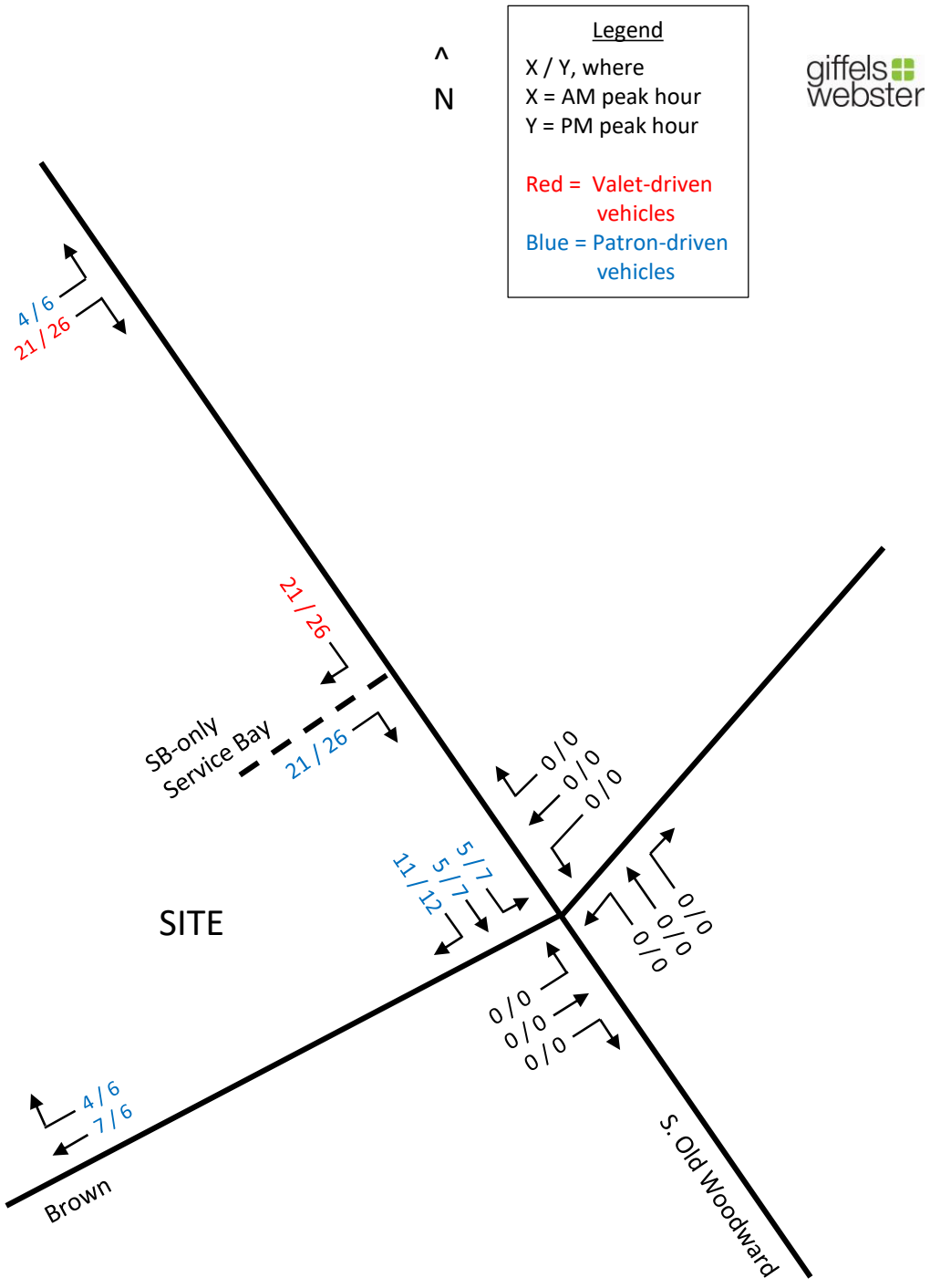

Figure H-3. Peak-Hour Hotel Departure Trips (Valets In & Patrons Out)

APPENDIX I:

SYNCHRO PRINTOUTS

CURRENT TRAFFIC

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	235	117	14	163	28	216	193	65	49	167	25
Future Volume (veh/h)	55	235	117	14	163	28	216	193	65	49	167	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.95	0.98		0.95	0.99		0.98	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1782	1800	1765	1765	1800	1765	1765	1765	1748	1748	1800
Adj Flow Rate, veh/h	62	267	133	17	196	34	248	222	75	54	184	27
Adj No. of Lanes	0	2	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.88	0.88	0.88	0.83	0.83	0.83	0.87	0.87	0.87	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	2	2	2	2	2	2	3	3	3
Cap, veh/h	163	647	322	315	545	95	471	838	596	472	705	103
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.47	0.47	0.47	0.16	0.16	0.16
Sat Flow, veh/h	284	1725	858	866	1454	252	1042	1765	1256	955	1485	218
Grp Volume(v), veh/h	242	0	220	17	0	230	248	222	75	54	0	211
Grp Sat Flow(s),veh/h/ln	1445	0	1421	866	0	1706	1042	1765	1256	955	0	1702
Q Serve(g_s), s	3.0	0.0	9.2	1.2	0.0	7.8	15.8	6.0	2.7	4.0	0.0	8.7
Cycle Q Clear(g_c), s	10.8	0.0	9.2	10.4	0.0	7.8	24.6	6.0	2.7	10.0	0.0	8.7
Prop In Lane	0.26		0.60	1.00		0.15	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	599	0	533	315	0	640	471	838	596	472	0	809
V/C Ratio(X)	0.40	0.00	0.41	0.05	0.00	0.36	0.53	0.26	0.13	0.11	0.00	0.26
Avail Cap(c_a), veh/h	599	0	533	315	0	640	471	838	596	472	0	809
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.6	0.0	18.5	22.3	0.0	18.1	21.1	12.6	11.7	24.6	0.0	21.4
Incr Delay (d2), s/veh	2.0	0.0	2.4	0.3	0.0	1.6	4.2	0.8	0.4	0.5	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	0.0	3.9	0.3	0.0	3.9	5.1	3.1	1.0	1.1	0.0	4.3
LnGrp Delay(d),s/veh	20.6	0.0	20.9	22.6	0.0	19.6	25.3	13.4	12.2	25.1	0.0	22.2
LnGrp LOS	C		C	C		B	C	B	B	C		C
Approach Vol, veh/h		462			247			545			265	
Approach Delay, s/veh		20.7			19.8			18.6			22.8	
Approach LOS		C			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		44.0		36.0		44.0		36.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		38.0		30.0		38.0		30.0
Max Q Clear Time (g_c+I1), s		26.6		12.8		12.0		12.4
Green Ext Time (p_c), s		0.6		0.9		0.6		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	20.2
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	360	220	35	174	65	147	241	46	57	199	48
Future Volume (veh/h)	72	360	220	35	174	65	147	241	46	57	199	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	0.99		0.97	0.99		0.97	0.99		0.96	0.99		0.93
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1782	1800	1782	1782	1800	1765	1765	1765	1765	1765	1800
Adj Flow Rate, veh/h	81	404	247	40	198	74	158	259	49	62	216	52
Adj No. of Lanes	0	2	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.93	0.93	0.93	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	2	2	2
Cap, veh/h	173	807	482	305	583	218	314	662	431	344	507	122
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.38	0.38	0.38	0.12	0.12	0.12
Sat Flow, veh/h	250	1698	1014	703	1227	459	986	1765	1148	949	1352	325
Grp Volume(v), veh/h	389	0	343	40	0	272	158	259	49	62	0	268
Grp Sat Flow(s),veh/h/ln	1555	0	1408	703	0	1685	986	1765	1148	949	0	1678
Q Serve(g_s), s	5.4	0.0	13.5	3.3	0.0	8.1	11.8	8.6	2.2	4.9	0.0	11.8
Cycle Q Clear(g_c), s	13.4	0.0	13.5	16.9	0.0	8.1	23.6	8.6	2.2	13.5	0.0	11.8
Prop In Lane	0.21		0.72	1.00		0.27	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	793	0	669	305	0	801	314	662	431	344	0	629
V/C Ratio(X)	0.49	0.00	0.51	0.13	0.00	0.34	0.50	0.39	0.11	0.18	0.00	0.43
Avail Cap(c_a), veh/h	793	0	669	305	0	801	314	662	431	344	0	629
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.3	0.0	14.6	20.4	0.0	13.1	28.4	18.3	16.3	31.8	0.0	27.1
Incr Delay (d2), s/veh	2.2	0.0	2.8	0.9	0.0	1.2	5.7	1.7	0.5	1.1	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	0.0	5.8	0.7	0.0	4.0	3.7	4.5	0.8	1.4	0.0	5.9
LnGrp Delay(d),s/veh	16.5	0.0	17.4	21.3	0.0	14.3	34.1	20.1	16.9	33.0	0.0	29.2
LnGrp LOS	B		B	C		B	C	C	B	C		C
Approach Vol, veh/h		732			312			466			330	
Approach Delay, s/veh		16.9			15.2			24.5			29.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		36.0		44.0		36.0		44.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		30.0		38.0		30.0		38.0
Max Q Clear Time (g_c+I1), s		25.6		15.5		15.5		18.9
Green Ext Time (p_c), s		0.5		1.5		0.8		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	20.9
HCM 2010 LOS	C

FUTURE BACKGROUND TRAFFIC

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	248	123	15	172	30	228	204	69	52	176	26
Future Volume (veh/h)	58	248	123	15	172	30	228	204	69	52	176	26
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.95	0.99		0.98	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1782	1800	1765	1765	1800	1765	1765	1765	1748	1748	1800
Adj Flow Rate, veh/h	66	282	140	18	207	36	262	234	79	57	193	29
Adj No. of Lanes	0	2	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.88	0.88	0.88	0.83	0.83	0.83	0.87	0.87	0.87	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	2	2	2	2	2	2	3	3	3
Cap, veh/h	161	637	320	304	545	95	462	838	596	462	703	106
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.47	0.47	0.47	0.16	0.16	0.16
Sat Flow, veh/h	278	1700	852	850	1453	253	1032	1765	1256	942	1479	222
Grp Volume(v), veh/h	254	0	234	18	0	243	262	234	79	57	0	222
Grp Sat Flow(s),veh/h/ln	1408	0	1422	850	0	1706	1032	1765	1256	942	0	1702
Q Serve(g_s), s	3.9	0.0	9.8	1.3	0.0	8.3	17.4	6.4	2.8	4.3	0.0	9.2
Cycle Q Clear(g_c), s	12.2	0.0	9.8	11.1	0.0	8.3	26.6	6.4	2.8	10.7	0.0	9.2
Prop In Lane	0.26		0.60	1.00		0.15	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	585	0	533	304	0	640	462	838	596	462	0	808
V/C Ratio(X)	0.43	0.00	0.44	0.06	0.00	0.38	0.57	0.28	0.13	0.12	0.00	0.27
Avail Cap(c_a), veh/h	585	0	533	304	0	640	462	838	596	462	0	808
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.0	0.0	18.7	22.9	0.0	18.2	22.0	12.7	11.8	25.1	0.0	21.6
Incr Delay (d2), s/veh	2.3	0.0	2.6	0.4	0.0	1.7	5.0	0.8	0.5	0.5	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	4.2	0.3	0.0	4.2	5.6	3.3	1.0	1.2	0.0	4.5
LnGrp Delay(d),s/veh	21.3	0.0	21.3	23.2	0.0	19.9	26.9	13.5	12.2	25.6	0.0	22.4
LnGrp LOS	C		C	C		B	C	B	B	C		C
Approach Vol, veh/h		488			261			575			279	
Approach Delay, s/veh		21.3			20.2			19.5			23.1	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		44.0		36.0		44.0		36.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		38.0		30.0		38.0		30.0
Max Q Clear Time (g_c+I1), s		28.6		14.2		12.7		13.1
Green Ext Time (p_c), s		0.6		1.0		0.7		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	20.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	380	232	37	184	69	155	254	49	60	210	51
Future Volume (veh/h)	76	380	232	37	184	69	155	254	49	60	210	51
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	0.99		0.97	1.00		0.97	0.99		0.96	0.99		0.93
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1782	1800	1782	1782	1800	1765	1765	1765	1765	1765	1800
Adj Flow Rate, veh/h	85	427	261	42	209	78	167	273	53	65	228	55
Adj No. of Lanes	0	2	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.93	0.93	0.93	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	2	2	2
Cap, veh/h	170	797	481	289	583	218	303	662	431	334	507	122
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.38	0.38	0.38	0.12	0.12	0.12
Sat Flow, veh/h	244	1677	1013	680	1227	458	975	1765	1148	935	1351	326
Grp Volume(v), veh/h	410	0	363	42	0	287	167	273	53	65	0	283
Grp Sat Flow(s),veh/h/ln	1526	0	1408	680	0	1686	975	1765	1148	935	0	1677
Q Serve(g_s), s	6.7	0.0	14.6	3.7	0.0	8.6	12.9	9.2	2.4	5.2	0.0	12.5
Cycle Q Clear(g_c), s	15.4	0.0	14.6	18.3	0.0	8.6	25.5	9.2	2.4	14.4	0.0	12.5
Prop In Lane	0.21		0.72	1.00		0.27	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	779	0	669	289	0	801	303	662	431	334	0	629
V/C Ratio(X)	0.53	0.00	0.54	0.15	0.00	0.36	0.55	0.41	0.12	0.19	0.00	0.45
Avail Cap(c_a), veh/h	779	0	669	289	0	801	303	662	431	334	0	629
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.8	0.0	14.8	21.3	0.0	13.3	29.5	18.5	16.4	32.5	0.0	27.4
Incr Delay (d2), s/veh	2.5	0.0	3.1	1.1	0.0	1.3	7.1	1.9	0.6	1.3	0.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	0.0	6.2	0.8	0.0	4.3	4.1	4.7	0.8	1.5	0.0	6.2
LnGrp Delay(d),s/veh	17.3	0.0	18.0	22.4	0.0	14.5	36.5	20.4	17.0	33.8	0.0	29.7
LnGrp LOS	B		B	C		B	D	C	B	C		C
Approach Vol, veh/h		773			329			493			348	
Approach Delay, s/veh		17.6			15.5			25.5			30.5	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		36.0		44.0		36.0		44.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		30.0		38.0		30.0		38.0
Max Q Clear Time (g_c+I1), s		27.5		17.4		16.4		20.3
Green Ext Time (p_c), s		0.4		1.7		0.8		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	21.6
HCM 2010 LOS	C

FUTURE TOTAL TRAFFIC

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	248	123	15	177	30	262	205	69	58	183	130
Future Volume (veh/h)	58	248	123	15	177	30	262	205	69	58	183	130
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.95	1.00		0.98	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1782	1800	1765	1765	1800	1765	1765	1765	1748	1748	1800
Adj Flow Rate, veh/h	66	282	140	18	213	36	301	236	79	64	201	143
Adj No. of Lanes	0	2	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.88	0.88	0.88	0.83	0.83	0.83	0.87	0.87	0.87	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	2	2	2	2	2	2	3	3	3
Cap, veh/h	160	634	319	304	548	93	398	838	596	460	447	318
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.47	0.47	0.47	0.47	0.47	0.47
Sat Flow, veh/h	275	1690	851	850	1460	247	926	1765	1256	940	940	669
Grp Volume(v), veh/h	254	0	234	18	0	249	301	236	79	64	0	344
Grp Sat Flow(s),veh/h/ln	1394	0	1423	850	0	1707	926	1765	1256	940	0	1609
Q Serve(g_s), s	3.9	0.0	9.8	1.3	0.0	8.5	25.7	6.5	2.8	3.5	0.0	11.4
Cycle Q Clear(g_c), s	12.5	0.0	9.8	11.1	0.0	8.5	37.1	6.5	2.8	10.0	0.0	11.4
Prop In Lane	0.26		0.60	1.00		0.14	1.00		1.00	1.00		0.42
Lane Grp Cap(c), veh/h	579	0	533	304	0	640	398	838	596	460	0	764
V/C Ratio(X)	0.44	0.00	0.44	0.06	0.00	0.39	0.76	0.28	0.13	0.14	0.00	0.45
Avail Cap(c_a), veh/h	579	0	533	304	0	640	398	838	596	460	0	764
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.1	0.0	18.7	22.9	0.0	18.3	26.4	12.7	11.8	15.8	0.0	14.0
Incr Delay (d2), s/veh	2.4	0.0	2.6	0.4	0.0	1.8	12.6	0.8	0.5	0.6	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	4.2	0.3	0.0	4.3	7.9	3.3	1.0	1.0	0.0	5.5
LnGrp Delay(d),s/veh	21.5	0.0	21.3	23.2	0.0	20.1	39.1	13.6	12.2	16.4	0.0	15.9
LnGrp LOS	C		C	C		C	D	B	B	B		B
Approach Vol, veh/h		488			267			616			408	
Approach Delay, s/veh		21.4			20.3			25.8			16.0	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		44.0		36.0		44.0		36.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		38.0		30.0		38.0		30.0
Max Q Clear Time (g_c+I1), s		39.1		14.5		13.4		13.1
Green Ext Time (p_c), s		0.0		1.0		1.1		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	21.5
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.6

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	257	114	0	293	0	114
Future Vol, veh/h	257	114	0	293	0	114
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	87	87	92	92
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	282	125	0	337	0	124

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	345
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	702
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	702
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NWT	SET	SER
Capacity (veh/h)	702	-	-	-
HCM Lane V/C Ratio	0.177	-	-	-
HCM Control Delay (s)	11.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.6	-	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	4	3	368	1	1	292
Future Vol, veh/h	4	3	368	1	1	292
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	75	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	91	91	87	87
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	7	5	404	1	1	336

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	743	405	0	0	405	0
Stage 1	405	-	-	-	-	-
Stage 2	338	-	-	-	-	-
Critical Hdwy	7.1	6.2	-	-	4.1	-
Critical Hdwy Stg 1	6.1	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	334	650	-	-	1165	-
Stage 1	626	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	334	650	-	-	1165	-
Mov Cap-2 Maneuver	334	-	-	-	-	-
Stage 1	626	-	-	-	-	-
Stage 2	680	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	13.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER
Capacity (veh/h)	1165	-	422	-	-
HCM Lane V/C Ratio	0.001	-	0.028	-	-
HCM Control Delay (s)	8.1	-	13.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	248	123	15	177	30	262	205	69	58	183	130
Future Volume (veh/h)	58	248	123	15	177	30	262	205	69	58	183	130
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.94	0.97		0.94	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1782	1800	1765	1765	1800	1765	1765	1765	1748	1748	1800
Adj Flow Rate, veh/h	66	282	140	18	213	36	301	236	79	64	201	143
Adj No. of Lanes	0	2	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.88	0.88	0.88	0.83	0.83	0.83	0.87	0.87	0.87	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	2	2	2	2	2	2	3	3	3
Cap, veh/h	120	460	242	212	419	71	501	993	708	555	530	377
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.56	0.56	0.56	0.56	0.56	0.56
Sat Flow, veh/h	221	1600	840	843	1456	246	925	1765	1259	940	942	670
Grp Volume(v), veh/h	253	0	235	18	0	249	301	236	79	64	0	344
Grp Sat Flow(s),veh/h/ln	1251	0	1409	843	0	1702	925	1765	1259	940	0	1612
Q Serve(g_s), s	6.2	0.0	11.4	1.5	0.0	9.8	21.5	5.4	2.3	3.0	0.0	9.5
Cycle Q Clear(g_c), s	16.0	0.0	11.4	12.9	0.0	9.8	30.9	5.4	2.3	8.4	0.0	9.5
Prop In Lane	0.26		0.60	1.00		0.14	1.00		1.00	1.00		0.42
Lane Grp Cap(c), veh/h	417	0	405	212	0	489	501	993	708	555	0	907
V/C Ratio(X)	0.61	0.00	0.58	0.08	0.00	0.51	0.60	0.24	0.11	0.12	0.00	0.38
Avail Cap(c_a), veh/h	417	0	405	212	0	489	501	993	708	555	0	907
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.8	0.0	24.4	29.9	0.0	23.8	18.3	8.8	8.2	10.9	0.0	9.7
Incr Delay (d2), s/veh	6.5	0.0	5.9	0.8	0.0	3.7	5.3	0.6	0.3	0.4	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	0.0	5.1	0.4	0.0	5.1	6.2	2.8	0.9	0.8	0.0	4.5
LnGrp Delay(d),s/veh	32.2	0.0	30.3	30.7	0.0	27.5	23.6	9.4	8.5	11.4	0.0	10.9
LnGrp LOS	C		C	C		C	C	A	A	B		B
Approach Vol, veh/h		488			267			616			408	
Approach Delay, s/veh		31.3			27.7			16.2			11.0	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		51.0		29.0		51.0		29.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		45.0		23.0		45.0		23.0
Max Q Clear Time (g_c+I1), s		32.9		18.0		11.5		14.9
Green Ext Time (p_c), s		1.0		0.7		1.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	20.9
HCM 2010 LOS	C

Summary of All Intervals

Start Time	7:50
End Time	9:00
Total Time (min)	70
Time Recorded (min)	60
# of Intervals	4
# of Recorded Intervals	3
Vehs Entered	3734
Vehs Exited	3747
Starting Vehs	54
Ending Vehs	41
Travel Distance (mi)	788
Travel Time (hr)	60.4
Total Delay (hr)	26.3
Total Stops	3449
Fuel Used (gal)	36.5

Interval #0 Information Seeding

Start Time	7:50
End Time	8:00
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Pre

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Vehs Entered	908
Vehs Exited	898
Starting Vehs	54
Ending Vehs	64
Travel Distance (mi)	191
Travel Time (hr)	14.5
Total Delay (hr)	6.3
Total Stops	840
Fuel Used (gal)	8.8

Interval #2 Information Peak

Start Time	8:15
End Time	8:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Vehs Entered	1052
Vehs Exited	1037
Starting Vehs	64
Ending Vehs	79
Travel Distance (mi)	224
Travel Time (hr)	17.7
Total Delay (hr)	8.0
Total Stops	1006
Fuel Used (gal)	10.5

Interval #3 Information Post

Start Time	8:30
End Time	9:00
Total Time (min)	30

Volumes adjusted by Growth Factors, Anti PHF.

Vehs Entered	1774
Vehs Exited	1812
Starting Vehs	79
Ending Vehs	41
Travel Distance (mi)	373
Travel Time (hr)	28.2
Total Delay (hr)	12.0
Total Stops	1603
Fuel Used (gal)	17.2

Intersection: 1: Old Woodward Avenue & Garage

Movement	EB	SE
Directions Served	LR	TR
Maximum Queue (ft)	29	55
Average Queue (ft)	5	5
95th Queue (ft)	23	29
Link Distance (ft)	85	153
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Valet Bay & Old Woodward Avenue

Movement	SE	NE
Directions Served	TR	R
Maximum Queue (ft)	50	102
Average Queue (ft)	8	36
95th Queue (ft)	31	67
Link Distance (ft)	31	89
Upstream Blk Time (%)	1	0
Queuing Penalty (veh)	5	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Pierce Street & Maple Road

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	287	49	139	74
Average Queue (ft)	85	26	72	35
95th Queue (ft)	186	53	142	65
Link Distance (ft)	272		118	290
Upstream Blk Time (%)	0		2	
Queuing Penalty (veh)	0		14	
Storage Bay Dist (ft)		25		
Storage Blk Time (%)		9	7	
Queuing Penalty (veh)		52	4	

Intersection: 19: Old Woodward Avenue & Merrill Street

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	53	71	138	97
Average Queue (ft)	30	19	44	30
95th Queue (ft)	60	54	100	72
Link Distance (ft)	333		153	324
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)		75		
Storage Blk Time (%)		0	4	
Queuing Penalty (veh)		1	2	

Intersection: 20: Old Woodward Avenue & Brown Street

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	TR	L	TR	L	T	R	L	TR
Maximum Queue (ft)	201	172	31	141	125	327	52	71	88
Average Queue (ft)	138	80	8	90	89	111	20	28	57
95th Queue (ft)	194	156	29	136	134	245	48	66	91
Link Distance (ft)	541			288		444			72
Upstream Blk Time (%)								0	3
Queuing Penalty (veh)								0	11
Storage Bay Dist (ft)		300	75		75		200	150	
Storage Blk Time (%)				16	19	5		0	3
Queuing Penalty (veh)				2	54	15		0	2

Network Summary

Network wide Queuing Penalty: 362

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	380	232	37	193	70	187	256	49	68	218	154
Future Volume (veh/h)	77	380	232	37	193	70	187	256	49	68	218	154
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	1.00		0.97	1.00		0.96	0.99		0.93
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1782	1800	1782	1782	1800	1765	1765	1765	1765	1765	1800
Adj Flow Rate, veh/h	87	427	261	42	219	80	201	275	53	74	237	167
Adj No. of Lanes	0	2	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.93	0.93	0.93	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	2	2	2
Cap, veh/h	171	783	479	288	587	214	232	662	431	332	350	246
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.38	0.38	0.38	0.38	0.38	0.38
Sat Flow, veh/h	244	1648	1008	680	1236	451	879	1765	1148	933	932	657
Grp Volume(v), veh/h	410	0	365	42	0	299	201	275	53	74	0	404
Grp Sat Flow(s),veh/h/ln	1491	0	1409	680	0	1687	879	1765	1148	933	0	1589
Q Serve(g_s), s	7.3	0.0	14.7	3.7	0.0	9.0	13.0	9.2	2.4	5.1	0.0	17.0
Cycle Q Clear(g_c), s	16.4	0.0	14.7	18.4	0.0	9.0	30.0	9.2	2.4	14.3	0.0	17.0
Prop In Lane	0.21		0.72	1.00		0.27	1.00		1.00	1.00		0.41
Lane Grp Cap(c), veh/h	763	0	669	288	0	801	232	662	431	332	0	596
V/C Ratio(X)	0.54	0.00	0.55	0.15	0.00	0.37	0.87	0.42	0.12	0.22	0.00	0.68
Avail Cap(c_a), veh/h	763	0	669	288	0	801	232	662	431	332	0	596
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.0	0.0	14.9	21.4	0.0	13.4	35.4	18.5	16.4	23.8	0.0	21.0
Incr Delay (d2), s/veh	2.7	0.0	3.2	1.1	0.0	1.3	32.4	1.9	0.6	1.5	0.0	6.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	0.0	6.3	0.8	0.0	4.4	6.5	4.9	0.8	1.5	0.0	8.4
LnGrp Delay(d),s/veh	17.8	0.0	18.1	22.5	0.0	14.7	67.8	20.4	17.0	25.4	0.0	27.1
LnGrp LOS	B		B	C		B	E	C	B	C		C
Approach Vol, veh/h		775			341			529			478	
Approach Delay, s/veh		17.9			15.7			38.1			26.8	
Approach LOS		B			B			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		36.0		44.0		36.0		44.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		30.0		38.0		30.0		38.0
Max Q Clear Time (g_c+I1), s		32.0		18.4		19.0		20.4
Green Ext Time (p_c), s		0.0		1.7		1.1		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	24.6
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.5

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	323	117	0	403	0	117
Future Vol, veh/h	323	117	0	403	0	117
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	91	91	92	92
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	351	127	0	443	0	127

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	415
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	642
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	642
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NWT	SET	SER
Capacity (veh/h)	642	-	-	-
HCM Lane V/C Ratio	0.198	-	-	-
HCM Control Delay (s)	12	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.7	-	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	438	3	4	399	2	2
Future Vol, veh/h	438	3	4	399	2	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	91	91	60	60
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	476	3	4	438	3	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	479	0	925	478
Stage 1	-	-	-	-	478	-
Stage 2	-	-	-	-	447	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1094	-	301	591
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	649	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1094	-	300	591
Mov Cap-2 Maneuver	-	-	-	-	300	-
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	647	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.1	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER
Capacity (veh/h)	398	1094	-	-	-
HCM Lane V/C Ratio	0.017	0.004	-	-	-
HCM Control Delay (s)	14.2	8.3	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	380	232	37	193	70	187	256	49	68	218	154
Future Volume (veh/h)	77	380	232	37	193	70	187	256	49	68	218	154
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.96	1.00		0.96	1.00		0.97	0.99		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1782	1800	1782	1782	1800	1765	1765	1765	1765	1765	1800
Adj Flow Rate, veh/h	87	427	261	42	219	80	201	275	53	74	237	167
Adj No. of Lanes	0	2	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.93	0.93	0.93	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	2	2	2
Cap, veh/h	131	553	376	195	462	169	351	838	551	443	446	314
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.47	0.47	0.47	0.47	0.47	0.47
Sat Flow, veh/h	205	1474	1003	680	1233	450	878	1765	1159	934	939	662
Grp Volume(v), veh/h	410	0	365	42	0	299	201	275	53	74	0	404
Grp Sat Flow(s),veh/h/ln	1280	0	1401	680	0	1683	878	1765	1159	934	0	1601
Q Serve(g_s), s	14.1	0.0	17.6	4.5	0.0	10.8	16.7	7.8	2.0	4.3	0.0	14.2
Cycle Q Clear(g_c), s	24.9	0.0	17.6	22.1	0.0	10.8	30.9	7.8	2.0	12.0	0.0	14.2
Prop In Lane	0.21		0.72	1.00		0.27	1.00		1.00	1.00		0.41
Lane Grp Cap(c), veh/h	535	0	525	195	0	631	351	838	551	443	0	760
V/C Ratio(X)	0.77	0.00	0.69	0.21	0.00	0.47	0.57	0.33	0.10	0.17	0.00	0.53
Avail Cap(c_a), veh/h	535	0	525	195	0	631	351	838	551	443	0	760
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.1	0.0	21.1	30.4	0.0	19.0	25.6	13.1	11.6	16.8	0.0	14.7
Incr Delay (d2), s/veh	10.1	0.0	7.4	2.5	0.0	2.5	6.6	1.0	0.3	0.8	0.0	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.9	0.0	7.9	1.0	0.0	5.4	4.7	4.0	0.7	1.2	0.0	6.7
LnGrp Delay(d),s/veh	34.2	0.0	28.5	32.9	0.0	21.5	32.2	14.1	11.9	17.6	0.0	17.4
LnGrp LOS	C		C	C		C	C	B	B	B		B
Approach Vol, veh/h		775			341			529			478	
Approach Delay, s/veh		31.5			22.9			20.8			17.4	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		44.0		36.0		44.0		36.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		38.0		30.0		38.0		30.0
Max Q Clear Time (g_c+I1), s		32.9		26.9		16.2		24.1
Green Ext Time (p_c), s		0.8		0.8		1.2		1.2

Intersection Summary	
HCM 2010 Ctrl Delay	24.3
HCM 2010 LOS	C

Summary of All Intervals

Start Time	4:50
End Time	6:00
Total Time (min)	70
Time Recorded (min)	60
# of Intervals	4
# of Recorded Intervals	3
Vehs Entered	4481
Vehs Exited	4497
Starting Vehs	80
Ending Vehs	64
Travel Distance (mi)	961
Travel Time (hr)	94.1
Total Delay (hr)	51.9
Total Stops	5049
Fuel Used (gal)	49.9

Interval #0 Information Seeding

Start Time	4:50
End Time	5:00
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Pre

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Vehs Entered	1125
Vehs Exited	1116
Starting Vehs	80
Ending Vehs	89
Travel Distance (mi)	241
Travel Time (hr)	21.8
Total Delay (hr)	11.3
Total Stops	1274
Fuel Used (gal)	12.0

Interval #2 Information Peak

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Vehs Entered	1167
Vehs Exited	1140
Starting Vehs	89
Ending Vehs	116
Travel Distance (mi)	249
Travel Time (hr)	25.7
Total Delay (hr)	14.8
Total Stops	1385
Fuel Used (gal)	13.3

Interval #3 Information Post

Start Time	5:30
End Time	6:00
Total Time (min)	30

Volumes adjusted by Growth Factors, Anti PHF.

Vehs Entered	2189
Vehs Exited	2241
Starting Vehs	116
Ending Vehs	64
Travel Distance (mi)	471
Travel Time (hr)	46.5
Total Delay (hr)	25.7
Total Stops	2390
Fuel Used (gal)	24.7

Intersection: 1: Garage & Old Woodward Avenue

Movement	SE	NW	NW	NE
Directions Served	TR	L	T	LR
Maximum Queue (ft)	135	19	31	30
Average Queue (ft)	41	1	1	6
95th Queue (ft)	113	6	10	25
Link Distance (ft)	119		30	94
Upstream Blk Time (%)	1	0	0	
Queuing Penalty (veh)	2	0	0	
Storage Bay Dist (ft)		75		
Storage Blk Time (%)		0	0	
Queuing Penalty (veh)		0	0	

Intersection: 3: Valet Bay & Old Woodward Avenue

Movement	SE	NE
Directions Served	TR	R
Maximum Queue (ft)	68	102
Average Queue (ft)	23	58
95th Queue (ft)	49	104
Link Distance (ft)	30	87
Upstream Blk Time (%)	10	7
Queuing Penalty (veh)	44	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Pierce Street & Maple Road

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	306	49	99	228
Average Queue (ft)	147	32	50	58
95th Queue (ft)	277	58	104	162
Link Distance (ft)	272		72	291
Upstream Blk Time (%)	11		2	
Queuing Penalty (veh)	0		11	
Storage Bay Dist (ft)		25		
Storage Blk Time (%)		16	7	
Queuing Penalty (veh)		85	4	

Intersection: 19: Old Woodward Avenue & Merrill Street

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (ft)	94	109	119	136
Average Queue (ft)	58	41	41	43
95th Queue (ft)	90	75	89	96
Link Distance (ft)	324		119	339
Upstream Blk Time (%)		0	0	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)		75		
Storage Blk Time (%)		1	1	
Queuing Penalty (veh)		3	1	

Intersection: 20: Old Woodward Avenue & Brown Street

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	TR	L	TR	L	T	R	L	TR
Maximum Queue (ft)	407	319	100	249	125	437	241	67	95
Average Queue (ft)	206	160	44	106	92	136	26	36	70
95th Queue (ft)	324	283	94	184	135	301	98	70	85
Link Distance (ft)	527			264		444			68
Upstream Blk Time (%)				0		0		1	20
Queuing Penalty (veh)				0		0		0	91
Storage Bay Dist (ft)		300	75		75		200	150	
Storage Blk Time (%)	1	0	4	19	40	16		1	20
Queuing Penalty (veh)	4	0	12	7	123	38		4	14

Network Summary

Network wide Queuing Penalty: 844