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Franklin Street Feasibility Study Phase II

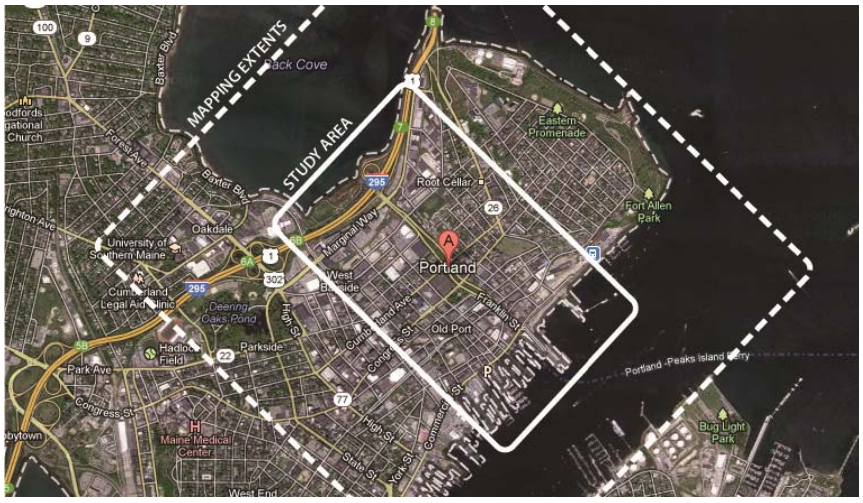
Technical Memorandum

To/Attention	Michael Bobinsky, City of Portland	**Date**	May 6, 2014
From	Tegin Teich, IBI Group	**Project No**	34144
cc	Jeremiah Bartlett, Darryl Belz, Carl Eppich, Markos Miller, PAC	**Steno**	tt, kh, rd, ch
Subject	2035 Future Baseline (No-Build) Conditions		

1 INTRODUCTION

Franklin Street Feasibility Study Phase II, under an agreement between the City of Portland, MaineDOT, and Portland Area Comprehensive Transportation System (PACTS), is a project to "[update and evaluate] alternatives [developed in a Phase I study] through a more comprehensive technical and engineering analysis that includes land use, social, economic, neighborhood and street connectivity, environmental, safety, and transportation data of both current and future conditions for the entire Franklin Street corridor from the Commercial Street Waterfront to the Waterfront at Back Cove."[1] In addition, the project also includes the development of a Preliminary Design Report (PDR), based on the final recommendation, for a section of Franklin Street between the Marginal Way intersection and 825 feet southeast of the Fox/Somerset Street intersection.

Figure 1: Study Area for Franklin Street Feasibility Study Phase II[2]



[1] Source: *RFP 313: Franklin Street Feasibility Study Phase II*, September 25, 2012, page 7.
[2] Source: Google Earth, 2013.

The study area for Franklin Street Feasibility Study Phase II is about one-quarter mile out from the edge of the roadway on each side of Franklin Street. Existing conditions will be mapped for a larger area to show additional context.

This technical memorandum summarizes the projected future (year 2035) traffic volumes, motorized vehicle level of service (LOS), and multimodal LOS (MMLOS) for a baseline) 'no-build' condition. It compares these results to the existing conditions. In the baseline scenario, the only changes are assumed to be a small increase in traffic volumes and traffic signal timing changes. To produce this information, the project team worked with Kevin Hooper and Associates to update the PACTS regional travel demand model to the design year for the Franklin Street Feasibility Study Phase II (2035). The updated volumes from the regional travel demand model were used as inputs to update a traffic simulation model developed by Gorrill-Palmer Consulting Engineers as well as to a MMLOS tool used by IBI Group.

2 PACTS REGIONAL TRAVEL DEMAND MODEL UPDATE

2.1 Product

Year 2035 AM and PM peak hour traffic forecasts were prepared for the following intersections with Franklin Street:

- I-295
- Marginal Way
- Fox and Somerset Streets
- Lancaster Street
- Oxford Street
- Cumberland Street
- Congress Street
- Federal Street
- Newbury Street
- Middle Street
- Fore Street
- Commercial Street

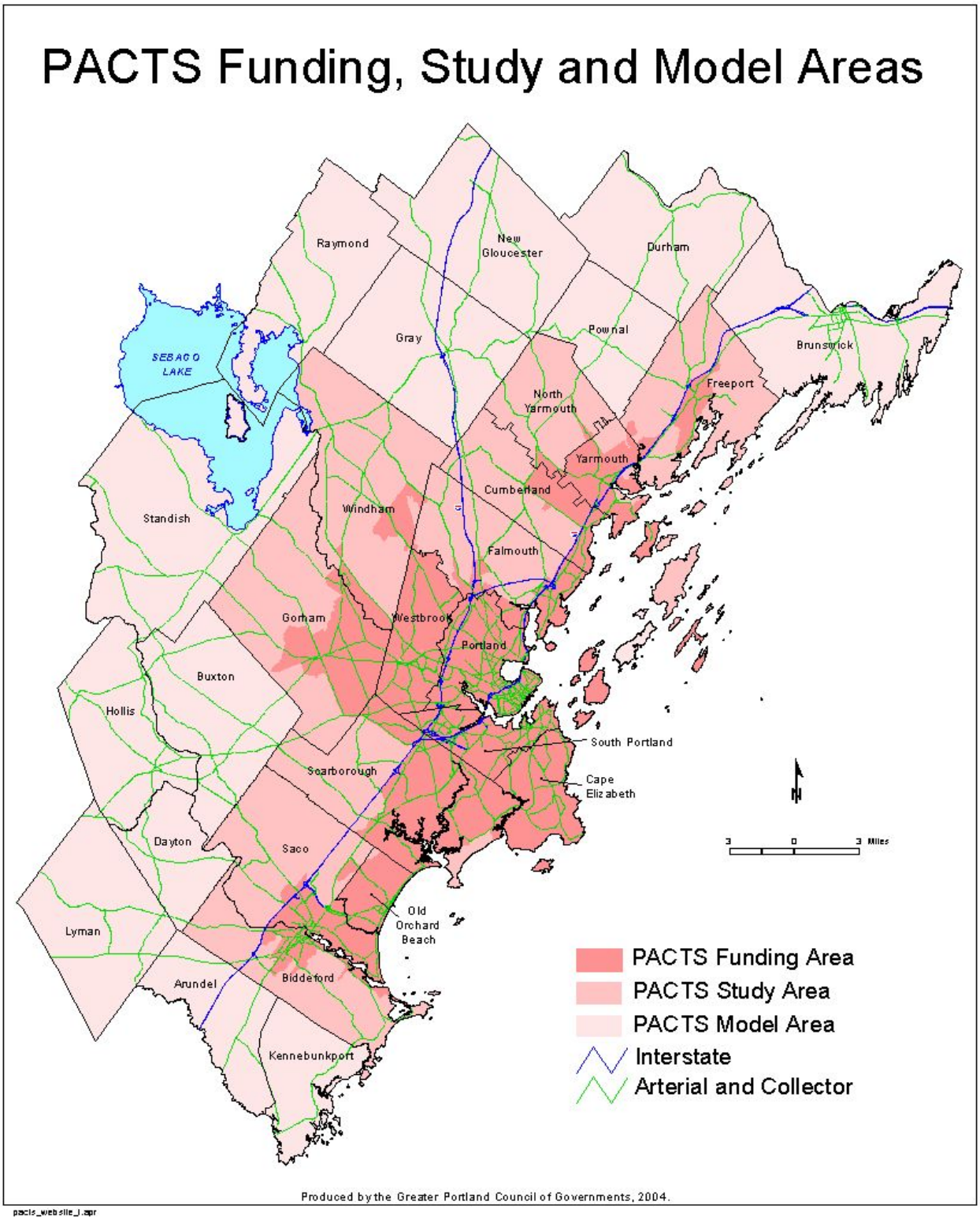
These forecasts were developed with the aid of the established PACTS regional travel demand model.

2.2 PACTS Travel Demand Model Overview

The PACTS model has been in use for more than 25 years. The model has undergone numerous improvements and refinements, with the most recent being the addition of an AM peak hour component to the previously existing PM peak and daily (24-hour) weekday models.

The PACTS model area is depicted in the following graphic (see Figure 2). It includes all of the PACTS jurisdictions and a 'halo' of jurisdictions around the PACTS region. The halo enables the model to more accurately depict travel within and through the jurisdictions at the edges of the PACTS region (e.g., Biddeford, Windham).

Figure 2: PACTS Funding, Study, and Model Areas



The PACTS model follows a traditional four-step process: trip generation, trip distribution, mode split, and traffic assignment.

- The trip generation component estimates the numbers of person trips (inbound and outbound) generated within each of the model area 720 traffic analysis zones (TAZs). The person trips are estimated separately for four different trip purposes: home-based work, home-based shopping, home-based other, and non-home based.
- The trip distribution component matches appropriately compatible trip origins and destinations to produce a trip table for each trip purpose, with a distribution of trip lengths characteristic of that measured in travel surveys.
- The mode split component estimates the travel modes for all trips in the trip tables. The model divides person trips into trips as vehicle driver, vehicle passenger, transit rider, pedestrian, and bicyclist.
- The trip assignment component estimates the loading of vehicle and transit trips onto the roadway and transit networks. The highway route assignment process takes into account travel speeds under congested conditions, travel distance, and tolls paid.

2.3 Year 2035 Base Land Use

For the initial analyses for this study, a future base condition for the year 2035 was defined for which traffic forecasts were developed. A year 2010 study[3] funded by the Maine Turnpike Authority (MTA) and Maine Department of Transportation (MDOT) produced a recommended land use forecast for the PACTS model area, called the Urban and Rural Form. For that forecast, the core urban communities of Portland, South Portland and Westbrook retain their high shares of regional employment and reverse a long-term trend toward lower shares of the region's population and housing units. Housing growth pressure is projected to decrease in the fast-growing inner suburbs (Cape Elizabeth, Cumberland, Falmouth, Freeport, Gorham, Scarborough, Windham, and Yarmouth) but they are expected to retain a significant proportion of jobs, population and housing units, much of which will be organized into dense nodes or town centers that include open space and public land use. In the more rural outer suburbs (Buxton, Gray, Hollis, New Gloucester, North Yarmouth, Pownal, Raymond, and Standish), population, housing unit and job growth is foreseen to slow down modestly compared with recent history, with an emphasis on placing the new residential and commercial development in proximity to each other to reduce the need for long-distance travel. The Urban and Rural Form forecast is the basis for the land use assumptions used in this study.

As noted above, the region is subdivided into 720 TAZs with the core jurisdictions having finer TAZ scales than the outlying jurisdictions. The City of Portland is represented by 172 TAZs. The Peninsula area east of High Street was the focus area for detailed examination of TAZ land use forecasts for this study; that area comprises 47 TAZs.

Both current year and future year TAZ data used in the forecasting of travel demand (e.g., household population, households, employment, and sidewalk continuity) were critically reviewed and revised as appropriate in concert with City of Portland staff. Particular emphasis was placed on the Franklin Street TAZs and on the area of the Portland Peninsula east of High Street. The base forecast includes development types and quantities that are currently planned or are considered likely to occur within the Franklin Street vicinity.

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[3] Gorham East-West Corridor Feasibility Study, prepared by HNTB Corporation for Maine Turnpike Authority and Maine Department of Transportation (2010)

Listed in Table 1 are current and forecast values for employment and housing units in the PACTS model. The overall region is expected to have an increase of 27,146 wage and salary jobs, an increase of 15 percent above the year 2011 number of 182,680. The overall region is expected to have an increase of 33,528 housing units, an increase of 23 percent above the year 2010 number of 146,104.

Also shown in the table are employment and housing unit growth assumptions for areas in the vicinity of the Franklin Street corridor that are expected to grow:

- Bayside (between Franklin Street and Elm Street)
- Bayside (between Elm Street and Forest Avenue)
- Government District
- Arts District
- India Street Neighborhood
- Old Port District
- Waterfront

Table 1: Current and Forecast Values in the PACTS Travel Demand Model

	Employment				Housing Units		
Area	Fall 2011	Growth by 2035	% Growth		2010 Census	Growth by 2035	% Growth
Region	182,680	27,146	15%		146,104	33,528	23%
Portland Total	63,758	7,858	12%		32,538	3,870	12%
Portland Peninsula[4]	35,024	4,361	12%		13,271	2,438	18%
Bayside (between Elm & Franklin)	1,399	500	36%		715	800	112%
Bayside (between Elm and Forest)	2,177	170	8%		408	360	88%
Government District	1,576	150	10%		149	100	67%
Arts District	2,404	-	0%		722	-	0%
India Street Neighborhood	977	375	38%		259	600	232%
Old Port District	6,014	510	8%		275	-	0%
Waterfront	2,817	1,045	37%		99	200	202%

The areas are mapped in the following graphic (see Figure 3) reproduced from the Portland Wayfinding Study prepared by Woodworth Associates.

[4] Includes any Portland traffic analysis zone that lies south of I-295 (excluding Peaks Island and some other islands)

Figure 3: Zones, Districts, and Neighborhoods in the Portland Peninsula[5]

2.4 Year 2035 Base Roadway Network

The base year 2035 roadway network was defined with guidance provided by City of Portland staff. It includes the following:

- Extension of Pearl Street from Somerset Street to Marginal Way
- Extension of Somerset Street to Forest Avenue

At the new intersection of Forest Avenue and Somerset Street,

- Left turns will be permitted for northbound I-295 exiting traffic to turn into Bayside via Somerset Street
- Left turns will be permitted for southbound Forest Avenue traffic to turn into Bayside via Somerset Street

For westbound Somerset Street traffic, only right turns will be allowed onto northbound Forest Avenue (i.e., no left turns to Forest Avenue or State Street from Somerset Street).

3 2035 TRAFFIC VOLUMES AND LOS

The project team used updated traffic volumes obtained from the PACTS Regional Travel Demand Model update to complete Synchro / Simtraffic computer modeling of the eight

[5] Source: Woodworth Associates

signalized intersections along Franklin Street for the Future Conditions of 2035 during the weekday AM and PM peak hours. The intersections are listed as follows from south to north:

- Commercial Street
- Fore Street
- Middle Street
- Congress Street (Comprised of two intersections that function as one)
- Cumberland Avenue(Comprised of two intersections that function as one)
- Somerset Street / Fox Street
- Marginal Way
- I-295 Ramps

The AM and PM peak hour volumes used for the modeling are derived from the year 2035 PACTS modeling performed by Kevin Hooper and Associates that considers both anticipated growth and changes in traffic patterns in the area. For the purpose of the baseline future conditions model, potential future roadway connections to Franklin Street from other side roads are not included.

The 2035 AM and PM analysis is based on the Synchro/Simtraffic modeling that was performed for the 2013 Existing Conditions and revising the traffic volumes to reflect of the projected 2035 Future Conditions. The traffic signal phasing is the same as the 2013 conditions, with timings optimized for 2035 traffic volumes. All the assumptions and methodology modeling are the same as in the 2013 Existing Conditions. The outputs for the AM and PM peaks were submitted to MaineDOT separately. See Figure 4 for projected 2035 traffic volumes on Franklin Street.

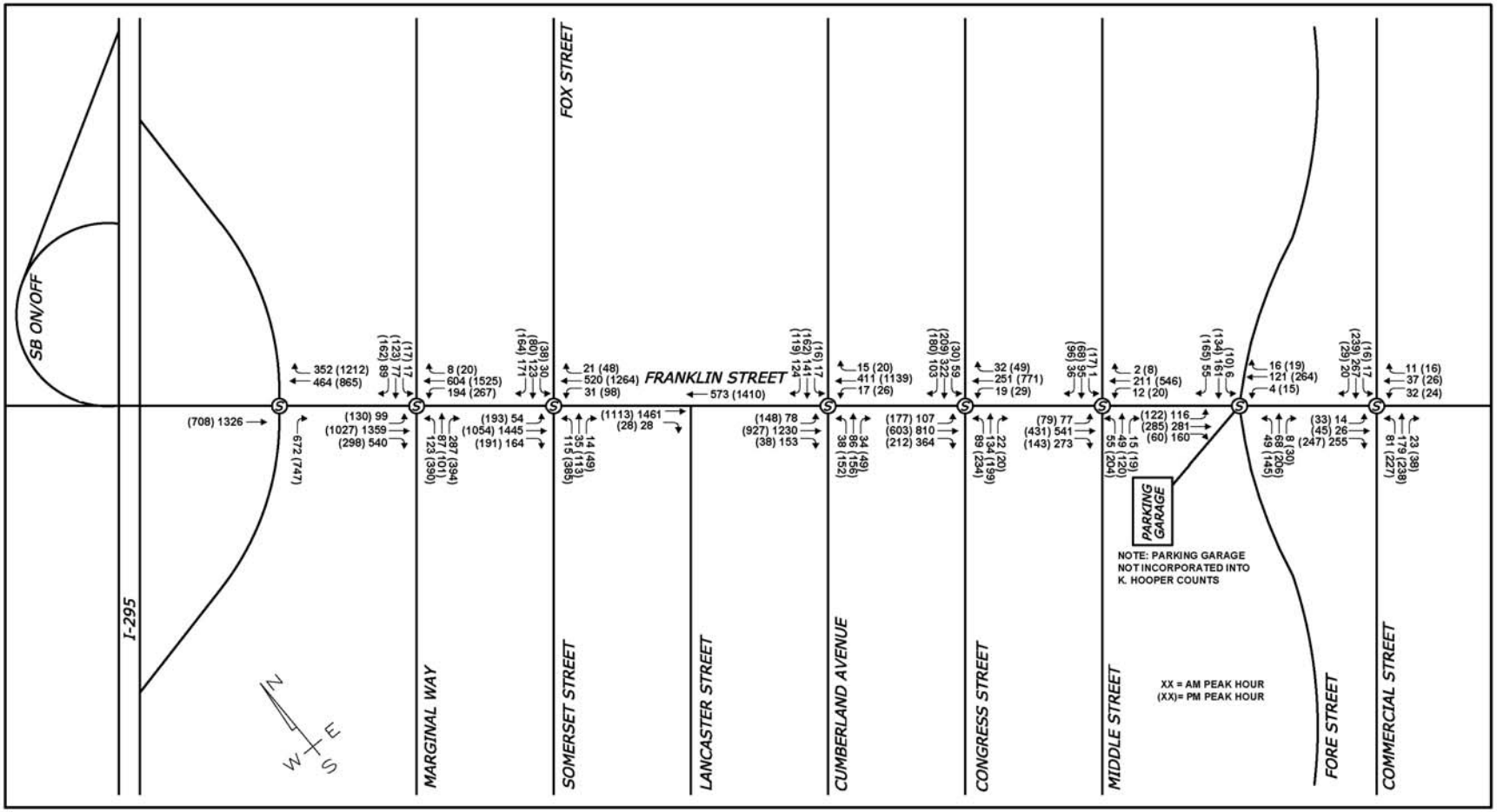
See Figure 5 for projected 2035 intersection level of service on Franklin Street as well as the overall arterial level of service. Based on the modeling of the 2035 Future Conditions (the average of five runs during AM & PM Weekday peak hours), the level of service for the intersections varies from A-B toward the Commercial Street end and decreases to failing at the Marginal Way end. Similar to the 2013 capacity analysis, this decrease in level of service relates to the trend in traffic volumes, because the Marginal Way end has approximately three to four times the volume of traffic of the Commercial Street end. The arterial LOS is F in both the 2013 and 2035 analysis. See Figure 6 for the 2013 Existing Conditions LOS for comparison. Figure 7 shows the change in volumes from the existing conditions. As can be seen from Figure 7, the largest increase in traffic volume occurs on the through movements of Franklin Street, with the PM peak hour increasing more than the AM peak hour. The percent increase in the movements varies considerably from less than 5% to over 30%. Figure 8 and Figure 9 show the projected queue lengths and delay compared to the existing conditions. Output files for the Synchro / Simtraffic work are available upon request and have been provided to MaineDOT.

3.1 Conclusions

Based on the capacity analysis for the Future Conditions, the intersections from Congress Street to Commercial Street are projected to operate at overall acceptable levels of service with some decrease in LOS from the 2013 conditions from the increase in traffic volume. The three intersections with Franklin Street at Somerset / Fox Streets, Marginal Way, and the I-295 ramps are all forecast to be over capacity and effectively at gridlock in the 2035 Future Conditions, leading to queue lengths that interfere with proper functioning of the surrounding intersections, including I-295. In the PM peak hour, traffic is more oriented toward I-295. In the PM peak, the queuing from the three signalized intersections on the I-295 end is projected to affect

operations of the signals at Cumberland Avenue and Congress Street, which did not occur under the 2013 Existing Conditions.

Figure 4: Projected 2035 Traffic Volumes on Franklin Street



FRANKLIN STREET, PORTLAND, MAINE

Design: RED Scale: NONE
Draft: LAN Date: FEB 2014
Checked: TLG File Name: 2735 -Traff 4-6 Lrge.dwg

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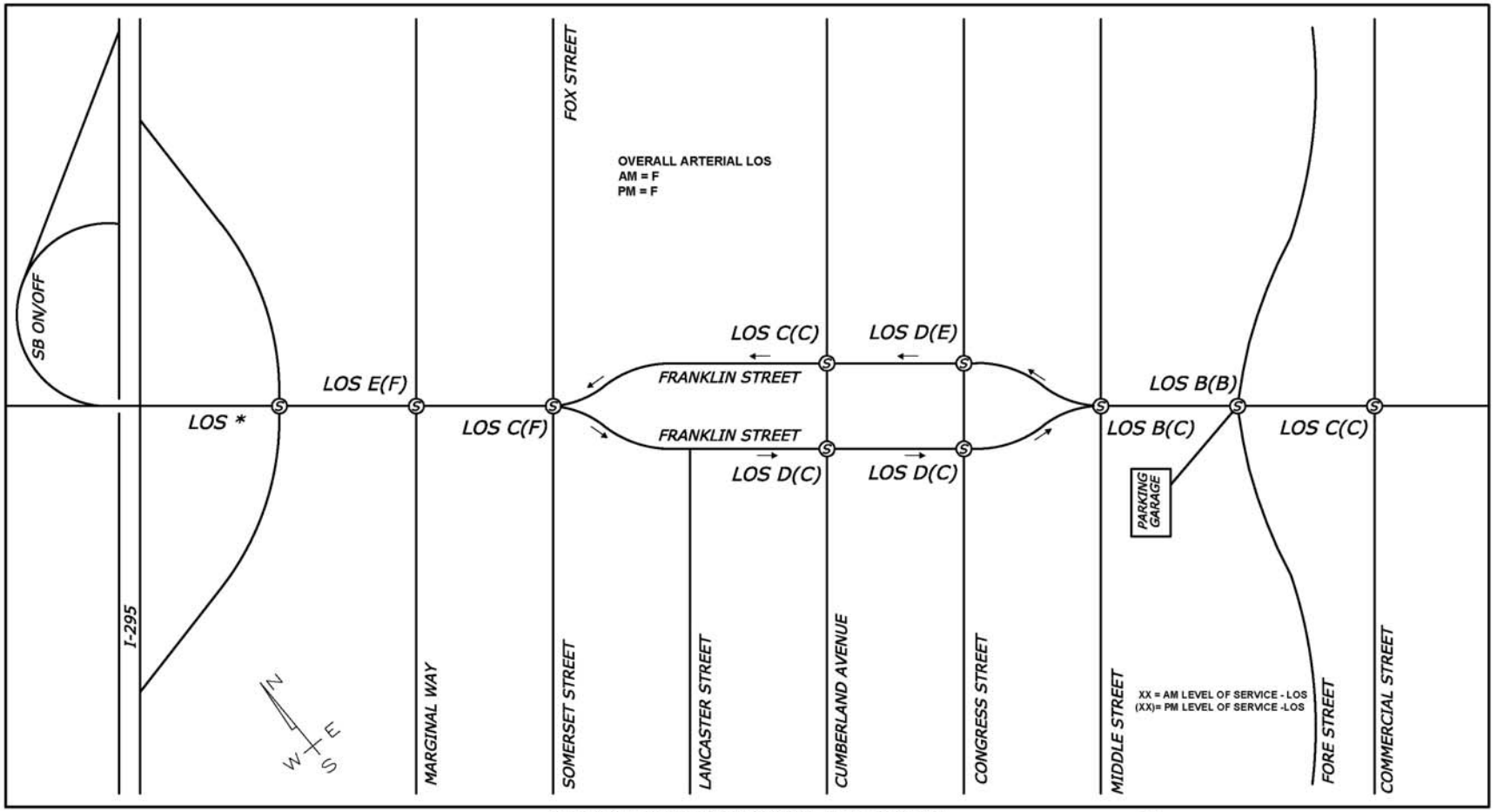
Figure 5: Projected 2035 Intersection and Arterial LOS with no Mitigation



FRANKLIN STREET, PORTLAND, MAINE

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*** LEVEL OF SERVICE WAS SIGNIFICANTLY EFFECTED BY THE INTERSECTION AT MARGINAL WAY AND AN ACCURATE MEASURE IS UNDETERMINABLE.**

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Figure 6: Existing Conditions (2013) Intersection and Arterial LOS

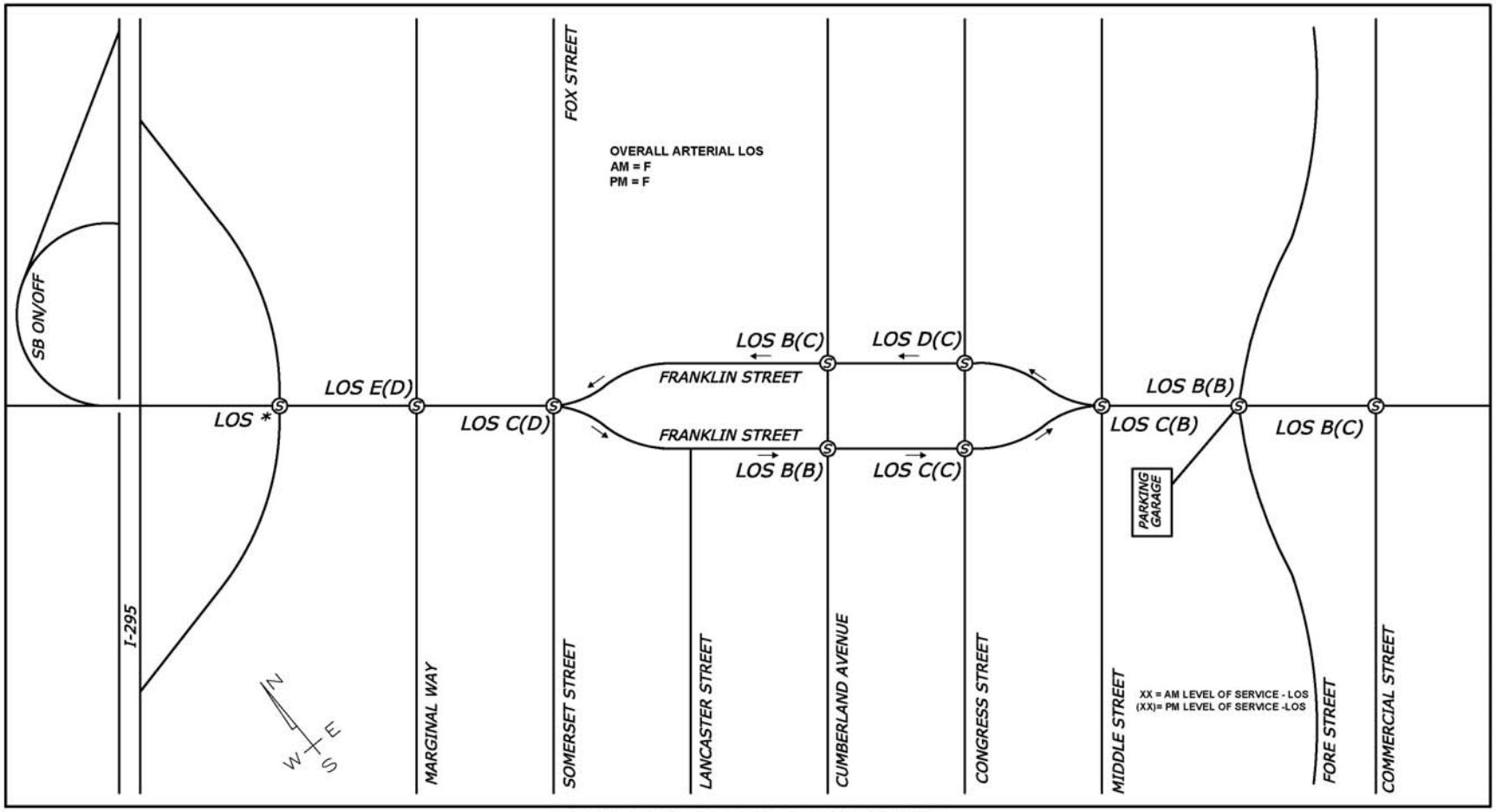

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Figure 7: Changes in Volumes from Present Day to 2035 Projections on Franklin Street

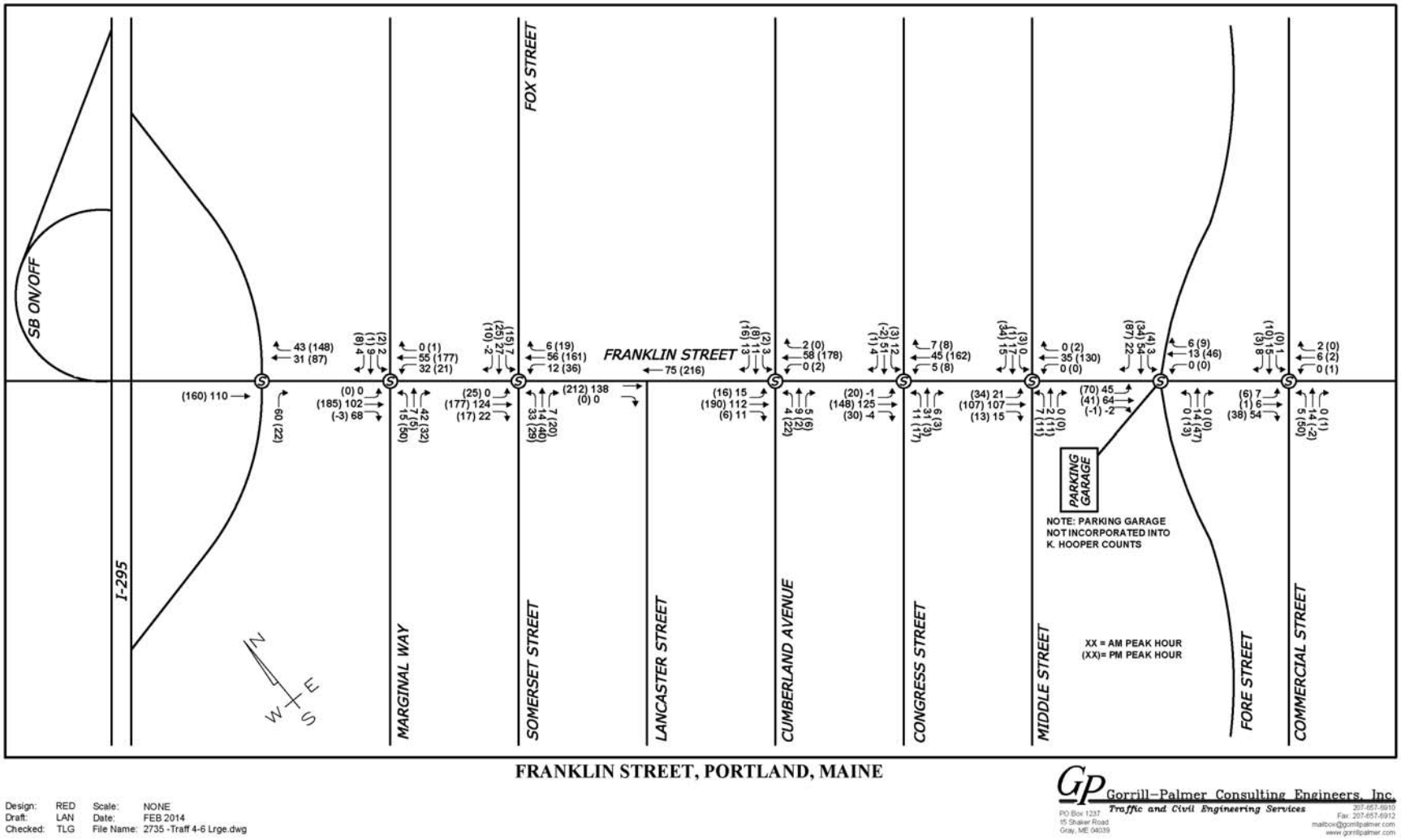

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Figure 8: Summary of Queue Lengths Existing and Future Conditions

Intersection / Approach			2013 - Existing Conditions				2035 - No Build			
			AM		PM		AM		PM	
			50% Queue (ft)	95% Queue (ft)	50% Queue (ft)	95% Queue (ft)	50% Queue (ft)	95% Queue (ft)	50% Queue (ft)	95% Queue (ft)
Franklin & I-295 Ramps										
I-295 SB Off	SE	T	242	304	100	184	252	286	238	302
		T	237	294	105	182	239	278	228	289
		T	229	296	84	152	232	279	208	284
I-295 NB Off	E	R	164	247	107	189	226	333	465	943
		R	145	227	84	163	207	307	433	891
Franklin & Marginal Way										
Franklin St	SE	L	150	196	139	192	154	192	146	191
		T	166	192	158	199	166	206	169	200
		T	154	187	155	196	151	187	174	198
		R	110	176	108	191	104	180	150	217
Franklin St	NW	L	117	195	219	376	201	335	299	434
		T	130	230	321	507	215	421	455	543
		TR	88	189	309	507	163	388	456	555
Marginal Way	NE	L	26	39	29	30	26	38	28	33
		T	119	199	590	1190	369	654	706	1302
		R	113	197	485	1146	312	622	583	1268
Marginal Way	SW	LT	61	104	108	192	189	416	134	248
		R	32	57	67	109	32	55	90	166
Franklin & Fox Street / Somerset Ave										
Franklin St	SE	L	56	151	119	218	74	199	149	268
		T	244	415	147	297	265	499	141	299
		TR	269	434	172	316	290	516	160	308
Franklin St	NW	L	18	48	79	212	29	87	165	322
		T	107	198	255	421	122	246	386	445
		TR	81	175	244	416	94	220	381	450
Fox Street	SW	LT	79	173	52	104	174	416	105	197
		R	111	191	73	131	147	243	102	184
Somerset Ave	NE	L	32	62	124	200	49	96	192	285
		T	31	67	140	233	52	102	215	325
		R	22	56	128	266	55	117	313	634
Franklin Street SB & Cumberland Avenue										
Franklin St SB	S	LT	156	361	211	446	421	858	196	338
		TR	214	428	202	441	468	873	190	342
Cumberland Ave	NE	T	62	192	162	381	72	242	119	292
		TR	90	142	105	146	87	143	99	147
Cumberland Ave	SW	L	8	33	10	37	15	56	12	41
		T	16	47	23	59	23	59	22	66
Franklin Street NB & Cumberland Avenue										
Franklin St NB	N	LT	40	90	130	234	48	117	278	498
		TR	35	87	127	234	44	115	276	505
Cumberland Ave	NE	L	18	56	77	135	26	65	80	132
		T	54	99	79	134	66	121	69	123
Cumberland Ave	SW	T	39	182	88	303	139	391	142	408
		TR	102	184	135	207	140	213	144	207

Intersection / Approach			2013 - Existing Conditions				2035 - No Build			
			AM		PM		AM		PM	
			50% Queue (ft)	95% Queue (ft)	50% Queue (ft)	95% Queue (ft)	50% Queue (ft)	95% Queue (ft)	50% Queue (ft)	95% Queue (ft)
Franklin Street SB & Congress Street										
Franklin St SB	SE	LT	216	415	196	421	332	519	187	341
		TR	295	483	205	442	378	535	203	365
Congress Street	NE	T	36	107	180	386	56	160	249	752
		TR	74	144	144	198	111	181	131	208
Congress Street	SW	L	19	49	17	50	32	77	17	49
		T	20	60	25	62	23	61	22	54
Franklin Street NB & Congress Street										
Franklin St NB	NW	LT	39	87	107	187	57	114	238	527
		TR	44	97	111	191	66	123	241	529
Congress Street	NE	L	51	94	85	120	65	112	86	119
		T	63	112	84	121	72	115	65	111
Congress Street	SW	T	310	572	307	616	332	551	656	1389
		TR	170	193	169	190	170	188	171	197
Franklin Street & Middle Street										
Franklin St	SE	LT	64	127	74	134	86	139	99	145
		TR	114	149	94	147	125	149	98	152
Franklin St	NW	LT	49	97	82	143	56	116	107	193
		TR	43	87	91	152	54	107	121	202
Middle Street	NE	LTR	42	86	104	178	45	92	114	227
Middle Street	SW	LT	27	58	25	59	32	70	34	111
		R	8	29	18	40	16	46	29	61
Franklin Street & Fore Street										
Franklin St	SE	LT	42	92	49	112	68	149	77	147
		TR	118	216	93	182	140	237	94	181
Franklin St	NW	LT	17	42	43	90	18	41	49	88
		TR	10	37	35	80	12	39	46	93
Fore Street	N	L	14	36	41	99	15	44	56	147
		TR	25	57	53	96	27	60	65	107
Fore Street	SW	LTR	58	104	69	126	77	134	101	190
Franklin Street & Commercial Street										
Franklin St	E	L	7	28	15	44	6	27	20	52
		T	12	35	27	69	12	38	28	68
		R	77	152	85	166	85	152	93	165
Franklin St	W	L	22	52	17	47	24	53	15	42
		T	32	69	29	72	36	74	23	63
		R	11	40	17	48	14	46	16	48
Commercial Street	N	L	41	84	101	172	44	95	149	219
		T	60	120	93	210	64	128	183	461
		R	7	24	12	55	8	30	11	49
Commercial Street	S	LT	107	182	118	193	112	193	123	202
		R	8	31	17	62	18	71	20	77

Figure 9: Summary of Delays and Level of Service for Franklin Street Existing and Future Conditions

Intersection / Approach			2013 - Existing Conditions				2035 - No Build			
			AM		PM		AM		PM	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Franklin & I-295 Ramps										
I-295 SB Off	SE	T	59.4	E	31.2	C	53.0	D	107.2	F
I-295 NB Off	E	R	26.2	C	10.4	B	37.7	D	127.9	F
Overall			34.5	C	10.0	A	34.4	C	53.3	D
Franklin & Marginal Way										
Franklin St	SE	L	37.7	D	55.5	E	39.5	D	75.7	E
		T	15.9	B	24.1	C	13.9	B	33.8	C
		R	6.0	A	6.4	A	4.9	A	12.9	B
Franklin St	NW	L	49.6	D	54.0	D	114.9	F	94.5	F
		T	17.4	B	34.0	C	24.0	C	53.6	D
		R	12.6	B	30.0	C	12.8	B	47.9	D
Marginal Way	NE	L	40.6	D	169.8	F	187.0	F	181.5	F
		T	39.4	D	159.1	F	184.3	F	171.3	F
		R	24.1	C	47.4	D	80.4	F	57.4	E
Marginal Way	SW	L	54.1	D	58.8	E	296.4	F	93.5	F
		T	45.9	D	59.3	E	276.3	F	80.5	F
		R	6.5	A	23.3	C	6.8	A	38.8	D
Overall			19.7	B	48.1	D	44.1	D	64.9	E
Franklin & Fox Street / Somerset Ave										
Franklin St	SE	L	61.8	E	45.2	D	82.6	F	50.9	D
		T	23.9	C	18.4	B	27.5	C	16.9	B
		R	23.8	C	16.6	B	26.8	C	13.8	B
Franklin St	NW	L	59.8	E	64.2	E	73.7	E	114.0	F
		T	20.3	C	31.3	C	19.1	B	71.6	E
		R	15.2	B	22.7	C	18.2	B	67.9	E
Fox Street	SW	L	31.5	C	48.4	D	79.5	E	72.3	E
		T	36.9	D	47.6	D	70.9	E	70.4	E
		R	38.4	D	20.9	C	83.9	F	43.8	D
Somerset Ave	NE	L	43.8	D	64.5	E	69.7	E	129.0	F
		T	39.6	D	59.2	E	64.3	E	111.3	F
		R	31.2	C	34.0	C	73.9	E	88.9	F
Overall			26.7	C	32.7	C	36.1	D	59.6	E
Franklin Street SB & Cumberland Avenue										
Franklin St SB	S	L	12.8	B	44.1	D	41.9	D	20.0	B
		T	16.6	B	27.9	C	54.7	D	19.0	B
		R	16.7	B	18.5	B	61.4	E	13.8	B
Cumberland Ave	NE	T	39.9	D	54.7	D	66.7	E	42.8	D
		R	7.5	A	25.2	C	20.3	C	14.0	B
Cumberland Ave	SW	L	13.9	B	25.9	C	60.2	E	12.6	B
		T	7.5	A	9.1	A	12.1	B	6.8	A
Overall			18.1	B	32.2	C	51.2	D	21.9	C
Franklin Street NB & Cumberland Avenue										
Franklin St NB	N	L	6.3	A	9.4	A	8.2	A	38.0	D
		T	6.6	A	12.3	B	7.8	A	48.0	D
		R	3.9	A	10.8	B	4.6	A	41.8	D
Cumberland Ave	NE	L	20.7	C	28.2	C	33.7	C	28.3	C
		T	15.9	B	21.1	C	25.4	C	10.9	B
Cumberland Ave	SW	T	42.5	D	61.9	E	68.8	E	73.0	E
		R	15.2	B	33.0	C	33.9	C	40.9	D
Overall			16.2	B	21.3	C	26.1	C	42.4	D

Intersection / Approach		2013 - Existing Conditions				2035 - No Build			
		AM		PM		AM		PM	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Franklin Street SB & Congress Street									
Franklin St SB SE	L	21.0	C	82.5	F	62.4	E	29.2	C
	T	25.6	C	35.6	D	46.1	D	26.9	C
	R	29.8	C	24.0	C	45.7	D	22.5	C
Congress Street NE	T	31.9	C	51.0	D	41.2	D	78.6	E
	R	32.8	C	37.7	D	47.1	D	45.6	D
Congress Street SW	L	7.4	A	14.5	B	12.2	B	9.0	A
	T	5.6	A	7.2	A	6.3	A	4.6	A
Overall		23.1	C	38.8	D	38.1	D	37.6	D
Franklin Street NB & Congress Street									
Franklin St NB NW	L	14.4	B	12.5	B	15.5	B	53.4	D
	T	11.4	B	15.1	B	17.4	B	53.5	D
	R	11.5	B	11.4	B	16.5	B	42.6	D
Congress Street NE	L	24.9	C	24.3	C	41.2	D	23.4	C
	T	16.5	B	17.4	B	21.1	C	8.0	A
Congress Street SW	T	82.0	F	83.4	F	61.0	E	208.1	F
	R	79.1	E	79.1	E	58.1	E	194.0	F
Overall		45.0	D	33.3	C	38.8	D	76.6	E
Franklin Street & Middle Street									
Franklin St SE	L	11.0	B	20.7	C	14.3	B	26.5	C
	T	12.3	B	15.8	B	15.9	B	19.2	B
	R	10.3	B	8.2	A	15.2	B	9.6	A
Franklin St NW	L	56.4	E	25.6	C	94.8	F	33.5	C
	T	19.3	B	18.6	B	22.0	C	23.5	C
	R	12.7	B	12.7	B	25.0	C	14.5	B
Middle Street NE	L	17.0	B	16.8	B	14.8	B	20.9	C
	T	14.5	B	17.2	B	13.2	B	21.6	C
	R	13.5	B	13.4	B	11.9	B	27.2	C
Middle Street SW	L	32.0	C	11.6	B	13.5	B	13.7	B
	T	13.0	B	9.6	A	11.4	B	12.6	B
	R	12.9	B	4.5	A	12.3	B	14.5	B
Overall		13.6	B	15.7	B	16.6	B	20.2	C
Franklin Street & Fore Street									
Franklin St SE	L	13.2	B	18.2	B	15.6	B	20.9	C
	T	15.4	B	17.9	B	20.0	B	18.9	B
	R	14.0	B	11.9	B	18.2	B	14.8	B
Franklin St NW	L	32.2	C	21.1	C	24.2	C	24.6	C
	T	19.1	B	18.5	B	17.2	B	19.9	B
	R	15.7	B	9.6	A	14.4	B	13.6	B
Fore Street N	L	11.8	B	11.0	B	13.5	B	15.0	B
	T	11.0	B	9.7	A	10.2	B	12.2	B
	R	10.7	B	7.0	A	12.6	B	10.1	B
Fore Street SW	L	25.1	C	22.7	C	11.9	B	21.3	C
	T	15.1	B	18.9	B	14.7	B	20.0	B
	R	15.3	B	8.6	A	13.9	B	14.8	B
Overall		15.0	B	14.8	B	16.7	B	17.2	B
Franklin Street & Commercial Street									
Franklin St E	L	26.6	C	31.7	C	19.6	B	32.8	C
	T	25.2	C	32.5	C	20.0	B	31.5	C
	R	13.8	B	16.0	B	14.4	B	19.2	B
Franklin St W	L	24.2	C	29.5	C	24.8	C	24.9	C
	T	26.5	C	29.4	C	27.6	C	23.9	C
	R	25.9	C	33.9	C	23.2	C	26.5	C
Commercial Street N	L	28.0	C	36.2	D	31.7	C	74.2	E
	T	16.3	B	16.7	B	17.6	B	26.2	C
	R	15.3	B	4.6	A	15.5	B	12.8	B
Commercial Street S	L	21.6	C	29.8	C	21.1	C	33.5	C
	T	24.1	C	29.7	C	22.2	C	29.8	C
	R	19.2	B	6.2	A	17.1	B	6.6	A
Overall		20.2	C	23.8	C	20.1	C	35.2	D

4 MULTIMODAL LOS

A Multimodal LOS analysis for the Future Year (2035) condition was conducted for Franklin Corridor. The methodology for the MMLOS is below and in detail in the Data Collection and Existing Conditions Analysis Memorandum. Future Year (2035) baseline roadway conditions and geometry remain consistent with existing conditions. The only changes associated with the Future Year (2035) analysis are traffic volume growth and traffic signal timing changes to adjust for the projected traffic changes.

4.1 Methodology

The methodology for this analysis follows the guidelines presented in *NCHRP Report 616 Multimodal Level of Service Analysis for Urban Streets* and utilizes the *CompleteStreets* software released by Dowling Associates, Inc.

The multimodal level of service (MMLOS) analysis framework translates complex numerical performance results into a simple letter grade system representative of the travelers' perception of the resulting quality of service provided by the facility. The letter grade "A" represents the "best" quality of service, and letter grade "F" represents the "worst" quality of service. However, level of service results should be considered in the context of other planning and design considerations. A level of service "F", by itself, does NOT mean that there is a problem that must be resolved. Similarly, level of service "A", by itself, does NOT mean that there are no problems.

Table 2 shows the thresholds for each letter grade set forth by the multimodal methodology for pedestrian, transit, and bicycle modes, in terms of the results of the evaluation model for each of these modes. Table 3 illustrates the threshold for each letter grade for auto level of service.

Table 2: LOS Letter Grade Numerical Equivalents

LOS Model Outputs	LOS Letter Grade
Model <= 2.00	A
2.00 < Model <= 2.75	B
2.75 < Model <= 3.50	C
3.50 < Model <= 4.25	D
4.25 < Model <= 5.00	E
Model > 5.00	F

Source: NCHRP Report 616, Transportation Research Board

Notes for LOS Tables:

1) If any directional segment hourly volume/capacity ratio (v/c) exceeds 1.00 for any mode, that direction of street is considered to be operating at LOS F for that mode of travel for its entire length (regardless of the computed level of service).
2) If the movement of any mode is legally prohibited for a given direction of travel on the street, then the level of service for that mode is LOS "F" for that direction.

Table 3: LOS Letter Grade Numerical Equivalents for Auto Mode

LOS Model Outputs	LOS Letter Grade
Model >= 0.85	A
0.84 < Model <= 0.67	B
0.66 < Model <= 0.50	C
0.49 < Model <= 0.40	D
0.39 < Model <= 0.30	E
Model > 0.30	F

Source: NCHRP Report 616, Transportation Research Board

The multimodal LOS methodology provides for the estimation of separate mean level of service for each of four modes of travel on the urban street: auto driver, bus passenger, bicyclist and pedestrian. The methodology does not provide for the computation of an overall weighted average of the LOS results across the four modes of travel. It enables the analyst to see the changes in LOS from one mode to the other as changes are made to the design and operation of the urban street. Weighing the trade-offs of improving the LOS for one mode versus worsening it for another mode are left to the analyst and the public agency operating the urban street.

Auto Level of Service: The auto level of service is a function of the estimated average travel speed over the length of the street and the average number of stops per mile. *Note that the methodology used to compute the auto level of service rating for the Multimodal LOS analysis (NCHRP 3-70) is not the same as the approach used in the traffic analysis in prior sections and the results may not be the same.* The NCHRP 3-70 auto level of service is based on the stops per mile, which was found in that research project to be a good predictor of how the general public would rate the quality of service for the street. Stops and speed are generally closely correlated.

Transit Level of Service: The transit level of service is based on a combination of the access experience, the waiting experience, and the ride experience. The access experience is represented by the pedestrian LOS score for pedestrian access to bus stops in the direction of travel along the street. Therefore, an improved pedestrian LOS could result in an improved transit LOS as well. The waiting experience is a function of the headway between buses and wait time associated with on-time transit performance.

Portions of the street where there is no transit service (i.e. no stops or stations) are split into their own segments for the purpose of transit LOS analysis and are assigned a transit LOS of "F". The overall transit LOS is a length-weighted average including the segments with no transit service.

Bicycle Level of Service: The bicycle level of service is a weighted combination of the bicyclists' experience at intersections and on-street segments in between the intersections. The most significant factors affecting bicycle LOS on an urban street are the presence of a striped (Class II) bicycle lane and the number of signalized intersections per mile that the bicyclist must cross. Other factors include the number of unsignalized intersections and commercial driveways that the bicyclist must cross, and the volume and speed of auto traffic in the direction of travel.

Pedestrian Level of Service: The pedestrian level of service for an urban street is calculated based on pedestrian density; a separate calculation is also made based on widths of bicycle lanes, parking lanes, buffers and sidewalk, among other factors. The final level of service for the facility is the worse of the two computed levels of service.

For pedestrians, the most significant factor affecting their LOS is usually the volume of auto traffic (AADT) and the traffic speed. Other factors that affect perceived quality of service include the presence of barriers between vehicular traffic and pedestrians in the form of wide outside lanes, on-street parking lanes, buffers and trees or fences.

4.2 Results of Year 2035 MMLOS Analysis

Table 4 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the northbound direction. Input and output files for the MMLOS modeling are available upon request and have been provided to MaineDOT. Table 5 summarizes the Multimodal LOS results for the AM and PM peak period for each segment in the southbound direction. In general, the model scores are lower than the scores for the existing conditions, however, only the bold and italicized letter grades are a decrease from the existing conditions.

Table 4: Year 2035 Peak Hour Level of Service Results – Northbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Commercial Street to Fore Street	Auto	36.2%	E	33.4%	E
	Transit	6.38	F	6.38	F
	Bicycle	2.98	C	3.01	C
	Pedestrian	2.55	B	2.56	B
Fore Street to Middle Street	Auto	25.4%	F	23.6%	F
	Transit	6.41	F	6.41	F
	Bicycle	3.53	***D***	3.51	***D***
	Pedestrian	2.70	B	2.70	B
Middle Street to Congress Street	Auto	57.6%	C	47.9%	***D***
	Transit	6.50	F	6.51	F
	Bicycle	3.51	***D***	3.64	D
	Pedestrian	3.32	C	3.40	C
Congress Street to Cumberland Avenue	Auto	59.3%	C	35.6%	***E***
	Transit	6.46	F	6.46	F
	Bicycle	3.81	D	3.70	D
	Pedestrian	3.06	C	3.06	C
Cumberland Avenue to Lancaster Street	Auto	38.5%	***E***	52.3%	C
	Transit	6.50	F	6.50	F
	Bicycle	3.72	D	3.69	D
	Pedestrian	3.33	C	3.30	C
Lancaster Street to Fox Street/Somerset Street	Auto	35.3%	E	24.6%	F
	Transit	6.49	F	6.51	F
	Bicycle	3.59	D	3.65	D
	Pedestrian	3.24	C	3.43	C
Fox Street/Somerset Street to Marginal Way	Auto	19.1%	F	27.5%	***F***
	Transit	6.54	F	6.56	F
	Bicycle	4.10	D	3.90	D
	Pedestrian	3.58	D	3.76	D

Table 5: Year 2035 Peak Hour Level of Service Results – Southbound

Segment	Mode	AM Peak		PM Peak	
		Score	LOS	Score	LOS
Marginal Way to Fox Street/Somerset Street	Auto	41.1%	D	31.5%	E
	Transit	6.46	F	6.46	F
	Bicycle	4.04	D	4.01	D
	Pedestrian	3.04	C	3.08	C
Fox Street/Somerset Street to Lancaster Street	Auto	38.0%	E	25.6%	F
	Transit	6.41	F	6.40	F
	Bicycle	3.64	D	3.60	D
	Pedestrian	2.71	B	2.70	B
Lancaster Street to Cumberland Avenue	Auto	56.6%	C	35.7%	***E***
	Transit	6.47	F	6.47	F
	Bicycle	3.64	D	3.61	D
	Pedestrian	3.12	C	3.15	C
Cumberland Avenue to Congress Street	Auto	43.7%	D	31.9%	E
	Transit	6.44	F	6.45	F
	Bicycle	3.29	C	3.28	C
	Pedestrian	2.95	C	3.00	C
Congress Street to Middle Street	Auto	65.5%	C	43.0%	D
	Transit	6.50	F	6.50	F
	Bicycle	3.74	D	3.72	D
	Pedestrian	3.32	C	3.35	C
Middle Street to Fore Street	Auto	32.5%	E	21.5%	F
	Transit	6.42	F	6.42	F
	Bicycle	3.77	D	3.72	D
	Pedestrian	2.78	***C***	2.82	C
Fore Street to Commercial Street	Auto	24.9%	F	26.8%	F
	Transit	6.42	F	6.43	F
	Bicycle	3.72	D	3.73	D
	Pedestrian	2.80	C	2.85	C

A summary of the overall corridor Multimodal LOS results for Franklin Street is provided in Table 6. The overall letter grade LOS for each mode does not change relative to 2013.

Table 6: Year 2035 Peak Overall Facility Score

Franklin Street – Overall Corridor					
	Mode	AM Peak - 2035		PM Peak - 2035	
		Score	LOS	Score	LOS
Northbound	Auto	0.34	E	0.33	E
	Transit	6.48	F	6.49	F
	Bicycle	3.62	D	3.61	D
	Pedestrian	3.18	C	3.24	C
Southbound	Auto	0.43	D	0.32	E
	Transit	6.45	F	6.46	F
	Bicycle	3.69	D	3.66	D
	Pedestrian	3.02	C	3.05	C

4.3 Conclusions of MMLOS Analysis (Year 2035)

The results of the Future Year (2035) Multimodal LOS for Franklin Street are generally consistent with existing conditions for all modes of travel. A comparison of the existing and future peak overall facility score is provided in Table 7.

The overall corridor Auto LOS remains at LOS "E" during both peak periods in the northbound direction and the PM peak period in the southbound direction (again, please note the different rating compared to the HCM measure developed from the Synchro / Simtraffic analysis). The overall corridor Auto LOS during the AM peak period in the southbound direction also remains at LOS "D." The Auto MMLOS score however changes slightly, due to forecast traffic growth and proposed signal timing changes. In most cases, the increase in traffic volumes results in a lower MMLOS score, however, the MMLOS score improves slightly in the AM peak period in the southbound direction due to the signal timing change proposed in the Future Year (2035) scenario.

There are no proposed transit services or stops planned along Franklin Street. The Transit LOS remains at LOS "F."

The overall corridor Bicycle LOS for Franklin Street remains at LOS "D" for both peak periods in both directions. No additional bicycle facilities along Franklin Street are included in the future no-build conditions, and with the forecast traffic volume growth, the MMLOS Score deteriorates slightly.

The overall corridor Pedestrian LOS for Franklin Street remains at LOS "C" for all scenarios. The most significant factor affecting Pedestrian LOS is usually the volume of auto traffic and traffic speed. The forecast traffic growth along Franklin Street increases the MMLOS score (which represents a lower level of service), but because the traffic speed remains at 35 miles per hour, the change is not significant.

5 NEXT STEPS

This deliverable was produced as a draft and reviewed by the City of Portland, MaineDOT, and PACTS before being finalized. The Existing Conditions report has also been submitted. These deliverables will be used to inform the update of the alternatives for the corridor, which have been developed in parallel to these efforts. Those alternatives will be finalized with input from the PAC and then evaluated based on refined criteria established in another memorandum, leading to the selection of the recommended alternative.

Table 7: Comparison of Peak Overall Facility Score

	Mode	AM Peak					PM Peak				
		Existing		Future		Change in Score	Existing		Future		Change in Score
		Score	LOS	Score	LOS		Score	LOS	Score	LOS	
Northbound	Auto*	0.38	E	0.34	E	-0.04	0.35	E	0.33	E	-0.02
	Transit	6.47	F	6.48	F	0.01	6.48	F	6.49	F	0.01
	Bicycle	3.59	D	3.62	D	0.03	3.58	D	3.61	D	0.03
	Pedestrian	3.13	C	3.18	C	0.05	3.18	C	3.24	C	0.06
Southbound	Auto*	0.41	D	0.43	D	0.02	0.34	E	0.32	E	-0.02
	Transit	6.45	F	6.45	F	0.00	6.45	F	6.46	F	0.01
	Bicycle	3.65	D	3.69	D	0.04	3.63	D	3.66	D	0.03
	Pedestrian	2.97	C	3.02	C	0.05	3.00	C	3.05	C	0.05

Note: Auto Mode is scored differently from Transit, Bicycle, and Pedestrian, as discussed in the methodology sections and in the Franklin Feasibility Study Phase II Task 4 Data Collection and Existing Conditions Analysis Memorandum.