



DRAFT

Bayfront Parkway Traffic Circulation Study

Sassafras to Holland

August 2016



FRENCH ENGINEERING, LLC



pennsylvania

DEPARTMENT OF TRANSPORTATION

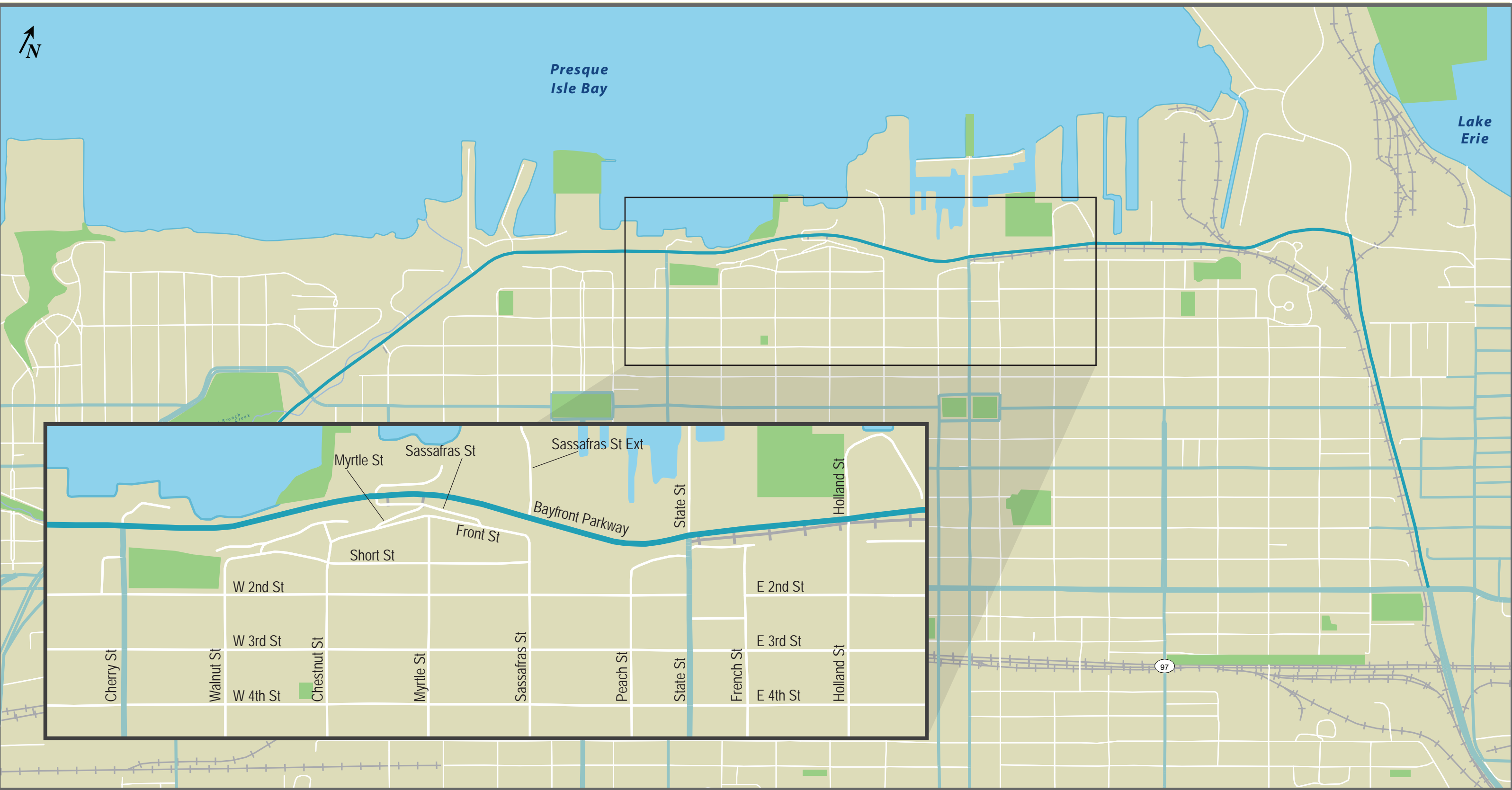
OVERVIEW AND SUMMARY OF FINDINGS

This memorandum and supporting documentation provides an analysis of the traffic circulation associated with a proposed 2034 future build improvement concept taking into account proposed development along the Bayfront. Several developments are proposed along the Bayfront adjacent to Lake Erie to the north of the Bayfront Parkway within the City of Erie. The focus study area for this analysis along the Bayfront Parkway is bounded to the west at Sassafras Street and at Holland Street to the east (see Figure 1 – Traffic Circulation Study Area). The purpose of this traffic analysis was to develop a traffic projection for the year 2034 that includes known potential developments, and evaluates a proposed build alternative (see Figure 2 – Bayfront Future Build Concept) for reconfiguring this area to accommodate the traffic demand. In short, it was determined that the proposed build alternative will accommodate the anticipated future traffic demand. While the many details that go into the analysis will need to be further refined as the Bayfront development plans and roadway improvement plans are advanced in tandem; it appears in concept that the proposed build improvement concept will work acceptably.

With the reconfiguration of the Bayfront Parkway and the emphasis on the redevelopment of the area, it would likely be beneficial to the regional circulation of traffic for longer distance through traffic to utilize 12th Street as an alternative to the Bayfront Parkway. As part of this overall project, it is recommended that the Department pursue improvements to 12th Street, such as adaptive traffic signal control, to improve travel time on 12th Street and consequently its attractiveness. Additionally, the deployment of ITS strategies along Interstate 79 located in advance of the Bayfront Parkway to provide real travel time information for trips along the Bayfront and 12th Street should be considered to better manage the travel demand along each route.

BACKGROUND TRAFFIC VOLUMES

Intersections within the study area include Sassafras Street, Sassafras Street Extension, State Street, Holland Street and considering a new access point to the west of Sassafras St. Ext and east of the Waterworks Driveway. As a result, these intersections were counted August 2014 and inflated to the year 2034 using a background traffic growth rate of 0.15% per year, which was consistent with the Bureau of Planning and Research (BPR) annual growth rates for urban non-freeways in Erie County, as well as the regional travel demand forecasting model for the Erie metro area.



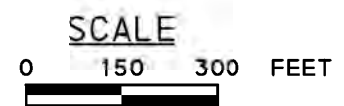
- Legend**
- ++ Railroad
 - State Road
 - Local Road
 - Parks
 - Bayfront Parkway

Figure 1 | Traffic Study Focus Area

City of Erie | Erie County, Pennsylvania



September 30th, 2014 | Source: ESRI



LEGEND






	POTENTIAL DEVELOPMENT ACCESS ROAD
	PROPOSED SIDEWALK/BIKE ACCESS
	PROPOSED WALL
	PROPOSED LANDSCAPED ARCHITECTURE
	PROPOSED STRUCTURE OVER RAMP

FIGURE 2
BAYFRONT FUTURE BUILD CONCEPT

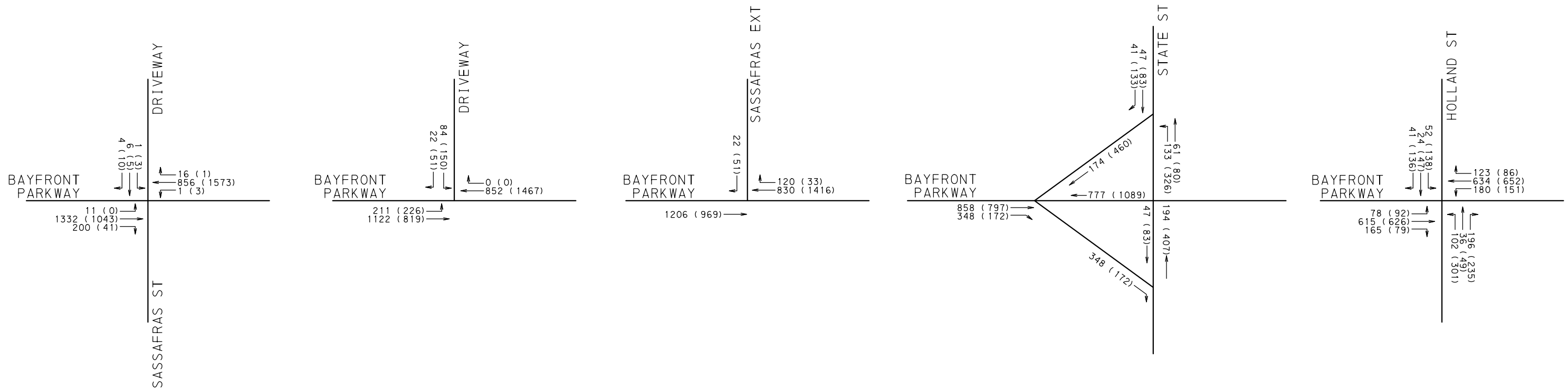
AUGUST, 2016

PROPOSED DEVELOPMENTS

Traffic from the following proposed developments was included in the 2034 traffic forecast:

- Cobblestone Hotel - 54 rooms, located to the west of the study area
- Ore Dock Road Industrial - 200 employees / 50 acres of industrial development to the east of the study area
- Bayfront Place - 192 room hotel; 25 townhouses; 72 apartments; 46,000 SF of retail; 34,000 SF of office space; and a 6,000 SF restaurant located north of the Bayfront Parkway in the vicinity of Sassafra Street
- Harbor Place - 28,500 SF of retail; 220 room hotel; 43 townhouses; 123,000 SF of office space; 100 apartments; and a 4,500 SF restaurant located north of the Bayfront Parkway between State Street and Holland Street

The development traffic forecast is provided in a spreadsheet form (See – Appendix A). Note that the number of trip ends associated with each development was calculated using the materials in ITE's *Trip Generation Manual (9th Edition)*. In order to account for growth anticipated in the region, these trip ends were then compared to the trip productions, unbalanced attractions, and balanced attractions computed by the Erie County Regional Travel Demand Model (TDM). The TDM applied base socioeconomics associated with each development as specific inputs into the model. As a result of this analysis, the ITE-generated trip ends were then lowered by a percentage corresponding to the reduction in trip attractions at the development sites when the productions and attractions were balanced. This approach to traffic forecasting allowed the ITE trip generation projections to be customized for the Erie metropolitan area, and are more in line with the population and employment centers within the area, which are appropriate for use within the study (see Figure 4 –Build Concept 2034 Turning Movement Volumes).



LEGEND
 XX - AM PEAK TRAFFIC VOLUMES
 (XX) - PM PEAK TRAFFIC VOLUMES

**ERIE BAYFRONT PARKWAY
 BUILD CONCEPT 2034
 TURNING MOVEMENT VOLUMES**

FIGURE 4

PROPOSED BUILD ALTERNATIVE

A concept drawing of the proposed build alternative is provided (see Figure 2 – Bayfront Future Build Concept). The following improvements are proposed to mitigate future traffic conditions at the intersections within the traffic circulation study area along the Bayfront Parkway (from west to east) as well as to provide better connectivity to the city of Erie's defined downtown area:

- Sassafras Street - No improvements proposed
- New Development Driveway - A new driveway would connect to the Bayfront Parkway between Sassafras Street and Sassafras Street Extension. Through cross-connectivity of adjacent parcels, this driveway would provide access to Bayfront Place and Harbor Place. A two-lane roundabout is proposed at the intersection of the development driveway with the Bayfront. The two directional lanes on the Bayfront will need to extend to the west of the intersection for a minimum of 1,000-ft to avoid negatively impacting traffic operations along the Bayfront. The driveway approach to the roundabout appears as if it would function acceptably with either one lane or two lanes.
- Sassafras Street Extension - Converted to right-in / right-out operation
- State Street - Grade-separated with ramps connecting the Bayfront Parkway EB with State Street SB; and State Street NB and SB with the Bayfront Parkway WB. The Bayfront will continue under a proposed bridge on State Street and the existing signalized intersection at the Bayfront and State will be eliminated (see Figure 3 – Bayfront/ State Street Grade Separation Concept).
- Holland Street - Converted to a two-lane roundabout and connected to the proposed development in such a way that it functions as its eastern-most driveway entrance. The two directional lanes on the Bayfront will need to extend to the east of the intersection for a minimum of 1,000-ft to avoid negatively impacting traffic operations along the Bayfront. Most likely both approaches to Holland Street will need to be two lanes in order to operate at acceptable levels. From an operational standpoint, it appears the roundabout will accommodate projected traffic volumes; however, the steepness of the approach grades on Holland Street, in particular at the northbound approach, will need to be further investigated to ensure the roundabout is feasible.

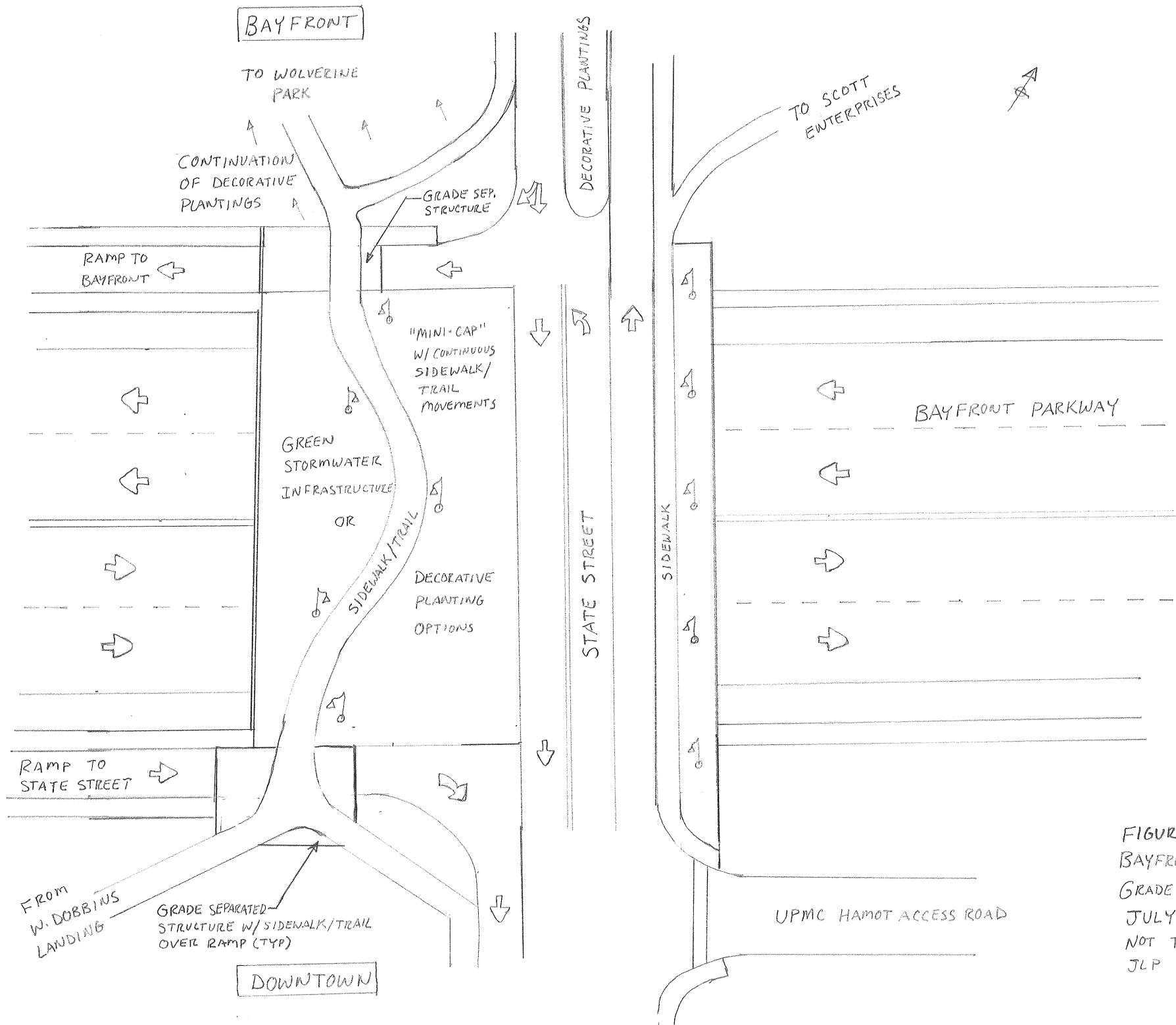


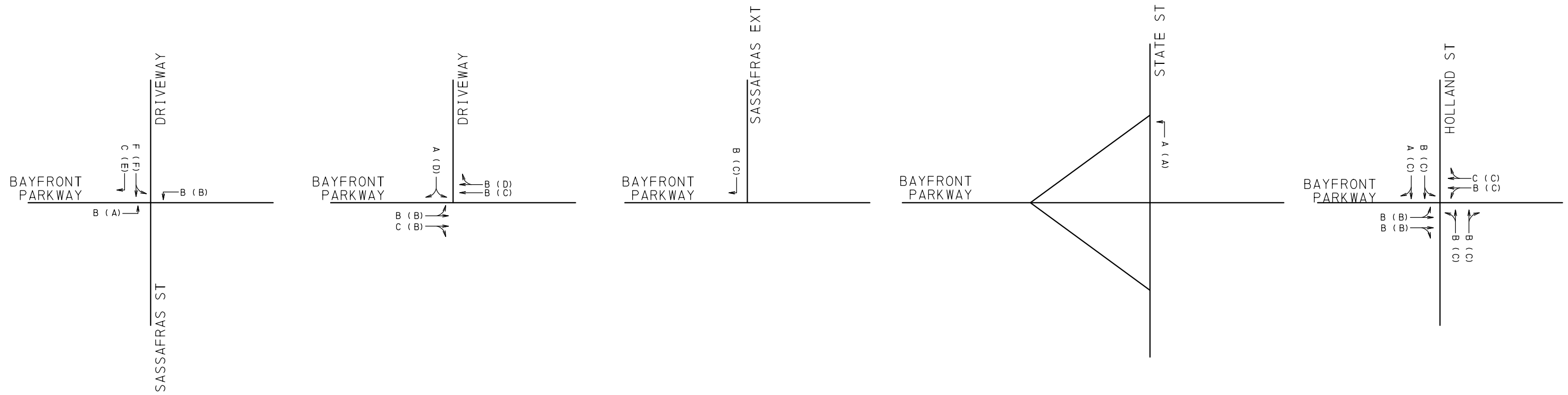
FIGURE 3
 BAYFRONT / STATE STREET
 GRADE SEPARATION CONCEPT
 JULY 2016
 NOT TO SCALE
 JLP

PROPOSED 2034 BUILD WITH DEVELOPMENT LEVEL OF SERVICE (LOS)

The Level-of-Service (LOS) was evaluated with the Highway Capacity Manual (HCM) procedures in Synchro where feasible. For the intersection of State Street with the WB on-ramp to the Bayfront Parkway, the Synchro procedures were required because HCM is not capable of evaluating it. Overall 2034 build intersection LOS is provided in Table 1, and the Synchro and/ or HCM output is provided in Appendix B. The 2034 Build Concept LOS by movement is provided in Figure 5. Please note the following:

- Currently, the Bayfront Parkway is one lane in each direction to the east and west of the study area, but assumed to be two lanes in each direction through the study area. At both the eastern and western limits, where the through lane is dropped, a bottleneck is expected. Since the two proposed roundabouts are on the eastern and western ends of the study area, the lane drops just beyond the roundabouts could impact the lane utilization and distribution in the roundabouts (i.e., traffic could overload the lane that is continuing on and avoid the lane that is dropping). This will have a significant impact on the capacity and LOS in these roundabouts. The lane drops must be moved a sufficient distance from the roundabouts to ensure normal lane utilization. For the purpose of this analysis, it is assumed this distance is a minimum of 1,000-ft at each limit. As the project advances, further analysis is warranted to better refine this distance.
- The Bayfront WB on-ramp from State Street appears to be overcapacity at its junction with the Bayfront Parkway when modeled as a right-turn at an intersection. It is assumed that in reality, this movement will be under capacity since it is a ramp junction and not a right turn movement.
- There will be some diversion of traffic south of the Bayfront Parkway in the street grid between State Street and Holland Street since it will no longer be possible to interchange directly between State Street to the south and the Bayfront Parkway to the east. The impacts to intersections such as 3rd Street at State Street or 3rd Street at Holland Street were not evaluated.
- Intersections that are internal to the development (Harbor Place and Bayfront Place) were not modeled with the exception of the approaches to the roundabouts on the Bayfront at the project limits. Most likely these intersections will not be configured until the development plans are advanced further. Key concerns would be whether backups from the internal intersections reach the Bayfront Parkway, and whether turning movements inside the development cause the uneven utilization of available lanes on the Bayfront Parkway.

The LOS of the "2034 Build with Development" scenario are summarized in Table 1.



LEGEND

- XX - AM PEAK TRAFFIC VOLUMES
- (XX) - PM PEAK TRAFFIC VOLUMES

**ERIE BAYFRONT PARKWAY
FUTURE 2034 LOS BY MOVEMENT**

FIGURE 5

Table 1 - 2034 Build With Development Overall Intersection LOS Summary

Intersection	AM Peak	PM Peak
Sassafras Street	A	A
Development Driveway	B	C
Sassafras Street Extension	A	A
Holland Street	B	C
State Street at the WB On Ramp	A	A

PROPOSED 2034 BUILD WITH DEVELOPMENT QUEUE RESULTS

Our analysis of the 95th percentile queues from Synchro (stop-controlled intersections) and HCM 2010 (roundabouts) are summarized in Table 2 for the "2034 Build with Development" scenario. Note that some of the lanes that have little to no queuing in them (right-turn lanes and low volume left-turn lanes) were omitted from the tabulation. Also, many of the approaches have more than one lane, and in those cases, the longest queue on the approach is provided.

As can be seen, there are no problematic queues expected.

Table 2 - 2034 Build with Development 95th Percentile Queue Length Summary (feet)

Intersection	Approach	AM	PM
Bayfront at Sassafras St	SB Sassafras St	5	8
Bayfront Driveway	EB Bayfront	200	100
	WB Bayfront	100	350
	SB Driveway	25	100
Bayfront at Sassafras St Ext	SB Sassafras St Ext	3	14
Bayfront at Holland St	EB Bayfront	100	100
	WB Bayfront	125	175
	NB Holland St	50	125
	SB Holland St	25	50
State St at the WB On Ramp	NB State St Left-Turn	8	27

CONCLUDING REMARKS

In summary, the traffic analysis of the conceptual improvements to the Bayfront Parkway from Sassafra Street to Holland Street demonstrates that the basic framework should provide a viable long-term solution for the area. As further details regarding the development and the design of the roadway improvements become available, the traffic analysis and assumptions should be revisited to ensure good traffic operations result. In addition, as additional details become available, it will be necessary to expand the study area to evaluate intersections and circulation patterns that are internal to the proposed developments, as well as key intersections along 12th Street and the city grid south of the Bayfront Parkway between State Street and Holland Street.

Appendix A:
Traffic Forecast Spreadsheet

Daily Trip Generation for Known Developments on Erie Bayfront

	ITE Land Use #	Socio-economic Variable	Size of SEV	Daily In%	Daily In	Daily Out	Total
Cobblestone Hotel	310	Rooms	54	0.5	221	221	441
Ore Dock Rd Industrial	130	Employees	200	0.5	453	453	906
Harbor Place							
Shopping Center (Rates)	820	1000 SF	28.5	0.5	608	608	1217
Hotel	310	Rooms	220	0.5	899	899	1797
Townhouses	230	Dwell Unit	43	0.5	154	154	309
General Office Building	710	1000 SF	123	0.5	768	768	1536
Apartment	220	Dwell Unit	100	0.5	333	333	665
High Turnover Restaurant	932	1000 SF	4.5	0.5	286	286	572
					3048	3048	6097
Internal Capture (20%)					610	610	1219
Total Trips					2439	2439	4877

Bayfront Place							
Courtyard by Marriott	310	Rooms	192	0.5	784	784	1569
Townhouses/Carriage Homes	230	Dwell Unit	25	0.5	96	96	193
Apartment	220	Dwell Unit	72	0.5	239	239	479
Shopping Center (Rates)	820	1000 SF	46	0.5	982	982	1964
General Office Building	710	1000 SF	34	0.5	289	289	578
High Turnover Restaurant	932	1000 SF	6	0.5	381	381	763
					2773	2773	5545
Internal Capture (20%)					555	555	1109
Total Trips					2218	2218	4436

Ore Dock Rd Industrial	130	Acres	50	0.5	1456	1456	2911
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WRA Modeling Output
Productions and Attractions (w hotel HH's)

	TAZ	Productions	Unbalance	Trips				Just Attractions	Factor
				Balanced A	Unbal	Bal	% Reduction		
Harbor Place	402	1844	3744	2954	5588	4798	14%	21%	0.79
Bayfront Place	1210	1259	2784	2131	4043	3390	16%	23%	0.77
Ore Dock	1435	375	1303	1087	1678	1462	13%	17%	0.83
Cobblestone	1440	392	574	505	966	897	7%	12%	0.88
Getgo	1441	39	236	168	275	207	25%	29%	0.71

Traffic Forecast for Known Developments on Erie Bayfront
Factors Based on Regional Travel Demand Model Applied August 15, 2016

Background Growth
 Growth Rate 0.15%
 Design Horizon 20 years
 Multiplier 0.0304

	ITE Land Use #	Socio-economic Variable	Size of SEV	AM In %	PM In %	Sat In %	AM In	AM Out	PM In	PM Out	Sat In	Sat Out	
Cobblestone Hotel	310	Rooms	54	0.59	0.51	0.56	15	10	15	14	19	15	
Ore Dock Rd Industrial	130	Acres	50	0.83	0.21	0.32	246	50	62	235	63	134	
Shopping Center (Rates)	820	1000 SF	10	0.62	0.48	0.52	6	4	18	19	25	23	
Bank	912	1000 SF	3.5	0.57	0.5	0.51	24	18	43	43	47	45	
					Shopping Bank	Pass-by	1	1	6	6	6	6	
						Pass-by	8	8	20	20	17	17	
						New trips	21	13	34	36	49	45	
Harbor Place													
Shopping Center (Rates)	820	1000 SF	28.5	0.62	0.48	0.52	17	10	51	55	71	66	
Hotel	310	Rooms	220	0.59	0.51	0.56	69	48	67	65	89	70	
Townhouses	230	Dwell Unit	43	0.17	0.67	0.54	4	22	20	10	30	25	Things on Holland St
General Office Building	710	1000 SF	123	0.88	0.17	0.54	199	27	37	179	29	24	AM In 12
Apartment	220	Dwell Unit	100	0.2	0.65	0.5	11	42	47	25	30	30	AM Out 50
High Turnover Restaurant	932	1000 SF	4.5	0.55	0.6	0.53	27	22	27	18	34	30	PM In 55
							257	135	196	278	223	193	PM Out 29
Internal Capture (20%)							27	27	39	39	39	39	
Total Trips						Total	230	108	157	239	184	155	Current Traffic on Holland and State
						Holland	115	54	145	146			Holland State
						State	115	54	12	93			AM In 120 105
													AM Out 36 84
Excess Parking							0	0	0	0	0	0	PM In 88 221 133
													PM Out 136 189 53 92.81288
Bayfront Place													
Courtyard by Marriott	310	Rooms	192	0.59	0.51	0.56	60	42	59	56	77	61	
Townhouses/Carriage Homes	230	Dwell Unit	25	0.17	0.67	0.54	3	14	13	6	27	23	Parking Multiplier
Apartment	220	Dwell Unit	72	0.2	0.65	0.5	8	31	37	20	24	24	0
Shopping Center (Rates)	820	1000 SF	46	0.62	0.48	0.52	27	17	82	89	115	106	
General Office Building	710	1000 SF	34	0.88	0.17	0.54	71	10	20	97	8	7	
High Turnover Restaurant	932	1000 SF	6	0.55	0.6	0.53	36	29	35	24	45	40	
							157	109	188	223	227	200	
Internal Capture (20%)							22	22	38	38	40	40	
Total Trips							135	87	151	186	187	160	
Parking Garage							0	0	0	0	0	0	
							365	195	308	424	371	315	

Trip Distribution for everything but the gas station

I-79 / Bayfront Highway to the west:	25%
PA 290 / Bayfront Highway to the east:	25%
State Street:	15%
Cranberry St	10%
Holland St	5%
Sassafras	0%
12th St to the west	5%
8th St to the west	5%
12th St to the east	3%
6th Street to the east:	7%

Trip Distribution for the Getgo Outparcels (From Getgo TIS, Figure 10 "Primary Trip Distribution")

Pass-by trips do not need to be assigned to anything since the driveway is not being modeled.

New Trips		In	Out
Lincoln North	3%	SB TH at Lincoln	NB TH at Lincoln
Lincoln South	1%	Not on network	
Greengarden North	2%	SB TH at Greengarden	NB TH at Greengarden
Greengarden South	57% (Includes 12th St traffic)	Not on network	
Bayfront West	19%	RT at Lincoln	NB LT at Lincoln
Bayfront East	18%	LT at Greengarden	NB RT at Greengarden

Trip Distribution for the Cobblestone

Bayfront West	40%
Bayfront East	40%
State St	20%

Trip Distribution for Parking Garages

Pass-by on Bayfront, New Trips from Downtown

Bayfront West	30%
Bayfront East	30%
State St	20%
Holland St	20%

AM Peak Traffic Forecast

Sassafras St at Bayfront Parkway

EB Bayfront	LT	11
	TH	1332
	RT	200
WB Bayfront	LT	1
	TH	856
	RT	16
NB Sassafras	LT	0
	TH	0
	RT	0
SB Sassafras	LT	1
	TH	6
	RT	4

Driveway at Bayfront Parkway

EB Bayfront	LT	211
	TH	1122
	RT	0
WB Bayfront	TH	852
	RT	0
Driveway SB	LT	84
	RT	22

<--All EB LTs previously assigned to State and Sass Ext + 25% from Holland

<--0 by default. Too many other opportunities to turn RT in.

<--All SB LTs out of Sass Ext and half out of State

<--Half SB RTs out of Sass Ext

Sassafras Extension at Bayfront Parkway

EB Bayfront	TH	1206
WB Bayfront	TH	830
	RT	120
Sass Ext SB	RT	22

<--Half WB RTs into State (other half go to Holland) + previous

<--Half SB RTs out of Sass Ext (other half went to new driveway)

State St Ramps at Bayfront Parkway

EB Bayfront	TH	858
	RT	348
WB Bayfront	TH	777
	RT	174

<--Previously EB RTs at State + 25% of Holland RTs

<--Previous SB RT and NB LT out of State

EB Off Ramp at State St

EB Off Ramp	RT	348
NB State St	TH	194
SB State St	TH	47

<--Previous minus NB RT out of State

<--Previous SB TH

WB Off Ramp at State St

NB State St	LT	133
	TH	61
SB State St	TH	47
	RT	41

<--Previous NB LT

<--Previous NB TH

<--Previous SB TH

<--Previous SB RT

Holland St at Bayfront Parkway

EB Bayfront	LT	78
	TH	615
	RT	165
WB Bayfront	LT	180
	TH	634
	RT	123
NB Holland	LT	102
	TH	36
	RT	196
SB Holland	LT	52
	TH	24
	RT	41

<--25% diverted to new driveway to west

<--Same as before but less half the SB LTs out of State and minus NB RT out of State

<--Same as before minus 25% turned right at State

<--Same as before + WB LT into State

<--Same as before but less half WB RTs into State and all WB LTs into State

<--Previous WB RT into Holland + Half WB RTs into State

<--NB RT out of Holland + NB RT out of State

<--All SB LTS out of Holland + Half out of State

Check of Balance on Bayfront

EB Leave Sass	1333
EB Arrive Driveway	1333
EB Leave Driveway	1206
EB Arrive SasExt	1206
EB Leave SasExt	1206
EB Arrive State St Ramp	1206
EB Leave State St Ramp	858
EB Arrive Holland	858
WB Leave Holland	777
WB Arrive State St Ramp	777
WB Leave State St Ramp	951
WB Arrive SasExt	951
WB Leave Sas Ext	852
WB Arrive Driveway	852
WB Leave Driveway	874
WB Arrive Sass	874

PM Peak Traffic Forecast

Sassafras St at Bayfront Parkway

EB Bayfront	LT	0
	TH	1043
	RT	41
WB Bayfront	LT	3
	TH	1513
	RT	1
NB Sassafras	LT	0
	TH	0
	RT	0
SB Sassafras	LT	3
	TH	5
	RT	10

Driveway at Bayfront Parkway

EB Bayfront	LT	226
	TH	819
WB Bayfront	TH	1467
	RT	0
Driveway SB	LT	150
	RT	51

<--All EB LTs previously assigned to State and Sass Ext + 25% from Holland

<--0 by default. Too many other opportunities to turn RT in.

<--All SB LTs out of Sass Ext and half out of State

<--Half SB RTs out of Sass Ext

Sassafras Extension at Bayfront Parkway

EB Bayfront	TH	969
WB Bayfront	TH	1416
	RT	133
Sass Ext SB	RT	51

<--Half WB RTs into State (other half go to Holland) + previous

<--Half SB RTs out of Sass Ext (other half went to new driveway)

State St Ramps at Bayfront Parkway

EB Bayfront	TH	797
	RT	172
WB Bayfront	TH	1089
SB Ramp	RT	460

<--Previously EB RTs at State + 25% of Holland RTs

<--Previous SB RT and NB LT out of State

EB Off Ramp at State St

EB Off Ramp	RT	172
NB State St	TH	407
SB State St	TH	83

<--Previous minus NB RT out of State

<--Previous SB TH

WB Off Ramp at State St

NB State St	LT	326
	TH	80
SB State St	TH	83
	RT	133

<--Previous NB LT

<--Previous NB TH

<--Previous SB TH

<--Previous SB RT

Holland St at Bayfront Parkway

EB Bayfront	LT	92
	TH	626
	RT	79
WB Bayfront	LT	151
	TH	652
	RT	86
NB Holland	LT	301
	TH	49
	RT	235
SB Holland	LT	138
	TH	47
	RT	136

<--25% diverted to new driveway to west

<--Same as before but less half the SB LTs out of State and minus NB RT out of State

<--Same as before minus 25% turned right at State

<--Same as before + WB LT into State

<--Same as before but less half WB RTs into State and all WB LTs into State

<--Previous WB RT into Holland + Half WB RTs into State

<--NB RT out of Holland + NB RT out of State

<--All SB LTS out of Holland + Half out of State

Check of Balance on Bayfront

EB Leave Sass	1046
EB Arrive Driveway	1046

EB Leave Driveway	969
EB Arrive SasExt	969

EB Leave SasExt	969
EB Arrive State St Ramp	969

EB Leave State St Ramp	797
EB Arrive Holland	797

WB Leave Holland	1089
WB Arrive State St Ramp	1089

WB Leave State St Ramp	1549
WB Arrive SasExt	1549

WB Leave Sas Ext	1467
WB Arrive Driveway	1467

WB Leave Driveway	1517
WB Arrive Sass	1517

	NEW	PREVIOUS
EB Arriving Area	1084	1084
EB Leaving Area	1000	1000

WB Arriving Area	890	890
WB Leaving Area	1523	1523

AM Peak Traffic Forecast Using Existing Road Configuration

		Count	Correction	Adjusted	Background	Getgo	Getgo OP	Getgo OP	Cobblestone	Industrial Park		Bayfront Place		BP Parking		Harbor Place			HP Parking		Total		
					Growth	(From TIS)	In	Out	In	Out	In	Out	In	Out	In	Out	In Holl	Out Holl	In State	Out State	In	Out	
Lincoln Ave at Bayfront Parkway																							
EB Bayfront	LT	151		151	5																		156
	TH	1027		1027	31	9			6		61		34				29		29				1226
	RT	7		7	0		4																11
WB Bayfront	LT	47		47	1	1																	49
	TH	426		426	13	9				4		13		22				14					514
	RT	13		13	0	1																	14
NB Lincoln	LT	0		0	0			2															2
	TH	15		15	0			0															16
	RT	17		17	1																		18
SB Lincoln	LT	10		10	0	1																	11
	TH	10		10	0		1																11
	RT	79		79	2																		81
Greengarden Blvd at Bayfront Parkway																							
EB Bayfront	LT	47		47	1																		48
	TH	991		991	30	5			6		61		34				29		29				1185
	RT	16		16	0																		16
WB Bayfront	LT	122	12	134	4	5	4					3		4				3					159
	TH	471	47	518	16	5				4		13		22				14			3		604
	RT	2		2	0																		2
NB Ggarden	LT	11		11	0																		11
	TH	65		65	2			0															67
	RT	183		183	6	5		2			12		7				6		6				226
SB Ggarden	LT	1		1	0																		1
	TH	23		23	1		0																24
	RT	9		9	0																		9
8th Street at Bayfront Parkway																							
EB (NB) Bfrt	LT	0		0	0																		0
	TH	870		870	26				6		74		40				35		35				1086
	RT	281		281	9																		290
WB (SB) Bfrt	LT	0		0	0																		0
	TH	488	-49	439	13					4		15		26				16				16	530
	RT	209		209	6							3		4				3				3	228
EB 8th St	LT	114	100	214	7						12		7				6		6				251
	TH	92		92	3																		95
	RT	9		9	0																		9
WB 8th St	LT	370	-100	270	8																		278
	TH	207		207	6																		213
	RT	4		4	0																		4
Cranberry St at Bayfront Parkway																							
EB Bayfront	TH	1182	-118	1064	32				6		86		47				40		40				1316
	RT	79		79	2																		81
WB Bayfront	LT	36		36	1							5		9				5				5	62
	TH	663		663	20					4		18		31				19		19			773
Cberry NB	LT	27		27	1																		28
	RT	127		127	4						25		13				12		12				192
Niagara Pier at Bayfront Parkway																							
EB Bayfront	LT	10		10	0																		10
	TH	1258		1258	38				6		111		61				52		52				1577
WB Bayfront	TH	669		669	20					4		23		39				24				24	804
	RT	2		2	0																		2
Niagara SB	LT	4		4	0																		4
	RT	10		10	0																		10
Lawrence Pier Connection at Bayfront Parkway																							
EB Bayfront	LT	6		6	0																		6
	TH	1268		1268	39				6		111		61				52		52				1587
WB Bayfront	TH	662		662	20					4		23		39				24				24	797

	RT	4		4	0															4
Lpier Con SB	LT	1		1	0															1
	RT	3		3	0															3
Cobblestone Hotel / Lawrence Pier at Bayfront Parkway																				
EB Bayfront	LT	5		5	0															5
	TH	1291		1291	39			111		61			52		52					1605
	RT	0		0	0															6
WB Bayfront	LT	0		0	0														9	9
	TH	669		669	20					23		39			24			24		800
	RT	0		0	0															0
NB Hotel	LT	0		0	0					4										4
	TH	0		0	0															0
	RT	0		0	0															6
SB Lpier	LT	0		0	0															0
	TH	0		0	0															0
	RT	2		2	0															2
Boat Launch at Bayfront Parkway																				
EB Bayfront	LT	2		2	0															2
	TH	1226		1226	37			6		111		61		52		52				1544
WB Bayfront	TH	627		627	19										24			24		766
	RT	5		5	0															5
Boat Lnch SB	LT	1		1	0															1
	RT	0		0	0															0
Sassafras St at Bayfront Parkway																				
EB Bayfront	LT	11		11	0															11
	TH	1053	-33	1020	31			6		111		61		52		52				1332
	RT	194		194	6															200
WB Bayfront	LT	1		1	0										0			0		1
	TH	660	55	715	22										23		39		24	856
	RT	16		16	0															16
NB Sassafras	LT	0		0	0															0
	TH	0		0	0															0
	RT	0		0	0															0
SB Sassafras	LT	1		1	0					0		0		0		0				1
	TH	6		6	0															6
	RT	4		4	0															4
Sassafras Extension at Bayfront Parkway																				
EB Bayfront	LT	20		20	1							61		0						81
	TH	1001		1001	30			6		111				0		52		52		1252
WB Bayfront	TH	709	19	728	22										23		74		0	830
	RT	16		16	0															91
Sass Ext SB	LT	9		9	0													48	0	57
	RT	4		4	0													39	0	43
State St at Bayfront Parkway																				
EB Bayfront	LT	50		50	2															103
	TH	687	3	690	21			4		111		35		0	52				0	912
	RT	270		270	8			2				13		0					0	293
WB Bayfront	LT	69		69	2							8							8	87
	TH	621		621	19										23	54		0	24	747
	RT	13		13	0															59
NB State	LT	107		107	3							20		0	0					133
	TH	42		42	1															61
	RT	78		78	2					37					17				17	134
SB State	LT	30		30	1															53
	TH	38		38	1														8	47
	RT	16		16	0														24	41
Holland St at Bayfront Parkway																				
EB Bayfront	LT	34		34	1									69						104
	TH	537	21	558	17			4		147		31		0					19	776

	RT	206		206	6				4		0			3	0		219	
WB Bayfront	LT	88		88	3			3							0		93	
	TH	615	-7	608	19			30	47		0			40		40	750	
	RT	51		51	2		6										93	
NB Holland	LT	87		87	3				7		0					6	102	
	TH	35		35	1												36	
	RT	42		42	1								12			6	61	
SB Holland	LT	7		7	0											19	26	
	TH	21		21	1										3		24	
	RT	8		8	0										32		41	
(Ore Dock) Water Treatment at Bayfront Parkway																		
EB Bayfront	LT	27		27	1								160				187	
	TH	548		548	17												637	
WB Bayfront	TH	745		745	23												901	
	RT	13		13	0												99	
W Treat SB	LT	12		12	0												30	
	RT	18		18	1												51	
Port Access Road at Bayfront Parkway																		
EB Bayfront	LT	25		25	1												26	
	TH	133		133	4												137	
	RT	402		402	12												504	
WB Bay Dr	LT	5		5	0												5	
	TH	111		111	3												114	
	RT	3		3	0												3	
NB Bayfront	LT	639		639	19												878	
	TH	12		12	0												12	
	RT	41		41	1												42	
SB PAcc Rd	LT	6		6	0												6	
	TH	10		10	0												10	
	RT	8		8	0												8	
6th St at Bayfront Parkway																		
EB 6th St	LT	14		14	0												14	
	TH	139		139	4												143	
	RT	38		38	1										0		39	
WB 6th St	LT	51		51	2												53	
	TH	306		306	9												315	
	RT	324		324	10												377	
NB Bayfront	LT	198		198	6												204	
	TH	327		327	10												514	
	RT	59		59	2												61	
SB Bayfront	LT	225		225	7												249	
	TH	184		184	6												263	
	RT	2		2	0												2	
8th St at Bayfront Parkway																		
EB 8th St	LT	5		5	0												5	
	TH	20		20	1												21	
	RT	5		5	0												5	
WB 8th St	LT	13		13	0												13	
	TH	7		7	0												7	
	RT	15		15	0												15	
NB Bayfront	LT	12		12	0												12	
	TH	577		577	18												772	
	RT	17		17	1												18	
SB Bayfront	LT	9		9	0												9	
	TH	256		256	8												337	
	RT	3		3	0												3	
10th St at Bayfront Parkway																		
EB 10th St	LT	10		10	0												10	
	TH	61		61	2												63	

	RT	26	26	1																	0	27
WB 10th St	LT	18	18	1																		19
	TH	118	118	4																		122
	RT	13	13	0																		13
NB Bayfront	LT	120	120	4																	0	124
	TH	587	587	18			6		69		38				32		32			0		782
	RT	14	14	0																		14
SB Bayfront	LT	18	18	1																		19
	TH	248	248	8			4		14		24						15		15		0	328
	RT	16	16	0																		16
12th St at Bayfront Parkway																						
EB 12th St	LT	51	51	2																		53
	TH	447	447	14																		461
	RT	89	89	3																	0	92
WB 12th St	LT	33	33	1																		34
	TH	407	407	12																		419
	RT	70	70	2					7		4				3		3					90
NB Bayfront	LT	221	221	7																	0	228
	TH	590	590	18			6		61		34				29		29			0		767
	RT	63	63	2																		65
SB Bayfront	LT	66	66	2						2		3					2		2			75
	TH	174	174	5			4		13		22						14		14		0	245
	RT	45	45	1																		46
Check of Balance on Bayfront																						
EB Leave Sass		1054	1021	31	0	0	0	0	6	111	0	61	0	0	0	52	0	52	0	0	0	1333
EB Arrive SasExt		1021	1021	31	0	0	0	0	6	111	0	61	0	0	0	52	0	52	0	0	0	1333
EB Leave SasExt		1010	1010	31	0	0	0	0	6	111	0	0	48	0	0	52	0	52	0	0	0	1309
EB Arrive State		1007	1010	31	0	0	0	0	6	111	0	0	48	0	0	52	0	52	0	0	0	1309
EB Leave State		795	798	24	0	0	0	0	4	147	0	0	35	0	0	69	0	0	22	0	0	1099
EB Arrive Holland		777	798	24	0	0	0	0	4	147	0	0	35	0	0	69	0	0	22	0	0	1099
WB Leave Holland		710	703	21	0	0	0	6	0	0	30	54	0	0	0	0	32	46	0	0	0	893
WB Arrive State		703	703	21	0	0	0	6	0	0	30	54	0	0	0	0	32	46	0	0	0	893
WB Leave State		744	744	23	0	0	0	9	0	0	23	74	0	0	0	0	24	0	24	0	0	921
WB Arrive SasExt		725	744	23	0	0	0	9	0	0	23	74	0	0	0	0	24	0	24	0	0	921
WB Leave Sas Ext		713	732	22	0	0	0	9	0	0	23	0	39	0	0	0	24	0	24	0	0	874
WB Arrive Sass		677	732	22	0	0	0	9	0	0	23	0	39	0	0	0	24	0	24	0	0	874

PM Peak Traffic Forecast Using Existing Road Configuration

	Count	Correction	Adjusted	Background	Getgo (From TIS)	Getgo OP In	Getgo OP Out	Cobblestone In	Cobblestone Out	Industrial Park In	Industrial Park Out	Bayfront Place In	Bayfront Place Out	BP Parking In	BP Parking Out	Harbor Place In Holl	Harbor Place Out Holl	In State	Out State	HP Parking In	HP Parking Out	Total
Lincoln Ave at Bayfront Parkway																						
EB Bayfront	LT	175		175	5																	180
	TH	475	45	520	16	10		6		16		38				36		3				644
	RT	13		13	0		7															20
WB Bayfront	LT	68		68	2	1																71
	TH	866		866	26	10			6	59		46				36			23			1073
	RT	38		38	1	1																40
NB Lincoln	LT	2		2	0									7								9
	TH	44		44	1				1													46
	RT	16	2	18	1																	19
SB Lincoln	LT	12	1	13	0	2																15
	TH	25		25	1									1								27
	RT	163		163	5																	168
Greengarden Blvd at Bayfront Parkway																						
EB Bayfront	LT	19		19	1	1																21
	TH	478		478	15	4		6		16		38				36			3			595
	RT	17		17	1																	18
WB Bayfront	LT	155		155	5	4	6					9					7			5		203
	TH	864		864	26	4			6			46				36			23			1065
	RT	3		3	0																	3
NB Ggarden	LT	49		49	1																	50
	TH	68		68	2	1			1													72
	RT	223	22	245	7	4		6		3		8				7			1			281
SB Ggarden	LT	3		3	0																	3
	TH	66		66	2	1	1															70
	RT	31		31	1	1																33
8th Street at Bayfront Parkway																						
EB (NB) Bfirt	LT	0		0	0																	0
	TH	619	70	689	21			6		19		45				44			4			827
	RT	153		153	5																	158
WB (SB) Bfirt	LT	1		1	0																	1
	TH	752		752	23				6		71	56					44			28		978
	RT	267		267	8						12	9				7			5			308
EB 8th St	LT	235	30	265	8					3		8				7			1			292
	TH	212		212	6																	218
	RT	13		13	0																	13
WB 8th St	LT	269		269	8																	277
	TH	213		213	6																	219
	RT	27	3	30	1																	31
Cranberry St at Bayfront Parkway																						
EB Bayfront	TH	796	103	899	27			6		22		53				51			4			1062
	RT	79		79	2																	81
WB Bayfront	LT	109		109	3																	178
	TH	1038		1038	32				6		24	19					15			9		1306
Cberry NB	LT	48		48	1																	49
	RT	144	19	163	5					6		15				15			1			205
Niagara Pier at Bayfront Parkway																						
EB Bayfront	LT	12		12	0																	12
	TH	919	122	1041	32			6		28		68				65			5			1245
WB Bayfront	TH	1070		1070	33				6		106	84				66				42		1405
	RT	8		8	0																	8
Niagara SB	LT	2		2	0																	2
	RT	20		20	1																	21
Lawrence Pier Connection at Bayfront Parkway																						
EB Bayfront	LT	90		90	3																	93
	TH	838	122	960	29			6		28		68				65			5			1162
WB Bayfront	TH	1014		1014	31				6		106	84					66			42		1347
	RT	15		15	0																	15
Lpier Con SB	LT	1		1	0																	1
	RT	21		21	1																	22
Cobblestone Hotel / Lawrence Pier at Bayfront Parkway																						
EB Bayfront	LT	73		73	2																	75

	TH	762	122	884	27			28		68				65		5					1077
	RT	0		0	0		6														6
WB Bayfront	LT	0		0	0		9														9
	TH	1045		1045	32				106		84				66		42				1374
	RT	59		59	2																61
NB Hotel	LT	0		0	0			6													6
	TH	0		0	0																0
	RT	0		0	0																8
SB Lpier	LT	7		7	0			8													7
	TH	0		0	0																0
	RT	13		13	0																13
Boat Launch at Bayfront Parkway																					
EB Bayfront	LT	7		7	0																7
	TH	705	122	827	25			8	28		68			65		5					1027
WB Bayfront	TH	1025		1025	31		9			106		84			66		42				1362
	RT	32		32	1																33
Boat Lnch SB	LT	7		7	0																7
	RT	2		2	0																2
Sassafras St at Bayfront Parkway																					
EB Bayfront	LT	0		0	0																0
	TH	720	122	842	26			8	28		68			65		5					1043
	RT	40		40	1																41
WB Bayfront	LT	3		3	0					0		0			0		0				3
	TH	1121	51	1172	36		9			106		84			66		42				1513
	RT	1		1	0																1
NB Sassafras	LT	0		0	0																0
	TH	0		0	0																0
	RT	0		0	0				0		0			0		0					0
SB Sassafras	LT	3		3	0																3
	TH	5		5	0																5
	RT	10		10	0																10
Sassafras Extension at Bayfront Parkway																					
EB Bayfront	LT	26		26	1						68		0								95
	TH	819		819	25			8	28				0		65		5			0	951
WB Bayfront	TH	1176	-17	1159	35		9			106			0	0		66		42			1416
	RT	20		20	1						83		0								103
Sass Ext SB	LT	12		12	0							102		0							115
	RT	17		17	1							84		0							101
State St at Bayfront Parkway																					
EB Bayfront	LT	93		93	3												5			0	101
	TH	645	-19	626	19			6	28			74		0	65					0	818
	RT	112		112	3			3				28		0	0					0	146
WB Bayfront	LT	54		54	2					35						22					113
	TH	834	-36	798	24		6			106		60		0		66					1060
	RT	52		52	2																58
NB State St	LT	292		292	9			3				23		0	0				5		326
	TH	76		76	2												2			0	80
	RT	125		125	4				9						22						160
SB State St	LT	33		33	1															37	71
	TH	67		67	2															14	83
	RT	89		89	3															42	133
Holland St at Bayfront Parkway																					
EB Bayfront	LT	34		34	1										87						122
	TH	548	113	661	20			6	37			65		0					32		822
	RT	89		89	3							9		0					5	0	106
WB Bayfront	LT	26		26	1					12										0	39
	TH	573		573	17		6			141		53		0				4			794
	RT	6		6	0											51				0	57
NB Holland	LT	284		284	9							8		0				1			301
	TH	48		48	1															0	49
	RT	63		63	2				3						7						75
SB Holland	LT	50		50	2												51			0	103
	TH	39		39	1												7			0	47
	RT	47		47	1												87				136

(Ore Dock) Water Treatment at Bayfront Parkway

EB Bayfront	LT	11	11	0			41											52	
	TH	909	-119	790	24													968	
WB Bayfront	TH	641		641	20	6	6		53	65	0	0	51	51	4	32	0	0	774
	RT	7		7	0			22											29
W Treat SB	LT	9		9	0														92
	RT	28		28	1														182

Port Access Road at Bayfront Parkway

EB Bayfront	LT	17		17	1														18
	TH	108		108	3														111
	RT	793	-119	674	21		6		82	65	0		51		32		0		931
WB Bay Dr	LT	11		11	0														11
	TH	98		98	3														101
	RT	11		11	0														11
NB Bayfront	LT	536		536	16	6		22	53		0		51		4		0		688
	TH	13		13	0														13
	RT	4		4	0														4
SB PAcc Rd	LT	5		5	0														5
	TH	12		12	0														12
	RT	14		14	0														14

6th St at Bayfront Parkway

EB 6th St	LT	11		11	0														11
	TH	319		319	10														329
	RT	108		108	3						0								111
WB 6th St	LT	103		103	3														106
	TH	218		218	7														225
	RT	269		269	8			4	11			10		1					303
NB Bayfront	LT	82		82	2						0								84
	TH	238		238	7	6		17	42		0		41		3		0		355
	RT	73		73	2						0								75
SB Bayfront	LT	354		354	11				16		13		10		6				411
	TH	363		363	11		6		66		52		0		41		26	0	564
	RT	11		11	0														11

8th St at Bayfront Parkway

EB 8th St	LT	8		8	0														8
	TH	41		41	1														42
	RT	27		27	1														28
WB 8th St	LT	13		13	0														13
	TH	21		21	1														22
	RT	19		19	1														20
NB Bayfront	LT	12		12	0														12
	TH	362		362	11	6		17	42				41		3		0		482
	RT	38		38	1														39
SB Bayfront	LT	15		15	0														15
	TH	547		547	17		6		66		52			41		26		0	754
	RT	6		6	0														6

10th St at Bayfront Parkway

EB 10th St	LT	17		17	1														18
	TH	148		148	5														153
	RT	104		104	3													0	107
WB 10th St	LT	33		33	1														34
	TH	115		115	3														118
	RT	32		32	1														33
NB Bayfront	LT	41		41	1													0	42
	TH	353		353	11	6		17	42				41		3		0		473
	RT	17		17	1														18
SB Bayfront	LT	16		16	0														16
	TH	551		551	17		6		66		52			41		26		0	758
	RT	19		19	1														20

12th St at Bayfront Parkway

EB 12th St	LT	63		63	2														65
	TH	417		417	13														430
	RT	242		242	7													0	249
WB 12th St	LT	85		85	3														88

	TH	460	460	14																	474	
	RT	69	69	2				2		5				4		0					82	
NB Bayfront	LT	145	145	4																0	149	
	TH	296	296	9			6	16		38				36		3				0	403	
	RT	63	63	2																	65	
SB Bayfront	LT	94	94	3						7			6			4				3	117	
	TH	521	521	16			6			59			46			36				23	707	
	RT	76	76	2																	78	
Check of Balance on Bayfront																						
EB Leave Sass		723	845	26	0	0	0	0	8	28	0	68	0	0	0	65	0	5	0	0	0	1046
EB Arrive SasExt		845	845	26	0	0	0	0	8	28	0	68	0	0	0	65	0	5	0	0	0	1046
EB Leave SasExt		831	831	25	0	0	0	0	8	28	0	0	102	0	0	65	0	5	0	0	0	1066
EB Arrive State		850	831	25	0	0	0	0	8	28	0	0	102	0	0	65	0	5	0	0	0	1066
EB Leave State		803	784	24	0	0	0	0	6	37	0	0	74	0	0	87	0	0	37	0	0	1049
EB Arrive Holland		671	784	24	0	0	0	0	6	37	0	0	74	0	0	87	0	0	37	0	0	1049
WB Leave Holland		904	904	28	0	0	0	6	0	0	141	60	0	0	0	87	5	0	0	0	0	1231
WB Arrive State		940	904	28	0	0	0	6	0	0	141	60	0	0	0	87	5	0	0	0	0	1231
WB Leave State		1215	1179	36	0	0	0	9	0	0	106	83	0	0	0	66	0	42	0	0	0	1520
WB Arrive SasExt		1196	1179	36	0	0	0	9	0	0	106	83	0	0	0	66	0	42	0	0	0	1520
WB Leave Sas Ext		1193	1176	36	0	0	0	9	0	0	106	0	84	0	0	66	0	42	0	0	0	1517
WB Arrive Sass		1125	1176	36	0	0	0	9	0	0	106	0	84	0	0	66	0	42	0	0	0	1517
EB Arriving Area																						1084
EB Leaving Area																						1000
WB Arriving Area																						890
WB Leaving Area																						1523

Appendix B:
Synchro Output Report (AM & PM)

Intersection

Int Delay, s/veh 0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	11	1332	200	1	856	16	0	0	0
Conflicting Peds, #/hr	4	0	0	0	0	4	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	3	0	0	5	0	2	2	2
Mvmt Flow	12	1497	225	1	962	18	0	0	0

Major/Minor

	Major1	Major2
Conflicting Flow All	966	1721
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	4.1	4.1
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	2.2	2.2
Pot Cap-1 Maneuver	721	373
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	719	372
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach

HCM Control Delay, s EB 0.1 WB 0

HCM LOS

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	719	-	-	372	-	-	27	308
HCM Lane V/C Ratio	0.017	-	-	0.003	-	-	0.291	0.015
HCM Control Delay (s)	10.1	-	-	14.7	0	-	186	16.9
HCM Lane LOS	B	-	-	B	A	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	0.9	0

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	1	6	4
Conflicting Peds, #/hr	4	0	4
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	0
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	89	89	89
Heavy Vehicles, %	0	0	0
Mvmt Flow	1	7	4

Major/Minor	Minor2		
Conflicting Flow All	2602	2714	970
Stage 1	968	968	-
Stage 2	1634	1746	-
Critical Hdwy	6.4	6.5	6.2
Critical Hdwy Stg 1	5.4	5.5	-
Critical Hdwy Stg 2	5.4	5.5	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	28	21	310
Stage 1	372	335	-
Stage 2	177	142	-
Platoon blocked, %			
Mov Cap-1 Maneuver	27	0	308
Mov Cap-2 Maneuver	27	0	-
Stage 1	369	0	-
Stage 2	173	0	-

Approach	SB
HCM Control Delay, s	124.5
HCM LOS	F

Minor Lane/Major Mvmt

Intersection					
Intersection Delay, s/veh	13.9				
Intersection LOS	B				
Approach	EB		WB		SB
Entry Lanes	2		2		1
Conflicting Circle Lanes	2		2		2
Adj Approach Flow, veh/h	1498		957		119
Demand Flow Rate, veh/h	1536		1005		119
Vehicles Circulating, veh/h	94		237		1005
Vehicles Exiting, veh/h	1030		1393		237
Follow-Up Headway, s	3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	16.2		11.0		9.2
Approach LOS	C		B		A
Lane	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LR
Assumed Moves	LT	TR	LT	TR	LR
RT Channelized					
Lane Util	0.470	0.530	0.470	0.530	1.000
Critical Headway, s	4.293	4.113	4.293	4.113	4.113
Entry Flow, veh/h	722	814	472	533	119
Cap Entry Lane, veh/h	1053	1058	946	957	559
Entry HV Adj Factor	0.975	0.975	0.953	0.952	1.000
Flow Entry, veh/h	704	794	450	507	119
Cap Entry, veh/h	1027	1032	902	911	559
V/C Ratio	0.686	0.769	0.499	0.557	0.213
Control Delay, s/veh	14.2	17.9	10.4	11.6	9.2
LOS	B	C	B	B	A
95th %tile Queue, veh	6	8	3	4	1

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	1206	830	120	0	22
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yeild
Storage Length	-	-	-	250	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	1	-3	-	-2	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	3	5	6	0	0
Mvmt Flow	0	1297	892	129	0	24

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	892	0	1540
Stage 1	-	-	892
Stage 2	-	-	648
Critical Hdwy	4.1	-	6.4
Critical Hdwy Stg 1	-	-	5.4
Critical Hdwy Stg 2	-	-	5.4
Follow-up Hdwy	2.2	-	3.5
Pot Cap-1 Maneuver	769	-	579
Stage 1	-	-	404
Stage 2	-	-	524
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	768	-	579
Mov Cap-2 Maneuver	-	-	265
Stage 1	-	-	404
Stage 2	-	-	524

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	768	-	-	579
HCM Lane V/C Ratio	-	-	-	0.041
HCM Control Delay (s)	0	-	-	11.5
HCM Lane LOS	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	0.1

Lanes, Volumes, Timings
 31: Off Ramp/On Ramp & Bayfront Pkwy

8/17/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑							↑
Volume (vph)	0	858	348	0	777	0	0	0	0	0	0	174
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Grade (%)		0%			-3%			0%				0%
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957										0.865
Flt Protected												
Satd. Flow (prot)	0	3744	0	0	3970	0	0	0	0	0	0	1781
Flt Permitted												
Satd. Flow (perm)	0	3744	0	0	3970	0	0	0	0	0	0	1781
Link Speed (mph)		35			35			25				25
Link Distance (ft)		673			1275			483				525
Travel Time (s)		13.1			24.8			13.2				14.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	933	378	0	845	0	0	0	0	0	0	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1311	0	0	845	0	0	0	0	0	0	189
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane		Yes										
Headway Factor	0.88	0.88	0.88	0.86	0.86	0.86	0.88	0.88	0.88	0.88	0.88	0.88
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop				Yield

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	35.8%
Analysis Period (min)	15
	ICU Level of Service A

Intersection									
Intersection Delay, s/veh	13.2								
Intersection LOS	B								
Approach	EB		WB		NB		SB		
Entry Lanes	2		2		2		2		
Conflicting Circle Lanes	2		2		2		2		
Adj Approach Flow, veh/h	1010		1103		393		137		
Demand Flow Rate, veh/h	1067		1142		410		148		
Vehicles Circulating, veh/h	314		283		930		1118		
Vehicles Exiting, veh/h	952		1057		451		307		
Follow-Up Headway, s	3.186		3.186		3.186		3.186		
Ped Vol Crossing Leg, #/h	0		18		4		0		
Ped Cap Adj	1.000		0.984		1.000		1.000		
Approach Delay, s/veh	13.2		14.1		12.0		9.8		
Approach LOS	B		B		B		A		
Lane	Left	Right	Left	Right	Left	Right	Left	Right	
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR	
Assumed Moves	LT	TR	LT	TR	LT	R	LT	TR	
RT Channelized									
Lane Util	0.470	0.530	0.470	0.530	0.424	0.576	0.473	0.527	
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113	
Entry Flow, veh/h	501	566	537	605	174	236	70	78	
Cap Entry Lane, veh/h	893	907	914	927	563	589	489	517	
Entry HV Adj Factor	0.947	0.946	0.965	0.966	0.931	0.979	0.922	0.933	
Flow Entry, veh/h	475	535	518	584	162	231	65	73	
Cap Entry, veh/h	846	858	868	881	524	577	450	482	
V/C Ratio	0.561	0.624	0.597	0.663	0.309	0.400	0.143	0.151	
Control Delay, s/veh	12.4	14.0	13.1	15.1	11.5	12.4	10.0	9.6	
LOS	B	B	B	C	B	B	B	A	
95th %tile Queue, veh	4	4	4	5	1	2	0	1	

Lanes, Volumes, Timings
61: State Street & On Ramp

8/17/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↕↕	↕	
Volume (vph)	0	0	133	61	47	41
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Frt					0.937	
Flt Protected				0.967		
Satd. Flow (prot)	0	0	0	3783	1929	0
Flt Permitted				0.967		
Satd. Flow (perm)	0	0	0	3783	1929	0
Link Speed (mph)	30			25	25	
Link Distance (ft)	525			422	720	
Travel Time (s)	11.9			11.5	19.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	145	66	51	45
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	211	96	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	

Lanes, Volumes, Timings
62: State Street & Off Ramp

8/17/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑	
Volume (vph)	0	348	0	194	47	0
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100
Storage Length (ft)	0	300	0			0
Storage Lanes	0	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Fr _t		0.865				
Fl _t Protected						
Satd. Flow (prot)	0	1781	0	3912	2059	0
Fl _t Permitted						
Satd. Flow (perm)	0	1781	0	3912	2059	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	483			1176	422	
Travel Time (s)	13.2			32.1	11.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	378	0	211	51	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	378	0	211	51	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.88	0.88	0.88	0.88	0.88	0.88
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

Intersection Summary

Area Type:

Intersection

Int Delay, s/veh 1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	1043	41	3	1513	1	0	0	0
Conflicting Peds, #/hr	3	0	0	0	0	3	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	0	1	0	2	2	2
Mvmt Flow	0	1159	46	3	1681	1	0	0	0

Major/Minor

	Major1	Major2
Conflicting Flow All	1684	1204
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	4.1	4.1
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	2.2	2.2
Pot Cap-1 Maneuver	385	587
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	384	586
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach

EB WB
 HCM Control Delay, s 0 0
 HCM LOS

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	384	-	-	586	-	-	17	116
HCM Lane V/C Ratio	-	-	-	0.006	-	-	0.523	0.096
HCM Control Delay (s)	0	-	-	11.2	0	-	\$ 357.1	39.3
HCM Lane LOS	A	-	-	B	A	-	F	E
HCM 95th %tile Q(veh)	0	-	-	0	-	-	1.4	0.3

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	3	5	10
Conflicting Peds, #/hr	3	0	3
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	0
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	0	0	0
Mvmt Flow	3	6	11

Major/Minor **Minor2**

Conflicting Flow All	2873	2895	1687
Stage 1	1691	1691	-
Stage 2	1182	1204	-
Critical Hdwy	6.4	6.5	6.2
Critical Hdwy Stg 1	5.4	5.5	-
Critical Hdwy Stg 2	5.4	5.5	-
Follow-up Hdwy	3.5	4	3.3
Pot Cap-1 Maneuver	19	16	117
Stage 1	166	151	-
Stage 2	294	259	-
Platoon blocked, %			
Mov Cap-1 Maneuver	17	0	116
Mov Cap-2 Maneuver	17	0	-
Stage 1	153	0	-
Stage 2	293	0	-

Approach **SB**

HCM Control Delay, s	180.5
HCM LOS	F

Minor Lane/Major Mvmt

Intersection					
Intersection Delay, s/veh	22.4				
Intersection LOS	C				
Approach	EB		WB		SB
Entry Lanes	2		2		1
Conflicting Circle Lanes	2		2		2
Adj Approach Flow, veh/h	1161		1630		224
Demand Flow Rate, veh/h	1179		1646		224
Vehicles Circulating, veh/h	167		251		1646
Vehicles Exiting, veh/h	1703		1095		251
Follow-Up Headway, s	3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	11.8		29.1		28.8
Approach LOS	B		D		D
Lane	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LR
Assumed Moves	LT	TR	LT	TR	LR
RT Channelized					
Lane Util	0.470	0.530	0.470	0.530	1.000
Critical Headway, s	4.293	4.113	4.293	4.113	4.113
Entry Flow, veh/h	554	625	774	872	224
Cap Entry Lane, veh/h	997	1005	936	948	357
Entry HV Adj Factor	0.985	0.984	0.990	0.991	1.000
Flow Entry, veh/h	546	615	766	864	224
Cap Entry, veh/h	982	990	926	939	357
V/C Ratio	0.556	0.622	0.827	0.920	0.627
Control Delay, s/veh	10.9	12.5	23.5	34.1	28.8
LOS	B	B	C	D	D
95th %tile Queue, veh	4	4	10	14	4

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	969	1416	133	0	51
Conflicting Peds, #/hr	7	0	0	7	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	-	-	-	250	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	1	-3	-	-2	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	2	1	0	0	0
Mvmt Flow	0	1053	1539	145	0	55



















Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1539	0	777
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	6.7
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	3.3
Pot Cap-1 Maneuver	438	-	359
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	435	-	357
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	16.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	435	-	-	357
HCM Lane V/C Ratio	-	-	-	0.155
HCM Control Delay (s)	0	-	-	16.9
HCM Lane LOS	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	0.5

Lanes, Volumes, Timings
62: Off Ramp/On Ramp & Bayfront Pkwy










8/17/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							 
Volume (vph)	0	797	172	0	1089	0	0	0	0	0	0	460
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Grade (%)		0%			-3%			0%			0%	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.973										0.865
Flt Protected												
Satd. Flow (prot)	0	3806	0	0	3970	0	0	0	0	0	0	1781
Flt Permitted												
Satd. Flow (perm)	0	3806	0	0	3970	0	0	0	0	0	0	1781
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		673			1275			483			525	
Travel Time (s)		13.1			24.8			13.2			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	866	187	0	1184	0	0	0	0	0	0	500
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1053	0	0	1184	0	0	0	0	0	0	500
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	0.88	0.88	0.88	0.86	0.86							

Intersection									
Intersection Delay, s/veh	17.9								
Intersection LOS	C								
Approach	EB		WB		NB		SB		
Entry Lanes	2		2		2		2		
Conflicting Circle Lanes	2		2		2		2		
Adj Approach Flow, veh/h	937		1046		688		377		
Demand Flow Rate, veh/h	969		1054		697		392		
Vehicles Circulating, veh/h	410		552		1039		1307		
Vehicles Exiting, veh/h	1289		1184		340		299		
Follow-Up Headway, s	3.186		3.186		3.186		3.186		
Ped Vol Crossing Leg, #/h	0		19		0		0		
Ped Cap Adj	1.000		0.989		1.000		1.000		
Approach Delay, s/veh	13.3		19.2		22.4		17.5		
Approach LOS	B		C		C		C		
Lane	Left	Right	Left	Right	Left	Right	Left	Right	
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR	
Assumed Moves	LT	TR	LT	TR	L	TR	LT	TR	
RT Channelized									
Lane Util	0.470	0.530	0.470	0.530	0.508	0.492	0.469	0.531	
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113	
Entry Flow, veh/h	455	514	495	559	354	343	184	208	
Cap Entry Lane, veh/h	831	848	747	768	518	546	424	453	
Entry HV Adj Factor	0.968	0.966	0.993	0.992	1.000	0.975	0.964	0.962	
Flow Entry, veh/h	440	496	492	555	354	334	177	200	
Cap Entry, veh/h	804	819	734	753	518	532	409	435	
V/C Ratio	0.548	0.606	0.670	0.736	0.683	0.628	0.434	0.460	
Control Delay, s/veh	12.5	13.9	17.6	20.6	24.0	20.6	17.6	17.4	
LOS	B	B	C	C	C	C	C	C	
95th %tile Queue, veh	3	4	5	7	5	4	2	2	

Lanes, Volumes, Timings
60: On Ramp & State Street

8/17/2016

						
Lane Group	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		 				
Volume (vph)	326	80	83	133	0	0
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt			0.917			
Flt Protected		0.961				
Satd. Flow (prot)	0	3759	1888	0	0	0
Flt Permitted		0.961				
Satd. Flow (perm)	0	3759	1888	0	0	0
Link Speed (mph)		25	25		30	
Link Distance (ft)		422	720		525	
Travel Time (s)		11.5	19.6		11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	354	87	90	145	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	441	235	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	0.88	0.88	0.88	0.88	0.88	0.88
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	34.3%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
 31: State Street & Off Ramp

8/17/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑	
Volume (vph)	0	172	0	407	83	0
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100
Storage Length (ft)	0	300	0			0
Storage Lanes	0	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt		0.865				
Flt Protected						
Satd. Flow (prot)	0	1781	0	3912	2059	0
Flt Permitted						
Satd. Flow (perm)	0	1781	0	3912	2059	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	483			1176	422	
Travel Time (s)	13.2			32.1	11.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	187	0	442	90	